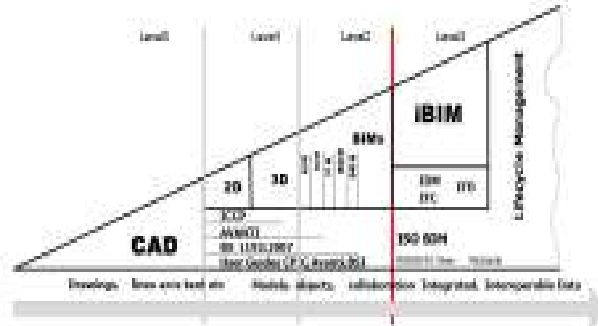


Building Information Management (BIM) Proven BIM Level 2 Compliance



Key Benefits

Our BIM strategy is simple, to continuously enhance and develop our offering to meet the demands of customers, industry requirements and standards and to achieve our own internal aspirations. NG Bailey continues to develop the benefits of BIM by applying our technical expertise and wealth of practical experience gained over 90 years.

The majority of new projects include some specific requirements relating to the production & management of digital models and the associated embedded data and many projects require compliance with Government BIM strategy (e.g. Level 2 BIM).

At the heart of Level 2 BIM are a number of processes and protocols laid down in the 1192 series of BS & PAS Standards which are designed to define and document the requirements of Level 2 BIM.

NG Bailey are one of the first companies in the country to achieve the BSI Kitemark standard for compliance with PAS 1192.

In an ever evolving and growing discipline, NG Bailey strives to be at the forefront of BIM development delivering detailed and geometrically correct models, high definition visualizations & 4D timelines and specific and complete asset data tagging and COBie exports with our in-house BIM production tools and our award winning 'BIM Hawk' toolkit developed in partnership with CIBSE.

BIM is more than just 3D coordination, clash detection and good looking visuals, it is the complete information lifecycle of building project and with a proven track record of delivering true level 2 BIM, NG Bailey is well placed to meet even the most stringent BIM requirements on a project.

- ✓ BSI Kitemark Certified
- ✓ Experienced BIM teams throughout the country
- ✓ Dedicated NGB Offsite BIM creation
- ✓ Fully COBie asset data compliant

The project BIM execution plan (BEP) is developed at the outset of the project. NG Bailey have the capability under BIM level 2 to comply with whichever BIM level is required by the client and their team. The BIM protocols that will be implemented on most of our projects are as follows:

Collaboration Process:

It assumed that the V&A East project will adhere to the BS1192 standard for procedures and processes, in particular the common data environment (CDE), and standard method and procedure (SMP). The 3D model

for the scheme will, we assume, be developed within the Autodesk Revit 2017 software to ensure accurate information exchange and ease of model production. We have used this method on numerous projects which NG Bailey have delivered / are delivering. Effective collaboration will be critical within the V&A East scheme.

Co-ordination and clash detection:

Spatial co-ordination of building information models is an essential component to successful project co-ordination in particular to ensure that all critical dimensions set out in compliance drawings are achieved. The generated model data shall be created in accordance with the true height above project datum to ensure accurate co-ordination, clash resolution, and sharing of model between all design parties.

BIM Objectives

A summary table of the key BIM achievement goals we implement on all of our projects are highlighted below, with some goals to be clarified by the client at the outset.

Goal Description	BIM Uses	Priority (High/Med/Low)
Multi-disciplinary fully coordinated models	Fully integrated design models across all disciplines to meet clients work scope	High
Controlled information management protocols in accordance with BS1192	Shared model development in a controlled environment	High
Enthuse and maximize stakeholder engagement	Visualisation capability within a 3D immersive environment through software such as Navisworks	High
Health and Safety requirements, management, and highlighting CDM	Pre-construction hazard evaluation and risk management	High
Ability to develop the model for asset management	Potential within the Revit system to provide the client with plant and O&M information to aid with future maintenance	TBC by client
HAZOP process/improve operational safety on site	Evaluation modelling, use of the model to aid in construction methodology explanations	Medium
Scheme is modelled to enable 4D should the client require.	Virtual design & construction possibilities	TBC by client

QA Process:

Throughout the modelling development process quality will be closely monitored. A number of processes are used to carry out this process.

Visual check – Ensure there are no unintended model components and the design parameters and restrictions have been followed

Interference check – Detect problems in the model where two components are clashing

Standards check – Ensure that the NR CAD standards have been followed (i.e. Fonts, dimensions, lines)

Model Integrity Check – Models that have been checked for standards will then be checked for engineering management standards

BIM co-ordination – The BIM Coordinator will reference the different disciplines 3d models into one confederated model and undertake clash detection. NG Bailey will feed into and assist this process.

As well as the above the design and BIM development process is managed in house by technical managers carrying out periodic inspections through the process.

Supply Chain Management

Collaborative Working

Suppliers and Sub-Contractors will be invited to declare interest / capabilities, for a presentation to detail the works and allow them the opportunity to demonstrate to NG Bailey where they believe they can add value to the project. This process will identify a clear list of sub-contractors that NG Bailey wish to engage with, allowing the bid and project teams to issue a standard pack of information, which can be used as selection criteria and a benchmark for cost. Chosen members of the supply chain may have an opportunity for inclusion on to the Stratford Waterfront V&A East project.

The project team will identify an opportunity to engage with MEP strategic supply chain as part of early procurement. NG Bailey believes that involving Sub-Contractors and Suppliers within our delivery strategy will also add value to the project both commercially and operationally. The intention is to utilise the supply chain so that suppliers selected for operational packages are engaged early and then used to provide delivery for key CDP items whose design is integral to achieving programme dates. By identifying and engaging with our supply chain at this early stage we intend to create a delivery team that instils a culture of making informed preferential engineering decisions as a team, engaging with the people that have a vast knowledge of the products being used, with the ultimate intention of developing the most efficient delivery process for the works.

