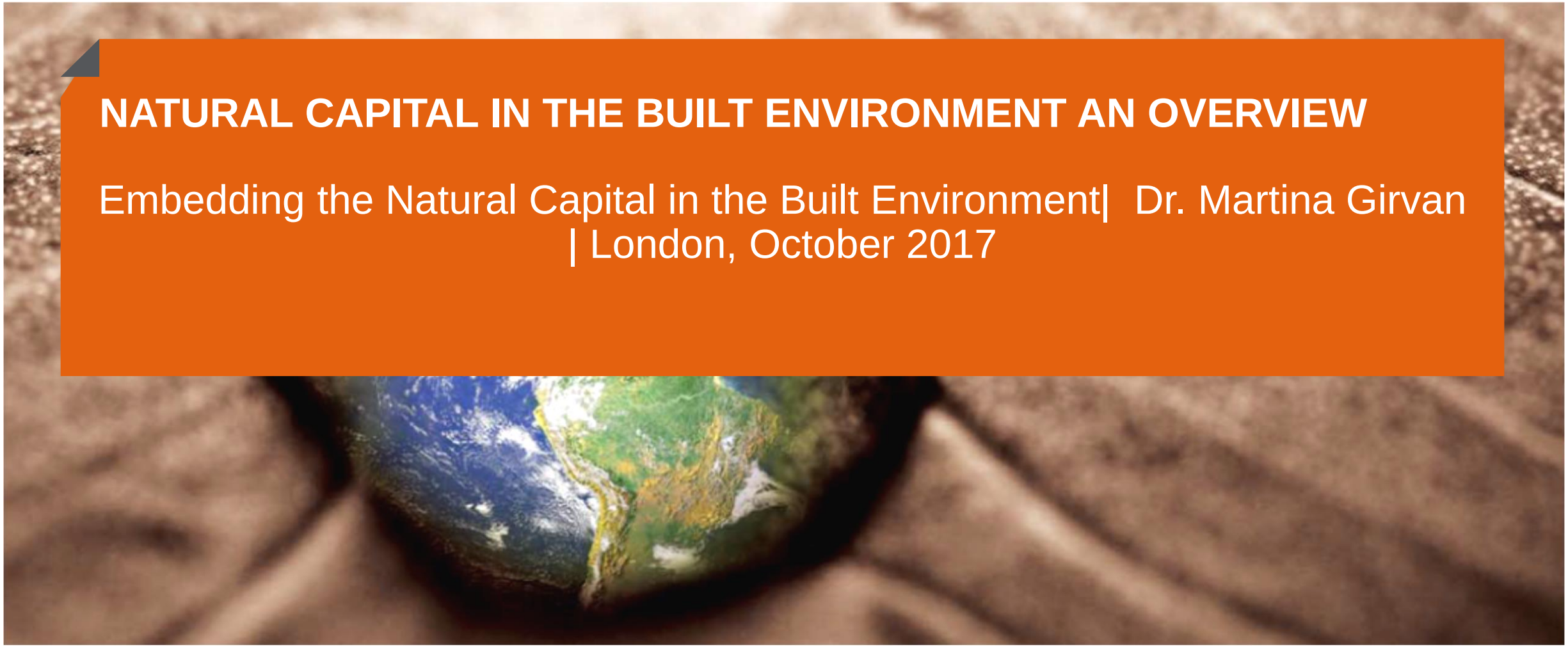
ARCADIS Design & Consultancy for natural and built assets

NATURAL CAPITAL IN THE BUILT ENVIRONMENT AN OVERVIEW

Embedding the Natural Capital in the Built Environment| Dr. Martina Girvan | London, October 2017



Presentation outline

- What is the natural capital approach?
- How does this relate to the built environment?
- How can it generate added value?
- How this can relate to our clients and projects, examples.
- What we can all do.
- Next steps and tools for implementation and embedding.

What is the natural capital approach?

- Although the term 'natural capital' was first used in 1973 by E.F. Schumacher in his book ***Small Is Beautiful,*** but the "***Tragedy of the Commons***" is an economic theory originated in1833 by the Victorian economist William Forster Lloyd, coining a phrase for the situation within a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting that resource through their collective action.

What is the natural capital approach?

- **Natural capital** is the "***stock of renewable and non-renewable natural resources*** *e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people*" (Natural Capital Protocol 2016). Natural capital assets provide people with a wide range of "free" goods and services, often called **ecosystem services**, which underpin our economy and society and some of which even make human life possible.
- The natural capital approach uses the **valuation** of these benefits to society to ensure that the decisions we make are based on holistic, real world scenarios. This requires the **qualification**, **quantification** and sometimes the **monetisation** of these benefits.

Biodiversity - the benefits of complexity ☺

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Eukaryotic diversity on Earth was estimated to be approx. 8.7 million (8.7×10^6) species in total[a]

One individual sample of 10g soil was estimated to contain 8.3 million (8.3×10^6) microbial species[b]

This complexity of biodiversity is what underpins our ecosystem to make our natural capital so productive, resistant to perturbations and resilient i.e. useful! [cd] ☺

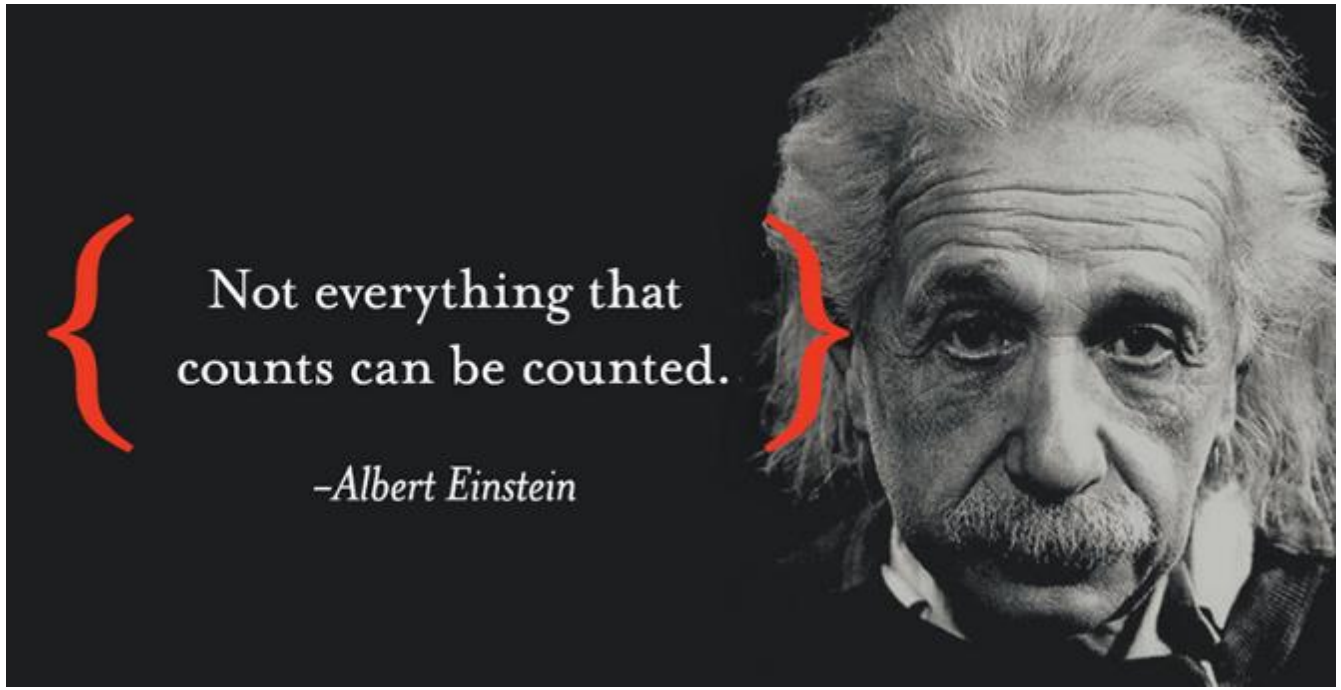
[a] Mora C, Tittensor DP, Adl S, Simpson AGB, Worm B (2011) How Many Species Are There on Earth and in the Ocean? *PLoS Biol* 9(8): e1001127. doi:10.1371/journal.pbio.1001127

