DGNB System

DGNB SYSTEM

DISTRICTS CRITERIA SET

Version 2020

DGNB Global Benchmark for Sustainability

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Version: 2020
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Sustainable Development Goals-Icons:
United Nations/globalgoals.org

Preface

Dear planners, building owners and local authorities, auditors, and those interested in the DGNB,

The development of sustainable districts is one of the key tasks of today's urban development. During this time of climate change, scarcity of resources and social division, planners, developers, municipal and institutional builders have a special responsibility. The aim is to create sustainable, liveable districts in which people feel comfortable without affecting the climate and environment.

With its certification system for sustainable districts, the DGNB has been offering a globally recognised planning and optimisation tool since 2012, which helps to implement this kind of holistic sustainability in a targeted, systematic and economic manner. It offers the right answers to our most important questions about the future of planning and construction practices.

The new 2020 version of the system presented here is an important further development of the previous DGNB district certification. All criteria were checked for their topicality, methodology, goal orientation and practical applicability and, where appropriate, adapted. Some elements from the latest version of the building certification were adopted. These include the introduction of bonuses, which have a positive effect on the certification result, and the principle of innovation areas, which allows for greater freedom in planning. The comparison of all criteria with regard to their contribution to achieving the global Sustainable Development Goals of the United Nations is also new.

The core issues addressed by the new 2020 version include climate action, climate adaptation and resilience. In concrete terms, certification supports the development of districts that generate potentially low CO_2 emissions – in planning and construction, as well as in their subsequent use. The city climate and microclimate are considered as are the environmental risks and the associated value retention of a district. Particular focus is dedicated to the promotion of biodiversity. And another focus is mobility: Sustainable transport is strengthened and mobility management strategies for car-free districts are rewarded.

Another central theme is the circular economy, which promotes thinking and acting in cycles in dealing with the resources and land used. In addition, the focus is on people, creating quality spaces people want to spend time in and supporting a good mix in the district. The early, participatory involvement of later users is also strengthened to promote greater acceptance and identification.

For the first time, the system can be used simultaneously for five different district schemes: Urban districts, business districts, commercial areas, event areas, and industrial sites. In addition, the criteria of the district system were more closely coordinated with those of the building certification system in order to offer better synergy opportunities. Among other things, building plus bonuses have been introduced if specific, ambitious sustainability requirements are already imposed on the buildings at district level.

The 2020 version of the DGNB system for districts is the result of an intensive examination of current social and market-specific requirements. We have examined around 200 comments from a commentary phase and included them in the final revision. We would like to thank all those who have participated in making the system even more user-friendly and future-oriented together with us. Thanks are also due to the first users of the new version of the system, who have shown that it can be applied in practice and is a real milestone in the certification of sustainable districts - a global benchmark for sustainability. Last but not least, we would like to thank the DGNB technical committee for its intensive professional exchange and strong, goal-oriented cooperation.

On behalf of the DGNB

Johannes Kreißig
MANAGING DIRECTOR

Dr. Christine Lemaitre
MANAGING DIRECTOR

People are at the centre

We build for ourselves, for the people who spend a large part of their lives in constructed environments. With this in mind, it goes without saying that people's health and happiness should be a focal point when making design and construction decisions. The DGNB has anchored this basic understanding in its system from the very beginning. This basic understanding is consistently continued and increasingly promoted in the current version.

Circular economy

Promoting the conscious use of resources has also been one of DGNB's core issues from the outset. This involves foresight in selecting products with regard to their contents in consideration the application and possible structural changes during use. Later dismantling should also be taken into account as a factor in product selection at the planning stage. For the present version, we have consistently expanded this subject area and anchored it further in the system. With its certification system, the DGNB is thus committed to ensuring that material cycles are available for later reuse or recycling in accordance with the cradle-to-cradle philosophy - through new business models and responsible and forward-looking product development. This makes the DGNB system the first of its kind to make circular economy solutions assessable and measurable at the district level. In order to promote new approaches here, these solutions are rewarded with appropriate bonuses that have a positive effect on the certification result.

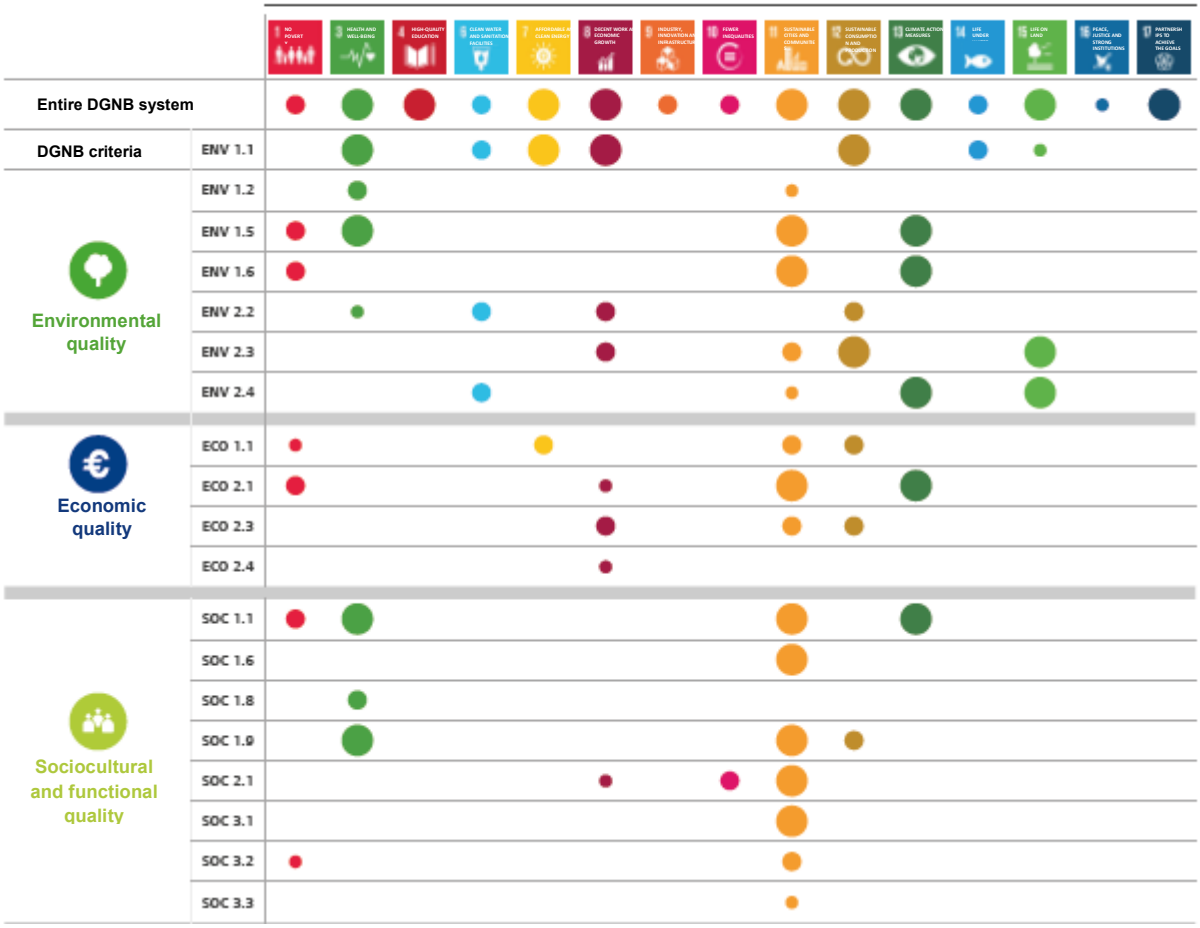
Design quality

The DGNB sees creativity and quality in design and construction as an integral part of sustainable building. In addition to the recommendations for action offered since 2016 by an independent commission for design quality, which are aimed at projects in an early planning phase, we have established our own form of assessment of this partial aspect of sustainability in addition to certification with the "DGNB Diamond" award for buildings. In this version, the consistent further development of the topic in the DGNB system is achieved by addressing topics that look at the contribution made by buildings and open spaces in an urban development context. The planning topics were also given greater relevance in order to promote an integral and holistic form of planning. This includes, for example, rewarding the continuous commissioning of the architectural office that won the competition and the associated specialist planning team.

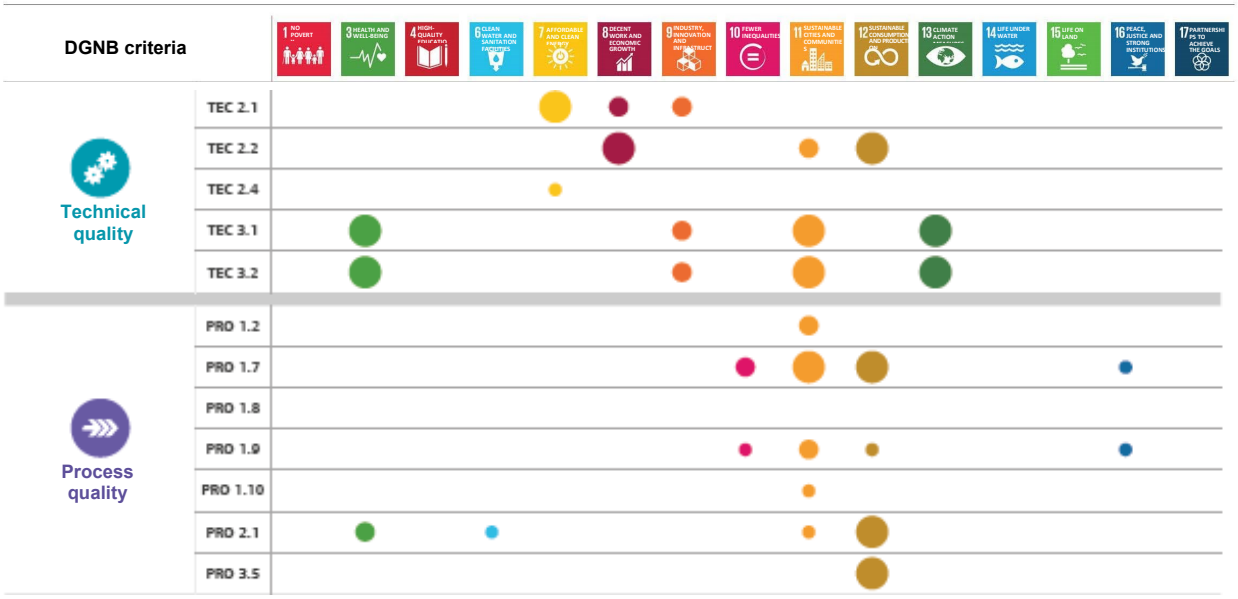
Sustainable Development Goals (SDGs)

With the Sustainable Development Goals (SDGs) as a central element of the Agenda 2030, the United Nations defined concrete goals in 2016 to make the development of the world sensible, to enable long-term rethinking of development and thus to enable life in a sustainable world. The DGNB supports these goals and wants to encourage a concrete positive contribution to their achievement through certification. In order to work out the connection between sustainable construction and the SDGs and to make this transparent, we have checked all the criteria of the present version for their links to the UN goals and have made them accordingly certifiable. As a result, every project that successfully completes DGNB certification will in future receive a statement on the extent to which it has contributed to achieving the SDGs - which also provides a motivation for users and operators to orient themselves towards these goals in their dealings with districts in future. As an additional incentive, we award “Agenda 2030 bonuses” in selected criteria for projects that make a particular contribution to climate action and the implementation of the other UN sustainability goals.

CONTRIBUTION OF THE DGNB SYSTEM TO THE SDGs - Districts



CONTRIBUTION OF THE DGNB SYSTEM TO THE SDGs - Districts



EU conformity

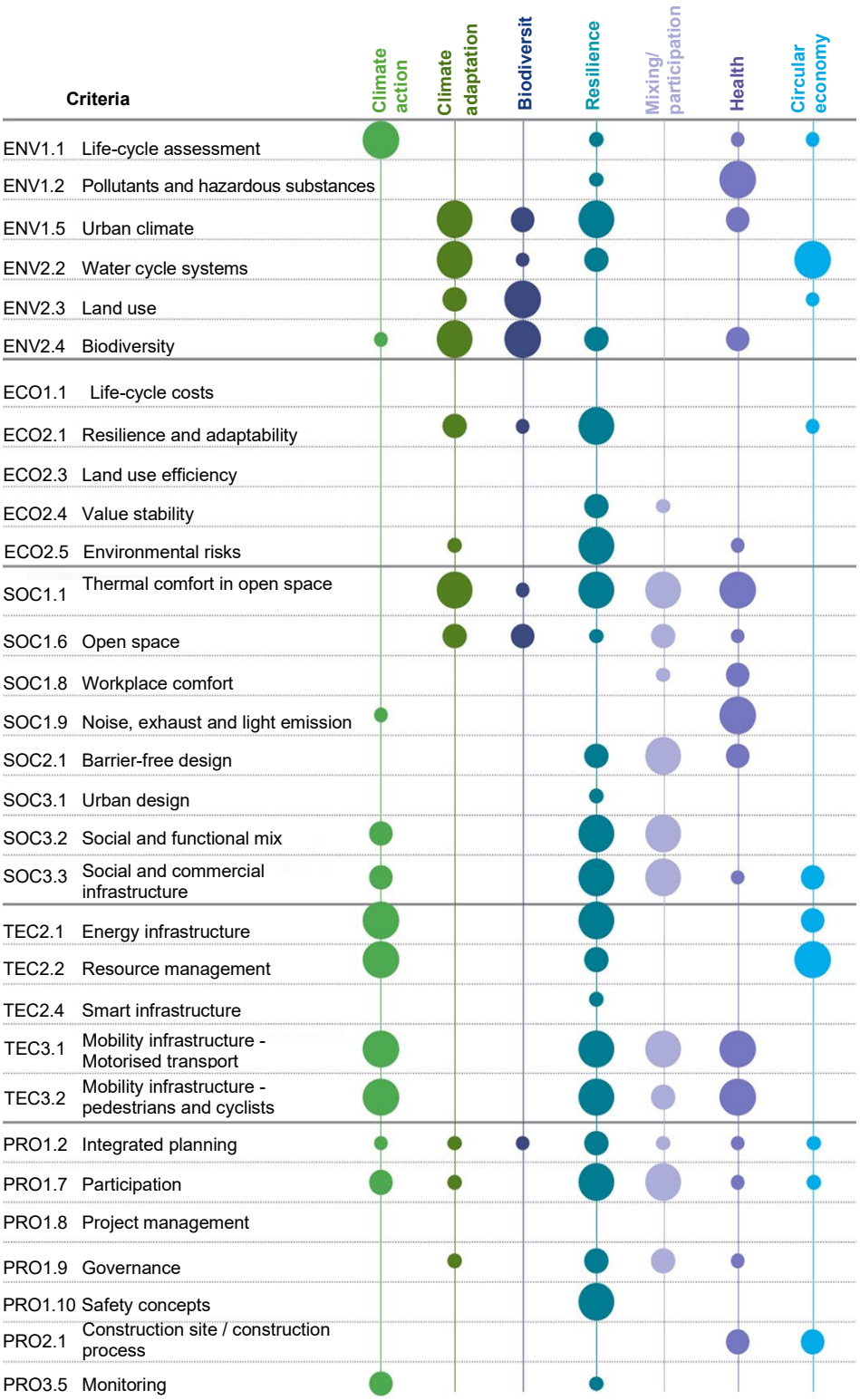
Like no other certification system, the DGNB system and the methods it uses have stood for the European understanding of sustainability since their introduction. One example is the life-cycle assessment of the entire district from production to operation and dismantling, which is anchored in the DGNB system in accordance with EU standards. It is important that the calculated and optimised environmental impacts are evaluated using scientifically defined benchmarks.

Innovation

Sustainability continues to be a topic for the future. And if we look at the buildings and districts of today, we can already see many strong implementations. Nevertheless, the DGNB aims to continue to promote new and courageous projects and approaches in this area. Against this background, a new instrument has been integrated into the criteria in the present version: the innovation areas. These are now in place for numerous criteria, motivating the planners to pursue the best and most sensible solutions for the project. The innovation areas, newly anchored in this form, are also intended to support a planning culture based on an active examination of the requirements of the specific construction task and to contribute to the customisation of projects.

Contribution of the DGNB system to a holistic view of relevant sustainability requirements

In the system, the core issues and other important global challenges, such as climate adaptation and resilience and the decline in biodiversity, are not exclusively considered in individual criteria; rather, the effectiveness of measures is assessed in different criteria to solve these challenges. The following figure shows how these are taken into account in the system.



Structure of the criteria

To further enhance the applicability of the DGNB system, all criteria have been restructured with a view to clarity, readability and user-friendliness. The structure has been designed in such a way that the most relevant aspects for the project decision-makers are foregrounded. The effects that result directly from addressing the respective criterion have been visually highlighted. At the same time, a perspective is given on how the DGNB will further deal with the relevant criterion in the future. More technical contents for documentation within the scope of certification, which are primarily relevant for the auditors, are contained in a separate document. The following figure is an exemplary compilation of various criteria.

Outlook

The requirements for barrier-free access are not expected to become more stringent in the future.

How will the criterion be further developed?

Share of the total score

	SHARE WEIGHTING FACTOR	
City Business	1.7%	2
Event Commercial	1.8%	2
Industry	1.8%	2

Weighting of the criterion in the overall evaluation

EVALUATION

In the criterion, up to 110 evaluation points can be achieved in the evaluation. A maximum of 100 evaluation points can be applied.

How will the objective of the criterion be implemented using the indicators?

NO. INDICATOR POINTS	
1 Share of fallow land City Business Event Industry Commercial	max 45
1.1 Percentage of fallow land City Business Event Industry Commercial	0 - 45
▪ 0 percent -100 percent	0 - 45

Tailored evaluation by project-specific allocation to a points range

Name of the indicators and special features of the evaluation

Depiction for interpolation

2.2	**CIRCULAR ECONOMY BONUS - WASTE AVOIDANCE ON THE CONSTRUCTION SITE** City Business Event Industry Commercial On the construction site, new and to a large extent waste-avoiding concepts, construction methods or technologies are being implemented.	+10

Bonuses for overfulfilment

4.1	**Vehicle sharing** City Business Event Industry Commercial Sharing opportunities exist for motorised vehicles (commercial/private sharing, company vehicles) in the district/ at the location or in the direct vicinity (max. 5 minutes on foot).	max 10
	▪ Vehicle sharing 1	+5
	▪ Vehicle sharing 2	+5

Scheme-specific

Depiction for addition

11.1	**Compatible delivery times for the district** City Business Event Commercial	max 5
	▪ Not defined	0
	▪ Compatible (examination available)	5

Depiction for selection (either/or)

	INNOVATION AREA	as in 2.1
Re 2.1	Explanation: Alternative approaches can also be selected and credited which achieve an optimisation of life-cycle costs.	

Innovation area

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

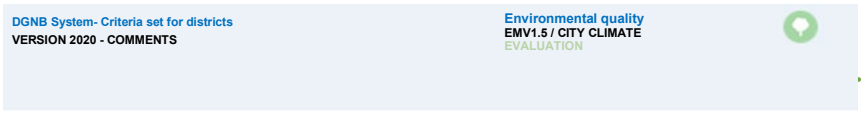
It is possible to communicate the design temperatures, the share of renewable energy from the district and the storage capacities as key figures / KPIs.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Design temperatures heating water/cooling water [°C]	

Building-related key performance indicators for sustainability reporting

Synergies with DGNB system applications

Relation of this criterion to criteria in other DGNB system applications



The blue background indicates all eppendices

APPENDIX A - DETAILED DESCRIPTION

Appendix A: Contains additional explanations on relevance and detailed description of the method

I. Relevance

City **Business** **Event**

The mesoclimate quality of the outdoor spaces is of great importance for well-being and a healthy living environment in the district. Due to global climate change and expected changes in the city climate, the importance of this topic is increasing.

Industry **Commercial**

The mesoclimate quality of the outdoor spaces is of great importance for well-being and a healthy living environment on the factory premises and in the surrounding area. The disadvantages from the development of an industrial sites must be minimised both for the factory premises and for neighbouring districts.

According to the German Federal Building Code, sustainable urban development must be guaranteed by urban land-use planning. This also includes promoting climate action and climate adaptation, as well as ensuring healthy living and working conditions (BauGB § 1 para. 5 and 6). Due to global climate change and the expected changes in the city climate, the importance of this topic is increasing. The objective is therefore: To avoid adverse health effects caused by bioclimatic stress situations and poor air quality, also for the surrounding area. The following areas are relevant in this context (VDI 3787 Part 2 and Urban Climate Guide):
1. City climate analysis of the district
2. Thermal quality of the district surfaces/factory surfaces
3. Ventilation

II. Additional explanation

III. Method

City **Business** **Event** **Industry** **Commercial**

This criterion is used to assess quantitative and qualitative aspects of the city climate. Measures that improve the microclimatic comfort (heat, ventilation) in the district are evaluated positively based on the following indicators:

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

Appendix B: Defines all documentation required for certification

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 5 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation with **relevant records/documents/expert opinions:** - B1: Presentation of the immission situation in relation to legally prescribed limit values; presentation of planning measures that result in improvements, deterioration or no change compared to the initial situation; air quality expert opinion - B2: Noise map (additionally aircraft noise map) - B3: Documentation based on measurements - B4: Documentation of the lighting concept; documentation of all lighting systems realised by means of data sheets	B
Photo documentation of the implemented sound insulation measures	C
Site plan with marking of implemented measures	D
Master tool calculation noise	J

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Share of fallow land	C, E, J	C, E, J	C, E, J	C, E, J	C, E, J
2. Area integration	C, E, J	C, E, J	C, E, J	C, E, J	C, E, J
3. Area contamination	A, B, E, J	B, E, J	B, E, J	B, E, J	B, E, J
4. Soil sealing factor	A, C, E, J	C, E, J	C, E, J	C, E, J	C, E, J

Appendix B:
Classifies the documentation according to phases and schemes

APPENDIX C - BIBLIOGRAPHY

I. Version

Change log based on version 2018

PAGE	EXPLANATION	DATE

Appendix C:
Contains information on any changes in the criterion and versions of the criterion

II. Bibliography

- Centre for Renewable Energy Sources (C. R. E. S.), Department for Buildings (Ed.): RUROS Rediscovering the Urban Realm and Open Spaces, EU research and development project in the 5th Framework Programme Research Framework Programme, “Energy, Environment and Sustainable Development”, 2004.
- Biotopflächenfaktor der Stadt Berlin (URL:http://wvA7.stadtentwicklungberlin.de/umwelülandschaftsplanung/bff/).
- Mathey, J. et al.: Noch wärmer, noch trockener? Stadtnatur und Freiraumstrukturen im Klimawandel. In: Naturschutz und Biologische Vielfalt, Vol. 111, Bonn-Bad Godesberg: Bundesamt für Naturschutz, 2011.

List of criteria that make people a focal point

CRITERION	CRITERION NAME	OBJECTIVE AND KEY STATEMENT
ENV1.2	**Pollutants and hazardous substances**	The aim is to reduce, avoid or substitute all hazardous or harmful materials, (construction) products, as well as preparations that can affect humans, flora and fauna or cause damage in the short, medium and/or long term.
ENV1.5	**Urban climate**	The urban climate quality of outdoor spaces is of great importance for well-being and a healthy living environment in the district. This can result in advantages for companies, municipalities and/or users.
ECO2.1	**Resilience and adaptability**	Due to the flexibility or redundancy of their systems, resilient cities are resistant to technical, environmental and economic partial failures or disruptions and thus offer robust conditions for long-term human settlement.
ECO2.5	**Environmental risks**	People should be protected from natural disasters or their effects should be minimised to avoid physical and financial damage.
SOC1.1	**Thermal comfort in open space**	The (thermal) comfort in public spaces is of great importance for daily and seasonal use and attractiveness. High microclimatic and bioclimatic quality promotes a healthy living environment and the well-being of the users of the district.
SOC1.6	**Open space**	The objective is to satisfy the need for recreation, leisure, enjoyment of nature, exchange and interaction by providing high-quality open spaces within walking distance.
SOC1.8	**Workplace comfort**	The satisfaction of employees with their physical environmental conditions, such as thermal quality, indoor air quality and visual and acoustic comfort, depends largely on the quality of the workplace provided.

CRITERION	CRITERION NAME	OBJECTIVE AND KEY STATEMENT
SOC1.9	**Noise, exhaust and light emissions**	The objective is to reduce the effects of noise and light on people and to ensure clean air.
SOC2.1	**Barrier-free design**	All people should be able to use buildings equally, regardless of their individual physical capabilities.
SOC3.1	**Urban design**	The users of buildings should be offered various ways of spending time, both inside and outside, in order to increase their well-being and health and to strengthen social cooperation and exchange among themselves.
SOC3.2	**Social and functional mix**	A balanced mix creates resilient socio-cultural and functional structures. And these promote synergies between the users/residents.
SOC3.3	**Social and commercial infrastructure**	The users of a district should have the opportunity to satisfy their needs for recreation, care, education etc. within their surroundings (“city of short distances”).
TEC3.1	**Mobility infrastructure – Motorised transportation**	The availability of different modes of transport and their time- and comfort-optimised networking are an important part of the human environment in terms of sustainable mobility.
TEC3.2	**Mobility infrastructure - pedestrians and cyclists**	Sustainable mobility can be further promoted through special measures and conditions in cycling and pedestrian traffic. And these form important components in human interaction.
PRO1.7	**Participation**	Participation as a procedure for turning interested and affected parties into stakeholders is a basic element of a project's sustainability.
PRO1.9	**Governance**	The aim is to develop control and organisational structures that make sustainable development transparent for people.
PRO2.1	**Construction site/construction process**	It is necessary to sensitise and train the construction workers on the construction sites with regard to the impact on people.

List of criteria with innovation areas

CRITERION	CRITERION NAME	OBJECTIVE AND KEY STATEMENT
ECO1.1	**Life-cycle costs**	Life-cycle cost optimisation accompanying planning: Alternative approaches can also be selected and credited that achieve an optimisation of life-cycle costs.
SOC3.1	**Urban design**	Impulse/attractor: If extraordinary impulses are given to the district/site that are achieved outside the defined aspects, these can also be credited. These may include architectural or constructional innovations.
TEC3.1	**Mobility infrastructure – motorised transportation**	Sustainable mobility: Alternative documentation: If measures are implemented that demonstrably contribute to encouraging users of the district to make extensive and frequent use of the sustainable transport (public transport, rental systems, car pools) to reach the district, these can also be evaluated positively in accordance with the formulation of the objective of the criterion and the evaluation of the other indicators. This is also possible in the area of MIT with alternative drive technologies (alternatives to petrol/diesel).
PRO1.10	**Safety concepts**	Safety measures that cannot be assigned to the above categories or measures, but which demonstrably increase the sense of safety and protection, can also be credited.
PRO2.1	**Construction site/construction process**	Novel concepts, processes and technologies for a significant reduction of noise or dust pollution for construction site workers and the environment can alternatively be credited.
PRO2.1	**Construction site/ construction process**	Environmental protection and nature conservation: Supplementary or alternative measurements, as well as other quality assurance measures can be evaluated alternatively, if they are not prescribed by law or authorities or are common practice, but document the high quality of the construction measures.

List of criteria with circular economy bonuses

CRITERION	CRITERION NAME	CONTRIBUTION TO CIRCULAR ECONOMY	EVALUATION
ENV2.2	**Water cycle systems**	Reuse of process water: If more than 50% of the process water used in production is kept in circulation via treatment/recycling, points can be credited for each additional 5%.	CE Bonus: +10 points
ENV2.2	**Water cycle systems**	Reuse of black water: Black water is collected separately by circulation systems in the district and treated decentrally and is available for further use in the district, e.g. for irrigating green spaces and food crops, nutrient use (terra preta plants, composting), energy use (biogas factory) etc.	CE Bonus: +10 points
ECO2.1	**Resilience and adaptability**	Deconstruction-friendly building construction: A binding dismantling concept has been drawn up for at least half of the buildings in the district. Alternative: Two points can be awarded for each DGNB-certified building in the district that has achieved at least a performance index of 50 percent for the criterion “TEC1.6 Ease of recovery and recycling” (Scheme for new buildings).	CE Bonus: +10 points
SOC3.3	**Social and commercial infrastructure**	Offers for daily care and exchange: Crediting of bonus points if previously unconventional measures are made for district users or external parties to provide services and are structurally implemented or planned, such as the promotion of neighbourly exchange of services (temporary trading areas, repair cafés, district meeting places or similar).	CE Bonus: +10 points

CRITERION	CRITERION NAME	CONTRIBUTION TO CIRCULAR ECONOMY	EVALUATION
TEC2.2	**Resource management**	Reuse or materials recycling: Special measures for waste avoidance/reduction of non-recyclable waste have been implemented which have had a demonstrable effect (e.g. substituting hazardous substances, process to promote uniformity of packaging, no landfilling of production waste, new disposal routes, waste management audit for relevant waste streams).	CE Bonus: +10 points
TEC2.2	**Resource management**	Urban mining: Recording of recyclable materials used in the district with the aim of reusing them at the end of the life of the respective building component.	CE Bonus: +10 points
PRO2.1	**Construction site/construction processes**	Avoiding waste on the construction site: On the construction site, novel, waste-avoiding concepts, construction methods or technologies are implemented to a considerable extent.	CE Bonus: +10 points

Note:

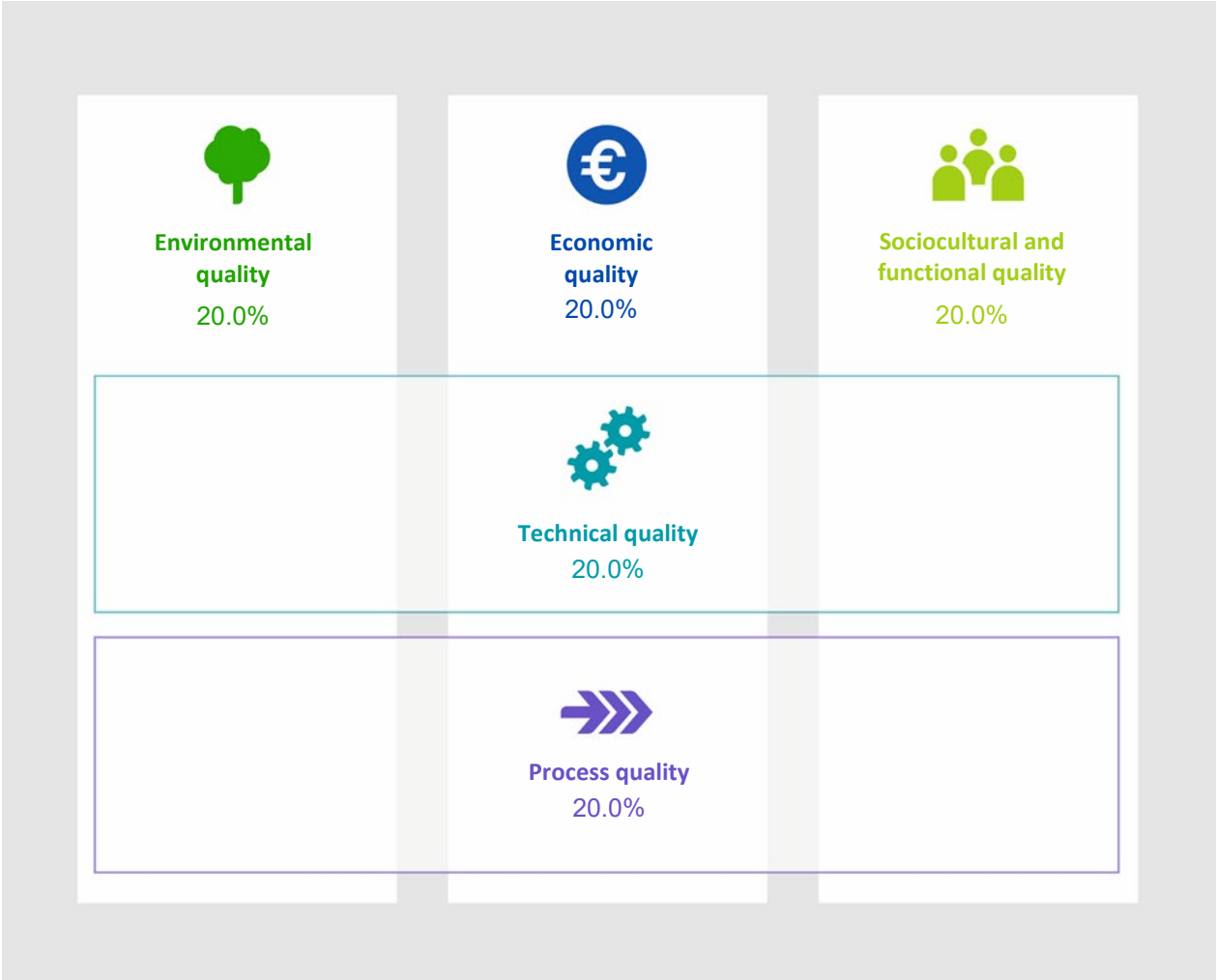
The contribution to the circular economy, which is made in criterion ENV1.1 “Life-cycle assessment” by the provision of surplus energy or by the reuse of components, is recorded by the indicator “Life-cycle comparison calculation” and is included in the evaluation. The contribution to the circular economy is thus fully reflected in this indicator.

List of criteria with Agenda 2030 bonuses

CRITERION	CRITERION NAME	CONTRIBUTION TO AGENDA 2030 OBJECTIVES	EVALUATION
ENV1.1	**Life-cycle assessment**	Carbon neutral energy demand: The CO_2 emissions of the building-related energy demand (legally defined framework of the Energy Saving Regulation) are at least covered in a carbon-neutral way according to the DGNB definition for the determination of carbon neutrality.	Agenda 2030 bonus: +14 points
ENV1.1	**Life-cycle assessment**	Carbon-neutral energy demand users: The CO_2 emissions of the energy consumption-related activities of the users in the district and processes at the site are at least covered in a climate-neutral manner in accordance with the DGNB definition for determining carbon-neutrality.	Agenda 2030 bonus: +14 points
ENV1.1	**Life-cycle assessment**	Halogenated hydrocarbons in refrigerants: No use of refrigerants with a GWP-factor ≥ 150 kg CO_2-equiv.	Agenda 2030 bonus: +2 points
ENV1.5	**–Urban climate**	Climate adaptation strategy at district level: A climate adaptation strategy specifically for the district is available for the planning area.	Agenda 2030 bonus: +20 points
ENV2.4	**Biodiversity**	Climate and species protection goals: Bonus points for exceeding the benchmark.	Agenda 2030 bonus: +10 points
TEC2.1	**Energy infrastructure**	Vehicle to grid: Equipment for bidirectional charging and discharging of electric vehicles is available.	Agenda 2030 bonus: +10 points
TEC2.1	**Energy infrastructure**	Use of the facade surfaces: Percentage of buildings where the facade surfaces are used for energy purposes.	Agenda 2030 bonus: +10 points

CRITERION	CRITERION NAME	CONTRIBUTION TO AGENDA 2030 OBJECTIVES	EVALUATION
TEC3.1	**Mobility infrastructure – motorised transportation**	No car parking spaces: A mobility management strategy that dispenses with motorised private transport has been fully implemented.	Agenda 2030 bonus: +10 points
TEC3.1	**Mobility infrastructure – motorised transportation**	Climate-neutral logistics: There is a concept for reducing CO_2 emissions caused by logistics, and measures for the logistics within the district/location have been implemented.	Agenda 2030 bonus: +10 points For **Industry**: + 20 points

Basic structure of the DGNB system



The sustainability concept of the DGNB system is broadly defined and extends beyond the familiar three-pillar model. It consistently considers all essential aspects of sustainable building. These cover the five subject areas of environment, economy, sociocultural and functional aspects, technology and processes.

All topics are equally weighted in the evaluation. This makes the DGNB system the only system in international comparison that attaches as much importance to the economic aspect of sustainable construction as to environmental and social criteria. The evaluations are always based on the entire life-cycle of a district.

Overview of the criteria

TOPIC	CRITERIA GROUP	CRITERIA NAME
ENVIRONMENTAL QUALITY (ENV)	EFFECTS ON GLOBAL AND LOCAL ENVIRONMENT (ENV1)	**ENV1.1** Life-cycle assessment
		ENV1.2 Pollutants and hazardous substances
		ENV1.5 Urban climate
	RESOURCE CONSUMPTION (ENV2)	**ENV2.2** Water cycle systems
		ENV2.3 Land use
		ENV2.4 Biodiversity
ECONOMIC QUALITY (ECO)	LIFE-CYCLE COSTS (ECO1)	**ECO1.1** Life-cycle costs
	ECONOMIC DEVELOPMENT (ECO2)	**ECO2.1** Resilience and adaptability
		ECO2.3 Land Use efficiency
		ECO2.4 Value stability
		ECO2.5 Environmental risks
SOCIOCULTURAL AND FUNCTIONAL QUALITY (SOC)	HEALTH, COMFORT AND USER SATISFACTION (SOC1)	**SOC1.1** Thermal comfort in open space
		SOC1.6 Open space
		SOC1.8 Workplace comfort
		SOC1.9 Noise, exhaust and light emission
	FUNCTIONALITY (SOC2)	**SOC2.1** Barrier-free design
	SOCIOCULTURAL QUALITY (SOC3)	**SOC3.1** Urban design
		SOC3.2 Social and functional mix
		SOC3.3 Social and commercial infrastructure

TOPIC	CRITERIA GROUP	CRITERIA NAME
 TECHNICAL QUALITY (TEC)	TECHNICAL INFRASTRUCTURE (TEC2)	**TEC2.1** Energy infrastructure
		TEC2.2 Resource management
		TEC2.4 Smart infrastructure
	MOBILITY (TEC3)	**TEC3.1** Mobility infrastructure - Motorised transportation
		TEC3.2 Mobility infrastructure - pedestrians and cyclists
 PROCESS QUALITY (PRO)	PLANNING QUALITY (PRO1)	**PRO1.2** Integrated planning
		PRO1.7 Participation
		PRO1.8 Project management
		PRO1.9 Governance
		PRO1.10 Safety concepts
	CONSTRUCTION QUALITY (PRO2)	**PRO2.1** Construction site/construction process
	QUALITY ASSURANCE IN THE USE PHASE (PRO3)	**PRO3.5** Quality assurance and monitoring

Weighting of the criteria

TOPIC	CRITERIA GROUP	CRITERION	URBAN DISTRICTS		BUSINESS DISTRICTS		EVENT AREAS		COMMERCIAL AREAS		INDUSTRIAL SITES	
ENVIRONMENTAL QUALITY (ENV)	EFFECTS ON GLOBAL AND LOCAL ENVIRONMENT (ENV1)	ENV1.1	8	6.4%	8	6.2%	10	6.5%	9	5.8%		
		ENV1.2	-	-	-	-	-	-	4	2.6%		
		ENV1.5	5	4.0%	5	3.8%	7	4.5%	4	2.6%		
	RESOURCE USE AND WASTE GENERATION (ENV2)	ENV2.2	4	3.2%	5	3.8%	5	3.2%	5	3.2%		
		ENV2.3	4	3.2%	4	3.1%	5	3.2%	4	2.6%		
		ENV2.4	4	3.2%	4	3.1%	4	2.6%	5	3.2%		
ECONOMIC QUALITY (ECO)	LIFE-CYCLE COSTS (ECO1)	ECO1.1	4	5.7%	4	6.7%	3	5.0%	4	5.0%		
	ECONOMIC DEVELOPMENT (ECO2)	ECO2.1	3	4.3%	3	5.0%	3	5.0%	4	5.0%		
		ECO2.3	3	4.3%	3	5.0%	2	3.3%	3	3.8%		
		ECO2.4	2	2.9%	-	-	2	3.3%	3	3.8%		
		ECO2.5	2	2.9%	2	3.3%	2	3.3%	2	2.5%		
SOCIOCULTURAL AND FUNCTIONAL QUALITY (SOC)	HEALTH, COMFORT AND USER SATISFACTION (SOC1)	SOC1.1	3	2.6%	3	2.6%	2	1.8%	3	2.7%		
		SOC1.6	4	3.5%	4	3.5%	4	3.6%	3	2.7%		
		SOC1.8	-	-	-	-	-	-	3	2.7%		
		SOC1.9	3	2.6%	3	2.6%	3	2.7%	3	2.7%		
	FUNCTIONALITY (SOC2)	SOC2.1	3	2.6%	3	2.6%	2	1.8%	3	2.7%		
	SOCIOCULTURAL QUALITY (SOC3)	SOC3.1	3	2.6%	3	2.6%	3	2.7%	4	3.6%		
		SOC3.2	4	3.5%	4	3.5%	5	4.5%	-	-		
		SOC3.3	3	2.6%	3	2.6%	3	2.7%	3	2.7%		

Relevance factor
Share of the total score

TOPIC	CRITERIA GROUP	CRITERION	URBAN DISTRICTS	BUSINESS DISTRICTS	EVENT AREAS		COMMERCIAL AREAS		INDUSTRIAL SITES	
TECHNICAL QUALITY (TEC)	TECHNICAL INFRASTRUCTURE (TEC2)	TEC2.1	4	4.4%	4	4.7%	5	5.3%	5	5.6%
		TEC2.2	2	2.2%	2	2.4%	3	3.2%	3	3.3%
		TEC2.4	2	2.2%	2	2.4%	3	3.2%	3	3.3%
	MOBILITY (TEC3)	TEC3.1	5	5.6%	5	5.9%	4	4.2%	4	4.4%
		TEC3.2	5	5.6%	4	4.7%	4	4.2%	3	3.3%
PROCESS QUALITY (PRO)	PLANNING QUALITY (PRO1)	PRO1.2	3	5.0%	3	4.0%	2	3.3%	3	5.5%
		PRO1.7	2	3.3%	2	2.7%	3	5.0%	3	5.5%
		PRO1.8	2	3.3%	2	2.7%	2	3.3%	-	-
		PRO1.9	2	3.3%	2	2.7%	2	3.3%	-	-
		PRO1.10	-	-	2	2.7%	-	-	-	-
	QUALITY IN THE USE PHASE (PRO3)	PRO2.1	1	1.7%	2	2.7%	1	1.7%	2	3.6%
		PRO3.5	2	3.3%	2	2.7%	2	3.3%	3	5.5%

Relevance factor
Share of the total score

The DGNB logic of the award

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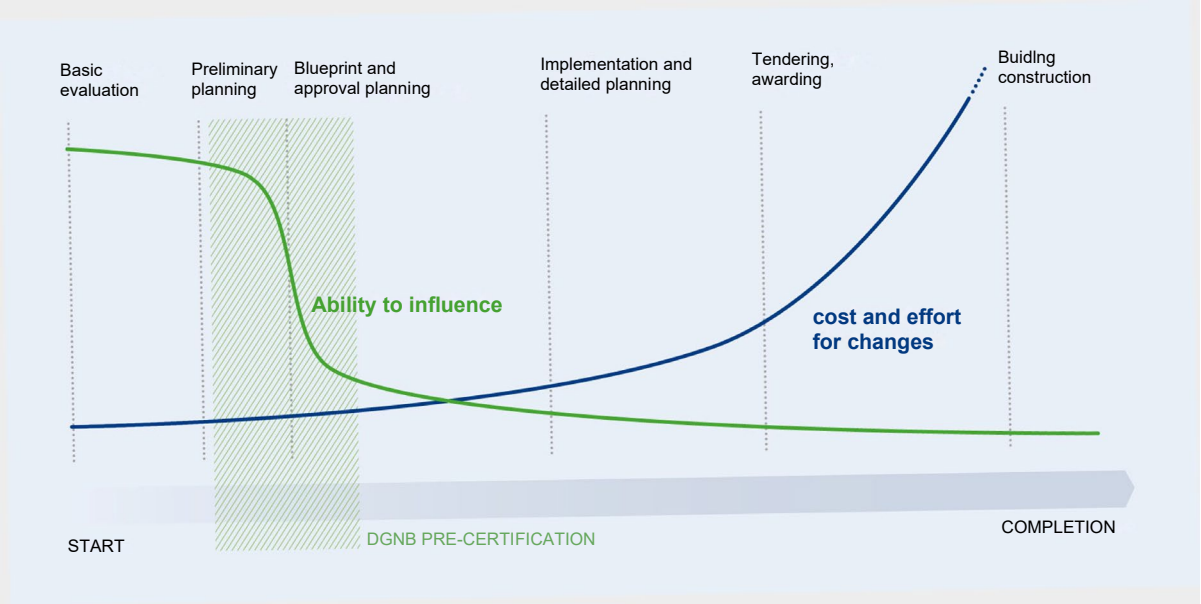
	PLATINUM	GOLD	SILVER
Totalperformance index	from 80%	from 65%	from 50%
Minimum performance index	65%	50%	35%

The DGNB system uses performance indices to grade buildings. The overall performance index is calculated from the five topic areas according to their weighting. The highest DGNB award is the platinum certificate

From an overall performance index of 50% and above, the district or industrial site receives the silver DGNB certificate. The DGNB certificate in gold is awarded for a performance index of 65% and above. For a DGNB certificate in platinum, the project must achieve an overall performance index of at least 80%.

The DGNB is committed to encourage high quality standard in every topic of the district. Therefore, the certificate is not based onthe total performance index alone.. The performance index must also reach a minimum performance index in the result-relevant topic areas in order to receive the respective award. For platinum, for example, a performance index of at least 65% in the first five topics is required. A performance index of at least 50% is a prerequisite for a gold certificate. For silver, the performance index must be 35% per topic area.

DGNB pre-certificate



DGNB's aim is to anchor certification at an early stage in the planning process.

The current fee schedule and more detailed information on pre-certification can be found on the DGNB website.

General principles

Evaluation points

The DGNB has defined target values for each criterion. Evaluation points are awarded achieving the targets. Some criteria are weighted differently based on the scheme, depending on the importance a criterion has for a particular scheme.

Key to how the evaluation is presented

The maximum achievable score is given for each indicator, whereby the presentation differs as follows when interpolation, addition or selection is possible:

- **Presentation with the possibility of addition:**

3 Retention or throttling of rainwater
City Business Event Industry Commercial **max. 20**

3.1 **Rainwater retention**
City Business Event Industry Commercial **max. 20**
- Rainwater retention in the district. +10
- Rainwater retention outside the district. +10

- **Presentation with the possibility of interpolation:**

4 Open spaces - Accessibility of public open spaces / open spaces in location (outside the project area)
City Business Commercial **max. 10**

4.1 Open space factor
City Business Commercial **0 - 10**
- 0 - 100 percent 0 -10

- **Presentation with the possibility of selection (either/or):**

3.1 **Consideration of the ventilation potential**
City Business Event Industry Commercial **max. 15**
- There is proven planning optimisation with a documentation of the planning approach and a corresponding argumentation based on a climate function map. 7.5
- The cold-air producing areas and discharges were identified by means of a digital city model (DGM) and the land use of the city, and documentation was provided that this ventilation is not disturbed by the new district. 15

- **Overfulfilment through bonus points**
  In some criteria additional points via circular economy bonus points or Agenda 2030 bonus points are available, which can lead to overfulfilment within the criterion. These additional points can only be credited within a main criteria group / subject area and cannot be transferred to other qualities. An overview of all bonus points is included in the preface.

Scheme-specific information

The system is based on the schemes for urban districts (**City**), business districts (**Business**), event areas (**Event**), industrial sites (**Industry**) and commercial areas (**Commercial**).

Definition of the schemes

City **Business** **Event** **Commercial**

The **district profile supplements the building systems** in accordance with the DGNB principles. It looks in particular at the **area between the buildings**, **the infrastructure** and the **district location**. In the following and in the individual criteria, the "**event area**" is equated with "**district**". These factors have a decisive influence on the quality of a district and define the framework for the sustainable development of the buildings. **Higher-level concepts** are also considered - for example, for dealing with energy, water and waste. The buildings themselves do not have to be certified for a district certification and are only included in the evaluation with base values.

- The schemes for city/business districts, event areas and commercial areas version 2020 evaluate in particular the **infrastructure and public spaces** in the district.
- The **allocation** to the scheme is generally carried out nationally in accordance with the **Building Utilisation Ordinance (BauNVO)**. Projects with multiple area uses, special construction areas and projects abroad are allocated on the basis of the auditor's proposal and in consultation with DGNB.
- The buildings are included through underlying base values. The surroundings are also taken into account in the evaluation to some degree.
- There is no **deadline** for the completion date of the project.

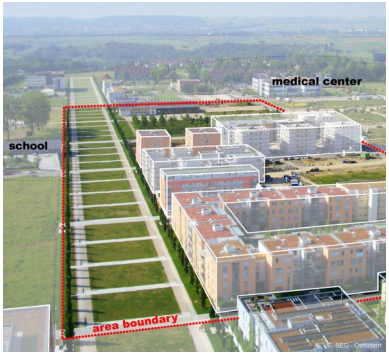


FIGURE 1 Area of consideration of the DGNB scheme (exemplary, © SEG-Ostfildern)

Industry

In contrast to the other DGNB schemes for districts, the scheme for industrial sites also evaluates the qualities of the buildings (including workplace comfort, pollutants, etc.). However, the buildings themselves do not have to be individually certified for site certification. **Certification is possible for existing, newly planned industrial sites** (or a combination of both).

- The "industrial sites" (IS) scheme concerns **newly constructed, planned and existing sites**.
- The "industrial sites" (IS) scheme evaluates in particular the **infrastructure and open spaces** in the planning area.
- The buildings are mainly included through underlying base values. The surroundings are also taken into account in the evaluation to some degree.
- There is no **age limit** for the completion date of the site.

District boundaries

City **Business** **Event** **Industry** **Commercial**

- In principle, the district should correspond to the boundaries of the **urban development plan** (phase 1) or the boundaries of the land-use plan (phases 2 + 3).
- **All areas within the district boundaries** must be evaluated. If a property owner refuses certification or has legal grounds for opposing it, an application can be made to the DGNB office for an exemption from the district boundaries.
- If public **roads** adjoin the district and open up the district, then, in contrast to the B plan, **one lane** is included in the consideration.
- If there are **water areas** adjacent to the district, a **five-metre wide strip** of these should be included in the evaluation. Internal water areas enclosed by the district are part of the district.
- The auditor determines the district or planning area to be evaluated a single time for project registration, in coordination with the client. It is not possible to change the certification boundary after the project application.
- For districts with a gross site area area of more than 10 hectares (50 hectares for **Industry**), it is possible, in consultation with the DGNB office, to carry out phases 2 + 3 (for the **Industry** certificate) of the certification process in smaller sub-sections, provided that these sections alone meet all the requirements of the respective DGNB scheme for districts.
  For **Industry**: In principle, the boundary for certification should be delimited along the **property or parcel boundaries**. The course of the factory fence and the entrances should be shown in the boundary plan. If there are areas/buildings outside of the factory premises which are directly connected to the site (e.g. canteen, museum), the boundary can be extended by this area. **The boundary must be agreed with the DGNB office at the beginning of the (pre-)certification** process.

Exceptions (e.g. regarding external development and open spaces) from the district boundary according to the boundaries of the urban development plan, the B plan and ownership structures must be agreed with the DGNB office. They will be approved in duly substantiated individual cases.

Admission requirement

City **Business** **Event** **Industry** **Commercial**

- The minimum size of a city/business district, event area, commercial area and industrial site (hereinafter referred to as “district”) is approx. 2 hectares of gross site area (GSA).
- The district consists of several buildings and at least 2 building plots and has public or publicly accessible rooms and corresponding infrastructure.
- For **City**: The residential share (measured by the GFA_{DGNB}) should be between 10 and 90 percent. In inner-city areas with complementary structures, the proportion of residential space can also be higher.
- For **Industry**: This is a site used primarily for industry where there is a natural or legal person who is responsible for the site.
- For **Commercial**: The commercial area has a differentiated usage structure. At least two uses for two hectares.
- At all stages of certification, the client is responsible for ensuring that there is no objection from the owners to the certification. This regulation refers to private plots of land in the district or plots of land belonging to the public authorities which do not serve the general public.
- Furthermore, the following minimum requirements apply within the criteria:

TABLE 1 DGNB minimum requirements

SUBJECT AREA	CRITERION	MINIMUM REQUIREMENT	DESCRIPTION
Nature conservation	ENV2.4 Biodiversity	10 points	Indicator 2: Targeted measures for the active introduction of new and native species **City** **Business** **Event** **Industry** **Commercial**
Climate	ENV1.5 Urban climate	15 points	Indicator 1: Urban climate analysis of the district **City** **Business** **Event** **Industry** **Commercial**
Social issues	SOC3.3 Social and commercial infrastructure	5 points 5 points	Education **City** **Business** Local supply **City** **Business** **Commercial**
Process	PRO1.7 Participation	15 points	Indicators 1-4 to ensure minimum participation of residents **City** **Business** **Event** **Commercial**

Phase delimitation

For **City** **Business** **Commercial** **Event**: The development of urban districts extends over a long period of time, during which the owners often change. Therefore, between a pre-certificate (phase 1), at the level of an urban development plan, a certificate for planning/development (phase 2) is introduced, for which at least the statutory resolution for the land-use plan must be present and at least 25% of the development must be completed. Alternatively, in phase 2 the execution quality can be contractually secured in accordance with the minimum requirements of DGNB. The final step is the certificate for the district that is at least 75% completed (Phase 3). The pre-certificate is valid for 3 years, the certificate for planning/development for 5 years. The certificate for the district remains valid indefinitely (see Figure 3).

FIGURE 3 Phase delimitation of the district profile

For **Industry**: The development of industrial sites takes place over a shorter period of time compared to urban districts. A distinction is therefore made between a pre-certificate, at the level of a master plan or site development plan, and a certificate for a site that is at least 75% completed. The pre-certificate is valid for 3 years and the certificate for 5 years. The site must be recertified every 5 years.

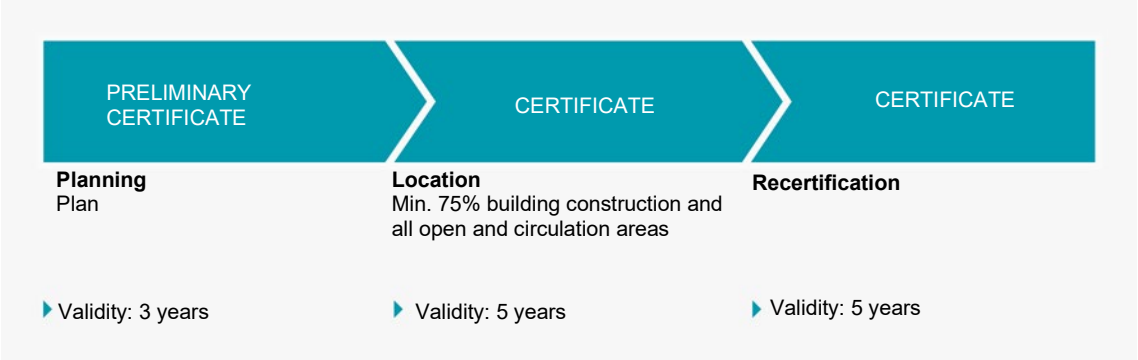


FIGURE 4 Evaluation levels of the utilisation profile Industrial sites

Pre-certificate (Phase 1): Plan

For **City** **Business** **Event** **Commercial**: There must be an **urban development plan** that is oriented in type and scope to the informational sheet 51 of the Chamber of Architects of Baden-Württemberg (urban development plan as informal planning according to § 42 HOAI). Additional requirements for these are described in Appendix 1 (documentation to be submitted) and in the "required documentation" at the end of each criterion.

For **Industry**: A **master plan** or equivalent documents must be available, which contain the following content (additional requirements for the master plan are described in the part "documents to be submitted" and the part "required documentation" for each individual criterion):

- Definition and coordination of a mission statement or the planning programme
- Use concept: Presentation of the different uses according to their nature and identification of specific locations
- Structural / spatial concept: Presentation of the building structures, their height development and roof design, important urban space edges, division of the plots and their development
- Open space concept: Representation of public and private areas and spatial sequences
- Transport concept: Presentation of public and private transport facilities and modes of transport
- Environmental concept: Evaluation of the power requirements for an environmental concept
- Comments: Description of the preliminary planning with explanatory sketches if necessary and characteristic data of the preliminary planning

Validity **City** **Business** **Event** **Industry** **Commercial**: Pre-certificates during phase 1 lose their validity 3 years after issue and must be resubmitted and updated if necessary.

Certificate (Phase 2): Development

City **Business** **Event** **Commercial**

To enable registration of a project for certification (phase 2), the following requirements must be met in addition to the requirements for pre-certification (phase 1):

- **At least one resolution** must be available for the **land-use plan**. In exceptional cases, the so-called planning maturity according to § 33 BauGB, which is reached with the plan resolution for the L Plan, is sufficient. This must be coordinated with the DGNB office.
- In addition to the stipulations in the land-use plan, it must be demonstrated that at least **25 % of the internal development areas** have been completed, calculated as a m² proportion of the finished area. All publicly accessible areas (traffic areas, green and open spaces) are considered as development areas. If subordinate measures within the 25 % are not completed, this must be justified by the construction process. (For example, the surface layer of the road or the light sources in the street lamps may still be missing. Only the completion of the substructure of the road or the absence of all street lamps is not permitted. It is also possible to evaluate completed parks if the seeds have not yet sprouted and the park is therefore closed. However, green spaces with missing modelling or without paths are not evaluated.)
  Alternatively, all execution qualities and all additional measures used for the evaluation must be agreed in writing.
- In order to be able to check the individual criteria, submission of an adapted **plan of the urban development plan** in addition to the (established) land-use plan and any building permits is recommended. This should represent all aspects of the **environment** relevant for the evaluation.

- Contracts to prove the development quality as an alternative to the documentation of the construction work in phase 2: The essential qualities of the development, infrastructure and open spaces are to be secured by means of urban development contracts, development contracts and purchase contracts or other legally binding agreements. The objectives and level of detail of the contracts will depend on the respective project evaluation for the certification. The following issues are to be regulated there:
  - Building materials
  - Lighting
  - Technical infrastructure with all supply and disposal facilities (local heating network, heating centre, sewage networks, decentralised sewage treatment, rainwater management, media development etc.)
  - Water body structure
  - Soil sealing factor
  - Remediation of contaminated sites and explosive ordnance disposal
  - Implementation measures environmental report
  - Planting
  - Compensation measures for environmental impacts
  - Earth mass management
  - Food cultivation areas in public spaces
  - Place and open space design
  - Noise protection measures
  - Measures for barrier-free development
  - Statements on the conservation of existing structures (roads, trees and other identity-creating elements)
  - Statements on traffic infrastructure (stops, parking spaces, footpaths and cycle paths, bicycle stands, e-charging stations etc.)
  - Construction process development

Validity: Certificates during phase 2 lose their validity 5 years after issue and must be resubmitted and updated if necessary.

Certificate (Phase 3): District

City **Business** **Event** **Industry** **Commercial**

To be able to apply for the certificate, 75% **of the building construction** must be completed and the following requirements must be met:

- **At least 75% of both the open spaces and traffic areas** and the **GFA_{DGNB}** (building construction) of all above-ground floors and main underground usable space (e.g. retail, granny flats) of the district must be completed. Subordinate ancillary facilities (e.g. private carports, bicycle sheds, garbage rooms, garden and equipment sheds) are not taken into account.
- In order to be able to check the individual criteria, it is recommended to submit an adapted **plan of the urban development plan or cadastral plan**, which also represents the **district's surroundings**.

Validity: Phase 3 certificates are marked with the year of certificate issue and are valid for an unlimited period of time for city/business districts, event areas and commercial areas. For industrial sites, the validity of the certificate is limited to five years. Re-certification is then required.

Delimitation of new construction / existing industrial sites

In some cases, a distinction is made in the evaluation of the individual criteria as to whether it is a completely new location, an existing location (possibly new construction < 2000 sqm GFA) or a mixed form. Depending on the categorisation of the location, different criteria or indicators are evaluated. The basic rule is:

Unless otherwise stated in the criterion, buildings or open spaces are considered to be “existing” if they are more than 3 years old, relative to the date of submission for the first compliance check. Which criteria / indicators can only be applied for the existing construction, only for the new construction or both is defined in the individual criteria. As with the DGNB system for existing buildings, consumption data only needs to be collected for 1 year.

A distinction is made among the following variants according to when the buildings are built in the industrial site,

	Share of new construction	Which criteria are evaluated?
Variant 1 (new construction or modernisation)	**100 %** of the GFA	■ **All** criteria
Variant 2 (new and existing construction)	**1 - 99 %** of the GFA; from 2000 sqm GFA new construction	■ **Building-related criteria**: If a distinction is made in the evaluation in the criterion between new and existing constructions (see Tab. 2), existing buildings and new buildings are evaluated separately. The prerequisite for this is that the **new buildings** together have a gross floor area (GFA) of more than **2000 sqm**. For new buildings, **at least 50 % of the buildings** must be taken into account. Smaller outbuildings etc. do not therefore have to be taken into account. ■ **Location-related criteria**: are evaluated for the entire site.
Variant 3 (existing construction, building older than 3 years)	**0 %** of the GFA	■ Only indicators that apply to the existing constructions. This is described in the criterion. ■ In the “process quality” subject area only the **participation, planning concepts and quality assurance and monitoring** criteria are evaluated. Their share in the overall evaluation increases accordingly.

TABLE 2 DGNB variants new construction / existing construction

The distinction as to whether the industrial site is a new construction, an existing construction or a mixed form has an effect on the evaluation. The following table shows the criteria for which adjustments have been made or which are not taken into account for pure existing locations.

Industrial sites, 2020 version

TABLE 3 Overview of the evaluation of new and existing buildings within the criteria

● = Standard

◒ = Deviating valuation/indicators

◌ = Not evaluated

Criteria number	Criteria description	New construction	Mixture new construction / existing construction	Existing construction
ENV1.1	Life-cycle assessment	●	●	●
ENV1.2	Pollutants and hazardous substances	●	● / ◒	◒
ENV1.5	Urban climate	●	● from 2ha GSA	◒
ENV2.2	Water cycle systems	●	●	●
ENV2.3	Land use	●	●	●
ENV2.4	Biodiversity	●	●	●
ECO1.1	Life-cycle costs	●	●	●
ECO2.1	Resilience and adaptability	●	●	●
ECO2.3	Land use efficiency	●	●	●
ECO2.4	Value stability	●	●	●
ECO2.5	Environmental risks	●	●	●
SOC1.1	Thermal comfort in open space	●	●	●
SOC1.6	Open space	●	●	●
SOC1.8	Workplace comfort	●	● / ◒	◒
SOC1.9	Noise, exhaust and light emission	●	●	●
SOC2.1	Barrier-free design	●	● / ◒	◒
SOC3.1	Urban design	●	●	●
SOC3.3	Social and commercialinfrastructure	●	●	●
TEC2.1	Energy infrastructure	●	●	●
TEC2.2	Resource management	●	●	●
TEC2.4	Smart infrastructure	●	●	●
TEC3.1	Mobility infrastructure - Motorised transportation	●	●	●
TEC3.2	Mobility infrastructure - pedestrians and cyclists	●	●	●
PRO1.2	Integrated planning (new construction)	●	● Only new construction	◌
PRO1.7	Participation	●	● / ◒	◒
PRO2.1	Construction site, construction process	●	● Only new construction	◌
PRO3.5	Quality assurance and monitoring	●	●	●

Environmental quality

The six criteria of environmental quality allow an assessment of the **effects of districts on the global and local environment** and **the city climate**, as well as on the **resource/energy consumption of** planning and construction.

ENV1.1	Life cycle assessment
ENV1.2	Pollutants and hazardous substances
ENV1.5	Urban climate
ENV2.2	Water cycle systems
ENV2.3	Land use
ENV2.4	Biodiversity

ENV1.1

Life cycle assessment

Objective

Our objective is to plan districts in a consistent life cycle-oriented manner in order to reduce emission-related environmental impacts and the consumption of finite resources to a minimum throughout all life phases of a district.

Benefits

Life cycle orientated planning of districts and locations with the help of life cycle assessments supports developers and planners in making environmentally oriented decisions based on comprehensive information. Solutions can be identified that are optimised with respect to various relevant environmental issues as well as with respect to different places and times of impact. The application of a consistent method supports the reporting of relevant environmental indicators of the district, such as CO_2 emissions or energy demand over the entire life cycle.

The following benefits can be achieved for companies, municipalities and/or users:

- Contribute to reducing global warming and the associated consequences for humans and nature (e.g. heat stress, extreme weather events)
- Contribute to reducing local smog pollution in the city
- Contribute to reducing the pH value of precipitation and the associated consequences (e.g. forest death)
- Contribute to reducing eutrophication of water bodies and open spaces and the associated consequences (e.g. algae in water bodies, fish mortality, entry into food)
- Reduce dependence on fossil fuels
- Long-term cost savings due to price increases for fossil fuels
- Avoiding effects on the environment and human beings caused by the mining of fossil fuels (e.g. destruction of biotopes, collapse of mines)
- Strengthening of the local economy through the expansion of renewable energies

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.9	Effects of chemicals, air, water and soil pollution	7.1.a/b	Conservation of resources
	7.2	Share of renewable energies	7.2.a	Renewable energies
	7.3	Energy efficiency	13.1.a	Climate action
	8.4	Global resource efficiency and decoupling from economic development		
	12.2	Use of natural resources		
Moderate	6.3	Improvement of water quality	3.2.a	Air pollution
	14.1	Prevention of marine pollution and eutrophication	14.1.aa/ab	Marine protection
	14.3	Prevention of marine acidification		
Low	12.4	Environmentally sound handling of chemicals and waste	6.1.a	Water quality
			7.2.b	Renewable energies
	15.1	Conservation of terrestrial and inland freshwater ecosystems	8.1	Conservation of resources
			15.2	Ecosystems

Outlook

In the future, the reference values will be further tightened in line with increasing requirements for national climate action, emission and resource targets for industry and the building sector. In order to promote positive measures within the context of the energy demand (not regulated by the building energy legislation), a meaningful expansion of the system boundaries is being worked on.

The scope of the life cycle assessment as a method for evaluating life cycle-based environmental effects should reflect other environmental impacts in future. If quantification and characterisation methods are available, for which a broad consensus has been reached in the scientific community and for which suitable data is available in LCA data sets, further environmental impacts should be calculated using the LCA. Some examples are ecotoxicity, use of natural areas and biodiversity.

In future, life cycle assessments can be created more easily with better tools and networked tools, and decision-makers will have more reliable assessments at their disposal in order to develop better districts more quickly. Consequently, life cycle assessments will also gain in importance for life cycle optimisation in all phases of district planning.

Indicators 1 and 2 have been introduced as supporting incentives for an earlier and more consistent anchoring of the LCA method in the planning of districts. In future, these indicators can be dropped once LCA calculations are established as normal elements of planning.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**6.4 %**	**8**
Commercial	**6.5 %**	**10**
Event	**6.2 %**	**8**
Industry	**5.8 %**	**9**

ASSESSMENT

It is recognised when life cycle assessment results are used in an early planning stage and the energy consideration framework goes beyond the Energy Saving Regulations (EnEV) (Indicator 1). In addition, the implementation and use of variant comparisons with life cycle assessment observations is assessed positively (indicator 2). The results of a complete district life cycle assessment calculated according to specified conventions are evaluated using comparative values (indicator 3). If the target values of the life cycle assessment comparison calculation are exceeded, up to 20 additional points can be credited. Furthermore, an "*Agenda 2030 bonus*" is granted if the district is operated carbon neutrally. The use of reused components or elements is included in the result of the life cycle assessment. The contribution to the circular economy is thus fully implemented in the "Life cycle assessment comparison calculation" indicator. A maximum of 100 points in total can be achieved in the criterion without bonuses, and a maximum of 130 points including bonuses.

NO.	INDICATOR	POINTS
1	**Consideration of LCA aspects in the planning** **City** **Business** **Event** **Industry** **Commercial**	**max. 10**
1.1	**Integration of LCA consideration into the planning process** **City** **Business** **Event** **Industry** **Commercial** The district variants available in an early planning phase are compared in terms of their potential environmental production and relevant usage impacts. Areas of action in the district that are relevant to life cycle assessment include among others: ■ the primary construction of the buildings ■ the energy supply of the district ■ the development of the district - Circulation areas - Open spaces - Supply/disposal lines (e.g. water) - … ■ other (e.g. traffic)	**max. 10**
	The variants present in **the early planning phase** (urban development design/framework planning) are roughly calculated and compared with regard to their potential environmental impacts. 2 points can be awarded per analysed area of action.	+6
	The LCA effects of changes in planning are determined **during the planning process** (adjusted to the respective planning status) and communicated within the planning team.	+4

NO.	INDICATOR	POINTS
2	**Optimisation of LCA considerations** City Business Event Commercial Industry	**max. 10**
2.1	**Optimisation of the LCA accompanying the planning** City Business Event Commercial Industry In further planning, the influences of significant alternative decisions on the life cycle assessment will be determined for the district. The choice of alternatives is comprehensible and has potential for improvement. The decision for the finally implemented solution is explained.	**max. 10**
	■ A **comprehensive consideration** (of the areas of action listed in indicator 1) was carried out from an early **planning phase** (urban development design/framework planning) up to **development planning**.	10
	■ A **partial assessment** (of some of the areas of action listed in indicator 1) was carried out from an early **planning phase** (urban development design/framework planning) up to **development planning**.	5
3	**LCA comparison calculation** City Business Event Commercial Industry	**max. 100**
3.1	**Weighted environmental impact: entire district** City Business Event Commercial Evaluation of the LCA results	**max. 100**
	■ weighted environmental impacts **exceed** the weighted **limit value**	0
	■ Weighted environmental impacts **correspond to** the weighted **reference value**	40
	■ Weighted environmental impacts **reach** the weighted **target value**	80
	■ Weighted environmental impacts **fall below** the weighted **target value**	100

NO.	INDICATOR	POINTS
3.2	**Weighted environmental impacts: energy supply**	
	Industry	**max. 80**
	Evaluation of the LCA results	
	■ Weighted environmental impacts **exceed** the weighted **limit value**	0
	■ Weighted environmental impacts **correspond to** the weighted **reference value**	30
	■ Weighted environmental impacts **reach** the weighted **target value**	60
	■ Weighted environmental impacts **fall below** the weighted **target value**	80
3.3	**Weighted environmental impact: building**	
	Industry	**max. 20**
	Evaluation of the LCA results of the largest building (GFA) at the site	
	■ Weighted environmental impacts **exceed** the weighted **limit value**	0
	■ Weighted environmental impacts **correspond to** the weighted **reference value**	5
	■ Weighted environmental impacts **reach** the weighted **target value**	15
	■ Weighted environmental impacts **fall below** the weighted **target value**	20
4	**AGENDA 2030 BONUS - CLIMATE ACTION GOALS**	
	City Business Event Industry Commercial	**max. 30**
4.1	**Ambition to achieve carbon neutrality**	
	City Business Event Industry Commercial	**max. 28**
	Carbon-neutral energy demand: The CO_2 emissions of the energy demand (legally defined framework of the Energy Saving Regulations – EnEV) are at least covered in a carbon-neutral way according to the DGNB definition for the determination of carbon neutrality.	+14
	Carbon-neutral energy demand users: The CO_2 emissions of the energy consumption-related activities of the users in the district and processes at the site are at least covered in a carbon-neutral manner in accordance with the DGNB definition for determining carbon-neutrality.	+14
4.2	**Halogenated hydrocarbons in refrigerants**	
	City Business Event Industry Commercial	**max. 2**
	No use of refrigerants with a GWP-factor ≥ 150 kg CO_2-equiv.	+2

NO.	INDICATOR	POINTS
5	**Special constructions**	
	Event	**max. 100**
5.1	**Evaluation of special constructions**	
	Event	**max. 120**
	For the evaluation of the sub-indicators an evaluation matrix is provided in Appendix 1.	
5.1.1	Sustainable building/selection of building materials	
	■ Use of recycled construction materials in building construction	max. +5
	■ Use of renewable raw materials in building construction	max.+15
	■ Use of recycled materials or building materials with a high recycling content.	max. +10
	■ Use of wood from sustainable forestry	max. +10
	■ Use of predominantly locally produced materials.	max. +10
	■ Selection of building materials based on their life cycle assessment	max. +15
	■ Consideration of the recyclability of building materials at the end of their service life	max. +10
5.1.2	Health-related aspects of the construction	max. +5
5.1.3	Health-related aspects of interior construction	max. +5
5.1.4	Specifications for the replacement of components	max. +15
5.1.5	LCA study for special constructions	max. +20
5.2	**Correction factor**	**max. 120**
	Event	
	The result of indicator 5.2 is deducted from the overall result of indicators 3 and 5.1. The calculation is described in the “Method” section.	0 - 120

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI it is useful to communicate the soil sealing factor of the entire built and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	CO_2 emissions (life cycle) with reference values area (GFA) and year (= LCA results for GWP, “Use” and “Construction”); Note: Applicable as simplified reporting option when using the full procedure. When using the simplified procedure, the indication “Incomplete life cycle” is necessary. For full reporting, all modules must be determined and specified in accordance with level(s) in accordance with EN15978.	[kg CO_2-e/m²*a]
KPI 2	Primary energy demand (operation), divided into total primary energy demand, primary energy demand non-renewable, primary energy demand renewable, differentiated according to heating, cooling, ventilation, hot water, lighting - corresponds to elements of the level(s) indicator 1.1.1	[kWh/m²a]
KPI 3	GRI Disclosure 302-01 “Energy Consumption within the Organization” Note 1: Divided into heating, cooling and other energy requirements.	[kWh/a]
KPI 4	GRI Disclosure 305-01 “Direct Greenhouse Gas Emissions” Note 1: According to GHG Protocol “Scope 1” definition. Note 2: Biogenic CO_2 emissions are also communicated separately.	[kg CO_2-e/a]
KPI 5	GRI Disclosure 305-02 “Energy Indirect Greenhouse Gas Emissions” Note 1: According to GHG Protocol “Scope 2” definition. Note 2: This includes CO_2 emissions from electricity, district heating or similar from externally generated, energy-related sources.	[kg CO_2-e/a]
KPI 6	GRI Disclosure 305-03 “Other indirect Greenhouse Gas Emissions” Note 1: According to GHG Protocol “Scope 3” definition. Note 2: CO_2 emissions from module B1 - B5 can be added here.	[kg CO_2-e/a]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Parts of the calculated LCA results for the district can be transferred to the criteria ENV1.1 of the system applications for buildings.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Commercial**

Districts cause emissions in all phases of their life cycle and require resources, from manufacture (e.g. due to the use of building materials and construction products), through use (e.g. due to operation, maintenance) to the end of life (e.g. due to dismantling). The emissions emit into the air, water and soil, where they cause a variety of environmental problems. These include global warming, the destruction of the stratospheric ozone layer, summer smog, forest and fish mortality, and the overfertilization of waters and soils. Life cycle orientated planning of districts supports developers and planners in making decisions in favour of solutions that are optimised with regard to different environmental issues as well as different locations and times of impact.

II. Additional explanation

With the help of life cycle assessment data, emissions and resource consumption are calculated over the entire life cycle - for production, operation and end of life - and can be evaluated using benchmarks. The environmental problems are reflected in the following environmental indicators:

(1) Climate change: Global warming potential (GWP)
(2) Destruction of the stratospheric ozone layer: Ozone layer depletion potential (ODP)
(3) Summer smog, low-lying ozone: Photochemical ozone creation potential (POCP)
(4) Acidification of soils, forest and fish death: Acidification potential (AP)
(5) Eutrophication of surface waters: Eutrophication potential (EP)
(6) Non-renewable primary energy demand (PEne)
(7) Total primary energy demand (PEtot)
(8) Share of renewable primary energy
(9) Abiotic, non-energy resource consumption: Abiotic elemental resource depletion potential (ADP elements)
(10) Water consumption: Net use of fresh water (FW)

If possible, the life cycle assessment should already be used during the planning phase. It can serve as an important instrument for optimising the environmental quality of the district.

In districts with manufacturing industry, consideration of the use-dependent energy demand in the buildings (e.g. process energy for production) would be desirable due to its high share of the total energy demand, but the practical implementation is difficult. In contrast to building energy demand, there are no reference values for the use-dependent energy demand to which savings could be related. The use-dependent energy demand is therefore not taken into account in the assessment.

It should be noted that the energy demand of a building and the associated emissions are significantly influenced by the urban configuration. For example, the surface-to-volume ratio of a building influences transmission heat losses and the building orientation influences the possibility of using solar energy passively or actively. Especially in early planning phases it is important to take these interrelationships into account.

III. Method

City **Business** **Event** **Industry** **Commercial**

Indicator 1: LCA aspects in planning

The objective of indicator 1.1 is to show the effects of different planning variants on the LCA in a transparent manner, adapted to the respective context, time and scope of planning, from an early planning phase (urban development design/framework planning).

In an early planning phase, measures should be examined for their potential impact on the environmental balance of the district and variants should be examined. Areas of action in the district that are relevant to life cycle assessment include:

- the primary construction of the buildings
- the energy supply of the district
- the development of the district
  - streets
  - open spaces
  - supply/disposal lines (e.g. water)
  - traffic
  - etc.
- other

The most probable/preferred planning variants available are compared with regard to their potential environmental production and relevant use effects.

For the determination and communication of the LCA results to the planning team during the planning process, target values (adapted to the planning status) should be defined, which are compared with the actual values in various planning phases.

Indicator 2: Optimisation of LCA considerations

The aim of the life cycle assessment optimisation during the planning process is to address the environmental effects of all life phases of a district as early as possible in the planning stage and to reduce or optimise them by considering variants. LCA optimisations should be carried out at various appropriate times.

Alternatively, full observations (life cycle assessment effects for the entire district) or partial observations (life cycle assessment effects for a section of the viewing frame) can be included in the evaluation.

The optimisations are intended to examine the life cycle impact of relevant alternatives for relevant decisions. These can vary greatly depending on the planning phase.

When considering life cycle assessment variants, statements should be made on the action areas listed in Indicator 1. The statements should be quantifiable and comparable (e.g. statements on potential CO_2 savings).

The knowledge gained from the life cycle assessment optimisation should be incorporated into the decision-making process. The choice of alternatives is comprehensible and has potential for improvement. The decision for the finally implemented solution is explained. It is evaluated for how many alternatives in early or later planning phases comprehensive or partial life cycle assessments are carried out.

Indicator 3: LCA comparison calculation

The methodology for indicator 3.1 can be found in the section “DGNB life cycle assessment methodology” (below). The methodology for indicators 3.2 and 3.3 can be found in section IV “Usage-specific description of the method” (below).

Indicator 4: Agenda 2030 bonus – Climate action goals

The aim is to promote solutions that already implement the long-term climate action goals today. It is evaluated whether it can be demonstrated by means of scenario calculations that at least carbonneutrality has been achieved for the following aspects:

- Energy demand
- Use and user-induced energy demand
- Halogenated hydrocarbons in refrigerants

The determination of CO_2 emissions for the documentation of at least carbon-neutral operation or construction must be carried out in accordance with the “DGNB CO_2 balancing rules”.

No refrigeration using refrigerants with a GWP factor ≥ 150 kg CO_2-equiv. should be used according to the Federal Environment Agency list (UBA list). This also includes equipment frequently used in building air conditioning systems such as R-134a, R-407c or R-410a. Buildings that are operated without active cooling also meet the requirements of this indicator.
More information on refrigerants can be found here:
www.uba.de Topics› Economy | Consumption› Products› Fluorinated greenhouse gases and CFCs› Documents or
https://www.umweltbundesamt.de/sites/default/files/medien/2503/dokumente/treibhauspotenziale_ausgewaehlter_verbindungen_und_deren_gemische_2017_05.pdf

Indicator 5: Special constructions

Event

5.1: Evaluation of special constructions

For special constructions, the assessment is based on a qualitative checklist (see Appendix 1). The following regulations apply:

- For several objects that are not connected, the list must be completed separately for each construction.
- For large connected objects (e.g. trade fair locations), a distinction may have to be made between existing constructions and new constructions, or the year of construction, if there are serious differences in building equipment and management.

Additional bonus points can be awarded if life cycle assessments for special constructions are available and, for example, optimisations have been derived and implemented from them.

5.2: Correction factor

For indicator 3 a maximum of 100 points can be achieved. Similarly, a maximum of 120 points can be achieved for indicator 5.1 Special constructions. Since a maximum of 120 points can be achieved in the criterion, the two results from indicator 3 Life cycle assessment comparison calculation and indicator 5.1 Special constructions are calculated on an area-weighted basis using the following formula:

$$EVP_{Indicator5.2} = ((EVP_{Indicator3} * GFA_1) + (EVP_{Indicator5.1} * GFA_S)) / ((GFA_1 + GFA_S) - (EVP_{Indicator3} + EVP_{Indicator5.1}))$$

with

$EVP_{Indicator5.2}$	Evaluation points of the indicator 5.2 (Correction factor)
$EVP_{Indicator3}$	Sum of the evaluation points from indicator 3
$EVP_{Indikator5.1}$	Evaluation points special constructions indicator 5.1
GFA_1	Gross floor area (a) of all buildings excluding special constructions
GFA_S	Gross floor area (a, b, c) of special constructions

The result of indicator 5.2 is deducted from the overall result of indicators 3 and 5.1.

IV Scheme-specific description of the method

Indicator 3.2: Weighted environmental impacts: energy supply

For **Industry**, the first indicator evaluates the environmental impacts for the energy provided (heating, cooling, electricity). Here, the entire life cycle of the energy supply, i.e. including production and end of life of the energy supply systems, is mapped. For this purpose, the respective energy sources imported into the site (district heating, electricity, gas, oil, etc.) must be multiplied by the specific environmental profile. The environmental profile of an energy source can be taken from the current version of the LCA database Ökobau.dat (oekobaudat.de/en) or can be calculated specifically for the respective energy producer or energy source (https://www.nachhaltigesbauen.de/en/). The use of older versions of Ökobau.dat is not permitted.

The total energy consumption (buildings and production processes) of the previous and completed 4 districts (12 months) from the date of submission of the documentation for the conformity check is taken into account. The reference value is one kilowatt hour (kWh) of total primary energy.

The reference values for energy supply were calculated based on the electricity mix and the district heating mix of the reference year 2018 of the database Ökobau.dat. The energy consumptions of the industry sector divided according to energy sources were used as reference value for heating mix. In detail, the following values were used for the calculation:

Parameter	Unit	Electricity*	Heat*
Non-renewable primary energy	MJ	7,14	2,814
Renewable primary energy	MJ	3,988	0,4852
Total primary energy	MJ	11,128	3,2992
Global Warming Potential (GWP)	kg CO_2-equiv.	0, 5397	0,2472
Acidification Potential (AP)	kg SO2-equiv.	7,157E-04	2,54E-04
Photochemical Ozone Creation Potential (POCP)	kg ethylene-equiv.	5,64E-05	2,448E-05
Eutrophication Potential (EP)	kg R11-equiv.	1,278E-04	4,683E-05
Ozone Depletion Potential (ODP)		2,128E-14	1,05E-16

* The CO2 emissions refer to end energy

The following 5 sub-indicators (environmental impacts) must be determined, whereby only the GWP is evaluated:

- **GWP** (Global Warming Potential) in [kg CO_2-equivalents]
- **ODP** (Ozone Depletion Potential) in [kg R11 equivalents]
- **POCP** (Photochemical Ozone Creation Potential) in [kg C_2H_4 equivalents] (ethylene equivalents)
- **AP** (Acidification Potential) in [kg SO2 equivalents]
- **EP** (Eutrophication Potential) in [kg PO43 equivalents] (phosphate equivalents)

TABLE 1 Assessment of Global Warming Potential (GWP)

HEADING	
ESACT:	$ES_{ACT} = \frac{(FE_{ELEC} \times GWP_{ELEC}) + (FE_{HEAT} \times GWP_{HEAT})}{FE_{TOTAL} \times PE_{TOTAL}}$ [kg CO_2-equiv./ kWh PE_{TOT}]
ESACT:	Actual energy supply [kg CO_2-equiv./ kWh total primary energy]
ESREF:	Reference key value energy supply [kg CO_2-equiv./ kWh total primary energy]
FE:	Final energy, electricity or heat [kWh total final energy]
PETOT:	Total primary energy [kWh total primary energy]
GWP:	Global warming potential for heat or electricity [kg CO_2-equiv./ kWh final energy]

Note:
Due to the methodological difficulty that the net energy demand for the buildings (heating, cooling, electricity) can only be separated from the net energy demand for the production processes at the site by means of very great technical effort (e.g. separate meter structure), only the environmental impact per kilowatt hour of primary energy is taken into account. Whether the energy provided is used efficiently is qualitatively assessed in criterion TEC2.1 Energy infrastructure.

System limit:

- For indicator ENV1.1.1, only the environmental impacts of energy supply are taken into account. The environmental impacts of the installed/purchased building materials or materials used in production (metals, plastics, etc.) are not taken into account.
- In indicator ENV1.1.2, the system boundaries are the same as the system of the respective DGNB scheme.

Calculation rules:

- **Photovoltaics / wind /** etc.: If electricity is generated on site from photovoltaic modules, wind turbines or other renewable sources, it must be balanced with the dataset for green power.
- **Green power**: Green power can be credited. A prerequisite for this is documentation that depicts the contract with the corresponding energy service provider has been valid for at least 1 year. The reported share of green power is linked to the Ökobau.dat dataset for electricity from wind, water, other renewable sources or the environmental profile of a corresponding Environmental Product Declaration (EPD) for electricity supply. If no Ökobau.dat dataset or EPD is available, a generically determined environmental profile (taking into account the manufacturer's information on electricity supply) can be used alternatively. In this case, an additional safety margin of 10 % on the environmental indicators shall be taken into account.
- **Combined heat and power unit/ Co-generation plant:** If the site has its own combined heat and power or cogeneration plant, only the quantity of the purchased energy source (gas, oil, wood, etc.) is balanced with the respective environmental profile.
- **District or local heating**: If the site is supplied via district or local heating, a situation-specific life cycle assessment dataset must be used for the energy supply. If this is not available, the procedure is as follows: The regenerative share of district heating reported by the supplier is estimated by a dataset for secondary fuel firing (if not available from a dataset for large-scale wood firing). The non-renewable part of the district heating is linked to the corresponding dataset of Ökobau.dat. The district heating data sets of Ökobau.dat represent the mix of non-regenerative district heating in Germany. The amount of the regenerative part of the district heating of the supplier must be proven by a corresponding certificate or indication. Renewable district heating sources include biomass, biogas, sewage and landfill gas, solar thermal energy and geothermal energy.
- **Geothermal or geothermal energy:** As a rule, the auxiliary energy shown in the energy certificate contains the electricity required to operate a heat pump. In this case, the renewable energy in the form of geothermal energy as renewable primary energy must also be taken into account. If the energy certificate does not show the heat pump’s electricity demand, a suitable heat pump dataset must be used, which must include the electricity demand as well as the regenerative energy in the form of geothermal energy.
- **Use of waste heat**: If waste heat generated at the site is used, this proportion can be deducted from the total heat demand. This heat component does not cause any environmental impact.

Indicator 3.3: Weighted environmental impacts: of the buildings

If a building life cycle assessment according to DGNB is available for new buildings (< 3 years) on site, the results of the life cycle assessment criterion can be offset against this indicator.

Mixed-use buildings can be assigned to the scheme of the main use for simplification. The main use is defined as the use that represents the largest share in terms of net ground area (NGF) over all uses. Alternatively, (several) mixed-use buildings can be recorded separately in their respective partial uses so that uniform areas of use within the industrial site can be recorded.

The area-weighted average of the individual life cycle assessment results is formed for the overall evaluation of the indicator.

The DGNB LCA method

The criterion ENV1.1 “Life cycle assessment” of the district is assessed according to the results of a district life cycle assessment. The results of this LCA are referred to as the “environmental profile” or “environmental quality” of a district. A district life cycle assessment determines and evaluates the environmental quality of the district and compares the results with reference values. The basis of the data determination must be documented and submitted for the definite verification of the results. If possible, the district life cycle assessment should already be used during the planning phase. Then it can serve as an important instrument for optimising the environmental quality of the district. The basis for calculating the district life cycle assessment is the life cycle assessment method according to ISO 14040, ISO 14044. The life cycle assessment indicators shall be calculated in accordance with DIN EN 15978. For buildings, the life cycle assessment calculation methodology of DIN EN 15978 shall be used. For the construction and operation of relevant elements in the district, life cycle assessment key values of the planned or implemented actual situation are determined and related to the total gross floor area (DIN 277-2, 2005). In order to avoid a negative evaluation of spatially dense urban development projects, a ratio between the total LCA value and the total gross floor area is thus found which takes into account the area-weighted values of individual uses.
The life cycle assessment key values are determined on an area-weighted basis, related to the total gross floor area of the buildings and to one year, and used for evaluation. The results of the planned or executed actual situation are compared with reference values. The ratios of actual to reference values thus determined are then weighted (according to defined factors of the LCA indicators) and then summed up for all indicators.

1. The DGNB LCA method

1.1 System boundary

The following relevant “elements” should be included in the determination of the district life cycle assessment:

- Period under consideration: A period of 50 years is assumed as the observation period for the district.
- Buildings: The calculation shall include emissions from the production, use (energy and water) and maintenance of the building. In addition, the emissions caused by the excavation of the buildings are taken into account.
- Sealed area / traffic area**:** like buildings (energy = lighting)
- Designed area / green space: The calculation must include the ground work for construction as well as the drinking water requirements for irrigation of all designed areas/green spaces in the district.
- Infrastructure/media development: like buildings (without energy and water)
- Traffic: In the absence of a consistent evaluation method of the traffic volume in the district, the traffic is not evaluated. Emission-related factors such as consumer behaviour and food production are also not taken into account.

1.2 LCA results

Total actual value of project area:

$$LCA_{Q,\,Total} = (LCA_{G,\,Total} + LCA_{CA,\,Total} + LCA_{GF,\,Total} + LCA_{M,\,Total}) / A_{GFA,\,Total} \quad (1)$$

with

$LCA_{Q,\,Total}$ Specific LCA actual value for the entire project area [LCA unit, e.g. kg CO_2-equiv.]
$LCA_{G,\,Total}$ Specific LCA actual value for the buildings [LCA unit, e.g. kg CO_2-equiv.]
$LCA_{CA,\,Total}$ Specific LCA actual value for the sealed surfaces/traffic areas [LCA unit, e.g. kg CO_2-equiv.]
$LCA_{GF,\,Total}$ Specific LCA actual value for the green spaces [LCA unit, e.g. kg CO_2-equiv.]
$A_{GFA,\,Total}$ Gross floor area of all buildings [m²]

Total actual value building:

$$LCA_{G,\,Total}\ \Sigma\ (LCA_{KG,\,n} + LCA_{NG,\,n}) * A_{GFA,\,n} \quad (2)$$

with

$LCA_{G,\,Total}$ Specific LCA actual value for the buildings [LCA unit, e.g. kg CO2-equiv.]
$LCA_{KG,\,n}$ Specific LCA construction key value building of use n (calculated from sum of actual building values [LCA unit, e.g. kg CO_2-equiv.])
$LCA_{NG,\,n}$ Specific LCA use key value building of use n
$A_{GFA,\,n}$ Gross floor area of all buildings [m²]

LCA calculations for buildings are to be carried out in accordance with regulations of the corresponding DGNB schemes for buildings. If no LCA according to DGNB is available for a new building, a corresponding reference value for construction and use can be used.
If a building life cycle assessment according to DGNB is available for the new buildings (< 3 years) on site, the results of the life cycle assessment (environmental impacts or potential) can be taken into account. In principle, the DGNB system distinguishes between different uses for buildings, for which in turn different system boundaries and benchmarks for the LCA apply.

In the case of mixed-use buildings, secondary use can be assigned to the scheme of the main use if this does not exceed the percentage share of 15%, measured on the basis of the gross floor area. With more than 15 % and/or several uses per building, this must be divided into the individual areas of use. In principle, the rules for mixed-use buildings of the DGNB building profiles apply here.

