ACWG
ALL COMPANY WORKING GROUP

The Regulators' Alliance for Progressing Infrastructure Development (RAPID) is a partnership between the three water regulators Ofwat, Environment Agency and Drinking Water Inspectorate, formed in 2019 to help accelerate the development of new water infrastructure and design future regulatory frameworks. RAPID was set up to identify and address issues relevant to the development of joint infrastructure projects and to analyse the feasibility of nationally strategic supply schemes. These Strategic Resource Options (SROs) are being developed by different water companies in partnership and are following RAPID's gated process to identify strategic water resource solutions to help meet the water needs of the future. The gated process relates to the funding of investigations and development of SROs from April 2020 until March 2024.

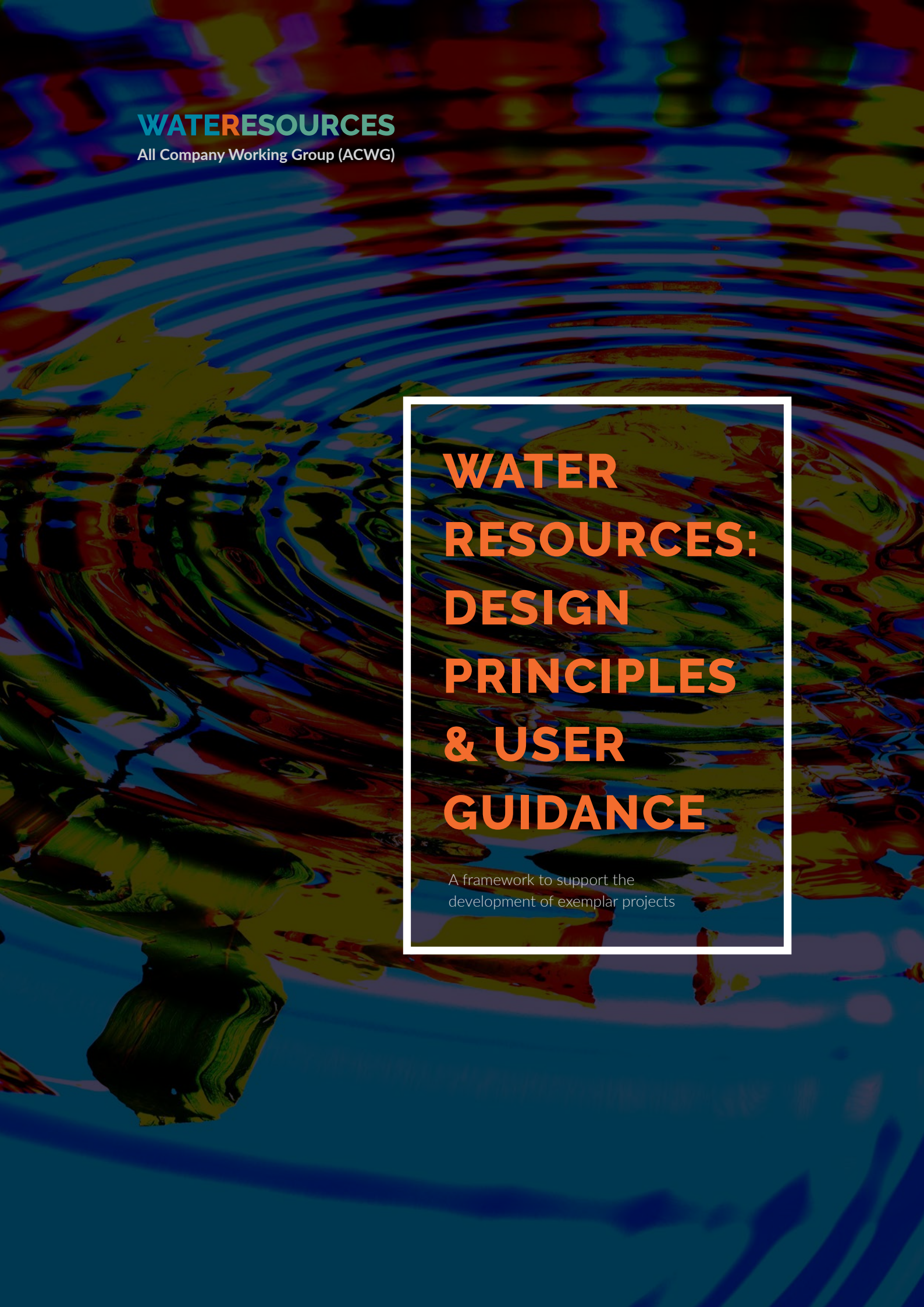
The All Company Working Group (ACWG) was set up to ensure that water companies with SROs were using a consistent approach where possible. The ACWG has commissioned a number of studies to identify where consistencies need to be made and how approaches can be aligned between different companies and SROs. A review of the approaches adopted across the SROs identified key areas in which consistency was needed, including cost, water quality, environmental assessments, deployable output, carbon and the design of schemes. The output reports from these studies are available for review on the WRSE website in the document library, and have been adopted by SROs and also by companies for their draft water resource management plans and the regional water resource planning groups.

In 2020, the Environment Agency published the first National Framework for Water Resources to transform how we plan future water supplies; requiring water companies and other large water users to collaborate across boundaries and develop plans that consider their region's water needs. These regional water resources plans should then fit together to provide a joined up national solution. There are five regional groups which together include all the water companies operating in England. Each regional group is producing a strategic water resources plan to assess the future need for water and identify the set of options that present the best value to customers, society and the environment to secure long-term resilience. In addition to the ACWG consistency reports, there are also regional planning related reports available to review on the WRSE website, including the reconciliation of regional plans reports (for both the emerging and draft regional plans) and a materiality paper regarding data changes through the gated process.

Any queries relating to the ACWG reports can be directed to contact@wrse.org.uk.

WATERESOURCES

All Company Working Group (ACWG)



WATER RESOURCES: DESIGN PRINCIPLES & USER GUIDANCE

A framework to support the development of exemplar projects

PREFACE

Water resource projects have a proud history of delivering infrastructure so well designed that it transcends its core purpose of collecting, treating and moving water from one place to another. For example, the New River was built in 1613 while Shakespeare was still alive and supplies 8-10% of London's drinking water to this day **as well as** supporting active travel and boosting biodiversity. 400 years later the country now faces the challenge of storing and moving enormous quantities of water to support its continued prosperity and growth.

In this age where our infrastructure must contribute to meeting the challenges of adapting to climate change, achieving net zero carbon, helping nature networks to recover and delivering social equity, we can simply no longer afford bad design. New water resource projects are vital to the continued flourishing of our society and good design can contribute by driving the best value out of investment - saving both resources and money.

Collectively, we challenge each Strategic Resource Option (SRO) to produce an ambitious vision and establish design principles early in their development process – and then to hold themselves to account for meeting them.

Clare Donnelly, Fereday Pollard
Charles Crawford, LDA Design

24 March 2023

The ACWG Design Principles provide a framework to support the development of exemplar projects be they reservoirs, pipelines, transfer channels or treatment works. They are based on the four themes of the National Infrastructure Commission with two cross-cutting principles that apply across all four themes.

IMPORTANCE OF GOOD DESIGN

It is often assumed that good design simply relates to appearance or function. To meet the challenges we face in the next 50 years, good design must be conceived of in its broadest sense as it impacts climate, people, places and value. It will be critical if we are to not only address water scarcity but also find creative approaches to meeting our carbon reduction targets, delivering on the levelling up agenda and creating healthy communities.

It is for these reasons that the Government made designing high-performing and beautiful infrastructure a priority of its 2020 National Infrastructure Strategy (NIS). The design process begins from the very earliest stage of development – from the moment an idea or project is conceived. Embedding design in projects early has many benefits, including saving money and more positive engagement with stakeholders. It is also an iterative rather than linear process, responsive to both internal and external challenge.

The NIS directly references the National Infrastructure Commission's (NIC) Design Principles of Climate, People, Places and Value, as does the Draft National Policy Statement for Water Resource Projects. These principles, therefore, have provided the starting point for the ACWG Design Principles which are grouped under these headings.

The NIC Design Principles stress the need for everyone involved in the procurement, development, design, construction, operation, maintenance and decommissioning of infrastructure to understand that they have a role to play in good design. This is particularly true of SRO projects. This document calls for strong and broad project teams with skills spanning a range of disciplines including some that have not (recently) been heavily represented on water-based programmes such as Architects, Landscape Architects and Artists.

The application of these design principles will (most likely) be led by a Civil Engineering profession used to applying their critical design skills to complex infrastructure – at scale. This document has been developed with them particularly in mind and, as such, it occasionally uses technical language and assumes a familiarity with the RAPID development process. It is, though, focused on practical guidance: the design principles are illustrated with good practice examples and the user guidance proposes a framework through which design and project teams should feel confident in delivering better design outcomes for all.

ACKNOWLEDGEMENTS

We would like to thank the members of the ACWG Steering Group with whom this document has been developed collaboratively throughout, and the industry experts on our Critical Friend Panel who have challenged us to ensure that a shared vision – understood by all - lies at the heart of every project.

CONTENTS

STRUCTURE OF THIS DOCUMENT

In November 2021 the All Company Working Group (ACWG) released its design principles for Water Resource projects. This document offers further guidance on how principles of a good design process should be applied throughout the project lifecycle to satisfy these design principles. While the Design Principles remain unchanged, this User Guidance supersedes the Interim Guidance issued in November 2021 which was solely focused on RAPID Gate 2 deliverables.

This User Guidance proposes a process broadly based on the phases of a project lifecycle but it does not offer a fully formed design process, nor is it a Design Management Plan or Design Assurance Strategy. It is assumed that the different projects and companies will have these – or are about put them in place. Instead, the guidance is focused on the areas that will "raise the bar" above "business as usual" infrastructure design and drive value through the design and delivery processes. This is primarily through the development of a thorough and thoughtful Project Specific Vision and Design Principles.

This deocument starts with an overview of the Design Principles and a suggested Design Process, which follows an increasing level of design maturity from A (site/route optioneering) to G (design for operation). It also introduces the Decision-Making Wheel, which supports the design process.

Guidance is then presented on various themes and activities that are appropriate and effective to raise the quality of design. These include:

- How Project Specific Design Visions and Principles will develop over time
- Design teams and successful multi-disciplinary working
- The use of Design Champions and Independent Design Review
- Engagement
- Consents
- Design for delivery

The Design Process is then set out in greater detail, with reference to the same themes and activities.

The document concludes with further detail on the Design Principles, supported by case studies.

ACWG DESIGN PRINCIPLES

1. Be Specific

Develop project-specific design vision and principles based on an understanding of the objectives of each project and the people and places it will affect.

3 Climate

Mitigate greenhouse gas emissions and adapt to climate change

A Nature knows no boundaries: Water is essential to all life and managing our response to climate change is a collective and urgent activity. Projects must be developed to work across companies and/or legislative boundaries to develop sustainable solutions and environmental enhancement for the wider benefit of society.

B Resource and carbon efficient throughout: Projects shall seek to reuse existing assets, eliminate waste (including waste of water) and make efficient use of materials and transport across the whole of the project lifecycle.

C Resilient and adaptable: Design for anticipated future demand at the appropriate scale. Build in the resilience to absorb and recover from the impacts of the extreme events and incremental stresses likely to arise from climate change.

4 People

Reflect what society wants and share benefits widely

A Understand and respond to your community's needs: Develop a full understanding of the social context that will be impacted by the project over its lifecycle. Design for how local communities will encounter the infrastructure in their everyday lives during both construction and operation.

B Engage widely, early, and meaningfully: Work with stakeholders and local communities to develop their understanding of the importance of nature and water conservation. Incorporate and balance the views of communities in aspects of the design of infrastructure and associated landscape wherever practicable.

C Improve access and inclusion: Consider how people move around your works. Maximise opportunities to support active travel and improve recreational access to waterside and green spaces that can improve outcomes for wellbeing, health, local economy, social inclusion, and education.

More detail on each of these principles is given from page 34 onwards. Outcomes are provided for each principle. These give more detail on the processes and outcomes expected to flow from each principle. Case studies that illustrate each principle have been selected from the water and infrastructure sectors

2. Safe and Well

Actively and collectively develop designs that can be built, used and maintained without unacceptable risks to the health and safety of workers - particularly during hazardous construction and operational activity. Manage risks to members of the public thoughtfully with an approach that balances maximising wellbeing benefits with protection from risks that could cause significant harm.

5 Place

Provide a sense of identity and improve our environment

A Take care: Develop proposals in the spirit of stewardship looking to both the past and future of each context to understand and develop its landscape, cultural heritage, health, and sustainability. Work with partners to secure the long-term success of all measures.

B Protect and promote the recovery of nature: Focus on the role of landscape, its capacity to accommodate infrastructure and shape places. Work collaboratively and employ holistic, landscape-scale approaches that support and deliver biodiversity net gain as well as multiple other benefits.

C Design all features beautifully, with honesty and creativity: Our utility infrastructure can be a source of pride and a positive contribution to its context. Develop proposals that reveal and celebrate its importance, provide visual delight and leave a positive legacy.

6 Value

Achieve multiple benefits and solve problems well

A Maximise embedded value: Work collaboratively across specialisms and with stakeholders to maximise the benefits of the scheme by being smart with the location and arrangement of elements and design of mitigation within the project scope and budget.

B Understand how you could provide additional value: Identify opportunities to contribute wider regional benefits outside of the project scope. In particular look for synergies with relevant catchment management plans and proposals that support the delivery and enjoyment of a healthy water environment.

C Capture and measure embedded and additional value: Have a clear narrative about how you are contributing to society beyond the core scope of your project. Quantify these benefits so they can be considered meaningfully in conversations on value, financing and risk. Share your experience and knowledge widely.

