DISCIPLINE BROCHURE

Sustainability

OPPORTUNITIES THROUGH EXCELLENCE

bgeeng.com

BG&E

Fitzroy River Bridge – Kimberly, WA, Australia.

Optus Stadium –
Perth, WA, Australia.

Driving Sustainable Results

The significance of sustainability in the design and construction of the built environment is paramount as we face global challenges in today's world.

Embodied carbon in construction significantly contributes to greenhouse gas emissions, with 40% of the world's 50 billion tonnes of annual carbon emissions originating from the built environment. Of this, 22% stems from embodied carbon emissions in infrastructure and construction.

Many of our Clients recognise the strategic risks and opportunities tied to climate change, carbon emissions, biodiversity loss and the social and environmental legacies of their projects.

Our tailored approach to sustainability recognises the unique needs of each Client, enhancing overall project success. Our strategy is twofold – our technical experts integrate sustainability outcomes into our design services and our sustainability consultants offer specialised support.

Quay Quarter Tower – Sydney, NSW, Australia.

Using a systems-based approach, BG&E looks at the wider context for each project and considers the long term. This allows us to develop pathways to improve outcomes that are not possible using more conventional approaches. One of the most significant enhancements of sustainability in construction is simply good design – design that intentionally embeds sustainability as a core aspect of project design, and doing this early in the project when the greatest impact can be had.

BG&E's experienced sustainability consultants are well positioned to manage sustainability requirements in projects across diverse sectors – including buildings, rail, roads, heritage, defence, water and hydrology, energy and resources.

We collaborate with project specialists, Client representatives, key stakeholders and asset owners to understand the unique priorities of each project and build sustainability goals into project design.

What Sets Us Apart

STRATEGIC ADVICE

Leveraging our extensive experience, we specialise in supporting Clients, industry partners and fellow sustainability professionals with strategic advice. This enables the achievement of sustainability outcomes aligned to project priorities.

INTEGRATED IN DESIGN TEAM

We work as part of project design teams, as we recognise that a high level of involvement and integration with stakeholders is essential to successful sustainability outcomes. Our commitment is to be a part of the team – fostering collaboration and ensuring the best possible result.

HOLISTIC APPROACH

We avoid getting buried in the detail too early in a project, opting instead for a high-level holistic approach to the project needs and solutions - ensuring a comprehensive understanding of how the project links with its context. This informs opportunities to create a positive social, environmental and economic legacy.

EastLink WA – Perth, WA, Australia.

Our Tools, Services & Capabilities

At BG&E, our suite of sustainability tools and services enables us to integrate sustainability into projects spanning various industry sectors, disciplines and geographic regions.

SUSTAINABILITY IN DESIGN

The greatest opportunity to integrate sustainability into projects occurs during the early stages when project vision and aspirations are determined. Bringing long-term thinking together with BG&E's technical excellence enables your project vision to be realised.

MATERIALITY ASSESSMENT

Focusing on the key issues helps to manage risk and ensure your limited resources are spent in the areas of greatest value. Together, we identify your project's sustainability priorities and align the design, construction and Client team direction.

RATING SCHEMES

We work with you upfront to develop an approach that is more effective, and focuses on value rather than admin. We can manage ratings, offer strategic advice to plan your approach, or assist with select components.

RESILIENCE & CLIMATE CHANGE RISK SERVICES

The built environment provides services for the community and economy that are long-lasting. Upfront testing for future scenarios allows risks to be identified and actions embedded from the outset. Our experienced resilience planning and disaster recovery specialists work collaboratively with Clients and stakeholders to develop plans that improve adaptability, appropriate to the project's context.

OPTIONS ASSESSMENT & DECISION-MAKING FRAMEWORKS

We use a suite of tools and approaches to inform decisions through each project phase. Our Decision-Making Framework links engineering design to project governance. It is designed to clarify what decision is required, and understand and appraise the economic, social and environmental components of decisions.