[b] Jason Gans, Murray Wolinsky, and John Dunbar (2005) Computational Improvements Reveal Great Bacterial Diversity and High Metal Toxicity in Soil *Science* : 309 (5739), 1387-1390.

[c] Girvan M. S., L.A. Glover, K. Killham, C. Campbell, J.I. Prosser. 2005. Bacterial Diversity Promotes Community Stability and Functional Resilience after Perturbation. Environmental Microbiology.

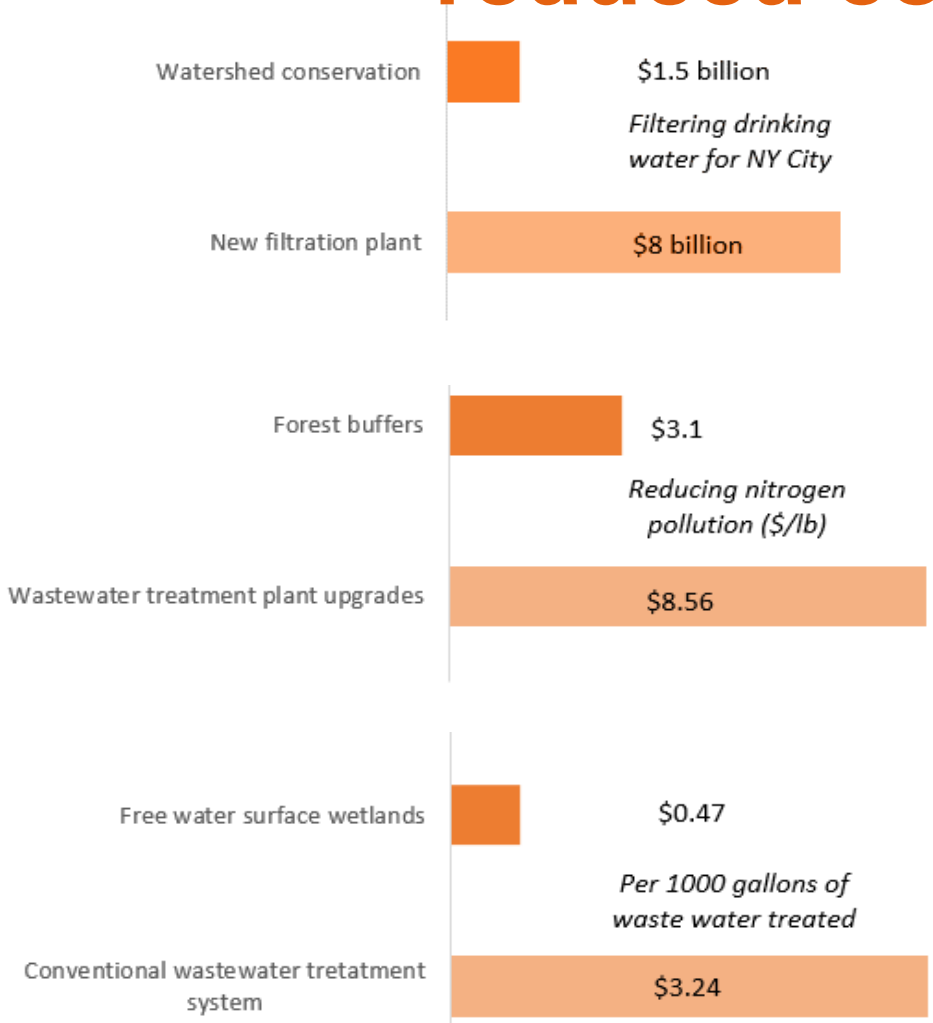
[d] Cardinale *et al*., 2012. Biodiversity loss and its impact on humanity. *Nature,* 486**,** 59–67.

Biodiversity the challenges of complexity ☹



Biodiversity is an incredibly complex area and biodiversity professionals can get lost in measuring and counting loss rather than seeking gains. We need to reduce this complexity in order to measure, value and communicate these benefits in a meaningful way that is tangible to business and community. The natural capital approach can help with this message as it relates directly to human and financial benefits.

How can the natural capital approach can add value to the built environment: reduced costs

