

Scottish Property Advisory Group Building Design and Construction

Report on NHSScotland Construction Quality Matters

A learning and development review for NHS Scotland staff involved in procuring, project managing, and commissioning construction projects

V 2.0 October 2022



DOCUMENT CONTROL SHEET:

Key Information:

Title:	Construction Quality Matters
Date First Published/Issued:	07 December 2020
Date Effective From:	07 December 2020
Version/Issue Number:	Version 2 – October 2022
Document Type:	BDaC Review and Reference Report
Document Status:	Draft version agreed – V1.1 agreed at BDaC 23 rd June 2022
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File Name:	SPAG BDaC - Construction Quality Matters

Revision History:

Version:	Date:	Summary of Changes:	Name:	Changes Marked:
Draft V1	11/06/2020			
Draft V2	13/07/2020	General update reflecting feedback to draft.	JD	
Draft V3	20/08/2020	General update reflecting BDaC feedback	JD	
Draft V4	30/09/2020	Updates reflecting BDaC feedback	JD	
Draft V5	19/10/2020	Minor changes / corrections	JD	
V1	04/12/2020	Sub-title and audience note added to Introduction. NHS assurance diagram updated.	JD	
V2	08/06/2022	Updates to include reference to North of Scotland Facilities and Capital Planning Group (NoSF&CPG) document in response to Prof. Cole reports. Updates reflect development of NHSS Assure. Updates to SFT CQIC initiative.	JD	

Approvals: This document requires the following signed approvals.

Name:	Title	Date:	Version:

Distribution: This document has been distributed to:

Name:	Title/SBU:	Date of Issue:	Version:

Linked Documentation:

Document Title:	Document File Path:

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1 Executive Summary

A focus has been placed on construction quality in the light of some recent high profile public building issues. A range of recent reports demonstrate that challenges around quality are not restricted to any one particular sector. These also illustrate a commonality in the root causes behind some of the issues identified.

Some early responses have been to increase the level of site inspections and seek ways to ensure building contractors are working to higher standards. However, as further scrutiny has been undertaken, it is clear that many failures stem from decisions, actions and shortcomings from much earlier in the process.

This document sets out the background, recent responses, health-specific issues and wider relevant factors associated with achieving quality. Such is the range of influences on quality that a change in priorities, culture, resourcing and contractual arrangements would be required to address all of these. However, the diagram below summarises some of the key areas identified in compiling this report, as representing threats to quality and the most effective ways to address these.

Figure 1: Risks to the project quality can be outweighed by appropriate client led mitigation



A. At the outset of the development process all of the key decisions lie in the hands of the client. With careful consideration, the client is in the position to take all necessary steps to ensure the end result meets all of its requirements and delivers a sound long-term investment.

Ironically at the early stages, when the client has the greatest influence, projects can be most challenged to secure appropriate resource and attention.

A recurring cause of failure is the lack of appropriate resource at the early stages. Client leaders must ensure that projects are led by individuals and teams who are focussed on its long term objectives, and are suitably resourced to put in place all of the mitigations required to offset the risks to quality.

In health projects it is particularly important that key stakeholders, including clinicians, end users and infection control experts, are involved consistently and throughout the process from the outset. Organisations need to enable this by ensuring that the workload of key stakeholders is balanced to create sufficient capacity.

It is clear that change is required to prevent the repeat of recent building failures. In response to calls for improvement a series of initiatives are in place to support clients to address the key issues. These include improving documentation, quality assurance and stakeholder engagement and are covered in Section 4 of this report.

However, long-term change requires a shift in culture to put quality at the centre of project development, irrespective of the contractual arrangement or procurement route. A client-side focus on quality-led design, procurement and delivery of projects is a key step on that journey. If these were achieved, the tools and approaches outlined in this document would deliver significant improvements in quality.

A series of points are highlighted throughout the document. These are collated in Section 7 and are offered for further consideration by the Scottish Property Advisory Group (SPAG).

2 Introduction

This report provides a high-level review of key documents and information in public circulation which are relevant to NHS Boards in respect of quality issues related to the design, development and construction of facilities.

In 2019 the Scottish Property Advisory Group (SPAG) created a sub-group to consider matters of building design and construction. This report outlines the key points of consensus reached by members of the SPAG Building Design and Construction (BDaC) sub-group. This group has representatives of each of the three NHS Scotland regions, and Health Facilities Scotland.

Purpose and Scope

This document has been developed to collate the key messages from various recent reports and highlight the overriding findings and recommendations alongside some other NHS-specific issues. It is not a substitute for review of the individual detailed reports.

This document has been developed specifically for the use of staff within NHS Scotland involved in procuring, project managing, and commissioning construction projects. The information is compiled solely as a learning and development review.

Documents which are referred to in the report have hyperlinks for easy access. The web addresses are also noted in Section 8. The key source documents referred to are:

- Edinburgh Schools Report (February 2017) link to document [here](#) (a):
- DG One Report (April 2018) link to document [here](#) (b):
- Grenfell Tower Phase 1 Report (October 2019) link to document [here](#) (c)
- Lessons Learned from Dumfries North West Community Campus (Dec 2019); linked [here](#) (d).
- Royal Hospital for Children and Young People: independent assessment of governance arrangements (Sept 2019)*, link to document [here](#) (e), and Royal Hospital for Children and Young People and Department of Clinical Neurosciences: review of water, ventilation, drainage and plumbing systems - supplementary report (Oct 2019)* to link to document [here](#) (f),
- Queen Elizabeth University Hospital Report (June 2020)* link to document [here](#) (g).

* References only reflect text contained in the reports noted. A public inquiry has been launched into construction issues in these projects.

Scottish Futures Trust (SFT) launched a Construction Quality Initiative in 2018 and the themes overlap with those covered here. SFT have been engaged during the development of this report and support the key points highlighted. Section 6 outlines some of the emerging SFT themes and more information on this can be found [here](#) (h).

The North of Scotland Facilities & Capital Planning Group (NoSF&CPG) commissioned a short life working group specifically to respond to the issues identified within the Cole Reports (Edinburgh Schools and DG ONE referenced to above). The NoSF&CPG response dated Dec 2020 [here](#) (q) provides 47 recommendations for further actions and improvements by Boards and the wider NoSF&CPG to implement - the recommendations are summarised within appendix A of the response document.

3 Background

This section covers the overarching backdrop within which most NHS projects are developed. The key areas of note are the contractual mechanisms which are quite different from traditional arrangements, the need for client expertise and the financial considerations and influences set against the longer-term operational costs of facilities.

Contractual Arrangements

The landscape for development of construction projects has changed significantly in recent years. A catalyst for this was the Egan Report in 1998 which highlighted the shortcomings of the industry and proposed:

- integrated project processes
- decent and safe working conditions
- improved management and supervisory skills
- replacing competitive tendering with long term relationships
- that leading public sector bodies should become best practice clients

Some of the major changes arising from this in the UK has resulted in the move towards frameworks and the inclusion of building contractors into the early stages of projects to assist with buildability and bring the expertise of specialist supply chain members into the early stages of the design process. In many forms of contract this integration has gone further and placed the contractor centre-stage, commissioning and managing the designers too. One of the key benefits of contractor-led contract arrangements is the transfer of risk to the private sector and the prospect of improved value-for-money outcomes.