The reference values for the buildings are generally derived from:

- a fixed share for the construction-related value of the emission-related environmental impacts for production, maintenance and recovery/disposal,
- a reference value per volume of moved soil, and
- a variable portion for the use-related value of the emission-related environmental impacts in the amount of the reference building used as a basis in the currently valid Energy Saving Ordinance (EnEV). The variable portion is calculated from the electricity and heat demand (final energy) determined in accordance with the EnEV, multiplied by defined factors (values of the environmental profiles electricity mix and a representative thermal energy mix).

$$LCA_{Gref} = LCA_{Kref} + LCA_{Bref} + LCA_{Nref} \quad (3)$$

with

LCA_{Gref} Reference value for the building

LCA_{Kref} Reference value for the annual average value of the environmental impact potential for manufacturing, maintenance, recovery and disposal of the building including the factory technology used over the period under consideration $t_{d,}$ in [kg environmental impact equiv./(m^2_{NGFa}*a)]

LCA_{Bref} Reference value for necessary ground work in [kg environmental impact equiv./(m^3 moved soil)]

LCA_{Nref} Reference value for the annual environmental impact potential arising from the operation of the building, derived from the final energy demand of the reference building according to the currently valid EnEV, as well as reference value for the annual environmental impact potential arising from the user equipment during building operation, derived from the final energy demand of the defined equipment in [kg environmental impact equiv./(m^2_{NGFa}*a)]

Total actual value of sealed surfaces/traffic areas (private and public, see system basics):

$$LCA_{CA,\ total} = \Sigma\ (LCA_{KCA,\ n} + LCA_{NCA,\ n}) * C_{A,\ n} \qquad (4)$$

with

$LCA_{CA,\ total}$ Specific LCA actual value for the sealed surfaces/circulation areas [unit LCA key value, e.g. Kg CO_2 equiv./m² area* year]

$LCA_{KCA,\ n}$ Specific LCA construction key value traffic area n (creation)

$LCA_{NCA,\ n}$ Specific LCA use key value traffic area n (maintenance)

$C_{A,\ n}$ Circulation area [m^2]

The reference values for the sealed surfaces/traffic areas are generally derived from

- a construction and maintenance reference value for roads,
- a reference value for the necessary ground work, and
- a reference value for street lighting.

Total actual value of green spaces (private and public, see system basics):

$$LCA_{F,\ Total} = \Sigma\ (LCA_{KF,\ n} + LCA_{NF,\ n}) * A_{F,\ n} \qquad (5)$$

with

$LCA_{F,\ Total}$ Specific LCA actual value for green spaces in [unit LCA key value, e.g. Kg CO_2 equiv./m² area* year]

$LCA_{KF,\ n}$ Specific LCA construction key value green space n (creation)

$LCA_{NF,\ n}$ Specific LCA use of green space n (maintenance)

$A_{F,\ n}$ Green space

The reference values for green spaces are generally derived from

- a reference value for the necessary ground work, and
- a reference value for drinking water requirements for irrigation.

Definition of specific target values in relation to the project phase

The reference value is determined in the same way as the life cycle assessment for the DGNB schemes for buildings**.** Existing buildings are not included in the calculation of the reference value for production. If these are renovated as part of the development of the district, the production costs for the renovation measures are calculated.
The use of key values is adapted to the assumed level of knowledge of the respective planning phase. If no determined key values are required, average values can be assumed in order to ensure consistent updating of the overall key value and comparability of the individual phases. If key values can already be reliably determined, these can also replace the average values in early phases.

TABLE 2 Use of mean and reference values in the assessment according to implementation phases (ø = mean value for various possible design variants; determined in the course of separate life cycle assessment studies)

		PHASE 1	PHASE 2	PHASE 3
Building	Production	Ø	Ø	Ø or $LCA_{KG, n}$
	Use	Ø or $LCA_{NG, n}$	Ø or $LCA_{NG, n}$	$LCA_{NG, n}$
Traffic areas	Production	Ø	$LCA_{KCA, n}$	Ø or $LCA_{KCA, n}$
	Use	Ø	Ø	Ø or $LCA_{KCA, n}$
Green spaces	Production	Ø	Ø or $LCA_{KGF, n}$	Ø or $LCA_{KCA, n}$
	Use	Ø	Ø	Ø or $LCA_{KCA, n}$

Reference values:
Key values utilisation phase building in relation to the respectively applicable EnEV at the time of submission of the building application, taking into account the requirements of the EEWärmeG. Depending on the phase of the project, specific key values or also mean values are used, which can be provided with additions or deductions in the evaluation based on the information available. The specific reference values can be taken from the master tool.

TABLE 3 Target and limit values of the various environmental indicators

LIMIT AND TARGET VALUE	GWP	POCP	AP	EP	PE_{NE}	PE_{TOT}	PE_E/PE_{TOT}	ODP	WF	ADP_E
Limit value	1.4	2.0	1.7	2.0	1.4	1.4	5 %	-	-	-
Target value	0.7	0.7	0.7	0.7	0.7	0.7	30 %	-	-	-
Overfulfilment	0.55	0.55	0.55	0.55	0.55	0.55	37.5 %	-	-	-

Note: The reference value (15 %) for the share of renewable primary energy is derived from the current share of renewable primary energy in the German electricity mix according to the Ökobau.dat dataset 2017, the simplified assumption that, according to the EEWärmeG, at least 15 % renewable energy sources must be used for the heat carriers, typically one third of the energy in building use is accounted for by electricity, and the share of construction over the life cycle can be assumed to be about one third in the reference case. The limit value (5%) is derived from a lower proportion of energy over the life cycle and an energy source for heat without a renewable share.

TABLE 4 Evaluation scale and sub-points for the environmental indicators

SUB-POINTS	GWP	POCP	AP	EP	PE_{NE}	PE_{TOT}	PE_E/PE_{TOT}	ODP	WF	ADP_E
0	GWP_G ≥ 1.4 * $GWP_{tot,ref}$	$POCP_G$ ≥ 2.0 * $POCP_{tot,ref}$	AP_G ≥ 1.7 * $AP_{tot,ref}$	EP_G ≥ 2.0 * $EP_{tot,ref}$	PE_{ne} ≥ 1.4 * $PE_{ne,ref}$	PE_{tot} ≥ 1.4 * $PE_{tot,ref}$	PE_e/PE_{tot} = 5 %	Values for ODP_G and ODP_{Gref} provided	Values for WF_G and WF_{Gref} provided	Values for ADP_G and ADP_{Gref} provided
40 for **Industry**: 30	GWP_G = $GWP_{tot,ref}$	$POCP_G$ = $POCP_{tot,ref}$	AP_G = $AP_{tot,ref}$	EP_G = $EP_{tot,ref}$	PE_{ne} = $PE_{ne,ref}$	PE_{tot} = $PE_{tot,ref}$	PE_e/PE_{tot} = 15 %	n.a.	n.a.	n.a.
80 for **Industry**: 60	GWP_G < 0.70 * $GWP_{tot,ref}$	$POCP_G$ < 0.70 * $POCP_{tot,ref}$	AP_G < 0.70 * $AP_{tot,ref}$	EP_G < 0.70 * $EP_{tot,ref}$	PE_{ne} < 0.70 * $PE_{ne,ref}$	PE_{tot} < 0.70 * $PE_{tot,ref}$	PE_e/PE_{tot} > 30 %	n.a.	n.a.	n.a.
100 (overfulfilment) for **Industry**: 80	GWP_G < 0.55 * $GWP_{tot,ref}$	$POCP_G$ < 0.55 * $POCP_{tot,ref}$	AP_G < 0,55 * $AP_{tot,ref}$	EP_G < 0.55 * $EP_{tot,ref}$	PE_{ne} < 0.55 * $PE_{ne,ref}$	PE_{tot} < 0.55 * $PE_{tot,ref}$	PE_e/PE_{tot} > 37.5 %	n.a.	n.a.	n.a.

Weighting of the indicators to determine the weighted environmental impacts

TABLE 5 Weighting key for environmental indicators (G)

G_{GWP}	G_{POCP}	G_{AP}	G_{EP}	G_{PENE}	G_{PETOT}	G_{PEE}
40 %	10 %	10 %	10 %	15 %	10 %	5 %

Industry

The criterion is evaluated quantitatively using the following indicators:

- 3.2 Weighted environmental impacts: of energy supply
- 3.3 Weighted environmental impacts: of buildings

System boundary:

- In indicator 3.2, only the environmental impacts of energy supply are taken into account. The environmental impacts of the installed/purchased building materials or materials used in production (metals, plastics, etc.) are not taken into account.
- In indicator 3.3, the system boundaries are the same as the system of the respective DGNB scheme.

Further definitions: LCA indicators

(1) Global warming potential (GWP)

The accumulation of greenhouse gases in the atmosphere leads to a warming of the air layers near the ground (greenhouse effect). The global warming potential of a substance is always stated in comparison to the global warming potential of carbon dioxide (CO_2). Greenhouse gas emissions are therefore expressed as carbon dioxide-(CO_2)- equivalents. Since greenhouse gases remain in the atmosphere for different lengths of time, the GWP value must be related to a time period. The characterisation of the contributions to the GWP is based on a period of 100 years. Furthermore, impact factors are used to describe the extent to which different substances contribute to the global warming potential. Over a period of 100 years, methane has, for example, 25 times the impact factor of CO_2 for the same mass. The CO_2 equivalent of methane is thus 25. This means that methane contributes 25 times more to the greenhouse effect than CO_2 (with the GWP value of 1) for the same mass.

(2) Ozone creation potential (POCP)

The POCP is the mass equivalent of harmful trace gases. These trace gases, such as nitrogen oxides and hydrocarbons, in combination with UV radiation, contribute to the formation of ground-level ozone. This contamination of the air layers near the ground by a high ozone concentration is also known as summer smog. Summer smog attacks the respiratory organs and damages plants and animals. The concentration of ground-level ozone is regularly measured by air monitoring stations and recorded in exposure maps.

(3) Acidification potential (AP)

The acidification potential indicates the effect of acidifying emissions and is measured in sulphur dioxide (SO_2) equivalents. Air pollutants such as sulphur and nitrogen compounds react with water in the air to form sulphuric or nitric acid; this acid then falls to earth as “acid rain” and enters soil and water. This damages living beings and buildings. For example, in acidified soils, nutrients are quickly chemically broken down and thus washed out more quickly. In the same way, toxic substances are produced in the soil, attacking the root systems and disturbing the water balance of the plants. In sum, the many individual effects of acidification cause two serious consequences: the death of forests and fish. But acid rain also attacks buildings. Especially the sandstone on historical buildings is affected.

(4) Eutrophication potential (EP)

Eutrophication is the transition of waters and soils from a nutrient-poor (oligotrophic) to a nutrient-rich (eutrophic) state. It is caused by the intake of nutrients, especially phosphorus and nitrogen compounds. These can be released into the environment during the production of construction products and through the leaching of combustion emissions. If the concentration of available nutrients in water increases, algae growth also increases there. This can result in fish mortality, among other things.

(5) Non-renewable primary energy demand (PEne)

The demand for non-renewable primary energy is determined over the life cycle for production, maintenance, operation and dismantling / disposal of the building.

The demand for non-renewable primary energy is related to area and year and is stated in [MJ/m^2_{NRF}*a]. The values required for the calculation can be determined (as in criterion ENV1.1 “Life cycle assessment - Emission-related environmental impacts”) from the energy verification according to EnEV. The environmental impact of the construction and the systems technology can be derived from the life cycle assessment of the materials used.

(6) Total primary energy demand (PEtot)

The necessary calculation values for the utilisation phase are obtained from the energy verification according to EnEV. The life cycle assessment of the materials and components used is used to determine the environmental impact of the construction and systems technology. Reference values of an average building help to assess the construction and systems technology.

(7) Share of renewable primary energy

This indicator assesses the share of renewable energies in total primary energy demand. For this purpose, the average share of renewable primary energy in the total primary energy requirement of the building under consideration is compared with values of a reference building according to EnEV. If the reference value according to EnEV is undercut by more than 30 %, the requirement for the share of renewable primary energy can be reduced proportionally. This enables the planners to use different concepts to achieve the overriding goal - an overall reduction in the demand for primary energy.

(8) Ozone depletion potential (ODP)

Ozone, which is only present in the atmosphere in low concentrations, is of great importance for life on earth. It is capable of absorbing the short-wave UV radiation and emitting it again at a longer wavelength, regardless of direction. The ozone layer shields a large part of the sun's UV-A and UV-B radiation from the earth, prevents the earth's surface from heating up too much and protects flora and fauna. The accumulation of harmful halogenated hydrocarbons in the atmosphere contributes to the destruction of the ozone layer. The consequences include tumour formation in humans and animals and disorders of photosynthesis. The ozone layer depletion potential is expressed in [kg R11 equiv./m^2_{NRF}*a]; the ODP values refer to the reference substance chlorofluorocarbon CFC-11. All substances with values below 1 are less ozone depleting, values above 1 are more ozone depleting than CFC-11 (or also called R11; chemical formula CCl3F).

(10) Water consumption fresh water (FW)

Water consumption or water use refers to all permanent or temporary human-induced removal from a water catchment area that is not re-distributed to the same water catchment area. Water consumption can be based on evaporation, transpiration, incorporation into products/materials or discharge into another water catchment area or sea. Evaporation from a water reservoir can also be counted as consumption, as can irrigation water, which evaporates if they do not remain in the same water catchment area.

The term was chosen with the intention that water that is only used but remains in the same catchment area, such as water turbines for electricity generation or as waterway for shipping or as cooling water, should not be included in consumption. Rainwater that evaporates through natural processes is also not included in consumption.
In the standards EN 15978 and EN 15804 relevant to the DGNB criteria, the indicator "net use of fresh water" is translated as "use of freshwater resources".
When the EN standards were adopted, ISO 14046 "Environmental 100 management - Water footprint - Principles, requirements and guidelines" was not yet sufficiently discussed. It was only completed in May 2014. The intention was to use the terms from ISO 14046. In the guidance document (currently in preparation) for the implementation of EN 15804, the indicator is explained in more detail, taking ISO 14046 into account. The EN 15978 and EN 15804 standards generally distinguish between consumption (or depletion) and use. However, "net use of fresh water" refers to the use of fresh water in the sense of consumption, which is expressed by the term "net use".
In life cycle assessment software systems, e.g. GaBi ts, the indicator is sometimes referred to as "blue water consumption" and is expressed in [kg].

(9) Abiotic resource consumption (ADP elements)

ADP (abiotic depletion potential) captures the consumption and scarcity of non-renewable (abiotic) resources as an impact category. These are the mineral resources as opposed to the resources that come from the biosphere. Mineral resources include the fossil raw materials with “ADP fossil fuels” and the remaining minerals with “ADP elements”. It should be noted that uranium, as a non-fossil fuel, is included in the “ADP elements”. The characterisation factors for fossil raw materials represent the lower heating value of the respective raw material. The same shortage is assumed for these raw materials, as they are interchangeable.

The characterisation factors for the remaining mineral resources take into account the amount of the resource present and its annual extraction rate. The estimation of the quantity depends on how much of the raw material is found in the earth’s crust or can be made available in a technically and economically appropriate way. Various calculation approaches are used for this purpose: for “ultimate reserve” only the occurrence in the earth's crust is taken into account. The “reserve base” is the quantity that is technically and economically available; the “economic reserve” is the quantity that can be extracted in an economically meaningful way at the time of investigation. DIN EN 15804 and DIN EN 15978 take into account the “ultimate reserve” approach.

APPENDIX B - DOCUMENTATION

I. Required documentation

City Business Event Industry Commercial

The following represent a selection of possible documentation forms. On basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 6 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** for implementation	A
Documentation of **relevant records/documents** - B1: Overview of the total energy demand and division into heating, cooling and electricity with extracts of supply contracts/certificates for the respective energy sources and energy demand calculation according to EnEV for each building - B2: Excerpts from life cycle assessment comparisons and presentation of the methodology used with reference to service phases - B3: Building material certificates for substantial masses - B4: Documentation of specific assumed LCA data - B5: Calculation results scenario calculations CO_2 equivalent energy demand and/or users; presentation of climate neutrality according to recognised standard (DGNB “Framework for carbon-neutral buildings and locations”); presentation determination of energy-related activities of the users and selected method - B6: Design variants, protocols, decision papers	B
Documentation of the individual aspects of the evaluation matrix (Appendix 1) shall be submitted according to the stage of the certification process: - Phase 1: In phase 1, the list is to be completed on the basis of plausible declarations of intent, if necessary. In the following phase, the correctness of the information is to be confirmed or the implemented quality is to be documented by means of plausible documents and documentation. - Phase 2: The correctness of the information from phase 1 shall be confirmed accordingly. All points already verifiable must also be plausibly demonstrated with the aid of suitable documents. - Phase 3: The accuracy of the information provided must be plausibly demonstrated by means of suitable documents.	C
Documentation of **master tool:** Entry of the values relevant for the life cycle assessment	J

TABLE 7 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. LCA aspects in planning	A, B, J	B, J	B, J	A, B	B
2. Optimisation of LCA considerations	A, B, J	B, C, J	B, C, J	A, B	B, C
3. LCA comparison calculation	A, B, J	B, C, J	B, C, J	A, B	B, C
4. Agenda 2030 bonus - climate action goals	A, B	B5	B5	A	B5
5. Special constructions	A; B, C	C	C	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

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- Bundesministerium für Wirtschaft und Technologie (BMWi) (2007): Nationaler Energieeffizienz-Aktionsplan (NEEAP), referring to EU-Directive “Energy End Use Efficiency and Energy Services” (2006/32/EC).
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- Renewable Energy Sources Act (EEG).
- Energy Saving Ordinance (EnEV).
- DIN 18599.
- DIN EN 13201.
- Directive 2012/27/EU: Energy Efficiency Directive, EED
- ECOFYS (2007): Energieeffizienz und Solarenergienutzung in der Bauleitplanung. Zusammenfassung und Thesen zum Rechts- und Fachgutachten, Frankfurt a. M.
- Goymann, Melanie; Kittelberger, Siegrun; Kreißig, Johannes (2009): Vergleichende Ökobilanz – Oberbaukonstruktion von Verkehrsflächen mit unterschiedlichen Deckschichten, Betonverband Straße (Ed.)
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Industry **Commercial**

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- Deutsches Institut für Normung (DIN): DIN V 18599 -Energetische Bewertung von Gebäuden. Berechnung des Nutz-, End- und Primärenergiebedarfs für Heizung, Kühlung, Lüftung, Trinkwarmwasser und Beleuchtung. Beuth Verlag, Berlin.
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- Deutsche Gesellschaft für Nachhaltiges Bauen e.V. (DGNB): Criteria ENV1.1, ENV2.1 and ECO1.1
- Institut Bauen und Umwelt e.V. (IBU): Environmental Product Declarations (EPDs) by construction product categories. Online URL: http://bau-umwelt.de/hp6249/EPDs-nach-Kategorien.htm.
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APPENDIX 1

Life cycle assessment of special constructions

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	LEVEL 5	LEVEL 4	LEVEL 3	LEVEL 2	LEVEL 1
Sustainable construction/selection of building materials (assessment based on the percentage of building materials that meet the requirements of the level).					
A significant amount of recycled building materials were used in the building construction (e.g. existing supporting structure).	≥ 40% = 5 points	≥ 30% = 4 points	≥ 20% = 3 points	≥ 10% = 2 points	≥ 5% = 1 point
Renewable raw materials were used to a considerable extent in building construction (e.g. wood).	≥ 40% = 15 points	≥ 30% = 12 points	≥ 20% = 9 points	≥ 10% = 6 points	≥ 5% = 3 points
Recycled materials or building materials with a high recycling content were used in the construction.	≥ 20% = 10 points	≥ 15% = 7.5 points	≥ 10% = 5 points	-	≥ 5% = 2.5 points
Wood from sustainable forestry (certified according to e.g. FSC) was used.	100% = 10 points	≥ 95% = 8 points	≥ 90% = 6 points	≥ 85% = 4 points	≥ 80% = 2 points
Locally produced materials were mainly used in the construction.	≥ 20% = 10 points	≥ 15% = 7.5 points	≥ 10% = 5 points	-	≥ 5% = 2.5 points
Building materials were selected on the basis of their life cycle assessment (extraction, transport, production, dismantling, etc.).	≥ 50% = 15 points	≥ 40% = 12 points	≥ 30% = 9 points	≥ 20% = 6 points	≥ 10% = 3 points

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	LEVEL 5	LEVEL 4	LEVEL 3	LEVEL 2	LEVEL 1
Sustainable construction/selection of building materials (assessment based on the percentage of building materials that meet the requirements of the level).					
When selecting building materials, attention was paid to their recyclability at the end of their service life (e.g. no elements that are difficult to separate, building materials that can subsequently be reused, etc.)	≥ 50% = 10 points	≥ 40% = 8 points	≥ 30% = 6 points	≥ 20% = 4 points	≥ 10% = 2 points
Health-related aspects of the CONSTRUCTION					
There is a concept for the avoidance of hazardous/harmful building materials in the construction (e.g. colouring of concrete, aggregates contaminated with heavy metals, coating of metals, PU foam boards etc.)	Implemented concept that covers all relevant areas of building construction. **= 5 points**	-	Implemented concept, which however only considers partial aspects or does not cover all areas of the construction. **= 2.5 points**	-	No regulations, concepts, etc. **= 0 points**
Health-related aspects of the FITTINGS (INTERIOR CONSTRUCTION)					
There is a concept for the avoidance of hazardous/harmful building materials such as paints, adhesives and coverings, which emit volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) into the atmosphere during construction and use.	Implemented concept that covers all relevant areas of building construction. **= 5 points**	-	Implemented concept, which however only considers partial aspects or does not cover all areas of the construction. **= 2.5 points**	-	No regulations, concepts, etc. **= 0 points**

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	LEVEL 5	LEVEL 4	LEVEL 3	LEVEL 2	LEVEL 1
Specifications for the replacement of components					
There are binding regulations/requirements for the replacement of components (... use of environmentally friendly products etc.) during maintenance and repair.	Mandatory requirements for the replacement of components in the case of maintenance and repair **= 15 points**	-	Mandatory requirements for the replacement of components in the case of maintenance or repair **= 7.5 points**	-	No regulations, concepts, etc. **= 0 points**
LCA study for special constructions					
A life cycle assessment is available according to ISO 14040, ISO 14044, DIN EN 15897, or comparable for special constructions.	Completely available **= 10 points**	-	Partially available **= 5 points**	-	Not available. **= 0 points**
Based on the life cycle assessment, demonstrable optimisations were derived and implemented in the project. If necessary, the results were confirmed by a further life cycle assessment.	Completely available **= 10 points**	-	Partially available **= 5 points**	-	Not available. **= 0 points**

ENV1.2

Pollutants and hazardous substances

Objective

Our objective is to reduce, avoid or substitute all hazardous or harmful materials, (construction) products, as well as preparations that can adversely affect or cause short, medium or long-term damage to people, flora and fauna.

Benefits

The use of particularly environmentally friendly materials not only contributes to improving indoor air quality, but also helps limit the impact of building renovations with regard to pollutants. Only a building elements catalogue, that is complete in terms of the environmental qualities of materials, can provide building owners with extensive information about construction products used in various parts of the building. This information is of key importance for the quality assurance in the building construction, for clarifying deficiencies and finding appropriate ways for eliminating them, simultaneously optimising the costs of maintenance. This provides an important contribution to the value stability of a building/location.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	3.9	Effects of chemicals, air, water and soil contamination		
Low	11.6	Reduction of environmental pollution in cities	13.1.a	Climate protection

Outlook

The handling and use of environmentally friendly materials is subject to increasingly strict regulatory specifications. Categorisation into quality levels will therefore change in future. In addition, beside the standard quality levels (QL), another quality level (QS0) is planned, which is the minimum requirement for this system.

Share of the total score

	SHARE	WEIGHTING FACTOR
Industry	**2.6 %**	**4**

ASSESSMENT

The quality levels (QL) named in the criteria matrix build upon each other. The quality level achieved is derived from the individual aspect that needs to be given the lowest evaluation and the form of documentation. Documentation in the form of a material-ecologically supplemented component catalogue is evaluated positively. The simplified documentation can be used for quality level 1 or 2. The requirements of a higher quality level in each case incorporate the successful implementation of all requirements listed for the lower levels. A maximum of 100 points can be achieved in the criterion.

NO.	INDICATOR	POINTS

1 Environmental pollutants new construction/modernisation

Industry **max. 100**

This group includes all buildings and infrastructure in the outside area which are not older than 3 years in relation to the application date of the certificate. The risks from construction materials/products that are newly used in the course of a new construction or modernisation project are evaluated. The evaluation is carried out in 4 quality levels according to Appendix 1.
The overall evaluation is area-weighted, the GFAa is to be used as a reference value.

1.1 Environmentally friendly materials new construction

Industry **max. 100**

- Fulfilment of all requirements in the criteria matrix (Appendix 1) for the **New construction site**:

QL 1	10
QL 2	40
QL 3	80
QL 4	100

- Fulfilment of all requirements in the criteria matrix (Appendix 1) for the **Mixed site**:

QL 1	5
QL 2	20
QL 3	40
QL 4	50

Is not rated for **Existing buildings**.

NO.	INDICATOR	POINTS
2	**Environmental pollutants existing buildings/old buildings**	
	Industry	**max. 100**
	This group includes all buildings and infrastructure in the outside area that are older than 3 years, in relation to the application date of the certificate. As a minimum requirement for existing buildings, the requirements described in Appendix 2 apply. The evaluation is based on 4 requirement levels, which are defined in the evaluation matrix in Appendix 2.	
2.1	**Environmentally friendly materials existing buildings**	
	Industry	**max. 100**
	■ Fulfilment of all requirements according to description (method, Table 1) for the **Existing buildings**:	
	QL 1	10
	QL 2	40
	QL 3	80
	QL 4	100
	■ Fulfilment of all requirements as described (Method, Table 1) for the **Mixed site**:	
	QL 1	5
	QL 2	20
	QL 3	40
	QL 4	50
	Is not rated for **New constructions**.	

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

Appropriate key performance indicators (KPIs) include, in the case of positive evaluation of indicator 2, not using certain refrigerants for the communication or communicating selected relevant emission parameters for construction products used.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	No use of halogenated and partially halogenated refrigerants that are persistent by themselves or have persistent degradation products	[yes]
KPI 2	Emission profiles for construction products used, stating carcinogenic volatile organic compounds (VOCs), formaldehyde and substances with LCI values (tested according to CEN/TS 16516); corresponds to level(s) indicator 4.1.2	[µg/m³], [-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** High synergies with criterion ENV1.2 from the scheme new buildings.
- **DGNB BUILDINGS IN USE:** The application of the criteria matrix can be proven in a procurement guideline for the ongoing maintenance in BIU criterion ENV9.2 “Procurement”.
- **DGNB RENOVATED BUILDINGS:** High synergies with criterion ENV1.2 from the scheme for renovated buildings.
- **DGNB INTERIORS:** High synergies with criterion ENV1.2 from the scheme for interiors.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Industry

In order to minimise risks for people and the local environment, materials, construction products and preparations that are dangerous for soil, air, groundwater and surface water and the health of people, flora and fauna due to their material properties or ingredient components must be reduced, avoided or substituted. This concerns their entire life cycle from manufacturing, processing on the construction site and use in the existing buildings to their disposal (dismantling, recycling, disposal in landfill). The local risks are assessed on the basis of substances and products, as the toxicological impact categories for the environment and humans have not yet been recorded in the life cycle assessment due to lack of recording and evaluation processes.

II. Additional explanation

Industry

Certain materials and components must already be considered in an early planning phase with regard to critical substances (see Appendix 1; criteria matrix) and, if necessary, constructive alternatives must be examined. By consciously choosing building materials, it is usually possible to avoid the hazardous substances and products listed in the criteria matrix without limiting the design and functional planning.
A complete layer structure of all components must be specified on the basis of a component catalogue (see design example in Appendix 3). Auxiliary materials such as adhesives, primers etc. must be added. For all requirements to be documented at the desired quality level, verifiable documentation must be provided in accordance with the criteria matrix (see Appendix 1, column: Type of documentation; requirement for the documentation of individual aspects).

III. Method

Industry

The evaluation of pollutants and high-risk substances is carried out separately for new and existing buildings and infrastructures in open spaces.

Indicator 1: Environmental pollutants, new construction/modernisation
This group includes all buildings which are not older than 3 years in relation to the application date of the certificate. The high-risk material and substance groups (environmental pollutants) are queried and evaluated individually and in a product-based way in the certification system for new buildings. The following substance groups (as products or as components of formulations) are currently taken into account, among others

- Halogenated and partially halogenated refrigerants
- Halogenated and partially halogenated propellants
- Heavy metals
- Substances covered by the Biocides Products Directive
- Hazardous substances according to CLP regulation (1272/2008/EC)
- Organic solvents and plasticisers

The specification and explanation of the materials and components to be considered for new buildings is given in the criteria matrix (see Appendix 1). For the requirement to limit emissions of volatile organic compounds by products or their risk potential during use, there is an overlap with regard to the VOC content in the product and the resulting release of VOCs by the product. In this criterion, only the VOC content in the product is assessed and not the release.
The requirements stated in the criteria matrix (Appendix 1) must be observed for all materials and components specifically listed in the table. Within each individual requirement, all materials and construction products must be recorded via a component catalogue (see design example in Appendix 3). As a result of this, the following surfaces must be considered:

- Floor structures incl. foundations
- External wall structures
- Internal wall structures
- Ceiling constructions
- Roof structures
- Underground car parks (to be considered separately)

The following requirements for this criterion must be considered, verified and complied for the prefabricated construction materials/products listed below:

- Coatings applied at the factory (e.g. steel structures, doors, frames, radiators, system partitions, ceiling systems) with regard to VOC and heavy metals. The VOC requirements are deemed to be fulfilled if either coating materials are used in accordance with the desired quality level or if the manufacturer falls under the regulations of 31 BImSchV (limitation of VOC emissions during operation).
- Synthetic foam insulating materials with regard to halogenated propellants
- Pretreated wood components (e.g. chemical wood protection according to DIN 68 800) with regard to biocidal agents and VOC
- Aluminium and stainless steel components regarding treatment with Cr(VI) compounds
- Refrigerant in cooling systems
- Windows, floor coverings and wall coverings of plastics with regard to lead, cadmium and tin stabilisers

The qualitative evaluation is based on requirement levels. These are based on both the effort and level of difficulty of practical implementation and on the environmental significance of substituting a material.

All substances and aspects considered in the criteria matrix must be verified with regard to the target quality level. Only verified requirements can be taken into account and evaluated in the conformity check. The quality level achieved in this criterion results from the individual aspect that needs to be given the lowest evaluation. This means that the quality levels named in the criteria matrix (see Appendix 1) build upon each other. The requirements of a higher quality level in each case incorporate the successful implementation of all requirements listed for the lower levels.

Indicator 2: Environmental pollutants, existing buildings/old buildings
This group includes all buildings and infrastructure in the outside space that are older than 3 years in relation to the application date of the certificate. Existing buildings must be examined and evaluated with regard to significant value-reducing building pollutants, such as asbestos, PCBs and carcinogenic artificial mineral fibres.

For structural measures according to subcriterion 1.2.2 (existing buildings), quality level 4 can be applied if the requirements mentioned below are met. A detailed pollutant report is not necessary.
Documentation of asbestos: All structural measures were implemented after 1993.
Documentation of polychlorite biphenyls (PCB): All construction measures were implemented after 1989.
Documentation of artificial mineral fibres (AMF): All construction measures were implemented after 06/2000.
Documentation of pentachlorophenol (PCP), lindane, DDT: All construction measures were implemented after 1989; alternatively, it can be verified that no load-bearing wood constructions were implemented.

TABLE 1 Quality levels for the assessment of environmental pollutants in existing buildings

QUALITY LEVEL	DESCRIPTION
QL 1	■ Preparation of a building cadastre with details of the year of construction and, if applicable, the year of renovation, including the scope of renovation ■ Legally valid declaration by the owner that no further pollution (e.g. mineral oil) or pollutants (e.g. mould) occurs in the buildings
QL 2	■ Quality level 1 is maintained and: An expert opinion is available for 50 % of the total GFA existing buildings (see Appendix 2; point I).
QL 3	■ Quality level 1 is maintained and: An expert opinion is available for 80 % of the total GFA existing buildings (see Appendix 2; point I).
QL 4	■ Quality level 1 is maintained and: An expert opinion is available for 100 % of the total GFA existing buildings (see Appendix 2; point I).

APPENDIX B - DOCUMENTATION

I. Required documentation

Industry

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 2 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to conduct specific surveys	A
Documentation with **relevant records/documents/expert opinions:** ■ B1: Listing of all buildings and infrastructures in the outside space with indication of the year, GFA or area and assessment of potential risk substances/assignment of the respective quality level ■ B2: Complete declaration and verification of the (relevant) components to be considered for new constructions through the documentation required in the criteria matrix ■ B3: Preparation of a material-environmental component catalogue (new construction) There is no mandatory specification for a material-ecologically supplemented component catalogue, but the materials, products and elements listed in the documentation of criterion ENV1.2 must contain at least the following information: ■ Construction product ■ Manufacturer ■ Area data ■ Description of the individual layers Supplementation of the construction component catalogue with the auxiliary materials used such as adhesives, primers, bonding layers, etc. ■ B4: Expert opinions on listed risk substances (Appendix 2) ■ B5: for buildings/infrastructure first built after 06/2000: legally valid declaration by the owner that no further pollution/pollutants will occur in the building	B

TABLE 3 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Environmental pollutants new construction/modernisation	-	-	-	A	B1-3, B5
2. Environmental pollutants existing buildings/old buildings	-	-	-	A	B1-2, B4-5

Exceptions for the documentation (new construction):

- Requirement level 3: At this level one of the criteria can be neglected without affecting the maximum score. The neglected criterion of the criteria matrix must meet the requirements of the next lower quality level.

- Requirement level 4: At level 4, two of the criteria can be neglected without affecting the maximum score. The neglected criteria of the criteria matrix must meet the requirements of the next lower quality level.

- Cut-off criteria: Only if explicitly listed in the criteria matrix in the column “Scope and documentation” may documentation be neglected for a maximum of 5 % of the GFAa according to DIN 277, regardless of the building surfaces on which the product/material is used (see criteria matrix Appendix 1: “Scope and documentation”).

Procedure (example):

- Buildings with 50,000 m² GFA (including areas below ground level, such as underground car parks)
- Result example: 5 % GFAa = 2,500 m²
- Application:
  On 2,500 m², the requirements of the criteria marked in the criteria matrix with this exception regulation can be neglected. The installation location (walls, ceilings, floors etc.) of the materials/products is not decisive in this respect.

- Technical and functional exceptions: If one of the specified product requirements cannot be implemented for technical or functional reasons (i.e. due to the absence of a functionally equivalent product or a construction alternative that meets the requirements) or because the data basis cannot be created with reasonable effort, , exceptions from the requirements are permitted. Deviations from the requirements must be documented and justified, stating the product, the technical application and the quantity used. Product exceptions for purely aesthetic reasons are not covered by the exemption. Possible forms of documentation include, for example, the current confirmation from at least two market-relevant manufacturers that no product that is suitable for the intended quality level is available (see Appendix 3), or proof that the use of the suitable product was technically impossible for reasons attributable to “force majeure” (weather conditions, natural circumstances such as pressing water in the building subsoil). Verification for a technical exception can only refer to a single quality level and does not exempt from the requirements that may exist in the lower quality levels.

Data basis:

In principle, the following can be used as the data basis:

- Technical information,
- Safety data sheets (SDS),
- Environmental product declarations of types I and III and manufacturers' declarations on ingredients and recipe components.
- Manufacturer declarations

The most suitable sources for the material qualities that are to be queried within the scope of criterion ENV1.2 are normally:

- VOC content of paints/lacquers: Technical information, safety data sheets, labels (declaration of VOC content according to Directive 2004/42/EC). Specified in g/l
- VOC content of other products: Manufacturer declarations
- GISCODE/product code: Safety data sheet, technical information, www.wingis-online.de
- SVHC substances in preparations: Safety data sheet
- SVHC substances in products: Technical information, manufacturer's data sheets (obligation to be fulfilled by the manufacturer)
- Individual substances (heavy metals etc.): Manufacturer's declaration

(See criteria matrix in Appendix 1; column: "Type of documentation / requirement for verification of individual aspects)

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

Fundamental sources chosen from the available lists of substances and material data:

- CLP Regulation 1272/2008/EC including alignment regulations *
- Hazardous Substances Ordinance (GefStoffV) and Technical Rules for Hazardous Substances (TRGS) *
- REACH Regulation (EC 1907/2006) *
- Biocides Regulation 528/2012 *
- Substance database GESTIS (Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA))
- Information from the trade associations GISCODE
- Independently verified declarations, for example Environmental Product Declarations (EPD)
- Industry-specific regulations, for example RAL, VdL guideline
- Industry certifications
- EC (2010): Consolidated list of active substances that may no longer be marketed, published and constantly updated by the European Commission:
- UBA (2009): Guidance on the application of the GHS Regulation - The new classification and labelling system for chemicals according to GHS - in brief - Federal Environment Agency Dessau 2009 and application guidance

*For all legal lists and material information, the status at the time of the building application must be referred to. In the case of legal regulations, the respective transitional periods for placing on the market and use apply.

APPENDIX 1 - CRITERIA MATRIX

No.	RELEVANT COMPONENTS/ CONSTRUCTION MATERIALS/ SURFACES	SCOPE	SUBSTANCES/ ASPECTS CONSIDERED	REFERENCE STANDARD	QUALITY LEVEL 1	QUALITY LEVEL 2	QUALITY LEVEL 3	QUALITY LEVEL 4	TYPE OF DOCUMENTATION	SCOPE AND DOCUMENTATION	NOTES ON DEFINITIONS/ EXPLANATIONS/ FOOTNOTES	FOCUS OF IMPACT OF THE SUBSTANCES/ASPECTS CONSIDERED OVER THE INDIVIDUAL STAGES IN THE LIFE OF A BUILDING (MODULES IN ACCORDANCE WITH DIN EN15978)					APPLICATION
	Where does this apply?	Product type	Explanation	Definition	Limit value 10 points	Reference 50 points (verification via building elements catalogue; alternatively, technical trade specific documentation possible)	Sub-target 75 points (verification via building elements catalogue)	Target value 100 points (verification via building elements catalogue	Requirements for verification of the individual aspects	The requirement applies to the following components		Raw materials extraction (A1)	Production of the product (A3)	Construction of the building (A5)	Operation/use of the building (B1)	Dismantling of the building (C1-C4 and D)	Typical HOAI phase of implementation
	General information: 1) For all standards, references, test seals, etc. listed below, legally valid proof of equivalence with regard to the substance or aspect considered (see column 4) will be accepted. This legally valid proof can be provided by the manufacturer or the authority responsible for awarding the test seal. 2) The requirements of the specified "reference standards" (see column 5) generally apply to the statutory requirements that are predominantly shown in quality level 1. Requirements outside of this do not always refer to the reference standard. The requirements of a higher quality level in each case incorporate all requirements listed for the lower levels; higher quality levels (QL) may require additional requirements and quality standards.										Legally valid proof	Reference to the DGNB criterion					
												ENV 1.3 "Sustainable resource extraction"			SOC 1.2 "Indoor air quality"	TEC 1.6 "Ease of recovery and recycling"	
1	Coatings on non-mineral sub-surfaces: Metals, wood, plastics (factory and building site)	This refers to decorative liquid coating materials: Paints/varnishes with primer coats. Effect coatings (such as metallic paints) are an exception to this	VOC	VOC definition in accordance with Directive 2004/42/EC	< 300 g/l - Category D in accordance with Directive 2004/42/EC	< 130 g/l – In accordance with the requirements for water-borne (Wb) coatings of the current Decopaint Directive (Appendix II) (Cat. D in accordance with Directive 1004/42/EC)	< 100 g/l or DE-UZ 12a	DE-UZ 12a	Technical data sheet (TDS) and/or SDS and/or manufacturer's declaration and/or test certificate	All relevant components and construction products	Please note: Coatings applied at the factory	Risk minimisation solvent manufacturing			Indoor air hygiene		Work stage 5-9
2	Coatings on predominantly mineral interior substrates as well as on wallpaper, non-woven materials, plasterboard, etc. Floor areas with special resistance requirements (such as OS (surface protection) systems) and traffic routes such as underground garages and access roads are not taken into account	This refers to decorative paints, primers, decorative fillers (incl. Q-filler) and deep primer, floor coatings with no special resistance requirements, concrete glazes	VOC/SVOC	VOC definition in accordance with Directive 2004/42/EC	In accordance with the requirements for water-borne (Wb) products in accordance with the current Decopaint Directive (Appendix II)	< 30 g/l	- solvent-free and - plasticiser-free according to VdL-RL01 or DE-UZ 102 (SVOC)	- solvent-free and - plasticiser-free according to VdL-RL01 or DE-UZ 102 (SVOC)	TDS and/or SDS and/or manufacturer's declaration and/or test certificate	All relevant components and construction products. For max. 5 % of the GFA(R) according to DIN 277 no documentation is required.					Indoor air hygiene		Work stage 5-9

No.	RELEVANT COMPONENTS/ CONSTRUCTION MATERIALS/ SURFACES	SCOPE	SUBSTANCES/ ASPECTS CONSIDERED	REFERENCE STANDARD	QUALITY LEVEL 1	QUALITY LEVEL 2	QUALITY LEVEL 3	QUALITY LEVEL 4	TYPE OF DOCUMENTATION	SCOPE AND DOCUMENTATION	NOTES ON DEFINITIONS/ EXPLANATIONS/ FOOTNOTES	FOCUS OF IMPACT OF THE SUBSTANCES/ASPECTS CONSIDERED OVER THE INDIVIDUAL STAGES IN THE LIFE OF A BUILDING (MODULES IN ACCORDANCE WITH DIN EN15978)					APPLICATION
3	Coatings on predominantly mineral interior sub-surfaces such as concrete, masonry, mortar and filler (e.g. concrete filler). Floor areas with special resistance requirements (such as OS (surface protection) systems) and traffic routes such as underground garages, access roads, as well as floor screed intended for use without additional coverings and decorative screeds are not taken into account.	This refers to dust-binding coatings and primer coats such as the concrete contact ("Betonkontakt"), or fire barrier ("Aufbrennsperre") products	VOC	VOC definition in accordance with Directive 2004/42/EC	< 30 g/l	< 30 g/l	< 10 g/l	< 5 g/l	TDS and/or SDS and/or manufacturer's declaration and/or test certificate	All relevant components and construction products. For max. 5 % of the GFA(R) according to DIN 277 no documentation is required.					Indoor air hygiene		Work stage 5-9
5	Coating materials for exterior mineral surfaces such as concrete, masonry, mineral mortar and filler, plaster, ETICS, wallpaper (facade wallpaper), plasterboard, etc.	Currently, decorative paints and dispersion insulation adhesives are taken into account	VOC	VOC definition according to Directive 2004/42/EC	< 40 g/l	< 40 g/l	< 40 g/l	< 40 g/l	TDS and/or SDS and/or manufacturer's declaration and/or test certificate	All relevant components and construction products							Work stage 5-9
20	Reactive PU products for coating mineral floor, ceiling and wall surfaces - including in system structures with no special requirements	Seals, 2K-PU paints, PU floor coatings – with the exception of OS (surface protection) systems for car parks, etc.	VOC, hazardous substances	GISCODE	GISCODE PU40	GISCODE PU40	- GISCODE PU40 and - Documentation of emissions according to AgBB Process as an individual product or in a system	- GISCODE PU40 and - Documentation of emissions according to AgBB Process as an individual product or in a system	TDS and/or SDS and/or GISBAU classification and/or manufacturer's declaration and/or test certificate	All relevant components and construction products. For max. 5 % of the GFA(R) according to DIN 277 no documentation is required.	GISCODE PU10 Documentation of emissions as an individual product or in the system AgBB Test certificate	Risk minimisation in solvent manufacturing		Minimisation of solvent emissions into the environment	Indoor air hygiene		Work stage 5-9

No.	RELEVANT COMPONENTS/ CONSTRUCTION MATERIALS/ SURFACES	SCOPE	SUBSTANCES/ ASPECTS CONSIDERED	REFERENCE STANDARD	QUALITY LEVEL 1	QUALITY LEVEL 2	QUALITY LEVEL 3	QUALITY LEVEL 4	TYPE OF DOCUMENTATION	SCOPE AND DOCUMENTATION	NOTES ON DEFINITIONS/ EXPLANATIONS/ FOOTNOTES	FOCUS OF IMPACT OF THE SUBSTANCES/ASPECTS CONSIDERED OVER THE INDIVIDUAL STAGES IN THE LIFE OF A BUILDING (MODULES IN ACCORDANCE WITH DIN EN15978)					APPLICATION
23	EP products for coating mineral floor, ceiling and wall surfaces - including in system structures with no special requirements	Seals, 2K-EP paints, EP floor coatings – with the exception of OS (surface protection) systems for car parks, etc.	VOC, hazardous substances	GISCODE MVVTB	GISCODE RE05, RE10, RE20, RE30, RE40, RE50, or RE55 - Documentation of emissions according to MVVTB as an individual product or in the system	GISCODE RE05, RE10, RE20, RE30 or RE55/"total solid" - Documentation of emissions according to MVVTB as anindividual product or in the system	- GISCODE RE05, RE10, RE20, RE30 or RE55/"total solid" and - Documentation of emissions according to MVVTB as an individual product or in a system	GISCODE RE05, RE10, RE20 or RE30 and - Documentation of emissions according to MVVTB as an individual product or in a system	TDS and/or SDS and/or GISBAU-Classification and/or manufacturer's declaration and/or test certificate	All relevant components and construction products For max. 5 % of the GFA(R) according to DIN 277 no documentation is required	Documentation of emissions as an individual product or in the system AgBB Test certificate	Risk minimisation in solvent manufacturing		Minimisation of solvent emissions into the environment	Indoor air hygiene		Work stage 5-9
24	EP/PU primers (including mastic asphalt screeds) and coatings for floor and wall surfaces (e.g. skirting boards) with special requirements	Industrial floorings, parking areas and underground garages (OS (surface protection) systems 8, 10, 11 among others) with the exception of markings (not regulated)	Polyurethane and epoxy resins	GISCODE	GISCODE PU10, PU20, PU40, PU60 RE05, RE10, RE20, RE30, RE40, RE50, or RE55	GISCODE PU10, PU20, PU40, PU60, RE05, RE10, RE20, RE30, RE40, RE50, or RE55	GISCODE PU10, PU40, PU60, RE05, RE10, RE20 or RE30	GISCODE PU10, PU40, PU60, RE05, RE10, RE20 or RE30	TDS and/or SDS and/or GISBAU-Classification and/or Manufacturer declarations	All relevant components and construction products	GISCODE PU10	Risk minimisation in solvent manufacturing		Minimisation of solvent emissions into the environment			Work stage 5-9
25	Roof sealing, sealing of buildings against soil/water/moisture, thick bitumen coating and insulation material installation	Coating products that can be processed cold (e.g. precoats) and auxiliary materials for installation (e.g. adhesives, sealants)	Bitumen	Solvent: Boiling point 135-250 °C GISCODE	GISCODE BBP10 or BBP20	GISCODE BBP10 or BBP20	GISCODE BBP10	GISCODE BBP10	TDS and/or SDS and/or GISBAU-Classification and/or manufacturer's declaration and/or test certificate	All relevant components and construction products		Risk minimisation in solvent manufacturing		Minimisation of solvent emissions into the environment	Indoor air hygiene		Work stage 5-9
26	Bituminous compound sealants for inverted roof	Bitumen primer	Bitumen	GISCODE	GISCODE BBP10, BBP20 or BBP30	GISCODE BBP10, BBP20 or BBP30	GISCODE BBP10, BBP20 or BBP30	GISCODE BBP10, BBP20 or BBP30	TDS and/or SDS and/or GISBAU-Classification and/or manufacturer's declaration and/or test certificate	All relevant components and construction products				Prevention of aromatic solvents			Work stage 5-9
34	Roof covering, guttering, downpipes	Components conveying water on the roof and rainwater drainage	Lead, copper and zinc				Heavy metal filters, if area > 10 % of the projected roof area viewed from above	Heavy metal filters, if area > 10 % of the projected roof area viewed from above	Planning and/or manufacturer's declaration, and/or documentation in accordance with Umweltbundesamt (UBA) guideline 17/05	All relevant components and construction products					Soil & groundwater protection		Work stage 3-9

No.	RELEVANT COMPONENTS/ CONSTRUCTION MATERIALS/ SURFACES	SCOPE	SUBSTANCES/ ASPECTS CONSIDERED	REFERENCE STANDARD	QUALITY LEVEL 1	QUALITY LEVEL 2	QUALITY LEVEL 3	QUALITY LEVEL 4	TYPE OF DOCUMENTATION	SCOPE AND DOCUMENTATION	NOTES ON DEFINITIONS/ EXPLANATIONS/ FOOTNOTES	FOCUS OF IMPACT OF THE SUBSTANCES/ASPECTS CONSIDERED OVER THE INDIVIDUAL STAGES IN THE LIFE OF A BUILDING (MODULES IN ACCORDANCE WITH DIN EN15978)					APPLICATION
37	Cooling systems/ building technology/ split devices (factory)	Refrigerants	Halogenated refrigerants		Additional evaluation point: Does not contain halogenated/ partially halogenated refrigerants	Additional evaluation point: Does not contain from halogenated/ partially halogenated refrigerants	Additional evaluation point: Does not contain halogenated/ partially halogenated refrigerants	Does not contain halogenated/ partially halogenated refrigerants	Building technology planning and/or manufacturer's declaration	All relevant components and construction products		Prevention of refrigerants or propellants that are persistent by themselves or have degradation products that are persistent.*			Avoidance of refrigerants or propellants that are persistent themselves or their degradation products are persistent.*		Work stage 3-9
40	Synthetic foam insulating materials for buildings and building services	PS/XPS/PUR insulating products, flexible building technology insulation (rubber and PE)	Halogenated propellants	REACH	No use of halogenated propellants	No use of halogenated propellants	No use of halogenated propellants	No use of halogenated propellants	TDS and/or manufacturer's declaration	All components and construction products relevant for the building thermal envelope (EnEV) and the main parts of the building technical installations			Prevention of potent greenhouse gases				Work stage 5-9

Note: Color-coded rows (column “No.”): In addition, the explanations in Chapter III Method have to be considered (“The following requirements of this criterion demonstrate and comply with materials / products / materials delivered to the site”)

Explanations and notes on APPENDIX 1 (Criteria matrix):

Legally valid documentation (see General notes: 1): A ppa. signed document or a clear statement in the manufacturer's declaration that this has been legally issued by a person who is familiar with the recipe is understood as legally valid documentation.

Chlorinated paraffins:
Chlorinated paraffins are mixtures of substances containing chlorinated alkanes with chain lengths of 10-30 carbon atoms and a chlorination degree of 10 to 70 mass % (= SCCP (short-chain CP), MCCP (medium-chain CP) and LCCP (long-chain CP)).

POP Regulation and REACH candidate list:
Both the POP VO and the REACH candidate list currently regulate short-chain chlorinated paraffins. For precautionary reasons, however, medium- and long-chain chlorinated paraffins are also relevant.

AgBB test certificate:
The AgBB test certificate can only be achieved with low-VOC formulations << 100g/l emissions

GISCODE PU10 or PU20:
Due to more stringent labelling of all isocyanates as sensitising substances, products that were previously classified as GISCODES PU10 or PU20 must now be reclassified as GISCODES PU40 and PU50. Until GISCODES have been adapted, fabrics with GISCODES PU40 (instead of PU10) and PU50 (instead of PU20) are accepted.

Wood protection according to 68800-2 or natural durability according to DIN EN 350-2:
The classification previously occurred according to DIN 68364 (11-1979). The new DIN 68800 of 2011 no longer refers to species-typical resistance, but refers in its statements to natural durability in the sense of DIN EN 350-2.

Approved active substance according to 528/2012/EC:
For products manufactured in the EU, compliance with these requirements can be assumed on the basis of the legal regulations (no additional documentation is required here).

Biocide Regulation:
Further information on active substances approved under the Biocides Regulation is available at: http://www.reach-clp-biozid-helpdesk.de/de/Biozide/Wirkstoffe/Genehmigte-Wirkstoffe/Genehmigte-Wirkstoffe.html

Documentation of emissions:
Confirmation (not older than 5 years) by an ISO 17025 accredited laboratory that the product or system complies with the AgBB criteria (except sensory properties) in an emission test according to ISO 16000-9, prEN 16516 or EN 16402.

Emission documentation as an individual product or in the system:
Instead of the proof of emissions, a certificate of conformity to DIN V 18026: 2006-6 together with a proof of compliance with the emission requirements according to AgBB by a test centre recognised for this purpose by DIBt is also recognised.

Hydrocarbon plasticiser (HCP):
Hydrocarbon plasticizers are aliphatic hydrocarbons in the boiling point range between 200 and 400 degrees Celsius.

Note on factory coatings:
The VOC requirements of line 1 in the highest quality level (QL) can be met at the factory with coating materials of QL 3 (<100g VOC/l).

Note on use of recycled materials:
For products made of recycled plastics, documentation that they are free of lead, cadmium and tin compounds must be provided by means of a manufacturer's declaration.

Note on DIBt principles:
DIBt principles for the health-related evaluation of construction products in interiors: including notes on the area of activity "Reactive fire protection systems on steel components" (DIBt Division II4 and III4 As of: April 2014).

Test chamber and perforator values:
The more stringent requirements for test chamber concentrations in line 48 in quality levels 3 and 4 are due to the higher room loading in timber house construction. There is no strict correlation for the specified limit values of the test chamber and perforator values.

Measurements according to EN ISO 16000-9 or EN 16516 (WKI calculation model):
For measurements according to EN ISO 16000-9 or EN 16516, the values must be converted by the test laboratory/manufacturer according to the WKI calculation model.

Notes on explanations and footnotes on "Focus on effects of the substances considered/aspects over the individual life phases of a building":

- * "Halogenated refrigerants or propellants" in lines 13, 37, 38 and 39:
  - Avoidance of halogenated refrigerants or propellants as long as it is not proven for these or their degradation products that they do not accumulate in the environment or have persistent degradation products that burden natural sinks (= accumulation) or have a damaging effect there.

APPENDIX 2

Examination of pollution risks / reports for existing buildings

For buildings constructed after 06/2000, the use of prohibited pollutants (see above asbestos etc.) can be excluded. Therefore, a simplified verification is possible here (= year of construction). This is done through a legally valid declaration by the owner that the further pollution (e.g. mineral oil) or pollutants (e.g. mould) is non-existant in the building under consideration.

For all older buildings, the risks listed in the “Expert opinion” section must be examined. Risks for pollutants already prohibited at the time of initial construction can be excluded in the same way (= year of construction).

I. Expert opinion

The first step in the evaluation of an existing building within the framework of DGNB certification is an expert opinion on the existing risks to the health of the users and possible costs for refurbishment or demolition. The expert opinion is equivalent to a risk assessment, which requires an inspection and assessment by an experienced expert (e.g. core drilling is not necessary for this purpose). The expert opinion shall evaluate the following risk issues separately according to current health risks and potential risks relating to the costs of conversion or dismantling:

1. Pollutants and contaminated sites in existing buildings (occurrence and release of pollutants)
2. Heavy metals in pipes (e.g. lead pipes)
3. High indoor air pollution (volatile organic compounds)
4. Strong odour nuisances
5. Visible moisture damage or mould

A general exclusion of risks to health or dismantling costs is not possible. The risks should be described qualitatively by the evaluator and classified qualitatively with a gradation such as “very low, low, medium, high and very high”. If the risk is very low or low (subordinate risks), the building can be certified without further assessment and without a pollutant register. All risks that are not classified as very low must be explained in the opinion to such an extent that the respective basis for assessment (benchmark) is identifiable.

For risks that are to be classified as higher than very low, the building can only be certified without further assessment and without a pollutant register if they are not to be considered a health risk for the current users. For example, a suspicion of PAH-containing seals in sanitary rooms could possibly only be interpreted as a risk for later conversion or dismantling costs.

1. Pollutants and contaminated sites in existing buildings

Separate statements on the occurrence (dismantling risk) and, if applicable, on the release (health risk) of pollutants and contaminated sites in the existing buildings must be made. A low or very low health risk exists if either the pollutant does not occur due to the age of the building, etc., or the user is sufficiently protected against low levels of the pollutant and in accordance with legal requirements. For contaminated sites (soil), a corresponding statement in the register of contaminated sites may be sufficient.

- Asbestos (differentiation between weakly and firmly bonded, according to type of cover); the basis for evaluation is the asbestos guideline and TRGS 519
- WP, wood preservatives (occurrence and compound with indoor air); basis for the evaluation is the PCP Directive and Biocide Directive
- AMF, artificial mineral fibre (carcinogenicity, compound with indoor air); basis for the assessment are the TRGS 521
- MOH, mineral oil hydrocarbons (visible or olfactory conspicuous indications)
- PAH, polycyclic aromatic hydrocarbons (position in the component, odour); the assessment is based on the PAH guidance[1]
- PCBs, polychlorinated biphenyls (primary and secondary sources); the basis for the assessment is the PCB Directive
- Radon according to radon cadastre (structural protection)

2. Heavy metals (lead) in pipes

Based on the inspection, a statement on the occurrence of lead drinking water pipelines on a larger scale is required. Short vertical sections of lead pipelines that have not been completely dismantled cannot be completely determined during an initial survey. Depending on the age of the building, there is therefore always a small to very small risk that small lead lines are in the building. This residual risk must be stated; further statements on the contamination of lines etc. are not required. In addition, there is the risk of paints containing heavy metals (lead, cadmium, etc.) in buildings, which cannot be assessed in the course of an inspection and therefore usually remains as a possible risk.

3. High indoor air pollution

The opinion shall indicate whether and for which rooms there is more than a very low risk that the VOC load exceeds the value of 3,000 µg/m³. Buildings or rooms with VOC loads of more than 3,000 µg/m³ are to be classified as hygienically critical according to the guidelines of the ad hoc[2] working group; the respective room may only be used with increased ventilation and for a limited period. If the expert cannot make any statements on the indoor air pollution on the basis of the inspection results, indoor air measurements are necessary to a statistically sufficient extent (depending on the different equipment and its installation age).

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1 Guidance for assessment and measures to reduce PAH exposure from parquet floors with tar adhesives in buildings; Project Group on Pollutants of the Expert Commission on Construction Technology of the Conference of Ministers of Construction; 2000

2 Assessment of indoor air contamination using reference and standard values

Handbook of the Ad Hoc Working Group of the Indoor Air Hygiene Commission of the Federal Environment Agency and the Supreme State Health Authorities; Bundesgesundheitsblatt - Health Research - Health Protection 2007 - 50:990-1005

4. Strong odour nuisance

The statement shall indicate whether and for which rooms there is more than a low risk of users being affected by strong odours. The scale for the evaluation is the odour intensity levels according to VDI 3882 or the AGÖF[3] guidelines between 0 = odourless (not perceptible), 1 = very weak, 2 = weak, 3 = significant, 4 = strong, 5 = very strong, (6 = extremely strong). Sampling according to VDI or guideline AGÖF is not required. The expert's statement serves exclusively to ensure that buildings with significant odour pollution are not certified without further evaluation measures and appropriate renovation.

5. Visible moisture damage and mould

In the statement it shall be shown whether and in which rooms visible moisture or mould occur. During an inspection, small or hidden mould contamination can usually not be identified. There is therefore always a residual risk of hidden moisture and mould damage. The evaluation is intended to exclude the certification of buildings that show obvious damage.

Audit requirements for the expert opinion

To audit the opinion, it is sufficient to check for completeness with regard to the required topics, plausibility of conclusions and clarity of the evaluation or determination of a qualitative value.
The structure of the opinion should look something like this

1. Pollutants in existing buildings
    a. Asbestos
    b. WP, wood preservatives
    c. AMF, artificial mineral fibre
    d. MOH, mineral oil hydrocarbons
    e. PAH, polycyclic aromatic hydrocarbons
    f. PCB, polychlorinated biphenyls
    g. Radon
2. Lead wires
3. Indoor air quality
4. Odour pollution
5. Moisture damage and mould

Result of the opinion

If the opinion cannot be limited to very low and in a few cases low health risks, further investigations must be carried out for the risks that are not limited. For pure dismantling risks, a further evaluation can be dispensed with, but no statement can then be made about the actual dismantling capability. A positive classification in criterion TEC1.6 Ease of recovery and removal is therefore not possible.

3 "Odours in interiors - sensory determination and evaluation" draft of the Arbeitsgemeinschaft ökologischer Forschungsinstitute e. V. of 12/09/2010 http://www.agoef.de/agoef/photoarchiv/pdfs/AGOEF-Geruchsleitfaden-Entwurf-2010-09-12.pdf The draft will be finally publishedafter expiry of the objection period in spring 2011.

II: Pollutant reports (informative only)

In the pollutant report, statements must be made on the distribution (component-related contamination register) in the soil or building of the contaminated sites and pollutants for which no limitation of the risk was possible. The pollutant report also includes statements on dismantling and disposal. In case of extensive contaminated sites or pollutant loads in the building, an independent dismantling and disposal report is recommended.

In the pollutant report, statements on the type and extent of the occurrence, its spatial and constructive distribution (component layers), its release potential, its toxicological evaluation, its classification with regard to occupational safety and disposal are to be made separately for each type of pollutant.

The basis for a pollutant report is not only the legal requirements such as the Substance Directive, Chemicals Prohibition Ordinance, Technical Guidelines on Hazardous Substances (TRGS), Closed Substance Cycle and Waste Management Act, state regulations on handling waste, but also the ad-hoc working groups guideline values for indoor air.

The expert opinion shall include statements on the above-mentioned pollutants (asbestos, WP, AMF, MOH, PAH, PCB, radon) and at least the following groups of substances: Phenols, formaldehyde, VOC and heavy metals. Furthermore, statements about the odour load of the rooms must be made.

The pollutant report must be carried out by an expert qualified for the listed pollutants and substance groups. The client should make sure that the expert is sufficiently qualified. An unfounded suspicion of pollutants can lead to unfounded depreciation or undiscovered pollutants can lead to massive recourse claims by buyers. The DGNB's audit cannot verify the technical quality.

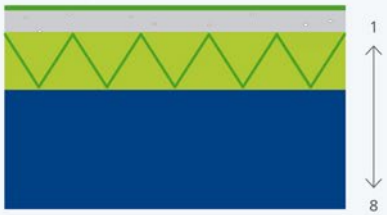
Exemplary structure of a pollutant report:

1. Aim and scope of the report
2. Methods of assessment - Assessment criteria
3. Research findings
   - Asbestos
   - WP
   - . . .
4. Evaluation of the results
   - Asbestos
   - WP
   - . . .
5. Notes on dismantling and disposal
   - Asbestos
   - WP
   - . . .
6. Appendices
   - Mapping of sampling
   - Mapping of the results in the floor plan
   - Exemplary layer structures
   - Analysis reports

APPENDIX 3

Group of costs (KG): 350
Component designation: Floor above basement

Presentation



NOTE

All component layers per component must be named. Building materials that are not considered in the DGBN assessment are to be marked as "not relevant". All components/assemblies of the following cost groups must be listed:

320 - Foundation
330 - External walls
340 - Internal walls
350 - Ceilings
360 - Roofs
370 - Structural fitments

410 - Sewage, water, gas installations
420 - Heat supply systems*
430 - Ventilation systems*
440 - Power installations*
450 - Conveyor systems*
*only relevant assemblies

INSIDE

No.	Designation	Building material	Manufacturer	Product designation	Substances/aspects considered; criteria matrix no.	Quality level of the DGNB criteria matrix	Brief explanation	Total area of the unit (component) (s-description method in criterion)	Component area	Area share	Appendix reference APX - Appendix MSDS - Material safety data sheet TDS - Technical data sheet GIS - Information sheet GISBAU EPD - Environmental product declarations
								(m^2)	(m^2)	(%)	
1	Linoleu										
2	Adhesiv										
3	Prime										
4	Cement screed										
5	Insulatio										
6	Reinforced concrete										
7	Primer										
8	Top	Interior paint on silicate basis	Model AG	Sytitol Organic interior colour	VOC No.2	4		The product is solvent-free, plasticiser-free, free of fogging-active substances			see APX 1.1 MSDS P.14

OUTSID E

8 Sample

APPENDIX 4

Sample letter "Confirmation from manufacturing companies"

"Dear sir or madam,

For the construction project:
The following coating materials/coating systems will be used:

No.	Product	DFT µm	VOC g/l	VOC Mass %	VOC g/m²
1					
2					
3					
Total					

Please complete the VOC information in the units g/L, mass % and g/m² of coated surface with the specified dry film thickness (DFT) based on the theoretical coverage.

ENV1.5

Urban climate

Objective

The objective is the climate-conscious design of the district and to avoid negative effects on the mesoclimate caused by district development and climate change.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Health and well-being of residents and users of the district, e.g. avoidance of heat stress, high air quality, etc.
- Stability of ecosystems and securing of the food base
- Reduction of energy demand by avoiding the use of technologies for air conditioning and air purification in buildings
- For employees: Increase in productivity

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.4	Reduction of premature mortality; promotion of health/well-being	3.1.a/b	Health and nutrition
	3.9	Effect of chemicals, air, water and soil pollution	3.2.a	Air pollution
	11.5	Impact of disasters	3.2.b	Air pollution
	13.1	Resilience and adaptability		
	13.2	Climate action measures in regulations, strategies and planning		
Moderate	1.5	Reduction of vulnerability to climate-induced extreme events	13.1.a	Climate action
Low	11.6	Reduction of environmental pollution in cities		

Outlook

Due to advancing climate change, climate adaptation at the city level is of great importance for the quality of life of the inhabitants. In future this will be increasingly important. Therefore, the contents of this criterion together with SOC1.1 Thermal comfort in open spaces will be integrated into the next system version for new buildings. The content of the criterion will be further developed.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**4.0 %**	**5**
Commercial	**4.5 %**	**7**
Event	**3.8 %**	**5**
Industry	**2.6 %**	**4**

ASSESSMENT

The climate-conscious planning of the district is evaluated by the criterion ENV1.5 Urban climate and SOC1.1 Thermal comfort in open spaces. In the present criterion, the influences of district planning on the mesoclimate are considered through the urban climate analysis, the determination of the urban climate factor and the consideration of ventilation potentials at city level.
In the criterion, a maximum of 100 points in total can be achieved without bonuses and a maximum of 120 points including bonuses.

NO.	INDICATOR	POINTS
1	**Urban climate analysis of the district**	
	City **Business** **Event** **Industry** **Commercial**	**max. 30**
1.1	**Urban climate analysis**	
	City **Business** **Event** **Industry** **Commercial**	**max. 30**
	■ Analysis of the large-scale city climate situation	+7.5
	■ Analysis of the wind direction	+7.5
	■ Analysis of orographically/topographically strongly structured areas	+7.5
	■ Analysis of the small-scale city climate situation	+7.5
2	**Thermal quality of the district surfaces/factory surfaces**	
	City **Business** **Event** **Industry** **Commercial**	**max. 40**
	For **Existing buildings**	**max. 50**
2.1	**Urban climate factor for districts**	
	City **Business** **Commercial**	**0 - 40**
	■ ≤ 0	40
	■ ≥ 4.0	0
2.2	**Urban climate factor for industrial sites/event areas**	
	Industry **Event**	**0 - 40**
	■ ≤ 2.0	40
	■ = 5.0	0
to 2.1	Explanation: Alternatively, an expert opinion with modelling of the mean radiation temperature can be used.	as in 2
to 2.2	For **Existing buildings:** A maximum of 50 points can be credited. Urban climate factor for industrial sites ≤ 2.0 = 50 points	0 – 50

NO.	INDICATOR	POINTS
3	**Ventilation** City Business Event Industry Commercial	**max. 30**
3.1	**Analysis of ventilation potential** City Business Event Industry Commercial	**max. 15**
	■ A planning optimisation with documentation of the planning approach and corresponding argumentation based on a climate function map is available.	7.5
	■ The cool air producing areas and airflow outlets were identified by means of a digital city model (DGM) and the land use of the city, and documentation was provided that the ventilation of the city/neighbouring districts is guaranteed.	15
3.2	**Expert opinion on ventilation potential** City Business Event Industry Commercial	**max. 15**
	■ Expert opinions on modelling were prepared and implemented.	15
4	**AGENDA 2030 BONUS - CLIMATE ADAPTATION STRATEGY AT THE DISTRICT LEVEL** City Business Event Industry Commercial A climate adaptation strategy specifically for the district is available for the planning area.	**max. 20** 20

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI, it is appropriate to use the avoidance of certain refrigerants for communication, in the event of a positive evaluation of indicator 2, or to communicate selected emission key values of relevant construction products used.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Classification of district surfaces according to urban climate factors.	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Contents of the criterion will be integrated into the next system version.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

The mesoclimate quality of the outdoor spaces is of great importance for well-being and a healthy living environment in the district. Due to global climate change and the expected changes in the city climate, the importance of this topic is increasing.

Industry **Commercial**

The mesoclimate quality of the outdoor spaces is of great importance for the well-being and healthy living environment on the factory premises and in the surrounding area. The disadvantages resulting from the development of an industrial site must be minimised both for the factory site itself and for neighbouring districts.

According to the German Federal Building Code, sustainable urban development must be guaranteed by urban land-use planning. This also includes promoting climate protection and climate adaptation, as well as ensuring healthy living and working conditions (BauGB § 1 para. 5 and 6). Due to global climate change and the expected changes in the urban climate, the importance of this topic is increasing. The objective is therefore: To avoid adverse health effects caused by bioclimatic stress situations and poor air quality, also for the surrounding area. The following areas are relevant in this context (VDI 3787 Sheet 2 and Urban climate guide):
1. Urban climate analysis of the district
2. Thermal quality of the district surfaces/factory surfaces
3. Ventilation

II. Additional explanation

-

III. Method

City **Business** **Event** **Industry** **Commercial**

This criterion is used to assess quantitative and qualitative aspects of the urban climate. Measures that improve the microclimatic comfort (warmth, ventilation) in the district are evaluated positively. The evaluation will be based on the following indicators:

Indicator 1: Urban climate analysis of the district
For a qualified urban climate analysis, all relevant information on the urban climate should be researched and collected. Possible sources for this include: Climate analysis of the entire city, climate assessment for sub-areas, municipal climate adaptation strategy, land use plan, landscape framework plan. Conclusions for district planning are to be drawn and the planning approach is to be justified on the basis of these queries. This planning integration is to be documented according to the relevance.

Analysis of the large-scale urban climate situation

First of all, the location of the district must be classified in relation to maritime influence (a), the proximity to large inland waters (b) or to an orographically highly structured area (c) and specific measures must be taken and demonstrated as a result. In the absence of special features (d), general measures must be demonstrated.

- (a) In the case of maritime influence, a strong land-sea wind effect should be taken into account by considering the orientation of roads, the orientation of the building structure and, if necessary, measures for wind comfort.
- (b) If there is proximity to a large inland waterway, the land-sea wind effect and the partly sensitive circulation with cooling properties should be exploited by ensuring that roads and building structures are oriented towards the water.
- (c) In the case of a highly orthographically structured area, mountain and valley winds and potentially usable cold air systems should be taken into account
- (d) If there are no special features, corridor winds from networking of green spaces should be taken into account depending on the size of the district.

Analysis of the wind direction

As an important basis for planning, the main wind direction and weak wind directions must be documented using wind roses. The district planning must then be presented in relation to the prevailing wind directions so that the streets, green spaces and building structure can be aligned accordingly.

Analysis of orographically/topographically strongly structured areas

- Integration of slope winds as well as mountain and valley winds can promote ventilation and cooling: After deriving the wind direction by means of an elevation model (e.g. DHM), the alignment of the roads and building structure should be carried out accordingly.
- Preservation of potentially usable cold air systems: Cold air run-off paths are extremely sensitive. They need a source, must be kept free, must be integrated by the urban structure and must not be obstructed by the district in its further course to neighbouring districts or parts of the city.

Analysis of the small-scale urban climate situation

Depending on the location of the district in relation to large parks/cemeteries (a), natural rivers/streams/meadows (b), railway tracks or areas with low aerodynamic roughness (c), location to the outside (d), direct neighbourhood (e), the following measures must be documented:

(a) Large-scale parks/cemeteries should be considered as climate-impacting areas with use of cooling and, if necessary, ventilation functions.
(b) For locations on natural rivers/streams/meadows, which are also potentially well suited for cold air transport, the cooler air masses should be used.
(c) For locations on tracks or surfaces with low aerodynamic roughness, the ventilation potential should be taken up by this as an air conduction or ventilation path (alignment with wind rose important).
(d) For locations facing the outside, the ventilation potential should be examined and integrated in an area with dispersed buildings, whereas in a densely populated area without ventilation, the vegetation and shadows should be taken into account.
(e) With regard to the direct neighbourhood, transitions should be taken into account, possible potential areas should be networked, green corridors should be included and permeability at the edges should be ensured.

If several aspects are relevant for the district and only a few are taken into account, the evaluation points must be reduced proportionally.

Indicator 2: Thermal quality of the district surfaces/factory surfaces

The thermal effect of green spaces, traffic areas and building surfaces should be taken into account in the development of districts and industrial sites. Here, climate-balancing open space elements such as green roofs, green spaces and water surfaces are to be maximised, and sealing is to be minimised in order to reduce the heat island effect and summer overheating of industrial sites. A positive course is with increasing greenery and reducing sealing.

Indicator 2.1: City climate factor for district surfaces/factory surfaces

The thermal quality of the district is evaluated by means of the surface structure with a factor for the district surfaces. The thermal properties of all open spaces, green spaces in their final state and climatically positive building surfaces (e.g. green roofs) are related to each other with factors.

According to the climatic effects, a factor of -5 to +5 is assigned to the district surfaces (e.g. tree-covered areas (on grassland) = -5; lake and pond areas, permanent = 0; hard surfaces with dark asphalt or stone coverings = 5), which describes the degree of temperature reduction potential of the surface compared to an asphalt surface (5 = no temperature reduction, -5 = max. temperature reduction).

This factor is multiplied by the area size of the respective area type. In the base surfaces category all horizontal surfaces (open and building roof surfaces) are summarized. The base surfaces together form the gross site area. Furthermore, facade areas are taken into account in the calculation.

The factor for the district surfaces is calculated by placing the assessed areas in relation to the total area of the district. The factors specific to each area category are stored in the master tool provided by the DGNB.

Calculation formula:

$$F_{TOT} = \frac{(((BS_1 \times F_1) + (BS_n \times F_n)) + ((FS_1 \times F_1) + (FS_n \times F_n)))}{GSA}$$

with

F	Factor for district surfaces
BS	Base surface
FS	Facade surface
GSA	Gross site area

The calculation can be performed automatically via the DGNB Master Tool for districts.

	AREA CHARACTER OR AREA USE	FACTOR F
Base surface BS	1 Hard surfaces with dark asphalt or stone surfaces	5
	2 Hard surfaces with light-coloured asphalt or stone surfaces	4
	3 Water-bound coverings and grass paving	2
	4 Grass areas (e.g. sports fields)	0
	5 Natural grasslands	-3
	6a Tree-covered areas (on sealing)	-2
	6b Tree-covered areas (meadows)	-5
	7 Temporary water surfaces (e.g. rainwater retention, grey water cleaning)	0
	8 Lake and pond areas, permanent	0
	9 Covered area	2
Facade surfaces FS	12 Facade greening	-2
	13 Bright facade surfaces; reflection > 50	-1
	14 Dark facade surfaces; reflection < 30 %	1
Roof surfaces RS	15 Roof surfaces with extensive roof greening (also with PV)	-2
	16 roof surfaces with intensive roof greening	-3

Alternatively, an expert opinion with modelling of the mean radiation temperature can be used. Here, the optimisation of the urban planning must be carried out by documenting 2 simulations of an earlier draft stage and the urban development design to be implemented. However, a representation of only the shadow cast or temperatures is not sufficient.

2.2 Urban climate factor for industrial sites/event areas

Content as for 2.1.

Indicator 3: Ventilation

In addition to thermal quality, ventilation and air exchange play a central role in the mesoclimate, especially in low-wind conditions. In addition, the inflow of cold and fresh air from the outskirts of the city to the site and to neighbouring districts should be preserved or guaranteed.

The local ventilation can be strongly influenced by a new district. For this reason, the new district is to be optimised in such a way that the ventilation of the city/neighbouring districts is guaranteed. On the basis of the documents from the urban climate analysis, conclusions for the district planning are to be drawn and the planning approach is to be justified. This planning integration is to be documented according to the relevance.

3.1 Analysis of ventilation potential

Since local ventilation in particular can be strongly influenced by a new district, the new district should be optimised in such a way that the existing ventilation is maintained or improved (assessment by experts if necessary).
Based on the urban climate analysis, conclusions for the district planning are to be drawn and the planning approach is to be justified. This planning integration is to be documented according to the relevance.

- There is a proven planning optimisation with documentation of the planning approach and a corresponding argumentation using a climate function map.
- Cold air producing areas and discharges were determined using a digital city model (DGM) and the city's land use. Documentation is available that the ventilation is not disturbed by the new district.

3.2 Expert opinions on ventilation potential

In addition, expert opinions can be used to model this dynamic component of the urban climate.

- Calculation of the wind field or cool airflow outlets and subsequent optimisation of the district planning by a qualified engineering office. Two calculations or simulations must be carried out: The first for the existing wind field or cool air outlet prior to the district relocation and the second for the urban development design to be implemented or carried out with the result that it can be proven that the district has no negative impact.

4. AGENDA 2030 BONUS - Climate adaptation strategy at the district level

In order to promote the future viability of the district, a climate adaptation strategy was drawn up for the planning area specifically at district level and taken into account in the planning of the district. This is to ensure the resilience and adaptability of the district to future expected climate changes at the site.

IV. Scheme-specific description of the method

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Declaration of intent on the implementation of the measures/expert opinions	A
Documentation of **relevant records/documents**	B

- B1: Presentation of relevant basic information on the urban climate, e.g. climate analysis of the entire city, climate reports for sub-areas, municipal climate adaptation strategy, land use plan, landscape framework plan, climate function map.

- B2: Calculation plan (similar to the area survey for the environmental report) and calculation for the urban climate factor with classification of the district and factory surfaces into categories with reference to the area sealing and the open space plans. Letters of intent are possible for open spaces for which no open space planning is available yet and for facade areas that have not yet been realised.
  Alternative: Expert opinion with modelling of the average radiation temperature. Here, the optimisation of the urban development planning must be carried out by proving two simulations of an earlier design status and the urban development design to be implemented or realised. However, it is not sufficient to show only the shadow cast or temperatures.

- B3a: The initial situation with cold air production areas, local and regional ventilation needs are to be presented in an analysis plan. Furthermore, the district planning or factory planning and the surroundings with building structures and open spaces must be presented. Presentation of the planning integration and consideration of the basic information on the basis of graphic concept representations and descriptions as well as justification of the extent to which there is a disturbance of the existing ventilation, as well as corresponding classification.

- B3b: Expert opinion on ventilation with the following contents:
  - Calculation of the wind field/cold air discharge and subsequent optimisation of the district planning
  - Two calculations/simulations: existing wind field or cold air discharge before the district realisation and for the urban development design to be realised/implemented, with a demonstrable result that the district has no negative impact
- B4: Analysis plan for the initial situation with cold air production areas, local and

regional ventilation needs; presentation of the district planning or factory planning and the surroundings with building structures and open spaces

- B5: A climate adaptation strategy at district level, not only the level of the city or part of the city

Documentation of **planning documents**: Presentation of planning integration and consideration of the basic information on the urban climate by means of graphic concept representations and descriptions as well as justification of the extent to which there is a disturbance of the existing ventilation, as well as corresponding classification.	E
Determination via master tool	J

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Urban climate analysis of the district	B1, E	B1, E	B1, E	B1, E	B1, E
2. Thermal quality of the district surfaces/ factory surfaces	A, J	B2, J	B2, J	A, J	B2, J
3. Ventilation	A, B1, E	B1, B3, B4, E	B1, B3, B4, E	A, B1, E	B1, B3, B4, E
4. **Agenda 2030 bonus - Climate adaptation strategy at the district level**	A or B5, E	B5, E	B5, E	A, E	B5, E

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Centre for Renewable Energy Sources (C. R. E. S.), Department for Buildings (Ed.): RUROS Rediscovering the Urban Realm and Open Spaces, EU research and development project in the 5th Research Framework Programme, “Energy, Environment and Sustainable Development Programme”, 2004.
- Biotope area factor of the city of Berlin (URL:http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/).
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- VDI 3785 Sheet 1: Environmental meteorology - Methods and presentation of investigations relevant for planning urban climate, Dec. 2008.
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- VDI Commission on Air Pollution Control, 1988: Stadtklima und Luftreinhaltung – ein wissenschaftliches Handbuch für die Praxis in der Umweltplanung, Springer Verlag, Berlin, 1988.

Industry **Commercial**

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- Deutscher Dachgärtner Verband e.V. (DDV) (Ed.): Guide on “Green roofs for municipalities” 2011
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- UVF - Umweltverband Frankfurt (Ed.), 1993, Ermittlung und Charakterisierung der Kaltluftentstehungsgebiete und Kaltluftabflussbahnen innerhalb des Verbandsgebietes des UVF, City of Frankfurt, Planning Department IV, Department of Environmental Protection, 1993
- Federal Ministry for Regional Planning, Building and Urban Development, 1979, publication series “Raumordnung” 06/032 - Regionale Luftaustauschprozesse und ihre Bedeutung für die räumliche Planung, Rock & Co., Bad Godesberg, 1979

Internet sources:

- www.staedtebauliche-klimafibel.de
- www.stadtklima-stuttgart.de
- www.dmg-ev.de/fachausschuesse/umet/akumet1.htm
- www.euro.who.int/Healthy-cities

ENV2.2

Water cycle systems

Objective

The objective is to preserve the natural water circulation, protect potable water and reduce water consumption and wastewater in the district.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Avoiding flooding by infiltrating and retaining rainwater in the district
- Saving costs by reducing water consumption
- Reducing precipitation water costs by utilising rainwater
- Reduced construction and maintenance costs due to smaller pipe dimensions
- Waste water treatment plants are no longer needed or are needed to a lesser extent
- High savings potential (energy and water) when using grey water recycling plants with upstream heat recovery (industry)
- Decentralised solutions allow flexibility for changing usage concepts
- Improved micro- and city climate through evaporation
- Potential for using valuable ingredients in black water and avoid transfer of environmental toxins (drug residues, hormones) into soil and groundwater

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	6.3	Improvement of water quality		
	6.4	Efficient use and sustainable withdrawal of water		
	6.5	Implementation of integrated water resources management		
	8.4	Global resource efficiency and decoupling from economic development		
	12.2	Use of natural resources		
Low	3.9	Effect of chemicals, air, water and soil pollution	6.2	Drinking water and sanitation

Outlook

The topic of potable water will become increasingly important, especially in an international context. The DGNB will keep an eye on developments and update the criterion accordingly. In addition, a quality survey may be added in the future, since nitrate pollution of drinking water will become more relevant.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**3.2 %**	**4**
Commercial **Industry**	**3.2 %**	**5**
Event	**3.8 %**	**5**

ASSESSMENT

The preservation of the natural water cycle as well as reducing the drinking water demand by recycling of wastewater and using local resources is considered on the basis of the indicators “Reduction of drinking water consumption” and “District water balance”. In addition, the treatment and use of black water is supported by a circular economy bonus. In the criterion, a maximum total of 100 points can be achieved without bonuses, and including bonuses a maximum of 110 points or 120 points can be achieved for **industry**.

NO.	INDICATOR		POINTS
1	**Reduction of drinking water consumption**		
	City **Business** **Event** **Commercial**		**max. 35**
	Industry		**max. 40**
1.1	**Water utilisation concept**		
	City **Business** **Event** **Industry** **Commercial**		**max. 5**
	There is an overarching concept in which the water use balance and possibilities for saving drinking water have been investigated.		+5
1.2	**Measures to reduce drinking water consumption**		
	City **Business** **Event** **Commercial**		**max. 30**
	Industry		**max. 25**
	■ Measures to reduce the drinking water demand in the district (buildings + open space) have been implemented and are presented in a overarching concept.	**City** **Business** **Event** **Industry** **Commercial**	+5 +5 +10
	■ Regular information to consumers in the district on how drinking water can be conserved in everyday life is provided.		+5
	■ A maximum of 20 % of the water required for toilets in the district is supplied by drinking water.	**City** **Business** **Event** **Industry** **Commercial**	+15 +10
	■ Use of rainwater or operating water* for 100% of public open spaces (e.g. irrigation, cleaning measures, fire-fighting water, including natural irrigation by precipitation).		+5

NO.	INDICATOR		POINTS
1.3	**Measures to reduce drinking water consumption in production processes***		
	Industry		**max.10**
	■ Economic and energetic aspects were analysed and recorded in a concept as to whether process water can be substituted with non-drinking water and/or recycled	**Industry**	+5
	■ Measures to recycle process water and/or substitute drinking water (rainwater treatment and use) were implemented to a significant extent (at least 50%). Justification based on water utilisation concept.	**Industry**	+5
	*In the absence of a production process, the ten points are divided proportionally between indicators 1.1 and 1.2. Each sub-indicator is thereby upgraded by two points.		
1.4	**CIRCULAR ECONOMY BONUS - REUSE OF PROCESS WATER**		+10
	Industry If more than 50 % of the process water used in production, is kept in circulation via treatment/recycling, 1 point can be credited for each additional 5 % of process water kept in circulation.		
1.5	**CIRCULAR ECONOMY BONUS - REUSE OF BLACK WATER**		+10
	City **Business** **Event** **Industry** **Commercial** Black water is collected separately by circulation systems in the district and treated decentrally and is available for further use in the district, e.g. for the irrigation of green areas and food crops, nutrient use (terra preta plants, composting), energy use (biogas factory),…		
	■ Treatment of black water for irrigation		+5
	■ Treatment of black water for uses other than irrigation		+5

NO.	INDICATOR		POINTS
2	**District water balance** **City** **Business** **Event** **Industry** **Commercial**		**max. 30**
2.1	**Percentage of precipitation in drain (D) in relation to the reference area** **City** **Business** **Event** **Industry** **Commercial**		**0 - 30**
	■ 60 - 0 percent		0 - 30
3	**Retention or throttling of rainwater** **City** **Business** **Event** **Industry** **Commercial**		**max. 20**
3.1	**Rainwater retention** **City** **Business** **Event** **Industry** **Commercial**		**max. 20**
	■ Rainwater retention in the district (and possibly supplemented by measures outside the district)		20
	■ Rainwater retention exclusively outside the district		10
4	**Design integration of the water infrastructure into the open space concept** **City** **Business** **Event** **Commercial** **Industry**		**max. 15** **max. 10**
4.1	**Creative integration** **City** **Business** **Event** **Commercial** **Industry**		**max. 15** **max. 10**
	■ The rainwater infrastructure is integrated into the open space concept in terms of design, and the water supply and waste disposal concept is presented and made visible to the users and visitors in the district, at least at certain points, using informational elements.	**City** **Business** **Event** **Industry** **Commercial**	+15 +10 +15

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As an key figure/KPI it is useful to communicate the soil sealing factor of the entire built and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Average water discharge in the district	[%]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The results obtained on the use of rainwater or grey water in the buildings, information on the irrigation of the outdoor facilities and information on integration in the district have high synergies with criterion ENV2.2.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

Districts are part of the natural water cycle and influence natural processes in their respective river basins all the way down to the oceans. They cause changes in the water balance, water quality and volume flow in the river basin or rivers. The type of land use (surface sealing, topographic changes, and development of floodplains) influences the water balance, flood discharge behaviour and the quality of natural water resources.

Additionally for **Industry** :
Optimisation of production-related factors with regard to water efficiency in the manufacturing process and subsequent treatment of process water for reuse in the production process are essential for sustainable water cycle systems at an industrial site. Furthermore, a high level of savings can be achieved in this sector by using water for energy purposes (keyword: Use of heated process water by means of heat pumps and heat exchangers for heating technology).

II. Additional explanation

Industry **Commercial**

Measures to optimise water efficiency in the manufacturing process and to treat process water for reuse in the production process are evaluated. The use of non-drinking water and the reuse of recycled process water in the production process, for use in sanitary areas and managing green spaces is positive and can be documented.

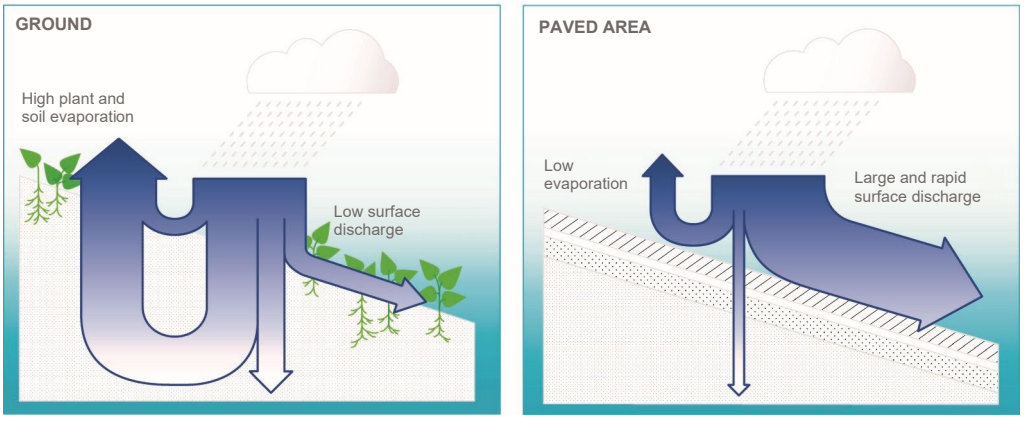


FIGURE 1 Water balance before and after development (own presentation according to decentralised near-nature rainwater management, Hamburg)

With regard to the commercial use in the district, the water consumption in production and by employees at the workplace should be mentioned in particular. Added to this is the water consumption for building maintenance and green space management. Optimising production-related factors with regard to water efficiency in manufacturing process and subsequent treatment of process water for reuse in the production process are essential for sustainable water circulation systems at a commercial location. Measures to optimise water efficiency in production processes and the treatment of process water for reuse in the production process are to be aimed for.

The use of specifically pre-treated rainwater and treated grey water or slightly contaminated wastewater as process water is also advantageous. Areas of rainwater treatment are to be integrated into the open space concept (path and recreation concept). Measures to reduce drinking water consumption in open space management are to be promoted and rainwater use for irrigation of green spaces is to be positively evaluated.

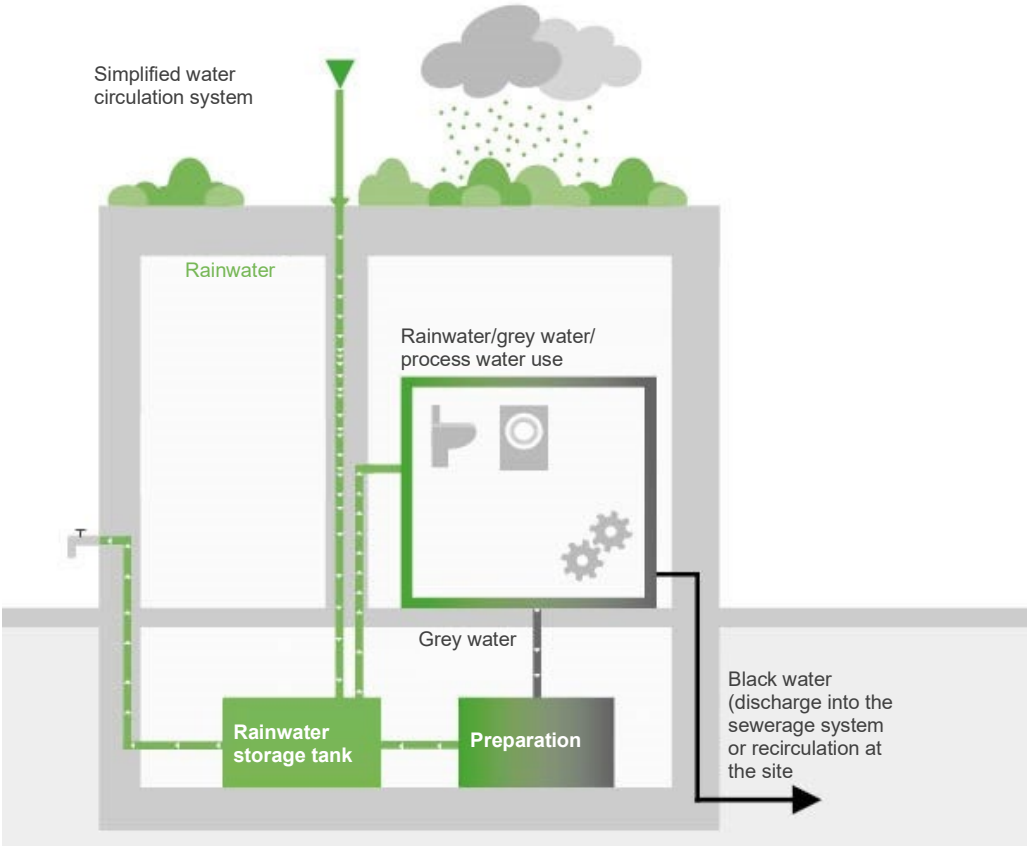
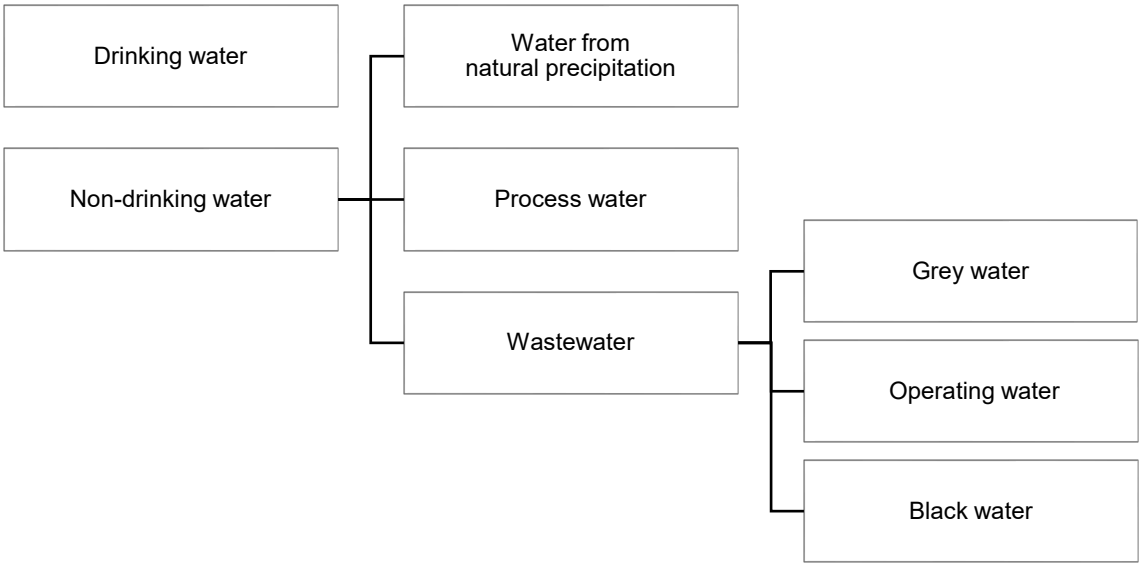


FIGURE 2 Simplified water circulation system

Definitions of water types

The different types of water are distinguished and defined as follows:



1. Drinking water

The requirements for drinking water are laid down in DIN 2000 and the technical rules of the DVGW. This includes, among other things, that it must be free of properties that are harmful to health, pathogens and germs, that it must be colourless, clear, odourless and have a perfect taste and that its temperature must be between 5 and 15 °C. The quality of drinking water is also regulated by the Drinking Water Ordinance (TrinkwV), which has existed since 2001 and has been in force in a modified form since November 2011.