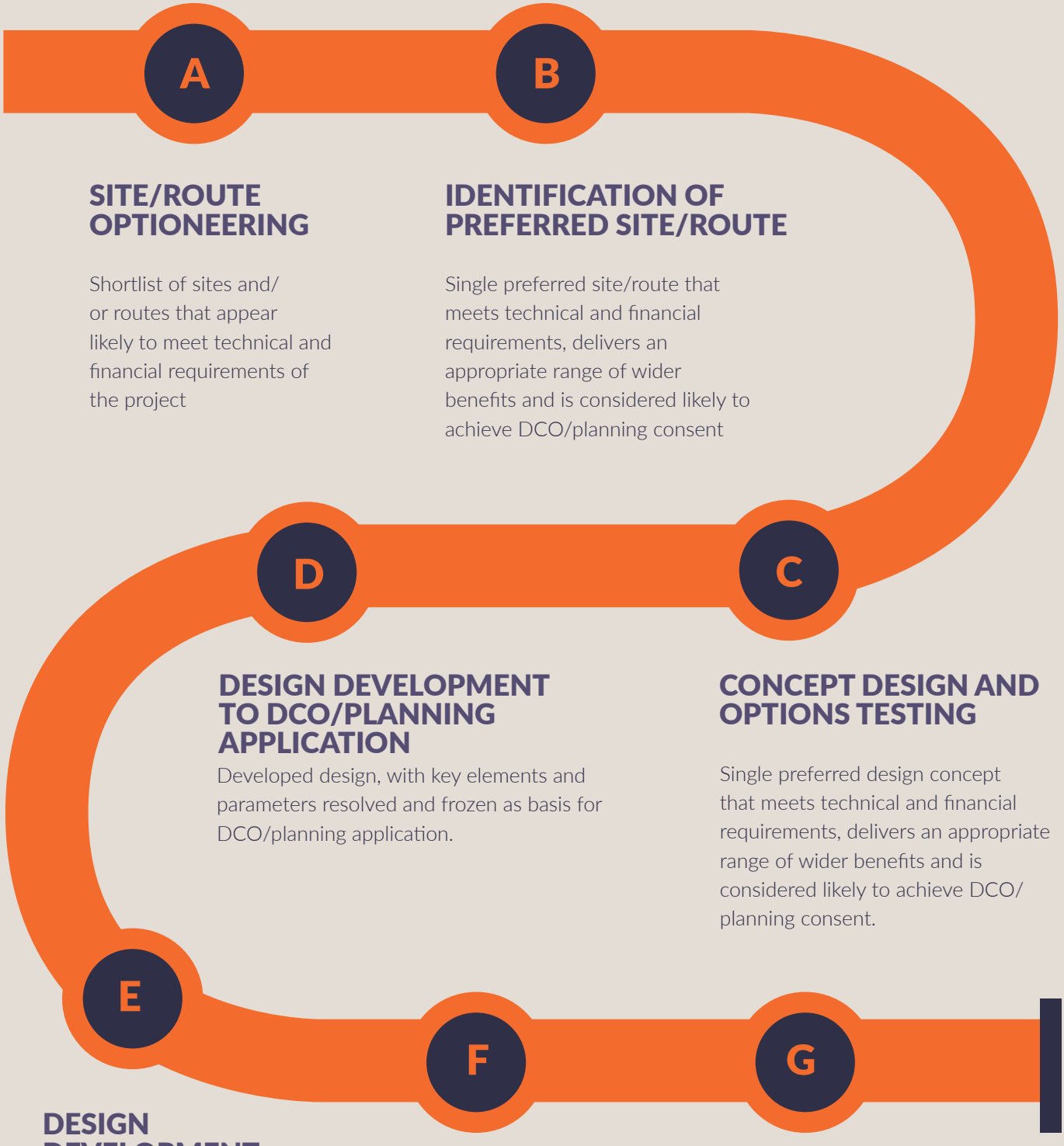
wherever possible. Like most projects, they will not be exemplary in every respect, but they demonstrate best practice with respect to the principle in question – and demonstrate that achieving good design is an attainable goal even in large, complex projects.

DESIGN PROCESS

Projects often have different phases, milestones and assurance gates which do not (always) correlate to a level of design maturity. To provide a common language around the progression of the design, and how this may impact the design vision and principles, a 7-stage design process is suggested.

Further detail on each of the stages is provided at page 22 onwards. This information is intended as guidance rather than absolute requirements. For example, the guidance refers to two stage statutory consultation but it is recognised that for some projects a single stage statutory consultation may be considered appropriate.

While the process does not align with the RAPID gates, we believe that by the time of RAPID Gate 3 submissions, the main elements of projects (particularly on the core site) should have completed Stage C of the design process, whilst some other elements, such as off-site associated development, might still be at Stage B.



SITE/ROUTE OPTIONEERING

Shortlist of sites and/or routes that appear likely to meet technical and financial requirements of the project

IDENTIFICATION OF PREFERRED SITE/ROUTE

Single preferred site/route that meets technical and financial requirements, delivers an appropriate range of wider benefits and is considered likely to achieve DCO/planning consent

CONCEPT DESIGN AND OPTIONS TESTING

Single preferred design concept that meets technical and financial requirements, delivers an appropriate range of wider benefits and is considered likely to achieve DCO/planning consent.

DESIGN DEVELOPMENT TO DCO/PLANNING APPLICATION

Developed design, with key elements and parameters resolved and frozen as basis for DCO/planning application.

DESIGN DEVELOPMENT POST CONSENT

Outstanding design elements resolved. Strategies for construction coordinated between design disciplines and key inter-dependencies resolved.

TECHNICAL DESIGN FOR CONSTRUCTION

All design information required to construct the project safely to a high quality.

DESIGN FOR OPERATION

All design information required for ongoing management and maintenance of the project.

DECISION-MAKING WHEEL

Design is an iterative process of gathering and analysing information to inform design decisions. Decisions are then reviewed in light of the original information that informed them and new information to hand, following which the design is revisited, refined or taken to the next stage of development. This process is repeated throughout the design phase.

The iterative nature of design is illustrated by the decision-making wheel. The decision-making wheel is applied throughout the design process, and the relevant segments of the wheel for each design stage are specified on pages 22-33. During each stage there will be divergent and convergent thinking, i.e. thinking that will broaden and define project aims in order for opportunities associated with the project to be captured. This will become more specific and detailed as the design stages progress and become more fixed.

When undertaking steps 2 to 4 of the wheel, think as widely as possible about the people and aspects of the environment that could be affected in any way by the project. This might be negative effects during the project's construction, operation or decommissioning. Equally, through good design and project planning, the project might be able to deliver benefits for people and the environment, frequently at no significant additional cost.

In relation to people, consider local residents, workers, visitors, people engaged in leisure or recreation and people travelling through the area. They might be affected in various ways, such as by noise/vibration, changes to views or air quality, disruption to travel routes or recreational activities, or effects on their health and wellbeing.

Aspects of the environment to consider include climate, landscape, biodiversity, cultural heritage and the water environment. Other aspects, such as the sea, might be relevant to some projects.

1. Understand the nature, objectives, requirements and components of the project – these will have been identified at the earliest stages of consideration of the project but they are likely to be refined and/or redefined during the course of the project.

2. Understand the places the project will affect:
- Landscape character appraisal
- Baseline ecology
- Cultural heritage
- Water environment
- Other environmental constraints and sensitivities

3. Understand the people who will be affected by the project:
- local residents
- settlements
- recreational users
- significant employers
- stakeholder organisations / interest groups

4. Identify the opportunities arising from the project - benefits that can be delivered through the project itself, and those requiring additional funding/parties/land/etc

5. Identify the key considerations arising from steps 1 to 4 - record constraints and opportunities for all items

6. Develop and refine project-specific design vision and principles that respond to opportunities and constraints

7. Embed the vision and design principles into the host organisation - board level design champion - briefings/ workshops for all involved in the project - holding to account against design principles - live and breathe them

8. Design to maximise benefits and minimise adverse consequences for people and places

9. Capture important design decisions affecting key considerations - key 'fixes' at project gateways should relate to these important decisions

DESIGN GUIDANCE

DESIGN VISIONS

The ACWG Design Principles require each project to develop project specific design visions and principles. Your vision should be a concise statement that encapsulates your ambitions for the project in an engaging, inspiring way that can gain the support of the entire project team and external stakeholders. To develop your vision, think about:

- How would you briefly describe what the project is intended to achieve, ie what problem it is required to solve, how it will do so, what wider benefits it might deliver, and how you would like it to be perceived by stakeholders and the public?
- If you met someone who could be a key influencer in support of the project (local Councillor, MP, etc), how would you explain the project to them and capture their interest in 30 seconds?
- What are the most exciting aspects of the project?

Distil these ideas into one or two short paragraphs. Use simple language that ordinary members of the public will understand, avoiding technical terms. A level of "aspirational" language helps set ambition and inspire people about the project, so make it compelling and irresistible. That does not mean it needs to be unrealistic; you need to find what is interesting/special about your project and communicate that as clearly as possible.

Your vision does not need to be "spatial"; it can focus on outcomes, but it does help to make it more specific by, for example, referencing the people, species or places that will benefit from it.

The best projects have a strong vision that comes from senior managers and is maintained by strong championing (see below). This helps to frame decision-making and sets expectation from the start.

Two examples of good "vision statements":

HS2 (Summary quick read version): We aim to enhance the lives of future generations of people in Britain by designing a transformational rail system that is admired around the world.

Thames Tideway Tunnel: The project would be a major, city-wide investment in London's wastewater infrastructure for the 21st century. It would build on Sir Joseph Bazalgette's legacy and maintain the long-term sustainability of London as a world-class city and improve the quality of its largest open space, the River Thames.

At design stages A and B, your vision will not be specific to a particular place but should be specific to your particular project. Avoid being too generic. For example, if your project is a reservoir, what makes it different from other reservoir SROs? Likewise, no transfer project is the same as another, so what makes yours different? The unique identity of your project should be captured in the vision.

At stage C onwards, your vision should be place-specific and is likely to include one or two place names. As there is greater clarity on key aspects and benefits of the project, these can be reflected in the vision. It might become longer than at stages A and B, but keep it concise and engaging – don't lose what made the earlier version compelling and irresistible.

Revisit your vision frequently throughout the project and amend it as necessary to ensure it continues to serve its purpose and express what is best about the project. However, if you establish a good version at stages A-C, it is likely to change and evolve much less than the design principles as you progress through the remainder of the design process.

DESIGN PRINCIPLES

The ACWG design principles should cover most generic areas of design so your project-specific ones should provide the next level of detail. In accordance with the "Be Specific" principle, they should have reference to specific places you are interacting with and the constraints/objectives of your project. Avoid generic statements like "design appropriate to context" (statements like this are used to justify "poor" design for "poor" contexts). Instead, state what the context is and, if possible, how you plan to respond to it.

Given the scale and complexity of SRO projects, your project is likely to have a great many design principles. Therefore, you may wish to consider how you group and organize them early so that they can develop. This may vary from project to project. For example, it is likely that a pipeline project will need both project-wide principles and geographically specific ones to suit changing conditions along its length. Single site projects may be able to group design principles by theme rather than location. It will be helpful to consider how the design principles may develop from the outset.

Many Development Consent Orders now include Design Principles as approved documents that must be complied with by the detailed designers.

The design principles are likely to become more and more detailed over time.

During design stages A and B, when you do not have a confirmed site or route, your project-specific design principles will not be specific to a particular place but should be specific to the particular requirements and challenges of your project. Avoid being too generic.

- Consider how decisions will be taken to shortlist or eliminate sites/routes. What criteria will be used? Steps 1-5 of the decision-making wheel will enable appropriate criteria to be identified. Capture these criteria and express them in a way that will enable you to test sites/routes against them – you will then have your first set of design principles.
- Apply the design principles as you sift sites/route options. Modify and refine the principles as necessary to help your decision-making process. If you shortlist or eliminate an option for a reason that isn't covered by the design principles, add a new principle to cover it.
- Revisit your design principles frequently, testing their validity and comprehensiveness and refining them as necessary.

DESIGN PRINCIPLES

During design stage C, once you have a preferred site/route and are starting to explore options for the design, your design principles should become place-specific and start to address the particular issues arising from your selected site/route.

- Review your design principles and refine them to relate directly to the place/places in which the project will take place. As at stages A and B, use the principles to express criteria that will enable you to test design options and decide which to pursue.
- As you acquire knowledge about technical or environmental constraints, stakeholder concerns, issues raised by communities and others who will be affected by the project, add design principles to address these matters. These should be as specific as possible, for example your response to issues relating to one neighbouring village may be different from your response to the issues arising from another village, so you should have a separate principle for each.
- For example, a principle might read: The boundary treatment to the western end of the compound shall be appropriate to the agricultural field patterns of the rural context.
- Seek out potential opportunities for enhancements and wider benefits and add design principles that address them.
- Revisit your design principles frequently, testing their validity and comprehensiveness and refining them as necessary. Always seek to make them as specific as possible.

During design stages D and E, the iterative design process continues, and the design principles should be central to that iteration.

- The principles should become more detailed as the design evolves. At this stage, the example given at stage C above might now read: The western edge of the compound shall be planted with a native species hedgerow to reflect the rural context and improve biodiversity.
- As design ideas are tested and developed, constantly check them against the design principles. If the emerging design doesn't follow from the principles, analyse the factors that led to the design solution. Does the design respond to a new consideration that has come into play? If so, add a design principle to address it. If there are no new considerations but the design solution conflicts with the existing design principles, be very cautious about amending the principles to legitimise the design, particularly if the principle in question has been in place and worked effectively for some time – it is more likely that the design is inappropriate and needs to be revisited.
- The over-riding purpose of design iteration during stages D and E is to find the optimal solutions to the range of constraints, issues and opportunities arising from the project, balancing all the considerations identified in steps 1-5 of the decision-making wheel. The design principles will enable the optimal solutions to be identified, and will help explain and justify the solutions.

At the end of stage E, all elements of the design should be resolved.

Design stages F and G are concerned with the production of the technical information that will enable the design to be constructed and maintained.

- The evolving technical design should be checked frequently against the design principles and any non-compliances resolved.
- At this stage, there should be no substantive change to the stage E design but resolving technical issues for construction can sometimes lead to potential design changes. Any such changes should be tested against the design principles. If necessary, an iterative design process (as at stages D- E) should be undertaken for the relevant part(s) of the project. Use the design principles to highlight whether a change to this part of the project will compromise other aspects of the project and, if so, to help find a solution.

THE DESIGN TEAM (WHO/HOW?/BRIEF/WHEN)

"The best results come from effective collaboration and interdisciplinary working. That collaboration includes client organisations, all design disciplines, contractors and partnerships that stretch well into the supply chain."

National Infrastructure Commission

Achieving benefits through multi-disciplinary working is highlighted as a priority in both NIC and ACWG Design Principles (6a: VALUE: Maximise Embedded Value), because of the potential to maximise the value of a project by reframing the brief to think more broadly about how infrastructure could deliver social, economic and environmental benefits, as opposed to a single fix solution.

This may mean engaging with broad range of design disciplines earlier than you may have previously. These may include architects, landscape architects, ecologists and planners, traffic modelling and constructability specialists. Getting high level input, such as through short design exercises and workshopping processes, with experienced representatives of these specialisms is likely to be the most efficient way to define issues early without committing a disproportionate number of working hours. Involving the regulators in these sessions can also limit the risk of developing undeliverable proposals later.

These disciplines will become part of the project team. Promoting effective inter-disciplinary working in large project teams is not always easy. Careful planning and management is required to achieve it.

