New Children's Hospital

Independent review of escalation in costs

05 April 2019

pwc

Important Notice

This document has been prepared only for the Health Services Executive ("HSE") on behalf of Government and solely for the purpose and on the terms agreed with the HSE in our engagement letter dated 30 January 2019, amended on 7 February 2019. We have been requested to submit this document to the Department of the Taoiseach. We accept no liability (including for negligence) to anyone else in connection with this document.

The scope of our work was limited to a review of documentary evidence made available to us and interviews with selected stakeholders and project personnel. We have taken reasonable steps to check the accuracy of information provided to us but we have not independently verified all of the information provided to us relating to the services.

A significant volume of documentation was provided to us throughout the course of the review. We have limited our review to those documents that we consider relevant to our Terms of Reference. We cannot guarantee that we have had sight of all relevant documentation or information that may be in existence and therefore cannot comment on the completeness of the documentation or information made available to us. Any documentation or information brought to our attention subsequent to the date of this report may require us to adjust our report accordingly.

For the attention of:
Health Service Executive
c/o Secretary General
Department of the Taoiseach
Government Buildings
Merrion Street Upper
Dublin 2
Ireland

5th April 2019

Subject : New Children's Hospital Independent review of escalation in costs

We report on the escalation of costs in relation to the New Children's Hospital in accordance with our contract dated 30 January 2019 and amended on 7 February 2019 with the Health Service Executive, on behalf of Government.

The subject matter and volume of information we reviewed as part of this process has been complex and significant in nature. Similarly, the timeline against which the review has been conducted has been challenging and has only been achieved with the cooperation of stakeholders involved, for which we are appreciative.

Save as described in the contract or as expressly agreed by us in writing, we accept no liability (including for negligence) to anyone else or for any other purpose in connection with this report.

Yours faithfully,

PricewaterhouseCoopers

Contents

Executive Summary

Introduction

The National Paediatric Hospital Project ("NPH Project") is the most significant capital investment programme ever undertaken in Ireland's healthcare system. It comprises the New Children's Hospital ("NCH") at St. James's Hospital as well as Outpatient and Urgent Care centres located at Connolly and Tallaght hospitals. The NPH Project forms part of a wider integrated programme of change designed to improve the future care of children and young people in Ireland. On completion in 2023, based on the current timeline, the NPH Project will provide: 473 in-patient beds; 22 operating theatres and procedure rooms; and 122 outpatient consulting and examination rooms.

Budget and Cost Escalation

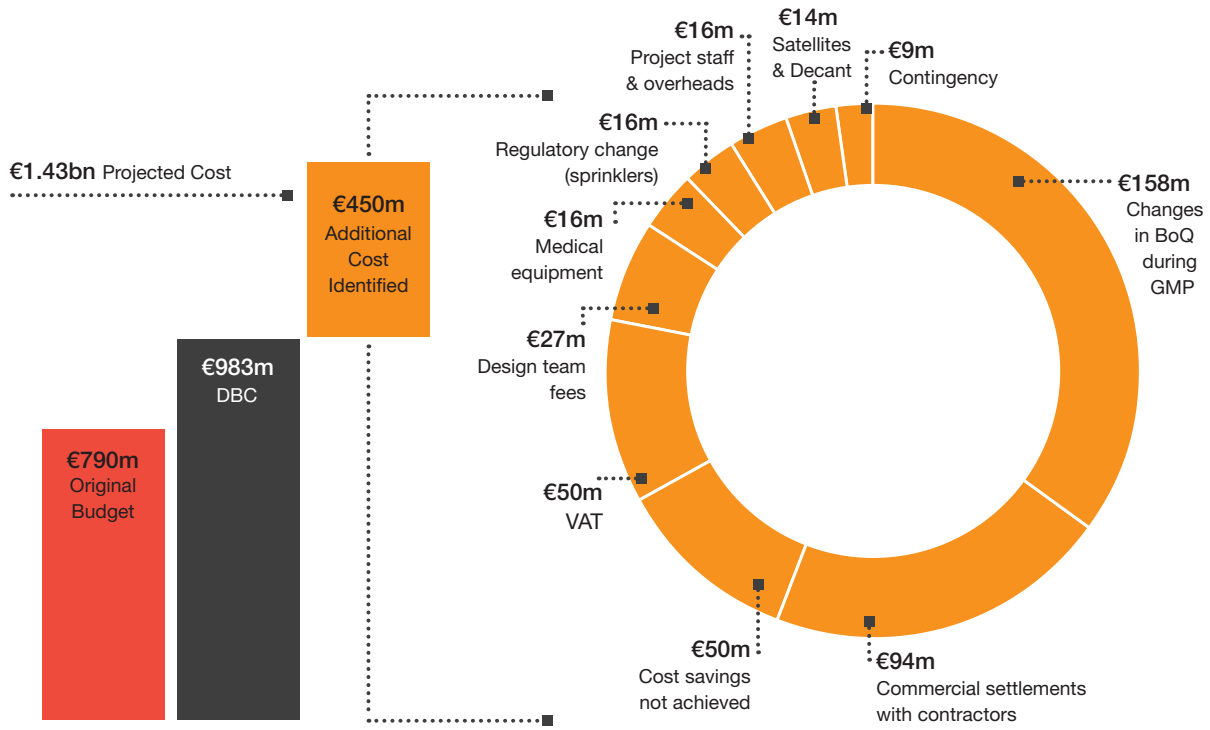
In 2013 the original budget for the NPH Project was defined as €790m[1].

In April 2017, the Definitive Business Case (DBC) identified a total cost of €983m to cover the construction and equipping of the NCH and the two satellite centres.

By December 2018 the estimated cost of building the NCH and satellite centres had increased by €450m to €1.43bn as set out in the diagram below.

To complete the hospital, it is estimated that a further €293m will be required for other items including integration of the three existing hospitals (€86m), IT systems (€97m), implementation of an electronic health record system (€52m) and a research and innovation centre (€18m). There is also a provision of €40m for costs already incurred in relation to the Mater site. Therefore the current estimated Capital Investment Requirement for the NPH Project is €1.73bn.

Figure 1: Original budget, DBC and additional costs identified



1 €650m of the €790m to be provided from Exchequer funding.

Scope of Review

In January 2019, PwC was commissioned by the HSE on behalf of Government to conduct a review to understand the reasons for the cost escalation associated with the NCH construction project. The review was conducted over a nine week period and was based on an analysis of documentation provided, in addition to consultation with relevant individuals involved in the governance and delivery of the project.

This was a complex project. In recognition of this complexity, we brought together a highly experienced team combining international Capital Project and Infrastructure specialists. Our team included chartered engineers, quantity surveyors, chartered accountants, commercial specialists, data analysts and healthcare experts with extensive experience in the review of complex capital projects and programmes.

The primary focus of the review was on the governance and management arrangements in place within and between the National Paediatric Hospital Development Board (NPHDB), the Project Executive, the Design Team, relevant consultants, and contractors. The scope of the review did not cover the initial decision to locate the NCH on the St. James's Hospital site and does not include an assessment of the value for money associated with the construction of the NCH[2]. The additional cost of €293m to complete the NPH Project as referred to above, is not part of the scope of the review.

2 The Terms of Reference for the review can be found in the Appendices.

Timeline for NPH Project

Delivery of the NPH Project is overseen by the NPHDB, which was established by statutory instrument in August 2013. The NCH Design Team comprises firms of architects (BDP and O'Connell Mahon), design engineers (Arup and O'Connor Sutton Cronin) and quantity surveyors (Linesight) was in place by August 2014. An NPH Executive was also appointed, charged with the executive management of the project and the Design Team. Planning permission, based on the initial design for the hospital, was granted in April 2016.

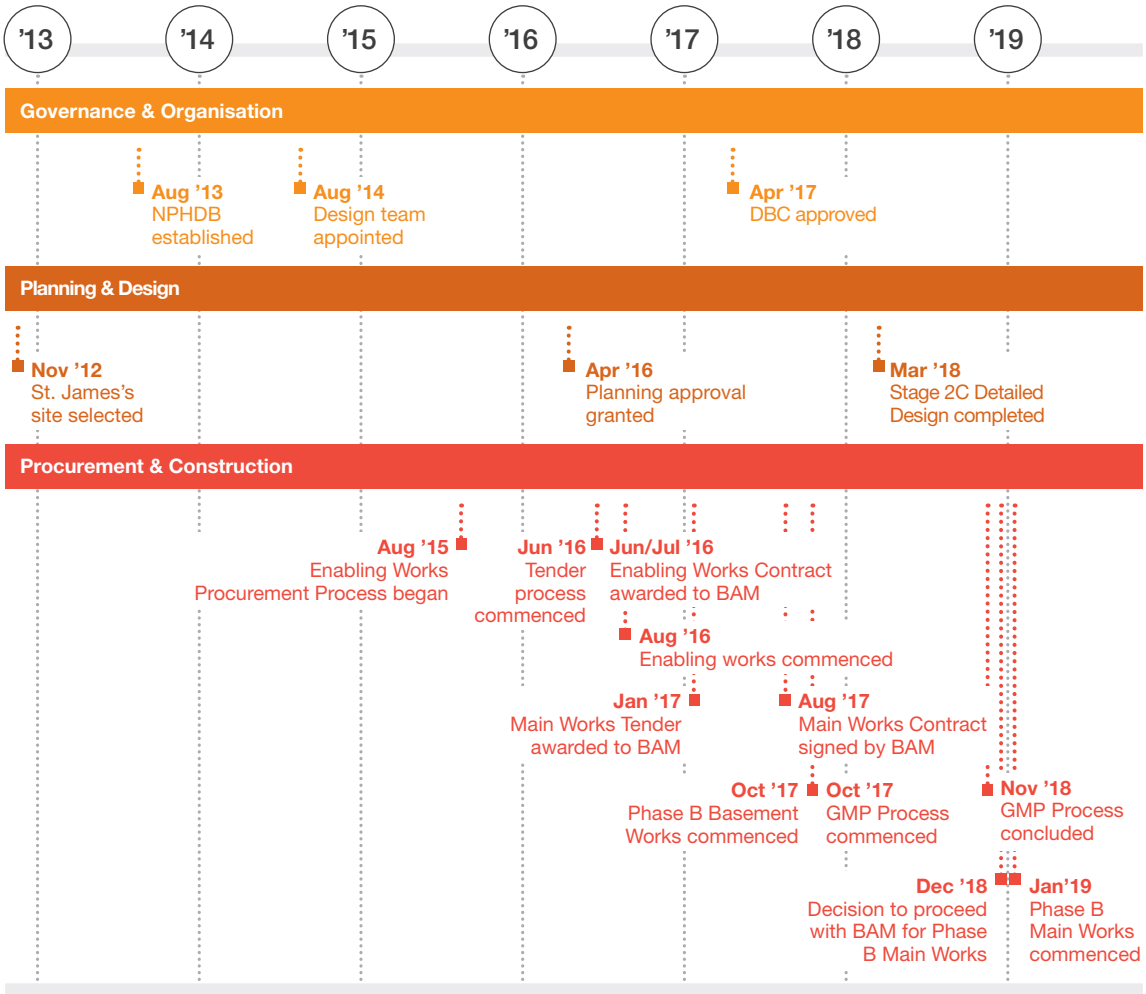
Construction of the NCH has been divided into three main parts, as follows:

1. Enabling works to clear the existing site at St. James's Hospital and prepare it for construction;
2. Construction of the basement and foundations; and
3. Construction of the main NCH building.

An initial tender was conducted for the first part and this was awarded to BAM in June 2016. A combined tender was then carried out for parts 2 and 3, which was awarded to BAM in February 2017. While the construction of the basement and foundations was being carried out, a process was conducted between BAM and the NPHDB to establish the Guaranteed Maximum Price (GMP) for the total cost of constructing the NCH. This process was finalised in November 2018 and a decision to proceed with the main construction based on the outcome of the GMP process was made in December, with work commencing in January 2019.

The key milestones relating to the NCH Project are set out in the diagram below:

Figure 2: NPH Project key milestones



Findings

The key findings of our review are set out below under the following headings: Set-up, Planning and Budgeting (underestimation); Execution; and Governance.

Set-up, Planning and Budgeting

Significant failures occurred during the crucial planning and budgeting stages of the project. The basis of the original budget was flawed and risks were understated in the business case. There was a lack of sufficiently comprehensive or robust planning for the process to establish a Guaranteed Maximum Price (GMP) for the construction of the New Children's Hospital. This created a situation in which the approved project could never be delivered within the financial parameters agreed.

The two-stage procurement process used to award the contract for construction of the NCH is a widely used approach. It can deliver significant benefit in relation to accelerating project timelines, however the necessary controls required to mitigate the associated risks and consequences of this approach were not put in place in this instance. Specifically:

- The understanding of the risk profile associated with the procurement and contracting strategy was poor at all levels of the governance structure. The capital budget made no provision for the price premium that the public sector would need to pay the contractors to bear the risks transferred to them through the GMP Process. There was also no contingency in the capital budget to absorb risks that might emerge during the process of agreeing a GMP. As a consequence the budget significantly underestimated the likely outturn cost. Furthermore, red flags indicating the inadequacy of the budget were missed;

- The procurement strategy included a mitigation option that in the event that a GMP could not be agreed with the preferred tenderer, the NPH Client[3] could procure and proceed with an alternative contractor. This was an unrealistic option which gave a false sense of security, and ultimately increased the risk inherent in the GMP Process. Changing the contractor would lead to a delay associated with re-tendering the project, with a likely increase in cost given the time elapsed since the original procurement;

- The DBC, on which the Government made its investment decision, contained material errors and did not adhere to the Public Spending Code. It overstated the maturity of the project and level of confidence in the forecasts, and understated the complexity and risks. This impaired the ability of stakeholders to provide effective challenge and consideration to the investment decision. A different outcome may have been reached had the business case more accurately conveyed the uncertainty inherent in the project; and

- There was a lack of formal planning, strategic direction and preparation in relation to the process by which the GMP would be determined. The Project Execution Plan (PEP), which set out the controls that would be put in place, was issued with considerable gaps and key controls were identified but not defined. As a consequence, the project was allowed to progress without the control arrangements to keep it on track.

Execution

Once underway, the process by which the GMP was determined was poorly coordinated and controlled.

- The process by which the GMP was determined created a significant imbalance between the NPH Client and its Contractors. This, combined with limited direct engagement by the NPH Executive in the latter stages of the process restricted their influence on the settlement with the Contractors;

- The NCH's Quantity Surveyor, Linesight, used a number of different techniques to determine quantities, which were in some cases different to those used by the Contractors. This complicated the process of determining the GMP. Furthermore, cost trend reporting was fragmented, difficult to interpret and at risk of error. This made it very difficult for the NPH Executive and the NPHDB to understand the unfolding picture of increasing costs;

- The control environment across the programme was weak and inadequate given the scale and complexity of the NPH Project. Progress reporting was generally unstructured, fragmented and lacked key information. Processes to manage risk, change and documentation were ineffective and project systems were insufficient. This created the conditions for major issues to arise without warning and to escalate unchecked; and

- The commercial construct of the Design Team created accountability gaps between the parties and impaired the effective coordination of the GMP Process.

3 NPH Client describes the entity as a whole rather than any specific component of its governance or management structure (for example, the NPHDB or NPH Executive).

Governance

The level of trust that the NPHDB placed on the NPH Executive and Design Team gave rise to insufficient scepticism and challenge. The structures above the NPHDB became reactive, limited by their terms of reference.

- The level of trust that the NPHDB placed on the NPH Executive and Design Team gave rise to insufficient scepticism and challenge, which allowed the impact of deficiencies to grow unabated. This created an environment in which the project was allowed to progress too quickly without being subject to rigorous challenge;
- There was an overreliance on written assertions by the Design Team relating to the level of cost certainty at tender stage. In our view there was sufficient evidence to the contrary that should have prompted earlier and greater challenge and scepticism by the NPHDB and NPH Executive;
- Although the NPHDB and NPH Executive had extensive experience of major and complex project development, specific healthcare infrastructure development experience was more limited. This experience was important in the sub-committee structures but was stretched. As a result reliance was placed on the expertise brought by the Design Team and effective oversight, performance management and instruction appeared to be challenging; and
- Whilst the governance structures in place above the NPHDB were complex, they did not appear to impede the flow of information relating to cost. However delays in the design development process and the costing of packages meant that critical information was only visible when the GMP Process was in its latter stages. The role of the governance structure became reactive with virtually no leverage to influence the outcome.

Cost Impact of Key Findings

In our view the €450m increase in projected costs in the NPH Project are attributable to the following areas (as illustrated in the diagram overleaf):

1. **Underestimation**: Costs that are a consequence of underestimation, principally during the planning, budgeting as well as set-up stages of the project. In our assessment, €294m (65%) of the cost increase can be attributed to issues that should have been identified prior to the approval of the DBC. It includes, for example, the price of risk transferred to the subcontractors that was insufficiently priced as well as costs that would have been absorbed by the inclusion of an allowance for optimism bias and a more appropriate level of contingency;
2. **Execution Issues**: Costs that were incurred as a result of issues that occurred during the GMP Process or the management of it. In our assessment, €56m (12%) of the cost increase can be attributed to issues that include delays to the GMP Process and its coordination;
3. **Consequential**: Secondary costs that have arisen as a direct consequence of costs associated with other issues, for example, VAT or contingency increases that arise from the overall increase in the construction estimates. In our assessment, €64m (14%) of the cost increase can be attributed to consequential costs;
4. **Uncontrollable**: Costs over which the NPHDB and NPH Executive had no control, for example those that arose from regulatory or legislative change. In our assessment, €16m (4%) of the cost increase falls under this category and is in relation to the regulatory change requiring installation of sprinkler protection throughout the hospital;
5. **Unclassified**: Costs that we have been unable to identify or allocate to a particular category. In our assessment these amount to €20.4m (5%); and
6. **CIR:** Capital Investment Requirement is the total estimated cost of the NPH Project.

Figure 3: The €450m increase of projected costs by identified area[4]

Cost reduction opportunities

Of the total project cost of €1.43bn, approximately 85% has already been contractually committed through the agreement of the GMP, and a further 2% relates to VAT payable on the NPH Project. The ability for cost reductions in these committed areas is very limited due to the restrictions in the respective contracts. Whilst cost reduction may be technically possible, exercises of this nature come with considerable risk of further claims from and disputes with the Contractors. Specifically any actions that carry a programme impact should be avoided. We are of the view that the focus of the NPHDB and NPH Executive going forward must be on the enhancement of the delivery and oversight arrangements to reduce the risk of future cost increases to the greatest possible extent.

Flow of Information

The reporting of cost information to the NPHDB, CHP&P Board and CHP&P Steering Group was sporadic. The updates on initial cost increases (€61m) were inconsistent at each of the stakeholder group levels but once significant cost pressures were identified during the GMP Process, reporting of issues appears to have been correctly managed.

Residual Risk

Whilst the conclusion of the GMP Process has now passed significant commercial risk to the Contractors, it is not a fixed price and risks still remain with the NPH Project. If these are not effectively managed, it could lead to further cost rises in relation to the capital works from the current forecast of €1.43bn (this is in addition to the €293m mentioned earlier in this report).

The key risks identified include:

- **Incomplete Design** - Elements of the design remain to be finalised. This is reflected in a number of assumptions that underpin the agreed packages of work for the main construction phase;
- **Provisional Sums** - Elements of the design remain to be fully quoted and costed. A total provisional sum amount of approximately €50m exists within the GMP at this time. This may not be adequate;

- **Contract Exclusions** - The contract contains exclusions that allow for recovery of costs relating to tender price inflation above 4%, as well as cost increases arising from statutory changes such as VAT increases. For example, an increase in Construction Price Inflation to 10% would result in an additional cost in the order of €97m to the project. Current Tender Price Inflation is 7.1%;

- **Schedule Adherence** – Any slippage against the agreed schedule could result in claims from Contractors for additional costs as a result of delays;

- **Governance Controls** - issues were identified in this review, which if not addressed, create potential for cost escalations not being identified and addressed in a timely and controlled manner; and

- **Programme Alignment** – The NPH Project requires significant integration of equipment and ICT systems, which is within the CHP&P Steering Group's remit and if not aligned, creates a risk of delays and/or design changes, impacting cost and timeline.

Recommendations

Based upon our findings, the following recommendations have been made:

New Children's Hospital Project

1. The project control environment should be overhauled to bring it up to the level of maturity and sophistication required for a project of the scale, complexity and importance of the NPH Project;

2. Comprehensive plans should be developed to mitigate the residual risks identified;

3. A Project Assurance Strategy, should be developed and implemented for the remainder of the NPH Project;

4. The commercial capability and capacity of the NPH Executive should be strengthened so that it is more self-sufficient and less reliant on external advisors;

5. The Executive of the NPH should be strengthened in the short term to support the planning and execution of the next phase;

6. Consideration should be given to opportunities for the closer working of the NHPDB and the CHI Board. This should include the potential for some shared appointments to promote integration and to address skills gaps;

7. The NHPDB should request confirmation of a number of key decisions in relation to procurement / approach for medical equipment, ICT and electronic health records to enable effective planning of the next phase of the programme;

8. The scope and responsibilities of the advisory firms that constitute the Design Team should be reviewed to reflect their future roles;

9. In view of the potential consequential programme risks, a scrutiny process that includes all levels of the governance structure should be put in place.

Other Capital Infrastructure Projects

10. The rules that govern public sector spending on major capital projects should be strengthened. The standards to which business cases must adhere should be more clearly defined and robustly enforced; and

11. A central assurance and challenge function should be established within Government to provide consistent challenge to and review of major projects throughout their lifecycles.

Conclusion

While reviews of this nature tend to focus on what went wrong, it is also important to recognise the progress made to date in the development of the NCH. After false starts and failures to build this hospital over many years, significant progress was made in dealing with difficult issues such as planning, completing the enabling and underground works, and the scheduled opening of the satellite centres.

Complex and unique programmes of work such as the NCH can never be fully de-risked and some evolution in cost must always be anticipated. When planning, budgeting and managing such programmes it is therefore imperative that: a sound baseline is first established, including the allocation of reasonable contingencies; risks and issues are proactively identified and monitored to enable early detection and resolution of emerging issues; and any changes to the agreed baseline are made in a controlled manner respecting the agreed oversight structures put in place.

This unfortunately did not occur in the case of the NCH, which from the outset, was driven by an imperative for timely completion, within a cost envelope that was never adequate to deliver the envisaged outcome and from a design that was continually evolving.

Whilst early progress was undoubtedly achieved, this was at the cost of visibility and control of the actual costs likely to be accrued from design finalisation and the conclusion of the GMP Process. This resulted in a rapid escalation of costs at a late stage in the programme. At this point, taking any alternative course of action, other than continuing, would have in all likelihood resulted in significant delay, increased cost and the possibility that the hospital would not be built. In addition, had the true cost of the NPH Project been known at an earlier stage in the process, this information could have had a material impact on decisions relating to planning, budgeting and design.

1

Introduction

This section of the report sets out an overview of the NPH Project, our approach and the structure of the report.

1.1 Overview of the National Paediatric Hospital Project

The National Paediatric Hospital Project ("NPH Project") comprises the New Children's Hospital ("NCH") at St. James's Hospital and Outpatient and Urgent Care centres located at Connolly and Tallaght Hospitals ("Satellite Centres"). It is the most significant capital investment programme ever undertaken in Ireland's healthcare system and forms part of a wider integrated programme of change designed to improve the future care of children and young people in Ireland[4]. The target completion date of the NCH is 2022, with the provision of clinical services planned to commence in 2023. On completion the NCH Project will provide 473 in-patient and day beds, 22 operating theatres and procedure rooms and 122 outpatient consulting and examination rooms[5].

The NCH is the centrepiece of the NPH Project. The NCH is being built on the site of St. James's Hospital campus and, on completion, will bring together clinical services currently provided at three other children's hospitals: the National Children's Hospital Tallaght, Temple Street Children's University Hospital and Our Lady's Children's Hospital Crumlin. Its stated ambition is to provide "a world class facility to care for children and young people from all over Ireland who have complicated and serious illnesses and who are in need of specialist and complex care"[6] and its design and specification reflects this.

The NCH is a substantial development. It comprises a gross floor area of approximately 123,000 square metres and a three-level basement of 35,000 square metres. It will be one of the largest children's hospitals in the world and the largest public building project in Ireland.