NET ZERO TRANSITION

Navigating emission reduction relevant to each sector and across disciplines – to play our part in the global journey towards Net Zero. We leverage science-based data and metrics as well as our materials and engineering specialists, to develop practical emissions reduction opportunities.

RESOURCE EFFICIENCY PLANS

We use lifecycle assessment tools to assess priorities, and help teams to reduce material quantities, reuse waste materials and transition to a circular economy.

SUSTAINABILITY STRATEGIES

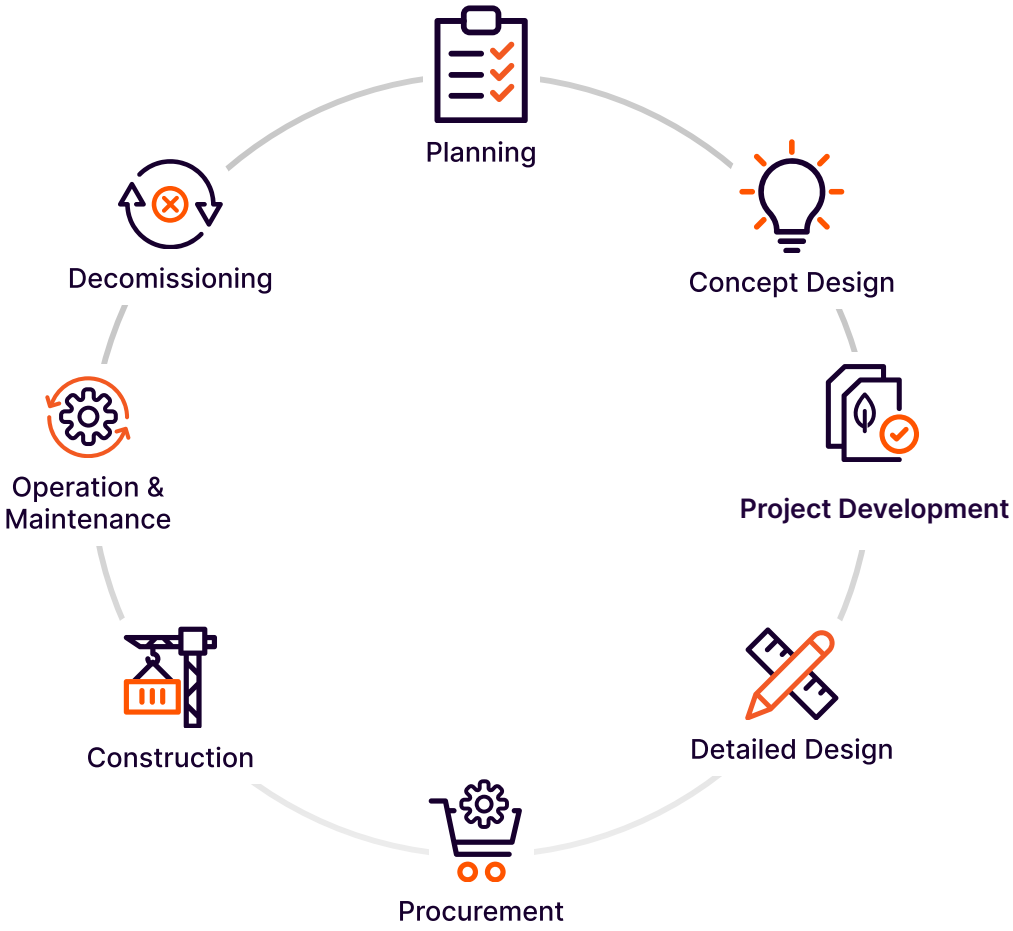
Our sustainability services would benefit buildings, infrastructure, precincts and organisations including sustainable procurement/supply chains, and legacy initiatives and innovation. Clients often seek our help to crystalise what sustainability means for their project or organisation, and to develop a strategy to focus on the most important areas, meet multiple demands and leave a positive legacy.

