Roadmap to Nature Positive

→ *Foundations for the built environment system*

World Business Council *for Sustainable Development*

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01. Nature Action: *a business imperative*

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Nature matters for business

Nature is the backbone of the world economy: all businesses depend on nature. Societies cannot survive, let alone thrive, without the essential functions that the natural world provides: clean air, water, food and a stable earth system to exist within. And yet, humanity is using double the resources that the Earth can regenerate each year.[1]

Nature loss is already impacting business. Industry value chains that are highly and moderately dependent on nature (relying heavily on direct extraction of resources from land, freshwater and ocean realms) generate over half of global GDP; every industry has some degree of direct and indirect dependency on nature.[2]

Furthermore, addressing the climate crisis, restoring nature and protecting biodiversity are mutually supporting goals. Climate change cannot be mitigated without taking action to repair and restore natural systems, returning them to healthy and resilient states.

The solutions needed are not incremental tweaks to current business models: achieving **Vision 2050** and creating a world in which more than 9 billion people can live well, within planetary boundaries[3] requires the transformation of societies and economies.

Nature risks have shifted global policy

Nature has rapidly risen up the agenda, both within the real economy and for the financial services industry and investors. There is no escaping rising nature-related risks – driving policymakers, regulators, investors, businesses, consumers and citizens to collectively call for rapid change.

Governments have sent a particularly strong signal. The 15th **United Nations Biodiversity Conference** (CBD COP15) took place in December 2022 and culminated with the adoption of the **Kunming-Montreal Global Biodiversity Framework** (GBF) – setting a global ambition to halt and reverse biodiversity loss by 2030.

This is a key milestone for nature action, the equivalent of a "Paris Agreement" for nature, raising nature to the same level as climate on the global political agenda. The GBF's 23 targets detail the plan to address nature loss for all actors: governments, businesses and civil society.

A corporate performance and accountability system is also emerging to support and catalyze credible and impactful business action on nature, building on a similar system for climate. Organizations and governments are putting both voluntary and mandatory accountability mechanisms into place.

On the voluntary side, 2023 sees the release of the initial set of science-based targets for freshwater and land (beta) by the **Science Based Targets Network** (SBTN) and the **Taskforce on Nature-related Financial Disclosures** (TNFD) v1.0 recommendations for nature-related financial disclosures. Mandatory requirements are of immediate relevance to companies, such as the European Sustainability Reporting Standards (ESRS) under the **Corporate Sustainability Reporting Directive**[4] (CSRD) that will impact all companies operating in the European Union. Similarly, regulators in a number of jurisdictions have indicated they will adopt the still voluntary standards from the International Sustainability Standards Board (ISSB) and make them mandatory in the near future, including **General Requirements for Disclosure of Sustainability-related Financial Information** (International Financial Reporting Standards (IFRS S-1) and **Climate-related Disclosures** (IFRS S-2).[5]

→ *See the* **Roadmaps to Nature Positive: Foundations for all businesses** to learn more about the emerging voluntary and mandatory accountability mechanisms, and how key stakeholders, including regulators, investors, standard setters, consumers and employees, are all raising their expectations of business.

Nature positive and current business approaches

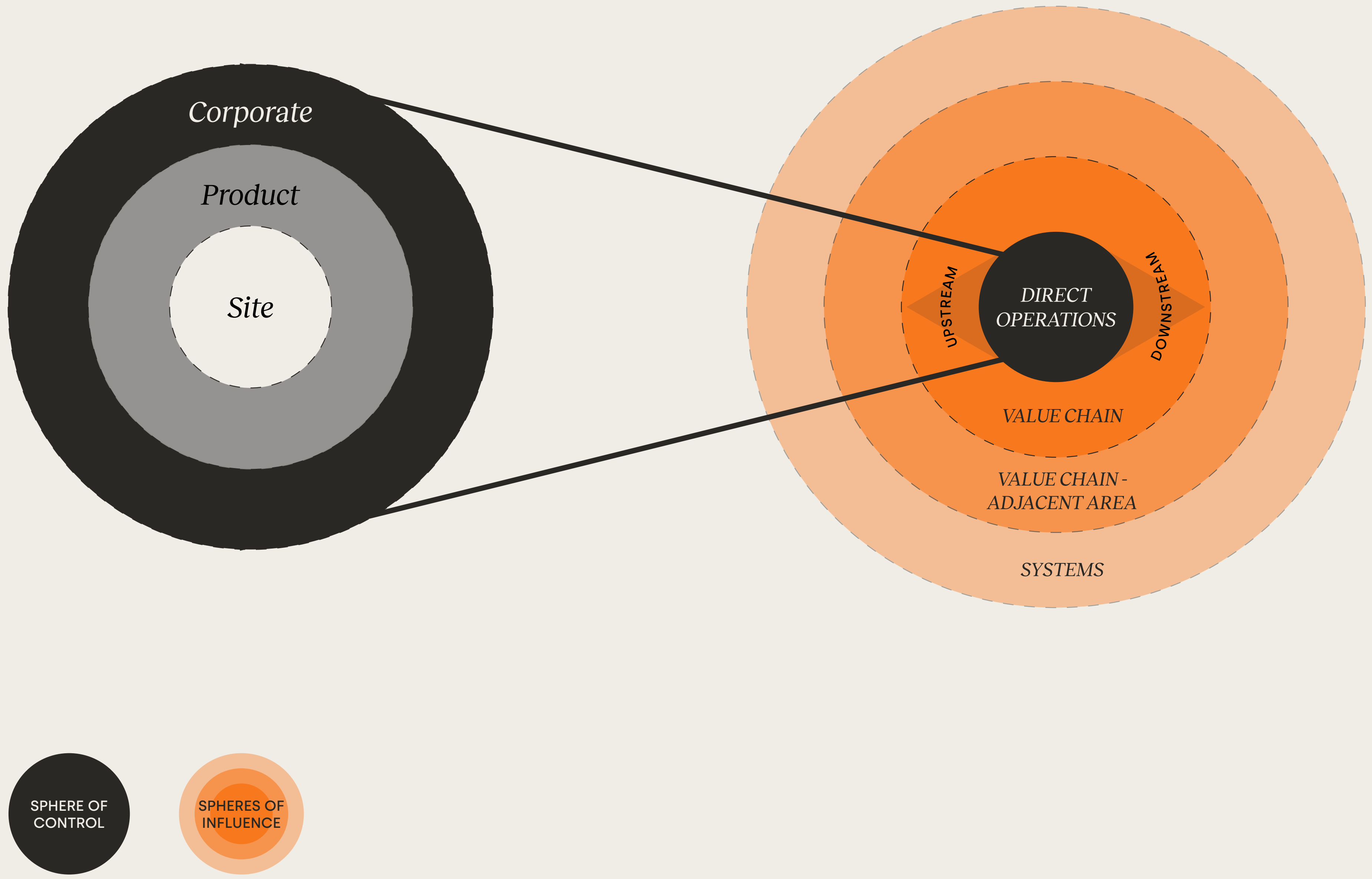
Stakeholders widely acknowledge the term “nature positive” as a global goal to halt and reverse nature loss by 2030 and achieve full recovery by 2050, as captured in the mission statement of the Kunming-Montreal Global Biodiversity Framework.[6]

Individual companies can contribute to this shared goal by adopting an approach to nature positive across their spheres of control and influence, including in their direct operations, across value chains and in priority locations for nature-related value or stress (see Figure 1).

To help guide business action on nature, WBCSD, SBTN, TNFD, the World Economic Forum and Capitals Coalition collaborated to provide business with a consistent approach: the **high-level business actions on nature to Assess, Commit, Transform and Disclose (ACT-D)**. The key elements of the high-level actions come together as the basis for an ambitious, credible, and strategic approach to contributing to nature positive (see Figure 2).

The ACT-D framework is necessarily ambitious but there is no expectation that companies will implement it in one go. Companies enter nature journeys at different stages of readiness and maturity. To address this, WBCSD has defined maturity levels (starting, developing, advanced and leading), informed by an analysis of public corporate disclosures on nature,[7] helping companies understand where they are on their nature journey and how to advance.

Figure 1: Sphere of control and spheres of influence relevant for corporate target-setting



Source: Adapted from Science Based Targets Network (2020). **Science-Based Targets for Nature Initial Guidance for Business**

→ ***See the*** **Roadmaps to Nature Positive: Foundations for all businesses** to learn more about maturity levels.

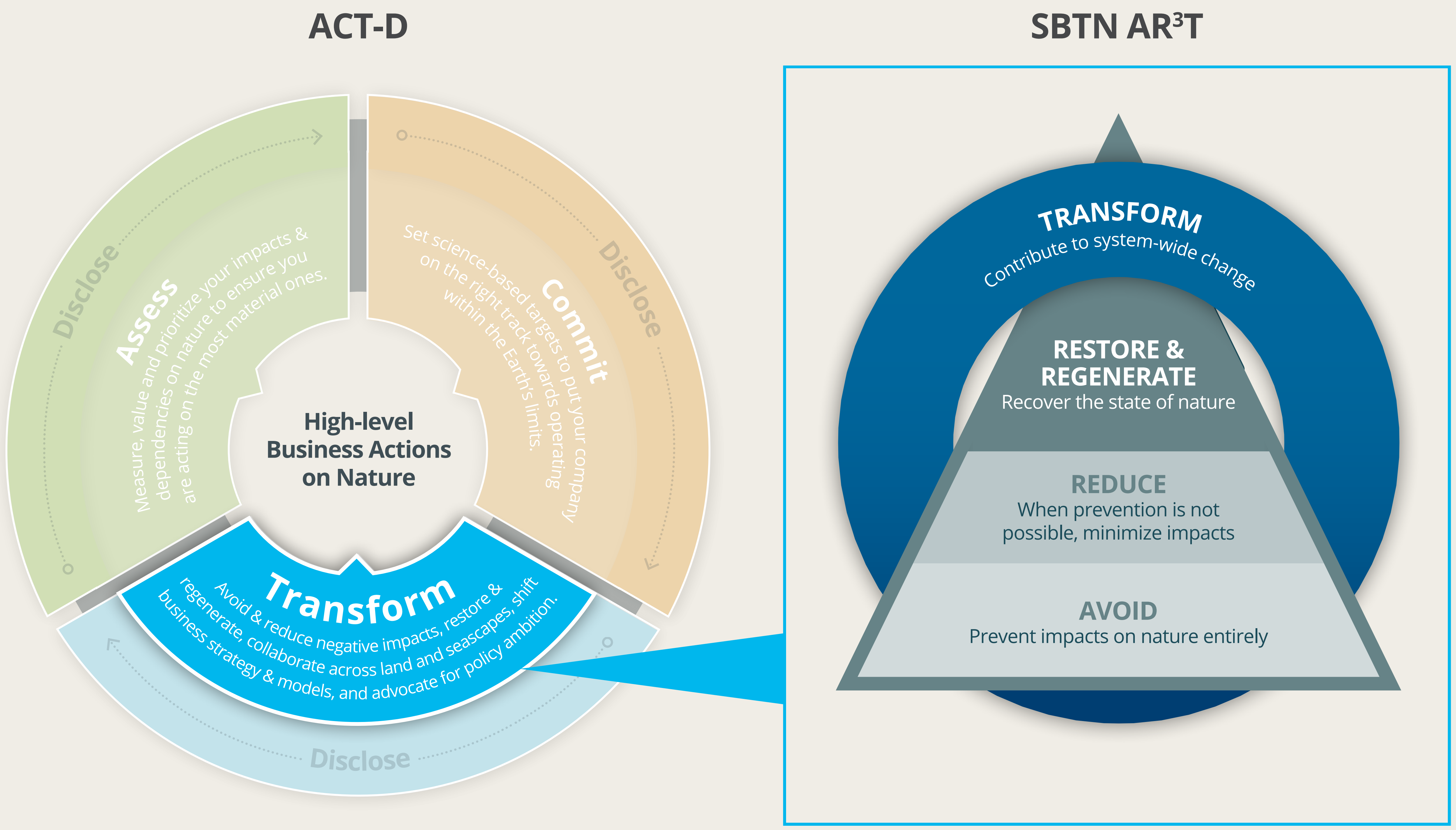
WBCSD approach to nature positive for business

Nature positive is gaining traction in the business community, yet lack of consensus around the term remains the subject of confusion. WBCSD's approach toward nature positive is based on key principles shared by leading organizations in this space, including SBTN, TNFD, Business for Nature and others.

In addition to understanding the company's relationship with nature, to set commitments that credibly contribute to nature positive, the collective impacts from regenerative and restorative business actions (doing "more good") must outweigh those from avoiding and reducing nature loss (doing "less harm") as guided by SBTN's Avoid, Reduce, Restore & Regenerate, Transform (AR3T) Action Framework (see Figure 2). This means that individual companies must urgently accelerate action to halt nature loss while simultaneously bringing back more nature. Actions that reduce harm will help to collectively reverse nature loss by 2030, while restorative, regenerative and transformative actions are critical to achieving full recovery by 2050.

In summary, companies should be holistic and transparent in the approach they take to assess, commit, transform and disclose, and in doing so highlight their contributions towards a nature positive future - rather than claiming to be nature positive themselves.[8]

Figure 2: SBTN's Action Framework (AR3T) defines the hierarchy of actions that companies can put in place as part of the "Transform" stage of ACT-D



Source: Business for Nature (2023). [Priority actions towards a nature-positive future]

Catalyzing critical business action in support of nature positive

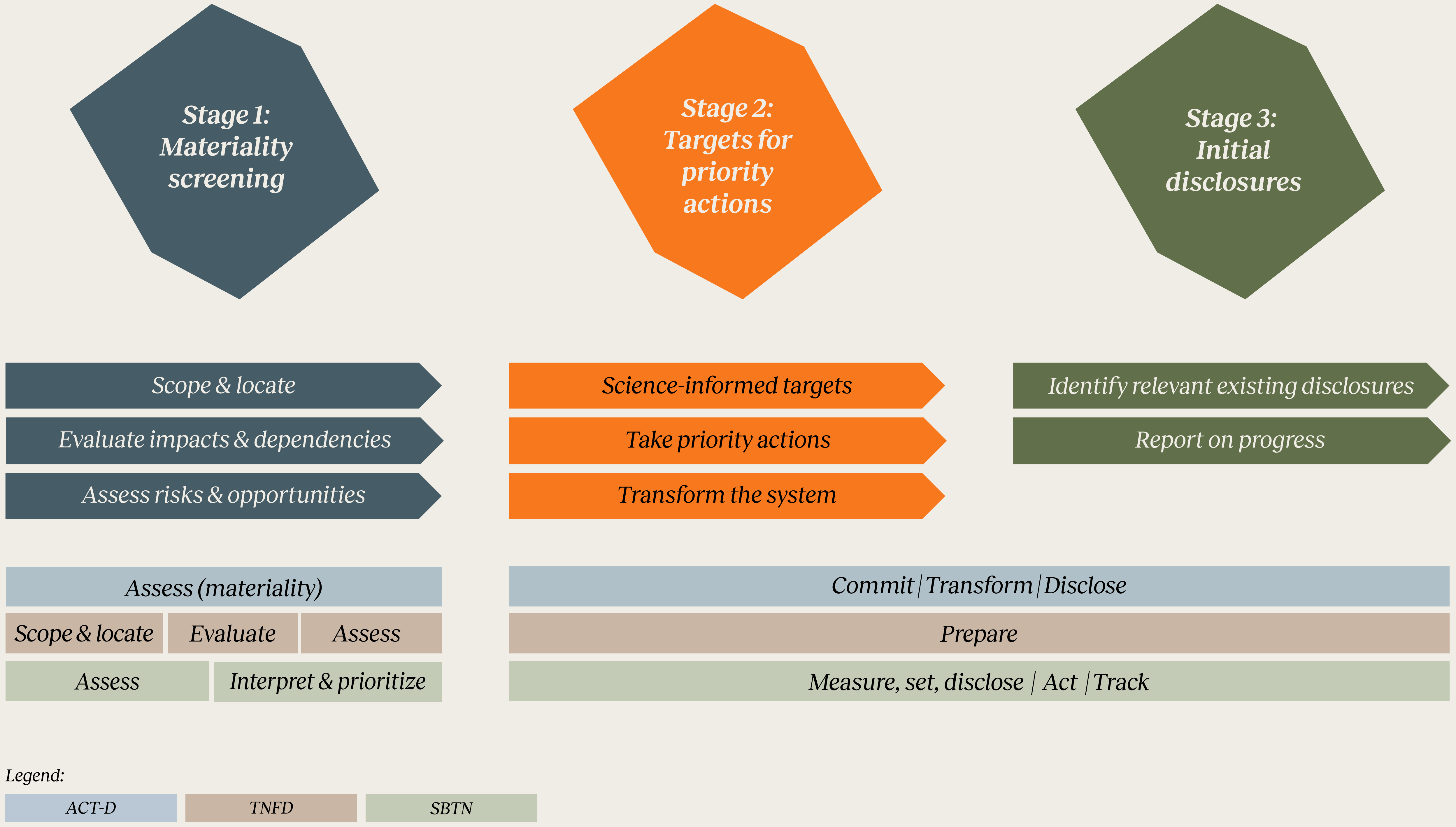
While the case for companies to contribute to nature positive is evident, this agenda can still be a blind spot. Ahead of CBD COP15, McKinsey found that while 83% of Fortune Global 500 companies have climate change targets, only 25% have freshwater consumption targets and a mere 5% have set targets related to biodiversity loss. Only 5% have assessed their impacts on nature and less than 1% understand their nature dependencies.[9]

WBCSD is working with Business for Nature and the World Economic Forum to develop guidance to support companies on their nature journeys: understanding their impacts, dependencies, risks and opportunities in order to prioritize actions that contribute to nature positive.

In addition, WBCSD is developing Roadmaps to Nature Positive that offer companies deep guidance and support on their nature journeys across maturity levels. The Roadmaps provide in-depth analysis and guidance relevant for all businesses, as well as specific guidance for four high-impact systems:[10] land use (including the agri-food and forest sectors), built environment and energy.

This initial guidance, covering the foundations of nature action, helps companies: define and improve their nature strategies based on value chain materiality screening; identify priority actions to systematically avoid and reduce negative impacts; determine the best restoration and regeneration approaches; prepare for initial voluntary and required disclosures. It provides a strong foundation to help business make progress towards achieving the shared goal of a nature-positive world by 2030.

Figure 3: Roadmaps to Nature Positive – a common approach for credible strategic action on nature



→ *See the* Roadmaps to Nature Positive: Foundations for all businesses to learn more about the approach followed for this work. Additional guidance is available for deeper support to prepare for TNFD, see WBCSD's TNFD pilot - Lessons from TNFD piloting with 23 global companies.

02. Introducing the Roadmap *for the built environment system*

02. Introducing the Roadmap to Nature Positive *for the built environment system*

Context: Importance of nature to the built environment system

The foundations for the built environment system provide a common understanding of what nature positive means for the built environment value chain. It also provides guidance on how to conduct a materiality assessment, how to identify priority actions and how to initiate transformative change at a system, landscape and company level. The next iteration of this Roadmap will focus on target-setting and defining suitable indicators to measure progress. The target audience for this guidance is very broad, reflecting the diversity of the built environment system, which consists of manufacturers, designers, architects, engineers, constructors, developers, real estate businesses, as well as public authorities and financial institutions.

The built environment system is responsible for 40% of global CO_2 emissions, 40% of global resource use and 40% of global waste streams.[11] It is also one of the four value chains, along with food, energy and fashion, responsible for approximately 90% of nature and biodiversity loss worldwide.[12]

Its impact is predicted only to increase. Projections show that urban land area will increase by 1.2 million km^2 by 2030[13] and include 10 additional megacities (population over 10 million).[14] By 2050, 68% of the world population will be living in urban areas,[15] adding 2.5 billion people.[16]

As a result, the size of the built environment is set to double[17] with the global population expected to reach 9.8 billion,[18] putting high pressure on nature through increased use of water, release of pollutants and production of waste.

In particular, the growth in urban areas, already estimated to impact nearly one-third of threatened and near-threatened species, will have an even more significant harmful impact on nature and biodiversity. This could take many forms: land conversion, habitat fragmentation, disturbance and pollution during construction, not to mention the harmful indirect effects of upstream and downstream processes.

The loss of nature is disrupting business through material risks in operations and value chains that stem in part from companies' impacts and dependencies on nature. All businesses must therefore work to quantify and manage their nature-related risks. They must account for nature and take action to halt and reverse nature loss.

A massive systemic transformation of the built environment is essential to solve the interlinked climate and nature crises. It is essential to accelerate this transformational change if the world is to meet the goals of the Paris Agreement and the societal goal of nature positive. The **Kunming-Montreal Global Biodiversity Framework** (GBF), sets a global ambition to halt and reverse nature loss by 2030 as a milestone to full recovery by 2050. To effectively respond to the biodiversity emergency, action must be taken today. This is especially true for built environment projects currently in development that are designed to be operational in 2030.