Some useful tools you may consider:

1. Co-location
2. Workshopping to identify and capture discipline specific opportunities and constraints
3. Design Team Meetings (Including both Engineering and Environmental disciplines)
4. Inter-disciplinary checking processes: Inter-disciplinary Reviews (IDR) and Inter-disciplinary Checks (IDC), Stage Gate Reviews
5. Consideration of end-user requirements eg. operability and maintenance reviews (OPMANs). Extending this process to include disciplines outside of MEICA and Civils ensures all aspects of the work are considered and accounted for – it also fosters understanding between design disciplines
6. Independent Design Review (see below):
7. Being reflective on the design at each stage: The decision-making wheel has a number of steps that should be completed at each design stage to assess and improve the project design principles (see pages 22-33). Going through these steps will ensure the principles remain current and relevant throughout the process.

DESIGN CHAMPIONS

"Adopting a structured approach for the design process, from start to finish of the project, greatly reduces the risk of design errors. An individual who has the authority to make informed decisions based on and aligned with cost and programme considerations should be identified and assigned to manage the design process – this role should not be confused with the lead designer, who is responsible for controlling the design and maintaining design quality."

The Get It Right Initiative

The National Infrastructure Commission (NIC) concluded in its 2018 National Infrastructure Assessment that design should be embedded into the culture of infrastructure planning, to save money, reduce risk, add value, support environmental net gain and to create a legacy that looks good and works well.

The UK government mandated these findings in its 2020 National Infrastructure Strategy requiring all infrastructure projects to have a board level Design Champion in place, at either the project, programme or organisational level, supported where appropriate by design panels to maximise the value provided by the infrastructure.

The level and "job description" of a Design Champion will vary according to the nature and governance structure of a project. The key purpose of a Design Champion is to promote good design across a project or business, ensuring that design quality occupies a central role in project decisions, and is consequently able to deliver demonstrable commercial and community benefits. To do this they will need to have an enthusiasm for design and the willingness to adopt a leadership role. It will be their responsibility to ensure that the project's vision is carried through into the design and that broad multi-disciplinary working is integral to the design process.

Design Champions may also be charged with determining whether a project meets its intended requirements, or achieves the necessary level of design assurance to enable it to move to the next stage of technical development.

Their role on your project may include;

- Ensuring the project projects its vision and policy for how it expects to deliver design quality
- Providing leadership, motivation and incentive to ensure that the project strives to incorporate the ACWG Design Principles across project design and delivery
- To promote use of independent design review (see below) where it is assessed that a project will benefit from it
- Promoting the value of good design as a catalyst for innovation and customer satisfaction
- Ensuring that project teams are aware of the Design Principles, industry best practice and opportunity to utilize independent design review
- Providing a visible point of contact for external organisations and internal project teams.

INDEPENDENT DESIGN REVIEW

Independent Design Review and the use of Design Panels is a tried and tested method of promoting good design and is a cost-effective and efficient way to improve quality. It offers independent, impartial advice on the design of projects.

Design Review is an independent and impartial evaluation process in which a panel of experts on the built environment assess the design of a proposal. The projects that Design Review deals with are usually of public significance, and the process is designed to improve the quality of buildings and places for the benefit of the public.

The Design Review process

- is conducted by expert practitioners with current experience in design and development, a record of good design in their own projects and the skills to appraise schemes objectively.
- offers feedback and observations that will lead to the improvement of schemes, but does not redesign them.
- gives decision makers the confidence and information to support innovative, high quality designs that meet the needs of their communities and customers, and to resist poorly designed schemes.

Review is most effective at an early stage of design development. It should be a conversation about work in progress, not a verdict on an outcome. The pre-application stage of the planning process, while the design is still fluid, is the best time for design review. It will help the project team to identify aspects of design that should be improved before the application is submitted.

More information can be found here: Design Review - Principles and Practice

ENGAGEMENT

Stakeholders and communities are more likely to support new infrastructure if they can influence, and be involved with, schemes from early on. Such support leads to successful DCO/planning applications, providing certainty for the infrastructure development process. Integrating people into the design process provides a sense of ownership and involvement, connecting people with places and making them feel valued.

To achieve this, it is essential to avoid the approach of simply telling people what you are proposing to do and seeking their views in response. Such an approach is unlikely to achieve support or encourage people to get involved constructively.

Rather, an approach of active, ongoing and informed joint working should be taken, including people in decision making processes and working together towards the project objectives. The approach should focus on building trust and establishing long-term relationships with local communities and stakeholders. It should start with engagement at the beginning of the project to understand the needs and concerns of stakeholders and the community before any specific proposals are discussed. It is then continued throughout the development process, designing to address stakeholder/community concerns and deliver local benefits as an integral part of the project, alongside delivering the technical and operational requirements.

A strong design narrative, including a vision and design principles, can be highly effective in enabling stakeholders and communities to engage with your project, helping them understand the objectives, requirements and aspirations and how they will be achieved through the design process. The design principles should evolve throughout the design process, ensuring principles are added to address issues raised during engagement. This in turn enables people to see how the design addresses their concerns.

It is essential to capture and record all feedback received from stakeholders and communities throughout the project, to carefully review all comments and suggestions and to actively decide whether and, if so, how the design approach should change in response. These decisions should also be recorded and justified, and the design narrative can be very useful in justifying them. A rigorous approach to capturing and responding to feedback is a key requirement of the DCO process.

CONSENTING

There are two main consenting regimes that will apply to SRO projects. Most or all SROs will fall within the Planning Act 2008 regime, under which Development Consent Orders (DCOs) are sought for Nationally Significant Infrastructure Projects (NSIPs). Two particular advantages of a DCO are, first, that it replaces a number of different consents that would otherwise have to be applied for separately and, second, that it includes compulsory purchase powers.

In some circumstances, conventional planning permissions may be sought under the Town and Country Planning Act regime. This would apply to smaller projects, which fall outside the scope of the Planning Act 2008 system. In some circumstances, a decision may be made to exclude certain elements of an SRO project from the DCO application and to deal with them separately under the Town and Country Planning Act, for example if they are progressing on a different timescale from the remainder of the project.

A full discussion of the consenting regimes is outside the scope of this guidance. However, whichever system is used, achieving consent is a critical requirement for any project and is a major driver in shaping the early stages of project development. Whilst the design process must have a focus on meeting the necessary requirements for a consent, it is essential to keep a broad view, maintaining a balance between consenting requirements and all the other considerations that should influence the design. The wider aspirations and objectives of the project should not be compromised by a narrow focus on achieving consent.

A key decision to be made in preparing an application is the level of design detail that should be fixed within the consent. You will want key parameters fixed to give you confidence your consent will allow you to build the project you have set out to. The consenting authority will need to be confident that the project will deliver the benefits set out in the application and that the adverse effects will be no greater than those set out in the Environmental Statement, on the basis of which the consent is granted – this may mean fixing a greater range of parameters. If you are intending to procure a contractor at an early stage, to enable their expertise on cost and construction efficiency to inform the design process, the level of detail fixed in the consent will also affect the flexibility the contractor has to change the design approach (see page 21).

DESIGN FOR DELIVERY

It is important that the client/project team continues to engage with design across the project lifecycle and has the appropriate tools to ensure that the design is meeting the vision and principles laid out in the earliest stages. The strategy about how good design should be delivered in the detailed design and construction phases will be intimately tied to the consenting approach and the constraints around the finished design. But design does not conclude at consent. The more flexible the consent is, the greater the effort will be required by all members of the client and project team after it is granted to ensure quality is delivered. Once construction has started, change is expensive so a thoughtful and thorough detailed design process between consent and construction is vital.

Most major projects are now delivered through commercial variations on a Design and Build approach where the contractor brings in their own design team with their own, additional, priorities. Often the knowledge and rationale of the original design team is lost. A good design vision and design principles along with other technical requirements will be vital to insure the pre-consent design intent is communicated and is not lost.

During this phase the client should consider what quality control mechanisms they have in place, which must be set out in their requirements for how the contractor carries out their scope. There are two broad approaches to this (and a range of combinations between them):

1. **What:** Usually used on constrained consents, or where the project team has undertaken a full design process (to stage E or F) prior to a contractor being selected: Define the contractual requirements in as much detail as possible. This would include detailed layouts and specifications for the works and may also cover specific materials and detailing.

2. **How:** Usually used with a flexible consent where the detailed design is to be carried out by the contractor: Set very clear performance requirements for the design, and set in place what progressive assurance processes and checks you would like the contractor to put in place to complete the design process. For example, you may wish them to present their proposals to an independent design review panel.

In addition to the above, projects always face difficult decisions and, sometimes, change in the demanding delivery period. The client plays an important role in this and should develop the mechanisms and secure the support they need to respond swiftly and efficiently to the unexpected.

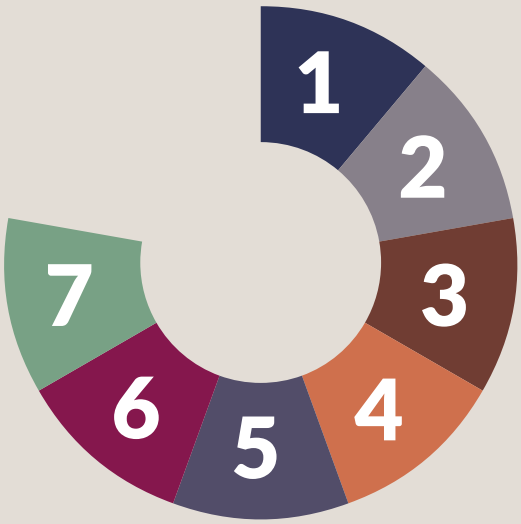
Budgets should be considered from the outset, beginning strategically (so as not to stifle innovation) and becoming progressively more detailed and fixed. Setting a clear design vision and principles should help project teams prioritise where limited budgets should be focused and spent where it will achieve the best value.

Throughout the design process a “controlling mind” is required to manage the interfaces between different (sometimes conflicting) requirements. This is particularly important during construction when the number of interfaces increases dramatically as the supply chain is engaged. Continuing to work across disciplines to coordinate designs, with strong leadership and decision making within the design/project team, is particularly important at this stage to prevent mis-coordination and costly rework on site.

DESIGN PROCESS IN DETAIL

A: SITE/ROUTE OPTIONEERING

Decision-Making Wheel



Stage outcome

Shortlist of sites and/or routes that appear likely to meet technical and financial requirements of the project

Decision-making wheel

- Once technically feasible options have been identified, undertake steps 1-5 of the wheel for each option.
- Develop a preliminary vision and design principles and embed it in the host organisation (steps 6-7).
- Revisit and refine steps 1-7 and ensure the outcomes are central to the selection of the preferred option.

Design Team (who/how?/brief/when)

Phase focused on technical water engineering disciplines.

Engagement

- Start identifying stakeholders and communities to be engaged with at Stage B.
- Engage with other projects of a similar nature to gather lessons learnt and understand best practice.

Design Champion

The design champion should be named and role defined.

Typical Deliverables

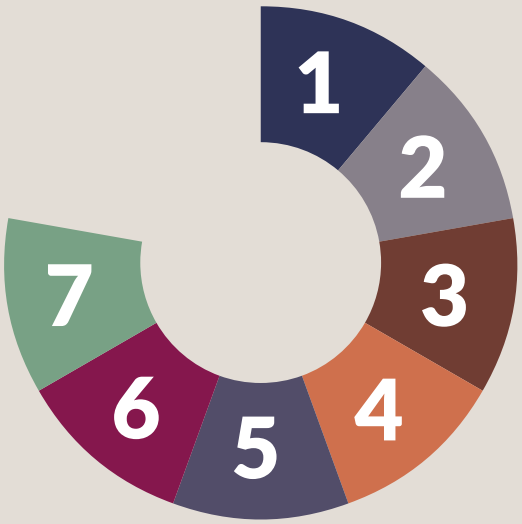
- Preliminary vision
- Preliminary design principles
- Options report

Notes

An option that is acceptable from a technical and financial perspective and delivers wider benefits may be preferable to an option that scores highest from a technical and financial perspective but presents fewer opportunities to deliver wider benefits.

B: IDENTIFICATION OF PREFERRED SITE/ROUTE

Decision-Making Wheel



Stage outcome

Single preferred site/route that meets technical and financial requirements, delivers an appropriate range of wider benefits and is considered likely to achieve DCO/planning consent

Decision-making wheel

- Revisit and refine steps 1-7 and ensure the outcomes are central to the selection of the preferred option.

Design Team (who/how?/brief/when)

At this stage the team needs to be as nimble and responsive to emerging technical and steakholder requirements as possible. Small but experienced teams are needed to make informed decisions quickly and highlight opportunities. "Light touch" consultancy across a broad range of disciplines including construction specialists, planning, landscape architecture and architecture can complement a core engineering team.

Design Champion

Defining the site location and preferred technical option are the single biggest design decisions on any project. The Design Champion will need to be satisfied that;

- All feasible alternatives have been explored with a robust decision making process for selecting a preferred option.
- The project has a diverse and experienced design team in place.
- Opportunities to deliver wider benefits, well as technical feasibility, have been adequately considered.
- Design quality control processes have been defined, eg procure independent design review services or other peer review services.

Engagement

- Undertake a local needs analysis.
- Preliminary engagement with relevant statutory bodies, LPA, wildlife trusts, etc re:
  - vision and design principles
  - identification of constraints and opportunities (environmental and social)
- Commence engagement with landowners.

Design Review

- Consider use of design review to inform final selection of preferred site/route where there are marginal differences between alternative solutions.

Typical Deliverables

- Preliminary vision (refined).
- Preliminary design principles (refined).
- Preferred options report.

Design for Delivery

Build outline cost information that allows the client to budget for the project and make relative descisions around different options.

Notes

A site/route that is acceptable from a technical and financial perspective and delivers wider benefits may be preferable to a site/route that scores highest from a technical and financial perspective but presents fewer opportunities to deliver wider benefits.

C: CONCEPT DESIGN AND OPTIONS TESTING

Decision-Making Wheel

Stage outcome

Single preferred design concept that meets technical and financial requirements, delivers an appropriate range of wider benefits and is considered likely to achieve DCO/planning consent

Decision-making wheel

- Revisit and refine steps 1-7.
- Design with step 8 and design principles in mind at all times.
- Capture decisions (step 9) and record how they respond to the site-specific design principles.

Design Team (who/how?/brief/when)

A larger team with a full complement of engineering, environmental and architectural disciplines will be required at this stage. Single disciplines should avoid rushing into too much detail that will constrain others' ability to shape the design. Management of the interfaces here becomes key.

Design Champion

- Implement & monitor quality control processes that have clear routes of escalation.
- Ensure multi-disciplinary coordination and decision making is being undertaken.
- Engage with stakeholders to understand their concerns and express the benefits of well-designed proposals.
- Develop strategies (passive or active) around elements of "additional value".

Engagement

- Engage with relevant statutory bodies, LPA, wildlife trusts, etc re:
  - vision and design principles
  - approach to constraints (environmental and social)
  - opportunities (environmental and social)
- Commence public consultation on same topics
- Continue engagement with landowners
- First statutory consultation for DCO projects

Design Review

It is at this phase of the design process that Design Review can add the most value - while there is still scope for change in the scope, general arrangement and character of proposals.

