

BIM Level 2

SES (Engineering Services) Limited has been at the forefront of digital engineering for more than 15 years, incorporating 3D modelling into projects and embedding data into models since 2010. In 2016, our company was the first MEP contractor to achieve BRE BIM Level 2 Business Certification.

SES uses clash detection, 3D modelling, Common Data Environment, our BIM2Map system, and collaborative working on all projects – no matter their size or complexity – to ensure digital engineering is built into their foundations.

Last year also saw us test the application of VR and AR to demonstrate the spatial fit of building services and allow an immersive experience of the end product from the earliest design stages.

These trials received highly positive feedback from our client, who is a pharmaceutical giant, where SES is currently supporting the delivery of a £94m expansion to its site in County Durham. This project is using extensive 3D BIM models and clash detection to assist offsite prefabricated construction of M&E components, ensuring they are built to be a perfect fit, on time and on budget.

During 2018, SES also trialled a number of ongoing pilot projects into site-based field tools –BIM 360, Viewpoint and Dalux, and we will be rolling out these tools across all projects in 2019.

SES works hard to ensure industry standards are upheld and during 2018, we successfully renewed our BIM Level 2 accreditation and began a BIM-team specific Construction Operations Building Information Exchange (COBie) training programme. We have also expanded our apprenticeship programme to hire two of our very first digital engineering-specific apprentices, who will become fully trained in BIM and its application across a range of projects.

SES continues to use BIM to innovate and reduce costs for both ourselves and our clients and encourage all of our employees to share best practice initiatives with the wider construction industry – outlining both successes and failures – to promote digital engineering even further.

Our BIM team representatives regularly take part in industry events discussing topics including ISO:19650 and the effects this will have on BIM in the UK. Details of our approach to digital engineering are also included in all relevant external communications. This included a detailed feature from Engineering Services Director, Paul Newby, on driving a digital culture in construction, named in Construction News' top five most read articles of 2018.

SES has also been instrumental in supporting our supply chain to ensure only the highest quality BIM outputs are associated with our brand, regardless of origin. This incorporates working collaboratively with suppliers, holding workshops and CPD events as well as organising site visits to share knowledge, content and experiences.

SES has continued to drive understanding and innovation within BIM throughout 2018. With the full backing of our strategy board, BIM and digital construction techniques are integral to all of SES' projects. With the foundations in place, the team works diligently to improve its systems, procedures and operations even further, to embrace as many new time and cost efficiencies as possible.

SES' commitment to BIM and digital engineering has ensured we are highly respected within both the BIM community and the wider industry, and in 2019 we have been shortlisted for Best BIM Contractor of the Year.

Example – Gasholders London



The aspirational requirements were for the Gasholders London project to be a full Revit project, complete with COBie data requirements, to ensure that upon completion the client could provide its FM supplier with a full data rich model of the building.

Due to each of the three Gasholders being not only circular, but also differing in height, diameter and floor layout it was necessary to work with all parties to develop a fully federated model from the earliest possible stage.

The use of BIM allowed the co-ordination of logistics routes, leave-downs for plant transition through the Basement and co-ordination of spatial fit. This meant that prior to any plant or prefabricated modules arriving on site, the builders work was complete and a run through of the logistics strategy had been carried out to ensure that the correct sequencing and installation methodology was developed.

Having already removed 12,500 hours off site through prefabrication (a time saving of 60% on the programme activities) this meant that the installation of the prefabricated works was optimised for maximum efficiency. The benefits of this included having allocated craneage slots and lifting times, co-ordinated exclusion zones and the knowledge that the programme had been significantly de-risked by this in depth planning.

In addition to the prefabricated atrium modules, we successfully delivered the BIM and modelling for mechanical and electrical services risers in each gasholder, as well as full take-offs and cut lists for the basement plant areas and corridors and finally 270 highly complex apartment service cupboards.

The information generated from this BIM operation was then used to input into the construction programme, reflecting the reduction in labour required and the detailed sequencing of the works to a much higher level of accuracy than a standard construction programme based upon tendered labour hours. This sequencing enabled for swifter handover times between trades in the transit areas such as atriums and corridors, increasing the efficiency of the general construction.

The BIM modelling was further used to provide accurate and visible progress reporting data, with data produced reflecting the progress of the build to programme and identifying any areas of risk due to preceding trades or architectural or structural changes.

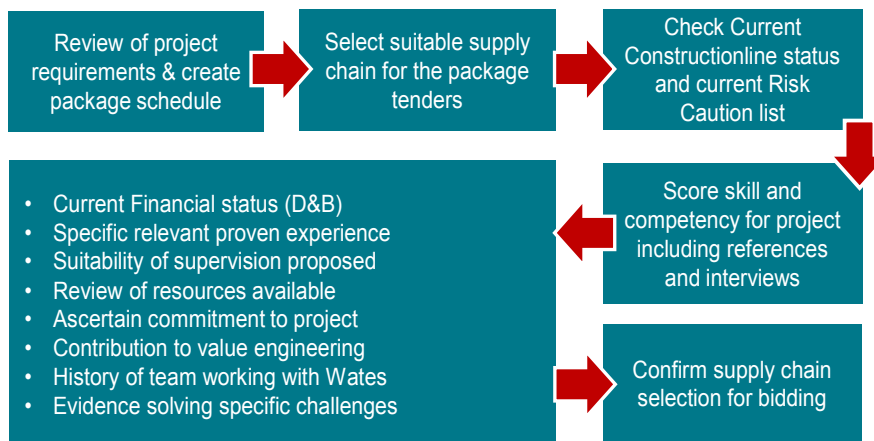
A BIM risk register was utilised to allow SES to work with both the Architect and Structural Engineer ahead of the installation activities where elements were subject to change. For example, the late introduction of balustrade handrails to some Duplex Apartments identified the requirement for the underfloor heating layouts to be changed to suit additional below screed steelwork. This was identified and a workshop undertaken to resolve before the installation took place on site.

Supply Chain

SES (Engineering Services) Limited utilises an Operating Framework which covers all aspects of the business, and sets out and defines the procedures and processes that are to be employed. Operating Framework compliance is mandatory and is regularly reviewed and audited at project, regional, company and group levels.

SES utilises Regional Procurement Leads to oversee the ongoing management and development of our supply chain. In London & South East, this is undertaken by Steve Knight. The Regional Procurement Lead is responsible for ensuring that best practice is followed, and that the selection of supply chain members and their use is conducted in line with the Operating Framework requirements and company policy.

The initial identification process is managed through the internal profiling system, and supported by the group Constructionline portal;



This web-based supply chain management solution not only profiles the supply chain, but also benchmarks and offers performance management solutions. The benefits of this system are that we can filter by trade, location, capacity and preferred work types, whilst also ensuring the company has the right capacity and capability.

We use detailed analysis to ensure minimum standards – we review the following:

- Health & Safety Record – policy, procedures and understanding of requirements including safety record and competency.
- Financial Health Status - we use financial checks using Dun and Bradstreet (D&B) database and the latest company management accounts.
- Previous Performance – KPI scores from previous projects used to review performance to ensure high quality is being maintained.
- Capacity & Capability – what levels of work they are currently delivering and future planned workloads through the life of the project.
- Review of Caution List - a live document circulated around the group which records major concerns over financial or safety performance.
- References – are taken on the last 3 projects by the procurement team.
- Interviews - For certain key packages we would expect to see the project specific team at the interview to see if they meet the requirements.

Proportionate arrangements for admitting one off firms

We recognise that there are things we can do to support smaller organisations and ‘one off specialist’ organisations to allow them to join our supply chain. We also strongly believe that we should not dilute the rigour of our selection process, and therefore we help new companies through the process.

We have the following support services for small and or one off firms:

- Fast Track – we identify organisations that meet the SME/Social Enterprise/One off Partner category and have a fast track process through the procurement checks and application process
- Meet The Buyer – these events support smaller supply chain partners with information
- Resource Support – many small firms lack the physical and people resources to negotiate ‘online’ requirements. Our Procurement team will support registration with potential partners.

With a policy that all projects recruit at least one social enterprise on every project, we are experienced and have the processes in place to support these smaller and or/one off organisations achieve a place on our supply chain.

Equal Opportunity for all supply chain organisations

Over 80% of our Supply Chain members are SMEs which shows we operate an equal opportunity for all based on Quality. Our selection process remains consistent for all organisations.

Fair payment terms

Typically our payment terms downstream reflect those of the contract itself; however we limit our payment terms to a maximum of 60 days. Our terms are divided among 30, 45 and 60 days depending on the supplier or subcontractor.

Using data from 1st January to 30th June 2018, we can confirm that our average number of payment days was 53 over the course of 29,723 transactions.

Ongoing management

Once appointed, we hold weekly meetings with subcontractors and monthly ongoing account meetings. Just like our account conversations upstream, these are used to agree variation accounts, review progress and engage on any other matters of concern on either side.

All subcontractors are evaluated for performance every month, with the project team reviews submitted electronically for review internally. This ensures governance within the project itself, and ensures that our Regional Procurement Leads are kept up to date on the performance of any supply chain member on all their active projects.

Any negative feedback is provided in a business to business meeting between company directors, to agree any mitigation strategy required and to ensure attention at the highest level.

Best practices

As mentioned in the outset of this question response, we ensure that best practice is used when dealing with all aspects of our business. In terms of the supply chain, we adopt the following main procedures;

- Ongoing engagement at all levels.
- Monthly agreement of account position.
- Provision of written instructions only.
- Clear scope of works included with each appointment, drafted by the project team and signed off by one of our Engineering Management Team.
- Robust interface schedules created and included with appointments.
- Collaborative working encouraged – regular meetings held with all project team supply chain members as the project progresses to create an open forum.
- Development of long term relationships.