Fortunately, there are many opportunities for the built environment system to avoid, reduce impacts and restore nature, particularly by taking a **circular economy approach** to building material production systems and waste streams.

As nature positive is not only interlinked with zero carbon but also with the notion of an equitable world, it is worth mentioning that taking action to contribute to nature positive should always consider social issues in parallel. In other words, actions that contribute to nature positive should also benefit citizens and local communities. As the many examples of actions included in this Roadmap will demonstrate, there is a tremendous opportunity to create synergies between benefits for nature and benefits for society (for example, green-blue infrastructure[19] that also enhances the quality of life for citizens).

Building on the analysis of typical nature-related impacts, dependencies, risks and opportunities for the built environment system (see next sections), the following principles for the built environment system are key to credibly contribute towards a nature-positive future.

→ Circular material use becomes the norm, reducing raw material extraction and waste incineration or landfilling, which in turn reduces adverse impacts on nature.

→ Zero deforestation and conversion-free land use. Degraded ecosystems are restored. New and refurbished project developments are systematically upgraded with nature-based solutions (NbS) such as green-blue infrastructure as well as with best practices for climate mitigation and adaptation.

→ Surface and groundwater resources are sustainably managed, i.e., in a way that adverse impacts on quantity and quality are avoided.

Scope of the Roadmap

Five built environment subsystems

The main impacts and dependencies on nature of many built environment companies arise from the sourcing of raw materials and the production of construction materials, as well as the construction and operation of buildings and infrastructure, which give rise to material impacts and dependencies. Given the substantial variability (such as scale, landscape context and type of building materials used) of activities and their impacts within the built environment system, **four subsystems and an additional fifth cross-cutting subsystem (on extraction)** are defined:

- **Buildings:** A built structure for human habitation, work or cultural use. It includes all human-made constructions and materials, and the open (green) space(s) on site.
- **Urban infrastructure:** Refers to all buildings and supporting infrastructure that underpin cities or towns such as private and public construction; transport, sanitation and sewage systems; land areas; and telecommunications equipment installed in this urban matrix.
- **Transport infrastructure:** The underlying system of public works designed to facilitate movement. It consists of fixed installations including roads, railways, airways, waterways, canals, pipelines, stations and terminals. We do not include the impacts of the modes of transport such as cars, trucks and public transport.
- **Marine and coastal infrastructure:** Infrastructure in marine and coastal environments, including offshore infrastructure (e.g., windfarms and drilling platforms), nearshore developments (such as land reclamation, artificial islands and aquaculture farms) and coastal infrastructure (for instance, dykes and other storm protection structures).
- **Extraction sector:** The mining and extraction of raw materials cuts across all built environment subsystems as it covers the upstream part of the value chain for all subsystems. The construction industry is one of the top three economic sectors most dependent on natural resources for raw materials.

This division is not based on any official system of classification, rather on the differentiating characteristics of the subsystems in terms of impacts on nature. Evidently, there are overlaps: buildings are part of every subsystem, transport infrastructure is part of urban infrastructure and can even be part of marine and coastal infrastructure. Energy infrastructure could have been distinguished as another subsystem of the built environment – however, WBCSD's Roadmap to Nature Positive: Foundations for the energy system covers it in detail.

Moreover, several value chain systems touch built environment subsystems. As an example, both the energy and the built environment Roadmaps could cover renewable energy infrastructure such as windfarms. There will always be multiple ways to subdivide a value chain system and there will always be overlaps. The current subdivision of subsystems is a pragmatic choice for addressing the broad variety of nature-related dependencies, impacts, risks and opportunities in the built environment system.

Four value chain stages of the built environment system

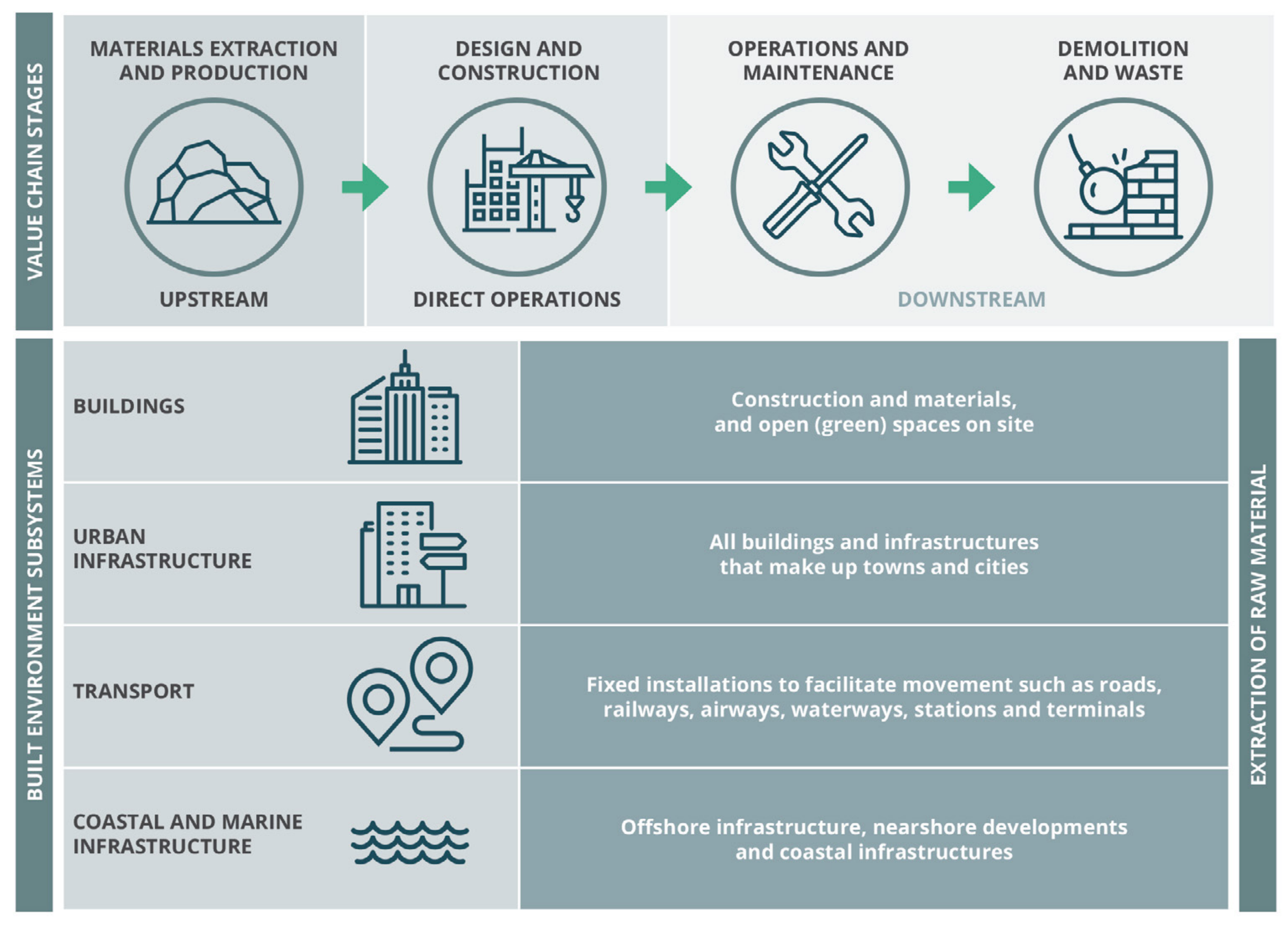
Contributing towards a nature-positive future means acting across the full value chain of the built environment system. Four key stages are identified to describe the built environment value chain in the life cycle of a project (see Figure 4), and it is recommended that every company starts its assessment with the value chain framing question to clarify which of the value chain stages corresponds to their direct operations (see page 35):

- → Materials extraction and production (upstream)
- → Design and construction (direct operations)
- → Operations and maintenance (downstream)
- → Demolition and waste (downstream).

This Roadmap builds on a description of impacts, risks, opportunities and priority actions across these four value chain stages. Note that built environment dependencies on nature are covered directly through the identification of risks.

Figure 4. Scope of the Roadmap for the built environment system

Four value chains stage across four subsystems



03. Foundations *for the built environment system*

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→ *Stage 1: Assess (materiality screening)*

Materiality screening is at the heart of an impactful nature journey as it enables a business to identify the most material nature-related issues that credible targets need to cover, including associated actions to address those issues. Companies should conduct a materiality screening as a participatory process with experts and stakeholders from within and outside the company.

Assess: Foundations – System materiality screening

A materiality screening based on typical system impacts and dependencies can help identify and prioritize the parts of the business with the highest potential risks and opportunities. By making dependencies, impacts, risks and opportunities (DIROs) more explicit, the business case for action on nature (with benefits for the business, communities and other stakeholders) becomes more straightforward.

A materiality screening should take place at the beginning of the corporate nature journey to identify priority issues for further, more detailed, assessment. More advanced companies can also use such a screening to check that they have covered their priority issues. This step is feasible regardless of system, geographic location or level of sustainability experience. Major frameworks – including CSRD, SBTN and TNFD – require it.

The foundational steps to "Assess" include:

1. **Scope and locate:** Identify the company's main sectors, sub-sectors and parts of the value chain and where they are located;
2. **Evaluate impacts and dependencies:** Prioritize potentially high impacts and dependencies on nature typical for the business and associated value chains for further assessment;
3. **Assess risks and opportunities:** Assess associated risks and opportunities for the business and for key stakeholders in order to prioritize further action.

Together, these steps can feed into a corporate materiality assessment and help prioritize those areas that require deeper analysis.

Stage 1.1 - Scope and locate

Identify the company's main sectors and sub-sectors and key parts of the value chain and their location.

Why do this:

For many companies, the main impacts and dependencies on nature will come from direct operations (sourcing of raw materials, production processes and sites) and the use of produced goods and services. The company needs to identify and address the value chain components that represent the greatest potential risks and opportunities in order to have a credible and impactful approach to nature, even if these components may not be under the company's direct control.

What to do:

→ Identify sectors and sub-sectors that represent the company's activities and key components throughout the value chain. This is necessary to extract typical impacts and dependencies from relevant tools (for example, if the company lists aluminium packaging as a key component, it should identify the aluminium mining sector as a relevant sector);

→ Identify direct operations or parts of the system where these typical impacts and dependencies are present.

Stage 1.2 - Evaluate impacts and dependencies

Prioritize potentially high impacts and dependencies on nature typical for the business and associated value chains for further assessment.

Why do this:

The starting point for materiality assessments on nature should not be subjective but informed by what data and science indicate are typical impacts and dependencies for a given sector. A company can then refine this within its risk assessment processes. In this way, it can identify and address strategically important issues and reduce exposure to accusations of greenwashing.

What to do:

→ Carry out a **system materiality screening**:
- Develop a list of typical nature-related impacts and dependencies based on existing materiality screening tools, in addition to expertise from the business and its partners;
- Prioritize impacts and dependencies rated as potentially "high" or "very high" risk for further analysis and action.

To understand the built environment system's most material impacts, companies can assess each of the four value chain steps for any of the built environment subsystems.

The most significant impacts across the built environment subsystems are:

1. **Land/Sea use change - Habitat loss and ecosystem degradation can occur at all stages of the built environment value chain**, but are predominant during materials extraction and production, and design and construction. This is due to land/sea use change, reduction in the extent and condition of ecosystems, or reduced connectivity between ecosystems (fragmentation is particularly relevant for the transport infrastructure subsystem). Habitat degradation due to inappropriate management of habitats is a key impact for the operations and maintenance stage.

2. **Pressure on water resources** can be significant if a company uses large amounts of water. This can happen in all value chain stages except the demolition stage. This pressure is strongly inter-linked with water-related hazards such as droughts and floods. For example, floods during storm events also affect water resources (e.g., aquifer recharge) due to lack of soil permeability within the built environment.

3. **Pollution of water and soils** is an important impact area in the materials extraction and production stage, but can also be a potential key impact area during construction, maintenance and operations, as well as during demolition in the case of inappropriate waste management.

4. **Greenhouse gas (GHG) emissions** are important across the whole built environment system. They are most prominent in materials extraction and production and during the use phase of buildings. The industry emits 4 Gt of GHGs annually[20] through the use of heavy machinery and in energy-intensive production processes. In addition, the energy used in buildings or other infrastructure (operations and maintenance stage) leads to 10 Gt of GHG emissions annually.[21]

An extensive overview of nature impacts across the value chain for each of the built environment subsystems is available in the detailed Impact tables (Annex 2). These tables aim to:

→ Facilitate the identification and mapping of nature-related impacts, risks and opportunities throughout a company's activities

→ Be pragmatic and user-friendly and adaptable to the needs of individual companies

→ Be inspirational – the tables are pre-filled with subsystem-specific examples of impacts, risks and opportunities – individual companies can adapt these examples according to their specific situation.

A description of the methodology and how to use the tables is provided in Annex 1.

As already described, the substantial variability (such as scale, landscape context and type of building materials used) of activities within the built environment system can lead to differentiating impacts on nature. **Examples of how and why nature-related impacts can differ between the four built environment subsystems can be found on next page.**

Land/sea use change

- Linear transport infrastructure is the most prominent cause of reduced habitat connectivity, a typical impact. However, depending on local landscape context, all subsystem developments can affect habitat connectivity.
- The land-use impact of an individual building is smaller than the impact in the other built environment subsystems, due to buildings' smaller spatial extent. However, cumulative impacts of buildings can become significant.
- Due to the spatial scale of urban as well as marine and coastal infrastructure, the demolition value chain stage can lead to loss of habitats that have developed over time around the infrastructure, which in some cases can be significant.

Climate change

- The urban heat island effect, where the density of grey infrastructure leads to increased absorption and retention of heat, is an impact most related to urban developments and buildings. Ultimately, it can lead to increased energy costs (such as for air conditioning), air pollution and heat-related illness and mortality.
- Already mentioned, and exacerbated by climate change, is the increased impact of flooding due to the poor water retention capacity of built surfaces, mainly in urban developments.
- Other climate-related disaster risks exacerbated by the built environment include landslides, storm damage and storm surges. The design of built infrastructure can be a determining factor in whether a hazard becomes a disaster, as well as how resilient the infrastructure proves to be (in terms of post-disaster rate of recovery).

Invasive species

- Linear infrastructure, such as roads, railways and canals, facilitate the distribution of invasive alien species, making this impact more relevant to transport infrastructure.

The most significant dependencies of the built environment system rely on a number of ecosystem assets, flows and services to function and grow. Businesses in the different subsystems of the built environment rely on:

- **Natural habitats (extraction stage), production processes and regulating services:** The built environment system is very dependent on the provision of raw material resources such as sand, gravel, timber, metals, etc. Protecting natural habitats to enable the production and/or replenishment of natural resources such as timber is crucial. However, many of these natural resources are finite and cannot be replenished fast enough to meet the system's current consumption demand. Destruction or degradation of natural habitats to access new sources of raw materials means losing valuable natural capital and ecosystem services like climate or water flow regulation, erosion control or storm protection.
- **Natural habitats (construction stage), regulating services:** Increasing urbanization to meet housing and infrastructure needs of growing global populations means balancing land intake for urbanization and infrastructure, and conservation of valuable habitats. As space becomes scarce, the built environment may increasingly compete with undeveloped lands, risking the loss of natural capital and its regulating services.
- **Freshwater:** Many value chain stages of the built environment system depend on functioning water flows and water reserves. Freshwater resources collected from precipitation and water flow from natural sources are often critical and irreplaceable for extraction of raw materials, construction of building materials and water use during operations.
- **Flood and storm protection, erosion control:** The built environment system heavily depends on regulating services that protect against flooding or storms and control erosion. Increased soil sealing and removal of vegetation decreases the capacity to provide these regulating services and increase the risk of natural hazards.
- **Climate regulation:** The built environment system depends on healthy ecosystems such as urban forests for mitigating the impact of extreme weather events and the urban heat island effect on wellbeing of residents and employees who live and work in urban environments. Such services may be at local, regional or global scale.

Note that in this Roadmap, dependencies on nature are covered directly through the identification of risks (see next section). As an example, a material dependency on water represents an operational risk in case of water scarcity, as this may lead to higher water price and/or stricter permitting conditions on water use.

Data availability and how companies should conduct the "Assess" stage

Data availability and capacity are a challenge when starting the "Assess" stage. Less mature companies should first determine, through the scoping step, which priority areas (such as a specific location, geography or technology) they want to focus on, depending on their strategy and ambition level.

Then, they should identify the data already available and evaluate its quality – how old is it, how was it collected, does it align with the latest methodologies, is it science-informed, does it use recognized assessment tools such as the **Integrated Biodiversity Assessment Tool (IBAT)**, **EXIOBASE**, **ENCORE**, etc.?

Collecting and comparing available data with data needs already places companies in a good position to start a materiality assessment. More mature companies can increase granularity and scope, for example by including more or all locations, and assessing location-specific materiality of impacts and dependencies. The major frameworks and standards are developing further guidance as well as metrics.

Following the guidance of the **Natural Capital Protocol** (see page 59 in the protocol), a company should answer the following questions when planning the "Assess" stage:

- What is the availability and quality of our data?Where time or budget do not allow for the collection of primary data, will implications of relying on secondary, potentially proprietary data and on subject-matter expert knowledge need to be considered?
- Does the company have people with appropriate expertise and capacity to undertake the assessment?
- Are there budget or time constraints that may affect what is achievable?

Table 1: Suitability of measurement approaches for different assessments and targets

	Primary Data	*Secondary Data*
Definition	Data collected specifically for the assessment being undertaken. Collected from site-level assessments on a specific impact driver through the use of direct measurement (e.g., volume of freshwater used to irrigate a wheat field each month).	Data that were originally collected and published for another purpose or a different assessment. Derived from modeled or proxy-level data. This could include data averaged from commodity sourcing (e.g., kg of pollutants for a given volume of leather purchased, hectares of land use per tons of timber purchased) at the national or regional level, or the use of input- output data models to provide estimates of impact drivers. Uncertainties in the quality of data used will need to be considered and discloses.
Site-level assessments and targets	**Collection of primary** data is often the most appropriate approach for site-level impacts and targets (field monitoring for biodiversity state, water flows and scarcity) and pressure measurement (internal company data). **Remote sensing** can be applied for large sites.	**Secondary data** (models of impacts, past assessments, literature values) can be applied in certain cases where primary data are unavailable or measurement is unfeasible. The appropriateness of secondary data will vary by issue area and SBT methods will provide further detail.
Company-wide assessments and targets	**Remote sensing** is a suitable approach for some issue areas-e.g., assessing deforestation.	Use of **models** linking economics activities and pressures to state are most appropriate (environmentally extended input-output (EEIO) models, life-cycle assessment (LCA) models) for estimation and may remain the best data source after refinement.

Source: Science Based Targets Network (2020). **Science-Based Targets for Nature Initial Guidance for Business**

Stage 1.3 - Assess risks and opportunities

Prioritize further action based on risks and opportunities for the business and stakeholders.

Why do this:

Increasing numbers of businesses are making the connection between the health of ecosystems and their bottom line. Risks and opportunities originate from business impacts on nature and associated impacts on stakeholders, as well as corporate and societal dependencies on ecosystem services. Risks, as defined by the TNFD, can be physical risks (typically linked to material nature-related dependencies), transition risks (linked to nature-related impacts that an organization may face in the changing regulatory, policy or societal landscape) and systemic risks (arising from the breakdown of the entire system, rather than the failure of individual parts). Annexes 3 and 4 provide more information on nature-related risks. Opportunities can result from avoided risks, and from innovation and market strategies arising from an approach that contributes to nature positive.

What to do:

- → Refine the list of prioritized impacts and dependencies by scoring for potential risks and opportunities based on likelihood versus magnitude of risks and other relevant criteria;
- → Engage with stakeholders to refine the list of issues;
- → Carry out a further qualitative assessment by considering how DIRO may evolve in the future; TNFD provides different scenarios for consideration.[22]

Table 2 (next page) offers a high-level overview of key risks and opportunities and provides insight into the most material risks and opportunities for the built environment system. For a more extensive inventory of potential risks and opportunities, please refer to Annex 4: Risks and Opportunities tables, which cover the four individual subsystems this Roadmap focuses on. A description on how to use the tables is availble in Annex 3. The tables are structured according to the five IPBES drivers of change and aim to support the identification of key impacts, risks and opportunities.