The NCH, together with the two Satellite Centres, has been designed as a "Digital Hospital"[7]. Information and Communications Technology ("ICT") will underpin the delivery of clinical services and the facilities will effectively be paperless, with patient records stored, processed and shared electronically. The NPH Project is integrated with the wider Electronic Healthcare Record ("EHR") programme, which is being developed by eHealth Ireland.

Enabling works at the St. James's site commenced in August 2015 and the main construction works for the NCH commenced in October 2017 following the appointment of the Main Contractor, BAM. The total expenditure of the project to date is €294m as at 29 March 2019[8].

Image 1 : Artist's impression of the New Children's Hospital at the site of St. James's Hospital

4 Project Brief Rev A, p4, 21 February 2017
5 DBC, Rev B, p121, 9 February 2017
6 Project Brief Rev A, p9, 21 February 2017
7 Project Brief Rev A, p20, 22 February 2017
8 Figure for total expenditure to date provided by the National Paediatric Hospital Development Board

Image 2: Paediatric Outpatient and Urgent Care Centre at Tallaght Hospital

Image 3: Paediatric Outpatients and Urgent Care Centre at Connolly Hospital

1.2 Background to this review

In the latter half of 2018, the HSE became aware that the capital budget for the NPH Project was likely to be breached by a significant margin. On conclusion of the GMP Process in November 2018 the CIR had risen to €1.43bn, an increase of €450m over the approved project budget.

In January 2019[9], PwC was appointed by the HSE on behalf of Government to conduct a nine week independent review into the cost overruns to understand the sequence of events, establish what was known, when and by whom, identify the root causes for the cost increases and comment on both future risks and changes that should be made to address them. Our full Terms of Reference is included in Appendix A.

1.3. Our review approach

The NPH Project today is the culmination of millions of hours of work; tens of thousands of individual activities have been completed, analyses undertaken, judgements considered and decisions made. A huge supply chain of contractors, suppliers and professional advisors has contributed to its development, along with a considerable number of healthcare professionals and government stakeholders who have each played their part. Every day, hundreds of individually choreographed activities take place to move it towards completion. The project's complexity cannot and should not be understated.

Our review has required us to rapidly understand the technicalities of the project and its story. It has required us to deconstruct the complex and intertwined events and circumstances that led to its position today and to drill deep into the causes of the issues that it currently faces.

In recognition of this complexity, we brought together a highly experienced team combining international Capital Project and Infrastructure specialists. Our team included chartered engineers, quantity surveyors, commercial specialists, data analysts, chartered accountants and healthcare experts with extensive experience in the review of complex capital projects and programmes.

Our review involved:

- The review of in excess of 2,000 project documents, records and data (a full list is provided in Appendix B);
- Over 40 interviews with 52 members of the project team, contractors, advisors and wider stakeholders;
- A visit to the construction site to understand the complexities and constraints of the location and build;
- Detailed analyses across a wide range of aspects of the project; and
- Fact checking and verification exercises.

9 Under a letter of engagement dated 30 January 2019 and amended on 7 February 2019

The purpose of these interviews has been to explore the context in which the project to date was delivered and to identify further documents or records that may be relevant to our review. Information revealed in the interviews does not form part of the evidence base on which our findings rely.

Specific areas of focused analysis are included in the following table:

Figure 4: Area of focus of the review

Area of Analysis	Description
Governance structures and policy documents	We analysed the structure of the project, the means by which information flowed through the various parties and the key areas of decision making and oversight.
Reporting	We assessed a vast quantity of reports between the various parties on the project, along with a significant volume of meeting minutes, to ascertain what was reported and when.
Finance and cost	We extracted and analysed detailed financial data to understand the patterns of how and when costs escalated.
Commercial agreements	We reviewed a multitude of contractual agreements to understand the key roles, responsibilities and accountabilities across the project.
Project records	We reviewed and analysed a considerable volume of project records to establish how key processes were set up and how they worked in practice.
Bill of Quantities	We extracted, cleansed and analysed thousands of line items within the Bills of Quantities to understand how quantities and costs changed between the start of the GMP Process and its conclusion.
Design data	We extracted and conducted pattern analytics on a wide range of design information including Requests for Information, design submission and revision data.

1.4 Structure of our report

In the following sections of our report we set out:

- **The background of the project:** The project's early history from inception to the selection of the site of the NCH at St. James's Hospital and the project's recent chronology, Section 2;
- **The key issues:** Our assessment of the major issues that occurred that relate to the increase in costs from the project budget of €983m to the estimate on conclusion of the GMP Process, resulting in CIR of €1.43bn, Section 3;
- **Cost impacts of the key issues:** Our analysis of the cost increases, including a stratification of them into the key issues identified, Section 4;
- **Flow of information:** Our analysis of how information relating to the cost issues was reported up through the project and governance structures above the NPHDB, Section 5;
- **Residual risks and opportunities:** Our analysis of the residual risks facing the project and opportunities to reduce cost, Section 6; and
- **Recommendations:** Our assessment of the steps that should be taken to address the issues identified in our report, Section 7.

2

Background to the Project

2.1 Introduction

This section of the report sets out the project's early history from inception to the selection of the site of the NCH at St. James's Hospital and the project's recent chronology.

2.2 Early History of the Project: Inception to November 2012

Proposals to create a single national children's hospital in Ireland have been around, in one form or another, for several decades. The concept was given fresh impetus in 2005 following a review of paediatric services commissioned by the HSE. The review recommended the building of a single national children's hospital, which would in turn necessitate the amalgamation of the three existing children's hospitals in Dublin[11].

The Government accepted the report's recommendations and by November 2006 the Mater Hospital Campus had been identified as the preferred location for this new hospital with an opening scheduled for 2015. In 2007 the then Minister for Health appointed a National Paediatric Hospital Development Board[12] ("NPHDB") to oversee the hospital's development.

A planning application for the development was submitted in July 2011, which was subsequently contested and an appeals process followed. Planning Permission was refused in February 2012 and the search for a new site commenced thereafter, concluding in November 2012 with the selection of the St. James's Hospital location.

2.3 Chronology of recent key events

A new NPHDB was established by statutory instrument in August 2013 with the remit to 'Design, Build and Equip' the NCH on the St. James' campus along with two satellite centres located in Tallaght and Connolly Hospitals.

The NPHDB is composed of senior individuals with background and experience in architecture, planning, engineering and procurement. Members of the board are committed individuals with strong public service ethos, whom have committed very significant amounts of time to the NCH Project.

As reflected by the earlier failed attempts to deliver the NCH, it is a project which is unique in scope, scale and complexity in comparison to any other health infrastructure project in Ireland's recent history. In reaching the current project status many successes have been recorded, and this point should not be overlooked when reviewing the findings of this report.

Since its appointment, the NPHDB has successfully overseen the delivery of several key milestones including planning application submission and approval, enabling and underground works and progress on the Satellite Centres.

The appointment of a Design Team for the NPH Project comprising firms of architects (BDP, O'Connell Mahon Architects), Design Engineers (Arup, O'Connor Sutton Cronin) and Quantity Surveyors (Linesight) commenced thereafter, along with an executive body charged with the executive management of the project and Design Team.

Separate design team(s) are in place for the Satellite Centres. This comprises architects (Coady Partnership Architects, HLM), Design Engineers (Ethos, ROD) and Quantity Surveyors (Turner & Townsend).

The design works commenced in January 2015 with the procurement strategy approved in May 2015 (with a subsequent update in February 2016) and procurement activities for a main contractor began in August that year. Planning permission was granted in April 2016.

The Main Contractor, Bam Ireland Limited ("BAM"), was appointed in January 2017, with contract award in August 2017, along with a number of Specialist Subcontractors including H. A. O'Neil Limited ("HAO") and Mercury Engineering Ltd ("Mercury"). The project's DBC was approved in April 2017, sanctioning capital investment of €983m.

Contracts were signed in August 2017 and Phase A Construction Works commenced thereafter[13], with target completion in 2022 allowing the hospital to open in 2023.

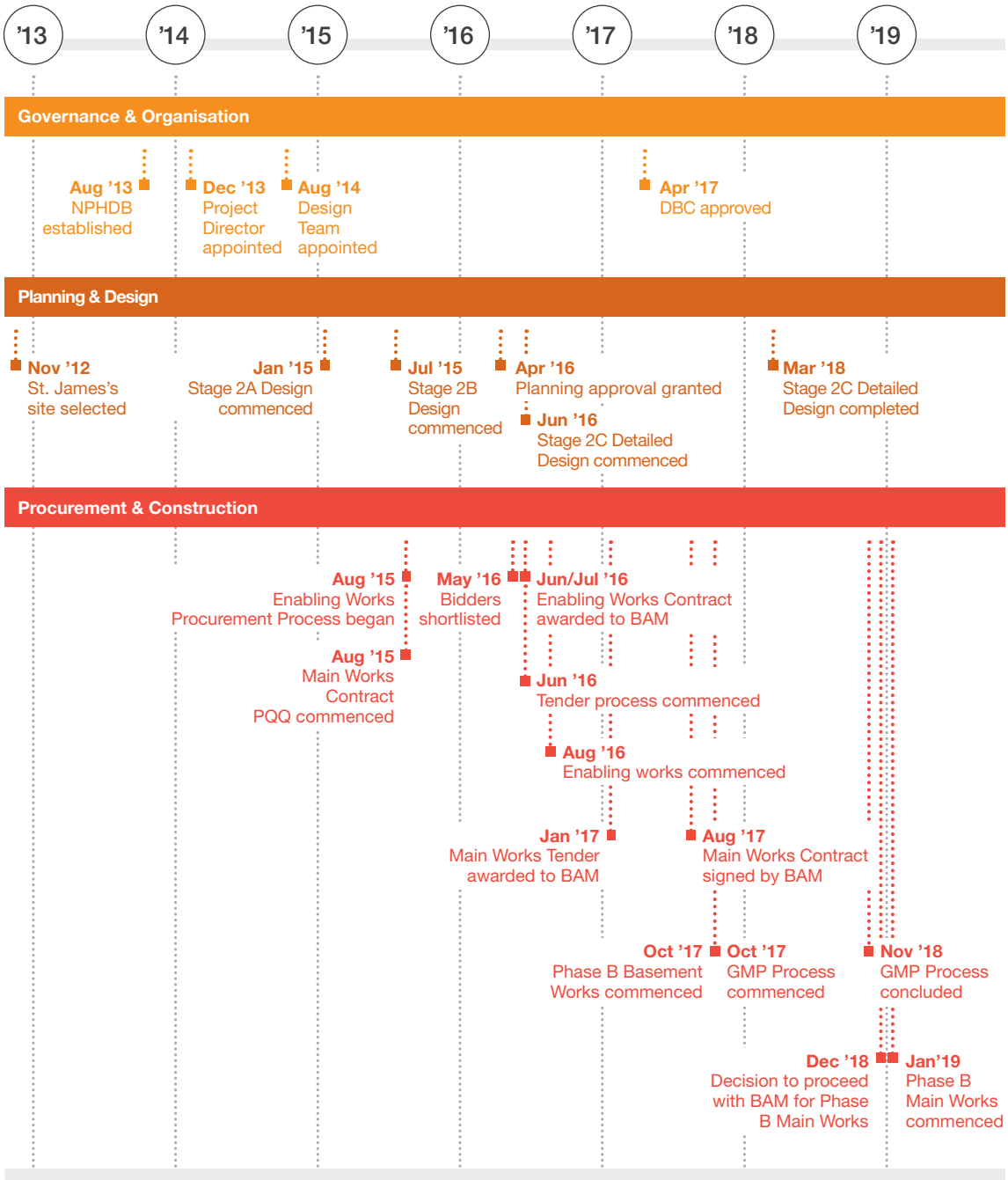
The timeline overleaf, summarises the key events and milestones for the NPH Project, from the selection of the site of the NCH at St. James's Hospital through to the present day.

11 Children's health first: McKinsey report 2006, McKinsey & Company, 2006

12 The NPHDB was re-established with new membership in August 2013 under statutory instrument and remains the body responsible for the oversight of the NPH Project. All future references to the NPHDB from this point forwards refer to the body created in August 2013 and not its previous incarnation

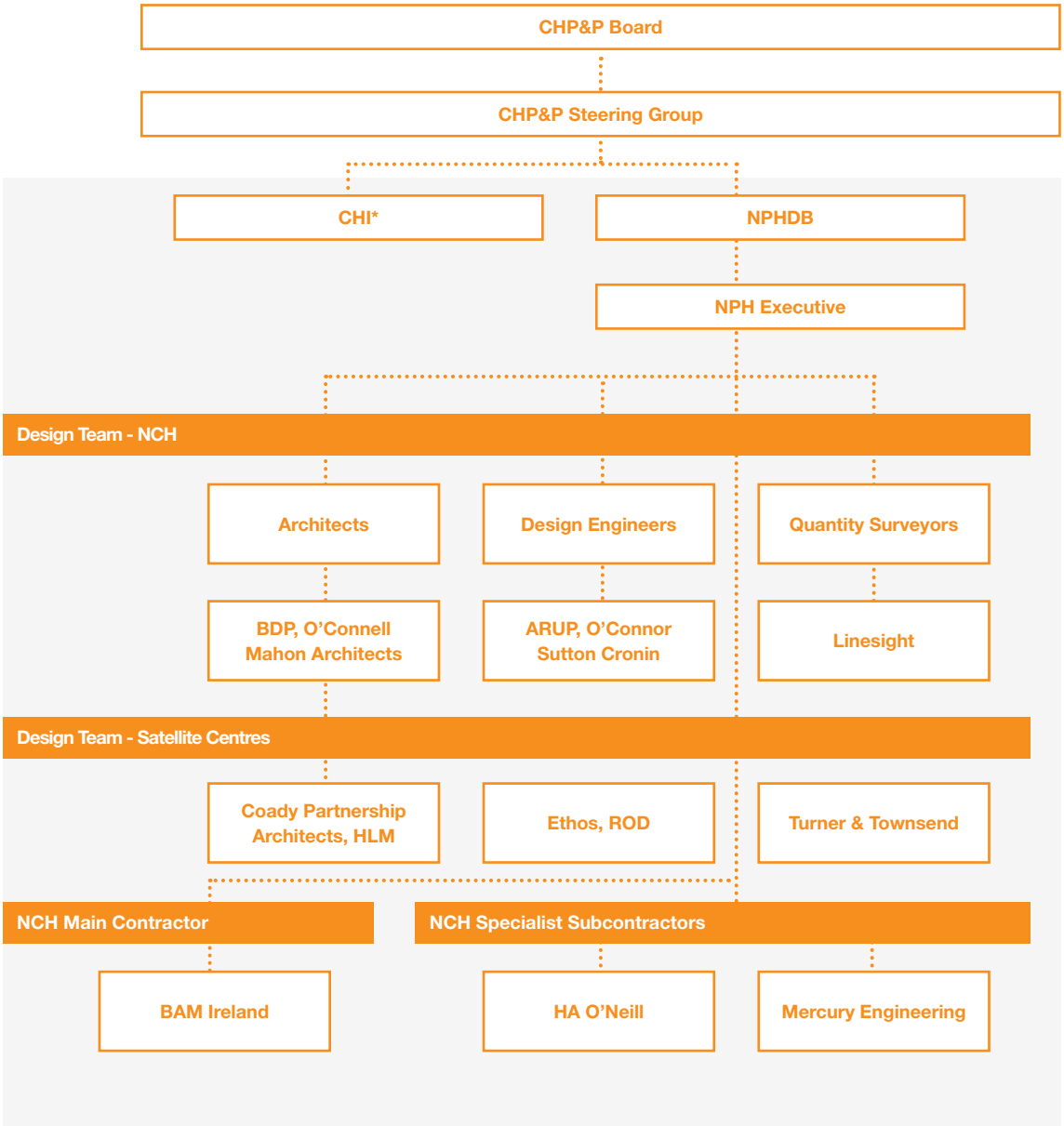
13 Enabling works for the site were procured separately and commenced in August 2015

Figure 5: Key events and milestones of the NPH Project



The organisation structure for the NPH Project including the entire supply chain across the Project is set out below.

Figure 6: Organisation structure for the NPH Project



* CHI was established by Statutory Instrument from 1st January 2019. Before this it was the Childrens Hospital Group.

3

The key issues

3.1 Overview

This section of our report sets out our assessment of the major issues that occurred that relate to the increase in costs from the project budget of €983m to the estimate on conclusion of the GMP Process, resulting in a Capital Investment Requirement of €1.43bn.

The issues are set out under three key headings, as follows;

Setup, planning & budgeting (underestimation):

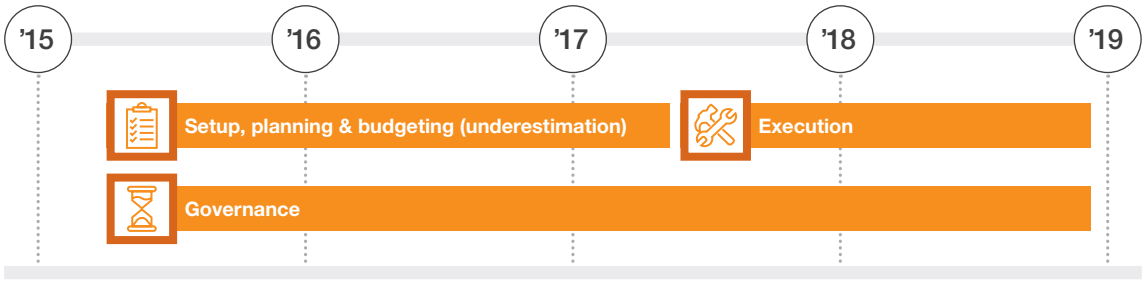
Following the approval of the procurement strategy in May 2015 (subsequently updated in February 2016) through to the approval of the DBC, which set the €983m project budget, in April 2017;

Execution:

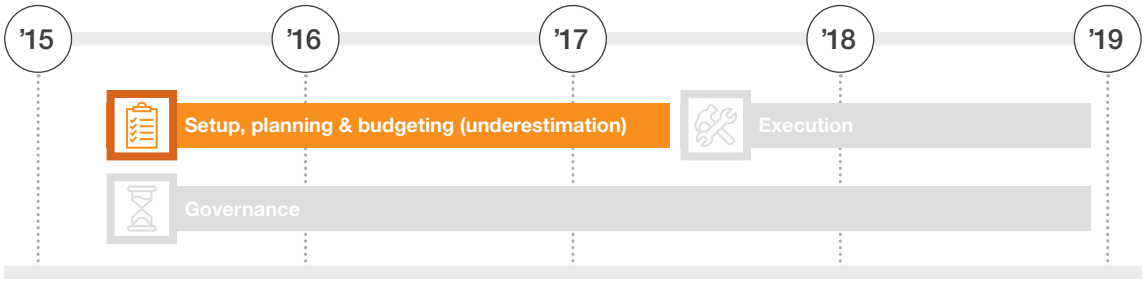
Following the approval of the DBC in April 2017 through to the process to determine the GMP in November 2018; and

Governance:

Relating to the oversight arrangements both above and below the NPHDB.



Throughout this section we refer to NPH Client which is defined as the entity as a whole rather than any specific component of its goverance or management structure (for example the NPHDB or NPH Executive).



3.2 Setup, planning and budgeting (underestimation)

Significant failures occurred during the crucial planning and budgeting stages of the project. The basis of the original budget was flawed and risks were understated in the business case. There was a lack of sufficiently comprehensive or robust planning for the process to establish a GMP for the construction of the New Children's Hospital. This created a situation in which the approved project could never be delivered within the financial parameters agreed.

Our review found issues in the following areas:

- **Procurement, contracting strategy & budgeting:** The understanding of the risk profile associated with the procurement and contracting strategy was poor at all levels of the governance structure. The capital budget made no provision for the price premium that the public sector would need to pay the contractors to bear the risks transferred to them through the GMP Process. There was also no contingency in the capital budget to absorb risks that might emerge during the process of agreeing a GMP. As a consequence the budget significantly underestimated the likely outturn cost. Furthermore, red flags indicating the inadequacy of the budget were missed;

- Additionally, the procurement strategy included a mitigation option that in the event that a GMP could not be agreed with the preferred tenderer, the NPH Client could procure and proceed with an alternative contractor. This was an unrealistic option which gave a false sense of security, and ultimately increased the risk inherent in the GMP Process. Changing the contractor would lead to a delay associated with re-tendering of the project, with a likely increase in cost given the time elapsed since the original procurement;

- **The DBC:** The DBC, on which the Government made its investment decision, contained material errors and did not adhere to the Public Spending Code. It overstated the maturity of the project and level of confidence in the forecasts, and understated the complexity and risks. This impaired the ability of stakeholders within HSE and DoH to provide effective challenge and consideration to the investment decision. A different outcome may have been reached had the business case more accurately conveyed the uncertainty inherent in the project; and

- **Execution planning:** There was a lack of formal planning, strategic direction and preparation in relation to the process by which the GMP would be determined. The PEP, which set out the controls that would be put in place, was issued with considerable gaps and key controls were identified but not defined. As a consequence, the project was allowed to progress without the control arrangements to keep it on track.

3.2.1 Procurement, contracting strategy and budgeting

The understanding of the risk profile associated with the procurement and contracting strategy was poor at all levels of the governance structure. The capital budget made no provision for the price premium that the public sector would need to pay the Contractors to bear the risks transferred to them through the GMP Process. There was also no contingency in the capital budget to absorb risks that might emerge during the process of agreeing a GMP. As a consequence the budget significantly underestimated the likely outturn cost. Furthermore, red flags indicating the inadequacy of the budget were missed.

The single largest item in the original project budget was the construction budget for the NCH, which was €575m including an associated allowance for inflation, as defined under the contract. The project budget was informed by tender exercises for the Main Contractor, along with Specialist Subcontractors for Mechanical Works, Electrical Works and Lifts Works.

The procurement strategy[14] set out an intention that the NCH would be delivered under a single contract, split into two components for the purposes of procurement: Phase A Works and Phase B Works.

- The Phase A Works comprised, amongst others, excavation, piling and construction of the basement; and
- The Phase B Works comprised the remaining "above-ground" works for the NCH and was to be procured following a two-stage process[15].

Extract 1: Definition of two stage process

"A two-stage process differs from single-stage traditional procurement. Its philosophy is that early involvement and collaboration with the supply chain de-risks a project and provides shorter delivery timeframes. It allows the supply chain to input into the latter stages of design, reducing the risk of buildability issues and increases familiarity of the project. It also allows work to start on site earlier, improving the timetable. Two-stage procurement is widely used internationally, although its application in Ireland is relatively novel, particularly in the public sector."

A principle of the procurement strategy was that the two-stage tender process would run based on the Developed Design (Stage 2B), with further development of the design into a Detailed Design (Stage 2C) taking place with the Main Contractor and Specialist Subcontractors appointed. The GMP was to be determined with them on completion of the Stage 2C Design, at which point delivery risk would transfer to them.

The strategy identified that a lack of interest from the market was a "primary potential risk" to the procurement[16] and mitigation strategies were put in place to address this. These included instructing Tenderers to price a BoQ issued to them (based on the Stage 2B Design) and giving "primacy" to it, which meant that Tenderers should rely on it for pricing purposes. This limited the cost and effort associated with tendering on the project and contractually committed Tenderers to a set of unit rates for materials and components (an important consideration given tender inflation in the local market at the time). It also generated bids that were directly comparable from a pricing perspective, reducing the risk of subjectivity in the evaluation process.

14 New Children's Hospital Procurement Strategy, 7 May 2015, p4

15 New Children's Hospital Procurement Strategy, 7 May 2015, p4

16 New Children's Hospital Procurement Strategy, 7 May 2015, p10

The capital budget was insufficient because it did not include provision for the cost premium associated with the transfer of risk to the project Contractors as the procurement strategy envisaged.

- The procurement strategy was intended to transfer cost risk to the Contractors through the first stage of the two-stage process. In line with the strategy, the risk on the Contractors was limited to their proposed programme of rates when their respective bids were submitted, as they were instructed to price a BoQ issued to them and not to develop their own based on an issued design. At this point, therefore, cost risk remained with the NPH Client.

> Extract 2: Excerpt from NCH Procurement Strategy, 7 May 2015
>
> "5. Ensuring the project will be well received by the market, achieved by strategies such as;-
>
> a. Primacy of BoQ (contractors can rely on quantiles measured in BoQ) and utilisation of two stage tendering facilitating contractor VE input etc.
>
> b. Traditional employer design, not contractor design and build (reducing tender costs + risk to contractors).
>
> c. Nominated/ Specialist sub-contractors (not domestic sub-contractors). Ensuring specialist sub-contractor interest in the project as they will have better protection afforded by nomination.
>
> d. Opportunity to be engage in value engineering process/early contractor involvement.
>
> e. Selection criteria which will encourage contractor engagement /applications."