2. Non-drinking water

Non-drinking water is defined as all types of water that do not fully meet the requirements for drinking water. This includes process water, rainwater and wastewater (grey and black water).

2.1 Rainwater

Rainwater is water from natural precipitation that has not been contaminated by use. Rainwater can be collected from the roof surfaces and used as operating water for purposes that do not require drinking water quality (washing machine, toilet flushing, garden irrigation). The rainwater that accumulates on a property should remain there as far as possible. Rainwater that is not used can be returned to the natural water circulation via evaporation (pond, ditches, green roof, irrigation) or percolation. Feeding rainwater into the sewerage system puts a strain on the existing sewer system, increases the wastewater content and thus the dimensioning of sewage treatment plants.

2.2 Process water

Process water is water that is required in industrial plants or used for the manufacture of products. With process water, increased demands on water quality and properties (and thus water treatment) may apply.

2.3 Wastewater

Used drinking water is called wastewater. In residential buildings it can be separated into grey water and wastewater containing faeces (= black or yellow water). As a rule, it is treated unseparated via a sewage system in sewage treatment plants to such an extent that it can be returned to the natural water circulation. Valuable ingredients (phosphate and nitrogen) are recycled very little to date.

2.3.1 Grey water

Grey water is non-faecal, slightly polluted wastewater, e.g. from bathtubs and shower trays or washing machines. Kitchen wastewater highly contaminated by fats and food waste is excluded (see definition in European standard 12056-1). Slightly polluted grey water can be used, among other things, both for watering green spaces and for flushing toilets.

2.3.2 Operating water

According to DIN 4046, operating water is defined as “water used for commercial, industrial, agricultural or similar purposes with different quality characteristics”. In the context of grey water use, this includes water used in households and businesses that do not necessarily require drinking-water quality. Operating water can be hygienically harmless water that is used in households and businesses to operate water-consuming functions that do not necessarily require water of drinking-water quality. It is used, for example, in commercial and technical applications or for cleaning purposes.

2.2.4 Black water

Black water is wastewater from toilets containing faeces (faeces, urine and flushing water). Energy and nutrients can be extracted from black water. Black water is of great importance with regard to energy.

III. Method

City **Business** **Event** **Industry** **Commercial**

The criterion is evaluated quantitatively using the following indicators:

Indicator 1: Reduction of drinking water demand

The water concept must include statements on the water use balance and explain whether and how drinking water can be conserved in the district. Measures to conserve drinking water include the installation of water-saving fittings, grey water use and/or operating water use for shower, WC, washing machine, garden irrigation, aquaponics and hydroponics.

On indicator 1.5:

The use of black water is a prerequisite for the crediting of bonuses. The extent to which measures have been taken to treat the black water and integrate it into the district's own cycles is evaluated.

On the one hand, the thermal energy of the black water can be used in local heating/local cooling supply.

And on the other hand, the combination of different thermal, chemical and mechanical processes (e.g. membrane bio-reactors and anaerobic treatment) can be used to supply the district. The possibilities include phosphate fertilizer production, water for green spaces, aquaponics, hydroponics, toilet flushing water, and electricity and heat. CO_2 heat generation for the district is possible.

There are many synergies between the combination and application of the procedures and other DGNB criteria.

Indicator 2: District water balance

Basically, the precipitation falling on a surface is divided into the following three components:

$$P = D + G + E \quad (1)$$

with

P	Precipitation [l/m²]
D	Discharge [l/m²]
G	Groundwater recharge/percolation [l/m²]
E	Evaporation [l/m²]

The percentage deviation of D for the district in relation to a reference area is used as a benchmark for the evaluation. An open green space with the following factor serves as reference area:

- D_{Ref} = 0 %

To determine the percentage deviation of AD, each surface area must be multiplied by the specific factor for D and an area-weighted average for the district must be formed. The percentage deviation from AD can then be determined. If the percentage deviation from AD is 0%, all evaluation points for the indicator can be assigned. The evaluation is based on the following formula:

$$AD = ((A_1 \times D_{1)}) + (A_n \times D_{n)})) / GSA \qquad (2)$$

with

AD	Average discharge in the district [%]
A	Area [m²]
D	Discharge per area [%]
GSA	Gross site area [m²]

The factors specific to each area category are stored in the master tool provided by the DGNB. The evaluation is also carried out in the master tool.

In the following cases, the discharge of the respective area is considered separately in the master tool:

- If the discharge is diverted from an area and seeps into the district (e.g. trough-trench elements)
- If rainwater is stored and used in the district (rainwater use in the building and/or open space)
- For areas where rainwater seepage is not practical (e.g. soils contaminated with pollutants)

For **Commercial**:

A prerequisite for crediting evaluation points for indicator is the guarantee of protection against incidents by means of the use of retention systems for prevention in the event of an incident or fire with automatic monitoring equipment in areas that are difficult to access.

The protection of the rainwater management systems on the commercial properties against emissions from incidents in the production process and fire must be guaranteed. Existing water bodies and groundwater must be sustainably protected against pollution. This requires appropriate retention systems in the event of danger.

For this purpose, measures must be taken to prevent operation-specific contamination (process materials, fire) of the rainwater to be diverted. The use of retention systems to prevent the pollution of groundwater and surrounding waters in the event of fire or accident is assumed to be standard practice (MUNLV 2004). The use of catch basins in the area of tank storage prevents hazardous substances from entering the ground or the sewerage system in the event of leaks. In the event of fire, the extinguishing water is retained by these catch basins. The rainwater connections to the sewer system are secured by retention systems, so that in the event of an accident or fire, emergency gate valves are closed. In hard to reach areas, these retention systems are equipped with automatic monitoring devices.

Indicator 3: Retention or throttling of rainwater

There are several measures implemented in the district: Retention basins (underground/above ground), troughs, lakes/ponds, completely greened roofs or storage channels with retention volumes, which release precipitation to the sewerage system with a delay or serve as water reservoirs for use.

If rainwater retention in the district is not fully possible, areas can be created in the immediate vicinity of the district that can be temporarily flooded (e.g. renaturation of rivers and floodplains). If only areas for rainwater retention outside the district are available, a maximum of 10 points can be credited.

Indicator 4: Design integration into the open space concept

The rainwater infrastructure will be made visible to visitors and users of the district in terms of design. This can take the form of rainwater retention at water sites such as in Rotterdam, lakes with retention volumes or illustration of the water supply/water disposal concept or the water circulation systems at periodic locations in the district/building. The user/visitor is made aware of water use and the necessary infrastructure through additional informational elements.

Scheme-specific description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City Business Event Industry Commercial

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.
Calculations with the “master tool” should be carried out in all phases according to the data basis.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents/expert opinions/calculations/documentation**	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures ■ D1: Site plan with area allocation	D
Documentation of **concept**	F
Documentation of master tool	J

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Reduction of drinking water consumption	A, F	A, B, C, D, F	B, C, D, F	A, B, F	B, C, D, F
2. District water balance	A, D1, J	D1, J	D1, J	A, D1, J	D1, J
3. Retention or throttling of rainwater	A, B, D	B, C, D	B, C, D	A, B, D	B, C, D
4. Design integration of the water infrastructure into the open space concept	A, B, D, F	A, B, C, D, F	B, C, D, F	A, B, C, D, F	B, C, D, F

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- “Wastewater - Phosphorus - Fertilizers” Workshop (28-29/01/2014), BAM, UBA, BMUB
- Wastewater recycling, Prof. Dr.-Ing. Hansen (2007-2008): Joint project: Entwicklung und Kombination von innovativen Systemkomponenten aus Verfahrenstechnik, Informationstechnologie und Keramik zu einer nachhaltigen Schlüsseltechnologie für Wasser- und Stoffkreisläufe, www.cleaner-production.de
- Abwassertechnische Vereinigung e. V. (ATV): Stormwater management in settlement areas for adaptation to natural discharge conditions, working report of working group 1.2.6 “Hydrologie der Stadtentwässerung”; Korrespondenz Abwasser, issue 4, 1999.
- A 100 (worksheet DWA-A 100): Guidelines of Integrated Urban Drainage, German Association for Water Management, Wastewater and Waste, Dec. 2006.
- ATV-DVWK leaflet M 153, recommendations for handling rainwater.
- Dickhaut, W. et al. (2012): Water Sensitive Urban Design.
- Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e. V. (DWA) (2009): Fachbuch Industriewasserbehandlung – Rechtliche Grundlagen, Verfahrenstechnik, Abwasserbehandlung ausgewählter Industriebranchen, Produktionsintegrierter Umweltschutz, Universitätsverlag Weimar.
- Energie aus Abwasser versorgt Stadtquartier, HAMBURG WASSER, Freie und Hansestadt Hamburg (2013)
- Mutschmann, J.; Stimmelmayr, F. (2008): Taschenbuch der Wasserversorgung, 14. Auflage, Vieweg Verlag.
- fbr (Ed.) (2002): Projektbeispiele zur Betriebs- und Regenwassernutzung, Öffentliche und Gewerbliche Anlagen, Schriftenreihe fbr Volume 6.
- Fachverband industrielle Teilereinigung e. V. (FiT): Checklist for optimising the energy efficiency of industrial component cleaning systems (www.fit-online.org).
- Feurich (2005): Sanitärtechnik, 9th edition, Düsseldorf.
- Free Hanseatic City of Hamburg (Ed.) (08/2006): Dezentrale naturnahe Regenwasserbewirtschaftung. Department of Urban Development and Environment.
- Hessisches Ministerium für Umwelt, Landwirtschaft und Forsten, (Ed.) (2001): Wasser im Gewerbe. ISBN 3-89274-221-9.
- König, K. W. (Ed.) (2013): Grauwassernutzung. Ökologisch notwendig – Ökonomisch sinnvoll.
- Luxemburg, Verwaltung der Wasserwirtschaft (2008): Leitfaden zum Umgang mit Regenwasser in Siedlungsgebieten Luxemburgs.
- ROOFWATERFARM (2013): Prof.Dr.-Ing. Angela Million, Dr.-Ing Grit Bürgow, Dr.-Ing. Anja Steglich, www.roofwaterfarm.com
- UBA (Ed.) (2009): Konzept für bundeseinheitliche Anforderungen an die Regenwasserbewirtschaftung. Texts 19/2009.

Legal foundations and guidelines:

- Directive 2000/60/EC European Water Framework Directive (EU WFD) (2000)
- Drinking Water Ordinance (TrinkwV)
- Federal Water Act (WHG)
- Waste Water Levy Act (AbwAG)
- State Water Acts
- Indirect discharger regulations
- Self-monitoring regulations
- Statutes of the cities and municipalities

- Ordinance on Requirements for the Discharge of Waste Water into Waters (Waste Water Ordinance of 17 June 2004 (BGBl. I p. 1108, 2625))
- Rinsing water supply and treatment in metalworking and metal processing (State of the art in § 7a para. 1, sentence 3 WHG)
- NN (1991): Directive 91/271/EEC of the European Council of 21.05.1991 concerning urban waste water treatment (OJ EC No. L 135 p. 40)

Industry **Commercial**

- Mutschmann J., Stimmelmayr F., (2008): Taschenbuch der Wasserversorgung, 14th edition, Vieweg Verlag
- Wasser im Gewerbe, Hessisches Ministerium für Umwelt, Landwirtschaft und Forsten, (Hrsg.) (2001) ISBN 3-89274-221-9
- Industrieabwasserreinigung von Karl-Heinz Rosenwinkel, Hans Rüffer
- Fachbuch Industriewasserbehandlung – Rechtliche Grundlagen, Verfahrenstechnik, Abwasserbehandlung ausgewählter Industriebranchen, Produktionsintegrierter Umweltschutz
- ATV-M 755 Determination of the efficiency of sewage treatment plants
- Checklist for optimisng the energy efficiency of industrial component cleaning systems FiT Fachverband industrielle Teilereinigung e.V.web: www.fit-online.org
- Wasserverbrauch für Verwaltungs- und Bürogebäude mit 20 bis 25 Liter pro Arbeitstag und Beschäftigten – Feurich [Sanitärtechnik, 9th edition Dusseldorf 2005; page 12-29], from Bewertungssystem nachhaltiges Bauen (BNB), Neubau Büro- und Verwaltungsgebäude 1.2.3 “Trinkwasserbedarf und Abwasseraufkommen” BMVBS Version 2009_4
- „Kontinuierliche Reduktion von Ressourcenverbrauch und Emissionen“, emil frei GmBH & co. KG

Legal basis and guidelines

- Directive 2000/60/EC European Water Framework Directive (EU WFD) (2000)
- Drinking Water Ordinance (TrinkwV)
- Federal Water Act (WHG)
- Waste Water Levy Act (AbwAG)
- State Water Acts
- Indirect discharger regulations
- Self-monitoring regulations
- Statutes of the cities and municipalities
- Ordinance on Requirements for the Discharge of Waste Water into Waters (Waste Water Ordinance of 17 June 2004 (BGBl. I p. 1108, 2625))
- Rinsing water supply and treatment of metal processing and metal processing (State of the art in § 7 a para. 1, sentence 3 WHG)
- NN (1991): Directive 91/271/EEC of the European Council of 21/05/1991 concerning urban waste water treatment (OJ EC No. L 135 p. 40)

ENV2.3

Land use

Objective

The objective is to reduce the use of natural land areas for building purposes.

This criterion assesses the land use on site. The aim is to reduce additional land use for building constructions and to limit soil sealing.

Benefits

The following benefits can be achieved for companies, municipalities and/or users: A common contribution is made to the achievement of national targets in the area of land use. Urban sprawl and the associated consequences (fragmentation of biotopes, traffic noise pollution, follow-up infrastructure costs) are avoided.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	12.2	Use of natural resources	11.1.a/b	Land use
	12.5	Waste reduction and prevention	15.1	Biodiversity
	15.3	Protection of soil quality		
Moderate	8.4	Global resource efficiency and decoupling from economic development	11.1.c	Land use
	11.3	Participatory, integrated and sustainable settlement planning		
	12.4	Environmentally sound handling of chemicals and waste		

Outlook

The reduction of land use is a relevant national sustainability goal. For this reason, the criterion will be retained in later versions and will be geared even more strongly to achieving overarching objectives.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**3.2 %**	**4**
Commercial	**3.2 %**	**5**
Event	**3.1 %**	**4**
Industry	**2.6 %**	**4**

ASSESSMENT

In order to reduce the use of natural land areas for building purposes, the use of fallow land (indicator 1), the integration of district development into the urban fabric (indicator 2) and the soil sealing factor in the district (indicator 4) are evaluated. In addition, an improvement in soil pollution (indicator 3) is rewarded. In the criterion, up to 110 evaluation points can be achieved in the evaluation. A maximum of 100 evaluation points can be credited.

NO.	INDICATOR	POINTS
1	**Share of fallow land** **City** **Business** **Event** **Industry** **Commercial**	**max. 40**
1.1	**Share of fallow land in percentage** **City** **Business** **Event** **Industry** **Commercial**	**0 - 40**
	■ 0 % - 100 %	0 - 40
2	**Area integration** **City** **Business** **Event** **Industry** **Commercial**	**max. 20**
2.1	**Area integration in percentage** **City** **Business** **Event** **Industry** **Commercial**	**0 - 20**
	■ 0 %– 100 %	0 - 20
3	**Area contamination** **City** **Business** **Event** **Industry** **Commercial**	**max. 15**
3.1	**Area contamination through contaminated sites** **City** **Business** **Event** **Industry** **Commercial**	**max. 15**
	The following measure has been implemented:	
	■ Initial investigation of the area contamination. The measures have not been documented.	3
	■ Detailed investigation of the area contamination. The measures have not been documented.	4
	■ Measure investigation of the area contamination. The measures have not been documented.	5
	■ An investigation confirms that there is no area contamination through contaminated sites in the district (Z0 Natural soil, unrestricted installation).	15

NO.	INDICATOR	POINTS
To 3.1	For soil classes Z1 - Z5, measures for the improvement of the soil classes have been documented with the investigation of contaminated sites.	
	■ Is carried out with lower contamination.	+5
	■ Is carried out with heavy contamination.	+10
4	**Soil sealing factor**	
	City **Business** **Event** **Industry** **Commercial**	**max. 35**
4.1	**Soil sealing factor**	
	City **Business** **Event** **Industry** **Commercial**	**0 - 35**
	■ 80 - 40 % (for **Events** and **Industry** : 100 – 50 %)	0 - 35

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As key figure/KPI it is appropriate to communicate the soil sealing factor of the entire built and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Soil sealing factor of the entire built and undeveloped area	[%]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The determination of the soil sealing factor meets the requirements of criterion ENV2.3.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

Limiting the daily increase in the settlement and transport area is of great importance for sustainable urban development. For urban districts, internal development should have priority over external development. For example, the national sustainability strategy of the Federal Republic of Germany defined the goal of limiting the daily increase in the settlement and transport area to 30 hectares per day by 2020. The aim is to achieve a equalized land area balance by 2050.

Industry **Commercial**

The criterion assesses the land use of the industrial site. The aim is to reduce additional land use for building construction and to limit soil sealing.

II. Additional explanation

In land recycling in the sense of circular land management, the handling of contaminated sites is an important issue. In some cases, environmentally qualified external development, e.g. to densify sprawl areas or to strengthen urban development axes along public transport or public transport lines, can also be advocated from a sustainability perspective.
The higher the proportion of fallow land in the planned area, the less open space is used as the settlement and transport area for building construction use. Furthermore, internal development areas use open spaces, but without urban sprawl in the landscape.

The land is not “consumed”, but used differently. This is usually reflected in the fact that the type and degree of land cover changes. The criterion assesses whether and to what extent the type of land use is changed by the construction project. A positive assessment can be achieved in particular by reusing land in the sense of land recycling, redensification and other measures for internal development. The sparing and careful use of land is not only necessary from an environmental point of view, but also makes economic sense against the background of rising consequential costs of increasingly lower infrastructure utilisation and competition for land. At the local level, this can lead to lower development costs and sewage charges and an improvement in the microclimate.

Industry **Commercial**

In some cases, an environmentally qualified external development e.g. to consolidate sprawl areas or to strengthen urban development axes along public transport or public transport lines are also advocated from a sustainability perspective. This positive effect in the area of other criteria can then compensate for a poor rating in this profile. The higher the proportion of fallow land in the planned area, the less open space is used as the settlement and transport area for use in building construction. Furthermore, internally directed areas use open spaces, but without urban sprawl in the landscape.

III. Method

City **Business** **Event** **Industry** **Commercial**

The criterion is assessed using the following indicators:

Indicator 1: Share of fallow land

The percentage of the gross site area that can be regarded as fallow land is evaluated. The higher the proportion of fallow land, the better the evaluation. Fallow land is defined as land that has been or is being used for construction or transport**.**

Fallow land exists mainly in the inner area of cities (industrial wastelands, railway areas, port areas, etc.), but it can also be located outside cities (e.g. military uses).

Land with individual built structures (e.g. sports grounds, golf courses, cemeteries) and areas that are newly reclaimed (backfill in the sea or river) are not considered as fallow land. From the time of the cessation of use until the start of planning, no uses or only interim or temporary uses may have taken place. In the evaluation, building on near-natural land leads to a negative assessment and building on heavily sealed or polluted areas leads to a positive assessment. The type of actual use as defined in the land cadastre is decisive for the evaluation.

Indicator 2: Area integration

Land integration is understood as the percentage of the boundary of the district that is integrated into the existing settlement area. If a part of the district borders on a natural or agricultural and forestry area, this part of the district boundary shall be considered as not integrated. This also applies if the district is separated from such an area by a road, railway line or similar. Inner-city open spaces belong to the settlement area and are not taken into account.

For **Industry**:

All areas that borders on predominantly built-up areas at a distance of 100 metres from the area boundary may be assessed as an integrated area. The percentage gradation is carried out over the length of the area boundary which does not fulfil this criterion (measured perpendicular to the area boundary).

Indicator 3: Area contamination

The area contamination indicator evaluates whether there are or could be contaminated sites in the soil of the district. The evaluation of contaminated sites is based on the German Federal Soil Protection Act (BBodSchG) with the checklist below. The prescribed usage-related test values of the BBodSchG must be complied with in the final state; sealing of the contaminated areas or similar measures are possible. The on-site installation of appropriate protection measures for soil and groundwater at contaminated sites is evaluated positively.

Definition of contaminated sites - pollutant classification according to BBodSchG:

Z0 Natural soils, unrestricted installation
Z1 Restricted open installation (restrictions of use)
Z2 Restricted installation with defined technical safety measures for the groundwater
Z3 TA Municipal waste, landfill class I
Z4 TA Municipal waste, landfill class II
Z5 TA Municipal waste, hazardous waste landfill

Indicator 4: Soil sealing factor

Sealing influences the urban ecosystem in various ways (urban climate, infiltration and water recharge). The soil sealing factor influences the human influence on the ecosystem as well as the rainwater discharge. Before using unsealed areas, it should be examined whether priority can be given to the reuse of already sealed areas. The sealing is additionally influenced by the type of covering. For this reason, permeable coverings should be used for all sites where the uses do not endanger the soil and groundwater. The soil sealing factor is calculated automatically after categorisation of the areas in the master tool. Different surfaces and their respective permeable capacity are stored in this tool.

Exception regulation for sealing:

- If it can be demonstrated by an expert opinion that the sealing of areas is necessary for environmental reasons (e.g. heavily contaminated soil or pollutant inputs would pollute the groundwater), these sub-areas can be excluded from consideration.
- (Green) areas, on which rainwater can theoretically seep away, but where this is not guaranteed due to building structures (e.g. underground car park, pond liner) may not be taken into account and are considered “sealed areas” in the calculation, as they do not contribute to groundwater recharge.

IV. Scheme-specific description of the method

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents/expert opinions/calculations/documentation** ■ B1: Documentation of **expert opinions** to prove the existence of contaminated sites in all relevant places. Classification according to the Working Group of the Federal States on Waste (LAGA) ■ B2: **Calculation** of the area integration	B
Photo documentation: Aerial photographs with number of years before the development with entry of the boundary of the district	C
Documentation of **planning documents:** Land use plan (FNP) or comparable plan (international)	E
Determination via master tool	J

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Share of fallow land	B, C, E, J	B, C, E, J	B, C, E, J	B, C, E, J	B, C, E, J
2. Area integration	B, C, E	B, C, E	B, C, E	B, C, E	B, C, E
3. Area contamination	A, B, E, J	B, E, J	B, E, J	B, E, J	B, E, J
4. Soil sealing factor	A, C, E, J	C, E, J	C, E, J	C, E, J	C, E, J

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- BBR (2007): Recycling management in land use. Workshop: Praxis Heft 51; Bonn.
- BBSR im BBR (1/2010): New approaches to land recycling, information on spatial development.
- German Building Code (BauGB)
- § 1 para. 4 Obligation to adapt planning to the objectives of regional planning
- § 1 para. 5 Responsibility towards future generations
- § 1a para. 2 (Soil protection clause) economical use of land and soil
- § 13a Development plans of the inner development
- Federal Soil Protection Act (BBodSchG) of 17 March 1998, amended on 24 February 2012.
- Federal Soil Protection and Contaminated Sites Ordinance of 12 July 1999, amended on 24 February 2012
- Law on the Facilitation of Planning Projects for the Inner Development of Cities of 21 December 2006 (Bundesgesetzblatt Part I No. 64 p. 3316).
- State development plans of the federal states, regional plans, land use plans.
- Regional Planning Act (ROG) of 19/8/1997, amended on 22/12/2008.
- Baugesetzbuch (BauGB), valid from 01/07/1987, last amended on 20/07/2017: § 1 para. 4 Obligation to adapt the planning to the objectives of regional planning, § 1 para. 5 responsibility towards future generations, § 1a para. 2 (Soil protection clause) economical use of land, § 13a development plans of interior development
- State development plans of the federal states, regional plans, land use plans
- Federal Soil Protection Act (BBodSchG) of 17 March 1998, amended on 27/09/2017
- Federal Soil Protection and Contaminated Sites Ordinance of 12 July 1999, amended on August 31, 2015
- Agricultural / municipal standard land value maps (expert committee for land values)
- Federal Soil Protection and Contaminated Sites Ordinance (BBodSchV of 17/09/1999), Federal Law Gazette No. 36 of 16/07/1999, p.1554.
- Federal Government / State Working Group on Waste (LAGA): Requirements for the recycling of mineral residues/waste - Technical rules - 5th extended edition 2004, general part.
- DIN 19731 Soil quality - Utilization of soil material, May 1998.
- Act on Protection against Harmful Soil Changes and the Remediation of Contaminated Sites (Federal Soil Protection Act BBodSchG of 01/03/1999), Bundesgesetzblatt I 1998
- State Environmental Agency NRW: Requirements for the recycling of soil material as bulk and backfill material, draft of 15/01/2001.
- State Environmental Agency NRW: Requirements for the application and placement of materials on or in the soil in accordance with § 12 of the Federal Soil Protection and Contaminated Sites Ordinance, Essen LUA 2004, Merkblätter volume 44

- Odensass, M.: Randbedingungen für Umlagerungen bei Altlastensanierung und Flächenrecycling, TerraTec 03/2001, p. 17-23.
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- Enforcement aid on the requirements for the application and introduction of materials on or into the soil (§ 12 BBodSchV), work aid of the LABO / LAB, LAGA and LAGA guidelines
- BBR, recycling management in land use, workshop: Praxis Heft 51; Bonn 2007
- BBSR at the BBR, New approaches to land recycling, Information on spatial development, issue 1/2010

Internet sources

- www.nationale-stadtentwicklungspolitik.de
- www.bmu.de/files/pdfs/allgemein/application/pdf/nachhaltigkeit_strategie.pdf
- www.umweltdaten.de/uba-info-presse/hintergrund/flaechenverbrauch.pdf
- www.in-zukunft-leben.de
- www.umweltbundesamt.de/boden-und-altlasten/altlast/web1/start.htm

ENV2.4

Biodiversity

Objective

Our objective is to conserve biological diversity in the local context. The constructed environment has a significant impact on the diversity of ecosystems (communities, habitats and landscapes), the diversity of species and their genetic diversity. We would like to provide motivation to positively contributeto establishing, maintaining and expanding biological diversity within the district.

Benefits

The following aspects are in favour of protecting species and biotope:

- Increasing the quality of life and thus also the value of the district through the experience of nature close to residential areas
- Maintaining the function of biological systems (food production, stability of ecosystems, biological pest control, pollination of cultivated plants, biological filters and detoxifiers, humus production, bioindicator potential)
- Preserving biochemical information (preservation of the potential for evolutionary adaptation, breeding of new varieties or breeds and resistance breeding, pharmacology)

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	13.1	Resilience and adaptability	15.1	Biodiversity
	15.1	Conservation of terrestrial and inland freshwater ecosystems		
	15.5	Natural habitats		
	15.8	Invasive species		
	15.9	Ecosystem and biodiversity values in decision-making processes		
Moderate	6.6	Protection and restoration of water ecosystems		
Low	11.5	Impact of disasters	15.2	Ecosystems

Outlook

The overarching relevance of the issue of biodiversity will continue to grow in importance. In the medium term, the methodology is to be expanded to include further indicators that are conducive to achieving the objectives.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**3.2 %**	**4**
Commercial	**2.6 %**	**4**
Event	**3.1 %**	**4**
Industry	**3.2 %**	**5**

ASSESSMENT

To preserve the diversity of ecosystems, Indicator 3 identifies the “Biotope area quality”. Measures aimed at supporting the diversity of animal species are positively evaluated in indicator 2. Indicator 5 contributes significantly to conserving the genetic diversity of the flora. If ecosystems are networked or the movement patterns of animals are supported, this can be credited in indicator 4. Finally, indicator 6 “Development and maintenance care” is used to reward a long-term commitment to planting. In the criterion 110 points can be achieved, of which a maximum of 100 points can be credited. Furthermore, an additional 10 points can be achieved via an “Agenda 2030 bonus”. A maximum of 110 points can be achieved in the criterion including the bonus.
The criterion of biodiversity is an exclusion criterion in the DGNB certification system for districts. A district that does not meet the minimum requirements of 10 points in indicator 2 in the criterion cannot be certified.

NO.	INDICATOR	POINTS
1	**Biodiversity strategy** **City** **Business** **Industry** **Commercial**	**max. 10**
1.1	**Development and implementation of a biodiversity strategy** **City** **Business** **Industry** **Commercial** Creation and implementation of a comprehensive and long-term biodiversity strategy for the district and its immediate surroundings, which goes beyond the measures prescribed in the land-use plan or building permit and takes into account future site development.	10
2	**Targeted measures for the active introduction of new and native species** **City** **Business** **Commercial** **Event** **Industry**	**max. 20** **max. 30**
2.1	**Active introduction of new native species** **City** **Business** **Event** **Industry** **Commercial** Implementation of measures to enable new and native species to settle in the district. The following points can be awarded for each actively implemented measure: ■ Districts ≤ 10 hectares = 10 points ■ Districts ≤ 50 hectares = 7 points ■ Districts ≥ 100 hectares = 4 points	

NO.	INDICATOR		POINTS
3	**Biotope area factor**		
	City Business Event Commercial		**max. 30**
	Industry		**max. 40**
3.1	**Biotope area factor total**		
	City Business Event Commercial		**max. 30**
	Industry		**max. 40**
	■ For City Business: Biotope area factor ≤ 0.1		0
	■ For Event Commercial Industry: Biotope area factor ≤ 0.05		
	■ For City Business: Biotope area factor ≥ 0.35		30
	■ For Event Commercial: Biotope area factor ≥ 0.3		30
	■ For Industry: Biotope area factor ≥ 0.3		40
3.2	**AGENDA 2030 BONUS - CLIMATE AND BIODIVERSITY GOALS** Biotope area factor > 0.35 (per 0.015 excess 1 bonus point, max. bonus points = 10) For Event Commercial Industry: Biotope area factor > 0.3		**10**
4	**Biotope connectivity**		
	City Business Commercial		**max. 20**
	Event		**max. 30**
4.1	**Biotope connectivity**		
	City Business Commercial		**max. 20**
	Event		**max. 30**
	■ Networking with the environment: Larger open spaces adjacent to the district are connected through the district (green infrastructure).	City Business Commercial Event	+10 +10 +15
	■ Internal connection: All ecologically relevant open spaces within the district that are larger than 1,000 m² are connected together. This includes green and water areas as well as areas whose environmental relevance has been documented by a qualified expert (or in the EIA or SEA).	City Business Commercial Event	+10 +10 +15
5	**Avoidance of invasive plant species**		
	City Business Event Commercial Industry		**max. 10**
5.1	There are no invasive plant species according to Appendix 1 in the district; if such species are already incorporated, a plan of measures for controlling them must be developed or it must be demonstrated why controlling them would be unsuccessful..		10

NO.	INDICATOR	POINTS
6	**Development and maintenance care** **City** **Business** **Industry** **Commercial**	**max. 10**
6.1	**Development maintenance contract** After the completion, the outdoor area is maintained for a limited period of time to promote vegetation (usually one to two years).	+5
6.2	**Maintenance care contract** The outside area is maintained according to a maintenance and upkeep scheme to maintain its functional condition and environmental quality. A contractually agreed audit takes place annually.	+5

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The biotope area factor determined in indicator 1 and the information on whether invasive plant species are planted can be used as key figures/KPIs for communication purposes.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Biotope area factor	[-]
KPI 2	Planting of invasive plant species	Yes / No

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The indicators are consistent with the contents of criterion ENV2.4.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

The decline in biodiversity can be observed worldwide. This endangers the existential basis for human life. This loss is irreversible (see BMU 2007). To counteract this, international goals for the conservation and enhancement of biodiversity were adopted at the UN Conference in Rio de Janeiro in 1992, among others, and are now to be implemented at the local level (see UN 1992).

The careful treatment of nature by considering the biodiversity on site creates a positive image both externally with customers and visitors and internally with employees. Well-being and health is demonstrably enhanced by spending time in a healthy and natural environment.

In the urban context, biodiversity can also be preserved or promoted by appropriate measures in such a way that a comparatively higher species diversity can be achieved in the urban habitat than, for example, in more monostructured landscape or rural areas with arable land of little value in this respect. In the sense of qualified environmental density, it is precisely the integration of landscape and architecture, e.g. through green roof landscapes, new façade greening systems or near-natural water elements as well as small-scale urban agriculture, that can integrate contemporary design, necessary utilisation as well as biotope protection and development.

Industry **Commercial**

The following aspects are in favour of species and biotope protection:

- Maintaining the function of biological systems (food production, stability of ecosystems, biological pest control, pollination of cultivated plants, biological filters and detoxifiers, humus production, bioindicator potential)
- Preserving biochemical information (preservation of the potential for evolutionary adaptation, breeding of new varieties or breeds and resistance breeding, pharmacology)
- Preserving objects of research (discovery of new species as food, bionics, biotechnological energy production, basic research)
- Conservation and protection of cultural heritage (phenological diversity, diversity and characteristics of spatial design and landscape, sensitive diversity, diversity of colours, forms, patterns of movement) and for educational reasons (see Kaule, p.140-144)

The aim of biotope connectivity:
The habitats of many plant and animal species are narrowed and divided through sealing of land and urban sprawl. The few remaining habitats of wild flora and fauna are isolated, and genetic exchange between populations is no longer possible. In order to prevent this, it is necessary to connect or network biotopes. In land-intensive construction measures for industrial districts, the preservation of the natural habitat network must be ensured by measures for biotope connectivity and the preservation of site-related biodiversity. The environmental evaluation of industrially used areas is to be emphasised as the basis of environmentally sound industrial planning. The definition of a large-scale biotope objective for the area promotes the clear definition of objectives in decisions on measures.

II. Additional explanation

Industry **Commercial**

The evaluated qualities are generally also dealt with in environmental reports in accordance with the legally prescribed environmental evaluation under the German Federal Building Code (BauGB) when drawing up development plans. The protected asset “plants and animals” evaluated for this purpose and the intervention-compensation balances carried out according to calculation models specific to the federal states have the aim of reducing environmental impacts, depending on the initial situation, and of identifying a need for compensation which must be carried out within the area or externally. At the same time, all nature conservation regulations must be observed. However, these legal requirements must be met in any case and are therefore not taken over here for the evaluation. In addition to these instruments, however, the following are evaluated in the sense of maximising measures to promote biodiversity (Indicator 1: Individual measures to protect species and biotopes): maximising biological quality regardless of the initial situation (Indicator 2: Biotope area factor) and maximising the implementation of networking measures (Indicator 3: Biotope connection). The environmental report or another expert opinion is used as the basis for the content.

III. Method

City **Business** **Event** **Industry** **Commercial**

The evaluation of the indicators is partly qualitative and partly quantitative. On the one hand, the overall environmental quality of the project area is evaluated on the basis of a biotope area factor and the networking of biotope types, and on the other hand the settlement of new species that were previously demonstrably not present in the area and the avoidance of invasive species are evaluated.

Indicator 1: Biodiversity strategy
Preparation and implementation of a comprehensive and long-term biodiversity strategy for the district/site (private and public spaces) and its immediate surroundings, which goes beyond the measures prescribed in the land-use plan or building permit and takes into account future site development. A clear definition of an objective development status must be presented, and an annual review of the development status achieved along with any necessary adjustments must be conducted.
The biodiversity strategy should include, for example, the following elements: Vision; objectives (short, medium, long term); topics (flora, fauna); concrete measures; consideration of existing local biodiversity strategy; The “Guidelines on Business and KBAs: Managing Risk to Biodiversity” (https://portals.iucn.org/library/sites/library/files/documents/2018-005-En.pdf) offer a further possibility for orientation.

Indicator 2: Targeted measures for the active introduction of new and native species

The evaluation will consider whether conditions have been created that allow new and native species that were previously demonstrably not present to settle in the area. Only measures that are implemented within or in the direct vicinity (350 m) of the project area are evaluated. The active introduction of new species is intended to increase biodiversity in the long term and not just to safeguard it. Species may be selected from the following genera:

- Birds, bats
- Butterflies/wild bees/wasps
- Amphibians, reptiles

For the selected species, a plan must be submitted that demonstrates the critical location factors for the life phases brooding/rearing, feeding/sleeping, hibernation and courtship/mating and shows how they are integrated into the area. In the sense of “Animal Aided Design” (see Hauck, Weisser 2015), the needs of the new animals must be integrated into the planning of open spaces from the outset. When animals thus become part of the design concept, they can not only inspire the design, but also enable better design.

A prerequisite for the crediting of evaluation points is a binding declaration that the measures listed in the environmental report or land-use plan of an environmental impact assessment (EIA) or a strategic environmental assessment (SEA) are actually implemented.

Examples of measures to increase/preserve biodiversity can be found, for example, at IUCN, International Union for Conservation of Nature (https://panorama.solutions/en/portal/agriculture-and-biodiversity)

Indicator 3: Biotope area factor

The biotope area factor is used to evaluate the overall environmental quality of the project area (planned or constructed status). For the evaluation, each sub-area is assigned a factor of 0 to 1 according to its biological quality (e.g. natural meadow = 1.0; park = 0.6; circulation area = 0).
In the base surfaces category, all horizontal surfaces (open and building roof surfaces) are summarised. The base surfaces together form the gross site area. In addition, supplementary and facade areas are incorporated in the calculation. Thus, the biotope area factor could theoretically also be greater than 1.0.
Individual trees are also included in supplementary areas. For the evaluation of the trees, they are divided into large, medium and small trees and their areas are added together. Method 4 (see System basics) is to be used for the area calculation. If there are trees in a green space, the trees and the green space are evaluated separately.

The biotope area factor is calculated by evaluating the areas in relation to the gross site area of the district. The biotope area factors specific to each area category are stored in the master tool provided by the DGNB and are shown in Appendix 1.

Biotope area factor:

$$BFF_{TOT} = \frac{((B_1 * BFF_{1)}) + (B_n * BFF_{n)})) + ((E_1 * BFF_{1)}) + (E_n * BFF_{n)})) + ((F_1 * BFF_{1)}) + (F_n * BFF_{n)}))}{GSA}$$

with

BFF	Biotope area factor
B	Base area
E	Supplementary area
F	Facade surface
GSA	Gross site area

Industry **Commercial**

In addition to evaluating the individual measures implemented to protect species and biotopes, the overall environmental quality of the project area (current status) is also to be assessed.
This evaluation should be carried out on the individual sub-areas of the project area and their biological quality. For this purpose, each sub-area is allocated a factor according to its biological quality (see Appendix). A completely asphalted area, for example, is entered with a factor of 0 and a meadow orchard with a factor of 1.0. Vertical greening and green roofs are also taken into account in the evaluation. Thus, the biotope area factor could theoretically also be greater than 1.0. The biotope area factor designates the ratio of the sub-areas of the project area multiplied by the respective factor to the total area of the land.
If it can be demonstrated by a qualified expert that the environmental quality of an area is to be rated higher than that indicated in Table 1, a new factor for the area can be determined. This may be the case, for example, if species with a high degree of endangerment have settled on an area.

Evaluation note on points 7.3 and 7.4 of the table in the Appendix: “Row of trees, grove of trees, avenues”: The individual trees are counted and categorised according to their size. If there are trees in a green space, the trees and the green space are evaluated separately. For the evaluation of the trees, they are divided into large, medium and small trees and their areas are added together. Method 4 (see System basics) is to be used for the area calculation.

Indicator 3.1: Agenda 2030 bonus – Climate action goals
If the biotope area factor receives a result above the maximum possible score this is rewarded. For every 0.015 excess, 1 bonus point can be credited (a maximum of 10 bonus points can be credited)

Indicator 4: Biotope connectivity
It will be evaluated whether larger open spaces bordering on the district are networked together by the district (Green Infrastructure). In addition, the internal networking of open spaces larger than 1,000 m² is evaluated.

Best practice: Analysis of the surrounding ecosystems; requirements due to the environment; determining whether a biosphere reserve or similar is in the vicinity; determining integration potential (site environment); deriving measures; implementation + effectiveness assessment

If there are no adjoining and/or no open spaces in the district that are larger than 1,000 m², no evaluation points can be credited for the indicator.

Definition of connection:

- A surface is described as “connected” or “networked” if it is connected to another open area by a sufficiently wide connecting corridor.
- If the connection (e.g. by a road or fence) is not available for certain species, measures (green bridge, frog tunnel, continuity of fences for hedgehogs, etc.) must be demonstrated that connect the existing species within the project area with the species outside in order to include the areas in the evaluation. The usefulness of these measures must be confirmed by a qualified expert (this can also be done as part of the EIA). This applies to roads if they are wider than 3.5 m.

Indicator 5: Avoidance of invasive plant species

The presence of invasive plant species in the district can have a lasting negative impact on environmental quality. “The intentional import and unintentional introduction of invasive species is seen worldwide as the second largest cause of threat to biological diversity after habitat destruction” (see BMU 11/2010).

Documentation shall be provided that no invasive plant species as specified in Appendix 1 are present in the planning area. If invasive species are localised, a plan of measures to control them must be drawn up, or it must be demonstrated why control would have no prospect of success.

List of important invasive and potentially invasive plant species used as ornamentals or woody plants. The list was taken from the NBB system for the assessment of outdoor facilities (version 2012_1, criterion biodiversity) (see BMUB 2010).

TABLE 1 Recommendations for invasive plant species

COMMON NAME (BOTANICAL NAME)	RECOMMENDATION FOR ACTION
Box elder (Acer negundo)	Do not plant near water and floodplains. A minimum distance of at least 2 km to water bodies must be maintained.
Tree of heaven (Ailanthus altissima)	Do not plant in the open landscape. In settlements, the use must be justified on the basis of the site conditions, e.g. drought resistance in highly urban locations where high drought stress is expected; measures against dispersal (vegetative and by seed) must then be demonstrated.
Bastard indigo (Amorpha fructicosa)	Do not plant in the open landscape. A minimum distance of at least 2 km to water bodies must be maintained in settlement areas.
Butterfly bush (Buddleja davidii)	Do not plant in the open landscape.
Turkish rocket (Bunias orientalis)	It should not be used as a spice herb (Bunias orientalis is not important as an ornamental plant).
Needleweed (Crassula helmsii)	It is not to be used.
Glandular globe thistle (Echinops spaerocephalus)	Do not plant in the open landscape.

Canadian waterweed (Elodea canadensis)	Use only in delimited water gardens/ponds. A minimum distance of at least 2 km to water bodies must be maintained; if the distance is less, the use must be justified.
Narrow-leaved waterweed (Elodea Nuttallii)	Use only in delimited water gardens/ponds. A minimum distance of at least 2 km to water bodies must be maintained; if the distance is less, the use must be justified.
Japanese knotweed (Fallopia japonica)	It is not to be used.
Sakhalin knotweed (Fallopia sachalinensis)	It is not to be used.
Bastard knotweed (Fallopia x bohemica)	It is not to be used.
Red ash (Fraxinus pennsylvanica)	Do not plant in the open landscape.
Jerusalem artichoke (Helianthus tuberosus)	Use is to be dispensed with if a minimum distance of 2 km to water bodies cannot be maintained.
Giant hogweed (Heracleum mantegazzianum)	It is not to be used.
Water pennywort (Hydrocotyls ranunculoides)	It is not to be used.
Glandular balsam (Impatiens glandulifera)	It is not to be used.
Himalayan balsam (Impatiens parviflora)	It is not to be used.
Multileaf lupine (Lupinus polyphyllus)	Do not use in the open countryside or on the edge of settlements (alternatively, sterile varieties may be used)
Common fenugreek (Lycium barbarum)	Do not plant in the open landscape.
Ocellaris alba (Lysichiton americanus)	It is not to be used.
Black pine (Pinus nigra)	Do not plant in the open landscape. No planting in the surrounding area or in grassland with low lime content.
Weymouth pine (Pinus strobus)	Do not plant in the open landscape. Planting within a radius of at least 300 m around rock sites worthy of protection is to be avoided.
Bastard poplar (populus x canadensis)	Do not plant in the open landscape. No planting should be carried out in the vicinity of natural black poplar trees.

Wild black cherry (Prunus serotina)	Do not plant in the open landscape. Planting in the vicinity of open land biotopes should be avoided.
Common douglas fir (Pseudotsuga menziezii)	Do not plant in the open landscape. When planting in the vicinity of shallow, nutrient-poor rocky ridges or block seas (e.g. red sandstone of the Black Forest and Odenwald), birch-oak forests or sessile oak forests and dry-acidic silicate sites, a minimum distance of 2 km must be maintained.

Red oak (Quercus rubra)	Do not plant in the open landscape. When planting in the vicinity of rock biotopes, a minimum distance of 2 km must be maintained.
Staghorn sumac (Rhus hirta)	Do not plant in the open countryside or on the edge of settlements.
Robinia (Robinia pseudoacacia)	Do not plant in the open landscape. When planting in the immediate vicinity of dry grassland worthy of protection, a minimum distance of 500 m must be maintained.
Rugosa rose (Rosa rugosa)	Do not plant in the open landscape. Near the coast, planting should be completely avoided (also in settlements).
Armenian blackberry (Rubus armeniacus)	Do not plant in the open landscape. When planting in the vicinity of lean and semi-arid grasses worthy of protection, a minimum distance of 500 m must be maintained.
Narrow-leaved ragwort (Senecio inaequidens)	It is not to be used.
Canadian goldenrod (Solidago canadensis)	It is not to be used.
Giant goldenrod (Solidago gigantea)	It is not to be used.
Common snowberry (Symphoricarpus albus)	Do not plant in the open countryside, in the vicinity of rough pastures or as roadside greenery.
North American blueberry (Vaccinium angustifolium x corymbosum)	Do not plant in the open landscape. When planting in the vicinity of bogs, a distance of 3 km must be maintained.

Indicator 6: Development and maintenance care

- It is also important to observe, maintain and adapt the appropriate measures. The evaluation considers whether a care contract is drawn up with a qualified specialist company, which defines both the type of maintenance and the frequency of maintenance. Development maintenance care according to DIN 18919 follows on from completion maintenance and serves to achieve a functional condition.
- Maintenance care according to DIN 18919 follows on from development care and serves to maintain the functional condition.

Appendix 1

Industry

NR	DESIGNATION	FACTOR
1.0 Sealed or partially sealed surfaces, unsealed ground		
1.1	Sealed surface (buildings, roads, paths, narrow pavement, walls etc.)	0
1.2	Sealed surface with subsequent seepage of surface water or tree-covered sealed area and track areas without vegetation	0.05
1.3	Partially sealed or unsealed operational areas, (water-bound surfaces, gravel, crushed stone, gravel, sand areas), lawn paving stone, lawn joint pavement	0.1
1.4	Partially sealed surfaces (pavement, slabs)	0.1
1.5	Semi-open areas (lawn gravel, wood-block paving, lawn grid stones)	0.2
1.6	Gravel, crushed stone, water-bound cover, germination floor	0.2
1.7	Field and forest paths, unsealed with vegetation development	0.3
1.8	Facade greening	0.4
1.9	Dry stone walls, abandoned quarries and abandoned dry excavation areas	0.4
2.0 Accompanying vegetation		
2.1	Banks, central strip (regular mowing)	0.1
2.2	Roadside greenery, road embankments without existing woody plants	0.2
2.3	Roadside greenery, road embankments with existing woody plants	0.4
2.4	Waysides, borders without woody plants	0.4

NO	DESIGNATION	FACTOR
3.0 Agricultural land, semi-natural cultural biotopes and horticultural land		
3.1	Field, intensive, wild herbs largely absent	0.2
3.2	Field, rich in wild herbs on nutrient-rich soils	0.4
3.3	Field, rich in wild herbs on nutrient-poor sandy and shallow green lime soils	0.5
3.4	Intensive meadow or pasture, species-poor	0.3
3.5	Species-rich hay meadow, rough pasture	0.6
3.6	Damp and wet meadows/pasture, floodplain grass	0.6
3.7	Semi-dry lime turf, bristle grass, sandy dry turf, silicate dry turf, heavy metal turf, dry and moist heath, reeds, sedge reed	0.7
3.8	Orchard up to 30 years old	0.6
3.9	Orchard older than 30 years	0.7
3.10	Permanent crops (tree nurseries, Christmas tree crops, commercial horticulture, orchards) without closed ground vegetation layer	0.2
3.11	Permanent crops (tree nurseries, Christmas tree cultures, commercial horticulture, fruit plantations) with closed ground vegetation layer	0.3
4.0 Green areas, gardens		
4.1	Extensive roof greening	0.05
4.2	Intensive roof greening	0.1
4.3	Ornamental and kitchen garden without woody plants or with < 50% native woody plants	0.3
4.4	Ornamental and kitchen garden with > 50% native woody plants	0.2
4.5	Intensive lawns (e.g. in industrial and commercial areas, sports facilities), perennial borders, ground cover	0.3
4.6	Extensive lawns (e.g. in green spaces and parks)	0.4

NO	DESIGNATION	FACTOR
4.7	Green area, cemetery, park-like garden, rich in structure with tree population	0.5
4.8	Park, cemetery, rich in structure with old tree population	0.6
4.9	Natural meadows (wet meadow, rough meadow, etc.)	1.0
4.10.	Floodplain grass	0.4
4.11	Extensive roof greening	0.05
4.12	Intensive roof greening	0.1
4.13	Ornamental and kitchen garden without woody plants or with < 50% native woody plants	0.3
5.0 Fallow land (flat or striped)		
5.1	Arable land, grassland, industrial or settlement wasteland, track areas with vegetation, woodland < 50%	0.4
6.0 Forest, edge of forest, field shrubs		
6.1	With tree species typical for the habitat 0 < 50%, low to medium timber (BHD > 14 - 49 cm)	0.4
6.2	With tree species typical for the habitat 50 < 70%, low to medium timber (BHD > 14 - 49 cm)	0.5
6.3	With tree species typical for the habitat 70 < 90%, low to medium timber (BHD > 14 - 49 cm)	0.6
6.4	With tree species typical for the habitat 90 - 100%, low to medium tree wood (BHD > 14 – 49 cm)	0.7
6.5	Coppice forest, managed	0.8

NO	DESIGNATION	FACTOR
7.0 Woody plants		
7.1	Hedges, stripes of shrubs and bushes, shoreline shrubs, shrubbery, woody plants typical of the habitat < 50%	0.3
7.2	Hedges, stripes of shrubs and bushes, shoreline shrubs, shrubbery, woody plants typical of the habitat ≥ 50%	0.5
7.3	Row of trees, group of trees, avenues with tree species typical for the habitat < 50% and single tree, pollarded tree not typical for the habitat	0.3
7.4	Row of trees, group of trees, avenues with tree species typical for the habitat ≥ 50% and single tree, pollarded tree typical for the habitat	0.5
8.0 Spring, stream, river, oxbow lake, oxbow lake, (meadow) pond		
8.1	Not natural	0.2
8.2	Conditionally not natural	0.5
8.3	Conditionally near-natural	0.8
8.4	Near-natural, natural	1.0

NO	DESIGNATION	FACTOR
9.0 Still water bodies		
9.1	Natural pond, lagoon, basin	1.0
9.2	Open water surface of a pond (drainable)	0.8
9.3	Open water surface of a natural lake	1.0
9.4	Open water surface of a quarry pond	0.8
9.5	Small non-natural water bodies	0.4
9.0 Still water bodies		
10.1	Rocks, scree slopes and their vegetation, inland salt sites	1.0
10.2	Bogs, reeds, sedge beds	0.9

APPENDIX B - DOCUMENTATION

I. Required documentation

City Business event Industry Commercial

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.
Calculations with the “master tool” should be carried out in all phases according to the data basis.
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TABLE 2 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant records/documents**: ■ B1: A binding declaration that measures listed in the environmental report or land use plan of an environmental impact assessment or strategic environmental assessment are actually implemented, and documentation of the preparation and implementation of a comprehensive and long-term biodiversity strategy ■ B2: Documentation of the planned/built avoidance and compensation measures for the protection of existing species and biotopes on the basis of a site plan with registration of the measures, assigned pictures, as well as a written statement of an expert that measures are reasonable for the project area.	B
Photo documentation of the implemented measures	C
Site plan with marking of implemented measures	D
Documentation of **concept/strategy** in the sense of “Animal-Aided Design” regarding how the needs of the new animals are integrated into the open space planning from the very beginning with an explanation by a qualified expert on the measures implemented	F
Master tool	J

TABLE 3 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Biodiversity strategy	B, D, F	B, C, D, F	B, C, D, F	B, (C), D, F	B, C, D, F
2. Targeted measures for the active introduction of new and native species	A, B, F	B1, C, F	B1, C, F	A, B, F	B, C, F
3. Biotope area factor	A, D, J	D, J	D, J	A, D, J	D, J
4. Biotope connectivity	A, B, D, F	B, C, D, F	B, C, D, F	-	-
5. Avoidance of invasive plant species	A, B, D, F	B, C, D, F	B, C, D, F	A, B, D, F	B, C, D, F
6. Development and maintenance care	A, B, F	B, F	B, F	A, B, F	B, C, F

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- BMU - Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2007): National Strategy on Biological Diversity.
- BMU - Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (11/2010): Indikatorenbericht 2010 zur Nationalen Strategie zur biologischen Vielfalt.
- BMUB - Federal Ministry for the Environment, Nature Conservation, Building and Reactor Protection (2010): BNB-Außenanlagen von Bundesliegenschaften (BNB_AA). Available at: www.bnb-nachhaltigesbauen.de.
- Daab, Karlfried (1996): Analyse- und Entwurfsmethodik für einen ökologisch orientierten Städtebau, Dissertation an der RWTH Aachen, Dortmunder Vertrieb für Bau- und Planungsliteratur (Ed.).
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- Kaule, Giselher (2002): Umweltplanung, Eugen Ulmer Verlag, Stuttgart.
- Küchler-Krischun, Jonna; Walter, Alfred Maria (10/2007): National Strategy on Biological Diversity, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (ed.).
- LANUV NRW 2008 (E.): Numerische Bewertung von Biotoptypen für die Bauleitplanung in NRW, State Office for Nature, Environment and Consumer Protection North Rhine-Westphalia, http://www.lanuv.nrw.de/fileadmin/lanuv/natur/lebensr/Num_Bew_Biotoptypen_Bauleitplanung_Maerz2008.pdf.
- Maass, Inge (2/2000): Stuttgarter Biotopatlas – Methodik, Beispiele und Anwendung, Landeshauptstadt Stuttgart, Amt für Umweltschutz (Ed.)
- UN - United Nations (1992): Convention on Biological Diversity of 5/06/1992, Rio de Janeiro.
- Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species
- Wolfgang W. Weisser, Thomas E. Hauck (2015): Animal aided Design, ISBN 978-3-00-047519-1, TU München.

Websites

- WISIA - Species protection database of the Federal Agency for Nature Conservation (URL: www.wisia.de, 16/02/2011).
- Booklet accompanying the exhibition StadtNatur - NaturStadt (URL: www.bfn.de/fileadmin/MDB/documents/themen/siedlung/stadtnatur.pdf, 27/01/2011).
- Biodiversity in the city (URL: www.vgoed.de/download_forum/forum_2008 _3_spfo083c.pdf, 27.01.2011).
- Biodiversity in the city (URL: www.hamburg.de/contentblob/426450/data/broschuere-naturschutzrat-

biologische-vielfalt.pdf, 27/01/2011).

- Biodiversity of settlements (URL: http://www.fh-erfurt.de/lgf/fileadmin/LA/Personen/Mueller/recentPub/BiodivNALA.pdf, 27.01.2011).
- Competition for the Federal Capital for Nature Conservation (URL: www.duh.de/uploads/tx_duhdownloads/Dokumentation_Naturschutzkommune.pdf, 27/01/2011).
- Alien and invasive species in Germany: http://www.neobiota.de.
- IUCN database: https://panorama.solutions/en/portal/agriculture-and-biodiversity
- Guidelines on Business and KBAs:Managing Risk to Biodiversity https://portals.iucn.org/library/sites/library/files/documents/2018-005-En.pdf

Appendix 1

TABLE 4 1.0 Sealed or partially sealed surfaces, unsealed ground

NO	DESIGNATION	FACTOR
1.1	Sealed surface (buildings, roads, paths, narrow pavement, walls etc.)	0
1.2	Sealed surface with subsequent seepage of surface water or tree-covered sealed area and track areas without vegetation	0.05
1.3	Partially sealed or unsealed operational areas, (water-bound surfaces, gravel, crushed stone, gravel, sand areas), lawn paving stone, lawn joint pavement	0.1
1.4	Partially sealed surfaces (pavement, slabs)	0.1
1.5	Semi-open areas (lawn gravel, wood-block paving, lawn grid stones)	0.2
1.6	Gravel, crushed stone, water-bound cover, germination floor	0.2
1.7	Field and forest paths, unsealed with vegetation development	0.3
1.8	Facade greening	0.4
1.9	Dry stone walls, abandoned quarries and abandoned dry excavation areas	0.4

TABLE 5 2.0 Accompanying vegetation

NO	DESIGNATION	FACTOR
2.1	Banks, central strip (regular mowing)	0.1
2.2	Roadside greenery, road embankments without existing woody plants	0.2
2.3	Roadside greenery, road embankments with existing woody plants	0.4
2.4	Waysides, borders without woody plants	0.4

TABLE 6 3.0 Agricultural land, semi-natural cultural biotopes and horticultural land

NO	DESIGNATION	FACTOR
3.1	Field, intensive, wild herbs largely absent	0.2
3.2	Field, rich in wild herbs on nutrient-rich soils	0.4
3.3	Field, rich in wild herbs on nutrient-poor sandy and shallow green lime soils	0.5
3.4	Intensive meadow or pasture, species-poor	0.3
3.5	Species-rich hay meadow, rough pasture	0.6
3.6	Damp and wet meadows/pasture, floodplain grass	0.6
3.7	Semi-dry lime turf, bristle grass, sandy dry turf, silicate dry turf, heavy metal turf, dry and moist heath, reeds, sedge reed	0.7
3.8	Orchard up to 30 years old	0.6
3.9	Orchard older than 30 years	0.7
3.10	Permanent crops (tree nurseries, Christmas tree crops, commercial horticulture, orchards) without closed ground vegetation layer	0.2
3.11	Permanent crops (tree nurseries, Christmas tree cultures, commercial horticulture, fruit plantations) with closed ground vegetation layer	0.3

TABLE 7 4.0 Green areas, gardens

NO	DESIGNATION	FACTOR
4.1	Extensive roof greening	0.05
4.2	Intensive roof greening	0.1
4.3	Ornamental and kitchen garden without woody plants or with < 50% native woody plants	0.3
4.4	Ornamental and kitchen garden with > 50% native woody plants	0.2
4.5	Intensive lawns (e.g. in industrial and commercial areas, sports facilities), perennial borders, ground cover	0.3
4.6	Extensive lawns (e.g. in green spaces and parks)	0.4
4.7	Green area, cemetery, park-like garden, rich in structure with tree population	0.5
4.8	Park, cemetery, rich in structure with old trees	0.6

NO	DESIGNATION	FACTOR
4.9	Natural meadows (wet meadow, rough meadow, etc.)	1.0
4.10	Floodplain grass	0.4
4.11	Extensive roof greening	0.05
4.12	Intensive roof greening	0.1
4.13	Ornamental and kitchen garden without woody plants or with < 50% native woody plants	0.3

TABLE 8 5.0 Fallow land (flat or striped)

NO	DESIGNATION	FACTOR
5.1	Arable land, grassland, industrial or settlement wasteland, track areas with vegetation, woodland < 50%	0.4

TABLE 9 6.0 Forest, edge of forest, field shrubs

NO	DESIGNATION	FACTOR
6.1	With tree species typical for the habitat 0 < 50%, low to medium timber (BHD > 14 - 49 cm)	0.4
6.2	With tree species typical for the habitat 50 < 70%, low to medium timber (BHD > 14 - 49 cm)	0.5
6.3	With tree species typical for the habitat 70 < 90%, low to medium timber (BHD > 14 - 49 cm)	0.6
6.4	With tree species typical for the habitat 90 - 100%, low to medium timber (BHD > 14 - 49 cm)	0.7
6.5	Coppice forest, managed	0.8

TABLE 10 7.0 Woody plants

NO	DESIGNATION	FACTOR
7.1	Hedges, stripes of shrubs and bushes, shoreline shrubs, shrubbery, woody plants typical of the habitat < 50%	0.3
7.2	Hedges, stripes of shrubs and bushes, shoreline shrubs, shrubbery, woody plants typical of the habitat ≥ 50%	0.5
7.3	Row of trees, group of trees, avenues with tree species typical for the habitat < 50% and single tree, pollarded tree not typical for the habitat	0.3
7.4	Row of trees, group of trees, avenues with tree species typical for the habitat ≥ 50% and single tree, pollarded tree typical for the habitat	0.5

TABLE 11 8.0 Spring, stream, river, oxbow lake, oxbow lake, (heath) pond

NO	DESIGNATION	FACTOR
8.1	Not natural	0.2
8.2	Limitedly not natural	0.5
8.3	Limitedly near-natural	0.8
8.4	Near-natural/ natural	1.0

TABLE 12 9.0 Still water bodies

NO	DESIGNATION	FACTOR
9.1	Natural pond, lagoon, basin	1.0
9.2	Open water surface of a pond (drainable)	0.8
9.3	Open water surface of a natural lake	1.0
9.4	Open water surface of a quarry pond	0.8
9.5	Small non-natural water bodies	0.4

TABLE 13 9.0 Still water bodies

NO	DESIGNATION	FACTOR
10.1	Rocks, scree slopes and their vegetation, inland salt sites	1.0
10.2	Bogs, reeds, sedge beds	0.9

Economic quality

The five criteria of economic quality are used to assess **long-term economic viability** (life-cycle costs) and **value development** as well as **adaptability**.

ECO1.1	Life cycle costs
ECO2.1	Resilience and adaptability
ECO2.3	Land use efficiency
ECO2.4	Value stability
ECO2.5	Environmental risks

ECO1.1

Life cycle costs

Objective

The objective is to enable a sensible and conscious use of economic resources during the entire life cycle of a district. The main potential for optimisation for subsequent economic gain is to be found in the conceptual and planning phases. Those involved in planning should regularly consider possible consequential costs of their design and implementation variants and should already do so in the early planning phase.

Benefits

The economic efficiency of districts depends not only on income, but also on the costs of production and utilisation, and essentially on their cost-efficient operation. The life cycle cost calculation allows a medium to long-term cost analysis of a district. The more often and earlier in the planning process life cycle costs are calculated and communicated to the planning participants, the greater the chance of obtaining economically optimised solutions in the long term. Based on this method, a transparent comparative cost calculation of buildings of similar use and functionality can also be determined in order to obtain orientation about one's own performance. For this step, the life cycle cost is calculated according to fixed parameters and defined conventions and can then be used for an evaluative comparison using suitable benchmarks.
The following benefits can be achieved for companies, municipalities and/or users:

- Reduction of operating costs
- Increased profitability
- Cost transparency for all project participants
- Holistic balancing

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	7.1	Access to modern energy services	7.1.a/b	Conservation of resources
			11.3	Living
	7.3	Energy efficiency		
	11.1	Affordable living space		
	12.2	Use of natural resources		
Low	1.1	Eradicate extreme poverty	1.1.a/b	Poverty
	1.2	Halving poverty		

Outlook

This version of the criterion emphasises the importance of continuously monitoring life cycle costs and identifying variants at different planning phases for creating economical districts by introducing new indicators. The comparative calculation of life cycle costs remains an essential tool to provide the project team with orientation on how their project compares to others.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**5.7 %**	**4**
Commercial	**5.0 %**	**3**
Event	**6.7 %**	**4**
Industry	**5.0 %**	**4**

ASSESSMENT

Regular reviews of life cycle costs of the respective planning status during the entire planning process are rewarded via indicator 1. The development and analysis of the life cycle costs of variants is evaluated via indicator 2. If the life cycle costs are determined according to a defined method and compared to a benchmark, a moderate over- or underperformance in indicator 4 can be considered positive, depending on the deviation from the benchmark. A maximum of 80 points can be achieved in this indicator. For **Industry**, instead of indicator 4, the optimisation of operating costs is evaluated (indicator 3). A maximum of 100 points can be credited in the criterion.

NO.	INDICATOR		POINTS
1	**Life cycle cost consideration in planning**		
	City **Business** **Event** **Commercial**		**max. 10**
	Industry		**max. 30**
1.1	**Integration of life cycle cost considerations into the planning process**		
	Measures influencing the life cycle costs of the district are examined in an early planning phase for the project (e.g. setting up a life cycle cost system/LCC model). The district variants available in the early planning phase are compared in terms of their production costs and relevant follow-up costs (including those for the measures examined in ENV1.1).	**City** **Business** **Event** **Commercial** **Industry**	+5 +5 +15
	Measures influencing the life cycle costs are regularly determined during the planning process (adapted to the respective planning status) and shared with the planning team.	**City** **Business** **Event** **Commercial** **Industry**	+5 +5 +15
2	**Life cycle cost optimisation**		
	City **Business** **Event** **Commercial**		**max. 10**
	Industry		**max. 40**
2.1	**Life cycle cost optimisation accompanying planning**		
	Further planning will determine the influence of significant alternative decisions on the expected effects on life cycle costs for the district. This is carried out with a comprehensive full analysis or a partial analysis (excerpt) for the relevant cost groups of the entire district.		
	■ A **comprehensive consideration** was carried out from an **early planning phase** (urban development design/framework planning) up to the **development planning**.	**City** **Business** **Event** **Commercial** **Industry**	10 10 40
	■ A **partial consideration** was carried out in an **early planning phase** (urban development design/framework planning) up to the **development planning**.	**City** **Business** **Event** **Commercial** **Industry**	5 5 20

NO.	INDICATOR	POINTS
	■ 3 points can be credited for each alternative in the context of a **partial consideration** in an early **planning phase** (urban development design/framework planning). For **Industry**, 8 points.	
	■ 1 point can be credited for each alternative in the context of a **partial consideration** during the **development planning**. For **Industry**, 4 points.	
	INNOVATION AREA	**as in 2.1**
For 2.1	Explanation: Alternative approaches for achieving an optimisation of lifecycle costs can also be selected and credited.	
3	**Optimisation of operating costs**	
	Industry	**max. 30**
3.1	**Optimisation of life cycle costs through optimised operation**	
	An evaluation matrix is provided in Appendix 3 for the evaluation of the sub-indicators.	
	■ Performance measurement	0 – 4
	■ Computer-aided facility management (CAFM) system	0 – 4
	■ Facility management (FM) standards	0 – 4
	■ Warranty (WAR) tracking systems	0 – 4
	■ Distribution of consumption costs/breakdowns	0 – 4
	■ Ratio of maintenance costs to repair costs	0 – 4
	■ Process/concept for operation costs controlling	0 – 6
4	**Benchmark calculation**	
	City **Business** **Event** **Commercial**	**max. 80**
4.1	**Public spaces and development**	
	City **Business** **Event** **Commercial**	**0 - 48**
	■ $LCK_P = LCK_{PMax}$	0
	■ $LCK_P <= LCK_{PMin}$	48
4.2	**Buildings and private open spaces**	
	City **Business** **Event** **Commercial**	**0 - 32**
	■ $LCK_B = LCK_{BMax}$	0
	■ $LCK_B <= LCK_{BMin}$	32

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI it is useful to communicate the degree of soil sealing of the entire built and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	District-related life cycle costs according to DGNB	[EUR/m² GFA*a]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Certain input values and the result of indicator 3.1 from the system application for new buildings can be used as a basis in criterion ECO1.1 of the schemes **City**, **Business**, **Event**, **Commercial**.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

In the planning and construction process it is often primarily production costs that are taken into account purely from the investor's perspective. Since the operation costs often reach a multiple of the production costs over the entire life cycle, more attention should be paid. The holistic approach ensures economically sustainable development independent of individual interests. In the present "life cycle costs" criterion, the expected operation costs of the individual areas (transport infrastructure and areas and buildings) are determined in addition to the production costs. Individual processes or process sequences are not focused on.

II. Additional explanation

III. Method

The evaluation is quantitative, by determining the life cycle cost key value of the district to be evaluated. The DGNB master tool is available as an aid for the calculation.
The life cycle costs of a district are usually made up of all costs incurred over the planned or assumed life of the considered district. The costs from project development to production and handover are defined as production costs. The remaining costs from the time of handover, from commissioning to dismantling, are referred to as operation costs. The production and operation costs are stated as net values. The life cycle cost key value is formed (cash value method) through the discounting of selected production and operation costs that were incurred within the analysis period of 50 years and included in the evaluation. The reference unit for the life cycle cost key value is one square metre of gross floor area above and below ground [m² GFA] of the district (see system basics).

Calculation formula:
The cash value of all payments is to be determined both for the areas with infrastructure/media development and for the buildings. The cash value is the discounted value of a future payment. The general formula for the cash value is the following (see Kruschwitz 2007):

$$C_0 = \sum_{t=0}^{T} \frac{c_t}{(1+i)^t} \qquad (1)$$

with

C_0	Cash value (or capital value) [€]
C_t	Payment at time t [€]
T	Time of a payment
T	Period under consideration [years]
I	Calculation interest rate [%]

The following selected cost elements are taken into account for the calculation of district-related costs in the life cycle:

- Selected production costs
- Selected use-phase costs
- Selected operating costs
- Selected repair costs

The lower the life cycle costs of the public spaces, infrastructure facilities and buildings in the planning area, the lower the long-term burden on the municipality and its inhabitants or private owners.

Indicator 1: Life cycle cost consideration in planning

The objective of indicator 1.1 is to show the effects of different planning variants on life cycle costs in a transparent manner, adapted to the respective context and the time and scope of planning, from an early planning phase.

In an early planning phase (urban development design/framework planning), for example, an LCC model can be set up. The most probable/preferred existing planning variants are compared with regard to their production and relevant follow-up costs, or at least the expected energy costs. For districts, the focus is on the open spaces of the district, and for industrial sites it is on open spaces and buildings.

For the determination and communication of the life cycle costs to the planning team during the planning process, target values (adapted to the planning status) should be defined, which are compared with the actual values in various planning phases.

The choice of the (calculation) method is in principle open, but it should meet the objectives of the sub-indicators. At the very beginning of the planning process, simple tools can be selected according to the use, such as the brokerage method as a calculation entry point for investment properties with a combination of energy costs. Furthermore, the approaches from the ImmoWertV can also be used for the calculation of further values.

Indicator 2: Life cycle cost optimisation (variants)

The objective of life cycle cost optimised planning is to address the follow-up costs as early as possible in the planning phase and to reduce or optimise them by means of variant calculations. Life cycle cost optimised planning should be carried out at various appropriate times.

Alternatively, full considerations (life cycle costs for the entire district according to the scope of indicator 4 and the minimum scope of follow-up costs mentioned in indicator 1) or partial considerations (life cycle costs for a section of the scope) can be included in the evaluation.

The optimisations are to examine the life cycle costs of relevant alternatives for relevant decisions. These can vary greatly depending on the planning phase and concern different aspects.

When considering variants with an impact on life cycle costs, aspects that are not part of the scope of “comparative cost calculation” can also be taken into account (see indicator 4). These include, for example, the inclusion of other cost groups (infrastructure, pipelines), other energy consumers (e.g. lifts, user equipment, machinery), operating materials (e.g. refrigerants) or conversion, replacement or modernisation costs. An extension of the viewing frame may also include the determination of potential income (including income related to personnel or customers). In the alternatives, conventions that deviate from the comparative cost calculation defined below (see indicator 4), such as interest rates, rates of price increases, etc., can also be used.

The knowledge gained from life cycle cost optimised planning should be incorporated into the decision-making process.

It is evaluated for how many alternatives in early or later planning phases comprehensive or partial life cycle cost calculations are carried out.

Indicator 3: Optimisation of operating costs

Industry

The operating costs depend on numerous parameters and can only be partially included in the forecast of a life cycle cost calculation. Therefore, further important points for the economical operation of a site are recorded in a qualitative way.
For this purpose, the following points are examined qualitatively for the entire site in a checklist (Appendix 3) with a 5-point gradation:

- Service management (performance measurement, CAFM system, FM standards)
- WAR management (systems for WAR tracking available)
- Metering concepts (distribution of consumption costs/breakdowns)
- Operation costs / costs in building operation / cost transparency (ratio of maintenance costs to repair costs, process/concept for operation cost monitoring)

Indicator 4: Benchmark calculation

City **Business** **Event** **Commercial**

In order to also give weight to open spaces (opposite to buildings) in the LCC, a maximum of 48 points can be achieved for indicator 4.1 Public spaces and development and a maximum of 32 points for indicator 4.2 Buildings and private open spaces.

Indicator 4.1: Public spaces and development

Public spaces and developments include public circulation areas (CA), public green spaces according to DGNB (PGS_{DGNB}) and supply installation areas (SIA). All publicly accessible areas are to be used, regardless of the actual ownership situation.
The life cycle key value (LCK) for development areas according to DGNB (LCK_P)is included in the overall assessment with **60 %**.
The assessment standard is project-related. In a first step, the district with its costs and masses must be mapped in the master tool (LCK_P). For reasons of comparability and the effort required to provide the cost values, the master tool specifies costs for different quality levels for production, care and cleaning. For the evaluation, the open spaces and buildings must be categorised in the master tool. It is not necessary to list the settled costs for the evaluation.
After entering the areas and quality levels in the master tool, the maximum and minimum project-specific reference values are automatically calculated (LCK_{PMax} and LCK_{PMin}).

The following costs are considered separately:

A. Selected production costs

A1 Areas

When calculating the production costs for public spaces, infrastructure and media development, selected costs from cost groups 200 and 500 according to DIN 276 are taken into account. Costs for the handling of contaminated sites and disposal of explosive ordnance as well as for the demolition of old systems or railway tracks are not taken into account. (Infrastructure)-buildings that are integrated into the public space (e.g. underground car park under parks, music pavilion in spa gardens, etc.) are included in the production costs of the buildings.

A2 Supply and disposal lines

For the calculation of production costs for supply and disposal lines, selected costs are considered based on reference values. The costs of pipelines, earthworks and (if present) infrastructure ducts or conduits must be included. As a matter of principle, it must be stated whether the supply and disposal lines have been laid underground or in the infrastructure or large empty conduit. It must be stated whether the laying of underground cables was coordinated in order to avoid additional costs.

The following lines are considered: Electricity, drinking water, wastewater (rainwater and black water; it must be specified whether it is discharged in separate or combined sewerage systems), if applicable gas or other media, if applicable grey water, if applicable local/district heating or similar (e.g. low-energy network). Telecommunications infrastructure is not considered.

B. Selected use-phase costs

The selected use-phase costs are divided into operating costs, maintenance and repair costs **and costs for care and cleaning**.

B1 Operating costs

The maintenance and cleaning costs of the open spaces are considered in operating costs. In addition, the drinking water requirements for irrigation and the disposal costs for rainwater are also included. The volume of drinking water and wastewater can be taken from the determinations for the criterion “water cycle systems”. The corresponding cost key values are stored in the master tool. Furthermore, the key values from the master tool are to be used for the final energy demand for electricity.

B2 Upkeep and cleaning costs

Costs for upkeep and cleaning depend on the design of the paved areas, green and water areas. The surface quality, road and path guidance, upkeep classes of the green areas and planting appropriate to the location are considered here. The reference value always refers to all areas of the considered category. No upkeep and cleaning costs are applied for supply and disposal lines.

B3 Maintenance and repair costs

The repair costs are made up of the service life of the plant/area and the regular costs for maintenance and inspection, which are calculated with a percentage surcharge on the production costs. All of this data can be found in the master tool.

B4 Maintenance and cleaning cost factor

In order to map the influence of selected design, technical and organisational features on the intensity of maintenance and care, various care standards are defined in the master tool. Characteristics of private buildings should also be considered here, provided that they can be seen from public spaces.

General:

- The cash value is determined using the specified rate of price increase and the discount rate according to DGNB, viewed over 50 years.
- The life cycle key value for the public spaces, infrastructure and media development (LCK_P) results from the sum of the production costs and the cash values of the utilisation costs, based on one square metre GFA (above and below ground).
- The calculated life cycle key value (LCK_P) is compared with the minimum and maximum reference life cycle key values to be determined by the same method and evaluated accordingly. See “Evaluation” for further explanation.

Indicator 4.2: Buildings and private open spaces

The costs for all buildings in the district (total GFA) as well as private green spaces (PGS) and private circulation areas (PCA) are considered. Building costs are used to illustrate the interactions between open spaces, technical infrastructure and buildings.

The life cycle key value for buildings (LCK_B) is included in the overall assessment with 40 %. The evaluation is based on the same scheme as for public open spaces and development. The reference value maximum is called LCK_{BMax} the reference value minimum is called LCK_{BMin} and the actual value is called LCK_B .

The following costs are considered separately:

A. Selected production costs

For the calculation of the production costs for buildings, the costs of the cost groups 300 and 400 according to DIN 276 are taken into account and the private open spaces (PGS + PCA) with selected costs from the cost groups 200 and 500 according to DIN 276.

Determination of the production costs for buildings according to the BKI ratio method

The construction costs of buildings is calculated by classifying each building according to its equipment standard (low, medium, high). The master tool contains cost parameters for different building uses and equipment standards. For the assessment of the equipment standard, the classification according to BKI is used, which varies depending on building use (Appendix 1).

B. Selected use-phase costs

The selected use-phase costs are divided into operating costs, maintenance and repair costs and costs for care and cleaning.

B1 Operating costs

Operating costs include energy costs from heating, cooling and electricity, drinking water and wastewater costs in the ongoing operation of the buildings, as well as the costs of care and cleaning. The amount of drinking water and wastewater needed and to be disposed of is taken from the determinations for the water cycle systems criterion. The final energy requirements are to be determined from project-specific values or via the demand key values from the master tool. The quantities for water and energy are linked to the corresponding cost key values according to DGNB.

B2 Maintenance and repair costs

The repair costs are made up of the lifetime for the entire building or the open spaces and the regular repair costs, which are calculated as a percentage surcharge on the production costs. All of this data can be found in the master tool.

B3 Upkeep and cleaning costs – buildings

For buildings, the upkeep and cleaning costs are represented by a lump sum based on their construction, whereby one classification per building is sufficient. The attached list (Appendix 2) can be used for classification. The total GFA can thus be classified according to the three care intensity levels: low, normal and high. The lump sum fee for low, normal and high upkeep and cleaning costs is applied to the respective area percentages and summed.

B4 Upkeep and cleaning costs – private open spaces

The upkeep and cleaning costs are calculated for both private and public open spaces. In contrast to public spaces, these spaces are not subject to additional maintenance and cleaning cost factor.

General:

- The cash value is determined using the specified rate of price increase and the discount rate according to DGNB, viewed over 50 years.
- The life cycle key value for buildings (LCK_B) is calculated from the sum of the production costs and the cash values of the utilisation costs, based on one square metre gross floor area (above and below ground).
- The calculated life cycle key value (LCK_B) is compared with the minimum and maximum reference life cycle key values to be determined by the same method and evaluated accordingly. See “Evaluation” for further explanation.

Further regulations:

- **Costs for dismantling and disposal**
  The costs for dismantling and disposal are not included in the current version**.**

- **Existing stock**
  Areas, facilities and buildings that are retained as existing stock in the new district are not taken into account in the construction costs with regard to the retained construction/facility. The costs of repair, modernisation or renovation shall be applied as production costs for the renewed part of the measure.
  Example: If the shell of a building remains intact, only about 50-70 % of the production costs for the building category are to be included.
  However, as a basis for calculating the utilisation costs, the existing buildings and the modernised and renovated buildings are to be regarded as complete buildings and the production cost key values of the master tool are to be used. Demolition costs are not taken into account.

- **Cross-district uses**
  If there is cross-district use, such as a CHP plant, long-distance heating, railway stations, rainwater infiltration systems, etc., the production costs for these systems are to be included in the calculations on a pro rata basis. This proportion is determined by the area that is supplied and lies within the district.

Example 1: A heat supply system will be installed in the district, which will supply both the entire district covered by the certification and the surrounding districts over an area three times the size of the district in question. In the determination of the life cycle key value, 25 % of the production costs for the heat supply system must be included.
Example 2: An underground metro station will be built in the district. The catchment radius for a subway station is assumed to be 500 m. If this radius is drawn around the station, about 30% of the area lies outside the district. 70% of the production costs for the station are to be included in the determination of the life cycle key value.
The catchment radii for the public transport stations are to be set according to the maximum radii from the mobility criteria.

- **Current value for energy quality of buildings**
  Statutory updates continuously tighten the requirements for the energy quality of buildings. That means: Buildings that are planned according to today's energy standards may no longer meet the legal minimum standard in 5 or 10 years' time. This circumstance is to be taken into account by means of graduated surcharges on the energy values according to the life cycle assessment.

- **Mixed-use buildings**
  If a building contains several uses (e.g. office and retail), the gross floor area of the building is to be divided accordingly between the uses and entered in the master tool accordingly.

- **Local/district heating network**
  If a local/district heating network is installed, the applied costs of KG 400, which are calculated using the BKI index method, may be reduced by 10 % for all buildings that are using it. This reflects the lower technical equipment and system space required for heat supply.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified letter of intent	A
Documentation of relevant records/documents ■ B1: Production costs via cost estimation/cost determination (in the area of buildings and private open spaces, cost calculations are permissible) ■ B2: List of the determinations for selected categories, selected production costs from BKI, lengths, areas, volumes and final energy values on which the calculation is based ■ B3: Building data sheet for each building (min. photo, short classification of use, standard of execution and intensity of care) ■ B4: Documentation of the variant consideration: Type of consideration (full or partial consideration); time of consideration, number of alternatives with documentation of which decisions were examined ■ B5: Documentation regarding the checklist (Appendix 3) ■ B6: Design variants, protocols, decision papers	B
Photo documentation	C
Proof of **planning documents** with identification of pipes, streets, squares, water and green areas and the corresponding mass and area list	E
Documentation of **master tool**: Calculation of the life cycle parameters and determination of the operation costs	J

TABLE 2 Documentation per indicator

INDICATORS	City	Business / Commercial	Event	Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Life cycle cost consideration in planning	B, J	B, J	B, J	B, J	B, J
2. Life cycle cost optimisation	A, B, J	B	B	B	B
3. Optimisation of operating costs	-	-	-	B5	B5
4. Benchmark calculation	A, B, J	B, J	B, J	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- BKI (2015): Baukosten 2015 Neubau. Statistische Kostenkennwerte für Gebäude. Ed.: Baukosteninformationszentrum Deutscher Architektenkammern GmbH. Stuttgart.
- DIN 276-1:2008-12 Building costs - Part 1: Hochbau (Building construction).
- DIN 276-4:2009-08 Building costs - Part 4: Ingenieurbau (Civil constructions).
- DIN 18960:2008-02 User costs of buildings.
- Kruschwitz, L. (2007): Investitionsrechnung, 11th updated and extended edition, Oldenburg, Munich.
- Beschreibung der Gebäudestandards, p. 20 ff., Sachwertrichtlinie (German Federal Ministry of Justice) of 18 October 2012 http://www.bmub.bund.de/themen/stadt-wohnen/staedtebaurecht/wertermittlungsrichtlinien/.
- DE: „Der Folgekostenschätzer“ – Infrastrukturfolgekosten neuer Wohnbaugebiete (Oberste Baubehörde im Bayerischen Staatsministerium des Innern, für Bau und Verkehr; Bayerisches Staatsministerium für Umwelt und Verbraucherschutz).
- Bott, H., Grassl, G, Anders, S. (2013) Nachhaltige Stadtplanung.
- Valuation guidelines (WertR 2006) - Appendix 7

An LCC tool specially developed for this criterion is available for determining the life cycle costs.

APPENDIX 1

Standard classification according to BKI

The description of the building standards 1 - 3 is taken from the BKI Atlas for New Buildings 2015 and summarised (see BKI 2015). According to BKI, only certain uses are differentiated into different standards. The following procedure is used to assign a standard to a building:

Step 1: Cost relevance of the building construction
In a first step, the standard of the building construction for a building is estimated using the following table (see BKI 2015: 60):

TABLE 3 Documentation

COST GROUP	- COST-REDUCING	+ COST-INCREASING
310 Excavation pit	Only topsoil removal, recycling of the excavated material on the site, no landfill fee, short transport distances, recyclable excavated material for backfilling	Dewatering, soil exchange, groundwater lowering, building pit shoring, sheet piling, building pit securing with large bored piles, rock drilling, BK 5, 6 and 7
320 Foundation	No floor construction on the foundation area, no insulation measures on or under the foundation area	Dewatering, soil exchange, groundwater lowering, building pit shoring, sheet piling, building pit securing with large bored piles, rock drilling, BK 5, 6 and 7
330 Exterior walls	(Monolithic) masonry, plaster facade, low requirements for statics, fire protection, sound insulation and optics	Natural stone facade, post and beam construction, exposed brickwork, passive house windows, triple glazing, other high-quality windows or special glazing, noise protection measures, sun protection systems
340 Interior walls	Large proportion of basement partition walls, sanitary partition walls, simple assembly walls, economical tiling	High proportion of mobile partition walls, cupboard walls, glazed walls, exposed brickwork, all-glass doors, solid wood doors, fire doors, other high-quality doors, high demands on statics, fire protection, sound insulation, room acoustics and appearance, stainless steel railings, room-high tiling
350 Ceilings	Simple floor coverings, few and simple stairs, small spans	Raised floors, natural stone floors, metal and wood panelling, stainless steel stairs, high demands on fire protection, sound insulation, room acoustics and optics, high spans

COST GROUP	- COST-REDUCING	+ COST-INCREASING
360 Roofs	Simple geometry, few penetrations	Elaborate geometry such as mansard roof and dormers, metal roofing, glass roofs or glass skylights, flat roofs that can be walked on or driven on, greenery, protective elements such as stainless steel railings
370 Structural fixtures	-	Site road, site office, bad weather construction, emergency glazing, temporary heating, complex scaffolding work, long lead times
390 Other measures for building construction		

Step 2: Cost relevance of the technical installations

In a second step, the standard of the technical installations for a building is estimated using the following table (see BKI 2015: 61):

TABLE 4 Documentation

COST GROUP	- COST-REDUCING	+ COST-INCREASING
410 Sewage, water, gas installations	Few, inexpensive sanitary objects, central arrangement of supply and discharge lines	Rainwater utilisation system, wastewater lifting unit, petrol separator, grease and starch separator, fire extinguishing and alarm systems, sprinkler systems, fire extinguishing equipment, pressure boosting systems, softening systems
420 Heat supply systems	-	Solar collectors, combined heat and power unit, floor heating
430 Ventilation systems	Single room ventilation	Air conditioning, heat recovery
440 High-voltage systems	Few sockets, switches and lighting points	Lightning protection systems, security and emergency lighting systems, electrical lines in conduits, photovoltaic systems, uninterruptible backup power supply systems, central battery systems
450 Telecommunications and information technology equipment	-	Fire alarm systems, burglar alarm systems, video surveillance systems, loudspeaker systems, computer cabling, conference system, paging system, time recording system
460 Conveyor systems	-	Passenger lifts (with glass cabins), freight lifts, double parking facilities

Step 3: Building standard classification

In the third step, the equipment standard (low, medium, high) for the building under consideration is determined based on the estimates of the costs of the building construction (step 1) and technical installations (step 2). Depending on whether cost-reducing or cost-increasing measures were carried out for the individual cost groups, different numbers of points can be calculated. On the basis of the sum of all determined points, the allocation to an expansion standard can be made. The number of points per cost group depends on the building use.

One and two family houses with basements:

TABLE 5 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	3	
330 Exterior walls	6	8	9	
340 Interior walls	2	3	3	
350 Ceilings	3	4	5	
360 Roofs	2	3	3	
370 Structural fixtures	0	0	1	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	1	2	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	0	1	
440 High-voltage systems	1	1	2	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	0	0	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 17 to 21 = simple construction standard
- 22 to 27 = medium construction standard
- 28 to 31 = high construction standard

One and two family houses do not have a basement:

TABLE 6 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	3	3	5	
330 Exterior walls	6	8	9	
340 Interior walls	2	3	4	
350 Ceilings	3	3	3	
360 Roofs	3	4	6	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	2	2	
420 Heat supply systems	2	2	3	
430 Ventilation systems	0	0	1	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	0	0	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 21 to 24 = simple construction standard
- 25 to 30 = medium construction standard
- 31 to 34 = high construction standard

Semi-detached and end-terrace houses:

TABLE 7 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	2	
330 Exterior walls	6	8	9	
340 Interior walls	2	3	4	
350 Ceilings	3	4	5	
360 Roofs	2	3	4	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	2	2	
420 Heat supply systems	2	2	3	
430 Ventilation systems	0	0	1	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	0	0	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 18 to 22 = simple construction standard
- 23 to 27 = medium construction standard
- 28 to 31 = high construction standard

Terraced housing:

TABLE 8 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	3	
330 Exterior walls	6	7	9	
340 Interior walls	4	4	5	
350 Ceilings	5	5	6	
360 Roofs	2	3	3	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	2	2	3	
420 Heat supply systems	2	2	3	
430 Ventilation systems	0	1	1	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	0	0	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 23 to 26 = simple construction standard
- 27 to 30 = medium construction standard
- 31 to 34 = high construction standard

Apartment buildings with up to 6 units:

TABLE 9 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	2	
330 Exterior walls	6	7	9	
340 Interior walls	4	4	5	
350 Ceilings	5	6	6	
360 Roofs	3	3	4	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	2	2	3	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	0	1	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	1	1	1	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 24 to 27 = simple construction standard
- 28 to 31 = medium construction standard
- 32 to 34 = high construction standard

Apartment buildings with 6 to 19 units:

TABLE 10 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	2	
330 Exterior walls	5	7	9	
340 Interior walls	3	4	5	
350 Ceilings	5	6	7	
360 Roofs	2	3	4	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	2	2	2	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	0	1	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	1	1	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 20 to 24 = simple construction standard
- 25 to 30 = medium construction standard
- 31 to 34 = high construction standard

Apartment buildings with more than 20 units:

TABLE 11 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	1	2	
330 Exterior walls	5	6	9	
340 Interior walls	3	4	5	
350 Ceilings	4	5	6	
360 Roofs	2	2	3	
370 Structural fixtures	0	0	1	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	2	2	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	0	0	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	1	1	1	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 19 to 24 = medium construction standard
- 25 to 33 = high construction standard

Residential buildings with up to 15 % mixed use:

TABLE 12 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	2	
330 Exterior walls	6	7	9	
340 Interior walls	3	4	4	
350 Ceilings	4	5	5	
360 Roofs	2	2	3	
370 Structural fixtures	0	0	0	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	2	2	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	0	0	
440 High-voltage systems	1	1	2	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	1	1	1	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 20 to 23 = simple construction standard
- 24 to 27 = medium construction standard
- 28 to 30 = high construction standard

Senior residences:

TABLE 13 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	2	
330 Exterior walls	6	7	9	
340 Interior walls	4	5	5	
350 Ceilings	6	7	8	
360 Roofs	2	3	3	
370 Structural fixtures	0	1	1	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	2	3	3	
420 Heat supply systems	2	2	3	
430 Ventilation systems	0	0	0	
440 High-voltage systems	1	2	2	
450 Telecommunications and information technology equipment	0	0	1	
460 Conveyor systems	1	1	2	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 25 to 33 = medium construction standard
- 34 to 39 = high construction standard

Office building:

TABLE 14 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	2	3	
330 Exterior walls	5	7	9	
340 Interior walls	3	5	6	
350 Ceilings	3	4	5	
360 Roofs	2	3	4	
370 Structural fixtures	0	0	1	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	1	1	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	1	2	
440 High-voltage systems	2	2	4	
450 Telecommunications and information technology equipment	1	1	2	
460 Conveyor systems	1	1	1	
470 Use-specific systems	0	0	1	
480 Building automation	0	1	1	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 20 to 26 = simple construction standard
- 27 to 35 = medium construction standard
- 36 to 42 = high construction standard

Kindergartens:

TABLE 15 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	3	4	5	
330 Exterior walls	6	8	9	
340 Interior walls	3	4	5	
350 Ceilings	1	2	3	
360 Roofs	4	6	7	
370 Structural fixtures	1	1	2	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	1	2	2	
420 Heat supply systems	1	2	2	
430 Ventilation systems	0	1	1	
440 High-voltage systems	1	2	2	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	0	0	0	
470 Use-specific systems	0	0	0	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 21 to 26 = simple construction standard
- 27 to 33 = medium construction standard
- 34 to 38 = high construction standard

Community centres:

TABLE 16 Documentation

COST GROUP OF THE 2ND LEVEL	LOW	MEDIUM	HIGH	POINTS
310 Excavation pit	-	-	-	
320 Foundation	1	3	4	
330 Exterior walls	6	8	9	
340 Interior walls	4	4	5	
350 Ceilings	1	2	3	
360 Roofs	4	6	7	
370 Structural fixtures	1	1	2	
390 Other measures for building construction	-	-	-	
410 Sewage, water, gas installations	0	1	1	
420 Heat supply systems	1	2	3	
430 Ventilation systems	0	0	0	
440 High-voltage systems	1	1	1	
450 Telecommunications and information technology equipment	0	0	0	
460 Conveyor systems	1	1	1	
470 Use-specific systems	0	0	1	
480 Building automation	0	0	0	
490 Other technical systems	-	-	-	
Total for buildings				

Interpretation of the points:

- 21 to 27 = simple construction standard
- 28 to 35 = medium construction standard
- 36 to 40 = high construction standard

APPENDIX 2

Life cycle assessment of special constructions

Orientation questions on the upkeep intensity of buildings

The questions are taken from the DGNB scheme New Office and Administration Building Version 2015, Criterion TEC1.5 and summarised. In principle, the questions apply to all types of buildings; however, other questions may be important depending on the use.

