

Measures for successful outcomes: the five capitals approach - A discussion paper

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Chief Executive's foreword

I am writing this in the midst of the COVID-19 crisis. At first glance, the issues shared in this paper might seem somewhat disconnected from what we're currently experiencing. However, on closer inspection it becomes clear that the themes explored in the five capitals model are intrinsically linked to how the country will respond to the crisis.

Weeks of lockdown have revealed that life is healthier without air pollution caused by congestion, that business can continue without staff undertaking long commutes and that badly designed homes with poor access to social infrastructure are, in fact, detrimental to health and wellbeing in a lockdown.

While it goes without saying that our sector will be instrumental in any recovery plan – both as a catalyst for kickstarting growth and in its own right – I believe that the crisis will profoundly affect expectations from society on what and how we build. We will need to look beyond a purely financial return and view our infrastructure holistically, exploring the natural, social, human and manufactured capitals alongside it, in order to meet these new expectations.

Of course, all of this is easier said than done. This is why our paper aims to frame a discussion rather than promote a specific approach. What is certain is that the detailed metrics and measurements for each capital will need to be further defined. Only then will public and private sector clients have confidence that the right decisions are being taken. What is certain is that this is vital work which will not only enable our industry to meet new demands emerging from the public, but also ensure we're able to tackle the longer-term challenges of delivering a net zero society.

While this paper doesn't aim to provide all of the answers, it feeds into wider work in this space. We're delighted that the Construction Innovation Hub will be developing the five capitals model further for the Construction Leadership Council, progressing it into a workable model which can allow Government to demonstrate value which looks beyond a financial prism.

Sustainability in the wider sense is never too far away from our conversations. Through the net zero agenda it has become fundamental to our work. Not only in what we choose to design but how this is delivered. The upcoming infrastructure strategy is likely to face these questions too – how can we ensure that it delivers across the five capitals?

This discussion paper, although focused in its remit, is a key piece of the jigsaw puzzle enabling our industry to start to answer some of the questions that are, rightly, being asked of it.



Hannah Vickers,
Chief Executive, Association for Consultancy and Engineering (ACE).



Chair's introduction

ACE's sustainability group represents a cross section of the consultancy organisations responsible for designing and delivering buildings and infrastructure.

We provide a forum to promote how our consultancy services interlink with the sustainable development agenda and use the expertise and skills in this area to inform government policy through consultations and lobbying. We provide support for members on their own sustainability journey and feed into ACE activities to promote sustainability to the wider sector.



Individual aspects of sustainability are attracting attention across sectors, shaping our understanding, and looking at ways to improve measurement and management; net positive biodiversity, social value and climate emergency are examples of aspects that have developed and gained significantly more interest in the last few years. The current COVID-19 crisis is a stark reminder that our social connections and community resilience rely on the infrastructure and places we design and build. The challenge comes in bringing this understanding into an integrated decision-making process that can combine aspects in a consistent way and addressing the disconnects that exist. When the opportunity and importance of all aspects of sustainability are properly considered together, the outcomes are greatly improved for all.

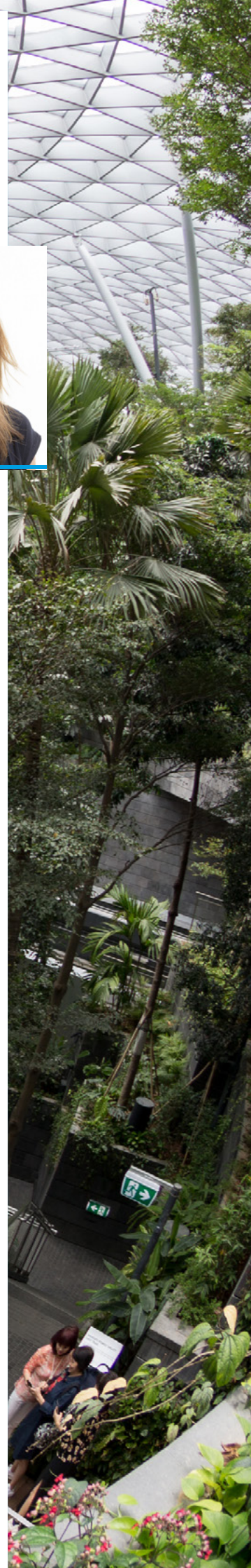
This paper puts forward our recommended model for measuring and assessing sustainability in procurement, design and delivery. The five capitals model is intended to provide a balanced approach to defining value on a project and allows the social and environmental aspects to be considered on a par with the traditional economic factors. We have some great examples from our members of where positive outcomes have been achieved, and know that, as a sector, we can deliver sustainable outcomes on a project. For this to happen, what is meant by value for the project needs to be clearly defined and effectively procured. The five capitals approach, and the outcomes based value definitions we suggest, offer a framework for the whole value chain to communicate what sustainability means for them and to define success.

This report outlines the model and gives examples of measures and successful projects, to offer clarity on the types of measures that may be appropriate. ACE's sustainability group will continue to work with others, such as the Construction Innovation Hub, who are looking at the development of the five capitals model for procurement in more detail. We believe that using a holistic model such as this can help to address the immediate climate and biodiversity emergency that we face, whilst considering wider implications of our actions on communities and individuals.

A handwritten signature in black ink, appearing to read 'N Cropp'.

Natalie Cropp,

Associate Director, Tony Gee and Partners LLP
& Chair, ACE sustainability group.



An integrated model for the sustainable built environment

The language around sustainability is as varied as the views on what it means. If we are to achieve a meaningful sustainable outcome, every organisation – and even project – will need to assess what aspects of sustainability are relevant to them in their political, environmental and social context.

As a sector we have proven that we can deliver sustainable projects. In this paper, we look at some examples of success from our members, and how we can build on that that success to improve delivery across the board.