Scottish Government and National Services Scotland (NSS) have provided direction on the contracts and development processes that NHS Boards in Scotland should follow in developing construction projects. These are outlined through the Scottish Capital Investment Manual and a series of Chief Executive Letters (CEL) which direct Boards to procurement via HFS [Frameworks Scotland](#) (i) and the [hub programme](#) (j) via DBDA and DBFM contracts. Until recently the NPD (Non-Profit Distributing) model was also utilised for larger scale projects. Each of these contracts utilises a contractual arrangement where the design, and the design team are under the control of a Tier 1 building contractor.

Some of the key reasons for developing these arrangements was to address previous construction difficulties which included adversarial relationships between parties and clients carrying design team performance risks, often leading to increased project costs. Contractor-led contracts generally transfer additional risk to a single party and offers the client the benefit of a fixed price and the transfer of risk to a single organisation. None of this comes free of charge, and contracting parties price risk into their contract proposals, so there is a less visible cost associated with this approach.

However, this has also created a different relationship between client and designers. In traditional contracts the design team are employed directly by the client and have a continuing relationship and duty to the client throughout the design and construction period. Generally, they also perform the task of administering a contract which empowers them to inspect and

condemn work which does not meet their specifications. Clearly there is a different dynamic when designers and their scope of service is controlled by the contractor.

Whilst the transfer of risk to a single party holds some appeal the consequence of failure does not leave the client unaffected. A significant failure of the design, or the construction quality, can create disruption (Edinburgh Schools wall collapse), the wholesale loss of the amenity (DG One) or the loss of life (Grenfell). Lessons need to be learned to avoid similar tragedies.

Some of the key findings from the [Edinburgh Schools Report \(a\)](#) include:

- the collapse of the wall was due to poor construction and inadequate supervision;
- insufficient independent quality assurance and poor record keeping by the Council and ESP;
- ineffective quality assurance measures within the construction industry;
- the issues identified in Edinburgh are likely to be more widespread;

The report highlighted the potential threat to life and personal safety and therefore the criticality that public sector clients understand the residual risks, and are mindful of the consequences of failure, irrespective of contractual responsibility.

Figure 2: Oxgangs Primary School collapsed wall following high winds January 2016



Client Duties

Clients must recognise that Design & Build style contracts do not relieve them of all risk. Indeed, the methods to mitigate the residual client risk is potentially more complex and requires greater client expertise than traditional contracts. Clients must:

- Ensure that they understand the extent and limits of risk transfer
- Ensure they have sufficient in-house expertise and resource to procure advice or support to discharge their responsibilities under the contract

- Ensure that they have the expertise and capacity to develop briefing documentation that is clear in its scope and specific requirements
- Ensure that they fully understand and are content that the “contractors proposals” meet the requirements set out in their briefing documentation
- Ensure that they are content with design details and reviewable design information provided post-contract, and are resourced to process these
- Ensure that they are satisfied that the contractor has sufficient quality control processes in place during constructions and that these are fully implemented
- Ensure that there are robust quality assurance processes in place, and that all relevant parties, including contractors, inspectors and consultants have sufficiently qualified and experienced staff to implement them

B. Clients are becoming more dependent on an army of external advisers to carry out key tasks. It is not enough for clients to simply appoint external advisers and assume that they will discharge their services diligently. The selection, appointment and management of external advisers is an activity that requires highly skilled and resourced professional teams.

Invitation to Tender (ITT) documents need to be carefully developed. Whilst it is tempting to simply dust down the last one, these should be bespoke documents tailored to the specific needs of the contract. Selection criteria need careful consideration and weighting. The opportunity to stipulate the scope and level of service, the required activities, and the level of experience of the day-to-day resource (not just the bidding team) is critical. Consideration should be given to experience of similar projects, references (which should be taken up) and importantly the conditions for substitution of staff when circumstances require it. These provide the foundations of securing the right resource for the project. Procurement processes must ensure that the quality element of selection is appropriately weighted and not undermined by polarised scoring of the cost element (e.g. low cost scores 30, high cost scores 0).

A key client duty is to develop a clear set of briefing documents. The brief is a fundamental building block for any project. A hastily written brief, or indeed the absence of a brief may be a tempting proposition to get a project started quickly but will inevitably lead to issues and problems as the project develops. Time spent developing a clear brief which is understood by stakeholders and signed off by the project Senior Responsible Officer will ensure that everyone has a common understanding of the project scope. Brief development is an area which offers an opportunity for shared learning and resource and is part of a separate work-stream being taken forward by the BDaC group. This will be covered in detail in a later report.

Capital Planning Expertise

NHS Boards in Scotland commission circa £500m of construction work each year. The range in projects is enormous and many low-key projects delivering high quality improvements are carried out efficiently and go largely unrecognised. Most attention is reserved for high profile projects when issues arise.

The NSS assurance process outlined in Section 4 is being developed to help ensure focus is placed on key aspects of projects at critical stages. This is not a substitute for Boards having

their own client-side resources and Boards ultimately need to own and manage the development process since they will remain contractually and legally accountable for them.

The previous section highlighted the complexity around delivering quality with current contractual arrangements. Capital Planning professionals now need to have a broad range of experience and skills to discharge the client duties outlined. Alongside traditional project management skills related to managing programme, cost and scope they also require technical knowledge, understanding of contract management, risk management, business case development, NHS governance, procurement legislation, stakeholder management and the ability to lead and manage an increasing range of design team consultants, specialist technical consultants, quality control professionals and in some cases legal advisers, technical advisers and financial advisers. If an element of design quality is to be achieved, design management skills also need to be added to the mix.

Crucially these tasks can determine the line between success and failure. They require client-side expertise to ensure the NHS remains in a controlled and protected position. This should be led by in-house professionals who are equipped to drive projects forward and focus on key risk areas. The value of having a skilled and experienced in-house team cannot be overstated.

However, developing major projects is not a continuous activity for most boards and projects are often advanced with a pool of resources without experience of anything similar. To help address this there are processes to capture and share “lessons learned”. However, the current system which requires that these are in the public domain may be inhibiting the extent or detail of the feedback provided. A more effective and direct way of sharing valuable information is needed.

C. A concerted effort should be made to improve information sharing. Work should be undertaken to develop new ways to make appropriate contact and provide direct, candid advice and input. Recent improvements in communication tools and IT infrastructure should be harnessed to take this forward as a priority.

Larger boards may have a sufficient pipeline of projects to form specific teams to develop projects, but there is clearly an opportunity to develop this further to provide national or regional support teams. Whilst out-sourcing these activities is possible, the potential long-term value of building and retaining client-side knowledge and expertise is evident.

Scottish Futures Trust (SFT) looked at this issue as part of their work for the Construction Procurement Review. The report, “Guidance on the use of a baseline skillset for construction procurement” can be found [here](#) (k). The report is not health-specific but provides a clear overview of the issues and sets out some advice and guidance to ensure that appropriately skilled people are in place to carry out key roles. The report highlights the skills required, dependent upon project size and complexity, to take up key roles in construction projects including Senior Responsible Officer/Project Director and Lead Project Manager.

A key recommendation in the report is 7.2.11:

- Public sector bodies involved in construction procurement must have access to the right mix of professional procurement and construction expertise to ensure that infrastructure is procured effectively. It may not be appropriate for each organisation to retain this expertise on a

permanent basis. It may instead be achieved through collaboration with other bodies – either on a project-by-project, or a longer-term basis.