- The questions are taken from the DGNB scheme New Office and Administration Building Version 2015, Criterion TEC1.5 and summarised. In principle, the questions apply to all types of buildings; however, other questions may be important depending on the use.
- Are there parts on the primary structure relevant for maintenance? If so, are they accessible (e.g. for maintenance measures for corrosion protection)?
- What proportion of the outer glass surfaces is easily accessible for cleaning or accessible for cleaning with aids?
- Have measures been taken to reduce the amount of cleaning required for the exterior facade?
- Is the floor covering tolerant of light pollution?
- Are there dirt-trapping zones at all main entrances? Do they fulfil the 3-step or 5-step principle (approx. 2.4 m or 4 m length)?
- Are the floor plans free of obstacles (wall mounting of installation, supports with at least 20 cm distance to neighbouring components, etc.)?

Industry

Power requirement for lighting

Daylighting design is a complex issue that cannot be considered in detail within the framework of simplified LCC. For the assessment of an increased or reduced power requirement for lighting, the auditor makes a qualitative classification at the building level. Using the orientation guide below, each building is classified into low, average or increased lighting requirements, for each of which a power consumption value specified by the DGNB is applied. This value is apportioned to the GFA per use type and summarised for the overall location in terms of area weighting per use type.

TABLE 17 Overview of power consumption values

POWER REQUIREMENTS FOR LIGHTING	STANDARDISED POWER CONSUMPTION VALUE
Low	20 kWh/a per m²
Average	42.5 kWh/a per m²
High	65 kWh/a per m²

Assessment aid for daylight – factors to be considered

- The typical maximum depth of daylight is about 2 * upper edge of the window.
- Window areas: The guideline value for the ratio of the translucent window or rooflight surface to the floor area of the room is 1:5 for workplaces with higher visual requirements (BGI 7007), and for canteens/sanitary rooms, not less than 1:6 or 1:7. For maintenance operations the ratio is 1:10.
- For typical offices (h up to 3.50m, usable area up to 50 m²) the glazing area must be larger than 30% of the room facade. For larger rooms, the glazing area must be larger than 10% of the usable area (workplace directive).
- Optimum proportion of window area for offices: 65 % Minimum window area: 50 % Office workplaces in standard offices up to a maximum room height of 3.5 m should normally be no more than 5 m from a window.
- Wall window: The upper edge of the window should be as close to the ceiling as possible (windows that are as low as the floor, however, do not have a great advantage).
- Skylights: The ideal distance between skylights is less than or equal to the clear room height to ensure even light distribution and should not be greater than approx. 1.5 * clear room height (ASR, Neufert). Consider skylight domes, light bands, shed roofs etc.
- Exposure from several sides
- Daylight directing systems (deflection lamellas, light saber, light pipe, light shelves, prisms, light directing glasses or similar)
- Surface design: Bright ceilings, walls and floors contribute to the room brightness (desired degree of reflection: >80 % for ceilings, 50-70 % for walls, 20-40 % for floors). Brightly designed machines and interior fittings (reflectance 25-45%) also reduce the need for artificial light.
- Shadowing by buildings/plants
- Narrow/wide window profiles
- Translucent room dividers
- Presence detector for artificial light
- Highly efficient LED lighting or similar

Literature

- Nominal illuminance levels: DIN 5035, EN 12464 and the workplace regulations
- BGI 7007 „Tageslicht am Arbeitsplatz -leistungsfördernd und gesund“, February 2009
- VDI 6011 sheet 1 Lighting technology - Optimisation of daylight use and artificial lighting
- Brandi, U., 2005, Detail Praxis: Daylight Artificial light
- Haas-Arndt, D., Ranft, F., 2006, Daylight technology in buildings

Energy requirement key value - heating and cooling

TABLE 18 Room target temperatures in heating mode ≥19°C **Category 1**

OBJECTIVES	U-VALUE WEIGHTED FOR WALL AND ROOF	U-VALUE WEIGHTED FOR OPENINGS	HEAT KWH/A	COOLING KWH/A
1	>0.95	>2	235	85
2	0.95 to 0.71	2 to 1.73	210	70
3	0.7 to 0.48	1.72 to 1.47	185	55
4	0.47 to 0.24	1.46 to 1.2	160	40
5	<0.24	<1.2	135	25

TABLE 19 Room target temperatures in heating mode ≥19°C **Category 2**

OBJECTIVES	U-VALUE WEIGHTED FOR WALL AND ROOF	U-VALUE WEIGHTED FOR OPENINGS	HEAT KWH/A	COOLING KWH/A
1	>1	>2.95	235	85
2	1 to 0.78	2.95 to 2.48	210	70
3	0.77 to 0.57	2.47 to 2.02	185	55
4	0.56 to 0.35	2.01 to 1.55	160	40
5	<0.35	<1.55	135	25

TABLE 20 Cost parameters for open spaces

DESIGNATION	STRUCTURE	LOW	MEDIUM	HIGH
Road (asphalt)	Crushed stone base layer + frost protection + asphalt	€ 36.30	€ 42.70	€ 56.60
Road (concrete paving stones)	Subgrade + base layer + paving	€ 44.00	€ 60.00	€ 72.00
Parking lot (concrete blocks)	Base layer + surface layer with markings etc.	€ 49.00	€ 58.00	€ 80.00
Parking lot (grass paver)	Base layer + surface layer with markings, lawn etc.	€ 50.00	€ 58.00	€ 71.00
Path (granite paving)	Fine subgrade + Crushed stone base layer + surface layer	€ 68.80	€ 82.20	€ 100.30
Path (concrete pavement slabs)	Fine subgrade + Crushed stone base layer + surface layer	€ 37.80	€ 48.20	€ 64.30
Path (gravel)	Fine subgrade + Crushed stone base layer + surface layer	€ 11.60	€ 16.70	€ 20.30
Green areas care class III (lawn)		€ 1.20	€ 2.90	€ 9.30
Green areas care class II (planted - ground cover)	Fine grade + planting	€ 8.00	€ 18.80	€ 24.20
Green areas care class I (planted - representative)		€ 25.00	€ 40.00	€ 65.00

Water area	€ 46.50	€ 72.00	€ 97.00
Other	€ 1.00	€ 4.20	€ 7.30

TABLE 21 Cost key values for buildings **KG 330**

BUILDING QUALITY KG 330	LOW	MEDIUM	HIGH
Office / Administration	€ 382	€ 457	€ 704
Hotel / Gastronomy	€ 384	€ 518	€ 635
Education	€ 473	€ 547	€ 678
Retail	€ 326.00	€ 406.00	€ 486.00
Production	€ 225.00	€ 325.00	€ 462.00
Sport	€ 327.00	€ 383.00	€ 439.00
Culture	€ 351.00	€ 394.00	€ 477.00
Logistics / Warehouse	€ 163.00	€ 274.00	€ 313.00
Parking	€ 152.00	€ 181.00	€ 290.00
Other	€ 183.00	€ 256.00	€ 325.00

TABLE 22 Cost key values for buildings **KG 360**

BUILDING QUALITY KG 360	LOW	MEDIUM	HIGH
Office / Administration	€ 235	€ 322	€ 476
Hotel / Gastronomy	€ 259	€ 357	€ 517
Education	€ 254	€ 298	€ 433
Retail	€ 159.00	€ 169.00	€ 179.00
Production	€ 183.00	€ 200.00	€ 234.00
Sport	€ 370.00	€ 499.00	€ 628.00
Culture	€ 180.00	€ 295.00	€ 439.00
Logistics / Warehouse	€ 125.00	€ 165.00	€ 237.00
Parking	€ 132.00	€ 201.00	€ 280.00
Other	€ 149.00	€ 209.00	€ 284.00

APPENDIX 3

Life cycle assessment of special constructions

Life cycle optimisation

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	4 POINTS	3 POINTS	2 POINTS	1 POINT	0 POINTS
1. Performance measurement - Condition: Definition of SLAs - Implementation within KPI systems - Consequences: Bonus/Malus - Applicable to internal and external service provision	PM is available, which is regularly evaluated and analysed together with the DL, measures are derived	PM is implemented, irregular evaluation of the results, action plans are drawn up but implementation is not followed up	PM is implemented, irregular evaluation, action plans are created but implementation is not followed up	PM is implemented, but not applied	No PM as instrument of the DL control available
2. Computer-aided facility management (CAFM) system ■ Definition: Mapping of FM relevant processes and data. The CAFM can include a combination of different systems, which are brought together through defined interfaces. ■ A ticket system is defined here as a fault message system	■ An holistic CAFM system is available for KGM, TFM, IGM ■ Technical and commercial data are recorded and linked ■ Maintenance planning is mapped holistically ■ Integrated ticket system	■ A CAFM system is available ■ Relevant technical, infrastructural and commercial data is recorded and linked ■ Maintenance planning is mapped ■ Integrated ticket system ■ No full data collection	■ A CAFM system is in place, relevant technical and commercial data is collected but not linked ■ Maintenance planning is roughly illustrated ■ Integrated ticket system or linked ticket system ■ No full data collection	■ The CAFM system is provided by DL and therefore offers little transparency for the client	■ There is no CAFM system in use

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	4 POINTS	3 POINTS	2 POINTS	1 POINT	0 POINTS
3. Facility management (FM) standards - Standards are defined internally - Standards should be defined based on norms, regulations and guidelines	- FM standards are available - Updates are systematically tracked - Standards are applied	- FM standards are available - Updates are tracked sporadically - Standards are applied	-FM standards are available - Updates are not tracked - Standards are partially applied	- FM standards are partially available - Updates are not tracked - Standards are not yet implemented	- FM standards do not exist and are not used
4. Warranty (WAR) tracking systems available - A system can map a tool or a method etc. - Warranty management = Defect claim management	- System for WAR tracking available - Current data status - Regular update - Access for all relevant persons possible - Display and tracking of WAR defects is possible consistent	- System for WAR tracking available - Current data status - Irregular updating - Access for all relevant persons possible - Reporting and tracking of WAR defects is possible in the majority of cases	- System for WAR tracking available - No current data status - Irregular updating - Access for all relevant persons possible - Reporting and tracking of WAR defects is only possible in individual cases	- System for WAR tracking available - No current data status - Irregular updating - Access not possible for all relevant persons - Display and tracking of WAR defects is not possible	- No system for WAR tracking available - Display and tracking of WAR defects is not possible
5. Distribution of consumption costs/breakdowns	■ All consumers can be counted separately; the costs are to be allocated according to the polluter	■ Consumption cannot be fully allocated properly to the polluter, but there is still a high degree of transparency of the costs incurred	■ Consumption is to be divided into the most important main consumers	■ Consumption is countable in clusters	■ Consumption cannot be assigned, only main metre available

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	4 POINTS	3 POINTS	2 POINTS	1 POINT	0 POINTS
6. Ratio of maintenance costs to repair costs - The average values of the last 5 years are used - Terms are defined according to DIN 31051, DIN 32541, EN 752-5	>80/20	70/30	60/40	50/50	<40/60

INDICATORS	POINTS CAN BE CREDITED ACCORDING TO THE LEVEL ACHIEVED				
	6 POINTS	4.5 POINTS	3 POINTS	1.5 POINT	0 POINTS
7. Is a process/concept for use-phase cost controlling in place?	- Determination of use-phase costs - Benchmarking - Action plans - Transparent & structured recording of use-phase costs (KG100-400, according to DIN 18960 or comparable)	- Determination of use-phase costs - Benchmarking - Action plans - Transparent recording of costs, rough classification according to standard structure, formation of cost groups (KG100-400, DIN 18960 or comparable)	- Determination of use-phase costs - Benchmarking - No action plans - Recording of at least parts of the use-phase costs, but not structured according to standards (KG100-400)	- Determination of use-phase costs - No benchmarking - No action plans - Partial recording of use-phase costs, without standardised structuring (KG100-400)	No processes/ concepts available, no recording of use-phase costs

ECO2.1

Resilience and adaptability

Objective

The objective is to design the district as flexible and resistant as possible and to allow for the greatest possible adaptability and robustness.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- High resale or rental value;
- High adaptability to changing demographic, climatic and technical conditions;
- High flexibility in case of unforeseen events.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	11.b	(Means of implementation) - Strategies for adaptation to climate change		
	13.1	Resilience and adaptability		
	13.2	Climate action measures in regulations, strategies and planning		
Moderate	1.5	Reduction of vulnerability to climate-induced extreme events	11.1.a/c	Land use
	11.5	Impact of disasters		
Low	8.4	Global resource efficiency and decoupling from economic development	7.1.a/b	Conservation of resources
			8.1	Conservation of resources
	11.3	Participatory, integrated and sustainable settlement planning		

Outlook

Flexibility and adaptability will be a core issue for most cities in terms of social change. Demographic change, Working 4.0, Industry 4.0 and digitalisation will change the requirements on districts dramatically. In the future, this criterion will become increasingly important and will be adapted to future technical possibilities.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**4.3 %**	**3**
Commercial **Event**	**5.0 %**	**3**
Industry	**5.0 %**	**4**

ASSESSMENT

The resilience of the district is assessed as a cross-cutting issue in many criteria. Since adaptation to the impacts of climate change is of great importance, results of the city climate, water circulation systems and environmental risks criteria are again evaluated in indicator 1. Furthermore, the adaptability, redundancy of the supply and development systems as well as the flexibility of the development reserves and urban development are evaluated. A maximum of 100 points in total can be achieved in the criterion without bonuses, and a maximum of 110 points including bonuses.

NO.	INDICATOR	POINTS
1	**Climate**	
	City **Business** **Event** **Industry** **Commercial**	**max. 25**
1.1	**Climate**	
	City **Business** **Event** **Industry** **Commercial**	**max. 19.5**
	■ City climate (points from ENV1.5/100) * 6,5	+6.5
	■ Water circulation systems (points from ENV 2.2/100) * 6,5	+6.5
	■ Environmental risks (points from ECO2.5/100) * 6.5	+6.5
1.2	**Climate adaptation plan**	
	City **Business** **Event** **Industry** **Commercial**	**max. 5.5**
	■ The municipality has a climate adaptation plan.	+5.5
2	**Adaptability**	
	City	**max. 10**
	Business **Event** **Industry** **Commercial**	**max. 20**
2.1	**Trend research**	
	City	**max. 5**
	Business **Event** **Industry** **Commercial**	**max. 10**
	A trend barometer for the region/city was taken into account in the planning. **City**	+5
	Business **Event** **Industry** **Commercial**	+10
2.2	**Innovation management**	
	City	**max. 5**
	Business **Event** **Industry** **Commercial**	**max. 10**
	During district planning, a future integration of technical and social innovations was taken into account. **City**	+5
	Business **Event** **Industry** **Commercial**	+10

NO.	INDICATOR		POINTS
3	**Supply and development**		
	City		**max. 57**
	Business **Event** **Commercial**		**max. 47**
	Industry		**max. 55**
3.1	**Security of supply for drinking water**		
	City **Business** **Event** **Industry** **Commercial**		**max. 10**
	■ Compensation measures for water supply are part of the district concept (e.g. extensive rainwater use, extensive greywater use).		5
	■ No significant water stress.		10
3.2	**Security of supply for wastewater**		
	City **Business** **Event** **Commercial**		**max. 5**
	Industry		**max. 10**
	In order to ensure that in the event of heavy rainfall the discharge is as free of damage as possible, a flow path analysis is conducted and taken into account in planning. If it is not possible to discharge rainwater to retention areas and/or retention basins, the points can also be credited if the rainwater is discharged via a separate sewage system.	**City** **Business**	5
		Event **Commercial**	5
		Industry	10
3.3	**Energy infrastructure**		
	City **Business** **Event** **Industry** **Commercial**		**max. 15**
	Energy is generated in the district itself (at least 10% of the final energy consumption for heat and electricity).		+5
	Energy storage capacities (battery storage, hot water storage, hydrogen storage, etc.) are available in the district.		+10
3.4	**Food cultivation areas**		
	City		**max .10**
	■ Regional products are offered in the district (e.g. weekly market, farm shop).		+2
	■ Cultivation areas for residents in the district are available and are being used.		+4
	■ Highly efficient or innovative cultivation methods in the district (e.g. urban farming (aquaponics), roof gardens etc. - the products/areas must be made available to the residents)		+4

NO.	INDICATOR			POINTS
3.5	**Flexibility and expansion reserves of the technical district infrastructure/building**			
	City **Business** **Event** **Commercial**			**max. 12**
	Industry			**max. 15**
	In the district, development reserves and flexible systems for the technical infrastructure (e.g. infrastructure canal) are available or are planned, and/or it is planned to convert buildings (e.g. multi-storey car parks) if the general conditions change, and/or the proportion of buildings constructed using flexible construction methods, in relation to the total GFA, is over 70 %.			
	■ 4 points can be awarded per implemented measure.	**City** **Business**		+12
		Event **Commercial**		+12
	■ 5 points can be awarded per implemented measure.	**Industry**		+15
3.6	**Redundancy and resilience of transport systems**			
	City **Business** **Event** **Industry** **Commercial**			**max. 5**
	The redundancy of transport systems is already assessed in TEC3.1 and is not considered separately here: TEC3.1.3. Infrastructure for alternative drive technologies TEC3.1.4 Vehicle sharing TEC3.1.5.2 Offerings for bus and train lines TEC 3.1.6 Intermodal platforms TEC3.1.9.1 Operational measures			
	Resilience of transport systems:			
	■ In the event of a crisis and/or a disruptive event (in the event of damage to roads/tracks, accidents, weather-related blockages/restrictions), access to the district is ensured.			5

NO.	INDICATOR	POINTS
4	**Urban design and architecture** **City** **Business** **Event** **Commercial**	**max. 8**
4.1	**Urban design** **City** **Business** **Event** **Commercial**	**max. 8**
	■ The building law permits mixed use at the district level. The district is designated as an MI or urban area (MU) or the district is equipped with at least three different categories according to § 1 para. 2 BauNVO, whereby each category accounts for at least 10% of the total GFA_{DGNB}.	+4
	■ The designs and specifications allow for different construction methods, building typologies and/or eaves and floor heights on the construction sites.	+2
	■ The design of the public space allows for future adjustments of the road width.	+2
4.2	**CIRCULAR ECONOMY BONUS - DECONSTRUCTION-FRIENDLY CONSTRUCTION** There are dismantling concepts for buildings and/or infrastructure across different districts Building: 5 points Infrastructure: 5 points.	**max. +10**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI, it is useful to communicate the degree of sealing of the entire developed and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Trend barometer for future adjustment	[-]
KPI 2	Food cultivation areas	[m²]
KPI 3	Dimensions of public space	[m]
KPI 4	Redundant transport systems	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The information on GFA from the ECO2.1 criterion can be used. In addition, certified buildings that have achieved at least a performance index of 50 percent in the criterion “TEC1.6 Ease of recovery and recycling” can be included in the evaluation.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

Resilience refers to the resistance of systems to disturbances. Resilient systems remain basically functional in crisis. Resilient cities are resistant to technical, ecological and economic partial failures or disruptions due to the flexibility or redundancy of their systems and thus offer robust conditions for long-term settlement.
Adaptability is the ability of a system to actively and quickly adapt the structures to temporally unpredictably changing tasks from its own substance (adaptation capability) in connection with the ability to develop the structures evolutionarily in the event of temporally constant or long-term predictably changing requirements from its own substance (developmental capability).

Industry **Commercial**

Adaptability is the ability of a system to actively and quickly adapt the structures to temporally unpredictably changing tasks from its own substance (adaptation capability) in connection with the ability to develop the structures evolutionarily in the event of temporally constant or long-term predictably changing requirements from its own substance (developmental capability).
The demand for adaptable factories is based on an environment of increasing clock speeds, which are less and less constant and less predictable.

II. Additional explanation

Industry **Commercial**

“Conventional factories” are planned and designed on the basis of the boundary conditions prevailing at the time of factory planning and predicted future conditions. In the event of unexpected influences and environmental changes, the factory must either be operated sub optimally or adapted to new conditions at great expense. The following factors, which force substantial changes in a factory, are often mentioned:

- strongly fluctuating demand for the products
- modified number of product variants
- shorter life cycles of product and technology and
- changed requirements of the customers with regard to product characteristics or supply

Another major reason for the need for adaptable factories is the generally varying duration of factory, technology and product life cycles. While many products are only produced for three years or less, the machines required for production are often used for five to ten years or more, and the entire factory is often used for more than 30 years. The tax depreciation for machinery is usually 10 years and for buildings 50. As a result, the machines would already have to be designed for the production of future products and the factory would have to be designed for the future machines, whose characteristics, however, are unknown and are hardly predictable.

From 2008, the adaptable factory will be one of the latest concepts for ensuring the competitiveness of companies within the context of production research. The following components are important prerequisites for adaptable factories:

- Universality: This enables the design or dimensioning of products or technologies in relation to different requirements. It also allows the factory object to be independent of other objects.
- Mobility: This allows unrestricted local mobility of transformation objects.
- Scalability: This is also referred to as expandability and reducibility and includes not only the spatial but also the technical and organisational ability to expand and reduce factory buildings.
- Modularity: This enables low-cost exchange of components of an overall system without impeding its function by using standardised elements on both the technical and organisational level. It thus refers to the internal structure.
- Compatibility: Also known as networking capability, this enables the elements of the production system to be easily linked to all supply facilities for operating resources, media, materials, information, energy or personnel relations. It refers to the external structure.

Modularisation and standardisation of technical resources in a factory are of particular importance for the practical implementation of the design requirements. Standardised components allow, if necessary, a new technical configuration of the factory with regard to new boundary conditions without disturbing the ongoing operation.

Note:
The main problem in evaluating different design approaches in the context of an uncertain environment is the need to invest more in an adaptable alternative at the current time, which will only pay off if unexpected events occur in the future. Standard investment calculations therefore fail for the evaluation of the economic efficiency of alternative factory design solutions. Adjusted evaluation methods are therefore based on statistical modelling of various uncertain input parameters (for example, using Monte Carlo simulation) that influence the advantageousness of investment decisions. The modelled input parameters are used in the calculation of production costs, capital value and other financial decision parameters.

The various design solutions for factories can thus be coordinated with regard to an uncertain future.

III. Method

City **Business** **Event** **Industry** **Commercial**

Based on a survey of a wide range of factors, the specific characteristics of resilience and adaptability are queried and evaluated. In this context, location-related, technical and planning aspects are considered above all, as these define the substance of the district which cannot be changed or can only be changed with difficulty. For this reason, some results of environmental and technical criteria are included here. Social and functional aspects of resilience and adaptability (e.g. diversity of use, participation), on the other hand, are not considered here, but in a differentiated manner in other criteria.

Indicator 1: Climate

The objective is to respond to climatic changes in such a way that disturbances either do not occur or can be managed with little damage (human, technical or economic). In the last decade, climate change has already led to a significant increase in the frequency of extreme weather events such as storms, heavy precipitation and heat waves, which hit many cities unprepared. When creating new urban districts, it therefore makes sense to avoid or compensate for environmental risks inherent in the location from the start. Favourable city climate conditions and rainwater management can mitigate the effects of weather extremes and climate change, e.g. by reducing surface heating and ensuring effective water drainage during heavy rainfall.

- Environmental risks: Are the districts located in hazardous areas? Have compensation measures been taken for given environmental risks?
- City climate: Was attention paid to the thermal surface properties when designing the district? Is the local air exchange guaranteed? Is air quality basically ensured?
- Rainwater management: How is the rainwater management concept structured? Does rainwater retention take place? What percentage of the surface is sealed?
- Climate adaptation plan of the municipality: Does the municipality have a climate adaptation plan?

Indicator 2: Adaptability

Future economic, social and climatic developments can influence the usability of the district. In order to be able to assess the influence of these future developments on the district, trend analyses (trend barometers, trend research, scenarios, etc.) should be used to show the extent to which the district must be adaptable.

Technical and social change is happening faster and faster. To ensure that the district remains sustainable, planning should take into account how future innovations can be integrated (e.g. reversible shafts for new information and communication technologies ... flexible floor plans for changed work/living culture ...).

Indicator 3: Supply and development

Whether due to changed usage requirements or system failures: Flexibility and resilience of supply and development are central parameters of the adaptability of a district. A robust supply infrastructure is characterised by the careful use of resources, own resource production and redundancies as well as the accessibility of the technical infrastructure. A high quality of development through transport infrastructure allows high flexibility of functional connection with the surrounding area and provides security in case of failures (including strikes, road closures).

- **Security of supply for drinking water:** Large parts of humanity already live in areas threatened by water shortages. If the district is located in an area affected by water stress, a comprehensive water concept is particularly important: Has a resource-conserving approach to drinking water been implemented in the district? Are water cycles closed and alternative service water potentials elevated? The World Resources Institute's Water Risk Atlas should be consulted (www.wri.org) for assessing water stress. Here is a direct link to the Water Risk Atlas. For the purposes of the criterion, no significant water stress is present if the "baseline water stress" is ≤ 20 %.

- **Security of supply for wastewater**: The rainwater retention potential can be determined and used via a flow path analysis. By diverting rainwater into retention areas, the water stress during heavy rainfall is reduced. Water that cannot be retained in the district and can be discharged with a time delay should be drained off via a separate sewage system. Irrespective of the type of sewage treatment plant, the basic principle is that a separate sewage system, as opposed to a combined sewage system, reduces the risk of contamination in the event of damage and can be more flexibly converted for retrofitting. Therefore, together with the type of rainwater management, it is assessed here whether there is a separate sewage system on site.

- **Energy supply**: Is energy or are energy sources generated and stored in the district, e.g. photovoltaics, solar thermal energy, waste heat feed-in, geothermal energy, biogas production? Are there also energy storage possibilities (e.g. hydrogen storage, batteries, hot water storage, solar ice storage etc.)? Energy systems can also be counted as a storage option if the environmental risks make this possible even in the event of an incident (geothermal probes or geothermal heat extraction in the event of an earthquake, for example, are not guaranteed).

- **Food cultivation areas**: Are there any agricultural businesses in the area? Are there food cultivation areas in the district that are used by the residents? Are highly efficient or innovative farming methods used in the district (not necessarily by the residents, including third parties)? These include hydroponics, aquaponics (combined aquaculture and hydroponic vegetable cultivation), greenhouses with efficient irrigation, permaculture.

- **Flexibility and development reserves in technical district infrastructure**: Are the technical lines easily accessible for extension/conversion (e.g. for the possible integration of future energy supply systems) or maintenance work, e.g. by using infrastructure ducts or empty conduit systems? A conversion concept was taken into account during planning and construction. This enables an adaptation to changed boundary conditions (e.g. transformation of traffic) by converting buildings (e.g. conversion of multi-storey car parks into residential buildings, office buildings, vertical farming). The proportion of buildings with correspondingly flexible construction methods is also supported. Typically, this refers to skeleton construction (usually wood or steel). Solid construction is generally not flexible, especially if it is firmly bound with binders. Further indications of flexible construction are, for example, large spans for ceilings (i.e. large pillar-free rooms) and high ceilings (> 3.0 m), which allow for residential or commercial use. Barrier-free building also contributes to flexible conversion, but is not the only indication of flexible construction.

- **Redundancy of public transport systems**: Technical redundancy refers to the ability of technical systems to maintain their functionality in the event of partial failures through the additional availability of functionally comparable resources. With regard to the transport system, redundancy of the transport systems/carriers is assessed in criterion TEC3.1. Here, the redundancy of the transport systems should also ensure accessibility in the event of a crisis or incident.

Indicator 4: Urban design and architecture

Adaptable urban development allows future changes in the mix of uses, e.g. through planning law stipulations for mixed use or through a variety of permissible building typologies (the topic of “construction field sizes” is dealt with in SOC3.1).

An adaptable structure is defined as a structure that can adapt to changing conditions in a short time with little effort or that has a high degree capability in terms of dismantling.

- **Urban design:** Is mixed use permitted at district level in terms of planning law? Do the plans and regulations allow for different construction methods, building typologies and/or eaves and floor heights on the construction sites? Does the design of the public space permit future adjustments to the width of the road, e.g. by creating free lanes or particularly wide carriageways and cycle paths?

Circular economy bonus: DECONSTRUCTION-FRIENDLY CONSTRUCTION

The DGNB Circular Economy Guidelines, for example, can be used as a basis for the deconstruction concepts of the buildings.

IV. Scheme-specific description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant records/documents** ■ B1: Supply layout of the technical infrastructure ■ B2: Documents/results of trend analyses, presentation of innovation management ■ B3: Presentation of drinking water supply, wastewater, energy infrastructure, food cultivation areas, development reserves of the district infrastructure, traffic systems	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of **planning documents:** Development plan/building structure plan	E
Documentation of **concept:** ■ F1: Climate protection concept of the municipality ■ F2: Water supply and energy concept ■ F3: Documentation of deconstruction concepts and planning documentation ■ F4: Documentation of the transport systems	F

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Climate	Results from ENV1.6, ENV1.5, ENV2.2	Results from ENV1.6, ENV1.5, ENV2.2	Results from ENV1.6, ENV1.5, ENV2.2	Results from ENV1.6, ENV1.5, ENV2.2	Results from ENV1.6, ENV1.5, ENV2.2
2. Adaptability	A, B, E, F1	B, E, F1	B, E, F1	A, B, E, F1	B, E, F1
3. Supply and development	A, B, E, F2+4	B, C, E, F2+4	B, C, E, F2+4	A, B, E, F2+4	B, C, E, F2+4
4. Urban design and architecture	A, B, D, E, (F3)	B, D, E, F3	B, D, E, F3	A, B, D, E, F3	B, D, E, F3

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Kaluza, B. (2005): Erfolgsfaktor Flexibilität: Strategien und Konzepte für wandlungsfähige Unternehmen, Erich Schmidt Verlag GmbH
- Nyhuis, P. (2010): Wandlungsfähige Produktionssysteme, GITO mbH Verlag
- Hernández Morales, R. (2003): Systematik der Wandlungsfähigkeit in der Fabrikplanung, VDI-Verlag
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- Schenk, M.; Wirth, S. (2006): Fabrikplanung und Fabrikbetrieb: Methoden für die wandlungsfähige und vernetzte Fabrik, Springer DE
- Nyhuis, P. (2013): Wandlungsfähige Produktion – Heute für morgen gestalten, PZH Verlag
- Heger, C. L. (2007): Bewertung der Wandlungsfähigkeit von Fabrikobjekten, PZH Verlag

ECO2.3

Land use efficiency

Objective

The objective is the efficient use of the building land by avoiding land use as much as possible while at the same time ensuring a highly efficient development structure.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Reduction of land use
- Minimisation of additional soil sealing
- Ending urban sprawl

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant			11.1.b/c	Land use
Moderate	8.4	Global resource efficiency and decoupling from economic development	11.1.a	Land use
	11.3	Participatory, integrated and sustainable settlement planning		
	12.2	Use of natural resources		

Outlook

The reduction of land consumption is a relevant national sustainability goal. For this reason, the criterion will be in later versions and will be geared even more strongly toward achieving the objectives.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**4.3 %**	**3**
Commercial	**3.3 %**	**2**
Event	**5.0 %**	**3**
Industry	**3.8 %**	**3**

ASSESSMENT

In order to achieve the goal of an efficient land use, the development efficiency of the district as well as the development density are evaluated. In this criterion, up to 100 points can be achieved. A maximum of 100 points can be credited.

NO.	INDICATOR		POINTS
1	**Development efficiency of the district**		
	City **Business** **Industry** **Commercial**		**max. 40**
1.1	**Development efficiency index (DEI)**		
	City **Business**		**5 - 40**
	■ DEI = 0.3		5
	■ DEI ≥ 0.75		40
1.2	**Development coefficient (DEC)**		
	Industry **Commercial**		**0 - 40**
	■ DEC ≥ 0.7		0
	■ DEC ≤ 0.2		40
2	**Building density**		
	City **Business** **Industry** **Commercial**		**max. 60**
	Event		**max. 100**
2.1	**Floor space index (FSI)**		
	City **Business**		**5 – 60**
	Event		**10 – 100**
	Industry **Commercial**		**0 - 60**
	■ 0.8 FSI - 2.0 FSI	**City** **Business**	5 – 50
	■ 2.0 FSI - 2.5 FSI		50 – 60
	■ 0.8 FSI - 2.5 FAS	**Event**	10 - 100
	■ 0.8 FSI - 1.5 FSI	**Industry** **Commercial**	0 - 60

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI it is useful to communicate the degree of soil sealing of the entire built and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Development efficiency index	[m²]
KPI 2	Development density	[m²]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** -

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Reducing the usage of land is one of the major global challenges, as open areas from the limited space on earth are increasingly being used for transport and settlement. This limited availability leads to enormous land prices for building land, especially in urban areas. In addition, efficient use of space also has a significant impact on the life cycle costs of a district.

The relevance of the topic is increasing with the rising quality of life and population development worldwide. The increase in land use and stagnating/ declining population development in countries is contrary to the idea of “sustainable urban development”.

Through efficient land use, the shortage of building land can be counteracted and life-cycle costs reduced. The basic necessities of life for humans are thus preserved. In addition to the economic advantages, a contribution is made to environmental protection and climate action by preserving natural open spaces.

The objective is to avoid land use as much as possible while simultaneously creating a highly efficient development structure.

II. Additional explanation

Land use efficiency is the position-independent influencing factor for reducing land use. On the one hand, an effective development structure must be ensured and on the other hand, an equally effective building structure must be ensured. An optimised process structure with the shortest possible distances also makes a decisive contribution to reducing land use.

As a result, very densely built locations, with little development space for roads and common areas, as well as an optimal arrangement of production processes, are evaluated as optimal in this criterion.

III. Method

City **Business** **Event** **Industry** **Commercial**

The achievement of objectives is determined by means of a quantitative evaluation method. The following indicators are taken into account:

Indicator 1: Development efficiency of the district

A high development efficiency is a key indicator of optimal land use. Effective development reduces land use as well as production costs. Development areas according to the DGNB include all circulation areas serving the public and areas for stationary traffic as well as public green spaces and other areas that cannot be developed or used as private open spaces (see also District areas in the system basics).

Development efficiency index

This key figure expresses the ratio of net building area (NBA) to gross building area (GBA). This describes what proportion of the district area is (potentially) usable in an economic sense. This is a statement about the basic development efficiency of the district independent of the property development. This calculation can be understood as the equivalent of the calculation of the share of usable area in the GFA_{DGNB} (for definition, see System basics) in building construction. This information is of great importance for both the project developer and the municipality that takes over the public spaces.

The development efficiency figure is normally calculated using GBA and NBA. The gross building area is usually defined by the boundaries of the area to be planned and is the sum of all areas including the development areas in the district. In this sense, the development areas in accordance with DGNB are not potentially economically usable for the project developer, but rather serve the necessary utilisation of the usable areas.

In deviation from the DGNB system principles, the following special rules apply to the assessment of the development efficiency of the district:

- If publicly accessible areas do not belong to the public sector, for example for legal reasons, but are in private ownership (semi-public spaces), they must be presented accordingly and may be excluded from consideration. They may therefore not be attributed to either the GBA or the NBA. Proof of ownership and public accessibility must be provided accordingly.
- Compactly connected, publicly accessible green spaces that make up at least 20 % of the GBA may be excluded from the GBA.
- Open spaces with basements (public spaces, green spaces, etc.), which are used, for example, as private underground car parks and are sold/rented, may be added to the NBA (economic use of the spaces). On the other hand, those underground car parks/basement areas which are used by the public (e.g. public underground car park) may not be added.

The development efficiency ratio is calculated as follows:

$$\text{DEI} = \text{NBA } [m^2] / \text{GBA } [m^2] \qquad (1)$$

with

DEI Development efficiency index
NSA Net building area
GSA Gross building area

Development coefficient

The development coefficient (DEC) is defined by the open spaces according to DGNB (OS) in relation to the site area. The site area (area within certification boundary) is usually defined by the boundaries of the area to be planned and is the sum of all areas, including the development areas in the district.

$$\text{DEC} = \text{OS } [m^2] / \text{Site area } [m^2]$$

The development coefficient is normally calculated using GBA and NBA. In the case of industrial sites, a distinction between GBA and NBA is not appropriate, which is why the open spaces and the entire site area are considered here in a simplified form. Open spaces that are an integral part of the production or storage of production parts and waste may also be deducted. The fixed component must be verified by means of a production flow scheme/plan. Temporary intermediate use of open spaces as storage space in the event of overcapacity or similar are not included under this heading. (Examples, are large open-air storage areas for e.g. raw materials, which are firmly integrated into the production process with a conveyor belt, test tracks for vehicles and products, which were built exclusively for this purpose, technical facilities of the production, without enclosure.)

Indicator 2: Building density

The building density is expressed not only by the base area index (BAI), but above all by the floor space index (FSI). Building density relativizes the efficiency of development since economic development is always determined by the associated building mass and its living and usable area.

Floor space index (FSI)

The development density is based on the FSI (Ger: GFZ) calculation of the BauNVO. The net building area (NBA) of a district is set in relation to the total gross floor area (GFA) of a district. This key figure expresses the structural utilisation of the economically (potentially) usable plots of land and thus makes a statement on the efficiency of the maximum structural utilisation.

The gross floor area is defined as the above and underground gross floor area of all main buildings (incl. staggered storeys) as well as underground main usable areas (e.g. commercial, granny flats) (see GFA_{DGNB} in system basics). Ancillary buildings are only to be taken into account in exceptional cases if they are of a particular size and have a particular impact on the total GFA (garden sheds, carports, private garages, etc. are not to be included, while larger car parks such as district garages are to be added, for example). For the calculation, the mentioned outbuildings are deducted from the GFA_{DGNB}. The specifications for the FSI calculation regarding the degree of soil sealing are to be disregarded.

The FSI must be proven on the actual building development, legal determinations are not sufficient for this purpose.

Note: As a rule, the built FSI calculated here will fall below the maximum permissible FSI of the L plan.

The floor space index is calculated as follows:

$$\mathbf{FSI = GFA_{DGNB}\ [m^2] / NBA\ [m^2]} \qquad \mathbf{(2)}$$

with

FSI	Floor space index
GFA_{DGNB}	Gross floor area according to DGNB (see system basics)
NSA	Net building area/ land (as defined in Appendix 3 in the system basics)

The evaluation is generally applicable; the benchmarks are oriented towards a central European city centre structure.

Scheme-specific description of the method

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APPENDIX B - DOCUMENTATION

I. Required documentation

City Business Event Industry Commercial

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.
Calculations with the “master tool” should be carried out in all phases according to the data basis.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Documentation of relevant **calculations**: Rough calculation of the FSI and DEI/ERC	B
Photo documentation for the entire district	C
Documentation of **planning documents** with the following visible contents: Certification area = GSA, development areas, net building area and development with floor details as well as marking of the individual buildings and areas according to the designation in the area balance. Semi-public spaces and areas with basements must also be presented accordingly	E
Categorisation of the areas in the **master tool**: The calculation of FSI and DEI/DEC are automatically calculated from this.	J

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Development efficiency of the district	B, E, J	B, E, J	B, C, E, J	B, E, J	B, C, E, J
2. Building density	B, E, J	B, E, J	B, C, E, J	B, E, J	B, C, E, J

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- The Federal Land Utilisation Ordinance (BauNVO) regulates the extent and type of building use. The calculations are carried out according to the method described in the criterion, which differs in part from the BauNVO (e.g. FAI calculation with sealed area share, etc.).
- GEORGE, Michael L.; ROWLANDS, Dave; KASTLE, Bill. What is Lean Six Sigma? 2004.
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ECO2.4

Value stability

Objective

The objective is to create districts with high user acceptance and long-term market potential.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Long-term value retention
- Planning security
- Image boost

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
1 **Low**	8.4	Global resource efficiency and decoupling from economic development	
	8.5	Decent work for all men, women and people with disabilities	

Outlook

A change in weighting and importance of the subject is not to be expected.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**2.9 %**	**2**
Commercial	**3.3 %**	**2**
Industry	**3.8 %**	**3**

ASSESSMENT

Value stability is essentially examined based on the aspects “market” and “location”. The question here is to what extent the district with its respective uses is in line with the location and market. It is not about an absolute assessment of the location or the market, but rather location aspects and market characteristics are assessed in relation to each other. The value stability can be described via the topics location (diversification, purchasing power index, unemployment rate, market/location analysis) and image (marketing, awards, for **Industry** training mix). In this criterion, up to 100 points can be achieved in the evaluation. A maximum of 100 points can be credited.

NO.	INDICATOR		POINTS
1	**Diversification**		
	City **Business** **Commercial**		**max. 30**
	Industry		**max. 40**
1.1	**Degree of diversification**		
	City **Business** **Commercial**		**0 - 30**
	Industry		**0 - 40**
	■ 0.2 to > 0.7	**City** **Business**	0 – 30
	■ ≥ 0.4 to ≥ 0.7	**Commercial**	0 - 30
		Industry	0 - 40
2	**Purchasing power index**		
	City **Business** **Commercial**		**max. 10**
	Industry		**max. 20**
2.1	**Purchasing power index**		
	City **Business** **Commercial**		**5 - 10**
	Industry		**10 - 20**
	■ 100 (average GER) to ≥ 115	**City** **Business**	5 – 10
		Commercial	5 – 10
		Industry	10 – 20
3	**Unemployment rate**		
	City		**max. 10**
3.1	**Unemployment rate**		
	City		**max. 10**
	■ The average unemployment rate of the last 5 years for the city/district is below the national average.	**City**	5
	■ The average unemployment rate of the last 5 years for the city/district is lower than the average unemployment rate of the last 15 years for the city/district.	**City**	10

NO.	INDICATOR		POINTS
4	**Market and location analysis**		
	City **Industry**		**max. 25**
	Business **Commercial**		**max. 35**
4.1	**Location analysis**		
	City		**max. 10**
	Business **Industry** **Commercial**		**max. 15**
	■ Demographic and economic development of the macro-location (district, city, possibly region)	**City**	+10
		Business	+15
	■ Urban planning development of the macro-location and the direct neighbourhood	**Industry** **Commercial**	+15
	■ Direct neighbouring areas (interactions, synergies and conflict potential)		
	■ General social perception of the location		
4.2	**Target group analysis**		
	City **Business** **Commercial**		**max. 5**
	■ Demographic and social characteristics		+5
	■ Lifestyle and recreational behaviour		
	■ Demand behaviour		
	■ Economic sectors		
	■ Size characteristics (commercial residents)		
4.3	**Competitor analysis**		
	City		**max. 5**
	Business **Industry** **Commercial**		**max. 10**
	A competitor analysis is available if competing projects are addressed in the analysis and conclusions are drawn from them.		
	Contents e.g.:		
	■ Competition projects in the catchment area of the target group(s) - locations, size, range of services, special features, clientele, pricing policy, advertising policy, SWOT analysis	**City**	+5
		Business	+10
		Industry **Commercial**	+10
	■ Description of the positioning of the project in relation to the competition		
4.4	**Use mix in line with the market**		
	City **Business** **Commercial**		**max. 5**
	This is the case if the implemented district use mix can be clearly read from the market analysis. This refers not only to the uses themselves, but also to ownership and rental structures, household and commercial sizes.		+5

NO.	INDICATOR	POINTS
5	**Marketing** **City** **Business** **Commercial**	**max. 10**
5.1	**Media work/brochures** **City** **Business** **Commercial** Points can be achieved, if the project is advertised using at least two different media (brochures/newspapers/Internet/TV/radio/posters, etc.) (articles and messages about the project are not sufficient).	**max. 2** +2
5.2	**Public relations** **City** **Business** **Commercial** Points can be achieved, if more than one public event with information and/or advertising character has been organised in the course of the planning/construction phase or the marketing phase (a limited public event is also sufficient if not only specialists but also residents or later users are involved).	**max. 2** +2
5.3	**Festivals/events** **City** **Business** **Commercial** Points can be achieved, if concerts, fairs, festivals or similar events have been carried out in the district in public space and the district appears as a venue for these events (concerts in a concert hall without experiencing the district are not sufficient).	**max. 2** +2
5.4	**On-site information** **City** **Business** **Commercial** Exhibitions and information about the project can be found directly at the place of origin (e.g. information box, QR codes for the website ...)	**max. 2** +2
5.5	**Direct marketing** **City** **Business** **Commercial** Is fulfilled if at least two investor events, expert rounds or project presentations at trade fairs (e.g. Expo Real, MIPIM) have been held.	**max. 2** +2

NO.	INDICATOR	POINTS
6	**Awards** City Business Commercial	**max. 15**
6.1	**Real estate award** City Business Commercial Real estate award (no award by the developer).	**max. 5** +5
6.2	**Building certificate** City Business Commercial Points can be achieved, if the promoter certifies at least 20% of the buildings in the district according to DGNB or another independent sustainability system.	**max. 10** +10
7	**Training mix** Industry	**max. 15**
7.1	**Jobs in the company** Industry	**max. 15**
	■ Both skilled and unskilled jobs are offered.	+5
	■ The company trains apprentices itself.	+5
	■ Among the trainees are usually both graduates with a secondary school graduation and high school graduates.	+5

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As a key figure/KPI, it is useful to communicate the degree of soil sealing of the entire developed and undeveloped area.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Degree of diversification	[-]
KPI 2	Purchasing power index	[-]
KPI 3	Market/location analysis	[-]
KPI 4	Awards	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** In criterion ECO2.2, information from the market and location analysis can be used.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

The local socio-economic conditions also determine the value stability of a project. Land-value development, purchasing power index and unemployment rate are therefore used in project development as indicators of the economic risk potential of a project location.

Industry **Commercial**

Stability through identification: The economic stability of an industrial site is shaped, among other things, by the identification of natural and settlement potential and its inclusion in the urban development concept, which also influences the new district in becoming a prime address.
By preserving structural and urban development, natural and cultural-historical features, a site with history can be linked to new uses. New technological developments or forms of use can also be an image-forming element. The positive identification with the local address in the urban space is an important factor for value stability. Similarly, the negative image of a site or district can trigger a process of value instability or decay.

Stability through diversification: Diversification in the manufacture of products allows a company to maintain jobs even in the event of a collapsing market. The objective should be to counteract monoculture.

II. Additional explanation

The positive identification with the local address in the urban space is an important factor for value stability. Forming a sense of community within the district is characterised by the urban development concept among other things. Marketing strategy and real estate awards can contribute to image building.
Overcoming the spatial separation of different uses in favour of a small-scale mix of uses is regarded as the key to sustainable urban development and a high-quality living and working environment. A variety and mixture of different forms of use and ownership prevents monostructures and counteracts the danger of ageing (e.g. in single-family housing areas) and segregation processes.
The following aspects should be examined with regard to possible development potential: existing building structure, natural conditions, historical aspects, technological developments, heterogeneous forms of ownership, district concepts, mixed use, updated models (e.g. master plan).

Industry **Commercial**

The evaluation aims to take into account previously inactivated potential in the new industrial site. What measures are being taken to mobilise this potential? How is the environment involved? Or what attention is paid to existing restrictions? Furthermore, the question of a flexible planning and structure to maintain or strengthen the value stability of the site in case of changing framework conditions is evaluated. Organisational concepts at the beginning of industrial development as well as their implementation with reference to and use of the location contribute to a fast and lasting formation of a sense of community. They also ensure the possibility of readjustments on a small scale, if necessary.
An economically stable industrial site is characterised by a balanced mix of ownership and rental structures and different company sizes; indicators also include a low vacancy rate and positive value development.

III. Method

City **Business** **Industry** **Commercial**

Indicator 1: Diversification
Based on the Berry index, which originates from the business sector (degree of diversification of a corporation), the degree of diversification of use of a district can be depicted. The index is calculated as the complement of the sum of the squared share of use (in %) of all independent uses in the district.

$$\mathbf{DI = Sum\ (p(i))^2} \quad (1)$$

with
DI Diversification index
p(i) share of use [%]

Example determination:
B1 = 10 %, B2 = 20 %, B3 = 30 % B4 = 40 %
p(i) here is share of use in %.
Diversification index = $1 - (0.1^2 + 0.2^2 + 0.3^2 + 0.4^2) = 0.7$

The calculation of the “Diversification” indicator is carried out automatically after entering the scheme per building in the master tool; the following distinctions of uses are examples of the schemes:

- Living (single family house, terraced house, ...)
- Administration (office building, ...)
- Commercial (industrial production, public standby services, hotel, underground car park, ...)
- Sports (gymnasiums, indoor swimming pools, ...)
- Science (institute/laboratory building, ...)
- Education (schools, kindergartens, ...)
- Culture (theatres, community centres, sacred buildings, etc.)
- Health (medical facilities, nursing homes, ...)

Indicator 2: Purchasing power index
The purchasing power index, e.g. of the GfK (Association for Consumption, Market and Sales Research), must be documented for the municipality and the urban district (for the urban district only for cities with more than 100,000 inhabitants).

Indicator 3: Unemployment rate

The average of the statistical values of the last 15 years must be computed. The development trend is to be shown by comparing the average of the last 5 years with the average of the last 15. Reference value: City or urban district (depending on data availability).

Indicator 4: Market and location analysis

In order to successfully market the district and create a long-term successful, self-sustaining urban building block, the planning should be based on a location and market analysis. For example, a “SWOT analysis” is used to analyse opportunities and risks as well as strengths and weaknesses of the existing market and action approaches for district development are derived from this.

The project environment is to be characterised in terms of current and medium-term development trends, image and condition. This is done based on an independent expert opinion by an appropriately qualified expert. Such expert opinions are often prepared anyway in the context of new construction and renovation projects. If this is not the case, an expert opinion must be commissioned. The expert opinion need only provide a qualitative location and market analysis; a quantifying evaluation (valuation in the narrower sense) is not required.

Indicator 5: Marketing

In this indicator, measures in the segment of media work/brochures, public relations, festivals/events, on-site information and direct marketing are evaluated.

Indicator 6: Awards

Awards such as real estate awards, but also certificates for individual buildings can significantly improve marketing and ensure quality as awarded from an independent unit.

Scheme-specific description of the method

Indicator 1: Diversification

Based on the Berry index, the degree of diversification of use of a site can be represented. The index is calculated as the complement of the sum of the squared share of use (in %) of all independent uses in the district. The Berry index actually comes from the business world and indicates the degree of diversification of a company, but the method can also be used for other purposes.

$$DB = \text{Sum } (p(i))^2$$

Example determination:

B1 = 10 %, B2 = 20 %, B3 = 30 % B4 = 40 %

p(i) here is share of use in %

Diversification index = 1- ($0.1^2 + 0.2^2 + 0.3^2 + 0.4^2$) = 0.7

Whereby B are different product manufacturers in order to maintain diversification in production and marketing and to avoid mono-structures. The depth of diversification is based on the qualitative differences of the individual uses, for example, the following distinctions of use apply:

- Office and administration buildings
- Research and development buildings
- Laboratory buildings
- Storage buildings
- Logistics buildings
- Production buildings separated according to process type: Original forms (1), forming (2), cutting (3), joining (4), coating (5), changing material properties (6)
- Educational institutions (e.g. further education/training buildings)
- Canteens

The value of the diversification index is between 0 and 1. The more diversified the products of the industrial area are, the closer it comes to the value 1. The variety of products is to be classified accordingly between monoculture (0%) and cluster (100%) and justified accordingly in the text.

Indicator 2: Purchasing power index

The purchasing power index, e.g. of the GfK (Association for Consumption, Market and Sales Research) must be verified for the municipality and the district. The higher the purchasing power index, the better the evaluation.

Indicator 3: Unemployment rate

The statistical values of the last 15 years must be averaged. The development trend is to be shown by comparing the average of the last 5 years with the average of the last 15. Reference value: City and/or urban district. The lower the unemployment rate and the more it has fallen, the better the evaluation.

Indicator 7: Training mix

Industrial companies have a responsibility to train personnel and to allow a healthy mix of different educational qualifications in the company. The percentage mix of training certifications in the company is considered here.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.
Calculations with the “master tool” should be carried out in all phases according to the data basis.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the planned measures ■ A1: The degree of diversification is to be assessed on the basis of existing uses and typologies in the project area.	A
Documentation of relevant **records/documents** (see description of method) ■ B1: The unemployment rate (in relation to the Federal Republic of Germany) is to be applied for the city as a whole The statistical values of the last 15 years are to be averaged and the development trend is to be shown by comparing the average of the last 5 years with the average of the last 15 years. ■ B2: The purchasing power index must be proven for the city as a whole. ■ B3: Documentation of the different uses and forms of ownership in the project area using a scale colour plan. Calculation of the percentage distribution of uses and forms of ownership and the Berry Index for the project area. ■ B4 Market and location analysis, if necessary, including target group analysis, competitor analysis	B
Calculation of the diversification index via **master tool** based on Berry index	J

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Diversification	A, B, J	B, J	B, J	A, B, J	B, J
2. Purchasing power index	B	B	B	B	B
3. Unemployment rate	B	B	B	B	B
4. Market and location analysis	B	B	B	-	-
5. Marketing	A, B	A, B	A, B	-	-
6. Awards	A, B	A, B	B	-	-
7. Training mix	-	-	-	A, B	B

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Rent and purchase price schedule for new and existing properties (real estate agents).
- Vacancy rate (municipal sources, broker reports)
- Ownership/rental structure, household sizes (utilisation concept).
- Purchasing power index e.g. GfK (Gesellschaft für Konsum, Markt und Absatzforschung): The code number can be obtained from the local Chambers of Industry and Commerce or ordered, for example, from GfK.

ECO2.5

Environmental risks

Objective

The objective is to protect the residents and users of the district from the effects of natural disasters and to promote the resilience of the district.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Increased safety for residents and users of the district against natural disasters
- Avoidance of follow-up costs for subsequent protection against natural disasters (e.g. temporary flood protection dams, technical modifications, dismantling of buildings and/or infrastructure)
- Maintaining the value of buildings, traffic and open spaces

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Significant	11.5 Impact of disasters 11.b (Means of implementation) - Strategies for adaptation to climate change 13.1 Resilience and adaptability	
Moderate	1.5 Reduction of vulnerability to climate-induced extreme events	

Outlook

Adapted to the DGNB system application for buildings, the content is also oriented towards international conditions. Various platforms are being developed for applications in Germany, also with regard to adaptation to climate change. In the medium term, further results are to be included in the criterion.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**2.9 %**	**2**
Commercial **Event**	**3.3 %**	**2**
Industry	**2.5 %**	**2**

ASSESSMENT

Only the three most relevant environmental risks and radon must be evaluated. The selection must be exemplified (see description of the method).
Intermediate steps in the evaluation are possible for the individual risks on the basis of the rather rough risk classes, but in some cases these must then be rounded up or down accordingly in order to be able to assign the points to the description.

The subsequent evaluation is carried out quantitatively using the published risk maps, which determines the degree of hazard of the planning area. For sites in endangered locations, implemented compensation measures can be credited up to the maximum score for the criterion under consideration. Depending on the environmental risk, compensation measures must take into account the urban/regional context or existing infrastructure (e.g. water drainage in the event of heavy rainfall must not lead to flood situations in neighbouring areas). The compensation measures are a qualitative assessment of specific measures. 100 points can be achieved in the criterion.

NO.	INDICATOR	POINTS
1	**Earthquake** **City** **Business** **Event** **Industry** **Commercial**	**max. 30**
1.1	**Hazard level for earthquake (Germany)** **City** **Business** **Event** **Industry** **Commercial** Not classified as a relevant environmental risk: Classification and measures are regulated according to DIN EN 1998-1/NA (version 2011-01) and corresponding allocation to the earthquake zones. **Hazard level for earthquakes (international)** Hazard level (Earthquake Intensity, Hazard, 475 Year Event)	**max. 30**
	■ High (> 8)	5
	■ Average (> 5)	10
	■ Low (< 5)	20
	■ Very low (< 1)	30
1.2	**Compensation measures for earthquakes** **City** **Business** **Event** **Industry** **Commercial**	**max. 8**
	There is a regional early warning system for earthquakes as well as a concept for the district regarding which measures have to be taken in this case.	+2
	There are specially designated earthquake-proof shelters.	+2
	A risk analysis has been conducted for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2

NO.	INDICATOR	POINTS
2	**Volcanic eruption** City Business Event Industry Commercial	**max. 30**
2.1	**Hazard level for volcanic eruption** City Business Event Industry Commercial	**max. 30**
	■ Last volcanic eruption more than 20 years ago	10
	■ Last volcanic eruption more than 50 years ago	20
	■ Last volcanic eruption more than 100 years ago or no volcanic eruption	30
2.2	**Compensation measures for volcanic eruption** City Business Event Industry Commercial	**max. 8**
	There is a regional early warning system for volcanic eruptions as well as a concept for the district regarding which measures have to be taken in this case.	+2
	The district is located at a site that is not normally directly affected by lava and/or debris.	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2
3	**Avalanches** City Business Event Industry Commercial	**max. 30**
3.1	**Hazard level for avalanches** City Business Event Industry Commercial	**max. 30**
	■ Red (highly endangered area; in the event of an avalanche, it is to be expected that buildings will be destroyed)	0
	■ Blue (rare avalanches; constructional measures are to be taken, danger especially in outdoor areas)	10
	■ Yellow (low hazard)	20
	■ White (no or negligible hazard)	30

NO.	INDICATOR	POINTS
3.2	**Compensation measures for avalanches (with direct effect on the district)** City Business Event Industry Commercial	**max. 8**
	Structural avalanche protection (e.g. supporting structures, avalanche dams, -galleries or object protection to stop avalanches)	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2
4	**Storms** City Business Event Industry Commercial	**max. 30**
4.1	**Hazard level for storm (Winter Storm, Hazard, 50 Year Event)** City Business Event Industry Commercial	**max. 30**
	■ > 50 m/s	0
	■ > 25 m/s	20
	■ < 25 m/s	30
4.2	**Compensation measures for storms (with direct effect on the district)** City Business Event Industry Commercial	**max. 8**
	There are no adjoining large open spaces without vegetation and water areas.	+2
	90% of all surrounding buildings have no more than 4 floors (the wind load on a facade increases exponentially with its height).	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2

NO.	INDICATOR	POINTS
5	**Floods** City Business Event Industry Commercial	**max. 30**
5.1	**Hazard level for floods** City Business Event Industry Commercial	**max. 30**
	■ Very high (danger of flooding between 10 and 50 years)	0
	■ Medium (danger of flooding every 50 to 100 years)	10
	■ Low (danger of flooding less often than every 100 years)	20
	■ No danger of flooding	30
5.2	**Compensation measures for floods (with direct effect on the district)** City Business Event Industry Commercial	**max. 12**
	Flood protection concept according to usage requirements	+2
	(Temporary) structural measures for flood protection (e.g. dam)	+2
	Safety distance of the ground floor (> 15 cm) above the level of a flood which statistically occurs every 50 years	+2
	Enlargement of the retention areas within the project area	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2
6	**Heavy rain** City Business Event Industry Commercial	**max. 30**
6.1	**Hazard level for heavy rain** City Business Event Industry Commercial	**max. 30**
	Approach according to KOSTRA-DWD-2010R as far as available in the federal state:	
	■ Rainfall quantities ≥ 36 mm / 1 hour or ≥ 50 mm / 6 hours (environmental warning) Return time of 10 years	10
	■ Rainfall quantities ≥ 32 mm / 1 hour or ≥ 45 mm / 6 hours (Significant weather warning) Return time of 10 years	20
	■ Rainfall quantities ≥ 28 mm / 1 hour or ≥ 40 mm / 6 hours	30
	■ Heavy rainfall due to assignment to hazard maps in the project is not possible because not available	0

NO.	INDICATOR	POINTS
6.2	**Compensation measures for heavy rain (with direct effect on the district)** City Business Event Industry Commercial	**max. 6**
	There is a report on heavy rainfall with site-specific statements on precipitation levels and rainfall as a function of precipitation duration and annularity (return interval), (e.g. according to KOSTRA-DWD-2010R).	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2
7	**Hail** City Business Event Industry Commercial	**max. 30**
7.1	**Hazard level for hail** City Business Event Industry Commercial	**max. 30**
	Through assignment to “Hail zones” of hazard maps (BBK Bund)	
	■ Zone High	0
	■ Zone Increased	10
	■ Zone Moderate	20
	■ Zone Low	30
7.2	**Compensation measures for hail** City Business Event Industry Commercial	**max. 6**
	A risk analysis has been carried out for the district.	+3
	The protective measures proposed in a risk analysis have been implemented.	+3

NO.	INDICATOR	POINTS
8	**Landslide/soil subsidence** City Business Event Industry Commercial	**max. 30**
8.1	**Hazard level for landslide/soil subsidence** City Business Event Industry Commercial	**max. 30**
	■ Endangered due to the sloping location (inclination greater than 20 degrees) or the location in a mining region or civil engineering measures (underground railway construction or similar)	0
	■ Not endangered	30
8.2	**Compensation measures for landslide/soil subsidence (with direct effect on the district)** City Business Event Industry Commercial	**max. 24**
	Analysis and assessment of soil properties by involving the competent authority for geology and mining in cooperation with geologists familiar with the area. The following issues need to be analysed: ■ Research mapping material with tunnels and shafts ■ Research of historical tunnels ■ Groundwater levels (maximum levels) ■ Slope instability ■ Cartographic examination of the topography, morphology, geological layers and source horizons ■ Infiltration and moisture penetration of the soil on slopes ■ Soil karstification as a risk	+10
	Constructional protection measures, e.g.: ■ Installation of drainages, either on the surface or deep into the subsoil (e.g. drainage anchors) ■ Preventive installations in the endangered subsoil - analogous to torrent and avalanche control ■ Short-term stabilisation of moving slopes by concrete and steel reinforcement ■ Extensive covering of critical slope areas by tarpaulins to prevent further rainwater ingress	+10
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2

NO.	INDICATOR	POINTS
9	**Storm surge/tsunami** **City** **Business** **Event** **Industry** **Commercial**	**max. 30**
9.1	**Hazard level for storm surge/tsunami** **City** **Business** **Event** **Industry** **Commercial** By assignment to the tsunami or storm surge hazard map	**max. 30**
	■ Very high risk	10
	■ Medium risk	20
	■ Low risk	30
9.2	**Compensation measures for storm surge/tsunami** **City** **Business** **Event** **Industry** **Commercial**	**max. 8**
	There is a regional early warning system for storm surge/tsunamis as well as a concept for the surrounding district regarding which measures have to be taken in this case.	+2
	The surrounding district is located at a site that is normally not directly affected by storm surge/tsunami (e.g. mountain top).	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2

NO.	INDICATOR	POINTS
10	**Temperature extremes** **City** **Business** **Event** **Industry** **Commercial**	**max. 30**
10.1	**Hazard level for special climatic extremes according to the ESPON map by assignment to the hazard map for extreme temperatures** **City** **Business** **Event** **Industry** **Commercial**	**max. 30**
	■ High risk	10
	■ Medium risk	20
	■ Low risk	30
10.2	**Compensation measures for temperature extremes** **City** **Business** **Event** **Industry** **Commercial**	**max. 8**
	Structural measures to mitigate the extremes	+2
	Organisational measures to mitigate the extremes	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2

NO.	INDICATOR	POINTS
11	**Forest fires** City Business Event Industry Commercial	**max. 30**
11.1	**Hazard level for forest fires** City Business Event Industry Commercial	**max. 30**
	■ Last forest fire more than 10 years ago in the immediate vicinity of the district	10
	■ Last forest fire more than 20 years ago in the immediate vicinity of the district	20
	■ Last forest fire more than 50 years ago or no forest fires in the immediate vicinity of the district	30
11.2	**Compensation measures for forest fires** City Business Event Industry Commercial	**max. 8**
	There is a regional early warning system for forest fires as well as a concept for the district, which measures have to be taken in this case.	+2
	The district is located at a site that is normally not directly affected by forest fires.	+2
	A risk analysis has been carried out for the district.	+2
	The protective measures proposed in a risk analysis have been implemented.	+2
12	**Radon** City Business Event Industry Commercial	**max. 10**
12.1	**Even low soil air concentrations may be sufficient to cause an increased indoor air concentration in a house (see Section 123 StrlSchG)** City Business Event Industry Commercial	**max. 10**
	The following procedure is evaluated:	
	■ Radon soil air concentration is determined in a risk assessment for each plot	+5
	■ Appropriate measures are taken in the district to prevent or significantly impede the entry of radon from the building ground (see § 123 StrlSchG)	+5

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Classification of environmental risks according to the evaluation (indicators 1 - 12)	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Indicators 1 -11 and 14 are consistent with the contents of the SITE1.1 Local environment criterion.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

Hardly a week goes by in which the media do not report about a natural disaster in the world. Germany is also increasingly affected by such disasters, especially storms and floods. The social, economic and ecological damage caused by such disasters is enormous and cannot be quantified.

II. Additional explanation

The number of natural disasters has been rising sharply worldwide in recent years (see Fig. 1). The social, economic and also ecological damage caused by such disasters is enormous and cannot be quantified.

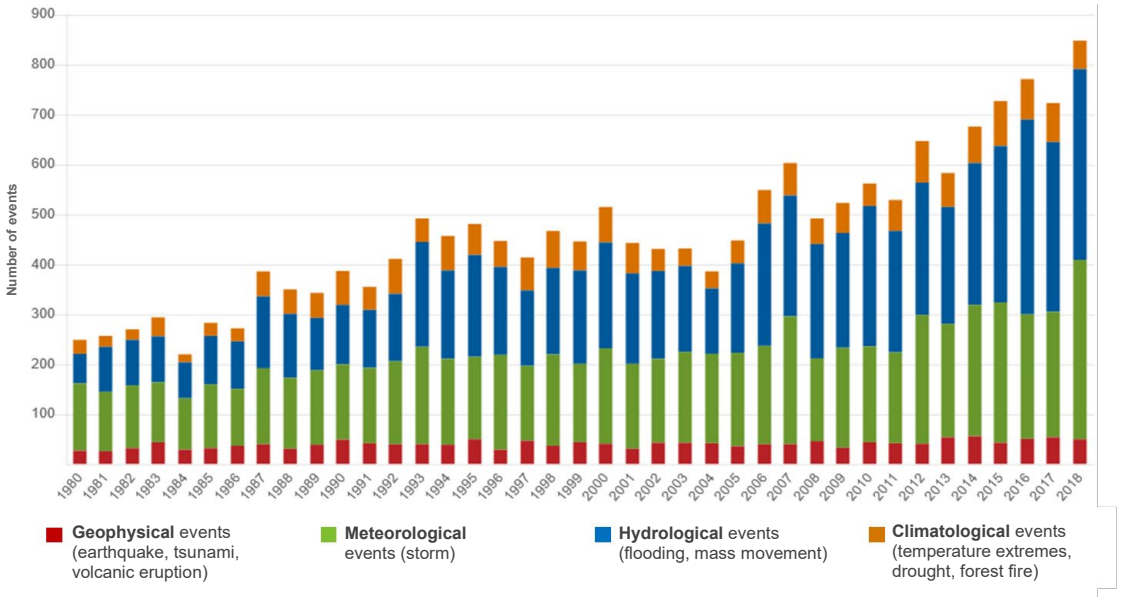

FIGURE 1 Number of natural disasters worldwide 1980 - 2018, source: Own presentation according to Munich RE: “NatCat Service, As of: 28/05/2019 | https://natcatservice.munichre.com/

The objective is not to build in endangered areas and, where possible, to return parts of our landscape to their natural state (e.g. renaturation of floodplain landscapes to prevent flooding). However, due to the limited availability of settlement areas, it will be difficult in the future to completely avoid settlement growth in endangered areas. For this reason, organisational and also structural measures must be taken to protect people in these areas.
Natural hazards depend on the geographical conditions of the location and are generally not influenceable in intensity and frequency and are difficult to predict.
The methodology takes into account the respective probability of occurrence and the possible severity of the effect. However, compensation measures are also taken into account.

III. Method

City Business Event Industry Commercial

The probability of occurrence of natural disasters is taken into account for the evaluation. In the case of some natural disasters, compensation measures may be taken into account. The criterion is assessed using the following indicators:

- Environmental risk 1 - highest relevance (30 points)
- Environmental risk 2 - second most relevant (30 points)
- Environmental risk 3 - third most relevant (30 points)
- Radon (10 points)

The first step is to determine the regional relevance of the natural environmental risks listed below for the district (scoping procedure). This requires the three most relevant environmental risks to be identified using the methods described. The selection must be justified. This procedure is intended to reduce the effort involved (evaluation of an avalanche risk in lowlands, flood risk far from water bodies or heavy rainfall events). The following environmental risks are considered:

Indicator 1: Earthquake

Earthquakes are measurable vibrations of the earth body. Strong earthquakes can destroy houses and buildings, trigger tsunamis and landslides and kill people in the process. In Germany the probability of strong earthquakes is relatively low, but in certain areas it is quite possible.

For Germany, the Center for Disaster Management and Risk Reduction Technology (CEDIM) publishes an earthquake risk map (CEDIM Risk Explorer, Hazard Maps, 475 year event) on its website. Based on the EMS 98 (European Macroseismic Scale), it classifies locations throughout Germany into different hazard levels that reflect a possible earthquake intensity.

If available, more detailed hazard maps can also be used in principle. For districts outside Germany, the risk maps of the European Spatial Design Observation Network (ESPON) can be used (earthquake hazard map).

TABLE 1 EMS intensity

EMS INTENSITY	DEFINITION OF THE INTENSITY	DESCRIPTION OF THE MAXIMUM EFFECT
0 - 5	Not perceptible – strong	Buildings are shaken, hanging objects oscillate strongly, small objects are moved.
5 - 6	Strong – slight damage to buildings	Slight damage is caused to buildings in poorer condition (e.g. cracks in the walls, falling off plastering).
6 - 7	Slight damage to buildings	Moderate damage occurs to buildings of solid construction (e.g. small cracks in walls, plaster falling off, chimney parts falling down).
7 - 8	Severe damage to buildings	Serious damage occurs in buildings of simple design (e.g. gable parts and roof cornices collapse).
> 8	Destructive	Well-built ordinary buildings show severe damage (e.g. collapse of load-bearing structures).

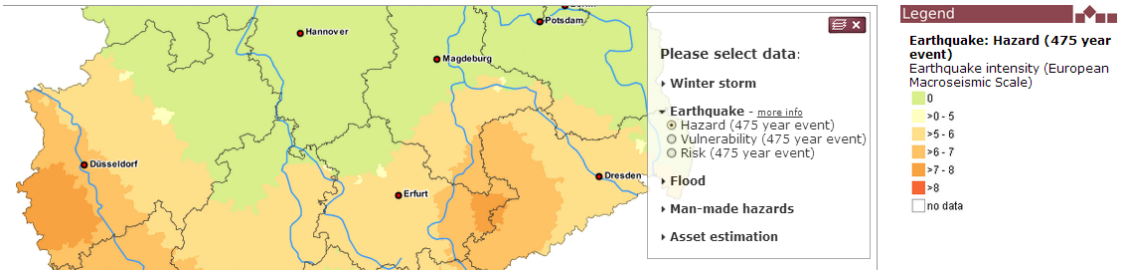

FIGURE 2 Hazard levels, source: CEDIM (URL: www.cedim.de)

Indicator 2: Volcanic eruption

Volcanic eruptions represent a serious environmental risk in some regions of the world. In Europe, the risk of being affected by volcanic eruptions is assessed using the risk maps of the European Spatial Design Observation Network (ESPON, Volcanic Hazard Map). If available, more detailed hazard maps can also be used.

Indicator 3: Avalanches

An avalanche is a large mass of snow or ice that detaches itself from mountain slopes and slides or falls towards the valley. Avalanches that cause major damage to property, people or the environment are counted as natural disasters. The danger of avalanches is particularly high in the Alpine foothills.

The degree of hazard and measures for avalanche protection are evaluated. The degree of hazard is determined on the basis of the regional and current avalanche hazard map (combination of intensity and probability of occurrence) of levels 0 (none, white), 1 (low, yellow), 2 (rare, blue) to 3 (significant, red), which are published by the respective municipalities, if regionally relevant.

In principle, the evaluation should be carried out with local detailed avalanche maps. If these are not available, the ESPON database can be used (Avalanche Hazard Map).

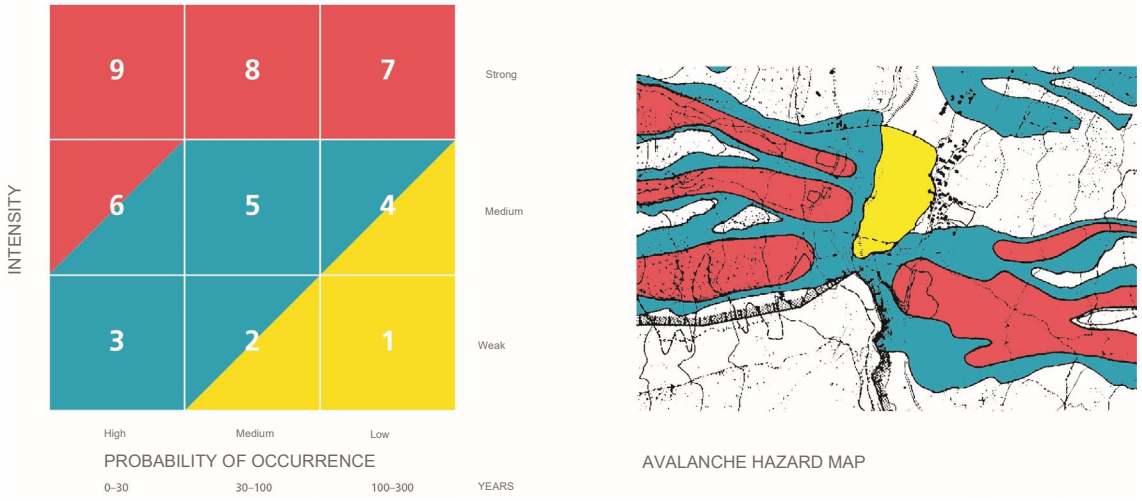

FIGURE 3 Probability of occurrence, source: SLF, Davos

TABLE 2 Hazard to the areas

AREAS	HAZARD
White	No or negligible hazard
Yellow	Low hazard
Blue	Rare avalanches (structural measures have to be taken, hazard especially in outdoor areas, therefore building permits are linked to conditions and evacuation plans for the residents are required)
Red	Highly endangered area (in the event of an avalanche, buildings may be destroyed; in the red area, no new building zones may be released. Furthermore, no buildings and facilities may be erected or extended)

Indicator 4: Storms

Storms are defined as winds with speeds of at least 20.8 m/s (74.9 km/h) or 9 Beaufort. Direct storm damage mainly affects the covering of roofs or other wind transport; in densely wooded areas, damage caused by fallen trees (storm-damaged timber) is an additional factor. Indirect damage is also significant, for example through the deposition of sand on agricultural land during a sandstorm or hail damage.

The risk of storm damage and measures to increase storm safety are evaluated. The storm damage risk is determined using the online tool CEDIM Risk Explorer (hazard maps, winter storms with wind speeds, 50-year event). It is recommended to take the data directly from CEDIM, as the coloured areas can be more clearly distinguished there by enlarging the map (possibly several times). The exact wind speed in m/s is displayed when clicking once on the planning location and can then be evaluated according to the table below.

If available, more detailed hazard maps can also be used in principle. For districts outside Germany, the risk maps of the European Spatial Design Observation Network (ESPON) can be used (Storm Hazard Map).

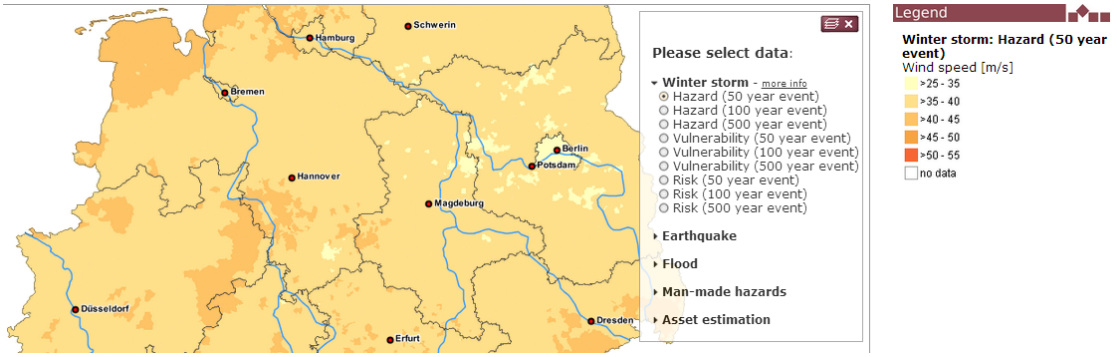

FIGURE 4 Storm damage risk map, source: CEDIM (URL: www.cedim.de)

TABLE 3 Wind damage

MEDIUM WIND SPEED	DEFINITION	DESCRIPTION OF THE MAXIMUM EFFECT
21 - 24 m/s	Storms	Minor damage to houses (roof tiles are removed)
25 - 28 m/s	Severe storm	Wind breaks trees, major damage to buildings
29 - 32 m/s	Hurricane-like storm	Wind uproots trees, spreads storm damage
> 33 m/s	Hurricane	Serious devastation

Indicator 5: Floods

Floods are generally natural events. They become a catastrophe (flood disaster) when human values are affected. In the course of progressive land use, more and more areas exposed to flood hazards are being used. Thus, the threat of flooding has increased, despite constantly improving flood protection over centuries.

The flood hazard and the protective measures are evaluated. The flood hazard is determined on the basis of the flood hazard map of the respective federal state. Four flood scenarios are presented in the maps: Floods with high probability (HQ 10-50), floods with medium probability (HQ 100), extreme events with partial failure of flood protection facilities (HQ 200) and no flood hazard.

In principle, the evaluation should be carried out using local detailed flood maps. If these are not available, the ESPON database can be used (Flood Recurrence Map, Precipitation Contributing to Flood Risk).

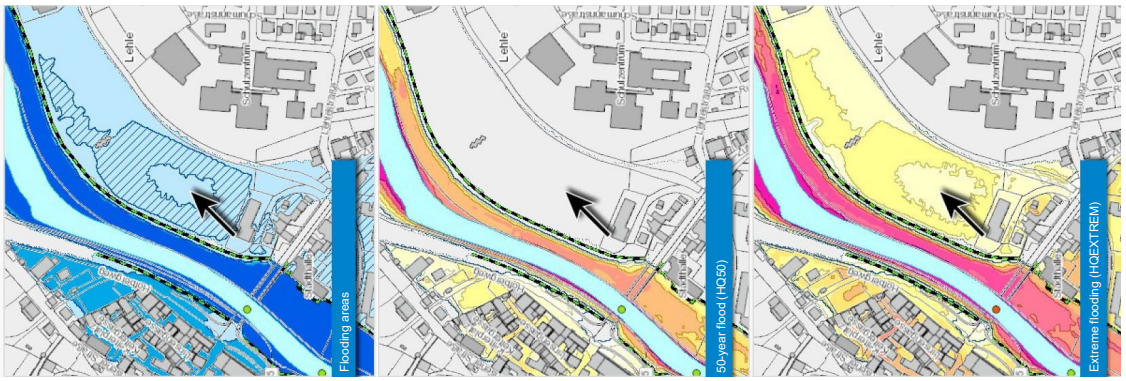

FIGURE 5 Excerpt from the flood hazard map Baden-Württemberg
Source: (http://rips-dienste.lubw.baden-wuerttemberg.de)

Indicator 6: Heavy rain

Heavy rainfall events lead to flash floods or flood inundations if rainwater can no longer seep away or be sufficiently absorbed and discharged by the sewerage system or water bodies. This is influenced by the topographic location of the property, its degree of soil sealing, existing rainwater retention systems or the dimensioning of the sewerage system (here, appropriate compensation measures can be taken).

The following factors have a particularly unfavourable effect here:

- Danger to the property from surface runoff from adjacent roads or land
- Ground level entrances or terraces
- Sidewalks, access roads, parking spaces have an incline to the building
- Water can flow from the adjacent street into the underground car park

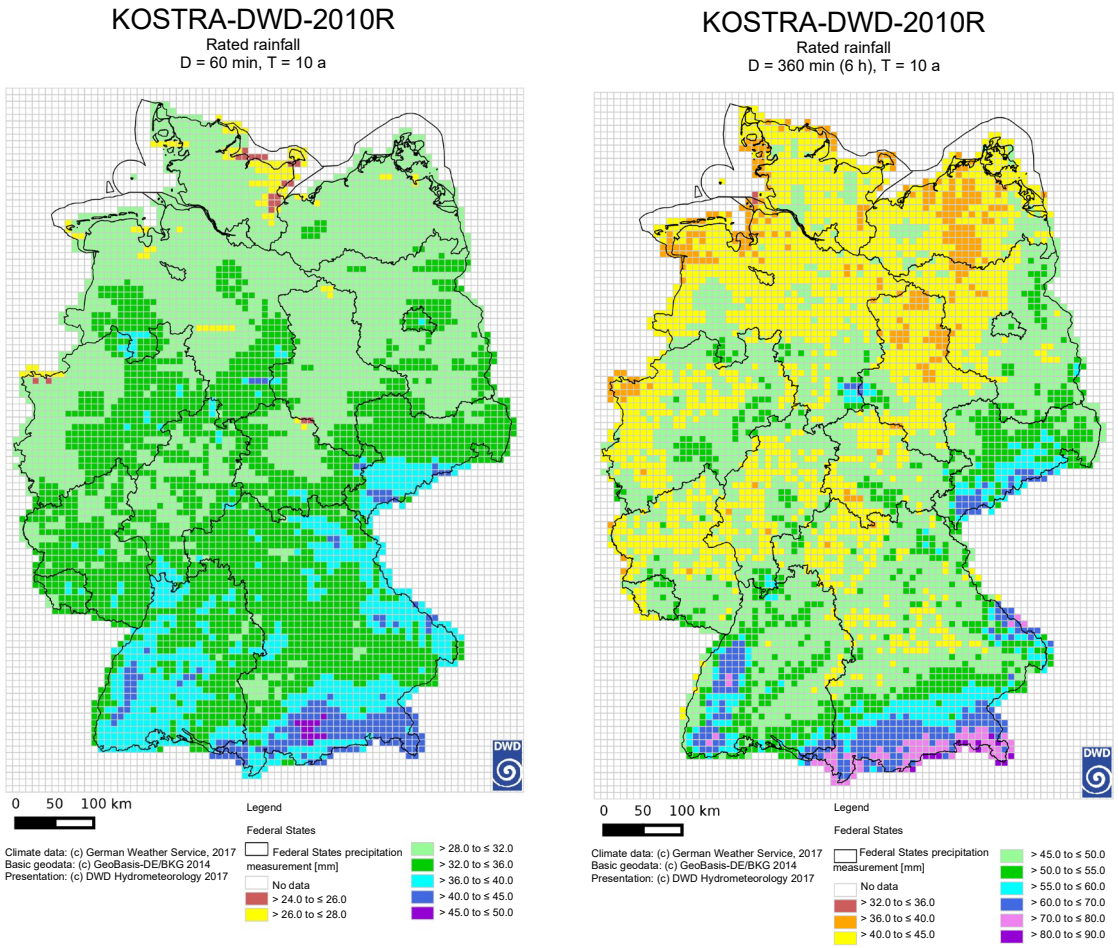

FIGURE 6 Coordinated heavy rainfall regionalisation and evaluation of the DWD (KOSTRA-DWD) 2010R (revision data set) for the duration of one hour (left) and six hours (right) and a return period of 10 years. Source: DWD - Hydrometeorology department

Indicator 7: Hail

According to the research project “Climate-adapted construction – criteria profile ‘resistance to natural hazards: Wind, heavy rain, hail, snow/humid winters and floods’” of the “Future Construction” research initiative, there are currently still insufficient regulations regarding the resistance of buildings. For this natural hazard, standards and regulations to reduce the risks are essentially not yet present in Germany.

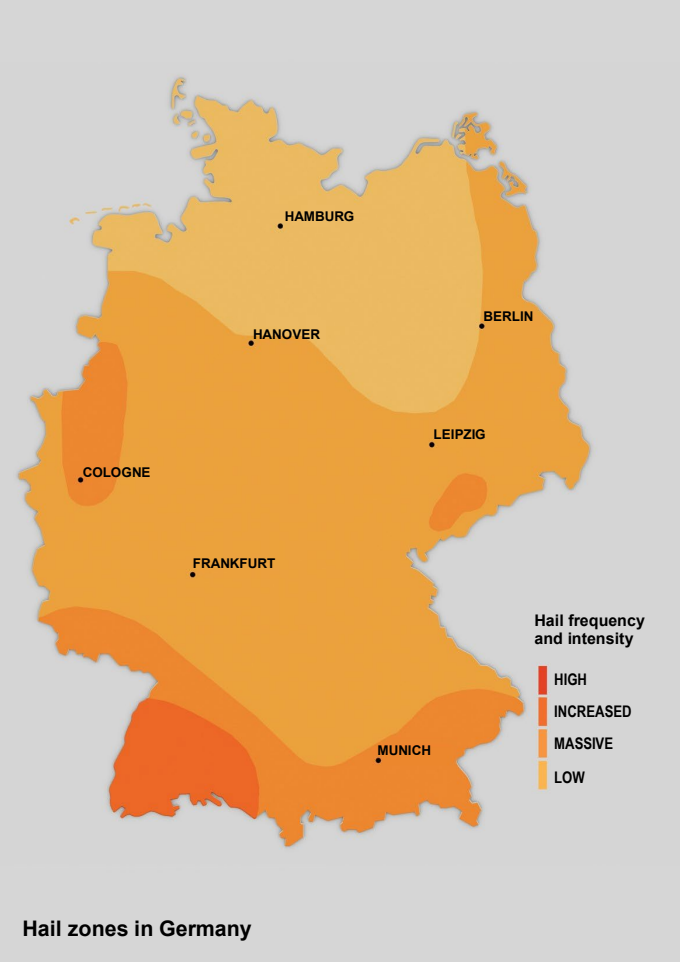

FIGURE 7 Hail zones low – high. Source: BBK Federation (https://www.bbk.bund.de/SharedDocs/Bilderstrecken/BBK/DE/2017/Sturmsicher_bei_Unwetter/PM_Sturmsicher_bei_Unwetter.html)

Indicator 8: Landslide/soil subsidence

A landslide is the sliding of large masses of earth and rock, usually triggered by heavy rainfall (prolonged rain or heavy rain) and the resulting intrusion of water between previously bounded soil layers.

The hazards (e.g. from former mining, hillside location or civil engineering measures) and compensation measures are assessed. For guidance on whether the issue of landslide/soil subsidence could be relevant for the district, the ESPON database can be used (Landslide Hazard Map). If available, more detailed hazard maps can also be used.

Indicator 9: Storm surge/tsunami

Tsunamis and storm surges represent a serious environmental risk in some regions of the world. In Europe, the risk of being affected by tsunamis and/or storm surges is assessed using the risk maps of the European Spatial Design Observation Network (ESPON, Tsunami Hazard Map, Storm Surge Hazard Map). If available, more detailed hazard maps can also be used in principle.

Indicator 10: Temperature extremes

Climate extremes *(heat waves/cold spells*) represent a serious environmental risk in some regions of the world. In Europe, the risk of being affected by climate extremes is assessed using the risk maps of the European Spatial Design Observation Network (ESPON**,** Extreme Temperature Hazard Map). If available, more detailed hazard maps can also be used in principle.

Indicator 11: Forest fires

Due to the increasing number of long dry periods, the danger of forest fires is rising. In Europe, the risk of being affected by forest fires is assessed using the risk maps of the European Spatial Design Observation Network (ESPON, Wildfire Hazard Map, Length of Dry Spell Affecting Forest Fires). If available, more detailed hazard maps can also be used in principle.

Indicator 12: Radon

Even low concentrations of soil air can be sufficient to cause increased indoor concentrations in a house. Therefore, the new Radiation Protection Law stipulates that anyone constructing a building with recreation rooms or workplaces must take appropriate measures to prevent or significantly impede the entry of radon from the building ground. This applies if the measures required for moisture protection according to the generally recognised rules of technology are observed. In radon precautionary areas, which the federal states must define by 2021, more extensive measures must then be implemented (§ 123 StrlSchG). These further measures are briefly mentioned in the Radiation Protection Ordinance. The Radiation Protection Law and Ordinance came into force on 31/12/18.

The radon map of Germany can only be used for initial assessments. It is not possible to determine the radon soil air concentration on a plot-exact basis.

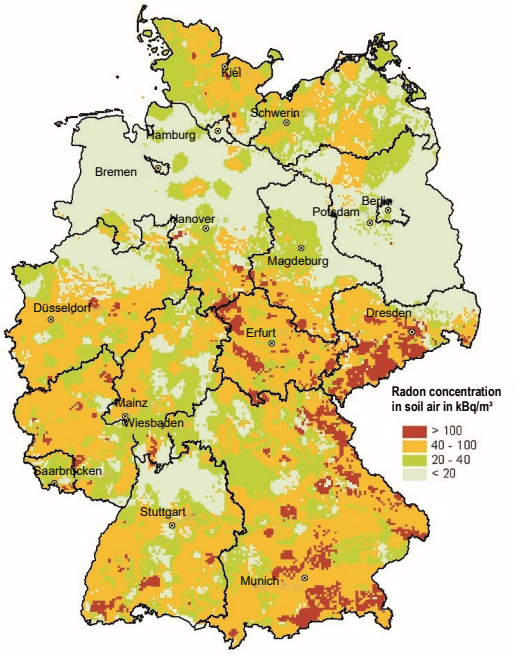

FIGURE 8 Radon concentration in soil air at one metre depth, source: Federal Office for Radiation Protection

Compensation measures - all indicators

In some cases, compensation measures for individual environmental risks are taken into account; these are described in more detail in the assessment section.