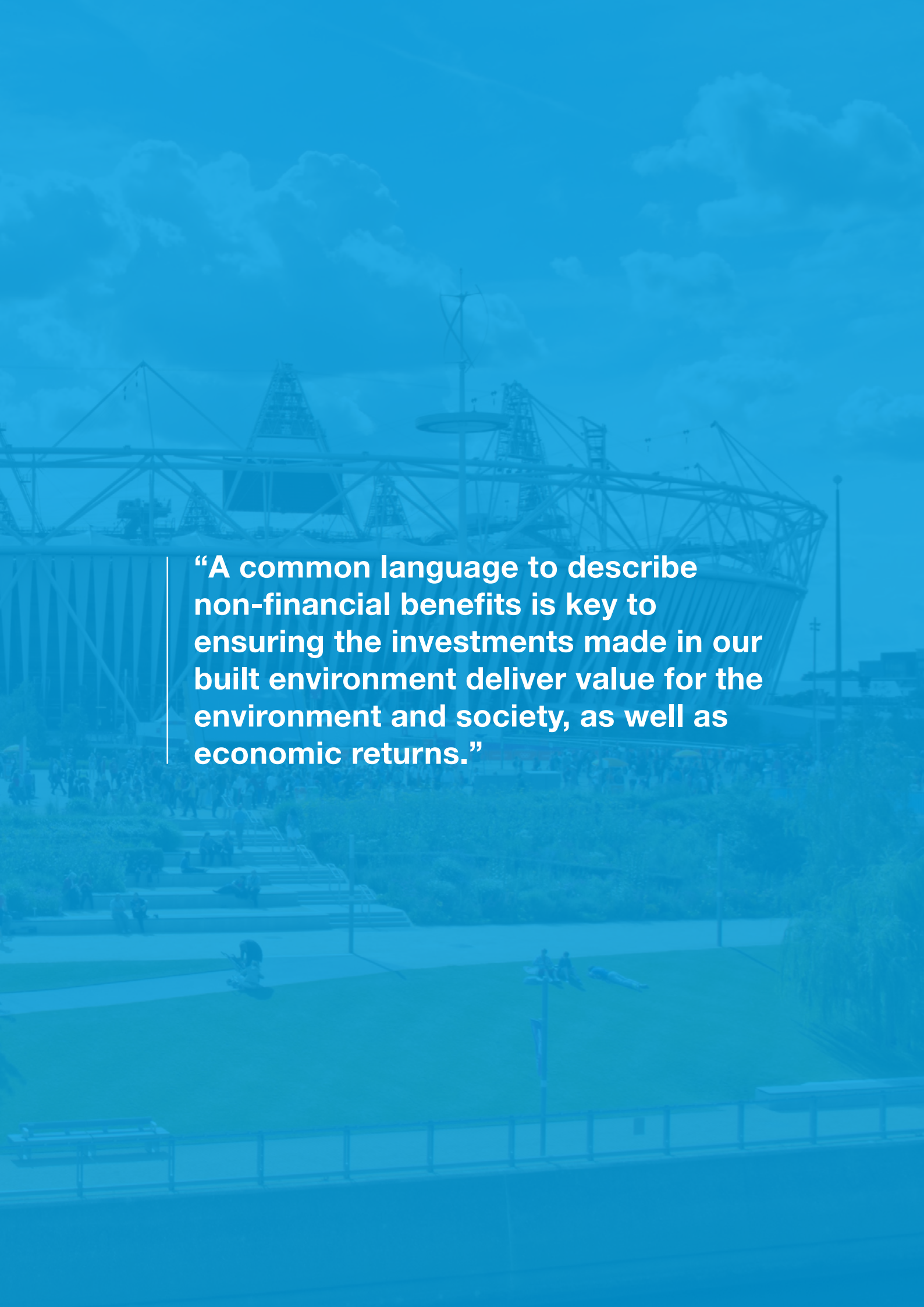
To support this conversation, ACE's sustainability group proposes following a five capitals model which builds on the framework allowing a client to define what value means to them in the context of a specific investment.

This definition of value then unlocks the ability to develop a commercial model and supply chain structure around a wider value proposition, rather than just cost and volume. This can be taken through design, construction and even when measuring the delivered outcomes of the final project.

A similar approach has been taken in the automotive industry where there has been an evolution of supply chain dynamics to streamline low-value processes into a production line, whilst maintaining appropriate value interactions. We believe this can be achieved in the built environment too through initiating an understanding of value within the design process, rather than the construction process.

Having this clarity, and a common language to describe non-financial benefits, is key to ensuring the investments made in our built environment deliver value for the environment and society, as well as economic returns. It will also help different stakeholders – the investor, the client, the asset operator and its users – reach a shared understanding of the purpose and value-added by the project – why are we doing this, what can we get out of it, and who are we doing it for?

The aim of this paper is to provide some basis for, and some detail of, what we mean by the five capitals. It is not meant to be an all-encompassing guide on its application. We will be working with others, such as the **Construction Innovation Hub** and the **Construction Leadership Council**, to develop the model in more detail and determine how best it can be applied for procurement and in supporting industry best practice.



“A common language to describe non-financial benefits is key to ensuring the investments made in our built environment deliver value for the environment and society, as well as economic returns.”

The five capitals

A challenge for major engineering schemes and projects is identifying appropriate outcome-based metrics to define success beyond delivery to cost and programme. The five capitals approach¹ proposed provides a holistic way to measure 'value'. The approach should be project specific and give due weight across all the capitals to provide a truly balanced view.