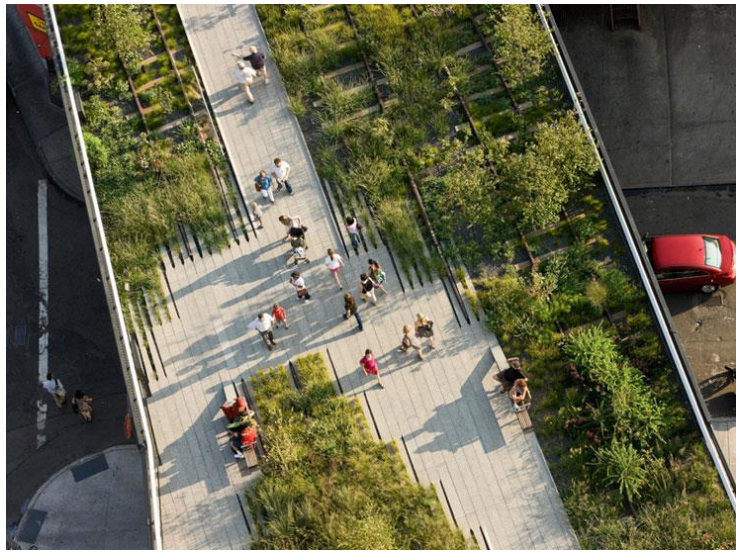


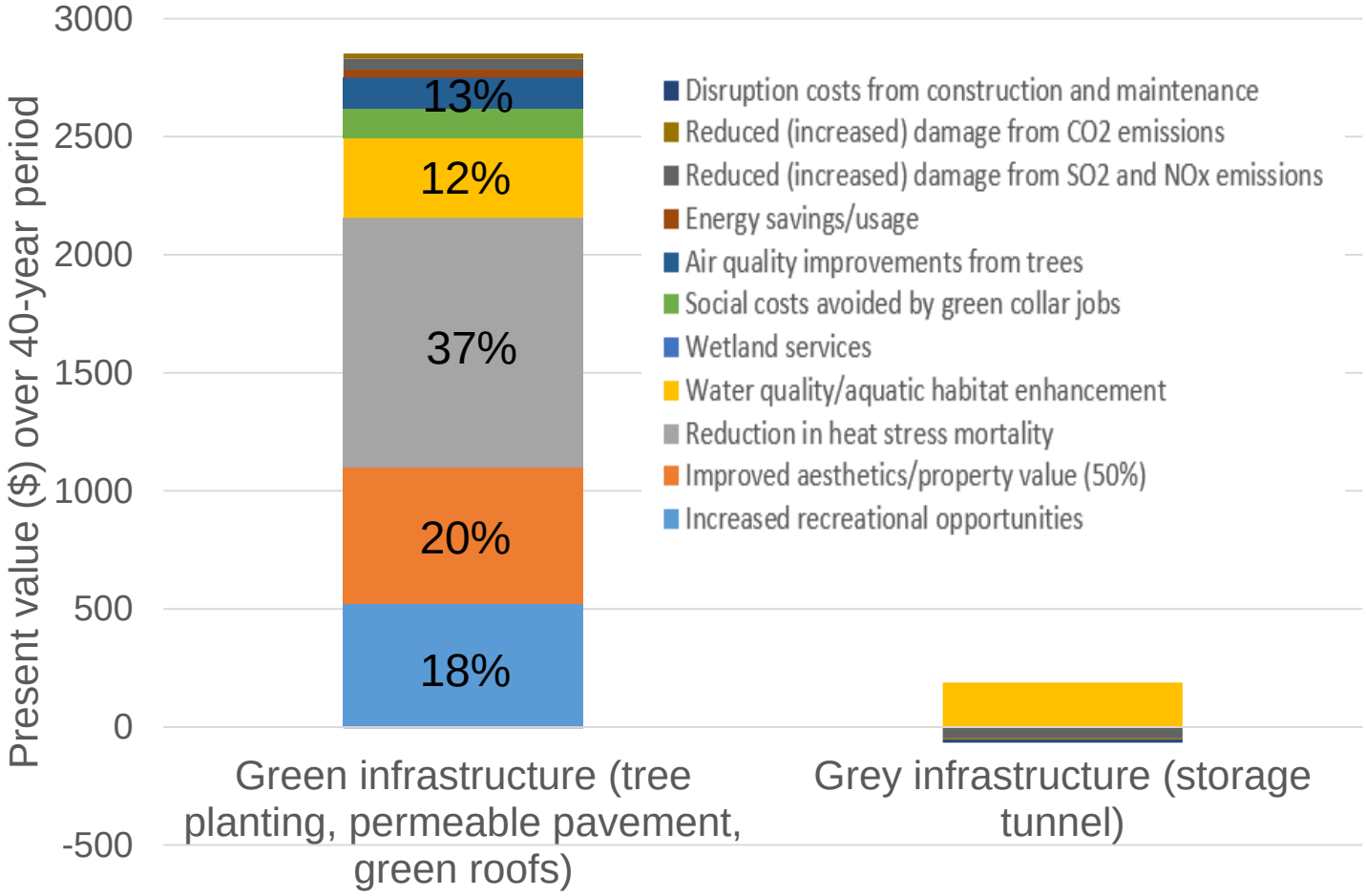
http://www.seesouthernforests.org/news/forests-water-us-south

Cost

Green vs Grey

How can the natural capital approach can add value to the built environment: increased benefits



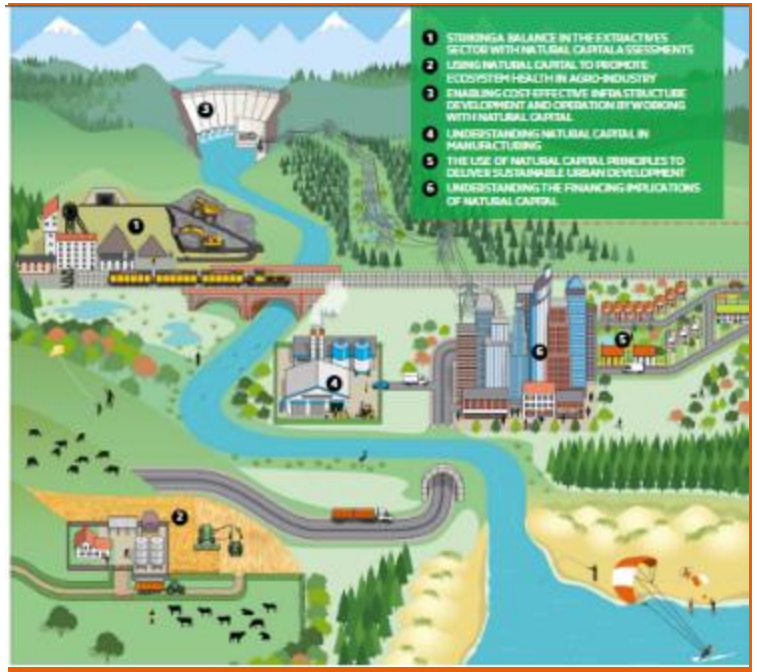


https://www.epa.gov/green-infrastructure/triple-bottom-line-assessment

Benefits

What services can we offer?

	Corporate + Finance	Finance + Site + Corporate	Site + Finance + Corporate	Corporate + Supply +Site	Supply Chain	Corporate + Site + Supply Chain
Guiding Corporate Strategy						
Maximizing Site Value						
Securing Sustainable Finance						
Securing Sustainable Supply						
	Attract environmentally aware investors and lenders, by creating revenue opportunities with innovative product and service solutions, maximizing profit	Comply with, and stay ahead of, impending regulatory changes - IFC Performance Standards (e.g., IFC PS6) and manage Equator Principles	Maximize efficiencies and avoid liabilities by maximizing the GI design and ecosystem services - thus boosting productivity and brand value	Differentiate your brand through superior purchasing, operating, or investment practices	Demonstrate leadership value by creating new markets through education around high-performing sustainable products - winning trust and loyalty	Involve stakeholders, to identify and value natural capital risks and opportunities, enabling fair redevelopment evaluations, optimization of business strategy and maintenance of license to produce



Arcadis White Paper Making Natural Capital Count https://www.arcadis.com/en/global/our-perspectives/2016/07/making-natural-capital-count/.