The North of Scotland Facilities & Capital Planning Group (NoSF&CPG) response to the "Cole Reports" went further by recommending that the Project Lead, the Board’s Senior Responsible Officer, and the accountable Project Board each had a role in providing assurance by checking the competency and capacity of the appointed project team, and in this regard recommended the development of a competency matrix to provide a baseline measure of qualifications/experience and a required project resources assessment to review the capacity of individuals being promoted for the project. The recommendations can be found [here](#).(q)

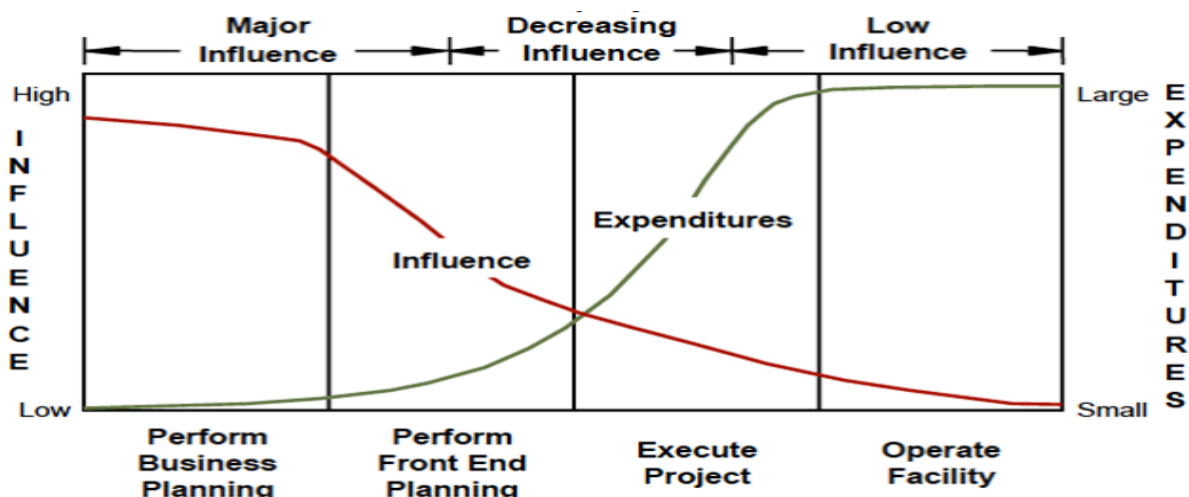
Insufficient client-side resource and expertise at the early stages of projects is a key issue at the root of many project failures. A collective approach to sharing resource, expertise and experience across boards is a potential easy-win if arrangements for co-operation can be developed.

D. Whilst the development of central or regional resource has been considered in the past, the current focus on project issues and improved communications tools now available indicate that this is worthy of reappraisal.

Project Cost Pressures and Opportunities

The early stages of a project is when decision makers have the greatest opportunity to influence cost and quality. As the project moves through the design development stages the ability to change design solutions reduces and the associated costs increase. When a project is in construction the cost of change rises exponentially and changes at this stage should be avoided since they are unlikely to provide value for money. Once operational, the cost to change is highest in terms of constructions and business interruption.

Figure 3: The most effective time to influence cost is in early stages of a project



Advice is often given to engage contractors during early stages of project development. This is the time of the greatest level of influence. Unless the client is alert to this, it may hand over significant control to commercial partners. It is imperative that the client is focussed and is suitably resourced to stay in control when the opportunities for value and quality are acutest.

Historically, public sector project costs have primarily focussed on bottom-line development costs. Within this context the management of projects within agreed budgets is a key aspect of project delivery.

The competing prioritisation of Time, Cost and Quality is a perennial issue and requires a clear understanding of the long-term impact of cost-driven change. In this context it is also worth considering the total costs of an operational facility. The diagram below illustrates the relative costs of a typical facility over a 30-year lifespan. The design and construction costs are a very small element of the total costs. It's clear that a focus on reducing design team fees has very limited overall impact on the total cost of the project but risks a compromised level of service which may disproportionately affect the quality of the project and potentially have a detrimental impact on the construction and operational costs of the facility. The benefits of a well-funded early stage, supporting briefing, planning and design will be repaid by the improvement in both the quality and efficiency of the operational facility.

Figure 4: The relative costs of design, construction, maintenance and operation

Value for Money

[According to Prof John Cole,] across 30yr lifetime of Healthcare facility, every £1 spent on develop & build costs (incl 10p for design), is dwarfed by £4 maintenance costs and £40 – 75 in-use costs for NHS e.g. staff, pharmaceuticals, equipment).



Potential threats to quality arise in the shape of cost management and “value engineering” when projects are developed with unrealistic budgets. Reductions in material specification, space standards and the promotion of derogations all offer tempting solutions when budgets are under pressure. However, the long-term costs in terms of life-cycle maintenance and/or functional efficiency can mean that these are poor decisions for long-term value for money. Conversely, poorly considered cost savings at the early design and construction stage have the ability to increase long-term operational costs.

A focus on quality alongside long-term costs may offer a more rounded view on true value for money, when compared to short term savings offered in typical Value Engineering exercises.

4 Responses to Quality Issues

This section highlights some of the responses developed to address the principal issues highlighted in the Edinburgh Schools report and the DG One report. The NHS Assurance Process / Centre of Excellence will be of particular interest to Boards. However, the review of scope for design teams, and the structured development process outlined in the Soft Landings initiative offer considerable potential to improve quality and compliance. A risk assessment tool developed from the recommendations from DGOne is also included at the end of this section and offers a useful approach for Boards.

Retrospective Diligence

Following the Edinburgh schools report there was a national initiative in 2017/18 to retrospectively inspect wall cavities in existing facilities to ensure wall ties were installed to specification. This highlighted areas where retrospective additional ties were required. Clearly this is a disruptive and expensive process and should be avoided by getting things right first time. Quality processes and paperwork alone does not guarantee compliance. In fact, their existence can provide false reassurance. Independent corroboration is essential.

E. Clients must ensure they have independent corroboration that contractors' quality management systems are of suitable quality and are being fully implemented.

Additional Inspection Services

Health Facilities Scotland (HFS) has recognised the additional demand by clients for increased inspection services utilising Frameworks Scotland. In 2019 the scope of the role of Supervisor was extended to specifically include inspection services. Further, a scope has been developed for Clerk of Works services and this has been made available in 2020. Further information can be found [here \(I\)](#).

Some Boards have reverted to directly employing staff within their teams to address quality issues. NHS Grampian have in-house Technical Supervisors who perform a technical function but also act as "Supervisor" under Frameworks contracts. In-house staff offer the additional benefit of building up a live framework of "lessons learned" from previous projects.

Outwith Frameworks, the inspection role is being implemented in different ways within the hub programme. Some clients have extended the role of the Independent Tester to include inspection. This has the benefit of minimising the number of parties and provides additional information and insight to the role which ultimately certifies if the project is complete. The Independent Tester (IT) is a joint appointment and there are potential "conflict of interest" issues. It is also important to distinguish that the IT role is to confirm delivery compliance with contract requirements and not necessarily to pick up any matters outside of this specific scope.

To address the potential conflict of interest some clients have introduced an additional role of Site Monitor. This is effectively a Clerk of Works inspection role, but without contractual rights to instruct the remedy of defects. Contractually, defects need to be channelled back via the client but working practices normally allow more direct communication. The Site Monitor role offers the benefit of being solely responsible to client and can therefore provide independent

advice. It is possible for the Site Monitor role to be carried out under an extended scope of works by the Technical Adviser.