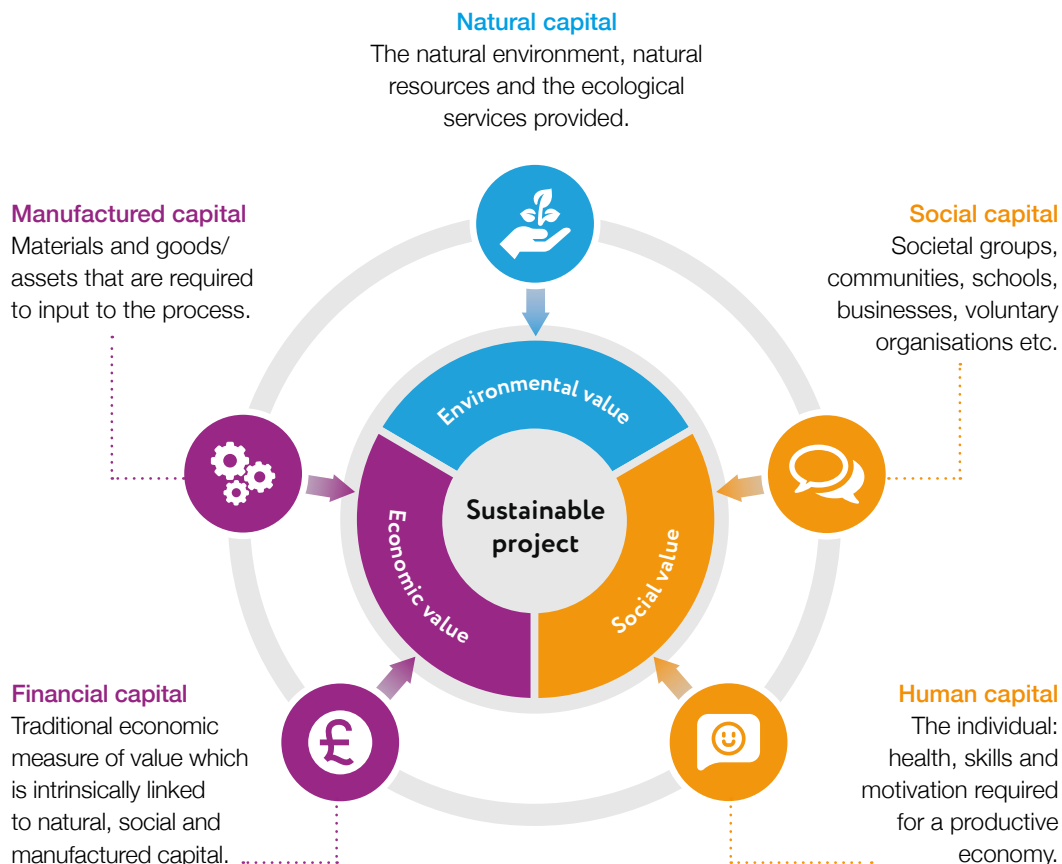


Figure 1: Definition of the five capitals

Main elements of the capitals

The chart overleaf outlines the themes we have included in each capital.

In our model, innovation is considered an enabler that sits across the capitals; to achieve a different outcome we simply need to do things differently.

Our approach has been to split environmental issues between natural capital (for impacts on the local environmental context) and low carbon manufactured capital (for carbon and resource efficiency impacts which, by definition, are not spatially significant and are a direct result of man-made processes and construction). Similarly, the resilience of an asset is to be 'built in' and so we have related this to manufactured capital.



Figure 2: Themes within the five capitals

Indexing and measured metrics

We are proposing an approach which indexes target and performance metrics for a project. By normalising the different capital measures against a simple index scale of industry best practice, it is then possible to combine the different elements to assess overall performance.

We will work with the Construction Innovation Hub and the Construction Leadership Council who are developing the mechanics of this approach in more detail. In this report we have provided an overview of the approach.

The following sections discuss each of the capitals and their relevance in more detail. For each we have included examples of the:

- Relevant national indicators that are used to assess the state of that capital in the UK – these may not be suitable as measures applied directly on an individual project, however the combined industry project successes should be aligned to improve these indicators;
- Types of related metrics that could be applied at project level where performance could be linked to the procurement mechanisms used for that project;
- Draft indexed scoring system for a metric to rate projects against best practice in that ‘capital’ that can be used to set targets for outcomes of the project; and
- Examples from across the industry to demonstrate what can be delivered.

Natural capital

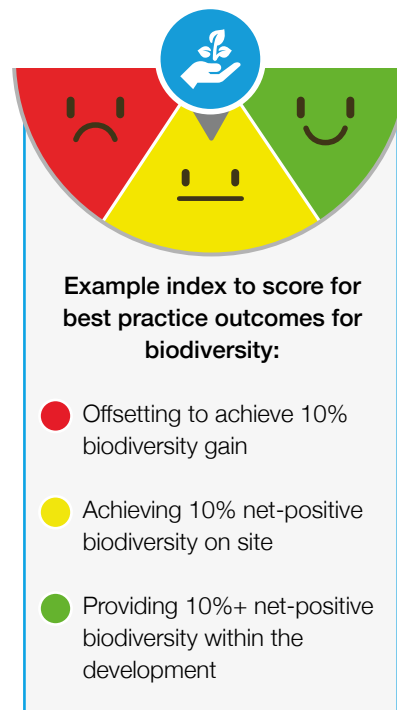
Natural capital is a way of thinking about the environment as a set of natural capital assets, for example soil, rivers, woodlands. We all rely on the flow of ecosystem services, for example, pollination, fresh water, air quality and other regulating services, which these assets provide.

Key themes that are relevant to natural capital are:

- Biodiversity
- Land quality
- Air quality
- Water quality

Government expectations of the infrastructure and construction sectors in this area are rapidly increasing.

The Environment Bill includes provisions for biodiversity net gain to be mandatory. In practice, this means that unless a biodiversity net gain plan, which will ensure that local habitats post-development are more biodiverse than before, has been submitted and approved, the project will have to remain on the drawing board.



At the same time, the Government's 25 Year Environment Plan includes the aspiration to: "expand the net gain approaches used for biodiversity to include wider natural capital benefits, such as flood protection, recreation and improved water and air quality. This will enable local planning authorities to target environmental enhancements that are needed most in their areas and give flexibility to developers in providing them."²

ACE's sister organisation, the **Environmental Industries Commission (EIC)**, has recently produced a report setting out how the concept of environmental net gain might work in practice.³

The table below outlines some national and project specific outcome measurements from the Enabling a Natural Capital Approach (ENCA) data-book which could apply to this capital. The infographic above shares examples of how an indexed approach could help to deliver best practice for specific projects.

The case study of **Otterpool Park** garden town demonstrates the how consideration of natural capital can deliver positive outcomes.

Relevant national indicators of the state of natural capital include:	Habitat/land use change Species decline Air quality limit value exceedances
Project detailed metrics could include:	Biodiversity net gain using Natural England biodiversity metric 2.0 Alignment with the relevant statutory Local Nature Recovery Strategy Impact on local air and water quality Defra, with support from EIC, has developed a services data book. Enhancing a Natural capital Approach provides around 200 sources of selected biophysical and valuation evidence for firms to use as local natural capital metrics.

Otterpool Park garden town



ACE member **Arcadis** were commissioned to provide services for the development of a garden town. This consisted of a range of disciplines including masterplan design, project management and Environmental Impact Assessment (EIA) provision, including associated specialist surveys and assessments.

The Otterpool Park project was to bring to the outline planning application stage a proposal for a garden town consisting of 8,500 houses in Kent. Arcadis were commissioned in late 2016 and delivered the Environmental Statement to accompany the outline

application in early 2019.