SESPS-WW-06 Procurement Strategy

You must:

- Create a procurement strategy which:
 - * Considers any bespoke project
 - * Utilises only existing approved supply chain members (unless exception confirmed by Regional Commercial Director (or predetermined by the Client))
 - * Considers previous operational and commercial performance for SES (review NPS scoring)
 - * Limits and protects SES from technical and commercial exposure (risk)
- Obtain approval for the use of unapproved supply chain specialists from the RCD as [SESPS-PrC-25 Update Supply Chain](#). Diligence checks should always be undertaken on newly sourced suppliers/sub-contractors
- Use SES expertise via Engineering Managers and Critical Friends to technically validate the procurement strategy

Guidance:

The goal is to procure packages as early as possible to suit the overall strategy

The procurement detail may need to be developed post Bid Launch (particularly on Design & Build projects), to fit Bid Strategy

Remember - late procurement decisions cost time and money and can result in non-recoverable costs on design, BIM, materials, labour, sub-contractors and the like

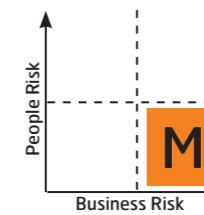
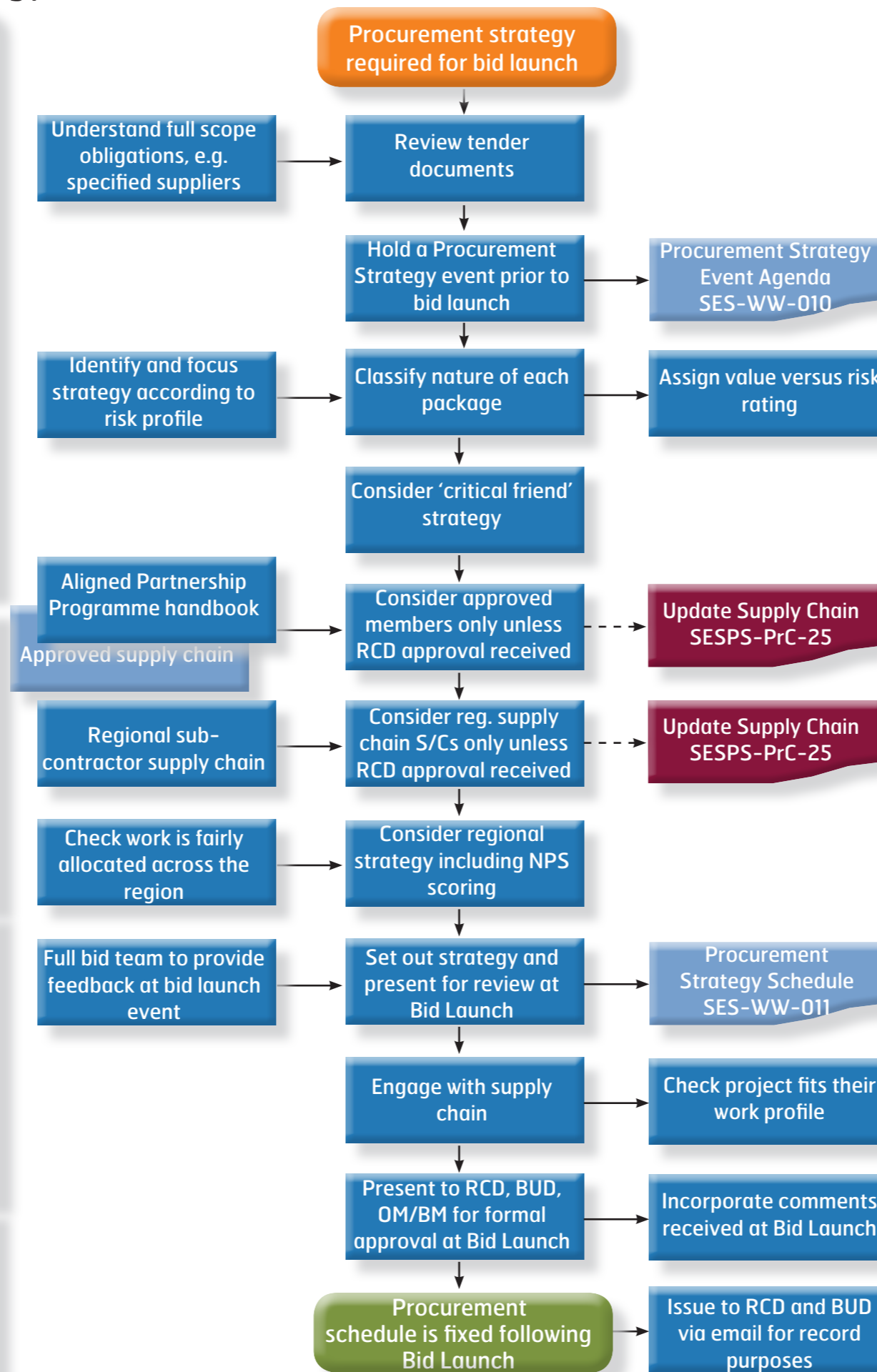
Procurement Strategy Event Attendees:

As a minimum, the following must attend the procurement strategy development event:

- Bid Lead
- Regional Procurement Lead
- Commercial Lead
- Operations Director/Manager
- Estimating Director/Manager
- Engineering Manager

SES Critical Friends and Engineering Management Guidance :

- Security - ASP
- Acoustics - Sharps Redmore
- Fire - Carvell
- Artificial Lighting - Lighting Alliance/Electric Centre/Park Electrical
- Gas Services - Blue Flame Limited
- Thermal Expansion - Barnvale Limited



Accountabilities

The **Bid Leader** is accountable for:

- Ensuring the Procurement Strategy Meeting is held prior to Bid Launch

The **Regional Procurement Lead and Commercial Lead** are accountable for:

- Identifying suitable sub-contractors and suppliers with the operational/bid team. The number of bidders should be limited to a maximum of four, unless pre-determined by the client
- Creating a procurement strategy schedule of the most suitable strategic/preferred/approved sub-contractors and suppliers which are capable of delivering the works
- Identifying which specific packages will be developed as 'strategic packages due to scale/opportunities across the business
- Assessing the suitability of the proposed specialists through due diligence checks such as:
 - * Obtaining financial checks
 - * Requesting trade and/or specific references
 - * Checking performance on SHE, quality and ethical standards (specifically review NPS scores)
- Advising sub-contractors and suppliers in advance of the nature and timing of the forthcoming enquiries
- Generating the application to the RCD if a supplier/sub-contractor outside the agreed supply chain is required
- Issuing the agreed procurement strategy document following the bid launch meeting to the Business Unit Director and RCD via email within 3 days of Bid Launch

The **Regional Commercial Director** is accountable for:

- Authorising any deviations from the Approved Regional Supply Chain/Aligned Partnership Programme

The **Operations Manager/Director** is accountable for:

- Leading and developing the procurement strategy through Work Winning Stage to completion at Pre-Construction Stage

The **Estimating Director/Manager** is accountable for:

- Incorporating the procurement strategy and procurement schedule outputs into the estimating/bid pricing process
- Ensuring that the estimating team do not deviate from the agreed strategy
- Liaising with suppliers and sub-contractors during the bid process to ensure quality returns are likely to be submitted

Health, Safety & Wellbeing

SES (Engineering Services) Ltd provides mechanical, electrical, design and contracting services for private and public sector customers, covering a wide range of commercial and industrial markets.

The Company's activities include project management design, supply, installation, testing and commissioning of mechanical, electrical, control and instrumentation services.

The Company has an exemplary safety record and holds several prestigious awards including the British Safety Council's Sword of Honour.

In 2003 SES became the first Building Services Company to achieve OHSAS 18001:1999 registration from the British Standards Institute. This was followed in 2005 by achieving ISO 14001: 2004 accreditation. The Company is now accredited to the revised OHSAS 18001:2007 standard.

The Company's commitment to safety is disseminated to all levels of personnel. All employees are expected to work safely, correctly and without risk to themselves or others who may be affected by their acts or omissions.

The Company employs professionally qualified SHE staff who are all IOSH members.

The Company SHE Director is a Chartered Fellow of Institute of Occupational Safety & Health (CFIOSH) and the International Institute of Risk & Safety Management (FIIRSM) and a Practitioner of the Institute of the Environmental Management & Assessment (PIEMA). The Company SHE Director is also the Chairman of the Electrical Contractors Association (ECA) Corporate Social Responsibility Committee and a member of the Specialist Engineering Contractors (SEC) Group SHE Committee.

Technical Facilities

To assist the SHE Department, the following systems and documentation are available:

- BESA Computerised COSHH assessment generation system.
- Relevant Regulations and Statutory Instruments.
- Relevant Health & Safety publications and technical bulletin services.
- Health & Safety Executive and relevant trade information help lines
- Construction Skills GE 700.
- Trade Organisation support.

Company Operating Framework

All Company procedures Inc. SHE Documentation is included and managed within the SES Operating Framework. This is a documented management system designed to govern and advise on all operational tasks.

We're Safer Together – Zero Harm

We're Safer Together is a 5 year plan designed to create Zero Harm culture across the Company by 2020. The initiative is the backbone of our health & safety strategy and is based around 6 enablers, Leadership, Simplify, Re-Think, involve, Learn, Track.



Induction Training

SES and sub contract operatives receive induction training from SES supervision in addition to the principal contractors inductions on every project. At this point the SES SHE policy and accident reporting procedures are brought to the attention of all attendees.

Project Management SHE Awareness Training

An in-house course has been developed to inform project management and supervision of their responsibilities in relation to the ongoing management of SHE issues from project conception to completion.

The intention is that this course is carried out to all newly appointed staff or persons who have recently been promoted to the grade of supervisor or above. This course is accredited by the BESA.

Operative Training and Consultation

It is SES policy that a safety talk is carried out to SES and sub-contract operatives at least fortnightly on all sites, this is also an excellent opportunity for the Company to discharge its duties under Workforce Consultation legislation as input is encouraged from all operatives, lessons learned are shared and a collaborative environment is fostered.

Proactive Supervision

Although the SHE Department set policy, carry out audits and support all levels of employee it is the responsibility of the project management team to manage project SHE issues. It is recognised that site supervision has a very important role in relation to this task. The presence of supervision at the workplace can help reduce accident and incident numbers and is a fundamental part of the Company's behavioral safety thinking.

Site Audits & Inspections

In order to identify potential hazards and maintain high standards, regular SHE audits and inspections are carried out by the SHE Department. To ensure senior management input, Directors and Senior Managers also carry out inspections accompanied by members of the SHE Department.

