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Bendis Saage

# Sustainable Construction: Green Building Supply and Project Management

## A Practical Guide to Building Construction, Site Management, and How to Build a House Using Lean Construction Methods

41 Sources
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7 Illustrations

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**Dear readers,**

We sincerely thank you for choosing this book. With your choice, you have not only given us your trust but also a part of your valuable time. We truly appreciate that.

Sustainable building is more important today than ever - for our environment and our wallets. Those planning and constructing a house face the challenge of making future-oriented decisions: from choosing the right plot of land to energy-efficient construction methods and optimal building technology. This specialized book systematically guides readers through all phases of sustainable building. Through concrete planning steps, proven methods, and current technologies, it demonstrates how ecological and economic goals can be optimally combined in house construction. Special attention is given to energy-efficient concepts, renewable energy systems, and the use of environmentally friendly building materials. The structured guide supports builders in making their project sustainable from the initial idea to the turnkey handover while keeping costs and quality in mind. Make your construction project future-ready - with well-founded insights and practical recommendations for sustainable building.

This guide provides you with easy-to-understand and practical information on a complex topic. Thanks to self-developed digital tools that also use neural networks, we were able to conduct extensive research. The content has been optimally structured and developed up to the final version to provide you with a well-founded and easily accessible overview. The result: You get a comprehensive insight and benefit from clear explanations and illustrative examples. The visual design has also been optimized through this advanced method so that you can quickly grasp and use the information.

We strive for the highest accuracy but are grateful for any indication of possible errors. Visit our website to find the latest corrections and additions to this book. These will also be incorporated in future editions.

We hope you enjoy reading and discover new things! If you have any suggestions, criticism or questions, we look forward to your feedback. Only through active exchange with you, the readers, can future editions and works become even better. Stay curious!

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## Quick access to knowledge

To ensure an optimal reading experience, we would like to familiarize you with the key features of this book:

- **Modular Structure:** Each chapter is self-contained and can be read independently of the others.
- **Thorough Research:** All chapters are based on thorough research and are supported by scientific references. The data shown in the diagrams serves for better visualization and is based on assumptions, not on the data provided in the sources. A comprehensive list of sources and image credits can be found in the appendix.
- **Clear Terminology:** Underlined technical terms are explained in the glossary.
- **Chapter Summaries:** At the end of each chapter, you'll find concise summaries that give you an overview of the key points.
- **Concrete Recommendations:** Each subchapter concludes with a list of specific advice to help you put what you've learned into practice.

**Additional bonus materials on our website**

We plan to provide the following exclusive materials on our website:

- Bonus content and additional chapters
- A compact overall summary
- An audio drama version. (In planning)

The website is currently under construction.

www.SaageBooks.com/sustainable_construction-bonus-KKNI3U

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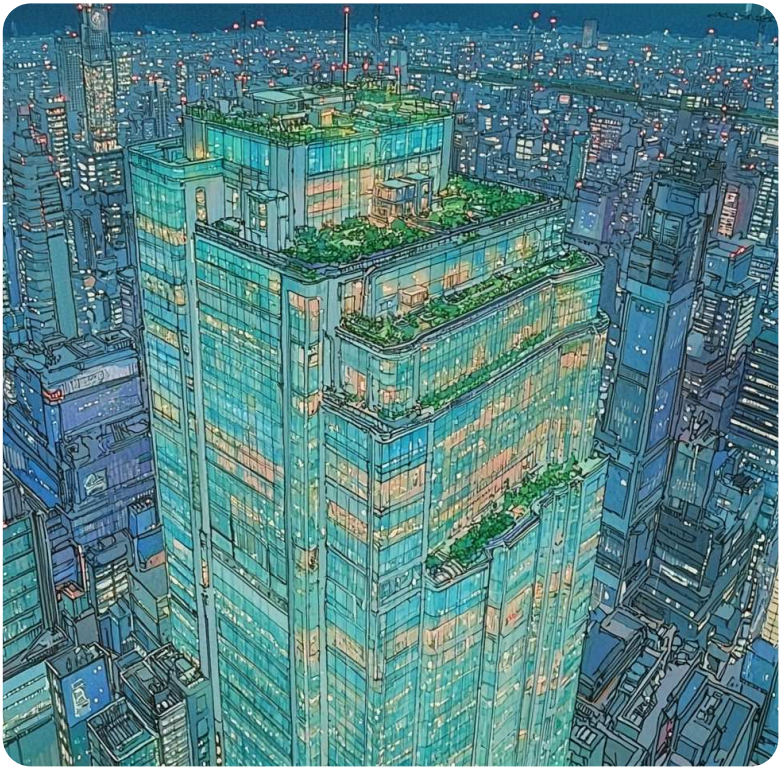
# 1. Sustainable Construction Planning