F. Additional costs are incurred to deliver enhanced inspection services, which may be consultancy fees or in-house staffing costs. In either case it is critical these are accounted for in early budgets to ensure that their scope is not constrained.

NHS Scotland Assure

National Services Scotland (NSS) was commissioned by Scottish Government to provide a quality assurance process which starts at the earliest stage of projects and extends across its lifecycle. NSS identified eight new services in response to this request which are to be delivered and developed through a new body, NHS Scotland Assure (NHSS Assure).

NHS Scotland Assure will, along with these new services, bring together the existing Health Facilities Scotland (HFS) and Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Directorates and services. NHS Scotland Assure exists to help support and improve the delivery and upkeep of the healthcare built environment across Scotland. Managing risk in the right way gives those involved in maintaining NHS buildings, facilities and equipment confidence and reassurance.

As a new body, NHSS Assure aims to be recognised across the world as a national centre for excellence in the healthcare built environment.

NHS Scotland Assure will not:

- address or seek to change legal responsibilities of NHSS Boards or primary legislation
- create a central Building Division as NHSS Boards need to remain accountable for their projects and current estate. Doing this would mean that accountability would move from Boards to a central function, and this would need legal changes
- address non NHSS Healthcare environments e.g. private dental practices
- develop an inspection function. We recognise the synergy with the inspectorate and will connect and underpin inspections through the provision of intelligence and subject matter expertise.

Key Stage Assurance Review (KSAR):

A key part of NHSS Assure will be the new Assurance service. The Assurance service aligns compliance with guidance and helps boards to demonstrate this throughout the full lifecycle of a build, from strategic assessment, building operations and ongoing maintenance, to decommissioning. The service will focus on new builds and major refurbishments within the estate. In addition, some projects identified as being complex due to the needs of patients using the facilities will be reviewed by this service.

This assurance service will be delivered through **Key Stage Assurance Reviews (KSAR)** which focus on making sure that infection prevention and control are a key consideration in the following parts of a build project:

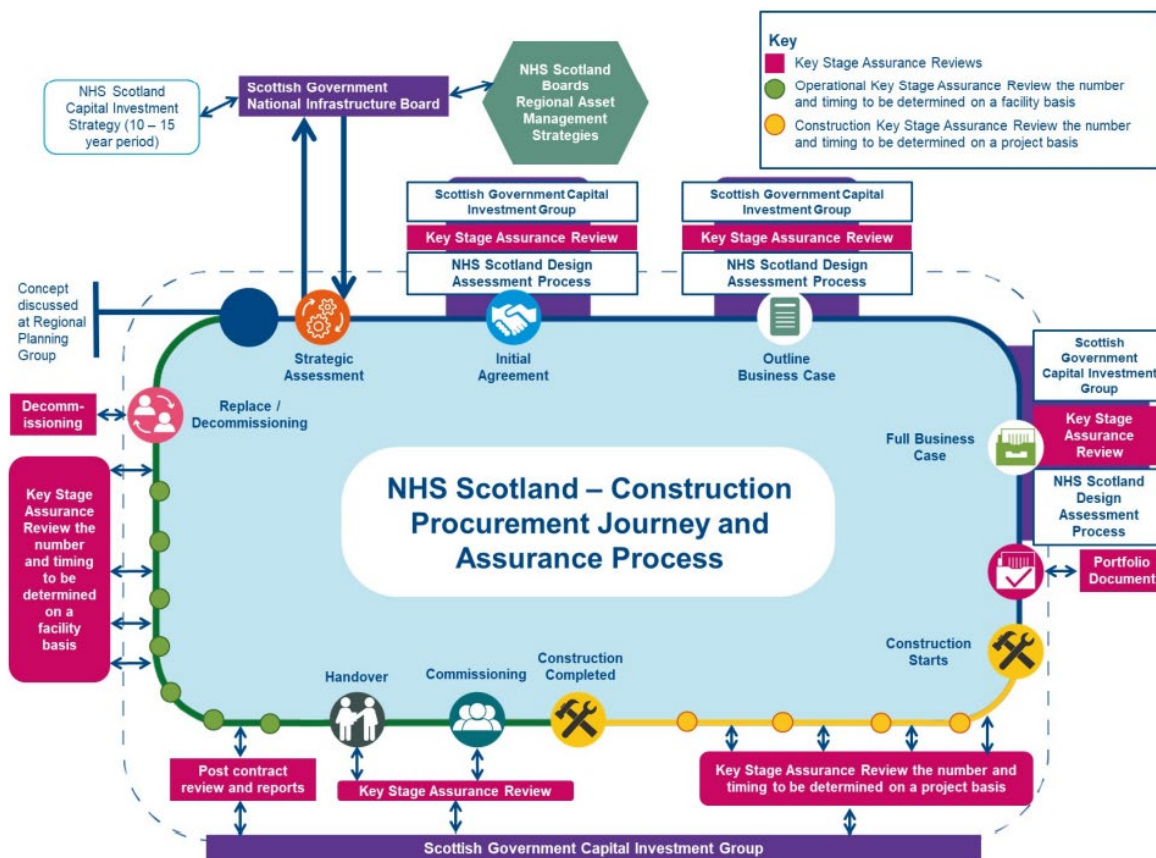
- water and drainage
- ventilation
- electrical

- medical gases
- fire safety.

The KSAR process examines projects at key points in their lifecycle. It does not remove any legal or contractual obligations from the NHS Health Board, their designers, or contractors. It provides assurance to progress successfully to the next review point and the process will be mandated for projects requiring CIG approval. KSARs focus on the assessment of the delivery approach and will work with the Health Board’s project team to ensure there is comprehensive understanding of the patient cohorts utilising the facility. KSARs also ensure relevant guidance is fully implemented and any technical derogations have been fully reasoned, transparently discussed, the implications understood, recorded and signed off by the Health Board and their advisors.

Further information on NHS Scotland Assure can be found [here](#).

Figure 5: NHSS Assurance diagram showing journey through approvals process



The independent report into the Queen Elizabeth University Hospital of June 2020, makes a number of key recommendations, as outlined in Section 5 of this document. Several highlight the importance of engaging with Infection Control professionals at key stages of the project. The new National Centre for Reducing Risk in the Healthcare Built Environment will help ensure this is taken forward in major projects. However, the success of the Centre will rely on having sufficient technical expertise at its disposal to understand the complexity around the technical application of Infection Control requirements alongside competing or contradictory technical guidance.

However, the centre will not process every project and it is important that Boards put measures in place to ensure that appropriate focus is placed in engaging with the right internal professional teams at key stages of the project and that key stakeholders are engaged throughout.

G. An essential part of stakeholder engagement is accurate record-keeping of engagement, dialogue, agreements and sign-offs. In lengthy projects stakeholder personnel often change, and it is essential to ensure that key decisions are recorded for future reference.

Extending the scope of Design Teams

One of the key concerns in contractor-led projects is the loss of direct communication between design teams and clients. There is growing recognition of the additional risks which arise from this and contractors have become more willing to accommodate client/project –specific requirements to open up communication channels.

It is now more commonplace to request that the scope of designers should include an obligation to provide regular written reports from site visits and the application of the agreed specifications and standards. This brings design teams back into the quality arena. In order that they maintain their Professional Indemnity Insurance cover, which is also in the contractor’s interest, their reports require to be based upon clear and open professional opinion. This is a clear step forward and Board’s should consider this as a standard requirement when selecting both contractors and their design teams.