Table 2: High-level overview of key risks and opportunities

Built environment value chain stages	*Key risks*	*Key opportunities*
Materials extraction and production	→ Habitat loss and degradation leading to loss of ecosystem services for local communities, such as change in water, food or timber quality/quantity (transition risk) → Erosion and floods due to land degradation (physical risk) → Materials sourced from value chains associated with significant biodiversity and/or human rights impacts (reputational risk)	Extraction site rehabilitation offers potential to: → Restore habitats and ecosystem connectivity, or create new habitats → Apply NbS to deliver ecosystem services (e.g., reedbeds for water treatment) and increase resilience to climate change (e.g., water buffering) among other benefits to climate, nature and people
Design and construction	→ Urban heat island (UHI) effect (physical risk) → Increased regulation, on material use, building prescriptions, location limitations (transition risk) → Reduced value of construction location due to pollution, lack of green space (transition risk)	The design phase offers potential to: → Reduce raw material demand with **circular design** → Implement **green-blue networks** (waterways, plantations, parks, raingardens, bioswales, etc.) and other NbS to increase connectivity, improve climate change adaptation, reduce UHI effect, improve water management and build resilience to water scarcity, while delivering broader benefits to climate, nature and people → Incorporate appropriate biodiversity needs within the planning of any kind of infrastructure, in terrestrial, freshwater and marine environments → Create and restore habitats for transport infrastructure, e.g., wildlife corridors
Operations and maintenance	→ UHI effect (physical risk) → Extreme weather events, associated costs for management, and potential damage claims (physical risk) → Flood risk due to soil sealing (physical risk) → Increased cost caused by increasing water use and water treatment needs (transition risk)	→ **Ensure extensive management of existing/new green spaces** by reducing use of pesticides and fertilizers and/or reducing mowing intensity to improve biodiversity value while reducing cost (e.g., greenkeeping) → Retrofit to phase-in nature-positive actions not included in the design phase
Demolition and waste	→ Inappropriate disposal of construction and demolition waste leading to soil and water pollution/remediation cost (transition risk)	The demolition phase offers opportunities to: → Increase habitat extent, condition and connectivity, even in case of replacement by new buildings, e.g., development of permanent green areas on covered landfill sites and those not available for redevelopment → Innovate and invest in circularity to reduce raw material extraction and supply costs

Summary of the four subsystem key impacts, risks and opportunities

Tables 3-7 (pages 22-26) summarize the key impacts, risks and opportunities of the four subsystems, providing a generic overview. The prominence of risks as well as the potential of opportunities depends on individual company activities and local contexts. Applying company-specific refinement is therefore an important step to identify key risks and opportunities across a company's value chain.

Often this will require engagement across relevant stakeholders in a company (finance, procurement, design, services, etc.) to identify the cross-cutting aspects specific to a company. Using the tables as a foundation for such stakeholder engagement can assist in this refinement – as noted by WBCSD members using the subsystems tables during consultation workshops held during the development of this Roadmap.

Table 3: Summary of Buildings subsystem key impacts, risks and opportunities

Detailed tables for each subsystem can be found in **Annex 2: Impact tables** *and* **Annex 4: Risks and Opportunities tables**

Buildings																
	Materials extraction and production				**Design and construction**				**Operations and maintenance**				**Demolition and waste**			
Habitat extent																
Habitat condition																
Habitat connecivity																
Groundwater/surface water level																
Climate change																
Air quality																
Water quality																
Soil quality																
Solid waste quantity																
Soil/seafloor characteristics																
Sound/lightscape																
Habitat condition (IAS)																

Key Opportunities | Physical Risk | Transition Risk | Key Impacts

Link to the table

Table 4: Summary of Urban developments subsystem key impacts, risks and opportunities

Detailed tables for each subsystem can be found in [Annex 2: Impact tables] *and* [Annex 4: Risks and Opportunities tables]

Urban developments	Materials extraction and production				Design and construction				Operations and maintenance				Demolition and waste			
Habitat extent	Key Impacts		Transition Risk	Key Opportunities	Key Impacts	Physical Risk	Transition Risk	Key Opportunities		Physical Risk		Key Opportunities	Key Impacts		Transition Risk	
Habitat condition	Key Impacts		Transition Risk	Key Opportunities		Physical Risk			Key Impacts		Transition Risk				Transition Risk	
Habitat connecivity	Key Impacts			Key Opportunities	Key Impacts			Key Opportunities			Transition Risk					
Groundwater/surface water level	Key Impacts	Physical Risk		Key Opportunities		Physical Risk		Key Opportunities	Key Impacts	Physical Risk		Key Opportunities				
Climate change	Key Impacts	Physical Risk		Key Opportunities	Key Impacts	Physical Risk		Key Opportunities	Key Impacts	Physical Risk						
Air quality												Key Opportunities				
Water quality	Key Impacts		Transition Risk	Key Opportunities	Key Impacts		Transition Risk			Physical Risk			Key Impacts			
Soil quality	Key Impacts			Key Opportunities	Key Impacts							Key Opportunities	Key Impacts		Transition Risk	Key Opportunities
Solid waste quantity								Key Opportunities					Key Impacts		Transition Risk	Key Opportunities
Soil/seafloor characteristics																
Sound/lightscape																
Habitat condition (IAS)																

Key Opportunities | Physical Risk | Transition Risk | Key Impacts

Link to the table

Table 5: Summary of Transport infrastructure subsystem key impacts, risks and opportunities

Detailed tables for each subsystem can be found in [Annex 2: Impact tables] *and* [Annex 4: Risks and Opportunities tables]

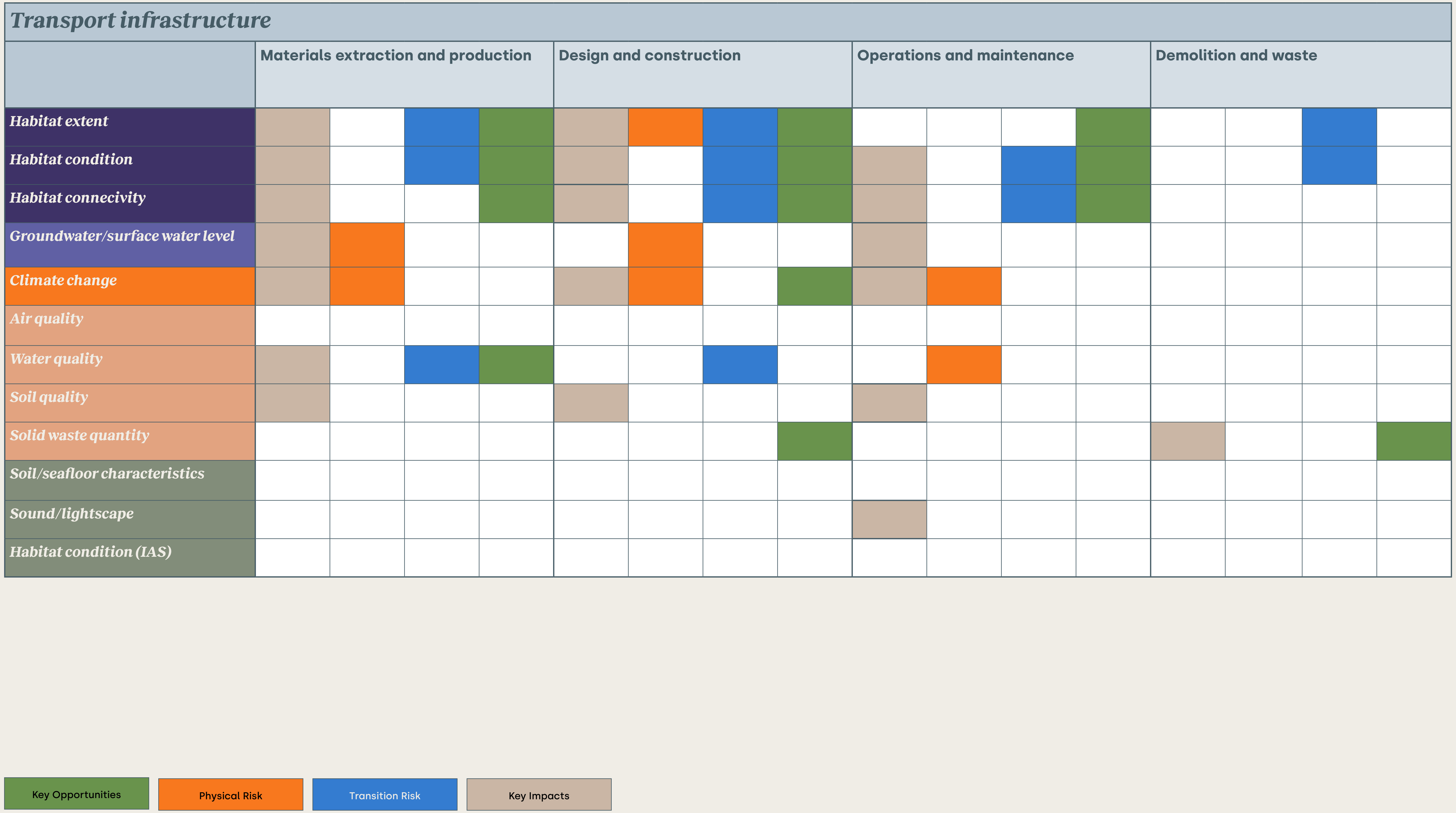

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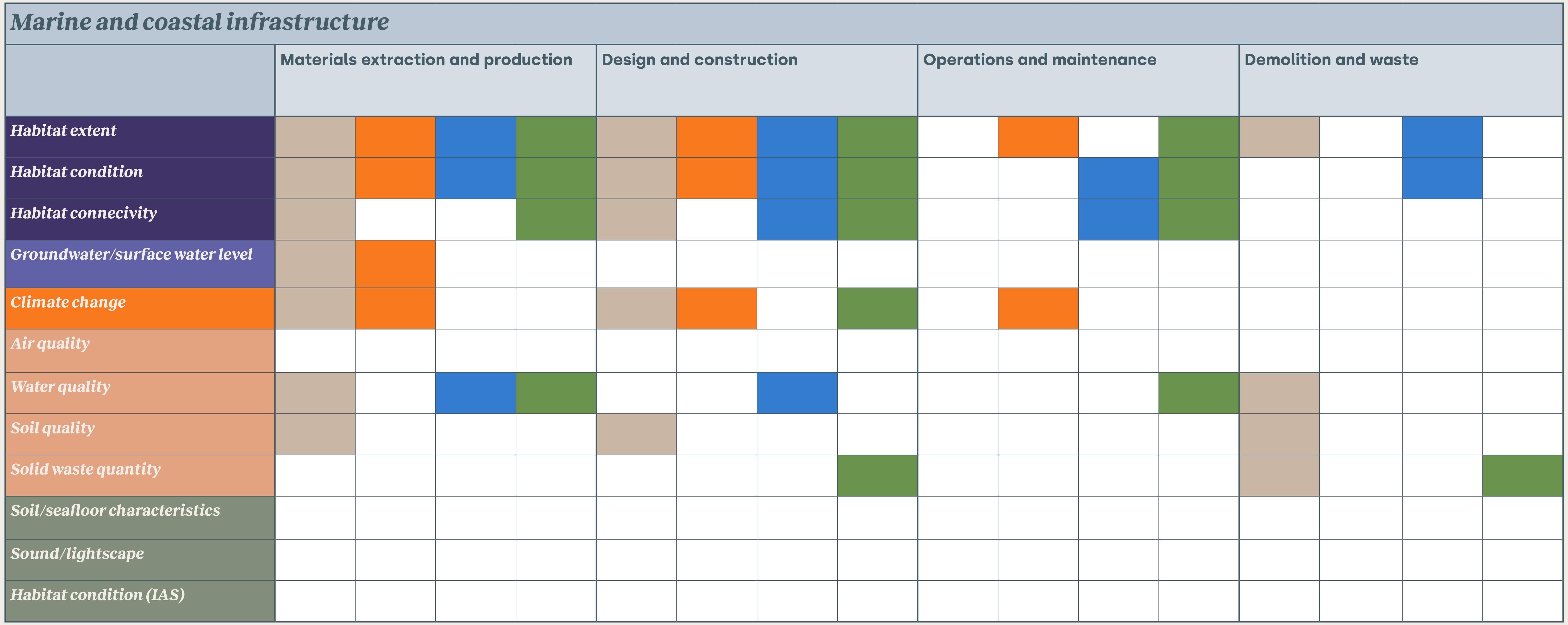
Table 6: Summary of Marine and coastal infrastructure subsystem key impacts, risks and opportunities

Detailed tables for each subsystem can be found in Annex 2: Impact tables *and* Annex 4: Risks and Opportunities tables

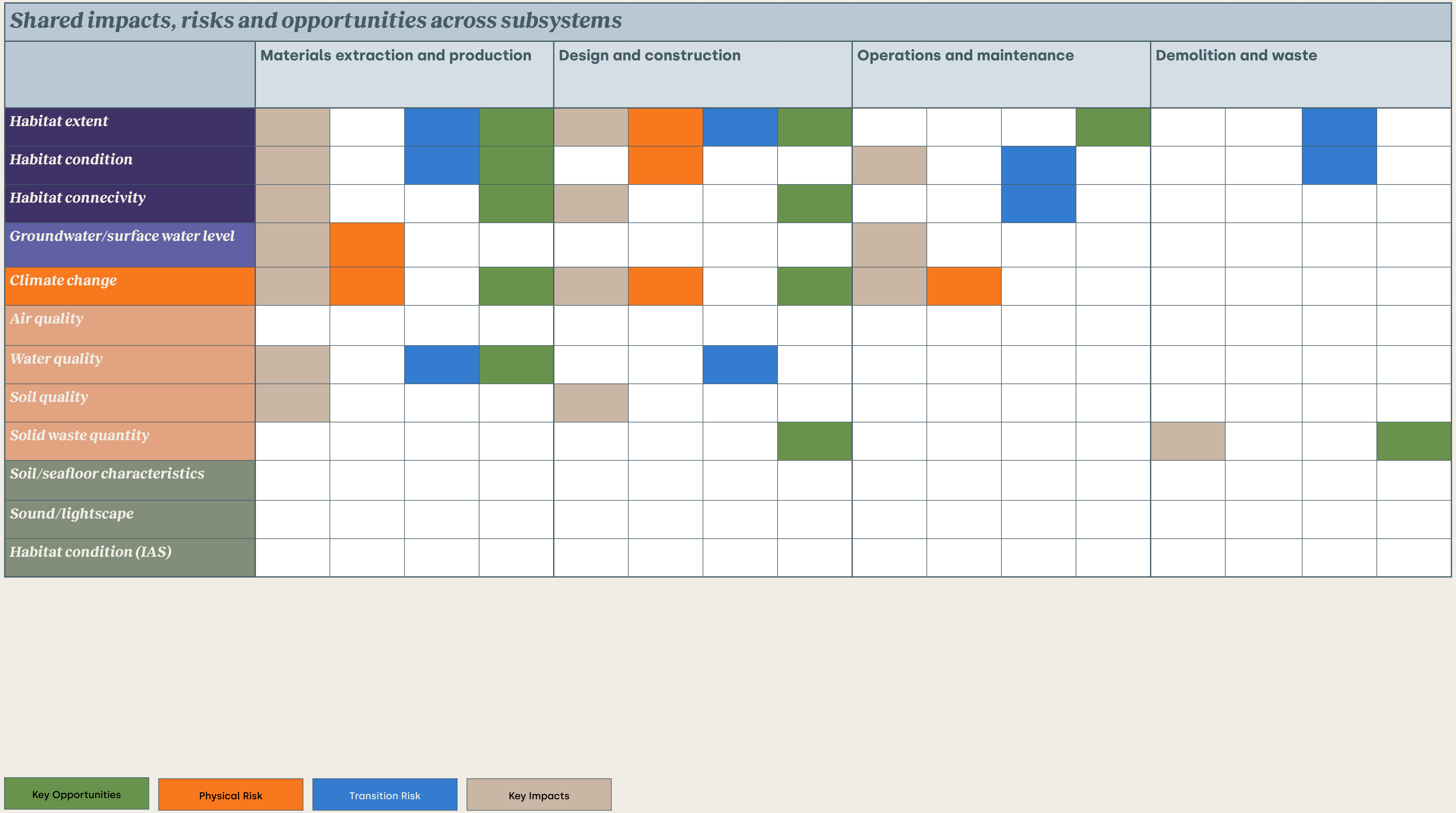


Key Opportunities | Physical Risk | Transition Risk | Key Impacts

Link to the table

Table 7: Summary of shared key impacts, risks and opportunities across subsystems

Detailed tables for each subsystem can be found in [Annex 2: Impact tables]() *and* [Annex 4: Risks and Opportunities tables]()



Link to the table

→ *Stage 2: Commit and Transform (targets for priority actions)*

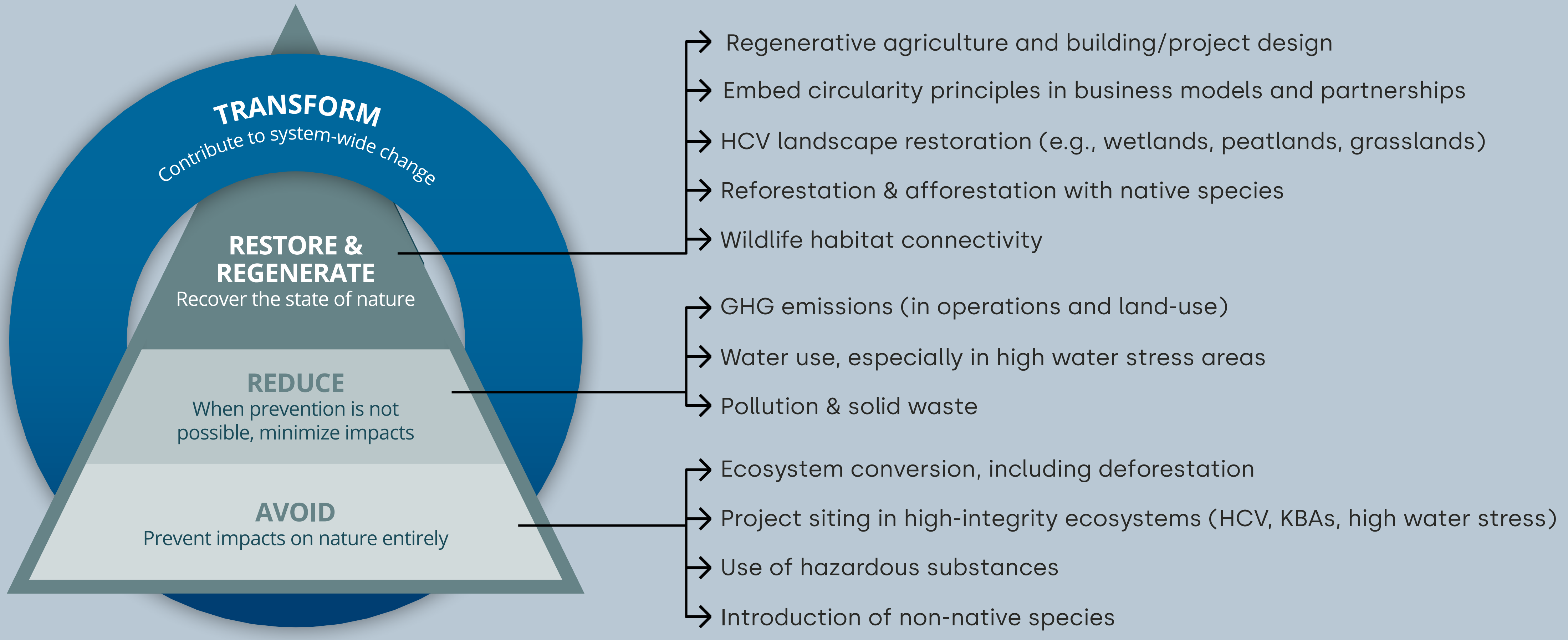
Having completed an initial materiality screening, companies should prioritize the impacts and dependencies that play a key role in informing their commitments and actions.

Credible, realistic and impactful nature commitments (including their associated targets) require a company to understand the actions it can take to address its priority impacts and dependencies on nature.

The foundational steps to "Commit and transform" include:

1. **Set science-informed targets:** Set time-bound, specific science-informed corporate-level targets and linked indicators to track progress on reducing priority impact drivers on nature;
2. **Take priority actions:** Identify existing and additional priority actions needed to avoid and reduce negative impacts, and promote opportunities to restore and regenerate;
3. **Transform the system:** Identify additional actions needed that transform business models and business activities to address barriers and improve the enabling environment (policy, financing, technology, infrastructure).

Figure 5: SBTN's Action Framework with examples of actions



Source: Adapted from WBCSD (2021). What does nature-positive mean for business?

Stage 2.1 - Set science-informed targets

Set time-bound, specific science-informed corporate-level targets and linked indicators to track progress on reducing priority impact drivers on nature.

Why do this:

Companies need to set targets according to a scientific assessment of where their main sectors' general impact drivers on nature are. They can then strengthen science-informed targets and add to them over time on the journey to science-based targets, which they articulate at a local level.

What to do:

→ Consider the activities throughout the value chain that typically cause the priority impact drivers and the actions the company is already taking to avoid and reduce these negative impacts (or could take in the near future);

→ Set targets, either at the impact driver level or the company response level. Identify priority land-, sea- and freshwater-scapes in direct operations to set baselines for impact drivers and eventual science-based targets;

→ Build on what the company has done so far, set targets accordingly, and always be transparent regarding methodology.