- Undertake a formative Design Review at commencement of this stage based on sketch proposals.
- Further design review towards the end of this stage to assess if objectives have been met and set priorites for the next phase.

Consenting

- Pre-application consultation

Typical Deliverables

- Site-specific vision
- Site-specific design principles
- General arrangement
- Architectural concept drawings, massing studies, etc
- Landscape strategy

Design for Delivery

- Develop the consents/delivery/design strategies and options.

Notes

Identify components, scale, general arrangement, access, etc.

An option that is acceptable from a technical and financial perspective and delivers wider benefits may be preferable to an option that scores highest from a technical and financial perspective but presents fewer opportunities to deliver wider benefits.

D: DESIGN DEVELOPMENT TO DCO/PLANNING APPLICATION

Decision-Making Wheel

Stage outcome

Developed design, with key elements and parameters resolved and frozen as basis for DCO/ planning application

Decision-making wheel

- Revisit and refine steps 1-7.
- Design with step 8 and design principles in mind at all times.
- Capture decisions (step 9) and record how they respond to the site-specific design principles.

Design Team (who/how?/brief/when)

As focus moves to production information the team will grow ever larger and may expand to include specialist disciplines such as recreational consultants, lighting designers and artists.

Management of interfaces now imperative with probable use of progressive design freezes to allow assessments to begin.

Design Champion

As above and:

- Ensure change processes (with adequate time) are in place to respond to emerging stakeholder and technical issues.
- Define how appropriate and deliverable commitments around design are to be secured through the consent.
- Develop a strategy for quality control in the delivery phase (post-consent).

Engagement

- Engage with relevant statutory bodies, LPA, wildlife trusts, etc re design development and resolution of issues.
- Further public consultation.
- Further engagement with landowners.
- Second statutory consultation for DCO projects.

Design Review

- A Design review towards the end of this stage should be focused on the layout and details of the proposals you intend to take to consent. A good response from a design review panel will help the project demonstrate that it has met planning criteria around good design.
- If managed correctly, the process can also bring broader stakeholders together for conversations around design. Stakeholders can be invited to observe and see design teams explain to a group of their peers how they are balancing complex requirements in their proposals.

Consenting

- Pre-application consultation
- DCO/planning application

Typical Deliverables

- Site-specific vision (refined)
- Site-specific design principles (refined)
- Works plans (DCO)
- Parameters plans (TCPA)
- Indicative drawings:
  - General arrangement
  - Buildings/structures plans & elevations
  - Landscape strategy
- Design & Access Statement
- Environmental Statement

Design for Delivery

- Potential early contractor engagement to support design process.
- Define what quality control approach the project will take and a programme to develop this in detail.

Notes

Make considered decision about desired level of fix/flexibility in DCO/planning consent.

E: DESIGN DEVELOPMENT POST CONSENT

Decision-Making Wheel

Stage outcome

Outstanding design elements resolved. Strategies for construction coordinated between design disciplines and key inter-dependencies resolved.

Decision-making wheel

- Review steps 1-7 and refresh as necessary.
- Design with step 8 and design principles in mind at all times.
- Capture decisions (step 9) and record how they respond to the site-specific design principles.

Design Team (who/how?/brief/when)

The design approach may need revalidation at this point with a new (often contractor-led) design team. This team may need to assemble rapidly and immediately include multiple specialist consultants and, possibly, suppliers for key elements. It is important that each understands the overarching design vision and principles.

Management of interfaces remains imperative with uses of progressive design coordination points and internal reviews essential.

Design Champion

- Ensure design continues to comply with the project Vision and Design Principles.
- Implement & monitor quality control processes that have clear routes of escalation.
- Ensure multi-disciplinary coordination and decision making is being undertaken.
- Ensure change processes are in place to respond to emerging issues.

Engagement

- Further engagement with key stakeholders re resolution of outstanding issues.
- Further public consultation.

Design Review

- Conduct reviews only where there is a high degree of flexibility in the consent and/or a major change to the scheme.

Consenting

- Discharge of conditions/requirements.

Typical Deliverables

- Developed drawings:
  - General arrangement
  - Buildings/structures plans & elevations
  - Hard & soft landscape plans
  - Materials and planting schedules

Design for Delivery

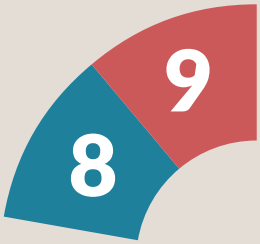
- Tender information and tender process - ensure quality controls are in place through detailed, performance or process requirements.
- Begin to identify the likely critical interfaces between different disciplines and sub-contracts and develop strategies of how to address them without compromising built quality.

Notes

Make considered decision about level of design fix/flexibility to be imposed on contractor.

F: TECHNICAL DESIGN FOR CONSTRUCTION

Decision-Making Wheel



Stage outcome

All design information required to construct the project safely to a high quality

Decision-making wheel

- Design with step 8 and design principles in mind at all times.
- Capture any changes to previous design decisions (step 9) and record how they respond to the site-specific design principles.

Design Team (who/how?/brief/when)

Defining clear collective objectives and the parameters around interfaces will allow disciplines to work with a degree of autonomy in order to progress production information.

Design Champion

- Ensure design continues to comply with the project Vision and Design Principles.
- Implement & monitor quality control processes that have clear routes of escalation.
- Ensure multi-disciplinary coordination and decision making is being undertaken.
- Ensure change processes are in place to respond to emmerging issues.

Engagement

- Maintain engagement with local communities and key stakeholders.
- Involve contractor in engagement once appointed.

Typical Deliverables

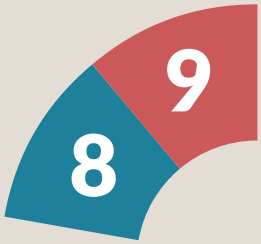
- Construction drawings and details
- Specifications
- Construction-phase Environmental Management Plan (CEMP)

Design for Delivery

- Tender information and tender process (if contractor to be appointed following design completion).
- Contractor involvement in design (if appointed early).

G: DESIGN FOR OPERATION

Decision-Making Wheel



Stage outcome

All design information required for ongoing management and maintenance of the project

Decision-making wheel

- Develop material with step 8 and design principles in mind at all times.
- Capture any changes to previous design decisions (step 9) and record how they respond to the site-specific design principles.

Design Team (who/how?/brief/when)

Defining clear collective objectives and the parameters around interfaces will allow disciplines to work with a degree of autonomy in order to progress production information.

Engagement

- Maintain engagement with local communities and key stakeholders.

Typical Deliverables

- Landscape & Ecology Management Plan (LEMP)
- Maintenance specification
- Maintenance drawings

Notes

Though all 'design' activity should now be complete, providing exemplary asset information (digital and written) is essential to ensure in-use performance matches design intentions.

ACWG
DESIGN PRINCIPLES IN DETAIL

More detail on each of these principles is given in the following pages. Outcomes are provided for each principle. These give more detail on the processes and outcomes expected to flow from each principle. Case studies that illustrate each principle have been selected from the water and infrastructure sectors wherever possible. Like most projects, they will not be exemplary in every respect, but they demonstrate best practice with respect the principle in question – and demonstrate that achieving good design is an attainable goal even in large, complex projects.

RAISING THE BAR

1. BE SPECIFIC

DESIGN PRINCIPLE

DEVELOP PROJECT-SPECIFIC DESIGN VISION AND PRINCIPLES BASED ON AN UNDERSTANDING OF THE OBJECTIVES OF EACH PROJECT AND THE PEOPLE AND PLACES IT WILL AFFECT.

Why it matters

The challenge around our water resource infrastructure is of a scale that decisions about which projects to develop will inevitably be driven by regional or even national concerns. Each project must mediate between this scale and many and varied local impacts of the built infrastructure itself. Setting a good design vision and principles for a project (and the narrative behind them) will be instrumental in defining the benefits and priorities of your scheme and communicating it to both the public and the project teams.

Each project will be different, and your design vision and principles should be specific to both the type of solution and its context. The act of developing/defining your own principles will challenge you to think broadly and prioritise the factors shaping your proposals. Sharing specific principles with stakeholders early will enable meaningful dialogue and consensus on them before a design solution is set.

Outcomes

- Development of project specific vision and principles mapped against the NIC and ACWG Principles early in the design development process (Stages A-C).
- Development of a clear, concise narrative describing the story behind your Vision and Principles.
- Review of design proposals against your design principles at every stage of the project lifecycle.

Relevant Project links

Upper Lee Valley Landscape Strategy February 2010

Rewilding London: Walthamstow Wetlands

Case Study: Walthamstow Wetlands

Walthamstow Wetlands is a fully operational 211 hectare Thames Water reservoir site which is the main source of water supply for 3.5 million people. It is also an internationally important nature reserve. In October 2017, Walthamstow Wetlands opened to the wider public for the first time in 150 years having previously being disconnected from the surrounding community.

The client stated that while the idea of opening up Walthamstow's reservoirs to wider public access had been around for several decades, it wasn't until the publication of the Upper Lea Valley Landscape Strategy in 2010 that the aspiration became a viable proposition. The strategy provided a catalyst for stakeholders, including site owners Thames Water and the London Borough of Waltham Forest, to come together as a partnership around a powerful shared vision and embark on the process of delivery. That vision "From edge to common ground" offered a vision that embraced the area's wildness and celebrated its industrial heritage, and was informed by a comprehensive analysis the Lee Valley context.

2. SAFE AND WELL

DESIGN PRINCIPLE

ACTIVELY AND COLLECTIVELY DEVELOP DESIGNS THAT CAN BE BUILT, USED, AND MAINTAINED WITHOUT UNACCEPTABLE RISKS TO THE HEALTH AND SAFETY OF WORKERS - PARTICULARLY DURING HAZARDOUS CONSTRUCTION AND OPERATIONAL ACTIVITY. MANAGE RISKS TO MEMBERS OF THE PUBLIC THOUGHTFULLY WITH AN APPROACH THAT BALANCES MAXIMISING WELLBEING BENEFITS WITH PROTECTION FROM RISKS THAT COULD CAUSE SIGNIFICANT HARM.

Why it matters

Health and safety within the construction industry has always been an issue. Though strengthening the regulatory framework has led to improvement, fatal injury statistics remain too high at 40 per year within the construction industry. Clients of large infrastructure projects are at the forefront of health and safety innovation and improvements, but performance still needs to be much better. Designers are in the responsible position to design assets that can be both constructed and operated safely. The best way to do this is collaboratively with the people who understand the risks involved in building, operating, and maintaining them.

Public safety must also be considered both during construction and operation. Providing access to green spaces and waterways has become increasingly important in recent years to encourage people to get active and for the benefit of their mental health. Many water resource projects will create or adapt existing bodies of water. Implementing nature based solutions to flood management can also create new areas of standing water, increasing the risk of drowning incidents. Designs need to be actively developed to manage the risk of accidents to the public without sacrificing the opportunity to deliver these benefits to people and the environment.

Outcomes

- No accidents, incidents or harm to people during construction and operation.
- Use of best practice procedures in design risk management following HSE Guidance and CDM legislation.
- Design informed by understanding potential risks to the public and management of these so far as reasonably practicable. Use of appropriate guidance including but not limited to:
  - RoSPA and the National Water Safety Forum's Guiding Principles for Managing Drowning and Water Safety Risks.
  - Visitor Safety in the Countryside.
- Consideration of security early in the design of fence, gate and boundary treatments.

Relevant Project links

Olympic Park Waterspace Masterplan

London 2012: The Construction

Leadership and worker involvement on the Olympic Park

Case Study: Queen Elizabeth Olympic Park

The London 2012 Olympics were feted as the safest in history. By the conclusion of the "big build" phase of the project in June 2011, the Olympic Delivery Authority (ODA) recorded around 62 million man hours worked with an Accident Frequency Rate (AFR) of 0.17 (calculated per 100,000 hours worked). This compared to construction industry averages of 0.4.

Significant research into the reasons for this success showed strong client commitment to health and safety from the outset being a key factor along with the early and collaborative involvement with contractors in the design process and delivery planning phases. However, it also highlighted how more feedback to designers on the safety implications of their proposals would have improved matters in the construction phase even further.

Waterside safety and security during the games and operational phases of the park were also considered very early in the process as part of the Park's "waterspace" strategy. This considered the design holistically with specific guidance on how the designers should consider layout, security fencing, handrailing, lighting, surveillance/CCTV, flood risk, emergency access and water quality.

3. CLIMATE: MITIGATE GREENHOUSE GAS EMISSIONS AND ADAPT TO CLIMATE CHANGE

Old Ford Water Recycling Plant, London

Part of the Olympic Park's sustainable water strategy, the installation produced grey water and data to provide an evidence base to inform commercial, operational and regulatory decisions on the role of water recycling - in addition to raising awareness of water reuse schemes.

3A. NATURE KNOWS NO BOUNDARIES

DESIGN PRINCIPLE

WATER IS ESSENTIAL TO ALL LIFE AND MANAGING OUR RESPONSE TO CLIMATE CHANGE IS A COLLECTIVE AND URGENT ACTIVITY. PROJECTS MUST BE DEVELOPED TO WORK ACROSS COMPANIES AND/OR LEGISLATIVE BOUNDARIES TO DEVELOP SUSTAINABLE SOLUTIONS AND ENVIRONMENTAL ENHANCEMENT FOR THE WIDER BENEFIT OF SOCIETY.

Why it matters

The scale and nature of water resource projects means they will often affect large geographical areas with multiple stakeholders and interests. The current stresses facing the UK water environment are multi-faceted covering all stages of the water cycle; from drought in some areas, to increased tidal and surface water flooding in others, to poor water quality and sewage spills into our seas and rivers. Recent studies have shown that fragmentation of responsibilities between different stakeholders within the water industry are impeding us from finding holistic solutions to address these.

Fragmentation of landscape and habitat is also an issue hampering the flourishing of our natural systems and resilience. Recent environmental policy requires that we look at nature as a whole and develop landscape scale solutions to the recovery of nature – it is no longer acceptable to consider isolated solutions and mitigations.

Collaboration will be key in this environment and working in close partnership with others essential to achieving positive outcomes.

Outcomes

- Collaborative working across companies and with stakeholders.
- Timely - preparation of proposals ready to construct in 5-10 years' time will involve early and rigorous development of design objectives followed by proposals.
- Alignment with other relevant environmental policy, plans and strategies such as Catchment Management and Local Nature Recovery Plans (see also Design Principle 4B).