It is the intention of the team to identify the leading suppliers based on initial review of the requirements of the project – location of sub-contractors and suppliers will be assessed to reduce travelling and delivery durations where appropriate. The review will be based on wholesale value of the project based on quality / Programme / performance. There are 3 key types of supply chain partners that we will be looking to engage with on Stratford Waterfront V&A East project:

- i) Strategic suppliers and sub-contractors
- ii) Installation sub-contractors
- iii) Transactional procurement

NG Bailey will select their supply chain against the following criteria:

- Safety Experience
- Efficiency
- Non-duplication of activities
- Off-Site Capabilities
- Ease of maintenance
- Cost effective
- Sustainable
- Quality
- Current Workload

The procurement team will identify key performance criteria of the packages developing the most effective way to manage the suppliers input to ensure not only the risk is capped, but also the potential opportunity is realised. It is intended – subject to Head Contract Terms – that the client delivery team will be invited to join the procurement selection process. As such they will be invited to the mid tender selection meetings with suppliers for key packages and will be invited to score the suppliers using the package selection criteria matrix on technical and delivery criteria. This will demonstrate a robust procurement process that delivers the right product and value for money.

The key areas considered and addressed are as listed:

1. Supply chain identification / my supply chain approval
2. Commercial
3. Programme
4. Information
5. Quality

6. Logistics of the site
7. On-site management / progress
8. Governance
9. Contract compliance

Key Performance measures / targets for continuous improvement

Customer of Choice

With an annual spend of over £300m, our supply chain plays an important role in the success of NG Bailey. The “Customer of Choice” strategy is a commitment and strategic alignment to our most important and best performing supply chain partners. Through carefully mapping our recent and future spend profiles, and clearly understanding the capacity, input and performance level required from our supply chain, we have a very clear picture of how to structure our supply chain.

By engaging with internal stakeholders and mapping the capacity, capability and business objectives of the whole supply chain, we are able to carefully select and segment our supply chain across a number of categories – strategic, preferred, approved, new entrants and not approved. Selection and segmentation however, is just the beginning of the “Customer of Choice” journey. Formal relationship management plans, appropriate relationship sponsorship on both sides, and strong 360-degree performance management is what brings the strategy alive. The strategy is about unlocking value through greater engagement with the supply chain. It’s about more effectively communicating our strategy and pipeline and creating opportunities for the supply chain to bring forward innovation and creativity to enhance both the work winning and operational delivery cycles.



In summary, our strategy puts a clear structure around some of the established informal supply chain process. It sets clear expectations of what NG Bailey’s commitments are, as well as what we require in return from our supply chain. It sets some rules and guidance regarding engagement and ensures our strategic and preferred supply chain partners have the opportunity to be successful, and for NG Bailey to be the most relevant and preferred route to market.

Structure and Reward

The NG Bailey supply chain is classified into approved, preferred, strategic, new entrants and not approved. This will be reviewed on an ongoing basis and suppliers will be promoted and relegated based upon performance and relevance to business strategy. Progression up the supply chain is rewarded with closer working relationships and repeat business.

Payment and Retention

We strive to be recognised as being both fair and timely with payments. For our preferred and strategic supply chain partners, NG Bailey will consider improved project payment terms, rewarding the strongest and consistently performing partners with improved retention release.

Tender Rules of Engagement

It’s important that we talk to our strategic and preferred supply chain partners and seek commitment to price before issuing tenders. We choose a maximum of three at tender stage and we stick with them if we win the work. We reject unsolicited bids but we ‘reserve the right’ to use new blood to stay sharp. We actively encourage alternative procurement routes with preferred and strategic companies where appropriate, such as back-to-back and two stage.

Relationship Management

Preferred and strategic supplier relationships are sponsored by a senior manager/director. Communication between preferred and strategic supply chain partners will be frequent. The NG Bailey strategic project pipeline will be shared, with early engagement in projects and tenders. Supply chain profiling and formal reviews will enable us to understand capability, capacity and each other's business plans.

Alignment to our Preferred Partners, Manufacturers and Suppliers

Across the NG Bailey group we have a number of preferred agreements with specialist manufacturers and suppliers. It is a key principle of the supply chain strategy that our strategic and preferred subcontract supply chain will actively support these agreements on all tender activity.

Performance Management

We monitor subcontractor performance bi-annually as a minimum, using both quantitative and qualitative information. The scores are used to drive the TOP 100 league table, and enable the business to recalibrate the position of strategic, preferred and approved supplier on an ongoing basis. By ensuring 360-degree feedback and closer communication with our preferred and strategic supply chain partners, we also strive to improve our own performance.

My Supply Chain



My Supply Chain is an online supplier and sub-contractor vetting and accreditation portal, tailored to fit the needs of NG Bailey. All members of the NG Bailey Supply Chain have to go through the rigorous vetting and selection process to gain access to My Supply Chain and no orders can be placed with an organisation if they are not on the system.

Using this system ensures NG Bailey have quality, consistent and accurate information about the supply chain, whilst also allowing for effective monitoring of performance management. It reduces our exposure to risk and provide improved quality of service and compliance through use of approved suppliers.

It allows NG Bailey to select partners with confidence, in the knowledge that each supplier has undergone a strict and consistent assessment and that their outgoing performance is also being measured. The aim is improve overall standards of health, safety and quality and to minimise risk to the company and our customers.

Health & Safety Management

Safety First & Foremost

  <p>MISSION STATEMENT</p> <p>There is nothing more important than the safety, health and well-being of our stakeholders.</p> <p>Safety First & Foremost represents a collective mission to continuously improve our existing culture of respect, fairness and excellence in everything that we do and everywhere that we do it.</p>	<h3>RECENT ACHIEVEMENTS</h3>		
	<p>11 RoSPA AWARDS Presidents Award and Gold Medal awards for all divisions.</p>  	<p>NEAR MISS REPORTING: 3,636 NEAR MISSES REPORTED IN THE LAST 12 MONTHS We encourage our people to report near misses so we can reduce the likelihood of incidents across the business.</p> 	<p>ACCIDENT INCIDENT RATE (AIR) well below industry average.</p> 
<p>OUR TARGET: ZERO RIDDORS </p> <p>ENGINEERING AIR 273 </p>			

Our Safety Philosophy

Safety First & Foremost is designed to ensure safety is a top priority for every employee. Through constant communications and on-site safety training we have managed to reduce the number of reportable incidents to a record low, and one of the best in the construction industry. This philosophy will be continued on the Stratford Waterfront V&A East project and it is our mission to ensure it is not just embraced by our team but influences a better safety culture for the entire site.

