

The Design Council enables people to use design to transform communities, business and the environment for the better.

As an enterprising charity, our work creates value by stimulating innovation in business and public services, improving our built environment and tackling complex social issues.

We inspire new design thinking, encourage public debate and inform Government policy to improve everyday life and help meet tomorrow's challenges today.

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A design-led approach to infrastructure



Abbey Mills Pumping Station, London:
The new plant is a positive contribution to a neglected brownfield area; it also shows attention to details and quality materials that matches its Victorian predecessor nearby.

Contents

Designing infrastructure	3		
Planning policy	3		
Design support by Cabe	4		
		Ten Design Principles	6
1	Setting the scene	6	
2	Multi-disciplinary teamwork	6	
3	The bigger picture	6	
4	Site masterplan	8	
5	Landscape and visual impact assessment	8	
6	Landscape design	8	
7	Design approach	9	
8	Materials and detailing	9	
9	Sustainability	10	
10	Visitor centre	10	
		Design Services	11
		Design Review	13
		Design Enabling	15
		Design Workshops	16
		Design Leadership Programme	17
		Design Challenges	17
		Further reading	18

Designing infrastructure

To ensure that the UK's infrastructure will continue to support economic growth and boost environmental efficiency, massive investment in national infrastructure is required. This large scale building task has the potential to create a series of compelling structures in both towns and countryside long-term. However, large infrastructure projects are often prone to a prolonged pre-construction process during the design, consultation and planning stages, and strong local opposition often hold up projects. Holistic design thinking at the outset, as promoted by Cabe and the Design Council, can help mitigate the planning risks. A design-led approach that takes geographical context into account will ensure these projects respond well to the setting, speak a confident, architectural language based on their purpose and function and allay concerns of the local community.

Planning policy

This guidance document relates to Nationally Significant Infrastructure Projects (NSIPs) for energy, transport, water, waste water and waste as defined in the Planning Act 2008. Schemes are deemed nationally significant once they are above a certain threshold in terms of size, energy output or capacity. For example, an energy generation facility that generates more than 50 MW is nationally significant or in terms of increase of passenger capacity for an airport - at least 10 m passengers - for example. There are sixteen different types of NSIPs.

The Cabe design guidance is based on ten design principles; they are intended to help NSIP applicants design successful proposals as set out in the criteria for good design in the National Policy Statements (NPS). Nationally Significant Infrastructure Projects must make design an integral part of their planning process and demonstrate that good design and the concerns of communities and stakeholders have been taken on board in the planning process.

- All National Policy Statements published so far include criteria for good design; infrastructure should be designed to be “sustainable, attractive, durable and adaptable”.¹
- Each National Policy Statement apart from the one for Ports mentions Design Council Cabe as a provider of design review for nationally significant infrastructure projects and encourages applicants to use this service.²

In a similar way, the National Planning Policy Framework (NPPF) acknowledges that “Good design is a key aspect of sustainable development, is indivisible from good planning and should contribute positively to making places better for people.”³ In particular, it identifies the value of design support services, particularly at an early stage in the process to ensure good quality outcomes and states that major projects should have a national design review as “currently provided by Design Council Cabe.”

¹ *Overarching National Policy Statement for Energy (EN-1): 4.5.3 Criteria for “good design” for energy infrastructure*

² *Overarching National Policy Statement for Energy (EN-1): 4.5.5 In particular, Design Council CABE can be asked to provide design review for nationally significant infrastructure projects and applicants are encouraged to use this service.*

³ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

Design support by Cabe

Cabe has years of experience in optimally delivering well-designed buildings, through reconciling the often diverging aspirations of the applicant, local planning authorities and the local community. Since 1999, it has supported design development for a large number of major infrastructure projects from conception to procurement. Cabe at the Design Council offers independent advice on design in the built environment, helping create places that improve quality of life for all. Our Design Services are explained in more detail in the second part of this document.

Recurrent themes have emerged from Cabe's work on infrastructure. They are encapsulated in this document and form the basis of the ten design principles for Nationally Significant Infrastructure Projects. We have presented these guidelines to The Planning Inspectorate and they fully recognise the importance of design considerations in nationally significant infrastructure projects as set out in National Policy Statements.