Relevant Project links

From Thirlmere to West Cumbria

Revitalising Eden: The Eden Catchment Plan

Case Study: West Cumbria Water Supply

The proposed 100km network of pipelines will transfer water from Thirlmere reservoir to West Cumbria to supply homes and businesses. The scheme also incorporates a new water treatment works, two pumping stations and new service reservoirs. More than 250 landowners were liaised with in the planning process. The route has been designed to avoid the natural obstacles where possible. The planned route considers the existing terrain and utilises gravity where possible to save additional energy used to pump upwards.

3B. RESOURCE AND CARBON EFFICIENT THROUGHOUT

DESIGN PRINCIPLE

PROJECTS SHALL SEEK TO REUSE EXISTING ASSETS, ELIMINATE WASTE (INCLUDING WASTE OF WATER) AND MAKE EFFICIENT USE OF MATERIALS AND TRANSPORT ACROSS THE WHOLE OF THE PROJECT LIFECYCLE.

Why it matters

The water industry has laid out an ambitious target to achieving a net zero carbon emissions (in operation) by 2030. This means opportunities and innovation must be pursued during design and construction to enable the decarbonisation of projects – and our society as a whole – as a priority before considering mitigating and offsetting residual emissions.

SRO projects should provide a method for measuring whole life emissions over the course of its full lifespan, make changes if it's not performing as it should do and ensure this knowledge is shared.

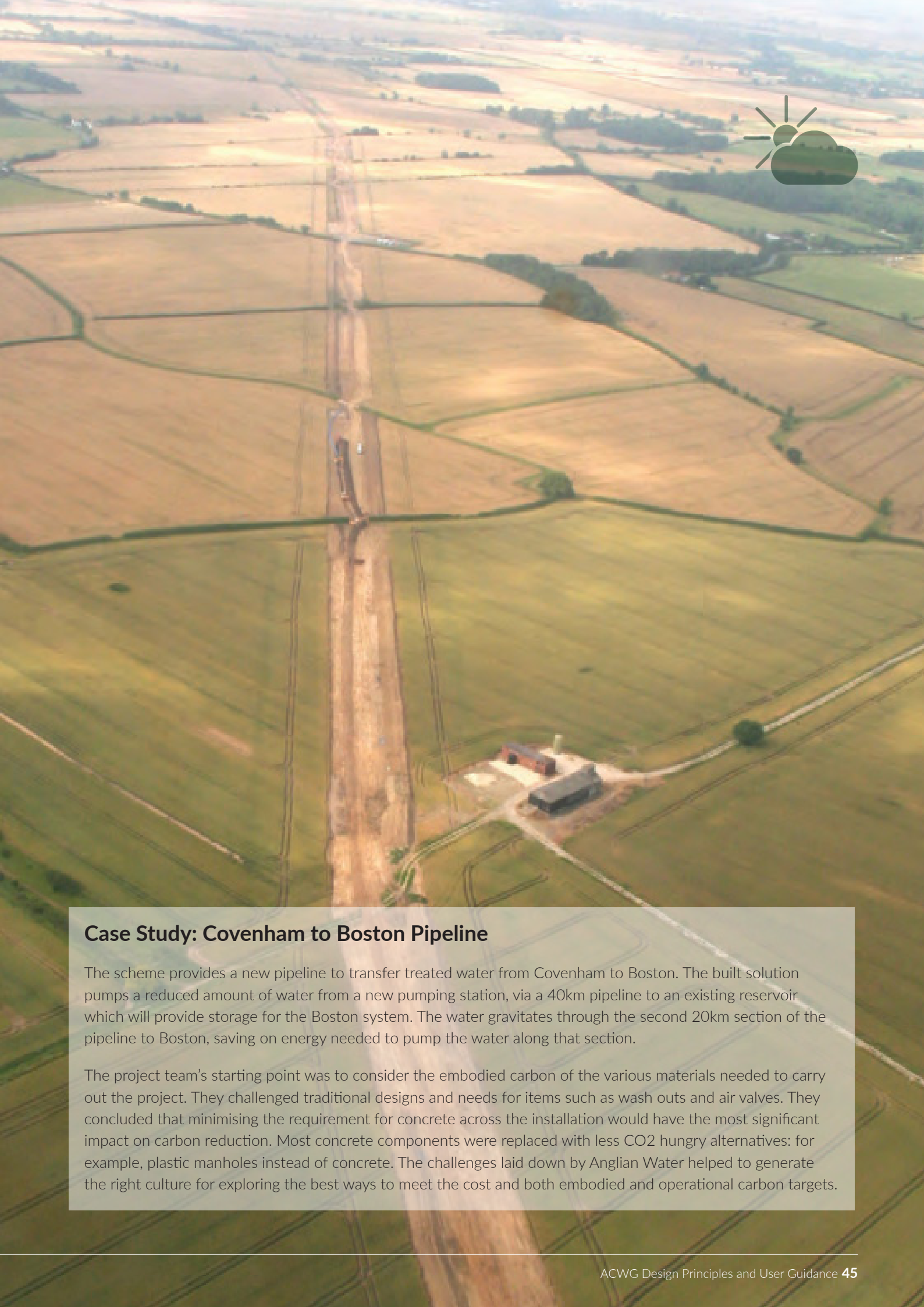
Essential to the industry commitment to reducing emissions is being as efficient as possible with the use of other resources – particularly water itself. Large projects have the responsibility to minimise leaks within their works and the opportunity to raise awareness with industry and the public of the need to be mindful in their use of this precious resource.

Outcomes

- Lifecycle Carbon: Projects shall support the water industry commitment to achieve Net-Zero in terms of operational carbon in accordance with the industry roadmap.
- Projects must be efficient in embodied carbon in both construction and operation.
- Projects should investigate if existing infrastructure assets could be repurposed and reused.
- Projects should look to avoid unnecessary construction and minimise use of materials.
- Projects should seek to minimise the use and waste of water.

Relevant Project links

Covenham to Boston Pipeline



Case Study: Covenham to Boston Pipeline

The scheme provides a new pipeline to transfer treated water from Covenham to Boston. The built solution pumps a reduced amount of water from a new pumping station, via a 40km pipeline to an existing reservoir which will provide storage for the Boston system. The water gravitates through the second 20km section of the pipeline to Boston, saving on energy needed to pump the water along that section.

The project team's starting point was to consider the embodied carbon of the various materials needed to carry out the project. They challenged traditional designs and needs for items such as wash outs and air valves. They concluded that minimising the requirement for concrete across the installation would have the most significant impact on carbon reduction. Most concrete components were replaced with less CO2 hungry alternatives: for example, plastic manholes instead of concrete. The challenges laid down by Anglian Water helped to generate the right culture for exploring the best ways to meet the cost and both embodied and operational carbon targets.

3C. RESILIENT AND ADAPTABLE

DESIGN PRINCIPLE

DESIGN FOR ANTICIPATED FUTURE DEMAND AT THE APPROPRIATE SCALE. BUILD IN THE RESILIENCE TO ABSORB AND RECOVER FROM THE IMPACTS OF THE EXTREME EVENTS AND INCREMENTAL STRESSES LIKELY TO ARISE FROM CLIMATE CHANGE.

Why it matters

The water environment is particularly vulnerable to climate change with extreme events of drought and flood already becoming more common. The industry has set out proposals to improve the resilience of the water sector to which the SRO projects can contribute greatly.

Good design incorporates flexibility, allowing a project to adapt over time and build our resilience to both incremental growth and change and the shocks and stresses that arise from unexpected events.

Outcomes

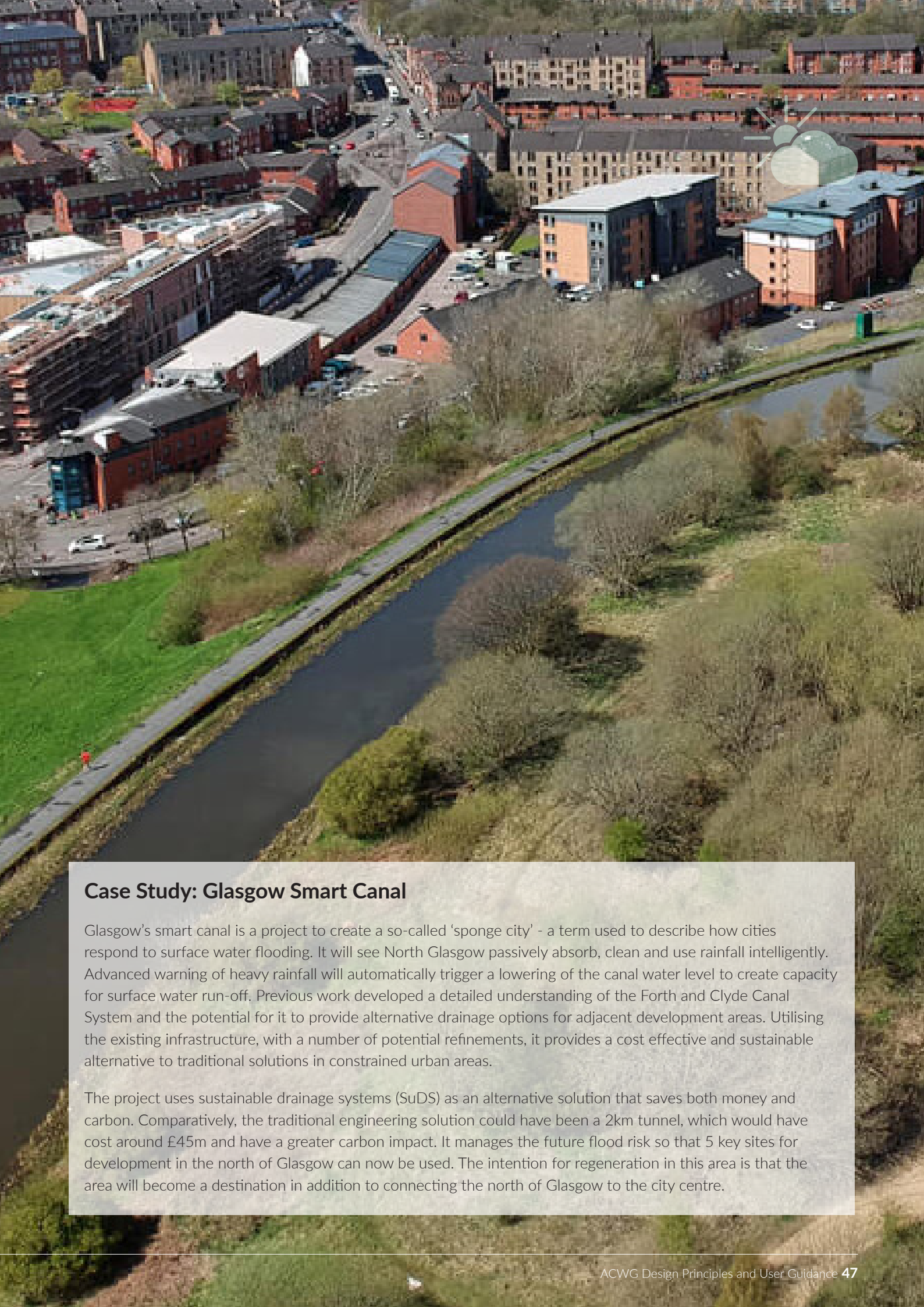
- Designs should be developed to include proportionate measures to anticipate future extreme events and stresses so that they can resist, absorb, recover and, where necessary, be adapted.
- Designs shall support the digitisation of the network at a catchment level using data to inform design, optimise solutions and improve operational efficiency in real time.
- Where proposals add to the resilience of the broader system this should be accounted for in its social value (see also 6C).
- The layout and design of specific elements of infrastructure should be taken in cognisance of planned future development of the immediate area.
- Deploy nature-based approaches to resilience wherever possible (see also 5B).

Relevant Project links

Anticipate, React, Recover

Operational resilience discussion paper

Glasgow's Smart Canal

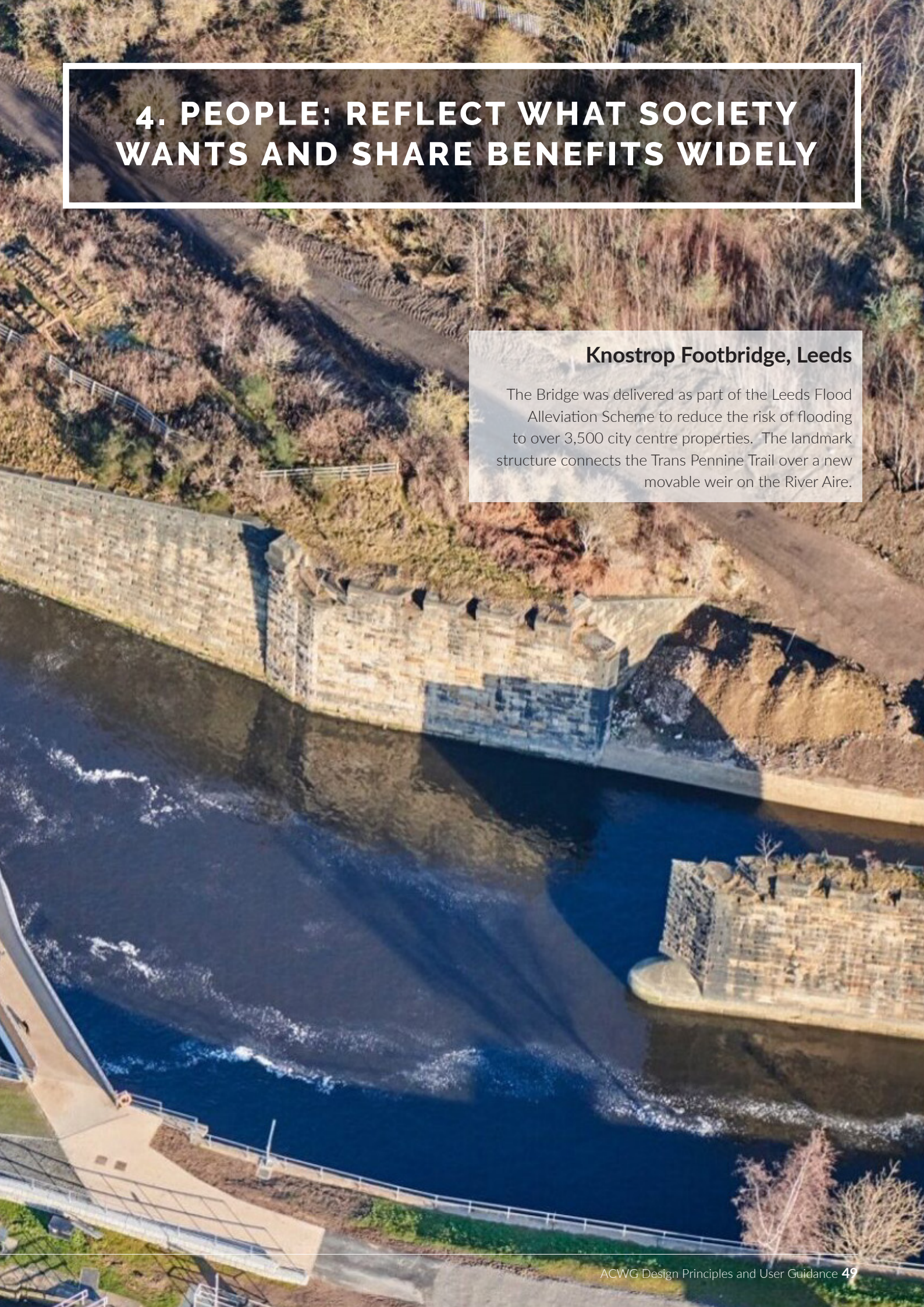


Case Study: Glasgow Smart Canal

Glasgow's smart canal is a project to create a so-called 'sponge city' - a term used to describe how cities respond to surface water flooding. It will see North Glasgow passively absorb, clean and use rainfall intelligently. Advanced warning of heavy rainfall will automatically trigger a lowering of the canal water level to create capacity for surface water run-off. Previous work developed a detailed understanding of the Forth and Clyde Canal System and the potential for it to provide alternative drainage options for adjacent development areas. Utilising the existing infrastructure, with a number of potential refinements, it provides a cost effective and sustainable alternative to traditional solutions in constrained urban areas.