Senior Management Support

The safety of all employees is integral to all activities. Safety is an agenda item on all relevant Company meetings including project planning and strategy meetings with a member of the SHE Department in attendance.

The support of senior management is vital to ensure that SHE issues receive the necessary profile and authority.

It is also SHE Department policy that the Company Director of Safety, Health & Environment and Regional SHE Managers/ Advisers are available at all times to deal with employee concerns.

Workforce Consultation and Information

SES recognises the importance of involving the workforce on health and safety matters. Regular SHE talks will be carried out on all sites where the opportunity for discussion on these matters will be encouraged. In addition to this SHE Bulletins and other communications will be produced and issued to all staff. Regular Regional communication meetings are also held where SHE issues are agenda items.

Stop/Go Cards

To help improve site safety standards all staff and employees are encouraged to complete Stop/Go cards. The cards are designed to highlight areas for improvement or instances of good practice. These cards are available in card form or via the Company Stop/Go App. These are then reviewed by the Project & SHE Teams and relevant suggestions implemented across the Comp

Safety Schemes in Procurement (SSIP)

The Company is accredited to a number of schemes included in the Government backed SSIP scheme; this is designed to establish a common acceptance of safety accreditation schemes and streamline the procurement process.

SHE Training

All employees are required to have a level of SHE knowledge and awareness relevant to their role within the Company. Attendance at a suitable course(s) either internal or by arrangement with a suitable external training provider is arranged to enable the individual to discharge their responsibilities in a safe and responsible manner.

Specific training given to:

- Site management and supervision.
- Users of mobile elevating working platforms (MEWP's), all training is IPAF accredited
- Users of lifting equipment and fork lift trucks etc.
- Persons required to mount abrasive wheels.
- Those required to work to or control a specific Permit to Work.
- Persons who will be required to use any new plant or machinery or carry out any new process.
- Personnel using display screen equipment.
- Persons who erect, alter or dismantle Mobile Scaffold Towers; all training will be PASMA accredited.
- Persons required to work in or control access to hazardous atmospheres, confined spaces etc.
- Those having to carry out works in the railway environment.

“Going Live” training is carried out on all sites prior to the energisation of site electrical systems.

The majority of the Company’s workforce is technical and/or apprentice trained and safety is an integral part of their training programme.

All employees will receive thorough safety training to ensure that they comply with the requirements of their appropriate trade skill card.

All personnel including temporary workers and sub-contract companies receive suitable and adequate induction training at every workplace to ensure that they are made aware of the type of work to be undertaken, the risks associated with the work and the workplace, and the control measures that are in place to minimise the risks.

Safety/Tool box talks are carried out regularly on all sites to promote SHE issues and encourage employee participation in health, safety and welfare matters.

Management of sub contract companies

Monthly On-Site Sub contract SHE Assessments are carried out on all sites to monitor sub contract operations and performance. All sub contract companies are assessed on,

- Supervision
- PPE
- Risk Assessments & Method Statements
- Plant & Equipment
- Training
- CSCS
- Mobile Aluminium Scaffold Towers (MAST)
- Tool Box Talks
- SHE Adviser/Management visits
- Workplace Management/Housekeeping
- Work at Height
- Environmental management
- Sub-contracting Management

Regular Sub-Contractor SHE Seminars are also carried out to inform Sub-contractor senior management of SES SHE standards and initiative. This forum is also used to provide feedback sessions on lessons learned across the business, and to encourage discussion amongst our supply chain.

CDM 2015

As part of our obligations under the Construction (Design and Management) Regulations 2015, we look to reduce any risk associated with the design of the services on a project. This may be risks that are apparent will impact our workforce on site, or residual risks that will remain once the works are complete.

Each project has a fully populated risk register from the outset that is regularly reviewed and updated as the project progresses. In all instances, a residual risk register is also provided at the end of the project, identifying any risks that will remain associated with the installation and its maintenance.

Examples of our involvement with CDM under previous projects would include;

- Use of offsite prefabrication to reduce number of hours worked both on site and at height.
- BIM spatial co-ordination to evaluate all maintenance access requirements prior to construction, to ensure sufficient provisions has been made. This also includes witnessing of the maintenance processes to the Client team at handover.
- Specific technical advice relating to the selection of materials, location of services and provision of incoming services.
- Evaluation of services runs in relation to fire compartmentation and penetrations through the structure.
- CDM design obligations under both Design & Build contracts and as CDP items on traditional contracts.

Promotion of Wellbeing Initiatives

At SES, Safety is engrained into our culture, our standards & our behaviours, our safer together initiative reflects our beliefs that together Zero harm is achievable.

We utilise regular initiatives to drive these messages on site, with posters developed around toolbox talks and subject specific campaigns to ensure we engage with the workforce. Below are some examples of previous safety campaigns undertaken on our projects;



Approach to Risk

Under our Risk Management Policy, the risk register lists any risks that may affect the project, describing each risk, the required actions to avoid or mitigate the risk, and which party is responsible for carrying out each action.

At the outset of any contract period, SES populates the risk register with the risks identified in the contract data. This is then added to as the project progresses and further risks are identified, or reduced as risks are removed as they expire.

Under NEC3 contracts, the risk register incorporates any items issued as early warnings, and is used as the basis for the risk reduction meetings held. This enables all parties to;

- consider proposals that will reduce or avoid the impact of the registered risk
- seek solutions that will benefit all affected parties
- decide which party will be responsible for each agreed action
- decide if any risks can be removed from the Risk Register if they have now passed or been successfully avoided.

The use of a risk register and early warnings allows such risks to be identified and raised as early as possible, whilst also giving the earliest opportunity for mitigation measures to be planned and agreed upon in order to minimise any cost and time consequences.

SES undertake the population of the risk register at work winning stage, in order to generate the risks as the estimating and engineering management see them based upon the tender information. This risk register is then handed over to the operational team once the project is secured, and during the handover meeting is further revised and populated with any items arising out of the full review of the project by both teams.

The risk register is maintained throughout the project duration, and is reviewed as part of the monthly Contract Review Meeting with the regional management. This document forms the basis of discussion around any issues the project may be facing, the relationship with the wider team in terms of collaboration, and the commercial position of the account.

It is SES policy for the risk registers to be reviewed regularly, but also that they are used as a working document. This means that the risk register is kept as a constantly live document, added to in real time to ensure the maximum amount of time is afforded from the identification of a risk and the implementation of an agreed mitigation measure.

Calculation of risk

SES employ a standard method of calculation of risk, which is undertaken by the project team member with the greatest level of expertise in the category. For example, commercial or contractual risk is calculated by the project Quantity Surveyor, and reviewed by their line manager the Regional Commercial Manager.

The SES calculation score uses Probability on a scale of 1 to 5, and Impact, again on a scale of 1 to 5. Once the two figures are multiplied together, the final risk score is calculated. 1 to 8 is classified as low risk, 9 to 17 as medium risk, and 18 to 25 as high risk.

Risks to both time and cost are then established, and entered into the risk register, along with an Owner, mitigation measure and deadline for the implementation of the mitigation measure.

SES then undertake a second risk calculation based upon the mitigation measure, and finally track on a per line basis whether each risk has increased, decreased or remained the same during the period.

Successful implementation of mitigation measures

Through constant engagement with the wider project team and our own supply chain, we have been successful in mitigating risks across all of our projects, to a greater or lesser extent.

Some specific examples (beyond those shown in the example Risk Registers on the following pages) would be;

Project: Wood Wharf A2/A3 – A risk item was added regarding a specific subcontractor, identifying that they appeared to be suffering financial issues arising from overrunning and disputed projects elsewhere. A two layer mitigation plan was developed should this prove to cause detrimental to their performance on the project, to both ensure that their SES account was up to date and not a source of their financial difficulties, and also to put into place a strategy should their business fail.

Unfortunately, the subcontractor entered into liquidation and it was necessary to implement the mitigation measures, which involved SES directly employing their operatives via an Agency within 48 hours of their withdrawal from site.

The overall effect to the project was a loss of approximately 2 working days for 20 operatives, where this could have involved a cessation of works while the package was re-let for a period of 6 weeks on site.

Project: Gasholders London – A risk item was identified concerning the development of the Atrium smoke strategy design, as the main contractor had broken this package down and let it to multiple subcontractors individually. Following design meetings, it became apparent that while system control was the responsibility of SES, the motorised windows and doors were being supplied by different manufacturers with no expertise in the field.

The mitigation measures involved SES chairing a meeting with the Building Control Officer and the relevant parties, including the Stage 3 designers to confirm the activation strategy and free area requirements for the Atrium venting. This was carried out within two months of the potential non-compliance being identified, and in time for the design and installation to be modified on site.

The fire strategy was adjusted to incorporate battery back-up power to the automated doors on each Gasholder, providing additional venting and a corresponding free area to that at the top of the Atrium. It was also identified that the AOV/Glazing manufacturer was not expecting to provide battery back-up as per the design, and indeed that there was not sufficient space to provide such.

Due to the timing of the construction programme, it was possible to design this facility, install in sufficient time to have no impact to the progress of the main works and commission as part of the existing period allowance. This mitigation strategy minimised the amount of additional cost incurred by the main contractor and ensured that there was no detrimental impact to the contract programme.