H. It is important that clients consider carefully what they want from the design team, especially in relation to inspection and validation services, and set this out in the briefing and appointment documentation of all parties, particularly contractors, where they will manage designers.

Application of Soft Landings approach

Soft Landings is becoming a key element of the design and construction process, maintaining the “golden thread” of the building purpose through to delivery and operation. Additionally, it prescribes early engagement of end users and inclusion of a Soft Landings champion on the project team, and commitment to aftercare post construction. A comprehensive guide to the key roles and process are available [here \(m\)](#).

Essentially soft landings align the interests of those who design and construct an asset with those who subsequently use it. Fundamental to this concept is collaborative working across the supply chain and key stakeholder engagement at all stages of the process.

There are many benefits to a Soft Landings approach but at a headline level it helps to ensure that any asset created by an NHS Scotland Board meets the end users’ needs and required operational outcomes. Through post-occupancy evaluation it monitors the post-completion outcomes against performance and cost criteria providing “lessons learnt” information captured for future projects.

In relation to pursuing quality in construction, the implementation of Soft Landings to all projects ensures that the engagement with key stakeholders throughout the development

process is embedded into a set of project control processes. This is a key recommendation to achieving quality as noted elsewhere in this document. NHS Scotland has developed clear guidance on this which is closely mapped to the business case process. Process charts outlining the principles and staging of Soft Landings can be found at [here \(n\)](#)

Figure 6: NHS NSS Soft Landings principles set out in process documentation

- Clear targets are to be set for required business outcomes at the start of the project. These targets need to be aligned with the strategic objectives and they should be cascaded through the supply chain. These targets and their measures need to be reviewed during the design, construction and operation. Targets and measures should consider statutory requirements, mandated government policy, previous experience, operational knowledge and end user needs.
- End users / operators should be involved to represent the client during design, construction and handover.
- The transition from construction to operation must be planned throughout the project and should be a smooth process enabling optimum performance to be reached as quickly as possible. The transition needs to consider the transfer of operational data as well as training, commissioning, handover and aftercare.
- Performance reviews will be undertaken post completion for up to 3 years and lessons learnt from this should be recorded and shared for future projects.

NHS
National
Services
Scotland

**Core
Soft Landings [SL]
Principles**

Implementation of Photographic record keeping

Whilst there is a general improvement in electronic record keeping in relation to project documentation, the continuing improvement of digital photography together with access to digital storage resources and potential integration of photography with CAD/BIM building records has opened up new avenues to record the construction process in a structured manner.

A number of public sector bodies have taken advantage of 3rd party photographic record keeping. This offers the advantage of systematic recording of progress and building make-up before areas are covered up. Photographs are pinned to an on-line electronic model of the development. A key benefit is the ability to allow inspectors (client's representatives, supervisors, clerk of works) to upload comments with photos of defects and pin these to the development plans. This creates a single record-source of problem areas mapped to specific areas and with a correspondence trail of issues and close-out activity. There is added

value to such a photographic record during the operational stage. Being able to look back at the record photos (e.g. what is inside a particular wall) can help to investigate issues without the need to necessarily open up completed work.

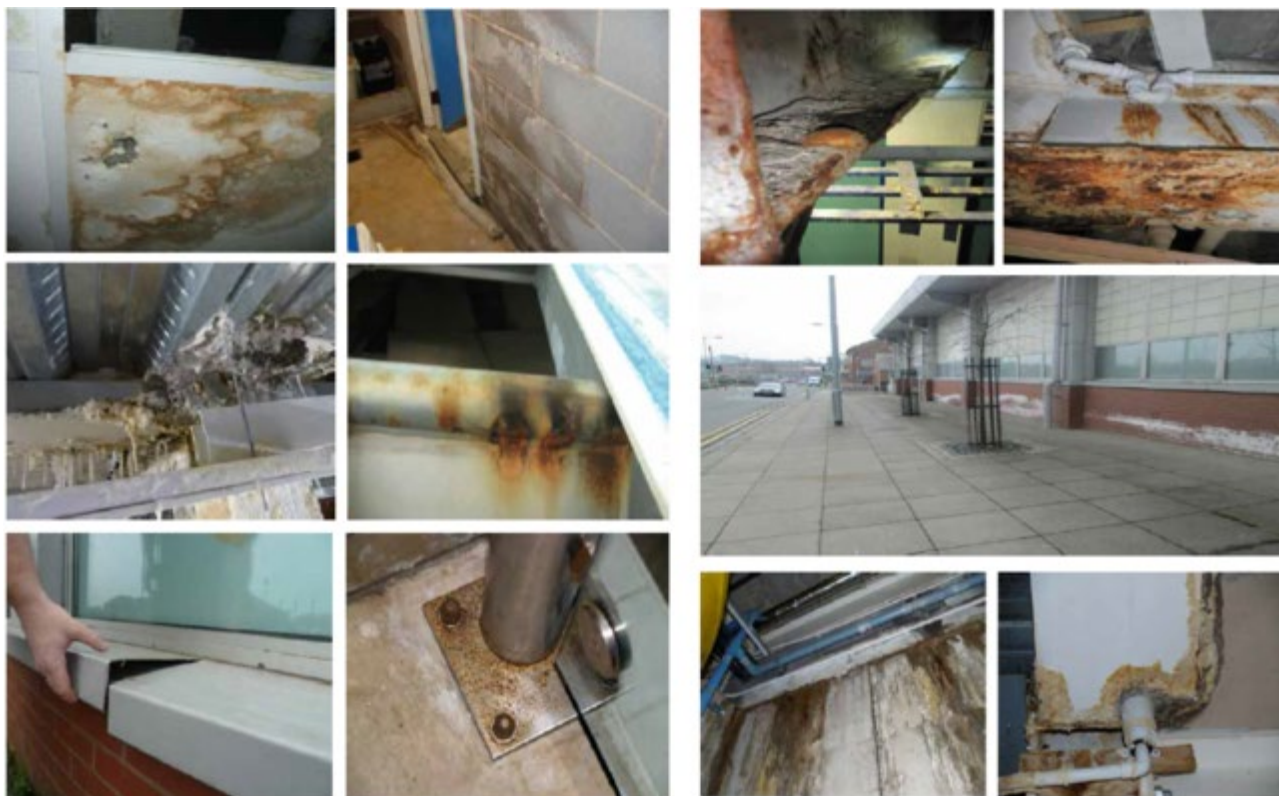
1. The implementation of photographic record-keeping is dependent upon contractors allowing the required access to the site. If this is to be undertaken it should be highlighted from the outset and included in contract documentation to ensure that suitable agreements are in place with all parties.

DG One recommendations and a Risk Management approach

There are clearly risks to any clients embarking on major construction projects. How should those risks be identified, assessed and appropriate mitigations developed to eliminate or control them? The [DG One report](#) (b) looks into the problems which ultimately led to the demolition and rebuilding of the leisure centre in Dumfries, and offers a substantial range of recommendations in response to issues identified throughout the project development period.

The photos in the report are testimony to the abysmal construction quality, poor detailing and minimal supervision, inspection and witnessing.