To support companies in their identification of priorities for investments and capacity development, priority target areas and related priority actions for the built environment system are defined below. These are based on a good understanding of the built environment's key impacts and risks, and they could further contribute to the development of a built environment-specific vision that would help clarify where companies should focus their priorities. Such a vision would enable companies to understand longer term objectives to support the nature-positive vision of halting and reversing nature loss.

The priority target areas and related priority actions have been prioritized based on the following proposed criteria, which could also serve to develop a nature-positive vision for the built environment:

→ Circular material use becomes the norm, reducing raw material extraction and waste incineration or landfilling, which in turn reduce adverse impacts on nature.

→ Zero deforestation and conversion-free land use are clear targets. In addition, degraded ecosystems are restored. New and refurbished project developments are systematically upgraded with NbS such as green-blue infrastructure as well as with best practices for climate mitigation and adaptation.

→ Surface and groundwater resources are sustainably managed, i.e., in a way that adverse impacts on quantity and quality are avoided.

Table 7 (next page) proposes tangible and time-bound targets and examples of indicators that are relevant for the priority target areas.

Table 8: Proposed science-informed targets for actions across most critical impact drivers

Topic	Targets	Indicators
Land/sea use change	→ By 2030, zero deforestation and conversion-free land use for direct operations and supply chains[23] → Biodiversity net gain for all new developments from 2030. No net loss for current projects by 2030, compared to 2023 baseline[24] → Habitat defragmentation targets in place for all new linear transport infrastructure by 2030 → By 2030, science-based wastewater emission targets defined → By 2025 mitigation hierarchy applied to all new projects	For example: → % sourcing in key biodiversity areas (KBA)[25] compared to baseline (2023) → Hectares (Ha) of land use footprint reduced; Ha restored compared to baseline (2023) → Net gain achieved in X% of direct and/or indirect operations → % of purchased raw materials covered by net gain compliance → % of projects measuring impact on nature → % of projects to which mitigation hierarchy is applied
Water use and water quality*	→ By 2030, net-positive water impact achieved (meaning water withdrawals in balance with environmental flow needs) → By 2030, water quality pressures in high impact parts of value chain reduced by X% to align with good ambient water quality → By 2030, soil quality pressures in high impact parts of value chain reduced by X% to align with good ambient soil quality	For example: → m^3 water withdrawal compared to baseline (2023) → % of supply chain adopting water consumption reduction plans (2023) See WBCSD **Wastewater Impact Assessment Tool** (WIAT) that allows users to understand which aspects of wastewater treatment within a facility cause major changes in terms of water quality, water availability and greenhouse gas (GHG) emissions.
Climate change	→ By 2030, 50% reduction in GHG emissions and by 2050, net-zero achievement across the full life cycle. For new buildings, net zero in operation by 2030 and 50% reduction in embodied carbon. By 2030, X% of green-blue space in new projects' surface area[26]	→ For example: Gigatons of carbon dioxide equivalent (CO_2e) or megatons CO2e (absolute targets); carbon dioxide emissions (tCO_2/t) or $kgCO_2/m^2$ or Mt CO^2/FTE (full-time employee) - to measure the emissions intensity of a product, say, cement or steel → Extent of ecosystems covered by NbS (Ha)
Materials/waste streams	→ By 2025, % of company/material where circularity is measured → By 2030, X% reduction in virgin raw material use in construction projects → By 2050, X% recycled and/or reused material use in construction projects	For example: % of company/materials where circularity is measured → See WBCSD **Circular Transition Indicators (CTI) report v4.0** that allows measurement of impacts and guides companies towards actions to increase circularity within their operations (not specific to the built environment)

*** Note:** By end-2023, WBCSD will publish a Freshwater Accountability Navigator (FAN) guide for companies, providing a high-level overview of the existing and emerging freshwater accountability frameworks, guidelines and tools, categorized within the ACT-D steps.

Stage 2.2 - Take priority actions

Identify existing and additional priority actions needed to avoid and reduce negative impacts and promote opportunities to restore and regenerate nature.

Why do this:

Companies need to take action to address priority impact drivers of nature loss. Companies often have actions in place that are already addressing some of the impact drivers, but which may not have been evaluated against the materiality assessment.

What to do:

- Map existing actions against the impact drivers prioritized through the materiality assessment and course-correct: understand what actions the company is already undertaking and should continue, which ones can be deprioritized, and which ones need to be put in place.
- These actions should align with the emerging ambition for target-setting (even if the methodology for science-based approach is not yet finalized).
- For any action, systematically consider and apply the principles of the action framework to avoid and reduce negative impacts and have positive contributions through restoration and regeneration and wider system transformation (see Figure 5);
- Consider these actions where the company has direct control and in areas where it has influence, including with suppliers and customers and the broader landscapes within which they operate.

Actions should be considered across three main levels:

1. Corporate
2. Operations and priority value chains
3. Broader system change (see Stage 2.3 – Transform the system)

For the built environment, a comprehensive overview of possible actions, across the four subsystems this Roadmap focuses, is provided in Annex 5: Actions tables. These tables are structured according to:

- The main impact drivers;
- The type of mitigation/conservation action;
- Each action's potential for the four built environment subsystems this roadmap focuses on;
- The sphere of influence the action relates to.

The Actions tables **highlight priority actions that companies can take in the short term to avoid or reduce key impacts** and contribute to achieving the targets defined in Table 7 (Targets). The Actions tables are not exhaustive: they are designed to guide and inspire companies.

Priority actions within a nature-positive built environment system:

1. **Avoid further terrestrial, freshwater, and marine habitat conversion.** Site new buildings and infrastructure responsibly by locating them in previously-impacted areas to prevent further loss of natural habitat. In all cases, avoid locations in protected areas and internationally recognized areas, and ensure no critical habitats are affected. Consider impacts on nature at the design stage, e.g. using space efficiently to minimize impacts on land and water. Where modifying natural habitat or affecting wildlife is unavoidable, commit to strategies aimed to achieve measurable positive outcomes for biodiversity (i.e. biodiversity net gain).

2. **Prioritize the re-use and retrofitting of buildings and infrastructure above demolition.** This action avoids value chain impacts and site-based impacts associated with land conversion and construction, in particular habitat loss and degradation. Companies should prioritize re-using and retrofitting buildings and infrastructure above demolition and new build even with circular approaches maximized. Design should also maximize the lifetime of new buildings and infrastructure.

3. **Include specific nature-related criteria in the selection and purchasing process of raw materials.** Developers and designers are influential in the choice of building materials. They need better information about the impacts of their choices on nature. Through better planning companies in the built environment system should gradually shift to more sustainable sourcing including green procurement and/or certified commodities. For example, timber is often quoted as being one of the more sustainable materials to use for construction and its demand may therefore increase. But it is necessary to account for the full nature implications of a global increase in demand for timber. Regenerative exploitation of forest resources is necessary to avoid loss of key ecosystem services that forests provide. Another example is sand and gravel extraction (two of the most extracted materials in the world, constituting 79% of the natural resources used by the built environment). The need for these resources exceeds realistic replenishment rates and can directly destroy river and coastal habitats. The Sand Motor project in the Netherlands shows the application of the natural replenishment of resources restoration, promoting natural dune growth.

4. **Drive transformative change by adopting circular material practices** across the various material value chains by matching supply and demand for secondary raw materials. Carefully select construction materials and maximize their reuse. One best practice example is in Switzerland, where companies are allowed to use up to 20% of construction and demolition waste to make cement. **The ultimate aim is circularity across the various material value chains.** Further examples of circular material practices can be found in the World Economic Forum's guidance Construction materials — Business For Nature.

5. **Address climate change and nature simultaneously in any project**. Nature loss and climate risks are interlinked. The urban heat island effect is a typical phenomenon in urban areas. Buildings, roads and pavements absorb solar heat leading to higher temperatures. Address these by investing in urban forests, more trees in the streets and adaptive buildings (e.g., featuring green roofs and green walls).

6. **Consistently consider and apply Nature-based Solutions (NbS)**. Promote NbS as an alternative for, or an addition to, grey infrastructure. Start by assessing biodiversity and ecosystems in the local landscape / seascape and integrate natural features in the design of new and existing projects. An example is applying NbS to mitigate the risk of flooding (exacerbated by impermeable soils in urban areas and by transport infrastructure). Investing in wetland restoration for buffering water (instead of building concrete dikes) and in sustainable urban drainage systems for better infiltration, could largely solve this problem. By contrast, the flood risks associated with coastal environments mostly relate to rising sea levels and storm surges. Combining grey infrastructure in coastal defense structures with nature-inclusive design provides opportunities for nature development and flood control, and the potential to adapt better to future climate scenarios.

Importantly, efforts to deliver these priority actions and transform the system must meet societal goals and have people at their core. A fair and inclusive transition towards nature positive requires a meaningful dialogue with affected groups such as employees, marginalized groups, local communities and Indigenous Peoples.

Built environment system actors must implement these priority actions within the next few years to allow alignment with the timeline for achieving the Global Goal for Nature by 2030.

Stage 2.3 - Transform the system

Identify further actions to transform the system

Why do this:

Individual company actions alone will not deliver nature-positive outcomes. Therefore, companies should also consider what further actions they can take in their value chains, priority landscapes and in the broader enabling environment to encourage collaboration with other stakeholders, and transform the parts of the system that they are embedded in.

What to do:

→ Consider what the key barriers to speed and scale up action are (such as a lack of supporting government policies, financing, technology);

→ Consider trade-offs (such as balancing conservation priorities against regional food security needs) and what collaborative actions can be taken to address these;

→ Identify who needs to do what to address the systemic barriers and plan to engage with stakeholders, such as peers in the system, suppliers, those in operational or priority sourcing landscapes;

→ Advocate for a supportive enabling environment, such as publicly demonstrating support for key policies and financing for infrastructure, institutions and technology.

When selecting priority target areas and related priority actions in line with thre recommendations above, it is important to ensure that **priority actions are long-lasting and transformative**.

There are two types of transformative actions:

1. Actions that result in **a permanent substantial reduction of pressures** on nature;
2. **Additional conservation/restoration measures that result in rejuvenation of nature by investing in the creation, restoration and conservation of ecosystems not affected by a company's activities**. This is different from offsetting under the mitigation hierarchy, and as such goes beyond the mitigation hierarchy, which does not necessarily result in nature restoration and regeneration).

A Net Gain target for new developments is a concrete example of the latter type of transformative action. A clear business case can be made for examples such as restoring natural flood areas upstream to reduce flood risk in urban areas downstream, creating green-blue infrastructure in urban development projects, or developing innovative ways of financing to invest in large-scale nature restoration.

It is only possible to implement transformative action by means of transformative changes in business operations, technology, advocacy and business models. The identified priority actions can all be considered as transformative as long as they are **applied at scale throughout the company and throughout the whole built environment system.**

As key actors in the value chains of almost all public and private entities, companies and organizations that make up the built environment system can support the societal goal for nature-positive by advocating for positive incentives in the various phases of development. Overall, targeting leverage points across the full value chain will be key. This will necessitate collaboration at system, landscape and value chain levels. To enable such collaboration, transparency is required on key performance indicators (KPIs), baselines, disclosures and targets so that these can be embedded into project cycles in the private and public sectors.

Incentivizing the investment community and partnerships will be key to taking action on tender procedures. Specifically for tender procedures, there could be higher scoring for nature-positive proposals, or proposals that trigger transformative change towards nature and people.

Finally, **transformative action will often be a collaborative effort** at the system or landscape level, and across the value chain. For example, a company could introduce a new technology resulting in a drastic reduction of pressures on nature that other competitors might use, which in turn will support system-level transformative change. Achieving nature positive outcomes at a landscape level will require multi-stakeholder cooperation with all actors in the landscape.

As a result, moving from priority to transformative action requires an advanced level of maturity – understanding the company's value chain and identifying the partners and stakeholders to collaborate with. Based on the four maturity levels outlines in the **Roadmaps to Nature Positive: Foundations for all businesses** the built environment considers three maturity levels: starting, developing/advancing and leading. These levels of maturity roughly correspond to different action levels within the mitigation hierarchy, in which companies at the early stages focus on reducing and avoiding nature loss, advanced companies expand their approach to also include regenerating and restoring nature, and leading companies consider all levels of action, plus focus on transforming the systems they operate in. The focus for starting companies is primarily on their direct operations (sites and products) and the priority parts of their value chain. More advanced companies engage with their entire value chain, while leading companies engage with the broader stakeholder landscape, including, for example, through policy and advocacy. Advanced companies can also check back that priority actions have been covered.

Recommended actions depending on a company's maturity level

Table 9: Recommended actions related to company maturity level

Maturity stage	*Starting*	*Developing/advancing*	*Leading*
Mitigation hierarchy focus	Avoid and reduce where possible	Avoid, reduce, regenerate and restore	Avoid, reduce, regenerate, restore and transform
Action focus	Focus on direct operations	Engage with the full value chain	Engage with broader stakeholder landscape – corporate, policy, etc.
Spheres of influence	Corporate, site and product	Corporate, product and value chain	Corporate, value chain and value chain-adjacent

There is no one-size-fits-all solution

Companies, organizations and public authorities will be at different stages of maturity in different impact areas. For example, a company might be advanced in climate change mitigation but may still need to start addressing habitat loss. The situation may be different between new and existing sites (for example, net gain is more applicable from the start for new sites, while working towards no net loss may be more feasible for existing sites). Actions to reduce pressures may sometimes be easier to implement than avoiding pressures altogether, especially for existing developments.

Therefore, companies are encouraged to understand their specific situation and engage with the guidance offered by this Roadmap to determine how the concepts apply to their operations.

Guiding questions for built environment companies to move through the ACT-D framework steps

WBCSD's nature action maturity framework provides tailored guidance to help companies progress their nature positive journeys and accelerate meaningful and credible actions to halt and reverse nature loss. It breaks down high-level nature actions in terms of maturity and references relevant frameworks and resources (available in Annex 3 of **Roadmaps to Nature Positive: Foundations for all businesses**).

By considering maturity, the guidance acknowledges that to credibly contribute to nature positive, companies prioritize actions as part of an iterative process. This means that companies prioritize actions, measure the impact of those actions, and overtime they progress on their maturity, and keep engaging with different parts of the **SBTN Action Framework**.

For the built environment system, the process described in Figure 6 provides guidance to companies in asking the right questions and understand how to use the supporting materials (**Annex 2: Impacts tables**, **Annex 4: Risks and Opportunities tables**, **Annex 5: Actions tables**).

Companies are advised to **start with a value chain framing question**, clarifying which of the built environment system's four value chain stages (from extraction to demolition) corresponds to their direct operations. This is a key step to align efforts with supporting materials that are part of this Roadmap (see Annexes 2, 4 and 5). But more importantly, clarifying **what is part of a company's direct operations and what is not** will help to identify the impacts, risks and opportunities that are within the company's direct influence or not.

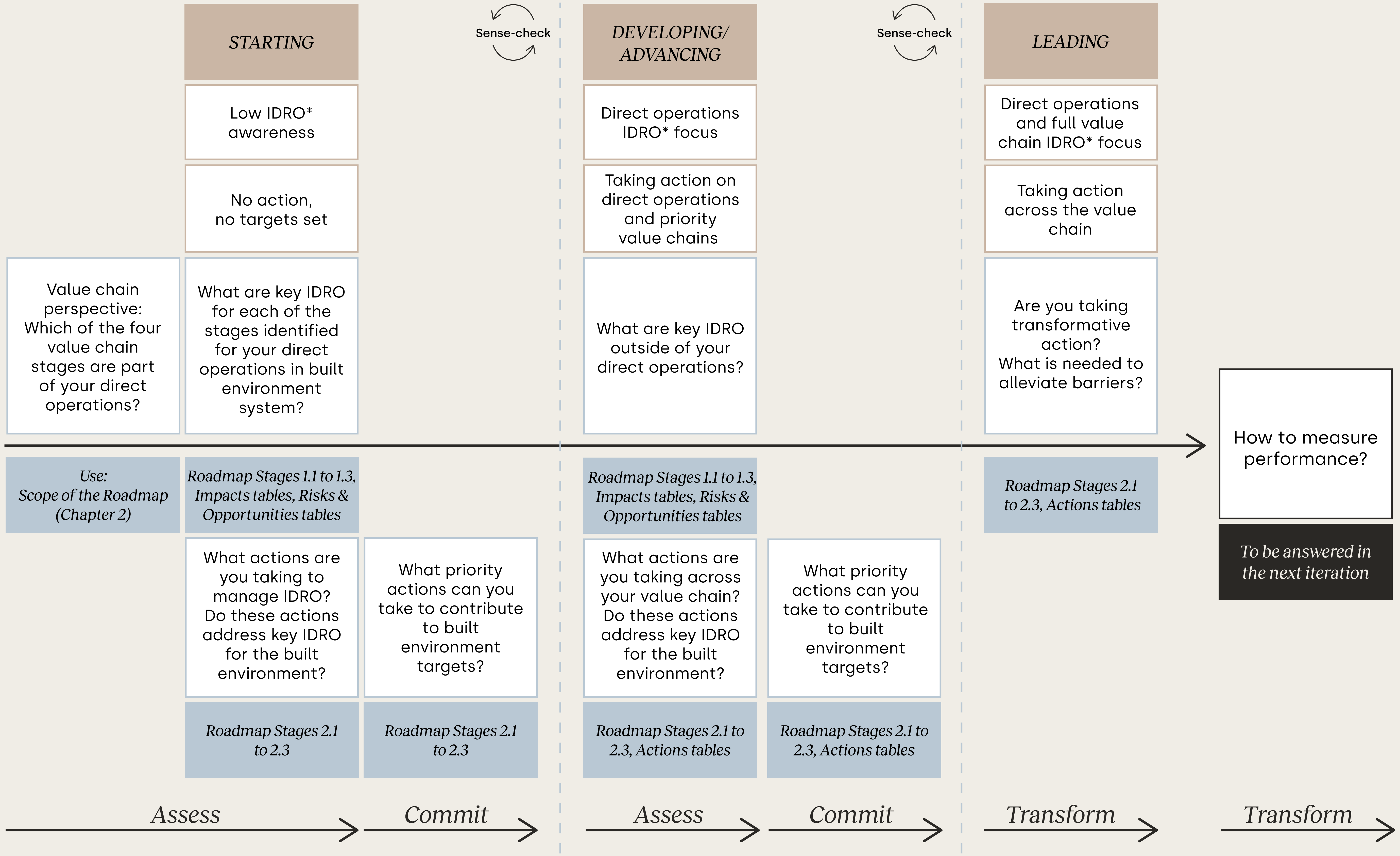
After defining which value chain stages will be addressed in the assessment, companies can map and analyze impacts, risks and opportunities. Starting companies are encouraged to analyze the relation of their direct operations with nature, whereas more mature companies can move (gradually) to more elaborate engagement with value chain impacts, risks and opportunities.

The following questions can provide guidance to move through the ACT-D framework steps:

1. What impacts, risks and opportunities have been identified as part of the company's operations? Do they correspond to key impact drivers identified in the built environment system supporting tables?
2. Which impacts, risks and opportunities can be influenced directly – which ones are in the company's value chain?
3. What actions has the company defined? Do these actions address key areas for impact reduction? Do they focus on the company's operations, or also on its value chain?
4. To what extent do the actions proposed relate to an opportunity for the company?
5. Are actions transformative? If not, what is needed to change that?

As shown in Figure 6, companies are encouraged to review and sense-check earlier work before moving on to the next level of maturity.

Figure 6: Suggested ACT-D steps and questions to help companies advance through nature maturity levels



*IDRO = Impacts, Dependencies, Rises and Opportunities

Note: As part of the development of this Roadmap, member companies used a template to map impacts, risks and opportunities, and connected actions to each of them, using the Impacts, Risks and Opportunities, and Actions tables provided as supporting tools to this Roadmap. The template can be found with guiding steps in Annex 6.

→ *Stage 3: Disclose (initial disclosures)*

Nature-related disclosures help companies communicate how they are acting on nature-positive outcomes. Disclosure will directly contribute to the achievement of GBF Target 15, and will increasingly be required by both voluntary and mandatory accountability mechanisms.

Why do this:

Increasingly, companies are expected to monitor their progress and be transparent on the steps taken to advance on their nature journey. When companies disclose this information systematically, for example according to the TNFD Framework, then investors and society are able to make informed decisions about the comparative sustainability performance of companies and sectors.

Investors will judge whether a company is creating additional enterprise value through its management of nature-related risks and opportunities. They will also consider the collective actions of companies to address systemic risks. Other stakeholders may focus on the total impact of a company or sector from the perspective of a social license to operate, including its alignment with societal goals for nature. Disclosures therefore provide an opportunity for a company to highlight its nature-related strategy, the progress made on its delivery and the value it creates.