Internal Risk Register for: Chiltern Academy

Version: 8
 Date: 28/09/2018
 Prepared by: Andy Bird
 Approved by:

18 - 25	High
9 - 17	Medium
1 - 8	Low



Item	Risk Description	Pre-mitigation					Notes / Action / Comment / Mitigation Plan	Owner	By When	Post-mitigation					Change in Period
		Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£				Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	
1.0 TOP 5 RISKS															
1.01	Prelim over run due to late power provision by statutory services provider	4	5	20	4 weeks	£ 50,000	Develop mitigation plan to allow for electrical systems completion and dead testing, ready for cascade of live power and live testing once available to prevent overrun.	Keith Hulme	19/10/2018	1	5	5	2 weeks	£ 20,000	Higher
1.02	Access for commissioning restricted by finishing trades & FF&E posing a H&S risk to carry out works caused by change to finishing sequence of works and MEWP removal	3	3	9	2 weeks	£ 5,000	Specialist access equipment to be brought to site by WCL/SES to carry out works	BT/RT	05/11/2018	2	3	6	0	£ 3,000	Same
1.03	Late utilities delaying the commencement of commissioning. Testing could be prolonged further than new programme allowance due to failure of equipment	4	4	16	4 weeks	£ 10,000	Constantly review all commissioning activities and progress wherever available as early as possible. Ensure that spares are available in the event of component failure to reduce down time.	Keith Hulme	22/10/18 onwards	3	2	6	2 weeks	£ 10,000	Same
1.04	Acoustic Issues with Plant operation once on site due to differing acoustic conditions from the FAT.	2	5	10	2 weeks	£ 5,000	Carry out acoustic tests to space to "sample" sound power levels in the installed location. Evaluate sound proofing options with MC should breakout sound exceed limits.	Keith Hulme	05/10/2018	2	2	4	1 week	£ 5,000	Same
2.0 SAFETY															
2.01	Inadequate task safety lighting provided by Subcontractors.	5	3	15	0	£ 2,000	The requirements for task safety lighting will be fully explained in the subcontractor selection process. This will also form part of the fortnightly reviews alongside any other SHE concerns. If continuously unacceptable SES will hire on their behalf and contra charge accordingly. Particularly during darker winter months. Risk reducing as power availability means access and task lighting available	Ryan Tranter/Barry Tierney	26th October 2018	1	2	2	0	£ 750	Lower
2.02	Dust extraction not being used by Subcontractors.	3	5	15	0	£ 3,000	The requirements for dust control will be fully explained in the subcontractor selection process. This will also form part of the fortnightly reviews alongside any other SHE concerns. If continuously unacceptable SES will hire on their behalf and contra charge accordingly. Dust generating works now restricted to ground floor only	Ryan Tranter/Barry Tierney	26th October 2018	1	2	2	0	£ 1,000	Lower
2.03	M+E trades working onsite whilst preceding trades such as cladding contractor is still working.	4	3	12	0	£ -	WCL to ensure exclusion zones are applied onsite to maintain a safe separation between these trades. SES trades must be educated to ensure they respect these zones. Risk reducing as workfaces reduce although closer coordination of trades becomes more important	WCL/Keith Hulme	26th October 2018	3	2	6	0	£ -	Higher
2.04	Working on roof floor surface wet is slippery and becomes exaggerated with Ice present	5	3	15	0	£ -	WCL to create safe walking routes with nylon/plywood walkway fewer material movements required and additional roof slip protection being installed	WCL/Keith Hulme	26th October 2018	1	1	1	0	£ -	Lower
2.05	Site Office Access staircase in darkness early AM & late PM risk of tripping	4	3	12	0	£ -	Additional Lighting required	WCL/Keith Hulme	26th October 2018	1	1	1	0	£ -	Same
2.06	Vertical Access of Plant Materials after Loading bay early removal	4	4	16	2 weeks	£ 4,000	Extend fork lift hire & use internal hoist or use motorised stair lift	WCL/Keith Hulme	5th November 2018	2	2	4	0	£ 1,000	Same
3.0 PRE-CONSTRUCTION / DESIGN															
3.04	Current design is unaffordable. Cost plan was created on a single corridor building however it is more like an elongated superblock which then has a number of internal rooms. Now 2 Corridors and 12 AHUs rather than 6. No adding a host of issues.	5	5	25	3 weeks	£ 300,000	CLOSED	Andy Bird/Keith Hulme/Matt Newman	CLOSED	1	1	4		£ -	Same

Item	Risk Description	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Notes / Action / Comment / Mitigation Plan	Owner	By When	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Change in Period
3-02	A number of design schedules are still outstanding and need to be received before final costings can be obtained	5	3	15	3 weeks	£ -	CLOSED	Keith Hulme	CLOSED	1	1	1		£ -	Same
3-03	Bruckl requirements (Heat recovery efficiencies) are in excess of the specified plant they were supposed to have been based upon. Revised plant may be required which may further impacting the loss.	5	3	15	1 week	£ 4,000	CLOSED	Keith Hulme/Matt Newman/Method (Consulting LLP)	CLOSED	2	3	6		£ -	Same
3-04	Change spec of roof insulation to Venturclad form PIB. Ensure Method change specification accordingly	3	3	9	2 week	£ -	CLOSED	Andy Bird/Keith Hulme/Matt Newman	CLOSED	1	1	1		£ -	Same
3-05	3nr VT circuits on current drawings, try to reduce to 2nr	3	3	9	2 week	£ -	CLOSED	Andy Bird/Keith Hulme/Matt Newman	CLOSED	1	1	1		£ -	Same
3-06	Additional special valves allowed at end of circuits that could duplicate others	3	3	9	2 week	£ 1,500	CLOSED but we will incur additional costs	Keith Hulme/Steve M/Method	CLOSED	1	1	1		£ 2,000	Same
3-07	Change from 500 x 500 downwards rectangular duct to Circular where practical space wise.	3	3	9	2 week	£ -	CLOSED	Keith Hulme/Steve M/Method	CLOSED	1	1	1		£ -	Same
3-08	System is overdesigned and safety margin exaggerated.	3	3	9	2 week	£ -	CLOSED	Keith Hulme/Steve M/Method	CLOSED	1	1	1		£ -	Same
3-09	Electrical Design issues raised by Stuart Moorhouse regarding circuitry and wiring arrangements	3	3	9	2 week	£ -	Comments being incorporated	Keith Hulme/Steve M/Method	CLOSED	2	2	4		£ -	Same
3-10	Kitchen Extract ductwork specification is outdated no alternative specification provided	3	3	9	2 week	£ -	CLOSED	Keith Hulme/Steve M/Method	CLOSED	1	1	1		£ -	Same
3-11	As at the 11th May 2018 Method are refusing to Produce 1:50 drgs and stick with 1:100 drgs.	4	4	16	1 week	£ -	CLOSED	Keith Hulme / Method	CLOSED	2	2	4		£ -	Same
3-12	Electrical Fault Study output required to determine Ze and incoming supplies	3	5	15	2 week	£ -	CLOSED	Keith Hulme / Method	CLOSED	2	2	4		£ -	Same
3-13	Erosion in margin due to issues with cost plan and design creep. Currently the revised forecast for the project is forecasting a circa £300k loss.	5	5	25	3 weeks	£ 300,000	CLOSED	Andy Bird/Keith Hulme/Matt Newman	CLOSED	1	1	1		£ -	Same
3-14	Quoted plant from YES does not meet with Bruckl requirements. New plant required may cost more further impacting the loss.	3	3	9	0	£ 10,000	CLOSED	Andy Bird/Keith Hulme/Matt Newman	CLOSED	1	1	1		£ -	Same
3-15	Revised lighting scheme from Thorn may still not be compliant.	3	3	9	0	£ -	CLOSED	Andy Bird/Keith	CLOSED	1	1	1		£ -	Same
3-16	NO Electrical resource agreed for Chiltern : Norwich site believe any assistance will be Procurement only.	3	4	12	2 weeks	£ -	CLOSED	Andy Bird	CLOSED	1	1	1		£ -	Same
3-17	58 RFIs still outstanding response.	3	3	9	2 weeks	£ -	CLOSED	Keith Hulme	CLOSED	2	2	4		£ -	Same
4.0 CONSTRUCTION / DELIVERY															
4.01	Subcontractors not providing sufficient labour to complete works in line with the agreed programme.	3	4	12	4 weeks	£ -	Subcontractors to be met weekly and key dates agreed to ensure focus on short term goals as well as overall project delivery strategy. Programme review with WCL weekly and recorded.	Ryan Tranter/Barry Tierney	On Going	2	2	4	0	£ -	same
4.02	Plant not being delivered in time to suit installation progress.	3	3	9	2 weeks	£ -	Plant to be procured inline with the procurement programme which gives float for all items to ensure they will be delivered in good time.	Keith Hulme/Matt Newman	On Going	1	3	3	0	£ -	same

Item	Risk Description	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Notes / Action / Comment / Mitigation Plan	Owner	By When	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Change in Period
4.03	Preceding trades running late and delaying our start to certain workfaces.	4	3	12	4 weeks	£ 10,000	We need to manage WCS to ensure they release workfaces on time and as a last resort manage a re-deployment of labour to move on other areas if necessary so as to ensure no time is lost. Regular progress meetings to take place to ensure issues can be minimised. Programme review with WCL weekly and recorded onwards.	Keith Hulme/Ryan Tranter/Barry Tierney	On Going	3	2	6	1 week	£ -	same
4.04	Trades Working out of sequence leading to abortive works and increasing difficulty factor	4	4	16	4 weeks	£ 10,000	Closer working relationship with WCL and increased use of Fieldview to coordinate works, ensure weekly reports and works lists are issued to subcontractors to maximise efficiency	Keith Hulme/Barry Tierney/Ryan Tranter	On Going	2	3	6	1 week	£ 5,000	same
4.05	Bruckl requirements (Heat recovery efficiencies) are in excess of the specified plant they were supposed to have been based upon. Revised plant may be required which may further impacting the loss.	5	3	15	4 weeks	£ 6,000	As at the 2nd July 2018 , we have been advised by Method that they have re-run the Bruckl Calculation and the PV requirement has increased introducing circa 17 extra panels As built BRUKL calculation being run by Method due to be issued mid Nov 2018	Keith Hulme/Matt Newman/Method (Consulting LLP)	12/11/2018	5	3	15	4 weeks	£ 6,000	higher
5.0 COMMERCIAL															
5.01	Rolling subcontractor account expectations become out of line with SES recoverable values.	3	4	12	1 week	£ 20,000	Twice monthly progress meetings to be held with commercial lead involved for account elements to discuss any additions and omissions. prevent domestic variations however we are going to incur costs due to domestic design errors	Matt Newman	Ongoing	2	2	4	1 week	£ 7,500	same
5.02	Scope gaps in subcontractor packages becoming apparent.	3	3	9	1 week	£ 20,000	All orders to be signed off in accordance with the delegated responsibilities procedure to ensure maximum checking.	Keith Hulme/Matt Newman	19/11/2018	2	2	4	1 week	£ 10,000	same
6.0 REPORTING & CONTRACT ADMINISTRATION															
6.01	Handover documentation not being available due to shortfall in staff availability through holidays and one long term illness.	3	3	9	4 weeks	£ 40,000	Independent commissioning engineer to be brought into the project on a part time basis to support the team until handover.	Keith Hulme/Matt Lowry	12/11/2018	2	2	4	0	£ 20,000	Same
7.0 OTHER															
7.01	Introduction of another DX System due to a Client change in the use of a teaching room to a second ICT suite.	4	4	16	3 weeks	£ 10,000	System design to be agreed with Client, provision to be made in pipework runs to facilitate the installation without a requirement to modify systems currently being installed. This is a definite requirement so current installation is to progress allowing sufficient space to undertake this one instructed.	Keith Hulme/Matt Newman	08/10/2018	3	3	9	2 weeks	£ 7,500	Lower