Figure 7: Sample defects photos included in the DG One Report by Prof. Cole



The key findings in the DG One report state:

“Before setting out a summary of the findings of the Inquiry in relation to the formal questions in the remit, it is important to point out that the fundamental failings in the construction of the DG One building were failings on the part of the design and build contractor. The Council had not unreasonably placed significant reliance on the size and experience of a major national contractor to deliver a building to the required standard.

Unfortunately, the construction of the building in many aspects failed to meet the basic standards of the Industry or to comply with both the requirements of the contract and of the statutory building regulations.

It was these failures on the part of the design and build contractor that led to the loss of use by the public of the DG One facilities for what will be a period of some five years and that has led to the incurrence by the Council of very significant additional expenditure, both as a result of having to seek legal redress for compensation and in undertaking the necessary remedial works.

The majority of the Council's failings were related to their lack of expertise as a client and their inability to proactively avoid and effectively identify and respond to the failings of the contractor, which latter requirement for the client would have not come to the fore had the contractor properly fulfilled the requirements of the contract in the first place."

J. Section 9 of the DG One report sets out the Recommendations, which cover the full project life from inception, funding, procurement and management, through to the delivery, construction, discovery of defects and actions thereafter. These provide an insightful guide to clients on the key areas of focus to avoid potential failure.

NHS Greater Glasgow & Clyde (GGC) has utilised the DG One recommendations to create a risk matrix template to allow each of the key issues to be considered, assessed and recorded in relation to any client's own development and procurement processes. It is a tool to enable a self-assessment process and identify potential mitigations. The approach provides an example of taking the expert work invested in the key reports and finding ways of applying the lessons to our own organisations. The NHS GGC DG One recommendations template is provided as an Appendix to this Report. It can be shared with any Board / Client to use or adapt to their own circumstances.

5 Health-specific Projects

This section highlights reports published to date in respect of Glasgow’s Queen Elizabeth University Hospital and Edinburgh’s Royal Hospital for Children. Both projects are currently the subject of an ongoing public enquiry and therefore this section simply highlights some key issues highlighted in the published reports. There is clearly an opportunity for health specific learning which is of value to other Boards. It would be useful to keep this section updated with any further reports on issues in health-sector projects.

Several of the reports noted in this document are focussed on projects which are not health related (i.e. schools, leisure centre, residential and further education). Many of the key issues identified are common across building types, and the lessons are easily transferable and applicable to the health sector. However, the recent and current reviews of some health projects will be invaluable in highlighting specific learning points for others in the health sector.

A public enquiry into The Queen Elizabeth University Hospital and The Royal Hospital for Children and the Department of Clinical Neurosciences in Edinburgh, commenced on 3rd August 2020 (and is still underway at time of writing), but a number of independent reports were commissioned and released prior to this and the summary points are noted below.

KPMG review into the Royal Hospital for Children and the Department of Clinical Neurosciences in Edinburgh

This report was instructed by NHS National Services Scotland to independently establish the facts surrounding the decision to delay the move to the Hospital. The report can be found [here](#) (e) and the supplemental report [here](#) (f). The key relevant findings included the following:

- The key issue which led to the Delay was the non-compliance with the Scottish Health Technical Memoranda 03-01 (“SHTM 03-01” or the “Standards”) for air change rates in some of the Critical Care areas of the Hospital (the “Issue”).
- This appears to have stemmed from a document which was contained within the Project tender documentation, a version of which was used throughout the Project, which included details on the environmental specifications of the Hospital, the Environmental Matrix (“EM”). Elements of the EM were inconsistent with SHTM 03-01 from the tender process (which commenced in late 2012) onwards.
- Aside from the specific Issue referred to in this Report, other ventilation systems were identified as having some deficiencies. We understand that all these deficiencies were considered rectifiable by NHS-NSS, and NHSL have an action plan in place to address each issue.
- Lack of clarity in the Standards. Consideration of the Standards on a standalone basis, in relation to air change rates in rooms within the Critical Care areas of the Hospital, could be open to interpretation. Specifically, the review identified that there is no definition of “Critical Care” in the Standards, and the extent to which “Critical Care” includes all types of rooms within that area of a hospital. Further, there is no explanation of the hierarchy which should be applied where different areas of the hospital overlap, for example, which standard should be applied to a ‘clean utility’ within a Critical Care unit.

Queen Elizabeth University Hospital Review

The independent report into the Queen Elizabeth University Hospital was published on the 15th June 2020 and can be found [here](#) (g). This report was commissioned “To establish whether the design, build, commissioning and maintenance of the Queen Elizabeth University Hospital and Royal Hospital for Children has had an adverse impact on the risk of Healthcare Associated Infection and whether there is wider learning for NHS Scotland”.

The key relevant findings included the following:

- The QEUH project would have benefitted from greater external expertise and greater uptake of internally available expertise to support decision making on the water and air ventilation systems at key points in the design, build and commissioning phases;
- The design of the hospital did not effectively reconcile conflicting aims of energy efficiency and meeting guidance standards for air quality;
- Some of the difficulties encountered with water and ventilation systems were the result of ambiguity concerning the status and interpretation of guidance;
- The level of independent scrutiny and assurance throughout the design, build and commissioning phases was not sufficient;
- Governance of the project during design, build, commissioning and maintenance did not adequately take account of the scale and complexity, and specialist nature of the building project;
- The effectiveness of IP&C advice was undermined by problems within the NHS GG&C IP&C leadership team and internal relationships with the wider IP&C and microbiology cohorts;

Some of these findings reflect messages highlighted elsewhere in this report. Amongst those issues are the value and use of in-house experience and expertise, the involvement of key stakeholders at the right stages and the implementation of independent scrutiny of design and construction. Governance processes are highlighted, particularly in relation to the scale and complexity of the project.

Complexity and Ambiguity in Guidance

Ambiguity around conflicting guidance is highlighted in both reports, and there is substantial work required to minimise the scope for conflict. Complexities around the application and status of the competing standards, codes of practice, guidance and policy is a major risk that is increased by the more complex a project, and the longer it is in development.

K. There is no easy fix to the risk arising from the complexity and ambiguity of guidance. It is recommended that Boards ensure appropriate resource is directed to mitigate this risk and that HFS lead the development of tools and processes to assist Boards. In view of the areas of concern of recent reports, a particular focus should be placed upon the review / rewriting of the guidance in relation to water and ventilations systems.