“In recent years, we have consulted Cabe on several major waste infrastructure schemes. Cabe’s multidisciplinary and independent feedback has always been highly valuable, helping us to confirm or enhance our design approach. This is key to delivering high quality infrastructure that will respect its environment and community.”

Luc Petit, Veolia Environmental Services



**Teesside Power Station,
Stockton-On-Tees**

This biomass-fuelled power station is an interesting example for a proposal that not only celebrates and connects with the area's industrial heritage but also creates a place that could become the focus of the local community.

Ten Design Principles

1 Setting the scene

Design thinking should be part of creating the vision and designing the brief for a new project. Even while still setting the brief, before a design team has been hired, the applicant and project management should be thinking in design terms and define a clear, design-led framework in which the project can develop. Machinery and internal processing equipment will represent the project's predominant purpose and highest costs - far more than the expenditure for façades and building - but its design will be integral to the scheme's success, both in terms of local acceptance and impact on the surroundings. There should therefore be suitable budget to ensure that building and landscape design match the quality of the technical equipment and that they can be maintained long-term.

2 Multi-disciplinary teamwork

To achieve a scheme that works both functionally and in design terms and, that, moreover, is well received, collaborations between stakeholders must begin early and be sustained. Stakeholders may include, among others, the client, the design team, technical experts, the community and the local planning authority. From the start of planning, the design team should include not just engineers and technical specialists but also architects and landscape designers. By including this expertise and letting them challenge the engineering approach, the applicant can achieve an inspirational, elegant and ambitious structure that has the potential to last for decades, at lower building costs and be relatively maintenance free. Early design input will ensure that efficiency, engineering aspects, town and landscape considerations and compelling design solutions come successfully together. Plant layout can be reorganised to minimise the footprint, mitigate impact on views and improve the relationship with its surroundings.

3 The bigger picture

Design does not start and end with the immediate project or site. Holistic thinking is required to ensure that projects are part of an integrated process that fits into bigger strategies such as regional or sub-regional planning. Potential synergies in an area should be explored in great detail, for example, to use the exhaust heat from new power plants for district heating systems, communal greenhouses and other uses. Large power plants are a major investment and often located in declining post-industrial areas and large brownfield sites. Investment and job opportunities can be very welcome, bringing benefit to the community and potentially creating a sense of local identity. Again, infrastructural requirements can work with wider needs. Visitor centres, for example, can contribute to community life by acting as community facilities and providing meeting rooms and a successful outcome will boost the reputation for future projects.

Energy Recovery Facility, Marchwood

The elegant dome above the
technical equipment shows how
design and engineering can form
a successful marriage.



4 Site masterplan

It is in the nature of nationally significant infrastructure projects to have far-reaching impacts. These can be both hugely positive (utility provision, employment) and potentially negative (noise, traffic, odour, visual blight etc.). Good design will do much to reconcile the infrastructure project with its environment by creating a facility that responds to its context. Understanding the structure of its surroundings, topography and adjacent land use at each site should be the starting point for master-planning. This will inform routing, site organisation and detailed layout. Such work can be hugely important in reducing the size of the facility, leaving the rest of the site free for other uses. For instance, innovative conveyor systems or rearrangement of the process line may achieve a smaller and more efficient plant layout. The value of and impact on existing structures, landscape and archaeology should also be a key consideration and feed into decisions about site clearance and mediation.

5 Landscape and visual impact assessment

Due to their size - and number in the case of power lines and wind farms - infrastructure projects are visible from many viewpoints. They may impact on many different surrounding areas, whether it is densely urbanised townscapes, suburban or sparsely populated rural settings. Each context requires a different appreciation of how to handle scale and how the project relates to the environment.

For power lines and wind farms, visual impact assessment and landscape character assessment is an obvious part of the planning process, but large power plants should also be assessed using the same strict criteria as have been put in place for residential buildings, high-rise buildings and any other major architectural work in terms of their

impact and the quality of design. Visual impact assessment should be used as a design tool to inform location, orientation, composition and height. This should take in a large number of viewpoints right from the beginning of design.