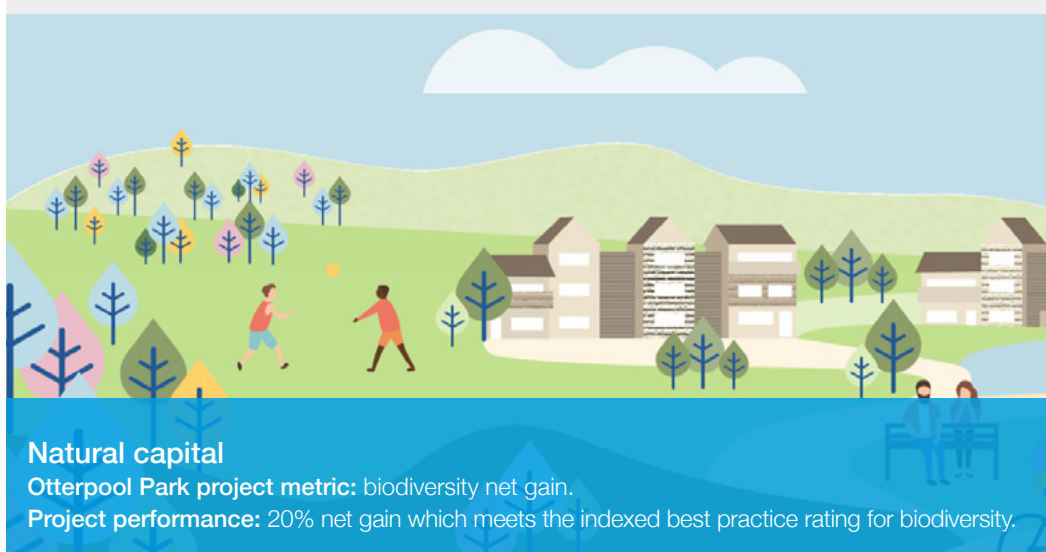
As part of the design, planning and assessment of the project, Arcadis prepared a natural capital strategy and undertook an ecosystem service impact assessment to accompany the ecology chapters of the Statement.

The purpose was two-fold, firstly to influence the design, and secondly to assess and demonstrate net environmental gain. The natural capital strategy included green infrastructure design principles for habitats to be retained, enhanced and created, designed to maximise their ecosystem

service value and assist in achieving biodiversity net gain.

Working with multiple specialists, the outlining of design principles with a natural capital strategy in mind ensured that the project team were able to maximise the environmental, social and functional ecosystem service benefits of the land.

An indicated 20% biodiversity net gain was achieved within the design while the bespoke assessment and the natural capital planning tool demonstrated increases in biodiversity, aesthetic values and recreation.



Social capital

As a sector we have huge capacity to influence society and the way people live. All of society will use or interact with the built environment on a daily basis. This is never more evident than with the concept of placemaking – the approach to the planning, design and management of public spaces.

Creating areas that are aesthetically appealing, well-connected and comfortable, improves personal wellbeing, but can also deliver economic benefits. Better service sector productivity is delivered and knowledge transfer enhanced as those working for highly productive industries tend to want to live and work in these areas.

Key themes that are relevant to social capital are:

- Community engagement – project level public engagement to understand the needs of the community and shape the solution to meet them
- Public services – looking for opportunities through projects to support public services
- Equality for all – ensuring that all members of society are considered and included in project design and engagement

Delivering positive outcomes under social capital, as well as human capital outlined below, would support delivering against broader 'social value' principles and aspects covered by the Public Services (Social Value) Act 2012, the Procurement Reform (Scotland) Act 2014 and the Wellbeing of Future Generations (Wales) Act 2015.

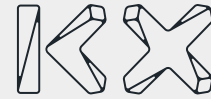
The following describes some national and project specific outcome measurements which could apply to this capital, the infographic above shares indexed examples of what the scope for best practice could be for specific projects.

The **Kings Cross redevelopment** case study demonstrates how consideration of social capital can deliver positive outcomes.

Relevant national indicators of the state of social capital include:	Deprivation indices Employment levels Homelessness levels Crime rates Access to local services (healthcare, post office, community support, library etc.)
Project detailed metrics could include ⁴ :	Community feedback surveys or Post Occupancy Evaluation Percentage of staff receiving the Real Living Wage, as specified by the Living Wage Foundation Supporting a local community develop their own Community Charter or Stakeholder Plan



Kings Cross redevelopment



King's Cross is one of the largest and most exciting redevelopments in London. The 67-acre site has a rich history and sits within a unique setting. What was once an underused industrial wasteland is being transformed into a new part of the city with homes, shops, offices, galleries, bars, restaurants, schools, and even a university. It even has a brand new postcode, N1C.

In September 2011, the **University of the Arts London** moved to the

Granary Complex and parts of the development were opened to the public for the first time. Since then, restaurants have opened, the **Great Northern Hotel** has been refurbished and the first residents have moved in. Companies such as **Google, Louis Vuitton, Universal Music and Havas** have chosen offices in the area.

A whole series of new public squares and gardens have opened, among them Granary Square with spectacular

fountains, Lewis Cubitt Park and Square and the new Gasholder Park.

As well as housing for all and new parks and open spaces, there are job and training opportunities, schools programmes and community projects. Kings Cross redevelopment demonstrates key aspects of social capital for communities.

By social capital measures, the project was a success with 7.5 million visitors to more than 10.5 ha of public spaces.



Social capital

Kings Cross project metric: placemaking success measures.

Project performance: 7.5 million visitors to 10.5ha public realm; 163 events; £1.2 million uplift thanks to public space which meets the indexed best practice rating.⁵

Human capital

Human capital is all about how we benefit individuals' wellbeing and skills through our projects. This can be associated with the individuals working on our schemes as well as those that use them once completed. Measures under this capital focus on delivering benefits that are relevant to the individual that is impacted.

As with the social capital described above, positive outcomes in this capital would support delivering against broader 'social value' considerations covered by The Public Services (Social Value) Act 2012, The Procurement Reform (Scotland) Act 2014 and The Wellbeing of Future Generations (Wales) Act 2015.

To achieve the maximum benefit, a good understanding of the needs of the individuals and the local community is required, and meaningful engagement with the individuals affected.

Key themes that are relevant to human capital are:

- Physical wellbeing
- Mental wellbeing
- Skills and training

The following table describes some national and project specific outcomes measures which could apply to this capital, the infographic above shares indexing examples of what the scope for best practice could be in specific projects.

The **The Midland Metro Alliance** case study demonstrates the how consideration of human capital can deliver positive outcomes.