Through a range of initiatives, including 'Don't walk by', Near miss reporting (QR Code system), hard-hitting posters, Behavioural training, Toolbox Talks and a quarterly awards scheme; we promote best practice across the organisation and reward excellence in leadership, performance and behaviour for Health & Safety.

Our Health and Safety group ensures key issues are discussed at senior level, and that the strategy and direction of the Safety, Health, Environment and Quality (SHE) team is meeting and responding to business needs. The group also ensures each business division has its own Health and Safety improvement plan, with performance reviewed every quarter.

Each business unit in conjunction with Senior Leadership Teams produce a high level action plan (called a GLOBE Implementation Plan) as part of its business planning process. This focuses on the key elements of Governance, Leadership, Ownership, Behaviour and Environment. In conjunction with this and the GLOBE implementation plan the Senior Leadership Team of Directors have embarked on a target of a minimum of four Senior Leadership Tours each per year.

Safety equipment is mandatory and provided

We will supply full Personal Protective Equipment (PPE) to our operatives for all site activities, which includes as a minimum:

- Safety helmet
- Safety footwear
- High visibility vest
- Gloves (Traffiglove system)
- Light eye protection i.e. safety glasses.

All our equipment is regularly inspected (PAT) and maintained, and calibration of our test equipment is subject to BS5750 / ISO 9001/2000. On the Stratford Waterfront site, our Supervisors and Logistics Controllers will have responsibility for ensuring all machinery and equipment is properly maintained and safe to use.

Only fully trained operatives working on your site

Only persons who are trained, authorised, and competent will undertake work on site, as with any of our projects. Competency levels are demonstrated by various internal and external means, including:

- Apprenticeship completion
- National grading attainment
- National registration bodies
- External examinations
- Membership of professional institutions
- Educational qualifications
- Attendance and passing specific training courses
- Regular internal reviews, appraisals, and assessments
- Relevant experience.

Operatives on V&A East will be continually monitored and evaluated by Management, Labour Manager and our Divisional Health & Safety Advisor.

Any training needs will be acknowledged and implemented for development; Our Divisional Health & Safety Advisor and our Labour Manager will, on request, carry out various forms of in-house training. Our staff also regularly attend Continuous Professional Development (CPD) seminars and online training sessions to ensure they maintain industry leading awareness of new products and installation methods.

Assured Health and Safety throughout the project

Our Safety, Health, and Environmental (SHE) department, based from our London office, will oversee and keep a close watching brief on the Stratford Waterfront project works.

Every fortnight Our Divisional Health & Safety Advisor will carry out comprehensive safety audit of the project and its associated Health and Safety documentation. This will ensure all aspects of our work activities are being managed and undertaken in a safe and methodical manner. It will also safeguard compliance with all current Health and Safety legislation applicable to our activities.

Our Divisional Health & Safety Advisor, when available, will attend site meetings to address any issues relating to Health and Safety.

An additional measure to enhance the management and commitment to Health and Safety will be to introduce weekly safety meetings our Client and all our sub-contractors, to discuss all aspects of Health and Safety.

These will include safety critical look-ahead, enabling the identification of areas where works will impact greatly on other trades and operatives.



Example poster from our North Tees Hospital Energy Centre scheme

We will also implement our new online observation reporting system (QR Code / poster), which allows easier, quicker reporting of potential accidents and incidents as well as good practice, by anyone with a smartphone or tablet.

The QR code system enables:

- ✓ Instant notification to site management of any report made
- ✓ Quicker investigation and resolution of potential hazards
- ✓ Trend data is captured more accurately
- ✓ Fully-automated weekly and monthly reports produced
- ✓ Informed actions can be implemented e.g. focused training to improve operative knowledge
- ✓ Cost savings made with unproductive reporting time removed.

Comparison	Recording time	Reporting time
Paper system	20 minutes	4 weeks
QR code system	3 minutes	Instant
Impact / Value	£170k per annum (expected to grow)	Invaluable

CDM 2015

We have already implemented the system onto 50 of our Engineering sites nationally, and can demonstrate a live dashboard of current trends across Health and Safety, Environment, and security categories.

The initiative has been recognised in the industry:



Winner of 'Committed to Innovation Award' at Committed to Construction in Humber and West Yorkshire 2018 Awards

Highly commended for the 'Innovation' category at the Constructing Excellence in Yorkshire and Humber 2018 Awards.

Health and Wellbeing

The wellbeing of our employees is as important as their safety and we are committed to sending all our employees home safe and well each day, both physically and mentally. We recognise that it is easy to identify a physical illness or injury but mental illness or injury can be much more difficult to see. Throughout the past year we have reviewed our approach to wellbeing to ensure we are enabling our people to manage their wellbeing, and ultimately 'work well'. Over the forthcoming year we will be rolling out our Working Well strategy across the Group to ensure our people have the advice and resources they need to address:

- Mental health and wellbeing
- Physical health and wellbeing
- A safe and healthy work environment
- Encouraging effective working relationships and business communication.

HEALTH & SAFETY POLICY STATEMENT

NG Bailey is committed to continually improving health & safety performance. This will be achieved by senior management setting clear health & safety objectives and monitoring performance against the objectives set. 'Safety First and Foremost' is our overriding principle.

To facilitate this, an occupational health & safety management system, aligned to the requirements of BS OHSAS 18001:2007, is documented, implemented and maintained.