6 Wider Issues

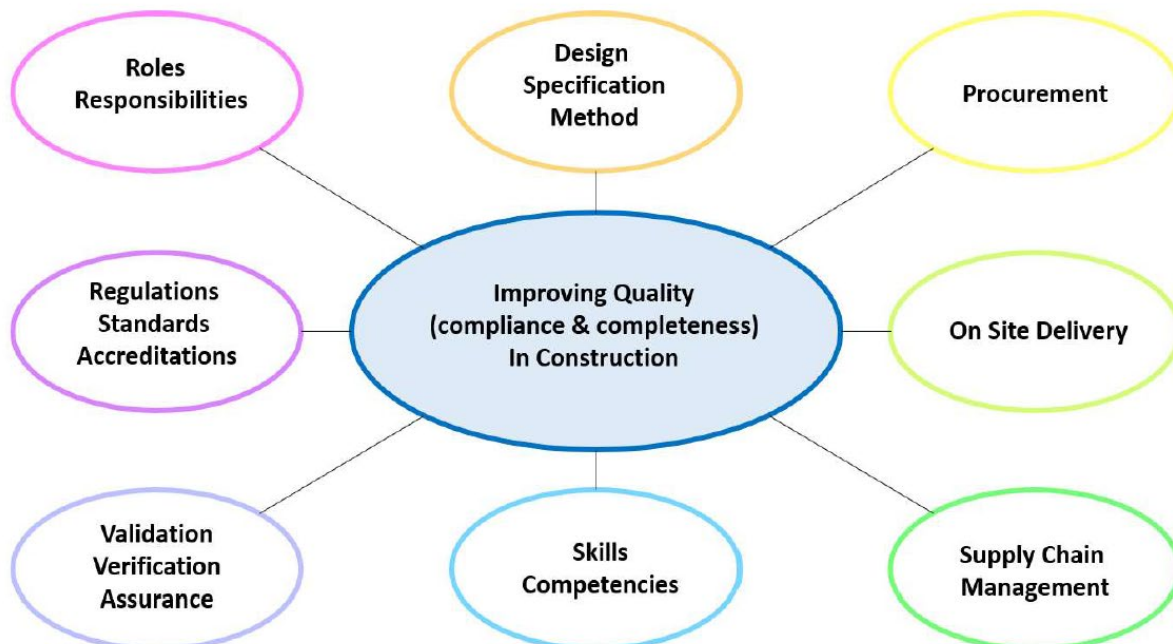
This section highlights wider issues that have an impact on quality. These include the need for cultural change, capacity around NHS leadership and resource, and about the approach to education and training. The final section highlights the contractual arrangements set-out and asks whether, in their current form, these are really the most suitable for highly complex projects with such significant impact on the wider population.

Cultural Change

The Scottish Futures Trust (SFT) Construction Quality Assurance Initiative (CQAI) has been underway since late 2018. With a recognition of the abundance of “processes” available, it is seeking to approach the issue by trying to change the culture around quality.

In addition to working at a project level to drive up quality, an initiative to work at a higher level, to create an environment for all projects to achieve the required quality, has commenced. The Construction Quality Improvement Collaborative (CQIC) currently involves Scottish Government, SFT, Construction Scotland, a local authority representative and other industry representative bodies. Other parties who can contribute to the initiative will be invited to participate as the initiative progresses. The CQIC is working with the SG Leading Improvement Team to identify the changes, and develop how they can be implemented, to achieve a cultural change on quality across the construction sector in a similar way to the cultural change which has been achieved in Health & Safety over the last 20 years. The key areas which influence quality, which have been identified by the CQIC thus far, are shown in the diagram below.

Figure 8: Factors that influence the built Quality as identified in the SFT CQIC report



It is appreciated that such a fundamental change to the construction industry will take time to be achieved. The objective of the CQIC is to achieve the change in culture by 2024. Like the CQAI it is intended that the work on the CQIC will be widely communicated across the construction sector as it progresses.

Under the CQAI support was provided for the development and application of site-level quality processes. This work was undertaken on three projects which took part in the pilot. Two of the projects were schools and one is NHS Greater Glasgow & Clyde's hub bundle which includes two new Mental Health Wards, and two Health & Care Centres. A focus on quality was directed by promoting open dialogue about quality between client, design teams, contractors and supply chain. Regular Quality meetings were held, rather than this aspect being a footnote at progress meetings. Engaged contractors carried the message through into engagement with sub-contractors and tool-box talks at site operative level. Each of the three projects took a slightly different approach to inspections and lessons learned are being integrated into site operations guidance which is part of the CQIC development. The latest report on the CQAI pilot projects can be found [here](#) (o).

Internal Leadership and Resource

NHS Boards are not necessarily structured to manage high-value construction projects. This is not surprising, since their key objectives and day-to-day business is centred on the delivery of health services to the population.

In section 2 the importance of NHS Capital Planning expertise was outlined. However, NHS leadership and the availability and meaningful engagement of appropriate senior leadership figures is equally critical to success.

Key NHS project leadership roles are often added to existing roles of senior NHS managers. Projects are generally service-led and senior service leads often have considerable responsibilities in their substantive roles and have little experience in construction or development. The attention and input of senior leaders is key to making timely and focussed decisions throughout the development period. Many major projects have lengthy timelines that can run to 5-10 years and the long-term consequences of decisions taken at very early stages are sometimes not appreciated at the time. At the early stages, when the endpoint is in the distant future, it can be difficult to secure focus when set alongside pressing issues which require immediate attention.

Leadership capacity is a major issue. In many cases it is unavoidable that additional resource is required to create the additional capacity needed to achieve success in major/complex projects.

L. Since the issues of capacity and resource are so fundamental to the successful delivery of projects it is recommended that representation is made to provide additional ring-fenced revenue funding to fulfil key roles to accompany capital funding for major projects, thus ensuring that Boards can afford to provide the additional temporary resource required to minimise the risk to investment.

Issues of capacity are not restricted to senior leadership roles. Feedback from contributors to this report highlight that insufficient resource is a common issue across the capital planning

system nationally. A report by ARUP for NHS NSS in 2015 highlighted the demographic profile of capital planning professionals within Boards and that 38.1% were expected to retire in the following 10 years, 2014-2024. This period coincided with years when Boards faced some of the most acute pressure to manage costs alongside continuing increases in front-line demand. Many “non-essential” services faced constrained budgets and found difficulty in replacing key staff as they left the system. It may be that the combination of a high rate of retirements and budgetary pressure has led to a reduced workforce together with a significant loss of experience and expertise.

At a time when building systems are progressively more sophisticated, contracts more complex and expectations grow higher it is clear that solutions to the overall resourcing issue need to be developed if the quality agenda is to be addressed.

Education and Skills

Many Boards have developed their own internal project management resources, often from staff who have progressed in their organisation and progressed through related roles. As contractual relationships have changed, it is more critical than ever that internal teams have a clear understanding of the contracts being used and are equipped to make decisions and recommendations. Whilst external advisers are available to assist, their quality is variable, even within the same companies, and Boards cannot solely rely on their services.

It is essential that NHS in-house resource is suitably skilled. Section 3, Capital Planning Expertise, described some of the many requirements and challenges facing capital planning professionals. It also highlights the impact of proper management of projects on the long-term efficiency and functionality of operational facilities. It is essential that Boards commit sufficient resource to invest in the professional development of its people. The recent work with National Education Scotland to develop Education Pathways for Property & Capital Planning staff is a positive step forward, but requires support and promotion by employers. The current pathways documentation can be found [here](#) (p) and charts out clear roles and qualifications allowing staff to map out a future through developing their skills and education.

Alongside formal long-term academic courses, regular training to communicate lessons learned and updates to guidance and contracts is also essential. In the past HFS delivered an excellent and extensive training and education programmes for NHS estates and capital planning staff. This provided a consistent, quality-checked training resource available to all Boards. This has been substantially reduced over the last 10 years. In light of the significant issues and challenges facing Boards and highlighted here, this is worth re-evaluation.

M. A return to a national programme for the training and development of NHS project staff could see improving education and performance alongside the Assurance process as a key step towards delivering quality-led objectives.

The widespread use of Teams and other methods of remote access would now allow any national training programme to be more easily accessed irrespective of geography, and in-turn make this a highly cost-effective improvement.

Suitability of Contracts

At the core of many of the issues highlighted in this report, and the required action to address them, lies the contract arrangements outlined in Section 3.

A benefit of contractor-led contract arrangements is the transfer of risk to a single party in the private sector alongside the promise of improved cost certainty.