Internal Risk Register for: Barts Square

Version: 010
 Date: 20/02/2018
 Prepared by: G. Baron / M. Sedge
 Approved by: A. Oppido / M. Townner

18 - 25	High
9-17	Medium
1 - 8	Low

Item	Risk Description	Pre-mitigation					Notes / Action / Comment / Mitigation Plan	Owner	By When	Post-mitigation					Change in Period
		Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£				Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	
1.0 SAFETY															
1.01	Inadequate task lighting from SES sub-contractors to maintain acceptable task lights for site activities in the specific areas.	5	3	15	0	5,000	A memo issued to all sub-contractors reminding them of their contractual obligations and this will continue to be monitored. If task lighting is hired and issued by SES this charge will be levied against the sub-contractors account.	Elliott Tipper / Bernie McCool	Ongoing	2	3	6	0	0	Same
1.02	Dust extraction not used by all sub-contractors	5	2	10	0	2,500	This is to be monitored by the supervisors and if it is deemed necessary SES will hire the equipment and this cost will be levied against the sub-contractors account.	Elliott Tipper / Bernie McCool	Ongoing	4	2	8	0	500	Same
1.03	Incorrect use of access equipment when working at height i.e. podiums, mobile tower scaffold.	4	5	20	0	10,000	Due to sub-contractors not using the access equipment correctly and this being a regular non-compliance. To ensure SES are compliant to the guidelines, additional SES supervisor is employed and this is charged against the sub-contractors	Elliott Tipper / Bernie McCool	Ongoing	2	3	6	0	2,000	Same
1.04	Due to full bins the waste materials overflowing which are a risk of injury to the site operatives.	4	4	16	0	0	Either more waste clearance bins are required or more turnover of the bins are required and this does not cause an unnecessary risk to the site operatives.	Elliott Tipper / Bernie McCool	Ongoing	2	3	6			Same
2.0 CONSTRUCTION / DELIVERY															
2.01	SSC providing the necessary resource to complete the project to the agreed dates with Helical / SLW	4	5	20	4 weeks	10,000	Contingency to be added to forecast to allow SES to bring in additional labour if required on behalf of SSC. Notice to be served to SSC not performing to ensure that any costs can be recovered.	Matt Sedge	Ongoing	5	2	10	2 weeks	10,000	Same
2.02	Failure to meet the durations set out in the apartment matrix / revised programme	5	5	25	6 weeks	50,000	The sub-contractors are to resource the works correctly and SES to ensure the sub-contractors have the free-issued materials and information to build against. If they continue to fail, the sub-contractors directors are to be contacted for a formal meeting and notices issued. Regular and detailed monitoring to be conducted against the programme and BIM progress models.	Matt Sedge	On-Going	4	5	20	4 weeks	20,000	Same
2.03	The project team not ensuring the priority tasks are carried out which becomes a concurrent delay	4	5	20	4 weeks	10,000	Prioritise the works at the team brief every Friday morning (Flushing, Power On, Apartment Matrix works).	Matt Sedge	Weekly	3	4	12	2 weeks	2,000	Same
2.04	RFA's inc BWIC holes not carried out by the principal contractor in a timely manner	5	3	15	4 weeks	10,000	This is escalated to the building services manager at a risk reduction meeting and if still not actioned, a delay notice is issued.	Anthony Cameron / Kat Frost	On-Going	4	3	12	4 weeks	5,000	Same
2.05	Access and Egress on site which wastes a considerable amount of time and affects site productively on a fast-track project	4	4	16	6 weeks		Daily communication at the 4c meeting where diverted routes are corresponded to SES and supply chain. A suggestion to CCL of removing the hand scanner and have a swipe card only. Block E remains an access issue to commence with the apartment activities.	Anthony Cameron / Kat Frost	On-Going	4	4	16			Same
3.0 COMMERCIAL															
3.01	SES and Supply Chain accounts (rolling inc variations) at polar opposites and creates delivery issues on site.	4	5	20	4 weeks	50,000	The bi-weekly progress meetings held by the package managers, the project surveyor is to be invited to the commercial part of the meeting to ensure they have sufficient detail for the monthly subcontractor progress meeting. QS to ensure that the account is agreed on a rolling basis to prevent the accumulation of disputed variations and commercial differences.	Giles Baron	Bi-weekly & Monthly	4	4	16	2 weeks	10,000	Same
3.02	Non-recoverable costs due to project or tender technical errors	5	5	25	4 weeks	50,000	A lessons learnt list is to be created and provided to the business. The project team to maximise efficiency of installation to recoup additional costs via savings.	Giles Baron	31/03/2017	4	3	12	2 weeks	25,000	Same
3.03	Variations not agreed and therefore cost and value uncertainty and risk profile increasing.	5	4	20		75,000	A weekly VO meeting is required between the commercial leads of SES and CCL which moves the variations to agreed status in good time.	Giles Baron	On going	4	4	16		50,000	Same
4.0 REPORTING & CONTRACT ADMINISTRATION															
4.01	If key dependencies are not carried out on the date(s) required and SES do not notify the principal contractor	3	4	12	4-6 weeks	0	SES would not be adhering to the contract and these dates are reviewed against the baseline programme weekly.	Matt Sedge	Weekly	2	4	8	2-3 weeks	0	Same

Item	Risk Description	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Notes / Action / Comment / Mitigation Plan	Owner	By When	Probability (1:5)	Impact (1:5)	Total Prob x Imp	Time	£	Change in Period
4.02	If SES do not issue monthly progress reports to the client	3	4	12	0	50,000	This is a business protocol and basic project management principles and protects SES's position. An internal review is carried out monthly by senior management.	Matt Sedge	Monthly	2	4	8	0	5,000	Same
5.0 OTHER															
5.01	PRISM Defective Works On Site	5	4	20	4 weeks	25,000	As the project moves forward there may be snags / defects noticed with PRISM Install. Contingency needs to be added to Forecast to deal with any issues. Thorough inspections to be undertaken on delivery to ensure if an error is found it can be corrected for subsequent deliveries of modules.	Katherine Frost	On going	4	4	16		5,000	Same
5.02	Specialist Water Treatment Commissioning Company representing the client Helical Bar and their requirements for Tertiary Circuit Sampling of the chilled water systems within the apartments.	4	4	4		50,000	Methods for sampling has been agreed and is being carried out. Contingency to be added to cover any issue with future water quality	Sam Herbert	On going	4	4	16		10,000	Same

Sustainable Development

SES (Engineering Services) Limited has an excellent history in delivering projects to the BREEAM formal assessment methodology, and has its own in-house Building Physics Team. This team provides initial consultation and support for every tender that we return, to ensure that the right initial questions are asked and that we make best possible use of their expertise.

A list of BREEAM projects completed in London & South East in the last 12 months is shown below, along with their ratings;

Project	Rating	MEPH Value
Capella	Excellent	£23.7m
1 – 9 Seymour Street*	Outstanding	£10m
Project S2*	Outstanding	£13m
Barts Square Phase 1	Very Good	£18.6m
Gasholders London*	Very Good	£18.9m

*denotes full design & build by SES

We are able to produce models for thermal, compliance, daylight, energy and CFD using our team’s expertise and software such as IES, DesignBuilder, Hevacomp, EnergyPlus, Ecotect Analysis, FASP and NHER.

Example

On a recent student accommodation project the client’s team were keen to minimise the overheating risks on the project to ensure a comfortable environment was maintained for the students. On previous projects the client had experienced overheating in internal corridors due to unwanted heat gains from services distribution within the corridor ceiling voids. To mitigate this risk, during the early stages of the project, the client’s consultant proposed mechanical ventilation to the corridors for the concept scheme. This was a reasonable approach given the information available during the early stages. However, after the development of the project’s concept the ERP Regulations were introduced which resulted in the predicted costs of the proposed system increasing. This was due to the imposed performance requirements and the additional requirement for heat recovery on the corridor supply and extract system as a result of the bidirectional classification.

To overcome the increased costs SES Engineering Services’ building physics engineer worked closely with the client and the client’s consultant to establish the overheating criteria deemed acceptable to the client, as there is no industry guidance providing recommendations for corridor overheating. In addition, the team discussed the intended usage of each space to establish detailed internal gains and load profiles (including unwanted heat gains from services distribution within the corridor ceiling voids) to ensure the thermal model inputs were reflective of the intended scheme rather than using arbitrary values. This collaborative work allowed for extensive thermal comfort analysis, which was intended to reduce the corridor ventilation requirements, in order to offset the additional cost of the ERP Regulations. However, the final results surpassed initial expectations and rather than simply offset the additional costs we were able to omit the requirement for a mechanical corridor ventilation and to offer a significant cost-saving for the client whilst alleviating the overheating concerns.

Climate resilience and low environmental impact

At SES, we look to reduce environmental impact of our projects as much as possible. As mentioned elsewhere in this PQQ application, we employ the use of offsite prefabrication wherever we can. The benefits of this include safety (through changing the working environment to a factory floor), efficiency (by removing a large percentage of working at height) and also carbon footprint.

Our prefabrication facility enables us to use far less deliveries compared to a just in time site delivery model, giving us the ability to hold large stocks of the necessary materials in our facility and reducing the number of deliveries required.

Annually, Prism currently removes 100,000 hours of work off site, which provides a staggering reduction in the requirement for travel, transport, welfare provision and risk to operatives.

A specific example of this would be Scotland’s £1.35bn Queensferry Crossing, which marked the first bridge services project SES worked on. Our works included installing M&E within the bridge’s 110,000-tonne cable-stayed deck sections.