In particular, NG Bailey will:

- Establish line management accountability for upholding a safe & healthy working environment and reducing or mitigating hazards to health & safety posed by our work activities
- Continually improve our occupational health and safety management by assessing hazards and setting risk-based objectives and targets as part of our overall improvement programme
- Take steps to ensure that all employees are aware of the health and safety hazards and arising from Company activities, including the benefits of improved performance to the Company, themselves & our customers
- Seek to prevent injury & ill health, by providing appropriate levels of health & safety training along with appropriate levels of supervision for employees. We will also take steps to ensure that our subcontractors have received relevant health & safety training and have the appropriate level of supervision
- Seek to comply with all health & safety legislation relevant to our activities and other requirements to which we subscribe
- Work with suppliers, customers and contractors to promote health & safety, and the need to work in a socially responsible manner, recognising our responsibilities to any third parties who may be affected by our works
- Periodically review this health & safety policy statement and the associated health & safety management system, to ensure that they remain suitable, appropriate and effective
- Empower all employees to stop or refuse to work, if they believe their health & safety have been compromised, until a suitable level of investigation and remedial action has been carried out
- Communicate this statement and any revision of it to all employees and others working under the control of the organisation. It shall also be available to interested parties via our webpage
- Regularly monitor our performance and progress against objectives for the management of health & safety at work, make necessary improvement and communicating internally and externally as required.
- Ensure that the Safety, Health & Environment policy is understood, implemented and maintained at all levels within the Company and by others working under our control

Signed by



David Hurcomb
Chief Executive Officer
For and on behalf of the board of the company.

Risk and Opportunity Management

Our collaborative risk assessment procedure serves to establish and mandate a risk assessment process in relation to collaborative working and opportunities and to establish initial risk assessment actions. The responsibility for this process rests with the Managing Director.

Implementation and Control

NG Bailey has mature processes and a defined approach to risk management. Therefore, the focus for adoption of collaborative working is to utilise this formal process to select opportunities and partners for potential collaborative arrangements and, once in a collaborative arrangement to develop and enhance this process to facilitate a joint approach to be taken to the risk management activities.

NG Bailey adopts a “5-steps to Risk Assessment” process to completing risk assessments:

1. Identify the hazards / aspects
2. Identify those who or what may be harmed / impacts.
3. Evaluate the risk.
4. Decide on control measures.
5. Record and Review.

Collaborative Working Risk assessments may be completed by those who are nominated to do so by the Managing Director. They must be competent in risk assessment, and be knowledgeable within the industry.

Risk Assessment Process

The risk is evaluated by using levels of risk, control measures employed and the scale and complexity of the risk involved. Managerial judgement and quantitative techniques are used. These are then assessed using a 5x5 matrix. (See table below). The Risk Assessment Form is completed under the following column headings:

- Risk ID No. – This gives a clear identifier for the risk.
- Project Activity/Potential Area of Risk - Used to describe the type of risk that may be encountered in association with a particular collaboration or collaborative opportunity
- Hazard Description – The type of business hazard that may be considered. These must always be documented and should identify the location or area of the business at Risk e.g. project, business, specific customer or supplier- Identify all the areas likely to be exposed to the area of risk This section should also describe all foreseeable / potential consequences / impacts.
- Unmanaged Risk - Likelihood – an assessment of how frequently the hazard may be realised. Separate scales may be developed for different hazards but consistency should be sought when assessing different opportunities: see table 1 in the Rail Contract Risk Assessment Process Form
- Unmanaged Risk - Severity – The potential impact on the business or the collaboration. See table 3 in the Rail Risk Assessment Form. Separate scales may be developed for different collaborative hazards but consistency should be sought when assessing different opportunities
- Unmanaged Risk – Risk Ranking - Used to calculate the risk exposure before control measures are introduced, by multiplying the likelihood (probability) by the severity using the tables of likelihood and severity definitions (tables 1 & 3).
- Control Measures - The planned control measures required to minimise the risk
- Managed Risk - Likelihood - Used to calculate the residual likelihood of the hazard being realised after the control measures been applied.
- Managed Risk - Severity – The potential impact on the business or the collaboration after the implementation of the control measures.

Each relevant risk, after the implementation of the planned control measures, is rated using the calculation of Managed Risk Severity and Managed Risk Likelihood.

This numeric figure calculated both before and after controls instituted can be translated to high, medium or low risk definitions (qualitative) using the table below.

Categorisation of Risk

Multiply the likelihood number by the severity number to arrive at the residual risk value.

		Severity				
		5	4	3	2	1
Likelihood	5	25 - High	20 - High	15 - High	10 - Med	5 - Med
	4	20 High	16 - High	12 - Med	8 - Med	4 - Low
	3	15 - High	12 - Med	9 - Med	6 - Low	3 - Low
	2	10 - Med	8 - Med	6 - Low	4 - Low	2 - Low
	1	5 - Low	4 - Low	3 - Low	2 - Low	1 - Low

KEY

	Low
	Significant
	Unacceptable/ High

Examples of Potential risks associated with Collaborative Relationships

Potential Area of Risk		
Reputational risk	Cultural / Behavioural Risk	Operational Risk
Customer acceptance Organisational Values External perceptions Stakeholder acceptance Sustainable agendas Market resistance Ethical / Responsible trading	Organisational culture (e.g. public v private sector, contractor v consultant) Organisational behaviours Historical relationship Levels of trust	Organisational structure (e.g. rigid or flexible) Process stability / maturity Resource capability Business continuity Continued competitive advantage Interdependencies

The above list is not exhaustive and should not be taken as definitive.

Initial Risk Assessment

This is undertaken, using the above process and is used to; Identify the risks to engagement in collaboration, how collaboration might reduce risks in prospective opportunities, Identify any risks when assessing prospective partners and who is best place to manage the identified risks

This initial risk assessment is to be undertaken:

- In relation to any initial decision to seek to work in a collaborative fashion. This considers NG Bailey and its position within the market relative to its internal and external stakeholders, its existing and potential customers and supply chain and in relation to the businesses own capability.
- In relation to any existing collaborative arrangements
- In relation to any potential or new collaborative arrangements or opportunities
- In relation to any considered or potential partners

This assessment should be used to produce a risk profile including risk mitigation factors and residual risks and should be compared to the potential benefits of collaboration and collaborative opportunities identified in the Collaboration Procedure - Review of Opportunity in Relation to Business Plans, Objectives & Policy.

Risk Register

A register of risks identified and assessed should be maintained for the various levels of activity i.e.

- Corporate
- Client/supply Chain
- Individual project

These will be regularly reviewed and actively managed.