- By contrast, on conclusion of the first stage and arrival at a GMP, cost risk almost fully transferred to the Contractors and beyond this point, the risk of quantities being incorrect was borne by the Contractors. Whilst the contract acknowledged the premium associated with this, stating that the contractor and specialist subcontractors were entitled "to present any reasonable proposition with regard to the risk around particular quantities"[17], a provision was not made in the original capital budget to account for it. We do not consider that this is a matter of the adequacy of the contingency provision, since contingency is to allow for risk events rather than certainties. It should therefore have been provisioned for separately in the budget.

> Extract 3: Excerpt from Main Contract Pre Phase B Engagement Process
>
> "10 Sign off On Quantities/ Adjusted Contract Sum
>
> Whilst all tenderers will price the Phase B Works during the tender preparation period, the finalisation of the quantities for the Phase B Works for the Contractor will take place during the Pre Phase B Engagement Process in accordance with the process set out in Exhibit A attached. On the instruction to commence the Phase B Works the Contractor and Specialist Sub-Contractors will take responsibility for all quantities relating to the Works, as set out and shown on all drawings, specifications and supporting documentation, which will have been developed as part of the Pre Phase B Engagement Process. Upon finalisation of the Adjusted Contract Sum, the Main Contract will be a lump sum contract with the Contractor and Specialist Sub-Contractors assuming responsibility for quantities.
>
> The Contractor/Specialist Sub-Contractors shall be provided with every opportunity to check and confirm quantities and to present any reasonable proposition with regard to the risk around particular quantities. In this regard it is important to note that during Pre Phase B Engagement Process the drawings and specifications shall continue to be developed and the bills of quantities will be updated (with the input from the Contractor/Specialist Sub-Contractors) to reflect all such design development prior to final conversion to a lump sum contract, with the Contractor/Specialist Sub-Contractors assuming responsibility for quantities thereafter."

17 New Children's Hospital Main Contract, Appendix 2, Main Works Contract, Appendix 2, item 10 - Sign off On Quantities/ Adjusted Contract Sum

 Setup, planning & budgeting (underestimation) Execution

 Governance

The capital budget did not contain sufficient risk contingency to allow for costs that would arise through the design development process.

- The BoQs provided to Tenderers during the tender process were based on a measure of the design undertaken in accordance with defined rules of measurement[18]. These rules are concerned solely with the translation of design into quantities and are not intended to make provision for additional quantities arising from change that occurs during the normal course of design development. The BoQs did not include provision for uncertainty that existed in the design at that time and, therefore, the costs that were returned by the market were also provided without additional risk provision.

- The budget also omitted the funding requirement for "programme alignment", the need for which was driven by the initial procurement strategy. Under the strategy, the specialist subcontractors were procured in parallel with the main contractor. Once the procurement exercises had concluded, their proposed individual construction programmes needed to be brought together into an overall construction sequence, the consequence of which was that the overall construction programme was extended from 48 to 52 months.

- We note that there are conflicts within the DBC with regards to the risk contingency included for the project; the capital budget[19] outlines a provision of €39m (€38m for the NCH, and €1m for the satellite centres), while the Risk Management section[20] of the DBC states an inclusion of €52.3m (€50.5m for the NCH, and €1.8m for the satellite centres). The NPHDB and NPH Executive have informed us that the difference arises from an embedded contingency within the capital budget but we note that it is not included as a line item in any of the cost or budget reports with which we have been provided.

- The Public Spending Code[21] outlines that risk contingency funding is required to be included in the project budget (see below). Given the capital size, complexity, nature and history of the NPH, we believe it would have been appropriate to look internationally for projects against which to benchmark the risk contingency funding. However, there is no evidence that this was undertaken. Whilst guidance contained within the Capital Works Management Framework states that risk contingency should not exceed 10% of the total capital cost[22], it does not prescribe alternative contingency arrangements for a two-stage process, which are relatively novel in the Irish public sector construction market. It is our view that the risks associated with a two-stage process differ considerably from traditional procurement and that this factor should have been considered by the NPHDB and NPH Executive when defining the capital budget.

> Extract 4: Excerpt from The Public Spending Code, D. Standard Analytical Procedures
>
> "3.3.2 Contingency costs
>
> Allowance should be made where contingencies are part of the expected costs of the proposal and included in the CBA. Projects with large initial capital outlays should include a contingency provision for escalating construction costs or delays. There may also be specific contingencies arising from contractual obligations which are triggered by certain events occurring. The project analyst should consider whether there is any applicable evidence regarding contingency costs from similar projects in the same sector."

18 ARM4 agreed rules for methods of measurement was used to provide a uniform basis for measuring the building work

19 Definitive Business Case, pg 245, February 2017

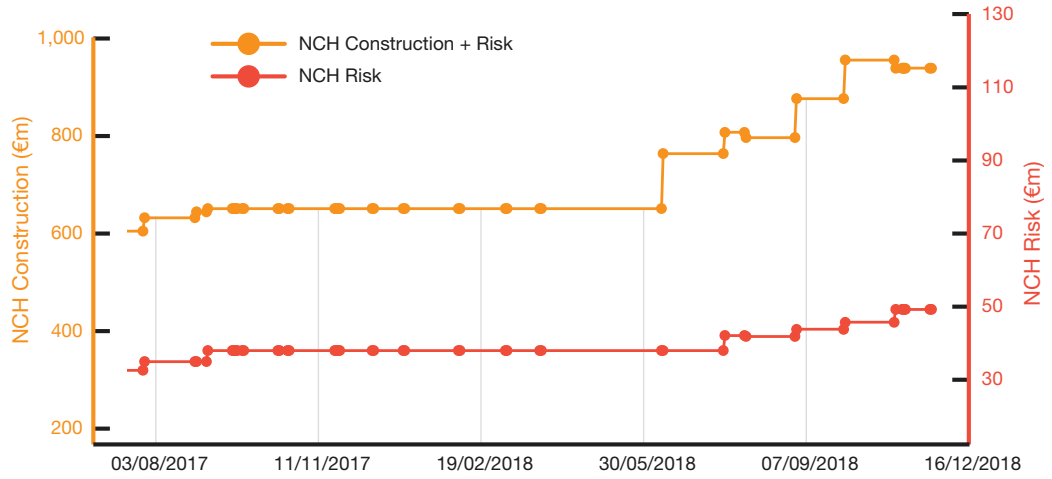
20 Definitive Business Case, pg 308, February 2017

21 The Public Spending Code: D. Standard Analytical Procedures, Guide to economic appraisal: carrying out a cost benefit analysis, D.03, p15

22 Capital Works Management Framework Guidance Note, Budget Development, GN1.3, 2009

The figure below sets out the movement of NCH construction costs and risk from August 2017 to final GMP.

Figure 7: Analysis of NCH Construction and NCH Risk from budget reports



- Whilst the NPH capital budget contains a contingency line[23] (entitled "NCH Risk"), analysis reveals that it increased over time in proportion with the rising construction forecast (refer to figure above). It has not been drawn down[24], suggesting that its purpose is to provision for risks that might arise post GMP when construction of the Phase B Works commence. Whilst we note that the protection of risk contingency for construction is prudent, we deduce that no risk contingency was assumed to be required during Phase A to account for costs associated with normal design evolution or any other risks or uncertainties that might arise during the GMP process.

Red flags warning that the budget was insufficient were missed.

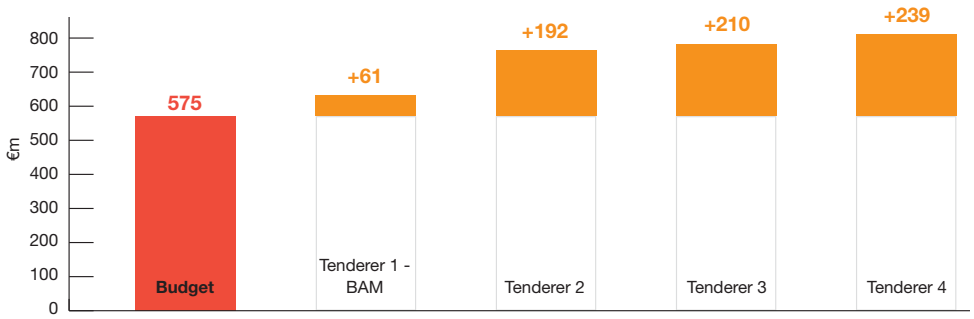
- The tender competition for the main construction contract concluded in October 2016 and returned four bids, all of which were higher than the budget of €575m by a range of €61m - €239m. This should have served as a warning that the budget that had been developed – and had not yet been submitted for approval – was insufficient.

- Instead, however, a Value Engineering (VE) target of €70m was introduced following contract award, which had the effect of offsetting the increase and presenting the main construction contract as being within capital budget.

23 The NPHDB and NPH Executive have informed us that an embedded contingency was included over and above the NCH Risk provision. It is not included as a line item in any of the cost or budget reports with which we have been provided and therefore has been excluded from our analysis.

24 We note that in response to the first €61m cost increase in August 2017, an instruction was given by the CHP&P Board to draw down €20m of the risk contingency. Our analysis of the NCH budget shows that this was not undertaken.

Figure 8: Commercial bid submissions for Main Construction Contract vs. budget



- The tender evaluation criteria for the main construction contract was heavily weighted towards price. Of the 1,000 points that bidders could be awarded, 750 were based on price and the evaluation criteria were arranged such that the lowest priced bidder would secure all 750 points. This would inevitably encourage lean pricing and the tender responses should have therefore reinforced warning that the budget was insufficient and that achieving the VE target would be highly challenging. This had the potential to create commercial tension with Contractors from the beginning of the project.

The procurement strategy included a mitigation option that in the event that a GMP could not be agreed with the preferred tenderer, the NPH Client could procure and proceed with an alternative contractor. This was an unrealistic option which gave a false sense of security, and ultimately increased the risk inherent in the GMP Process. Changing the contractor would lead to a delay associated with re-tendering the project, with a likely increase in cost given the time elapsed since the original procurement.

The procurement strategy set out a risk contingency option in the event that the GMP determined with the preferred tenderer was not acceptable. The basis of the risk contingency option was the inclusion of a buffer in the programme, the stated purpose of which was to allow a "comprehensive" VE exercise to be undertaken or, alternatively, for the works to be retendered[25].

Extract 5: Excerpt from NCH Procurement Strategy Update, 23 February 2016, Potential Risks, p13

"Potential Risks

Having considered the strategy set out in this report, the primary potential risks to successful procurement identified are:

1. Delay in receipt of planning permission
2. Delay or challenges to EU procurement procedures
3. Delay in preparation of tender documents.
4. Quality of Tender documents (two stage tendering)
5. Poor tender interest
6. Poor tender response (market attaching a premium to the project)
7. Delay in starting work on site as a result of delay in identifying a main contractor (fall back strategy)…Delay in receipt of tenders , etc.
8. The GMP with the preferred bidder is not acceptable and accordingly the contract must be retendered."

Extract 6: Excerpts from NCH Procurement Strategy Update,23 February 2016, Risk Mitigation Strategy, p14

"8. Providing appropriate programme provision for a comprehensive Value Engineering / GMP agreement period to ensure sufficient opportunity to sign off on an overall GMP for the project. Also allowing a suitable buffer period from the drop dead deadline for agreeing a GMP to allow for going back out to the market and re-tendering the works."

25 NCH Procurement Strategy Update, 23 February 2016

Retendering the works was an unrealistic fall-back option and would have increased costs further.

- Retendering the works at such a late stage in the GMP Process would expose the project to construction inflation and it is unlikely, given market conditions at the time, that a new tender exercise would yield the material rates achieved by the original tender.

- Retendering the works would also require the replacement Contractor to take on the basement / substructure works delivered by the original Contractor, which would create a number of contractual / legal challenges around warranties and create an interface risk that could give rise to contractual claims or delays (and additional cost).

- Attracting a replacement contractor would be challenging and may require a significant premium to be paid. Recent examples in the UK (Midland Metropolitan Hospital and Royal Liverpool University Hospital) illustrate the challenges of replacing a contractor on a part-built site. In both of these instances there was limited market interest, a considerable price premium and material delays to the construction timeline.

- There would be limited incentive for a contractor to engage in the alternative option of a VE exercise. The contractor would also be well aware of the challenges that the NPH Client would face if it elected to procure a replacement contractor (as outlined above) and its leverage over the NPH Client would therefore be considerable.

3.2.2 Business case

The DBC, on which the Government made its investment decision, contained material errors and did not adhere to the Public Spending Code. It overstated the maturity of the project and level of confidence in the forecasts, and understated the complexity and risks. This impaired the ability of stakeholders within HSE and DoH to provide effective challenge and consideration to the investment decision. A different outcome may have been reached had the business case more accurately conveyed the uncertainty inherent in the project.

The DBC, Revision B, was submitted to the HSE in February 2017, with approval being granted in April 2017 for the NPHDB to proceed with appointment of the Main Contractor and Specialist Subcontractors to commence with Phase A works. The approved project budget in April 2017 was €983m, with €575m allocated to the construction of the project.

Cost Certainty in the project budget was overstated and the DBC did not adhere to the requirements defined in the Public Spending Code, despite numerous references to it.

- In line with Public Spending Code guidelines[26], tendered market rates were included at DBC stage for approval to proceed to contract award. The narrative surrounding these rates portrays a high level of cost certainty and confidence in achieving the final project deliverable within the budget of €575m, stating that "costs have been verified following completion of the tendering exercise" and that "The NPHDB has adopted an innovative procurement strategy to deliver [cost certainty / design certainty]". This position was also supported by the assertions provided by the Design Team in that the Procurement Strategy would provide 95% cost certainty.

Extract 7: Excerpt from DBC, p17, February 2017

"In line with the Public Spending Code, this business case represents the updated costs which have been verified following completion of the tendering exercise. As such, the approval of this DBC will inform:

- The Cabinet decision to award tenders for the main contractor and completion of the remaining aspects of the build, therefore approving the funding associated with these costs
- Approval of the integration, commissioning and transitioning programme funding requirements over the 2017 – 2021 period
- Approval of the ICT programme, including the delivery of an EHR through the national programme (including associated funding)
- Implementation of the health technology sourcing strategy which would allow for the procurement of a MES provider and involve a fixed multi-annual funding commitment from the Exchequer to the CHG"

Extract 8: Excerpt from Definitive Business Case, p297-298, February 2017

"There are a number of strategic objectives underpinning the procurement of these works contracts for the new children's hospital which are:

- Single point accountability for the works with a Tier 1 contractor
- Early start and optimised programme
- Cost certainty / design certainty
- Minimise risk to employer and stakeholders
- Early contractor involvement / collaborative approach to programme delivery
- Maximum opportunity to deliver value for money
- Comply with public sector / EU requirements

The NPHDB has adopted an innovative procurement strategy to deliver these objectives."

26 Public Spending Code guidelines

- While it is factually correct that tendered costs were included in the DBC, the tendered costs themselves were not a robust articulation of an outturn price. As set out in the risk transfer earlier, the tendered prices were provided on the basis of the public sector retaining all of the risk in quantities at this stage.

- The Public Spending Code[27] sets out processes for public sector capital projects in order to address optimism bias (see below).

Extract 9: Excerpt from the Public Spending Code, p32, D. Standard Analytical Procedures

"6.4 Optimism Bias

Optimism bias describes the effect that project analysts overestimate the benefits and underestimate the costs and timings for a project. A range of ex-post reviews of investment projects have shown a systematic tendency to overstate the benefits and understate the costs in the ex-ante appraisal5 . It is generally accepted that optimism bias can be a common feature of capital appraisal in many countries for both the public and private sectors. Typical examples of optimism bias include forecasts of demand which turn out to exceed actual usage levels for projects or overly ambitious planned schedules for projects which take a much longer time to deliver. Appraisers should be conscious of this effect and it is critical therefore that optimism bias is avoided.

There are a number of techniques which may be used to address optimism bias. Standard optimism bias factors may be applied to costs and benefits. Best practice requires that sector specific optimism bias factors based on empirical data be used, adjusted where necessary for the specific characteristics of the project under consideration. Project appraisers may also use project specific bias factors where detailed information is available for similar projects previously undertaken. However, neither sector specific nor project specific optimism factors are generally available. Therefore, pending the emergence of detailed optimism bias data for sectors in Ireland, it is recommended that the appraiser take a comprehensive approach to addressing optimism bias by systematically testing low benefit outturns against highest cost outturns for the critical variables as part of the sensitivity analysis. This testing should also include a pessimistic view of the project timings including delays in project delivery."

- Whilst the DBC includes a risk contingency allocation in the capital budget, there is no substantiation for the value that has been set nor any specific allocation to cover optimism bias. On a project of the scale and complexity of the NPH, we would expect to see a quantified risk assessment or a detailed and separate optimism bias allocation.

27 The Public Spending Code: D. Standard Analytical Procedures, Guide to economic appraisal: carrying out a cost benefit analysis, D.03, p15

- The United Kingdom Green Book Guidance[28], for example, sets out the UK approach to optimism bias for hospital development programmes. The table below, extracted from the Green Book Guidance, outlines the recommended adjustment ranges for projects to allow for optimism bias, in addition to normal project contingency provisions. Hospitals fall within the "Non-standard Buildings" category, suggesting that a range of 4% - 51% of optimism bias is required at Outline Business Case(OBC), which we consider to be equivalent to the NPH Project at tender stage.

Extract 10: Excerpt from UK Green Book Guidance: Optimism Bias, April 2013

Project Type	Optimism Bias (%) ^2			
	Works Duration		Capital Expenditure	
	Upper	Lower	Upper	Lower
Standard Buildings	4	1	24	2
Non-standard Buildings	39	2	51	4
Standard Civil Engineering	20	1	44	3
Non-standard Civil Engineering	25	3	66	6
Equipment/ Development	54	10	200	10
Outsourcing	N/A	N/A	41*	0*

*The optimism bias for outsourcing projects is measured for operating expenditure.

The DBC overstated the completeness of the design and understated the risks.

- The level of design completion at the time the tendering process concluded meant the range of potential variations in the tendered prices was even more significant.

- The DBC states that at the issue of tender documentation in summer 2016, the Design Team had progressed to Stage 2C and that the Stage 2C design was complete on the issue of the tender documentation in June 2016[29]. This was factually incorrect and, in fact, when the DBC was approved in April 2017, the Stage 2C Design had been underway for 11 months[30].

Extract 11: Excerpts from Definitive Business Case, p243-244, February 2017

"The NPHDB Capital Budget

The NPHDB's budget for the capital element of the programme was determined in 2013 and finalised in 2014. The NPHDB then proceeded to develop the Project Brief which was approved by the Minister for Health and the Health Service Executive in June 2014. This allowed NPHDB to tender for and appoint a design team.

In accordance with the Capital Works Management Framework (CWMF), the programme is progressing through the following Stages:

- Stage 1: Preliminary Design (completed)
- Stage 2A: Scheme Design (completed)
- Stage 2B: Developed Design and Planning, Pre-qualification (completed)
- Stage 2C: Detailed Design, Tender Documentation (completed)

The design team progressed the design through the approved stages; submitted a planning application (August 2015) and the capital build received planning approval on April 28th 2016.

The design team have progressed to Stage 2C and the tender documentation went to market in summer 2016. The tender responses have been received. The enabling works for the capital build were tendered in May 2016 and started on site in summer 2016."

28 Supplementary Green Book Guidance: Optimism Bias, April 2013

29 Definitive Business Case, Revision B, p243-244, 9 February 2017

30 Stage 2C Design commenced in July 2016. We note that as of the date of this report, the Stage 2C report has yet to be approved by NPHDB.

Extract 12: Excerpt from Definitive Business Case, p310, February 2017

Risk Description	Risk	Mitigation
Approval	Approval by HSE/DoH of Definitive Business Case does not occur in a timely manner. Delay to awarding of contracts, increased construction inflation costs of €3m/month, and delivery programme delayed.	Engage with key stakeholders to communicate business case content and ensure this is understood and messages agreed. Ensure the financial content of the business is as robust as is reasonably practically.
Approval	ICT Programme funding is not approved to meet programme objectives and timelines.	Approval process has been agreed between all parties. Dependencies on the hospital physical design, its operability and the workforce plan have been acknowledged and contingency planning is in development.
Budget	Market tender responses not aligned with cost plan expectations. Delay to programme and/or additional programme costs.	Monitor market benchmarks and factor into capital budget. Design team to establish Value Engineering strategy and identify opportunities for Value Engineering to progress with the contractor as part of the GMP process. Drawdown on contingency provision and seek additional funding as appropriate.
Procurement	Nomination/awarding of the specialist works contracts by the main works contractor is delayed and/or protracted	Ensure robust process in place to facilitate awarding of contracts by main works contractor.

- As of the date of our report, the Stage 2C report, which would confirm completion of this design stage, has yet to be approved by the NPH Client.
- The level of design completeness differs considerably between Stage 2B and 2C. At Stage 2B, a set of 120 different room types were drawn in detail to represent the room level information for the entire building. These "standard" rooms were repeated throughout the entire hospital, for example, the standard bedroom is repeated 360 times, the standard day bed is repeated 90 times and meeting rooms are repeated 100 times. Whilst this is standard practice in hospital design, a complete design does not exist until completion of Stage 2C.
- A project budget predicated on a Stage 2B Design would generally require a greater risk contingency sum compared to the same project at Stage 2C as there are more risks and uncertainties. For example, at Stage 2B insufficient design detail exists to identify mechanical clashes between the various Mechanical and Electrical systems and the costs associated with resolving these will be unknown. The specification of key plant and equipment may also lack complete definition.
- The risks identified in the DBC suggests a fully locked down design, with a well-developed and understood risk profile. None of the risks associated with the cost certainty or design maturity were identified, meaning arrangements were not put in place to mitigate or provision for them. The risk register contained in the DBC includes only a single risk line relating to the capital budget, which is that overall tender responses did not align with the cost plan expectations[31].
- We note, for example, that the procurement strategy created a certainty that additional time and cost would be incurred as a consequence of a need to "align" the construction programmes of the main contractor and Specialist Subcontractors It has been asserted that instead of increasing the overall budget, which would be standard practice, a provision for this was included within the contingency. We note that this would have had the effect of absorbing €19.8m of the budgeted contingency (35% of the asserted €57m risk contingency fund) and our analysis of the contingency shows that no drawdown was made for it.

31 Table 23.1, page 310, Definitive Business Case, February 2017

3.2.3 Execution planning

There was a lack of formal planning, strategic direction and preparation in relation to the process by which the GMP would be determined. The Project Execution Plan (PEP), which set out the controls that would be put in place, was issued with considerable gaps and key controls were identified but not defined. As a consequence, the project was allowed to progress without the control arrangements to keep it on track.

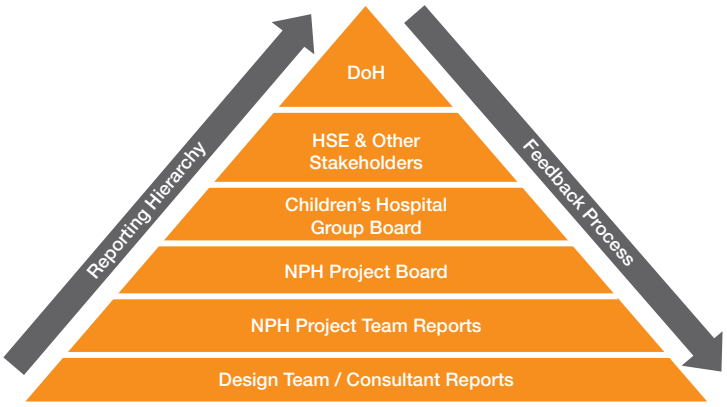
The PEP that was in place prior to the commencement of the GMP[32] was the key reference document for the project's control environment, defining the roles, responsibilities, reporting and management arrangements during the project. It was updated from time to time with the most recent update prior to commencement of the GMP being in May 2015[33].

The PEP did not define the specific controls, processes, reporting or management arrangements that would be put in place to ensure the coordination of the GMP process, nor did it identify any specific risks relating to the GMP that needed to be managed.

- The section of the PEP that describe key project controls is vague and includes very limited detail. Many just state that "appropriate" procedures will be put in place. In a project of the scale and complexity of the NPH, we would expect that all of these would be developed in detail in the PEP.
- The section on reporting does not describe the reports that will be put in place to provide visibility, stating simply that "an appropriate progress reporting procedure will be put in place" (see below). In Section 3.3.2 of our report, we set out significant issues with the quality of reporting and it is our view that the lack of definition within the PEP could explain, at least in part, why this occurred.