SERVICES:

Sustainability in Design

Sustainability in Design is a strategic approach that recognises that the greatest opportunities to embed sustainability as a core part of a project are early in the project life cycle when project vision and aspirations are determined.

Applying a Sustainability in Design ethos to your project ensures the creation of environmentally conscious, socially responsible, and economically viable design solutions that minimise negative impacts on the planet while enhancing long-term resilience and positive societal contributions.



Sustainability in Design

Each project phase presents different opportunities to improve environmental, social and economic outcomes, and BG&E's discipline specialists consider these questions at various project stages:

1. PLANNING

- Can the building (or part of it) be reused?
- What schemes are being considered? Are lower-carbon options possible?
- Consider resilience risks and opportunities.
- Define the project's legacy.
- What are the regional opportunities for material sourcing and material reuse?

2. CONCEPT DESIGN

- Consider building orientation, repurposing opportunities, spans and floor heights.
- Material selection and circular economy opportunities.
- Consider infrastructure alignment to avoid impacts and seek whole of life benefits.
- Proof of concept focus for innovations, e.g. structural timber, biophilic design, breathable facades.
- Identify and assess options for regenerative, low carbon design.

3. PROJECT DEVELOPMENT

- Structural simplicity.
- Context vs experience.
- Options assessment and decision making.
- Engage market to embed social and environmental outcomes, e.g. circular resource options, local economic outcomes, jobs and businesses, net zero pathway.

4. DETAILED DESIGN

- Design efficiency.
- Materials choice and durability.
- Deconstuctability (i.e. end-of-life reuse).
- Minimise carbon and environmental impacts.
- Aesthetic choice, livability and occupant health.

Sustainability in Design

5. PROCUREMENT

- Materials supply chain.
- Mix design.

6. CONSTRUCTION

- Temporary works.
- Reuse of temporary works elements.
- Opportunities to minimise energy, materials and water footprint.

7. OPERATION & MAINTENANCE

- Post occupancy evaluation.
- Upgrade options – e.g. new technologies, strengthening for new purpose.

8. DECOMMISSIONING

- Materials reuse.
- Materials recycling.

SERVICES:

Rating Schemes

Rating schemes provide benchmarks for the sustainability performance of buildings and infrastructure, serving as increasingly crucial internationally recognised metrics that drive social and environmental outcomes and fulfill growing regulatory demands from both government and the private sector.

Our team has a strong understanding of how these rating schemes, tools and frameworks operate. We can collaborate with you from the outset to navigate the priorities and requirements of various schemes, develop an effective and value-focused strategy, and support the delivery of certain components to ensure alignment with these requirements.

We are familiar with the BREEAM (Building Research Establishment Environmental Assessment Method) Sustainable Building Certification, LEED (Leadership in Energy and Environmental Design) Rating System, WELL Building Standard, IS (Infrastructure Sustainability) Rating Scheme, Green Star Rating System, NABERS (National Australian Built Environment Rating System), Living Building Challenge and more.

In Australia, we have experience managing the IS Rating Scheme, which is overseen by the Infrastructure Sustainability Council (ISC) and mandated for major infrastructure projects across Australia and New Zealand.

Whether it's providing strategic advice, conducting workshops, overseeing the rating process, or offering assistance with specific key components or credits within the ratings schemes - we can tailor our support to your needs.

Castle Towers –
Sydney, NSW, Australia.

Quay Quarter Tower - Sydney, NSW, Australia.

SERVICES:

Resilience & Climate Adaptation

Our sustainability and resilience approach informs and guides our design and is tailored to each project. We use a collaborative approach to undertaking engineering designs that are adapted to a changing climate and resilient to a range of disruptions.

Natural disasters such as storms, landslides, floods and bushfires may impact each project phase in different ways. Cost effective integrated resilient treatments recognise interdependencies and the need for an asset that is designed to respond and recover quickly.

BG&E has vast experience gained on several disaster recovery projects in ‘designing for resilience’.