Applying the natural capital approach throughout the project lifecycle

- Valuing the natural capital assets provided by biodiversity appropriately, realising the risks and opportunities associated with them enable us to maximise the benefits and minimise the impacts

wbcsd urban

Birmingham City Council

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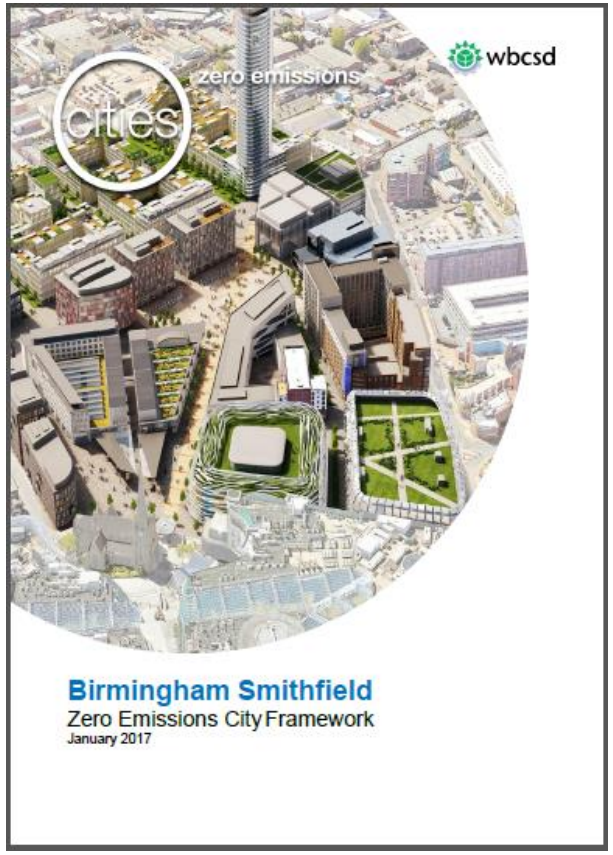
Strategy, Design, Planning and Procurement: Zero Emission Cities (ZEC) Birmingham Smithfield Development Zone STAR (Sustainable Tools for Assessing and Rating Communities) Framework



http://www.wbcsd.org/Projects/Zero-Emissions-Cities

- Sustainability framework was being developed to achieve the aspirations of the development and financing for Smithfield for BCC.
- We introduced a natural capital focus and ensured that it was embedded into all of the core sustainability principles.
- Key interventions were identified to deliver these aspirations, and the need to demonstrate financial viability to provide investor security around delivery.
- Cost/benefit analysis of green infrastructure solutions.
- A sustainable development at Smithfield to cement the city's leading position on natural capital and its lead as the first UK Biophilic City.

1.Energy and Climate Action

2.Water

3.Waste

4.Buildings

5.Natural Capital

6.Transport and Accessibility

7.Materials and Resources

8.Community and Culture

9.Local Economy

10.Health and Wellbeing

Showing how natural capital approaches can also be the most economically viable approaches, balancing money making with place making

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Design and Planning: NW Bicester Eco-Town Masterplanning

- New community of around 6,000 homes/ employment opportunities / community amenities on greenfield land
- Exemplar site of 393 homes, now complete while the masterplan for the wider is now being detailed for the remainder of the site.
- Arcadis designed the green and blue infrastructure, around which the masterplan was developed, to maximize natural capital benefits, reduce operational dependencies and deliver a net gain in biodiversity.

Designed around the ten principles of One Planet Living

1. Zero carbon
2. Zero waste
3. Sustainable transport
4. Sustainable materials
5. Local and sustainable food
6. Sustainable water
7. Land and wildlife
8. Culture and heritage
9. Equity and local economy
10. Health and happiness

Developing a new town on greenfield land, providing a healthy place to live while adhering to legislation and policy while promoting net gain in biodiversity

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Biodiversity net gain combined with the natural capital approach

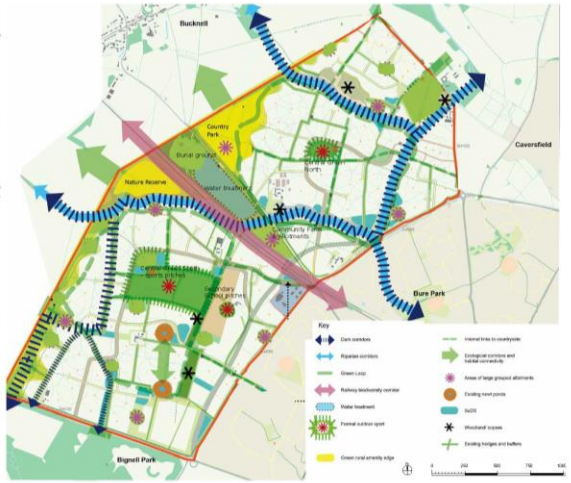
ONE PLANET COMMUNITIES

GI retained landscape & buffers

NW Bicester Masterplan provides Green infrastructure of 40% site area, and achieves net gain in biodiversity with:
- Retention of existing habitats: woodland, hedgerows and habitats around the River Bure and its tributaries
- Buffer zones:
  - 60m across watercourses with flexible width either side.
  - 20m across hedgerows with flexible width either side.
  - 10m from woodlands.
  - 40 m across 'dark corridors' for nocturnal species.
- Creation of new habitats including: Nature Reserve, Country Park, wetland area, SuDS ponds and damp grassland.
- Multi-functional GI areas, e.g. locating play areas within green space.

GI amenity space & recreation

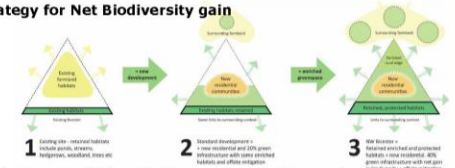
NW Bicester Masterplan provides Green infrastructure of 40% site area, half of which is publicly accessible amenity and recreation with:
- 16 ha of Sports pitches in two areas; the main sports area in a Central Green south of rail near secondary school and local sport area in a Central Green north of rail.
- Play spaces totalling 11 ha distributed throughout the site.
- 5.5 ha of Allotments distributed throughout the site.
- The 1 ha community farm in the triangle.
- A burial ground of 4ha in the triangle
- General amenity space distributed throughout the site; including the country park, local parks in the "green loop" and local greenways distributed throughout the site.
- A network of segregated footpaths and cycleways, providing both direct connectivity through the site and leisure routes in the "green loop".