Note on environmental risks identified in ESPON/CEDIM maps:

In countries not covered by ESPON/CEDIM maps, the auditor is obliged to identify alternative sources of risk data. The sources of the risk data and the adjustment of the evaluation (scaling) must be agreed in advance with the DGNB office.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 4 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the compensation measures and disaster control plan	A
Documentation of **relevant expert reports/documents:** ■ B1: Expert opinion/risk analysis regarding whether the project area is affected by the respective risk and evaluation (if available) ■ B2: Presentation and explanation of the compensation measures and the disaster control plan	B
Photo documentation of the implemented measures	C
■ **Site plan with markings**: Location of the project area on risk maps and evaluation (if available)	D

TABLE 5 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Earthquakes	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
2. Volcanic eruption	A, B, C, D	B, C D	B, C, D	A, B, D	B, C, D
3. Avalanches	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
4. Storms	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
5. Floods	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
6. Heavy rain	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
7. Hail	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
8. Landslide/soil subsidence	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
9. Storm surge/tsunami	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
10. Particular climate extremes	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
11. Forest fires	A, B, C, D	B, C, D	B, C, D	A, B, D	B, C, D
12. Radon	A, B, C, D	B, C, D	B, C, D	A, B	B, C, D

APPENDIX C - LITERATURE

I. Version

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PAGE	EXPLANATION	DATE

II. Literature

- FOEN - Federal Office for the Environment Switzerland: www.bafu.admin.ch/naturgefahren.
- Avalanche maps of cities and municipalities (if relevant).
- ZÜRS Zoning systems for floods, backwater and heavy rain.

Industry **Commercial**

- Risk maps of the CEDIM Risk Explorers Germany, Karlsruher Institut für Technologie
- Avalanche maps of cities and municipalities (if relevant)
- ZÜRS Zoning systems for floods, backwater and heavy rain
- Location analysis with concrete statements on the criterion
- Burk, Peter: Construction planner, development and crisis regions, Fraunhofer Informationszentrum Raum und Bau (Ed.), 1998
- Einwirkungen auf Tragwerke DIN EN 1991-1-4/NA [2010-12]
- Disaster control plans can be created online and kept up to date (www.kats-plan.de)

Internet sources

- Risk maps of the CEDIM Risk Explorer Germany (www.cedim.de).
- Risk maps of the ESPON European Spatial Design Observation Network (www.espon.eu).

Industry **Commercial**

- http://kats-plan.de.dedi888.your-server.de/Home/Willkommen-beim-KatS-Plan.html
- http://www.vpi-bw.com/ingenieure/freudenstadt/FDS_2005-33-03.pdf
- http://www.gfz-potsdam.de/portal/gfz/home
- http://www.bafu.admin.ch/naturgefahren/
- http://cedim.gfz-potsdam.de/
- http://www.cedim.de/img/content/sturmschaden_bild6.jpg

Sociocultural and functional quality

The eight criteria of sociocultural and functional quality assess districts in terms of **health**, **comfort** and **user satisfaction** as well as essential aspects of the **social and infrastructural mix**.

SOC1.1	Thermal comfort in open spaces
SOC1.6	Open space
SOC1.8	Workplace comfort
SOC1.9	Noise, exhaust and light emissions
SOC2.1	Barrier-free design
SOC3.1	Urban design
SOC3.2	Social and functional mix
SOC3.3	Social and commercial infrastructure

SOC1.1

Thermal comfort in open spaces

Objective

The objective is to increase the attractiveness of public spaces by taking microclimatic effects into account during planning. This promotes a pleasant, varied climate in the district throughout the year, which meets the different individual thermal needs of users.

Benefits

The following benefits for companies, municipalities and/or users can therefore be achieved:

- Attractive and versatile public spaces
- Promotion of the well-being and health of users
- Contribution to improving the microclimate and energy demand for air conditioning in buildings
- Reduction of the heat-island effect (urban heat island)
- Long-term use of open spaces through adaptability to climate change

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.4	Reduction of premature mortality; promotion of health/well-being	3.1.a/b	Health and nutrition
	3.9	Effect of chemicals, air, water and soil pollution	3.2.a	Air pollution
	11.5	Impact of disasters		
	13.1	Resilience and adaptability		
Moderate	1.5	Reduction of vulnerability to climate-induced extreme events	13.1.a	Climate action
Low	11.6	Reduction of environmental pollution in cities		

Outlook

With climate change advancing, climate adaptation in cities is increasingly of great importance for the quality of life of the inhabitants. The contents of this criterion will therefore be integrated together with ENV1.5 Urban climate in the next system version for new buildings. The content of the criterion will be adapted and developed.

Share of the total score

	SHARE	WEIGHTING FACTOR
City Business Event	**2.6 %**	**3**
Commercial	**1.8 %**	**2**
Industry	**2.7 %**	**3**

ASSESSMENT

The climate-conscious planning of the district is evaluated in criterion SOC1.1 Thermal comfort and ENV1.5 Urban climate. In the present criterion, the microclimatic effects in the district are evaluated by ensuring basic comfort in open spaces (indicator 1), by considering wind comfort (indicator 2) and perceived temperature (indicator 3). The objective is not to create a homogeneous climate in the district, but to create a pleasant, varied climate that meets the different individual thermal needs of the users. A maximum of 100 points can be achieved.

NO.	INDICATOR		POINTS
1	**Basic comfort**		
	City **Business** **Event** **Commercial**		**max. 70**
	Industry		**max. 80**
1.1	**Microclimate analysis**		
	City **Business** **Event** **Commercial**		**max. 10**
	Industry		**max. 20**
	Analysis of the microclimatic conditions in the planned open spaces by a qualified person.	**City** **Business** **Event**	10
		Commercial	10
		Industry	20
1.2	**Solar radiation on 21 December in hours**		
	City **Business** **Event** **Commercial**		**max. 10**
	■ ≥ 1 h (At least 80 % of the surfaces in the study area are exposed to 1 hour of solar radiation on 21 Dec.)		5
	■ ≥ 3 h (At least 80 % of the surfaces in the study area are exposed to 3 hours of solar radiation on 21 Dec.)		10
1.3	**Shading of the study areas in percentages**		
	City **Business** **Event** **Commercial**		**max. 10**
	Industry		**max. 30**
	■ ≥ 10% of the surfaces in the study area are protected by trees, rigid or adaptive/flexible shading systems or buildings from summer sun	**City** **Business**	5
		Event	5
		Commercial	5
		Industry	15
	■ ≥ 30 % of the surfaces in the study area are protected by trees, rigid or adaptive/flexible shading systems or buildings from summer sun .	**City** **Business**	10
		Event **Commercial**	10
		Industry	30

NO.	INDICATOR	POINTS
1.4	**Wind protection measures** City Business Event Commercial	
	■ The building structure is optimised for the city climate, so that negative effects for the common areas (wind tunnel effects, handling of fall winds from high-rise buildings, etc.) are avoided. Wind protection measures are used for areas affected by gusts of wind.	10
1.5	**Improvement measures for microclimate** City Business Event Industry Commercial	**max. 30**
	The measures of the analysis were planned/implemented:	
	■ Between 33 and 100% of the recommended measures are implemented	10 – 30
2	**Wind comfort** City Business Event Commercial	**max. 10**
2.1	**Examination in all categories** City Business Event Commercial	**max. 10**
	■ Examination with division into all categories (A-C). The requirements are not met or have not been documented.	3
	■ Examination with division into all categories (A-C). The requirements are fulfilled on average for at least 50 % of all the common areas examined.	5
	■ Examination with division into all categories (A-C). The requirements are fulfilled for at least 80 % in each of the examined common areas.	10
3	**Perceived temperature** City Business Event Industry Commercial	**max. 20**
3.1	**Percentage reduction of hot or cold periods (number of hours h) compared to the base variant** City Business Event Industry Commercial	**max. 20**
	■ ≥ 30 %	3
	■ ≥ 40 %	7
	■ ≥ 50 %	14
	■ Demonstrably no stress days available or demonstrable reduction of stress days by at least 80%.	20

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As key figures / KPIs, it is useful to communicate values for operating temperature, air speed, surfaces and room air humidity. Basic data and the results of a thermal simulation can be used for reporting according to “Level(s) - Common EU framework of core environmental indicators”.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Wind comfort	[-]
KPI 2	Perceived temperature	[%]
KPI 3	Shading	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Contents of the criterion will be integrated into the next system version.

- **DGNB BUILDINGS IN USE:** Indirectly, if a high level of thermal comfort is achieved, it has a positive impact on the evaluation of user satisfaction (BIU criterion SOC2-B).

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

The (thermal) comfort in public spaces is of great importance for daily and seasonal use and attractiveness. High microclimatic and bioclimatic quality promotes a healthy living environment and the well-being of the district users. At the same time, attractive open spaces encourage people to meet and engage in interpersonal exchange, thus making a significant contribution to the social stability of the district. The objective is not necessarily to provide a climate that is as homogeneous as possible, but to provide differentiated microclimatic conditions for different users.

II. Additional explanation

City **Business** **Event** **Industry** **Commercial**

The objective is to achieve a high quality of stay even on hot, stormy and/or days with high humidity. The buildings orientation and the open space design can optimise solar radiation, reduce overheating and reduce or increase air movement. The potential of necessary drainage and rainwater retention measures can be used to create bioclimatic added value through surface and artistically designed water elements in addition to the design quality.

In view of the negative effects of climate change, the positive influence on comfort in public spaces in general and in inner-city locations plays a central role in municipal climate adaptation strategies. It is therefore important to take bioclimatic effects into account in the development and implementation of the district.

To create and secure high-quality public spaces is a central requirement of the “LEIPZIG CHARTER on Sustainable European Cities”, which was adopted in 2007 and is being continued at the national level as part of urban development policy. The same objective can be found in the United Nations Human Settlements Programme - HABITAT, formulated in the Habitat Agenda 1996.

III. Method

City **Business** **Event** **Industry** **Commercial**

The comfort must be presented for high quality and important common areas such as city squares, parks of the district, common areas at the factory premises. For event areas, this includes the inner courtyards of exhibition stands or spectator stands. However, all permanently roofed event rooms (e.g. concert halls) are not relevant.

In principle, all outdoor living areas that are critical in terms of thermal comfort should be examined. Outside common areas for visitors, which are designed for a longer stay in a specific location, must be included in the examination for event areas. This includes, for example, spectator stands at a football stadium or an open-air theatre (but not the pitch or the stage itself).
In addition, at least the following number of common areas must be subjected to an examination:

- For districts smaller than 10 hectares = min. 2 common areas
- For districts larger than 10 hectares = min. 2 common areas plus 1 common area per additional 10 hectares (e.g. with 22 hectares = 2 + 1 = 3 common areas)
- A maximum of 10 common areas per district must be examined.

The qualities of the common areas need to be determined separately and an average value is to be formed. A distinction is made between “classic” outdoor spaces and “special forms” such as spectator areas. The assessment is as follows:

Classic outdoor spaces for **City** **Business** **Industry** **Commercial**: Evaluation of indicators 1 - 3 as described below.

Specifics for **Event**: Evaluation of indicators 2 – 3 (simulations), with the following regulations:
For fully enclosed building types (e.g. football stadiums), only the evaluation of thermal comfort may be sufficient; this must be justified accordingly or confirmed/documented by a qualified expert.
For large-area special types with different comfort zones, the area-weighted average of all zones is to be calculated to verify the reduction of stress days. For the full point score, the reduction to 0 stress days must be demonstrated separately for each area.
Thus (depending on the case) a maximum of 50 POINTS each for indicator 2 and 3, or a maximum of 100 POINTS only for indicator 3, can be achieved per living area. For the overall evaluation of the criterion, the average value for all examined spaces has to be calculated.

It is recommended to use appropriate holistic software tools/simulation programs for the evaluation.

Indicator 1: Basic comfort

Indicator 1.1: Microclimate analysis
The analysis should explain how to react to the climatic conditions on site and how to plan a pleasant climate in the open spaces. A climate adaptation strategy should serve as the basis for the analysis. If none is available for the municipality, heat maps, landscape frame plans, main wind direction in winter/summer etc. can also be used.
The analysis should also show how open spaces can meet different microclimatic requirements of users (e.g. sunny warm places and windless and shady outdoor spaces that are available at the same time).

Indicator 1.2 – 1.5: Basic comfort
The comfort of public spaces is of great importance for daily and seasonal use and for their attractiveness.

The public spaces of the district should offer good urban climatic conditions throughout the year (enough sun and protection from cold winds and rain in winter and protection from sun and overheating in summer). Otherwise, spaces remain unattractive and only partially usable during the day or year. For this reason, common areas should be exposed to sunlight ("solar access") and offer shading in summer. Wind protection measures are intended to minimise unpleasant strong and cold air movements.
City squares and parks are of great importance for the urban environment, because the quality of stay depends mainly on the comfort of the place. Comfort in summer can be increased especially by green spaces, open water surfaces, the choice of materials (absorption and reflection properties) and shading elements. In winter, especially solar radiation is relevant. Wind protection is particularly relevant from autumn to spring and should help to reduce high wind speeds close to the ground. It should be noted that maximising wind protection can result in a conflict of objectives with the ventilation assessed in the "City climate" criterion.

5 basic indicators (green spaces, water areas, solar radiation, shading, wind protection) are used to evaluate basic comfort. Further points can be achieved by demonstrating an appropriate integral process for improving planning.

If it is proven by expert opinion that the objectives from the analysis are achieved, the maximum score can be given.

Indicator 2: Wind comfort
The wind comfort in the district has to be demonstrated by a qualified study or simulation.

The wind limiting speeds are defined differently for different boundary conditions of use (area types). For example, the permissible wind speeds on footpaths and cycle paths are less strict than within covered passages.
A detailed, yearly wind comfort study has to be executed for each investigated common area by means of a wind tunnel test or a flow simulation using CFD (Computational Fluid Dynamics) software.

The area types defined under wind comfort aspects are divided into

- Area type I: Area type I includes (public) areas where people move around as pedestrians or cyclists or similar with the primary aim of moving forward. The short name of area type I is therefore traffic area. Traffic areas are e.g. car parks, parking decks, footpaths and cycle paths, public roads.

- Area type II: Area type II includes areas where people go for a stroll or for a short stay outdoors. These areas require a higher quality of stay than those of area type I. Area type II includes areas such as bus and train platforms or (aerodynamically open or semi-open) station halls. The short name for area type II is "movement area". Movement areas are e.g. bus and train platforms, squares and parks, pedestrian zones, building entrances, covered streets, station halls.

- Area type III: Areas that are classified as area type III must meet the highest standards in terms of the quality of stay. They are intended to provide a feeling of comfort even during longer stays. Wind draughts are often classified as very problematic on such surfaces, since the desired feeling of comfort is significantly impaired. Many areas of area type III are therefore, depending on the location, often designed as (fluidically) closed areas such as shopping malls or (mainly) covered stadiums or similar. However, area type III also includes those areas where larger wind movements are not acceptable due to their specific use, such as open-air swimming pools or summer terraces for high-quality recreation, for which the choice of location is therefore of great importance. The short name for area type III is “Recreational area”. Examples for recreational areas are terraces with seats, sports stadiums and swimming pools, covered shopping arcades.

Internationally, the mean wind limit speeds of 5 m/s averaged over an hour have become established for the assessment of wind comfort conditions. The assessment is based on the excess frequency of this average wind speed.

In wind comfort tests, the number of hours per year wind speeds of 5 m/s are exceeded is checked. The determined excess hours per year are then evaluated using a 3-stage comfort criterion. The comfort levels include the categories:

- Category A - Rating: good
- Category B - Rating: moderate
- Category C - Rating: unsatisfactory, needs improvement

For the evaluation, the selected area types are to be subdivided according to the respective category in the following table and then evaluated.

TABLE 1 Assessment of wind comfort based on the frequency of exceeding average hourly wind speeds according to NEN 8100

AREA TYPE	PERCENTAGE OF EXCESS HOURS PER YEAR		
	COMFORT CRITERION (V > 5M/S)		
	A (GOOD)	B (MODERATE)	C (UNSATISFACTORY, NEEDS IMPROVEMENT)
I. Traffic areas [pass through]	5 – 10 %	10 – 20 %	> 20 %
II. Movement areas [strolling]	2.5 – 5 %	5 – 10 %	> 10 %
III. Recreational areas [Sitting]	> 2.5 %	2.5 – 5 %	> 5 %

The following applies to the content assessment of the comfort criterion:

Category A: In evaluation category A (good), no obstruction or nuisance is to be expected due to excessively high wind speeds. The wind comfort is generally considered good.

Category B: Category B (moderate) includes areas that are rated less than good in terms of the desired or required comfort, but still sufficient (moderate). Improvements in wind comfort should be aimed if they can be implemented by simple measures.

Category C: For category C (in need of improvement), “comfort” can only be spoken of to a very limited extent, as disturbing wind speeds generally occur regularly. At measuring points assigned to category C, improvement measures should be implemented to achieve more favourable wind comfort.

Note: The assessment criteria listed in table 1 refer to inland conditions. Experience has shown that wind sensations are perceived as less disturbing in coastal regions than within the country.

Indicator 3: Thermal effect complex
The outdoor comfort evaluation must be applied to a situation in midsummer. The objective should therefore be to reduce the periods that are assigned to the thermal sensation “warm”. This concerns the evaluation area (26 °C < Perceived Temperature (PT) < 32 °C or 20 °C < PT < 26 °C).
For winter conditions, the evaluation area “pleasant” is the basis (0 °C < PT < 20 °C). With regard to the respective use of the common area to be evaluated, the comfort must be assessed in a time-resolved manner. In order to show a potential for improvement, a person who is directly exposed to the local climate - i.e. without wind protection and sun protection measures - is considered the basic variant.
To calculate the perceived temperature, a simulation/calculation must be carried out by using a suitable program. Alternatively, the methods described in VDI 3787 Part 2 can be applied.

A detailed outdoor comfort study using perceived temperature (Perceived Temperature PT, Universal Thermal Climate Index UTCI, etc.) must be carried out for each living area examined. In addition to wind comfort, other factors of outdoor comfort such as outside temperature, solar radiation etc. are taken into account. For the simulation, the warmest and coldest day of the past ten years have to be used (without outliers).

The evaluation of the perceived temperature is the most holistic approach to evaluate and optimise outdoor comfort. This method can also be used to evaluate the influence of seasonal measures (temporary sun protection) on outdoor comfort (see VDI 3787 Part 2). In the course of global warming and in hot regions of the world, this topic will become increasingly important in the future.

IV. Scheme-specific description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City Business Event Industry Commercial

TABLE 2 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation with **relevant records/documents/expert opinions/** ■ B1: Urban development design including open space concept with marking and justification of the selected characteristic common areas ■ B2: Presentation of input parameters in the simulation and simulation results; verification of previous simulation results and, in the event of changes, proof of these changes by means of a modified simulation or on-site measurement	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D

TABLE 3 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Basic comfort	(A), B	B, C, D	B, C, D	(A), B	B, C, D
2. Wind comfort	A, B	B	B	A, B	B
3. Perceived temperature	A, B	B	B	A, B	B

APPENDIX C - LITERATURE

I. Version

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II. Literature

- Federal Ministry of Transport, Building and Urban Affairs (Ed.): Neue Freiräume für den urbanen Alltag, Modellprojekt im ExWoSt-Forschungsfeld „Innovationen für familien- und altengerechte Stadtquartiere", Berlin 2009.
- Gehl, Jan (2015): Cities for People, Jovis Verlag, ISBN 978-3-86859-356-3.
- Lohmeyer A., Bächlin W., Plate E. J., Seitz R. (1992): Städtebauliche Klimafibel - Hinweise für die Bauleitplanung, Ministry of Economics Baden-Württemberg (E.), Stuttgart.
- Mathey, J. et al.: Noch wärmer, noch trockener? Stadtnatur und Freiraumstrukturen im Klimawandel. In: Naturschutz und Biologische Vielfalt, Vol. 111, Bonn-Bad Godesberg: Bundesamt für Naturschutz, 2011.
- VDI 3785 sheet 1 Environmental meteorology - Methods and presentation of investigations relevant for planning urban climate, Dec. 2008.
- VDI 3787 sheet 2 Environmental meteorology - Methods for the human biometeorological evaluation of climate and air quality for urban and regional planning at regional level - Part I: Climate, Nov. 2008.
- VDI 3787 sheet 5 Environmental meteorology - Local cold air, Dec. 2003.
- VDI 3787 sheet 9 Environmental meteorology - Provision for climate and air quality in regional planning, Dec. 2004.
- VDI Commission on Air Pollution Prevention, 1988: Stadtklima und Luftreinhaltung – Ein Wissenschaftliches Handbuch für die Praxis in der Umweltplanung
- NEN 8100:2006 Wind comfort and wind danger in the built environment
- Explanations to NEN 8100:2006 according to the Windkomfortgutachten (wind comfort report) of Peutz Consult GmbH

SOC1.6

Open space

Objective

The objective is to satisfy the need for recreation, leisure, enjoyment of nature, exchange and interaction by providing high-quality open spaces within walking distance.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Improvement of well-being and health (mental and physical) of district users and residents
- Strengthening of social interaction and exchange
- Value stability of the district/area by increasing the attractiveness for users and residents

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Significant	11.7	Access to public spaces and green areas	
	11.A	Promotion of the urban-rural relationship	

Outlook

A change in weighting and importance of the subject is not to be expected.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**3.5 %**	**4**
Commercial	**3.6 %**	**4**
Industry	**2.7 %**	**3**

ASSESSMENT

The criterion evaluates the quality of stay and accessibility of open spaces. The following topics are addressed: Integration into landscape context, qualification of open spaces and the availability of open spaces within and outside the district and the availability of urban farming areas.
In total, 100 points can be credited in the criterion.

NO.	INDICATOR		POINTS
1	**Integration into the landscape**		
	City **Business** **Commercial**		**max. 20**
	Event **Industry**		**max. 25**
1.1	**Consideration of landscape aspects**		
	City **Business** **Commercial**		**max. 5**
	Event **Industry**		**max. 10**
	The following aspects should be considered: Topography, green spaces, trees/forests, biotopes, native plant species.		
	■ An analysis/study of the landscape is available.	**City** **Business** **Commercial**	+3
		Event **Industry**	+5
	■ In the open space concept, the integration of the project into the landscape is comprehensibly derived from the results of the analysis/ study (explanation required).	**City** **Business** **Commercial**	+2
		Event **Industry**	+5
1.2	**Urban integration**		
	City **Business** **Event** **Industry** **Commercial**		**max. 5**
	The following aspects should be considered: Network and hierarchy of public spaces...		
	■ An analysis/examination of urban integration is available.		+3
	■ In the open space concept the urban integration of the project is comprehensibly derived from the results of the analysis/ study of the existing situation (explanation required).		+2
1.3	**Integration into the higher-level urban and regional planning**		
	City **Business** **Event** **Industry** **Commercial**		**max. 5**
	Formal and informal planning should be taken into account: Urban development planning, landscape planning, urban framework planning ...		
	■ An analysis/stock analysis of the higher-level planning is available.		+3
	■ In the open space concept, the integration of the project into the higher-level urban and regional planning is comprehensibly derived from the findings of the analysis/ study of the existing situation (explanation required).		+2

NO.	INDICATOR		POINTS
1.4	**Integration of existing and identity-creating landscape and open space elements**		
	City Business Event Industry Commercial		max. 5
	■ There is an analysis/examination of the existing and identity-creating landscape and open space elements.		+3
	■ In the open space concept, the integration of the existing and identity-creating landscape and open space elements is comprehensibly derived from the findings of the analysis/study(explanation required).		+2
2	**Qualification of open spaces**		
	City		max. 50
	Business Commercial		max. 55
	Event		max. 75
	Industry		max. 25
2.1	**Open space structure**		
	City Business Commercial		max. 10
	Event		max. 15
	Industry		max. 5
	■ Design specifications for creating an identity-promoting open space structure with high legibility	City Business	+10
		Event	+15
		Industry	+5
		Commercial	+10
2.2	**Open space types**		
	City		max. 5
	Business Event Business		max. 10
	■ Specifications for the design of different open space types (playground, square, landscape park, etc.)	City	+5
		Business Event	+10
		Commercial	+10
2.3	**Materiality**		
	City Business Commercial		max. 5
	Event		max. 10
	■ Design specifications for the materials to be used in open spaces	City Business Commercial	+5
		Event	+10
2.4	**Vegetation**		
	City Business Industry Commercial		max. 5
	Event		max. 10
	■ Design specifications for the planting	City Business	+5
		Event	+10
		Industry Commercial	+5

NO.	INDICATOR		POINTS
2.5	**Equipment**		
	City		**max. 5**
	Business **Event** **Commercial**		**max. 10**
	■ Design specifications for handling street furniture (seating, bicycle parking, bus stops, etc.)	**City**	+5
		Business	+10
		Event **Commercial**	+10
2.6	**Lighting**		
	City **Business** **Industry** **Commercial**		**max. 5**
	Event		**max. 10**
	■ Design specifications for outdoor lighting beyond functional lighting and energy considerations	**City** **Business**	+5
		Industry **Commercial**	+5
		Event	+10
2.7	**Circulation areas**		
	City **Business** **Event** **Industry** **Commercial**		**max. 10**
	■ Design specifications for the appearance of areas and rooms primarily dedicated to flowing and stationary traffic		+10
2.8	**Design of private open spaces**		
	City		**max. 5**
	■ In addition to the stipulations in the L Plan, there is a binding guideline for the design of private open spaces which respects the individual creative drive of residents, but provides a framework for coherent area design.	**City**	+5
3	**Open spaces - public open spaces GFA_{DGNB} (within the project area)**		
	City **Business**		**max. 10**
	Commercial		**max. 15**
3.1	**Open space factor**		
	City **Business**		**0 - 10**
	Commercial		**0 - 15**
	■ 0.0 – ≥ 1.0	**City** **Business**	0 – 10
		Commercial	0 – 15
4	**Open spaces – Accessibility of (public) open spaces (outside the project area)**		
	City **Business** **Commercial**		**max. 10**
4.1	**Free space factor**		
	City **Business** **Commercial**		**0 - 10**
	■ 0 - 100 percent		0 – 10

NO.	INDICATOR	POINTS
5	**Open spaces - Private open spaces of GFA_R / in-factory open spaces per employee per shift** (within the project area) **City** **Business**	**max. 5**
	Industry	**max. 25**
5.1	**Open space factor for districts** **City** **Business**	**0 - 5**
	■ > 0.1	0
	■ 0.1 to ≥ 0.2	2 - 5
5.2	**Open space per employee and shift** **Industry**	**0 - 25**
	■ < 1 m²	
	■ 1 m² to ≥ 1.5 m²	10 - 25
6	**Urban farming** **City**	**max. 5**
6.1	**Food cultivation areas** **City**	**max. 5**
	There are food cultivation areas in the district that are used by residents.	5
7	**Accessibility of open spaces within the industrial facility** **Industry**	**max. 25**
7.1	**Building exits within high-quality open spaces** **Industry**	**0 - 25**
	Percentage share of building exists, from which high-quality open spaces can be reached within 100 metres.	
	■ 70 - 100 %	0 – 25

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

It is appropriate to communicate the facilities for communication, for users and for families, children and seniors as a key performance indicator.

NO.	KEY FIGURES/KP	UNIT
KPI 1	Open space factor – public open spaces	[-]
KPI 2	Open space factor – private open spaces / open spaces in location	[-]
KPI 3	Food cultivation areas	[m²]

Synergies with DGNB system applications

- **DGNB BUILDINGS IN USE:** High synergies with BIU criterion SOC2-B.
- **DGNB RENOVATED BUILDINGS:** High synergies with criterion SOC1.6.
- **DGNB INTERIORS:** High synergies with criterion SOC1.6.
- **DGNB NEW BUILDINGS:** High synergies with criterion SOC1.6.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

In the district, open spaces as a place for everyday life are central to urban coexistence. Open spaces are used to maintain social contacts, citizen participation or as recreational or adventure areas. The public space is a prominent place of social interaction. Public space as an expression of cultural diversity is therefore more than just the sum of its surfaces.

Industry **Commercial**

Open spaces as places for recreation during breaks and meeting places with colleagues are central to the productive working environment of an industrial district. The objective is to create high-quality and accessible open spaces within walking distance to strengthen the company bond and recreational opportunities for individuals. The quantification of employee-related open spaces on the factory premises must be evaluated, including the area size, the distance to common areas and the networking of open space nodes.

II. Additional explanation

The creation and safeguarding of high-quality public spaces is a central requirement of the “LEIPZIG CHARTER on Sustainable European Cities”, which was adopted in 2007 and is being continued at the national level as part of urban development policy. The same objective can be found in the United Nations Human Settlements Programme - HABITAT, formulated in the Habitat Agenda 1996.
Only a simultaneous consideration of “soft” and “hard” factors can do justice to the complexity of public spaces. Therefore, sociocultural qualities are considered, such as the interaction and diversity of uses and users.
In addition to quantitative aspects, the quality of the open space plays a decisive role.
Open spaces within walking distance outside the district must also be taken into account. A small district near the city park does not necessarily need another park within the district.

Industry **Commercial**

Only a simultaneous consideration of "soft" and “hard” factors can do justice to the complexity of open spaces. Therefore, sociocultural qualities are considered, such as the interaction and diversity of uses and users. Spatial qualities are also relevant, for example when identity-forming places are created and networked. It is also important to consider physical well-being in terms of bioclimatic comfort. The quantitative supply and accessibility of open spaces are also taken into account.

III. Method

City **Business** **Event** **Industry** **Commercial**

Qualitative and quantitative indicators are describing the quality of open space. While the integration and qualification of public open spaces is evaluated qualitatively, the offerings of public and private open spaces are considered quantitatively.

Indicator 1: Integration into landscape
The integration of the open spaces in the project area is evaluated by considering its embedding in the landscape and urban development context, derivation from the higher-level urban and regional planning and the handling of existing landscape and open space elements.

Indicator 2: Qualification of open spaces
The qualification of the publicly accessible open spaces in the project area is evaluated based on the open space concept by means of specifications regarding open space design, open space types, materiality, vegetation, equipment, lighting, traffic, provided budget, updating and monitoring.
Open spaces that are not open to the public (private gardens, roof terraces, etc.) are not included in this indicator.

Indicator 3: Open spaces – public open space per GFA_{DGNB} (within the project area)
The calculation is based on the DGNB master tool.
The term public open space refers to the area category explained in the document “System basics” (Appendix 3). In addition to squares, green and water areas, forest areas and areas for agriculture, road spaces that potentially perform open space functions has to be also included.

The proportion of public open spaces depends on the use of the district (see Table 1). A district with a high proportion of residential space tends to have to provide more open space for residents and users than a district with a low proportion of residential space.

TABLE 1

CONVENTIONS	PUBLIC OPEN SPACE PER GFAR (RESIDENTIAL)*	PUBLIC OPEN SPACE PER GFANR (NON-RESIDENTIAL)
TARGET VALUE	**0.2** m^2/GFA_{DGNB-R} [1] = POS_{RR}	**0.1** $m^2/GFA_{DGNB-NR}$ [2] = POS_{RNR}

1] corresponds to approx. 12 m² per resident. This reference value was defined on the basis of the evaluation of the DGNB pilot projects and literature research (see values Munich 2005, Zurich 2006).
[2] Corresponds to approx. 6 m² per workplace (see Zurich 2006)

The evaluation is based on the following formula:

$$OSF = \frac{OS}{(POS_{RR} \times GFA_{R}) + (POS_{RNR} \times GFA_{NR})}$$

with

OSF	Open space factor
POS_{RR}	Target value of public open space per m² of GFA_R (residential) [m²]
POS_{RNR}	Target value of public open space per m² GFA_{NR} (non-residential) [m²]
GFA_{DGNB-R}	Gross floor area residential (see system basics) [m²]
$GFA_{DGNB-NR}$	Gross floor area non-residential (see system basics) [m²]
OS	Actual open space in the district (see (see system basics) [m²])

Indicator 4: Open spaces – Accessibility of (public) open spaces (outside the project area)

In addition to the size and quality of the open spaces within the project area, it is also necessary to evaluate important open spaces (city park, central squares (designed open spaces that offer quality of stay both during day and night (seating facilities, greenery, water, lighting), parking spaces are not included) outside the project area, etc.). To simplify matters, only the accessibility of these open spaces within walking distance from the project area is assessed.

Procedure for determining the accessibility of public open spaces outside the project area:

1. Location of public open spaces

   By identifying all urban or district-related open spaces that lie outside the project area and are within **walking distance (max. 350 m)** by the residents and users of the area. Open spaces larger than 3 hectares, are considered to be city or urban district open spaces (does not apply to central squares).

2. Evaluation

   Method 3 is used for the evaluation (see system basics, without alternative verification procedure taking into account public transport).

Indicator 5.1: Open spaces – private open space per GFAR (within the project area): Open space factor for districts

City **Business**

The following reference and target values are defined and evaluated for the proportion of private open spaces.

TABLE 2

	FACTOR
REFERENCE VALUE	0.1 m² private open space per m² GFA_{DGNB-R} [1]
TARGET VALUE	0.2 m² private open space per m² GFA_{DGNB-R} [2]

[1] corresponds to approx. **6 m² per resident** (defined by the DGNB as a reference value)

[2] corresponds to approx. **12 m² per resident** (see Korda 2005, Munich 2005)

The area of the private open spaces is to be divided by the number of GFA_{DGNB-R} (calculated with the DGNB master tool). The area category GFA DGNB-R consists of housing up to 6 residential units (GFAR<6), housing of more than 6 residential units (GFA>6) and housing in high-rise buildings (GFARH). The determination of the gross floor area is described in the document “System basics”.

Indicator 5.2: Open space per employee and shift

Industry

The area size analysis of the outdoor facilities assesses how much open space is available per employee per shift. The specifications of the “Technical rules for workplaces (ASR A4.2) – Break and stand-by rooms” assume a reference value of 1 m² per workplace per shift and a minimum value of 6 m² floor space for the respective open spaces considered. In principle, the square metre area of the places for stays/breaks is thus set in relation to the number of employees.

TABLE 3 Target and limit values for in-factory open spaces

	FACTOR
REFERENCE VALUE	1 m² / workplace
TARGET VALUE	1.5 m² / workplace
MINIMUM SIZE OF THE INDIVIDUAL OPEN SPACES	6 m²

[1] complies with “Technical rules for workplaces (ASR A4.2) - Break and stand-by rooms” August 2012 edition

Indicator 6: Urban farming

In addition to the availability of fresh food and increased supply security, open spaces in the district, which are used to grow fruit and vegetables, help to promote social interaction. The areas serve as meeting points and for interaction.

Indicator 7: Accessibility of open spaces within the industrial facility (max. 25 points)

Industry

Qualitative and quantitative indicators describe the open space in the external factory facilities. The categories are social interaction, identity-forming effect, open space comfort, area of the in-factory open spaces and their accessibility. The following indicators will be assessed.

In addition to the size of the open spaces of the industrial site that can be used for recreation during breaks, the accessibility of the actual recreational and break areas have to be also evaluated. The in-factory open space network must correspond to the short periods of breaks, with regard to footpath connections. The time required and thus the permissible distance of in-factory open spaces from the exterior door is determined by the “Technical rules for workplaces" (ASR A4.2); paragraph: “Break and stand-by rooms”. 5 minutes per route (on foot or with means of transport provided by the company) should not be exceeded here. The distance to break areas should not exceed 100 metres. This distance serves as the basis for the evaluation. The basic rule is: The more factory employees that are able to reach various open spaces on foot in the shortest possible time (in the period of the break of at least 15 minutes according to the Working Hours Act 2013), the better the assessment of this criterion.

The assessment of the accessibility of recreational and break areas is based on their location within the project area: For this purpose, a representation in the site plan by marking the building exits (no emergency exits and less frequented exits for storage areas) and draw in a circle with a radius of 100 metres is used. The evaluation is based on the ratio of all exits to those that can reach an open space within 100 metres. Distances covered within the buildings / halls are not taken into account.

IV. Scheme-specific description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.
Calculations with the “master tool” should be carried out in all phases according to the data basis.

TABLE 4 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents/expert opinions** - B1: Guidelines for the design of private open spaces, which respect the individual design wishes of the residents, but provide a framework for coherent area design - B2: Inventory studies/analyses of relevant topics and explanations of how aspects were implemented in the planning process - B3: Design manual for the open space, which is continuously updated and covers the relevant contents	B
Photo documentation of the implemented measures	C
Site plan with markingrelevant indicators/measures - D1: Marking a circle with a radius of 100m around the building exits and calculating share of building exits from which a high-quality open space is accessible	D
Documentation of **planning documents** - E1: Presentation of the higher-level planning (regional planning, urban development planning, landscape planning, etc.). Location of the district and urban development design with open space concept - E2: Land-use plan with detailed open space planning for the district. Identification of the selected characteristic open spaces and justification of the selection. Based on this, explanations with regard to the respective indicators as well as a justification of the classification in the evaluation scale - E3: Site plan (as described in system basics) with entry of the max. permissible distance according to method 3 in the system basics	E
Documentation of **master tool**: Categorisation of the areas (public and private open spaces and the resulting evaluation are calculated automatically)	J

TABLE 5 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Integration into landscape	B, C, E1	B, C, E1	B, C, E1	E	B, C, E2
2. Qualification of open spaces	A, B,	B, C, E	B, C, E	A, E	B, C, E2
3. Open spaces – public open space per GFA_{DGNB} (within the project area)	A, B, C, D, E, J	B, C, D, E, J	B, C, D, E, J	-	-
4. Open spaces – Accessibility of public open spaces (outside the project area)	A, B, C, D, E, J	B, C, D, E, J	B, C, D, E, J	-	-
5. Open spaces – private open space per GFAR/open space factor for internal open spaces	A, B, C, D, E, J	B, C, D, E, J	B, C, D, E,J	A, B, C, D, E	B, C, D, E
6. Urban farming	A, B, C	A, B, C	B,C	-	-
7. Accessibility of open spaces within the industrial facility	-	-	-	A, C, D1, E	C, D1; E

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Bott, Helmut; Jessen, Johann; Pesch, Franz (Hrsg.) (2010): Lehrbausteine Städtebau: Basiswissen für Entwurf und Planung, Edition: 6. Institute of Urban Development at the University of Stuttgart.
- Federal Ministry of Transport, Building and Urban Affairs (Ed.) (2009): Neue Freiräume für den urbanen Alltag, Modellprojekt im ExWoSt-Forschungsfeld „Innovationen für familien- und altengerechte Stadtquartiere", Berlin.
- BNatSchG - Act on Nature Conservation and Landscape Management, Federal Nature Conservation Act as amended on 1 April 2018, BGBl. I p. 2542.
- BSU - Hamburg Department of Urban Development and Environment (ed.) (1997): "Materialien zum Landschaftsprogramm: Versorgungsanalyse für wohnungsnahe, siedlungsnahe und übergeordnete Freiräume." Office for Landscape Planning.
- RSB - Department of Urban Planning and Building Regulations of the City of Munich (ed.) (1995): "Erholungsrelevante Freiflächenversorgung für das Stadtgebiet.." Perspektive München - Series of publications on urban development, issue C 1, p. 79.
- SenStadt - Berlin Senate Department for Urban Development and Housing (ed.) (2009): "Availability of Public, Near-residential Green Spaces." Processed by the Business Plantage. 10 S.
- Schürmann, T (2006): Placemaking als Konzept ökonomisch effizienter Standortaufwertung. Eine Analyse englischsprachiger Literatur, Institute for Regional and Urban Development Research and Construction of the State of North Rhine-Westphalia - ILS NRW (Ed.), Dortmund.
- Korda, Martin; Bishop, Wolfgang (2005): Städtebau – technische Grundlagen, p. 525–526, 5th edition, Teubner Verlag.
- Zurich - City of Zurich (2006): Das Grünbuch der Stadt Zürich, integral planen – wirkungsorientiert handeln, Planungsrichtwerte für die Wohnbevölkerung im Vergleich, p. 94.

Industry **Commercial**

- Schürmann, T: Placemaking als Konzept ökonomisch effizienter Standortaufwertung. Eine Analyse englischsprachiger Literatur, Institute for Regional and Urban Development Research and Building of the State of North Rhine-Westphalia - ILS NRW (ed.), Dortmund 2006
- BNatSchG - Act on Nature Conservation and Landscape Management, Federal Nature Conservation Act as amended on 1 April 2018, BGBl. I p. 2542.
- BMVBS (2010): Main topics, URL: www.nationale-stadtentwicklungspolitik.de
- GALK – Gartenamtsleiterkonferenz (Ed., 1971): „Bericht 1971 der Arbeitsgruppe Grünflächenbedarf.“ in: “Das Gartenamt” Isssue 8, 1971.
- RSB - Department of Urban Planning and Building Regulations of the City of Munich (ed., 1995): “Erholungsrelevante Freiflächenversorgung für das Stadtgebiet.” Perspektive München – Schriftenreihe zu Stadtentwicklung, Heft C 1., p. 79
- SI - Städtebau-Institut der Universität Stuttgart (Ed., 2010): Lehrbausteine Städtebau: Basiswissen für Entwurf und Planung, Edition: 6Th completely revised and updated edition
- Zurich - City of Zurich (2006): Das Grünbuch der Stadt Zürich, integral planen – wirkungsorientiert handeln, Planungsrichtwerte für die Wohnbevölkerung im Vergleich, p. 94
- Technische Regeln für Arbeitsstätten (ASR A4.2) - Pausen- und Bereitschaftsräume“, August 2012 edition

SOC1.8

Workplace comfort

Objective

The objective of the criterion is to provide high-quality workplace conditions that are appropriate for the intended use and ensure adequate user comfort. Within the framework of the assessment, priority is given to indicators which can also be influenced by the building structure.

Benefits

Good physical conditions as well as a high-quality work environment are an important prerequisite for the performance and comfort of employees.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	3.4	Reduction of premature mortality; promotion of health/well-being	3.1a/b	Health and nutrition

Outlook

No specific solutions should be specified for the achievement of points. Rather, planners are called upon to take a closer look at the objectives of the criterion in the context of their project. A further expansion of the objective is not currently planned.

Share of the total score

	SHARE	WEIGHTING FACTOR
Industry	**2.7 %**	**3**

ASSESSMENT

Six corresponding indicators are used to assess thermal, acoustic and visual comfort, as well as air quality, the influence on ventilation and temperature, and the quality of retreat areas and workplaces. In this criterion, in totalmore than 100 points can be achieved in the assessment. A maximum of 100 points can be achieved.

NO.	INDICATOR	POINTS
1	**Thermal comfort**	
	Industry	**max. 10**
1.1	**Planning/recording/measures**	
	Industry	**max. 10**
	■ Planning/recording all workplaces or work areas in terms of their thermal requirements	+6
	■ Measures for summer are planned/implemented	+2
	■ Fixed outdoor workplaces have rain/sun protection	+2
2	**Indoor air quality**	
	Industry	**max. 15**
2.1	**Ventilation concept & CO_2 benchmark values**	
	Industry	**max. 15**
	■ Ventilation concept/planning with target values for air exchange rate for all areas is defined and implemented	+4
	■ Low-pollutant or pollutant-free interior design is implemented at least in the office, break and canteen areas (or for existing buildings: implemented for conversion and extension measures)	+8
	■ benchmark values for indoor CO_2 concentration levels are defined and a concept to achieving them is available	+3
3	**Visual comfort**	
	Industry	**max. 10**
3.1	**Daylight & visual reference**	
	Industry	**max. 10**
	■ Planning/recording all workplaces or work areas according to the required illuminance (and other lighting requirements, if applicable)	+3
	■ Daylight and/or visual reference to the outside in at least 80% of all event and meeting rooms as well as all offices, canteens, break rooms	+3
	■ Daylight and/or visual reference to the outside for other interior spaces (e.g. circulation areas, logistics areas, changing rooms, toilets)	+3
	■ Glare is avoided as far as possible	+1

NO.	INDICATOR	POINTS
4	**Acoustic comfort**	
	Industry	**max. 14**
4.1	**Noise-reducing measures**	
	Industry	**max. 14**
	■ Planning/recording of all workplaces or work areas according to noise exposure (e.g. according to TRLV Noise Part 2)	+3
	■ Noise-reducing measures are implemented in the interior (production, logistics) or not necessary	+2
	■ Low-noise working processes are used	+2
	■ Room acoustics planning carried out for at least 50 % of open-plan offices and canteens (if available)	+7
5	**User influence**	
	Industry	**max. 10**
5.1	**Lighting/temperature/air change**	
	Industry	**max. 10**
	■ Lighting and/or sun protection can be controlled by users in at least 50% of the offices*	+2
	■ Lighting and/or sun protection can be controlled by users in all break rooms (justified exceptions are permitted)	+3
	■ Temperature and/or air exchange (including openable windows) can be controlled by users in at least 50% of the office*	+2
	■ Temperature and/or air exchange (incl. openable windows) can be controlled by users in all break rooms (justified exceptions are permitted)	+3
6	**Retreat areas**	
	Industry	**max. 10**
6.1	**Determining requirements for retreat areas**	
	Industry	**max. 4**
	The requirements for the retreat/interaction rooms indoors and outdoors were determined and include the following three room types: Rooms for formal communication, rooms for informal communication and quiet retreats.	
	■ In new buildings	+4
	■ In existing buildings/mixed	0

NO.	INDICATOR	POINTS
6.2	**Quality requirements for retreat areas** **Industry** Level 1: All 3 types are accessible for all employees at a maximum distance of 100 m from their workplaces, but do not meet “high” quality requirements	**max. 6**
	■ In new buildings	0
	■ In existing buildings / mixed	2
	Level 2: All 3 types are accessible for all employees at a maximum distance of 100 m from their workplaces. 30 % - 80 % meet “high” quality requirements	
	■ In new buildings	3
	■ In existing buildings / mixed	5
	Level 3: All 3 types are accessible for all employees at a maximum distance of 100 m from their workplaces, > 80 % meet “high” quality requirements	
	■ In new buildings	6
	■ In existing buildings / mixed	10

NO.	INDICATOR	POINTS
7	**Design concept** **Industry**	**max. 26**
7.1	**Design concept** **Industry** A concept is available and implemented, which goes beyond the specifications of a CI concept.	**0 – 26**
	■ The design concept has been demonstrably implemented for rest and break rooms and -areas, canteens (involvement of designers or participatory design). If the concept has been implemented for all rest/break rooms, 13 points can be awarded.	0 – 13
	■ The design concept has been demonstrably implemented for workplaces / office workspaces (involvement of designers or participatory design). When the concept has been implemented for all workplaces / office workspaces, 13 points can be awarded.	0 – 13
	For **Existing buildings**: Points can be credited according to the transformation from the actual state analogous to new buildings.	

NO.	INDICATOR	POINTS
8	**Ergonomics**	
	Industry	**max. 10**
8.1	**Ergonomic assessment**	
	Industry	**max. 6**
	■ Level 1: A CIP for ergonomics is implemented or planned.	2
	■ Level 2: Evaluation methodology for all workplaces is available or under development. All workplaces have been evaluated or will be evaluated shortly with regard to ergonomic requirements. CIP is available.	4
	■ Level 3: same as level 2, and at least 50% meet the highest level of the ergonomic evaluation.	6
8.2	**Process optimisation**	
	Industry	**max. 4**
	■ Process optimisation according to ergonomic aspects (production, logistics, if necessary laboratory), either in the planning process or afterwards	+4
9	**Determining workplace comfort**	
	Industry	**max. 15**
9.1	**Collecting data on workplace comfort**	
	Industry	**max. 5**
	Methodology for recording user complaints, e.g. “suggestion box”, complaint call number is available and known among employees. Incoming complaints are demonstrably investigated and, if necessary, counteracted (if necessary, prioritisation of measures and successive elimination based on an action plan).	+5
9.2	**Inventory regarding workplace comfort**	
	Industry	**5 – 10**
	The deficiencies identified have been or are being successively and methodically remedied.	5 – 10
	■ For **New buildings**: Workplace comfort parameters (temperature, air quality, air humidity, illuminance, noise level or other, at least 2) are measured in the impact area of at least 50 % - 100 % employees (stationary or regularly planned) in order to determine any deviations from the planning objectives	
	■ For **Existing buildings / mixed**: A systematic inventory, which evaluates the current workplace comfort and shows possible deficiencies, has been carried out for at least 50 % - 100 % of the GFA/workplaces and is max. 5 years old (in case of existing buildings/mixed)	

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

It is appropriate to communicate the offerings for communication, for users and for families, children and seniors as a number.

NO.	KEY FIGURES/KP	UNIT
KPI 1	Ventilation that can be individually controlled room-wise or by users/user groups.	Yes / No
KPI 2	Sun and/or glare protection that can be individually influenced room-wise or by users/user groups.	Yes / No
KPI 3	Room temperatures that can be individually influenced room-wise or by users/user groups (heating period).	Yes / No
KPI 4	Room temperatures that can be individually influenced room-wise or by users/user groups (outside the heating period).	Yes / No
KPI 5	Artificial light can be individually influenced room-wise or by users/user groups.	Yes / No
KPI 6	Percentage of rooms with direct reference to the outside	[%]
KPI 7	Survey of all workplaces according to noise exposure, e.g. according to TRLV Noise Part 2	[-]
KPI 8	Guideline values for CO_2 concentration	

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Information in the criterion can be used for SOC1.1 up to and including SOC1.5.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Industry

Good physical conditions as well as a high-quality work environment are an important prerequisite for the performance and comfort of employees. The quality of the workplace environment is determined by numerous factors. Due to the abundance of influencing variables that cannot be depicted, workplace comfort is evaluated below using a few selected indicators. In addition to the physical conditions, users consider possibilities for retreating and interaction to be particularly important.
The objective of the criterion is to provide high-quality workplace conditions that are appropriate for the intended use and ensure adequate user comfort. Within the framework of the evaluation, priority is given to indicators which can also be influenced by the building structure.

II. Additional explanation

Industry

The satisfaction of employees with their ambient conditions, such as thermal quality, indoor air quality and visual and acoustic comfort, depends largely on the quality of the workplace provided. Too high/low (operative) room and surface temperatures, draughts and relative humidity perceived as unpleasant can lead to a decrease in the work efficiency of employees. Insufficient intelligibility of speech or a disturbing background noise level also reduces employees productivity.
A working environment that does not impair the well-being and health of the room users is desirable. In this sense, it is important on the one hand to ensure a high level of visual comfort through sufficient daylight at the workplace and visual reference to the outside. On the other hand, a quality indoor air must also be guaranteed, and concentrations of pollutants and olfactory perceptions, which are perceived as unpleasant, must be avoided.
The possibility of influencing the described room climate conditions has been proven to have a positive effect on employee satisfaction with their working environment. In addition, the available space for an employee, the occupancy concept, the workplace design, as well as the ergonomics at the workplace can influence employee satisfaction.
Apart from the factors already mentioned, however, aspects such as opportunities for retreat and identification also make a decisive contribution to employee satisfaction and identification with their own workplace. Studies have increasingly identified rooms for undisturbed work, for meetings, as well as for breaks and relaxation, as basic needs of office users. Employees also want (physical) space for informal and formal exchange, which has to be provided in sufficient quantity and quality in the interests of the company.

III. Method

Industry

This criterion examines quantitative and qualitative aspects of workplace comfort. Compliance with the essential comfort requirements at the workplace, such as good physical environmental conditions (e.g. pleasant room temperature) and the availability of retreat areas and interaction possibilities, are considered separately for new and existing buildings. Due to the complexity and diversity of the potential jobs and indicators to be examined, the evaluation is carried out indirectly. Thus, on the one hand, measures for quality assurance regarding comfort at the workplace, such as the existence and level of detail of guidelines, and on the other hand, approaches for identifying and eliminating possible comfort deficiencies are considered. The evaluation results of the individual indicators are added together.

IV. Scheme-specific description

Industry

The evaluation of workplace comfort is qualitative. However, cross-location measurements for many parameters of workplace comfort would be too costly and very difficult to assess due to the heterogeneous requirements of different work areas and locations.
In principle, it must be demonstrated that the parameters of workplace comfort were taken into account in the planning or that the construction situation is recorded (mapped or tabulated) with regard to the corresponding requirements. This means, for example, that when planning the technical building equipment, it must be known which rooms must have which temperature levels, or which illuminance is required for which production steps. It must also be known which workplaces are at risk from noise, or where increased air exchange is required. Such an overview is also of great value for the operation of site (e.g. facility management). If such an overview is not available, it has to be prepared for the corresponding indicators as documentation.
Documentation has to refer to areas, rooms or workplaces (i.e. employees) depending on the requirements. In case of doubt, the documentation must be referred to the “comfort subject”, i.e. the employee.
For the documentation, examples (photographic, plan excerpts) are to be shown. Therefore it is not necessary to catalogue all site areas. A justification why the selected examples are representative is desirable (e.g. “the surface design of the desks is the same in all offices” or “the samples of assembly and body construction represent the working environment of 75 % of the total employees”).

Indicator 1: Thermal comfort
The requirements for room air temperature and humidity are sometimes very different. Are workplaces or rooms recorded or planned according to relevant thermal loads and/or requirements? This may include, depending on the working method: Air temperature, air humidity, air speed, heat radiation, work weight, clothing (see ASR A3.5), production requirements.
Are measures planned or implemented for the summer to avoid overheating of rooms? These include, for example, night or morning ventilation, external sun protection, reduction of internal thermal loads, shifting of working hours, mechanical ventilation.
Are fixed outdoor workplaces (i.e. not only temporary loading work) equipped with rain/sun protection?

Indicator 2: Indoor air quality

The required air exchange rate depends on e.g. work procedures, room occupancy, physical strain, room volume. Are target values for all interior spaces of site, depending on their function and, if applicable, other relevant parameters, defined and implemented in the planning?

A low-emission interior design is another way to keep the material loads in the indoor air low.

The CO_2 concentration of indoor air is now known to be a significant factor for well-being, health and productivity. Like the required air exchange rate, it depends on many factors. In addition, e.g. the length of stay in the room is relevant. Are guideline values for indoor Co_2 concentration present/known at the site and is a concept to achieve these in place?

Indicator 3: Visual comfort

Depending on the working method or room function, different illuminance levels are required. Is the lighting planned according to these requirements or has it been implemented according to these requirements?

In production and laboratories, the use of daylight is often incompatible with the work requirements. However, for all other areas where people spend time and for many ancillary areas, the use of daylight or a visual reference to the outside makes sense, often economically reducing the use of artificial light and being beneficial to health. For offices, canteens, break rooms, meeting and event rooms, documentation must therefore be provided for all rooms. For traffic areas, logistics areas, toilet rooms, changing rooms or other rooms, it is not necessary to fulfil the documentation completely - exemplary documentation that daylight is used in secondary areas is sufficient (at least 2 each for at least 2 room types).

Glare can be avoided e.g. by selecting and arranging lights, by small differences in brightness, avoiding reflections, and if necessary by using sun shades, by workplaces parallel to windows, light sources on the side of the workplace, low-reflection surfaces, mix of light sources.

Indicator 4: Acoustic comfort

Acoustics can be both a comfort and a health factor. Are workplaces or work areas in production and possibly other areas planned according to noise exposure (mapped or tabulated)? It must be possible to clearly identify workplaces which may be at risk by noise or vibration, e.g. by locating and marking noise sources in the plan and by recording the workplaces affected. For noise exposure areas see TRLV Noise Part 2.

Things can get loud especially in production and logistics. Have noise-reducing measures (partial encapsulation of loud machines, use of silencers, flexible intermediate layers, elastic storage, separation joints, smooth rolling joints, etc.) been implemented to minimise the noise level? Are low-noise work processes (see TRLV Noise Part 3, Tab. 1, p. 6) used?

In open-plan offices, canteens and lounges, noise is known to be a stressor and a factor reducing productivity. These effects can be minimised by acoustic room planning and appropriate selection of measures (e.g. sound-absorbing ceiling and wall cladding, acoustic table partitioning, floating acoustic absorbers).

Indicator 5: User influence

The user's influence plays a major psychological role in comfort. Can employees control lighting or sun protection, room temperature or ventilation? Offices and break rooms are considered (each related to the number of rooms).

Indicator 6: Retreat areas

The provision of different types of room that meet different needs is crucial for work performance and human well-being at the workplace. It is important that the employee has the opportunity to access rooms according to their current needs. The accessibility of the following 3 location types for the employees within 100 m of the workplace (according to ASR A4.2) is evaluated.

1. Formal communication: e.g. small meeting room, large meeting room
2. Informal communication: e.g. tea kitchen, break room or zone, cafeteria, outdoor facilities
3. Retreat possibilities for quiet breaks and/or concentrated, undisturbed work: e.g. “think tanks”, freely accessible (non-personal) individual offices, explicitly “quiet” break rooms/zones

In addition, the quality of the retreat/interaction spaces is included in the evaluation. A distinction is made between “low” and “high” quality according to the following definitions:
Low quality – rooms have seating but, for example, no daylight, no visual reference to the outside, no access to the outside, low acoustic comfort, no special equipment, no design, no kitchen elements;
High quality – rooms have seating areas, daylight and at least three other features, e.g. visual reference and/or access to the outside area, special design, art, plants, acoustic elements, sofas, kitchen elements, football tables or similar

Indicator 7: Design concept

When planning break rooms and office rooms, a design with an aesthetic standard that goes beyond the company’s own CI is also important for the employees well-being. The influences of room design (e.g. visual references, colours, plants, choice of materials, surface structures/colours, furniture etc.) on user comfort are known from architectural psychology. The optimisation of workplace design in terms of high design and equipment quality can therefore result in performance increases up to 36 % (Fraunhofer IAO, 2006).
Consideration of design in industrial sites is still the exception rather than the rule. Two groups of areas are considered: break rooms and canteens on the one hand, and work areas on the other. A design can either be done by a qualified designer in the planning stage or afterwards, or through a participatory process with a budget.

Indicator 8: Ergonomics in the workplace

Is there an evaluation methodology for the ergonomics of all workplaces? If not, is it under development or is it comprehensibly justified if a small number of workplaces cannot be evaluated ergonomically? Is there a continuous improvement process in which the ergonomic situation is recorded and, where possible, systematically improved? Do the workplaces meet the ergonomic requirements?

Indicator 9: Determining workplace comfort

Unforeseen factors can influence the workplace comfort drastically after implementation of the concept. Therefore, the actual workplace comfort must be determined. Do the employees know about options for making complaints - e.g. a “grievance box”, an electronic recording system, a complaint call number or similar? Are the complaints systematically recorded and processed, and where possible resolved?
Are essential, measurable workplace comfort parameters (temperature, air quality, humidity, illuminance, noise level) measured regularly or continuously for new building sites? If necessary, are defects remedied?
For existing or mixed sites, is there a systematic inventory which, if defects are identified, results in the successive elimination of defects?

APPENDIX B - DOCUMENTATION

I. Required documentation

Industry

The following list represents a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant records/documents**: ■ B1: Mapping/tabular assignment according to relevant requirements, alternatively planning guidelines/specifications with corresponding contents ■ B2: Guideline/prescription with description of measures and procedures, or description of measures and procedures with responsibility ■ B3: Award documentation or invoices, safety data sheets ■ B4: Planning documents for room acoustics planning ■ B5: Award documentation/confirmation of order designer/documentation of the participation process and results ■ B6: Proof of ergonomic concept and documentation of measures, documentation of process optimisation, guidelines ■ B7: Excerpt from the results of the inventory, stating the identified comfort levels and deficiencies/ from the measurement concept and results; proof of an institution/person's options for user complaints, including complaint management	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures and calculation of the accessibility percentage	D

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Thermal comfort	-	-	-	A/B1	B1
2. Indoor air quality	-	-	-	A/B1	B2, C
3. Visual comfort	-	-	-	A/B1	C, H
4. Acoustic comfort	-	-	-	A/B1	B2, B4
5. User influence	-	-	-	A/B1	C, H
6. Retreats	-	-	-	A	C, D
7. Design concept	-	-	-	A	B5, C, D
8. Ergonomics	-	-	-	A	B6
9. Determination of the workplace comfort	-	-	-	A	B2, B7

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- ASR A1.2 Room dimensions and movement areas
- ASR A3.4 Lighting
- ASR A3.5 Room temperature
- ASR A3.6 Ventilation
- ASR A4.2 Break and stand-by rooms
- Technical Rule on the Noise and Vibration Protection Ordinance (TRLV Lärm)
- DIN EN 16798-3: Energy efficiency of buildings - Part 3: Ventilation for non-residential buildings - Performance requirements for ventilation, air-conditioning and cooling systems

SOC1.9

Noise, exhaust and light emissions / immissions

Objective

The objective is to reduce the effects of noise and light on people and to ensure clean air. Beyond the existing legal emission regulations, the lowest possible emissions should be generated.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Increasing the health and well-being of the district users. This has a positive effect on the productivity and sickness rate of employees, among other things.
- Ecosystems stability and reduction of the consequential costs to society associated with the impairment.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.9	Effects of chemicals, air, water and soil pollution		
	11.6	Reduction of environmental pollution in cities		
Moderate	3.4	Reduction of premature mortality; promotion of health/well-being	3.1.a/b 3.2.a	Health and nutrition Air pollution
	12.4	Environmentally sound handling of chemicals and waste		
Low			15.1	Biodiversity

Outlook

The contents will be adapted according to future technical and legal developments.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**2.6 %**	**3**
Commercial **Industry**	**2.7 %**	**3**

ASSESSMENT

The air quality and prevention or reduction of emissions is evaluated to guarantee an air quality in the open space that does not affect the user. Factors that are important for air quality, such as fresh air supply, traffic volume and the proportion of greenery, are already assessed in the criteria ENV1.5 Urban climate, ENV2.4 Biodiversity and TEC3.1 Mobility infrastructure. This criterion also considers noise pollution in the district and noise pollution emanating from the district, as well as measures to reduce light pollution. 100 points can be credited.

NO.	INDICATOR	POINTS
1	**Air quality**	
	City **Business** **Event** **Industry** **Commercial**	**max. 20**
1.1	**Compliance with the legal limits for air quality characteristics**	
	City **Business** **Event** **Industry** **Commercial**	**max. 10**
	In the surrounding area, nitrogen dioxide (NO_2) levels are below the limit values	
	■ NO_2 exceedance at a maximum of 18 3-hour intervals (above the one-hour daily maximum)	5
	■ No NO_2 exceedance	10
1.2	**Change in the emission situation / air hygiene expert opinion**	
	City **Business** **Event** **Industry** **Commercial**	**max. 10**
	■ Execution of a qualified air hygiene expert report	+3
	■ Implementation of the results of the air hygiene report, 50 % of measures implemented	+3
	■ Implementation of the results of the air hygiene report, measures fully implemented	+4
2	**Road traffic noise (inside)**	
	City	**max. 30**
	Business **Commercial**	**max. 20**
2.1	**Evaluation of the average existing road traffic noise level (day/night)**	
	City	**max. 30**
	Business **Commercial**	**max. 20**
	■ = limit value (the German federal law on Immissions Control, 16. BImSchV) **City** **Business** **Commercial**	2
	■ Exceeding the value “Good road traffic noise” by max. 3dB **City** **Business** **Commercial**	5
	■ = Good road traffic noise level **City** **Business** **Commercial**	10
	■ Undercutting the value “Good road traffic noise” by up to 3dB **City**	20
	Business **Commercial**	15
	■ = Orientation value (DIN 18005) **City**	30
	Business **Commercial**	20

NO.	INDICATOR				POINTS
	Notes to the evaluation of 2.1: ■ The evaluation must be made separately for day and night. An average of the two results is to be calculated. ■ Should the case arise that the difference between “good road traffic noise” and “orientation noise” is less than 3 dB, the evaluation steps would have to be adjusted. For example, if the difference is 1.5 dB > good traffic noise, 25 points could be awarded.				
3	**Noise in the central open space accessible to the public**				
	City **Business** **Commercial**				**max. 10**
	Event				**max. 5**
3.1	**Noise value for open space (day)**				
	City **Business** **Commercial**				**max. 10**
	Event				**max. 5**
	< 55 dB(A)			**City** **Business** **Commercial**	10
				Event	5
4	**Industrial noise / noise from event use outside the district**				
	Business				**max. 10**
	Event				**max. 25**
	Industry				**max. 30**
	Commercial				**max. 15**
4.1	**Industrial and commercial noise in adjacent sensitive usage areas**				
	Business				**max. 10**
	Event				**max. 25**
	Industry				**max. 30**
	Commercial				**max. 15**
	■ = Reference value			**Business**	2
				Event **Industry** **Commercial**	4
	■ < Reference value			**Business**	3
	> Comfort value			**Event** **Industry**	10
				Commercial	6
	■ = Comfort value			**Business**	6
				Event	18
				Commercial	10
				Industry	20
	■ < Comfort value			**Business**	10
				Event	25
				Industry	30
				Commercial	15

NO.	INDICATOR		POINTS
5	**Prevention or reduction of emissions**		
	City **Business**		**max. 10**
	Event		**max. 20**
	Industry **Commercial**		**max. 25**
5.1	**Air pollution from heating/firing systems**		
	City **Business** **Event** **Commercial**		**max. 10**
	■ In the district, there is pollution from heating/firing systems.	**City** **Business**	0
		Event **Commercial**	0
	■ If there is pollution from heating/firing systems in the district, appropriate compensation measures are implemented (chimney height, soot filters, etc.)	**City** **Business**	5
		Event **Commercial**	5
	■ In the district there is no pollution from heating/firing systems (e.g. heat supply by district heating, heat pump, solar thermal, wood chip firing with exhaust gas cleaning etc.).	**City** **Business**	10
		Event **Commercial**	10
5.2	**Compliance with or undercutting of limit values**		
	Industry		**max. 25**
	Evaluation according to the “Best Available Techniques Reference or Best Available Techniques Reference Document (BREF)” or “Best Available Techniques (BAT)” of the Federal Environmental Agency:		
	■ Current emission levels are verified and complied by using BREF or BAT or equivalent scientific findings.	**Industry**	10
	■ Current emission levels are undercut based on the BREF or BAT or equivalent scientific findings, or, if they exist, measures are taken to support compliance.	**Industry**	25
5.3	**Industrial noise / noise caused by additional traffic in adjacent sensitive usage areas**		
	Event		**max. 10**
	Commercial		**max. 15**
	■ Operating restrictions	**Commercial**	+3
	■ Compliance with the requirements of the distance guideline	**Commercial**	+3
	■ Zoning of the industrial site (emission quotas)	**Commercial**	+3
	■ Structural sound protection - sound insulation (active sound insulation)	**Event**	+5
		Commercial	+3
	■ Passive sound insulation	**Event**	+5
		Commercial	+3

NO.	INDICATOR		POINTS
6	**Noise from rail and air traffic, industry and commerce as well as sport and leisure (reduction factor)**		
	City **Business** **Commercial**		**max. -37.5**
	Event		**max. -51.5**
6.1	**Noise from rail and air traffic, industry and commerce as well as sport and leisure (reduction factor)**		
	City **Business** **Commercial**		**max. -37.5**
	Event		**max. -51.5**
	The determination of evaluation points, which are deducted due to the additional noise pollution, is carried out according to formula 1.	**Commercial** **City** **Business**	max. -37.5
		Event	max. -51.5
7	**Measures to reduce light pollution**		
	City **Business** **Event**		**max. 30**
	Industry		**max. 25**
	Commercial		**max. 20**
7.1	**Measures to reduce light pollution**		
	City **Business** **Event**		**max. 30**
	Industry		**max. 25**
	Commercial		**max. 10**
	■ There is an (implemented) lighting concept (for open spaces, building lighting and advertising) that explicitly addresses the issue of light pollution and its prevention and, above all, takes into account the lowest possible level of room illumination for adjacent uses.	**City** **Business** **Event**	+8
		Industry	+7
		Commercial	+3
	■ All light sources in the outdoor area are designed in a way that no light is scattered upwards and to the side.	**City** **Business** **Event**	+8
		Industry	+7
		Commercial	+3
	■ All light sources in the outdoor area have light colours and orientation which are harmless for species protection.	**City** **Business** **Event**	+8
		Industry	+7
		Commercial	+2
	■ No undesirable glare effects occur with lights.	**City** **Business** **Event**	+6
		Industry	+4
		Commercial	+2

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1		[ ]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:**

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

Human health and well-being are the focus of this criterion. Therefore, the stability of ecosystems and reducing the consequences for society are of importance. .

II. Additional explanation

Beyond the existing legal emission regulations the lowest possible emissions should be caused.

Definition of emission
The air pollution, odours, noise and similar phenomena emanating from a district or a vehicle are called emissions according to the Federal Emission Control Act (BImSchG).

Definition of immission
In terms of this Act, immissions are air pollution, noise, odours and similar environmental effects affecting humans, animals and plants. Every emission usually also results in an immission.

Air quality
Especially in cities, large amounts of pollutants are emitted into the atmosphere by traffic, building heating systems, industry and power plants. Especially emissions from combustion plants and car traffic are of great significance for the air quality in districts. It is important to avoid health impairments.

Noise and sound insulation
Noise is a risk factor that can cause adverse health effects in conjunction with other exposures. The effects of noise include sleep disturbances, headaches, listlessness, aggressions and a decrease in physical and mental performance.
A large proportion of the population feels frequently or permanently annoyed by noise. At the top of the list of disturbing noise sources is road traffic. However, noise from neighbours, aircraft noise and workplace and industrial noise also play a major role.
The legal basis for this criterion is the EU Directive 2002/49/EC. The national guideline and limit values only apply to the calculation regulations of the respective national noise protection and if the EU directive does not specify any values. However, in order to have a standard of comparison, the national guideline and limit values (in this case based on the German guideline and limit values) are included and prescribed for all as a binding basis for evaluation.

For event areas, the noise pollution of the surroundings through recreational and sports noise is of high relevance. In Germany, the protection against harmful environmental effects caused by noise from sports facilities is regulated by the Sports Facilities Noise Protection Ordinance - 18. BImSchV (the German federal law on Immissions Control). In addition to emission guide values, the ordinance also contains the determination and assessment procedure. Noise from recreational facilities that are not covered by 18. BImSchV (the German federal law on Immissions Control), is assessed according to the recreational noise guideline of the respective federal state.

Lighting quality
The rhythmic alternation of day and night, light and darkness has a decisive influence on the biological activity of all living beings on earth. The increasing use of artificial light sources in the everyday environment, such as lighting systems for streets, sports facilities or advertising structures, has made light a cause of nuisance to neighbours and the general public. The negative effects of artificial lighting can be mitigated by taking into account the impact on residents.

III. Method

City **Business** **Event** **Industry** **Commercial**

The quality of open space is described using qualitative and quantitative indicators. While the integration and qualification of public open spaces is evaluated qualitatively, the offerings of public and private open spaces are considered quantitatively.

Indicator 1: Air quality
If there is no measuring station in the immediate vicinity of the district/location, a measuring station can be set up. The measurement methods to be used for this purpose are prescribed by law throughout Europe. According to this, e.g. the NO_2 concentration must be determined with the reference method according to DIN EN 14211:2012, edition November 2012, “Ambient air - Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence”.

The air quality in the district is assessed in relation to the main pollution source, traffic. For this purpose, it is determined whether the legal limits for nitrogen dioxide (NO_2) are being observed in the district - and also on the roads. At the same time, the emission in the surrounding area must not deteriorate because of the planned district to such an extent that the limit values are expected to be exceeded.
Furthermore, the emission at the time of planning is compared to pollutants from traffic, with the emission situation after realisation. A significant improvement in city climate can be achieved by reducing emissions and thus reducing air pollution. Integrated urban and traffic planning as well as energy supply concepts are particularly suitable in the municipal sector to influence pollutant emissions.
At the other end of the causal chain of emission - transmission - immission, an appropriate planning response to identify and assess emission exposure situations can reduce the extent of “impact” (see also City climate fibula). The points are determined in two steps:

(1) First of all, an assessment of the initial situation and a classification must be made, whether the EU limits of nitrogen oxides (NO_2) for pollutant emissions from traffic are complied with in the district. The basis for the consideration are the limit values of 39. BImSchV (the German federal law on Immissions Control), which is based on the EU Air Quality Framework Directive and its subsidiary directives.

TABLE 1 Immission limit values according to 39. BImSchV (the German federal law on Immissions Control) for fine dust and nitrogen oxides

AIR POLLUTANTS	[µG/M³]	DESCRIPTION
Nitrogen dioxide NO_2 annual average	30	Immission limit value averaged over a calendar year for the protection of human health
Nitrogen dioxide NO_2 max. 1h value	200	For 18 authorised exceedances in the calendar year

(2) The emission situation in the surroundings must also be considered. It must be determined whether negative effects of the district planning worsen the situation to an extent that the limit values are likely to be exceeded.
(3) Subsequently it must be determined which changes will occur due to the district planning. From the joint consideration of these aspects, an allocation to the categories and an evaluation are possible.

Air hygiene expert opinion

An emission forecast is to be developed for the pollution and its propagation. Software tools with the following features are available for this purpose: micro-scale models, estimation of traffic-induced pollution, calculation of pollutant dispersion on roads without and/or with loose roadside structures, and calculation of pollution on roads.
Since usage restrictions are to be assumed in the area of high-traffic roads, the planning or the corresponding zoning of roads with a traffic volume of more than about 10,000 vehicles per 24 hours makes it necessary in any case to determine the exhaust gas emission exposure for the area close to the road.
If no air hygiene expert report is available, a classification should be made based on air hygiene maps, climatic atlases or measurements. Only if there is no tool available, an assessment of the emission situation should be made with reference to road classifications and their traffic densities using factors, e.g. the traffic situation, average driving speeds and road characteristics (see also City climate fibula).
The emission situation and dispersion climatology of pollutants can be estimated based on local wind and topographic conditions, the development and open space structure of the district, with its aeration conditions and absorption measures such as plantations of deciduous and coniferous trees and shrubs, for street space profiles and other open spaces (see also the City climate fibula).

Indicator 2: Road traffic noise (inside)

In Phase 1, the average traffic noise level can be roughly estimated using simple methods. A first overview of possible sound sources can be obtained, e.g. with reference to the noise map for EU Directive 2002/49/EC.

Otherwise, a noise map (a calculation of noise emission) with noise data for the entire district serves as a basis. Exact noise levels of road and rail traffic are coloured on the surface, usually in 5 dB steps. The determination points or the emission height should be at 4-5 m or the result should be corrected accordingly to this height.
The noise indices of the EU Directive L_{den} (day-evening-night = day (12 hours), evening (4 hours) and night (8 hours)) and L_{night} for the preparation and review of strategic noise maps deviate from the national typically applied noise indices L_{night} and L_{day}. For simplification, the noise map L_{den} is used to assess noise immissions during the day. The resulting deviations are accepted because the noise levels throughout the day are higher than the daily values. This will result in a more rigorous evaluation. If no noise mapping is available, it must be prepared by a specialist planner with reference to the assumed traffic development.

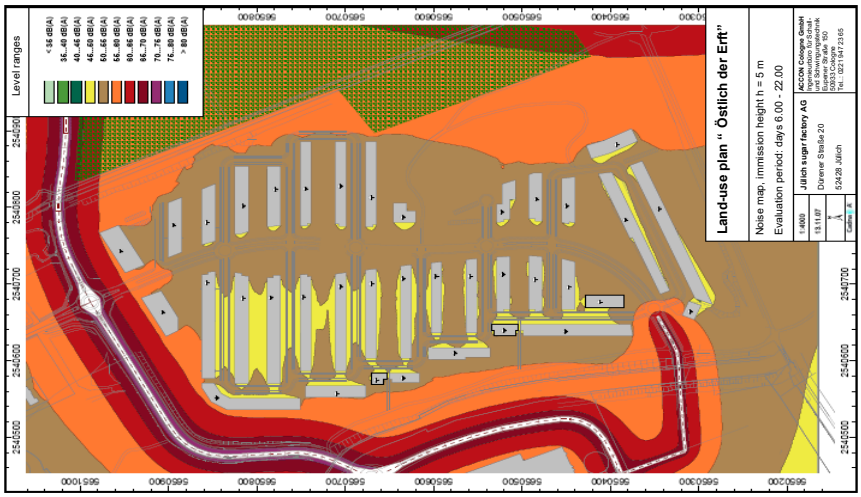

FIGURE 1 Noise map for the development plan “Östlich der Erft”, Bedburg, h = 5 m (Source: Accon Köln GmbH)

Calculation

For the existing road traffic noise level, the coloured areas can be taken from the noise maps per CAD. Depending on the size of the coloured area, the respective noise level is weighted. The mean value of the sum of the existing noise levels results in the average road traffic noise level.

For simplified calculation, the master tool provides an extra spreadsheet for entering the determined areas with the respective day and night sound levels.
For the calculation of the “good traffic noise level”, the project area has to be subdivided into areas according to the different land uses and also entered in the calculation tool under “Areas construction sites”. The “good traffic noise level” represents a value between the limit value and the orientation value.
For example, if a public open space is located in an area of the planning area with a large proportion of residential development (≥ 50 % of the GFA is residential), the “residential development” noise protection requirement applies to the area of the open space.
Calculation of “good road traffic noise”
For all road surfaces that are not used as a recreational area (e.g. a play street), there are no prescribed sound orientation values. However, to determine the ratio of building area to road area for the value “good road traffic noise”, the road area is included.
The limit value of the road area is the incoming sound level at the wall of the adjacent building. This must be entered in the table under sound level day/night for the road area.

In the master tool, the entire limit value (the German federal law on Immissions Control,16. BImSchV) of the district and the orientation or comfort value (DIN 18005) is determined once. These two values are averaged; the resulting value results in the average “good” road traffic noise level, which can be set in relation to the existing road traffic noise level.

Orientation and limit values (applied in the master tool)
The orientation values are comfort values which are desirable (DIN 18005). The limit values (the German federal law on Immissions Control ,16. BImSchV) are values that are usually used as upper limits of what the legislator obviously considers reasonable. They are on average 4 dB higher than the orientation values. In some places, the values deviate from the German federal law on Immissions Control 16. BImSchV, because in the opinion of the author, certain classifications are not plausible and conflict with other regulations, such as the German Technical Instructions on Noise Protection (TA Lärm).

TABLE 2 Sound-related limit and **orientation values** differentiated according to areas of use as well as day and night (sources: the German federal law on Immissions Control 16. BImSchV and supplement 1 to DIN 18005 part 1)

USAGE AREAS	BUILDING AREA	DAY	NIGHT
		Limit value **Orientation value**	Limit value **Orientation value**
Residential area (≥ 50 % GFA residential)	Mere residential areas	59 dB(A) **50 dB(A)**	49 dB(A) **40 dB(A)**
	General residential areas	59 dB **55 dB(A)**	49 dB **45 dB(A)**
Open spaces (which can be assigned to the residential area)	Mixed areas	64 dB(A) **60 dB(A)**	54 dB(A) **50 dB(A)**
Non-residential area (the rest of the development)	Hospitals, nursing homes, health resorts	57 dB(A) **50 dB(A)**	47 dB(A) **40 dB(A)**
Open spaces (which can be assigned to the non-residential area)	Schools (deviating from 16. BImSchV, schools are equated with social and cultural institutions ≙ the values MI)	64 dB(A) **60 dB(A)**	54 dB(A) **50 dB(A)**
	Retirement homes (deviating from 16. BImSchV, since a retirement home is a form of residence ≙ WA)	59 dB(A) **55 dB(A)**	49 dB(A) **45 dB(A)**
	Industrial sites	69 dB(A) **65 dB(A)**	59 dB(A) **55 dB(A)**
Rest areas (Continuous area of ≥ 2500 m²; a park, a grove, a public inner courtyard etc. in the city; a kind of island of peace, shielded by buildings or due to the good location)	Rest areas	**55 dB(A)** (No exceedance possible, otherwise quite normal open space)	**55 dB(A)** (No exceedance possible, otherwise quite normal open space)

As a rule, **Event areas** are designated as special areas according to BauNVO, for which there are no uniform limits. For the evaluation of event areas, the limit and orientation values of the land use category “mixed area” are taken as a basis.

Indicator 3: Noise in the central open space publicly accessible

An open space is evaluated that should offer a good quality of stay, even if no event is taking place on the site. If possible, the central district square, market place or the centre should be considered. If there is no priority location, one can be selected from several possible open spaces, which should particularly serve the stay of the district users.

TA Lärm provides guideline values for the determination of industrial and commercial noise (Table 3). As with road and rail traffic noise, the sound-related comfort values are 3 to 6 dB (A) lower than the guideline values of TA Lärm. The comfort values are based on the surcharge for noises at sensitive times of day as specified in TA Lärm (see TA Lärm 6.5 “Surcharge for times of day with increased sensitivity”). Since, unlike traffic noise, noise mapping cannot be used, noise levels must be determined with the help of a noise expert opinion.

TABLE 3 Sound-related guide and comfort values differentiated according to usage areas and day and night (Source: TA Lärm)

BUILDING AREA/USAGE TYPE	DAY	NIGHT
	Reference value **Comfort value**	Reference value **Comfort value**
Hospitals, nursing homes, health resorts, schools, resorts	45 dB(A) **39 dB(A)**	35 dB(A) **32 dB(A)**
Pure residential areas	50 dB(A) **44 dB(A)**	35 dB(A) **32 dB(A)**
General residential areas	55 dB(A) **49 dB(A)**	40 dB(A) **37 dB(A)**
Core, village and mixed areas	60 dB(A) **54 dB(A)**	45 dB(A) **39 dB(A)**
Urban area	63 dB(A) **59 dB(A)**	45 dB(A) **41 dB(A)**
Commercial sites	65 dB(A) **61 dB(A)**	50 dB(A) **46 dB(A)**
Industrial sites	70 dB(A) **64 dB(A)**	70 dB(A) **64 dB(A)**

The guide and comfort values given in Table 3 also apply to the evaluation of construction, sport and leisure noise. The requirements set out in the General Administrative Regulation on Protection against Construction Noise (AVV Baulärm), the Recreational Noise Directive and the Sports Facilities Noise Protection Ordinance (the German federal law on Immissions Control 18. BImSchV) are identical with the guide values for industrial and commercial noise.

Areas within a site that are relevant for protection are in particular rest and break areas. These include e.g. break and smoking areas outdoors, the surroundings of canteens, outdoor areas with a quality of stay, etc. The objective must be to ensure that employees can spend their breaks undisturbed by noise emissions.
The evaluation is carried out in the same way as the method described above, except that in this case the noise values are weighted according to the size of the quiet zones. The target and reference values are presented in Table 3. Smoking areas: only intended for a short break (approx. 10 min) and for employees of the industrial site; usually in

the immediate vicinity of the workplace; little or no furniture, possibly roofing.

- Break areas: intended for longer breaks (approx. 30 min), only for employees of the industrial site, can be a little further away from the workplace, seating and roofing available
- Open areas of canteens: intended for longer stays (approx. 30 min), can also be used by customers or guests of the industrial site, the quality of stay is better than in break areas, direct workplace of canteen staff

Indicator 4: Industrial noise/noise from event use outside the district

Since noise is not only directly perceptible at the point of origin, but can also spread into the environment depending on the sound source and local conditions, the protection of neighbouring sensitive uses is also a priority when considering industrial and commercial noise or noise from event use. The direct vicinity of an industrial or commercial area or event area to hospitals or purely residential areas etc. represents a challenge for emission control. The guideline and comfort values given in Table 2 serve to protect the users and residents of adjacent sensitive areas.

The indicative and short-term peak values given in Table 4/SOC1.9 also apply to the evaluation of construction, sport and leisure noise. The guideline values given in the General Administrative Regulation for Protection against Construction Noise (AVV Baulärm), in the Recreational Noise Directive and in the Sports Facilities Noise Protection Ordinance (the German federal law on Immissions Control,18. BImSchV) are identical. This becomes relevant, e.g. when constructing short-term buildings for trade fairs or similar events.

Noise values at the certification limit (impact on the environment):

Since noise is not only directly perceptible at the point of origin, but can also spread into the environment depending on the sound source and local conditions, the **protection of neighbouring sensitive uses is a priority** when considering industrial noise. The direct vicinity of an industrial area to hospitals or purely residential areas etc. represents a challenge for emission control. The guideline and comfort values given in Table 4 serve to protect the users and residents of adjacent sensitive areas.

Determination of the average existing noise level at the certification limit:
In phase 1, noise emissions can be roughly estimated with simple instruments in order to assess the situation and thus **create** the prerequisites for sustainable planning. **Only the noise emitted by the industrial site is taken into account.** Noise from adjacent uses, roads or railways is not included in the indicator.

The valuation basis is an area-wide emission map (a calculation of the noise emission) with noise data for the entire observation area. Exact noise levels are marked in colour gradients, usually in 5 dB steps. The determination points or the emission height should be at 4-5 m or the result should be corrected accordingly to this height. The noise indicators of the EU directive L_{den} (day-evening-night = day (12 hrs.), evening (4 hrs.) and night (8 hrs.)) and L_{night}, for the preparation and review of strategic noise maps, differ from the national, mostly used noise indicators L_{Nacht} and L_{Tag}. In the calculations, a simplified distinction is only made between day (16 hours) and night (8 hours).

Calculation:
The assessment area is the area **250 metres** around the certification limit (see Figure 2). For this area, on the one hand, the average orientation and limit value for noise exposure must be determined and compared to the simulated value from the noise map. For a simplified calculation, a calculation tool is provided in which the determined areas with the respective day and night sound level must be entered.

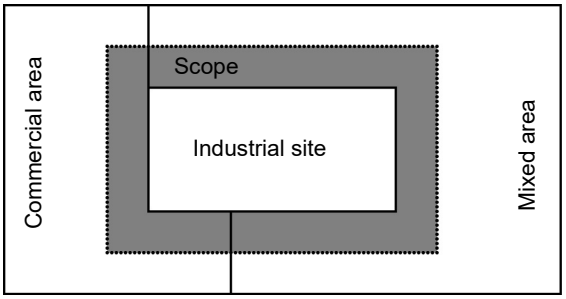

FIGURE 2 Exemplary observation area around the industrial site. In this example, the area under consideration would have to be divided into two parts (commercial and mixed area).

If **building areas with different uses** neighbouring the industrial location, the noise level is assessed according to a **weighting of the percentage area share of the respective use in the total area of the considered area**. If the **industrial site is located outdoors** (TA Lärm serves to protect the general public and the district) and no areas worthy of protection are affected by noise, the full points can be applied. It is assumed that outdoor sites are required to undergo an environmental impact assessment (EIA), which lists the noise limits.

TABLE 4 Acoustic reference values and individual peak values differentiated according to areas of use and day and night (sources: the German federal law on Immissions Control 18. BImSchV, Leisure Noise Directive; TA Lärm)

BUILDING AREA/USAGE TYPE	DAY	NIGHT
	Reference value **Comfort value**	Reference value **Comfort value**
Hospitals, nursing homes, health resorts, schools, resorts	75 dB(A) **45 dB(A)**	55 dB(A) **35 dB(A)**
Pure residential areas	80 dB(A) **50 dB(A)**	55 dB(A) **35 dB(A)**
General residential areas	85 dB(A) **55 dB(A)**	60 dB(A) **40 dB(A)**
Core, village and mixed areas	90 dB(A) **60 dB(A)**	65 dB(A) **45 dB(A)**
Urban area	93 dB(A) **63 dB(A)**	65 dB(A) **45 dB(A)**
Commercial sites	95 dB(A) **65 dB(A)**	70 dB(A) **50 dB(A)**
Industrial sites	100 dB(A) **70 dB(A)**	90 dB(A) **70 dB(A)**

For the determination and assessment of the existing and expected sport and leisure noise level, the recognised basic acoustic rules of TA Lärm and the Sports Facilities Noise Protection Ordinance (18th amendment of the German Federal Immission Control Act, BImSchV) must be applied. An expert opinion is absolutely necessary.

Indicator 5: Prevention or reduction of emissions

The type of heat supply in the district has a high influence on the air quality. The use of regenerative heat sources or district heating contributes to the avoidance of emissions in the district. Through appropriate planning of compensation measures for emission-causing heating systems, emissions in the district can be reduced. To prevent emissions from impairing district areas (e.g. accumulation of exhaust gases and particles due to insufficient chimney heights (inversion weather conditions), down-wash effects, etc.), the following points must be observed when using firing plants in the district:

- In all firing plants: Muzzle height of the chimneys (exhaust gas discharge device) according to VDI guideline 3781 part 4
- If necessary, installation of filters/catalysts in combustion plants that use oil and wood as energy sources
- Installation of flue-gas cleaning for firing with wood (e.g. wood chips)

For **Industry**, the TA Luft and the “Best Available Techniques Reference or Best Available Techniques Reference Document (BREF)” or “Best Available Techniques (BVT)” of the Federal Environment Agency are used to avoid or reduce emissions.

For **Event** **Commercial**: A good industrial noise level/noise level from event use will be achieved if the comfort values in Table 3 are maintained. Various measures can lead to compliance with these comfort levels:

- **Operating restrictions:** Operating restrictions are usually laid down in urban land use planning. With the help of an emission forecast expert report it can be determined which type of industrial or commercial use is compatible with the specifications of TA Lärm or not.
- **Compliance with the requirements of the distance guideline:** The distance guideline is also applied in the consideration process of urban land use planning. Numerous emission control expert opinions have been included in the distance guideline. The objective of the distance guideline is to provide the planner with a suitable tool for the structuring of industrial and commercial areas.
- **Zoning of the industrial and commercial area (emission quota system):** Noise-emitting uses and building areas requiring protection must be arranged in such a way that noise immissions are reduced to a minimum (see also distance guideline). For this purpose, an industrial or commercial area is subdivided into emission quotas, which are then determined in the course of noise engineering studies (e.g. emission forecast expert reports).
- **Structural sound insulation - Sound insulation:** Noise emission can be significantly reduced with the help of structural sound insulation measures. Active sound insulation measures at the noise source reduce the sound propagation. Sound insulation by buildings with non-sensitive uses is most common in an industrial or commercial area and also corresponds to the zoning of the area.

Indicator 6: Noise from rail and air traffic as well as industry and commerce

In addition to the most frequently occurring road traffic noise, noise from rail and air traffic as well as from industry and commerce is also relevant. The noise types are included in the evaluation as reduction factors, i.e. all achieved evaluation points from indicators 2 to 6 are reduced depending on the impairment. The evaluation is based on the following formula:

$$POINTS_7 = ((POINTS_{SUM} - (POINTS_{SUM} \times RfS \times RfF \times RfI)) \times -1 \quad (1)$$

$$POINTS_{SUM} = POINTS_2 + POINTS_3 + POINTS_4 + POINTS_5 + POINTS_6 \quad (2)$$

with:

$POINTS_7$	Noise from rail and air traffic and industry and commerce (indicator 7)
$POINTS_{SUM}$	Sum of the evaluation points from indicator 2- 2
$POINTS_2$	Evaluation points from indicator 2: Road traffic noise
$POINTS_3$	Evaluation points from indicator 3: Noise on the central, public open space
$POINTS_4$	Evaluation points from indicator 4: Industrial noise within the district
$POINTS_5$	Evaluation points from indicator 5: Industrial noise outside the district
$POINTS_6$	Evaluation points from indicator 6: Measures to reduce industrial noise
RfS	Reduction factor from rail traffic
RfF	Reduction factor from air traffic
RfI	Reduction factor from industrial and commercial noise

Reduction factor from rail traffic (RfS)

Rail traffic noise from urban railways and tramways is recorded and mapped throughout Europe in the course of environmental noise mapping (EU Directive 2002/49/EC). These noise maps can be used for the assessment. The distribution of points is based on the use according to the BauNVO, which is most affected by noise according to the noise map (in Figure 2: WA). The highest noise level reached at the edge of a building is to be taken into account and the average value of this is to be calculated (in Figure 2: 67.5 dB(A)). If the noise levels are equally distributed, the more sensitive use is used. The following reduction factors apply to rail transport noise:

	REDUCTION FACTOR
> Limit value (16. BImSchV)	0.5
> Orientation value ≤ Limit value (DIN 18005)	0.75

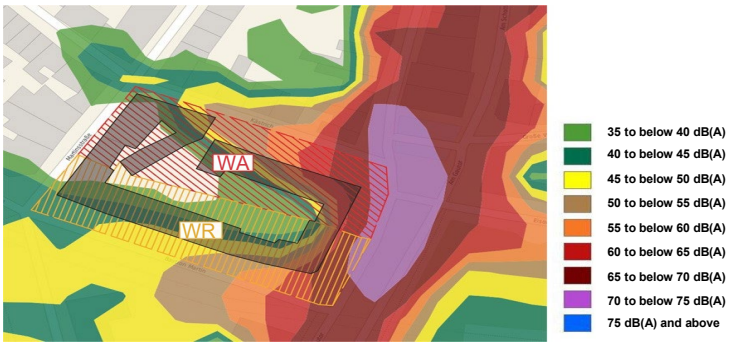

FIGURE 3 Exemplary assessment of rail traffic noise (Source: Faerber according city of Mainz)

Reduction factor of air traffic (RfF)

Aircraft noise is recorded and mapped throughout Europe in the course of environmental noise mapping (EU Directive 2002/49/EC). These noise maps can be used for this purpose. The distribution of points and the associated gradations of the protection zones are based on the **noise protection zones** prescribed in Germany. To this end, the district's location must be examined and classified for noise pollution caused by aircraft. The following reduction factors apply to noise caused by aircraft:

NOISE PROTECTION ZONES:	REDUCTION FACTOR
Noise protection zone 1: L_{DEN} **exceeding 75 dB(A)**. In principle, no new dwellings and facilities requiring protection may be built in protection zone 1.	0.25
Noise protection zone 2: L_{DEN} **67 to 75 dB(A)**. In protection zone 2 no facilities requiring protection, such as schools, hospitals, etc., may be erected. Dwellings are only possible with special sound insulation requirements, but they are severely restricted by the noise, because sound insulation only applies to interiors and open spaces are still heavily impaired.	0.5
Noise protection zone 3: L_{DEN} **62 to 67 dB(A)**. Protection zone 3 corresponds to the limit value for road and rail traffic in an industrial estate.	0.75

Reduction factor of industrial and commercial noise **(RfI)**

While indicators 4 to 6 look at industrial and commercial noise that occurs within the assessed district, this section refers to **industrial and commercial noise that occurs outside an urban district and affects it**. Noise emissions are determined based on the **noise mapping of industrial and commercial noise (EU Directive 2002/49/EC), which has been recorded throughout Europe**. The distribution of points is based on the use according to the BauNVO, which pursuant to the noise map is most affected by noise (see rail traffic noise). The following reduction factors apply to industrial and commercial noise:

	REDUCTION FACTOR
> Reference value (TA Lärm)	0.5
> Comfort value ≤ Reference value (both TA Lärm)	0.75

Indicator 7: Measures to reduce light pollution

Room brightening is understood to be the **unreasonable brightening of a living or working area** within a building and the increased illumination of a terrace or similar outdoor area by external light sources. **Residential buildings in the direct vicinity of an industrial site** are particularly affected. Brightness is measured using the illuminance in the respective window plane. The illuminance depends not only on the brightness of an illuminating light source but also, to a decisive extent, on the distance between the light source and the point of emission.