For large scale projects, which may spread over the landscape the assessment of verified montages needs to be representative of what the eye actually sees and perceives. Typically, montages are based on a 50 mm lens (as set out in the Landscape Institute's Advice Note 1/11 on Photography and Photomontage for Landscape and Visual Impact Assessment). A 75mm lens can help provide a better representation of the impact of the presence of certain structures such as wind turbines or pylons when seen from afar in a wide landscape and should be used to supplement montages based on a 50mm lens in these circumstances.

6 Landscape design

Intelligent landscape design mitigates the impact of an infrastructure installation and can enhance its setting. It should be developed in parallel with the proposal and take into account site topography; including, for example, existing flora. Good landscape designers minimise tarmac surfaces and provide better road systems, pedestrian routes, car parking and lay-by surfaces. They will often look at using excavated material to reform and shape the site to suit the plant. Wherever possible, the majority of the site should be given back to nature, providing space for leisure, play and wildlife - even up to the point of sinking the structure into the ground. Often remote and protected from human activity sites can become valuable habitats for a wide range of flora and fauna. Well-designed outdoor spaces will offer pleasure and relaxation for staff and can create a visitor attraction in their own right, perhaps a new destination for school ecology projects.

7 Design approach

A clear architectural concept can manifest itself through symmetry (or asymmetry) and balance, repetition of organisational elements such as the grid, the frame or the bay and resonance between elements of different scales. The structure of the building - the system of bearing elements (girders, columns and walls)

- can significantly inform the overall appearance. In a good design, such choices will seem compelling and inevitable, clearly expressing what the project is about and working well with its setting. In a poor project, such choices will often seem arbitrary. On a large scale project the adverse impact on the surrounding environment is amplified by poor decisions in the design, where typically inappropriate, wilful or superfluous, additions are made.

However, difference and variety of design approaches in relation to the context can be virtues. Infrastructure projects benefit society as a whole and should be celebrated. Different structures will require different levels of architectural ambition.

There are places for an expressive or assertive approach and places for modesty - dictated both by a project's context and its purpose and status. In most cases less is more: simple (but not simplistic), straightforward designs go well with functional and efficient infrastructure. Nevertheless, real design ability is required to create compelling structures, rather than standard catalogue solutions, ubiquitous distribution sheds surrounded by acres of tarmac.

8 Materials and detailing

High quality materials and careful detailing will limit the need for maintenance and allow schemes to weather and age well. Metal cladding is often the default these days, but there may be other options that better reflect the value of a major civic building. Local materials and traditional building methods, for example, might inform the design.

A building's appearance often tells us something about what purpose it serves, its place in a town or city, what sort of spaces it contains and how it is organised and put together. It can be especially effective to make the building's internal workings visible: glazed surfaces showcase equipment and processes as well as contributing to better working conditions. A lighting expert or artist might be commissioned to develop a design strategy for large surfaces. Light, colour or an art installation can add character and give large elevations structure and rhythm. Intelligent lighting, perhaps using multiple colours, can highlight and strengthen aspects of the design.

Often a good design can be let down by clumsy detailing. Junctions between materials, the framing of materials or panelling for example, well handled, make a major contribution to the success of a project in visual terms. Design intent for key details should be developed alongside the Concept and Scheme Design stages so that the architectural potential can be understood by approval bodies and consultees.

9 Sustainability

Given the complexity of infrastructure projects, sustainability must be integral to the design from the very beginning. A successful proposal will cover every aspect of this, including, to give just a few examples, traffic movements (e.g. delivery and refuse), social inclusion of workers and visitors and the use of biomass.

While natural light provides good working conditions for staff, glazed surfaces need to be carefully considered to avoid glare and light pollution affecting wildlife and residents at night. The site strategy should include biodiversity, planting and sustainable urban drainage systems.

Ideally, building materials should be locally sourced, reclaimed, recycled or have very low carbon impact. Most infrastructure has a long lifespan and should therefore be designed to take account of potential changes to the frequency and severity of extreme weather due to climate change. Aspects of use are likely to change over the structure's lifetime, as will the technologies it contains. A good design will be flexible, able to accommodate changing requirements without major alterations, and adaptable, able to be altered or extended conveniently when necessary. All good design teams are attuned to these issues and employ the latest best-practice to deliver these challenging requirements. There is no reason why infrastructure projects should not win eco awards and achieve high CEEQUAL scorings like Pudding Mill Pumping Station.