What to do:

→ Monitor progress and be transparent about the nature journey, to meet increasing expectations from stakeholders.

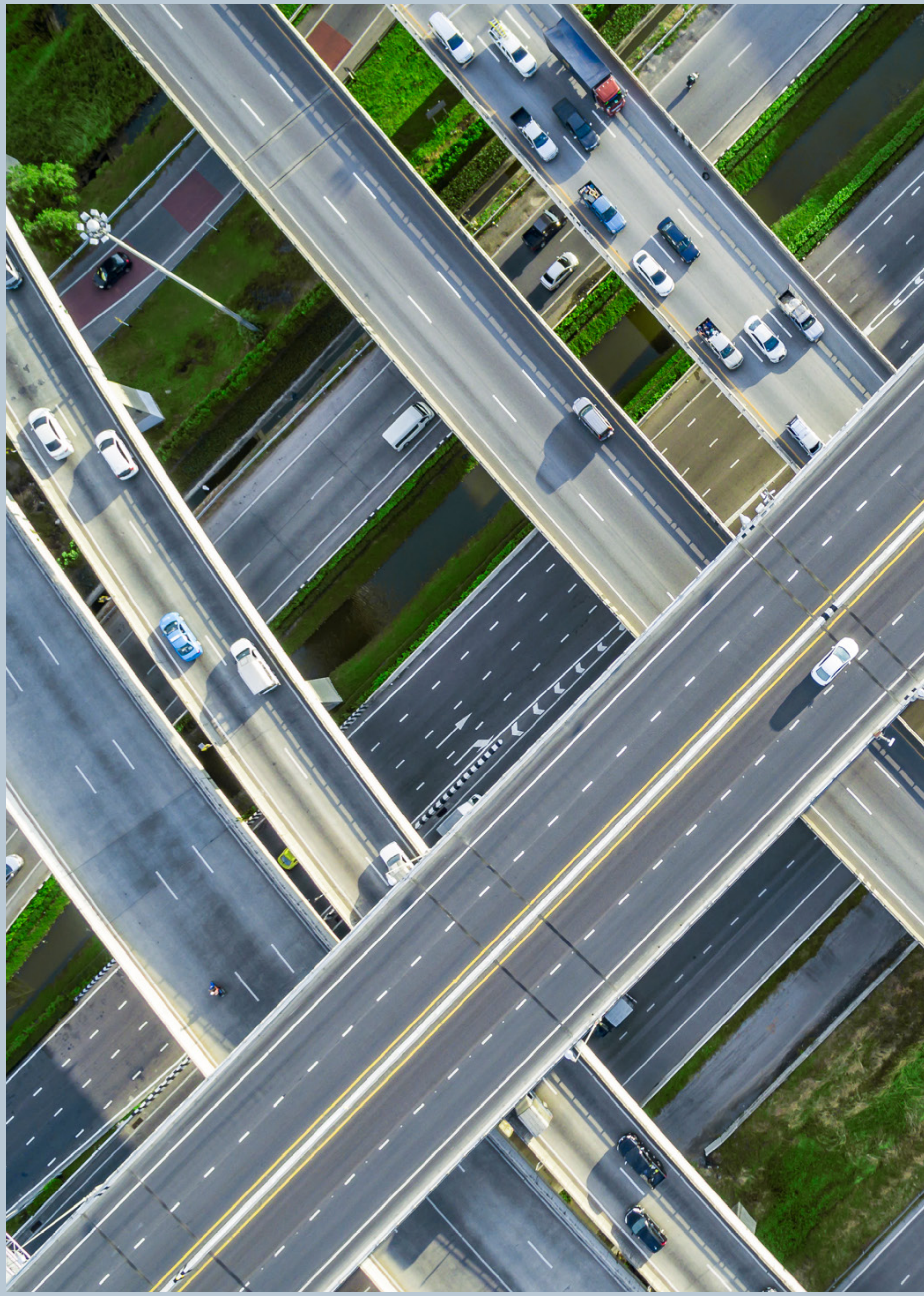
→ Initial disclosures can include the methodologies and outputs of a company's materiality assessment, value chain mapping, interim target-setting and progress on actions. As a company's nature journey matures, disclosure ambitions and granularity will increase. The structure of the TNFD's reporting framework reflects this reality, providing both "core" and "enhanced" disclosures across the four disclosure framework pillars.

The foundational steps to "Disclose" include:

→ Leverage existing disclosures that are relevant to nature;

→ Report on the foundational "Assess" and "Commit and Transform" stages (methodologies and outputs).

→ ***For further lessons,*** see the PwC/WBCSD joint blog post "Five things you should know about the TNFD." For further guidance and use cases, see WBCSD's TNFD pilot - Lessons from TNFD piloting with 23 global companies.



Lessons from the WBCSD TNFD pilot

WBCSD ran a TNFD pilot for 23 member companies from September 2022 until June 2023, including six built environment companies.

“Started is better than perfect”: It is important to start now, given the urgency. A credible approach can begin with qualitative, process-oriented disclosures, particularly if a company has not yet quantified risks and opportunities or established targets. Many companies have impactful nature-related actions and disclosures underway; an important step is mapping these against ACT-D steps to spot gaps and develop a more strategic approach. Companies can benefit from peer learning through system-specific forums and case studies.

Get the “right” data: Start with the data you have, complement with assumptions and fill data gaps over time. Built environment value chains are long and complex; in order to gather and disclose the right data, it is important to understand what is needed and from which sources. TNFD guidance covers value chains and data in detail, including topics like supply chain tiers, primary v. proxy data considerations, and more. Key questions to consider: What are stakeholders (financial and others) actually looking for? What is within my company’s control to manage and measure? What falls within my company’s broader spheres of influence?

Scenarios can be a powerful tool to map out strategy and resilience planning related to possible futures. TNFD includes detailed guidance on nature scenarios, and there are emerging examples to support this approach.

The work completed for TCFD scenarios by WBCSD and synergies with the approaches taken for climate change could be a helpful starting point for companies.

Typical areas companies identified where further work was needed to implement TNFD include:

- Identification and management of dependencies and opportunities;
- Testing of business strategy and resilience against scenarios;
- Translation of risks and opportunities into business impact.

For more lessons, see the PwC/WBCSD joint blog post **“Five things you need to know about TNFD”**.

For further guidance and recommendations, see **WBCSD’s TNFD pilot - Lessons from TNFD piloting with 23 global companies**.

In order to provide practical examples of how to apply the Roadmap steps described so far, WBCSD will release case studies in the fourth quarter of 2023. The aim is to translate the suggested methodology into real business-world examples, highlighting both positive takeaways and challenges encountered.

A **use case by Swire Properties** has been developed showing the journey of the company aligning its efforts with parts of TNFD's LEAP stage (Evaluate, Assess and Prepare), using elements of previous nature-related risk and opportunity management, target-setting approaches and reporting efforts.

This use case focuses on identifying opportunities as part of the Assess phase of LEAP. The case discusses how Swire’s Biodiversity Policy informs their actions in identifying opportunities. In particular, the use case looks at how Swire Properties has seen a market opportunity in making nature and biodiversity a core element of new developments. The use case also explores how Swire has used nature-based solutions as an integral part of the risk management process in one of their locations.

05. Next steps for the *Roadmaps to Nature Positive*

05. Next steps for the *Roadmaps to Nature Positive*

To support companies as they advance on their nature journeys, subsequent iterations of the Roadmaps to Nature Positive will build on the 2023 Foundations guidance, focusing on performance and accountability.

WBCSD will work with members to implement aligned measurement methods to support more detailed assessments.

The work will support WBCSD members in testing and using commonly agreed indicators for nature disclosures, both general and system-specific, with key pathways. Activities will include mapping core and enhanced **TNFD v1.0 indicators** against current member practices, and identifying and addressing gaps (including metrics for reporting on interim and science-based targets). This work will build on and connect to related indicator work within WBCSD, including **Regenerative Agriculture Metrics**, the **Wastewater Impact Assessment Tool (WIAT) Initiative**, and **Nature-based Solutions** and the **Circular Transition Indicators v4.0 (CTI)**. It will also build on the work of other related initiatives, including the **Align** project (recommendations for a standard on corporate biodiversity measurement and valuation) and the **Transparent project** (standardized natural capital accounting and valuation principles for business in line with the ambition of the **European Green Deal**).

In addition, other emerging work to support the Nature Positive Roadmaps includes:

→ Putting in place science-informed target-setting and supporting companies that are further along on their journey as they prepare to set science-based targets for nature;

→ Mobilizing resources needed for transformative actions;

→ Working with WBCSD's Equity Action imperative to clearly identify when and how to bring stakeholders effectively into corporate and landscape engagements (to be scoped);

→ Working with the WBCSD's Climate Action imperative to build on related work on actions to deliver resilient systems.

Annexes

Annex 1: Methodology and use of the Impacts tables

ENCORE and the **Science Based Targets Network (SBTN) Materiality Screening Tool** were used to understand generic impacts across the built environment value chain. Very high and high material impacts from the outcomes of both tools were selected for further assessment and action. Additional expert judgement and exchange with WBCSD members enabled a more refined assessment outcome for the most significant impacts.

The **four subsystem Impacts tables (Annex 2)** start from the key drivers of change on nature and biodiversity (the first column), as per IPBES (the Intergovernmental Platform on Biodiversity and Ecosystem Services). These drivers are land-/water-/sea-use change, resource exploitation, pollution, climate change and invasive species. The second column of each table delineates the impact drivers categories and the third column the impact types as referenced by the **TNFD Nature-Related Risk and Opportunity Management and Disclosure Framework**. The expression of impact types is neutral, as impacts can be negative or positive (e.g., there can be a "change in habitat condition" instead of a "decrease in habitat condition"). This is important as it paves the way for the identification of positive nature-related action (opportunities). The combination of drivers of change and impact drivers categories covers all relevant nature components, such as biodiversity, water and soil, and therefore covers the full scope of "nature".

The **Impacts tables (Annex 2)** indicate the intensity (light or darker grey) of the impact for the subsystem in scope. The intensity of the impacts is a relative "valuation" as the real importance of an impact is largely dependent on the magnitude of the pressure and the local context (e.g., sensitivity of affected habitats or the local water system). Assessing the sensitivity of local ecosystems is a company-specific exercise that can be inspired by the generic impacts described in the tables.

The tables aim to facilitate the identification and mapping of nature-related impacts, risks and opportunities throughout a company's activities, and in this way provide a solid basis for defining targets and actions as well as informing both the Taskforce on Nature-related Financial Disclosures (TNFD) and other disclosure frameworks reporting. This approach aligns specifically with TNFD reporting in its focus on risks and opportunities, with the potential to include materiality scoring (by color intensity) and align the risk terminology. The approach is also fully consistent with key nature-positive principles such as its focus on transformative actions, its alignment with the **SBTN Action Framework** and the acknowledgement that nature positive is a collaborative effort to which companies can contribute – at the system, landscape or value chain level.

Annex 2: Subsystem Impacts tables

Buildings impacts

Drivers of change	Impact drivers	Impact types*	Overview of processes that can cause impact			
			Upstream	**Direct operations**	**Downstream**	
			Material extraction & production	Design & construction	Operations & maintenance	Demolition & waste
Land-water-/sea-use change	**Terrestrial ecosystem use**	Change in habitat extent	Land clearing for extraction of materials (habitat loss) Land clearing for timber production	Land clearing for building (habitat loss)		Habitat loss from land clearing during demolition of large-scale projects, mainly of old buildings that have provided nesting sites for birds like swifts, sparrows and swallows
		Change in habitat condition	Poor habitat quality due to intensive forestry practices (in case of non-certified timber) Habitat degradation due to mining activities, raw materials processing, transport	Habitat degradation due to construction activities e.g., temporary drainage of groundwater	Reduced capacity of green spaces to buffer water, pollution and noise due to inappropriate management of open/green spaces at building sites in urban areas	
		Change in habitat connectivity	Habitat fragmentation due to location of extraction sites and access roads/transport infrastructure	Reduced connectivity between habitats due to location of new buildings		
	Freshwater ecosystem use	Change in habitat extent	Habitat loss and quality reduction due to sand and gravel quarries in rivers and lakes	Wetland destruction for building construction		
		Change in habitat condition		Effect on freshwater habitats due to temporary drainage of groundwater		
	Marine ecosystem use	Change in habitat extent	Habitat loss and quality reduction due to sand and gravel mining			
		Change in habitat condition				
Resource exploitation	**Water use**	Change in groundwater/surface water level	Falling groundwater tables due to water withdrawal for resource production	Reduced groundwater availability due to water use for construction activities (e.g., mixing cement onsite) Lower groundwater tables due to freshwater use for dust control, cleaning purposes	Reduced groundwater availability due to potable water use in bathrooms, kitchens, laundries and outdoor taps and other cleaning processes Reduced infiltration and water-logging due to low permeability and hard surfaces	Lower groundwater tables due to freshwater use for dust control, cleaning purposes
Climate change	**GHG emissions**	Climate change impacts	Increased GHG emissions due to energy use for building materials production, transport GHG release from soils/seabeds	Increased GHG emissions due to energy use during construction (machinery) GHG release from disturbance of soils/seabeds	Increased GHG emissions due to electricity use and mobility Net reduction in GHG emissions with renewable energy use	Increased GHG emissions due to energy use during demolition (in machinery, e.g.)
Pollution	**Non-GHG air pollutants**	Change in air quality	More release of dust and particulate matter during extraction and production processes	Increased release of dust and particulate matter during construction Release of noxious vapors from oils, glues, thinners, paints, treated woods, plastics, cleaners and other hazardous chemicals	Depending on building heating system	More dust and particulate matter during demolition
	Water pollutants	Change in water quality	Chemicals leakage and spills during extraction Untreated wastewater from extraction activities	Chemicals leakage and spills during construction	Depending on presence of sewerage system and wastewater treatment	Chemicals leakage and spills during demolition
	Soil pollutants	Change in soil quality	Chemicals leakage and spills during extraction/production	Chemicals leakage and spills during construction	Pesticide use	Chemicals leakage and spills during demolition
	Solid waste	Change in solid waste quantity	Extraction site/production process waste disposal	Uncontrolled waste disposal (e.g., of packaging waste)	Depending on solid waste collection and disposal system	Depending on solid waste collection and disposal system
Invasive species and others	**Disturbance**	Change in soil/seafloor characteristics	Soil compaction due to heavy machinery use on-site	Soil compaction due to heavy machinery use on-site		
		Change in sound/lightscape	Temporary impact on light- and sound-scape during extraction process	Temporary impact on light- and sound-scape during construction	Fauna disturbance due to site operations (e.g., light pollution, noise)	Temporary impact on light- and sound-scape during demolition
	Invasive alien species (IAS)	Change in habitat condition		IAS introduction by shipping vessels/international transport	Rapid spread of IAS due to lack of IAS management	

Impact Scale	High/ Very High	Medium	Low

Link to the table

Annex 2: Subsystem Impacts tables

Urban Developments impacts

Impact drivers	Pressure category	Impact type*	Overview of processes that can cause impact			
			Upstream	**Direct operations**	**Downstream**	
			Material extraction & production	**Construction**	**Operations & maintenance**	**Demolition & waste**
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Removal of habitats due to raw material extraction (timber, sand, metals and rare earths)	Habitat loss due to soil sealing, land reclamation and encroachment of nature (protected) areas		Habitat destruction during demolition
			Habitat degradation due to overexploitation of raw materials like timber, sand, metals and rare earths	Possible negative impact on ecosystem dynamics due to use of non-indigenous plant species for urban parks and green spaces, lining of streets with trees	Lower species diversity due to intensive mowing regimes and use of pesticides in green spaces	
		Change in habitat condition	Habitat fragmentation due to location of extraction sites (i.e., vulnerable biodiversity areas) and access roads/transport infrastructure	Habitat fragmentation due to land conversion and urban sprawl	Support for corridor function for fauna and flora migration thanks to well-designed green-blue spaces	
	Freshwater ecosystem use	Change in habitat connectivity	Habitat degradation due to extraction of stones and sand, increased sedimentation and river bank erosion	Degradation of natural ecosystems due to land reclamation and covering of rivers	Loss of ecosystem services due to constriction of natural dynamics of rivers and water bodies in urbanized contexts	Habitat destruction during demolition
		Change in habitat extent		Barriers for fish migration from urbanization and infrastructure development		
	Marine ecosystem use	Change in habitat condition				
		Change in habitat extent	Habitat degradation due to sand/gravel mining for land reclamation	Adverse effects on the health of coastal ecosystems such as mangroves and seagrass meadows, and reduced resilience due to coastal development		
Resource exploitation	Water use	Change in habitat condition	Reduced groundwater tables due to use of freshwater in building materials production (e.g., steel)	Lower groundwater tables due to freshwater use for dust control, cleaning purposes, etc.	Reduced absorption capacity and health of soils due to hard infrastructure instead of green and permeable materials and surfaces	Lower groundwater tables due to freshwater withdrawal for dust control, for cleaning purposes, etc.
		Change in groundwater/surface water level			Contamination of drinking water with pollutants due to poor maintenance of infrastructure and sources	
Climate change	GHG emissions		Increased GHG emissions due to raw material production for urban development – emissions related to extraction, energy use and shipment	Urban heat island effect, (flash) flooding and sea level rise	Increased GHG emissions due to transport, energy use, construction and urban sprawl	Increased GHG emissions due to fuel use (in machinery and transport)
Pollution	Non-GHG air pollutants	Climate change impacts	Dust and particulate matter increase during extraction and production processes	Higher levels of nitrogen dioxide (NO2), particulate matter (PM2.5 and PM10) and ozone due to increased traffic	Higher levels of nitrogen dioxide (NO2), particulate matter (PM2.5 and PM10) and ozone due to increased traffic	More dust and particulate matter during extraction and demolition
		Change in air quality				Toxic gas release due to improper processing of (toxic) waste
	Water pollutants		Chemicals leakage and spills during extraction/production processes	Chemicals leakage and spills during construction	Poor surface water quality due to contaminated run-off from impermeable surfaces	Chemicals leakage and spills during demolition process
		Change in water quality	Untreated wastewater from extraction activities			Leachate pollution of ground/surface water and soils due to improper processing of (toxic) waste
	Soil pollutants		Chemicals leakage and spills during extraction	Chemicals leakage and spills during construction	Soil pollution and degradation due to industrial use and at brownfields	Chemicals leakage and spills during demolition
		Change in soil quality		Soil degradation due to soil sealing and compaction resulting from built infrastructure		Leachate pollution of ground/surface water and soils due to improper processing of (toxic) waste
	Solid waste		Waste disposal during extraction/production	Increased costs of landfilling or processing of packaging and construction material waste	Increased urban solid waste footprint with urban growth (household and industrial)	Landfilling of non-recycled materials
Invasive species and others	Disturbance	Change in solid waste quantity	Soil compaction due to heavy machinery activities on-site	Soil compaction due to heavy machinery use on site		
		Change in soil/seafloor characteristics	Temporary impact on light- and sound-scape during extraction process	Temporary impact on light- and sound-scape during construction	Fauna disturbance due to site operations (e.g., light pollution and noise)	Temporary impact on light- and sound-scape during demolition
	Invasive alien species (IAS)	Change in sound/lightscape		Risk of IAS introduction from shipping vessels/international transport	Rapid spread of IAS due to lack of IAS management	