Relevant national indicators of the state of human capital include:	National statistics on mental and physical wellbeing – for example lost years of healthy life; suicide National statistics on skills, education and training
Project detailed metrics could include:⁶	Local employment on the project Number of apprentices recruited Education and training supported through the project Staff that have access to wellbeing programmes (such as flexible working, physical wellbeing programmes, and mental health resources). Initiatives to support vulnerable people in the community live more independently (number of people helped)

Midland Metro Alliance



The Midland Metro Alliance was formed in 2016 to transform the West Midlands by planning and building an integrated transport system for the future.

It is a unique alliance of nine international partners, including designers, civils and construction experts, recruitment and safety specialists, and the people who know the region best, and a first for the UK light rail industry.

The Alliance provides skill development programmes and work to bring those furthest from the workplace into employment through upskilling and training. While working beyond the project boundaries in collaboration with education providers, job centres

and other projects in the region. The programme covers a wealth of initiatives including; support to colleges, apprentice employment, a new Trailblazer Apprenticeship for Tramway Construction, and the Sector Based Work Academy (SBWA).

The Sector Based Work Academy (SBWA) offers unemployed candidates, aged 18 and over across the region, with an opportunity to achieve accredited qualifications, develop personal skills and gain practical experience in key competencies required to kick-start a career in the light rail sector.

Group information sessions and initial assessments were delivered to unemployed people in each geographical

area, referred by DWP coaches after initial one-to-one consultations. Following these, candidates took a rail sector approved drug and alcohol test and medical. Successful candidates attended the SBWA at their local college to commence an intensive six week programme of practical learning with assessments throughout.

All candidates benefited from ongoing support from college staff and the MMA. Following successful completion of the course, all candidates then received formal interviews by panel, with each MMA partner represented, and participated in group celebrations of success where the MMA Project Director and college principals issued certificates.



Human capital
MMA project metric: Number of up-skilled local labour.
Project performance: 50 local SBWA graduates; six of whom enrolled in the new Tramway Construction Operative Apprenticeship, 26 employed within the project.
Meets the indexed best practice rating for up-skilled local labour.

Financial capital

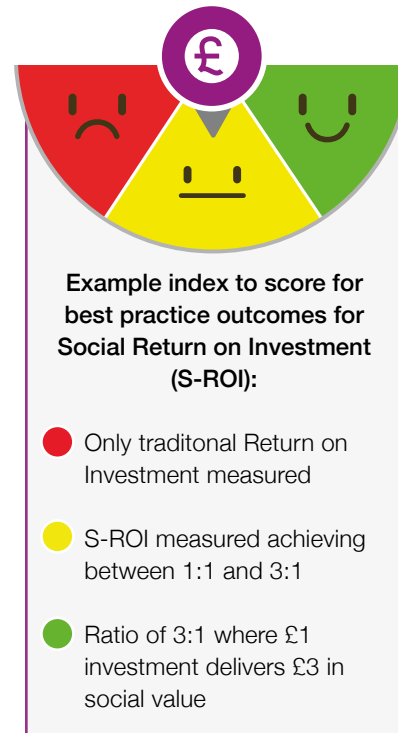
Financial capital plays an important role in our economy, enabling the other types of capital to be owned and traded. But unlike the other types, it has no real value itself but is representative of natural, human, social or manufactured capital; for example, shares, bonds or banknotes.

Key themes that are relevant to financial capital are:

- Governance
- Financing / Return on capital employed
- Whole-life value for money
- Wider economic impacts

The table below describes some national and project specific outcomes measures which could apply to this capital, the infographic to the right shares indexing examples of what the scope for best practice could be in specific projects.

The **Very Sheltered Housing case study** from Scotland demonstrates the how consideration of financial capital can deliver positive outcomes.



Relevant national indicators of the state of financial capital include:	GDP Gini Coefficient % GDP spent on infrastructure investment GVA % spend on SMEs
Project detailed metrics could include:	Performance against project budget Return on investment (ROI) Operational profit Social Return on Investment (S-ROI)

Very Sheltered Housing in Scotland

Very Sheltered Housing consists of self-contained flats or houses for frail older people that need regular care and support. It allows tenants greater independence and autonomy than they would likely receive in a traditional care home. Although the provision and quality of Very Sheltered Housing varies between providers, the average annual cost is around £11,000 per property.

The **Bield, Hanover (Scotland), and Trust** housing associations commissioned a Social Return on Investment (SROI) study to examine the value

created by Very Sheltered Housing. It measured the wellbeing benefits of such housing, and the financial returns and savings for the **Scottish Government**. It provides a better sense of value for money and informs the debate around the provision and funding of housing for older people.

An investment of nearly £18.3 million in Very Sheltered Housing leads to significantly higher levels of autonomy, wellbeing, and, in particular, independence than in care home alternatives. Levels of social wellbeing – including contact with friends, family, and belonging to

the community – are also higher than in care home alternatives. In total, a Very Sheltered housing unit saves an estimated £19,000 a year in care home costs per person.

The study demonstrated that the £18.3 million that Bield, Hanover, and Trust invested in Very Sheltered Housing developments creates £33.7 million of social value. 95% of this is through savings in care home costs; the remainder is through increased levels of well-being for tenants. This gives a total return on investment of £1.50 to £2.00 for every £1 invested.



Financial capital

Very Sheltered Housing project metric: Social Return on Investment (S-ROI).

Project performance: S-ROI of 1.5:1 to 2:1 achieved, exceeding industry standard practice and delivering Social Return on Investment.

Manufactured capital

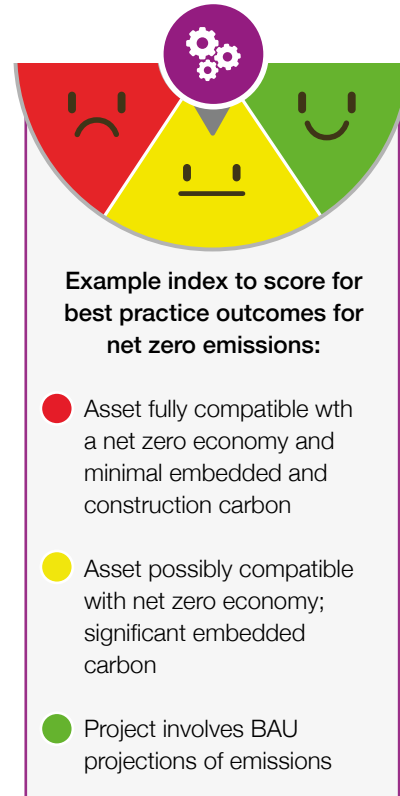
Manufactured capital is any physical means of production or means of protection beyond that which can be gathered or found directly in nature and often refers to goods, and infrastructure controlled by an organisation.