Each section was completed onshore before being transported by barge onto the River Forth then craned to connect between the bridge towers. This offsite engineering approach reduced the need for working at height and saved more than 25,000 worker-hours.

Innovation and best practice construction techniques

Our use of advanced technologies, such as BIM, whilst coupled with our Prefabrication offering enables us to provide innovation in the field of MEPH services. This is reflected in our commitment to new technology, for example becoming the first MEPH contractor to qualify for BIM Level 2.

We are constantly furthering our use of technology, from VR and AR to the use of Trimble Robotic Total Stations. We invest significantly in training our staff, undertaking R&D and furthering ourselves in the field of MEPH services through constant evolution.

SES has a commitment to employing best practice through our “Project Excellence” initiative. This initiative is designed to promote working to the best possible standard across all areas of the business. Through this, we drive an increase in excellence by the use of guidelines, training and project standards such as the example shown below.

VISUAL STANDARD
PLANT, VEHICLE AND PEDESTRIAN CO-ORDINATOR (PVPC)

KEY CONTROLS: The Project Lead must appoint a member of the SES Project Team who has sufficient knowledge and experience to **identify and manage the risks** associated with the plant and people interface. They must hold, as a minimum, the **CITB Site Management Safety Training Scheme (SMSTS)** and have a level of seniority which allows them to carry out their role without compromise.

- The PVPC must ensure a **safe system of work** is developed in accordance with the risks associated with vehicle, plant and equipment use and that it is **communicated** in the management plan.
- The Project Lead or PVPC must **review and approve** any supply chain’s safe systems of work for the use of vehicles, plant and equipment.
- Enter all plant on site in the **Plant Register**. **Keep** the register **up-to-date** on a weekly basis with new, replacement and off-hired equipment.
- Plant operators must follow the appropriate **isolation procedures** when their plant is not in use to prevent unauthorised operation. This must also be **recorded in risk assessments**.
- Perform **plant maintenance** according to the manufacturer’s instructions.
- Ensure we **minimise environmental risk** (i.e. noise and emissions) through regular servicing, and the use of alps trays or plant tipples.

TRAFFIC MANAGEMENT PLAN
 PEOPLE PLANT

SES PROJECT STANDARD:

- All vehicles, plant and equipment must be controlled and operated by competent operators who have a valid Fit-for-Work Medical.
- Project Leads or PVPC’s must ensure that inexperienced operatives (less than 2 years’ experience with a RED CPC’s Competency Card) are interviewed and have direct supervision.
- Persons younger than 18 years old may not use vehicles, plant and equipment, with the exception of powered hand tools while under direct supervision.

WE’RE SAFER TOGETHER ZERO HARM

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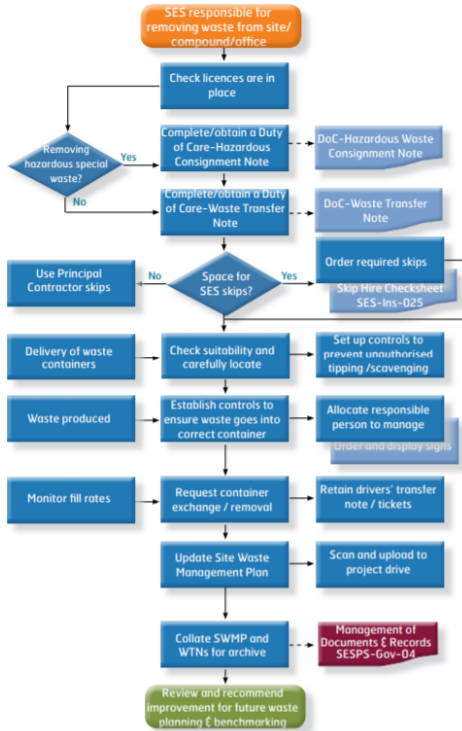
Our Operating Framework provides a clear methodology on best practice and enables us to deliver consistent quality. This includes areas such as waste management and supply chain management, extracts of which can be seen below;

SESPS-Ins-04 Management of Waste

- You must:**
- Comply with the Principal Contractor's (PC) Waste Policy and Rules
 - Complete, or obtain from the supply chain, the appropriate Duty of Care documents for the waste stream, where this is SES's responsibility
 - Always segregate hazardous waste on site
 - Ensure Waste Transfer Notes/Consignment Notes are correctly completed and retained for at least three years

- Additional information:**
- Waste Transfers**
- Individual Duty of Care: Waste transfer notes for every skip/ load must be obtained. The driver normally issues the note as he collects the load (Waste Carrier). As the waste producer, SES will have sections of the note to complete. SES must ensure that each note is fully completed and signed – failure to fully complete & sign each Duty of care waste transfer note could result in an environmental charge/line being raised against SES
 - SES-Ins-595-51 Duty of Care - Waste Transfer Note [Toolbox Talk](#)
 - SES sub-contractors removing waste from site fall under the same legislation and must provide SES with a completed copy of a Duty of Care waste transfer note if they are moving waste from site under their own arrangements
 - Removal of any Hazardous waste must be accompanied by a Duty of care "Consignment Note" rather than a waste transfer note. Consignment notes must also be completed and signed by both the waste producer and the waste carrier
 - Scotland only: Duty of Care Consignment Note to be purchased from [SEPA](#). [Scottish Government Guidance on managing Special \(Hazardous\) Waste](#)
 - Removing materials between sites may not require a waste transfer note – An exemption notice may be appropriate – contact the SHE department for further guidance

- Useful Links**
- www.gov.uk/government/collections/waste-exemptions-using-waste
 - www.clair.co.uk



Accountabilities

The **Project Manager** is accountable for:

- Completing Site Waste Records monthly
- Nominating a competent Environmental Co-ordinator for the project and establishing clear responsibilities
- Ensuring full compliance with the conditions set out in the contract or by the PC/Client

The **Project Environmental Co-ordinator** is accountable for:

- Checking all those removing waste from the project have a valid Waste Carriers Licence and where applicable, Waste Disposal Site Licence
- Completing or obtaining from the supply chain the appropriate Duty of Care document(s) for the waste stream and checking they have been fully completed
- Managing waste container ordering (segregating waste wherever possible) and exchange / collection as cost effectively as possible
- Checking that waste containers are in good condition and waste cannot escape
- Stopping waste being scavenged by people or wildlife and preventing unauthorised / inappropriate tipping
- Updating the SWMP where applicable
- Collating and uploading Waste Transfer Notes / Consignment Notes to project drive for archiving
- Liaising with and providing information and updates as required to the SHE Department

Supporting documentation:

- [SES-Ins-595-51 Duty of Care Waste Transfer Note Toolbox Talk](#)
- [SES-Ins-025 Skip Hire Check Sheet](#)
- [SES-Ins-300 Disposal of Redundant Surplus Ferrous and Non-Ferrous Materials](#)
- [SES-Ins-024 Site Waste Management Plan](#)
- [SES-Ins-023 Site Waste Management Plan Checklist](#)

SES Professional Standard SESPS-Ins-04 Management of Waste

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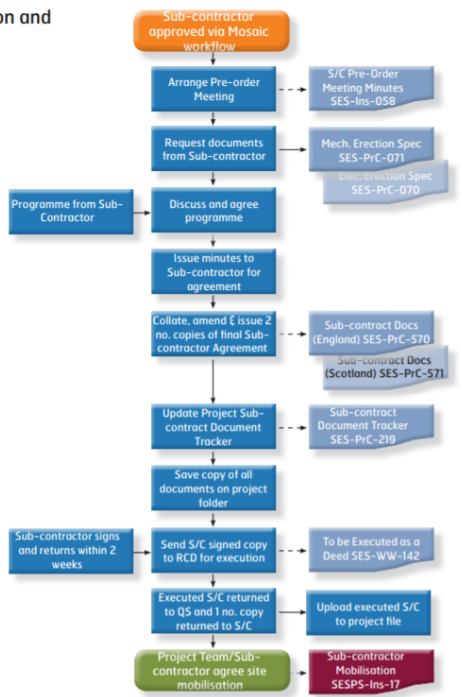
Revision 1.0 October 2017

SESPS-PrC-27 Sub-contractor Selection and Appointment

- You must:**
- Check sub-contractors are approved on the Mosaic database
 - Establish the competence and capability of the sub-sub-contractor to carry out and complete with works prior to appointment
 - Check that the sub-contractors with design responsibility have sufficient capability to meet the requirement of the project. Liaise with the Engineering Managers where necessary
 - Instigate further checks and / or controls if the sub-contractor is:
 - * Critical to the project
 - * Showing concerns over financial stability
 - * Undertaking a high proportion of their turnover with SES
 - * Unknown to SES/taking on a new type of work
 - Identify and approve the materials being installed as part of the sub-contract package
 - Agree the final sub-contractor selection with the Operations Director/Manager
 - Ensure that the materials being installed as part of the sub-contract package are identified and approved

- Additional information:**
- No payments will be made if there is no Commencement Notice
 - No payments will be made if there is no signed Sub-contract
 - Quotes must not be included in the Sub-contract

- Documents to be requested from Sub-contractor:**
- Fully quantified Schedule of Rates
 - Insurances
 - RAMS
 - Evidence of Health and Safety competence
 - Quality Plan



Accountabilities

The **Pre-construction Leader** is accountable for:

- Leading the process of assessing the suitability of the proposed sub-contractor at the pre-employment meeting and if required, ensuring further checks are completed
- Ensuring that a schedule of materials being installed by the sub-contractor is identified and approved
- Ensuring the appropriate personnel (SES and Sub-contractor) attend the pre-employment meeting
- Ensuring there is a clear record of the Pre-Order Meeting and ensuring minutes are issued for agreement by the sub-contractor

The **Managing Surveyor** is accountable for:

- Analysing and comparing tender returns in detail to highlight pricing anomalies, specification qualifications or changes
- Assessing evidence of BIM competence (for sub-contractors with design responsibility)
- Negotiating resolution to non-conforming bids or agreeing a dispensation with the Pre-construction Leader and where applicable, the customer and/or designers
- Ensuring that the sub-contract tracking document is always maintained
- Ensuring no amendments are made to SES TECs without Regional Commercial Director approval
- Ensuring a quantified Schedule of Rates is included in the Sub-contract Agreement
- Ensuring return receipt of signed sub-contract documents

The **Engineering Manager** is accountable for:

- Ensuring sub-contractor design is compliant with SES scope and is not over specified, where they have design responsibility

The **National Quality and Compliance Manager and Regional Gas Safe Representative** are accountable for:

- Authorising the appointment of specialist sub-contractors for installation, inspection and testing and making live services

SES Professional Standard SESPS-PrC-27 Sub-contractor Selection and Appointment

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Revision 2.0 April 2018



Project:	Barts Square Phase 3	Duration:	85 weeks
Client:	Helical Bar/McLaren Construction	MEPH Services Value:	£13m
Nature of Works:	Residential development within Central London	Contract:	JCT D&B 2011
Extent of Works:	Full MEPH Shell & Core and Fit-out installation	Reference:	Neil Smith Project Director McLaren Construction Neil.smith@mclarengroup.com

High Standards

SES uses an Operating Framework as the basis for all aspects of our business. This best practice system ensures that the correct oversight, quality control and management are applied to everything we do.