Extract 13: Excerpt of Project Execution Plan version 0.3, revised 22 May 2015

"The reporting of project progress and other matters needs to occur on a regular basis with appropriate reports being prepared for each project workstream and/or area and below is an overview of the reporting structure



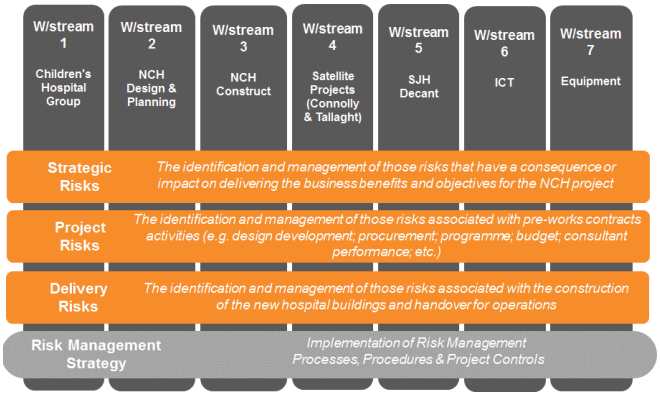
When reports are prepared for each workstream they should contain key information on progress and expenditure, as well as detailing with any issues and risks that have arisen. Regular meetings must be held between the various project parties with the frequency of meetings reflecting the status of the project and the issues to be reviewed and discussed. Meetings and reports will take place at least on a monthly basis and when required on a more frequent or regular basis.

An appropriate progress reporting procedure will be put in place to support project reporting requirements."

32 Project Execution Plan, version 3.0, May 2015
33 Project Execution Plan, version 3.0, May 2015

Extract 14: Excerpt of Project Execution Plan version 0.3, revised 22 May 2015

"The effective management of risk on the new children's hospital (NCH) project will be a key element in ensuring the design, procurement, construction, commissioning and handover for operational use are achieved to programme and within budget. The objective is to ensure that an effective and structured approach to the management of risk take place on the project and an appropriate strategy and approach is adopted for this across the key workstream areas.



The management of risk on the project across all workstreams is the responsibility of all delivery stakeholders (NPH, CHG and SJH). To ensure the effective management of risk is addressed and in particular those risks considered to be joint and/or interdependent a Project Risk Working Group (PRWG) has been established consisting of representatives from each of the workstream areas.

The Project Risk Working Group is accountable for ensuring the management and mitigation of the critical and high-priority joint and/or interdependent risks takes place in a strategic, pro-active and systematic manner. They are also accountable for ensuring the appropriate processes, procedures and plans for the management of these risks are in place along with appropriate risk mitigation measures and for appropriately reporting risk to the NPH, CHG and SJH Boards.

To support the management of risk an appropriate risk management procedure will be put in place."

- The risk management process is similarly vague. Described on a single page, it provides only a high level overview of the approach by various workstreams. We would expect the PEP to include a detailed risk management process, however it only states that a "Risk Management Process" will be put in place. We were informed by the NPHDB and NPH Executive that a risk management strategy was developed in February 2015. We have not been provided with this strategy but have been provided with the minutes of a Project Risk Working Group between May and September 2017, to which the NPHDB and NPH Executive also referred. A characteristic of well managed projects is that the control environment is defined in detail in a PEP in advance of commencement. Given the assertion that the risk management strategy was developed in February 2015, we are unable to explain its exclusion from the May 2015 PEP.
- The arrangements outlined for Document and Information Management are brief and fall significantly short of what we would expect. They state little more than a requirement to adhere to a folder structure that has been put in place. It does not, for example, describe the naming conventions for documentation or how the documents should be configuration controlled.
- A Change Management Procedure was in place prior to the commencement of the GMP[34]. It was produced after the PEP was issued but nevertheless provided a detailed overview of the Change Management Processes. However, it does not set out any specific Change Management Processes associated with the GMP Process.

34 NPH Change Management Procedures, Version 6, March 2016

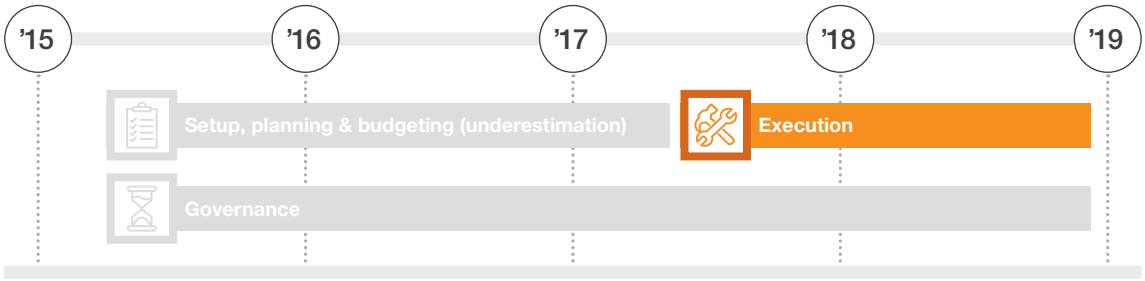
- The only reference to oversight of the GMP process that the PEP makes is in placing responsibility for a "GMP Contract Award" deliverable with the Design Team. In fact, the word "GMP" only appears on six occasions throughout the 75 page document. The next consequent update of the PEP was in June 2018[35] - over three years later than the previous version - and some limited detail was added in relation to the GMP process. However this was very high level in nature and of limited practical use given that the process was nearing completion at this point.

- A programme was prepared by BAM in August 2017[36], which set out the sequence of Design Team activities between August 2017 and June 2018 when the GMP was due to be determined. Whilst this provides evidence that a level of planning was undertaken, we consider it unusual that a similar document had not been prepared in advance of the commencement of the GMP process, and that there was an absence of similar planning on the part of the Design Team.

- A document exists entitled "GMP process[37]", which sets out a high-level management arrangement and process for the GMP. We were informed by the NPHDB and NPH Executive that this document was developed to assist the Design Team and Contractors resolve outstanding issues of difference on packages to mitigate delay to the programme. Over four slides it sets out a high level process, names works owners and includes a template reporting dashboard to monitor the progress of the GMP. The document is undated but the file's metadata suggests that it was created on 16 April 2018, at which point the GMP process was well underway and nearing its original planned completion date.

- The level of detail within the GMP Process falls far short of what we would expect to see by way of formal process and control around such a critical aspect of the project. It does not, for example, explain the way in which the various members of the Design Team will coordinate with each other during the GMP process or set out how progress and risk will be measured and managed throughout. Whilst the above mentioned dashboard report sets a positive intent, there is no evidence that it was actually ever used.

35 Project Execution Plan, version 3.0, May 2015
36 GMP Summary Programme, July 2017
37 This document does not contain any dates or version control, so we cannot confirm when it was created or distributed



3.3 Execution

Once underway, the process by which the GMP was determined was poorly coordinated and controlled.

Our review finds issues in the following areas:

- **Close out of the GMP:** The process by which the GMP was determined created a significant imbalance between the NPH Client and its Contractors. This, combined with limited direct engagement by the NPH Client in the latter stages of the process restricted their influence in the settlement with the Contractors;
- **Cost forecasting and trend reporting:** The NCH's Quantity Surveyor, Linesight, used a number of different techniques to determine quantities, which were in some cases different to those used by the Contractors. This complicated the process of determining the GMP. Furthermore, cost trend reporting was fragmented, difficult to interpret and at risk of error. This made it very difficult for the NPH Executive and the NPHDB to understand the unfolding picture of increasing costs;
- **Project control environment:** The control environment was weak and inadequate, given the scale and complexity of the NPH Project. Progress reporting was generally unstructured, fragmented and lacked key information. Processes to manage risk, change and documentation were ineffective and project systems were insufficient. This created the conditions for major issues to arise without warning and to escalate unchecked; and
- **Project coordination and organisation:** The commercial construct of the Design Team created accountability gaps between the parties and impaired the effective coordination of the GMP Process.

3.3.1 Close out of the GMP

The process by which the GMP was determined created a significant imbalance between the NPH Client and its Contractors. This, combined with limited direct engagement by the NPH Executive in the latter stages of the process restricted their influence in the settlement with the Contractors.

The procurement strategy set out an original timetable for the GMP process of approximately nine months, running from the end of March 2016 to mid-December 2016[38]. As a consequence of changes in the procurement timetable, the revised duration, prior to the commencement of the process, set out a period of 10 months, from August 2017 to June 2018[39].

Within this period the Stage 2C design was to be completed and issued to Contractors to measure and price the Work Packages. In parallel with the issuance of the design, the Design Team's Quantity Surveyor was to undertake its own measure and assessment of the price of each element of the Works. In the event of a dispute between the parties, an Independent Expert ("IE") would review submissions of the parties and make a written, binding determination within 28 days[40].

As a result of delays during the GMP Process, the June 2018 completion date was moved to November 2018 by mutual agreement of BAM, H.A. O'Neil, Mercury Engineering and the NPHDB.

The GMP process created a "hard backstop" that put pressure on the NPH Client, reducing its commercial leverage and strengthening that of its Contractors.

- A delay in conclusion of the GMP Process and the subsequent instruction to commence the Phase B works would result in exposure to claims relating to further construction inflation and additional costs associated with delays to the commencement of the Phase B works.

Delays to the submission of Work Packages reduced the time available to measure and price the works and conclude the GMP.

- The Main Contractor's original GMP Summary Programme shows that the Mechanical, Electrical and Structural Works would be made available at the end of January 2018[41]. We conducted an analysis of the design submissions for the mechanical and electrical works, which shows that a significant volume of design information was still being submitted in February and May 2018. We note that there was also a significant submission of design documentation in August 2018 but have been informed that this was a resubmission of all existing design packages with all outstanding queries incorporated.
- An updated revision of the integrated GMP Summary Programme[42] (dated 26 January 2018) further evidences delay of between five and seven weeks across key design related activities.
- The timetable to agree the GMP was extended from June 2018 to November 2018. However, a report from Linesight of 23 July 2018[43] warns that they were operating under time pressure.

38 New Children's Hospital Procurement Strategy, Appendix A, 7 May 2015
39 GMP Summary Programme, September 2017
40 Conditions of Contract, Main Contract, Clause 14, August 2017
41 GMP Summary Programme, September 2017
42 Appendix 2 Summary Programme, January 2018
43 GMP Update Report (Internal), Linesight, 23 July 2018

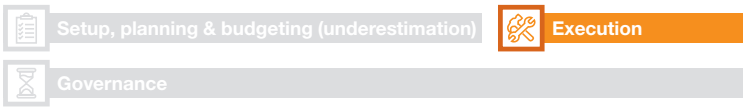
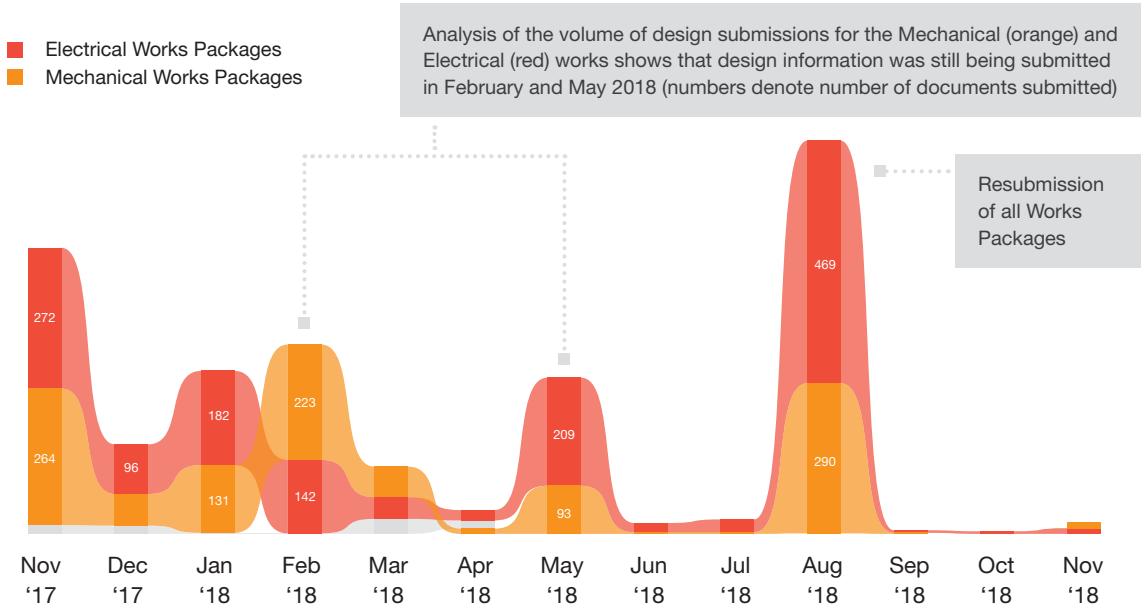


Figure 9: PwC analysis of the volume of design submissions for the Mechanical and Electrical Works



The NPH Executive was insufficiently close to the close out of the GMP. Facing a significant difference in the valuations undertaken by the Contractors and Linesight, the NPH Executive did not ask the Independent Expert to provide any formal determinations.

- The volume and scale of differences in the measures between the Contractors and Linesight was significant. We were informed by the NPHDB and NPH Executive that quantity differences were resolved between the parties and that the formal determinations by the Independent Expert was not required. This was confirmed to us in a written submission from the Independent Expert, which stated that "I did not have any disputes on quantities referred to me for determination"[44]. We find this surprising given both the magnitude of the initial differences and the ultimate increase from the previously reported cost estimates (from €610m in April 2018 to €887m in December 2018, an increase of €277m). In our view, the absence of formal determinations, which are carried out over a longer period of time and are of a more considered nature, also compromised the rigour with which the final agreements were made.
- There was a lack of formality in the close out of Works. Whilst the final GMP positions for individual packages are well documented, the NPH Executive has limited documentation to evidence how those positions were arrived at or approved. We note that it was a contractual responsibility of the Design Team to maintain a schedule of all computations and adjustments relevant to the calculation of the GMP.
- Attendance of the NPH Executive in key meetings relating to the close out of the GMP was limited and attendance was delegated to the next tier down. We have been provided with records of GMP "delivery meetings" between May and June 2018, the purpose of which was to provide a forum to discuss the GMP timeline, project budget, design status, measure status and Works status. Whilst these meetings were consistently attended by the NCH Project Team, attendance by the NPH Executive was limited.

44 Letter from Independent Expert to PwC, 15 March 2019

We have set out below the attendance at meetings between May '18 and June '18 for Mechanical and Electrical Works.

Figure 10: Attendance at Electrical Works GMP Delivery Meeting, 1 May 18 - 15 June 18, taken from meeting minutes

	01-May-18	08-May-18	15-May-18	22-May-18	29-May-18	15-Jun-18
BAM	Y	Y	Y	Y	Y	Y
Mercury Engineering	Y	Y	Y	Y	Y	Y
Arup	Y	Y	Y	Y	Y	Y
Linesight	Y	Y	Y	Y	Y	N
Ennis Engineering	Y	N	Y	Y	N	N
NPH Executive (any member of)	**N**	**N**	**Y**	**N**	**N**	**N**
NPH project team	Y	Y	Y	Y	Y	Y
Employer's Representative	N	N	N	N	N	N
Jones Engineering / HA O'Neil	N	N	Y	N	N	N

Figure 11: Attendance at Mechanical Works GMP Delivery Meeting, 1 May 18 - 14 June 18, taken from meeting minutes

	01-May-18	08-May-18	15-May-18	29-May-18	14-Jun-18
BAM	Y	Y	Y	Y	Y
Jones Engineering / HA O'Neil	Y	Y	Y	Y	Y
Arup	Y	Y	Y	Y	Y
Linesight	Y	Y	Y	Y	Y
Ennis Engineering	Y	N	Y	N	N
NPH Executive (any member of)	**N**	**N**	**Y**	**N**	**Y**
NPH Project Team	Y	Y	Y	Y	Y
Employer's Representative	N	N	N	N	N

3.3.2 Cost forecasting and trend reporting

The NCH's Quantity Surveyor, Linesight, used a number of different techniques to determine quantities, which were in some cases different to those used by the Contractors. This complicated the process of determining the GMP. Furthermore, cost trend reporting was fragmented, difficult to interpret and at risk of error. This made it very difficult for the NPH Executive and the NPHDB to understand the unfolding picture of increasing costs.

The Design Team produced a 3D engineering model (a Building Information Model, "BIM Model") as part of the design process. From this model, two-dimensional ("2D") drawings were prepared and annotated to provide further design information and the rules that should be applied for certain aspects of the measure of quantities, from which cost estimates were derived.

"Cost Trending" reports were prepared during the period to establish the GMP to provide visibility to the NPH Executive of what the GMP was likely to be.

Linesight used a combination of the BIM Model and 2D drawings for estimation purposes. This resulted in inconsistent and incomparable measures to those undertaken solely against the 2D drawings being used by the Contractors and ultimately led to greater complexity in closing out individual packages because the source of differences was more difficult to establish.

- A review of Linesight's cost trending reports show instances in which quantities derived from the BIM Model are lower than the 2D drawings and also instances in which the quantities are higher. In the case of lower quantities, we have observed the use of provisional amounts to compensate.

We have set out in the figure below instances of differences of measuring provided by Linesight.

Figure 12: : Instances of BIM measure producing lower quantities (from a sample of cost trending reports)

Section of trending report	Description and comment included in Linesight report (emphasis added by PwC)	Instances of comment in sample revived
	A line item described as **"Measure differences between 2D & Model"** was included with a value of €16,000,000 alongside the following comment: "Risk carried on differences on remaining systems. Models are stated to be of good quality for measurement on remaining systems - therefore **the BIM measure** should be a good indication of the actual measure."	• Weekly Cost Update, 18 May 2018 • Weekly GMP Commercial Update, 25 May 2018 • Weekly GMP Commercial Update, 01 June 2018
M1-M4 Mechanical	The value in the "Cost Trending" column is calculated by applying 20% to the corresponding value in the "Measured" column, alongside the following comment: "**Provision made for items not shown in model** still being reviewed with Contractor."	• Weekly Cost Update , 04 May 2018 • Weekly Cost Update, 11 May 2018
M5 Mechanical	The report contains the following comment: "Submitted, assessed, reviews ongoing with Contractor. **Provision included for missing items in model.**"	• Weekly Cost Update, 18 May 2018 • Weekly GMP Commercial Update, 25 May 2018 • Weekly GMP Commercial Update, 01 June 2018 • Weekly GMP Commercial Update, 08 June 2018

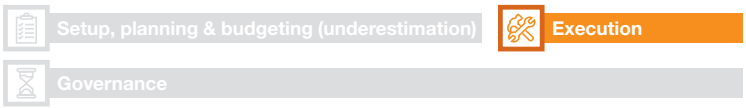


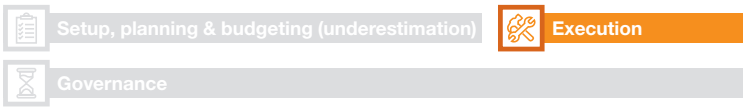
Figure 13: Instance of BIM measure producing higher quantities (provided to PwC by Linesight on 3 April 2019)

Measure	Water System (Pipework)	Ventilation System	LTHW System
Linesight BIM Measure	10,787m	€743,668	€866,121
Linesight 2D Measure	10,056m	€674,197	€852,713
JEG 2D Measure	23,958m	€1,086,278	€1,045,903

- The methods of measurement used by Linesight varied across different Work Packages and were inconsistent with the methods used by the Contractors increasing the complexity of the GMP Process. This issue was raised in the early stages of the GMP Process in a meeting with the Independent Expert. However, we have been provided with email correspondence between the parties that illustrate ongoing discussions in respect of the method of measure during the close out of packages, particularly in relation to the Mechanical and Electrical Works, suggesting that the issues remained. The Mechanical and Electrical Works costs increase significantly throughout the SMP process. An example is provided below.

Extract 15 from GMP Process Meeting with Independent Expert, 14 Nov 2017

No.	Item	Description/action	Owner
3.0	Developing a common approach on measure	Linesight are using Costx to derive quantities from Model whilst BAM are using Cubit from Billsoft. DOL recommended using one common system to avoid discrepancies. [redacted] offered a 3-way solution where he would extract the quantities from the Model with Linesight and BAM's QSs in attendances so they 95 % are agreed real time. BAM and Linesight to consider	Note TW / BAM / Linesight
4.0	Steps to Agreement	For the first packages released BAM and Linesight will measure off 2D with doing a 3D quantity check. It was proposed to get the quantification agreed first followed by pricing. PM pointed out that BAM need time to validate their price by tendering these packages out to the market. [redacted] pointed out that the process was applying the tendered BQ rates to the Design package quantities to arrive at an agreed Adjusted Contract Sum and that BAM tendering to the market was a BAM internal matter.	Note



Extract 16: Email from Linesight to Arup, 22 May 2018

From: [redacted]@linesight.com]
Sent: 22 May 2018: 10:36
To: [redacted]@linesight.com], [redacted]@nph.ie]

In relation to piping: the Linesight measure is based on the BIM quantities with a 12% addition for measuring through fittings etc. We have then added any items required from typical details and the schematics.

In relation to ductwork: the Linesight measure is based on the BIM quantities with a 40% addition for measuring through fittings etc. This addition is based on calculation of the equivalent length of the fittings quantity from the model.

Extract 17: Email from Arup to Linesight, 23 May 2018

From: [redacted]@arup.com]
Sent: Sent: 23 May 2018: 11:07
To: [redacted]@linesight.com]

As a separate exercise, for Wednesday of next week you mentioned that you would complete a 2D measure of one of the floors to compare with the Jones measure. This would hopefully close any arguments from Jones that the Linesight measures from the model and their 2D measure are not comparable.

- Both the Mechanical and Electrical packages increased significantly from the tender adjusted price (included as part of DBC) to the final GMP ie. Mechanical 71%, Electrical 80%.

Linesight's trending reports understated the costs throughout the majority of the GMP Process.

- Cost trending reports in the period to April 2018, prior to the submission of costed packages by contractors, were based on a "hard measure" of the design, i.e. a measure undertaken in line with the Agreed Rules of Measurement:

Extract 18: Excerpts from Linesight clarifications to PwC, 3 April 2019, p3 (f)

"Linesight are carrying out a 'hard' measure so as to achieve the lowest possible GMP for the client"

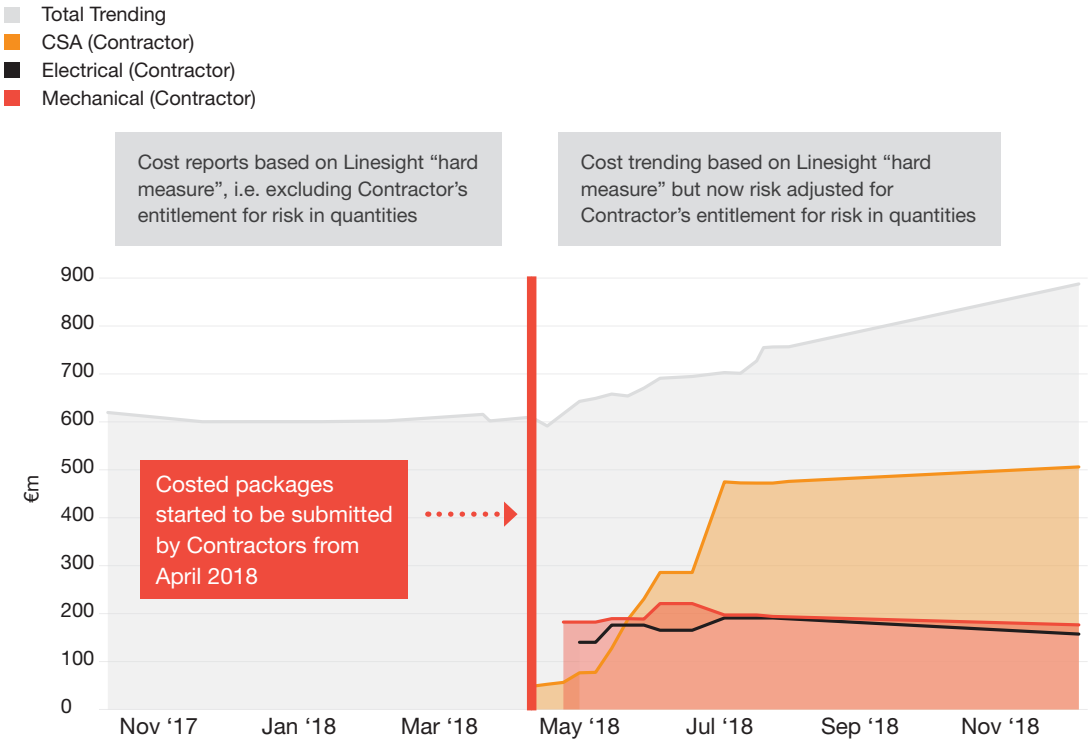
- In our view, this provided a helpful base for negotiation purposes with Contractors, but presented an unrealistic picture of the likely outturn position of the GMP for the NPH Executive because it did not include an adjustment for risk in the quantities that Linesight acknowledged existed:

Extract 19: Excerpts from Linesight clarifications to PwC, 3 April 2019, p3 (f)

"Clause 5 of Appendix 3 to the construction contract agreement….similarly provides for the Contractor being entitled to make submissions on quantities. These provisions facilitate the contractor seeking to inflate its assessment of the measure of the stage 2C design. This approach by the contractor is endemic in two-stage tendering where the contractor will always be ambitiously seeking to maximise its final position. This approach is further accentuated where the two-stage process also includes a GMP."