Sustainable Development

Environment

We recognise that as a responsible business we must take steps to manage our own impact on the environment, both to reduce our carbon emissions, and to ensure efficient use of resources and minimise our costs. Our environmental impacts arise from three main categories:

- Our office locations
- Business travel undertaken by our employees
- Project/site locations.

We already report on our office and business travel impacts and we are currently working to gather robust data for our project and site locations so we can disclose this in future.

We remain committed to achieving a reduction of 20% in CO2 emissions per employee from our baseline and are pleased to report that we have achieved a 19% reduction in our total net tCO2e footprint per employee since baseline. 2017/18 is the fifth consecutive year where we have achieved a year on year reduction in our office footprint as a result of our investment in on-site renewable energy capabilities, energy saving campaigns within the business and the purchase of renewable energy from the grid.

We understand the environmental challenges that face us and our customers. Therefore, we know the importance of striving for environmental sustainability within both our own operations and the services we deliver.

The process usually involves NGB reviewing the BREEAM assessment at tender stage. This will allow us to identify areas of the pre assessment that we feel are achievable. The aim is to approach this to offer a cost neutral approach working with the whole team to identify and improve upon the pre-assessment scores. We approach this by reviewing the BREEAM scheme and classifying the credits as low, medium and high risk credits.

BREEAM Examples

Often BREEAM credits are linked and a credit is gained in one area, this can result in the loss of credits in another. It's our target to achieve the most appropriate sustainability solutions for our projects for the long term and we utilize BREEAM to achieve this.

Detailed design of modern buildings is about developing early concepts into efficient, affordable and well-engineered designs that can be easily coordinated whilst exceeding increasingly stringent energy performance standards. Early engagement, collaborative working and design management are key to the delivery of successful designs we understand the importance of environmental sustainability on our projects and the requirement of obtaining specific BREEAM ratings and compliance targets. To ensure you achieve your goals and environmental vision, our in-house sustainability Engineers, will offer support and guidance to our site teams.

Successful sustainable constructing is only progressed following the finalisation of a robust sustainable design. It is this design that forms a key element in how NG Bailey manages a project, as we believe that sustainable design is a key driver in the construction or refurbishment of buildings and a vital component in achieving excellent energy and environmental performance within them.

We appreciate that the design may have been developed to a stage where various options have already been considered and some already discounted, however we will seek to always improve on the current design with a strategy of reviewing the key sustainability and BREEAM drivers.

Environmental Impacts

The environmental aspects of our contracts are managed in accordance with the NG Bailey Environmental Management System, which meets the requirements of ISO 14001:2015. In order to minimise the risk of pollution or environmental damage we carry out Environmental risk assessments and implement control measures.

Environmental issues are covered at site inductions for all persons working on site. We also deliver relevant Toolbox Talks to our operatives and subcontractors.

We consider that the biggest environmental risks are as follows:

- The waste material caused by off-cuts, packaging Carbon emissions caused by people travelling to and from site, power tools, welding machines, deliveries and the manufacture of materials. Local deliveries from logistics centre to maximise the capabilities of our delivery vehicles with collection of redundant luminaires on the same delivery.

We therefore consider that the opportunities exist in being able to reduce all the risks above by analysing and managing resource efficiency, corporate responsibility, waste management and Eco design.

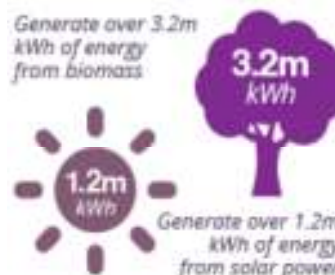
We will implement the following measures to reduce the environmental risks:-

- Employ a logistics coordinator so that materials can be controlled resulting in operatives only taking what they need and when they need it.
- Site specific 'Site waste management plan'.
- Set targets and then monitor and report on waste and emissions on a monthly basis.
- Work with our Supply Chain partners to reduce packaging and embed sustainable and innovative supply chain solutions.
- Utilise local labour wherever possible to reduce CO2 emissions.

NG Bailey's Approach to the Environment

2018 saw us.....

The Past 5 years has seen us.....



NG Bailey Carbon Footprint

Environment | our performance this year

One Approach goals	2017/18 commitments	Current Status	Explanation of performance
We will save our customers more CO ₂ than we emit by 2018.	Continue to save our customers more CO ₂ than we emit and work to increase the CO ₂ savings delivered to our customers beyond our achievement in 2016/17.	Exceeded expectations	118,085 tonnes of CO ₂ e has been saved over the 2017/18 reporting period. This is equivalent to 22 times our 2017/18 carbon footprint.
We will send zero waste to landfill and champion innovation in water use.	Continue to maintain a landfill diversion rate above 92%.	Achieved	Our zero to landfill rate for this year has been maintained at 97% and we continue to explore avenues to reduce our waste generation and maintain our diversion to landfill rate. We continue to look for potential avenues to champion innovation in water use.
We will cut our CO ₂ emissions by 20% per employee from a 2012 baseline.	This year we have re-baselined our carbon footprint and we remain committed to achieving a reduction of 20% in CO ₂ emissions.	Exceeded expectations	We have successfully reduced our carbon emissions by 27% (net) and 23% (gross) reduction from baseline as a result of estate rationalisation, absolute energy reductions and a Group-wide Skype roll out. The Group-wide Skype roll out has resulted in a reduction of over 1.2 million miles driven across the Group in the reporting year.

Our carbon footprint:

This year we are pleased to report that we have exceeded our commitment to reduce our carbon footprint by 20% per employee and achieved an overall reduction of 27% (net) since our baseline year of 2012 to 1.77 tCO₂e/per employee. This reduction has been achieved primarily through a reduction in the number of miles we have driven, through our continued investment in on-site renewable energy capabilities, purchases of green tariff energy, energy-saving campaigns throughout the Group and the rationalisation of our property portfolio. Our gross footprint has also experienced a reduction of 23% since baseline with an intensity of 1.87 tCO₂e/per employee.