ow can a construction project be designed from the outset to remain ecologically and economically viable for decades? Careful planning in the early project phase is crucial for the later success of the entire construction endeavor. Numerous factors interconnect, from site selection to building orientation to material choice. A well-thought-out approach not only saves resources and costs but also creates greater long-term living quality. In this chapter, we will show you what decisions you can make during the planning phase for a future-proof building.



## 1. 1 Site Analysis

and analysis forms the foundation of sustainable building planning. Soil quality and topography influence the statics, drainage, and landscaping, while the microclimate and climatic conditions determine energy demand and living comfort. The infrastructural connectivity shapes mobility and quality of life. A careful analysis of these factors avoids costly mistakes and increases property value. Discover below how to optimally utilize the potential of the land.

> *Sustainable construction planning requires a comprehensive site analysis that takes into account not only soil conditions and climatic factors but also infrastructural connectivity and integration into the urban green infrastructure.*

## Soil Condition and Topography

oil condition and topography significantly influence the planning and implementation of sustainable construction projects. The load-bearing capacity of the soil determines the type of foundation and thus the structural integrity of the building. A rocky substrate provides different conditions than sandy soil. The latter may require additional stabilization measures, which can impact construction costs. The type of soil also affects the drainage of the property. Clayey soils retain water and can lead to waterlogging, while sandy soils drain water quickly. These characteristics influence the choice of plants and the design of outdoor spaces. Knowledge of the soil condition is therefore essential for planning garden design and selecting suitable building materials. A high groundwater level may necessitate drainage systems to protect the building from moisture. Topography, or the surface shape of the property, affects the placement of the building, the orientation of solar panels, and energy demand. A steep property may require terracing or special foundations, which can increase construction costs. South-facing slopes offer optimal conditions for solar energy use, while north-facing slopes tend to be shadier and may result in higher heating needs. Topography also influences surface water runoff. Depressions can fill with water during heavy rain, while slopes ensure rapid drainage. These factors affect the choice of location for the building and the design of the landscape. An analysis of ecological resilience shows that areas with complex topography and high ecological sensitivity are more resilient to human interventions. A detailed topographic analysis helps identify potential problems early and take appropriate measures. For instance, through the strategic placement of the building and garden design, energy demand can be minimized, and the microclimate positively influenced. A property with a steep gradient can be optimally utilized by constructing retaining walls or creating terraces to establish different levels for garden, living area, and vegetable garden. Considering the natural conditions of the property allows for a harmonious integration of the building into the

landscape and contributes to sustainable resource management. Soil condition and topography are important factors for site selection and planning a sustainable construction project. A careful analysis of these factors enables optimal adaptation of the construction project to local conditions and contributes to a long-term increase in property value. A soil report provides detailed information about the soil condition and load-bearing capacity and is therefore an important basis for planning and implementing a construction project. By considering these factors early on, costly modifications can be avoided, and the sustainability of the construction project ensured. An analysis of geological environmental suitability can provide valuable information about the suitability of an area for development. In regions with complex topography, such as karst mountains, such an analysis is particularly important, as the ecosystems here are sensitive and space is limited.

## Good to know

**Drainage Systems**

Drainage systems divert excess water from the building and protect it from moisture damage. Sustainable materials should be used in the planning of drainage systems, and the impact on the property's water balance should be considered.