- Our review of the cost reporting throughout the GMP further corroborates this. In the period to April 2018, before costed packages are provided by the Contractors, cost reporting is broadly in line with the capital budget. After costed packages start being provided, a component of risk adjustment is added. We have set out below an analysis of cost reporting by Linesight throughout the GMP Process.

Figure 14: Analysis of Linesight cost reporting throughout the GMP Process



Setup, planning & budgeting (underestimation)

Execution

Governance

Cost trending reports between Linesight and the NPH Executive were fragmented and lacked continuity, making them difficult to interpret. Whilst not readily visible to the reader, calculations that underpinned the reports were inconsistent creating a significant risk of error.

- There is a lack of consistency and continuity in the cost trending information prepared throughout the GMP period. 23 types of reports were in existence during the GMP period that related to cost or commercial matters. Some reports or analyses appear only occasionally, some only once (see diagram below and table overleaf).

Figure 15: Identified NCH Project Reports

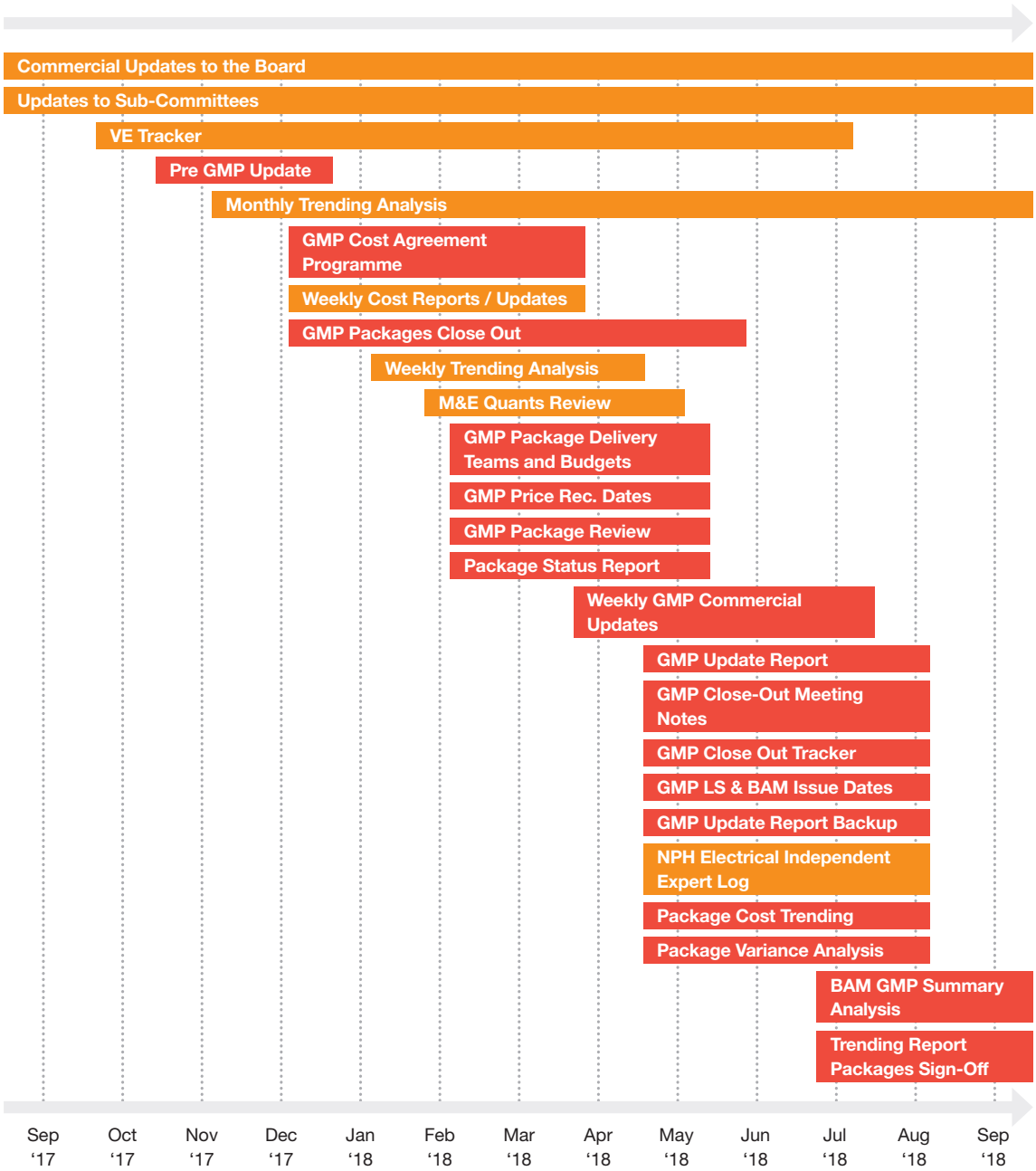


Figure 16: Details of Variances in Cost Reports

Cost report name variances	Number of times report occurred	Used for
Pre-GMP Cost Update	4	135 days
Monthly Trending Analysis	2	9 days
Weekly Trending Analysis	3	17 days
Weekly Trending Report	1	7 days
Weekly Cost Update	5	35 days
Weekly GMP Commercial Update	4	42 days
GMP Close Out Tracker	5	30 days
GMP Update Report	1	4 days

- Eight different types of more comprehensive cost trending report have been discovered. The figure above summarises the number of occurrences and days of being in use.
- Key pieces of information are not consistently included within a particular report. They are either omitted or presented to different levels of detail from month to month. The figure below shows a representative sample of this issue in relation to the cost trending reports.

Figure 17: Content included in cost trending reports for a selection of dates

	31/01/2018	09/02/18	14/02/18	09/03/18	16/03/18	23/03/18	27/04/18
Summary CSA	✓	✓	✓	✓	✓	✓	✓
Summary Mech	×	✓	×	×	×	×	×
Summary Elec	×	✓	×	×	×	×	×
Detailed CSA	✓	✓	✓	✓	✓	✓	✓
Detailed Mech	×	×	×	×	×	✓	×
Detailed Elec	×	×	×	×	×	✓	×

- There are inconsistencies in the basis of the calculations or source of the underlying data on which financial information is predicated and there are inconsistencies in how cost trending information is calculated. The figure below sets out how the basis of certain key figures in Linesight's trending report differ. Also see Appendix G for more detailed illustration.

Figure 18: Assessment of methods of calculation used in cost trending reports[45]

Item in trending report	CSA works	Mechanical works	Electrical works
Total trend calculation	Sum of "trending totals" of the constituent packages that constitute the CSA works	Hybrid of the "measured totals" and "trending totals" of the constituent packages that constitute the Mechanical works OR Total of "measured totals" of the constituent packages (i.e. with no trending figures)	Hybrid of the "measured totals" and "trending totals" of the constituent packages that constitute the Electrical works OR Total of "measured totals" of the constituent packages (i.e. with no trending figures)
Trends for individual packages: basis of the trending figure		Percentages of the corresponding "assessed totals" for a limited number of individual packages, others blank	Fixed values for a limited number of individual packages, others blank
Trends for individual packages: what the figure represents	Absolute trend (i.e. the total number)	Differential trend (i.e. the amount that needs to be added to the measured value to determine the trend)	Number presented is differential (i.e. difference from the measure to the trend)

45 Weekly Cost Update , 04 May 2018

3.3.3 Project Control Environment

The control environment across the programme was weak and inadequate given the scale and complexity of the NPH project. Progress reporting was unstructured, fragmented and lacked key information. Processes to manage risk, change and documentation were ineffective and project systems were insufficient. This created the conditions for major issues to arise without warning and to escalate unchecked

Successful delivery of complex projects requires a robust system of internal controls to ensure that, amongst other things:

- Clear information is provided in a timely manner through a regular and well-structured reporting regime, allowing informed decisions and interventions to be made;
- Risks are identified and quantified in a consistent and objective manner and managed effectively on an ongoing basis;
- Change is controlled; and
- Documentation is secured and can be retrieved when necessary.

Project reporting arrangements were fragmented and unstructured, making it difficult to establish the status of the GMP and the risks associated with it.

- The reporting arrangements in place were fragmented and unstructured and there were a myriad of methods of communicating progress during the GMP process. The table below sets out a review of the reports that were made available to us and our assessment of the issues associated with them, excluding cost trending reports, which we have commented on earlier.

Figure 19: Summary of reporting structure

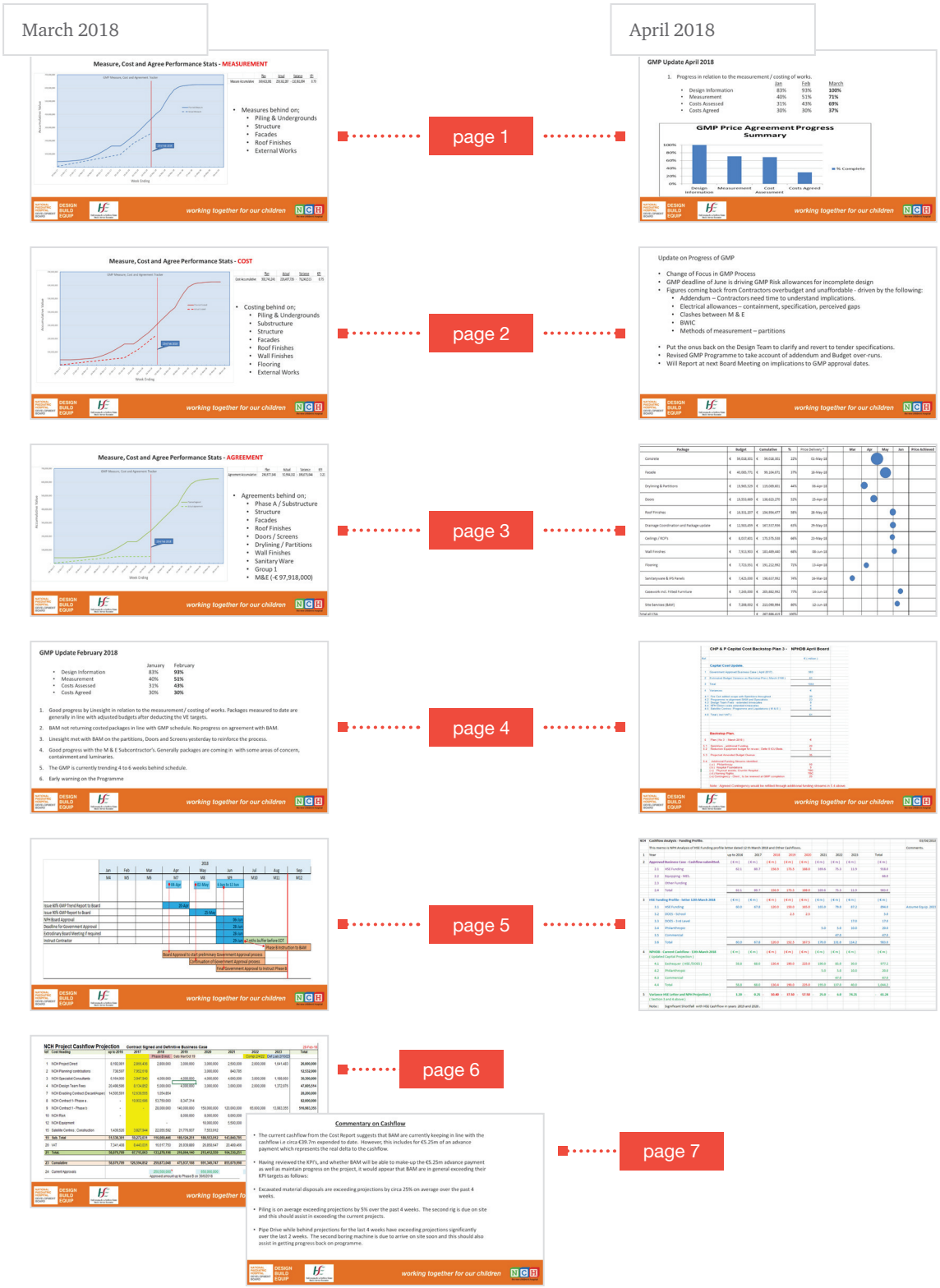
	Report	Frequency	Summary contents	PwC assessment
To the Executive	**Level 2 dashboard report** **Prepared by NPH Executive for the wider NPH Executive**	Monthly (August 2017 – ongoing)	Project updates with greater details about the construction	• There is no detailed cost information provided in these reports. • The section 'Design Programme to GMP' is reported as green up until April 2018 at which time it turns orange identifying an issue with this process. This aligns with the time it is removed from the Level 1 dashboards. This section is removed from this report in August 2018.
	CM Team weekly update **Prepared by BAM for the NPH Executive**	Weekly (ongoing)	Progress photos, safety metrics, environmental metrics, detailed construction update, procurement	• No specific Risk Management section. • Does not provide relative positioning compared to the overall construction programme and key milestone targets.
	Design Team Progress Report **Prepared by Design Team for the NPH Executive**	Monthly (August 2014 – March 2018, July 2018)	Dedicated sections for each discipline. Programme overview, design progress, key issues and risks.	• Limited cost and commercial information included in the report.

Figure 19: contd.

	Report	Frequency	Summary contents	PwC assessment
To the NPHDB	**Level 1 dashboard report** **Prepared by NPH Executive for the NPHDB**	Monthly (August 2017 – ongoing)	Project updates on all aspects of the programme	This dashboard provides a good overview of progress on site but has the following weaknesses: • An update on commercial and cost information is not provided; • The delivery programme status is indicated but does not provide insight about the likelihood of achieving milestones; • The section entitled "Design Programme to GMP" which provided a status update of design submissions and GMP activities was removed in March 2018; and • Project and programme risks are not reported or detailed. The section 'Design Programme to GMP' is reported as green throughout, until it is removed from the report in April 2018.
	Commercial presentations to Board **Prepared by NPH Executive for NPHDB**	Monthly	Commercial update	Reports prepared for the NPHDB by the NPH Executive varied considerably in structure and content, making it difficult to build a broader picture of how the process to establish the GMP was progressing. There is significant variation in the presentation and content of specific reports from one reporting period to the next, as illustrated by the Commercial Presentations to the Board for March and April 2018 (below), which are entirely different in content and structure.
To the CHP&P	**Bi-monthly project updates** **Prepared by Project Director for CHP&P steering group**	Bi-monthly (November 2017 – ongoing)	Milestone completion, project dependencies, dashboard providing overview of project (progress, risks and issues)	Dashboard approach implemented from October 2017 which provides a clear method of reporting progress against key milestones. There is limited costing information provided in the report. RAG status and risk scoring is provided. No ability to track trends between reports.

The following figure presents an exemplar of variations in report structures from one month to the next.

Figure 20: Analysis of report variations



- As set out earlier, the latest revision of the PEP that was in place prior to the commencement of the GMP[46] did not contain any meaningful definition of the reporting arrangements. The PEP was revised in July 2018[47] setting out a more comprehensive reporting regime. A number of the reports identified within it (for example the "Dashboard reports") were already in place at this time and we are therefore of the view that the revised PEP was retrospective, rather than pre-emptive. We also note that by July 2018 the GMP was well underway and therefore changes to the control environment at this point would have limited impact.

Risk registers lacked the detail necessary to understand the impact of risk.

- Risk registers were maintained from December 2016[48] by the NPHDB. They contain a number of risks across the lifecycle of the project (business case, procurement, construction, equipping and operations) but beyond giving a high level rating and colour coding, these risks are not quantified and are not linked to project risk contingency.

- Several different risk registers (Project, Construction, Pre-phase B/ GMP Risk Register, etc.) were maintained within the project team. None of these risk registers included information about the potential cost, programme implications (prior and after risk mitigation measures) or the necessary monitoring requirements in order to maintain the estimated residual risk level and are therefore of limited value for Risk Management purposes.

There is no evidence of configuration control in relation to the structure or content of key documents. As a consequence baseline documents cannot be compared to subsequent revisions, making it difficult to establish how and why things have changed.

- There was considerable movement between line items in the project budget between February 2017 and June 2017 with little by way of explanation of project budget movement.

- There are extensive changes in structure and composition of the tender and GMP BoQs to a degree that they are effectively entirely separate documents. Good Project Management practice would require any changes to be mapped so that an auditable trail exists from one version to the next. No such mapping appears to exist in this instance.

- There are also instances in which important project records were discarded. We were informed by the NPH Executive that tender submissions of the unsuccessful bidders for the main contract, for example, were discarded in November 2017, nine months after the evaluation in February 2017 and only three months after the contract was executed with BAM in August 2017. This is irregular and exposes the NPH Client to significant risk in the event that an unsuccessful bidder were to legally challenge the procurement process. Whilst the "Procurement documents" section of the NPH Client's document retention policy[49] does not explicitly ascribe a retention timescale to bid submissions, it references a seven year requirement recommended in the Statute of Limitations Acts, 1957 – 1991[50]. See extract overleaf.

The figure below sets out the movement between NCH construction and NCH risk budget line items.

Figure 21: Movement between NCH construction and NCH risk budget line items

	18/02/2017	17/05/2017	12/06/2017	20/06/2017
NCH construction	575	565	583	568
NCH risk	38	48	30	45
Total	613	613	613	613

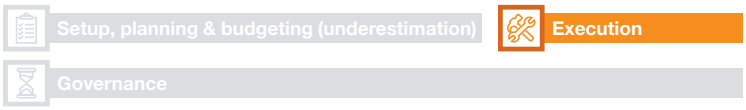
46 Project Execution Plan, version 3.0, May 2015

47 Project Execution Plan, version 4.2, July 2018 (despite the version numbering, the document control sheet contained in version 4.2 of the PEP states that version 3.0 issued in May 2015 was the most recent revision prior to the update)

48 NPH (Project Risk Register), Dec 2016. This is the earliest register that we have received.

49 NPH Document Management and Retention Policy, April 2017, p11

50 NPH Document Management and Retention Policy, April 2017, p10



> Extract 20: NPH Document Management and Retention Policy, April 2017, p10
>
> "The Statute of Limitations Acts, 1957 - 1991 outline periods where an organisation might need to invoke relevant documents in its own favour in actions brought by or against it is six years from the date the cause of action accrued. The recommended time frame for such material to be held is seven years in order to provide for the year during which proceedings may be served after being issued in the courts;"

Project systems.

- There is no evidence of the use of the type of robust project systems e.g. Risk Management and Cost Management, that we would expect to have been deployed on a project of the scale and complexity of the NPH. Microsoft PowerPoint and Excel are the primary tools used for financial analysis, progress reporting and the management of change and risk. In our view these tools are wholly unsuitable for these purposes as they offer no protection for human error and lack the structure required to ensure consistency and accuracy.

3.3.4 Project coordination and organisation

The commercial construct of the Design Team created accountability gaps between the parties and impaired the effective coordination of the GMP Process.

A clearly defined delivery team structure is crucial in order to ensure the effective execution of large, complex capital projects. The leadership positions and responsibilities around critical tasks, such as integrated programme management, delivery coordination and communication with the Contractors, need to be clear and well defined to the whole delivery team in order for it to function as intended. Where key project responsibilities are not defined and there is ambiguity around roles, the risk of performance issues increases significantly.

The members of the Design Team were contracted directly to the NPH Client and there was no single point of contractual accountability within the Design Team.

- The contractual construct did not mirror the organisational construct. No single party took the contractual risk for coordination of the others, creating accountability gaps between the parties. The impact of this has become fully evident following the identification of cost increases and in our interviews we observed significantly different and opposing views from members of the Design Team as to where responsibility for the issues during the GMP lay.

There was ambiguity in relation to who was responsible for coordination of the GMP process.

- A 'Leadership and Management' document[51] was produced by BDP in early 2017[52], describing the roles and responsibilities of members of the Design Team in general terms but not the specific functions that they would perform relating to the coordination of the GMP process.

- A review of organisation charts prepared by two members of the Design Team, Arup and BDP, prior to the commencement of the GMP set out differing views on the overall organisational structure of the project and its coordination, as shown below. The key differences were:

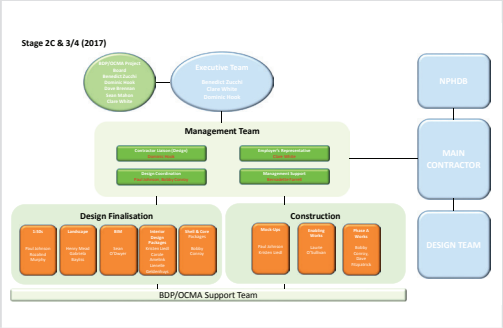
  - BDP shows the Main Contractor sitting between the NPHDB and above the Design Team; and

  - Arup show that the Employer's Representative is the main contact between the Main Contractor, the Design Team and Linesight (which was actually part of the Design Team). But it also showed a "Project Board" in between the Construction Management Team (part of the NPH Executive) and the NPHDB, which never existed according to the Project Execution Plans.

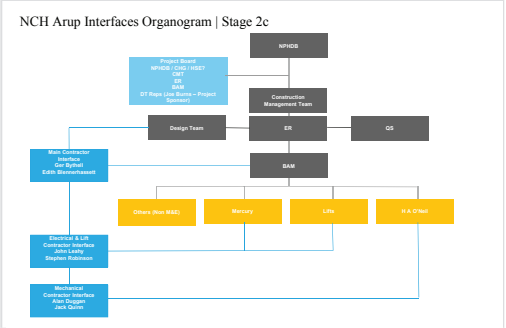
51 BDP OCMA Leadership_1 (1), specific dates and version control are not evident on this document

52 Specific dates and version control are not evident on this document

Extract 21: Excerpt from BDP



Extract 23: Excerpt from Arup



- A lack of coordination during the GMP Process was recognised by both the NPHDB and BAM in April 2018, resulting in an intervention from both parties. A GMP alignment meeting, held on 12 April 2018 recognised that the current process to achieve the GMP was not working and needed to change:

> Extract 22: Excerpt from GMP Alignment Meeting 13 Apr 18
>
> "It was agreed by all parties that the current process/structure to achieve a GMP is not working and needs to be changed. BAM set out a proposed new Team Structure"

- On 16 April 2018 a letter was sent from the NPHDB to the Design Team relating to the lack of coordination, noting that:

Extract 24: Excerpt from NPH Letter to Design Team Re GMP Process 16.04.18 (ID 24081)

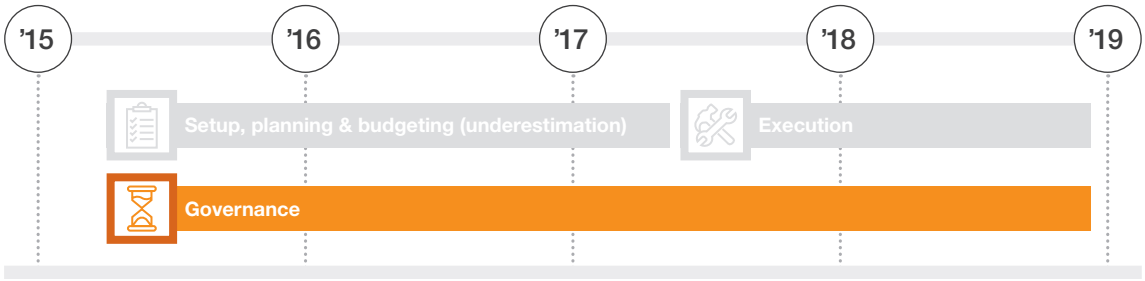
"Following recent meetings and correspondence, it is clear that the GMP budget and programme is in jeopardy."