Given the current climate emergency, we believe that the manufactured capital society creates is only of value if it is low carbon or net zero and ideally resource efficient in the widest sense.

Key themes that are relevant to manufactured capital are therefore:

- Resource efficiency
- Resilience
- Carbon (embedded, construction and operational)
- Physical assets

The table below describes some national and project specific outcomes measures which could apply to this capital, the infographic to the right shares indexing examples of what the scope for best practice could be in specific projects.



The **Pennington pumping station case study** from Greater Manchester demonstrates the how consideration of manufactured capital can deliver positive outcomes.

Relevant national indicators of the state of manufactured capital include:	National GHG emission data 4th, 5th and 6th carbon budgets National statistics on resource productivity and construction and demolition waste National Infrastructure Plan delivery Innovation - Innovate UK / I3P (measures) R&D investment
Project detailed metrics could include:	Waste measures Circular economy measures for materials used; Material Circularity Indicator⁷ Compatibility with net-zero (e.g. UKGBC Net Zero Framework) Whole life carbon measurements in line with PAS 2080 Industry embodied carbon calculator for materials (e.g. RICS, RSSB etc). Measure of resilience and risk from climate change impacts Operational efficiency

Pennington pumping station

This pumping station in Leigh, Greater Manchester provides a 1 in 100 year standard of flood protection to over 400 properties. Opened in 1939 and rebuilt in 1975, the station had reached the end of its serviceable life. The **Environment Agency** needed to replace it to ensure ongoing flood protection and maintaining current standards, but also wanted to explore lower carbon methods of operation.

The works involved replacing both pumps and associated pipework, building demolition and

replacing a 230m long downstream culvert. The works created a sealed system which ran more efficiently, incorporating more efficient pumps needing fewer starts ups. A key part of assessing the lifecycle impacts of the asset and associated work was to use the carbon planning tool, including a carbon calculator.

The project team used the calculator to assess the whole-life impact of the works. This ensured the carbon emitted would provide an overall net benefit by reducing the operational, replacement

and refurbishment carbon of the system. The project team estimated that the project would deliver revenue budget savings of £70,000 for the operation and maintenance of the new system over the 25 year design life. Using the carbon calculator, the project team also estimated they would save 35 tonnes of operational carbon usage throughout the design life of the pumping station.

The new pumping station opened in March 2016 and is being monitored to determine its actual reduction in the whole-life carbon of the system.



Manufactured capital

Pennington pumping station metric: Operational carbon usage.

Project performance: Saving 35 tonnes of operational carbon usage throughout the design life of the pumping station.



“Projects can achieve successful outcomes across multiple capitals, often with a single solution.”

Interconnected capitals

The five capitals are intrinsically linked. Projects can achieve successful outcomes across multiple capitals, often with a single solution. For example:

- Enhancing natural capital can be done in ways which help improve public access to green space which can bring people closer to nature, improve physical and mental health and provide learning opportunities.
- Well-designed public transport systems with increase safe cycle ways in city centres, can improve air quality, improve access for all and support physical wellbeing.

The Tideway case study overleaf is a major project that has demonstrated positive outcomes across multiple capitals.

Five capitals and the UN SDGs

In developing our five capitals model, we recognise the need to relate to other models of sustainability that are used to communicate the complex and interrelated concepts. The overall intent of the different models are aligned, so they should relate to one another.

A key model that is referred to by government and industry is the UN Sustainable Development Goals (UN SDGs). These offer an international framework for sustainability that can be applied for business or government and offers a blueprint for a sustainable future. To reach the goals by 2030 we need to achieve a number of measured deliverables.

The 17 goals reflect priority themes in sustainability and can be attributed to the five capitals model, and a three pillars model, as shown below. This is intended as a communication aid for talking to clients that are using the goals as their framework, or those that need to report on them externally.



Figure 3: The 17 UN SDGs and five capitals

Tideway

Tideway is one of the largest and most ambitious civil engineering projects in Europe. It will construct a 25km tunnel under the Thames to prevent tens of millions of tonnes of pollution entering the river every year. The overall cost of the project is approximately £4.2 billion.

In the case of the Tideway, multiple stakeholders including Thames Water, Ofwat, HM Government, the Environment Agency and the investor community and many other public bodies and commercial organisations with an interest in the proposal, came together

in support of the project's vision and gradually aligned their interests to a common purpose.

Tideway has successfully demonstrated positive outcomes across multiple capitals. All capitals strongly fed into the project however particular attention was given to the natural and manufactured capitals due to the nature of the project. One of the key aims was promoting a sustainable reduction in pollution while increasing biodiversity.

The figure below shows how each capital was covered in different aspects of the project:

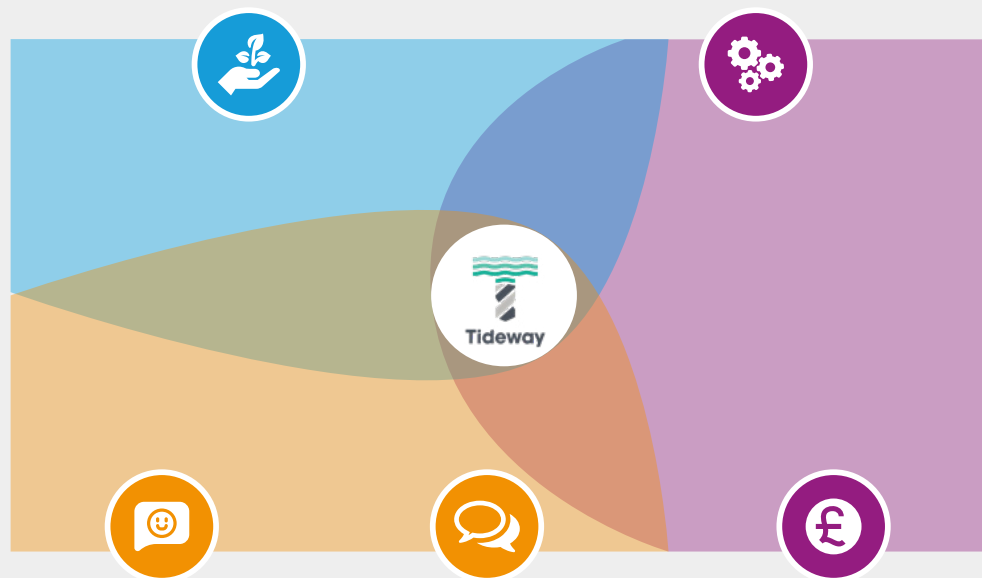


Natural capital

The project provides benefits to the environmental and biodiversity assets, such as fishery nursery habitats and other designated habitats for wildlife. Fish populations in the River Thames have improved significantly since the early 19th century when major industrial and polluting discharges limited the river's ability to sustain life. Due to the reduction in fish deaths, the project now supports a diverse range of wildlife and provides a key fish nursery for many species such as sole, herring and bass which supports North Sea fish stocks.