The project uses sustainable drainage systems (SuDS) as an alternative solution that saves both money and carbon. Comparatively, the traditional engineering solution could have been a 2km tunnel, which would have cost around £45m and have a greater carbon impact. It manages the future flood risk so that 5 key sites for development in the north of Glasgow can now be used. The intention for regeneration in this area is that the area will become a destination in addition to connecting the north of Glasgow to the city centre.

4. PEOPLE: REFLECT WHAT SOCIETY WANTS AND SHARE BENEFITS WIDELY



Knostrop Footbridge, Leeds

The Bridge was delivered as part of the Leeds Flood Alleviation Scheme to reduce the risk of flooding to over 3,500 city centre properties. The landmark structure connects the Trans Pennine Trail over a new movable weir on the River Aire.

4A. UNDERSTAND AND RESPOND TO YOUR COMMUNITY'S NEEDS

DESIGN PRINCIPLE

DEVELOP A FULL UNDERSTANDING OF THE SOCIAL CONTEXT THAT WILL BE IMPACTED BY THE PROJECT OVER ITS LIFECYCLE. DESIGN FOR HOW LOCAL COMMUNITIES WILL ENCOUNTER THE INFRASTRUCTURE IN THEIR EVERYDAY LIVES DURING BOTH CONSTRUCTION AND OPERATION.

Why it matters

SRO projects are being developed to provide reliable water supplies but often the communities who benefit from this will be located far from the physical infrastructure that will enable this. Therefore the project needs to also consider the needs of those most impacted by its construction and operation.

Understanding a community requires a multi-faceted look at an area's spatial, environmental and social context. It requires knowledge of the places and services that the current community use and need, and the identification of opportunities for how these could grow and develop over time. Studies, analysis and data gathering are important to complement local and regional consultation exercises to develop a holistic, diverse and long-term understanding of a place – and thereby informing design proposals that respond most effectively.

Outcomes

- Reliable supply of water to customers
- Designs developed to maximise their social value.
- Proposals reflect local community views as to how they interact with and experience the infrastructure as far as possible.

Relevant Project links

The Architecture of Reconnection: Walthamstow Wetlands

Case Study: Walthamstow Wetlands

The ultimate focus of the project was to create a place that would work for the people - and wildlife - using it. Walthamstow Wetlands describes itself as a place that fosters a special sense of community and is improving the health and wellbeing of those that have discovered its treasures. As part of the development the engine house was redesigned and now contains a visitor centre and café, while the tower offers panoramic views across the wetlands and towards the city and accommodates nesting swifts and roosting bats.

Both experts and local community stakeholders were involved in the planning process, and through working with these stakeholder groups and by fundraising, the final project exceeded the vision of the original brief. Some of the consultation events were run by the London Wildlife Trust (LWT). The Wetlands played an important role during the Covid-19 lockdowns, the number of visitors increased by 140% as people sought out outdoor space.

4B. ENGAGE WIDELY, EARLY, AND MEANINGFULLY

DESIGN PRINCIPLE

WORK WITH STAKEHOLDERS AND LOCAL COMMUNITIES TO DEVELOP THEIR UNDERSTANDING OF THE IMPORTANCE OF NATURE AND WATER CONSERVATION. DEVELOP CO-DESIGN APPROACHES TO ASPECTS OF THE DESIGN OF INFRASTRUCTURE AND ASSOCIATED LANDSCAPE WHERE PRACTICABLE.

Why it matters

The range of views of communities affected by a project must be taken into account and reflected in the design. While it won't always be possible to please everyone, engagement should be diverse, open and sincere, addressing inevitable tensions in good faith and finding the right balance. And it should not just be designed for people today. Work with the people who use the infrastructure, the communities who live nearby and the workers who build, maintain and operate it, to ensure the design meets their diverse needs.

Often on projects, stakeholder involvement is largely confined to public consultation exercises, timed too late in the process to influence key strategic decisions. A project's success ultimately depends on long term support by users and public. This can only be fully achieved by their early (i.e. pre-gateway) and active engagement during the process.

Outcomes

- Stakeholders and communities understand the need for the scheme and the nature/appearance of the proposed solution(s).
- The views of local stakeholders have shaped the design, where possible.
- Engagement and consultation with communities has influenced the design (including but not limited to site selection, layout, materials, detailing and public access) making it more acceptable to them.
- The project provides the public with information on the importance of water and/or nature conservation (e.g. through information boards, artwork or digital information).

Relevant Project links

Castle Irwell Urban Wetland

Salford Castle Irwell

Case Study: Salford Wetlands

In addition to the space being a green asset in the urban environment that attracts flora and fauna including birds of prey, the space has provided an asset that can be used by the community and not just for flood events.

The aspiration for this space to have a community benefit beyond its original flood alleviation purpose was expressed from the outset. From the beginning of the project a good relationship was established with the local community. A steering group was also set up to help guide the design. The project approached the design systemically, this allowed the brief to be expanded and became a catalyst for greater opportunities for the scheme. A landscaped feature of the site, Harry's Hill, is named after a local activist and environmentalist who died before the scheme was completed. The site has been called an outdoor classroom to learn about ecology and wildlife

4C. IMPROVE ACCESS AND INCLUSION

DESIGN PRINCIPLE

CONSIDER HOW PEOPLE MOVE AROUND YOUR WORKS. MAXIMISE OPPORTUNITIES TO SUPPORT ACTIVE TRAVEL AND IMPROVE RECREATIONAL ACCESS TO WATERSIDE AND GREEN SPACES THAT CAN IMPROVE OUTCOMES FOR WELLBEING, HEALTH, LOCAL ECONOMY, SOCIAL INCLUSION AND EDUCATION

Why it matters

The United Kingdom is facing a crisis in health caused by inactivity that (in part) can be addressed by providing more opportunities for active travel and recreation. People actively seek out waterside spaces for wellbeing and recreation. Reservoir projects are likely to have the greatest opportunities in this regard, but changes in the boundaries to water works (often located on watercourses) and environmental mitigation works could also have impacts on local walking routes that require careful design to consider these impacts on diverse groups.

During construction it is not only car traffic that can be disrupted. Walkers, cyclists and horse riders also rely on a network of routes that should be managed and kept open wherever possible. Contractors and water companies may also be able to find ways to promote active travel by their workforce to reduce reliance on car travel during both construction and operation.

Providing people with information on the natural environment and the reasons behind the need for water resource infrastructure can improve their appreciation of both. Projects can use the design of features of the proposals as well as signage and interpretation to maximise this.

Outcomes

- Find opportunities to improve people's health, wellbeing and understanding of the natural environment, through access to waterside and green spaces for recreational and other purposes.
- Maximise opportunities for workers to access sites via sustainable transport during construction and operation. Minimise disruption to travel routes in areas affected by a project during construction and operation.

Relevant Project links

The Afsluitdijk. Ready for the future

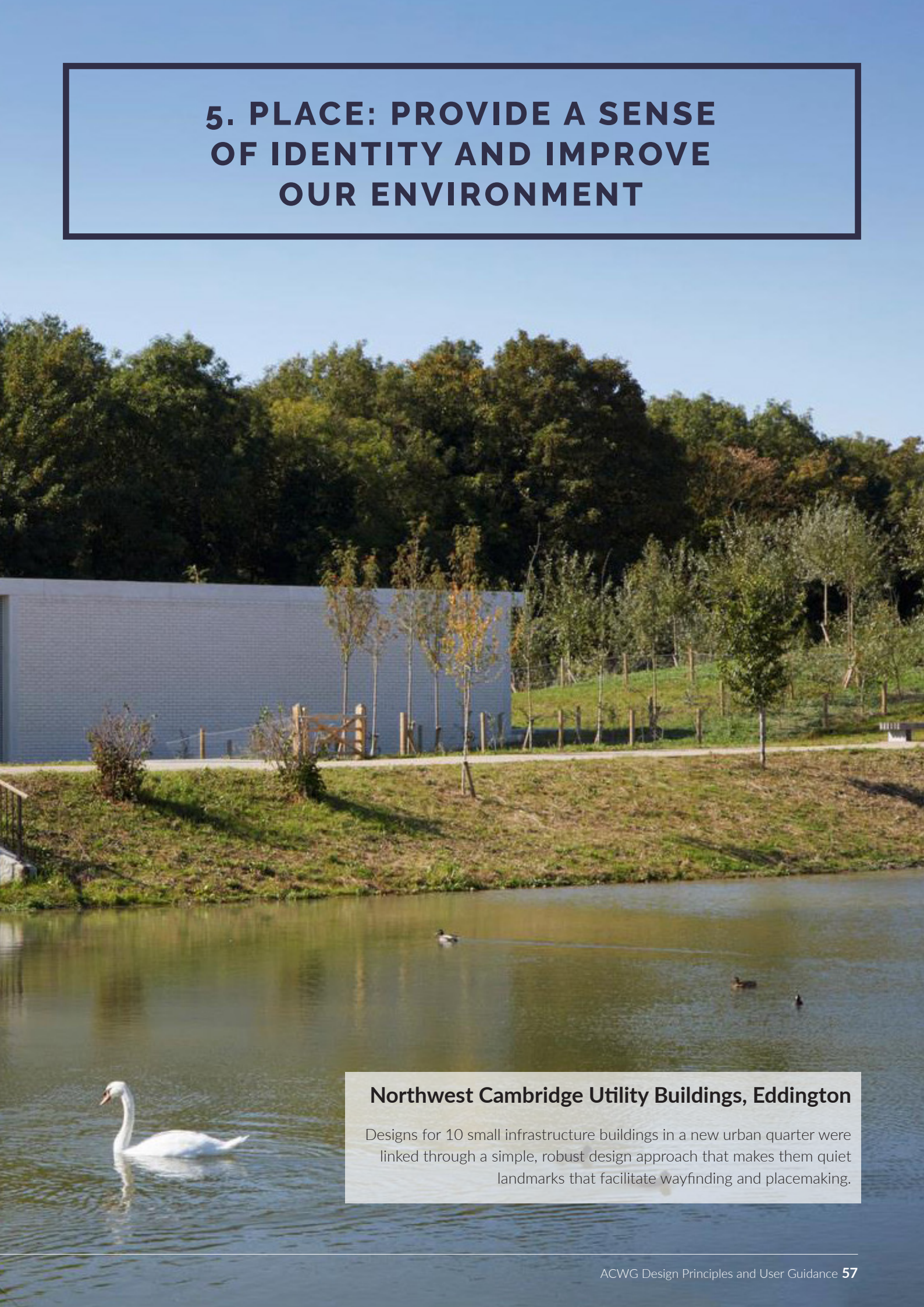
Case Study: Afsluitdijk

The Afsluitdijk is the 32-kilometre-long dyke which protects the Netherlands against flooding and connects Friesland with North Holland via a road along its length. The project was needed for the dyke to continue to protect the Netherlands from flooding due to rising sea levels.

An ethos of the scheme was to transform the dyke from dividing to connecting, incorporating ambitions for ecology, sustainability, and recreation. On the side of the Wadden Sea a verge was created between the lower slope and the upper slope, which inhibits wave run-up and provides space for a new walking and cycle path.

The scheme increases the recreational value of the dyke. New features include a visitor centre, art installations, a walking and cycle route and opportunities to visit the nature reserves created. These establish the dyke as a destination for visitors, not just a route to drive through. The project respects the history of the 90-year-old structure, its design and the monument structures are a national heritage site.

5. PLACE: PROVIDE A SENSE OF IDENTITY AND IMPROVE OUR ENVIRONMENT



Northwest Cambridge Utility Buildings, Eddington

Designs for 10 small infrastructure buildings in a new urban quarter were linked through a simple, robust design approach that makes them quiet landmarks that facilitate wayfinding and placemaking.

5A. TAKE CARE

DESIGN PRINCIPLE

DEVELOP PROPOSALS IN THE SPIRIT OF STEWARDSHIP LOOKING TO BOTH THE PAST AND FUTURE OF EACH CONTEXT TO UNDERSTAND AND DEVELOP ITS LANDSCAPE, CULTURAL HERITAGE, HEALTH AND SUSTAINABILITY. WORK WITH PARTNERS TO SECURE THE LONG-TERM SUCCESS OF ALL MEASURES.

Why it matters

Our built environment and natural environments should be protected and enhanced for the long-term benefit of the communities that depend on them. New infrastructure should be regenerative, enhancing its environment and adding to the health, sustainability and biodiversity of its context. Our society no longer has the luxury of exploiting our environment to meet short-term or narrowly defined objectives. The time has come to enhance and care for it instead.