"To mitigate the delay the NPHDB is stepping up resources to provide project management skills to ensure:

- That design packages are owned;
- Information is complete and robust;
- To focus on changed specification and quantity leading to budget over-runs;
- and to manage the closure of these issues efficiently to meet the programme and the available budget.

This is a clear responsibility of the Design Team, and not the NPHDB."

"……..Despite this, it has transpired design information was issued late and a significant addendum was the required due to a lack of coordination across the design team."



3.4 Governance

The level of trust that the NPHDB placed on the NPH Executive and Design Team gave rise to insufficient scepticism and challenge. As cost escalated through the GMP Process, the structures above the NPHDB became reactive, limited by their terms of reference.

Our review finds issues in the following areas:

- **Oversight of the NPH Executive and Design Team by the NPHDB:** The level of trust that the NPHDB placed on the NPH Executive and Design Team gave rise to insufficient scepticism and challenge, which allowed the impact of deficiencies to grow unabated. This created an environment in which the project was allowed to progress too quickly without being subject to rigorous challenge;

- Although the NPHDB and NPH Executive had extensive experience of major and complex project development, specific healthcare infrastructure development experience was more limited. This experience was important in the sub-committee structures but was stretched, as a result reliance was placed on the expertise brought by the Design Team and effective oversight, performance management and instruction appeared to be challenging;

- There was an overreliance on written assertions by the Design Team relating to the level of cost certainty at tender stage. In our view there was sufficient evidence to the contrary that should have prompted earlier and greater challenge and scepticism by the NPHDB and NPH Executive; and

- **Oversight of the NPHDB:** Whilst the governance structures in place above the NPHDB were complex, they did not appear to impede the flow of information relating to cost. However delays in the design development process and the costing of packages meant that critical information was only visible when the GMP process was in its latter stages. The role of the governance structure became reactive with virtually no leverage to influence the outcome.

3.4.1 Oversight of the NPH Executive and Design Team by the NPHDB

The level of trust that the NPHDB placed on the NPH Executive and Design Team gave rise to insufficient scepticism and challenge, which allowed the impact of deficiencies to grow unabated. This created an environment in which the project was allowed to progress too quickly without being subject to rigorous challenge.

It is common in large and complex projects for team members and Executives to become entirely immersed in the delivery of their roles. An external perspective, frequently in the form of a peer review is often needed to help identify potential weaknesses and to provide assurance to the various level of governance.

Internationally, major projects in both the public and private sector are typically delivered within well-defined assurance frameworks. As they progress from their early stages of planning through construction and into operation, they are subject to review and scrutiny at critical junctures and decision points.

The purpose of these reviews is to provide objective challenge, establishing whether they are ready to proceed to the next stage of development with reference to defined maturity criteria. They act as a checkpoint, preventing projects from progressing before they are ready and recognise the widely understood principle that robust planning and set-up increases the likelihood of successful outcomes.

There was inadequate oversight and challenge of the Design Team.

- The NPH executive and Board relied fully on the expertise provided by the Design Team.
- It is typical in projects of this nature where external expertise is being used, that a strong client role is established within the programme team to provide an interface with the external advisors in order to direct, control, challenge and monitor the support provided. Whilst Executive capability did exist there was limited evidence that such a role was in place in the NPH project.

The type of formal gateway process typical in major projects was absent.

- The sub-committees of the NPHDB provided a level of internal challenge to the NPH project.
- However, the NPH project lacked the independent challenge provided by a well-defined assurance framework and structured gateway process.
- In the absence of these formal controls, the project progressed through procurement and into construction without an objective assessment on its readiness to progress at each stage.

The objectivity of the NPHDB may have been impaired because it was performing both management and oversight roles prior to the appointment of the full NPH Executive team[53].

- The sub-committee structure established to support the NPHDB ensured active engagement by the NPHDB members in the implementation of the NPH project. However, there is a concern that by being too involved in operational project delivery, this compromised the oversight and challenge role that these individuals were expected to perform.
- Shortly after the establishment of the NPHDB in August 2013 it began the process of appointing a Design Team to develop the design and a permanent NPH Executive body to provide full time leadership of the project. The NPH Executive was slow to establish and whilst the Project Director was appointed in December 2013, it was a considerable period of time before the NPH Executive was fully resourced.
- There was an extended period during which the NPH Executive ramped up to full capacity. During this time, there was limited management capacity between the NPHDB and Design Team. In our view this gap will have inevitably led to the NPHDB fulfilling management roles for at least part of that time which, as a consequence, may have impaired their ability to be truly objective

53 Letter from NPH Executive to the Design Team, April 2018.

when assessing recommendations that were being made and decisions taken.

- We note that certain members of the NPH Executive were procured through a Construction Management Services contract with Linesight. We have not seen evidence to suggest that their objectivity was impaired; however, the arrangements could create the potential for a perceived conflict of interest to exist. We do recognise that changes were subsequently made to the contractual arrangements to avoid this conflict.

There was an overreliance on written assertions to the NPH Executive by the Design Team relating to the level of cost certainty at Tender Stage without effective challenge.

- We draw particular attention to the assertions made in relation to cost certainty, which feature prominently in the procurement strategy of May 2015[54] and its subsequent update in February 2016[55] and in the Stage 2B Quantity Surveyor Report[56], asserting that at tender stage costs would have a margin of error of +/-10% , latterly 95% cost certainty.

> Extract 25: Excerpt from New Children's Hospital Procurement Strategy, 7 May 2015, p8
>
> "As part of this Procurement Strategy it is the proposal of the Design Team to have achieved a level of cost certainty of +/-10% prior to Contract Award (March 2016). Neither the enabling works contract nor Contract 1 Phase A/ Phase B will be awarded until the +/-10% cost certainty has been achieved"

> Extract 26: : Excerpt from New Children's Hospital Procurement Strategy Update, 23 February 2016, p12
>
> "L12. Cost Certainty
>
> As part of this Procurement Strategy it is the proposal of the Design team to have achieved a level of cost certainty of 95% prior to award of the Main Contract (either Phase A or B)."

> Extract 27: Excerpt from National Paediatric Hospital Project - Stage 2B Quantity Surveyor Report - Pre Tender Cost Valuation, 24 August 2016
>
> "As part of the two stage procurement strategy a level of cost certainty of 95% was identified."

- We consider that the lack of a fully signed off design, coupled with the procurement strategy, form of contract and local inflationary environment, provide considerable evidence to the contrary and we are unable to understand why there was not earlier and greater scepticism by the NPHDB and NPH Executive.
- Although the NPHDB and NPH Executive had extensive experience of major and complex project development, specific healthcare infrastructure development experience was more limited. This experience was important in the sub-committee structures but was stretched, as a result reliance was placed on the expertise brought by the Design Team and effective oversight, performance management and instruction appeared to be challenging.

54 New Children's Hospital Procurement Strategy, 7 May 2015
55 New Children's Hospital Procurement Strategy Update, 23 February 2016
56 National Paediatric Hospital Project – Stage 2B Quantity Surveyor Report – Pre Tender Cost Valuation, 24 August 2016

3.4.2 Oversight of the NPHDB

Whilst the governance structures in place above the NPHDB were complex, they did not appear to impede the flow of information relating to cost. However delays in the design development process and the costing of packages meant that critical information was only visible when the GMP process was in its latter stages. The role of the governance structure became reactive with virtually no leverage to influence the outcome.

The NPHDB was established by statutory instrument in August 2013. It was intended to be an arms-length body, independent of Government and accountable for delivering the NPH Project. It was composed of senior individuals with backgrounds and expertise in architecture, planning, engineering, legal and procurement. This was in recognition of the scale, complexity and profile of the project.

On foot of a Government decision in April 2017, two oversight bodies were established to ensure coordination and oversight of a wider set of activities that, together with the hospital build, would be necessary for the successful completion and operation of the children's hospital. These were the Children's Hospital Project & Programme (CHP&P) Board and the CHP&P Steering Group and they would operate above the the Children's Hospital Group Board (CHGB) and the NPHDB. The structure of the revised governance arrangements are set out in the figure below.

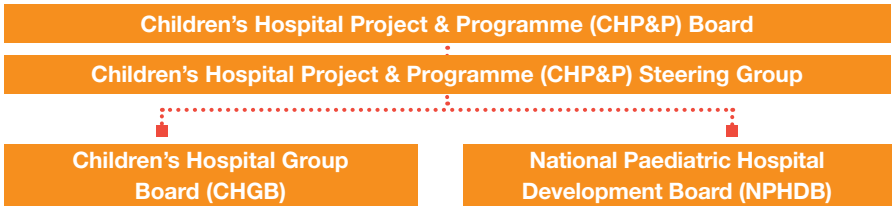
CHP&P Board

The CHP&P Board has the following responsibilities[57]:

- To oversee and monitor progress of the Children's Hospital Project & Programme against the agreed parameters for the programme in relation to timeline, scope and funding;
- To act as the escalation point for decisions which cannot be resolved by the CHP&P Steering Group; and
- To approve key project and programme gateways and parameters as recommended by the CHP&P Steering Group.

The CHP&P Board meets quarterly (or as required). Its is chaired by the Secretary General DoH, with membership including the Director General HSE, Assistant Secretary Acute Hospitals Policy DoH and COO HSE. It is also attended by the Chief Executive of CHI and the Project Director of the NPH Executive.

Figure 22: Revised governance structure above the NPHDB



57 Terms of Reference, CHP&P Board

CHP&P Steering Group

As illustrated above, the CHP&P Steering Group reports directly to the CHP&P Board, and provides oversight to both the CHI Board and the NPHDB.

The CHP&P Steering Group has the following responsibilities:

- To ensure a coordinated and aligned approach to the three main elements of the CHP (the building, the ICT infrastructure and the operational integration of the three existing children's hospitals), in particular, dependencies with other national HSE projects and programmes;
- To provide input and decisions in accordance with the agreed programme timelines, taking reports from the relevant National Directors, CHG CEO, and the Project Director, NPHDB, to ensure alignment with overall programme timelines;
- To oversee timely HSE approval, signoff and funding decisions for the three Children's Hospital Programme elements;
- To oversee the implementation of the EHR plan for the New Children's Hospital; and
- To determine revenue and staff approvals in relation to the integration, service developments and transition to the satellites and new hospital in line with the business case approved and delegated authorities.

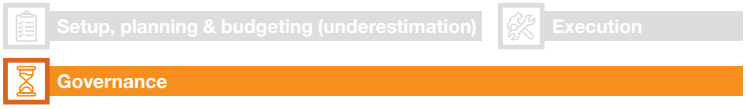
The CHP&P Steering Group meets monthly, chaired by the DDG Strategy HSE, with membership including: National Director of Acute Hospitals HSE, Interim Director of Health Business Services HSE, National Director Clinical Strategy and Programmes HSE, Chief Information Officer HSE, National Director Human Resources HSE, CFO HSE, Group CEO CHF, Project Director NPHDB, Assistant Secretary Acute Hospitals Policy DOH, Assistant Secretary Finance DOH, Assistant Secretary R&D and Health Analytics DOH, and Principal Officer Acute Hospitals Policy DOH.

The establishment of the NPHDB by legislation as a standalone entity, led to an overreliance on it to successfully deliver the NCH construction project.

- The NPHDB was established as a competency based board, comprising individuals with significant relevant experience.
- The legal structure and composition of the NPHDB was intended to establish an entity that could take overall responsibility for the delivery of the NCH construction project.
- However this also created the potential for a single point of failure, should the NPHDB not discharge its responsibilities effectively.

The terms of reference and composition of the CHP&P Board and Steering Committee meant that their collective ability to provide challenge to the role of the NPHDB was limited.

- The terms of reference for the CHP&P Board and Steering Group provide for the monitoring of information provided to it by the NPHDB and the escalation of any issues arising. However, they do not include the requirement for these entities to provide challenge to the role of the NPHDB, for example through the implementation of additional assurance controls or the establishment of an external gateway process.
- The composition of the CHP&P Board and Steering Group also impaired its ability to provide challenge to the information being provided to them. Staffed primarily by senior members of the DoH and HSE, the CHP&P Board and Steering Group lacked the industry experience necessary to challenge the NPHDB and project team, which had far greater experience.
- A key role of the CHP&P Steering Group is to facilitate alignment between the three key components of the overall programme: the building; the ICT infrastructure; and the operational integration of the three existing children's hospitals. To date it has been successful in doing this, however given the relatively early stage in the overall programme implementation, significant integration challenges remain to be addressed as the programme evolves.



- Whilst the terms of reference for the CHP&P Steering Group state that it will 'provide input and decisions in accordance with the agreed programme timelines', they do not prescribe the limits of its decision making authority. In our view, this created ambiguity as to the scale and nature of decisions that the Steering Group was empowered to take.

4

Cost impacts of the key issues

4.1 Overview

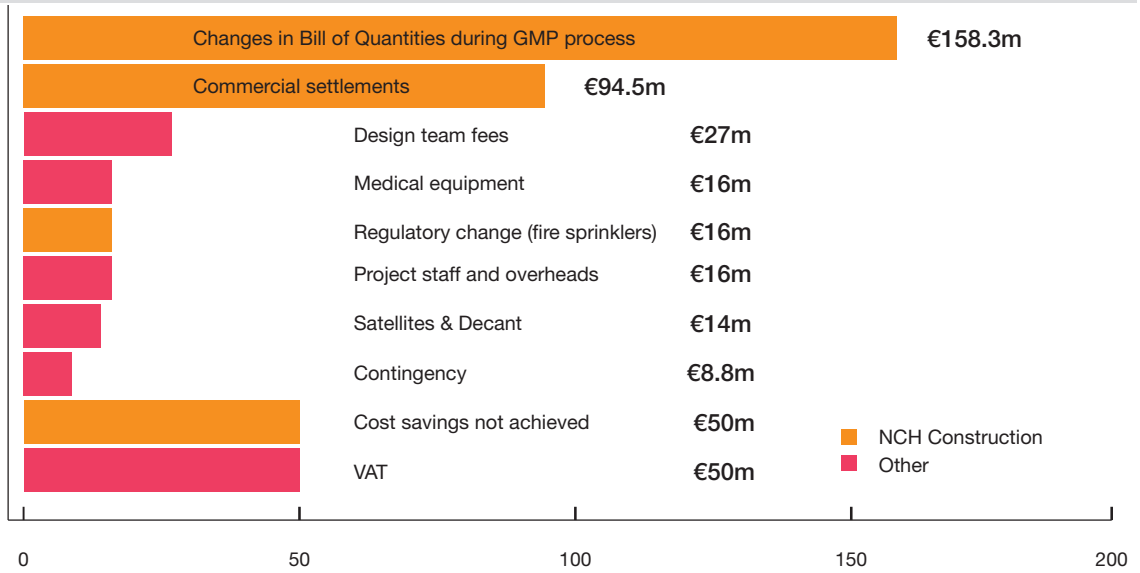
This section of our report sets out our analysis of the increase in cost from the project budget of €983m contained within the Definitive Business Case to the estimated cost in November 2018 of €1.43bn. It includes:

- A review and explanation of the key areas of cost increase; and
- An analysis and quantification of the underlying causes.

4.2 Key areas of cost increase

The figure below sets out the component parts of the €450m increase from the budget of €983m to the final forecast of Capital Investment Requirement of €1.43bn. A detailed description of each item is provided below.

Figure 23: Summary of areas of cost increase*[57]



*any variance can be attributed to rounding.

Changes in Bill of Quantities during GMP Process (€158.3m)

The content of the BoQ changed during the GMP Process, resulting in an increase in costs of €158.3m. These changes were as follows:

- Changes in unit rates; and/or
- Changes in quantities; and/or
- The inclusion of items not in the Tender BoQ.

In order to understand and attempt to quantify these in greater detail, we have undertaken a detailed reconciliation of the contract BoQ to the GMP BoQ. The GMP BoQ differs significantly in structure and content to the contract BoQ, making a direct line-by-line comparison almost impossible. However, we have been able to undertake an analysis on a sample basis[58] of the BoQ that relate to the Structural Works (contracted to BAM), Mechanical Works (contracted to H.A. O'Neil) and Electrical Works (contracted to Mercury Engineering).

Our analysis reveals the following:

- In relation to the Civil, Structural and Architectural Works, the inclusion of items where the quantity has increased, but the rate has remained the same, occurred most frequently in our sample, occurring in 42% of the line items;
- In relation to the Mechanical Works, the inclusion of items not in the contract BoQ occurred most frequently in our sample, occurring in 52% of the line items; and
- In relation to the Electrical Works, increases in unit rates occurred most frequently in our sample, occurring in 38% of the line items.

57 There may be minor differences between the contractors settlements and the analysis presented above. We have relied on the Linesight reporting on the conclusion of the GMP packages for the split of the cost information.

58 Our full analysis is included in Appendix F.

Commercial settlements with Contractors (€94.5m)

During the GMP Process, claims were submitted by the contractors amounting to €258m (BAM: €163m, H.A. O'Neill/Jones Group: €62m, Mercury Engineering: €33m). The claims were settled at €94.5m, a breakdown of which is provided below.

Figure 24: Claims Summary

Claim	Description	Total €m
Preliminaries and programme alignment	Preliminaries are a contractor's overhead costs that cannot be directly attributed to an individual package of work. They are determined as a percentage of the overall contract value. €38.1m was awarded to BAM, €12.4m to H.A.O'Neil and €7.7m to Mercury Engineering as a result of the increased value of work and the corresponding increase in preliminary costs. Of the total of €58.2m across all three contractors, €19.8m arose from costs awarded for "alignment" of the Contractors' construction programmes. Under the Procurement Strategy, the Mechanical, Electrical and CSA Contractors were procured in parallel. Once the contractors had been selected, their proposed individual construction programmes needed to be brought together into an overall construction sequence and, as a consequence, the overall construction programme was extended from 48 to 52 months.	58.2
Addition to Reserved Specialists	BAM was awarded €9m to manage the works of other Specialist Subcontractors that had not yet been determined.	9.0
Clash resolution and congestion	Issues with clashes and congestion in the design were identified during the GMP Process, for example the ductwork and cabling were routed in a way that meant that they would have interfered with each other. Complexities in the design also meant that aspects of the build would be more difficult and time consuming to undertake due to congestion, for which the Mechanical and Electrical Contractors were awarded additional costs of €4.5m and €3.5m, respectively.	8.0
Tender Inflation	Costs were awarded to the H.A. O'Neil (€2.2m), Mercury Engineering (€1.7m) and BAM (€1.4m) Contractors in relation to inflation on works that were not part of the contract BoQ.	5.3
Secondary Steel	H.A.O'Neil was awarded additional costs of €4.4m for additional steel that was required to construct gantries and access floors. This was a reallocation from the CSA package.	4.4
M&E Interface and Increased attendances	BAM was awarded €3.5m to cover the risk of the Mechanical and Electrical Works that were novated to them.	3.5
Gap Analysis	BAM was awarded €2.5m to account for potential changes that could not be determined following the issuance of a tranche of design documents towards the end of the GMP Process in August 2018.	2.5
Extension of Pre-Phase B Engagement Team	BAM, H.A. O'Neil and Mercury Engineering were awarded costs associated with the extension in timescales required to agree the GMP (€1.4m, €0.5m, €0.4m and, respectively).	2.3
Other	A number of additional minor claims totaling €1.3m were agreed including bond extension and finance costs associated with increased timescales	1.3
Total		**94.5**

Cost savings not achieved (€50m)

A cost savings target of €70m was built in to the original budget and a VE programme was established to identify and deliver cost savings in the design. This exercise was of limited success, delivering €20m in savings, leaving a balance of €50m.

Enquiries into the VE programme revealed considerable challenges in securing savings and there were instances in which costs actually increased. For example, adjustments to the design of Air Handling Units was made to reduce cost. However, this led to the addition of new items for which the rates in the contractual BoQ did not apply, exposing the package to current rates. The overall impact in this instance was 27% increase in price (corresponding to €1.3m).

VAT (€50m)

As a consequence of the overall cost increase, the contribution to VAT also increased. This is an item over which the project team had no control and therefore is not considered further in our analysis.

Design Team Fees (€27m)

The design team fees were originally budgeted at €40m. During the GMP Process these fees increased by €27m to €67m, an increase of 68%.

Each constituent member of the Design Team submitted a request for additional fees to the NPHDB. Following an appraisal with the Independent Expert the revised fee structure was approved. The reasons for the increase include prolongation of the Stage 2C design (encompassing the GMP process), prolongation of the construction contract by approximately 4 months, which required the design team to deploy staff over a longer period of time, client-instructed increases to the site quality inspectorate team, Employers Representative team, Design Team leadership and the submission of amended planning/fire certification applications.

The table below highlights an elemental breakdown of each of the disciplines increase.[59]

59 Any variance can be attributed to rounding.

Figure 25: Breakdown of increase by discipline*

Discipline	Original budget (€m)	Increase (€m, %)	Total (€m)
Architect	18.0	10.7 (59%)	28.7
Quantity Surveyor	4.0	5.3 (133%)	9.3
Mechanical & Electrical	10.5	4.9 (47%)	15.4
Structural	5.5	3.9 (71%)	9.4
Other**	2.5	2.1 (84%)	4.6
Total	40.5	27 (68%)	67.4

*any variances can be accounted for by rounding.
**Other includes: PSDP, Fire, Planning, Traffic, Other Specialists, CPI Allowance and Contingency for the Design Team fees)

Regulatory change (€16m)

On 2 May 2017 a Fire Safety Certificate was granted by Dublin County Council with the condition that sprinkler protection be extended and installed throughout the hospital. The cost associated with this was €16m. This was a cost over which the project team had no control and could not, in our view, have reasonably foreseen.

Medical Equipment Costs (€16m)

The budget for medical equipment was €52.6m, which increased to €68.6m. This increase was as a result of market testing with medical equipment suppliers that was completed by the NCH executive. This was on foot of a request by the HSE to determine that the overall budget for the medical equipment was sufficient. The breakdown of the increase is provided below;

Figure 26: Breakdown of increase by medical equipment costs*

Medical Equipment	Total (€m)
Imaging - MES	20.0
Labs - MES	10.2
Med Tech – MES	32.0
Medical - Capital	14.0
Backstop Plan No 3 - Reuse Medical Equipment	(7.6)
Total	**68.6**

*any variances can be accounted for by rounding.

Project staff and overheads (€16m)

There was a net increase in project staff and overhead costs, as a result of the following:

Figure 27: Breakdown of increase of staff and overhead costs*

Description	Original budget (€m)	Increase (€m, %)	Total (€m)
Direct costs: Increase in costs associated with the project team due to an extension of the duration of the project. This includes staff costs, rent, insurances.	32.5	11.5, 35%	44
Planning costs: Provision for planning fees and conditions attached to planning consent. Planning costs reduced by €1.3m due to lower planning levies than were budgeted for.	13.7	(1.3), (9%)	12.4
Specialist costs: Increased costs associated with legal services, auditors, communications, health planning, the Independent Expert and the Standing Conciliator. The Specialist Consultants provision has increased by €5.8m due to the extended timeline and the use of the Independent Expert during the GMP Process	19.5	5.8, 30%	25.2
Total	**66**	**16, 24%**	**82**

*any variances can be accounted for by rounding.

Satellites and decant (€14m)

There was a net increase in Satellites and Decant totaling €14m which include the following items:

Figure 28: Breakdown of increase of satellite and decant costs*

Other defined costs	(€m)
Satellite Centres Design Team Fees	0.8
Satellite Centres Construction	15.4
Satellite Centres Equipment	0.3
Satellite Centres – allowance for treatment of Aspergillus fungus	(1.0)
Decant Project (NPH Allocation)	(1.5)
Total	**14.0**

*any variances can be accounted for by rounding.

The Satellite Centre construction costs were the main reason for this increase. This was dues to the following, an under estimation of the quantities for mechanical and electrical works, a liquidation of the two mechanical and electrical subcontractors. of the subcontractors and unforeseen ground conditions.

Contingency (€9m)

The allowance for contingency increased as the overall costs increased. Contingency is calculated as a percentage of the construction costs and therefore it increased consequentially with rising construction costs. We consider that this is prudent and in line with good project management practice.

To complete the hospital, it is estimated that a further €293m will be required for other items including integration of the three existing hospitals (€86m), IT systems (€97m), implementation of an electronic health record system (€52m) and research and innovation centre (€18m). There is also a provision of €40m for costs already incurred in relation to the Mater site. Therefore the current budget for the NPH Project is €1.7bn.