*Expressed as change in the state of nature, which can be positive or negative

Impact Scale | High/ Very High | Medium | Low

Link to the table

Annex 2: Subsystem Impacts tables

Transport Infrastructure impacts

Drivers of change	Impact drivers	Impact type*	Overview of processes that can cause impact			
			Upstream	Direct operations	Downstream	
			Material extraction & production	Construction	Operations & maintenance	Demolition & waste
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Removal of habitats due to mining activities	Removal or creation of habitats		Habitat extent can increase unless replaced by new infrastructure
		Change in habitat condition	Mining activities, raw materials processing and transport may lead to habitat degradation	Change in habitat condition depends on disturbance and pollution levels (see specific pressure categories)	Depending on management of non-built areas e.g., road verges and grasslands between airport runways (ranging from intensive to extensive), habitat condition can improve/deteriorate	Habitat condition can improve unless replaced by new infrastructure
		Change in habitat connectivity	Presence of quarry and access roads contribute to fragmentation	Connectivity can be affected by both linear and non-linear infrastructure, though it tends to be more substantial in case of linear	Presence of transport infrastructure creates permanent fragmentation, eventually alleviated by means of cross-cutting green-blue infrastructure	Ecosystem connectivity often improves after demolition of transport infrastructure (unless replaced by new infrastructure)
	Freshwater ecosystem use	Change in habitat extent	Sand and gravel quarries in rivers and lakes lead to habitat loss and quality reduction	Canalization (transforming meandering rivers to canals) reduces the extent of natural freshwater habitat		Habitat extent can increase unless replacement by new infrastructure
		Change in habitat condition		Transforming natural borders to concrete reduces habitat quality.	Inappropriate maintenance (e.g., periodic dredging, cleaning of borders) leads to further degradation	Habitat condition can improve unless replacement by new infrastructure
	Marine ecosystem use	Change in habitat extent	Sand and gravel mining leads to habitat loss and quality reduction	Construction of marine transport infrastructure might cause severe impacts on habitat extent and condition	No action might result in gradual increase in habitat extent and condition (new habitats on artificial substrates)	Depending on the manner of demolition, newly created habitats can either remain or disappear again
		Change in habitat condition				
Resource exploitation	Water use	Change in groundwater/ surface water level	(Permanent) groundwater drainage to keep mining pits dry leads to lower groundwater tables	Temporary groundwater drainage contributes to lower groundwater tables	Permanent groundwater drainage to keep tunnels dry leads to lower groundwater tables	
			Freshwater use for processing (cleaning etc.) extracted materials reduces groundwater levels	Freshwater use for dust control and for cleaning purposes reduces groundwater or surface water availability	Freshwater extraction for users of transport infrastructure (e.g., airports, harbors and highway restaurants) contributes to lower groundwater levels	
Climate change	GHG emissions	Climate change impacts	Increased GHG emissions due to energy use for processing and transport of raw materials	Increased GHG emissions due to fuel use (machinery and transport)	Increased GHG emissions from fossil-fuel driven transport	Increased GHG emissions due to fuel use (machinery and transport)
Pollution	Non-GHG air pollutants	Change in air quality	Dust and particulate matter increase during extraction and production processes	Dust and particulate matter increase during construction	PM emissions from engine-driven transport and emissions from tires	Dust and particulate matter increase during demolition
						Improper processing of (toxic) waste can lead to toxic gas release
	Water pollutants	Change in water quality	Chemicals leakage and spills during extraction/ production processes	Chemicals leakage and spills during construction process	Specific chemical use (e.g., de-icing products in airports (runways)), or accidental leakage of fuels have a negative impact on water quality	Chemicals leakage and spills during demolition
			Untreated wastewater from extraction activities			Improper processing of (toxic) waste can lead to leachate polluting ground/surface water and soils
	Soil pollutants	Change in soil quality	Chemicals leakage and spills during extraction/ production processes	Chemicals leakage and spills during construction	Chemicals leakage and spills during operation	Chemicals leakage and spills during demolition
						Improper processing of (toxic) waste can lead to leachate polluting ground/surface water and soils
	Solid waste	Change in solid waste quantity	Extraction site/production process waste disposal	Packaging and construction material waste needs to be landfilled or processed	Urban transport-associated solid waste footprint increases with urban growth (such as at train stations and airports)	Landfilling of non-recycled materials
Invasive species and others	Disturbance	Change in soil/seafloor characteristics	Soil compaction due to heavy machinery use on-site	Soil compaction due to heavy machinery activities on-site		
		Change in sound/lightscape	Temporary impact on light- and sound-scape during mining, processing and transport	Temporary impact on light- and sound-scape during construction	Transport infrastructure is a (semi-) permanent source of noise and light disturbance	Temporary impact on light- and sound-scape during demolition
	Invasive alien species (IAS)	Change in habitat condition		Shipping vessels/international transport poses risk for IAS introduction	Lack of IAS management along transport infrastructure can lead to rapid spread of IAS	

*Expressed as change in the state of nature, which can be positive or negative

Impact Scale High/ Very High | Medium | Low

Link to the table

Annex 2: Subsystem Impacts tables

Marine and Coastal Infrastucture impacts

Drivers of change	Impact drivers	Impact type*	Overview of processes that can cause impact — Upstream: Material extraction & production	Direct operations: Design & construction	Downstream: Operations & maintenance	Demolition & waste
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Habitat loss due to extractive activities for raw building materials (e.g., steel)	Loss of coastal habitat due to land clearing for infrastructure development (construction footprint)		Habitat destruction during demolition
		Change in habitat condition		Loss of ecosystem dynamics (e.g., tidal dynamics and sand dune dynamics) due to physical alterations (e.g., dykes)	Loss of ecosystem dynamics (e.g., tidal dynamics and sand dune dynamics)	
		Change in habitat connectivity	Habitat fragmentation due to location of extraction sites and access roads/transport infrastructure	Habitat fragmentation due to location of project site		
	Freshwater ecosystem use	Change in habitat extent				
		Change in habitat condition				
	Marine ecosystem use	Change in habitat extent	Habitat degradation due to sand/gravel mining for land reclamation	Permanent loss of intertidal and benthic habitat and dynamics (construction footprint)	Hard substrates below water provide new habitat for marine species and often less physical disturbance due to inaccessibility (e.g., for fishing boats)	Habitat destruction during demolition
		Change in habitat condition			Population dynamics/marine food webs could be influenced by population growth of species thriving in these "new habitats"	
Resource exploitation	Water use	Change in groundwater surface water level	Reduced groundwater levels due to use of freshwater in building materials production (e.g., steel)			
Climate change	GHG emissions	Climate change impacts	Increased GHG emissions due to energy use for building materials production	Increased GHG emissions due to fuel use (machinery and transport)	Increased GHG emissions due to fuel use (machinery and transport) In case of renewable energy production, a net reduction in GHG emissions	Increased GHG emissions due to fuel use (machinery and transport)
Pollution	Non-GHG air pollutants	Change in air quality	Dust and particulate matter increase during extraction and production processes	Dust and particulate matter increase during construction		Dust and particulate matter increase during extraction and demolition processes Improper processing of (toxic) waste can lead to toxic gas release
	Water pollutants	Change in water quality	Chemicals leakage and spills during extraction Untreated wastewater from extraction activities	Chemicals leakage and spills during construction	Polluted/untreated run-off from building surfaces	Chemicals leakage and spills during demolition Improper processing of (toxic) waste can lead to leachate polluting ground/surface water and soils
	Soil pollutants	Change is soil quality	Chemicals leakage and spills during extraction/ production processes	Chemicals leakage and spills during construction		Chemicals leakage and spills during demolition Improper processing of (toxic) waste can lead to leachate polluting ground/surface water and soils
	Solid waste	Change in solid waste quantity	Extraction site/production process waste disposal	Packaging and construction material waste needs to be landfilled or processed		Landfilling of non-recycled materials
Invasive species and others	Disturbance	Change in soil/seafloor characteristics	Soil compaction due to heavy machinery use on site	Seabed disturbance due to increased turbidity and sedimentation of suspended solids		Seabed disturbance due to increased turbidity and sedimentation of suspended solids
		Change in sound/lightscape	Temporary impact on light- and sound-scape during extraction	Temporary impact on light- and sound-scape during construction	Marine sealife/avifauna disturbance due to site operations (e.g., movement and noise from windmills)	Temporary impact on light- and sound-scape during demolition
	Invasive alien species (IAS)	Change in habitat condition		Foreign materials import of construction materials or vessels pose risk of IAS introduction	Lack of IAS management can lead to rapid spread of IAS	

*Expressed as change in the state of nature, which can be positive or negative

Impact Scale High/ Very High | Medium | Low

Link to the table

Annex 3: Methodology and use of the Risks and Opportunities tables

The risk sections of the **Risks and Opportunities tables (Annex 4)** differentiate between physical risks and transition risks in order to align with sustainability disclosures including TNFD language (we do not cover systemic risks as these are less typical for subsystems and are fully dependent on local context).

→ Physical risks (mainly acute risks) in the table are in orange and are linked to a company's dependencies on ecosystem services. These are the so-called "operational risks" as used in the Natural Capital Protocol.

→ Transition risks in the tables are in blue and are mainly limited to legal, market and reputational risks. These link to the dependencies that other stakeholders in the landscape have on ecosystem services, in particular when these stakeholders face reduced availability of these ecosystem services due to the company's activities. An example is the reduced availability of freshwater fish for local communities due to river pollution by a company. An outcome of transition risks can be stranded assets that lose value or turn into liabilities before the end of their expected economic life.

Color intensities indicate the relevance of the risk for the subsystem.

The opportunities sections of the **Risks and Opportunities tables (Annex 4)** of each subsystem provide examples of measures that companies in the built environment can take to contribute to nature-positive outcomes. The table does not focus on the range of potential actions for reducing negative impacts but rather on transformative and positive-impact actions. These are actions that go beyond the mitigation hierarchy[27] and aim to create, restore and/or conserve ecosystems not affected by the company's activities (hence different from offsetting). These opportunities are in green and again, the color intensity is indicative for the importance (or "potential added value") of the opportunity for the subsystem concerned.

Annex 4: Subsystem Risks and Opportunities tables

Buildings risks and opportunities

Drivers of change	Impact drivers	Impact type*	Overview of processes that represent risks (*)				Overview of processes that present opportunities (**)			
			Upstream	Direct operations	Downstream		Upstream	Direct operations	Downstream	
			Materials extraction & production	Design & construction	Operations & maintenance	Demolition & waste	Material extraction & production	Design & construction	Operations & maintenance	Demolition & waste
Land/water/sea use change	Terrestrial ecosystem use	Change in habitat extent	Transition risk specifically with regard to use of timber (e.g., EU regulation on deforestation-free value chains)	Land use footprint of individual buildings usually rather small but dependent on location (e.g., sensitive habitats) can have transition risks			Biodiversity gain from quarry rehabilitation, at processing sites (first processing of extracted materials) that might include offsets, connectivity-enhancing measures	Biodiversity net gain (at least +10%) to be achieved from design interventions in new real estate		Opportunities to increase habitat extent, condition and connectivity, even in case of replacement by new buildings
			Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Loss of range of ecosystem services for local communities or indigenous people might create transition risks						
			Acute physical risks due to loss of flood defense capacity, erosion control capacity (depending on local context)	Increased risk of urban heat island effect and high temperatures						
		Change in habitat condition	Reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people might create transition risks	Reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people might create transition risks					Decreased (re)insurance premiums based on protection afforded by healthy green/blue infrastructure	
			Acute physical risks due to reduced flood defense capacity, erosion control capacity (depending on local context)		Increased maintenance fees: Loss and damage from storm and flood impact due to loss of protective services of ecosystems such as forests, coral reefs and mangroves				Decreased energy costs due to green/blue infrastructure offering temperature control	
		Change in habitat connectivity	Material impacts on wildlife populations due to barrier effect (e.g., fencing around quarries) might cause transition risks	Inappropriate location of new buildings might impact connectivity which can result in stakeholder concerns				Building-in measure that enhance connectivity	Cultural engagement with nature with green routes/commuting paths	
	Freshwater ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks		Increased insurance premiums due to increased flood risk from loss of water storage in wetlands		Creation of freshwater ecosystems (wetlands, ponds, etc.) during quarry rehabilitation	Integration of blue-green infrastructure measures in design of new building infrastructure	Lower insurance premiums thanks to use of green infrastructure	Increase in habitat extent, condition and connectivity from post-demolition restoration of freshwater systems
			Acute physical risks due to reduced flood defense capacity, reduced water availability (depending on local context)	Building constructions in former wetlands or natural flood areas might create substantial physical risks (flooding)				Preservation of new habitats by reducing demand for new raw materials (e.g., through recycling) and of materials with high biodiversity footprint		
		Change in habitat condition	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks		Transition risks from untreated wastewater					
	Marine ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks							
			Acute physical risks due to reduced flood defense capacity (depending on local context)							
		Change in habitat quality	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks							
Resource exploitation	Water use	Change in groundwater/surface water level	Freshwater scarcity due to resource depletion (acute or chronic physical risk)	Reduced value of buildings which are not water use efficient, both in terms of rainwater storage and infiltration as well as in terms of household water saving technology (design phase very important!)	Higher cost for water use in water-scarce areas		"Water positive" approach at landscape level through investment in water use reduction, water recycling, rainwater harvesting, etc. in cooperation with IPLC		Building protection and water credits from green infrastructure and habitats capturing/storing rainwater	
Climate change	GHG emissions	Climate change impact		Reduced value of buildings that are not energy efficient (design phase very important!)			Increased resilience against extreme weather events from implementation of natural climate solutions for climate adaptation such as afforestation (which provides erosion control) and wetland creation (provides drought resistance)		Carbon reduction and contribution to net-zero efforts through sustainable use, conservation and restoration of ecosystems	Carbon capture and storage in vegetation and soils from restoration and rewilding of old sites
			Extreme weather events might create acute physical risks	Extreme weather events might create acute physical risks	Acute physical risks due to extreme weather events		Carbon capture and storage in vegetation and soils from restoration and rewilding of old sites			
Pollution	Non-GHG air pollutants	Change in air quality	Low air quality can affect IPLC and cause transition risks				Range of gains from afforestation programs		Better air quality thanks to green infrastructure that absorbs pollutants	
	Water pollutants	Change in water quality	Reduced availability of quality water can affect IPLC (Indigenous Peoples and Local Communities) and cause transition risks		Transition risks from untreated wastewater		Gains from full wastewater treatment, eventually in combination with engineered wetlands		Water filtration (of a range of (in)organic compounds) from investment in wetland habitats	
			Reduced availability of quality water can cause direct physical risks							
	Soil pollutants	Change in soil quality	Soil pollution poses compliance risks with (inter)national regulation, with possibility of shutting down activities and resulting in damage claims (financial risk)			Non-compliance risks and remediation costs from remaining soil pollution	Capture of a range of pollutants through sustainable remediation of old sites			Capture of range of pollutants through sustainable remediation of old sites
	Solid waste	Change in solid waste quantity				Increased expense on landfilling due to scarcity of space, regulation that applies polluter-pays principle				Opportunities to develop permanent green areas on covered landfills not available for redevelopment
Invasive species and others	Disturbance	Change in sound/lightscape			Lower prices due to reduced attractiveness of spaces/locations		Avoidance of light disturbance using a series of light reduction measures	"Green" design of new and existing infrastructure to alleviate noise levels (planting trees but also use of materials that reduce noise)	Avoidance of light disturbance using a series of light reduction measures	
	Invasive alien species (IAS)	Change in habitat condition						Inclusion of IAS-avoidance measures in design		

(*) Risks are related to negative impacts. Risks are categorized as physical risks (in orange) and transition risks (blue), with different color intensities according to risk materiality.
(**) Opportunities are related to positive impacts. Opportunities refer to both mitigation hierarchy and conservation hierarchy (i.e., proactive investment in nature restoration going beyond compensation/offsets)

High Opportunity | Medium Opportunity | Low Opportunity | High Physical Risk | Medium Physical Risk | Low Physical Risk | High Transition Risk | Medium Transition Risk | Low Transition Risk

Link to the table

Annex 4: Subsystem Risks and Opportunities tables

Urban Developments risks and opportunities

Impact driver	Pressure category	Impact type	Overview of processes that represent risks (*)				Overview of processes that present opportunities (**)			
			Upstream	Direct operations	Downstream		Upstream	Direct Operations	Downstream	
			Material extraction & production	Design & construction	Operations & maintenance	Demolition & waste	Materials extraction & production	Design & construction	Operations & maintenance	Demolition & waste
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Transition risks from loss of range of ecosystem services for local communities or indigenous peoples	Transition risks from loss of range of ecosystem services for local communities or indigenous peoples		Destruction of habitats that have evolved over time into biodiversity-rich plots; transition risks from removing them	Biodiversity net gain from quarry rehabilitation; at processing sites (first processing of extracted materials) that might include offsets; integration of connectivity enhancing measures	Creation of new blue and green habitats as part of design and construction to strengthen urban resilience, e.g., nesting boxes for bats and birds, pollinator-friendly habitats, biodiverse green roofs and walls, conversion of grey infrastructure to green, green parking lots and playgrounds	On-site and off-site habitat creation and maintenance	Use of abandoned spaces for natural regeneration and rewilding of areas for new community developments such as urban agriculture, wildlife habitats, green neighborhoods, local community social enterprise development
			Acute physical risks due to loss of flood defense capacity and erosion control capacity (depending on local context)	Acute physical risks due to loss of flood defense capacity and erosion control capacity (depending on local context)	Acute physical risks of flooding due to soil sealing and reduced water infiltration capacity			Avoidance high value biodiversity areas; avoidance of habitat loss by reducing demand for new raw materials (i.e., increased recycling) and/or by moving away from materials with devastating impacts on biodiversity during extraction and processing (e.g., application of LCA); minimization of land use footprint of new construction and application of combined land use (e.g., combine with generation of renewable energy)		Opportunities to increase habitat extent, condition and connectivity, even in case of replacement by new buildings
				Increased risk of urban heat island effect and high temperatures	Increased risk of urban heat island effect and high temperatures					
		Change in habitat condition	Transition risks from reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people	Transition risks from reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people	Reduced habitat quality due to maintenance activities (e.g., use of pesticides and frequent mowing), reduced cultural values for local people	Destruction of habitats that have evolved over time into biodiversity-rich plots; transition risks from removing them			Promotion of endemic plant species and citizen stewardship to increase natural maintenance practices (e.g., less frequent mowing and no pesticides)	
			Acute physical risks due to loss of flood defense capacity and erosion control capacity (depending on local context)	Acute physical risks due to loss of flood defense capacity, erosion control capacity (depending on local context)	Increased maintenance fees; loss and damage from storm and flood impact due to loss of protective services such as forests, coral reefs and mangroves				Decreased re/insurance premiums based on protection afforded by healthy green/blue infrastructure	
				Increased risk of urban heat island effect and high temperatures	Increased risk of urban heat island effect and high temperatures				Decreased energy costs due to green/blue infrastructure offering temperature control	
		Change in habitat connectivity	Transition risks from material impacts on wildlife populations due to barrier effect (e.g., fencing around quarries)	Transition risks from material impacts on wildlife populations due to barrier effect (e.g., collisions)				Creation of blue-green networks to increase connectivity between (semi-)natural and cultural habitats across the urban landscape	Management of blue-green networks to continuously improve connectivity between (semi-)natural and cultural habitats across urban landscape	
	Freshwater ecosystema use	Change in habitat extent	Transition risks from reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people	Transition risks from reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people	Increased insurance premiums due to increased flood risk from loss of water storage in wetlands		Prioritization of protecting nature reserves and protected areas that are the source of drinking water, and restoration of catchment zones to improve access to drinking water supplies	Creation of natural ponds, and rainwater harvesting to improve biodiversity value locally and improve water infiltration	Restoration of urban waterways to semi-natural conditions to improve biodiversity value, reduce flood risk and improve water quality	Restoration of freshwater systems post demolition to increase habitat extent, condition and connectivity
				Substantial physical risks (flooding) from construction in former wetlands or natural flood areas			Creation of quarry rehabilitation plans to revive freshwater ecosystems (e.g., wetlands and ponds)	Integrated in project design of blue-green infrastructure measures		
			Acute physical risks due to reduced flood defense capacity and reduced water availability (depending on local context)	Acute physical risks due to reduced flood defense capacity, reduced water availability (depending on local context)						
		Change in habitat condition	Transition risks from reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people	Acute and/or chronic physical risk due to reduced quality of drinking water sources (due to pollution and drought) and scarcity of water	Transition risks from untreated wastewater					
	Marine ecosystem use	Change in habitat extent	Transition risks from reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people				Increased habitat extent, increased coastal resilience and provision of nurseries for sealife through mangrove and sea meadow restoration	Urban wetland restoration to improve climate change resilience and water availability for urban development	Non-intervention approach allowing for natural increase of biodiversity values on newly created marine habitats	Demolition with respect to preservation of newly created marine habitats (by keeping artificial underwater substrates if possible)
			Acute physical risks due to reduced flood defense capacity (depending on local context)					Use of NbS to actively create semi-artificial marine habitats, avoiding destruction of new habitats by reducing demand for new raw materials (e.g., with increased recycling)		
		Change in habitat condition	Transition risks from reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people	Acute physical risks due to reduced flood defense capacity (depending on local context)						
Resource exploitation	Water use	Change in groundwater/surface water level	Freshwater scarcity due to resource depletion (acute or chronic physical risk)	Freshwater scarcity due to resource depletion (acute or chronic physical risk)	Freshwater scarcity due to resource depletion (acutze or chronic physical risk)		Implementation of "water positive" approach at landscape level by investing in water use reduction, water recycling, rainwater harvesting, etc. in cooperation with IPLC	Increased urban natural water storage and replenishment through nature-based solutions, such as SUDS, rain gardens and bio-swales to create resilience against water scarcity	Green infrastructure and habitats capturing/storing rainwater to protect buildings as well as to be sold as water credits	
				Reduced value of buildings that are not water use efficient, both in terms of rainwater storage and infiltration and in terms of household water saving technology (design phase very important!)	Higher cost of water use in water-scarce areas			Implementation of associated program of green-blue infrastructure measures, including water retention and infiltration	Implementation of associated program of green-blue infrastructure measures, including water retention and infiltration	
Climate change	GHG emissions	Climate change impacts	Acute physical risks from extreme weather events	Acute physical risks from extreme weather events	Acute physical risks from extreme weather events (such as damage to infrastructure, e.g., due to storms and floods); chronic physical risks (e.g., damage to asphalt due to continuously high temperatures)		Increased resilience against extreme weather events by implementing natural climate solutions for climate adaptation such as afforestation (erosion control) and wetland creation (drought resistance)	Nature-based solutions to reduce urban heat island effect (e.g., increasing extent and complexity of tree canopy, and diversity of plant and tree species to increase resilience of urban ecosystems to reduce urban heat and absorb excess rainfall)	Citizen engagement, e.g., through urban gardens, microforests, tree adoption, "bioblitzes", participative budget planning, climate adaptation bonds, etc. to strengthen climate change adaptation and mitigation efforts	Increased resilience against extreme weather events through implementation of natural climate solutions for climate adaptation such as afforestation (erosion control) and wetland creation (drought resistance)
							Carbon capture and storage in vegetation and soils through restoration and/or rewilding of old sites			
Pollution	Non-GHG air pollutants	Change in air quality			Reduced passenger numbers due to reduced attractiveness of spaces/locations (e.g., transport hubs)		Afforestation programs		Green infrastructure to absorb pollutants and improve air quality	Afforestation (unless replacement by new infrastructure)
	Water pollutants	Change in water quality			Untreated wastewater can cause transition risks		Full wastewater treatment, eventually in combination with engineered wetlands	Inclusion of water retention ponds with self-purification capacity in design	Use of run-off water retention ponds with self-purification capacities	
			Transition risks from reduced availability of quality water, effect on IPLC	Transition risks from reduced availability of quality water, effect on IPLC	Reduced availability of quality water can cause direct physical risks					
	Soil pollutants	Change is soil quality	Compliance risks from (inter)national regulation of soil pollution, financial risk from shutting down of activities and/or damage claims		Increased soil pollution, constrained possibilities for urban agriculture	Non-compliance risks and/or remediation costs from remaining soil pollution	Capture of range of pollutants through sustainable remediation of old sites		Investment in wetland habitat to provide water filtration services for range of (in)organic compounds	Sustainable remediation of old sites to capture range of pollutants
	Solid waste	Change in solid waste quantity				Increasing cost of landfilling due to scarcity of space and regulation that increasingly applies polluter-pays principle		Increased re-use of materials		Use of covered landfills not available for redevelopment to develop permanent green areas
Invasive species and others	Disturbance	Change in sound/lightscape			Lower prices due to reduced attractiveness of spaces/locations		Avoidance of light disturbance through a series of measures	"Green" design of new and existing infrastructure to alleviate noise levels (planting trees but also use of materials that reduce noise levels)	Avoidance of light disturbance through a series of measures	
	Invasive alien species (IAS)	Change in habitat condition			Transition risk due to international trade being entry points for IAS in urban areas			Avoidance of IAS introduction in design		Removal of IAS, allowing areas to rewild