10 Visitor centre

Many large infrastructure proposals offer the opportunity to provide a centre where visitors can learn about the plant operation and be introduced to the concepts of sustainability, energy generation, waste management and humanity's impact on the environment in terms of our ecological footprint and the exploit of natural resources. A good visitor centre can be an engaging place of exploration, providing a compelling insight into the need for the infrastructure and an appreciation of its size and scale.

A good visitor experience makes the most of the opportunities: a well-planned tour, for example, will encourage visitors to enjoy the often monumental dimensions of the plant, show them the extraordinary machinery at work and perhaps take them up on the roof for an exciting view. Design can optimise this experience by making sensitive provision for it and creating a unique attraction.

The siting of a visitor centre should be considered carefully, as part of the overall experience of the visitor. It ought not to be shunted out of the way as an inconvenience, but located to celebrate the process and purpose of the plant and enjoy the heroic scale and character of its architecture.



Design review session
Panel members discuss
the design quality of
a proposal

"As a chair of many infrastructure reviews, I have observed how Cabe advice complements the applicants' expertise and adds knowledge in key disciplines around sustainability, design and landscape to support the project through the planning process. The quality of our advice is based on more than ten years of independent design advice, which is provided by a renowned network of experts and covers a wide range of professional experience to respond with a bespoke skillset to specific projects."

Hanif Kara

Design Review Chair and Design Director
at Adams Kara Taylor II

Design Services

Cabe offers advice to improve the design quality of Nationally Significant Infrastructure Projects (NSIPs), supports clients delivering NSIPs in England and advises the National Infrastructure Directorate at The Planning Inspectorate. Due to on-going advances in science and technology, infrastructure projects are getting cleaner, quieter and more sustainable every year - good news for people who live and work near installations.

It is Cabe's aim to promote this progress by innovative design and high quality materials, much like the great Victorian civil engineering achievements such as Middlesbrough's Transporter Bridge, Joseph Bazalgette's sewer network for London and the great railway stations across the country. These were structures with durability and a visual language that spoke with pride of their importance to society. This attitude was lost in the latter part of the 20th century. It is now re-emerging, notably in the ambition, skill and design intelligence evident in the award-winning infrastructure for the London Olympic site at Stratford.

Cabe's design services can encourage, enable and help deliver successful projects that are at the heart of local communities.