However, when a facility such as a school or a hospital face disrupted or withdrawn facilities the true cost is not solely financial. The loss of service and disruption to the wider population cannot easily be quantified.

The long-term value-for-money aspect of contractor-led contracts is difficult to demonstrate. As each issue has arisen, the additional requirements for advisors, supervisors, checkers, and checkers of checkers has created an ever increasing army of people who add limited value to the process. They are simply employed to ensure that parties discharge their contractual duties and that clients have sufficient independent assurance of them having done so.

Traditional contract arrangements which preceded the current arrangements were not without fault nor risk. It was concluded in the Egan report that they resulted in aggressive tendering behaviours and resulted in adversarial behaviour between parties. The outcome of this opened up public sector clients to additional risks around design team performance and the financial consequence of poor performance or failures.

However, it seems clear that there is a growing body of evidence that current systems are leading to some significant problems in large complex projects. Are these contractual arrangements still the best solution to complex projects that have such a significant impact on the wider population? There is scope to revisit the strengths and weaknesses of the available options and find a better way forward that addresses the issues and recommendations highlighted in recent reports.

N. It is recommended that a review is undertaken to consider the continued suitability of currently prescribed contracts for NHS projects in light of the emerging issues highlighted. The review should consider the appropriate use of current contracts, the ability to tailor these for NHS-specific needs and consideration of alternative options.

7 Conclusions and Key Points

The recent reports into issues and failures on major public projects highlight some significant areas for improvement. It's clear that the issues that are often identified as construction or design issues, often have their roots at much earlier stages in projects.

At the outset of the development process all of the key decisions lie in the hands of the client. The client is in the position to ensure that all means are put in place to ensure the end result meets all of its requirements and delivers a sound long-term investment.

There are some key areas where the client can positively address quality issues. These include:

- Appropriate client resourcing and governance of projects
- Budget and programmes which account for the achievement of quality
- Design and quality objectives being considered and set out early
- Clear written briefing documentation
- Quality-led procurement of designers and construction partners
- Clear decision-making structures and protocols
- Clear communication protocols for client engagement directly with design teams from inception to completion
- Appropriately experienced client representatives and advisers to administer the execution of the contract
- Engagement throughout with experts, end users and maintenance teams

A series of key points have emerged throughout the development of this report which are summarised below:

Knowledge sharing

- A concerted effort should be made to improve information sharing. Work should be undertaken to develop new ways to make appropriate contact and provide direct, candid advice and input.*
- Whilst the development of central or regional resource has been considered in the past, the current focus on project issues and improved communications tools now available indicate that this is worthy of reappraisal.*

Budgets and Resourcing

- Insufficient client-side resource and expertise at the early stages of projects is a key issue at the root of many project failures. Any Business Case prepared for projects should include a requisite allowance for all required resources.*
- The selection, appointment and management of external advisers is a key activity and requires highly skilled and resourced professional teams.*
- Additional costs are incurred to deliver enhanced inspection services, which may be consultancy fees or in-house staffing costs. In either case it is critical these are accounted for in early budgets to ensure their scope is not constrained.*

- F. Since the issues of capacity and resource are so fundamental to the successful delivery of projects it is recommended that representation is made to provide additional ring-fenced revenue funding to fulfil key roles to accompany capital funding for major projects, thus ensuring that Boards can afford to provide the additional temporary resource required to minimise the risk to the investment.*

Project Management

- G. For major projects, clients should ensure they have accountability through a Project Board with a clearly identified Senior Responsible Officer and lead roles clearly set out identifying individuals with capacity and competency to take projects forward.*
- H. The Project Board should formally sign off the design at each key stage, noting and taking account of outstanding or incomplete design information and relevant design development information to allow the project to proceed within the Business Case process*
- I. An essential part of stakeholder engagement is accurate record-keeping of engagement, dialogue, agreements and sign-offs.*
- J. It is important that clients consider carefully exactly what they want from the design team, especially in relation to inspection and validation services, and set this out in the briefing and appointment documentation of all parties.*
- K. Clients must ensure that they have independent corroboration that contractors' quality management systems are of suitable quality and are being fully implemented.*

Training, Education & Guidance

- L. A return to a national programme for the training and development of NHS project staff could see improving education and performance alongside the Assurance process as a key step towards delivering quality-led objectives.*
- M. There is no easy fix to the risk arising from the complexity and ambiguity of guidance. It is recommended that Boards ensure appropriate resource is directed to mitigate this risk and that HFS lead the development of tools and processes to assist Boards. In view of the areas of concern of recent reports a particular focus should be placed upon the review/rewriting of the guidance in relation to water and ventilations systems.*

Contracts

- N. It is recommended that a review is undertaken to consider the continued suitability of currently prescribed contracts for NHS projects in light of the emerging issues highlighted. The review should consider the appropriate use of current contracts, the ability to tailor these for NHS-specific needs and consideration of alternative options.*

8 Reference Documents and Hyperlink Addresses

Hyperlinks are embedded throughout the document. Below are digital addresses for links:

- a) https://policy.ciob.org/wp-content/uploads/2018/03/Inquiry_into_Edinburgh_Schools_Feb_2017_FINAL_VERSION.pdf
- b) https://www.dumgal.gov.uk/media/20076/DGOne%20Inquiry%20Report/pdf/DG_One_Inquiry_Report_Bookmarks.pdf
- c) <https://www.grenfelltowerinquiry.org.uk/phase-1-report>
- d) <https://www.scottishfuturetrust.org.uk/storage/uploads/nwccsftlessonslearnedsft050220.pdf>
- e) <https://www.gov.scot/publications/independent-assessment-governance-arrangements-nhs-lothian-royal-hospital-children-young-people/>
- f) <https://www.gov.scot/publications/nhs-lothian-royal-hospital-children-young-people-department-clinical-neurosciences-review-fire-systems-electrical-systems-medical-gas-installations/>
- g) https://webarchive.nrscotland.gov.uk/20200903233034/https://qeuhprodwebsite.blob.core.windows.net/media/yutnag4j/final-report-published-version-458529_sct0220167968-002_queen-elizabeth-university-hospital-independent-review_p3.pdf
- h) <https://www.scottishfuturetrust.org.uk/page/improving-delivery>
- i) <https://frameworks-scotland.scot.nhs.uk/>
- j) <https://www.scottishfuturetrust.org.uk/page/hub>
- k) <https://www.scottishfuturetrust.org.uk/storage/uploads/baselineskillsetguidance111017.pdf>
- l) <https://frameworks-scotland.scot.nhs.uk/consultant-frameworks/>
- m) https://ukbimframework.org/wp-content/uploads/2019/11/GSL_Report_PrintVersion.pdf
- n) https://www.cdbb.cam.ac.uk/files/nhss_sl_process_map_28.02.2020.pdf
- o) <https://www.scottishfuturetrust.org.uk/storage/uploads/constructionqualityassuranceinitiativepdf.pdf>
- p) <http://ef.nes.digital/capital-planning.html>

V2.0 addition:

- q) [https://www.nhsscotlandnorth.scot/uploads/tinyMCE/NOSF&CPG%20SLWG%20response%20to%20Cole%20reports%20-%20Final%20December%202020%20\(1\).docx](https://www.nhsscotlandnorth.scot/uploads/tinyMCE/NOSF&CPG%20SLWG%20response%20to%20Cole%20reports%20-%20Final%20December%202020%20(1).docx)