4.3 Classification of cost impacts

In order to establish the relative significance of the issues identified, we have classified the cost increases into the following groups:

1. **Underestimation**: Costs that are a consequence of underestimation, principally during the planning, budgeting and set-up stages of the project. In our assessment, €294m (65%) of the cost increase can be attributed to issues that should have been identified prior to the approval of the DBC. It includes, for example, the price of risk transferred to the subcontractors that was insufficiently priced and costs that would have been absorbed by the inclusion of an allowance for optimism bias and a more appropriate level of contingency;

2. **Execution Issues**: Costs that were incurred as a result of issues that occurred during the GMP process or the management of it. In our assessment, €56m (12%) of the cost increase can be attributed to issues that include delays to the GMP process and its coordination;

3. **Consequential**: Secondary costs that have arisen as a direct consequence of costs associated with other issues, for example, VAT or contingency increases that arise from the overall increase in the construction estimates. In our assessment, €64m (14%) of the cost increase can be attributed to consequential costs;

4. **Uncontrollable**: Costs over which the NPHDB and NPH Executive had no control, for example those that arose from regulatory or legislative change. In our assessment, €16m (4%) of the cost increase falls under this category and is in relation to the regulatory change requiring installation of sprinkler protection throughout the hospital;

5. **Unclassified**: Costs that we have been unable to identify or allocate to a particular category. In our assessment these amount to €20.4m (5%); and

6. **CIR:** Capital Investment Requirement is the total estimated cost of the NPH Project.

The full breakdown of the allocation of individual cost increases is included in the Appendices.

Figure 29: The €450m increase of projected costs by identified area[60]

60 We note that certain tables contained within this report may not sum due to minor rounding differences

5

Flow of information

5.1 Overview

This section of the report summarises the flow of information associated with the increasing costs within the NPH Project.

5.2 Flow of information

The reporting of cost information to the NPHDB, CHP&P Board and CHP&P Steering Group was sporadic. The updates on an initial €61m cost increase, for example, were inconsistent at each of the stakeholder group levels. When other significant cost pressures were identified during the GMP Process, reporting of cost escalations appear to have been correctly managed.

The analysis below on what was known, when and by whom has been completed using information collated from various documents and reports we have been provided with by the NPHDB, HSE and DoH. These include reporting documents between the different stakeholder groups, the minutes of the various board meetings and letters and memos from the DoH and HSE.

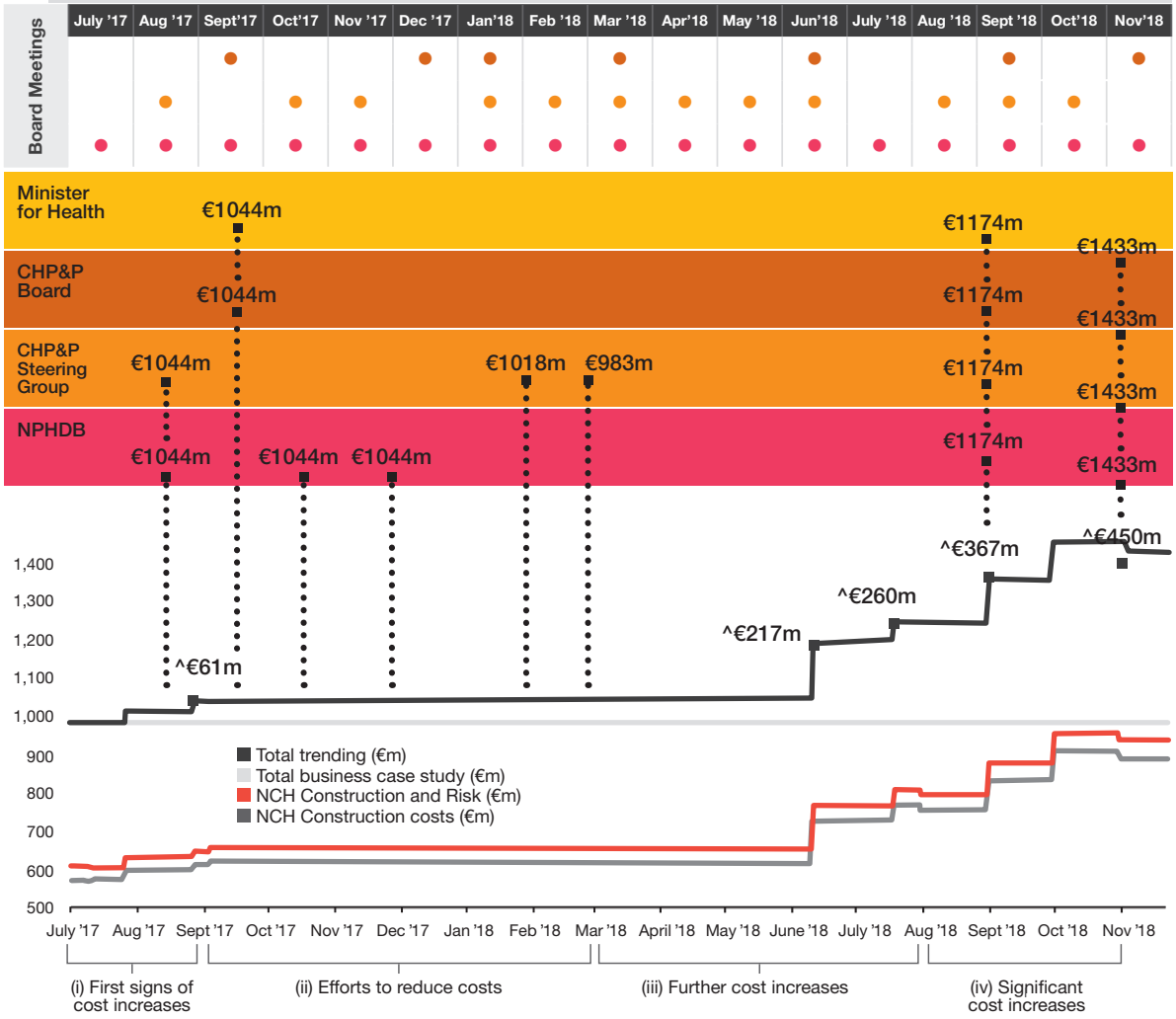
The reports at each level of the governance structure were inconsistent in content and format which made it difficult to clearly track information, particularly in relation to costs. As the content below is based on what was reported at the various stakeholder meetings, the figures may vary to the final agreed figures identified in other sections of the report.

The figure below outlines what was known, when and by whom in relation to cost increases from these four key phases of the project:

1. First signs of cost increases;
2. Efforts to reduce costs;
3. Further cost increases; and
4. Significant cost increases.

The figure demonstrates information on costs within these phases. The top of the figure identifies the frequency by which the NPHDB, CHP&P Board and CHP&P Steering Group met in their respective groups. The information presented below relates to the total NCH cost trending against the agreed DBC budget and the total NCH construction cost trending with and without risk contingency.

Figure 30: Key Stakeholder meetings and reporting on cost increases vs Linesight's cost trending reports



First signs of cost increases

The first sign that costs would be higher than the agreed project budget was in April 2017. The NPH Executive presented to the NPHDB meeting[61] that there would need to be a discussion on the Design Team's fees due to the extended programme of work and changes in scope.

At the beginning of August 2017, prior to the signing of the contract for the NCH Phase A Work, a member of the NPH Executive explained at the NPHDB meeting that there were three areas of significant potential cost increases resulting in a potential €61m cost overrun: Design Team fees, programme alignment and fire certificate implications[62]. Having been advised of these known potential cost increases and following briefings to HSE Estates, the NPHDB made a unanimous decision to proceed with the build and the signing of the contract for main works. This was on the basis that the cost pressure was manageable within the project budget given the cost savings VE exercise that was underway.

The Public Spending Code requires that a revised cost effectiveness analysis, cost benefit analysis or re-appraisal be undertaken in the event that serious additional costs arise (see below). This requirement was not complied with.

> Extract 28: Excerpt from Public Spending Code, B-02 Expenditure under Consideration
>
> If serious additional costs have arisen, the sanctioning authority should require the Sponsoring Agency to undertake, as appropriate, a revised cost-effectiveness analysis or cost benefit analysis having regard to the increased costs. Where a revised cost-effectiveness analysis or cost benefit analysis has been carried out and the project is either no longer affordable or the best value option, the procurement should be terminated and the resources diverted to more worthwhile projects.
>
> If tenders are over the approved limit re-appraisal may be required to determine whether the project should be abandoned or proceeded with. If this re-appraisal suggests proceeding at higher cost the approval of the Sanctioning Authority to a raised financial limit must be sought before contracts are placed. If it is decided that the project should be abandoned at this post-tender stage, and if substantial amounts have already been spent on planning etc. at this stage, the position should be reviewed to determine why the project came to proceed to this stage and was then abandoned.

61 NPHDB Meeting Minutes, April 2017
62 NPHDB Meeting Minutes, August 2017

The CHP&P Board and CHP&P Steering Group were subsequently notified of the cost increases of €61m. They were also advised of the need to achieve VE targets of €70m, in order to stay within the project budget, at their board meetings in August and September 2017[63]. The Minister for Health was informed by memo on 14 September 2017[64]. In response to the memo, the Minister stated in a handwritten note on the memo that the "Government has been very clear on this project needs to come in within Budget"[65].

In November 2017, a detailed breakdown of the €61m cost increase was presented to the NPHDB[66]. It included:

Figure 31: Analysis of €61m increase

	Total (€m)
Design Fees and Staff Costs	9
Fire Certificate Specifications	19[67]
Programme Alignment	20
Satellites costs	5
VAT	8
Total	**61**

The analysis of the overrun was also shared with the CHP&P Board and CHP&P Steering Group members at their relevant meetings.

Efforts to reduce costs

In the months that followed the initial cost increase of €61m, efforts were made by all stakeholder groups to reduce costs. They also identified potential alternative sources of funding in order to deliver the project within the agreed parameters. These included[68]:

- The development of a Risk Management Strategy;
- The creation of 3 Capital Backstop plans[69];
- The identification of areas for descoping not

63 CHP&P Steering Group Meeting Minutes, August 2017 & CHP&P Board Meeting Minutes, September 2017
64 Memo to the Minister for Health from the Department of Health, 13 September 2017
65 Note written on the Memo to the Minister for Health from the Department of Health, 14 September 2017
66 NPHDB Meeting Minutes, November 2017
67 The final cost increase as a result of the fire cert specifications was €19.8m including VAT.
68 Various CHP&P Board Meeting Minutes (December 2017 – March 2018)
69 The Capital Backstop plans were developed to outline how cost overruns would be addressed. The plans included cost savings through descoping, the use of existing equipment and the generation of additional funds from philanthropic endeavours.

directly related to patient care or from occupation;

- Use of the NCH Contingency Fund; and
- The identification of further revenue options including philanthropy and the sale of existing or future assets e.g. OLCHC.

The CHP&P Board rejected each of the 3 Capital Backstop plans and made the decision to instruct the NPHDB to assign €20m of the NCH Contingency Fund to known cost increases[70]. We have not been provided with evidence that this occurred. Although a Risk Management Strategy was referred to on numerous occasions by the CHP&P Board, we have not been provided with the document. The success of efforts to identify further revenue options and areas for de-scoping are uncertain.

At the March 2018 CHP&P Steering Group meeting[71], the cost overrun had been reduced to €35m as a result of the approval of €20m in additional funding for the sprinklers by the Government and €6m in cost reductions in other areas not clearly defined. The planned mitigating actions to offset the remaining €35m in overruns outlined were:

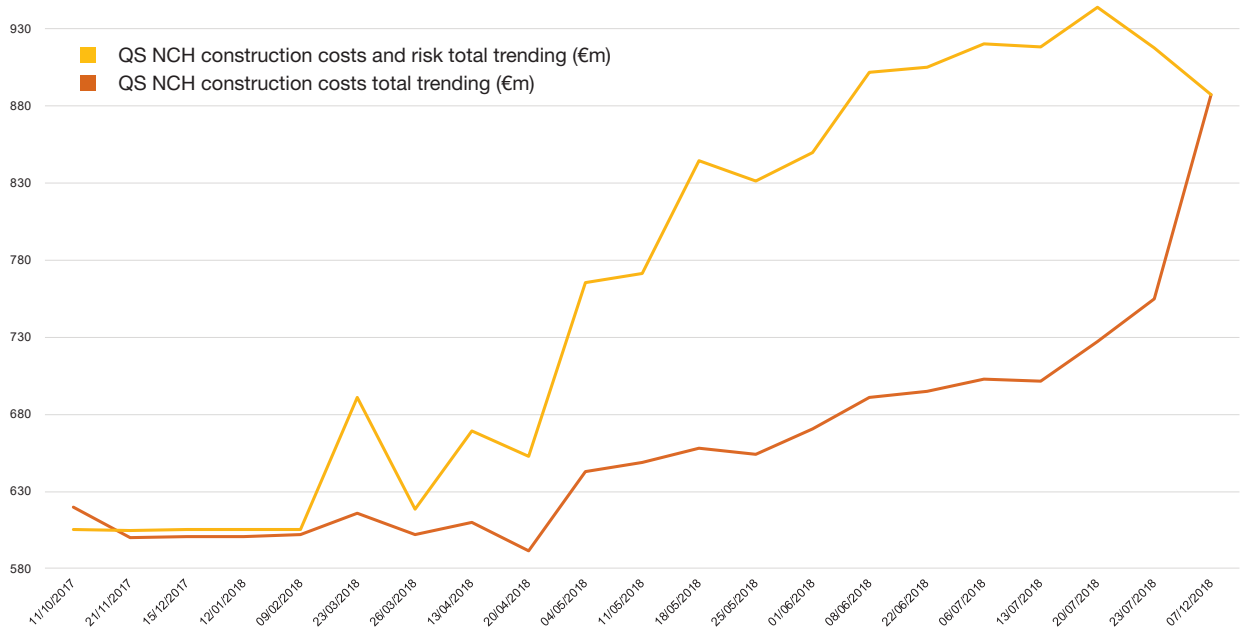
Figure 32: Mitigating actions

	Total (€m)
Use of the NPH contingency, on instruction from CHP&P Board	20
Once-off funds generated from dissolution of existing hospital foundations	9
Revenue generation through philanthropy	6
Total	35

Further cost increases

Linesight's NCH construction cost reports to the NPH Executive changed significantly in content and format over the duration of the project. Based on our analysis and understanding of the reports provided, the NCH construction cost total trending were within the agreed capital budget until May 2018. The costs and risk trending showed an increase of €86m above the agreed capital budget in March 2018 as shown in the figure below. The costs and risk contingency steadily increased from May 2018 as the figure shows below. These cost reports were produced by Linesight and sent directly to the NPH Executive. The graph below shows the outputs of the reports we have been provided with.

Figure 33: Linesight NCH construction costs total trending including and excluding risk



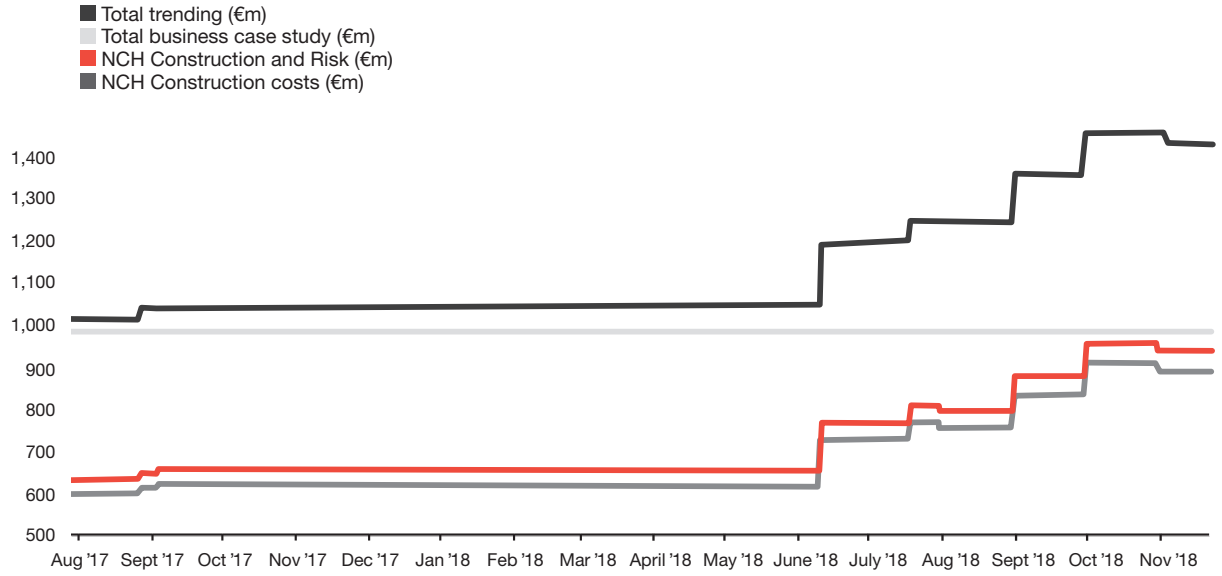
70 CHP&P Board Meeting Minutes, December 2018
71 CHP&P Steering Group Meeting Minutes, March 2017

Beginning in April 2018, at the various NPHDB, CHP&P Board and CHP&P Steering Group meetings concerns were raised about potential delays to the GMP and increases in costs due to[72]:

- Figures being returned from the Contractors over the capital budget;
- Measurement discrepancies between Linesight and Contractors;
- Perceived gaps in the design and specifications and scope creep;
- VE opportunities which had come back from Contractors as additional costs rather than savings; and
- A claim in relation to Sectoral Employment Order (SEO) from the Main Contractor that had been rejected.

The NPH Executive produced Executive Project Budget Summary reports from the information provided by Linesight. These reports were trending on plan until June 2018 when the total costs increased by €150m as shown in the figure below. From that date, costs steadily increased month on month.

Figure 34: NPH Executive Project Budget Summary Report figures



72 CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, April – August 2018

The NPHDB was informed at the beginning of June 2018[73] that Linesight's NCH construction cost trending reports were €55m above budget. Furthermore, the Contractors had submitted significant additional costs but no total figure was given. The reasons outlined for the additional costs were:

- VE not achieved;
- BoQ omissions in tender;
- Scope gaps in tender documentation; and
- Decisions made by the Independent Expert on disputes.

At the end of June 2018, Linesight's NCH construction cost trending reports to the NPH Executive were showing figures of €95m over the agreed capital budget for the construction and there was €211m in risk above this.

Significant cost increases

Linesight's NCH construction cost trending reports to the NPH Executive for the NCH construction showed figures of €149m above the capital budget in July 2018 with an additional €163m in risk. The NPH Executive Project Budget Summary reports showed figures of €255m above the total capital budget.

At NPHDB, CHP&P Board & Steering Group meetings in August and September 2018[74], attendees were told that the costs were trending at €191m (excluding VAT, SEO and inflation) over the agreed total capital budget, that a significant additional claim had been submitted by the Main Contractor and that the GMP was delayed until October 2018. The Minister for Health was informed on 27 August 2018[75].

In the months that followed, there were internal and external reviews commissioned to investigate the cost overruns and an analysis of the options for the next steps on the project was carried out. The NPHDB made the decision[76] to delay the awarding of the contract for Phase B Main Works by 3 months until these reviews and analysis were progressed. Following negotiations with the Contractors, an extension of three months was agreed without incurring additional costs for the NCH Project. On 7 September 2018 and 1 October 2018, the Minister for Health was updated by memo on the progress of the reviews and next steps[77].

In an analysis presented to the CHP&P Board[78] and similar presentations to the NPHDB and DoH, a total increase of €455m was set out over the period of October to December 2018. Concerns were raised by CHP&P Board members about future increases in costs as a result of Design Team fees, SEO and inflation. Methods of reducing costs were discussed and the CHP&P Board were informed that the maximum cost reduction from Value Engineering had been achieved and that all descoping/backstop options put forward in 2017 and 2018 had been rejected. It was discussed that in light of the increases, these options would have to be revisited.

The GMP Process concluded in early November 2018, following which, on 8 November the NPHDB informed the DoH of the revised cost of €1.43bn[79] to plan, design, build, furnish and equip the New Children's Hospital and Satellite Centres. On 9 November 2018, the Minister for Health was informed by memo[80]. The Minister has stated publicly that he informed the Taoiseach of the cost increase the same day.

In November and December 2018 officials from the Department of An Taoiseach, DPER and the Government were briefed on the cost overruns. The Minister for Health issued a memo to the Government on 18 December 2018 [81] detailing the cost increases, the internal and external reviews completed and the ongoing and cost reducing strategies. The memo requested that the Government approve the construction investment decision for the Phase B Main Contract and the commissioning of a review into the cost overruns. On 24 December 2018[82], the DoH wrote to the HSE to instruct them to give approval to the NPHDB to award the contract for the Phase B Main Contract. In January 2019, the NPHDB awarded the contract and construction continued on site.

73 NPHDB Meeting Minutes, June 2018
74 CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, August and September 2018
75 Memo to Minister for Health from Department of Health, 27 August 2018
76 CHP&P Board Meeting Minutes, September 2018
77 Memo to Minister for Health from Department of Health, 7 September 2018 and 1 October 2018
78 Memo to Minister for Health from the Department of Health, 7 September and 1 October 2018
79 CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, October - December 2018
80 Letter to Department of Health from NPHDB, 8 November 2018
81 Memo from Minister for Health to the Government, 18 December 2018
82 Letter from Department for Health to HSE, 24 December 2018

6

Residual risks and opportunities

6.1 Overview

This section of our report sets out our assessment of the residual risk that exists on the project from a commercial perspective, as well as identifying potential areas where cost reduction opportunities could present themselves.

6.2 Residual risks

Whilst the GMP does provide for an enhanced position in respect to price certainty, it does not present a fixed price. A number of risk areas remain that have the potential to place further cost pressure on the budget, both within the NPH Project and also those complementary programmes of work that interface with it. They include:

- **Controllable risks** – these are risks that the NPH Client can control or risks that could manifest as a consequence of action or inaction on the NPH Executive's part;
- **Embedded issues** – these are essentially issues that already exist but have not yet crystallised financially; and
- **Uncontrollable risks** – these include factors that are beyond the control of the NPH Executive but which could impact the financial performance of the project.

Controllable risks

Issue	Mitigation
Client change. Any further changes to the design will have a direct and potentially material impact on the programme and capital cost of the project.	• Minimise any further design changes by putting in place a rigorous change control process. • Ensure that design omissions are not categorised as design changes. • When making procurement decisions on equipment and furnishings, consider carefully the potential need for design change to accommodate it.
Delay to the construction programme. BAM has noted that the timeframe associated with completion of the NPH Project is ambitious. Any slippage that is attributable to the client could result in claims from contractors for additional costs as a result of delays to the current agreed schedule.	• Closely monitor schedule against the current baseline plan, and make every effort to maintain this baseline. • In the event that any delay is requested, undertake a rigorous assessment of impact and potential mitigation steps before agreeing to this.
Integration Alignment and Handover Risk. The NPH Project requires a significant level of core integration with ICT (behind the wall)/ Equipment /Laboratories etc. If these programmes are not carefully aligned there is a risk that unforeseen delays and/or design changes are encountered, impacting multiple stakeholders. Furthermore, there are wider integration requirements with the Electronic Health Record programme. Any delays or integration issues associated with that programme could cause delays to the NPH Project, with cost and claim implications.	• Ensure that detailed integration and handover plans are put in place covering all functional elements of the building. • This should cover the overall approach to be adopted, the criteria that form the basis for acceptance, roles and responsibilities for addressing defects etc. and should include CHI. • This plan should be managed on an ongoing basis and refined to reflect additional detail required as the project progresses towards integration and handover milestones. • Ensure that detailed integration plans between the NPHDB and CHI are in place and refined to reflect ongoing developments in both programmes. • Ensure that all key interdependencies, roles and responsibilities are identified, and clearly articulate any assumptions made.
Contract management. The Contractors understand the contractual relationships better than the NPHDB, allowing them to exploit opportunities to increase prices.	• Ensure that wider team fully understand the contractual position in order to avoid claims, minimise any claim amounts and allow for robust adjudication and approval.