Play & Recreation Areas

Allotments

Strategy for Net Biodiversity gain



Birds that would benefit from offsite habitat enhancement

Birds that will benefit from green space within the masterplan

Species attracted by green spaces in masterplan

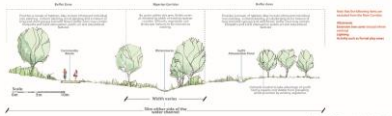
Amphibians and fish that will benefit from green space in the masterplan

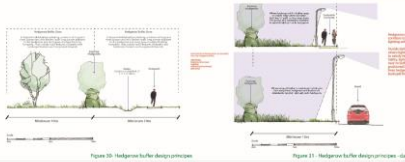
Mammals that will benefit from green space in the masterplan

Invertebrates that will benefit from green space in the masterplan.

Bats that will benefit from green space in the masterplan

north west bicester | a2dominion | BARTON WILLMORE | Hyder | SQW | RANDALLTHORP | Bioregional | FARRELLS





Biodiversity Units Prior to Development	Biodiversity Units Post Development	Change in Biodiversity Units
553.94	829.57	+275.63

A landscape driven masterplan intrinsically linking biodiversity net gain within the design has also been selected for one of ten NHS Healthy Town Initiatives and has been awarded the One Planet Living status and soon to be published ICE Paper on the benefits of SuDS

Transport for London

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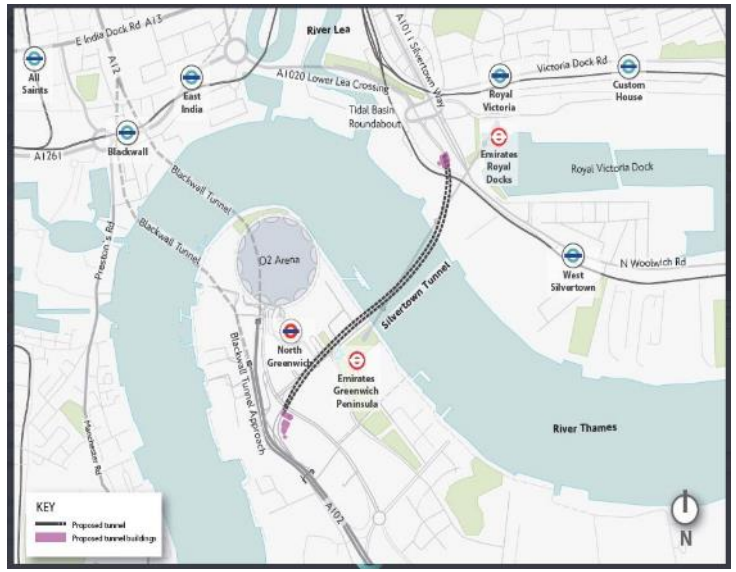
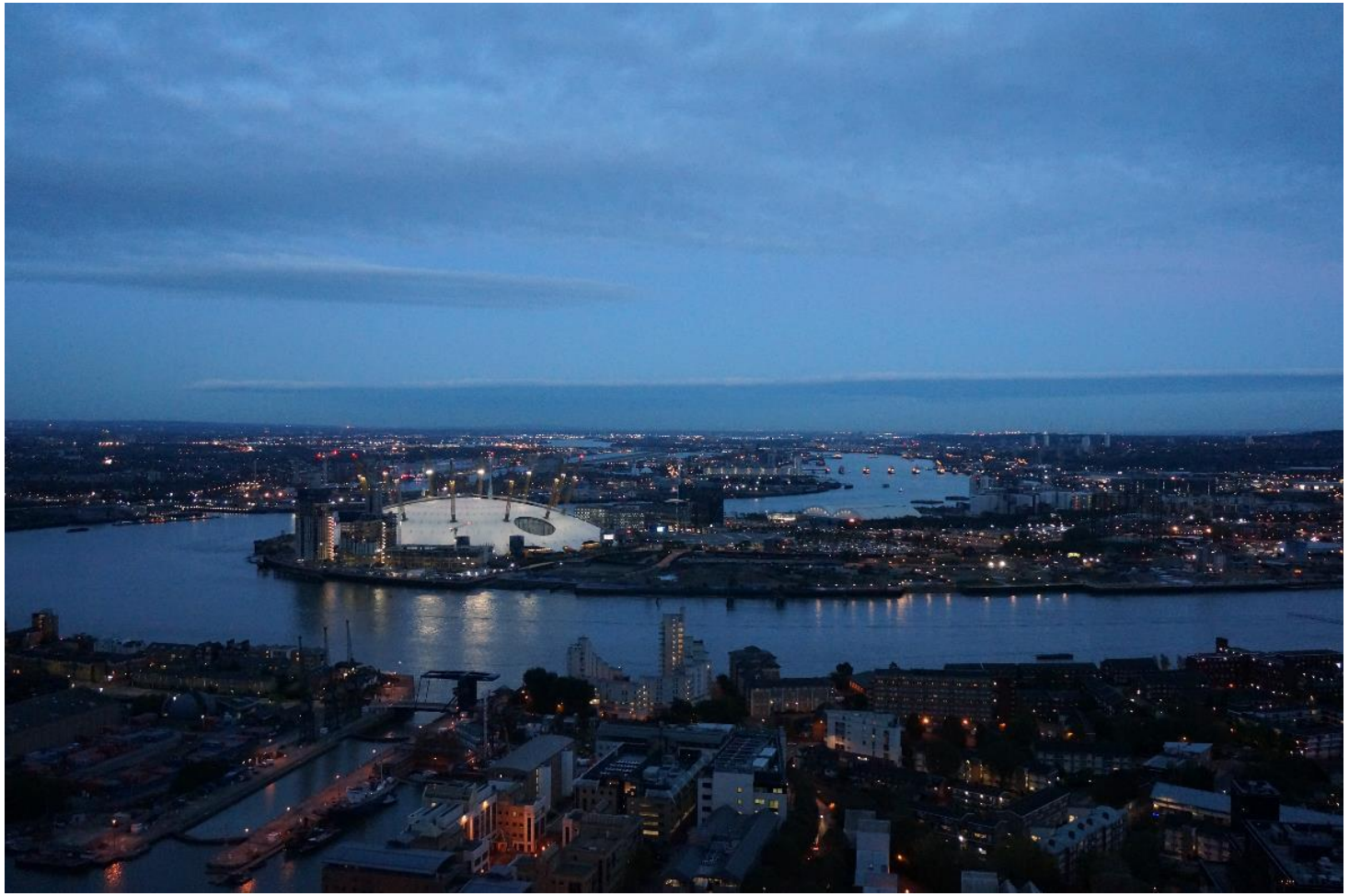
Design and Planning: Silvertown Tunnel Crossing EIA