*Further details of our carbon reporting by scope can be found at www.ngbailey.com/ourresponsibilities

Carbon emissions per employee (net tCO₂e/employee):



Alongside these investments this year we became one of the first organisations in the building services sector to achieve the ISO14001: 2015 standard; we maintained our vehicle carbon profile below 102g/CO₂/km, and to further reduce our business travel carbon footprint, we promoted alternative and more sustainable methods of transport through our Travel Less, Live More campaign.

Travel carbon footprint (tCO₂e)



Office carbon footprint (tCO₂e)



We continue to manage our waste impacts across the NG Bailey estate and we are pleased to report that we have maintained a landfill diversion rate of 97% for the second year in a row. This exceeds our annual target and has reduced our absolute waste by 11%. In addition, where we have refurbished properties, we have achieved a recycling rate above 90%, seeking to re-use and recycle materials wherever possible. We continue to work with our supply chain to explore how we can reduce the amount of waste generated as a result of our services.

CASE STUDY

Southbank Centre



CLIENT

Southbank Centre

Year – 2016 – 2018

Value – £19m

PRINCIPAL CONTRACTOR

BAM Construction
Andy Mason – Construction Director

Service – M&E

Duration – 2 Years

Contract Type – Subcontract

KEY BENEFITS

Description of the job

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COLLABORATION



BIM TECHNOLOGY



SERVICES REMAINED OPERATIONAL



INNOVATION

CASE STUDY

Southbank Centre

NG Bailey Delivery

All projects NGB are involved with, deliver the points raised in this item. As a standard function we will take the lead on behalf of the client/main contractor to ensure the design is sufficiently complete and integrates with the structure and the appropriate environment required for visual exhibitions and showing historical artefacts.

The design should have delivered on the clients brief from a technical perspective but can sometimes be lacking in the detail required to give surety on the programme and cost management. This will often require a phase of workshops to re-focus the project team on the above referenced items.

The following points are what we consider key to the successful programme management of the Stratford Waterfront V&A East project and as project knowledge is gained more certainty can be apportioned to each of the following items.

- Design development/completion & programming of the preconstruction and construction activities.
- CDP packages to be integrated into the base design with specialist supply chain.
- Identification of long lead times for materials and equipment and assessing the interfaces between other key subcontractor packages. Development of a clear offsite and logistic strategy to support the commissioning strategy ensuring all aspects of the build programme are factored in.

Drive Quality but with a strong commitment to value for money

We will request attendance from key stakeholders, Client, Project Manager, Professional team and any potential end users. End Users are often key to these workshops. Where developments are in the "Arts" classification, the end user has a very clear understanding of how the finished project will operate. Again this should have been embraced during the design phase but may not capture the entire clients brief. These workshops also provide a good platform to debate alternative solutions to assist with contract sum management and value engineering. If all parties are represented the answers to proposals will be considered within a wider group, ensuring a perceived cost saving to one package does not merely transfer the cost into another sub con package, providing no actual client benefiting saving



CASE STUDY

Southbank Centre

This approach was recently adopted at the South Bank Centre (see case study above), two existing leading exhibition spaces, The Queen Elizabeth Hall and the Hayward Gallery. The specified systems were unique to the confines and requirements of these spaces and as such required a greater level of understanding than available from a written document. Specialist supply chain partners were engaged as a priority in the preconstruction phase, ensuring the project benefited from their knowledge and understanding of how the finished areas would control from both an environmental and from a lighting and blind control perspective, closely monitoring the correct conditions for whatever was being exhibited. These workshops will allow a very open and transparent line of debate between all parties, ensuring all expectations are as a minimum matched but with a desire to exceed. These workshops will require strong leadership from the outset by NGB as they can be interpreted as being critical of parties already engaged in the scheme i.e. some parts of the professional team. We will strive to enhance the previously delivered solutions.

The above takes an amount of time to resolve and the programme may not) have made these due allowances. At NGB and with our extensive DfMA / offsite manufacturing capabilities we are able to offset some of this period due to our approach of installation. We will not just look to tick a box with stating that we do modularization, we will actually re-engineer the scheme to allow a modular solution to be incorporated as a meaningful alternative, embracing "other packages" like riser flooring, fire stopping and the reduction of secondary trades not usually covered within our scope, i.e. removal of any scaffolding requirements within riser shafts by designing a solution that provides a complete safe working environment in all shafts.

This method is proven to ensure the highest level of quality is achieved, via a manufacturing mentality, with the works being undertaken in a controlled, safe environment. This will obviously improve the quality of the installation and will allow all services to be benchmarked, tested and inspected prior to delivery supporting a defect free handover. This approach will also be incorporated into the horizontal distribution on the above ground areas and where appropriate in the basement with the larger services and skid mounted plant and equipment.

This model will also reduce on waste materials, a manufacturing approach reuses off cuts of materials, reduces on packaging being transported to site (all packaging generated with modular installations is returned and where possible reused) and significantly reduces the amount of singular delivery vehicles requiring slots for unloading. This all reduces the impact of our carbon footprint on every development we are engaged on.

The added benefits are a greater degree of programme certainty, utilising a labour resource that is in plentiful supply, not affected by the demands of the overheating London labour market, a reduced number of operatives on site and improved safety performance/stats due to the envelope created within the riser shafts. This approach puts a greater degree of focus on the preconstruction phase of the project. Decisions have to be made as early as possible, which will ensure the build element of the project is clearly understood and all programme requirements are managed with all appropriate logistics catered. This will also provide a greater degree of main contractor focus on whom each of the large trade packages integrate with.

CASE STUDY

University College Birmingham Phase 2



CLIENT

University College Birmingham (UCB)

PRINCIPAL CONTRACTOR

KIER

KEY BENEFITS



COLLABORATION



OFFSITE



DESIGN



INNOVATION

Year – 2018 – 2020

Value – £28m

Service – M&E

Duration – 18 Months

Contract Type – Subcontract

Description of the job

NG Bailey has been appointed as building services partner to Principal Contractor KIER for the University College Birmingham Phase 2 project.

NG Bailey are working alongside KIER to complete phase two of the Charlotte Street Campus redevelopment, located in the Jewelry Quarter. This is positioned adjacent to Phase 1 which was opened to students in September 2014.