(*) Risks are related to negative impacts. Risks are categorized as physical risks (in orange) and transition risks (blue), with different color intensities according to risk materiality.
(**) Opportunities are related to positive impacts. Opportunities refer to both mitigation hierarchy and conservation hierarchy (i.e., proactive investment in nature restoration going beyond compensation/offsets)

High Opportunity | Medium Opportunity | Low Opportunity | High Physical Risk | Medium Physical Risk | Low Physical Risk | High Transition Risk | Medium Transition Risk | Low Transition Risk

Link to the table

Annex 4: Subsystem Risks and Opportunities tables

Transport Infrastucture risks and oppportunities

Drivers of change	Impact drivers	Impact types	Overview of processes that represent risks (*)				Overview of processes that present opportunities (**)			
			Upstream	Direct operations	Downstream		Upstream	Direct operations	Downstream	
			Materials extraction & production	Design & construction	Operations & maintenance	Demolition & waste	Materials extraction & production	Design & construction	Operations & maintenance	Demolition & waste
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Loss of range of ecosystem services for local communities or indigenous people might create transition risks		Demolition can in some cases result in destruction of habitats that have evolved over time into biodiversity rich plots. Removing them might create transition risks	Quarry rehabilitation offers great potential to achieve biodiversity net gain. Biodiversity net gain can also be achieved at processing sites (first processing of extracted materials), which might include offsets. Connectivity enhancing measures can be integrated	New habitats can be included in the design of new constructions	On-site and off-site habitat creation and maintenance	Demolition offers plenty of opportunities to increase habitat extent, condition and connectivity (unless replaced by new infrastructure)
			Acute physical risks due to loss of flood defense capacity, erosion control capacity (depending on local context)	Acute physical risks due to loss of flood defense capacity, erosion control capacity (depending on local context)	Acute physical risks due to loss of flood defense capacity, erosion control capacity (depending on local context)			Avoid high value biodiversity areas; avoid habitat loss by reducing demand for new raw materials (for instance, through increased recycling) and by moving away from materials with devastating impacts on biodiversity during extraction and processing (e.g., application of LCA); minimize land use footprint of new construction and application of combined land use (e.g., combine with generation of renewable energy)		
		Change in habitat condition	Reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people might create transition risks	Reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous people might create transition risks	Maintenance activities (such as use of pesticides and frequent mowing) can result in reduced habitat quality, reducing cultural values for local people	Demolition can result in reduced habitat quality in places that have evolved over time into biodiversity-rich plots. Affecting them might create transition risks.			Habitats can be optimized in order to increase biodiversity values (e.g., road verges)	
			Acute physical risks due to reduced flood defense capacity and erosion control capacity (depending on local context)	Acute physical risks due to reduced flood defense capacity and erosion control capacity (depending on local context)						
		Change in habitat connectivity	Material impacts on wildlife populations due to barrier effect (e.g., fencing around quarries) might cause transition risks	Material impacts on wildlife populations due to barrier effect (e.g., causing collisions) might cause transition risks	Material impacts on wildlife populations due to barrier effect (e.g., causing collisions) might cause transition risks			Ecoducts and ecobridges can be included in the design phase of new infrastructure	Habitats can be optimized in order to increase connectivity (e.g., road verges)	
	Freshwater ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Loss of range of ecosystem services for local communities or indigenous people might create transition risks			Freshwater ecosystems (wetlands, ponds, ...) can be created as part of quarry rehabilitation plans	Blue-green infrastructure measures can be integrated in design of new transport infrastructure; "room for the river" initiatives can be adopted; destruction of new habitats can be avoided by reducing demand for new raw materials (through increased recycling, e.g.)	Habitats can be optimized in order to increase biodiversity values (e.g., road verges)	
			Acute physical risks due to reduced flood defense capacity and reduced water availability (depending on local context)	Acute physical risks due to reduced flood defense capacity and reduced water availability (depending on local context)						
		Change in habitat condition	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks		Loss of sufficient water level for navigation					
	Marine ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks					NbS to actively create semi-artificial marine habitats; avoiding destruction of new habitats with reduced demand for new raw materials (through increased recycling)	Taking non-intervention approach allowing for natural increase of biodiversity values on newly created marine habitats	Demolition with respect to preservation of newly created marine habitats (by preserving artificial underwater substrates if possible)
			Acute physical risks due to reduced flood defense capacity (depending on local context)							
		Change in habitat condition	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks							
Resource exploitation	Water use	Change in groundwater/ surface water level	Freshwater shortage due to resource depletion (acute or chronic physical risk)	Freshwater shortage due to resource depletion (acute or chronic physical risk)			Implementing "water positive" approach at landscape level by investing in water use reduction, water recycling, rainwater harvesting, etc. in cooperation with IPLC	Implementing associated program of green-blue infrastructure measures, including water retention and infiltration	Implementing associated program of green-blue infrastructure measures, including water retention and infiltration	
Climate change	GHG emissions	Climate change impacts	Extreme weather events might create acute physical risks	Extreme weather events might create acute physical risks	Extreme weather events might create acute risks (damage to transport infrastructure e.g., due to storms, floods, etc.) and chronic physical risks (e.g., damage to asphalt due to continuously high temperatures)		Increase resilience against extreme weather events by implementing natural climate solutions for climate adaptation such as afforestation (erosion control) and wetland creation (drought resistance)	Increase resilience against extreme weather events by implementing natural climate solutions for climate adaptation such as green roofs/green walls (heat control) and infiltration zones near the building (drought resistance)		Increasing resilience against extreme weather events by implementing natural climate solutions for climate adaptation such as afforestation (for erosion control) and wetland creation (for drought resistance)
							Restoring and rewilding old sites can contribute to carbon capture and storage in vegetation and soils			
Pollution	Non-GHG air pollutants	Change in air quality	Low air quality can affect IPLC and cause transition risks		Reduced attractivity of spaces/locations (e.g., transport hubs) might lead to reduced passenger numbers		Afforestation programs	"Green" design of new and existing transport infrastructure e.g., by creating forest patches	"Green" design of new and existing transport infrastructure, e.g., by creating forest patches	Afforestation (unless replacing with new infrastructure)
	Water pollutants	Change in water quality	Reduced availability of quality water can affect IPLC and cause transition risks	Reduced availability of quality water can affect IPLC and cause transition risks			Full wastewater treatment, eventually in combination with engineered wetlands	Including water retention ponds with self-purification capacity in design	Creating run-off water retention ponds with self-purification capacities	
			Reduced availability of quality water can cause direct physical risks	Reduced availability of quality water can cause direct physical risks	Reduced availability of quality water can cause direct physical risks					
	Soil pollutants	Change is soil quality	Soil pollution poses compliance risks with (inter)national regulation, possible shutting down activities and resulting in damage claims (financial risk)				Sustainable remediation of old sites can capture a range of pollutants			
	Solid waste	Change in solid waste quantity						Increasing re-use of materials		Recycling demolished materials
Invasive species and others	Disturbance	Change in soil/ seafloor characteristics								
		Change in sound/lightscape			Reduced attractivity of spaces/locations (e.g., transport hubs) might lead to reduced passenger numbers		Avoiding light disturbance as much as possible using series of light reduction measures	'Green' design of new and existing transport infrastructure to alleviate noise levels (planting trees but also use of materials that reduce noise levels)	Avoiding light disturbance as much as possible using series of light reduction measures	
	Invasive alien species (AIS)	Change in habitat condition					Removing IAS	Avoiding introduction of IAS in design	Removing IAS	Removing IAS and allowing areas to rewild

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(**) Opportunities are related to positive impacts. Opportunities refer to both mitigation hierarchy and conservation hierarchy (i.e., proactive investment in nature restoration going beyond compensation/offsets)

High Opportunity | Medium Opportunity | Low Opportunity | High Physical Risk | Medium Physical Risk | Low Physical Risk | High Transition Risk | Medium Transition Risk | Low Transition Risk

Link to the table

Annex 4: Subsystem Risks and Opportunities tables

Marine and Coastal Infrastucture risks and opportunities

Drivers of change	Impact drivers	Impact types	Overview of processes that represent risks (*)				Overview of processes that present opportunities (**)			
			Upstream	**Direct operations**	**Downstream**		**Upstream**	**Direct operations**	**Downstream**	
			Material extraction & production	Design & construction	Operations & maintenance	Demolition & waste	Materials extraction & production	Design & construction	Operations & maintenance	Demolition & waste
Land-/water-/sea-use change	Terrestrial ecosystem use	Change in habitat extent	Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Loss of range of ecosystem services for local communities or indigenous people might create transition risks	Demolition can in some cases result in destruction of habitats that have evolved over time into biodiversity-rich plots. Re-moving them might create transition risks	Mining site rehabilitation offers great potential to achieve biodiversity net gain. Biodiversity net gain can also be achieved at processing sites (first processing of extracted materials), which might include offsets. Connectivity enhancing measures can be integrated.	Project design to improve coastal protection using nature-based solutions such as using coastal dynamics and natural dune formation for erosion control, flood mitigation)		Demolition offers plenty of opportunities to increase habitat extent and condition
			Acute physical risks due to loss of natural protection against sea-level rise and storm surges and loss of erosion control	Acute physical risks due to loss of natural protection against sea-level rise and storm surges and loss of erosion control	Acute physical risks due to loss of natural protection against sea-level rise and storm surges and loss of erosion control					
		Change in habitat condition	Reduced availability of range of eco-system services (e.g., food) for local communities or indigenous people might create transition risks	Reduced availability of range of ecosystem services (e.g., food) for local communities or indigenous peo-ple might create transition risks		Demolition can result in reduced habitat quality in cases which have evolved over time into biodiversity rich plots. Affecting them might create transition risks.		Minimize footprint of new construction and application of combined coastal land use (e.g., combine with generation of renewable energy)	Habitats can be optimized in order to increase biodiversity values	
			Acute physical risks due to loss of natural protection against sea level rise and storm surges	Acute physical risks due to reduced flood defense capacity, capacity (depending on local context)						
		Change in habitat connectivity			Material impacts on coastal wildlife populations due to barrier effect might cause transition risks					
	Freshwater ecosystem use	Change in habitat extent								
		Change in habitat condition								
	Marine ecosystem use	Change in habitat extent	Reduced availability of range of ecosys-tem services (e.g., fish) for local commu-nities or indigenous people might create transition risks	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks	Reduced availability of range of eco-system services (e.g., fish) for local communities or indigenous people might create transition risks	Demolition can in some cases result in destruction of habitats that have evolved over time into biodiversity-rich plots. Re-moving them might create transition risks	Mining site rehabilitation offers great potential to achieve biodiversity net gain. Biodiversity net gain can also be achieved at processing sites (first processing of extracted materials), which might include offsets.	Deploy NbS by actively creating semi-natural marine habitats and using innovate materials (e.g., concrete blocks providing new habitat or easy colinization)	Passive marine infrastructure (e.g., windmill base) could represent sanctuaries or no-take zones for fisheries	
			Acute physical risks due to loss of natural protection against sea level rise and storm surges and loss of erosion control.	Acute physical risks due to loss of natural protection against sea level rise and storm surges and loss of erosion control.	Acute physical risks due to loss of natural protection against sea level rise and storm surges and loss of erosion control.				Non-intervention approach allowing for natural increase of biodiversity values on newly created marine habitats	
		Change in habitat condition	Reduced availability of range of ecosys-tem services (e.g., fish) for local commu-nities or indigenous people might create transition risks	Reduced availability of range of ecosystem services (e.g., fish) for local communities or indigenous people might create transition risks	Reduced availability of range of eco-system services (e.g., fish) for local communities or indigenous people might create transition risks	Demolition can in some cases result in destruction of habitats that have evolved over time into biodiversity-rich plots. Re-moving them might create transition risks				
Resource exploitation	Water use	Change in ground-water/surface water level	Falling short of freshwater due to resource depletion (acute or chronic physical risk)				Implementing a 'water positive' approach at landscape level by investing in water use reduction, water recycling, rainwater harvesting, etc. in cooperation with IPLC			
Climate change	GHG emissions	Climate change impacts	Extreme weather events might create acute physical risks	Extreme weather events might create acute physical risks	Extreme weather events might cre-ate acute (damage to infrastructure e.g., due to storms and floods) and chronic physical risks (e.g., damage to concrete/asphalt due to continu-ously high temperatures)		Restoring and rewilding extraction sites can contribute to carbon capture and storage in vegetation and soils.	Increased resilience against extreme weather events by implementing natural climate solutions such as mangrove or wetland protection and restoration		Increasing resilience against extreme weather events by implementing natural climate solutions such as mangrove or wetland protection and restoration
Pollution	Non-GHG air pollutants	Change in air quality							Green infrastructure absorbs pollutants and improves air quality	
	Water pollutants	Change in water quality	Marine water pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Marine water pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Marine water pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Marine water pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Investment in wetland habitat protection and restoration can provide water filtration services for a range of (in) organic compounds.		Investment in seaweed forests provides opportunity for marine/coastal water filtration and increased revenue based on seaweed farming (colocation of activities)	
	Soil pollutants	Change is soil quality	Sediment pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Sediment pollution (oil spills, plastics, etc.) poses im-portant transition risks from (inter)national regulation	Sediment pollution (oil spills, plas-tics, etc.) poses important transition risks from (inter)national regulation	Sediment pollution (oil spills, plastics, etc.) poses important transition risks from (inter)national regulation	Apply fytoremediation / fytostabilization to manage polluted soils and develop nature at the same time			
	Solid waste	Change in solid waste quantity				Increased costs of landfilling and compliance with regulation that applies polluter-pays principle		Increased re-use of materials		Recycling of demolished materials
Invasive species and others	Disturbance	Change in sound/ lightscape			Increased underwater noise influenc-ing underwater marine life may pose a transition risk		Avoid light and noise disturbance as much as possible by series of reduction measures			
	Invasive alien species (IAS)	Change in habitat condition	Transition risk due to international marine transport and contractor vessels being entry points for IAS	Transition risk due to international marine transport and contractor vessels being entry points for IAS	Transition risk due to international marine transport and contractor vessels being entry points for IAS	Transition risk due to international marine transport and contractor vessels being entry points for IAS		Avoiding introduction of IAS in design		

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(**) Opportunities are related to positive impacts. Opportunities refer to both mitigation hierarchy and conservation hierarchy (i.e., proactive investment in nature restoration going beyond compensation/offsets)

High Opportunity | Medium Opportunity | Low Opportunity | High Physical Risk | Medium Physical Risk | Low Physical Risk | High Transition Risk | Medium Transition Risk | Low Transition Risk

Link to the table

Annex 5: Actions tables

Actions: Upstream

Drivers of change	Key actions	Overview of actions to achieve nature positive												
		Upstream												
		Material extraction & production				**Subsystem potential**				**Spheres of influence***				
		Avoid	Reduce	Restore	Transform	Buildings	Urban developments	Transport infrastructure	Marine & coastal	Corporate	Site	Product	Value chain	Value chain-adjacent
Land-/water-/sea-use change	No Material extraction in highly valuable (biologically) or vulnerable (e.g., water stressed) habitats (see IFC PS6)	X								X	X			
	Plan project to avoid natural habitat and animal migration routes	X								X	X			
	Use recycled materials to build as much as possible to reduce use of virgin raw materials	X								X			X	
	Develop sourcing guidelines for professionals	X								X			X	
	Create a no-dams policy on remaining free-flowing rivers	X								X				
	No harmful activities during breeding or nesting seasons of vulnerable specie/during times of resource scarcity (e.g., water stress)	X								X	X			
	Create buffer zones/ecological corridors around valuable ecosystems		X								X			X
	Project design to consider habitat connectivity		X								X			X
	Project design to avoid reduction of ecosystem functioning and services (e.g., flood control and water purification)		X								X	X		
	Moving production to a lower-impact location—as noted above, changing suppliers		X							X	X		X	
	Ensure non-certified wood is covered by due diligence and traceability systems (e.g., to ensure wood has been harvested legally)		X							X		X	X	
	Invest in landscape restoration at extraction/production sites			X							X			X
	Undertake water replenishment projects			X							X		X	X
	Engage in reforestation/afforestation on degraded land			X							X		X	X
	Engage in context-based landscape management approaches (e.g., watershed stewardship and enhancing biodiversity)			X							X		X	X
	Support individual species recovery programs related to the habitat type affected			X							X			
	Ensure compensatory conservation/target-based ecological compensation			X							X			X
	Use sand motor techniques to prevent recurring artificial sand suppletion				X						X		X	
	Apply management practices to promote biodiversity at production sites (e.g., maintain decaying wood and forest residues, high-stumps and retention trees)				X						X			
Resource exploitation	Reduce resource use during times of resource scarcity (e.g., water stress)	X								X			X	X
	Optimize resource input needs (e.g., irrigated water)		X							X		X		
	Increase circularity by maximum re-use of demolished materials in new construction or retrofitting				X					X	X	X	X	
	Carry out preferential sourcing (e.g., using sustainably certified inputs like FSC timber)	X								X		X	X	
Climate change	Improve operational efficiency		X									X		
	Increase carbon storage in soils and forests (e.g., with use of biochar)			X							X			
Pollution	Adopt extended producer responsibility models to control end-of-life waste		X							X			X	
	Reduce packaging waste, particularly single-use plastic		X									X		
Invasive species and others	Reduce lighting levels during construction to minimize light pollution		X								X			

*Spheres of influence (and control)
Direct operations (corporate, site, product): This category covers all activities and sites (e.g., buildings, farms, mines, retail stores) over which the enterprise has operational or financial control. This includes majority-owned subsidiaries.
Value chain: The value chain is a series of activities, sites and entities, starting with raw materials and extending through end-of-life management. The value chain can be divided into upstream and downstream sites/activities.
Value chain-adjacent: This covers the landscapes, seascapes and watersheds that are geographically adjacent to value chain sites.