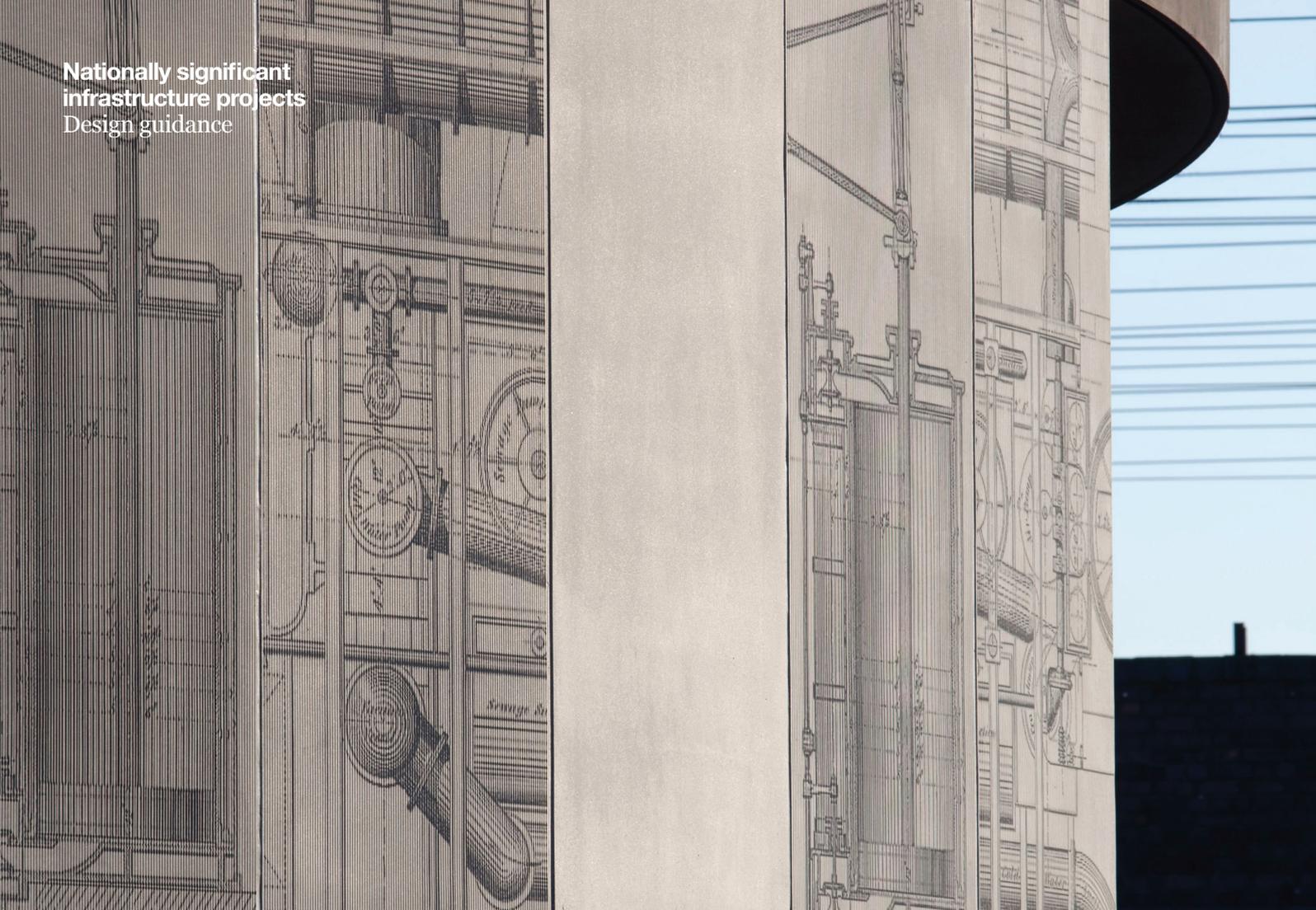
Every project is unique which is why we offer a bespoke package of support for all, from support through the process, to Design Review or training for your team.

Expert Panel

Cabe has a pool of 250 inter-disciplinary Built Environment Experts who are the leading practitioners in their field. They provide expert advice on various aspects of a project:

- urban design, planning, architecture, engineering, transport, highway and street design
- landscape, ecology, heritage, sustainability
- community development and participation

Where special expertise is required, we have arrangements in place to provide additional support, for example, we collaborate with the Landscape Institute on wind farm and power line projects.



Design Review

Design Review is an independent and impartial evaluation process where a panel of built environment professionals assesses the design of significant development proposals at different stages of the NSIP application process. It gives applicants the opportunity to receive design advice for NSIPs as set out in the NPSs. In a situation where there are often no right or wrong answers, only better solutions, this independent advice can help stakeholders confidently navigate a plethora of views from multiple sources. It does this through dialogue and peer review, working to deliver best fit in terms of layout, location and design, often reconciling conflict between the applicant, the planning authorities and the community. The consequence is a quicker, easier and less expensive route to a design that has the considered support of a leading group of experts. Our Design Review panel, which is composed of five panel members and a chair, applies the ten criteria of good design to assess the design quality of NSIPs; the scope of schemes ranges from large power plants, nuclear power stations

and biomass plants, to transport infrastructure and wind farms. However, each type of project requires a specific focus on particular characteristics. We offer a bespoke packages for each NSIP typology.

What are the benefits of Design Review?