A challenge to demonstrate no significant residual effects to achieve planning consents and with an uncertain landscape design





Requirement to submit an NSIP Environmental Statement with certainty on Mitigation and Residual Effects without a detailed design in place

Transport for London

Silvertown Tunnel Crossing

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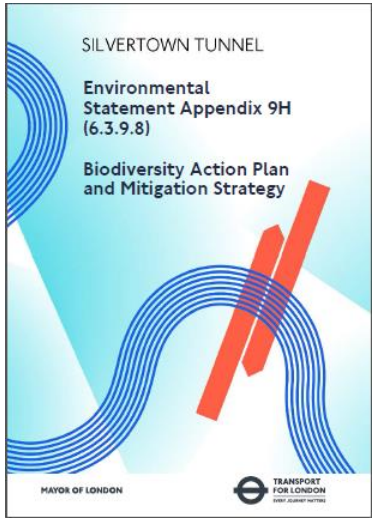
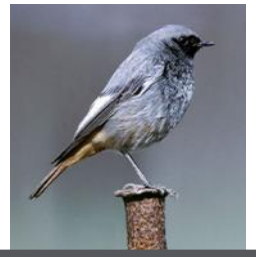
Design and Planning: principles and offsetting strategy to provide certainty for biodiversity



- Poor quality brownfield land in between developed areas
- Uncertain landscape design strategy
- Very high commercially valuable land
- Silvertown Tunnel BAP and Mitigation Strategy
- Sets out detailed design parameters for key receptors on and off site
- Natural capital value of baseline calculated
- Worst case scenario for on site habitat replacement deficit modelled
- Capital sum negotiated for offsetting to be spent as directed in the BAP by the LPA agreed under Section 106 wording to confirm implementation of BAP parameters
- Design Review Panel, KPIs for project criteria and auditing to ensure implementation




Demonstrating net gain for planning without the need for CPO of land outwith the Order limits which would be fragmented, incredibly expensive and hard to obtain thus maximizing the value of biodiversity mitigation

Ensuring Sustainable Finance

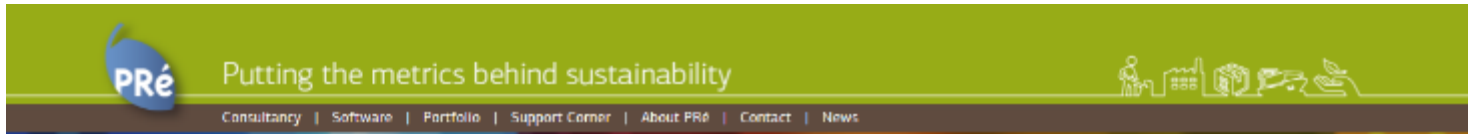
IFC PS 6 compliant
Biodiversity Action Plan

Client Challenge

In need of a clear approach to address issues of net gain in critical habitats, with no net loss of natural habitat or ecosystem services, and complying to IFC PS6

Yamal LNG

Outcome: Managed PS6 compliance issues ensuring that terms of reference for the work, contracted specialists, and resulting Biodiversity Action Plan aligned with expectations of Good International Industry Practice



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platform biodiversity, ecosystems & economy

Operational: Supply Chain Analysis - BioScope

This web based tool provides a simplified LCA which is free for all to use. It provides users with a rapid and general insight into the type, location and intensity of their most important impacts on biodiversity and ecosystems in their value chains. Based on the outcome they make clear decisions on how these impacts can be managed.

Commodities Traded + Origin of Commodity + Volume of commodity

What, Where and How?

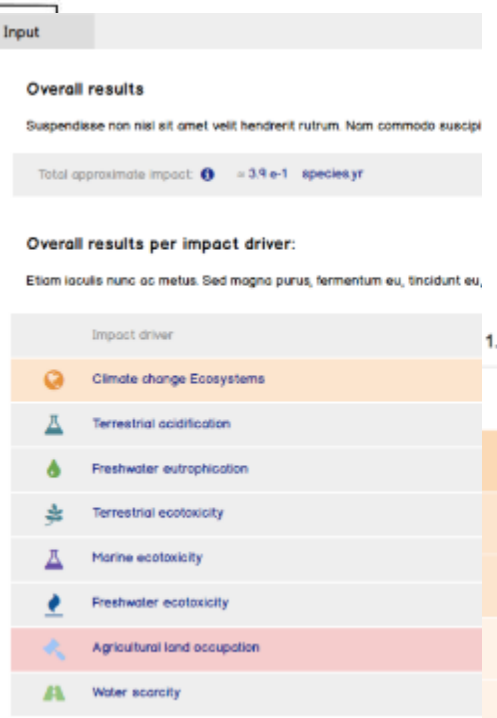
Impact Intensity and Location

The analysis are based on a combination of Exiobase – ReCiPe data which maps the impact drivers of certain commodities. The web-based tool shall have a user-friendly user interface.