Buildings | Urban developments | Transport infrastructure | Marine & coastal

Link to the table

Annex 5: Actions tables

Actions: Direct operations (design & construction)

Nature-related issue	Key actions	Overview of actions to achieve nature positive												
		Direct operations (design & construction)												
		Material extraction & production				Subsystem potential				Spheres of influence*				
		Avoid	Reduce	Restore	Transform	Buildings	Urban developments	Transport infrastructure	Marine & coastal	Corporate	Site	Product	Value chain	Value chain-adjacent
Land-/water-/sea-use change	Design circular infrastructure by designing out waste	x	x		x						x	x	x	
	Avoid establishing operations in/adjacent to areas of high biological importance	x								x	x			
	Avoid establishing operations in water-stressed areas	x								x	x			
	Plan project to avoid natural habitat and animal migration routes	x								x	x			
	Design to use recycled materials as much as possible to reduce use of virgin raw materials	x								x			x	
	Develop sourcing guidelines for professionals	x								x			x	
	No harmful activities during breeding or nesting season of vulnerable species/during times of resource scarcity (e.g., water stress)	x								x	x			
	Create buffer zones/ecological corridors around valuable ecosystems		x								x			x
	Project design to consider habitat connectivity		x								x			x
	Project design to avoid reduction of ecosystem functioning and services (e.g., flood control and water purification)		x								x	x		
	Develop/favor circular business models for materials		x							x		x	x	
	Engage in context-based landscape management approaches (e.g., watershed stewardship and enhancing biodiversity)			x							x		x	x
	Support individual species recovery programs related to the habitat type affected			x							x			
	Undertake compensatory conservation/target-based ecological compensation			x							x			x
	Use nature-based solutions (e.g., green roofs, bird/bat-friendly building materials)				x						x	x		
	Use nature-based solutions for flood mitigation/storm protection (mangroves, semi-artificial reefs)				x						x			
	Use habitat enhancing (concrete) materials				x						x			x
Resource exploitation	Implement water consumption reduction plans in water-stressed areas (e.g., adapting water consumption to seasonal rainfall)		x							x	x			
	Maximize recovery of process water (e.g., water reuse/recycling, closed loops)		x	x							x			
	Use recovered water from other industries (e.g., strike a partnership with a local drinks company to reuse waste water)				x						x			x
	Harvest rainwater and use it to replace extraction of groundwater in processes				x						x			
Climate change	Switch to cleaner fuel alternatives (e.g., renewable energy or natural gas)	x	x							x		x	x	
	Set time-bound and verified CO2 reduction targets aligned with climate science		x							x				
	Improve energy efficiency of equipment (e.g., combined heat & power systems, recovery boilers)		x								x	x		
	Apply circular design principles to maximize the recovery potential of products				x							x	x	
	Invest in building resilience (thermal comfort with natural shading, green roofs for passive heating and cooling)				x						x	x		
Pollution	Switch to cleaner alternative fuels (e.g., renewable energy or natural gas)		x							x	x			
	Improve wastewater treatment		x								x	x		
	Increase use of bio-based chemicals, adhesives and coatings where possible				x							x	x	
	Upcycle waste streams and processing residues. Sell byproducts to other industries		x		x							x	x	x
Invasives and others	Develop appropriate environmental management plans to avoid and reduce soil compaction, and minimize noise and light disturbance	x	x							x	x			
	Choose native/local plant species for landscaping	x									x			

*Spheres of influence (and control)
Direct operations (corporate, site, product): This category covers all activities and sites (e.g., buildings, farms, mines, retail stores) over which the enterprise has operational or financial control. This includes majority-owned subsidiaries.
Value chain: The value chain is a series of activities, sites and entities, starting with raw materials and extending through end-of-life management. The value chain can be divided into upstream and downstream sites/activities.
Value chain-adjacent: This covers the landscapes, seascapes and watersheds that are geographically adjacent to value chain sites.

Buildings | Urban developments | Transport infrastructure | Marine & coastal

Link to the table

Annex 5: Actions tables

Actions: Downstream (operations & maintenance)

Nature-related issue	Key actions	Overview of actions to achieve nature positive												
		Downstream (operations & maintenance)												
		Material extraction & production				**Subsystem potential**				**Spheres of influence***				
		Avoid	Reduce	Restore	Transform	Buildings	Urban developments	Transport infrastructure	Marine & coastal	Corporate	Site	Product	Value chain	Value chain-adjacent
Land-/water-/sea-use change	Retain and manage local plants on-site to retain biodiversity	x	x								x			
	Ensure management regime is ecologically appropriate for the respective site (e.g., clear-cutting where it mimics high-intensity natural disturbance regimes)		x								x			
Resource exploitation	Encourage sustainable behaviors among building users to reduce water and energy use	x	x							x	x			
	Apply rainwater harvesting (e.g., surface runoff and rooftop rainwater harvesting)			x							x			
Climate chaange	Shift to renewable energy sources	x	x							x	x			
	Increase the use of renewable fuels in transportation (e.g., electric trucks, hydrogen ships/barges)				x					x			x	x
Pollution	Nature-based solutions, such as plant-based water filters				x						x	x		
	Minimize the release of untreated blackwater, greywater and bilge from shipping	x	x							x	x			
Invasive species and others														

*Spheres of influence (and control)
Direct operations (corporate, site, product): This category covers all activities and sites (e.g., buildings, farms, mines, retail stores) over which the enterprise has operational or financial control. This includes majority-owned subsidiaries.
Value chain: The value chain is a series of activities, sites and entities, starting with raw materials and extending through end-of-life management. The value chain can be divided into upstream and downstream sites/activities.
Value chain-adjacent: This covers the landscapes, seascapes and watersheds that are geographically adjacent to value chain sites.

Buildings | Urban developments | Transport infrastructure | Marine & coastal

Link to the table

Annex 5: Actions tables

Actions: Downstream (demolition & waste)

Nature-related issue	*Key Actions*	*Overview of actions to achieve nature positive*												
		Downstream (demolition & waste)												
		Material extraction & production				**Subsystem potential**				**Spheres of influence***				
		Avoid	Reduce	Restore	Transform	Buildings	Urban developments	Transport infrastructure	Marine & coastal	Corporate	Site	Product	Value chain	Value chain-adjacent
Land-/water-/sea-use change	Avoid establishing landfills or recycling facilities in/adjacent to sites with high ecological sensitivity	x									x			
	Avoid need for refurbishing by choosing higher quality, more flexible internal systems that have greater longevity	x								x		x	x	
	Repurpose buildings by avoiding full demolition (design deconstruction process for the materials to be reused and repurposed)				x						x	x		
Resource exploitation														
Climate change	Localize supply chains where possible to reduce transportation		x										x	x
	Optimize local energy reuse from waste product incineration				x						x		x	x
Pollution	Ensure safe landfill disposal sites (e.g., regulation, planning and management)		x							x	x			
	Optimize waste segregation process for reuse				x							x	x	x
Invasive species and others														

*Spheres of influence (and control)
Direct operations (corporate, site, product): This category covers all activities and sites (e.g., buildings, farms, mines, retail stores) over which the enterprise has operational or financial control. This includes majority-owned subsidiaries.
Value chain: The value chain is a series of activities, sites and entities, starting with raw materials and extending through end-of-life management. The value chain can be divided into upstream and downstream sites/activities.
Value chain-adjacent: This covers the landscapes, seascapes and watersheds that are geographically adjacent to value chain sites.

Buildings | Urban developments | Transport infrastructure | Marine & coastal

Link to the table

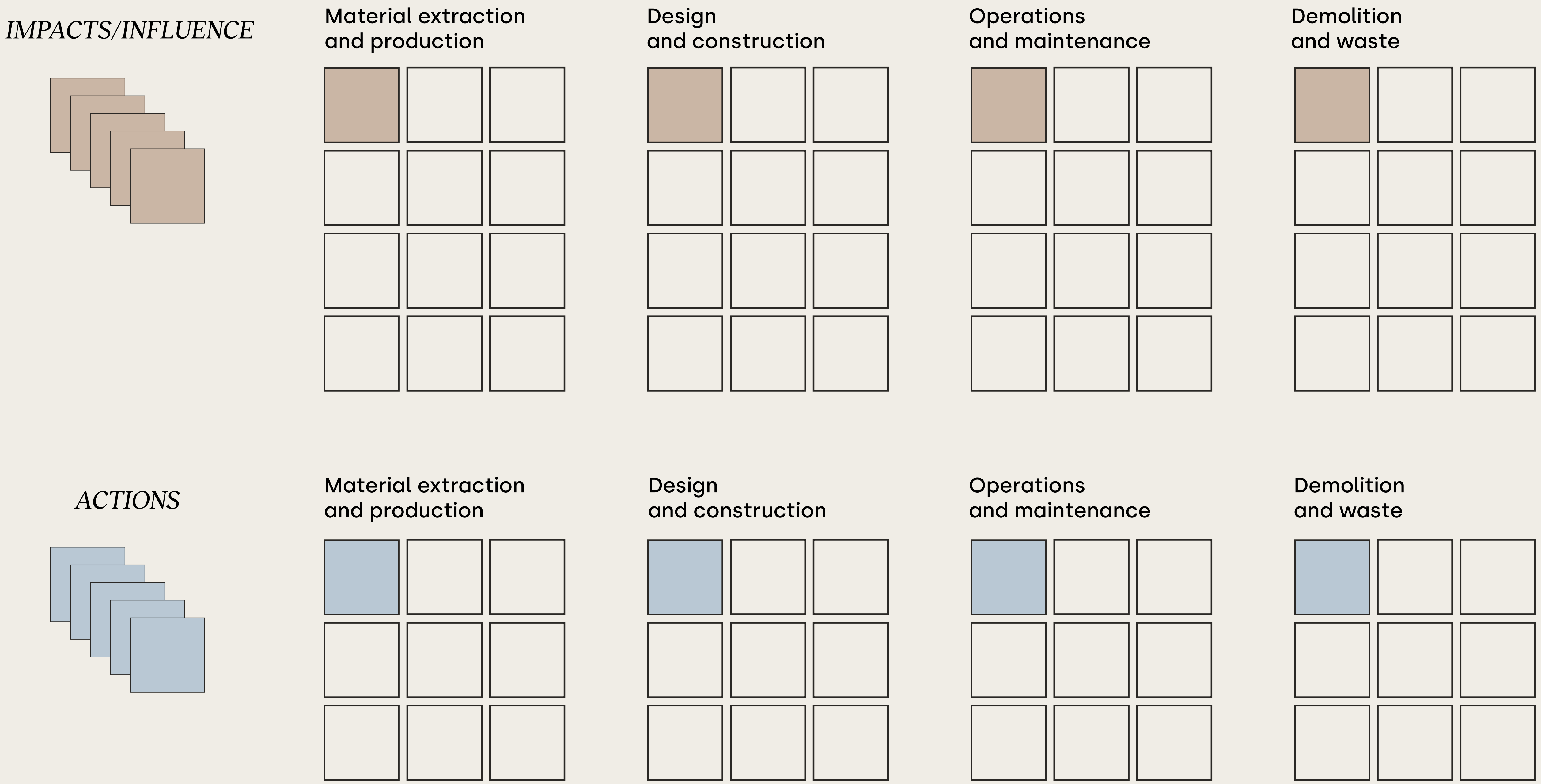
Annex 6: Template to map impacts, risks and opportunities, and connected actions

This template helps to start assessing your business's impacts and their influence on nature across the built environment value chain. This will help inform a discussion on transformative actions specific to your business as well as how to prioritize them.

Step 1: Using orange stickies, mark where in the value chain (four stages, from extraction to demolition & waste) your business has an impact on nature (this can be either positive or negative), or where nature-related risks or opportunities exist. Use the Roadmap tables for inspiration. Indicate on the sticky whether you refer to an impact, physical risk or transitional risk.

Step 2: Using blue stickies, add possible transformative actions to address impacts, risks or opportunities defined in step 1. These can be actions your company already takes, or which you hope it will take in the future. Where actions touch multiple points across the value chain, indicate that with arrows.

Step 3: Go through each value chain section, to recap and discuss impacts, risks and opportunities. As a next step discuss transformative actions, the influence a company (in)directly has to take these actions, and to what extent actions can and should be prioritized.



Annex 7: Definitions related to the built environment roadmap

No net loss

No net loss (NNL) policy: Policy applied at various spatial scales aiming to achieve a minimum of no net loss in biodiversity across all impacts of development. NNL policies are often operationalized in practice through application of the mitigation hierarchy.[28]

Net gain

Net gain is an approach to development that aims to leave the natural environment in a measurably better state than before. This means protecting existing habitats and ensuring that lost or degraded environmental features are compensated for by restoring or creating environmental features that are of greater value to wildlife and people. It does not change the fact that losses should be avoided where possible, a key part of adhering to the SBTN Action Framework.

Annex 8: Further reading

- **Achieving a circular economy: using data-sharing tools, like the Digital Product Passport**, WBCSD/ Metabolic, August 2023
- **Biodiversity Net Gain Fact Sheets**, UK Green Building Council, May 2023
- **The nature imperative: How the circular economy tackles biodiversity loss – built environment deep dive**, Ellen MacArthur Foundation, 2021
- **Buildings and Infrastructure Construction, The Nature Handbook for Business**, Get Nature Positive
- **Circular Transition Indicators (CTI) v.04 – Metrics for business by business**, WBCSD, May 2023
- **City-level circular economy interventions to protect and enhance biodiversity**, Local Governments for Sustainability (ICLEI), February 2022
- **Impact protocol, impact analysis and impact management for banks**, United Nations Environment Programme Finance Initiative (UNEP-FI), October 2022
- **International Good Practice Principles for Sustainable Infrastructure**, United Nations Environment Programme Finance Initiative (UNEP-FI), February 2021
- **IUCN Global Standard for Nature-based Solutions**, IUCN, 2020
- **Natural Climate Solutions Alliance**, focuses on identifying opportunities and barriers to investment in the NCS voluntary carbon market
- **Nature Positive and Net Zero: The Ecology of Real Estate**, Urban Land Institute, 2022
- **Platform for nature & biodiversity for EU corporates**, European Commission
- **Resilient by Nature: Increasing Private Sector Uptake of Nature-based Solutions for Climate-resilient Infrastructure: A Market Assessment for Latin America and the Caribbean**, Inter-American Development Bank (IADB), October 2021
- **Risk Filter Suite – Water & Biodiversity**, WWF
- **The Biodiversity Metric 4.0 (JP039)**, Natura England, July 2021
- **The role of Nature-based Solutions in strategies for Net Zero, Nature Positive and addressing Inequality**, WBCSD, November 2022
- **The Routemap for Zero Avoidable Waste in Construction, Construction Leadership Council**, UK, July 2021
- **Wastewater Impact Assessment Tool (WIAT)**, WBCSD, March 2023
- **50L Home Coalition**, WBCSD

Endnotes

1 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio, E. S., Settele, J., Díaz, S. & Ngo, H. T. (editors). IPBES Secretariat, Bonn, Germany. 1148 pages. Available at https://doi.org/10.5281/zenodo.3831673.

2 World Economic Forum (2020). New Nature Economy Report II: The Future of Nature and Business. Retrieved from: https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business/.

3 Rockström, J., Gupta, J., Qin, D. et al. (2023). Safe and just Earth system boundaries. Nature 619, 102–111. Retrieved from: https://doi.org/10.1038/s41586-023-06083-8.

4 European Financial Reporting Advisory Group (EFRAG) (n.d.). Public consultation on the first set of Draft ESRS. Retrieved from: https://www.efrag.org/lab3?AspxAutoDetectCookieSupport=1.

5 Davies, P. Fortt, S. & Huber, B.M. (2023). ESG Insights: 10 Things That Should Be Top of Mind in 2023. Latham & Watkins. Retrieved from: https://www.globalelr.com/2023/01/esg-insights-10-things-that-should-be-top-of-mind-in-2023/.

6 Business for Nature et al. (2022). How business and finance can contribute to a nature positive future now. Retrieved from: https://www.businessfornature.org/news/nature-positive-discussion-paper

7 https://www.wbcsd.org/Programs/Food-and-Nature/Nature/Nature-Positive/Resources/Business-readiness-to-step-up-action-on-nature-trends-insights-on-corporate-reporting.

8 Business for Nature (2022). How business and finance can contribute to a nature positive future now. Retrieved from: https://www.businessfornature.org/news/nature-positive-discussion-paper

9 McKinsey (2022). Where the world's largest companies stand on nature. Retrieved from: https://www.mckinsey.com/capabilities/sustainability/our-insights/where-the-worlds-largest-companies-stand-on-nature.

10 World Economic Forum (2020). New Nature Economy Report II: The Future of Nature and Business. Retrieved from: https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business/.

11 Global Alliance for Buildings and Construction (2022). 2022 Global Status Report for Buildings and Construction. Retrieved from: https://globalabc.org/our-work/tracking-progress-global-status-report.

12 Kurth, T., Wübbels, G., Portafaix, A., Meyer zum Felde, A. & Zielcke, S. (2021). The Biodiversity Crisis Is a Business Crisis. BCG. Retrieved from: https://web-assets.bcg.com/fb/5e/74af5531468e9c1d4dd5c9fc0bd7/bcg-the-biodiversity-crisis-is-a-business-crisis-mar-2021-rr.pdf.

13 Seto, K., Güneralp, B. and Hutyra, L. R. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. PNAS, September 17, 2012, 109 (40) 16083-16088. Retrieved from: https://www.pnas.org/doi/10.1073/pnas.1211658109.

14 World Economic Forum (2019). 10 cities are predicted to gain megacity status by 2030. Retrieved from: https://www.weforum.org/agenda/2019/02/10-cities-are-predicted-to-gain-megacity-status-by-2030/#:~:text=India%20will%20see%20the%20biggest,joined%20by%20Hyderabad%20and%20Ahmedabad.

15 United Nations Department of Economic and Social Affairs (2018). 68% of the world population projected to live in urban areas by 2050, says UN. Retrieved from: https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html.

16 United Nations Department of Economic and Social Affairs (2018). Around 2.5 billion more people will be living in cities by 2050, projects new UN report.

17 ARUP (2018). First steps towards a circular built environment. Retrieved from: https://www.arup.com/perspectives/publications/research/section/first-steps-towards-a-circular-built-environment.

18 United Nations Department of Economic and Social Affairs (2017). World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100. Retrieved from: https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100.

19 In the context of an urbanized environment, green and blue infrastructure is all natural and semi-natural landscape elements that (could) form a green-blue network. It can refer to landscape elements on various spatial scales: from individual rows of trees to complete valley systems. Examples of green landscape elements are hedgerows, orchards, woodlands, natural grasslands and, in an urban context, urban parks, green roofs and green walls. Blue landscape elements are linked to water. They can be pools, ponds, wadis, artificial buffer basins or water courses. Together, they form the green-blue infrastructure.

20 United Nations Environment Programme (UNEP) (2022). 2022 Global Status Report for Buildings and Construction. Retrieved from: https://globalabc.org/resources/publications/2022-global-status-report-buildings-and-construction.

21 United Nations Environment Programme (UNEP) (2022). 2022 Global Status Report for Buildings and Construction. Retrieved from: https://globalabc.org/resources/publications/2022-global-status-report-buildings-and-construction.

22 Taskforce on Nature-related Financial Disclosures (TNFD) (2023). Nature-related Risk and Opportunity Management and Disclosure Framework Beta v0.4 Annex 4.10 Additional guidance on scenario analysis. Retrieved from: https://framework.tnfd.global/wpcontent/uploads/2023/03/23-23882-TNFD_v0.4_Annex_4.10_v5-2. pdf.

23 Policy development related to biodiversity conservation increasingly uses zero deforestation and zero conversion of natural ecosystems.

24 Companies should base no net loss (NNL) and net gain (NG) approaches on a clear biodiversity accounting framework that at least includes the extent and condition information. A good example is the Biodiversity Metric 4.0 as used in the UK (see Natural England (2021), The Biodiversity Metric 4.0, at **https://publications.naturalengland.org.uk/publication/6049804846366720**). As in the UK, governments can best impose and regulate NNL/NG but companies should apply NNL/NG in the absence of regulation too.

25 KBA are "sites contributing significantly to the global persistence of biodiversity" in terrestrial, freshwater and marine ecosystems. Source: IUCN (2016). A Global Standard for the Identification of Key Biodiversity Areas: Version 1.0. Retrieved from: **https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf**.

26 WBCSD (2022). If we act today we can halve the emissions of the built environment by 2030. 3 November 2022. Retrieved from: **https://www.wbcsd.org/Overview/News-Insights/WBCSD-insights/If-we-act-today-we-can-halve-the-emissions-of-the-built-environment-by-2030**.

27 Science-Based Targets for Nature (2020). Initial Guidance for Business. Retrieved from: **https://sciencebasedtargetsnetwork.org/wp-content/uploads/2020/09/SBTN-initial-guidance-for-business.pdf**.

28 zu Ermgassen, S.O.S.E., Utamiputri, P., Bennun, L., Edwards, S. & Bull, J.W. (2019). The Role of "No Net Loss" Policies in Conserving Biodiversity Threatened by the Global Infrastructure Boom. One Earth, Volume 1, Issue 3, 2019, Pages 305-315. Retrieved from: **https://www.sciencedirect.com/science/article/pii/S2590332219301332#bib31**.

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