- Design Review offers an independent view on the design quality of your scheme and helps with the design development
- Design Review gives you the confidence that your project has gone through a rigorous assessment of the design quality so that it is ready for the Planning Inspectorate to make a recommendation to the Secretary of State
- Design Review allows you to tap into our comprehensive experience, to fill knowledge gaps and to add an extra layer of innovative expertise

Pudding Mill Lane Pumping Station, London

The elegant shape of the building is derived from the functional and engineering requirements. Together with the pigmented concrete which shows technical drawings of Joseph Bazalgette, the building celebrates the engineering achievements of old and new sewer networks and a new pride in technology and infrastructure.

Design Review

	Regular	Extended – large scale ⁴
Briefing meeting	Introduction to scheme and setting out of Design Review framework	Introduction to scheme and setting out of Design Review framework
Preparation	Panel review of background documentation; including scheme description	Comprehensive background documentation for the panel to study; including scheme description
Design Review Meeting	Site visit with Design Review panel Client / design team presentation Local Authority presentation) Panel review and comments	Site visit with Design Review panel Client / design team presentation Local Authority presentation, thematic approach to specific questions (masterplan, landscape, enabling developments,..) Panel review and comments
Output	Design Review Report	Design Review Report
Fee ⁵ (first review)	£ 11,000	£ 18,000
Fee (follow-up reviews)	£ 5,000	£ 8,000
Contact information	design@designcouncil.org.uk Telephone: 020 7420 5200	

⁴ Developments that are larger in size, have a longer construction period, are technically complex and will have greater impact on the surrounding area; the Design Review may be structured around: (i) overview, general master-planning and site arrangement, (ii) relationship between design and technical requirements, (iii) form, appearance and building performance and (iv) landscape setting and design.

⁵ All fees correct as of September 2012

Design Support

We offer a number of services to support applicants successfully through the process including Design Enabling and Design Workshops.

Design Enabling

Design Enabling is a support package which helps increase the capacity of individuals and teams to achieve good design through the development process. Design Enabling is usually one to one support, and provides visioning workshops, training, technical advice. A built environment expert will act as an honest broker, a critical friend or leading site visits, for example. We cater for local authorities, community groups and public and private sector organisations. Topics we cover include: planning, infrastructure, small and large scale developments, public space, new-build housing, health, housing, redesigning and reconfiguring existing estates and ways to embed design in planning policy documents.

The benefits of Design Enabling

- Design Enabling is tailored to meet each client's specific needs.
- Design Enabling helps people become more confident clients, able to demand and achieve good design for the projects in which they are involved.
- Design Enabling can provide follow-up events to support individuals or groups, implement their learning or act as a critical friend at key project milestones.
- Design Enabling can be delivered in short bursts or over longer periods.

Design Enabling

Output	Bespoke Enabling package
Fee	Enabling projects are individually priced.
Contact information	cabe@designcouncil.org.uk Telephone: 020 7420 5200

How Cabe can help

- Advice on the development of an over-arching vision for a project and to establish the most appropriate design solution in a particular context. This can include advice on the selection of the design team or running a design competition
- Facilitation of engagement between parties leading on different elements of a scheme to enable the successful delivery of interconnections and bring a holistic view; for example between infrastructure promoters, distribution network operations, and National Grid.
- Advice to local planning authorities to help assess the impact of an NSIP project, deliver community benefits and produce Local Impact Reports.
- Facilitation at an early stage between a scheme promoter, design team, local authority and local community.

Design Workshops

Design Workshops offer design support at key moments in the design process and comprise a series of intensive interactive workshops. Clients sign up for a minimum of two sessions. The first session is an initial appraisal, suggesting ways forward which are captured in a short report. Subsequent sessions build on this and respond to modified designs.

Applicants may consult us on individual projects or a broader programme of work. We will put together a bespoke programme that responds to client needs

The benefits of Design Workshops

Design Workshop is a conversation, not a review. It provides a critical friend and an independent view at key moments in the design process. It is totally confidential, which allows for the frank discussion necessary in promoting design development.

The Cabe team at the Design Council has pioneered this unique service in response to client demand. We are able to assemble a bespoke panel with project-specific knowledge and a depth of experience. The process offers a fresh look at the progress of the design team and provides constructive advice to clients.