Manufactured capital

At the Chambers Wharf site, numerous carbon saving opportunities were identified and delivered within the design. This was driven by the team's ambition to challenge specifications and reduce materials and waste, an example of this is the redesign of the drop shaft resulting in a significant carbon emission saving of 145 tCO₂eq. This innovative design also reduced steel requirements by 99 tonnes.



Human capital

The water quality of the tidal Thames will be greatly improved, enabling communities to enjoy the river for recreational and business activities. Improvements to the water quality in the Thames will also lead to wider, long-term positive impacts on London's reputation as a tourist destination. Equally, the lack of an effective and timely solution could be damaging and costly.

Social capital

Thames Water estimates that the tunnel will directly employ around 4,250 workers at the height of construction activity, with a further 5,100 indirect jobs created. As well as this positive employment impact totalling around 9,350 jobs, the tunnel builds on the skills legacy already started by Crossrail, including the establishment of the Tunnelling and Underground Construction Academy.

Financial capital

Thames Water acknowledges that it is not possible to make a definitive assessment of the impact of removing future growth constraints. However, it presents an illustrative assessment suggesting that over 20 years the cumulative impact on GDP of preventing development constraints arising because of sewerage capacity could be worth anywhere between £5 billion and £15 billion.

Figure 4: Tideway's five capitals approach

Five capitals supporting the climate and biodiversity emergency and Net Zero agenda

We also recognise that there are many environmental, political and policy drivers that will put pressure on industry to deliver outcomes against one or more capitals. The Climate and biodiversity emergency is a challenge that engineers have a significant role in addressing. All of these capitals can be directed towards supporting the efforts to deal with these issues. Delivering projects with value achieved across the five capitals, can still be done in the context of the climate and biodiversity emergency that we are facing.

- **Natural capital** – Each built asset sits within a network of natural capital assets. Infrastructure needs to play its part in enhancing our collective natural capital to meet the ecological and biodiversity emergencies.
- **Social capital** – Our social institutions and the community cohesion they create support our well-being and provide the platforms for wider low carbon behavioural changes.
- **Human capital** – Improving our environment has the ability to make a positive impact on physical and mental wellbeing as well as opportunities for new skills.
- **Manufactured capital** – We must construct our assets in a resource efficient, low carbon way, and their operation must be compatible with the transition to net zero.
- **Financial capital** – Investors will still require financial returns to enable finance to flow into the projects that society needs.

Implementation

The five capitals model provides a framework which allows for the economic, environmental and societal aspirations of policy makers, funders and project deliverers to be robustly assessed and valued in the appraisal and procurement processes, as well as in assessing the project's delivery of the proposed outcomes. By doing so it will support more informed decision making and ultimately deliver greater value for society.

This opportunity has already been identified by the **Infrastructure and Projects Authority (IPA)** in the alignment and integration chapter of their Transforming Infrastructure Performance report, and this paper is directed towards supporting a framework to deliver on that.

We will work with the Construction Innovation Hub in their project to develop a model for procuring for value against the five capitals.

Public sector programmes and projects

At a programme level, the five capitals can be applied to clearly describe and set measurable metrics for what it aims to deliver – including the relative importance of the capitals to that particular project. This should be developed and presented as part of a programmes' strategic outline business case and set a measurable baseline for performance. A version of the five capitals model would be provided at a project level, demonstrating alignment to overarching programme objectives.

As a project develops and continues to deliver against this baseline, it will support the programme in making informed choices around prioritisation and the delivery of benefits. The final delivered outcomes can then be measured against the same five capitals, thereby assuring actual delivery of the intended outcomes at the strategic decision-making stage.

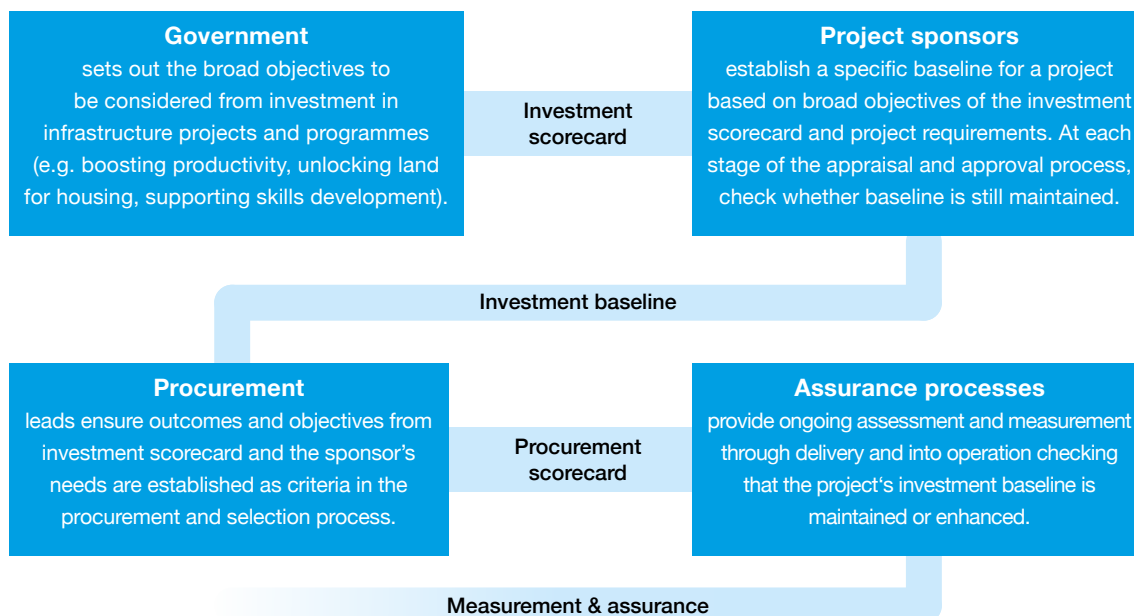


Figure 5: Key decision stages of the Investment lifecycle^a

HM Treasury case model appraisal and 'Green Book'

The following table describes the detail around how the five capitals model could be used within Government project appraisal

guidelines. It does not require a change to the rule set, it just introduces more robust evidence into the process and decision making.