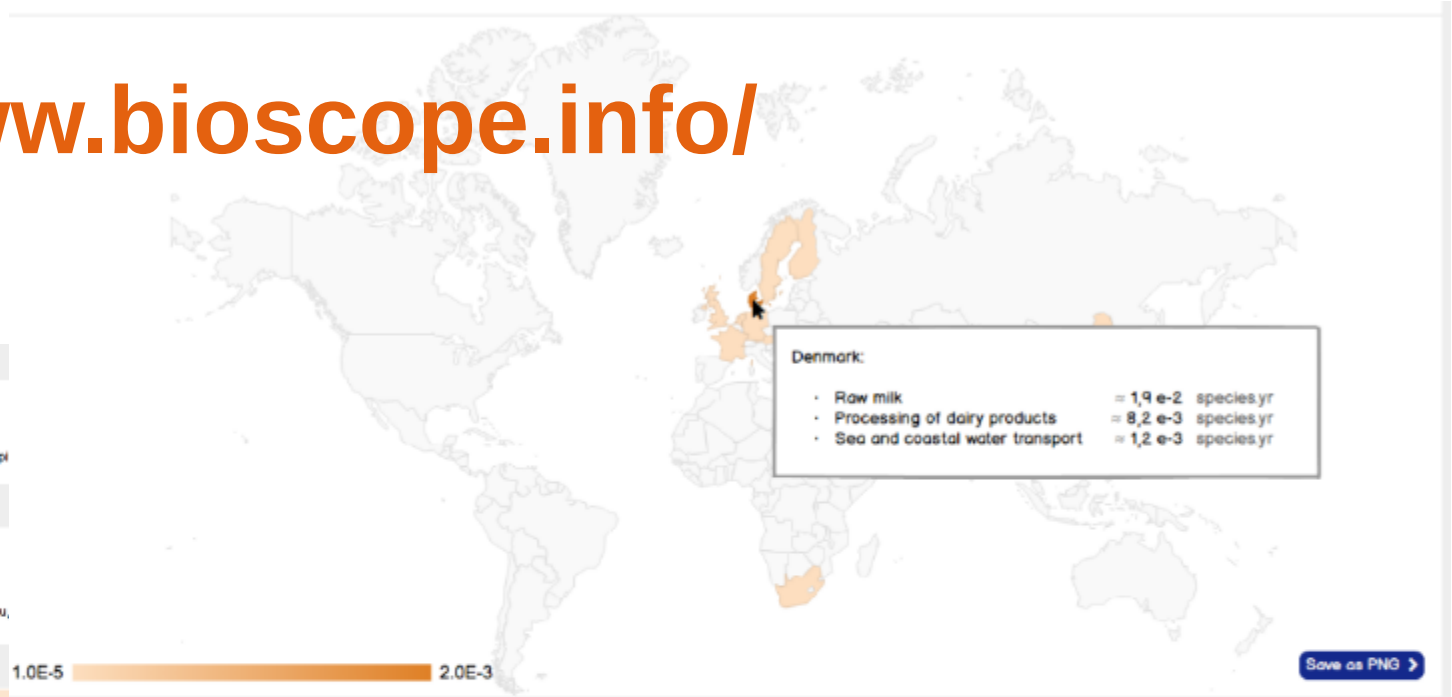
Simple, Interactive Measuring Engages the NC Issue and Promotes Positive Direction of Travel in Impact Reduction with Readily Implementable Measures

BioScope, https://www.bioscope.info/

Simple data entry



Intensity per impact c

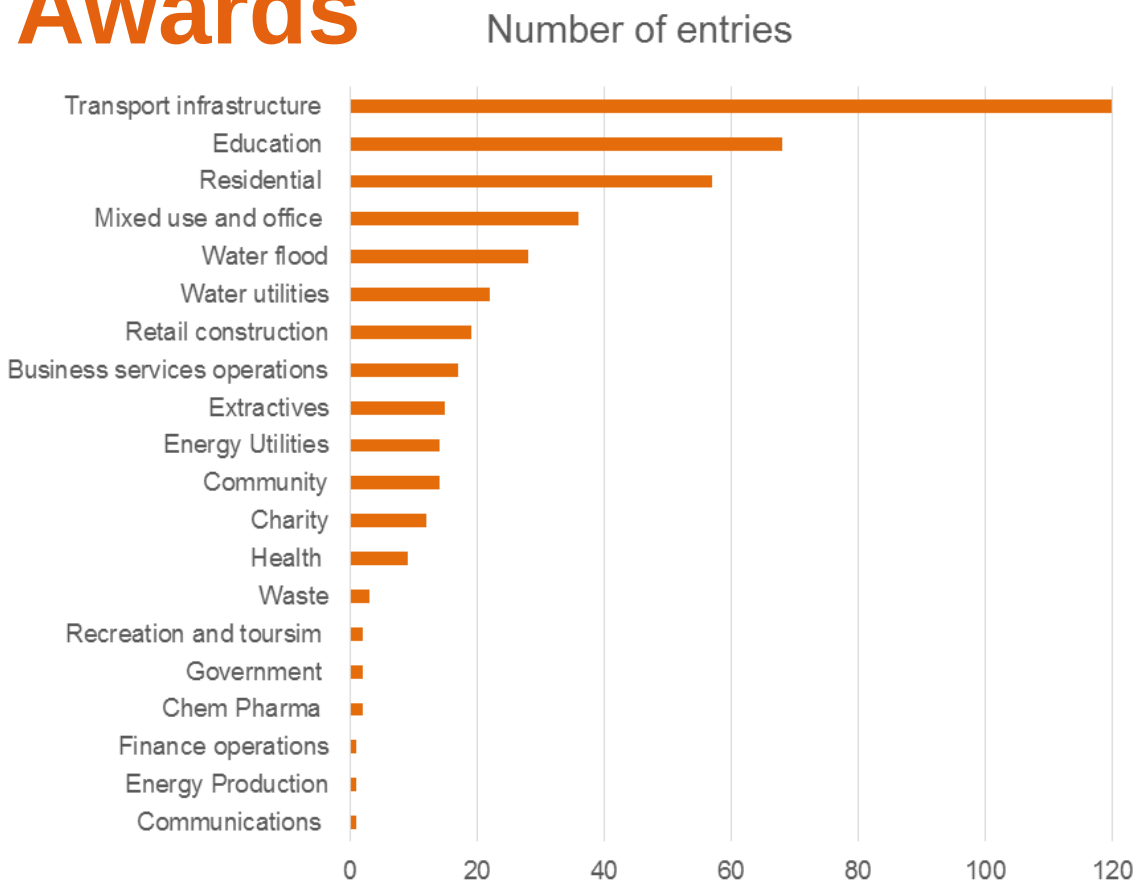


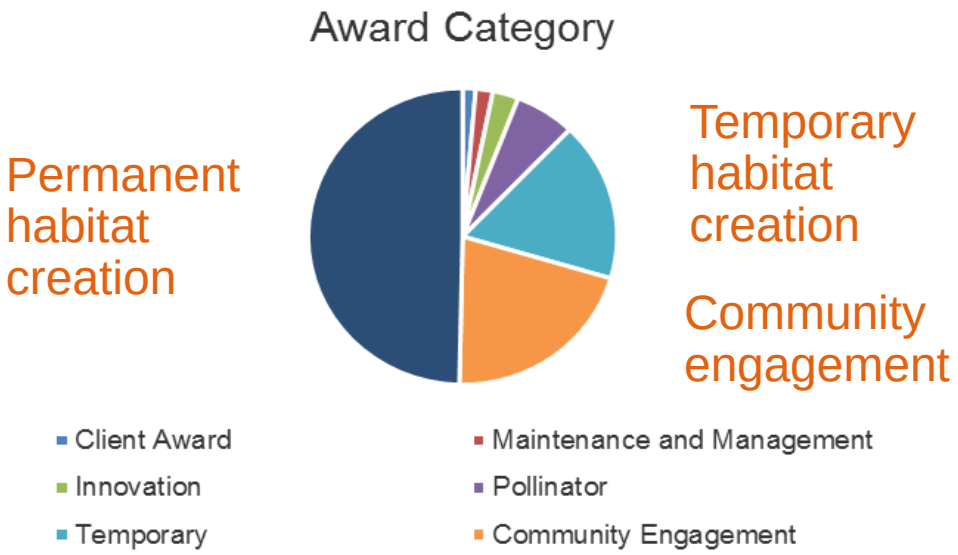
Process	Country of origin	Approximate impact	Relative contribution
Raw milk	Denmark	≈ 1,9 e-2 species.yr	36%
Processing of dairy products	Denmark	≈ 8,2 e-3 species.yr	15%
Manufacture of basic iron and steel and of ferro-alloys and first products thereof	Sweden	≈ 7,3 e-3 species.yr	14%
Processing of dairy products	Rest of Middle East	≈ 2,8 e-3 species.yr	5%
Manufacture of basic iron and steel and of ferro-alloys and first products thereof	Sweden	≈ 2,1 e-3 species.yr	4%
Sea and coastal water transport	Denmark	≈ 1,2 e-3 species.yr	2%