The Operating Framework provides the rules, guidelines and information required to ensure that we push for project excellence and continue to maintain our quality systems certification.

This project was no exception to that with all internal sign offs undertaken and continuous improvement being implemented from the work winning stage through to Smart Landings. Smart Landings is the SES system whereby the completion of the project is planned at the outset, including commissioning methodology, resources and handover planning to ensure that a project starts the best possible way.

Regular Engineering and Design audits were carried out by both our Engineering Management department, but also the National Compliance Managers to ensure that the project was delivered to an exceptionally high standard.

During construction, the use of hold points and inspections has been employed to check off the installation at each stage, and to ensure that activities such as void closures are not undertaken without a fully witnessed sign off being carried out.

All testing is witnessed both internally and externally, and signed test packs provided at each stage to provide the confidence to continue towards final system testing.

Programme Management

SES utilise a fully staffed planning department, producing weekly progress droplines, identifying any areas of risk or slippage on a weekly basis and providing the ability to re-sequence or adjust labour levels to suit.

SES uses a combination of labour loaded programming and milestone planning to monitor achievement from one week to the next, and this allows robust and accurate reporting to be generated. In addition, specialist subcontractor elements are similarly labour loaded, providing a means of tracking subcontractor performance beyond progress mark ups.

Wherever possible, we look to de-risk programme activities and reduce the chance of outside influences on the programme by offsite storage of materials for call off and prefabrication.

Similarly, we employ weekly meetings with all subcontractors to monitor their progress, daily co-ordination meetings at the start of each day, and regular meetings with the main contractor to coordinate and discuss progress on site. Each Thursday, a two week look ahead is generated from the construction programme to provide focus on work faces and material and plant delivery requirements.

The project is currently achieving the construction programme, with power on being achieved on Friday 29th March 2019.

Value Management

We look to maximise value on all of our projects, and achieve this through seeking the highest possible efficiency in our installation methodology. Similarly, we look to offer value engineering through alternate selections when practicable, but understand that in some instances the Client has an incumbent supply chain.

Any value engineering offerings are provided with a full equivalent analysis by one of our Engineering Managers, which is then offered to the Client Design Team for consideration. We undertake the same technical submittal sign off process for a VE offering as we would for any other approval process, only proceeding once all parties provide Status A, and sign off of any samples or benchmarking has been completed.

With this project, we were able to offer value engineering based around alternative luminaires, rationalising of the BMS monitoring and alternative product selections on the access control system. These were offered and were subsumed within SES' revised contract sum at the total value of £100k in savings. These revisions had no impact on overall technical performance of the systems.

Health, Safety & Wellbeing Performance

SES have an exceptional AFR rate of 0.06, which is as a result of our industry leading standards in the areas of health, safety & wellbeing. This is further assisted through the use of communication strategies such as our targeted safety posters, our drive on wellbeing through the provision of mental health first aiders and our ongoing Zero Harm safety campaign.

For this project, all SHE procedures were observed, including the use of our Stop/Go cards and mobile phone application to enable our workforce to directly report issues. A dedicated SHE notice board is located outside of the project offices, using a colour coded daily permit system for each subcontractor so that compliance can be checked at a glance.

Constant reviews and Visiting Manager's Reports are undertaken to provide scrutiny of conditions on site, and H&S workshops were undertaken each week.

Similarly, a health & safety action group on the site meets at regular intervals to discuss safety on site and to explore ways of further promoting increased standards in this respect.

Environmental & Sustainability Performance

SES is committed to recycling and reducing the amount of waste that goes to landfill. With this in mind, a recycling drive has been undertaken on site, with recycling bins provided in the site office, and waste from site being sorted prior to removal.

The use of offsite prefabrication for pipework sections assisted in the reduction in waste materials from installation activities, and reduced the carbon footprint of the build by reducing the number of deliveries required on a daily basis.

Similarly, operatives are encouraged to use public transport for travel to and from site, and a local supply chain was utilised to further reduce the total distance of travel for the workforce.

Working Under a Principal Contractor

As sub-contractors, SES is extensively experienced in working under other companies in the role of Principal Contractor. Usually, this role is fulfilled by SES only by exception, and as such our team were well placed to interface with McLaren. By attending regular co-ordination meetings and encouraging an atmosphere of team work, it helped to develop an atmosphere of trust and mutual respect.

Both teams work together well, and through open communication a number of issues were identified early on in the project and resolved satisfactorily. Key to this was engagement between both companies at all levels, ensuring ongoing contact between both hierarchies and the delivery of consistent messages across the project.

Similarly, a robust and detailed reporting process is employed to ensure that progress is accurately recorded, and the correct level of formality is employed with regard to contractual mechanisms such as Site Instructions, Requests for Information and other such correspondence.

This ensures that the project remains on a professional footing whilst interpersonal relationships develop and mutual understanding is built.

Issues of Working in a High Profile Environment

SES has internal policies regarding brand, social media and professionalism. For this project, all staff were briefed at the outset on the appropriate use of forms of communication, and on our “rules of engagement” external to the project team.

Whilst they were working for SES, the team was also briefed on following the site rules and adhering to general good practice such as removing safety equipment prior to leaving each day. Similarly, toolbox talks were undertaken regarding behaviours away from site, use of smoking areas rather than standing outside site, and general conduct.

It is very important to us as a business that our staff, operatives and subcontractors understand that they are not only representing SES, but also the Main Contractor and the Client on each project as well. We would expect our teams to conduct themselves in the same exemplary manner whether the project was publicly visible or not.

The Barts Square project is in a highly visible location, and sits closely within the surrounding buildings including a popular historical church. As a result, specific project briefs were given to all staff and operatives, and we worked with McLaren to ensure that the access and egress from site has the minimum impact on the surrounding buildings.



Project:	Gasholders London	Duration:	October 2015 to January 2018
Client:	King's Cross Central Limited Partnership	MEPH Services Value:	£18.5m
Nature of Works:	Combined Subcontracted and Self Delivered Works	Contract:	JCT 98 with Design
Extent of Works:	Full Shell & Core and Fit out MEPH Works	Reference:	Bradley Mackay MEP Services Manager Argent LLP Bradley.mackay@kingscross.co.uk

For this project, SES were required to take a developed Stage 3 design which had been produced by Hoare Lea, and undertake the full Stage 4 design with full and retrospective design responsibility. The project itself consisted of the new build of 3 circular buildings, containing 145 high end luxury apartments, with numerous common area amenities and a shared Basement.

Each building was of a different height, diameter and layout, but all three were interconnected and served via the same infrastructure. As well as the technical aspects of the project, it was also required that as much prefabrication as possible was introduced, including MEP cupboards, risers and lateral distribution modules.

SES worked with the design team to develop a collaborative solution to the MEPH installation within the buildings, producing a federated model which allowed not only the spatial co-ordination of services, but the production of builders' work and prefabrication production drawings. This was a key requirement for the co-ordination of ceiling heights, services voids, fire compartmentation and also to enable the co-ordination of fixings and supports for the various finishes.

This necessitated close working with the teams from Wilkinson Eyre, Hoare Lea and Arup to ensure that the design progressed in a manner that delivered the best possible solution for the Client, whilst at the same time providing SES the ability to develop prefabricated solutions for as much of the infrastructure installation as possible. For example, the services cupboards were designed and built using prefabrication, but had to be designed to work with high end joinery surrounds and doors to be fitted later on site.

In order to facilitate teamwork within the design team, design workshops were held on a weekly basis, with additional specialist workshops held supplementary to this. Two methods of working were used, the first being BIM modelling and document transmittal via the Conject system which allowed for formal sign offs of design changes in a tracked and efficient manner.

The other methodology employed was the use of mark-ups and design meetings with the Architectural team to sketch out solutions regarding the incorporation of various joinery elements and finishes. These sketches were then countersigned at the end of each workshop, copies taken and then digitised and entered into the model post-meeting. This was felt to be the correct balance of formal technical design production and creative input with the Architects.

It was further necessary to manage the formal sign off from all parties as the design progressed. Camden Building Control and London Fire Brigade were engaged early on in the process to ensure both the Fire Strategy, Smoke Ventilation Strategy and the resultant CDP packages were aligned and in accordance with both Building Regulations and LFB's requirements.

Value for the Employer was added throughout the design stage by the incorporation of changes to Apartment layouts at almost no cost. As the marketing and market testing of the apartment layouts was ongoing during the design phase, it was possible to incorporate changes to the design quickly and effectively.

In some units, ceiling heights and layouts were adjusted, and the resultant changes to the BIM model were picked up in time to incorporate into the construction programme without incurring delays.

SES produced a design programme based around the construction programme, which meant that the Client had visibility at all times of the final design cut off dates for each section of the buildings. This approach meant that any required changes could be prioritised and design change undertaken ahead of the programme of works to minimise increased cost.

In order to ensure quality and accuracy in the design work undertaken by our subcontractors, SES use a system of “Critical Friends” to provide expert validation of subcontractor designed packages. This consists of leading consultants in their fields kept on retainer to undertake full detailed evaluation of CDP packages, in order to provide an independent and informed view. This internal checking system is carried out prior to any elements being offered up for approval externally.