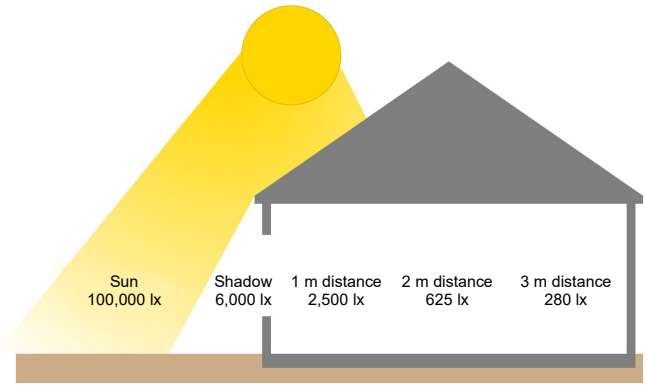

FIGURE 4 Dependence of illuminance in lx on the distance from the light source (© Faerber's office)

The evaluation of light pollution at the site is based on a **qualitative assessment**. The **lighting installations in the outdoor area** are considered. The objective is to **avoid light scattering upwards and sideways as far as possible**. The illuminance should also be adjusted to the actual lighting conditions. For example, it is unnecessary for the lights to shine with their full luminosity in twilight. Lights are **therefore** classified as good if they have only slight light scattering upwards and sideways and can automatically adjust their luminous intensity to the ambient conditions. Furthermore, e.g. motion detectors should be aligned in such a way that unnecessary activation is avoided.

In general, an appropriate lighting concept should be created, which regulates the type of lights and the area of application of the street lighting in order to avoid the use of unnecessary lighting systems. Room illumination must also be taken into account in the lighting concept.

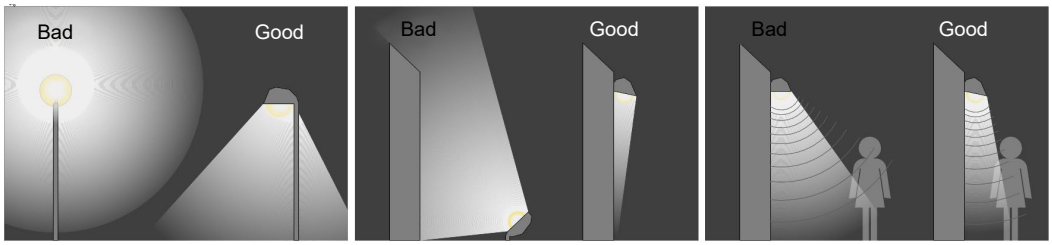

FIGURE 5 Lighting examples (Source: Faerber according to Przygoda)

In order to achieve sufficient illumination, interference effects cannot always be avoided. Various measures can lead to compliance with these comfort levels. For example, avoiding direct view of the radiation source by choosing the right location, the optimum height of the light, the appropriate angle of inclination of the lights or shielding measures. In addition, light emission can be reduced by switching on for limited periods of time, by distributing many smaller lights instead of one large one or by darkening the room.

IV. Scheme-specific description

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APPENDIX B - DOCUMENTATION

I. Required documentation

City Business Event Industry Commercial

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.

This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 5 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation with **relevant records/documents/expert opinions:** - B1: Presentation of the emission situation in relation to legally prescribed limit values; presentation of planning measures that result in improvements, deterioration or no change compared to the initial situation; air quality expert opinion - B2: Noise map (additionally aircraft noise map) - B3: Documentation based on measurements - B4: Documentation of the lighting concept; documentation of all lighting systems realised by means of data sheets	B
Photo documentation of the implemented sound insulation measures	C
Site plan with marking of implemented measures	D
Master tool calculation for noise	J

TABLE 6 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Air quality	A	B1, B3	B1, B3	A	B1, B3
2. Road traffic noise (inside)	A, B2, J	A, B2, C, J	B2/B3, C, J	A, B2	B2/3, C
3. Noise in the central open space accessible to the public	A, B1, B2	A, B2/B3, C	B2/B3, C	-	-
4. Industrial noise/noise by event use outside the district	A, B1, B2,	A, B1, B2/B3, C	B1, B2/B3, C	A, B21, B2/B3, C	B1, B2/B3, C
5. Prevention or reduction of emissions	A, B1,	A, B2/B3, C	B2/B3, C	B1, B3	B1, B3
6. Noise from rail and air traffic, industry and commerce as well as sport and leisure (reduction factor)	A, B1, B2	B1, B2/B3, C	B2/B3, C	-	-
7. Measures to reduce light pollution	A, B1, B4	B4, C	B4, C	A, B1, B4	B4, C

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Federal Immission Control Act (BImSchG)
- DIN 18005 (Noise abatement in town planning)
- Noise maps and noise action plans - EU Directive 2002/49/EC
- Przygoda, Carsten (2013): Leuchtmittel und Lichtlenkung. URL: http://www.funnytakes.de/lichtverschmutzung/leuchtmittel-und-lichtlenkung.html
- TA Luft - Technical Instructions on Air Quality Control
- VDI 3787 Sheet 9: Environmental meteorology - Provision for climate and air quality in regional planning, Dec. 2004
- VDI Commission on Air Pollution Control, 1988: Stadtklima und Luftreinhaltung – ein wissenschaftliches Handbuch für die Praxis in der Umweltplanung, Springer Verlag, Berlin, 1988
- BVT Reference Documents in the latest version
- VDI - 3781 Sheet 4
- Health resort guidelines in the respective valid edition
- Soot in airborne particulate matter, VDI Status Report, Sept. 2016

Websites

- www.lärmkarte.de
- www.umgebungslaerm.nrw.de
- www.staedtebauliche-laermfibel.de
- www.umweltbundesamt.de/verkehr/laerm/strassen-und-schienen-verkehr.htm#lms
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- www.verlustdernacht.de/startseite.html

Industry **Commercial**

- http://www.lärmkarte.de/
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- http://www.staedtebauliche-laermfibel.de/pdf/S-V-Laerm.pdf
- http://www.bmu.de/laermschutz/themenbereiche/doc/41293.php
- http://www.fluglaerm.de/bvf/info/

Appendix 1

The legal basis for this profile is the **EU Directive 2002/49/EC**.

The national guideline and limit values only apply to the calculation regulations of the respective national noise protection and if the EU directive does not specify any values. However, in order to have a standard of comparison, the national guideline and limit values (in this case based on the German guideline and limit values) are included and prescribed for all as a binding basis for evaluation.
The area of “noise pollution caused by leisure and sports noise” is not assessed in this profile, as it is treated very differently in national comparison. This makes it very difficult, if not impossible, to achieve a uniform assessment. Furthermore, leisure and sports facilities within a city district are usually desired / tolerated for social reasons and are also approved accordingly. In Germany, the protection against harmful environmental effects caused by noise from sports facilities is regulated by the Sports Facilities Noise Protection Ordinance- 18.BImSchV. In addition to emission guide values, the ordinance also contains the determination and assessment procedure. Noise from recreational facilities, that do not fall under 18. BImSchV, is assessed according to the recreational noise guideline of the respective federal state.
Commercial and industrial noise is not assessed in this profile either, as the guidelines for commercial areas are very specific and are sufficiently covered by national legislation (in Germany: Technical Instructions on Noise Protection - TA-Lärm). Furthermore, the possibility of the city or municipality to influence the noise immissions of commercial and industrial activities is very low.

Noise maps and noise action plans - EU Directive 2002/49/EC
Since 30 June 2007, based on the EU Directive 2002/49/EC Environmental Noise (ULR) of 25 June 2002 in conjunction with Ordinance on Noise Mapping of 15 March 2006 requires cities and municipalities with more than 250,000 inhabitants to make a local noise register available to the interested public.
The EU Environmental Noise Directive pursues the goal of recording the pollution caused by environmental noise (noise from road and rail traffic, air traffic, industry and commerce) throughout Europe and to prevent, avoid or reduce the harmful effects of environmental noise. To this end, noise maps are to be drawn up every five years to document exposure and to inform the public. Noise maps are an important basis for cities and municipalities to consider noise problems in municipal planning and to develop specific measures to reduce noise pollution. In order to regulate noise problems and noise effects, municipalities must draw up noise action plans.
Note: It should be noted here that the target and threshold values of the EU Directive again refer to national values, so that here are no uniform values too.

National guideline and limit values
The national guideline and limit values distinguish between the respective EU member states, i.e. there are no uniform values. The national limit values for noise dimensioning and assessment are prescribed by various laws, ordinances, standards, guidelines, decrees and service instructions and may vary depending on the protection objective pursued. For traffic noise, for example, Germany has the RLS 90 with guidelines for noise protection on roads.
The VLärmSchR 97 is the guideline for traffic noise protection on federal highways in the construction load of the federal government. The “Law on Protection against Aircraft Noise” of 31 October 2007 defines protection zones in which certain uses are not permitted; there are no values and regulations for short-term aircraft noise from passing aircraft. Regulations for rail traffic are contained in SCHALL 03 with the guideline of the German Federal Railway for the calculation of noise immissions from railways. The Traffic Noise Protection Ordinance - 16. BImSchV is a set of rules and regulations that specifies fixed limits for noise pollution on roads.

BImSchG

The Federal Immission Control Act (BImSchG) cited above stands out for its wide range of regulations. The system for differentiating between “emissions” and “immissions” is regulated by the “Act on Protection against Harmful Environmental Effects caused by Air Pollution, Noise, Vibration and Similar Processes” - Federal Immission Control Act (BImSchG). The BImSchG pursues the purpose “... of protectng humans, animals and plants... from harmful environmental influences ... and preventing the occurrence of harmful effects on the environment”. This law enshrines both the important polluter-pays principle and the precautionary principle. This is a federal law, the implementation of which is the responsibility of the federal states.

DIN 18005

This standard provides guidance on the consideration of sound insulation in urban planning. The determination of the sound immissions of the different types of sound sources is only presented here in a very simplified way. For the exact calculation, reference is made to relevant legislation and regulations.

For the estimation of the noise immissions to be expected from road, rail and ship traffic, DIN 18005 -1 provides diagrams with sound-related orientation values.

SOC2.1

Barrier-free design

Objective

Our objective is to make the entire environment accessible to everyone and without restrictions on its use, regardless of their personal condition.

Benefits

Barrier-free design or disabled access is an essential component of future-oriented and sustainable development in the building industry. If principles of barrier-free construction are already taken into account in the planning of construction measures, regardless of whether people with disabilities or restrictions are using the building at that time, the costs of necessary adaptation and costly conversion can be largely avoided. Barrier-free construction increases the value and attractiveness of districts for all groups of people, especially for people with motor, sensory and cognitive disabilities. Especially in the context of demographic change, the diversity of people should be seen as potential. A barrier-free or handicapped accessible district guarantees freedom of movement in the outside areas, accessibility to all buildings, as well as accessibility to relevant building areas. This is the only way to ensure that everyone can use the facilities for the intended purpose.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	11.7	Access to public spaces and green areas		
Moderate	10.2	Promoting inclusion		
Low	8.5	Decent work for all men, women and people with disabilities	10.2	Distributive justice

Outlook

A tightening of the requirements for barrier-free access is not to be expected in the future.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**2.6 %**	**3**
Commercial	**1.8 %**	**2**
Industry	**2.7 %**	**3**

ASSESSMENT

The criterion is evaluated qualitatively and quantitatively according to the degree to which barrier-free design is fulfilled. The more district areas are designed to be accessible, usable and barrier-free for people with motor, sensory and/or cognitive disabilities without particular difficulty and generally without secondary help, the better the evaluation of the district will be.

In some schemes, additional points can be credited within the quality levels. A maximum of 100 points can be credited.

NO.	INDICATOR		POINTS
1	**Barrier-free area**		
	City **Business** **Event** **Commercial**		**max. 30**
1.1	**Barrier-free design index**		
	City **Business** **Event** **Commercial**		**0 - 30**
	■ ≤ 0.1		0
	■ ≥ 0.9		30
2	**Accessibility of the necessary infrastructure**		
	City **Business** **Commercial**		**max. 30**
	Event		**max. 20**
	The maximum walking distance that children, older or disabled people can be expected to walk to reach infrastructure is shorter. Therefore, the orientation and reference values for the social and economic infrastructure have been lowered. The maximum achievable points are capped in this indicator.		
2.1	**Local facilities**		
	City **Business** **Commercial**		**max. 30**
	Event		**max. 20**
	■ Education: Childcare and primary school max. walking distance 200m as the crow flies	**City** **Business**	+5
		Commercial	+5
	■ Playgrounds max. walking distance 200m as the crow flies	**City**	+5
	■ Local supply 1: Full-range supplier (offer of goods for daily needs) max. walking distance 400 m as the crow flies	**City** **Business**	+8
		Commercial	+8

NO.	INDICATOR		POINTS
	■ Local supply 2: Small-scale commercial retail (bakery, butcher, drugstore,...) max. walking distance 400 m as the crow flies	**City** **Business** **Commercial**	+7 +7
	■ Medical facilities: General practitioner max. walking distance 400 m as the crow flies		+5
	■ Bus or tram stop: max. walking distance 200 m as the crow flies		+5
	■ Catering**:** Restaurant, café, canteen, dining hall, etc. max. walking distance 400 m as the crow flies		+5
	■ Sanitary facilities: Toilet for disabled people max. walking distance 200 m as the crow flies	**Event**	+5
3	**Barrier-free design of the traffic areas** **City** **Business** **Event** **Commercial**		**max. 15**
3.1	**Barrier-free movement areas** **City** **Business** **Event** **Commercial**		**max. 15**
	■ Width of movement area on footpaths in the vicinity of schools, childcare facilities, leisure and care facilities, shopping centres, pedestrian crossings and passages: 3 m		+2
	■ Width of the movement area of footpaths at the narrowest point (in road space and in open spaces): 1.5 m		+2
	■ Width of the movement area on side walkways, in passages at cash registers and controls: 0.9 m		+2
	■ Resting places in front of public facilities: 1.5 x 1.5 m (e.g. as turning possibility, as a relaxing or resting area, at the beginning and end of a ramp, in front of house and building entrances etc.)		+2
	■ Movement area within footpaths: 2.0 x 2.5 m (after max. 18 m, within the visibility range)		+2
	■ Execute footpaths with a longitudinal gradient of 0-3 %, if necessary, with a gradient of 3-6 % only resting places at least every 10 m		+2
	■ Traffic-reduced road space: Orientation by means of tactile and optically contrasting guidance systems		+2

NO.	INDICATOR		POINTS
	■ Access, pedestrian crossing and passage with lowered pavement, perpendicular to the road, without visibility barriers		+2
	■ Different levels must be made accessible by means of DIN-compliant ramps or lifts (possibly also escalator or moving walkway)		+2
	■ Barrier-free public transport stops (height differences and distances to be overcome ≤ 3 cm, marked entry points, weather protection, movement areas not crossed by bicycle paths)		+2
	■ Sufficient parking spaces for disabled persons (3 % of the parking spaces, but at least 1 parking space; 1.5 m deep movement area next to the long side for transverse parking, 7.5 m long and 2.5 m wide for longitudinal parking)		+2
	■ Sufficient car parking spaces for disabled people in the immediate vicinity of the arena (corresponding to the total capacity of the arena: 15,000 - 20,000 visitors = at least 30 wheelchair users + at least 10 visually impaired; 20,000 - 30,000 visitors = at least 50 wheelchair users + 12 visually impaired; 30,000 - 50,000 = at least 75 wheelchair users + at least 15 visually impaired; > 50,000 visitors = at least 100 wheelchair users + at least 20 visually impaired)	**Event**	+2

Note: The listed aspects apply to the planning, construction and equipment of roads, squares, paths, public transport facilities and green areas accessible to the public, as well as to access to public transport and playgrounds.

NO.	INDICATOR	POINTS
4	**Visual information in the public area** **City** **Business** **Event** **Commercial**	**max. 10**
4.1	**Visual information elements** **City** **Business** **Event** **Commercial**	**max. 10**
	■ Adherence to the prescribed contrasts for characters and symbols, especially with emergency and warning functions as well as for information carriers (special care with custom solutions!)	+2
	■ Implementation of uniform, glare-free ambient lighting with accentuated illumination of important areas (e.g. stairs) and possible targets (e.g. information boards)	+2
	■ Selection of helpful colour combinations of visual object and surroundings	+2
	■ Compliance with the minimum character size depending on the observer distance	+2
	■ Affixing and durability of visual information	+2
	■ Easy comprehensibility and clarity (use of easy language)	+2
	■ Semantic grouping (information elements with related content should be spatially grouped together)	+2
	■ Information elements that direct and accompany a movement process should form a continuous information chain	+2

NO.	INDICATOR	POINTS
5	**Tactile walking surface indicators in public areas** City Business Event Commercial	**max. 8**
5.1	**Surface protection measures** City Business Event Commercial	**max. 8**
	■ Uniform orientation of the surface structure e.g. at crossing points	+2
	■ Systematic repeatability	+2
	■ Anti-slip properties	+2
	■ Contrasting accompanying stripes with luminance contrast (K > 0.4)	+2
	■ Safety distance from the kerb	+2
6	**Additional devices for blind and partially sighted people** City Business Event Commercial	**max. 4**
6.1	**Signalling systems in road traffic** City Business Event Commercial	**max. 4**
	■ Facilitated locating of the pedestrian passageway as well as the signal transmitter mast by means of request button and tactile signs	+2
	■ Recognition of the release signal for the pedestrian passageway	+2
	■ Safe and straight-line road crossing is possible	+2
7	**Planning basis** City Business Event Commercial	**max. 3**
7.1	**Luminance contrast & two-sense principle** City Business Event Commercial	**max. 3**
	■ Luminance contrast (relative luminance difference of adjacent surfaces; can be supported by colouring) systematic repeatability	+1
	■ Two-senses principle: simultaneous transmission of information for two senses (visual, tactile and auditory)	+2

NO.	INDICATOR	POINTS
8	**Spaces for disabled people**	
	Event	**max. 10**
8.1	**Luminance contrast & two-sense principle**	
	Event	**max. 10**
	■ Sufficient seats and space for disabled people (according to the total capacity of the arena: 15,000 - 20,000 visitors = at least 30 wheelchair users + at least 10 visually impaired; 20,000 - 30,000 visitors = at least 50 wheelchair users + 12 visually impaired; 30,000 - 50,000 = at least 75 wheelchair users + at least 15 visually impaired; > 50,000 visitors = at least 100 wheelchair users + at least 20 visually impaired)	+2
	■ Seats and spaces are arranged separately, even, roofed, rainproof and have an unobstructed view	+2
	■ Seats and spaces are numbered, size according to E DIN 18040-1, with short and unobstructed access (easily accessible)	+2
	■ Seat for accompanying people, arranged laterally to the disabled seat	+2
	■ Seat for blind or visually impaired people with the possibility of auditory tracking of the event by radio transmission	+2
9	**Barrier-free design of the open space**	
	Industry	**max. 50**
9.1	**Quality level 1**	
	Industry	**max. 10**
	Barrier-free **public transport stops** outside the system boundary, max. distance **500 m** from barrier-free **access to the factory premises** (height differences to be overcome and distances ≤ 3cm, entry points marked)	10

NO.	INDICATOR	POINTS
9.2	**Quality level 2**	
	Industry	**max. 20**
	Compliance with quality level 1 and: ■ Sufficient car parking spaces for disabled people (3 % of the parking spaces, but at least 1 parking space; 1.5 m deep movement area next to the long side for transverse parking, 7.5 m long and 2.5 m wide for longitudinal parking) ■ Barrier-free public transport stops outside the system boundary, max. distance 400 m from barrier-free access to the factory premises (height differences to be overcome and distances ≤ 3 cm, entry points marked)	20
9.3	**Quality level 3**	
	Industry	**max. 40**
	Compliance with quality level 2 and: ■ Width of the movement area of footpaths at the narrowest point (in road space and in open spaces): 1.5 m ■ Footpaths executed with a longitudinal gradient of 0% - 3%, if necessary, with a gradient of 3%- 6%, with resting places at least every 10 m ■ Barrier-free public transport stops outside the system boundary, max. distance 300 m from barrier-free access to the factory premises (height differences to be overcome and distances ≤ 3 cm, entry points marked)	40
9.4	**Quality level 4**	
	Industry	**max. 50**
	Compliance with quality level 3 and: ■ Barrier-free public transport stops outside the system boundary, max. distance 200 m from a barrier-free access to the factory premises (height differences to be overcome and distances ≤ 3 cm, access points marked, weather protection, movement areas not crossed by bicycle paths)	50
10	**Barrier-free building design**	
	Industry	**max. 50**
	In principle, a distinction must be made between two building categories for the evaluation: ■ Administration buildings: Buildings with > 20% of the usable area with office and administrative use, conference use, canteen use and uses with visitor traffic. ■ Industrial buildings: Buildings which mainly have production-related functions. The secondary uses (according to 1) are < 20 % of the usable area. Industrial buildings are not further addressed in criterion SOC 2.1.	

NO.	INDICATOR	POINTS
10.1	**Quality level 1** ■ All main outdoor accesses to the building uses according to (1) and designated circulation areas for people are barrier-free. ■ In addition, there is at least one barrier-free bathroom (in accordance with DIN 18040-1) in each head office building, buildings with visitor traffic and canteens. Alternatively, if necessary, feasibility can be demonstrated by means of a planning concept. This only applies to quality level 1. The above requirement applies to: All new buildings: 100 % of the GFAa All existing buildings (older than 3 years): 50 % of the GFAa. If retrofitted, a side entrance can also be built barrier-free.	10
10.2	**Quality level 2** **Industry** Compliance with quality level 1 and additional requirement for new buildings: ■ 5% - 50% of the areas in the building are barrier-free in accordance with DIN 18040-1, as well as all outdoor areas necessary for development The reference value is the total gross floor area of all new buildings within the system boundary. The evaluation can be interpolated. For **Existing buildings**: Only the indoor traffic areas are considered.	**10 - 30** 10 - 30
10.3	**Quality level 3** **Industry** Compliance with quality levels 1 and 2 and: ■ 50% - 100% of the areas in the building are barrier-free in accordance with DIN 18040-1, as well as all outdoor areas necessary for development The evaluation can be interpolated. For **Existing buildings**: Only the indoor circulation areas are considered.	**30 - 50** 30 - 50

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As key performance indicators/KPIs, it is appropriate to communicate the proportion of indoor barrier-free areas and the number of barrier-free sanitary facilities.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Barrier-free areas index	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Barrier-free accessibility indoor is evaluated in criterion SOC2.1.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

Barrier-free design increases the value and attractiveness for all population groups. It mainly affects people with motor and sensory disabilities, but also children and their parents.
As a result of demographic change, the proportion of people with limited mobility due to age will increase in the future. Future-oriented and sustainable development must do justice to that.

II. Additional explanation

City **Business**

The barrier-free use of urban districts includes

- Primary traffic areas
- Disabled car parking spaces
- Outdoor areas necessary for the development
- Barrier-free entrances
- Bathrooms for disabled people in relevant parts of buildings

Basic information on barrier-free design:

- In principle, a district is freely accessible if all district access points (the district boundaries must be clearly defined) pose no obstacle for people with motor or sensory disabilities. The barrier-free use of the district must be possible and safe without foreign support.
- In order to ensure equal use, the centralised bundling of common areas is to be seen as positive, as it avoids long distances.
- In addition, barrier-free access to public transport and private transport must be ensured, controllable by the number of stops, the quality of stops and buses (e.g. low-floor buses) and the number of disabled parking spaces.
- Tactile and acoustic measures to increase user safety are positively evaluated within the implementation of the relevant DIN standards, as is the choice of floor covering surfaces.

Industry **Commercial**

A barrier-free or handicapped accessible industrial site guarantees freedom of movement in the outdoor areas, accessibility to all buildings, as well as accessibility to relevant building areas. This is the only way to ensure that everyone can use the facilities for the intended purpose. The barrier-free use of industrial sites includes

- Primary traffic areas
- Disabled car parking spaces
- Outdoor areas necessary for the development
- Barrier-free access to buildings
- Barrier-free access to parts of buildings

III. Method

City **Business** **Event** **Commercial**

Indicator 1: Barrier-free area

In the first step, the barrier-free area is determined quantitatively. For this purpose, the barrier-free developed open space (without water areas, see system basics) must be set in relation to the total open space.

FIGURE 1 Exemplary illustration of how the areas in a district can be categorised with regard to accessibility (source: own illustration based on Faerber planning)

Public green spaces (PGS) are designed barrier-free if the green space is accessible to many people with limited motor abilities.

For all open spaces, a distinction is made between easy, medium and difficult to drive on surfaces. The surface properties for each surface in terms of accessibility are included in the master tool provided by the DGNB.
The evaluation depends strongly on the material and the execution. When awarding evaluation points, the auditor has the possibility to take into account project-specific features or to assess the classification and provide appropriate documentation.

Calculation formula:

$$IB = ((SAOS_1 \times FB_{1)} + (SAOS_n \times FB_{n)})) / OS \qquad (1)$$

with

IB	Barrier-free index
SAOS	Sub-area open space [m²]
FB	Barrier-free factor
OS	Total open space [m²]

Example:
(SAOS1 x FB1) + (SAOS2 x FB2) = 44.580 m²
OS = 55.000 m²
IB = 44.580 m² / 55.000 m² = 0.81

In addition to the surface properties of the individual areas, for evaluation it is also relevant that these areas are connected in a barrier-free manner (ramps, lifts, etc.). If one area is not connected to another in a barrier-free manner, it is not taken into account in the calculation.

Indicator 2: Accessibility of the necessary infrastructure
The average accessibility of selected facilities/infrastructures is assessed according to “Method 3 - Determination of accessibility” of the system basics. In addition to the distance, it is also necessary to prove that these facilities are accessible without barriers. This also applies to facilities that cannot be accessed directly due to obstacles such as a river or a major road.

In addition, barrier-free design is evaluated using the following indicators:
Indicator 3: Barrier-free design of the traffic areas
Indicator 4: Visual information in the public area
Indicator 5: Tactile walking surface indicators in public areas
Indicator 6: Additional devices for blind and partially sighted persons
Indicator 7: Planning basis
Indicator 8: Spaces for disabled people

Barrier-free design is qualitatively evaluated based on selected measures described in DIN standards on barrier-free design. In principle, DIN standards are available for use to anyone. This means the use is on voluntary basis and not required. The evaluation of selected components thus goes beyond the legal requirements.

Industry

The criterion is evaluated qualitatively according to the degree to which barrier-free design is fulfilled. The more traffic areas, outdoor and building areas are barrier-free (particularly with regard to motor, sensory and cognitive impairments) and geared to the needs of all people, the better the evaluation of the industrial site will be.

Traffic and outdoor facilities
A separate standard DIN 18040-3 is planned for public spaces (for a short time as DIN 18070 “Barrier-free built environment - design principles. Public transport and open space”). It will replace DIN 18024-1. Until its publication, : DIN 18024-1: 1998-01: “Barrier-free built environment - Part 1: Streets, squares, paths, public transport, recreaction areas and playgrounds; design principles” continues to be valid.

Publicly accessible areas
The measure for the minimum requirement (limit value) complies with the generally recognised rules of technology for barrier-free design in accordance with § 8 1 BGG (the German Law on Equal Opportunities for the Disabled), in particular the barrier-free design of publicly accessible buildings in accordance to the currently valid building model regulations. Additional requirements to the this are: Barrier-free entrances must always be implemented in the main entrance areas for barrier-free access for visitors and in the area of the staff entrance(s) for employees.

Other areas not accessible to the public
The level of barrier-free accessibility is also evaluated for areas not intended for public use. A positive evaluation is to be made if at least parts of these other non-publicly accessible areas of use are designed in a barrier-free manner in accordance to DIN 18040. This applies with regard to particular areas to which people with disabilities usually need to have access. These areas can differ according to the type of use (e.g. offices and meeting rooms, traffic routes, escape routes, doors, sanitary rooms, etc.)

Indicators:
Indicator 9: Barrier-free design of the open space
Indicator 10: Barrier-free design of the buildings

IV. Scheme-specific description

Industry **Commercial**

In principle, a distinction must be made between two building categories for the evaluation:

(1) Administration building: Buildings with > 20% of the usable area with office and administrative use, conference use, canteen use and uses with visitor traffic.

(2) Industrial buildings: Buildings which mainly have production-related functions. The secondary uses (according to 1) are < 20 % of the usable area. Industrial buildings are not further addressed in criterion SOC 2.1.

The criterion is evaluated qualitatively according to the degree to which barrier-free design is fulfilled. The more traffic areas, outdoor and building areas are barrier-free (particularly with regard to motor, sensory and cognitive impairments) and geared to the needs of all people, the better the evaluation of the industrial site will be.

- Traffic and outdoor facilities
  A separate standard DIN 18040-3 is planned for public spaces (for a short time as DIN 18070 “Barrier-free built environment design principles. Public transport and open space”). It will replace DIN 18024-1. Until its publication: DIN 18024-1: 1998-01: “Barrier-free built environment - Part 1: Streets, squares, paths, public transport, recreation areas and playgrounds; design principles” continues to be valid.
- Publicly accessible areas
  The measure for the minimum requirement (limit value) complies with the generally recognised rules of technology for barrier-free design in accordance to § 8 1 BGG (the German Law on Equal Opportunities for the Disabled), in particular the barrier-free design of publicly accessible buildings in accordance to the currently valid model building regulations. Additional requirements to the MBR: Barrier-free entrances must always be implemented in the main entrance areas for barrier-free access for visitors and in the area of the staff entrance(s) for employees.
- Other areas not accessible to the public
  The level of barrier-free accessibility is also evaluated for areas not intended for public use. A positive evaluation is to be made if at least parts of these other non-publicly accessible areas of use are designed in a barrier-free manner in accordance with DIN 18040. This applies with regard to particular areas to which people with disabilities usually need to have access. These areas can differ according to the type of use (e.g. offices and meeting rooms, traffic routes, escape routes, doors, sanitary rooms, etc.)

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **documentation/calculation** ■ B1: Definition of the boundaries of the planning area and determination of the barrier-free developed areas as well as the accessibility of the necessary infrastructure ■ Display and determination of the areas in the existing planning material ■ Number of barrier-free public transport stops (including their catchment radius of 300 m) ■ Width and gradient of the pavement areas ■ Number and distance of common areas (for a pavement gradient of 3 % - 6 %) ■ B2: Verification of the planning area boundaries and determination of the barrier-free developed areas as well as the accessibility of the necessary infrastructure ■ Representation and determination of the areas in the existing planning material, adapted to the implementation status ■ B3: Expert opinion on “continuous barrier-free accessibility” or alternatively test run with differently disabled persons and evaluation of the test run ■ B4: Information on the barrier-free accessibility of the building development areas: Proportion of car parking spaces for disabled persons; overall concept description of the barrier-free design of the building’s access situation; information on the area proportions	B
Photo documentation of the implemented measures	C
Documentation of **planning documents**: - E1: Determination of the planning area boundaries and adaptation of the actually barrier-free developed areas as well as the accessibility of the necessary infrastructure, presentation and determination of the areas - E2: Information on the accessibility of primary traffic routes: Ground floor layout with outdoor facilities with transition to public space including parking spaces; relevant details; information on barrier-free design of relevant building areas: relevant floor plans, number of handicapped accessible bathrooms	E
Documentation via **master tool**: Categorisation of areas (proportion of accessible area is calculated automatically)	J

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Barrier-free area	A, B1, J	A, B2, C, E1, J	C, E1, J	-	-
2. Accessibility of the necessary infrastructure	A, B1	A, B2, C, E1	C, E1	-	-
3. Barrier-free design of the traffic areas	A, B	B2, B3, C	B3, C	-	-
4. Visual information in the public area	A, B	B2, B3, C	B3, C	-	-
5. Tactile walking surface indicators in public areas	A, B	B2, B3, C	B3, C	-	-
6. Additional devices for blind and partially sighted persons	A, B	B2, B3, C	B3, C	-	-
7. Basis for design	A, B	B2, B3, C	B3, C	-	-
8. Spaces for disabled people	A, B	B2, B3, C	B3, C	-	-
9. Barrier-free design of the open space	-	-	-	A, B1, B2, B4	B2, C, E2
10. Barrier-free design of the buildings	-	-	-	A, B1, B2, B4	B2, B4, C, E2

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Act on the equality of disabled persons (Disability Equality Act - BGG) of 10 July 2018: § 4 Design for all, § 8 Establishing accessibility in the areas of construction and transport.
- DIN 18024-1: Streets, squares, paths, public transport, recreation areas and playgrounds
- DIN 18070: Barrier-free built environment - design principles. Public transport and open space.
- DIN 32984: Tactile walking surface indicators in public areas.
- DIN 32981: Tactile and acoustic devices for blind and partially sighted persons on traffic signals - Requirements.
- DIN 32975: Designing visual information in the public area for accessible use.
- DIN 18040-1: Construction of accessible buildings - Design principles - Part 1: Publicly accessible buildings.

Links:

- www.thueringen.de/de/publikationen/pic/pubdownload678.pdf.
- www.ab-nrw.de.

SOC3.1

Urban design

Objective

The objective is to contribute cultural identity by establishing and maintaining consistent urban structure as part of the city as a whole.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Implementation of the overall planning objectives for the benefit of the general public
- Value stability of the district / area by increasing its attractiveness for users and residents

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Significant	11.A Promotion of the urban-rural relationship	

Outlook

A change in weighting and importance of the subject is not to be expected.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**2.6 %**	**3**
Commercial	**2.7 %**	**3**
Industry	**3.6 %**	**4**

ASSESSMENT

The urban design and integration of the district is evaluated in this criterion. In addition, it is evaluated whether a high-quality building acts as a motivator/ attractor in the district. A maximum of 100 evaluation points can be achieved.

NO.	INDICATOR	POINTS
1	**Urban design integration** **City** **Business** **Event** **Industry** **Commercial**	**max. 50**
1.1	**Integration into the urban design and urban structure** **City** **Business** **Event** **Industry** **Commercial** The following aspects should be considered: Morphology/structures, scale, visual axes, interfaces, height development.	**max. 20**
	■ The urban design and urban structures have been analysed/ examined.	+10
	■ The project has been integrated into the urban design and urban structure according to the findings of the analysis in the urban development concept.	+10
1.2	**Integration into the development network** **City** **Business** **Event** **Industry** **Commercial** The following aspects should be considered: Roads, public transport lines, bicycle and footpaths.	**max. 10**
	■ The development network has been analysed.	+5
	■ The project has been integrated into the development network according to the findings of the analysis in the traffic concept	+5
1.3	**Integration into the higher-level planning/factory framework planning** **City** **Business** **Event** **Industry** **Commercial**	**max. 10**
	■ The formal and informal higher-level planning has been analysed.	+5
	■ The integration of the project into the formally and informally higher-level planning is comprehensibly derived from the findings of the analysis in the urban development concept.	+5

NO.	INDICATOR	POINTS
1.4	**Integration of existing buildings** City Business Event Industry Commercial	max. 10
	■ There is an analysis/examination of the existing and identity-forming buildings.	+5
	■ The integration of existing and identity-forming buildings in the urban development concept is derived in a comprehensible manner from the findings of the analysis.	+5
2	**Urban design qualification** City Business Event Industry Commercial	max. 20
2.1	**Higher-level design concept** City Business Event Industry Commercial	
	A guideline for the architectural design, which defines important design elements, but simultaneously offers freedom for the individual architect (e.g. facade structure) is available.	City Business +4 Event Industry +4 Commercial +8
2.2	**Set of rules for the characteristics of buildings** City Business Event Commercial	
	The guideline, includes volume characteristics, beyond the volumetric specification of the land-use plan (transparency, permeability, massiveness, edges, lines, etc.) and thus significantly influences the overall impression of the area	City Business +4 Event Commercial +4
2.3	**Material, colour, texture** City Business Event Industry	
	The urban planning and design concept includes a guideline for the material concept for architecture (coherence, local materials, regional features/building culture, characteristics in general, steel, glass, plaster, stone, minimum and/or maximum ratios, etc.)	City Business Event +4 Industry +8
2.4	**Design of prominent buildings in terms of urban design** City Business Event Industry Commercial	
	Staging competitions or comparable procedures to ensure design quality= for buildings at prominent locations in the district (e.g. entrance situations) in terms of urban design	City Business +4 Event Industry +8 Commercial +4

NO.	INDICATOR		POINTS
2.5	**Design of private parking spaces and ancillary facilities** **City** **Business** **Commercial** Guideline for the design of private parking spaces and ancillary facilities (e.g. parking spaces, carports, garages, outbuildings, waste collection facilities)	**City** **Business** **Commercial**	+4 +8
3	**Impulse / Attractor** **City** **Business** **Event** **Industry** **Commercial**		**max. 30**
3.1	**Impulse by use** **City** **Business** **Event** **Industry** **Commercial** There is a new use / a new building for the district, which has a unique regional selling point or results in supra-regional visits and / or attracts new uses / employers / recreation (e.g. outlet city, adventure worlds etc.).		**+15**
3.2	**Impulse by spatial and design aspects** **City** **Business** **Event** **Industry** **Commercial** Building / use as an extraordinary building project with attracting effect and effect as a district “activator” (e.g. 50Hertz building Berlin) or buildings / use as namesake for the district (e.g. Alnatura Campus, Ricola Kräuterzentrum, Torre Agbar, Kulturbrauerei Berlin, ZKM Karlsruhe etc.).		**+15**
On 3.	**INNOVATION AREA** Explanation: If extraordinary impulses are given to the district / location, that are achieved outside the defined aspects above, these can also be credited. These may include architectural or constructional innovations.		**As in 3.**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

It is appropriate to communicate the offerings for communication, for users and for families, children and seniors as a number.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	-	[-]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Synergies with the criterion SITE1.2 Impact and influence on the district. Indicator 3 in SOC3.1 (districts) can be credited directly to indicator 4 SITE1.2 (buildings).

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

The district planning should implement essential goals of the higher-level planning. Higher-level planning is understood to be the planning of different planning levels and their specialist planning. These include regional planning, urban development planning, landscape planning, land use planning and urban framework planning.

Industry **Commercial**

The objective of the criterion is to integrate the industrial site in the best possible way and to implement the higher-level planning. Higher-level planning is understood to be the planning of different planning levels and their specialist planning. These include regional planning, urban development planning, landscape planning, land use planning and urban framework planning.

II. Additional explanation

III. Method

City **Business** **Event** **Industry** **Commercial**

The urban design quality of a district is evaluated using the following qualitative indicators:

Indicator 1: Urban design integration
This indicator evaluates the way the existing urban design and urban structure, the development network, the derivation of the overall planning and the existing buildings are handled.

Traffic/mobility planning as essential higher-level sectoral planning serves the best possible networking of the district/industrial site with the city. For this reason, particular attention has to be paid to the networking or connection to roads, bicycle paths and footpaths. According to a sustainable district/industrial site, the integration in the existing public transport system for inhabitants/employees is essential.

Landscape integration takes into account the connection and integration of water bodies, the continuation of green corridors, the integration of trees and forests, the creation of biotopes and their interconnection as well as the importance of native factory species and other landscape elements.

The integration in the surrounding urban design and urban structure especially takes into account the orientation within a city. Visual axes, high points, but also differentiated public spaces and the morphology of the city are of particular importance. While cityscapes and the city silhouette primarily influence the overview of the city and its effect from a distance, criteria such as scale, storey height/depth, building site size, urban density and the construction method have a strong influence on the location's identity.

Functional integration refers to the further development of the uses surrounding the project area, the integration of new and complementary functions, the support of local initiatives and the densification of uses in the catchment area of bus stops.

For **Industry**: The integration of the factory framework planning into the urban structure especially takes into account how the factory's plans react to the surrounding uses, in terms of use, disturbance and noise pollution and possible public crossing of the area (factory area is not a massive separated construction).

Indicator 2: Urban design qualification
Based on the urban development design, the urban design qualification is evaluated by means of specifications for the overall concept, the set of rules for the characteristics of building structures, the material, the design of characteristic buildings of urban design, the design of private open spaces, the design of private parking spaces and ancillary facilities, updating and monitoring.

IV. Scheme description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant. These are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents / expert opinions / files** ■ B1: Guideline for the design of the architecture, which is continuously updated and deals with the requested contents ■ B2: Excerpt from competition invitations or other procedures for buildings in significant locations in the district in terms of urban design	B
Photo documentation	C
Site plan with marking of implemented measures	D
Documentation of **planning documents:** Urban development design including structural and spatial concept ■ E1: Planning in form of the development plan / general framework plan with detailed open space and traffic planning for the industrial site and presentation of the relevant surroundings	E
Explanation from the city planner regarding to what extent individual elements were taken into account of the design	I

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1.Urban design integration	B, D, E, I	B, C, D, E, I	B, C, D, E, I	B, D, E, I	B, C, D, E, I
2.Urban design qualification	B, E, I	B, C, D, E, I	B, C, D, E, I	B, E, I	B, C, D, E, I

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Bott, Helmut; Jessen, Johann; Pesch, Franz (eds.) (2010): Lehrbausteine Städtebau: Basiswissen für Entwurf und Planung, Edition: 6. Institute of Urban Development at the University of Stuttgart.
- Schenk, Leonhard (2013): Stadt entwerfen: Grundlagen – Prinzipien – Projekte. Birkhäuser Verlag. ISBN-13: 978-3034613200.

SOC3.2

Social and functional mix

Objective

The objective is to make the district adaptable to social change, avoid segregation and gentrification and ensure a social and functional mix.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Creating and securing resilient sociocultural and functional structures
- Increasing the well-being of district users and residents
- Value stability of the district
- Mixed use means less traffic and associated emissions (CO_2, NO_X, noise etc.)

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	11.1	Affordable living space	11.3	Living
Low	1.1 1.2 1.4	Eradicate extreme poverty Halving poverty Access to economic resources, basic services and property	1.1.a/b	No poverty

Outlook

A change in weighting and importance of the subject is not to be expected.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**3.5 %**	**4**
Commercial	**4.5 %**	**5**

ASSESSMENT

The integration of the district into the social and functional context and the qualification of the social mix are evaluated to promote the social mix in the district. In order to avoid mono-structures in the **City**, it is rewarded not to exceed or undercut a certain proportion of use for living in the district. In total, 100 evaluation points can be credited.

NO.	INDICATOR		POINTS
1	**Social and functional integration**		
	City **Business** **Event** **Commercial**		**max. 20**
1.1	**Integration into the social and functional context**		
	City **Business**		**max. 15**
	Event **Commercial**		**max. 10**
	■ The social (population structure, living and working typologies) and functional context (usage structure, social and public facilities, commercial and local supply) of the surroundings is taken into account in planning.		+5
	■ In addition, the development of the district will generate significant improvements for the immediate surroundings.	**City** **Business** **Event** **Commercial**	+10 +5
1.2	**Integration of existing social structures or uses**		
	City **Business**		**max. 5**
	Event **Commercial**		**max. 10**
	Protection, preservation of previously existing structures. e.g. allotment gardens	**City** **Business** **Event** **Commercial**	5 10
2	**Qualification of the social mix**		
	City		**max. 40**
	Business **Event** **Commercial**		**max. 65**
2.1	**Demographic mix**		
	City **Business** **Commercial**		**max. 8**
	Event		**max. 40**
	■ For project areas smaller than 10 hectares, the surroundings (350 m) can be included in the evaluation.	**City** **Business**	+8 +8
	■ For **City**: There is a wide range of generation-specific offers and facilities (assisted living, clubs, kindergartens, district office, community centre, playgrounds, etc.) in the district.	**Commercial** **Event**	+8 +40
	■ For **Business** / **Commercial**: At least one facility is available per 5 hectares of district size, which is either designed inter-generationally or for children, young people or retired people in the commercial district (for 10 hectares there would have to be 2 facilities).		

NO.	INDICATOR		POINTS
On 2.1	■ For **Event**: Measures are taken to ensure that socially disadvantaged and different age groups can participate in the events (e.g. free tickets for the socially disadvantaged). 10 points can be awarded per measure.		
2.2	**Forms of ownership**		
	City		**max. 4**
	Are there differentiated forms of ownership in the district or is the district being developed by different developers, investors, building cooperatives, building groups, etc.?		+4
2.3	**Property offerings**		
	City **Business** **Commercial**		**max. 4**
	Does the design provide for a subdivision of the project area into different construction areas (grain size, size, modelling), which can be developed and supplied independently (TG etc.)?		+4
2.4	**Differentiated construction types/forms of workplaces**		
	City		**max. 8**
	Business **Commercial**		**max. 12**
	The mix of building types for residential and commercial use also influences the social mix of the district.	**City**	+8
		Business **Commercial**	+12
	■ For **City**: 2 points can be awarded for each building type (e.g. semi-detached, terraced, garden courtyard, terrace house or city villa, residential cell, multi-storey dwelling, point, disk tower or chipboard building types or buildings with access to pergolas, loft, special forms for city districts) that achieves at least 10% of the total GFAR.		
	■ For **Business** / **Commercial**: 3 points can be awarded for each workplace type (e.g. production halls, workshops, office buildings > 5,000 m² gross floor area, commercial/sales areas, hotels, meeting places, restaurants, sports and leisure buildings) that achieves at least 10% of the total gross floor area for non-residential use.		
2.5	**Lively ground floor zone**		
	City		**max. 13**
	Share of non-residential use on the ground floor along the main road axes / squares in the district. For **Business**: Share of non-office use (service providers, shops, restaurants, day-care centres, ...) on the ground floor along the main road axes / squares in the district		
	■ 10 – ≥ 80 percent non-residential use in ground floor zones	**City**	5 - 13
	■ ≥ 15 percent non-office use in ground floor zones	**Business**	5

NO.	INDICATOR			POINTS
2.6	**Types of housing**			
	City			**max. 8**
	■ Are there programmes, initiatives or subsidies that enable innovative housing types in the district (building groups, generation houses, subsidised housing construction)?			+8
	■ 4 points can be awarded per programme, funding or initiative.			
2.7	**Different company sizes**			
	Business **Commercial**			**max. 8**
	■ Are companies with an annual turnover of less than 50 million euros as well as more than 50 million euros located in the district?			+8
	■ Each of the two categories (smaller and larger than 50 million annual company turnover) must reach at least 10% of the total GFA_{DGNB}.			
	■ The annual turnover refers to the individual company, not to the part that is generated in the district. The annual turnover of the individual companies in total is irrelevant for the evaluation.			
2.8	**Differentiated industry structure**			
	Business **Commercial**			**max. 33**
	Event			**max. 25**
	The district consists of two or more industries (for examples see method), which accounts for at least 10% of the total GFA each (for **Events** 5% of the GFA_{DGNB}).			
	■ 2 uses with more than 10 % of the GFA each	**Business** **Commercial**		10
			Event	5
	■ 3 uses with more than 10 % of the GFA each	**Business** **Commercial**		17
			Event	10
	■ 4 uses with more than 10 % of the GFA each	**Business** **Commercial**		24
			Event	20
	■ ≥ 5 uses with more than 10 % of the GFA each	**Business** **Commercial**		33
			Event	25

NO.	INDICATOR	POINTS
3	**Share of use**	
	City	**max. 40**
	Business **Event** **Commercial**	**max. 15**
3.1	**Share of use of urban districts**	
	City	**max. 25**
	The percentage of residential use (GFAR) in relation to the total GFA in the district is	
	■ 0.0 - 20.0 % = 0 points	+20
	■ 20.1 - 30.0 % = 10 points	
	■ 30.1 - 50.0 % = 15 points	
	■ 50.1 - 70.0 % = 20 points	
	■ 70.1 - 80.0 % = 15 points	
	■ ≥ 20 % of residential use are social housing	+5
3.2	**Strengthening of the local economy**	
	City **Business** **Event** **Commercial**	**max. 15**
	■ There is an overarching concept to strengthen the local economy - both in the project area and in the surrounding area.	+5
	■ Concept measures were implemented.	+10

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

It is appropriate to communicate the measures and facilities for of communication, for users and for families, children and seniors as a number.

NO.	KEY FIGURES/KP	UNIT
KPI 1	Categories residence sizes	[Number]
KPI 2	Differentiated industry structure	[%]
KPI 3	Share of residential use (GFAR)	[%]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** -

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event**

A social and functional mix as a planning objective for sustainable settlements and urban developments is imperative. A balanced mixture creates resilient socio-cultural and functional structures. These promote synergies between users/inhabitants and establish connections between local economic actors. This helps to keep a district stable in the long run.
At the same time, numerous traffic science studies show that dense and mixed-use districts generate less traffic than loosely populated monofunctional districts. Mixed use thus makes a significant contribution to reducing traffic volumes and the associated emissions (CO_2, NOx, noise, etc.).

II. Additional explanation

III. Method

City **Business** **Event** **Commercial**

The social and functional mix is evaluated using the following qualitative indicators:

Indicator 1: Social and functional integration
The indicator is evaluated according to embedding the social and functional context, derivation of the overall planning and handling of existing social structures and uses.

Indicator 2: Qualification of the social mix
The indicator is evaluated according to the demographic mix, differentiated forms of ownership and diverse typologies. In addition, residence sizes and types of housing are evaluated for urban districts.

Indicator 3: Share of use
The indicator is evaluated according to the share of use in the district, the concept of mixed use and use synergies. In addition, the integration of commercial locations or housing in commercial districts and the strengthening of the local economy are evaluated. When strengthening the local economy, industrial estates must not only be planned locally, but integrated into the region. In addition, the provision of small-scale areas for business parks and incubators can promote “bottom-up” strategies.

The following list can be used to determine uses for a differentiated industry structure:

- Industry 1: Agriculture, forestry and fisheries
- Industry 2: Mining
- Industry 3: Manufacturing industry
- Industry 4: Electricity, gas and steam generation
- Industry 5: Water supply
- Industry 6: Construction industry
- Industry 7: Wholesale and retail commercial; repairers of motor vehicles
- Industry 8: Transport and storage
- Industry 9: Hotels and restaurants (accommodation and catering)
- Industry 10: Information and communication
- Industry 11: Credit and finance
- Industry 12: Real estate industry
- Industry 13: Freelance, scientific and technical services
- Industry 14: Administration, management
- Industry 15: Public administration, defence, social security
- Industry 16: Education
- Industry 17: Health and social work
- Industry 18: Arts, entertainment and recreation
- Industry 19: Other services
- Industry 20: Private households with domestic staff
- Industry 21: Extraterritorial organisations and corporations

For usage synergies, concepts for special/mixed uses on a regional, city-wide or district scale can be taken into account.

- At regional level, industrial sites, incubators, technology and innovation centres or science, technology or research parks and sports camps are exemplary for industrial districts.
- At city level, special forms of retail commercial, leisure facilities and culture, among others, are exemplary for commercial districts.
- At level of the immediate surroundings, facilities for daily needs, leisure facilities and culture are examples of commercial districts (e.g. residents form cooperatives and finance supermarkets)
- Inexpensive rooms for start-ups, small crafts.

IV. Scheme description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Commercial**

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Photo documentation of the implemented measures ■ C1: Aerial photographs with number of years before the development with entry of the boundary of the district	C
Site plan with marking of implemented measures ■ D1: Presentation of the overall planning with regard to social and functional aspects and the location of the district ■ D2: Site plan (as described in System Basics) with registration and categorisation of the uses in the surrounding area and the social infrastructure	D
Documentation of **planning documents:** urban development design including uses of the surroundings and in the district, which must be continuously updated and deal with the contents requested. In addition, the forms of ownership, the possibility of subdividing the building plots and the commercial uses with potential for disturbance should be evident	E
Explanation: ■ I1: Explanation of programmes, subsidies, initiatives and concepts ■ I2: Explanation of how commercial uses with potential for disruption were integrated into the district, what usage synergies were generated at different scale levels and how the local economy was supported ■ I3: Explanation of the social and functional context (current status) by urban planners/sociologists and description of improvement measures, if necessary	I
Mastertool Categorisation of building areas/building types/company sizes/industries in the district in the “master-tool”. The percentage mix of building types/residence sizes/companies/industries and the resulting evaluation are calculated automatically. Letters of intent are feasible for buildings, where plans have not been drawn up yet. It can be based on an area depiction of the district.	J

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Social and functional integration	A, C1, D, E, I3	C(1), D, E, I3	C(1), D E, I3	-	-
2. Qualification of the social mix	A, E	C, D, E, I1	C, D, E, I1	-	-
3. Share of use	A, E, J	C, D, E, I1-2, J	C, D, E, I1-2, J	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- BBR (Ed.) (2000): Nutzungsmischung im Städtebau, Bonn.
- Bott, Helmut; Jessen, Johann; Pesch, Franz (Hrsg.) (2010): Lehrbausteine Städtebau: Basiswissen für Entwurf und Planung, Edition: 6. Institute of Urban Development at the University of Stuttgart.
- Harlander, Tilman; Kuhn, Gerd (Ed.) (2012): Soziale Mischung in der Stadt: Case Studies – Wohnungspolitik in Europa – Historische Analyse. ISBN-13: 978-3782815390.
- Läpple, Dieter (2000): Städtische Arbeitswelten im Umbruch. In: Heinrich-Böll-Stiftung (Ed.): Das neue Gesicht der Stadt. Berlin.

SOC3.3

Social and commercial infrastructure

Objective

Our objective is to ensure that the users of the district are supplied with close, easily accessible, social and commercial infrastructure, which is integrated into an overall urban concept, thus creating social acceptance of the district.

Benefits

The following benefits can be achieved for companies, municipalities and/or users. On the one hand, there is the increase in well-being through short distances to facilities for daily needs, and on the other hand, the revitalisation of the district through more intensive use of public space. Furthermore, the reduction and shifting of traffic as well as the associated emissions (noise, CO_2, NO_X) and the value stability of the district by increasing the attractiveness for users and residents are significant.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate			11.2.b	Mobility
Low	11.7	Access to public spaces and green areas	4.2.a/b	Perspectives for families

Outlook

A change in weighting and importance of the subject is not to be expected.

Share of total score

	SHARE	WEIGHTING FACTOR
City **Business** **Event**	**2.6 %**	**3**
Commercial **Industry**	**2.7 %**	**3**

ASSESSMENT

The social and commercial infrastructure is an exclusion criterion in the DGNB certification system for urban districts. An urban district that does not meet the minimum requirement of 5 points in the indicators for evaluating education and local supply facilities each (10 points in total) cannot be certified. In the criterion, the distances to relevant social and commercial infrastructure facilities are determined and rated as “close and easily accessible” if they are within a certain distance. Furthermore, it is evaluated which infrastructural offers are available for the users directly in the district. More than 100 evaluation points can be achieved in total, however only a maximum of 100 evaluation points can be credited.

NO.	INDICATOR		POINTS
1	**Social infrastructure**		
	City **Business**		**max. 50**
	Event		**max. 25**
	Commercial		**max. 20**
	Industry		**max. 15**
1.1	**Distance to facilities**		
	City **Business**		**max. 50**
	Event		**max. 25**
	Industry		**max. 15**
	Commercial		**max. 20**
	Education 1: Childcare and primary school (maximum distance as the crow flies 350 m). For **City** **Business** **Event** max. walking/driving time by public transport 10 min., max. distance as the crow flies 700 m. 5 points per facility. For **Commercial** max. walking time of 10 minutes in total + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: max. cycling time 15 minutes. The maximum number of points can be credited if both facilities are accessible. Otherwise the points can be calculated proportionately.	**Commercial** **City** **Business** **Event**	+20 +15 +10
	Education 2: Secondary or vocational school (max. walking/driving time by public transport 15 min., max. distance as the crow flies 1300 m)	**City** **Event** **Business**	+5 +10
	Free time: Art and culture (cinema, theatre, galleries, (factory) museums), library, district centre, community centre, youth room, senior citizens’ meeting place etc. For **City** **Business** **Event** max. walking/driving time by public transport 10 min., max. distance as the crow flies 700 m. 5 points per facility. For **Industry** **Commercial** max. walking time (from the factory gate) 10 minutes + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: maximum cycling time 15 minutes. 5 points per facility.	**City** **Business** **Event** **Industry** **Commercial**	max.15 max. 5 max. 5
	Playgrounds (max. distance as the crow flies 350 m)	**City**	+10

NO.	INDICATOR		POINTS
	Sports facilities: Gymnasium and sports hall, open-air sports grounds/sports field with athletics, indoor or outdoor swimming pool etc. For **City** **Business** **Event** (max. walking/driving time by public transport 10 min., max. distance as the crow flies 700 m) For **Industry** **Commercial** max. walking time (from the factory gate) 10 minutes + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: max. cycling time 15 minutes	**City** **Event** **Business** **Industry** **Commercial**	+5 +10 +5
2	**Commercial infrastructure**		
	City **Business**		**max. 50**
	Event		**max. 25**
	Industry		**max. 50**
	Commercial		**max. 45**
2.1	**Supply with commercial infrastructure**		
	City **Business**		
	Event		
	Industry		
	Commercial		
	There is a retail/centre concept in which the district/location is integrated.	**City** **Business** **Event** **Industry** **Commercial**	+10 +10 +10
	Local supply 1: Offer of goods for daily use is available on-site (except orders from e-commerce platforms). For **City** **Business** **Event** (max. walking/driving time by public transport 10 min.), (max. distance as the crow flies 700 m) For **Industry** **Commercial** max.. walking time (from the factory gate) 10 minutes + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: max. cycling time 15 minutes	**City** **Business** **Event** **Industry** **Commercial**	+15 +5 +15 +10
	Local supply 2: Small-scale commercial retail (bakery, butcher, drugstore etc.) (max. walking/driving time by public transport 10 min.), (max. distance as the crow flies 700 m) For **City** **Industry** **Commercial**, one point can be credited per shop. For **Business**, two points can be credited per business. For **Industry** **Commercial**, (max. walking/driving time by public transport/bicycle 15 min.).	**City** **Industry** **Commercial** **Business**	max. +5 max.+5 max.+10
	Local supply 3: Weekly market (max. walking/driving time by public transport 10 min.), (max. distance as the crow flies 700 m)	**City** **Event**	+5

NO.	INDICATOR		POINTS
	Catering: Restaurant, café, canteen, dining hall etc. For **City** **Business** **Event** max. walking/driving time by public transport 10 min., max. distance as the crow flies 700 m. 5 points per facility. For **Industry** **Commercial** max. walking time (from the factory gate) 10 minutes + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: maximum cycling time 15 minutes.	**City** **Event** **Business** **Industry** **Commercial**	+5 +10 +5
	Other services: Bank, post office, (service provider independent) parcel station, hairdresser, wellness etc. For **City** **Business** **Event** max. walking/driving time by public transport 10 min., max. distance as the crow flies 700 m. 5 points per facility. For **Industry** **Commercial** max. walking time (from the factory gate) 10 minutes + max. travel time by public transport 10 minutes (total travel time 20 minutes). Or alternatively: maximum cycling time 15 minutes.	**City** **Business** **Industry** **Commercial**	+5 +5
	Medical care 1: General practitioner, pharmacy, (max. walking/driving time by public transport 10 minutes)		
	■ General practitioner	**City** **Business** **Industry** **Commercial**	+7 +7
	■ Pharmacy	**City** **Business** **Industry** **Commercial**	+3 +3
	Medical care 2: Specialist, hospital etc. (max. walking/driving time by public transport 30 minutes)	**City** **Business**	+5
3	**Synergies and offerings for the public**		
	Event		**max. 50**
	Industry		**max. 55**
	Commercial		**max. 45**
3.1	**Concepts and ideas**		
	Event **Industry** **Commercial**		
	Utilization concept: There is a concept for the use of the area outside event/business hours, for the implementation a responsibility is defined.	**Commercial** **Event**	+5
	Daytime and evening use: The concept considers daytime and evening	**Commercial** **Event**	+5
	Additional uses: There are at least 2 additional social or commercial uses (besides the core use, e.g. services, gastronomy, sports hall) in the area/location that are open to the public.	**Event** **Industry** **Commercial**	+5 +15

NO.	INDICATOR			POINTS
	Free facilities: There are free regular facilities for at least 1 user group. 5 points per user group.	**Commercial** **Industry**		+5
			Event	+10
	Rental: There are areas that are (temporarily) available for rent to the public.	**Industry**	**Event**	+5
	Education: The area/location contains educational facilities (e.g. thematic museum, exhibition, guided tours).		**Event**	+5
		Industry	**Commercial**	+5
	Experience facilities s: There are facilities on site, which offer special experiences outside the event/location use (e.g. behind-the-scenes tour, viewing platform).	**Industry**	**Event**	+5
	Outdoor and indoor spaces for alternative use: There are outdoor or indoor areas outside the actual event area with regular events (e.g. outdoor areas for street musicians, pop-up store with changing content, regular market in the open space, flying retail).	**Industry**	**Event**	+5
	Initiative for culture and/or sustainability: The area/location is part of an initiative for culture and/or sustainability, either permanent or regularly recurring (e.g. Night of Museums, discount for city sightseeing tours).	**Industry**	**Event**	+5
	Other social initiatives and/or sponsorship for the general public:		**Event**	max. 10
	e.g. free provision of space for vulnerable groups/the public, employment of marginalised groups, special offers for migrants, etc. 5 points per initiative, can be added up to 10 points	**Industry**	**Commercial**	max. 10
4	**CIRCULAR ECONOMY BONUS - FACILITIES FOR DAILY SUPPLY AND EXCHANGE**			**+10**
	City **Business** **Event** **Industry** **Commercial**			
	Explanation: Crediting bonus points; if unconventional facilities are offered to district users or external parties to provide services and are structurally implemented or planned, such as the promotion of neighbourly exchange of services (temporary trading areas, repair cafés, district meeting places or similar).			

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Number of nearby social infrastructure facilities	[Number]
KPI 2	Number of nearby commercial infrastructure facilities	[Number]
KPI 3	Number of social or commercial infrastructure facilities within the district	[Number]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Synergies with criterion SITE1.4. Contents can be partially adopted.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

The users of a district should have the opportunity to satisfy their needs for recreation, care, education etc. within their environment (“Walking City”). An adequate supply infrastructure helps to reduce traffic, since routes can be covered on foot.

II. Additional explanation

III. Method

City **Business** **Event** **Industry** **Commercial**

This is a quantitative method in which the percentage of buildings within the district must be determined graphically, which lie within the catchment area of the respective infrastructure facility.. The facilities should be accessible to the public, in the case of sports facilities e.g. through membership in a club or similar. (Schools or business facilities are not to be evaluated).

Method 3 is used to determine the accessibility (see System basics). The following indicators will be evaluated:

Indicator 1: Social infrastructure
The social infrastructure is subdivided into the areas of education, leisure and playgrounds/sports facilities and evaluated according to method 3 in the system basics.
For **Industry**: For all in-factory infrastructures, method 3 in the system basics is applied. For all infrastructures outside the site, the walking/driving time is applied. The starting point **for all infrastructure facilities** is **the factory gate(s) closest to the centre of focus of the site**. From there, the **actual length of the route on foot and/or by public transport** is to be determined (factory lines, which are available to all employees, can also be taken into account). The centre of focus is the point from which **all employees on average travel the same distance** to their workplace. **The centre of focus of the location is to be estimated**. If it is not possible to determine the distance using the online tools, or only for partial sections, **the duration of 1 minute on foot** must be assumed for a **distance of 70 metres** (see Determination in System Basics).

Indicator 2: Commercial infrastructure

The commercial infrastructure is subdivided into local supply, medical care and other services and is evaluated according to method 3 in the system bases.

Pedestrian access to all infrastructure facilities is desirable in principle but not always feasible in practice. For this reason, the accessibility of an infrastructure facility by local public transport is also included in the analysis. This means that a district that is well connected to public transport does not necessarily need all the infrastructure facilities within the district, but can benefit from the facilities of other districts.

On 2.2: Goods for daily use such as food (including bakery products, fruit, vegetables, animal products, dairy products, etc.), drugstore articles, beverages, etc. must all be available in the district and/or according to Method 3 within short reach.
For **Industry** **Commercial**, the provision of basic goods supply according to the "cornerstone principle" (vegetables, flour, rice, pasta, eggs, milk and other basic foodstuffs) can also be credited at the location.

On 2.6: For **Industry** **Commercial**, it can also be credited if a parcel station is available at or near the gate.

Indicator 3: Synergies and offerings for the public

The availability of services to the public beyond the core use is particularly important for large specific areas. Facilities with a thematic reference to the core use (e.g. souvenir shops, thematic museum) are considered as facilities for the broader public. Special efforts to integrate social groups beyond the core target group can also be credited here.
The prerequisite for points in this indicator is free, unrestricted access to essential outdoor areas of the site for the public. Overnight closing is permitted for security reasons (comparable to public parks in Great Britain and France).

IV. Scheme-specific description

-

APPENDIX B - DOCUMENTATION

I. Required documentation

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Photo documentation of the implemented measures	C
Site plan with location of the indicators/measures and with entry of the maximum permissible distance per use category and evaluation according to method 3 in the system basics.	D
Documentation of **concept:** Urban development design including a concept for use and open space concept, which deals with the requested contents. Identification of all planned infrastructure facilities in the district.	F

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Social infrastructure	D, F	C, D, F	C, D, F	D, F	C, D, F
2. Commercial infrastructure	D, F	C, D, F	C, D, F	D, F	C, D, F
3. Synergies and offerings to the public	(A), F	C, D, F	C, D, F	A, D, F	C, D, F

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Bott, Helmut; Jessen, Johann; Pesch, Franz (Ed.) (2010): Lehrbausteine Städtebau: Basiswissen für Entwurf und Planung, Edition: 6. Institute of Urban Development at the University of Stuttgart.
- BMUB (Ed.) (2007): LEIPZIG CHARTER on Sustainable European Cities.
- Korda, Martin; Bishop, Wolfgang (2005): Städtebau - technische Grundlagen, pp. 525-526, 5th edition, Teubner Verlag.

Technical quality

The five criteria for technical quality provide a benchmark for evaluating the quality of the **technical execution** with regard to relevant sustainability aspects as well as the quality of mobility and its contribution to the sustainability of the district.

TEC2.1	Energy infrastructure
TEC2.2	Resource management
TEC2.4	Smart infrastructure
TEC3.1	Mobility infrastructure - motorised transportation
TEC3.2	Mobility infrastructure - pedestrians and cyclists

TEC2.1

Energy infrastructure

Objective

The objective is to ensure the technical prerequisites for the optimisation (efficiency, effectiveness, generation) of the energy demand, renewable energies and the costs of providing energy in the district.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Reduction of energy demand and the associated consequences for people and the environment (contribution to climate protection)
- Short- and long-term reduction of energy supply costs
- Contribution to municipal economic power by using local resources and synergies
- Risk minimisation by ensuring later adaptability to changes in external conditions

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	7.1	Access to modern energy services	7.1.a/b	Conservation of resources
			7.2.a/b	Renewable energies
	7.3	Energy efficiency		
Moderate	7.2	Share of renewable energies		
	8.4	Global resource efficiency and decoupling from economic development		
	9.4	Modernisation of infrastructure and increase in resource efficiency		

Outlook

The contents will be adapted according to future technical and legal developments.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**4.4 %**	**4**
Commercial	**5.3 %**	**5**
Event	**4.7 %**	**4**
Industry	**5.6 %**	**5**

ASSESSMENT

In order to promote the optimisation of energy demand, the creation of an integral energy concept is rewarded with indicator 1. The systems for heat and cooling distribution are assessed in indicator 2. Furthermore, the use of synergies in the form of energy cycles and the implementation of energy management and load management are considered. A particular focus, especially in **Industry** and **Commerce**, is on the use of roof areas for energy generation. In order to promote the reduction of the primary energy requirement for technical systems in **Industry**, the use of passive systems is evaluated via indicator 7.
A maximum of 120 points can be credited, including bonuses. A maximum of 100 points can be credited without bonuses.

NO.	INDICATOR		POINTS
1	**Integral energy concept**		
	City		**max. 40**
	Business **Event**		**max. 30**
	Industry **Commercial**		**max. 20**
1.1	**Energy demand**		
	City		**max. 10**
	Business **Event**		**max. 7**
	Industry **Commercial**		**max.3**
	An energy concept including an energy demand analysis (heat, cooling, electricity)is available (or has been commissioned) in which the reduction of the district's energy demand as well as the renewable energy generation in the district/location and surroundings is evaluated.	**City**	+10
		Business **Event**	+7
		Industry **Commercial**	+3
1.2	**Energy potential**		
	City		**max. 10**
	Business **Event** **Industry** **Commercial**		**max. 7**
	■ In the energy concept, the existing energy potentials (waste heat, renewable energies) and possible interconnections with existing energy infrastructure in the surrounding area are analysed.	**City**	+10
		Business **Event**	+7
		Industry **Commercial**	+2
	■ The energy concept analyses the existing local energy potential of waste heat.	**Industry** **Commercial**	+5
1.3	**Energy balance**		
	City		**max. 6**
	Business **Event**		**max. 4**
	Industry **Commercial**		**max. 2**
	Energy balances are created for heating, cooling and electricity in the energy concept.	**City**	+6
		Business **Event**	+4
		Industry **Commercial**	+2

NO.	INDICATOR		POINTS
1.4	**Energy supply variants**		
	City **Business** **Event**		**max. 7**
	Industry **Commercial**		**max. 4**
	At least three decentralised and/or centralised electricity/heat supply variants are compared and evaluated in environmental terms (emissions) in the energy concept,.	**City** **Business** **Event**	+7
		Industry **Commercial**	+4
1.5	**Investments and operating costs**		
	City		**max. 7**
	Business **Event**		**max. 5**
	Industry **Commercial**		**max. 4**
	The different energy supply variants are economically evaluated (investments and operating costs) in the energy concept,..	**City**	+7
		Business **Event**	+5
		Industry **Commercial**	+4
2	**Coherent supply structure**		
	City **Event**		**max. 20**
	Business **Commercial**		**max. 10**
2.1	**Heat and cooling supply structure**		
	City **Event**		**max. 20**
	Business **Commercial**		**max. 10**
	There is a coherent heat or cooling supply structure: ■ If no energy infrastructure is maintained parallelly (e.g. parallel laying of gas and district heating networks); this should be ensured by formal instruments, such as compulsory connection and use of district or local heating supply. ■ If different types of heating or cooling supply are provided in an area, clearly defined sub-areas are identified for the individual supply types (e.g. sub-area with local/district heating and sub-area with decentralised heat supply). Exception: In district areas where facilities with high process heat requirements in the medium and high temperature range are available or planned, parallel piping is permitted with justification, e.g. gas for cooking in hotels, bakeries, breweries etc., especially if electricity can be substituted in this area.	**City** **Event**	+20
		Business **Commercial**	+10

NO.	INDICATOR		POINTS
3	**Using synergies**		
	City **Business** **Event**		**max. 30**
	Commercial **Industry**		**max. 20**
3.1	**Synergies and energy cycles**		
	City **Business** **Event** **Industry**		**max. 30**
	Commercial		**max. 20**
	Due to the joint planning of buildings and facilities, synergetic effects and/or energy cycles for electricity, heating and cooling are created to a significant extent.		
	■ Synergy 1 (see Method for examples)	**City** **Business** **Event**	+15
		Industry **Commercial**	+10
	■ Synergy 2 (see Method for examples)	**City** **Business** **Event**	+15
		Industry **Commercial**	+10
	■ Synergy 3 (see Method for examples)	**Industry**	+10
3.2	**AGENDA 2030 BONUS - VEHICLE TO GRID**		
	Preliminary equipment for **bidirectional** charging and discharging of the electric vehicles are available.		**+10**
4	**Energy management and energy audits**		
	Business **Event** **Commercial**		**max. 10**
4.1	**Introduction of energy management/audits**		
	Business **Event** **Commercial**		**0 – 10**
	Percentage of companies in districts (measured by GFA) that have conducted energy consulting, energy audits or have an energy management system.		5 -10
	■ 20 % - 80 % GFA		
5	**Load management**		
	Business **Event** **Industry** **Commercial**		**max. 10**
5.1	**Load management at district level**		
	Business **Event** **Industry** **Commercial**		**max. 10**
	Load management was introduced at the district level or for large consumers.		10

NO.	INDICATOR	POINTS

6 Energy generation on roof surfaces

City Business **max. 10**

Industry Commercial **max. 30**

6.1 **Use of the roof surfaces for energy generation**

City Business **3 - 10**

Industry Commercial **10 - 30**

Percentage of roof surfaces used for renewable energy generation:

City Business 3 - 10

Industry Commercial 10 - 30

For City / Business: 30 % - ≥50% of the roof surfaces.

For Industry / Commercial: 20% - ≥80% of the roof durfaces.

6.2 **AGENDA 2030 BONUS - USE OF FACADE SURFACES FOR ENERGY GENERATION**

Percentage of buildings where the facade surfaces are used for energy purposes:
30 % - ≥ 50 % of buildings

5 - 10

7 Passive systems

Industry **max. 10**

7.1 **Design of passive building concepts**

Design of passive building concepts to reduce the primary energy demand caused by technical systems in building operation, which includes at least 5 of the following topics:

- Orientation and compactness of the building, proportion of window area
- Use of daylight (light control)
- Use of solar yields (passive)
- Sun protection
- Storage mass and insulation standard
- Natural ventilation
- Passive heating
- Passive cooling

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Energy balance	[Number]
KPI 2	Integrated energy cycles	[yes / no]
KPI 3	Proportion of roof surfaces used for energy generation	[%]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Indicator 6 Energy generation on roof surfaces can have a positive effect on ENV1.1. Contents from indicators 1, 3 and 6 can be considered in indicator 4 of TEC1.4.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

The energy efficiency potential must be optimised in districts. To this end, favourable conditions for high energy efficiency are to be created at an early stage. This can be done, for example, by requiring higher energy standards for the buildings in the district, but also by setting up a central heat supply with renewable energies.

Industry **Commercial**

The reduction of CO_2 emissions and energy consumption is a widely declared goal of international and national politics. The framework for the national level is the European Buildings Directive. In its energy concept, the Federal Government of the Federal Republic of Germany has formulated a target of reducing CO_2 emissions by 80 % by 2050. In addition to the operation of buildings, process-related energy consumption at an industrial site has a considerable influence on the total energy demand. The environmental impact of this energy consumption is largely determined by the quality of the energy infrastructure (heating, cooling, electricity). This quality is evaluated in the criterion, independent of the actual energy consumption of the supplied buildings and processes.

II. Additional explanation

City **Business**

Increasing energy efficiency is a declared goal of international and national politics. For example, the EU Energy Efficiency Directive (EED) calls for a 20% increase in energy efficiency by 2020.
The prerequisite for a targeted optimisation of energy efficiency is the early analysis of existing potential and local energy requirements. This requires the involvement of an energy planner in all development phases of a district.
Technical infrastructure measures in the field of energy supply are generally planned and implemented for a period of at least 20 to 50 years. For this reason, early, comprehensive planning (e.g. in the form of an energy concept), taking into account possible future developments, is indispensable.

Industry **Commercial**

Technical infrastructures of energy supplies are usually planned and executed for a period of at least 20 to 50 years. For this reason, an early, comprehensive planning (e.g. in the form of an energy concept), taking into account possible future developments, is indispensable. Sufficient flexibility of the infrastructure is also required to react to changing conditions.

III. Method

City Business Event Industry Commercial

Indicator 1: Integral energy concept

It is checked whether an energy concept (rough concept in phase 1, detailed concept in phases 2 + 3) is or has been defined in the course of urban development planning/site planning. The scope and requirements of this energy concept depend on the planning status and include statements on energy saving potentials, energy generation on site and profitability considerations. Natural energy sources, heat sinks, and waste
heat sources (e.g. wastewater, production processes, heating, etc.) should be considered and examined with regard to their usability.

Indicator 2: Coherent supply structure

A coherent and consistent energy supply structure requires, among other things, that no energy infrastructure is provided parallelly or that different sub-areas in the district are provided for this purpose. Integrated energy concepts consisting of different components (e.g. solar thermal and district heating if the sun alone is not enough) do not count as parallel provision. In addition, centralised and decentralised solutions are to be compared.

Indicator 3: Using synergies

It is examined whether it is possible to use synergy effects in the energy supply of the district. Synergy effects can be used, for example, through:

- Combined heat and power
- Combined heat, power and cooling (CHP)
- Use of waste heat from heat sources inside or outside the district, e.g. industrial waste heat (e.g. waste heat of compressors for compressed air production)
- Combined solar energy use for hot water preparation and heating as well as solar cooling
- Heat from wastewater, exhaust air etc.
- Use of waste heat for building heating or cooling by absorption cooling systems

The measures described must cover at least 10 % of the total requirements for heating, domestic hot water and, where appropriate, cooling.

Indicator 4: Energy management and energy audits

It is checked whether the companies in a commercial district have introduced energy audits according to DIN EN 16247 or an energy management process according to DIN EN ISO 50001. The assessment is based on the gross floor space occupied by the individual companies.

Indicator 5: Load management

It is examined whether load management has been introduced at district level or for large consumers. The objective is to shift the burden on the demand side in line with the current generation situation. This requires control systems and regulation technology. Prediction methods can support this process. The targeted load management is known as load management or demand-side management (DSM).

Indicator 6: Energy generation by roof surfaces

Flat roofs in Germany cover an area of approximately 1.2 billion square metres. A large part of it has no other function than to close off the building at the top. The use for energy generation is another useful function that can be integrated on unused roofs. Energy generation on roofs and green roofs need not be mutually exclusive as additional functions.

Indicator 7: Passive systems

Not only the generation, but particularly the use of energy in industrial companies will increase in importance in the future due to volatile and especially rising energy prices. In order to create or maintain a competitive advantage in the production of products in the long term, the topic of energy efficiency will become more and more important in the planning and operation of industrial buildings and sites.

For new buildings, the choice of location and the arrangement of the structures form the basis for almost all passive measures to reduce the primary energy demand in building operation. In addition, the prerequisites for the use of renewable energies such as solar thermal energy, photovoltaics and geothermal energy as well as for the design of local heating supply systems are ensured.

The objective is to reduce the total energy demand of buildings by means of architectural, constructional and technical factory means.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **records/documents/expert opinions** ■ B1: Documentation of the planned or implemented supply infrastructure with explanation of the respective individual criteria ■ B2: Extract from reports on energy management/audit	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of an **energy concept** drawn up by a specialist office	F

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1.Integrated energy concept	(A), B, F	F	F	(A), B, F	F
2. Coherent supply structure	(A), B, F	B1, C, D	B1, C, D	A, B, F	B1, C, D
3. Synergy utilisation	A, B, F	B1, C, D	B1, C, D	A, B, F	B1, C, D
4. Energy management and energy audits	A, B	A, B2	B2, D	A, B	B2, D
5. Load management	A, B, F	A, B, F	B1, D, F	A, B, F	B, D, F
6. Energy generation on roof surfaces	A, B	B1, C, D	B1, C, D	A, B	B1, C, D
7. Passive systems	-	-	-	A, B	B1, C, D

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Bavarian State Ministry for the Environment and Health (Ed.) (2010): Leitfaden Energienutzungsplan. Teil I: Bestands- und Potenzialanalyse.
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- Wolff, D.; Jagnow, K. (2011.05): Untersuchung von Nah- und Fernwärmenetzen. Überlegungen zu Einsatzgrenzen und zur Gestaltung einer zukünftigen Fern- und Nahwärmeversorgung.

TEC2.2

Resource management

Objective

The objective is to minimise the use of primary raw materials, prevent toxic waste and avoid waste materials, and to use and recycle waste/reusable materials by means of appropriate infrastructures that enable ecycling of materials.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Reduction of resource dependency
- Increasing the attractiveness for companies by innovative recycling management systems
- Cost advantages by use of material flow synergies and cascade utilisation
- Increasing the local share of value added
- Protection of the environment

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Significant	8.4	Global resource efficiency and decoupling from economic development	
	12.2	Use of natural resources	
	12.5	Waste reduction and prevention	
Moderate	11.6	Reduction of environmental pollution in cities	
	12.4	Environmentally sound management of chemicals and waste	

Outlook

The circular economy is of great importance for the conservation of resources. In the future, the contents will be adapted according to future technical and legal developments.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**2.2 %**	**2**
Commercial	**3.2 %**	**3**
Event	**2.4 %**	**2**
Industry	**3.3 %**	**3**

ASSESSMENT

In order to promote the minimal use of primary raw materials and the recycling of materials, the responsible use of recyclable materials is rewarded here. Based on the principles of the Closed Substance Cycle Waste Management Act (Kreislaufwirtschaftsgesetz) (avoidance, reuse, recycling), concepts for use of reusable materials, implementation of waste management as well as measures for waste avoidance, reuse and material recycling are evaluated. In addition, the Circular Economy Bonus - Urban Mining promotes the further recycling of the resources used in the district at the end of their life cycle. A maximum of 120 points can be achieved in the criterion including bonuses, and 130 points for **Business** **Industry**. A maximum of 100 points can be achieved without bonuses.

NO.	INDICATOR		POINTS
1	**Concept for the use of recyclable materials**		
	City		**max. 18**
	Business **Industry** **Commercial**		**max. 22**
	Event		**max. 16**
1.1	**Concept for the use of recyclable materials**		
	City **Business** **Event** **Industry** **Commercial**		**max. 10**
	There is a district-based concept for the use of recyclable materials and a recyclables balance sheet as an internal planning instrument.		+10
	For **City**: Recyclables balance sheet is optional.		
1.2	**Waste prevention and waste recycling**		
	City		**max. 8**
	Business **Event** **Industry** **Commercial**		**max. 4**
	Targets for waste prevention and waste recycling are defined.	**City**	+8
	For **Industry**: There is also a special concept to reduce the amount of	**Business** **Event**	+4
	hazardous waste or there is no hazardous waste	**Industry** **Commercial**	+4
1.3	**Methods, facilities and equipment**		
	Business **Industry** **Commercial** **Event**		**max. 2**
	The concept for use of recyclable materials also includes the methods,	**Business** **Event**	+2
	facilities and equipment for waste recycling and waste disposal, including	**Industry** **Commercial**	+2
	collection, transport, treatment and storage.		

NO.	INDICATOR			POINTS
1.4	**Lifetime of waste-management facility**			
	Business **Industry** **Commercial**			**max. 2**
	The concept for the use of recyclable materials includes additional information on the expected lifetime of the existing waste-management facilities.	**Business**		+2
		Industry	**Commercial**	+2
1.5	**Measures, schedules, locations**			
	Business **Industry** **Commercial**			**max. 2**
	The concept for the use of recyclable materials also includes the presentation of disposal safety, including the measures and schedules introduced, as well as the definition of locations for the necessary waste-management facilities.	**Business**		+2
		Industry	**Commercial**	+2
1.6	**Presentation of waste-management companies**			
	Business **Industry** **Commercial**			**max. 2**
	The concept for the use of recyclable materials also includes a presentation of the necessary cooperation with other public waste-management companies.	**Business**		+2
		Industry	**Commercial**	+2
2	**Waste management**			
	Business **Industry** **Commercial** **Event**			**max.10**
2.1	**Central waste management**			
	Business **Industry** **Commercial** **Event**			**max.10**
	There is a district-based central waste-management system.			10
3	**Waste prevention**			
	City			**max. 27**
	Business **Commercial**			**max. 23**
	Event			**max. 35**
	Industry			**max. 22**
3.1	**Promotion of information and education campaigns**			
	City			**max. 20**
	Business **Commercial**			**max. 6**
	Promotion of information and education campaigns and events for the user groups in the district (residents, industry and commerce).		**City**	+20
		Business	**Commercial**	+6
3.2	**District-based recyclables collection system**			
	City **Business** **Industry** **Commercial**			**max. 7**
	Event			**max. 10**
	There is a district-based recyclables collection system, the data of which is transmitted to the individual waste producers at least annually. The targets and measures for waste avoidance described in the recyclables management concept are mandatory for third parties (e.g. catering). For **Event**: The contents above applies to all third parties located in the event buildings or directly adjacent to them		**City** **Business**	+7
		Industry	**Commercial**	+7
			Event	+10

NO.	INDICATOR	POINTS

3.3 Measures to reduce packaging waste

Event **max. 10**

Industry **max. 5**

Special measures to reduce packaging waste are implemented at the site/location (e.g. buying detergents in concentrate, bulk containers without individual packaging); e.g. delivered waste packaging is returned and recycled for the same products (added value packaging/circulation packaging).

Event +10

Industry +5

3.4 Waste avoidance for tenants/retailers

Business **Event** **Commercial** **max. 5**

Furthermore, the targets and measures for waste prevention are mandatory for tenants/retailers in the entire area (e.g. offices, retail).

+5

3.5 Visitor information campaign

Event **Industry** **max. 5**

There is an information campaign that involves visitors in the management of recyclable materials and encourages them to handle recyclables/waste responsibly.

+5

3.6 Staff training

Event **Business** **Industry** **Commercial** **max. 5**

There is an information campaign or training that involves employees in the management of recyclable materials and encourages them to handle recyclables/waste responsibly.

+5

3.7 CIRCULAR ECONOMY BONUS - REUSE OR MATERIAL RECYCLING

Industry +10

Special measures for waste avoidance/reduction of non-recyclable waste have been implemented which have had a demonstrable effect (e.g. substitution of hazardous by non-hazardous substances, process to promote the standardisation of packaging, no landfilling of production waste, new disposal routes, waste management audit for relevant waste streams).

NO.	INDICATOR		POINTS
4	**Reuse**		
	City **Business**		**max. 20**
	Event		**max. 10**
	Industry		**max. 8**
	Commercial		**max. 13**
4.1	**Reuse and repair services**		
	City **Business** **Commercial**		
	Establishment of reuse and repair services	**City**	+10
		Business	+5
		Commercial	+3
4.2	**Promotion of sharing economy**		
	City **Business**		
	Event		
	Industry **Commercial**		
	Special measures are implemented in the area to promote recycling	**City**	+10
	management (e.g. take-back/deposit, leasing or	**Business**	+15
	Cradle-to-Cradle® systems for catering products, furniture etc.,	**Event** **Commercial**	+10
	sharing economy concepts).	**Industry**	+8
5	**Recycling of recyclable materials**		
	City **Business**		**max. 25**
	Event		**max. 19**
	Industry		**max. 28**
	Commercial		**max. 22**
5.1	**Waste recycling system**		
	City **Commercial**		**max. 15**
	Business **Event**		**max. 10**
	Proof of a waste recycling system in the district that ensures the collection and separation of the waste listed below	**City** **Commercial**	+15
		Event **Business**	+10
	This can take place at public collection points, by integrating into a higher-level collection system or also in private households, provided that this is guaranteed on a mandatory basis. The material separation does not necessarily have to take place in the district, if the further recycling cycle is documented (e.g. collection systems according to wet and dry or round and flat for later mechanical separation).		
	▪ Separation and recycling must be demonstrated for each of the following groups of recyclable materials: Paper, glass, metals, plastics, organic waste, hazardous materials, electrical appliances.		
	▪ For **City** and **Commercial**: 3 points can be awarded per group of recyclable materials.		
	▪ For **Business** and **Event**: 2 points can be awarded per group of recyclable materials.		

NO.	INDICATOR		POINTS
5.2	**CIRCULAR ECONOMY BONUS - URBAN MINING**		**+10**
	City **Business** **Event** **Industry** **Commercial**		
	Recording of recyclable materials used in the district with the aim of reusing them at the end of life of the respective building component.		
	■ There is an urban mining concept for the district		+5
	■ There is an urban mining cadastre/BIM model, in which some of the raw materials used in the district are recorded (parts of the building masses and open spaces)		+5
5.3	**Recyclable commercial waste**		
	Event		**max. 5**
	All recyclable commercial waste (or at least 85%) is demonstrably recycled.		+5
5.4	**Landfilling of commercial or household waste**		
	Event		**max. 4**
	It can be demonstrated that there is no landfilling of commercial or household waste.		+4
5.5	**Waste recycling**		
	Industry		**max. 20**
	■ Recycling of hazardous waste		7
	■ Recycling (all factory waste including hazardous waste) 50 - 100 %		10 – 20
	Note: Recycling of recyclable material refers exclusively to the material recycling. Thermal utilization is not included.		
5.6	**Composting**		
	City **Business**		**max. 10**
	Setting up facilities for composting the compostable waste produced in the district (or in the surrounding area).		+10
5.7	**Use of accruing recyclable materials**		
	Business		**max. 5**
	Industry		**max. 8**
	Commercial		**max. 7**
	Use of recyclables produced in the district/location by companies in the district or in neighbouring districts (output of one company becomes input of the other)	**Business**	+5
		Industry	+8
		Commercial	+7

NO.	INDICATOR	POINTS
6	**Technology and logistics** **City** **Business** **Event** **Industry** **Commercial**	**max. 10**
6.1	**Waste logistics** **City** **Business** **Event** **Industry** **Commercial** Innovative waste logistics concepts in the district (e.g. waste-management centre supplied with piping systems, underfloor systems, conveyor belts or electric collection vehicles) ■ A waste logistics concept has been created. ■ The waste logistics concept was implemented.	**max. 10** +5 +5
6.2	**CIRCULAR ECONOMY BONUS - WASTE TECHNOLOGY** **City** **Business** **Event** **Industry** **Commercial** Innovative waste technology in the district: ■ E.g. waste compactor for obtaining water of the waste ■ E.g. new techniques such as phosphorus recovery, etc. ■ E.g. energy production of biomass	 **+10**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Reuse and repair services available	[Yes / No]
KPI 2	Measures implemented to promote recycling management	[Yes / No]
KPI 3	Recyclable share of commercial waste	[%]

Synergies with DGNB system applications

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APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

Potential for waste-management is often assigned to the energy sector and industry in energy balance sheets. Separate waste-management balance sheets and concepts, modelling of municipal or district-related waste flows and the implementation of measures to optimise waste-management material flows in cities and districts can reveal potentials for sustainable waste management.

Industry **Commercial**

Comprehensive circular economy considerations are a foundation for the sustainable use of material resources and thus an essential component of sustainable concepts for urban districts and industrial sites.
The long-term goal of the circular economy is to ensure the “reliable availability of all resources” (BMWi 2014) for the whole society. The principle of circular economy is based on the sustainable handling of waste material. For industry in particular, waste-management concepts and balance sheets, monitoring of waste flows and the implementation of measures to optimise material flows are therefore important measures for securing its own raw material supply in the long term and, in addition, for responsibly taking into account the ecological and social objectives of sustainability.

II. Additional explanation

City **Business**

In order to establish a resource-conserving circular economy, it is necessary to understand waste as “recyclable material”. To this end, the waste produced in the district must be recorded and the potential for use or recycling must be analysed.

Industry **Commercial**

The basis of German waste management is the German Closed Substance Cycle Waste Management Act (KrWG). According to this definition, waste includes “all substances and objects which their owner discards, intends to discard or is required to discard” (KrWG, § 3 para. 1). The greatest efficiency advantages are achieved by a circular economy in which as many materials as possible remain in the material cycle with as little loss of value as possible, i.e. the process energy and costs incurred during production are not lost by burning the waste product, but are retained by high-quality reuse. Accordingly, the KrWG defines recycling as “any recovery process by which waste is processed into products, materials or substances either for the original purpose or for other purposes. It includes the processing of organic materials, but not energetic recovery and processing into materials intended for use as fuel or for backfilling” (KrWG, § 3 para. 25).