	Strategic outline business case	Outline business case	Full business case
Strategic case	Define and set the baseline five capitals metrics.	Provide a report on the current project performance against the five capitals baseline metrics.	Confirm the project performance against the five capitals baseline metrics based on commercial contracts negotiated before they are signed.
Economics case	Economic appraisal includes the financially measurable metrics to ensure parity of benefit cost ratio above 1:1.	Update economic assessment in line with benefits expected.	Confirm economic assessment benefits expected before signing contracts.
Commercial case	Identify areas of the market capability which can deliver the baseline five capitals metrics and demonstrate market sounding plan to explore these.	Feedback from the market sounding incorporated into the performance report against the baseline metrics. Presentation of a commercial strategy designed around delivering the five capitals metrics with aligned incentivisation out into the supply chain.	Confirm commercial contracts and incentives structure aligns with the five capitals metrics before contract signature.
Management case	Project governance structure represents and aligns five capitals metric beneficiaries.	Monitoring and reporting structure put in place to report on the five capitals metrics.	Monitoring and reporting structure put in place to report on the five capitals metrics.
Financial case	Funding sources and conditions identified and linked to five capitals metrics – potentially identifying external funding sources who would contribute to delivery of certain metrics.	Funding sources and conditions aligned to both five capitals metrics and commercial incentives.	Confirm funding is sufficient to deliver five capitals metrics.

Private sector programmes and projects

At a funding stream level, the five capitals model can be used in a similar way to describe and set measurable metrics as criteria for accessing funding. Doing this in a measurable way allows for transparency of prioritisation of project funding bids against those criteria and their relative importance.

At a project level, the five capital model can be used with the same capitals highlighted, but specific project level metrics can be set to provide clarity and certainty of their delivery back to the funder.

Industry response

If industry can quantifiably describe and measure a baseline based on capital which goes beyond financial, this opens up the opportunity to incentivise and base commercial relationships on a broader definition of value.

This is critical in incentivising innovation and improving productivity in the construction sector. If a client can clearly describe a definition of value, and a company can be rewarded for delivering it with contracts focused on outcomes rather than inputs, then this will impact on the whole business model.

ACE has already begun developing this approach for the consultancy sector in our value based business models research as part of the **Future of Consultancy** programme.⁹ However, this exciting and fundamental shift in the industry structure can already be seen in **RIBA's** Sustainable Outcomes Guide.¹⁰

Recommendations



We recommend for:

- ACE members to use the five capitals model to measure sustainable outcomes with their clients.
- Government to work with ACE, the Construction Leadership Council (CLC) and Construction Innovation Hub (CIH) to embed the five capitals into their appraisal and business case process. Specifically, in the strategic case of the HM Treasury, to use the five capitals model to provide quantifiable assessment of wider benefits allowing for more robust evidence-based decision making, alongside quantitative economic appraisals.
- Private sector funders and clients to work with ACE, the CLC and CIH to bring the five capitals into their development appraisal and procurement processes.
- ACE to develop business models and commercial arrangements for consultancy business which incentivise, and reward delivery of value defined by the five capitals.
- Wider industry and external stakeholders to consider this holistic approach to ensure a cultural shift throughout the sector and beyond during client engagements and our own business performance.

Contributors

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Acclaro Advisory
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ACE economic and policy papers

ACE Manifesto 2019: Infrastructure for everyone

This Manifesto explores the UK's needs in vital infrastructure areas aiming towards a better Britain in 2019. Stabilising a pipeline of much needed infrastructure projects for years to come is a key focus on ACE's 2019 Manifesto.

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A paper recommending a more productive and sustainable road network in England.

Funding Roads

This report takes a macroeconomic approach to explore the potential inefficiency and loss of economic productivity as a result of the current condition of the road network. The report then suggests a new model for road development going forward.

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This paper is the second in ACE's housing paper series and explores in detail a new model to rebalance the incentives for development.

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This paper explores the conditions within the UK housing market.

To download these, please visit:
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About ACE

As the leading business association in the sector, ACE represents the interests of professional consultancy and engineering companies large and small in the UK. Many of our member companies have gained international recognition and acclaim and employ over 250,000 staff worldwide.

ACE members are at the heart of delivering, maintaining and upgrading our buildings, structures and infrastructure. They provide specialist services to a diverse range of sectors including water, transportation, housing and energy.

The ACE membership acts as the bridge between consultants, engineers and the wider construction sector who make an estimated contribution of £15bn to the nation's economy and the wider construction market contributing a further £90bn.

ACE's powerful representation and lobbying to Government, major clients, the media and other key stakeholders, enables it to promote the critical contribution that engineers and consultants make to the nation's developing infrastructure.

ACE's publications, market intelligence, events and networking, business guidance and personal contact, we provide a cohesive approach and direction for our members and the wider industry. In recognising the dynamics of our industry, we support and encourage our members in all aspects of their business, helping them to optimise performance and embrace opportunity.

Our fundamental purposes are to promote the worth of our industry and to give voice to our members. We do so with passion and vision, support and commitment, integrity and professionalism.

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Endnotes

- 1 Forum for the Future (2018) www.forumforthefuture.org/the-five-capitals
- 2 25 Year Environmental Plan (2018), p33, www.gov.uk/government/publications/25-year-environment-plan.
- 3 Delivering Environmental Net Gain (2020), Environmental Industries Commission (2020), www.eic-uk.co.uk/wp-content/uploads/2020/02/EIC-Report-Delivering-environmental-net-gain-2019.pdf.
- 4 Measures of success for what ACE have defined as social and human capitals are captured within industry 'social value' calculators. The key tool used as reference here are National Themes Outcomes and Measures (TOMs) developed by the Social Value Portal in line with Social Value UK principles. www.socialvalueportal.com/national-toms/
- 5 The Economic and Social Story of Kings Cross, Regeneris Consulting & Argent (2017), www.argentllp.co.uk/content/The-Economic-and-Social-Story-of-Kings-Cross.pdf.
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- 9 Future of Consultancy – Value Based Business Models, ACE (2019) www.acenet.co.uk/media/4457/foc-a4-value-based-business-models-2019.pdf
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