Solutions and opportunities often come from local knowledge and integration of multiple disciplines within our team with local stakeholders and traditional owners are encouraged wherever possible.

SERVICES:

Net Zero Transition

The transition to net zero is a critical challenge, and our projects offer an opportunity to help Clients to decarbonise.

Net zero transition capabilities include:

- Embodied carbon and lifecycle assessment calculations for buildings and infrastructure projects.
- Identifying carbon reduction priorities throughout project lifecycle.
- Developing carbon reduction strategies throughout the design process.

Our team is adept at calculating early-stage carbon footprints to allow our designers to compare options, and informing decisions to reduce carbon.

Collaborating with other disciplines allows us to identify and incorporate effective sustainability opportunities into the design.

As of 2023, the updated Green Star Building rating system mandates a minimum 20% reduction in upfront embodied carbon to achieve a 5-star Green Star rating. To gauge this reduction, the project team must provide a reference design and transparently track decisions and design changes contributing to the reduction, following Green Building Council Australia's specified modeling requirements. Given that a building's structure often contributes significantly to upfront carbon, we prioritise targeting structural solutions for optimal efficiency.

Fitzroy River Bridge – Kimberly, WA, Australia.

Our Technical Expertise

BG&E's approach to sustainability draws heavily on applying our technical expertise to Client problems - which allows us to go beyond ideation and high-level targets, to identify real-world solutions for better outcomes.

Some of the technical areas that we are heavily engaged in enhancing sustainability outcomes in include:

MATERIALS & DURABILITY

- Testing for reuse.
- Understanding the impacts of cement reduction.
- Research and innovation.

STRUCTURAL DESIGN

- Low-carbon structures.
- Mass timber and hybrid timber structures.
- Building re-use.
- Prefabricated design.

FACADES

- Building reuse (e.g. recladding).
- Thermal performance.
- Rating achievement (e.g. Greenstar).

FLOOD MODELLING & DRAINAGE

- Understanding flood risk and climate change risks to assets.
- Enhancing resilience in design.
- Water sensitive urban design.

EMERGENCY & DISASTER RECOVERY

- Assessing the role of the infrastructure in social-economic resilience.
- Designing to suit local capacity and capability for construction and maintenance.
- Considering legacy and whole-of-life outcomes.

GEOTECHNICAL

- Assessing the re-use opportunities of excavation spoil.
- Developing material treatment strategies to minimise the import of materials.
- Resilience, climate and natural hazard assessment.
- Natural hazard assessments to inform disaster recovery strategies, such as landslides and rockfalls.
- Inform design for future climate scenarios such as sea-level rise and coastal erosion.
- Re-use of foundations.

BRIDGES, CIVIL DESIGN, RAIL & WATER INFRASTRUCTURE

- Considering social and environmental constraints and opportunities in project design.
- Risk and opportunity management.
- Decision making and options assessment.
- Resource, energy and water efficiency initiatives.

DIGITAL ENGINEERING (INCLUDING BIM & GIS)

- Tools to enable dynamic modelling of carbon footprint.
- Facilitate stakeholder engagement though visualisation of project options.
- Effective data management and reporting.
- GIS analysis for constraints and opportunity mapping.

TIMBER

- Applying innovative material solutions.
- Enabling reduced carbon emissions.
- Enhancing built environment outcomes for end users.

TRAFFIC ENGINEERING & TRANSPORT PLANNING

- Considering needs of all users.
- Enhancing pedestrian and cycling networks.
- Demand management and behaviour change programs.

At BG&E, we are united by a common purpose – we believe that truly great engineering takes curiosity, bravery and trust, and is the key to creating extraordinary built environments.

Our team of more than 1100 highly skilled people, in 15 offices across Australia, New Zealand, Singapore, the United Kingdom and Middle East, design and deliver engineering solutions for Clients in the Property, Transport, Ports and Marine, Water, Defence, Energy and Resources sectors.

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