The structure of the criterion is based on the waste hierarchy of the German legislation on recycling (KrWG), according to which prevention and waste management measures are ranked in the following order (KRWG § 6): “1. Avoidance, 2. Preparation for reuse, 3. Recycling, 4. Other recovery, in particular energetic recovery and backfilling, 5. Disposal.”

III. Method

City **Business** **Event** **Industry** **Commercial**

The evaluation of the concepts and infrastructure for sustainable resource management is carried out qualitatively on the basis of the following indicators:

Indicator 1: Concept for the use of recyclable materials
In the concept and the balance sheets statements are made about:

- Waste prevention, recycling and waste generation.
- Waste prevention measures.
- Methods, installations and equipment for waste recycling and disposal, material flows etc.

Indicator 2: Waste management
Essential aspects of waste management are also dealt with in “PRO3.5 Quality assurance and monitoring”. However, as the basis of circular economy, the recording and breakdown of material flows is particularly important. Transparency of the waste-disposal system as well as the instruction of the employees and possibly disposal audits are also very important for compliance with standards.
In the waste-management concept, the waste infrastructure is documented in an general plan (location of all collection stations) and a description of the disposal hierarchy (with material flows, possibly waste manual). Waste balance sheet, according to type and quantity, possible statements about the waste disposal company etc.

Indicator 3: Waste prevention
For example, target-group-specific information and advisory campaigns on waste and packaging avoidance, on avoidance of disposable tableware at events, on promoting training for environmental and waste officers, etc. - for example by promoting reusable packaging, reusable transport containers for recurring transport in urban districts and the like, and **training for employees**.
For **Industry**: The top priority in terms of the circular economy is the avoidance of waste. For the evaluation of the indicator, the total quantity of waste at the factory or the quantity of waste per relevant production unit can be considered, but not a percentage share without taking the quantity into account. This should avoid, for example, a situation where a decreasing proportion of non-recyclable waste is positively evaluated even though the overall amount of waste is increasing.
It is evaluated whether measures have been taken which have demonstrably and noticeably reduced the volume of waste in the factory. This includes measures that apply to the entire factory (e.g. special employee training, change of supplier) as well as measures that only affect one area (e.g. technical improvement in a production section).
In addition, it is considered whether the quantity of the non-recyclable fraction has been reduced by specific measures. This can be done, for example, by switching to processes that result in less contaminated operating materials or by using more expensive but recyclable materials.
Hazardous substances pose higher risks in transport, use and disposal/reprocessing than other groups of substances, so in the interests of environmental and social responsibility it is also evaluated whether the volume of hazardous waste is reduced in a targeted manner, e.g. by switching to less harmful substances or by increasing efficiency. If there are no hazardous substances, this point is considered to be fulfilled.

Indicator 4: Reuse

For example, setting up urban reuse and repair services, installation of collection points for the delivery and sale of old but well-preserved items (e.g. electrical appliances, clothing, furniture, etc.). In order to strengthen the sharing economy, infrastructures can be created in the district which promote/enable the reuse of objects. For example book boxes in the open spaces, at the buildings (integrated in terms of design and function), rooms for equipment rental/leasing in the district, exchange platforms. The establishment of collection points or integration into a collection service, where old but still reusable items can be handed in and purchased, also contributes to the reuse of items.

Indicator 5: Recycling of recyclable materials

For example, a dense network of separating facilities for paper, glass, metal and plastic packaging and organic waste, collection islands for problematic materials, establishment of recycling exchanges, concepts for recycling building materials, etc., establishment of composting factories, use of compost in factories in the district, provision of compost for residents of the district.

For **Industry**: Closed loop recycling in industrial processes (aluminium, glass), concepts also for batteries, substitution of fossil material sources by biological material sources.

The indicator distinguishes between “waste recycled within the company” and “waste recycled externally”. In principle, a positive evaluation is given here if a company makes efforts to establish its own material cycles or to support material cycles and thus assumes a particular responsibility for the conservation of resources. The percentage of the total factory waste that is recycled in a traceable manner with reuse in the factory or return to the company is evaluated. This may also include an agreement for external reprocessing by third parties with subsequent return to the company, provided this is contractually regulated.

The use of hazardous substances cannot always be avoided, but many hazardous waste materials can be recycled at reasonable cost, which is preferable to disposal.

The recycling quota refers to the entire factory waste, but in the case of hazardous materials recycling, only to the produced hazardous materials waste.

Indicator 6: Technology and logistics

For example, waste-management centres supplied via pipeline systems, waste compactors to extract water by the waste, waste shafts to underground collection containers to avoid noise and visual impairment, etc.

APPENDIX B - DOCUMENTATION

I. Required documentation

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **records/documents/calculations/expert opinions** - B1: Waste balance sheet (broken down by type, source, quantity and proportion, whereabouts) with details of the recycling rate in the factory, externally and for hazardous waste	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of diagram/concept/model	F

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Concept for the use of recyclable materials	A, B, F	A, B, F	B, F	A, B, F	B, F
2. Waste management	A, B, F	A, B, F	B, F	A, B, F	B, B1, D
3. Waste prevention	A, B, F	A, B, C, D; F	C, B, D, F	A, B, F	B, C, F
4. Reuse	A, B, F	A, B, C, D, F	C, B, D, F	A, B, F	B, F
5. Recycling of recyclable materials	A, B, F	A, B, C, D, F	B, C, D, F	A, B, F	B, B1, F
6. Technology and logistics	A, B, F	A, B, C, D, F	B, C, D, F	A, B, F	B, F

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
- Act on the Promotion of Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Management (Closed Substance Cycle Waste Management Act - KrWG) of 24 February 2012

Internet sources

- www.rreuse.org
- www.rusz.at
- https://epeaswitzerland.com/cradle-to-cradle/
- http://www.bmwi.de/DE/Themen/Industrie/Rohstoffe-und-Ressourcen/entsorgungs-und-kreislaufwirtschaft.html

TEC2.4

Smart infrastructure

Objective

The objective is to conserve resources and costs and to increase user comfort by interlinking social and technical systems.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Conserving resources such as electricity, heat, water, time and money
- Locational advantage over other districts: increased attractiveness for companies and investors who depend on specific infrastructure (e.g. broadband, industry 4.0, care of the elderly 4.0)
- Possibility of improving social participation of residents and users through information and communication
- Protection and safety of residents and users (e.g. early warning systems for environmental risks, detection of limit value exceedances in air and water, ambient assisted living in buildings)
- Prerequisite for faster implementation of energy system transformation (e.g. grid usability)

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
1 Low	7.1 Access to modern energy services	

Outlook

The contents will be adapted according to future technical and legal developments.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**2.2 %**	**2**
Commercial	**3.2 %**	**3**
Event	**2.4 %**	**2**
Industry	**3.3 %**	**3**

ASSESSMENT

Preparing and equipping the district to integrate digital infrastructure and automation processes can help to conserve resources and costs in the district and contribute to increasing user comfort. Indicator 1 evaluates whether a digital strategy is in place and which fields of action were taken into account in the district's development. The quality of the telecommunications infrastructure is assessed in indicator 2. The extent to which data is collected in the district and how it is used to achieve the goal of a sustainable district is considered in indicator 3. The district/location-related networking of the inhabitants/employees is finally assessed in indicator 4.

NO.	INDICATOR	POINTS
1	**Integration of digitisation into district planning** **City** **Business** **Event** **Industry** **Commercial**	**max. 30**
1.1	**Integration of digitisation into district planning** **City** **Business** **Event** **Industry** **Commercial** There is a digital agenda/digital strategy of the municipality for the entire city, which is considered/applied in the district planning. Or: If no digital agenda/digital strategy of the municipality is available, a separate analysis of the action fields for digitisation can be prepared.	**max. 30**
	■ For each action field addressed in the digital agenda/digital strategy/analysis, 6 points can be credited (administration, health, IT infrastructure, commercial, energy and environment, security, society, data platform, mobility, education)	+30
2	**Telecommunications infrastructure** **City** **Business** **Event** **Industry** **Commercial** For digitisation and automation processes, appropriate technical infrastructure is a basic prerequisite. Therefore the technical prerequisites are queried in the indicator. More points can be achieved than can be credited. For example, a deficiency in 2.1 Broadband internet access can be compensated by appropriate preparations in 2.2 Preparations.	**max. 30**
2.1	**Broadband Internet access** **City** **Business** **Event** **Industry** **Commercial** There is a powerful broadband network with a download speed of:	**max. 25**
	■ > 50Mbit/s	5
	■ > 100 Mbit/s	10
	■ > 300 Mbit/s	25

NO.	INDICATOR	POINTS
2.2	**Preparation of broadband internet access***	**max. 10**
	City **Business** **Event** **Industry** **Commercial**	
	The district has preliminary installations for implementing broadband connections (e.g. preparation with fibre optic cable or empty conduit system for the district) or 5G mobile network- coverage.	+10
	*When the download speed is below 300Mbps	
2.3	**Free WIFI in public areas**	
	City **Business** **Event** **Industry** **Commercial**	**max. 5**
	Free WIFI is available in the entire public space of the district/location.	+5
3	**Data evaluation**	
	City **Business** **Event** **Industry** **Commercial**	**max. 30**
3.1	**Use of collected data**	
	City **Business** **Event** **Industry** **Commercial**	**max. 30**
	Data on the action fields administration, health, IT infrastructure, commercial, energy and environment, security, society, data platform, mobility, education, etc. that are collected during planning, construction and use of the district/location is available, taking into account data protection.	
	■ Collected data on specific action fields is made available to users in a processed form (e.g. air quality).	+10
	■ Collected data on specific action fields is used to manage elements in the district (e.g. lighting control, traffic, etc.)	+10
	■ Collected data on specific action fields is shared with the local authority/administration (e.g. environmental data on air pollution, climate data, data on mobility, etc.)	+10
	■ Collected data on specific action fields is available for research purposes.	+10

NO.	INDICATOR	POINTS
4	**District-related digital offerings** **City** **Business** **Event** **Industry** **Commercial**	**max. 10**
4.1	**Information on digital services for districts** **City** **Business** **Event** **Industry** **Commercial** When moving in and when changes are made to the offerings, the residents/users of the district are informed about the digital facilities (e.g. information event, flyer, internet, applications ...).	**max. 2** +2
4.2	**District-related online platform(s)*** **City** **Business** **Event** **Industry** **Commercial** There are one or more district/location-related networks of residents/employees, e.g. for the organisation/allocation of jointly used rooms/goods. Points can only be credited if the corresponding premises or goods are available in the relevant spaces. * The prerequisite for the crediting of evaluation points is the consideration of data protection and the possibility to delete stored data.	**max. 8** +8

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Digital agenda/digital strategy available	[Yes / No]
KPI 2	Download speed of the broadband network	[Mbps]

Synergies with DGNB system applications

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APPENDIX A - DETAILED DESCRIPTION

I. Relevance

The digitisation topic must not be seen as an end in itself, but serves to achieve the goals of sustainable district development. For example, networked infrastructure systems can save resources and costs in the long term. At the same time, an appropriate infrastructure offers a wide range of opportunities for residents and users to obtain information and, if necessary, to intervene. Infrastructure supply also plays an increasingly important role in the location decisions of companies.
Data protection and the possibility to delete stored data are important for the acceptance of the systems.

II. Additional explanation

III. Method

City **Business** **Event** **Industry** **Commercial**

The criterion is evaluated qualitatively on the basis of measures that can be influenced by the development of the district. Overarching concepts at the city level and measures not tied to a specific location were only considered to a limited extent. As the topic of “smart infrastructure” is a cross-cutting issue, aspects of it are evaluated in the criteria of mobility (e.g. dynamic passenger information in public transport) and quality assurance and monitoring (e.g. energy, waste and water management). In this criterion, the technical prerequisites for data collection, analysis and management of the resource requirements in the district are considered and evaluated using the following indicators:

Indicator 1: Integration of digitisation into district planning
In order to determine in which areas of the district resources can be conserved through digitalised processes/services and which interfaces to the municipality are necessary and exist, a digital agenda/digital strategy of the municipality for the entire city can be used. Alternative: If so, a separate analysis of the action fields for digitisation can be prepared.

- Administration,
- Health,
- IT infrastructure,
- Commercial,
- Energy and environment,
- Safety,
- Society,
- Data platform,
- Mobility,
- Education
- Etc.

This consideration, together with the analyses/concepts in other criteria (mobility concepts, analysis of energy and material flows, etc.), is the starting point to select the measures in indicator 3: Infrastructure data evaluation/information that contribute greatly to achieving the objectives in the criterion.

Indicator 2: Telecommunications infrastructure
For digitisation and automation processes, the availability of an appropriate technical infrastructure is a basic prerequisite. The indicator therefore queries the technical prerequisites.

Publicly accessible free WIFI enables the barrier-free (salary-independent) use of digital services. When supplying public spaces with WIFI, care must be taken to ensure that WIFI hotspots/routers are clearly visibly marked and that private routers are not used for public use without actively requesting consent.

Indicator 3: Data evaluation

With the help of sensors, a wide range of data can be collected in the district and management measures can be taken. These can be assigned to the following areas:

- Resources: Electricity, heat, fuels, refrigeration, drinking water, wastewater, waste (e.g. harmonisation of electricity supply and demand, recording of consumption data and peak demand, garbage cans send signals on the level, indication of defects in pipes)
- Environment: Air pollutants (smog), light pollution, water quality, heat islands
- Mobility: Traffic situation on roads, display of free parking spaces, public transport, free car-sharing cars or bike sharing bicycles, pedestrian traffic on certain sections of road
- People, administration: Information and communication, possibility for district users to inform the municipality of weak points, complaint management)
- Technical components, installations etc. (e.g. garbage cans report fill level, facade reports soiling and need for cleaning, monitoring on digital boards in public spaces e.g. for facts about recycled waste from the last week ...)
- Health, safety and security: Early warning systems for natural disasters, ambient assisted living in buildings

Additionally for **Industry** and **Commercial**

- Logistics: e.g. fully automatic loading of containers
- Production (Industry 4.0)

When implementing measures to use data or control elements in the district, the results from indicator 1 and the concepts/analyses from other criteria (mobility concepts, analysis of energy and material flows, etc.) must be taken into account. This is to ensure that the measures implemented contribute significantly to saving resources and/or increasing user comfort.

Indicator 4: District/location-related digital offerings

A district/location-related networking of residents/employees can help to save resources (e.g. the organisation/allocation of communally used rooms) and can offer social added value. A district-related online platform or a similar digital offer supports the use and administration of jointly used goods/rooms and facilities. This includes, among other things:

- Common rooms (e.g. large bathrooms, sauna, function rooms, kitchen, dining room, coworking spaces, etc.)
- District transport fleet (vehicles, scooters, load wheels etc.)
- Equipment (electrical appliances, projectors, lawnmowers, tools, etc.)
- The possibility of alerting the administration to grievances online

Points can only be credited if the corresponding premises or equipment/goods are available in the district.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures ■ A1: In the form of an official confirmation by the local internet provider of the available bandwidth in the district	A
Documentation of relevant **records/documents** ■ B: Regarding the action fields, the telecommunication infrastructure, the use of the collected data etc. ■ B1: Official confirmation of infrastructure or building services by engineering planners on the required contents ■ B2: Informal confirmation by the city's digitisation officer or the person jointly responsible for the topic that the infrastructure measures and digital services to be implemented in the district have been agreed with the city ■ B3: Measurements of achievable download/upload broadband speeds	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of suitable **planning documents** as well as excerpts of the respective textual explanations, which show that the necessary digital infrastructures and usage scenarios are an integral part of the planning.	E

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Integration of digitisation into district planning	A, B, E	B, E	B2, E	A, B, E	B2, E
2. Telecommunications infrastructure	A(1), B, E	A(1), C, D, E	A1, C, D, E,	A(1); B, E	A1, C, D
3. Data evaluation/information	A, B, E	A, B, E	C, D	A, B, E	C, D
4. District/location-related digital offerings	A, B, E	A, C, D	C, D	A, B, E	C, D, E

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Bullinger, Hans-Jörg; Röthlein, Brigitte (2012): Morgenstadt – Wie wir morgen leben: Lösungen für das urbane Leben der Zukunft. www.morgenstadt.de. Carl Hanser Verlag Munich. ISBN: 9783-446-43203-1.
- DKE/DIN (Ed.) (04/2014): German standardisation roadmap Smart City, Version 1.1. Publisher: DIN e. V. / DKE German Commission for Electrical, Electronic & Information Technologies in DIN and VDE. Berlin.
- PwC (Ed.) (05/2015): Deutschlands Städte werden digital. Publisher: PricewaterhouseCoopers AG in cooperation with the Department of Urban and Regional Research of the Institute of Geography at the University of Bonn. www.pwc.de/digitale_stadt.

TEC3.1

Mobility infrastructure – motorised transportation

Objective

Our objective is to conserve natural resources, reduce traffic-related emissions to the air, water and soil, increase user comfort through a sustainable mobility infrastructure and strengthen efficient, affordable mobility services.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Accessibility for all, without the need to use a specific means of transport
- Improving of environmental quality, i.e. reducing the negative environmental impact of motorised individual transport
- Higher quality of life

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.9	Effects of chemicals, air, water and soil pollution	3.2.a	Air pollution
			3.2.b	Air pollution
	11.2	Access to and development of affordable public transport	11.2.b	Mobility
			13.1.a	Climate action
	11.6	Reduction of environmental pollution in cities		
	13.2	Climate action measures in regulations, strategies and planning		
Moderate	3.6	Reduction of traffic accidents		
	9.1	Sustainable infrastructure		
	9.4	Modernisation of infrastructure and increase in resource efficiency		
Low			11.2.a	Mobility
			12.3.b	Sustainable procurement

Outlook

The mobility sector is currently transitioning (e.g. electric mobility, car sharing, ridesharing, etc.). The development is being closely monitored and the contents will be adapted according to requirements.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**5.6 %**	**5**
Commercial	**4.2 %**	**4**
Event	**5.9 %**	**5**
Industry	**4.4 %**	**4**

ASSESSMENT

Mobility is centrally linked to the district and its infrastructure as a starting and finishing point. In addition to accessibility, the primary concern is the quality of the connection with alternative transport modes in order to ensure high-quality mobility for each user group in the district. It is a qualitative-quantitative method in which the transport model, modal split, infrastructure for alternative propulsion technologies, vehicle sharing, and public transport supply indicators are evaluated. The infrastructure for pedestrians and cyclists is considered in criterion TEC3.2. A surplus of points is offered, but maximum 100 points can be credited without bonuses. With bonuses, a total of 120 points can be achieved in the criterion and 130 points for **Industry**.

OVERALL TRANSPORT SYSTEM

NO.	INDICATOR	POINTS
1	**Transport model** **City** **Business** **Event** **Industry** **Commercial**	**max. 5**
1.1	**Topicality of the transport model** **City** **Business** **Event** **Industry** **Commercial**	**max. 5**
	■ Mono-modal model: Topicality of the transport model 6-10 years	1
	■ Multi-modal model: Topicality of the transport model 6-10 years	2
	■ Mono-modal model: Topicality of the transport model < 5 years	3
	■ Multi-modal model: Topicality of the transport model < 5 years	5
2	**Modal split** **City** **Business** **Event** **Industry** **Commercial**	**max. 20**
2.1	**Environmental alliance** **City** **Business** **Event** **Industry** **Commercial**	**5 - 20**
	The share of environmental alliance in the modal split is evaluated for the different space types (RegioStaR 7) using Table 1 in the Method (by interpolation in the specified range).	5 - 20

NO.	INDICATOR	POINTS
at 2	**INNOVATION AREA** **Sustainable mobility** Alternative documentation: If measures are implemented that demonstrably contribute to encouraging the users of the district to make extensive and frequent use of the environmental alliance (public transport, rental systems, car pools) to reach the district, these can also be evaluated positively in accordance with the formulation of the objective of the criterion and the evaluation of the other indicators. This is also possible in the area of MIT with alternative drive technologies (alternatives to petrol/diesel).	10

3 Infrastructure for alternative drive technologies

City **Business** **Event** **Industry** **Commercial**

max. 20

3.1 Motorised individual transport (MIT)

City **Business** **Event** **Industry** **Commercial**

Mobility management strategy - charging infrastructure (Option A)

- There is a mobility management strategy to ensure adequate provision of charging stations (electric, hydrogen, natural gas, etc.). This should consider project-specific needs: future users, building typology, public transport connections, etc.. It supports the objectives of the national strategic framework on the development of infrastructure for alternative fuels and, where available, is based on measures derived at the municipal level for buildings and districts. +5

- The mobility management strategy takes future developments into account and allows for retrofitting in the future. +5

Mobility management strategy - no car parking spaces (option B)

- Motorised individual transport was deliberately avoided. Instead, an active contribution (e.g. rental systems, financing a bus stop, improving the frequency of public transport) was made to develop and implement a mobility management strategy which, by integrating non-motorised modes of transport, public transport and/or rental systems, enables building users to do without motorised individual transport without any loss of comfort. +10

Implementation of mobility management strategy

- The mobility management strategy (option A or option B) has been fully implemented. +10

NO.	INDICATOR	POINTS
3.2	**AGENDA 2030 BONUS - CLIMATE ACTION GOALS** City Business Event Industry Commercial **No car parking spaces** A mobility management strategy according to option B was fully implemented.	**max. 10** 10
4	**Vehicle sharing** City Business Event Industry Commercial	**max. 10**
4.1	**Vehicle sharing offers** City Business Event Industry Commercial Sharing facilities are available for motorised vehicles (commercial/private sharing, company vehicles) in the district or in the direct vicinity (max. 5 minutes on foot). ■ 5 points can be credited for each different facility. Each type of offering can only be credited once (e.g. only one station-based car-sharing provider).	**max. 10**
5	**Quality of public transport access** City Business Event Industry Commercial	**max. 9**
5.1	**Quality of public transport access** City Business Event Commercial Percentage of buildings (measured by gross floor area) located within 350 m of a public transport stop as the crow flies (bus, S-Bahn, tram) ■ 50 – 90 % ■ > 90 %	**max. 9** 5 9
5.2	**Alternative to 5.1: Offerings for bus and train lines** City Business Event Industry Commercial Number of bus and train lines in the district or in the circulation areas directly bordering the district/location. ■ 1 ■ 2 ■ 3 ■ ≥ 4	**max. 9** 2 4 7 9

NO.	INDICATOR	POINTS
6	**Intermodal platforms** City Business Event Industry Commercial	**max. 10**
6.1	**Accessibility of intermodal platforms from the district** City Business Event Industry Commercial Percentage of buildings (measured by gross floor area)/percentage of factory gates/entrances within 350 m as the crow flies of an intermodal platform (at least 3 different means of transport, e.g. suburban railway, tram/streetcar, bus, bicycle rental)	**max. 10**
	■ 50 – 90 %	1 - 6
	■ > 90 %	10
7	**Access to the nearest railway station** City Business Event Industry Commercial	**max. 5**
7.1	**Public transport** City Business Event Industry Commercial Access to the nearest station (S-Bahn, regional and/or long-distance) by public transport, bicycle or on foot.	**max. 5**
	■ ≤ 30 minutes	1
	■ ≤ 20 minutes	2
	■ ≤ 10 minutes	3
	■ Station/suburban railway stops in the district/at the factory gate/access	5

NO.	INDICATOR		POINTS
8	**Frequency of public transport**		
	City Business Event		**max. 10**
	Industry Commercial		**max. 5**
8.1	**Frequency of public transport**		
	City Business Event		**max. 10**
	Industry Commercial		**max. 5**
	Average frequency of all public transport lines on weekdays between 6 AM and 7 PM. Or public transport intervals adapted to shift changes.		
	■ 15 to max. 30 minutes		2
	■ 10 to max. 15 minutes	City Business Event	5
		Industry Commercial	3
	■ 6 to max. 10 minutes	City Business Event	8
		Industry Commercial	5
	■ Max. 5 minutes	City Business Event	10
9	**Specific measures promoting public transport**		
	City Business Event Industry Commercial		**max. 16**
9.1	**Construction or operational measures**		
	City Business Event Industry Commercial		**+max. 8**
	■ Measure 1 (see Method for sample actions)		+4
	■ Measure 2 (see Method for sample actions)		+4
9.2	**Design of public transport stops**		
	City Business Event Industry Commercial		**max. 8**
	Implementation of contents from the user-specific description of the method		
	■ Stop has roofing, lighting, seating, 2 points can be set per element		+6
	■ Dynamic stop information or additional (creative) stop element		+2

NO.	INDICATOR		POINTS
10	**Commercial transport concept**		
	City **Business** **Event**		**max. 10**
	Industry **Commercial**		**max. 20**
10.1	**Commercial transport concept**		
	City **Business** **Event**		**max. 10**
	Industry **Commercial**		**max. 20**
	■ Concept available for parts of the public traffic areas.	**City** **Business** **Event** / **Industry** **Commercial**	3 / 6
	■ Concept available for parts of the public and private traffic areas.	**City** **Business** **Event** / **Industry** **Commercial**	5 / 10
	■ Comprehensive concept for public traffic areas. The points can also be credited if not relevant according to the overall traffic concept.	**City** **Business** **Event** / **Industry** **Commercial**	5 / 10
	■ Comprehensive concept for public and private traffic areas. The points can also be credited if not relevant according to the overall traffic concept.	**City** **Business** **Event** / **Industry** **Commercial**	10 / 20
10.2	**AGENDA 2030 BONUS - CLIMATE ACTION GOALS**		
	City **Business** **Event** **Commercial** **Industry**		**max. 10**
	Ambition to achieve climate-neutral logistics		
	There is a concept for reducing logistics-related CO_2 emissions and measures have been implemented for logistics within the district/location.		10
	For **Industry**: There is a concept for reducing logistics-related CO_2 emissions and measures have been implemented for logistics at the site (inbound, in-house, outbound).		

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The following topics can be used as key figures/KPI for communication:

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Modal split	[%]
KPI 2	Car-sharing offerings	[Number]
KPI 3	Quality of public transport access	[%]
KPI 4	Number of car charging stations (standard and bidirectional)	[Number]
KPI 5	Offerings for bus and train lines	[Number]
KPI 6	Average frequency of public transport	[Min.]
KPI 7	Accessibility of intermodal platforms from the district	[%]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The contents are comparable with indicators 2, 3 of the criterion TEC3.1 Mobility infrastructure.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

The objective is to conserve resources and increase user comfort through a sustainable mobility infrastructure for motorised transport.

The following benefits can be achieved for companies, municipalities and/or users:

- Good accessibility for all, without restriction to a specific means of transport
- Improving of environmental quality, i.e. reducing the negative environmental impact of motorised private transport
- Higher quality of life

Industry **Commercial**

The objective is to achieve a high level of user acceptance for the existing modes of transport through sustainable mobility offerings. Mobility is an important location factor today. The existence of different modes of transport and their timing- and comfort-optimised networking lead to a high level of acceptance and frequency of use by users.

The term “logistics” is used as a generic term for all industry and commercial activities which serve to store and handle goods. Logistics processes take place both within and between companies. On the one hand, a connection to the external network logistics must therefore be provided, which enables deliveries to be made as required and at the same time ensures a safe and uninterrupted flow of materials between the public infrastructure and the factory or storage facilities.
On the other hand, the planning of internal logistics processes is a mechanism to avoid waste.
Unnecessary storage and transport times lead to high capital commitment due to “work-in-process”. It can also make it difficult to control material flows. In addition, storage facilities provided for the purpose of sustainable business management must be used to full capacity. In addition to economic criteria, the planning of transport and commissioning processes must also take into account the use of energy and ergonomic aspects of physical work in manual activities in order to ensure sustainable planning.

The objective of the overall logistics concept criterion is to evaluate logistics planning and design with regard to their sustainability. Key figures for the evaluation of logistics performance and capacity utilisation are also taken into account.

II. Additional explanation

City Business Event Industry Commercial

Mobility is an important location factor today. The availability of different modes of transport and their timing- and comfort-optimised networking lead to a high level of acceptance and frequency of use by users.

Mobility is understood to be a holistic view of motorised and non-motorised transportation with the aim of considering the design phase and to the implementation and utilisation phase equally.

MIT-INFRASTRUCTURE

The development of the MIT infrastructure (infrastructure for motorised individual transportation) has a lasting effect on the development quality. Both the accessibility of central facilities and the development of route guidance is of high relevance. These aspects are taken into account by the relevant guidelines of the Research Association for Roads and Traffic (FGSV)).

Measures for alternative means of transport (such as car sharing etc.) and regulations for stationary traffic are also important. By means of efficient route components and optimal interface design to other transport systems, the potential of the MIT infrastructure can meet both environmental and user-specific requirements.

PUBLIC TRANSPORT INFRASTRUCTURE

The demands of public transport in terms of punctuality and reliability result from its role in connecting and networking. The need to reach a destination as efficiently as possible or to make connections in short travel times is complemented by the networkability of public transport systems and the comfort requirements of users. The evaluation of the quality of the public transport infrastructure can be carried out quantitatively and qualitatively.

III. Method

City Business Event Industry Commercial

In the following indicators, measures are evaluated both qualitatively and quantitatively by using a checklist.

OVERALL TRANSPORT SYSTEM

Indicator 1: Transport model

A transport model, especially a multimodal one (car, truck, bicycle, foot), offers the possibility to simulate and optimise the interaction of different measures.

Indicator 2: Modal split

A key feature of sustainable mobility is a high proportion of environmental alliance (public transport, cycling, walking) in the modal split, in order to keep traffic-related emissions low.

For **Industry**, only the modal split of employee traffic is considered here.

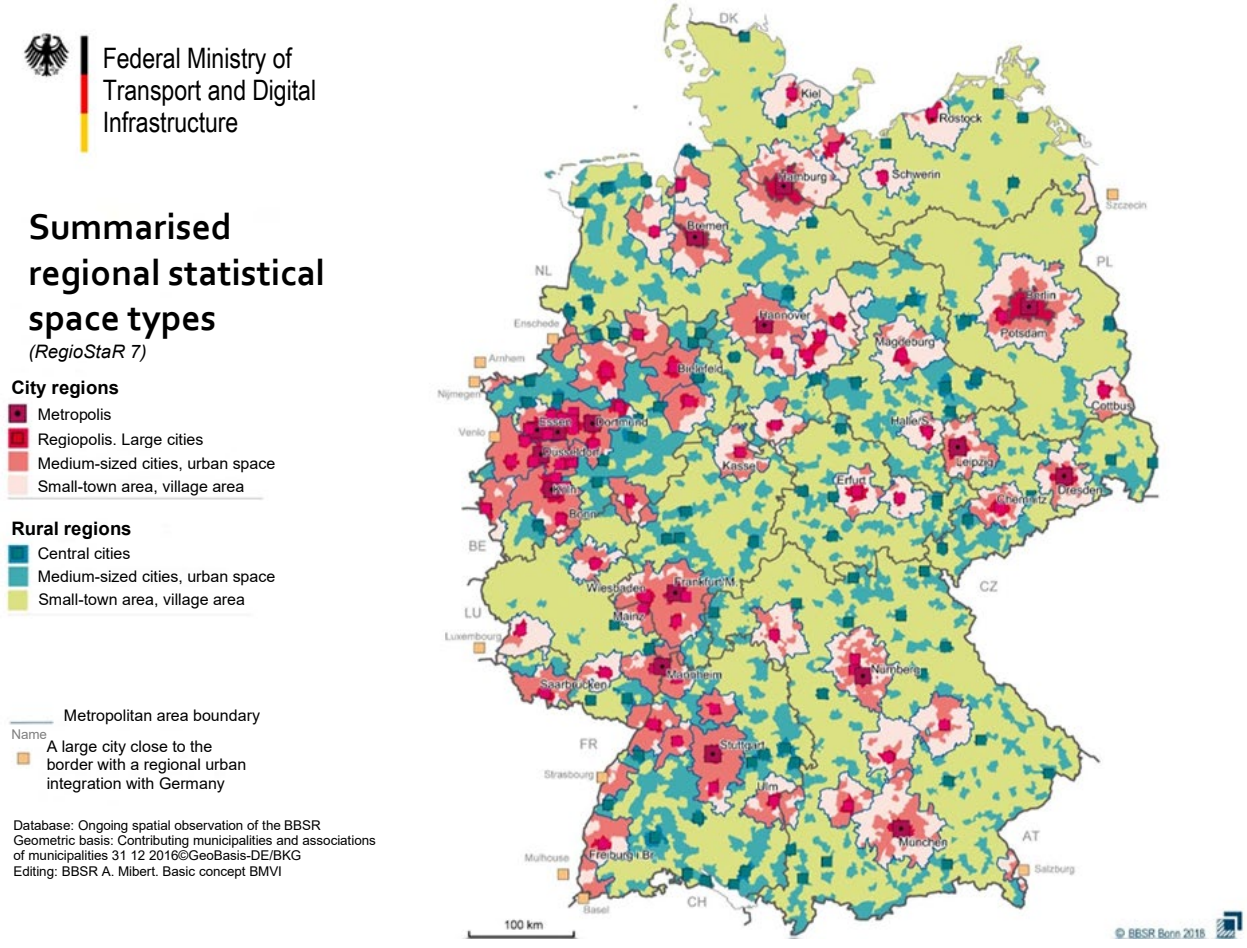
The evaluation is based on the classification of the district using the regional statistical space type (RegioStaR17) for mobility and transport research of the Federal Ministry of Transport and Digital Infrastructure [BMVI] (Table 1).

TABLE 1 Evaluation of the share of environmental alliance on the basis of regional statistical space types (RegioStaR 7)

	CITY REGION	SHARE OF ENVIRONMENTAL ALLIANCE IN MODAL SPLIT
City region	Metropolis	60 ≥ 80 %
	Big city, regiopolis	55 ≥ 80 %
	Medium-sized city, urban area	50 ≥ 70 %
	Small-town area, village area	30 ≥ 60 %
Rural region	Central city	45 ≥ 70 %
	Medium-sized city, urban area	30 ≥ 60 %
	Small-town area, village area	30 ≥ 50 %

The minimum value for the share of the environmental alliance in the modal split is based on the average modal split for the respective space type, which is listed in the results report of the BMVI study “Mobility in Germany - MiD 2017”. For the evaluation, it is not necessary to look at the city as a whole; district or district-related traffic studies on the modal split can also be used.

FIGURE 1 Summarised regional statistical space types (RegioStaR7) Source: BMVI: Regional Statistical Space Typology (RegioStaR), www.bmvi.de/regiostar, 20/01/2020



On indicator 2: Innovation area
If the share of environmental alliance is lower than required by the indicator, but measures have been taken to reduce traffic-related emissions, points can be credited once these measures have been proven. Examples of measures: Networking of people (carpooling), large parts of the motorised individual transport have low emission/free drives (electric, hydrogen drives). Furthermore, there are measures that reduce the traffic volume as a whole and thus also save emissions, such as mixed use, short distances, but also mobile services (mobile ambulance, mobile supermarket, etc.), which contribute to the supply of local residents and thus reduce the volume of travel.

Indicator 3: Promotion of alternative drive technologies
The basis for the evaluation is the availability and the level of implementation of a mobility management strategy, which points out the need for and the possibilities of efficient and environmentally compatible alternative drive technologies (electric, hydrogen, natural gas, etc.) and necessary charging infrastructure for the district , and identifies project-specific measures and usage requirements.

Option A: The mobility management strategy supports the objectives of the national strategic framework on the development of infrastructure for alternative fuels and, if available, is oriented towards target values and measures for buildings, districts or rural structures derived at the municipal level. The assumed target values for the distribution of transport volumes in the district and buildings (modal split) are presented in a plausible manner and form the basis for implementation.

Optiont B: Giving up motorised individual transport (MIT). Development and implementation of a mobility management strategy which, through integrating non-motorised modes of transport, public transport and/or rental systems, enables district users to do without motorised individual transport without any loss of comfort. The early planning and completion of public transport and cycling infrastructure before the district contributes to increased use of non-motorised modes of transport (e.g. Seestadt Aspern, Vienna). The full implementation of option B is additionally rewarded by an AGENDA 2030 bonus.

Indicator 4: Vehicle sharing
Vehicle sharing facilities: Residents/ users of the district have facilities of using vehicles in the form of car sharing (free floating, station-based, private car sharing, district vehicles, etc.). Thisis an important factor for the residential and workplace environment and reduces dependence on private vehicles. Ridesharing/carpooling offerings with direct relation to the space/location can also be credited.

PUBLIC TRANSPORT INFRASTRUCTURE

Indicator 5: Quality of public transport access
Good accessibility to the nearest public transport stop (bus, train, tram) is an essential prerequisite for using public transport. It is evaluated on the basis of the documentation methods in the system basics (Radius: 350 m).

Indicator 6: Intermodal platforms
Linking of different transport modes improves the overall quality of public transport. The accessibility of the nearest intermodal platforms is determined on the basis of the verification methods in the system basics (Radius: 350 m).

Indicator 7: Access to the nearest railway station

An important prerequisite for using public transport frequently, is a good connection to long-distance rail transport, so that (longer) trips can also be covered in a shorter time.

Indicator 8: Frequency of public transport

In order to make local public transport even more attractive, fast and convenient connections are essential. For this reason, it is evaluated how often the individual lines operate during the day between 6 AM and 7 PM. To determine the average frequency, all trips of individual lines at the considered stops are to be added and divided by the observation period of 780 minutes. Only lines that run in a main direction with the (intermediate) destination of a central station, train station, central bus station or intermodal stop are evaluated.

In addition, it is evaluated whether (at least) some of the public transport lines are adapted to the operating or shift times of the location. This is the case, for example, if a bus line only runs at the beginning or end of a shift. A positive evaluation is also given if the site has its own factory line that takes the employees from the factory gates to the individual workplaces.

Indicator 9: Specific measures promoting public transport

Additional points can be awarded for improving the quality of public transport through special structural or operational measures. Special structural or operational measures include, for example, the existence of rendezvous systems for buses, priority for public transport on roads, bus connections from the periphery to the factory site, bicycle parking facilities at bus stops, etc.

In addition to connectivity, the design of the public transport system also plays an important role in ensuring that the service is accepted by as many people as possible. The following factors play an important role:

- Covered stops
- Illuminated bus stops
- Barrier-free stops and means of transport
- Dynamic transport stop information

Additional points can be credited if stops are equipped with additional elements that add functional or design value to the stop, e.g. integration of playing facilities, art (advertising is not art here), etc.

COMMERCIAL TRANSPORT

Indicator 10: Commercial transport concept

An essential component of a sustainable urban district in particular, but also of a commercial district, is the mix of uses. However, commercial uses can cause disturbances (traffic, noise). For example, a commercial transport concept can clarify questions of accessibility to individual areas for commercial traffic and the delivery of commercial enterprises without impairing the flow of traffic.

AGENDA 2030 BONUS - CLIMATE ACTION GOALS

Ambition to achieve climate-neutral logistics:

A concept for reducing logistics-related CO_2 emissions is available and measures have been implemented for logistics within the district/location. For industry, the concept includes all incoming, internal and outgoing traffic (inbound, in-house, outbound).

It must be demonstrated to what extent the emissions are below the average emissions caused by freight traffic in Germany. E.g. current studies by the Federal Environmental Agency can be used as a point of reference (see Figure 1).

FIGURE 2 Comparison of emissions from individual means of transport in freight transport - reference year 2017

		Trucks	Freight railroad[1]	Inland vessel
Greenhouse gases[2]	g/tkm	103	19	32
Carbon monoxide	g/tkm	0.076	0,013	0.070
Volatile hydrocarbons[3]	g/tkm	0.035	0.002	0.027
Nitrogen oxides	g/tkm	0.217	0.037	0.413
Particulates[4]	g/tkm	0.003	0.001	0.010

g/tkm = grams per tonne-kilometre

Source: TREMOD 5.82

Emissions from the provision and conversion of energy sources in electricity, petrol and diesel are included.

Federal Environment Agency 13/11/2018

[1] The emission factors for railways shown in the table are based on information on the average electricity mix in Germany. Emission factors based on company- or sector-related electricity therefore differ from the values in the table.

[2] CO_2, CH* and N_2O expressed in CO_2 equivalents

[3] Without methane

[4] Without abrasion

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 2 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **documents/files/ screenshots/written confirmation about the operator** (e.g. timetables, rough calculation of travel time for public transport, documents for planning the offerings, ...) - B1: On the basis of the detection methods in the system basics	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of suitable **planning documents**	E
Documentation of **transport model** (load plan, forecast)	F

TABLE 3 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Transport model	B, F	B, F	F	B, F	F
2. Modal split	A, B, F	B, F	B, F	B, F	B, F
3. Infrastructure for alternative drive technologies	A; B	B, D	B, C, D, E	A, B	B, C, D, E
4. Vehicle sharing	A, B, D	B, D	B, C, D, E	A, B	B, C, D, E
5. Quality of public transport access	A, B	B, D	B, C, D, E	-	-
6. Intermodal platforms	A, B, D, E	B, D, E	B, C, D, E	A, B, D, E	C, D, E
7. Access to the nearest railway station	A, B, D, E	B, D, E	B, D, E	A, B, D, E	B, D, E
8. Frequency of public transport	A, B, E	B, E	B, E	A, B, E	B, E
9. Specific measures promoting public transport	A, B, E	B, E	B, C, D, E	A, B	B, C, D, E
10. Commercial transport concept	A, B, E	B1, E	B, C, D, E	A, B, E	B, C, D, E
11. Delivery times according to accommodation contract	A, B, E	B, E	B, E	A, B, E	B, E

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

Road and Transportation Research Association:

- Guidelines for integrated network design, latest version.
- Guidance on estimating the traffic volume of area types, latest version.
- Instruction sheet on directing signage for cycle traffic.
- Guideline for the construction of urban roads (RASt) in its current version.
- Handbook for the design of road traffic systems (HBS) in its current version.

The FGSV rules and regulations have been reproduced with the permission of the Road and Transportation Research Association (FGSV). The version of the FGSV rules and regulations with the latest issue date, which is available at FGSV Verlag, Wesselinger Straße 17, 50999 Köln, www.fgsv-verlag.de, is decisive for the application.

Association of German Transport Companies:
Differentiated operation in public transport - flexible modes of operation 2009.

Hessische Straßen- und Verkehrsverwaltung:
Integration of transport planning and spatial planning 2000.

State building code
Reference numbers for the parking space requirements.

The reference values for comparison should be taken from existing districts (best practice with comparable mix of uses). The rating can be positive or negative.

Nachhaltigkeit in der Verkehrs- und Stadtplanung
1. Edition 2014, Dr.-Ing. Frank Schröter & bookboon.com, ISBN 978-87-403-0816-7.

Modal split and space types

- infas, DLR, IVT and infas 360 (2018): Mobility in Germany (on behalf of the BMVI) http://www.mobilitaet-in-deutschland.de/pdf/MiD2017_Ergebnisbericht.pdf

Additionally for: **Industry** **Commercial**

- Arnold, D, Furmans, K. (2007): Materialfluss in Logistiksystemen, Springer-Verlag Berlin Heidelberg
- Arnolds, H. (2010): Materialwirtschaft und Einkauf, Gabler GWV Fachverlage GmbH, Wiesbaden
- DIN 18024-2: Construction of accessible buildings - Part 2: Publicly accessible buildings and workplaces, design principles
- DIN ISO 23601: Safety identification - Escape and evacuation plan signs
- FML (2014): Compendium of the FML, Munich, http://www.fml.mw.tum.de/fml/index.php?Set_ID=320etter=F_id=3031367B-4144-3536-372D-413539322D34.
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- KOM (2008) 435: Strategy for the internalisation of external costs
- Martin, H. (2006): Transport- und Lagerlogistik: Planung, Struktur, Steuerung und Kosten von Systemen der Intralogistik, Vieweg Verlag
- VDI 2385: Recommendations for material handling planning in industrial plants

III. Links

- https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten#textpart-1
- https://www.bmvi.de/SharedDocs/DE/Artikel/G/regionalstatistische-raumtypologie.html

TEC3.2

Mobility infrastructure - pedestrians and cyclists

Objective

Our objective is to conserve natural resources, reduce traffic-related emissions to the air, water and soil, increase user comfort through a sustainable mobility infrastructure and strengthen efficient, affordable non-motorised mobility services.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Better accessibility, especially for non-motorised and mobility-impaired road users.
- Increasing of the quality of street spaces.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	3.4	Reduction of premature mortality; Promotion of health/well-being	3.1.a/b	Health and nutrition
	3.9	Effect of chemicals, air, water and soil pollution		
	11.2	Access to and development of affordable public transport		
	11.6	Reduction of environmental pollution in cities		
	13.2	Climate action measures in regulations, strategies and planning		
Moderate	3.6	Reduction of traffic accidents		
	9.1	Sustainable infrastructure		
	9.4	Modernisation of infrastructure and increase in resource efficiency		

Outlook

The mobility sector is currently transitioning (e.g. rental systems). The development is being closely monitored and the contents will be adapted according to requirements.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**5.6 %**	**5**
Commercial	**4.2 %**	**4**
Event	**4.7 %**	**4**
Industry	**3.3 %**	**3**

ASSESSMENT

Mobility is centrally linked to the district and its infrastructure as a starting and finishing point. In addition to accessibility, the primary concern is the quality of the connection with alternative transport modes in order to ensure high-quality mobility for each user group in the district. This is a qualitative-quantitative method in which the mobility elements/infrastructure for cycle/pedestrian traffic, quality of bicycle parking facilities and signposting systems for cycle/pedestrian traffic indicators are evaluated. The infrastructure for motorised transport is considered in criterion TEC3.1. A surplus of points is offered, but 100 points can be credited at most.

OVERALL TRANSPORT SYSTEM

NO.	INDICATOR		POINTS
1	**Mobility elements for cycle/pedestrian traffic**		
	City Business Event Industry Commercial		**max. 30**
1.1	**Mobility elements promoting cycle/pedestrian traffic**		
	City Business Event Industry Commercial		**max. 30**
	10 points can be credited for each (innovative) mobility element. Examples are given in method for indicator 1.		30
2	**Mobility infrastructure for cycling**		
	City Business Event Industry Commercial		**max. 19**
2.1	**Prioritisation of bicycle traffic in the district**		
	City Business Event		**max. 19**
	Industry Commercial		**max. 6**
	■ Cycle express paths/cycle lanes for direct access	**City Business Event**	+10
	■ At least 80 % of the buildings (or the factory entrances) have publicly accessible bicycle racks at and/or in the building (at the factory gate)	**City Business Event**	+9
		Industry Commercial	+6

NO.	INDICATOR	POINTS
2.2	**Prioritisation of bicycle traffic at the site**	
	Industry **Commercial**	**max. 7**
	■ The location is connected to a higher-level bicycle path network.	3
	■ The location is connected to a higher-level network of bicycle paths and there are bicycle paths on site (no coherent network).	4
	■ The location is connected to a higher-level bicycle path network and has its own network of bicycle paths in the interior. The routing of the internal paths is mainly parallel to the road, whereby the paths are only visually separated from the rest of the circulation area.	5
	■ The location is connected to a higher-level bicycle path network and has its own network of bicycle paths in the interior. The routing of the internal paths is parallel to the road, whereby the paths are structurally separated from the rest of the circulation area by kerbs or similar.	6
	■ The location is connected to a higher-level bicycle path network and has its own network of bicycle paths in the interior. The routing of the internal paths is mainly independent to the road. Where the bicycle paths are merged with the rest of the traffic area, the paths are separated from the rest of the traffic area by kerbs or similar.	7
2.3	**Degree of fulfilment of the quantitative requirements**	
	Industry **Commercial**	**max. 6**
	1 bicycle parking space per 250 m² usable area or per 20 employees	2
	1 bicycle parking space per 125 m² usable area or per 10 employees	4
	1 bicycle parking space per 50 m² usable area or per 5 employees	6

NO.	INDICATOR	POINTS
3	**Quality of bicycle parking facilities** City Business Event Industry Commercial	**max. 20**
3.1	**Quality of the parking facilities** City Business Event Industry Commercial	**max. 20**
	■ The bicycle parking facility/ parking spaces are secured from theft and vandalism(min. 50 %)	+8
	■ The parking facility/parking spaces are protected from weather (min. 80 %)	+5
	■ The parking facility/parking spaces are lit up (min. 80 %)	+2
	■ For pedelecs and small electric vehicles (scooters, prams,...) charging facilities are available in the form of parking spaces, charging cabinets for batteries, etc. (the number of charging facilities depends on a needs analysis).	+2
	■ Bicycle repair facility is accessible from 70% of the buildings within a ten minute walk. Points can be awarded according to the equipment:	
	■ Weather-protected, well-illuminated and if necessary heated	+3
	■ The usual tools for bicycle repairs must be kept ready	+2
	■ A hand-washing basin	+3
	■ Each further measure	+2
4	**Signposting systems for cycle traffic** City Business Event Industry Commercial	**max. 10**
4.1	**Signposting systems** City Business Event Industry Commercial	**max. 10**
	Signposting system partially available (or available, but not according to FGSV standard)	4
	Complete signposting system (according to the FGSV bulletin or comparable standard)	10

NO.	INDICATOR	POINTS
5	**Footpath network**	
	City **Business** **Event** **Industry** **Commercial**	**max. 15**
5.1	**Pedestrian infrastructure**	
	City **Business** **Event** **Industry** **Commercial**	**max. 15**
	The footpath network covers a maximum of 50% of possible routes.	4
	The footpath network covers more than 80% of possible routes	8
	The footpath network covers all possible routes.	15
6	**Location of crossings for pedestrians**	
	City **Business** **Event** **Commercial**	**max. 15**
6.1	**Crossing of paths**	
	City **Business** **Event** **Commercial**	**0 - 15**
	Direct crossing for at least 80 - 100 % (without detours) possible without restrictions.	10 - 15
7	**Signposting systems for pedestrians**	
	City **Business** **Event** **Industry** **Commercial**	**max. 10**
7.1	**Signposting systems**	
	City **Business** **Event** **Industry** **Commercial**	**max. 10**
	Area-wide signposting (destinations, distances, possibly walking minutes) is available; the most important destinations are signposted: ≤ 30 minutes.	+5
	Area-wide orientation plans (e.g. at central facilities, squares etc.) support orientation and increase safety.	+5

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The following topics can be used as key figures/KPI for communication:

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Proportion of buildings with nearby bicycle parking	[%]
KPI 2	Bicycle parking spaces in relation to the usable area	[number/m²]
KPI 3	Number of high-quality bicycle parking facilities	[Number]
KPI 4	Coverage of footpath network in the district with direct path connections	[%]
KPI 5	Area-wide signposting system available	[Yes / No]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** The contents are compatible with indicators 1 and 2 from the TEC3.1 Mobility infrastructure criterion.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

Mobility is an important location factor today. The existence of different transport modes and their timing- and comfort-optimised networking lead to a high level of acceptance and frequency of use by users.
Mobility is understood to be a holistic consideration of motorised and non-motorised traffic with the aim of equal consideration from the design to the implementation phase.

II. Additional explanation

City **Business** **Event** **Industry** **Commercial**

Cycling infrastructure
In order to activate the potential of cycling in everyday traffic more strongly, cycling must be possible quickly, safely and comfortably and take place in an environment in which the bicycle is accepted and used as a “normal” means of transport.

An infrastructure which - based on network planning - enables direct and comfortable journeys by bicycle in a safe traffic environment and traffic environment perceived as safe is the basis for effective promotion. In addition to the elements of bicycle traffic guidance, this includes convenient bicycle parking facilities at the source (home) and at the destination that provide effective protection against theft and vandalism, and elements linking bicycle use with public transport and signposting that guides cyclists on routes with as little traffic as possible.

Pedestrian infrastructure
To encourage foot traffic, a comprehensive network of footpaths is required that is as dense as possible. Pedestrian traffic is very sensitive to detours, so crossings should be made at junctions with the shortest route.

Mobility is understood to be a holistic consideration of motorised and non-motorised traffic with the aim of equal consideration from the design to the implementation phase.

III. Method

City **Business** **Event** **Industry** **Commercial**

This is a qualitative/quantitative method in which the following indicators are considered:

Overall transport system

Indicator 1: Promoting mobility elements for cyclists and pedestrians
Sustainable mobility can be further promoted through special measures and conditions in cycling and pedestrian traffic. Innovative mobility elements are important components of overall transport concepts. This can include digital elements (e.g. app-based information on bike stations, rental systems, etc.) as well as special bike rental systems, handcart systems for transporting loads, tricycles for the mobility impaired, etc. This also includes the pedestrian and bicycle-friendly design of the circulation areas. This can include, for example, the level design of traffic areas, which increases the freedom of movement of bicycles, prams or even delivery robots and (self-propelled) shopping/handcarts.

Cycling infrastructure

Indicator 2: Mobility infrastructure for cycling
The mobility infrastructure and its elements should further promote bicycle traffic. This may include, for example, rapid and direct access via bicycle lanes/express paths. As a prerequisite for the evaluation of the indicator, a documentation must be provided that parking spaces for bicycles are guaranteed by an appropriate amount of space. The design of the parking facility is assessed in indicator 3.

The sufficient number and quality of parking facilities can be determined according to the leaflet no. 593 of the Chamber of Architects of Baden-Württemberg. The result based on the reference values is to be increased or reduced if, in individual cases, it is grossly disproportionate to the need arising from the number of bicycles available or expected to be used by users and visitors of the building.
Alternatively, the following recommendations can be used to determine the space requirement:

- Instructions for the planning of bicycle parking facilities and the ADFC Technical Guideline TR 6102
- Bicycle Parking Manual of the Danish Cycling Federation

Indicator 3: Quality of bicycle parking facilities
In particular, the qualitative characteristics of parking facilities are assessed on the basis of following criteria:

- Passable access directly to the parking facilities/buildings with parking facilities. All parking stands must be suitable for the safe parking and connection of all standard bicycles (compliance with the principle of arrangement). In addition, they must guarantee a secure hold for the bicycles before or during locking the bicycle and allow the simultaneous locking of frame and wheel with a standard lock.
- Effective weather protection, roofing and lighting
- Theft/vandalism security: To protect against theft and wilful destruction, locations must be clearly visible, in the field of vision of passers-by or shops, or constantly guarded (personal or video surveillance). Bicycle lockers/garages/boxes are also ways to protect the bicycles.
- Changing rooms + showers (for buildings with permanent workplaces)

Indicator 4: Signposting systems for cycle traffic

Evaluation points are awarded according to the existence and quality or density of existing or planner-confirmed signage systems that meet the quantitative and qualitative requirements of the FGSV leaflet on signposting for bicycle traffic or comparable national standards.

Pedestrian infrastructure

Indicator 5: Footpath network

It is checked whether a comprehensive network of footpaths without gaps in the network is present, which allows for direct path connections without detours. For this purpose, the district/factory site is analysed and the potential footpaths (possibility to walk) are determined. All those traffic routes that could be used on foot are to be understood as possible paths. This also includes routes that are mainly intended for motorised individual transport (MIT). On the other hand, paths are not considered which are not suitable for pedestrian traffic for special safety reasons (danger zone) or which may only be entered with personal protective equipment (PPE).

Indicator 6: Location of crossings for pedestrians

City streets should be traversable. The type of crossing possibilities according to the guideline for the construction of urban roads (RASt) is relevant here. Since pedestrian traffic is very sensitive to detours, crossings must be provided directly at important routes.

Indicator 7: Signposting systems for pedestrians

It is checked whether an appropriate area-wide signposting system with overview plans (depending on the size of the site) and clear and legible signs are present.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. On the basis of the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **records/documentation/screenshots**	B
Photo documentation of the implemented measures	C
Site plan with marking of relevant indicators/measures	D
Documentation of suitable **planning documents**	E

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1.Mobility elements for cyclists and pedestrians	A, B	B, D, E	B, D	A, B	B, D
2.Mobility infrastructure for cycling	A, B, D / E	B, D / E	B, D/ E	A, B, D / E	B, D, E
3.Quality of bicycle parking facilities	A, B, D / E	B, D / E	B, C, D/ E	A, B, D / E	B, C, D, E
4.Signposting systems for bicycle traffic	A, B	B, C, D	B, C, D	A, B	C, D, E
5.Footpath network	A, B	B, D / E	B, C, D / E	A, B	B, C, D, E
6.Location of crossings for pedestrians	A, B	B, D, E / E	C, D / E	-	-
7.Signposting systems for pedestrians	A, B	B, E	B, C, D / E	A, B, D, E	B, C, D, E

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

Road and Transportation Research Association:

- Guidelines for integrated network design, latest version
- Guidance on estimating the traffic volume of area types, latest version
- Public transport and settlement development - planning aid for communal urban land use planning, current version
- Recommendations for cycle traffic facilities, current version
- Instruction sheet on directing signage for cycle traffic,
- Recommendations for pedestrian traffic systems, current version
- Guidelines for the construction of urban roads, current version
- Handbook for the design of road traffic systems (HBS) in its current version.

The FGSV rules and regulations have been reproduced with the permission of the Road and Transportation Research Association (FGSV). The version of the FGSV rules and regulations with the latest issue date, which is available at FGSV Verlag, Wesselinger Straße 17, 50999 Köln, www.fgsv-verlag.de, is decisive for the application.

Association of German Transport Companies:

- Differentiated operation in public transport - flexible modes of operation 2009.

Hessian Road and Traffic Administration:

- Integration of transport planning and spatial planning 2000.

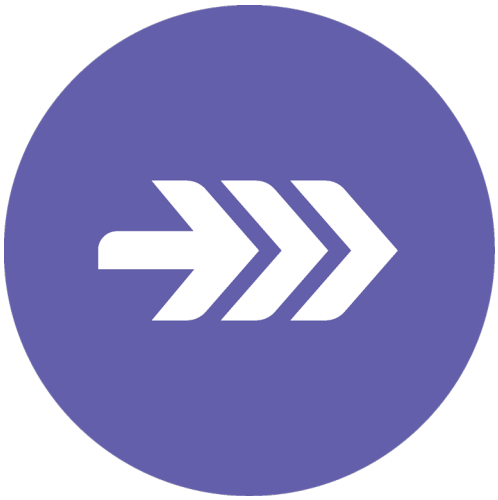
State building code

- Guidelines for parking space requirements and bicycle parking facilities.

EFA (Recommendations for pedestrian traffic systems of the Road and Transportation Research Association (FGSV))

The version of the FGSV rules and regulations with the latest issue date, which is available at FGSV Verlag, Wesselinger Straße 17, 50999 Köln, www.fgsv-verlag.de, is decisive for the application.

The reference values for comparison should be taken from existing districts (best practice with comparable mix of uses). The rating can be positive or negative.



Process quality

The six criteria of process quality aim to increase the **quality of planning and planning participation** as well as the **quality of construction and operation of the district**.

PRO1.2	Integrated design
PRO1.7	Participation
PRO1.8	Project management
PRO1.9	Governance
PRO1.10	Safety concepts
PRO2.1	Construction site / construction process
PRO3.5	Quality assurance and monitoring

PRO1.2

Integrated design

Objective

The objective is to develop more sustainable districts by cooperating with to the project relevant disciplines by defining the framework conditions at an early stage (“Phase 0”).

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Prevention of conflicts during construction and use of the district
- Avoidance of delays in construction
- Higher project quality through the integrated cooperation of the planning team and consideration of variants

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Moderate	11.3 Participatory, integrated and sustainable settlement planning	

Outlook

New design methods with Building Information Modelling (BIM) can have an impact on future planning preparation processes. The DGNB will consider thesefuture changes in design processes.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**5.0 %**	**3**
Commercial	**3.3 %**	**2**
Event	**4.0 %**	**3**
Industry	**5.5 %**	**3**

ASSESSMENT

In order to achieve the best possible district quality, three indicators are used to evaluate the extent to which the relevant framework conditions were established at an early stage. Indicator 1 is used to evaluate the composition of the integrated planning team. Indicator 2 evaluates the extent to which the integrated design process has been shaped. Indicator 3 rewards measures that promote action for planning scenarios and variants. 100 points can be achieved in the criterion.

NO.	INDICATOR		POINTS
1	**Integrated planning team** **City** **Business** **Event** **Commercial** **Industry**		**max. 36**
	6 points can be credited per member of the core planning team. 3 points can be credited for each additional member.		
1.1	**Core planning team**		
	■ For each discipline of the core planning team (max. 4 disciplines/max. 24 POINTS) (see Table 1)		+24
	■ For each discipline of the additionally desirable disciplines (max. 4 disciplines/max. 12 POINTS) (see Table 2)		+12
	■ Coordinator of integrated design (mandatory)		0
2	**Integrated design process** **City** **Business** **Event** **Commercial** **Industry**		**max. 34**
2.1	**Time of integration of DGNB certification criteria into the design process**		
	City **Business** **Event** **Commercial**		**max. 14**
	Industry		**max. 23**
	Information on the distribution of phases for industrial sites can be found in the methods appendix.		
	■ Phase 5: Approval of execution building construction + infrastructure planning + open space		1
	■ Phase 4: Preliminary design of development planning, infrastructure planning + open space, draft building construction	**City** **Business** **Event** **Commercial** **Industry**	5 5 7
	■ Phase 3: Draft land-use plan, preliminary draft building construction	**City** **Business** **Event** **Commercial** **Industry**	8 8 11
	■ Phase 2: Urban design, preliminary draft land-use plan, detailed development concept for event	**City** **Business** **Event** **Commercial**	10 10

NO.	INDICATOR		POINTS
	■ Phase 1: Framework planning, urban development concept, rough development concept for event	City Business	14
		Event Commercial	14
		Industry	23
2.2	**Cooperation of the planning team**		
	City Business Event Commercial Industry		**max. 11**
	Time of completion and use of the interface list with indication of: Project organisation/task distribution (clarity of project organisation and task distribution within the interdisciplinary planning team, regular coordination processes, wide range of topics and level of detail of the information base).		
	■ Phase 1: Framework planning, urban development concept, rough development concept for event		11
	■ Phase 2: Urban design, preliminary draft land-use plan, detailed development concept for event		9
	■ Phase 3: Draft land-use plan, preliminary draft building construction		7
	■ Phase 4: Preliminary design development planning, infrastructure planning + open space, draft building construction		4
	■ Phase 5: Approval of execution building construction + infrastructure planning + open space		1
2.3	**Aspects of the integrated design process**		
	City Business Event Commercial		**max. 9**
	■ Pre-design: Conducting workshops or comparable methods of information collection to formulate the needs of the client and planning tasks at the time of the basic evaluation.		+3
	■ Upgrade levels: Presentation of important stages of the project (“points of no return”), important decisions and completed (partial) tasks as a basis for qualified further processing.		+3
	■ 3-D data model: Cooperation of the planning team with a 3D data model (GIS, CIM, BIM).		+3

NO.	INDICATOR		POINTS
3	**Planning scenarios and variants** City Business Event Commercial Industry		**max. 30**
3.1	**Planning scenarios** City Business Event Commercial Industry		**max. 6**
	Development scenarios/sustainability evaluation: The selected planning was analysed while considering at least 3 development scenarios (e.g. expansion, deconstruction, temporary use, synergies, cluster ...) and additionally evaluating the project's sustainability with the criteria .		+6
3.2	**Planning variants** City Business Event Commercial Industry		**max. 6**
	■ Planning variants/sustainability evaluation: At least three alternative planning variants were examined. These were also roughly evaluated with criteria (self-imposed benchmarks) to assess the sustainability of the project.		+6
3.3	**Method for design-based and functional concept development** City Business Event Commercial Industry		**max. 18**
	■ Conceptualisation/guiding principles for design of buildings and outdoor facilities (not for production processes).	Industry	+18
	■ Process for concept development: Competitive and/or cooperative procedures for the urban development design were carried out (investor selection procedure, multiple contracts, charrette/perspective workshop ...).	City Business Event Commercial	+9 +9
	■ Participation of users, neighbours or stakeholders: Representatives of users, residents or stakeholders were involved in the decision-making process (e.g. as members of a competition jury).	City Business Event Commercial	+3 +3
	■ Preliminary examination according to DGNB criteria: The preliminary examination of the urban and landscape planning competition is carried out according to DGNB criteria (for those criteria that can be assessed in an early planning phase).	City Business Event Commercial	+3 +3
	■ Interdisciplinary jury/selection committee: The jury or selection committee is composed of interdisciplinary members and covers all relevant sustainability aspects according to DGNB. These are at least the disciplines of urban planning, architecture, traffic planning, open space and landscape planning as well as energy planning.	City Business Event Commercial	+3 +3

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The following topics can be used as key figures/KPI for communication:

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Core planning team available	[Yes / No]
KPI 2	Pre-design conducted	[Yes / No]
KPI 3	3D data model available	[Yes / No]

Synergies with DGNB system applications

- Interface to **all** criteria, cross-cutting criterion, as the goal is systematic networking.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business**

Integrated design includes the entire life cycle of a district. It begins with project development and ends with recycling. Urban development, architecture, open space planning, traffic planning, infrastructure and much more are interwoven through very complex dependencies. Integrated design makes these dependencies transparent and optimises them simultaneously and iteratively. This holistic approach requires an interdisciplinary planning team. In the case of very long life cycles, special attention must be paid to systematic documentation and handover to subsequent planners.
In addition, the urban development and functional concept should be found through competing and cooperating planning procedures. These planning procedures take into account alternative development possibilities, integrated local knowledge and ensure a step-by-step approach to optimise the concept, especially with regard to sustainability aspects.

Additionally for: **Industry** **Commercial**

The utilisation phase of industrial sites is much longer than the planning and construction phase. Thus, the quality of today's planning is the decisive lever for the quality of the constructed environment in the decades to come. At the same time, the key planning decisions with the greatest impact on economy, ecology and socio-cultural aspects are made in the early planning phases. For this reason, the cooperation of an interdisciplinary planning team is of great importance especially in the early planning phases.

II. Additional explanation

-

III. Method

City **Business** **Event** **Commercial** **Industry**

The criterion is evaluated qualitatively using the following indicators:

Indicator 1: Integrated planning team
The integrated planning team should cover at least four different disciplines plus the coordinator (core planning team, see Table 1). One person can also represent several disciplines (e.g. architect and urban planner). Depending on the tasks and objectives, additional experts (see Table 2) and later users and representatives of the city should be integrated into the planning team. Teamwork and communication skills are basic requirements for all team members.

TABLE 1 Overview of the disciplines in the core planning team

NUMBER	CORE PLANNING TEAM DISCIPLINES
1	Urban planning
2	Architecture
3	Traffic planning
4	Open space and landscape planning
5	Energy
6	Economic development (for commercial districts)
7	Structural design (for event areas)
8	Coordination committee for safety (depending on the project, with representatives from the sectors of safety and order, construction supervision, road traffic, fire brigade, rescue service providers, police, public transport companies, press office)
9	Coordinator of integrated design (mandatory)

For **Industry**

NUMBER	CORE PLANNING TEAM DISCIPLINES
1	Factory planning
2	Material and energy flow planning (production planner, logistics planner, organisation planner)
3	Architecture
4	Traffic planning
5	Open space and landscape planning
6	Supply and disposal infrastructure
7	Operation (Facility Management)
8	Personnel (works council, human resources)
9	Coordinator of integrated design (mandatory)

TABLE 2 Overview of desirable additional members of the planning team

NUMBER	ADDITIONAL DISCIPLINES IN THE PLANNING TEAM
1	Species protection
2	Geology
3	Noise
4	Water (drinking water, rainwater and sewage)
5	Urban climate (air quality, microclimate, comfort)

NUMBER	ADDITIONAL DISCIPLINES IN THE PLANNING TEAM
6	Waste
7	Economy
8	Legal advice
9	Real estate industry
10	Culture
11	Art (artist or art expert for art in public space)
12	Sociology
13	Chambers of Industry and Commerce (for commercial districts)
14	Supply and disposal infrastructure
15	Event organisation
16	Preservation of historical monuments

The coordinator of integrated design must have experience in leading interdisciplinary teams. This person is responsible for the successful implementation of integrated design, moderates the integrated planning team and documents the integrated design process. The role should be assigned at the beginning of the planning. The integration of the future users and representatives of the city is important for the success of the planning, but is not evaluated in the criterion, since this integration is considered in the “participation” criterion.

TABLE 3 Overview of reduction factors for the time from which the planning team has worked together regularly

DATE	REDUCTION FACTOR
Phase 1: Framework planning, urban development concept, rough development concept for event	1.0
Phase 2: Urban design, preliminary draft land-use plan, detailed development concept for event.	0.8
Phase 3: Draft land-use plan, preliminary draft building construction	0.6
Phase 4: Preliminary draft infrastructure planning + open space, draft building construction	0.4
Phase 5: Execution of building construction + infrastructure planning + open space	0.2

TABLE 4 Overview of reduction factors for project phases

DATE	REDUCTION FACTOR
Target planning: Outline of planning and start or commencement of updating of the factory development concept in relation to the new construction measure	1.0
Rough planning: Preliminary draft factory planning, draft land-use planning (only in case of new land-use plan or change of existing land-use plan), preliminary draft infrastructure planning with open space	0.8
Design and approval planning: Draft factory planning, draft infrastructure planning (with open space), approval of land-use planning (only in case of new land-use plan or change of existing land-use plan) and building permit	0.5
Implementation planning: Implementation planning factory planning, implementation planning infrastructure planning	0.2

Indicator 2: Integrated design process

All DGNB certification criteria must be considered as focal points in integrated design. The basis for the successful integration of these criteria is a continuous coordination process in the planning team. This coordination should be supported by a clearly structured project organisation, regular working and information meetings as well as an internet-based communication platform or 3D data models.

The presentation of the design process and the successful integration of the DGNB certification criteria into the planning process are evaluated according to Table 4, depending on the time of full integration.

An important aspect is the pre-design:

The integrated (interdisciplinary) design process should be structured through an analytical methodology in such a way that a transparent and comprehensible basis for communication as equals for all those involved in the process is established at the earliest stage.

In the analysis and understanding phase, the amount of data required for the planning process should be maximised, even before solutions in the sense of design and planning approaches are developed; the focus is initially on problem recognition and the identification of what is actually the task.

In interviews, workshops and researches, a visual procedure in clearly defined steps should generate a structured, assessable picture of the client's requirements and needs from a wealth of individual data. At the same time, alternating between analysis and initial approaches to solutions should allow the strategic and conceptual project goals to be strengthened and sharpened. Due to the complexity of the task, critical statements are explicitly allowed and are weighed in several communication loops to find a maximum sustainable solution. The holistic consideration of all planning parameters should raise the evaluation of sustainability effects beyond the purely architectural object level and allow for systemic consideration in material cycles (resources), socio-economic effects (behaviour) and ecological factors (environmental qualities). Different qualities of urban life such as mobility, health, public space, technologies, materiality, functionality and programmatic can be interwoven.

For **Industry**, the contents of phase 2 can be assigned to either phase 1 or phase 3.

Indicator 3: Planning scenarios and variants

Especially in complex urban planning projects, thinking in terms of planning scenarios and planning variants is indispensable. On the one hand, this ensures that the chosen solution for the site offers maximum sustainability, and on the other hand, it allows the flexibility and adaptability of the planning concept to be optimised with regard to changing framework conditions, e.g. through gradual implementation with verifiable buffers for flexibility in later phases. Scenarios/variants to be examined can be proposed by the auditor or another person involved in the planning.

Definitions:

- Planning scenarios are comprehensive planning alternatives with different concepts, different building structures and special sectoral planning. They are based on assumptions for future external conditions.
- Planning variants only affect the building structure or individual sectoral plans and should be carried out in parallel (comparison).

Part of the indicator also includes procedures for concept development (e.g. urban development competitions). The evaluation and selection of the competition work is to be carried out by a jury as described in RPW 2008 or, in the case of collaborative procedures, by a decision-making body composed of members authorised by the client and the municipality, taking into account relevant technical and professional expertise. During implementation, care should be taken to ensure that the DGNB sustainability aspects are introduced and reviewed throughout.
With non-standardised procedures, importance is attached to the fact that the execution of the procedure was managed by an interdisciplinary committee of decision-makers.
For participatory development, regardless of the chosen procedure and in addition to the representation of the builder’s or the client’s side in the decision-making bodies, the involvement of future users, residents or stakeholders is important.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Commercial** **Industry**

The following represent a selection of possible documentation forms. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted supporting documents:

TABLE 5 Overview of documentation with abbreviations

DOCUMENT	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents/expert opinions/calculations** ■ B1: Presentation of the integrated planning team and organisation chart of the project team with designation of the tasks, minutes of the meeting showing the point in time from which the integrated planning team has worked together or the DGNB criteria have been integrated into the planning process. Special working formats such as workshops, creative processes or similar are to be presented. ■ B2: The sustainability criteria integrated or to be integrated so far ■ B3: Screenshot/documents of the district in the 3-D model, confirmation from the client that the 3-D model is to be used further when using the district. Explanation of how this will be implemented (e.g. who will update the model when changes are made). ■ B4: Award/official document on the competition or other procedure ■ B5: Plan presentation of the development scenarios/planning variants	B
Documentation of **minutes** of meetings of the planning team, indicating the type of working formats (e.g. workshops, creative processes, etc.) and which DGNB criteria were integrated into the planning process.	G
Timetable of previous and future development stages, important decisions and completed (partial) tasks	H

TABLE 6 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Integrated planning team	B1, G	B1, G	B1, G	B1, G	B1, G
2. Integrated design process	B1, B3, G, H	B1, B3, G, H	B1, B3, G, H	B1, B3, G, H	B1, B3, G, H
3. Planning scenarios	B2, B4	B2, B4	B2, B4	B1, B2	B1, B2

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

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Additionally for: **Industry** **Commercial**

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Websites

- www.akbw.de/recht/vergabe-und-wettbewerb/rpw-2008.html
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PRO1.7

Participation

Objective

The objective is to better adapt the development goals and the relevant framework conditions of the district to the needs of future users by involving all those affected by the planning at an early stage.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Early detection and resolution of planning conflicts
- Design optimisation from the utilisation perspective
- Streamlining of planning and consideration processes and support effects in the approval procedure
- Necessary networking of actors to implement sustainability concepts in the event area (e.g. transport, energy, open space)
- Early location marketing, branding and customer loyalty

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
Significant	11.3 Participatory, integrated and sustainable settlement planning 12.8 Awareness for sustainable development	
Moderate	10.2 Promoting inclusion	
Low	16.7 Inclusive and participatory decision-making	

Outlook

New design methods with Building Information Modelling (BIM) can have an impact on future planning preparation processes. The DGNB will consider any changes in design processes in the future and will adapt the criterion accordingly.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business**	**3.3 %**	**2**
Commercial	**5.0 %**	**3**
Event	**2.7 %**	**2**
Industry	**5.5 %**	**3**

ASSESSMENT

In order to promote an active contribution by the user to the sustainability of the district, the extent to which the user was enabled to participatory processes in the planning process is evaluated (indicators 1 - 4). The effects of participatory processes on the overall concept and the contributions of participatory processes to sustainability are considered in indicators 5 and 6. The participation criterion is an exclusion criterion in the DGNB certification system for city/business districts. An event area that does not meet the minimum requirement of 10 evaluation points in the criterion cannot be certified.

NO.	INDICATOR		POINTS
1	**Participatory processes - Framework planning and urban concept development / value development concepts in general**		
	City **Business** **Commercial**		**max. 10**
	Event		**max. 15**
	Industry		**max. 25**
	Only the evaluation points of one indicator (1.1, 1.2, 1.3 or 1.4) can be credited.		
1.1	**Information**		
	City **Business** **Commercial**		**max. 2**
	Event		**max. 5**
	Industry		**max. 8**
	■ Target groups: Citizenship (citizenship, stakeholders, local experts, public institutions), future users (private individuals, companies, associations, etc.), municipality, local politics, stakeholders, local experts, companies internal (works council, employees).	**City** **Business**	2
		Commercial	2
		Event	5
		Industry	8
	■ Subject: Information about the project and effects on the environment through project presentations, project homepage and newsletter or similar.		
1.2	**Consultative user participation / advice**		
	City **Business** **Commercial**		**max. 5**
	Event		**max. 7**
	Industry		**max. 15**
	■ Target groups: Citizenship, future users (private individuals, companies, associations, etc.), local politics, stakeholders, local experts	**City** **Business**	5
		Commercial	5
		Event	7
		Industry	15
	■ Subject: Information on the project and effects on the environment through project presentations, project homepage and newsletter.		
	■ For **Industry**: As in 1.1		
	■ Subject: Discussion events on the factory development concept, effects on the environment and sustainability standards according to DGNB criteria, online forum, questionnaires, etc.		

NO.	INDICATOR		POINTS
1.3	**Co-determination**		
	City **Business** **Commercial**		**max. 7**
	Event		**max. 15**
	Industry		**max. 23**
	■ Target groups: democratically legitimised committees, real estate industry, participation of citizens' representatives in competition price tribunals; project committees of planners, administration, politics	**City** **Business**	7
		Commercial	7
		Event	15
	■ Subject: As in 1.2 additionally an active influence on concept, framework conditions of planning and sustainability standards according to DGNB criteria through planning with workshops and planning tables; attention is paid to intensive participation, open workshops for everyone or similar informal procedures.	**Industry**	23
	■ For **Industry**: Target group: As in 1.1 Subject: Active influence on concept, planning workshop/workshops (if necessary with planning tables) for planning framework conditions and sustainability standards according to DGNB criteria.		
	■ With **additional** co-responsibility, e.g. by employees with an economic stake in the company, and the institutionalisation of participation procedures.	**Industry**	+2
1.4	**Conceptual integration**		
	City **Business** **Commercial**		**max. 10**
	■ Target groups: As in 1.3.	**City** **Business**	10
	■ Subject: As in 1.3, but institutionalised. Involvement in active decision-making with regard to the concept, framework conditions and sustainability standards according to DGNB criteria through direct democracy by means of citizens' decisions or votes, budgets for implementation managed by users themselves, etc.	**Commercial**	10

NO.	INDICATOR		POINTS
2	**Participatory processes - Planning and realisation of public spaces / social spaces on factory premises**		
	City **Business** **Commercial**		**max. 10**
	Event		**max. 15**
	Industry		**max. 25**
	Only the evaluation points of one indicator (2.1, 2.2, 2.3 or 2.4) can be credited.		
2.1	**Information**		
	City **Business** **Event** **Industry** **Commercial**		
	■ Target groups and subject: As in 1.1.	**City** **Business**	2
	■ For **industry**: Target group internal company (works council, employees) and subject as in 1.1.	**Commercial**	2
		Event	5
		Industry	8
2.2	**Consultative user participation**		
	City **Business** **Event** **Industry** **Commercial**		
	■ Target groups and subject: As in 1.2.	**City** **Business**	5
	■ For: **Industry**: Target group as in 2.1 and subject: As in 1.2 additional consultation hours, consultation in committee.	**Commercial**	5
		Event	7
		Industry	15
	■		
2.3	**Codetermination**		
	City **Business** **Event** **Industry** **Commercial**		
	■ Target groups and subject: As in 1.3.	**City** **Business**	7
	■ For: Target group as in 2.1 and subject as in 1.3.	**Commercial**	7
		Event	15
		Industry	23
	■ With **additional** joint responsibility, e.g. employees who have an economic stake in the company and by direct democracy through voting.	**Industry**	+2
2.4	**Conceptual integration**		
	City **Business** **Commercial**		
	■ Target groups and subject: As in 1.4.	**City** **Business**	10
		Commercial	10

NO.	INDICATOR		POINTS
3	**Participatory processes - Planning and implementation architecture and utilisation concept**		
	City **Business** **Commercial**		**max. 10**
	Event		**max. 15**
	Industry		**max. 25**
	Only the evaluation points of one indicator (3.1, 3.2, 3.3 or 3.4) can be credited.		
3.1	**Information**		
	City **Business** **Commercial**		**max. 2**
	Event		**max. 5**
	Industry		**max. 8**
	■ Target groups and subject: As in 1.1.	**City** **Business**	2
	■ For **Industry**: Target group: As in 2.1 and subject: As in 1.1.	**Commercial**	2
		Event	5
		Industry	8
3.2	**Consultative user participation**		
	City **Business** **Commercial**		**max. 5**
	Event		**max. 7**
	Industry		**max. 15**
	■ Target groups and subject: As in 1.2.	**City** **Business**	5
	■ For **Industry**: Target group: As in 2.1 and subject as in 1.3.	**Commercial**	5
		Event	7
		Industry	15
3.3	**Codetermination**		
	City **Business** **Commercial**		**max. 7**
	Event		**max. 15**
	Industry		**max. 25**
	■ Target groups and subject: As in 1.3.	**City** **Business**	7
	■ Subject: Active influence on the concept, realisation and sustainability standards of the entire architectural project according to DGNB criteria, beyond the own apartment, office etc., through planning workshops, participation in competition prize juries etc.	**Commercial**	7
		Event	15
		Industry	23
	■ With additional co-responsibility, e.g. employees with an economic stake in the company and by participation in the economic realisation and co-decision possibilities.	**Industry**	+2

NO.	INDICATOR		POINTS
3.4	**Conceptual integration**		
	City **Business** **Commercial**		**max. 10**
	■ Target groups and subject: As in 1.4.	**City** **Business**	10
	■ Subject: Possibility to participate in the economic realisation of the project, possibility to decide on the concept, design and sustainability standards according to DGNB criteria (building owner associations, cooperatives, construction by employee holding companies, etc.).	**Commercial**	10
4	**Participatory processes - Utilisation phase**		
	City **Business** **Commercial**		**max. 10**
	Industry		**max. 25**
	Only the evaluation points of one indicator (4.1, 4.2, 4.3 or 4.4) can be credited.		
4.1	**Information**		
	City **Business** **Commercial**		**max. 2**
	Industry		**max. 25**
	■ Target groups: Users of the district.	**City** **Business**	+2
	■ Subject: Information on district operation and management, including sustainability aspects through user information systems. Direct, comprehensible and easily accessible information via technical or organisational systems such as internet platforms, infobox, district newspaper etc.	**Commercial**	+2
	For **Industry**, there is a budget for employee participation and implementation of proposals, which has the objective:		
	■ to increase social quality and employee satisfaction. For **Existing buildings**: 12.5 points	**Industry**	+4
	■ to increase the ecological quality. For **Existing buildings**: +12.5 points	**Industry**	+3
	For **Industry**, there is an institutionalised management system for the reception, evaluation and implementation of contributions in the:		
	■ social area; For **Existing buildings**: +12.5 points	**Industry**	+3
	■ ecological area. For **Existing buildings**: +12.5 points	**Industry**	+3
	For **Industry**: There is an incentive system for employee participation (e.g. advertising, bonuses) for:		
	■ measures to improve employee satisfaction. For **Existing buildings**: +12.5 points	**Industry**	+3
	■ ecological area. For **Existing buildings**: +12.5 points	**Industry**	+3

NO.	INDICATOR		POINTS
	For **Industry**: There is regular reporting by the factory management and employees on the proposals and measures in:		
	■ social area.	**Industry**	+3
	For **Existing buildings**: +12.5 points		
	■ ecological area.	**Industry**	+3
	For **Existing buildings**: +12.5 points		
4.2	**Consultative user participation**		
	City **Business** **Commercial**		**max. 5**
	■ Target groups: Users of the district.		5
	■ Subject: Provide opportunities for suggestions and criticism on district operation and management, including sustainability aspects (e.g. on the maintenance and care of public green spaces, waste management, safety aspects, user meetings, events).		
4.3	**Codetermination**		
	City **Business** **Commercial**		**max. 7**
	■ Target groups: Users of the district.		7
	■ Subject: Provide opportunities for suggestions and criticism on district operation and management, including sustainability aspects (e.g. on the maintenance and care of public green spaces, waste management, safety aspects, user meetings, events).		
4.4	**Conceptual integration**		
	City **Business** **Commercial**		**max. 10**
	■ Target groups: Users of the district.		10
	■ Subject: Creation of framework conditions that allow people to take their own, joint initiatives and implement measures in a self-determined manner (e.g. premises, district disposal funds, care partnerships, participation in infrastructure operating companies, “community trusts”).		
5	**Impact of participatory processes on the overall concept**		
	City **Business** **Event** **Commercial**		**max. 30**
	For each procedure carried out in each phase, it is determined how strongly the process influences the results and has an impact on planning and implementation. If several procedures are carried out per planning, implementation or utilisation stage, the result is averaged.		

NO.	INDICATOR	POINTS

5.1 **Framework planning and urban development concept**

City **Business** **Event** **Commercial** **max. 16**

- Quality level 1 - low — 3
  The suggestions and proposals from the participatory phase are listed clearly and transparently and are dealt with in the planning process and, if necessary, taken further.
  The consideration process and the decision results for the individual proposals are documented.

- Quality level 2 - medium — 8
  As in quality level 1 plus: Proposals were implemented.

- Quality level 3 - strong — 16
  As in quality level 1 plus: Proposals have been implemented and their implementation is monitored and evaluated. If necessary, optimisations are made.

5.2 **Planning and realisation of public spaces**

City **Business** **Event** **Commercial** **max. 7**

- Quality level 1 - low — 2
  Up to 20% of the suggestions and proposals of the participatory process can be found as measures.

- Quality level 2 - medium — 5
  Up to 50% of the suggestions and proposals of the participatory process have influenced the overall approach and can be found as measures.

- Quality level 3 - strong — 7
  More than 50% of the suggestions and proposals of the participatory process have had a significant impact on the overall approach and can be found as measures.

5.3 **Planning and implementation architecture and utilisation**

City **Business** **Event** **Commercial** **max. 7**

- Quality level 1 - low — 2
  Up to 20 % (see indicator 5.2 for explanation)

- Quality level 2 - medium — 5
  Up to 50 % (see indicator 5.2 for explanation)

- Quality level 3 - strong — 7
  More than 50 % (see indicator 5.2 for explanation)

NO.	INDICATOR	POINTS
6	**Contributions of participatory processes to sustainability**	
	City **Business** **Commercial**	**max. 30**
	Event	**max. 25**
6.1	Contributions of participatory processes to sustainability The participatory processes are also examined with regard to contributions to the sustainability approach. For each significant contribution that goes well beyond the legally required level - especially with regard to the use of local knowledge and creativity - 10 points (a maximum of 30 points in total for **City** as well as **Business** and 25 points for **Event**) can be awarded if they are bindingly identified for implementation. These contributions must be documented in detail.	
	■ Per significant contribution	+10

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The following topics can be used as key figures/KPI for communication:

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Codetermination / conceptual integration in the planning phase	[Yes / No]
KPI 2	Codetermination / conceptual integration in the execution phase	[Yes / No]
KPI 3	Codetermination / conceptual integration in the utilisation phase	[Yes / No]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Content can be used in PRO1.1 Quality of project preparation indicator 2.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Participation as a procedure for turning interested and affected parties into stakeholders is a basic element of a project's sustainability. Participation can also make a major contribution to the efficiency of planning processes. Participatory processes in this sense go far beyond the statutory citizen participation prescribed in the German Building Code, in which citizens and affected parties are usually confronted with planning that has already been agreed in advance. By contrast, target-oriented procedures for sustainable district development rely on broad-based planning participation by all relevant target groups from the early concept development stage. Instead of classical discussions and discussion workshops, methods with planning tables as well as open planning workshops with cooperating or competing planning teams are used. Form and scope must be adapted to the size, use and organisation of the project and its planning, implementation and utilisation stages.

II. Additional explanation

Industry **Commercial**

In urban land-use planning and in building permit procedures for the factory development, the intensity of participation procedures desired and demanded by the population often goes far beyond the citizen participation required by the German Building Code. With the prescribed so-called early citizen participation, citizens and those affected are already confronted with existing plans, and the same applies to building permits. In the meantime, more advanced methods are available that are used at an early stage of concept development.
Particularly in the case of conflicts, consensus-building and mediation procedures can be of great importance for the high-quality implementation of planning. This should go beyond discussion workshops.
Methods, e.g. with planning tables as well as open planning workshops and the active, broad-based planning participation of all relevant target groups can be very helpful for the early development of ideas and preliminary coordination.
The form and scope of participation depends on the size, use and organisation of the measures and their planning, implementation and utilisation stages.

III. Method

City **Business** **Commercial** **Event** **Industry**

Indicator 1: Participatory processes

The participatory processes are evaluated in a differentiated manner on the basis of the degree of influence granted to the participants and accordingly divided into **4 categories**:

1. Information (access to project data)
2. Consultative user participation (comments on project)
3. Codetermination (participation in / influence on decisions)
4. Conceptual integration (direct decision possibility or concrete contribution to the realization of the project, e.g. assumption of entrepreneurial risk)

These possibilities of influence are queried for the various 4 planning, implementation and usage stages of a district:

- 1.1 -1.4. Framework planning and urban development concept
- 2.2 - 2.4 Planning and realisation of public spaces (squares, green spaces, playgrounds, promenades etc.)
- 3.1 - 3.4 Planning and realisation of architecture (building construction and private open space)
- 4.1 -4.4 Utilisation phase

Additionally for: **Industry**

The participatory processes are evaluated in a differentiated manner on the basis of the degree of influence granted to the participants and accordingly divided into **3 categories**:

1. Information (access to project data)
2. Consultative user participation (comments on project)
3. Participation (involvement in or influence on decisions)

Event

These possibilities of influence are queried for the different 4 planning, implementation and utilisation stages of an event area:

1. Framework planning and urban concept development
2. Planning and realisation of public spaces (squares, green spaces, promenades etc.)
3. Planning and realisation architecture (building construction and private open spaces)
4. Utilisation phase (management of the event area, public relations)

Indicator 2: Participatory processes - Planning and realisation of public spaces / social spaces on factory premises

The system corresponds to indicator 1, but with a focus on public spaces or, in the case of **Industry**, on social spaces on the factory premises.

Indicator 3: Participatory processes - Planning and implementation architecture and utilisation concept

The system corresponds to indicator 1, but with a focus on the architecture and utilisation concept.

Indicator 4: Participatory processes - Utilisation phase

The system corresponds to indicator 1, but with a focus on the utilisation phase.

Indicator 5: Impact of participatory processes on the overall concept

It will be evaluated in which form suggestions and proposals are considered in the planning process and to what extent the results of participation are incorporated in the final consideration and decision-making processes, as well as the effects or influence of participatory procedures on the overall approach and individual measures.

Indicator 6: Contributions of participatory processes to sustainability

The contributions made by participatory processes to the development of sustainability issues from the DGNB system's topic areas are evaluated. A positive evaluation is given to the implementation of participatory procedures during all planning, implementation and use stages of the district, whereby the greater the scope for influence, the more positive the evaluation. The quality of the procedures can be seen in the effects on the overall concept and the generation of impulses for individual measures. The greater the impact, the more positive the assessment. Contributions to the sustainability issues of the DGNB system are also rated positively.

While the effects of participatory processes on the overall concept are assessed quantitatively in terms of the implementation of the proposals from participation, a qualitative evaluation is made of the contributions of participatory processes to sustainability. In particular, the effects on ecological, economic, sociocultural and functional aspects are taken into account.

APPENDIX B - DOCUMENTATION

I. Required documentation

The following represent a selection of possible documentation forms. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted supporting documents. This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant documents/expert opinions/calculations/screenshots** ■ B1: Explanation by a representative of the district users which measures are planned and how they are to be implemented (use phase) ■ B2: Listing of suggestions and proposals from participation; calculation of the percentage of measures implemented	B
Photo documentation of the implemented measures/events	C
Documentation of **planning documents** in the form of sketches and plans developed in participatory procedures	E
Documentation of **minutes** of the workshops/meetings with extracts of the presentation/sketches/plans	G
Timetable showing participatory measures implemented so far and planned future measures	H

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Participatory processes - Framework planning and urban development concepts	G, H	C, G, H	B, C, G, H	G, H	B, C, G, H
2. Participatory processes - Planning and realisation of public spaces	G, H	C, G, H	B, C, G, H	G, H	B, C, G, H
3. Participatory processes - Planning and implementation of architecture and utilisation concept	G, H	C, G, H	B, C, G, H	G, H	B, C, G, H
4. Participatory processes - Utilisation phase	G, H	C, G, H	B, C, G, H	G, H	B, C, G, H
5. Impact of participatory processes on the overall concept	G, H	B, C, E, G, H	B, E, G	G, H	B, E, G, H
6. Contributions of participatory processes to sustainability	G, H	C, G	C, G	G, H	C, G, H

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

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Laws

Additionally for: **Industry** **Commercial**

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Websites

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Additionally for: **Industry** **Commercial**

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- http://cordis.europa.eu/easw/home.html
- http://www.communityplanning.net

PRO1.8

Project management

Objective

The objective is to ensure quality, costs and deadlines during the development of the district / areal.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Avoidance of delays and additional costs
- Ensuring high project quality

Contribution to sustainability goals

No direct contribution to the Sustainable Development Goals (SDG) of the United Nations (UN) or the German Sustainability Strategy.

Outlook

Project management as a basic prerequisite for sustainable districts will remain prospectively anchored in the system in this form. No modifications are currently planned.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Commercial**	**3.3 %**	**2**
Event	**2.7 %**	**2**

ASSESSMENT

In order to secure costs and deadlines in the development of the district, project management, risk management, quality assurance, scheduling and cost control are rewarded if they are carried out early and comprehensively in the project. 100 points can be achieved in the criterion.