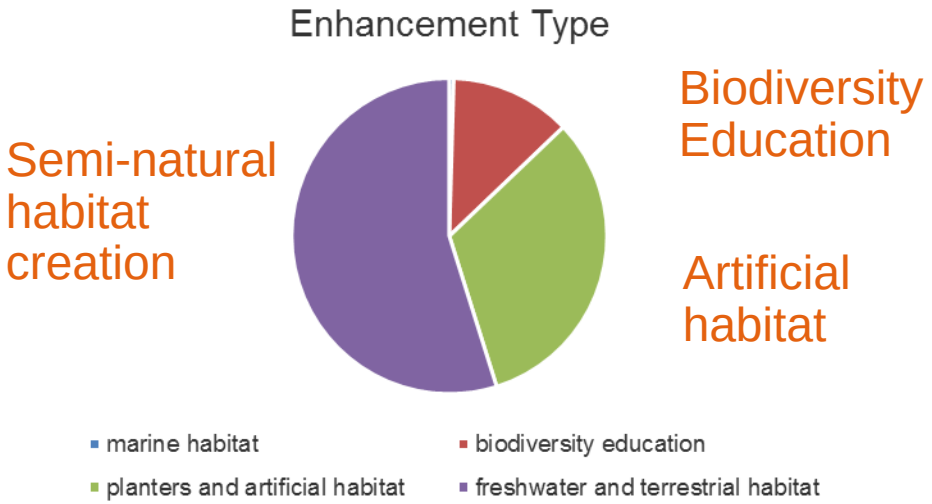
Top 3 impacts, intensities and location of impacts

Demonstrates Clearly at a High Level Easy to Communicate Cross Sector, Cross Discipline and Globally

Operational, Differentiating the Brand: CIRIA BIG Awards







As well as the benefits that come from community engagement there is an increasing recognition as to the value that can be returned in terms of brand differentiation

What we can all do

Recognise the value of habitats likely to performing important ecosystem services (such as water quality and volume attenuation, air quality and heat attenuation etc.) in addition to their value as reservoirs of biodiversity.

Identify all of the natural capital benefits biodiversity underpins and liaise as early as possible with the design team to include and cost for mitigation and enhancements

Why should we use the natural capital approach in the built environment

- Rapid attainment of consents reducing permitting costs
- Reduced capital and operational costs
- Greater efficiency and resilience in systems (climate adaptation)
- Differentiation of brand value
- Multiple secondary benefits
- Releasing land for affordable homes
- Offsetting potential
- And much more

Next steps

Arcadis Collaborations and Initiatives

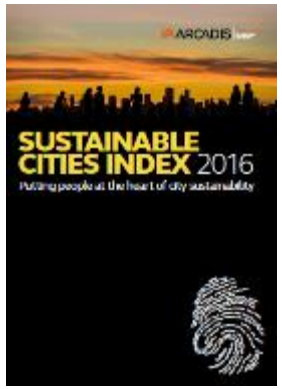
JNCC
Joint Nature Conservation Committee

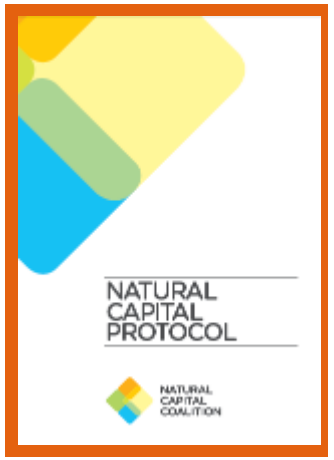
http://businessbiodiversity.in/

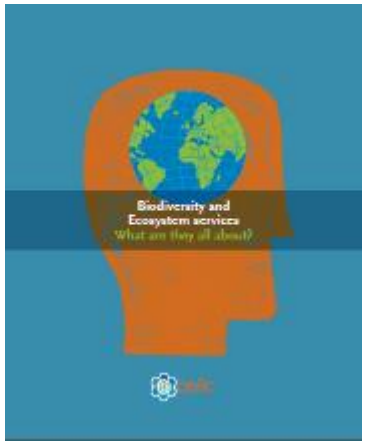
http://www.naturalinfrastructureforbusiness.org/news-story/

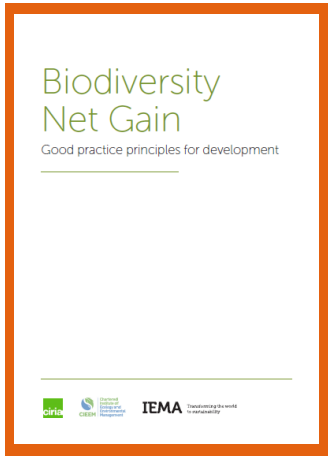
https://www.arcadis.com/en/global/our-perspectives/2016/07/making-natural-capital-count

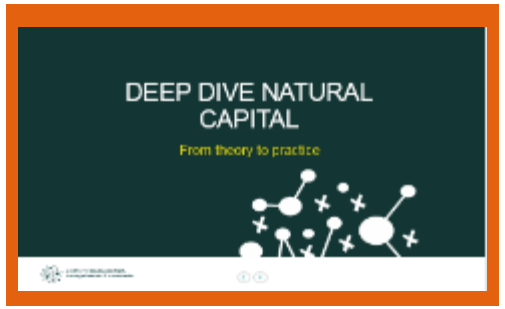
Knowledge Sharing











Practice makes Perfect!

NCI/Arcadis conference and workshop 6th October Arcadis House in London

https://www.eventbrite.com/e/embedding-the-natural-capital-approach-in-the-built-environment-sector-tickets-36722157963

Collaborating with partners, sharing with all and practising as often as possible!

“An ounce of practice is generally worth more than a ton of theory.”

Ernst F. Schumacher, Small Is Beautiful: A Study of Economics as if People Mattered

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Making Natural Capital Count: matching economic generation with environmental preservation