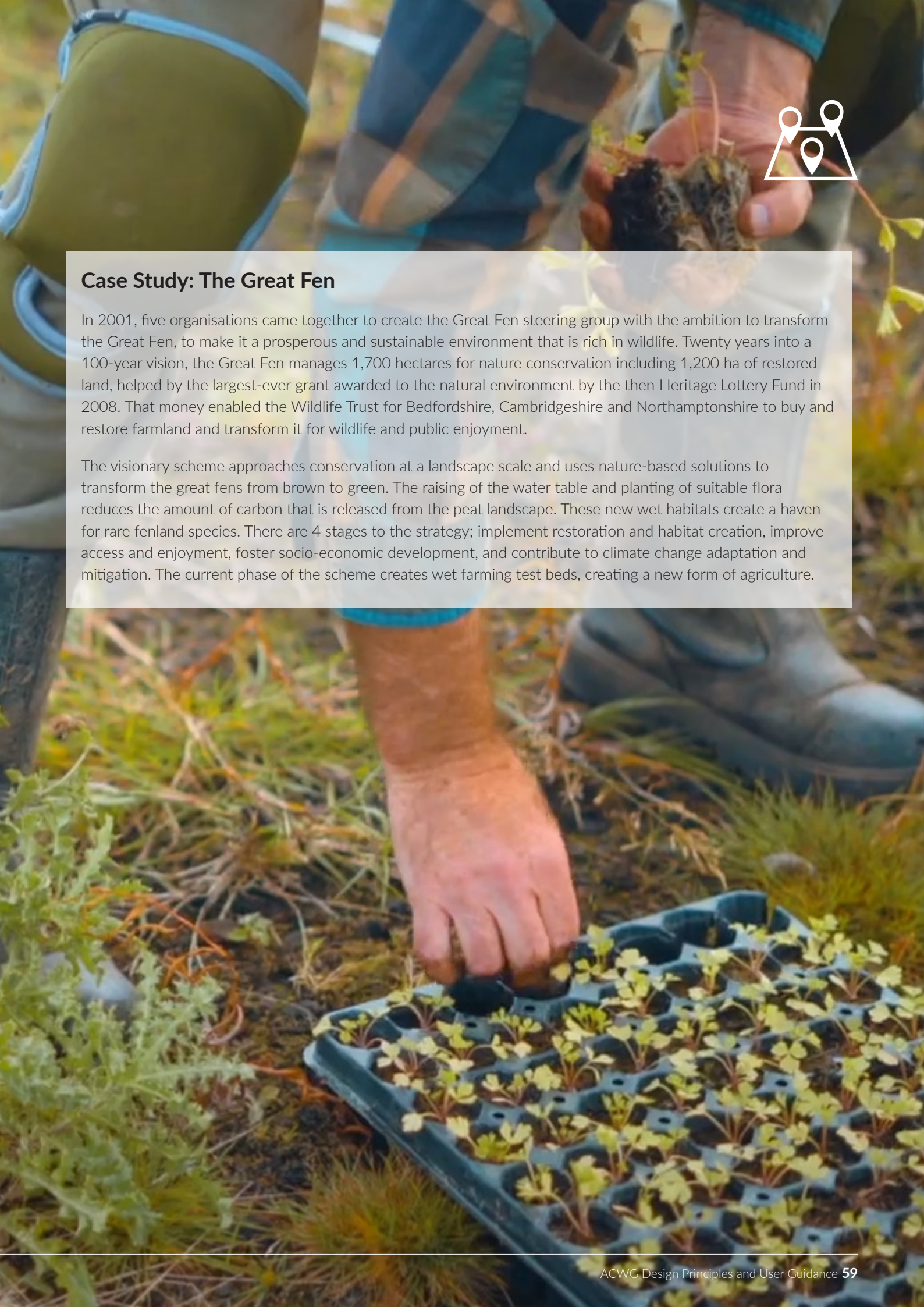
SRO projects will play a part – be it long term or fleeting – in the stewardship of the environment and people they impact. The projects need to be designed – with the stewards of those environments – to ensure that what we pass on to future generations is as good as it can be.

Outcomes

- Achieve Environmental Net Gain (ENG).
- Adopt measures in the design that enhance the environment and help avoid future problems - e.g. adoption of SuDS solutions that improve cooling, attenuate surface water run-off and improve infiltration and biodiversity.
- Have clear and realistic long-term strategies for how operational and mitigation proposals will be managed and maintained. Develop partnerships with local communities where this has a mutual benefit.
- Develop proposals in light of a clear understanding of the area's landscape and history.

Relevant Project links

Raising the waters – a 100-year plan for Great Fen



Case Study: The Great Fen

In 2001, five organisations came together to create the Great Fen steering group with the ambition to transform the Great Fen, to make it a prosperous and sustainable environment that is rich in wildlife. Twenty years into a 100-year vision, the Great Fen manages 1,700 hectares for nature conservation including 1,200 ha of restored land, helped by the largest-ever grant awarded to the natural environment by the then Heritage Lottery Fund in 2008. That money enabled the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire to buy and restore farmland and transform it for wildlife and public enjoyment.

The visionary scheme approaches conservation at a landscape scale and uses nature-based solutions to transform the great fens from brown to green. The raising of the water table and planting of suitable flora reduces the amount of carbon that is released from the peat landscape. These new wet habitats create a haven for rare fenland species. There are 4 stages to the strategy; implement restoration and habitat creation, improve access and enjoyment, foster socio-economic development, and contribute to climate change adaptation and mitigation. The current phase of the scheme creates wet farming test beds, creating a new form of agriculture.

5B. PROTECT AND PROMOTE THE RECOVERY OF NATURE

DESIGN PRINCIPLE

FOCUS ON THE ROLE OF LANDSCAPE, ITS CAPACITY TO ACCOMMODATE INFRASTRUCTURE AND SHAPE PLACES. WORK COLLABORATIVELY AND EMPLOY HOLISTIC, LANDSCAPE-SCALE APPROACHES THAT SUPPORT AND DELIVER BIODIVERSITY NET GAIN AS WELL AS MULTIPLE OTHER BENEFITS.

Why it matters

Biodiversity and well-functioning ecosystems are critical for human existence, economic prosperity, and a good quality of life. They play an important role in providing food, energy, shelter and medicines; sustaining water and soil quality; regulating the Earth's climate; and providing opportunities for recreation, recuperation and inspiration.

The UK is one of the most nature-depleted countries in the world. Since the 1970s 41 per cent of all UK species surveyed have declined, while 15 per cent of species within the UK are said to be threatened with extinction.

The UK needs a transformative collective effort to halt and reverse this decline. The design of SRO projects can contribute to this, carefully designing reinstatement, permanent features and mitigations to maximize their biodiversity value and increase the resilience of existing ecosystems.

Outcomes

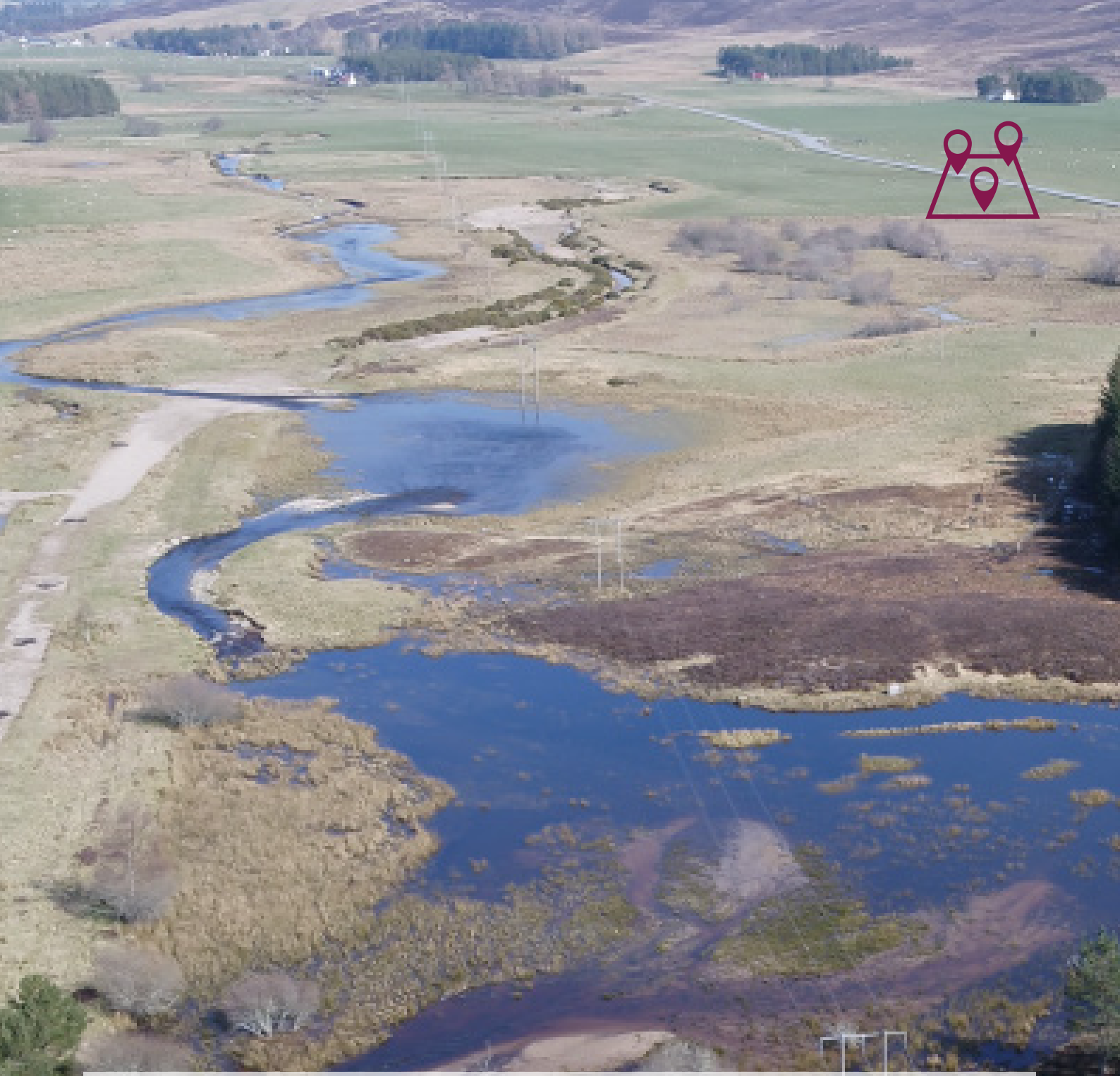
- Achieve at least 10% Biodiversity Net Gain (BNG).
- Deploy nature-based approaches to integration and mitigation as the first-choice solution where possible.
- When looking at options to provide compensation or enhancement, prioritise measures that support achieving good ecological condition for affected watercourses and bodies as a whole. When making an intervention, mitigate infrequent impacts by developing proposals that keep them local and short lived.
- Work with landowners and land managers to develop mutually beneficial solutions where practicable.

Relevant Project links

Biodiversity in the UK: bloom or bust?

Upper River Nairn restoration project

Re-naturalising River Nairn



Case Study: River Nairn Restoration

The River Nairn at Aberader Estate has a long history of straightening, dredging and artificial embankments. The channel had been straightened and constrained between embankments, becoming 'perched' above its floodplain making flood risk worse while reducing the biodiversity in the 'log flume' channel. This project was in response to farmer concerns regarding flooding and sediment build up in the channel.

During the restoration, the river was opened up, the embankments were removed and the river was allowed to meander again, allowing space for the river to deposit and re-establish the natural processes. River restoration like this is a low carbon solution that will provide resilience in the face of increased flooding. Removing the physical constraints that had contained the channel for so long has allowed the new channel to evolve rapidly, creating far more diverse physical habitats within the river corridor, whilst re-connecting the river back to its floodplain. Ongoing monitoring has shown positive results for Atlantic salmon and trout. Tree planting was also undertaken to reduce run-off and provide large woody elements in the channel.

5C. DESIGN ALL FEATURES BEAUTIFULLY, WITH HONESTY AND CREATIVITY

DESIGN PRINCIPLE

OUR UTILITY INFRASTRUCTURE CAN BE A SOURCE OF PRIDE AND A POSITIVE CONTRIBUTION TO ITS CONTEXT. DEVELOP PROPOSALS THAT REVEAL AND CELEBRATE ITS IMPORTANCE, PROVIDE VISUAL DELIGHT AND LEAVE A POSITIVE LEGACY.

Why it matters

Well-designed infrastructure supports the natural and built environment. It gives places a strong sense of identity, and through that forms part of our national cultural heritage.

It is not enough to "hide" new infrastructure – or just mitigate its least attractive features. Projects should be inspiring in form and detail, respecting and enhancing local culture and character without being bound by the past. A creative and innovative design process will produce proposals expressive of the societal benefits SRO projects will bring. Careful attention to composition, proportion and craftsmanship can make the most robust utilitarian structures attractive. In the past the water industry has built infrastructure that combined practicality and beauty. Even modest pumping stations have become valued features in our townscapes and landscapes. Every SRO can achieve the same for future generations.

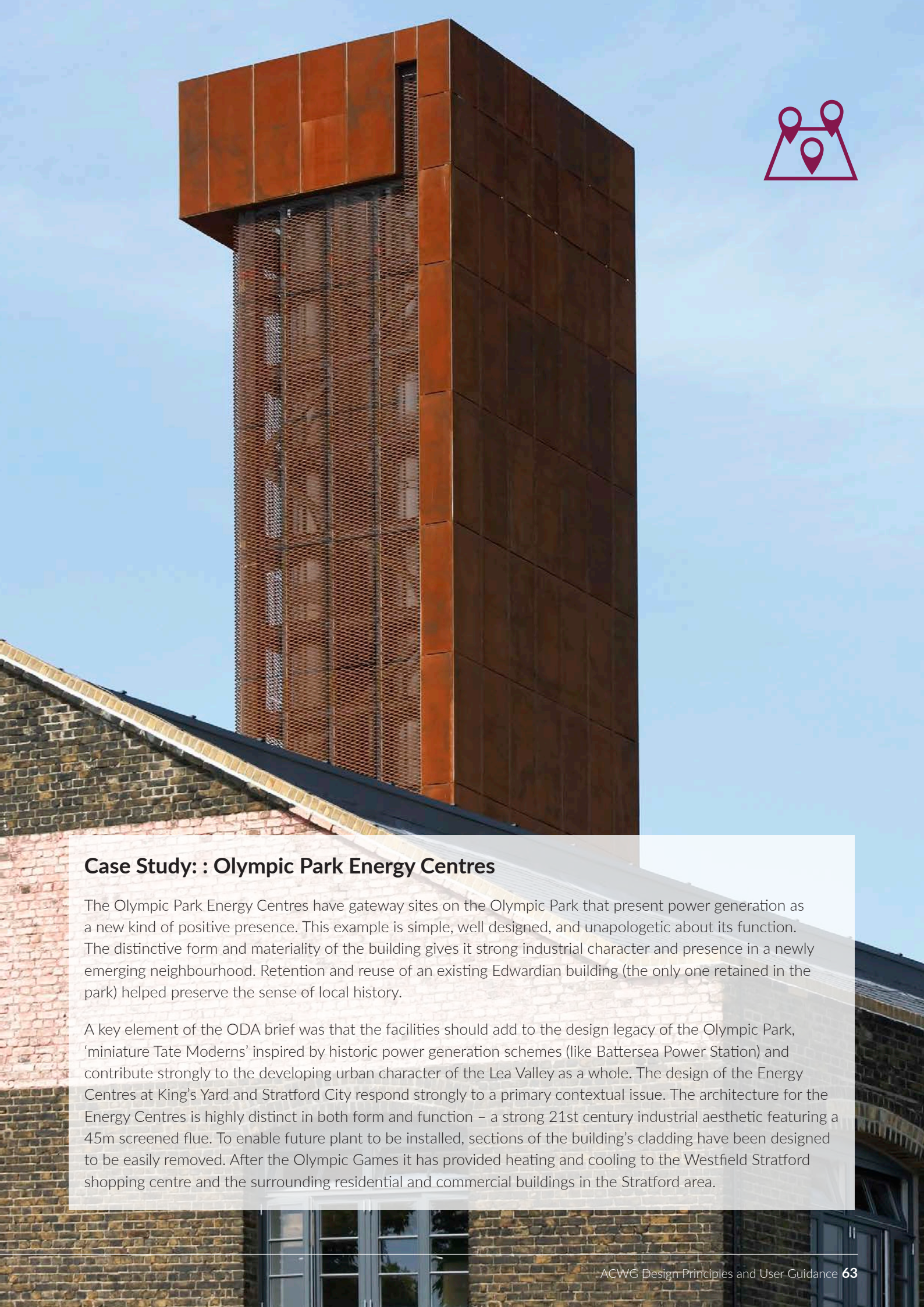
Outcomes

- Develop a utilities architecture that speaks to its purpose and enhances its context. This applies to buildings, structures and landscape.
- Develop designs and, where appropriate, artworks that bring narrative (meaning), beauty and interest to the proposals.
- Consideration of context in every aspect of design including its location, layout, form, scale, appearance, landscape, materials and detailing.