NO.	INDICATOR		POINTS
1	**Project management** **City** **Business** **Event** **Commercial**		**max. 15**
1.1	**Implementation of project management** **City** **Business** **Event** **Commercial**		**max. 15**
	■ Project management was carried out.		5
	■ Project management is directly assigned to the owner or developer, once the building law comes into effect,		10
	■ Project management is supported by professional, web-based communication platforms or a 3D data model (GIS, BIM, CIM), during conception phase, prior to building law coming into effect.		15
2	**Risk management** **City** **Business** **Event** **Commercial**		**max. 25**
2.1	**Risk controlling** **City** **Business** **Event** **Commercial**		**max. 25**
	Preventive risk management was conducted.	**City**	+15
		Business **Event**	+10
		Commercial	+10
	Risk identification was conducted with the help of stakeholder and/or project participant workshops.	**City**	+10
		Business **Event**	+5
		Commercial	+5
	In addition, regular risk controlling was conducted accompanying the project.	**Business** **Event**	+10
		Commercial	+10

NO.	INDICATOR	POINTS
3	**Quality assurance** City Business Event Commercial	**max. 25**
3.1	**Project objectives, documentation, implementation of quality review** City Business Event Commercial	**max. 25**
	Definition of specific ecological, economic and sociocultural project objectives (incl. design) before starting the awarding of building contracts.	+5
	Documentation of the contractual agreement (binding) of the specific ecological, economic and sociocultural project objectives (design manual, contracts, quality standards).	+5
	The project objectives are clearly communicated to all those involved in the planning process (including contractors) and updated in case of changes.	+5
	A regular quality review is conducted and documented.	+5
	A quality review is conducted after project completion, which compares the project objectives and the results.	+5
4	**Scheduling** City Business Event Commercial	**max. 10**
4.1	**Overall schedule** City Business Event Commercial	**max. 10**
	An overall schedule is available.	2
	A professional and adaptable time schedule (e.g. MS-Project or equivalent) with division into work phases and construction phases is available.	5
	A professional and adaptable time schedule (e.g. MS-Project or equivalent) with a detailed breakdown into the individual work phases of project development and individual construction phases as of the conception phase with buffer times for risks and alternatives is available.	10

NO.	INDICATOR	POINTS
5	**Cost control** City Business Event Commercial	**max. 25**
5.1	**Profitability calculation, consultation and optimisation** City Business Event Commercial	**max. 25**
	A cost and income analysis in form of a static project developer calculation is available, with constant review of the established budget.	+7
	A profitability calculation on the project realisation during the entire development period (from the acquisition of building law and planning to the realisation and marketing/sale)is available and based on a market and location analysis. The costs are to be constantly checked, at least during the implementation phase, by means of a special cost control programme.	+6
	A binding cost structure has been defined, which allows a use-oriented cost allocation and aggregation on a superordinate level (e.g. structure according to DIN 276 with additional project-related subdivision).	+6
	A follow-up cost consultation or analysis was conducted.	+6

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

As key figures / KPIs, it is useful to communicate the number of sustainability aspects for which quality assurance measurements were carried out.

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Number of sustainability aspects for which quality assurance measurements were carried out	[Number]
KPI 2	Implementation of risk management	[yes]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** Information from this criterion can be used in the PRO2.2 criterion.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Commercial**

The objective is to ensure quality, costs and deadlines in the development of the district.

The following benefits can be achieved for companies, municipalities and/or users:

- Avoidance of delays and additional costs
- Ensuring high project quality

II. Additional explanation

District developments are among the most complex construction tasks of our time due to their size, the long development period and the numerous parties involved. With accompanying process management, the goals of a development can be secured and undesirable developments can be counteracted in time. Numerous challenging examples of master plans that were never realised show the relevance of the topic.
Successful process management is a holistic development management approach that requires long-term and permanent project support. A holistic view extends from legal certainty to the promotion of innovation.

- The primary objective is to ensure that the defined quality goals and the sustainability goals are met.
- In addition, it is necessary to monitor the adherence to deadlines for a smooth process.
- The third essential point is cost certainty, without which the quality of a development or, even the project itself can be called into question.

III. Method

City **Business** **Event** **Commercial**

It is a qualitative method in which the following indicators are considered, in the form of a checklist

Indicator 1: Project management
Long-term and effective project management requires long-term project support from the initial concept to the final implementation. To be able to work effectively, project management must be given a corresponding position in the project structure, so that necessary management measures can be implemented quickly and in a targeted manner.
Approaches for the management of land development as a form of project management are regulated in the AHO or HOAI (German ordinance on architects' and engineers' fee). There is no fixed legal evaluation standard for the management of land development. The chosen evaluation standard is therefore structured as a checklist. The evaluation standard is designed for an event area with mixed use and a district of appropriate size.
This process can be supported by an internet-based communication platform or a 3D data model (GIS, BIM, CIM).

Indicator 2: Risk management

“Risk management is a supporting instrument (...) for the systematic identification, assessment and treatment of risks” (Enz 2007). While in the Anglo-American region risk analysis is already firmly anchored in project development through the inclusion of risk costs, proactive risk assessment is still relatively new in German project management. Identifying, assessing and dealing with potential risks that could jeopardise the success of a project are an important step towards avoiding additional costs and undesirable developments, especially in projects on an urban development scale.

Risks are not inherently limited to one field - they can be, for example, scheduling, technical, personnel, financial, socio-cultural, political, ecological, contractual or of other nature.

Risks can be identified, for example, by

- Document analysis
- Implementation of risk workshops
- Conducting interviews, surveys and checklists with project participants from different areas
- Use of a risk database accessible to all project participants
- Scenario planning
- Stakeholder analyses

Risks are evaluated by (expert) assessment and aim to prioritise risks in order to develop alternative actions and strategies for management and coping in the next step. Risks are not always static, but are partly dependent on developing internal and external factors. For this reason, regular risk controlling should be carried out throughout the project, documenting the measures decided on and their effects and, if necessary, updating the current status of non-static risks.

Indicator 3: Quality assurance

To ensure quality assurance over a long development period with many parties involved, agreements on official quality assurance instruments are required. These can be achieved with design manuals, design statutes or similar measures.

Indicator 4: Scheduling

In order to ensure a smooth project flow and an on-schedule implementation, a realistic time schedule with corresponding risk assessments and adjustment options (e.g. for development variants) is required.

Indicator 5: Cost control

A high degree of cost certainty requires a profitability calculation over the course of the entire development period based on a realistic location and market analysis.

APPENDIX B - DOCUMENTATION

I. Required documentation

The following represent a selection of possible documentation forms. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted supporting documents:

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant records/documents**, e.g. contracts, analyses, target agreements, budget planning, etc.	B
Proof of **timetable**	H

TABLE 2 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Project management	B	B	B	-	-
2. Risk management	B	B	B	-	-
3. Quality assurance	A, B	B	B	-	-
4. Scheduling	B, H	B, H	B, H	-	-
5. Cost control	A, B	B	B	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

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PRO1.9

Governance

Objective

The objective is to develop management and organisational structures that ensure the sustainable development of the district over its entire life cycle.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Creation of basis for implementing sustainability goals of the district during planning, construction as well as “involvement of all residents and users”. Securing what is “special or unique”.
- Lively togetherness, resilient sociocultural structures and thus avoidance of undesirable social developments (in event areas)
- Reduction of costs and emissions through the establishment of inter-company material flow management and shopping communities as well as shared infrastructures such as kindergartens (in commercial districts)
- Value stability of buildings and land

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Moderate	11.3	Participatory, integrated and sustainable settlement planning		
Low	10.2	Promoting inclusion	16.3.a	Good governance
	12.8	Awareness for sustainable development		
	16.5	Reduction of corruption		
	16.6	Transparent institutions		
	16.7	Inclusive and participatory decision-making		

Outlook

The aspect of governance is an important component of sustainable districts and will prospectively remain anchored in the system in this form. No modifications are currently planned.

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Commercial**	**3.3 %**	**2**
Event	**2.7 %**	**2**

ASSESSMENT

In this criterion, governance is understood as network management, as opposed to government or hierarchical management. Which framework conditions have been created, which actors have been involved, which instruments have been used and how open and transparent the processes and structures are, will be evaluated. 100 points can be credited in the criterion.

NO.	INDICATOR		POINTS
1	**General conditions**		
	City **Business** **Commercial**		**max. 45**
	Event		**max. 55**
1.1	**District or area management**		
	City **Business** **Event**		**max. 15**
	Commercial		**max. 20**
	There are one or more full-time employees who are responsible for district or area management.	**City** **Business** **Event**	15
		Commercial	20
1.2	**Consultation with (future) residents and users**		
	City **Business** **Commercial** **Event**		**max. 5**
	For example, assembly support, (advanced) trainings on funding programmes, preparation of manuals and guides, location marketing for trade and industry		5
1.3	**Self-government**		
	City **Business**		**max. 10**
	Commercial **Event**		**max. 5**
	In the district, framework conditions are created that enable the residents and users of the district to manage individual areas themselves (e.g. maintenance of green spaces by residents, provision of financial resources by the municipality, initiation of experience exchange networks, shopping communities for commercial enterprises). The partnerships should be able to identify problems in the district, develop appropriate problem-solving strategies and implement them.	**City** **Business**	10
		Commercial **Event**	5

NO.	INDICATOR		POINTS
1.4	**Strengthening or development of social initiatives**		
	City **Business** **Commercial**		**max. 10**
	Event		**max. 30**
	The municipality and/or the resident companies participate in measures that strengthen social interaction (e.g. promotion/provision of common space, initiatives, budget for the implementation of citizens' proposals, citizens' newspaper, joint district festivals, etc.).		
	■ Financial support	**City** **Business** **Commercial**	+5
		Event	+15
	■ Organisational support	**City** **Business** **Commercial**	+5
		Event	+15
1.5	**Financial incentive systems**		
	City **Business** **Commercial**		**max. 5**
	In order to implement social and ecological projects in the district (e.g. social housing construction, solar energy systems), subsidy programmes and/or low-cost loans are offered to builders in the district that go beyond state subsidies. Only incentive systems that have been developed specifically for the district can be considered.		5
2	**Municipal project participation and accountability**		
	City **Business** **Commercial**		**max. 35**
	Event		**max. 45**
2.1	**Project organisation**		
	City **Business** **Commercial**		**max. 20**
	Event		**max. 30**
	Specific project organisation with clear responsibilities and short decision-making paths in the municipal administration is formed for district development (e.g. spin-off of a staff unit). For private developments, the municipality makes an effective contribution to project implementation and effective participation in project steering. A distinction is made between the following three levels:		
	Low project participation: no project-specific or sufficiently existing organisational form, no continuous participation in steering groups, long decision-making paths, no competent contact persons, scarce personnel resources (which, for example, does not allow for rapid processing of the project in normal day-to-day business).		0

NO.	INDICATOR		POINTS
	Medium project participation: efficient organisation or participation in steering group, short decision-making paths, competent contact persons, sufficient personnel resources (e.g. existing project group takes on additional tasks, clear definition of contact persons or similar).	City Business Commercial Event	10 15
	High project participation: very efficient organisation or direct participation in steering group, very short decision-making channels, highly competent contact persons and very good personnel resources (e.g. development company, staff unit with external project controller, project-specific project group, participation with decision-making authority in steering group with sufficient resources, etc.)	City Business Commercial Event	20 30
2.2	**Municipal projects / services** City Business Commercial Event The municipality has one or more projects/services that support the development of the district.		max. 15
	■ Planning (e.g. consulting)		+5
	■ Construction (e.g. municipal “starter project”, Freiburg-Rieselfeld light rail system, town hall, information centre, municipal library, a special leisure facility)		+5
	■ Use (e.g. consulting)		+5
3	**Openness and transparency of structures and processes** City Business Commercial		max. 20
3.1	**Transparent allocation of building plots** City Business Commercial Are the criteria according to which building plots are allocated in the district transparent for everyone, and is it possible to influence them during the planning phase by means of appropriate participation procedures? Exception for single user/owner: 10 points can be awarded.		max. 10 10
3.2	**Distributive justice** City Business Commercial Are the building plots in the district allocated according to ecological and/or social criteria (e.g. Tübingen Alte Weberei: Application procedure for plots of land. Not the highest bidder, but the one with the most sustainable concept is awarded the contract, the construction of social housing or systems for the regenerative production of energy in commercial enterprises)?		max. 10 10

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Full-time district/area management available	[Yes]
KPI 2	Number of social initiatives supported/established	[Number]
KPI 3	Proportion of building plots in the district that were allocated according to ecological and/or social criteria	[% / number]

Synergies with DGNB system applications

-

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Nowadays, the term governance is used in various contexts (see Drilling 2009: 11). In this criterion, governance is understood as network management, as opposed to government or hierarchical management. The question is therefore which framework conditions must be created, which actors must be involved and which instruments must be used to ensure that the district develops sustainably in the long term.
Here, “process management in the sense of urban governance [...] is a necessary, but not sufficient condition for the realisation of sustainable districts. Such process management does not come about automatically, but must be actively developed and established by the actors. Project quality therefore depends on the quality of the process management that the actors are able to develop and establish” (citation from Schäffer-Veenstra 2013: 4)

II. Additional explanation

Distinction from other criteria:
Good network management requires that all those affected by district development are involved in the creation phase and that development is regularly reviewed during the use phase. As these two aspects are assessed in the participation and monitoring criteria, they are not considered in this criterion. The focus of the criterion is a functioning management and organisational structure that ensures sustainable district development.

III. Method

City **Business** **Event** **Commercial**

The concepts of responsibility and accountability, openness and transparency, effectiveness, and justice and fairness are mentioned as characteristics of sustainable governance structures. These characteristics are assessed using the following indicators:

Indicator 1: General conditions
The central tasks of district/area management are

- Provision (of certain services)
- Mediation/moderation (between different interests)
- Initiation (of projects and actions by residents and/or users)
- Networking (of different actors)

Indicator 2: Municipal project participation and accountability
Indicator 3: Openness and transparency of structures and processes

APPENDIX B - DOCUMENTATION

I. Required documentation

The following represent a selection of possible documentation forms. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted supporting documents:

TABLE 1 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant documents/expert opinions: ■ B1: Explanation of planned measures and presentation of which structures/processes were considered/implemented in the planning ■ B2: Presentation of the persons and tasks of the district/area management, organisational structure if applicable, list of implemented measures	B
Photo documentation of the implemented measures	C

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. General conditions	A, B	B	B, C	-	-
2. Municipal project participation and accountability	B	B	B, C	-	-
3. Openness and transparency of structures and processes	B	B	B, C	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- Betker, Frank (10/2013): Nachhaltigkeit institutionalisieren: ein neuer Gesellschaftsvertrag für städtische Gewerbegebiete. In: GAIA – Ecological Perspectives for Science and Society, Volume 22, Number 3, S. 178–186(9).
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PRO1.10

Safety concepts

Objective

The objective is the development of safety regulations that guarantee a smooth event focussing on emergency response/defence, as well as countermeasures in the event of an emergency, and which safeguards visitors.

Benefits

The following advantages can be achieved for the organisers, municipalities and/or users:

- Creation of a safe and secure environment and thus an attractive event area, which protects both people and the building through existing security structures
- Creation of a safety standard for the operation of the event area
- Reduction of the consequential costs of damage to people or buildings by reducing the probability/risk of occurrence using a location-specific safety structure
- Value stability of buildings, land and brand
- Increase of professionalism in the area of security management processes
- Classification of safety risks and initiation of specific countermeasures (systematisation)

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) OF THE UNITED NATIONS	CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY
1 Low	11.7 Access to public spaces and green areas	

Outlook

The aspect of safety concepts as a component for sustainable event areas will remain anchored in the system in this form in the future. Modifications will be made according to the current situation.

Share of the total score

	SHARE	WEIGHTING FACTOR
Event	**2.7 %**	**2**

ASSESSMENT

The criterion evaluates the emergency response/ defence and countermeasures. A maximum of 100 points can be achieved in the criterion.

NO.	INDICATOR	POINTS
1	**Escape and emergency routes**	
	Event	**max. 10**
1.1	**Escape plans**	
	Event	**max. 10**
	Escape and emergency route plans are created and implemented	10
2	**Emergency planning**	
	Event	**max. 10**
2.1	**Emergency plan and countermeasures**	
	Event	**max. 10**
	Emergency plan is created and implemented.	10
3	**Safety concept for fire protection (depending on fire protection regulations of the country)**	
	Event	**max. 10**
3.1	**Fire protection concept**	
	Event	**max. 10**
	Preventive measures in the case of fire are implemented.	10
4	**Evacuation concept**	
	Event	**max. 10**
4.1	**Evacuation concept**	
	Event	**max. 10**
	An evacuation concept was developed and implemented.	10
5	**Overcrowding concept**	
	Event	**max. 10**
5.1	**People flow analysis**	
	Event	**max. 10**
	An overcrowding concept was developed and implemented.	10

NO.	INDICATOR	POINTS
6	**Traffic concept**	
	Event	**max. 10**
6.1	**Entrances and exits**	
	Event	**max. 10**
	A traffic concept was developed and implemented.	10
7	**Communication concept**	
	Event	**max. 10**
7.1	**Exchange of prevention and intervention information**	
	Event	**max. 10**
	A communication concept was developed and implemented.	10
8	**Anti-terrorism concept**	
	Event	**max. 10**
8.1	**Safety management**	
	Event	**max. 10**
	An anti-terror concept was developed and implemented.	10
9	**Concept against violent visitors/vandalism high-risk games**	
	Event	**max. 10**
9.1	**Safety measures for high-risk games**	
	Event	**max. 10**
	Safety measures for high-risk games developed and implemented.	10
10	**Electronic safety systems**	
	Event	**max. 10**
10.1	**Video surveillance and loudspeaker systems**	
	Event	**max. 10**
	Monitoring and loudspeaker systems were planned and installed.	10
On 1-10	**INNOVATION AREA** Explanation: Safety measures that cannot be assigned to the above categories or measures, but which demonstrably increase the sense of security and protection.	**As in 1 - 10**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

Not available

NO.	KEY FIGURES/KPI	UNIT

Synergies with DGNB system applications

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Event

Safety is the intersection of technical, organisational and personal requirements (TOP). The individual prerequisites are described in more detail below on the basis of this TOP model.
Technical requirements describe the safety-oriented design of the material environment. Constructional-technical measures should prevent accidents.

II. Additional explanation

Event

As far as the organisational requirements are concerned, an organisational, functional and secure system structure should be in place. There should be a safe and optimum correlation of effects between the fault-free states and processes.
Personal requirements include the individuals as well as the community as a whole. The latter contributes actively or passively to safety for themselves or others. This is done through their actions, e.g. by designing the technical and organisational requirements.
The focus of the criteria and indicators to be evaluated is the influence of the building on the safety of the workforce and the properties. This must be given special consideration during the audit.

III. Method

Event

In order to ensure safety at events, both planning and execution must be considered, especially from the visitor's point of view (see German safety guide for major events - BaSiGo-Guide). All foreseeable risks must be recorded and suitable prevention or intervention measures developed. Based on the research results of the "BaSiGo-Guide" (components for the safety of major events) and the "FIFA Stadium Safety and Security Regulations", indicators were developed that address the core areas of safety/security.

Indicator 1: Escape and emergency routes
In the event of danger, escape and emergency routes lead the spectators in an orderly manner out of the stadium or grounds to an "appropriate place"/ a danger-free zone (outdoor area) and guide rescue personnel safely to the source of danger. Escape and emergency routes must be marked as such and be comprehensible to visitors by means of escape plans. Escape routes must also be designed for people with disabilities. The number of escape routes is determined by two indicators (cf. FIFA Stadium Safety and Security Regulations).

- Evacuation time in case of emergency
- Number of visitors

Indicator 2: Emergency planning
The emergency plan illuminates the entire event area (stadium and surroundings) and deals with both the trouble-free operation and a concrete incident, which is minimised by planned countermeasures to restore the proper stadium operation. This includes a catalogue of measures that covers all potential risks/emergencies and refers to

appropriate countermeasures. Important aspects of emergency planning are: Scheduling countermeasures, provision/organisation of resources and documentation and cooperation of the security personnel involved (see German guide for major events BaSiGo-Guide).

Indicator 3: Safety concept for fire protection

This includes both the prevention and the elimination of danger, which is intended to prevent a fire from breaking out or to eliminate it upon occurrence. The installation of fire detection and fire alarm systems is fundamental. In addition, the event area is divided into fire risk classes to determine the degree of risk of certain sections (electronics, smoking areas, stoves, heaters, etc.). When there is a high degree of risk, the relevant sections/rooms must be separated from adjacent rooms by structures and must be able to resist fire for at least 30 minutes. The classified sections are equipped with opportune extinguishing systems. The creation of a planned evacuation of spectators/participants and the entry of rescue personnel via escape and rescue routes with adequate signage is essential. Escape and rescue routes must be constructed in such a way to enable appropriate quantities from passing through(cf. FIFA Stadium Safety and Security Regulations).

Preventive measures must be suitably verified or contractually anchored in the form of fire protection or evacuation exercises.

Indicator 4: Evacuation concept

The developed evacuation concept ensures that all visitors can be led away from the event area in a controlled manner via the designated escape routes. The basis of this concept should be a people flow analysis, the result of which determines how and via which escape routes visitors and employees are guided from the site.

Indicator 5: Overcrowding concept

The concept is based on careful pre-planning of the specific event. Critical areas can be examined by means of a people flow analysis. The security of the outer area must be protected against unauthorised access by walls or fences (2.5m). In addition, access must be adequately controlled to prevent unauthorised people from entering. Entrances and exits must also be secured by personnel during the event (see FIFA Stadium Safety and Security Regulations).

Indicator 6: Traffic concept

The event area must be accessible with sufficient entrances and exits. For this, the number of visitors must be determined and taken into account in the traffic concept. Even in the event of danger, visitors must be able to leave the area in a controlled manner. In addition, paths must be accessible for rescue personnel. The event infrastructure should be adapted to the existing infrastructure. A capacity analysis (simulation) must be carried out for all existing traffic types in order to adjust any traffic routes. (see German safety guide for major events BaSiGo
)

Indicator 7: Communication concept

The communication concept represents the exchange of prevention and intervention information between organisers and authorities and/or safety organisations (before, during and after the event). It clarifies who (which party: organisers/authorities/ security companies) in which case (rule/crisis situation) has to implement which measures. A simple, clear and reliable exchange of information with clear responsibilities is needed. It is important that all participants have a clear overview of the overall situation (training etc.) (see German safety guide for major events: BaSiGo). The relevant contact persons must be recorded in an emergency call list/notification scheme and kept up to date. Here, too, regular practice is recommended.

Indicator 8: Anti-terrorism concept

Major events are also increasingly affected by terrorism. The security/safety management should carry out regular patrols and before major events/games with high spectator numbers be particularly sensitive to potential hazards within the event area. During the event, the area should be guarded by suitable security personnel. Vehicles and passers-by entering the secured area must be searched by security personnel (see FIFA Stadium Safety and Security Regulations).

There should be a constant exchange with the competent authorities and bodies in order to initiate preventive measures or subsequently draw conclusions for the event. In addition, a concept of measures to be taken in the event of an emergency (concrete terror warning or attack) should be developed.

Indicator 9: Concept against violent visitors/vandalism high-risk games

Riots or acts of violent fans should be detected and minimised by trained personnel (authorities/security personnel). Deescalating measures in particular come to the fore here. For the detection of criminal offences, a surveillance room must be provided in which a trained official/team can detect dangerous situations at an early stage and initiate appropriate countermeasures. Offenders will be expelled by the authorities with a warning or a stadium ban. Access must be denied to them by means of an entrance check. In the case of already known groupings, a more precise entry inspection is carried out.

Appropriate measures must be taken in the case of high-risk matches (determined by the association) (see FIFA Stadium Safety and Security Regulations, p. 86ff.).

Indicator 10: Electronic safety systems

- Video surveillance systems must cover predetermined and critical areas.
  They are used to identify potential dangers and can make an important contribution to the investigation of criminal offences through storage. Trained personnel can use these systems to detect incidents and initiate appropriate measures. The records are kept for 60 days or 2 years (in the case of incidents) (FIFA Stadium Safety and Security Regulations, p. 62f.).
- Loudspeaker systems must meet certain criteria (FIFA Stadium Safety and Security Regulations, p. 64f.). These must represent direct communication between stadium management/authorities and visitors and must be tested regularly.

All electronic security systems must be operated via an emergency power supply even in the event of a power failure.

APPENDIX B - DOCUMENTATION

I. Required documentation

Event

The following represent a selection of possible documentation forms. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted supporting documents.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of **relevant records/documents** ■ B1: About (planned) measures; illustration that structure/processes were already taken into account during planning; persons and tasks in site management ■ B2: List of the involved companies for quality control ■ B3: People flow analysis	B
Photo documentation of the implemented measures	C
Documentation of **concept** in the form of the developed safety concept of the respective indicators with reference to corresponding contact persons/provision	F

TABLE 2 DOCUMENTATION PER INDICATOR

INDICATORS	Event			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Escape and emergency routes	A, B, F	B, F	B, C, F	-	-
2. Emergency planning	A, B, F	B, F	B, C, F	-	-
3. Safety concept for fire protection (depending on fire protection regulations of the country)	A, B, F	B, F	B, C, F	-	-
4. Evacuation concept	A, B F	B, F	B C, F	-	-
5. Overcrowding concept	A, B, F	B, F	B, C, F	-	-
6. Traffic concept	A, B, F	B, F	B, C, F	-	-
7. Communication concept	A, B, F	B, F	B, C, F	-	-
8. Anti-terrorism concept	A, B, F	B, F	B, C, F	-	-
9. Concept against violent visitors/vandalism - high-risk games	A, B, F	B, F	B, C, F	-	-
10. Electronic safety systems	A, B, F	B, F	B, C, F	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

- http://www.basigo.de/handbuch/Hauptseite
- FIFA Stadium Safety and Security Regulations (14/12/2012), Tokyo
- http://www.tuv.com/de/deutschland/gk/managementsysteme/tourismus_freizeit/sicherheitsmanagement_stadion/sicherheitsmanagement_stadion.html

PRO2.1

Construction site / construction processes

Objective

Our objective is to minimise negative effects on the local environment during the construction phase. To this end, it is necessary to sensitize and train construction workers on construction site on relevant environmental issues.

Benefits

Trained individuals generally incorporate findings into their everyday work and also contribute to more environmentally friendly construction sites.

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	12.5	Waste reduction and prevention		
Moderate	3.4	Reduction of premature mortality; promotion of health/well-being	3.1.a/b	Health and nutrition
			3.2.a	Air pollution
	3.9	Effects of chemicals, air, water and soil pollution	3.2.b	Air pollution
Low	6.3	Improvement of water quality		
	11.6	Reduction of environmental pollution in cities		
	12.4	Environmentally sound handling of chemicals and waste		

Outlook

It is not planned to incorporate changes in this criterion, however once issues addressed in the criterion have been standardized, this criterion might be dropped in future..

Share of the total score

	SHARE	WEIGHTING FACTOR
City **Business** **Commercial**	**1.7 %**	**1**
Event	**2.7 %**	**2**
Industry	**3.6 %**	**2**

ASSESSMENT

In order to minimise the impact on the local environment, four indicators are used to assess the extent to which measures have been implemented to reduce noise, dust, negative impacts on soil and groundwater and waste on the construction site, and the extent to which the local construction workers have been trained on this issue. The circular economy bonus - waste prevention on the construction site can be used to reward novel waste-preventing concepts, construction methods and technologies with 10 additional points. In the criterion 100 points can be achieved; including the bonus a maximum of 110 points can be credited.

NO.	INDICATOR		POINTS
1	**Communication**		
	City **Business** **Commercial**		**max. 25**
	Event **Industry**		**max. 15**
1.1	**Signage and information**		
	City **Business** **Event** **Industry** **Commercial**		
	Residents are informed about the construction project and site with signs.. This includes construction information, route guidance, and, if applicable, responsible individuals and contact persons.		+5
1.2	**Communication with residents**		
	City **Business** **Event** **Industry** **Commercial**		
	■ Regular communication with the residents: The measures that have been taken are described and residents and users are informed and involved, beyond mere signage.	**City**	+10
		Business **Commercial**	+10
		Event **Industry**	+5
	■ Contact person for complaints: A contact person is available for the residents. In case of changes, information is provided in a timely manner.	**City**	+10
		Business **Commercial**	+10
		Event **Industry**	+5
2	**Waste**		
	City **Business** **Commercial**		**max. 15**
	Event **Industry**		**max. 25**
2.1	**Waste**		
	City **Business** **Commercial**		**max. 15**
	Event **Industry**		**max. 25**
	■ Level I: No special measures are taken to prevent, recycle or dispose waste in an environmentally sound manner. Legal minimum requirements are met.		0
	■ Level II: Requirements for waste separation and disposal are regulated in the tender and contract documents, including the delivery of mineral construction waste to a construction waste processor. Supply contracts stipulate that suppliers shall take back packaging material at no extra cost.		10

NO.	INDICATOR			POINTS
	■ Level III: The construction management monitors the separation of materials and the correct use of the collection points. The construction materials are separated into mineral waste with/without gypsum, plastics, metals, possibly glass, mixed construction site waste, problem waste and possibly waste containing asbestos. ■ For **City** **Business** **Commercial**: Level III can be credited in the form of a requirements catalogue/guideline or something similar together with signed declarations of the building owners.			15
	■ For **Existing buildings**: Only in the case of construction/dismantling work: Before construction work begins, the potential for on-site recycling of demolition material (e.g. concrete, asphalt, wood) is analysed.		**Industry**	15
	■ Level IV: Those involved in the construction process are specifically trained in waste prevention. The packaging take-back obligation of the suppliers (Closed Substance Cycle Waste Management Act: Product Responsibility) is demonstrably complied with.	**Event**	**Industry**	25
	■ For **Existing buildings**: Only in the case of construction/dismantling work: Demolition material is reused on site as far as possible. A register of pollutants is compiled for the dismantling. The dismantling is accompanied by experts. After completion, the expert prepares a final report.		**Industry**	25
2.2	**CIRCULAR ECONOMY BONUS - WASTE AVOIDANCE ON THE CONSTRUCTION SITE** **City** **Business** **Event** **Industry** **Commercial** On the construction site, novel concepts, construction methods or technologies are implemented that avoid waste to a considerable extent.			**+10**

NO.	INDICATOR		POINTS
3	**Noise** City Business Event Industry Commercial		**max. 20**
3.1	**Noise** City Business Event Industry Commercial		**max. 20**
	■ Level I: No special measures are taken to prevent or shield construction noise. The German general administrative regulation for construction noise (AVV Baulärm) or equivalent is not fulfilled.		0
	■ Level II: The tender and contract documents contain the official noise protection regulations and, if applicable, other noise protection requirements for the construction site. The noise emissions of the construction machines used are also specified in bids (noise emission specification according to DIN EN ISO 4871, so-called two-number specification). The requirements formulated in the tender and contract documents are demonstrably met.		5
	■ Level III: As in Level II, in addition: Before the construction site is set up, a construction noise plan is drawn up in which noise-intensive work processes and construction machinery are described in terms of space and time and the emission locations to be protected are shown. There are clear specifications as to when which noise-reducing measures are to be carried out (type of work, timing, location on site, responsible party, etc.) . The responsibility for noise reduction measures is clearly assigned. Measures are carried out and recorded (in the construction site diary or similar) over the entire duration of the construction site. ■ For City Business Commercial: Level III can be credited in the form of a catalogue of requirements/guidelines or similar with signed declarations of the building owners.		10
	■ Level IV as in level III, in addition: Compliance with the requirements and implementation of the measures was monitored by regular sound level measurements at the place of emission and comprehensively documented by means of measurement and inspection reports.	Event Industry	20
	■ For City Business Commercial: Level IV (see above) applies only to infrastructure construction measures (e.g. development of the district; canals, roads, etc.)	City Business Commercial	+10 +10

4 Dust

City Business Event Industry Commercial — max. 20

4.1 Dust

City Business Event Industry Commercial — max. 20

- Level I: No special measures are taken to prevent or avoid dust. Legal minimum requirements are met. — 0
- Level II: Dust reducing measures are defined in the tender and offer documents. The emission classes/levels of the construction machines are also specified in the offers. The requirements formulated in the tender and offer documents were demonstrably met. — 5
- Level III: As in Level II, in addition: There are clear specifications as to when which measures are to be carried out to prevent the formation of dust (type of work, timing, location on site, responsible party, etc.). The responsibility for dust-reducing measures is clearly assigned. Measures are carried out and recorded (in the construction site diary or similar) over the entire duration of the construction site. — 15
- For City Business Commercial: Level III can be credited in the form of a catalogue of requirements/guidelines or something similar together with signed declarations of the building owners.
- Level IV: As in Level III, in addition: Planning of measures takes place with the involvement of environmental construction supervision. Monitoring of the measures by environmental construction supervision (inspection reports). Emission requirements are set for machines and equipment with diesel engines and compliance is documented (Table 1). — Event Industry — 20
- For City Business Commercial: Level IV (see above) applies only to infrastructure construction measures (e.g. development of the district; canals, roads, etc.) — City — +5; Business Commercial — +5

On 4 **INNOVATION AREA**

Novel concepts, processes and technologies for a significant reduction of noise or dust pollution for construction site workers and the environment can be credited alternatively.

As in 4

NO.	INDICATOR	POINTS
5	**Environmental protection and nature conservation** **City** **Business** **Event** **Industry** **Commercial**	**max. 20**
5.1	**Environmental protection and nature conservation** **City** **Business** **Event** **Industry** **Commercial**	**max. 20**
	The following steps are described in more detail in the Method section. ■ Level I: No special measures are taken to protect the soil. Legal minimum requirements are met.	0
	■ Level II: Before construction work begins, a plan of measures for soil protection (5 points) and environmental protection (5 points) is drawn up on the basis of the official requirements, schedule, topography and vegetation (see method for detailed description of measures). ■ For **City** **Business** **Commercial**: Level II can be credited in the form of a requirements catalogue/guideline or something similar together with signed declarations of the building owners.	10
	■ Level III: The planning of measures takes place with the involvement of the environmental construction supervision.	20
On 5	**INNOVATION AREA** Supplementary or alternative measurements, as well as other quality assurance measures can be evaluated alternatively, if they are not prescribed by law or authorities or are common practice, but document the high quality of the construction measures.	**As in 5**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

NO.	KEY FIGURES/KPI	UNIT
KPI 1	Number of separately collected waste materials	[Number]

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** There are synergies with criterion PRO2.1.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

City **Business** **Event** **Industry** **Commercial**

Sustainable construction aims to minimise the consumption of energy and resources in all phases of the life cycle of factories. During the planning of a sustainable industrial site, the construction and the construction processes are of importance, since during these phases there are direct impacts on the environment. The main focus is on reducing traffic congestion (congestion in the road network in general and on access and exit roads for construction sites) as well as noise reduction, especially on construction sites.
The objective is to minimise the impact on the environment while protecting the health of all parties involved. In addition, there may also be effects on the uninvolved environment which must be prevented or minimised.

II. Additional explanation

City **Business** **Event** **Industry** **Commercial**

There are various factors that affect construction sites and construction activity, both within and outside a construction area. The construction activity itself generates waste: Building materials, packaging, excavation, but also dismantling existing structures. Working with equipment and machinery also generates noise and dust from combustion engines, welding work and vehicles. Direct construction activity has an impact on natural environmental factors such as water, soil and nature. Efficient construction site logistics and construction phase planning reduces waste, noise and dust and has the least possible impact on the environment. When the factory is built in construction phases, the individual construction stages should be logistically coordinated as well as possible. Subsequent construction phases should have as little impact as possible on the parts of the factory already in use.

III. Method

City **Business** **Event** **Industry** **Commercial**

Indicator 1: Communication
A prerequisite for the fulfilment of this indicator is a coherent communication concept. This includes providing residents with relevant information in connection with the construction site and processes as well as information on impairments. The information should not be static; instead, measures should be taken to enable regular involvement of local residents (e.g. information events, flyers, website, display board/monitor). Ideally a contact person is available.

Indicator 2: Waste
In the case of dismantling measures for buildings, expert opinions must prove that they are harmless with regard to hazardous building substances. Alternatively, an appropriate pollutant register with a disposal concept can be established. During the construction phase, disposal must be accompanied by specialist planning. For waste from contaminated sites, refer to criterion ENV 1.2.

Indicator 3: Noise

For certification, it must be proven that either “no” construction noise occurs (AVV construction noise limits are complied with) or that construction noise is reduced by suitable measures (noise protection concept). These are, for example, low-noise construction machines and appropriate logistics planning. On the basis of documentation or measurement protocols, compliance with certain limit values is checked. The noise development on the construction site must be monitored regularly.

Indicator 4: Dust

Suitable measures to avoid and reduce dust emissions must be demonstrated, e.g: avoid dust in the planning and preparation of the construction work, bind dust (humidification) and trap dust (enclosure). During the construction phase, measures must be carried out and documented. In addition, emission requirements must be set for machines and equipment with diesel engines* and compliance is documented (see table; central documentation of all construction machines used with documentation of the EC type approval number). If the respective exhaust gas level is not reached, the use is only permitted with the retrofitting of a certified particulate filter.

TABLE 1 Emission requirements for machines and equipment with diesel engines*

EXHAUST GAS STANDARD FOR CONSTRUCTION MACHINERY		SELF-PROPELLED WORK MACHINE WITH TYPE APPROVAL OF THE ENGINE	MOBILE MACHINES AND EQUIPMENT AND GENERATORS WITH CONSTANT ENGINE SPEED
Power class	**Emission level**	**Emission standard**	**Requirement independent of exhaust gas level**
From 19 kW and <37 kW	Level IIA	At least Euro IV	Particle filter (factory fitted or retrofitted)
From 37 kW and <56 kW	Level IIIB		
From 56 kW Up to 560 kW	Level IIIB or IV		

*Excluded from the requirements:
Construction machinery with diesel engine and engine power less than 19 kW or more than 560 kW, pile drivers, graders, road pavers, mastic asphalt diggers, blacktop mixers and other categories of machinery not listed in the table.

Indicator 5: Environmental protection and nature conservation (nature, soil and water protection)

On the basis of tender documents, the consideration of measures to protect the soil and groundwater is monitored. In order to ensure the protection of natural assets, “environmental construction monitoring” must accompany the construction process from the implementation planning stage onwards. The “environmental construction supervision” regularly monitors and documents the processes on site. On the basis of documentation or measurement protocols, compliance with certain limit values is checked.

- Level I: No special measures are taken to protect the soil. Legal minimum requirements are met.
- Level II: Before construction work begins, a plan of measures for soil and environmental protection is drawn up on the basis of official requirements, scheduling, topography and vegetation. This identifies possible soil and groundwater contamination, soil compaction, erosion events and vegetation endangered by the construction work and defines protective measures.

The construction site equipment plan defines areas for construction site equipment and roads, storage areas for building materials, interim storage for soil and areas not to be used (protection zones). Measures to preserve the protection zones have been implemented.
Earth mass management is available. Humus topsoil is, if removal is necessary, pushed off and stored separately from the subsoil and later reinstated/reused as topsoil. In case of intermediate storage of soil material, it must be protected against erosion by covering it with reusable tarpaulins or films.
Vehicles and machinery are only refuelled, cleaned or subjected to oil changes (collection facilities or other measures to prevent soil contamination) in designated, suitable areas.
Compliance with environmental and nature protection (nature, soil, water) is regularly checked by the site management. Minutes must be taken for the inspections.

- Level III: The planning of measures takes place with involving the environmental construction supervision. Regular monitoring of the measures by the environmental construction supervision (inspection reports).
Minutes must be taken for the inspections.
Documentation must be prepared on the basis of the minutes and supplemented by photographs. The documentation must also take into account planning changes that have an impact on the protected assets. Measures were implemented to preserve the protection zones and protection was ensured throughout the entire construction phase.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 2 Overview of documentation with abbreviations

SUPPORTING DOCUMENTS	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant documents/expert opinions/calculations/evidence/screenshots ■ B1: Tender documents for waste prevention ■ In case of dismantling: technical planning support (documentation and final report) ■ B2: Noise protection measures (tender documents); Volume measurements including expert opinions ■ B3: Measures to protect against dust (tender documents) ■ B4: Measures to protect nature, soil and groundwater (tender documents)	B
Documentation of **planning documents** ■ E1: For dismantling: Pollutant register	E
Documentation of **concept/model**	F
Documentation of **minutes** ■ G1: Minutes for the public relations work or participation; minutes for the coordination with parties involved in the construction ■ G2: Training protocols ■ G3: Monitoring protocols of the “environmental construction monitoring”	G

TABLE 3 Documentation per indicator

INDICATORS	City / Business / Event / Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Communication	A, B, F	A, B, F, G	B, F, G	A, B, F	B, F, G
2. Waste	A, B, F	A, B, E, F, G	B, E, F, G	A, B, F	B, E, F, G
3. Noise	A, B, F	A, B, F, G	B, F, G	A, B, F	B, F, G
4. Dust	A, B, F	A, B, F, G	B, F, G	A, B, F	B, F, G
5. Environmental and nature protection	A, B,	A, B, G	B, G	A, B,	B, G

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

Indicator 2: Waste

- Law for the promotion of recycling management and ensuring the environmentally sound disposal of waste
- Landfill Ordinance (DepV), 27/09/2017
- Ordinance on waste recovery - GewinnungsAbfV, 24.02.2012, Ordinance on the implementation of Directive 2006/21/EC
- Ordinance on record keeping for waste disposal
- State Waste Acts
- The respective local statutes

Indicator 3: Noise

- §27 of the Federal Immission Control Act of 15 March 1974 (BGBl. 1I p. 721), as amended by the announcement of 31 August 2015 (BGBl. I p. 1474)
- RAL, 2007, Basis for awarding the eco-label for low-noise construction machinery RAL-UZ 53
- Directive on noise emission in the environment by equipment for outdoor use - Directive 2000/14/EC, 31 August 2015
- AVV Baulärm (General Administrative Regulation for Construction Noise)
- 32. BImSchV Equipment and Machine Noise Protection Ordinance

Indicator 4: Dust

- Hazardous Substances Ordinance (GefStoffV)
- Technical Rules for Hazardous Substances (TRGS)
- Guideline for the specification of operator obligations under immission control law to avoid and reduce dust emissions from construction activities

Indicator 5: Environmental protection and nature conservation (nature, soil and water protection)

- BBodSchV - Federal Soil Protection and Contaminated Sites Ordinance
- WHG Water Resources Act
- BNatSchG Federal Nature Conservation Act
- Industrial environmental protection in Baden Württemberg - An information platform of the Ministry of Economic Affairs Baden Württemberg
- Principles for assessing the impact of construction products on soil and groundwater Draft April 2005, Deutsches Institut für Bautechnik - DIBt -, Berlin
- For effective soil protection in building construction - Tips and guidelines for planning – Swiss Confederation Federal Office for the Environment FOEN
- Environmental Impact Assessment Act (UVPG)
- §74 Para. 2 VwVfG Plan approval decision, plan approval (principle of precaution for the public good)

PRO3.5

Quality assurance and monitoring

Objective

The objective is to check by continuously monitoring whether the planned characteristics have been implemented and to ensure and improve the quality of the district/area in the long term.

Benefits

The following benefits can be achieved for companies, municipalities and/or users:

- Identification of adverse developments
- Cost and resource savings
- Higher user satisfaction

Contribution to sustainability goals

	CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS (SDG) OF THE UNITED NATIONS		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	12.6	Sustainability reporting	12.2	Sustainable production
Low			13.1.a	Climate action

Outlook

No change of criterion is planned - ideally, this criterion can be dropped in a few years, when the topics have become standard.

Share of the total score

	SHARE	WEIGHTING FACTOR
City Business Commercial	3.3 %	2
Event	2.7 %	2
Industry	5.5 %	3

ASSESSMENT

The criterion rewards the implementation of a sustainability management. In addition, it is evaluated whether there is an operating concept for continuous monitoring of energy and water consumption and to what extent the established design goals have been implemented. For **Event**, indicators 6 and 7 are used to assess the extent to which an orderly commissioning of the completed area has been prepared and documented. In the criterion ,100 points can be achieved.

NO.	INDICATOR				POINTS
1	**Sustainability management**				
	City **Business** **Commercial**				**max. 45**
	Event				**max. 35**
	Industry				**max. 40**
1.1	**Location management**				
	City **Business** **Commercial**				**max. 15**
	Event				**max. 20**
	Industry				**max. 24**
	Location management with sustainability management is implemented at site and a contact person for residents and users is available.	**City**	**Business**	**Commercial**	+15
				Event	+10
	The environmental management is certified according to the current version of the international environmental management standard DIN EN ISO 14001.			**Event**	+10
	The environmental management is certified according to the current version of the international environmental management standard DIN EN ISO 14001.			**Industry**	+12
	The environmental declarations is published according to EMAS III.			**Industry**	+12
1.2	**Budget and powers of action**				
	City **Business** **Commercial**				**max. 10**
	Event				**max. 5**
	The sustainability manager has a budget and authority to promote sustainability measures. The goals for sustainability management are defined.	**City**	**Business**	**Commercial**	+10
				Event	+5
1.3	**Reporting on sustainability issues**				
	City **Business** **Commercial**				**max. 10**
	There is regular public reporting on various sustainability issues in the district.	**City**	**Business**	**Commercial**	+10

NO.	INDICATOR	POINTS
1.4	**Contents of sustainability reporting** **City** **Business** **Event** **Commercial**	**max. 10**
	Contents of regular sustainability reporting in the usage phase (5 points can be awarded per topic): CO_2 balance, waste (balance, whereabouts, etc.), biodiversity, construction measures, materials used, aspects of social sustainability (e.g. satisfaction measurement by survey), frequency of use in public spaces, diversity, energy (consumption, production, etc.), water (consumption, recovery, etc.). For **Commerce**, contribution of the industrial site to the sustainability strategy of the municipality, e.g. as part of a reporting. Alternative: An environmental declaration according to EMAS III is published (the maximum points can be credited in this case.	+10
1.5	**Corporate social responsibility** **Industry**	**max. 16**
	■ There is a company-wide CSR strategy that includes the site under consideration.	+4
	■ This CSR strategy and the measures implemented are communicated to the public and employees at regular intervals in the form of sustainability and CSR reports based on recognised guidelines (e.g. Global Reporting Initiative (GRI), ISO 26000).	+4
	Reporting in line with the CSR report is conducted regularly for the site (which briefly summarises what the site is doing to achieve the CSR goals of the entire group)	+8
2	**Energy monitoring/management** **City** **Business** **Event** **Commercial**	**max. 15**
	Industry	**max. 35**
2.1	**Energy monitoring** **City** **Business** **Event** **Commercial**	**max. 15**
	Industry	**max. 35**
	Note: * The minimum requirement for energy monitoring is an annual recording of energy consumption and a comparison with the requirements of the above-mentioned specifications or with generally applicable comparative values (e.g. VDI 3807).	
	■ The energy quality of the buildings are reviewed during planning, construction and after completion. — **Event**	+5
	■ Heat at district level is monitored via an energy monitoring system, in which all building users can participate. — **City** **Business**	+8
	— **Commercial**	+8
	— **Event**	+5

NO.	INDICATOR		POINTS
	■ Electricity is monitored at district level via an energy monitoring system, in which all building users can participate.	City Business	+7
		Commercial	+7
		Event	+5
	■ Certified according to the current version of the international energy management standard ISO 50001 (alternative proof for small and medium-sized companies: DIN EN 16247 -1 or comparable measures)	Industry	+13
	■ There is a concept in place that permanently calls on all employees to reduce energy consumption (e.g. training, defined standby standards for more than 80% of technical systems).	Industry	+5
	■ There is an inspection of the energy-related quality during construction.	Industry	+5
	Note: Only the highest quality level achieved can be taken into account for the evaluation:		
	■ Quality level 2: Recording in a central monitoring system with monthly measurement + differentiation into A Electricity and B Heat and, if necessary, other conditioning (recording depth: Building/building area).	Industry	7
	■ Quality level 3: As in level 2 + further differentiation in A Electricity, B Heat, C Cooling (depth of coverage. Building area/room/machine).	Industry	9
	■ Quality level 4: As in level 3 + D, if necessary, other conditioning, recording in a central monitoring system with hourly real-time measurement (building area/room/machine).	Industry	12

3 Water monitoring/management

City Business — **max. 10**
Event — **max. 5**
Industry Commercial — **max. 15**

3.1 Water monitoring

City Business — **max. 10**
Event Commercial — **max. 5**

The consumption of water is monitored at district level, in which all building users can participate.	City Business	10
	Event Commercial	5

NO.	INDICATOR		POINTS
3.2	**Drinking and operating water requirements**		
	Industry		**max. 8**
	The drinking and operating water requirements are recorded at least monthly for each unit (building area, room, technical system) and summarised in a central system for analysis of the entire site.	**Industry**	8
3.3	**Reduction of drinking and operating water requirements**		
	Industry		**max. 7**
	Commercial		**max. 10**
	Target values for the reduction of drinking and operating water requirements are defined and are reviewed in regular intervals; in addition, a continuous improvement process is documented and shows improvements (reporting)	**Industry**	7
		Commercial	10
4	**Implementation of design goals**		
	City **Business**		**max. 20**
	Commercial		**max. 10**
4.1	**Process methodology**		
	City **Business**		**max. 10**
	There is an informal set of instruments and a process methodology that ensures the design requirements in relation to the architecture/open space during the implementation process and after completion of the district (e.g. design advisory board, design manual).		
	■ Informal tools and a process methodology for the architecture		+5
	■ Informal instruments and a process methodology for the open space		+5
4.2	**Design specifications**		
	City **Business** **Commercial**		**max. 10**
	The design specifications are safeguarded formally (e.g. development plan, design statutes, etc.).		
	■ Design specifications for architecture		+5
	■ Design specifications for open space		+5

NO.	INDICATOR			POINTS
5	**Data models**			
	City **Business** **Event** **Industry**			**max. 10**
	Commercial			**max. 15**
5.1	**3-D data models**			
	City **Business** **Event** **Industry**			**max. 10**
	Commercial			**max. 15**
	There is further cooperation based on 3D data models (GIS, CIM, BIM).	**City** **Business** **Event**		10
		Industry		10
		Commercial		15
6	**Facilities management**			
	Event			**max. 10**
6.1	**Implementation of norms and standards**			
	Event			**max. 5**
	Facility management is based on standards. A significant proportion of the contents of relevant standards are implemented in functional terms (e.g. usage cost management, service level agreements, regulated reporting, integrated ticketing, monitoring, analysis and controlling systems, benchmarking, comprehensive fault and complaint management), so that there is a high degree of transparency for operators with regard to costs and their originators and qualities and FM planning is well represented			5
6.2	**Facility management according to DIN**			
	Event			**max. 10**
	There is a facility management in the company according to the current version of DIN EN 15221, GEFMA Guideline 100, VDI 6009 or comparable standards.			10

NO.	INDICATOR	POINTS
7	**Orderly commissioning**	
	Event	**max. 25**
7.1	**Quality level 1**	
	Event	**max. 5**
	All factory components were subjected to a functional test by the executing companies. The type, scope and results of the functional tests were documented in the respective handover certificates.	5
7.2	**Quality level 2**	
	Event	**max. 15**
	In addition to quality level 1: A commissioning with subsequent adjustment and readjustment by independent third parties (individuals with necessary qualifications, e.g. building services engineers who are not part of the planning team and are separately commissioned for this task outside the HOAI basic service) was carried out. Safety systems are exempted from the requirement of “third party verification”. The orderly commissioning must, however, be proven with the same quality standard. Further exceptions for safety-relevant systems can be granted with good reason (explanation!). A concept for a complete documentation is available or has been contractually agreed.	15
7.3	**Quality level 3**	
	Event	**max. 25**
	In addition to quality levels 1 and 2: A commissioning with subsequent adjustment and readjustment was conducted or contractually agreed within the first 14 months of the period of use. A complete documentation is available or has been contractually agreed upon. A concept for the transfer of commissioning into a process of continuous review and optimisation is available.	25

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

-

NO.	KEY FIGURES/KPI	UNIT

Synergies with DGNB system applications

- **DGNB NEW BUILDINGS:** There are synergies with the PRO2.3 and PRO2.5 criteria of the SQ and GQ schemes.

APPENDIX A - DETAILED DESCRIPTION

I. Relevance

Only through consistent quality assurance and monitoring can the innovative ideas from the planning phase be implemented. In reality, good sustainability approaches are often neglected or forgotten in the course of construction and further site development. The objective of sustainable district/industrial location planning is therefore to ensure that the quality developed in the planning phase is realised without major compromises. A particular focus is on energy efficiency and its implementation in construction. This requires special quality assurance, which is combined with energy monitoring and is lived and developed within the framework of a management system.

II. Additional explanation

City **Business** **Event** **Commercial**

Only through consistent quality assurance and monitoring can the innovative ideas from the planning phase be turned into reality. In reality, good sustainability approaches are often neglected or forgotten in the course of construction and further site development. The objective of sustainable district planning is therefore to ensure that the quality developed in the planning phase is realised without major compromises and is also maintained in the utilisation phase. This includes ongoing monitoring of compliance with sustainability goals, ideally through clearly defined site management. A designated person in charge, who initiates measures if necessary, is just as important as the regular communication of the results to the residents and users of the district. The maintenance of design quality must also be supported by processes, especially in long-term projects.

Additionally for: **Industry**

Sustainable quality assurance must be continuous and adaptable. It has been found, for example, that quality assurance purely via the development plan is often circumvented with approved deviations or that execution is not assured due to a lack of effective quality assurance. Especially when it comes to energy, which is currently often used as the flagship of an industrial site, it makes sense to review improved quality standards. Additional energy monitoring during operation can show whether the implemented optimisations actually lead to the desired success.

III. Method

City **Business** **Event** **Industry** **Commercial**

It is a qualitative method in which the following indicators are considered:

Indicator 1: Sustainability management

In order to ensure holistic development, a sustainability management system integrated into a site management system makes sense. Sustainability management should regularly check the quality of the site. Good sustainability management provides an improved overview of the current status of sustainable development, identifies weaknesses, develops corrective measures and forms a basis for future sustainable action. The simultaneous consideration of ecological, social and economic aspects as well as comprehensive participation of and communication with the public should improve the overall quality of life of all citizens.

Additionally for: **Industry**

Environmental management is the part of the management of an organisation, which deals with the operational and regulatory environmental issues of the organisation. It serves to ensure the sustainable environmental compatibility of operational products and processes on the one hand and the behaviour of employees and stakeholders on the other. This includes, for example, the environmental policy of the organisation.

Corporate Social Responsibility (CSR) describes the voluntary assumption of social responsibility by companies and other organisations and institutions, which goes beyond legal obligations. For example, this may mean that more young people are trained than are needed for the company. And that less pollutants are emitted on site than legally permitted and that the environment is not polluted. In addition to the added value of CSR for society, it also benefits companies by strengthening competitiveness and avoiding risks.

Indicator 2: Energy monitoring/management
It is checked whether the requirements for the building owners with regard to the energy quality of the buildings are checked during construction process. This can be done, for example, by experts, university institutes or engineering offices acting on behalf of the municipality or the project developer. In addition, an evaluation is made of whether there is energy monitoring during the utilisation phase of the district.

Additionally for: **Industry**

Energy management includes the planning, operation and monitoring of energy technology systems. The goals are both the conservation of resources and climate action and cost reductions, while ensuring the energy requirements of the manufacturing company are met. Industrial sites contain a large number of energy consumers. In this context the quantity of energy consumption per equipment or production process is commonly unknown. Thus, the energy supplier invoices the energy quantities consumed at a fixed cycle, without any possibility of allocating them to the respective polluters on a pro rata basis. In order to ensure targeted energetic optimisation of production, it is necessary to take a differentiated view of energy consumers and to monitor them.

Indicator 3: Water monitoring/management
Water consumption is monitored at district level with corresponding meters and management (reporting, targets and continuous improvement process), in which all building users can optionally participate.

Indicator 4: Implementation of design goals
It is evaluated how design aspects are (bindingly) implemented in the planning and updated in the utilisation phase (design advisory board, design handbook, design statutes ...)

Indicator 5: Data models
Points can be achieved, if within FM 3-D data models (GIS, CIM, BIM) is utilized.

Indicator 6: Facility management

Facility management (FM) refers to the administration, management of buildings, facilities and equipment and is regulated by DIN EN 15221-1. The objectives of FM with regard to the sustainability of the site are to guarantee safety and health protection for visitors and employees, to maintain structural and factory engineering values, to increase the quality of use and at the same time reduce the costs of use.

Indicator 7: Orderly commissioning

Particularly in the case of large and complex structural facilities such as those found in event areas (e.g. stadiums, large event halls, etc.), correct installation and coordination of the building technology is essential for optimum operation. By means of an orderly commissioning, later additional consumption due to e.g. incorrectly coordinated processes or incorrectly set up technical systems can be reduced. The evaluation is carried out analogous to the DGNB building criterion PRO2.3.

APPENDIX B - DOCUMENTATION

I. Required documentation

City **Business** **Event** **Industry** **Commercial**

The following represent a selection of possible documentation forms. Based on the submitted supporting documentation, the selected evaluation of the individual indicators must be comprehensively and plausibly documented or the intention to do so must be explained.
This documentation applies to all schemes. Depending on the scheme, different types of documentation may also be relevant; these are explicitly mentioned.

TABLE 1 Overview of documentation with abbreviations

DOCUMENTATION	ABBREVIATION
Qualified **declaration of intent** to implement the measures	A
Documentation of relevant **records/expertise's/documentation** ■ B1: Certification documents ■ B2: To illustrate the continuous improvement process and the structural and procedural organisational anchoring of the CIP ■ B3: Documentation of the measures carried out ■ B4: Documents that encourage employees to reduce energy consumption ■ B5: Implementation of the monitoring and examination of the results ■ B6: Sustainability reporting ■ B7: Templates of the corresponding contracts/documents/guidelines ■ B8: Documentation of the performance of inspections of the planning documents or of the construction work ■ B9: Presentation of the design manual	B
Documentation of **diagram/concept/model** for recording the drinking and process water demand; input/output analysis of the water flow and distribution at the site	F
Documentation of a handover certificate	G

TABLE 2 Documentation per indicator

INDICATORS	City Business Event Commercial			Industry	
	PHASE 1	PHASE 2	PHASE 3	VZ	Z
1. Sustainability management	A, B	B	B6, B7	A	B
2. Energy monitoring/management	A, B	B	B5, B7, B8	A	B
3.Water monitoring/management	A, B	B	B5, B7	A	B, F
4.Implementation of design goals	A, B	B	B7, B9	-	-
5.Data models	A, B	B7	B7	A, B	B

6. Facilities management	A, B	B	B	-	-
7. Orderly commissioning	A	B, G	B, G	-	-

APPENDIX C - LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE

II. Literature

Additionally for: **Industry** **Commercial**

- MÜLLER, Egon, et al. Energieeffiziente Fabriken planen und betreiben. Springer, 2009.
- MARTIN, Lars, et al. Energy Efficiency by Optimised Adjustment between Production and Building Services. Advances in simulation for production and logistics applications Verlag: Fraunhofer IRB Verlag, Stuttgart, 2008, pp. 121-130.
- ERLACH, K.; WESTKÄMPER, E. Energiewertstrom: Der Weg zur energieeffizienten Fabrik, 2009.
- FICHTER, Klaus. Die EG-Öko-Audit-Verordnung: mit Öko-Controlling zum zertifizierten Umweltmanagementsystem. Hanser, 1995.
- Krinn, H., & Meinholz, H. (1997). Einführung eines Umweltmanagementsystems in kleinen und mittleren Unternehmen: Ein Arbeitsbuch. Springer DE.
- McKane, A. (2010). Thinking Globally: How ISO 50001-Energy Management can make industrial energy efficiency standard practice.
- Meffert, B., & McKane, A. (2009). Development of an energy management standard: ISO 50001. Retrieved April, 2, 2010.
- Dyllick, T., & Hamschmidt, J. (2000). Wirksamkeit und Leistung von Umweltmanagementsystemen.: Eine Untersuchung von ISO 14001-zertifizierten Unternehmen in der Schweiz. vdf Hochschulverlag AG.
- Bransal, P., & Hunter, T. (2003). Strategic explanations for the early adoption of ISO 14001. Journal of Business Ethics, 46(3), 289-299.

Websites:

Additionally for: **Industry** **Commercial**

- www. iso50001.org/index.html
- www.14001news.de
- www. csr-in-deutschland.de

System basics

City Business Event Industry Commercial

The system basics describe methods for the evaluation of individual indicators across criteria, as well as information on documents to be submitted, area boundaries in the various schemes, definitions and a glossary.

General methods

City Business Event Industry Commercial

The system is geared towards the overall performance of the district. **In general, the key indices from the project and not the technical solution are evaluated.** Checklists are used for qualitative evaluation if no suitable quantitative calculation methods are available.
The values of the defined district form the basis for the calculations and evaluations. As a rule, this is the **GFA_{DGNB} of the above-ground floors and wholly or partially underground main usable floor areas** (e.g. retail areas, granny annexe).
As far as described in the calculation method, the buildings and/or the surroundings of the district are to be considered.

Currentness of expert opinions and simulations:
Expert opinions and simulations must refer to the current planning status. If this is not the case, their continuing validity for the case in question must be documented.

- For the overall evaluation, the evaluation points of the criteria are first multiplied by the specific weighting factor (evaluation points * weighting factor) and then summarised according to main criteria groups.
- To determine the overall performance index, the performance indexes of the main criteria groups are to be added together according to their weighting.

The following methods are to be used in the documentation of each criterion:

Method 1 - Calculation

For many criteria or indicators, the evaluation is determined by calculations. The respective calculation method is precisely described in the criterion and must be applied accordingly. Simple calculations can be performed by the auditor or specialist planner according to criteria. For more complex methods, the DGNB provides appropriate calculation tools. In special cases, special reports may also be required. The comments in the criterion must be observed regarding interpolation when determining the evaluation points.

Method 2 - Checklist

For some criteria or individual indicators, the evaluation is carried out with the help of checklists. The comments in the criterion must be observed regarding whether only single or multiple answers are possible.

Method 3 - Determining accessibility

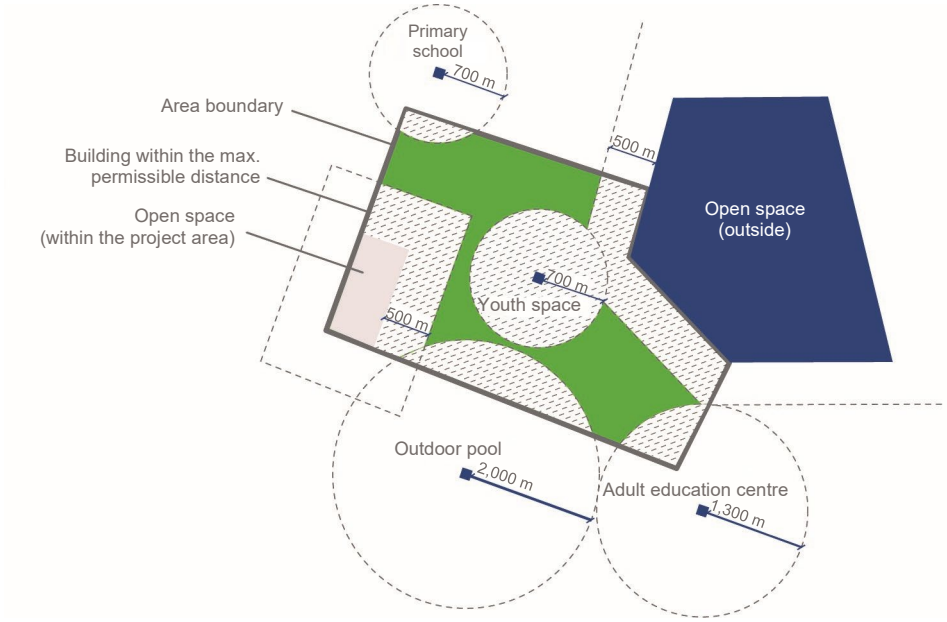
This is a quantitative method, in which it must be determined by way of a drawing what percentage of the buildings within the district are within the maximum permissible distance of the respective object under consideration.

The following procedure is used to determine accessibility:

1. Location
Location of all points (e.g. school or open spaces) on an overview map, which are necessary for the evaluation of the criterion. The centre of the building is to be used as the point.

2. Determining the catchment area
Drawing of a circle at points (or a parallel line for surfaces) with a radius of the maximum permissible distance around the object under consideration. This drawing shows which buildings in the district are within or outside the maximum permissible distance.

FIGURE 1 Example for determining the catchment area



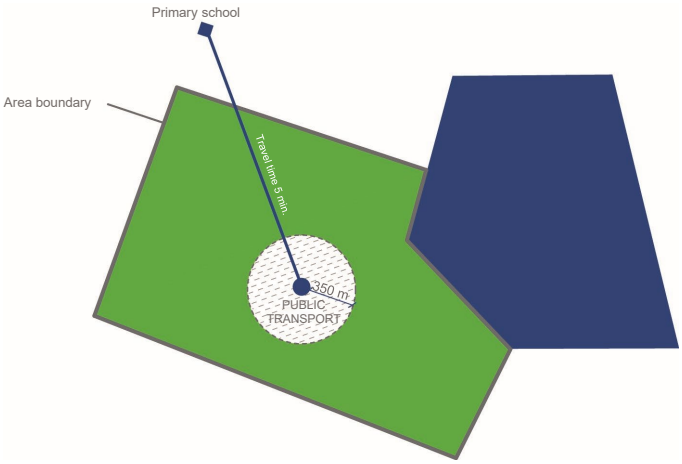
Real path length for barriers
If there is a strong barrier (river, highway, railways etc.) between the district and the object under consideration, the real path length must be determined.

Alternativemethod taking into account public transport

If the next object under consideration is not or is only partially accessible within the permitted walking distance, it can be documented that it is accessible by public transport within the permitted walking and driving time. Applied to the example “primary school” this means: If a primary school cannot be reached on foot within 700 m, but by public transport within 10 minutes (maximum permitted distance), the full evaluation points can be credited.

The drawing for ddetermining accessibility begins with the object under consideration itself. Public transport timetables must show the length of travel from the object under consideration to the nearest stop in the district. This time, e.g. 4 minutes, is deducted from the maximum time allowed (primary school = 10 minutes). Subsequently, the percentage of the district (GFA_{DGNB}) that can be reached within the remaining 6 minutes must be investigated.

FIGURE 2 Example of alternative method of documentation taking into account public transport



Example: primary school

Max. travel time public transport 10 min. (or 700 m)
With a travel time of 4 min:
10 min - 4 min = 6 min
This leaves 6 minutes, i.e. it must be investigated what percentage of the district (measured by the GFA_{DGNB}) is within a distance of 420 m (= 6 min.) from the public transport stop.

The alternative method of public transport may only be chosen if the corresponding connections areavailable during the corresponding opening hours (e.g. a connection to a discotheque must also be proven at night). Further requirements for the timing can be found in the individual criteria. Transfer times must be taken into account in the calculation.

3. Determining accesibility

Based on the overview plan with the entered maximum permissible distance of the respective object under consideration, the percentage accessibility of the gross floor area of the buildings is now estimated or, in the event of doubt, precisely calculated according to the following gradation. In principle, all buildings within the catchment area are to be included in the calculation at 100 %; there is no partial accessibility of a building (if a building is cut up in the simplified method by the circle representation, it is nevertheless to be included at 100 % in the GFA of accessibility).

4. Calculation of points

The maximum achievable evaluation points per object under consideration are multiplied by the respective percentage reduction factor.

Calculation example:

If a maximum of 3 evaluation points can be awarded for a primary school, but only 40% of all buildings in the district reach this primary school within 700 m, the 3 points are multiplied by the factor 0.4. For the primary school only 1.2 points may be credited here.

Method 4 - Area calculation for trees

The following values are defined for area calculations for trees:

- Large trees = area 200 m² (corresponds to canopy diameter of approx. 15 m)
- Medium-sized trees = area 100 m² (corresponds to canopy diameter of approx. 10 m)
- Small trees = area 25 m² (corresponds to canopy diameter of approx. 5 m)

When calculating the area of the trees, the plan state must always be assumed. The assignment to the three tree types is done by rounding (example canopy diameter 7 m corresponds rounded off to class 5 meters = small trees).

Appendix 1 - Documents to be submitted

The following documents are to be submitted at the individual stages in addition to the documentation requirements for the individual criteria for all schemes. Exceptions or deviations are marked for the respective profile in Table 3 (e.g. **Industry**).

TABLE 1 DGNB Documents to be submitted

DOCUMENTS	P1	Not for Industry P2	P3
A Boundary and use plan (M 1:1,000)	X	X	X
■ Depiction of the boundary of the development plan (phases 2 + 3), certification boundary according to the information in the chapter on district boundaries and uses For **Industry**: Depiction of boundary of the factory fence (Z), certification boundary according to the information in the Area boundary and distribution of use chapter with indication of the area shares (GFA) ■ if necessary, additional coordination of the demarcation of the district with the DGNB office			
B Site plan (M 1:10,000)	X	X	X
■ Depiction of district and surroundings in relation to the location in the city			
C Urban development design:	X	X	X
■ **Requirements** (based on the AKBW informational sheet 51): Defining mission statement or the planning programme For **Industry**: Requirements as defined for phase delimitation ■ **Use concept**: Building-specific representation of the different uses according to their type and identification of specific locations (in phase 1, building-specific accuracy is not mandatory) ■ **Structural/spatial concept**: Presentation of the building structures, their height development and roof design, important urban space edges, division of the plots of land and their development (in phase 1 the division of the plots of land is not mandatory) ■ **Open space concept**: Presentation of public and private areas and spatial consequences (if available: existing and planned water areas, high points, lawns, meadows, parks, trees, paths, etc.) ■ **Transport concept**: Presentation of the public and private transport facilities as well as the transport connection of the district. For this purpose, roads, possibly special roads for public transport, footpaths, cycle paths and parking spaces must be clearly recognisable (in Phase 1, rough representations are also permitted). ■ **Environmental concept** with basic statements e.g. on species protection (biodiversity strategy), energy, water, mobility			

	DOCUMENTS - CONTINUATION OF URBAN DEVELOPMENT DESIGN	P1	Not for Industry P2	P3
C	■ **Explanations**: Description of the urban development design, with explanatory sketches where appropriate ■ In the urban development design / master plan or site development plans, the district **environment** must also be presented in at least a simplified form. ■ The urban development design or at least the project must be **known** to the respective **municipality**.	X	X	X
D	**Calculation overview with overview plan:** ■ A calculation must be submitted on the basis of the urban development design or the actual execution. The numbers and areas in the calculation must be comprehensible on the plan (for example, continuous designation of the buildings must be found uniformly in the plan and the calculation, the floor heights must be readable in the plan, etc.). In phase 1, rough calculations are sufficient. ■ Additionally for **Industry**: During recertification, the changes for certification must be documented accordingly	X	X	X
E	**Land-use plan:** As far as available (exceptions for developments in the interior are possible). The following contents are required as a minimum: ■ Plan presentation according to BauNVO ■ Green space plan (can be integrated into the development plan) ■ Textual stipulations, references and recommendations and justification ■ Environmental report with compensation area calculation ■ Additionally for **Industry**: During recertification, the changes for certification must be documented accordingly		X	X
F	**Aerial photograph and photo documentation:** ■ Aerial view of the state before the project started ■ Aerial photograph of the state after construction (only necessary in phase 3) ■ Photo documentation of all important traffic and open spaces (from phase 2) ■ Photo documentation of all buildings (phase 3 only) ■ Additionally for **Industry**: During recertification, the changes to the certification must be documented accordingly.	X	X	X
G	**Project explanation:** ■ Explanation of the project (history of the site, project participants) Additionally for **Industry**: Explanation of the production process and other special features ■ Project procedure with presentation of important procedures (competitions, participation procedures, municipal decisions, decisions on the preparation of the B Plan and the articles of association, start of marketing, start of development)	X	X	X

Appendix 2 - Required documentation for project submission

City **Business** **Event** **Industry** **Commercial**

The required documentation shall be prepared in accordance with the requirements described in the criteria in the chapter “Required documentation”.

Furthermore, the following alternatives for documentation are available:

- **Alternative documentation**

  The requirements of the criterion/indicator remain unchanged.

  The criteria specify the required or permissible proofs. Documentation may be provided by other means if the objective of the criterion/indicator is clearly demonstrated. For this documentation, the proposal must be coordinated with the DGNB certification body before the planned submission. The decision lies with the DGNB certification body.

- **Project-specific solution**

  The criterion/indicator can be replaced by a project-specific individual solution.

  The objective of a criterion/indicator can be met by a building quality that is not yet described in the criterion/indicator. For this documentation, the proposal must be coordinated with the DGNB certification body before the planned submission. The decision lies with the DGNB certification body.

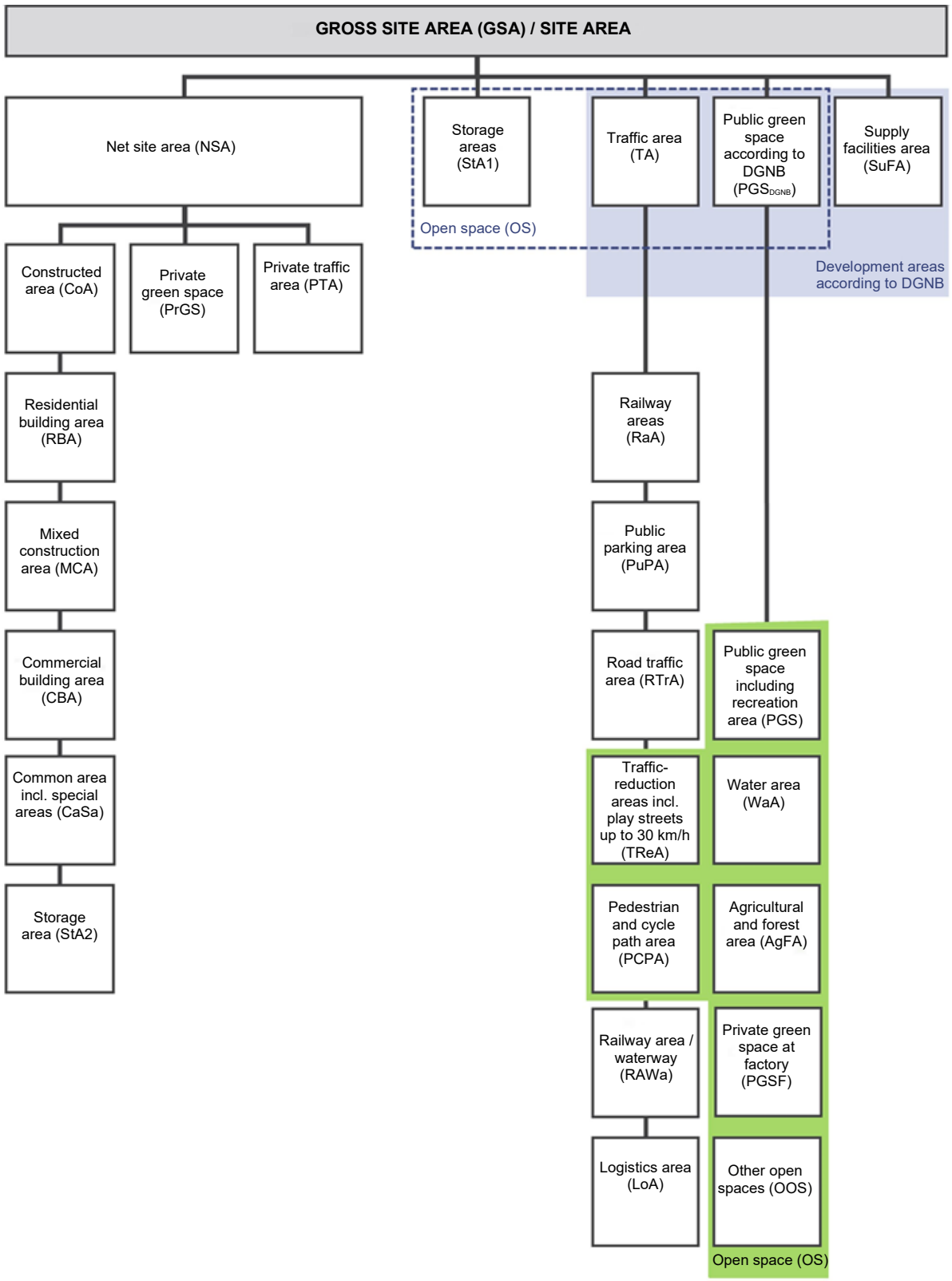
- **Documentation by means of “Templates for documentation”**

  Instead of the “required documentation”, in some criteria the documentation can be provided by means of a template for documentation (Appendix to the criterion). The template must be signed by the persons named on the template. By signing, the signatories certify that the requirements set out in the criterion are met. The DGNB reserves the right to randomly request individual documentation retrospectively as part of the conformity audit.

Appendix 3 - Area definitions for districts

City Business Event Commercial Industry

FIGURE 3 Area definitions in the district



Area definitions

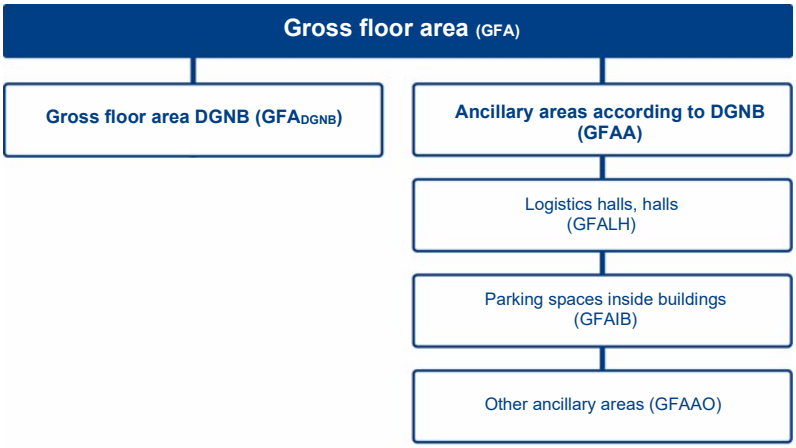
TABLE 2 DGNB area definition for gross site area and site area

GROSS SITE AREA (GSA)	Developed land or land intended for development, including public development and parking areas, green and supply areas.
NET SITE AREA (NSA)	Sum of all developed and building plots within a building area.
TRAFFIC AREAS (CA)	Public areas for roads, car parks, railways, footpaths and cycle paths as well as traffic areas of special purpose such as pedestrian areas, traffic-reduced areas or play streets. In the development plan, public circulation areas define the areas that are necessary for the development of the building area and are accessible to the public.
PUBLIC GREEN SPACES ACCORDING TO DGNB (PGS_{DGNB})	Generally accessible and usable green spaces, which serve the ecological stabilisation of the environment, the improvement of the climate, the recreation and health of the population as well as the promotion of cultural and sports leisure interests. Water areas, recreational areas and agricultural and forest areas are also taken into account as green spaces according to DGNB. If a green space is private but publicly accessible, it can be included in the calculation. For example, this could be a private forest area or a large garden in front of a company.
SUPPLY FACILITIES AREAS (SuFA)	Land intended to provide services of general interest, in particular to accommodate installations and facilities for supplying the population with electricity, gas, heat or water.
OPEN SPACE (OS)	This definition goes far beyond the concept of public green space according to the DGNB, although green spaces fulfil central functions for the municipal open space system. Traffic-reduced road spaces and pedestrian and cycle paths, which are generally not green spaces, are also included in the definition of “open space”. This is done against the background that these can potentially take over open space functions such as green links as well as leisure and recreation space (play, recreation/play streets). In principle, road, rail and parking areas can also function as open space, but this must be justified in each individual case.
CONSTRUCTED AREA (CoA)	Part of the building plot on which a construction or buildings may be erected in accordance with the provisions of the development plan and in compliance with the relevant building regulations.
PRIVATE GREEN SPACE (PrGS)	Home gardens, terraces, allotments
PRIVATE CIRCULATION AREA (PTA)	Traffic area not owned by the public authorities but by a natural or legal person.
STORAGE AREA (STA1)	See storage areas inside the building (STA2)

STORAGE AREA (STA2)	Storage rooms (in accordance with DIN 277 (2005), storage sites and storage spaces for material, equipment and goods; solvent storage, explosives storage, isotope storage, vaults, barns, silos); archives and collection rooms for documents or teaching materials; cold storage rooms; sales rooms and showrooms. Under the DGNB certification system, the definition is applied equivalently for non-constructed areas areas.
RAILWAY AREA / WATERWAY (RAWa)	Transport areas according to VDI 3644. All main transport areas or transport routes. Manipulation areas directly at the workplace must be added to the workplace area. The DGNB certification system differentiates between rail-, water and road transport. RaWa includes all areas for transport by rail or water vessel.

Area definitions for buildings:

FIGURE 4 Area definitions for buildings



Area definitions

TABLE 3 Area definitions for buildings

GROSS FLOOR AREA (GFA)	GFAa according to DIN 277-2 (2005). The gross floor area is the sum of the **floor areas of all floor plan levels** of a building with uses including those resulting from their structural enclosures. For the determination of the gross floor area, the external dimensions of the building components, including cladding, shall be used. The GFA is the sum of the three areas a, b and c. These three areas are defined as follows: **Area a**: covered and enclosed on all sides at full height (e.g. recreation rooms) **Area b**: covered but not enclosed on all sides at full height (e.g. balconies with roof) **Area c**: uncovered areas (e.g. roof terraces) Only **GFA a** is taken into account for the evaluation of districts. For large **special constructions** such as stadiums, the **GFA b and c** are also entered with a **factor of 0.5**.

GROSS FLOOR AREA ACCORDING TO DGNB (GFA_{DGNB})	GFAa according to DIN 277-2 **less ancillary areas** according to DGNB (GFAA). **Additionally** the GFADGNB takes into account the above-ground storeys including **staggered storeys** and wholly or partially **underground main usable areas** (e.g. retail, granny flats).
ANCILLARY AREAS ACCORDING TO DGNB (GFAA)	**Large** above-ground **garages, halls, logistics halls** and underground **ancillary areas** (parking, storage and technical areas) that are not heated main areas (retail, granny flats). Note: Ancillary areas inside buildings (staircases etc.) are not part of the ancillary areas according to DGNB at the urban development level.

Determinations

In order to obtain comparable project values in the early planning phases, the following values are set by the DGNB for all projects. If appropriate documentation is provided, especially in phases 2 and 3, actual project values may also be used. For reasons of efficiency, the DGNB values can also be used in Phase 3, since at the district level, for example, the precise determination of all inhabitants and workplaces with verifiable documentation would require considerable effort.

TABLE 4 DGNB determinations

WALKING-DISTANCE ACCESSIBILITY	= 350 m (corresponds to: 5 minutes on foot, at 1.17 m/sec) A person can thus walk 70 m in 1 minute.
GFA PER WORKPLACE	For a workplace, 40 m² gross floor space must be provided.
LIVING SPACE PER INHABITANT	LS = 42.5 m^2/INH (See DESTATIS 2011) 53 m^2 $GFA_{LIVE\ DGNB}$ corresponds to 1 inhabitant. LS = Residential space INH = Inhabitant GFA = Gross floor area Destatis - Federal Statistical Office of Germany (2011): Statistical Yearbook 2011, Average living space per inhabitant, p. 291
CONVERSION OF NGF TO GFA	GFA = NGF / 0,8
DEFINITION OF HIGH-RISE BUILDING	A building is a high-rise if the last common space is more than 22 metres above the ground.

Appendix 5 - Glossary

S TO V RATIO	Ratio of surfaces (S) to volume (V)
ABWAG	The Waste Water Levy Act regulates the obligation to pay levies for the discharge of wastewater (sewage, precipitation water) into water bodies.
BAUGB	German Building Code
GSA	Gross site area
BBODSCHG	The Federal Soil Protection Act (BBodSchG) is a federal German law which came into force in 1999 and, together with the soil protection laws of the federal states, forms the main part of the Federal German soil protection law. The law is supplemented by the Federal Soil Protection and Contaminated Sites Ordinance (BBodSchV).
OPERATING WATER	Operating water (often also referred to as industrial or service water) is water used for a specific technical, commercial, agricultural or domestic application.
GFA	Gross floor area (building) see DIN 277-1 (2005-02)
BIKE SHARING	Bicycles are provided as public transport at self-service stations.
BIMSCHV	The Federal Immission Control Ordinances (BImSchV) are legal ordinances of the Federal Republic of Germany, which primarily serve to protect against harmful environmental effects from air pollution and noise.
BIODIVERSITY	Biodiversity, diversity of flora and fauna within a geographical area
STANDARD LAND VALUE	Under German urban development law, the standard land value is an average location value determined from the purchase prices of land, taking into account its state of development.
L PLAN	Land-use plan
CAR-SHARING	Shared use of one or more cars
CFD	Computational fluid dynamics: Simulation fluid mechanics
CO_2 EQUIVALENT	The CO_2 equivalent indicates how much a fixed amount of a greenhouse gas contributes to the greenhouse effect.
EEWÄRMEG	German act on the Promotion of Renewable Energies in the Heat Sector
ENEV	Ordinance on energy-saving thermal insulation and energy-saving systems engineering in buildings
EPD	Environmental Product Declaration (EPD) is a standardised method for quantifying the environmental impact of a product or system.
ECONOMIC INFRASTRUCTURE	Facilities of retail trade, handicraft and other services, banks, restaurants, pharmacies, hairdressers etc. As a rule, the main sponsors are private companies.
SITE RECYCLING	Reclamation of derelict land (industrial wastelands, railway areas, port areas, military uses, etc.)

GATED COMMUNITIES	A gated community or closed residential complex (closed community) is a settlement centre of the upper or middle class that is separated from the rest of society by security installations and barriers – such as alarm systems, walls, fences, camera surveillance, private security personnel.
OVERALL PERFORMANCE	Evaluation of the overall result instead of evaluation of individual measures
FSI	Floor space index: Ratio of the total permissible floor area of all full storeys of the building structures on a plot of land to the area of the building plot
GREY WATER	Low-pollution wastewater, such as that produced when showering, bathing or washing hands, but also from the washing machine, can be used for processing into service or industrial water.
GREEN DEVELOPMENT PLAN	The green development plan (GDP for short) is a term from landscape planning and forms the ecological basis for the development plan. It defineds the specifications of the landscape plan and has no legal validity of its own in most countries; only the specifications adopted in the development plan become binding.
SAI	Surface area index: Indicates how many square metres of floor space per square metre of land area are permitted.
HOAI	The Fee Structure for Architects and Engineers (HOAI) is a federal regulation governing the fees for architectural and engineering services in Germany.
INTERMODAL PLATFORM	A station that allows you to switch between at least two different transport systems (train, S-Bahn, city/tram, bus, bike sharing, car sharing).
LANDSCAPE PLAN	A landscape plan is the instrument of landscape planning at the level of towns and municipalities.
LBO	The building code (BauO) or state building code (LBO) of the respective federal state is an essential component of public building law in Germany. According to a legal opinion of the Federal Constitutional Court, the competence for building regulations law lies with the German federal states.
LCC	Life cycle costs: All costs incurred over the planned or assumed life of the district under consideration, i.e. production costs, usage costs, operating costs (supply and disposal, cleaning, operation, inspection and maintenance), repair costs, dismantling and disposal costs.
MIXED USE	Mixture of different uses (residential, commercial, leisure, cultural, educational) within an urban district, construction site or building
MIT	Motorised private transport
MOBILITY MANAGEMENT	The road user is provided with a wide range of alternative transport opportunities, including the necessary information.

MODAL SPLIT	Ratio of the means of transport in the environmental alliance to the MIT, measured in terms of transport performance (transport of persons/km).
MONITORING	Monitoring is an umbrella term for all types of direct systematic recording (logging), observation or monitoring of an operation or process by means of technical aids or other observation systems.
NEIGHBOURHOOD BRANDING	Form of district development that aims to improve the image and enhance the value of housing estates with the participation of various actors, including residents.
PUBLIC SPACE	Areas that are freely accessible to the public at all times and are usually managed and maintained by the municipality (public transport areas, green and open spaces, squares).
LIFE CYCLE ASSESSMENT	Method for analysing the environmental impact of products throughout their life cycle (ISO 14040, ISO 14044)
PUBLIC TRANSPORT	Local public transport
PEDELEC	Electric bicycle
PRIMARY ENERGY	In the energy industry, primary energy is the energy that is available with the naturally occurring forms of energy or energy sources, such as coal, gas or wind.
PRIMARY ENERGY FACTOR	Ratio of total primary energy used to final energy
RENDEVOUZ SYSTEM	Busses or trains of different lines meet at fixed times at a stop to allow passengers to change trains smoothly and without waiting.
BLACK WATER	According to ISO 6107-7:1997, black water in urban water management is domestic wastewater without grey water containing faecal solids.
SHARED SPACES	The road space is designed in the mixing principle for as many traffic subsystems as possible, i.e. without spatial separation. Signage and traffic signals are largely dispensed with.
SMART GRID	Intelligent power grid: Digital networking of the supply infrastructure, currently mainly used for energy supply systems.
SOCIAL INFRASTRUCTURE	Facilities for the common good, which serve the general public and ensure that our cultural, social and health needs are adequately met.

URBAN DEVELOPMENT CONTRACT	Urban development contracts are regulated in the German Law in § 11 BauGB. The municipality can conclude urban development contracts with investors/developers and thus reach agreements that go beyond the stipulations of the B plan.
CITY DESIGN	The following characteristics determine the shape of the city: city view, silhouette, long-distance effect, identity, storey height/depth, building method
CITY STRUCTURE	The following characteristics determine the structure of a city: morphology, scale, building site size, urban density, visual axes, orientation, squares
SWOT ANALYSIS	The SWOT analysis (acronym for Strengths, Weaknesses, Opportunities and Threats) is an instrument of strategic planning.
ENVIRONMENTAL REPORT	An environmental report is a publication in which a company describes its goals, measures and results of its activities in the field of corporate environmental protection.
SUSTAINABLE TRANSPORT NETWORK	Network of environmentally friendly means of transport: pedestrians, cyclists, public transport

Appendix 6 - Building - district interfaces

If buildings are constructed in certified districts, qualities from the district should be recognised in the building certification. The building plus bonus can be recognised in the certification of districts if the information/certification is shown/displayed accurately for the building.

List of criteria with building plus bonuses

CRITERION Q20 → V18	CRITERION NAME	BUILDING PLUS BONUS DESCRIPTION	EVALUATION
ENV1.1 →ENV1.1	**Life-cycle assessment**	Indicator 1. Integration of LCA consideration into the planning process: For the district LCA, more detailed building variants (e.g. wood vs. reinforced concrete) will also be considered.	Building Plus Bonus: +8 points
ENV1.2 →ENV1.2	**Pollutants and hazardous substances** Only **Industry**	Indicator 1.1 Environmentally friendly materials new construction: There are legally binding specifications for building developers (e.g. purchase contract: Cooling without halogenated propellants)	Building Plus Bonus: +10 points
ENV2.2 →ENV2.2	**Water cycle systems**	Indicator 2. District water balance: There are legally binding guidelines for building developers to connect to the rainwater infrastructure of the district	Building Plus Bonus: +5 points
ECO1.1 →ECO1.1	**Life-cycle costs**	Indicator 1. Life-cycle cost consideration in planning In the district analysis, more detailed building variants are also considered	Building Plus Bonus: +5 points
TEC3.2 →ECO2.2	**Mobility infrastructure - pedestrians and cyclists**	Indicator 2. Mobility infrastructure for cycling: The dimensioning according to the number and arrangement of bicycle parking spaces is carried out for each individual building (public and non-public)	Building Plus Bonus: +10 points
ECO2.4 →ECO2.2	**Value stability**	Indicator 4. Market and location analysis The location analysis explicitly takes each building into account.	Building Plus Bonus: +10 points

TEC2.1 →TEC1.4	**Energy infrastructure**	Indicator 3. Using synergies When energy, which is used to cover the building-related or user-related energy demand, is generated in the surrounding district/in the direct vicinity from renewable energy sources (at least 10 % of the building-related final energy demand). Alternatively, if energy generated in the building or on the property from renewable energy sources is transferred to the district/the immediate surroundings (at least 10% more than the building-related final energy requirement), the convergence bonus can be applied for explicitly documented buildings.	Building Plus Bonus: +10 points
TEC2.1 →TEC1.4	**Energy infrastructure**	Indicator 3. Using synergies Buildings provide storage capacities to a considerable extent (approx. 10 % of the final energy demand of a building) by enabling use grid or use integrated energy and load management	Building Plus Bonus: +10 points