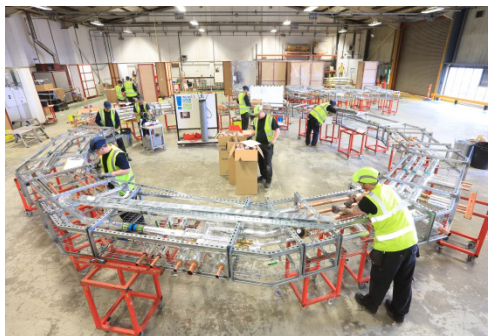
Prefabrication

SES undertook the installation of 270 services cupboards, 196 atrium modules and 6 full risers with its own in-house prefabrication facility, Prism.

The risers were constructed in modules of 4 floors each, complete with flooring and handrails and delivered to site for installation by tower crane. This meant that a full 12 floor riser could be installed over the course of a weekend, with no disruption to the regular operation of the site and greatly reduced exposure to risks such as falls from height typically associated with services installations within risers.

The Atrium modules (shown below) were produced at waist level in a factory environment, reducing the use of podiums down to the operation to bolt them together on site. This meant that a high level of quality control and inspection could be employed due to the working level of their assembly.

Each floor’s modules were assembled, checked, tested and then protected and shipped to site with unique references. The installation drawings were then used on site to ensure that every unique module was installed in the correct location, meaning that every valve set aligned perfectly with the access hatch that would eventually be installed outside each apartment front door.



The prefabrication approach also meant that SES was able to fully consider the thermal expansion of the LTHW system and undertake design accordingly. Each floor’s modules contained rolling brackets for lateral expansion, fixed point anchoring at the midpoint, and flexible connections at the riser and DPCV assemblies at the end of line.

Samples, Benchmarks and Mock Ups

SES undertook a full regime of samples, benchmarks and mock ups, whilst also observing rigorous Factory and Site Acceptance tests of all major plant.

Every product installed within the buildings was offered up for sample sign off by both the Architect and the Client, and the first instance of every installation activity was offered as a benchmark to the Consultant. Joint

monthly inspections of the installation were undertaken with all parties, and the resultant Engineer's Survey Reports were closed out within the month that they were issued.

Mock Ups were undertaken for module assemblies and cupboards, with factory inspections regularly taking place at the Prism facility.

Factory and Site Acceptance Tests were carried out for items of plant such as the Generator, Main Panels and AHUs amongst others.

Value Management

During the design phase, SES offered a number of value engineering options to the Client team, and provided technical reports demonstrating where any changes would be made from the original Employer's Requirements.

All plant and equipment was evaluated by our Engineering Management team, in co-ordination with our Building Physics department to ensure that the required aspirations for BREEAM, amongst others, were achieved through correct selections.

SES also undertook the design and verification of other factors such as solar gains and overall building energy performance throughout the project, including calculations around the provision of manifestations to external glazing (demonstrated as unnecessary), amongst others.

During the apartment modelling, SES undertook the relevant performance calculations regarding Fan Coil Units and Underfloor Heating. This was necessary due to significant redesign of some apartment layouts to suit the perceived requirements of the housing market at the time.

Some apartment types were modified to change the quantity and placement of the cooling systems around architectural finishes, and SES were able to fully support this and demonstrate revised quantities and selections in time to incorporate the changes into the build.

Similarly the design and selection of the Heat Interface Units within the apartments enabled us to select the correct models for the apartment types based upon size and instantaneous heat requirements. In all, four different types of HIU were used in differing configurations to tailor the plant specifically to the requirements of the Project.

Summary

In summary, the collaborative approach to design management whilst maintaining rigorous scrutiny enabled SES to deliver an exceptionally complex project to the Employer's Requirements and to achieve the required BREEAM rating.

This approach meant that excellent communications were maintained throughout the project, and that sufficient flexibility was retained to enable us to adapt to changes made as a result of property market influences during the construction of the project.



Project:	Project S2	Duration:	June 2016 to December 2018
Client:	King's Cross Central Limited Partnership	MEPH Services	
Nature of Works:	Combined Subcontracted and Self Delivered Works	Value:	£12.5m
Extent of Works:	Full Shell & Core MEPH Works	Contract:	JCT 98 with Design
		Reference:	Emmett Frawley Project Manager Midgard Ltd Emmett.frawley@midgard.ltd.uk

For this project, SES undertook the full design & build of the Landlord's MEPH services, with provision for future tenant fit out on each of the floors.

This included a District LTHW system and localised Chillers serving the CHW system, whilst incorporating as much offsite prefabrication as was feasible.

SES undertook the design based upon Stage 3 information, and developed a full proposal incorporating interface arrangements with the future Tenant requirements for both the office floor plates and the 3 retail spaces on the ground floor.

The design solution for the retail spaces incorporated;

- Individual PHX units at high level for LTHW provision
- Electrical supplies via local isolators
- BMS and Fire Alarm interfaces
- Provision of sprinkler connections for future use

The design for the office spaces incorporated LTHW and CHW bypass arrangements and future connection valve arrangements. These arrangements were provided as part of the prefabricated risers and contained the required commissioning sets and valve assemblies to simulate the Tenant load requirements to allow for accurate measurement and sign off of system performance.

Further interfaces were provided in the form of ductwork connections emanating from the cores at each floor level, distribution boards served by Rising Busbar, and localised HIUs to provide HWS for the Tenant fit outs.

Additionally, extract ductwork was provided within two risers for future use kitchen fit outs by the office tenant, along with two gas risers and the related pipework.

Challenges

Predominantly the challenges faced on this project were related to the prefabrication of the risers themselves, and the incorporation of the support steelwork required to make prefabrication feasible. S2 had a sufficient number of risers available, and it was necessary to undertake detailed BIM co-ordination to ensure that the framework was co-ordinated with door locations and services exits, whilst at the same time maintaining a layout of services that allowed suitable access for future maintenance.

Further challenges lay in the window of opportunity to make use of the ground floor slab soft spot, which was to be open for a brief period of time and necessitated an accelerated programme to deliver the plant and prefabricated pump modules at an early enough point in the programme that the soft spot could be filled in.

This meant that deliveries had to be planned and front loaded, and a basement logistics plan drawn up that saw the majority of the plant and equipment moved on to site far in advance of its eventual installation. These materials were then transited through the basement as areas became available and finally located.

Due to the nature of prefabrication works taking place away from site, an inspection rota was created to ensure that one of the project team was making quality inspections in the prefabrication facility. This included the witnessing of internal tests, approval of the wrapping and protection of finished modules, and the approval of QA prior to shipping to site.

It was critical to SES that the pipework and ductwork installed to the pre-fabricated modules were adequately protected from the ingress of dust and dirt during storage and transit. It was then also necessary to introduce quality checks on site during the craning of the modules to ensure that the end caps were removed during the lifting process to prevent them being trapped as ends of modules were lined up with each other.

Following craning and installation, tightening up was undertaken followed by air testing to ensure the integrity of the services within the modules. This also enabled the checking for any components that may have been damaged in transit or during the lifting operation itself.

Interfaces

The system interfaces were not designed in isolation, but with the creation of draft floor layouts for the office floors based upon the riser exit points. This enabled the BIM team to check that valve placements and future tenant connections would have sufficient space, and that there would be no future clashing with steelwork or building structure once installed.

Similarly, checks were made to ensure that any future valve assemblies would be in accessible locations that future maintenance activities such as filter checks were possible, and physical demonstrations took place to the Client team.

Utilising BIM modelling, it was possible to demonstrate via the model that space had been provisioned for future tenant installations such as extract ductwork from the retail units, including across the roof to vent to the outside. This was necessary due to Level 12 containing a number of large plant items and the smoke extract system fans, and to ensure that there was still sufficient route through this area for two future runs of ductwork.

Commissioning processes

The commissioning process was undertaken in line with the Smart Landings process developed for the project, which is the SES operating framework process for giving full consideration and written planning to the close out of a project from the very outset.

The landlord's systems were witnessed to all parties as the works progressed, with individual pressure tests on every section of pipework being conducted prior to partial (and later full) system tests.

A full package of ISTs was issued in advance of every test, with expected performance and design parameters, method statements and red line record drawings provided.

The test themselves were conducted in line with best practice, and were witnessed and signed off by third parties throughout.

The use of valve sets enabled SES to demonstrate that the LTHW and CHW systems met the design, and rigorous testing similarly demonstrated the performance of the fans, FCUs, AHUs and ductwork of the air systems.

The incoming Tenant's professional team were invited to witness as much of this landlord testing as they required in order to engender a collaborative approach and to provide confidence in the systems that were being inherited.

Closed water system quality

During the construction phase of the project the original main contractor, Carillion, went into liquidation. As a result of this, the building stood empty for some time and with the MEPH services isolated. This included the

closed water systems, which had been undergoing dynamic flushing at the time. With no access to the building, it was inevitable that some damage would be incurred to the water systems.

Upon reengagement through the new Main Contractor, Midgard, SES undertook extensive examinations in concert with both the specialist manufacturers, subcontractors and BSRIA.

SES removed some sections of pipework from both systems and BSRIA undertook laboratory analysis, concluding that while some biofilms were present, an enhanced flushing process would be sufficient to rectify the microbiological issues.

It was also identified however that some parts of the water systems would need replacing due to expansion as a result of lack of circulation and trace heating power during a cold spell.

It was determined that draining down and undertaking a rapid replacement of the affected sections of the system was the most effective means of undertaking this.

In consultation with Chesterfield, a plan was developed for the replacement of these sections of the system and the controlled water treatment & monitoring to resume flushing operations. This was undertaken as additionally instructed works, and through stringent controls on the cleaning of replacement parts prior to introduction and close quality control, the systems were restored and pressure testing undertaken.

A new filling, flushing and monitoring regime was instigated, and the water quality was brought back to acceptable standards culminating in repeated satisfactory laboratory samples. Matching samples were taken regularly from multiple points of both systems by SES, Kings Cross Estates and Chesterfield to ensure that the highest level of scrutiny was applied. The individual trend logs and water treatment log book were reviewed in bi-monthly meetings of all parties, including the physical inspection of installation works on site and the water treatment process.

During this period, the incoming tenant team were also included and provided with copies of all results in order to ensure transparency for all parties.