Key features of Phase Two include:

- Approximately 8,500m² of additional teaching facilities
- Lecture theatres
- Sport teaching facilities
- Gym
- Social learning areas
- Staff offices
- Catering facilities
- A multi-storey car park to provide around 160 spaces

Construction began in January 2018, and is scheduled for completion in January 2020.

The building has extremely high quality exposed soffits requiring very detailed services coordination to conceal services within the structure/fabric of the building. This requires very early finalisation of the services design and coordination.

Operations Director, Duncan Smith, comments: "University College Birmingham is adding to their impressive portfolio of real estate in a vibrant, upcoming part of Birmingham City Centre. This will provide an exemplary environment for the development of future generations, creating a memorable and fruitful student experience. NG Bailey has worked successfully alongside KIER on multiple projects nationally and locally, and through the collaborative working of our organisations and with the representatives of UCB we will deliver a building, environment and legacy to be proud of."

CASE STUDY

University College Birmingham Phase 2

Design Management

NG Bailey employs over one hundred people in their technical function across the UK to drive excellence in design, BIM, quality control and commissioning.

The function is split into two hubs, southern and northern. The southern hub containing circa 50 employees. This comes under the control of the southern design and engineering manager ensuring a seamless end to end approach as a project transitions from design into pre construction, offsite, installation and handover. (See figure 1 below)

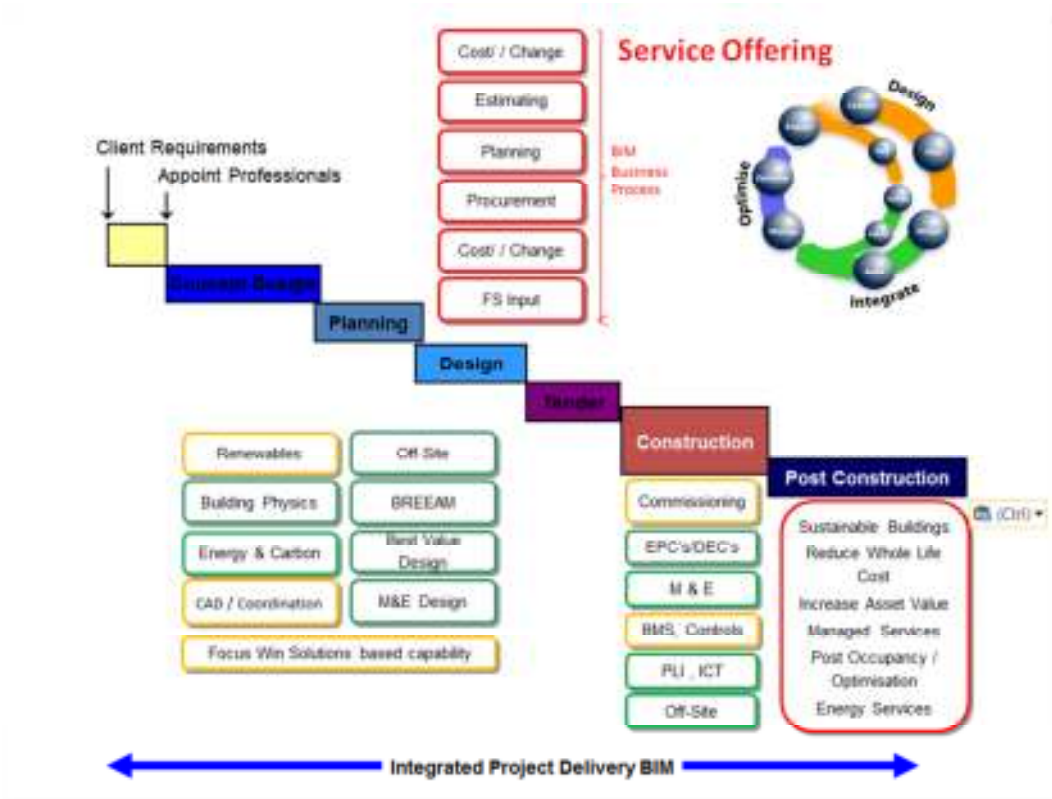


Figure 1

All of the above is wrapped in our internal governance and assurance processes. Our Management of Technical Engineering Activities (MTEA) document sets out guidance, the roles and responsibilities of individuals, tender activity requirements, pre contract activity requirements, management of M&E design processes in contract and compliance with CDM regulations. This is then further supported by our technical review gateways at 0%, 30%, 60% and 95% with a close out at 100% which captures any final outstanding items from the previous gateway reviews.

NG Bailey has proven pedigree in the industry of delivering projects where we design internally from concept stage, where we join the project in a PSCA arrangement and support a consultant in the development of the technical design with buildability advice or where we take a project in a more traditional approach from the start of Stage 4b and imbed the CDP elements into the design using our internal team or supply chain partners.

If a project is already at Stage 4a when we receive it, there is a danger that the opportunity to maximise offsite has been lost. This can be down to decisions already been taken by the client design team that limits its use. This can mean a lot of time and effort in reviewing the design and revisiting areas to make it work, we do this on a value analysis basis on how much benefit does all the rework release to the client, whether that is CAPEX or OPEX.

CASE STUDY

University College Birmingham Phase 2

We have delivered and are delivering a number of projects in this manner, some examples are below;

- 33 King Williams Street
- Lambeth Town Hall
- Wood Wharf
- RAF Lakenheath
- Woking Hotel
- Brentford Football stadium

The two figures (figures 2 & 3) below show how implementing an offsite approach to a project changes the dynamic of the project lifecycle as set out in BSRIA guidance and how much more effort needs to go in at an early stage of the process to really release the value.