**Karst Mountains**

Karst mountains are characterized by water-soluble rock such as limestone. Special caution is required for construction projects in such areas, as the substrate can be unstable and may contain voids or sinkholes. A thorough geological investigation is essential.

**Soil Report**

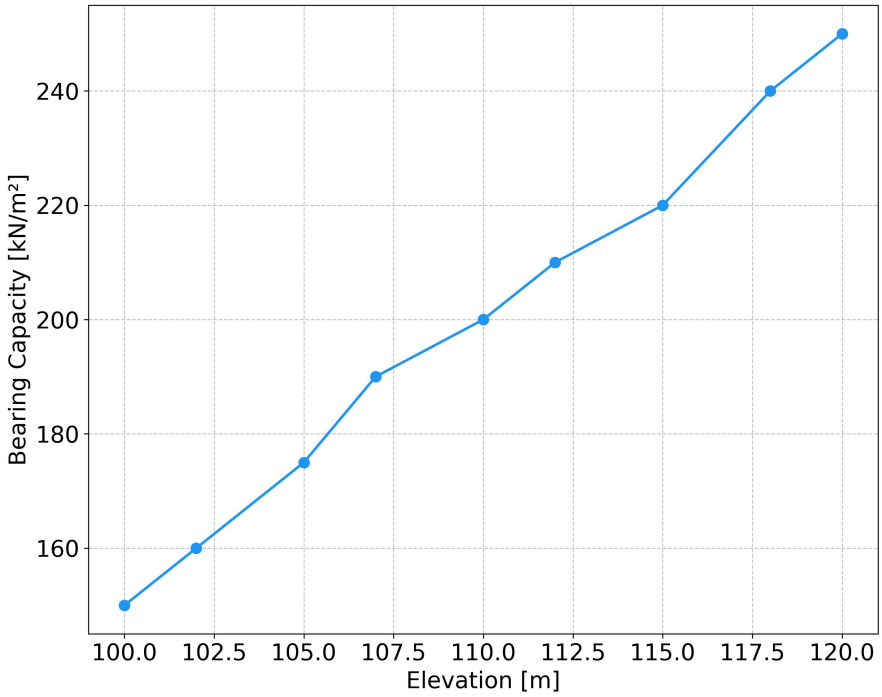
A soil report provides important information about soil condition, groundwater level, and potential contamination. It serves as the basis for planning the foundation and other earth-contacting components and helps minimize risks and costs.

**Terracing**

Terracing can be implemented on sloped properties to create level areas for gardens or agriculture. They offer the opportunity to create different microclimates and promote biodiversity.

## Soil Bearing Capacity vs. Elevation

Correlation between soil bearing capacity and elevation on the site.




Higher elevations generally exhibit increased soil bearing capacity, suggesting suitability for heavier structures. Lower areas might require ground improvement techniques for optimal foundation stability. This correlation is valuable for informed building placement and resource-efficient foundation design.

## Climatic Conditions

limatic conditions significantly shape the energy demand and living comfort of a building and should therefore be thoroughly analyzed during the planning phase. This includes not only seasonal temperature fluctuations but also prevailing wind conditions, solar radiation, and precipitation amounts. These factors influence the choice of building materials, the insulation of the building, the placement and size of windows, as well as the design of outdoor spaces. Strong winds, for example, can increase heat losses from a building and may require additional protective measures such as windbreak hedges. Solar radiation determines the potential use of solar energy and affects the natural lighting of the rooms. In regions with high solar radiation, overheating of rooms in summer can be avoided through shading elements such as roof overhangs or targeted planting. Precipitation amounts influence the dimensioning of roof drainage and the design of the terrain to avoid runoff problems. A green roof can retain rainwater and thus relieve the sewage system. The analysis of climatic conditions also includes the examination of the microclimate. This is influenced by local conditions such as vegetation, topography, and development. For instance, urban areas may be exposed to higher temperatures due to the so-called urban heat island effect than the surrounding rural area. Considering the microclimate allows for optimal adaptation of the building to local

*Roof overhang* [i1]

*Green roof* [i2]