Relevant Project links

Engineers Perspective: Olympic Energy Centres

Architects Perspective: Olympic Energy Centres



Case Study: : Olympic Park Energy Centres

The Olympic Park Energy Centres have gateway sites on the Olympic Park that present power generation as a new kind of positive presence. This example is simple, well designed, and unapologetic about its function. The distinctive form and materiality of the building gives it strong industrial character and presence in a newly emerging neighbourhood. Retention and reuse of an existing Edwardian building (the only one retained in the park) helped preserve the sense of local history.

A key element of the ODA brief was that the facilities should add to the design legacy of the Olympic Park, 'miniature Tate Moderns' inspired by historic power generation schemes (like Battersea Power Station) and contribute strongly to the developing urban character of the Lea Valley as a whole. The design of the Energy Centres at King's Yard and Stratford City respond strongly to a primary contextual issue. The architecture for the Energy Centres is highly distinct in both form and function – a strong 21st century industrial aesthetic featuring a 45m screened flue. To enable future plant to be installed, sections of the building's cladding have been designed to be easily removed. After the Olympic Games it has provided heating and cooling to the Westfield Stratford shopping centre and the surrounding residential and commercial buildings in the Stratford area.

6. VALUE: ACHIEVE MULTIPLE BENEFITS AND SOLVE PROBLEMS WELL

Brighton & Hove Wastewater Treatment Works, Peacehaven

Good design here helped unlock a lengthy and contentious consenting process. Southern Water then developed partnerships to integrate the extensive works into their greenfield setting whilst maximising the site's biodiversity and amenity for local communities

6A. MAXIMISE EMBEDDED VALUE

DESIGN PRINCIPLE

WORK COLLABORATIVELY ACROSS SPECIALISMS AND WITH STAKEHOLDERS TO MAXIMISE THE BENEFITS OF THE SCHEME BY BEING SMART WITH THE LOCATION AND ARRANGEMENT OF ELEMENTS AND DESIGN OF MITIGATION WITHIN THE PROJECT SCOPE AND BUDGET.

Why it matters

The country needs solutions that deliver the best value. A good design process adds value by defining issues clearly from the outset and providing overall direction for everyone working on a project. It explores opportunities for increasing value alongside the creative process. This approach means the brief is interrogated rigorously so that opportunities to secure economic, environmental and social benefits are identified, pursued and articulated for local and national audiences.

Opportunities to maximise embedded value can arise across the entire project lifecycle. They should derive from a clear understanding of the places, people and environments impacted by the works and could come in many forms; from designing in construction phase services and facilities so that they could be re-purposed for use by others later, to locating and positioning operational structures so they best support the creation of attractive open space and biodiversity. It involves working in a coordinated way to do what you have to do as well as possible. Good design should seek to solve multiple problems well with a single solution. It provides more for less with savings on cost, the environment, materials and space.

Outcomes

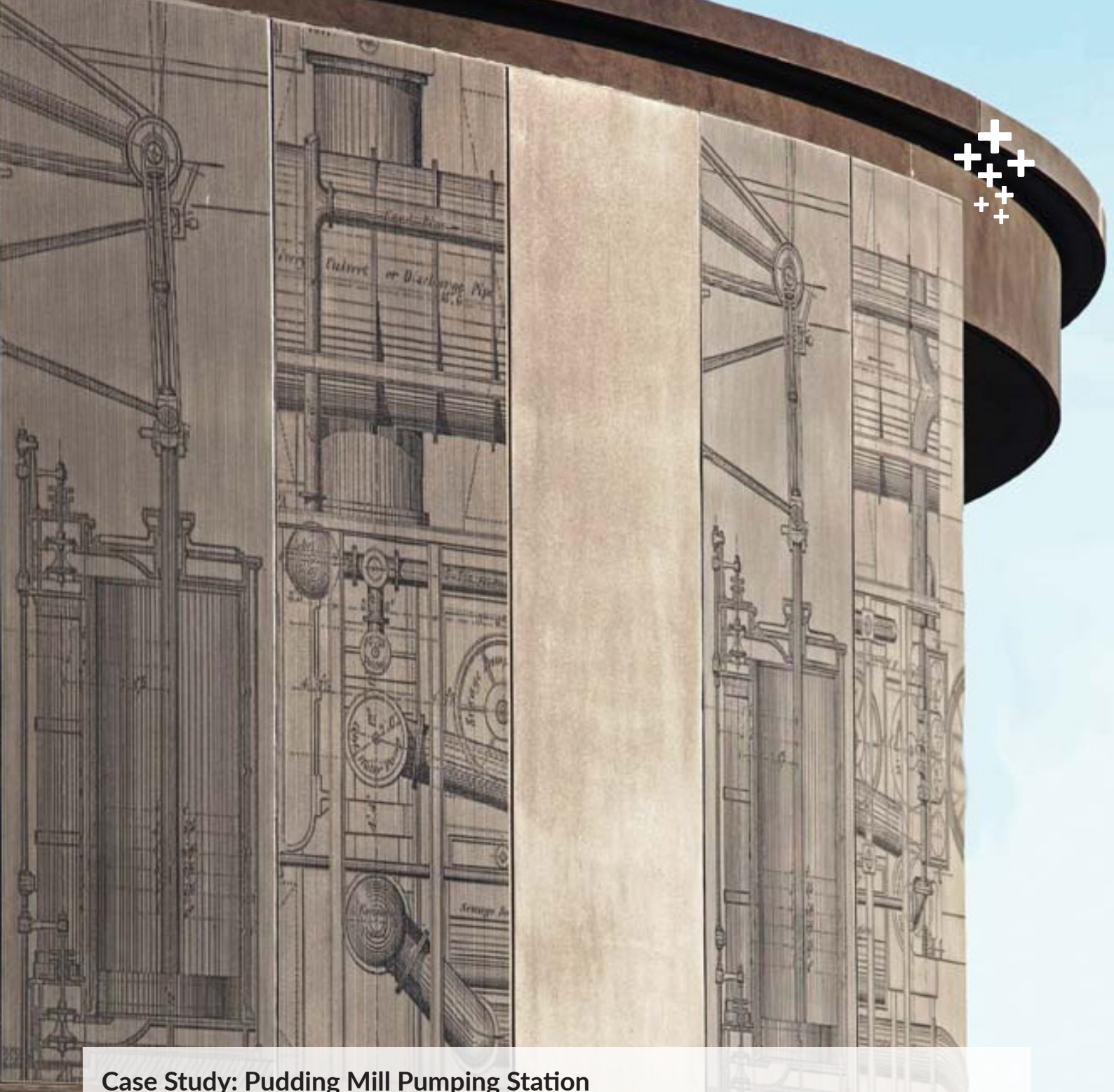
- Early multidisciplinary input informing a design that solves multiple problems at once.
- Design of infrastructure capable of adaptation to reasonable future demands (see also 3C).
- Site selection processes and layouts that assist (or as a minimum, do not prevent) local development except where absolutely necessary.
- Reinstatement, landscape and mitigation proposals that improve the existing situation, - e.g. through better biodiversity, carbon sequestration, surface water infiltration and reduced run-off.
- Deliver benefits efficiently by exploiting the two-way relationship between infrastructure and natural capital to enable multiple benefits to be delivered simultaneously.

Relevant Project links

Section 9 – Aspects to consider in compiling a best value plan

Maximising Social Value from Infrastructure Projects

Good Architecture in the Water Industry



Case Study: Pudding Mill Pumping Station

The building is a primary foul pumping station, connecting the new sewer system built for the Olympic Park to the existing Northern Outfall Sewer. It is located next to one of the main public entrance routes into the Olympic site.

Early designs were for a rectangular shed sitting on top of a circular caisson. Working together the design team found a way in which the superstructure could also have a circular plan. This meant that the thick foundation ring which holds down the underground tank could also be used to support the superstructure. This saved money and resulted in a building which looked good and followed the curve of the road.

The outer wall is clad with pre-cast concrete panels with a pattern inspired by the drawings of Joseph Bazalgette; thereby celebrating the Victorian engineering heritage of the area. The building's ventilation tower was designed to act as a wayfinding point. Other environmental features include a green roof and bird and bat boxes secreted in the concrete walls.

6B. UNDERSTAND HOW YOU COULD PROVIDE ADDITIONAL VALUE

DESIGN PRINCIPLE

IDENTIFY OPPORTUNITIES TO CONTRIBUTE WIDER REGIONAL BENEFITS OUTSIDE OF THE PROJECT SCOPE. IN PARTICULAR LOOK FOR SYNERGIES WITH RELEVANT CATCHMENT MANAGEMENT PLANS AND PROPOSALS THAT SUPPORT THE DELIVERY AND ENJOYMENT OF A HEALTHY WATER ENVIRONMENT.

Why it matters

Ofwat's vision for the water sector stresses the importance adding value – that means value for money to customers, but it also means companies delivering value for communities and the environment. Significant infrastructure investment can have ripple effects far beyond its core purpose, construction and operation, and the government, stakeholders and investors increasingly demand that the benefits for local environments and communities are maximised – whether it be in terms of levelling up local economies, restoring nature, or achieving additional social value.

Good design considers the opportunities to add value beyond the main purpose of the infrastructure. It looks beyond the site boundary to consider the wider benefits the project can bring. Realising these opportunities will not always be in the gift of a project to deliver – but they may be able to passively enable, anticipate or, at the very least, not obstruct them.

Understanding what interventions could deliver benefits may involve taking a wide view assessing local and regional needs and engaging with a wide group of local stakeholders.

Outcomes

- Strategic project selection is informed by cross-sectoral engagement to maximise social benefit and reduce the use of customers money.
- Work closely with partners and focus on landscape scale schemes that improve hydrology, aquatic ecology and reduce/sequester carbon and provide opportunities for access to recreation and visual delight.
- Be honest and realistic with partners as to what you might be able to offer as an organisation.

Relevant Project links

Beyond the bottom line

A Valuation of Rutland Water using Environmental Economics

Long-term benefits and performances of dams

Case Study: Rutland Water

Originally known as the Empingham Reservoir Project, Rutland Water is filled by pumping from the Rivers Nene and Welland and provides water to the East Midlands. Rutland Water is one of the largest reservoirs in England and, in the words of Sir David Attenborough, is "one of the finest examples of creative conservation in Great Britain".

In the 50 years since its construction, the reservoir has become a significant regional leisure destination, offering a range of recreational activities including bird watching, walking, cycling and water sports. It has also developed major ecological value, including a SSSI and international designations as a Ramsar site and Special Protection Area. A 2012 preliminary economic impact study estimated that Rutland Water directly generated about £100 million annually in revenues and provided direct employment for over two thousand people. A 2010 analysis using environmental economic valuation techniques put the annual value of the reservoir between £123 million and £215 million with around 64% of this attributable to functions additional to its primary purpose as a source of potable supply.

6C. CAPTURE AND MEASURE EMBEDDED AND ADDITIONAL VALUE

DESIGN PRINCIPLE

HAVE CLEAR NARRATIVES ABOUT HOW YOU ARE CONTRIBUTING TO SOCIETY BEYOND THE CORE SCOPE OF YOUR PROJECT. QUANTIFY THESE BENEFITS SO THEY CAN BE CONSIDERED MEANINGFULLY IN CONVERSATIONS ON VALUE, FINANCING, AND RISK. SHARE YOUR EXPERIENCE AND KNOWLEDGE WIDELY.

Why it matters

One of the most significant barriers to improving how large projects deliver multiple benefits through design is the lack of a common vocabulary and assessment methods that are capable of articulating a project's broad environmental, social and economic benefits in its business case. While benefits in the construction phase (eg no. of apprenticeship or local SME's engaged) can be captured and quantified, the "qualitative" benefits of good design are often overlooked and undervalued.

Across the sector there is inconsistency in definition and measurement methods, a lack of knowledge and skills, and an absence of leadership. As a programme, the SRO projects have the potential to develop a sound evidence base that captures the huge range of benefits water infrastructure projects can deliver.

SRO projects should create and use clear measures to define objectives for providing social, environmental and economic benefits and monitor their success in meeting them. Finally, they should share lessons learned so future projects can benefit.

Outcomes

- Gathering of project specific data and improvement in the tools we have to measure and monitor added and additional value across the sector.
- Full consideration of potential benefits in the Cost Benefit analysis and investment case for the SRO.
- Clear communication of value of the scheme to stakeholders, communities and within the industry.

Relevant Project links

Maximising Social Value from Infrastructure Projects

Measuring social value in infrastructure projects

Boston tidal barrier, UK: adapting to climate change and delivering social outcomes

Case Study: Boston Barrier

Boston in Lincolnshire is situated entirely in floodplain and relies significantly on tidal flood defences. The Boston barrier scheme was designed to improve the resilience of the town to the impact of climate change which had the potential to result in the permanent loss of 17,000 residential and commercial properties. In the absence of a universally recognised process for quantifying the social outcomes of a major construction project such as the Boston barrier, the project team used the 17 United Nations sustainable development goals (SDGs) as a lens to analyse and measure the wider impacts of the project on society.

Supported by the client (the Environment Agency), the Boston project team developed a methodology based on the SDGs to assess the contribution of the project to each one, considering both direct and indirect impacts. The scheme was found to contribute positively to all 17 SDGs across 25 targets.

The image shows murals on the new right bank floodwall that reflect the town's maritime history and were developed in consultation with the local community

Water Logo Co.

Water Logo Co.

Water Logo Co.

Water Logo Co.

Can LOGOs be provided as transparent PNG files in

WHITE OUT

OR Eps file format they need to sit on this background

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WATERESOURCES

All Company Working Group (ACWG)