How Cabe can help

- Independent review of different routeing options, to help assess the design benefits of one route compared to another.
- Support in the assessment of the impact of an NSIP scheme upon neighbouring, existing or proposed developments, such as residential or commercial schemes.
- Support in the consideration of the cumulative effects of NSIP schemes and develop a co-ordinated approach.
- Advice on the balance between national interest and local impact.

Design Workshop

Output	Bespoke Design Workshop package
Fee	From £4,000 per 2 hour session (minimum of two sessions).
Contact information	cabe@designcouncil.org.uk Telephone: 020 7420 5200

Training

Design Training is a bespoke package to help increase the in-house capacity of individuals and teams to applicants achieve maximum benefits from a project.

We work with applicants to identify their specific needs to achieve each clients desired outcomes.

Design Training

Output	Bespoke Design Training package
Fee	Design Training packages are individually priced
Contact information	cabe@designcouncil.org.uk Telephone: 020 7420 5200

Other Design Services from the Design Council

The Design Council aims to bring the transformative power of design to the things that matter. Our other design services could help to promote innovation and efficiency in the construction and delivery of NSIP developments.

Design Leadership

For over a decade the Design Leadership Programme, a bespoke package of support and coaching, has helped over 2,000 manufacturers and businesses open up new markets, improve and diversify, and communicate their value. We have helped rail industry leader, Mechan, reposition itself in the market and grow internationally; and supported the likes of wire joiner and tensioner manufacturer, Gripple, to become more innovative and

bring products to market faster than before. We have coached public sector organisation such as NHS Trafford and HMRC to engage more effectively with service users, improve outcomes, enhance customer satisfaction, and reduce past inefficiencies by transforming the product and service development process. More information can be found on the Leadership pages:
www.designcouncil.org.uk/leadership

Design Leadership Programme

Output	Bespoke package of coaching and Design Associate assigned to the project
Fee	Between £2,000 and £15,000
Contact information	leadership@designcouncil.org.uk Telephone: 020 7420 5200

Design Challenges

Design Council Challenges are national competitions that use design to tackle big issues. They offer a tried and tested, highly visual and practical intervention, proven to bring people together, accelerate new thinking and deliver innovation. They consistently achieve rapid results and change, regardless of sector. For instance, Working in partnership with Southern Water, the Design Council delivered Low Water Living, the UK's most significant programme to drive sustainable water consumption - a clear demonstration

of how designers can help people understand and better manage their water consumption.

Challenges are a call to action. They bring together unique teams made up of proven and emergent innovators and industry producers and providers to take on the issue together. These powerful multi-disciplinary teams benefit from access to what are typically concealed markets and sectors untapped by design, plus the expertise of leading figures in the field.

Over the last five years, in partnership with central government departments, regulated industry bodies and local governments, the Design Council has delivered a total of eight Challenges across four main areas: health, communities, environment and safety. Past challenge teams have delivered innovative solutions for key challenges in these difficult marketplaces.

The Design Council has continuously evolved its Challenges model, seeking to better meet the needs of partners and markets alike. In 2011, it formed a new partnership with Warwick Business School to examine how behavioural science and design can combine to advance pro-social change. Together we plan to research and inspire truly effective design-led solutions to change public behaviour.

Design Challenges

Output	Bespoke package
Fee	Please ask for more information
Contact information	info@designcouncil.org.uk Telephone: 020 7420 5200 www.designcouncil.org.uk

Further reading

Creating excellent buildings. A guide for clients. Commission for Architecture and the Built Environment, London (2011)

Design for Innovation. A Design Council paper published to coincide with the Government's Innovation and Research Strategy for Growth. Design Council, London (2011)

Research Strategy for Growth. Design Council, London (2011)

Better Public Building Initiative. Published in 2006 for HM Government by the Commission for Architecture and the Built Environment and the Department for Culture, Media and Sport, London (2006)

Illustrations

Title	Avedøre Waste Incinerator, Copenhagen, designed by Gottlieb Palludan Architects
2	designed by Allies & Morrison, photo by Peter Cook
5	designed by Thomas Heatherwick Studio
7	designed by S'PACE architects for Veolia Environmental Services (UK)
13	designed by John Lyall Architects, photo by Rob Scott