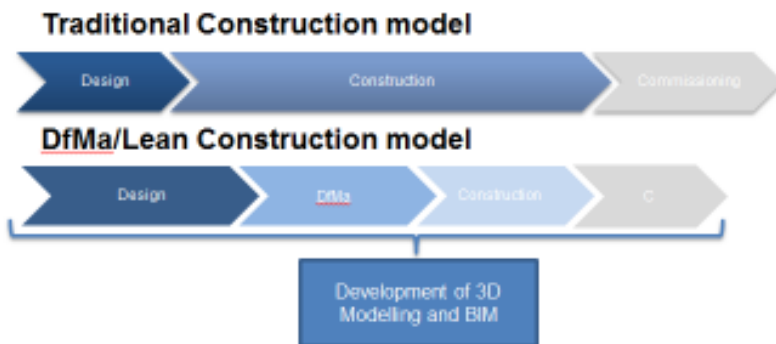


Figure 2

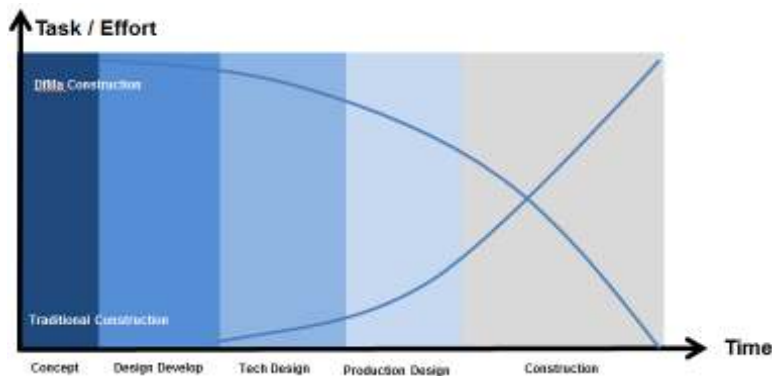


Figure 3

Our internal processes and governance enables us to manage a robust design process from any stage of design and whether it is being delivered internally or externally. We understand the value that an efficient design process brings and the importance of supply chain members in making that happen with engagement at the right times.

The technical function and engineering team have control over the delivery of the offsite drawings to the factory to build. This creates one point of ownership and means our off site solution is thought about one day one of design and not at the point of the design being complete and installation information being prepared. Our offsite solution has the same quality control processes and procedures as our design teams and engineering delivery teams which help us deliver on our right first time approach to all projects.

Our building physics team work with the engineering and technical teams to make sure we have the most efficient services designs and that all elements of the building services design meet the criteria to deliver on local planning conditions, Part L and any BREEAM requirements.

CASE STUDY

Southbank Centre



CLIENT

Southbank Centre

Year – 2016 – 2018

Value – £19m

PRINCIPAL CONTRACTOR

BAM Construction
Andy Mason Construction Director

Service – M&E

Duration – 2 Years

Contract Type – Subcontract

KEY BENEFITS

Description of the job

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COLLABORATION



BIM TECHNOLOGY



SERVICES REMAINED OPERATIONAL



INNOVATION

CASE STUDY

Southbank Centre

Integration of pre-fabricated Elements

Close collaboration with the clients design team is essential for the integration of pre-fabrication and requires the clients design team to embrace this philosophy creating an equal platform maximising the potential of prefabrication.

Early involvement in the surveys and the early RIBA stages provides the maximum benefits to the design, pre-commencement and construction stages. This strategy allows a “design for offsite fabrication” philosophy, a proven method for reducing time, congestion on site and providing improved quality. Challenges and Design support required are as follows:

- Assist in the development of the MEP Services design and the ability to influence the clients design team.
- Identify areas of offsite fabrication and influence the client’s team to “design for offsite fabrication”. Provide advice and support in partnership with Bailey Offsite including structural loads so that the client’s structural engineer can make due allowance. This short cuts the usual process of design, and re-design for offsite fabrication = time and money.
- Bringing buildable solutions to the design.
- Assisting with the co-ordination of the various elements of the design.
- The proposal of, budget costing, benefits and risks of Value Engineering.
- Provide phasing advice at design stage ensuring practical solutions which will provide minimum disruption.
- Provide technical assessment of the MEP Services design and providing workable solutions working with the client’s design team.
- Early identification of problem areas and providing detailed reports and advice on solutions.
- Develop mock ups where needed to demonstrate the effectiveness of the design solutions.
- Insertion of tracking QR / Barcode control of modular / pre-fabrications units on complex works from factory to work face



CASE STUDY

Southbank Centre

Commissioning Process and Integration

NG Bailey has a structured and logical approach to commissioning, and our own in house commissioning managers who integrate with the project team on site to guide and control the process. We work to all of the CIBSE commissioning codes and BSRIA best practice guidance; additionally we trust our specialist contractors and work with them to ensure we deliver a high quality product that meets the design intent.

We undertake many shell and core contracts whereby there is a concurrent or eventual integration with an end user or fit out contractor, and as such have comprehensive experience as to preventing common issues from arising, and dealing with other issues that may occur as every individual project is a unique undertaking.

We look to be involved at as an earlier stage as possible, so that we can bring our experience and knowledge to bear to the benefit of the project. By detailing the interface points at an early stage they can be designed in such a way as to reduce the management of the interface necessary and any potential issues that it could cause. Working on a number of large infrastructure projects we have practical experience in both installing and connecting into district heating and cooling networks, working to the CIBSE heat networks code of practice to deliver robust energy efficient schemes.

Closed Water Quality

NG Bailey has extensive experience in managing the water quality of closed systems on our projects, often for long periods of over a year between the end of pre-commission cleaning through to practical completion/handover.

NG Bailey has a comprehensive quality control procedure governing the pre-commission cleaning of pipework systems, covering the initial fill for pressure testing through to monitoring samples and eventual handover of the system to ensure we comply with BSRIA BG29/2012. All of our engineers and supervisors have received training in implementing the policy, and our Quality Control managers ensure it is followed on site. No matter how well the cleaning process is carried out, and the subsequent ongoing monitoring of the water quality, issues can still arise. There are common remedial actions for specific problems and NG Bailey would always seek the advice of our water treatment specialist as to the best action to be carried out however some common examples are listed below:

- Microbial growth – dosing with increased amount or different type of biocide
- Suspended solids – introduction of inline filtration to reduce levels
- Suspended iron – induction of magnet with inline filtration to reduce levels
- Suspended copper – dose withazole (copper corrosion inhibitor) and introduce inline filtration to reduce levels
- Soluble iron or copper – water exchange to reduce levels, and then top up biocide and inhibitor