Issue	Mitigation
Governance and control. This review has identified a number of issues associated with the governance and control of the project, including the extent of misalignment between design and cost elements. If this is not addressed there remains a risk that cost escalation issues may not be identified and addressed in a timely and controlled manner, with associated negative implications on the extent of risk exposure.	• Revisit the governance and control structure. This includes establishment and enforcement of clear change approval procedures for all design and cost items, implementation of appropriate systems and regular and consistent progress reporting in standard forms covering all Key Performance Indicators (KPIs).
Loss of corporate memory. Significant changes to key individuals within the NPHDB and the NPH Executive in the immediate term would result in a loss of valuable insight and may result in a reduction in the ability of the NPHDB to resist future claims. Erosion of corporate knowledge may place further reliance on the Design Team.	• Any short term changes to resources needs to be done in a managed and measured way to avoid losing valuable corporate knowledge.
Additional delivery and advisory capacity. Programme budgets need to increase to reflect need for additional capacity and capability in the executive team.	• A capability assessment should be completed to develop a revised resource plan and budget for the executive, project staff and advisors.

Embedded issues

Issue	Mitigation
Provisional sums. Elements of the design and fit out remain to be fully quoted and costed. This is typically the case with specialist parts of the build or elements that are not due for completion until near the end of the project for example the theatre pendants and other fixed furniture and the specialist fit out associated with the MES. In total a provisional sums amount of approximately €50m exists within the GMP at this time.	• Develop a plan to get provisional sum amounts costed now, or at least robustly validated.
Contract exclusions. The contract allows for costs associated with tender inflation to be recovered under certain conditions. Inflation above 4% from August 2019, as defined by the average of three defined tender price indices, can be claimed for annually on a compound basis, based upon the revised contract amount.	• Manage the schedule closely in order to minimise any slippage, thus reducing the impact of these exclusions.

Uncontrollable risks

Issue	Mitigation
Brexit. The NPH Project is based upon the delivery of construction materials and equipment on a 'just in time' basis. It is estimated that approximately €50m of materials and equipment for the NPH are currently planned to be sourced from the UK. The ability to provide all necessary material and equipment to the NCH to the anticipated timeline and cost could be significantly disrupted by a no-deal Brexit.	• Undertake a detailed analysis of the envisaged supply chain. • Ensure that necessary documentation is in place to facilitate the supply of material and equipment on an ongoing basis and/or look for alternative sources of supply within the EU.
Statutory Change. Changes to relevant building regulations or changes to the VAT rate can also be claimed for.	• Ensure that the project is completed to schedule in order to minimise the likelihood of any change, and resultant impact.

Illustration of Materiality of Tender Inflation Recovery Clause

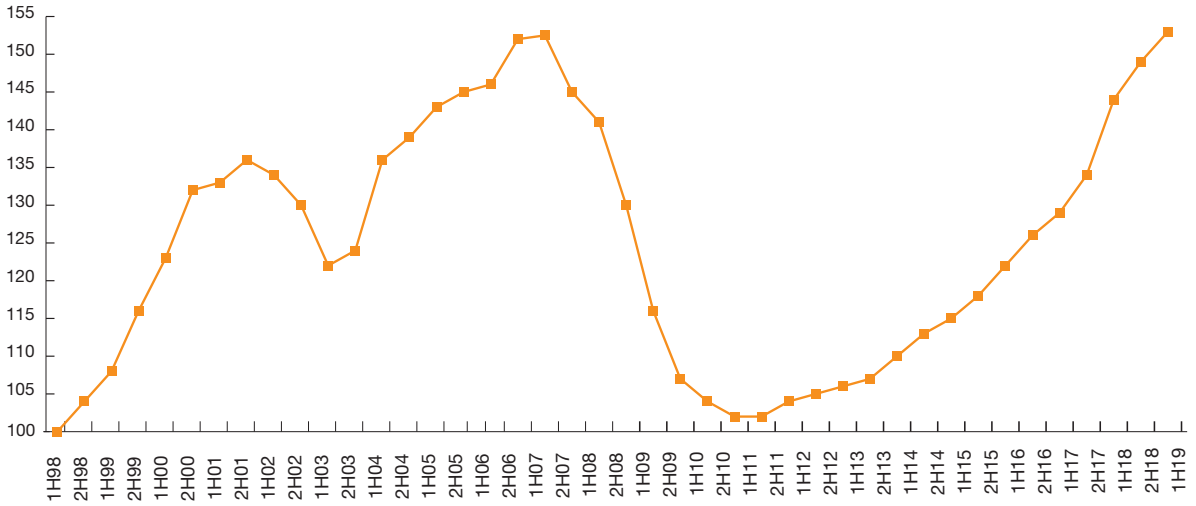
The following table presents a summary of the indicative cost implications on the revised project budget of the Tender Inflation Recovery Clause. In essence this clause enables the contractor to claim for Tender Price Inflation ("TPI") on the revised contracted sum between August 2019 and the conclusion of the build, to the extent that TPI exceeds the 4% threshold rate as included in the current price. These figures are set out to provide an indication only of the potential impact of this clause on the NPH Project costs to be incurred.

Figure 35: Materiality of Tender Inflation Recovery Clause

Average Inflation	Threshold	Applicable Rate	Inflation Cost €m
4%	4%	0%	-
7%	4%	3%	47.2
10%	4%	6%	96.6
14%	4%	10%	166.1

The below figure shows the current trend of construction tender prices in the Irish construction market. If the trend continues, there will be a material cost implication over the duration of the construction of the NPH Project into 2022, with the 4% TPI threshold providing very limited protection.

Figure 36: Construction Tender Price, Society of Chartered Surveyors Ireland, March 2019



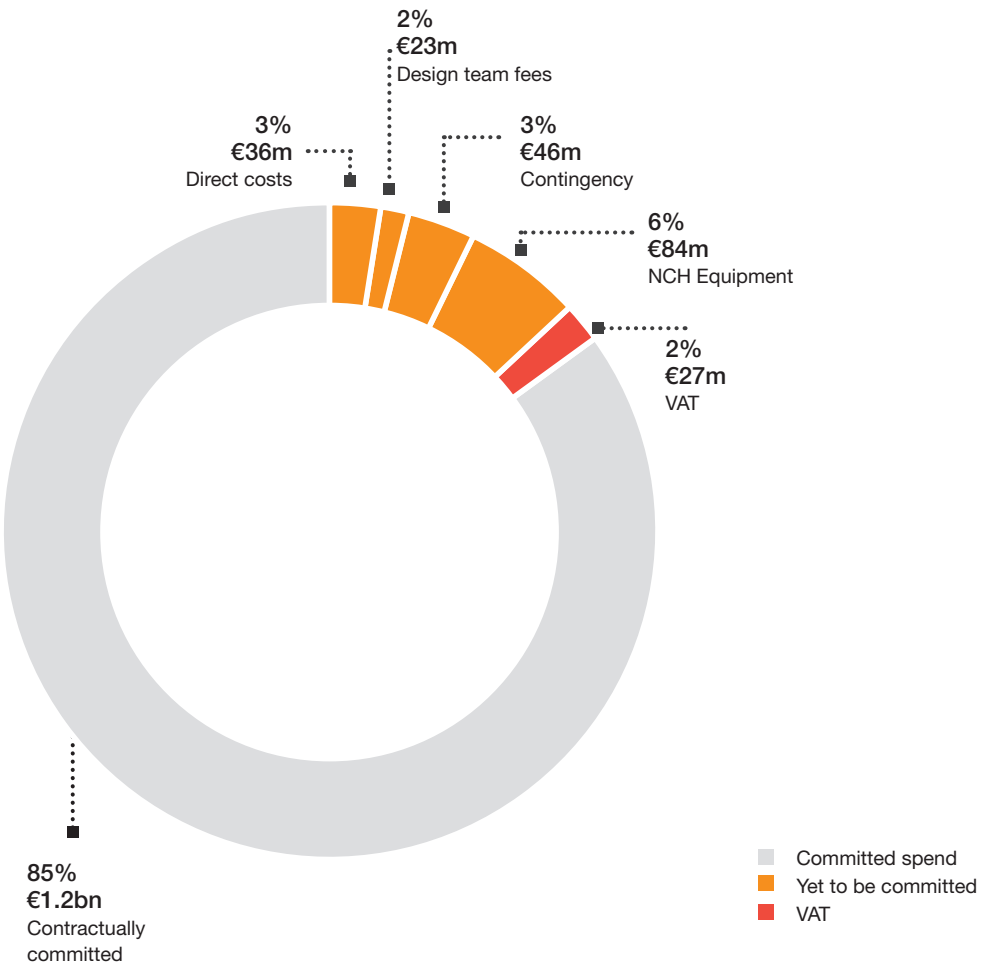
By way of example, when using the previous year's Society of Chartered Surveyor's Ireland (SCSI) Tender Price Index, TPI is of the order of c.7%[83], meaning a material cost impact will be incurred from the point of the first Review Period in August 2019. The Tender Inflation Recovery Clause presents a significant residual risk throughout the remainder of the NPH Project in the context of current trends.

83 Tender Price Index, Society of Chartered Surveyors Ireland, March 2019

6.3 Cost reduction opportunities

The figure below identifies the areas of opportunity to address cost reduction going forwards in the NPH Project. Of the total project cost of €1.43bn, approximately 85% has already been contractually committed through the agreement of the GMP, and a further 2% relates to VAT payable on the NPH Project. The ability for cost reductions in these committed areas is very limited due to the restrictions in the respective contracts.

Figure 37: Cost Reduction Opportunities in relation to the NPH Project*



*any variances are accounted for by rounding.

Theoretically VE could be applied to elements of the committed amount, but these opportunities have been largely exhausted. That is not to say that opportunistic instances where all parties are in agreement should not be pursued, but to undertake a dedicated VE exercise at this point brings with it significant risk of material change to the scope, schedule and agreed amount, which should be avoided. As such cost reduction opportunities are limited in the context of the overall budget, however that is not to say that they do not exist and every effort should be made to maximise savings by investigating fully the opportunity steps summarised in the following figure.

The remaining 13% of the total NPH Project cost is split between NCH Equipment, the Contingency sum, Design Team fees and Project Direct Costs. These areas of cost are not contractually committed and therefore present the best opportunity to achieve any potential cost reductions. The figure below examines the opportunities for cost reductions and efficiencies that exist under the uncommitted costs associated with the NPH Project.

Figure 38: Cost Reduction Opportunities in relation to the NPH Project

Opportunity	Opportunity Steps
Managing Contingency. A contingency of €46m exists within the approved project budget. If this is not fully used then the remaining amount will translate into a direct cost saving.	Establish a firm governance and control structure with respect to: i. the avoidance of claims in the first instance; ii. minimisation of claims in the second instance; and iii. firm adjudication and approvals of any claims received.
Managing Design Omissions. An amount of 2.5% of the contracted amount is included in the contingency budget. If this is not fully used then the remaining amount will translate into a direct cost saving.	Establish a firm governance and control structure with respect to the review and approval process for design omission claims.
Re-Use of Equipment. Linked to the previous point, the equipment team have identified some €7.5m in savings by re-using equipment from the three current hospital sites, which has already been accounted for in the capital allocation for the NPH Project. The potential to increase this figure by re-using more furnishings / material / equipment from the existing sites should be investigated and should not only take into consideration existing stock, but also planned additional capital expenditure (e.g. additional intensive care beds in Crumlin).	Extend assessment of re-use from medical equipment to other classes, and also look at extent to which planned capital expenditure between now and 2022 across the three hospitals can be re-used.
Project Direct Costs / Design Team Fees. The NCH is now entering its next phase of construction, which will place a different set of requirements on the Design Team.	The NPHDB is revisiting its own capacity/capability and governance requirements in light of this and the earlier Mazars report. It is the case that the project is also moving into a new phase of construction, so taking the above into consideration it is recommended that the scope and value of the Design Team Fees in this revised context be assessed.

Concluding comments

There remains significant risk on this project, which will require careful monitoring and control if the NPHDB are to deliver on their scope within the revised budget envelope. This risk spans both the core construction project and external factors that may have a material impact on it.

There also remains opportunity for cost reduction, but this is primarily associated with cost containment measures, as many of the potential efficiencies (e.g. re-use of equipment) have already been identified and accounted for.

7

Recommendations

7.1 Overview

In this section we synthesise the findings of the review into a concise set of recommendations.

7.2 Recommendations

The Guaranteed Maximum Price established through the two-stage tender process does not provide a contractual ceiling on cost and significant residual risks remain of further cost escalation. A primary focus of the NPH Client must be on managing this risk and preventing further cost increases. In this regard we make the following recommendations.

We have considered and agree with recommendations made by Mazars in their reports relating to cost escalation[84] and governance[85] . The recommendations that we have set out below in this report do not replace those and should be implemented in conjunction with them.

Recommendation 1: The project control environment should be overhauled to bring it up to the level of maturity and sophistication required for a project of the scale, complexity and importance of the NPH. The following areas require specific attention:

a. **Monitoring and reporting** – The existing reports between the Design Team, NPH Executive and NPHDB should be replaced with a new reporting regime that is based on fewer reports that are easier to understand and provide greater insight. It should incorporate the principles outlined below. We note that adhering to these principles will require enhancements to other areas of the control environment.

Key principles

Consistency –The presentation, structure and content of reports should be consistent from one reporting period to the next;

Comprehensiveness – Reports should provide a comprehensive picture of cost, progress, risk, quality and safety;

Objectivity – Data driven performance metrics should be established to quantify performance and trends, both in absolute terms (against a revised baseline budget reflecting the GMP) and in relative terms (against the previous reporting period). Narrative should be used sparingly to support the explanation of the data, not as a replacement for it;

Alignment and traceability – Cost, progress, risk, quality and safety information provided in reports should align and be traceable through all reports in a given reporting period; and

Quality – The basis of data included in reports should be defined and measures put in place to assure the quality of reported information.

b. **Risk management** – The existing risk management framework and process should be developed and deployed across the NPH Project (and wider programme) to enhance the identification, management and mitigation of risk. It should incorporate the principles outlined below. Once this has been completed a new, comprehensive assessment of risk should be undertaken across the project.

Key principles

Identification – Risks should be identified and described in a manner that allows their cause and consequence to be articulated;

Assessment – The impact and likelihood of risks should be evaluated with reference to a defined and quantified scale that is consistent across the project;

Response – The response for each risk should be defined. This should define, for example, whether a risk is avoided, reduced, transferred or accepted. Where risks are not accepted, plans should be put in place corresponding to the defined response;

Ownership – Each risk should be allocated to an individual owner; risks should not be assigned to bodies or groups of individuals; and

Monitoring – The monitoring arrangements in relation to risks and their response plans should be defined.

c. **Document management** – Document management arrangements should be developed with specific attention being given to the configuration control of key documents (e.g. the project budget and BoQ), revision and version control of documents (including the processes by which a reliable audit trail between document revisions is established), the organisation and retention of documents and their naming convention.

84 Report on preliminary observations in relation to the construction capital cost escalation of the National Children's Hospital, Mazars, 17 December 2018

85 Review of Senior Management Team Structure and Related Governance Systems, Mazars, 20 December 2018

d. **Change control** – Recognising the level of flux in the change control process during the GMP process, a review of the change control process as it currently stands should be undertaken to assess the extent to which it is fit for purpose for the Phase B works.

e. **Project systems** – A review of enterprise-class project systems should be undertaken and appropriate system or systems selected and implemented for the analysis, management and reporting of costs, schedule/progress, risks and quality. This should fully replace the existing Excel- and PowerPoint-based tools.

Recommendation 2: Comprehensive plans should be developed to mitigate the residual risks identified. Once developed they should be subject to a rigorous peer review to "stress test" their robustness and comprehensiveness.

Recommendation 3: A project assurance plan, including formal external review, should be developed and implemented for the remainder of the NPH Project. This should go beyond existing internal audit arrangements and define the review and challenge regime to which the programme as a whole should be subject to. The roles of the CHP&P Board and the CHP&P Steering Group should be reviewed in the context of this revised assurance model and their terms of reference updated to facilitate the revised role and challenge function.

Recommendation 4: The commercial capability and capacity of the NPH Executive should be strengthened so that it is more self-sufficient and less reliant on external advisors. Where external advice is required, for example to inform key decisions and for the provision of assurance, the NPHDB and NPH Executive should draw on wider expertise, and should not rely solely on advisors that are performing delivery roles.

Recommendation 5: Commissioning capability of the NPH Executive should be significantly increased in the short term to support the planning of the next phase and establish the programme for transition between the construction and opening of the new hospital.

Recommendation 6: As set out in the residual risks section, material risks remain around the integration of three existing children's hospitals in terms of staff, technology and broader integration. In this context, consideration should be given to opportunities for the closer working of the NHPDB and the CHI Board. This should include the potential for some shared appointments to promote integration and to address skills gaps.

Recommendation 7: The NHPDB should request confirmation of a number of key decisions to enable effective planning of the next phase of the programme. These include the commercial and procurement approach for the medical equipment, ICT and Electronic Health Records to avoid unnecessary delays and consequential costs.

Recommendation 8: The scope and responsibilities of the advisory firms that constitute the Design Team should be reviewed to reflect their future roles in the performance monitoring of Contractors throughout the remaining construction programme. Where necessary those roles should be revised. The current commercial arrangements between the NPHDB and its advisors should also be reviewed to establish whether the construct is fit for purpose and a stronger performance management regime should be put in place so that there is a greater level of performance monitoring and management of advisors.

We support the proposed on-site co-location of professional advisors and regard this as a positive step in enhancing relationships between advisors and their coordination. However, it must be undertaken in conjunction with contractual and structural changes and not as an alternative to these.

Recommendation 9: In view of the potential consequential programme risks, a scrutiny process that includes all levels of the governance structure should be put in place to review all proposals that are focussed on reducing the GMP. The process must highlight the potential impacts on programme and any risk of consequential claims.

Our review has identified a number of failures that occurred in the setup, planning and budgeting stages of the NPH Project. That period has now concluded and the recommendations below relate to the delivery of capital projects in Ireland more broadly.

Recommendation 10: The rules that govern public sector spending on major capital projects should be strengthened. The standards to which business cases should adhere should be more clearly defined and robustly enforced. In this regard business cases should be required to:

- Assess and quantify risk comprehensively, including risks that relate to the chosen procurement and contracting strategy;
- Include rigorous scenario analysis that establishes the range of potential outturn positions based on the identified risks;
- Provide much greater clarity as to the basis of capital budget estimates and their maturity/ vulnerabilities;
- Explicitly define the contingency that is included in capital budgets, its basis and intended use; and
- Include an expressly identified allowance for "optimism bias" in relation to time and cost with reference to a prescribed set of rules.

Recommendation 11: A central assurance and challenge function should be established within the Government to provide consistent challenge to and review of major public sector infrastructure projects throughout their lifecycles. This should consider:

- The development, implementation and enforcement of a standard gateway process. This should define the minimum levels of planning and organisational maturity that should be achieved at key lifecycle stages and the conditions that must be satisfied before projects are allowed to progress to successive stages; and
- An assurance regime that ensures that projects are subject to rigorous, objective scrutiny at periodic intervals and prior to major junctures and decision points.

Appendices

A. Terms of Reference

B. List of Interviews by Organisation

C. Types of Documents Requested

D. List of References

E. Glossary and Terms

F. Analysis Outputs

G. Key Artefacts

Appendix A: PwC's Terms of Reference

This review has been commissioned to understand the reasons for the cost escalation associated with the new children's hospital construction project ("the project"). The primary focus of the review is on the governance and management arrangements in place within and between the National Paediatric Hospital Development Board (NPHDB) and Executive, Design Team, relevant consultants, user groups and contractors. The review will be completed by 29th March 2019, subject to availability of relevant documentation and personnel, and will inform any governance or other changes required. The review will deal with the accountability of the relevant key parties, functions and roles. This may inform appropriate next steps by decision makers, including Government.

Scope of Work

Specifically, the review will:

- Establish the sequence of events in relation to the cost increases experienced by the project.
- Establish what was known, when and by whom, and the reporting of relevant information from the project team to the relevant oversight and governance bodies including NPHDB Board and its Committees, the HSE and the Department of Health.
- Assess the processes, controls, decision-making and oversight arrangements in relation to the planning and delivery of the project, including specifically the:
  - development and approval of the original business case / original design, budget and scope
  - development and approval of the construction/procurement strategy for the project
  - appointment of the main contractor, selection and execution of the construction contract
  - management of the main contract, in particular in relation to cost/budget and scope/change
  - design development process
  - assessment and valuation of risk at key decision points and on an ongoing basis
  - roles of key parties and accountability for the financial control and performance of the project.
- Establish the underlying root causes (processes, controls, governance and decision-making structures) that have contributed to cost increases.
- Comment on the major residual risks and the robustness/completeness of the current forecasts and identify and where possible quantify those risks contractually excluded from the GMP/ adjusted contract sum.
- Comment on the extent to which changes have been put in place by the NPHDB, the HSE and the Department of Health to address lessons learnt.
- Develop any further recommendations, if possible, which may:
  - identify any areas of potential cost savings or reductions, which are consistent with the applicable contractual undertakings and the delivery of the project, in light of it's current status
  - address major residual risks, control and oversight issues and
  - bring greater oversight of performance and value for money.

Appendix B: List of Interviews by Organisation

As part of our review, we have completed over 40 interviews with 52 interviewees from the below key stakeholder groups.

#	Stakeholder
1	National Paediatric Hospital Development
2	National Paediatric Hospital Executive
3	Children's Health Ireland
4	Department of Health
5	Health Service Executive
6	Contractors
7	Design Team
8	External Advisors
9	The Minister for Health

Appendix C: Types of Documentation Requested

#	Document name
1	Statutory Instrument for NPHDB
2	Final Project Brief 21 May 2014
3	NCH Report - Project Brief
4	Primary NCH Definitive Business Case
5	CHPP Steering Group Meeting Minutes
6	Governance and Project Approvals
7	NCH Change Management Procedures
8	Design Team Stage 1 Reports
9	2019 NPHDB Meeting Dates
10	Monthly Reports to CHP&P Steering Group
11	Commercial Presentations to the Board
12	Estimates contained within Design Stage reports
13	Procurement Strategy Paper
14	NCH Report on Tenders
15	BAM - NCH Main Works Tender Submission
16	NCH Main Works Tender
17	NCH Main Works Tender - Assessment Panel Meeting MOM
18	Main Works Quality & Financial Tender Evaluation Report (Signed)
19	BAM, Mercury and Jones Engineering Bill of Quantities
20	Signed contract documents for BAM, Mercury, O'Neil & Schindler
21	NPHDB Project Execution Plan
22	BAM Tender Programmes L1& L2 48months
23	NCH Change Request Register No 12
24	NPH Risk Registers
25	NCH Cost Reports
26	Project Brief
27	Initial Tendering and Final
28	IA Review of Project Management within the NPHDB
29	Capital Budget Descoping Appraisal
30	Final NCH Dublin MEP Review Report
31	NCH Report
32	Contracts
33	Design Team Stage 2a Report
34	Design Team Stage 2b Report
35	NPHDB Board Members Self-Assessment Evaluation Summary Report
36	Primary NCH Definitive Business Case
37	Code of Governance Manual
38	NPHDB Project Execution Plan
39	NCH Report
40	Design Brief for the NCH Project V2.2
41	Construction Sub-committee
42	NCH Cost Reports

#	Document name
43	NCH Construction Inflation Overview in Construction Industry
44	EY Analysis
45	NPH Financial Results
46	NPHDB Board Meeting Actions 2018
47	Log of NPHDB Concerns
48	Board Minutes Record of Sub Committees Annual Review
49	NCH Technical Requirements Revision B
50	NPHDB Board Minutes 2017 Jan to Dec
51	Monthly Change Order Logs
52	Monthly Reports to CHP&P Steering Group
53	Construction Committee Minutes
54	NPHDB Risk Management Policy
55	Appointment of Independent Expert
56	NPHDB Board Reappointment Letters 2018
57	Change Registers and Explanation of Change Process
58	Satellite Design Team Technical Requirements
59	GMP Close Out Tracker
60	BAM Satellite BoQs
61	Cost Trending Emails
62	CSA Design Information
63	NCH Hospital RFI Registers

Appendix D: List of References

#	Reference
1	€650m of the €790m to be provided from Exchequer funding.
2	The Terms of Reference for the review can be found in the Appendices.
3	NPH Client describes the entity as a whole rather than any specific component of its governance or management structure (for example, the NPHDB or NPH Executive).
4	Note; any variances can be attributed to rounding.
5	Project Brief Rev A, p4, 21 February 2017
6	DBC, Rev B, p121, 9 February 2017
7	Project Brief Rev A, p9, 21 February 2017
8	Project Brief Rev A, p20, 22 February 2017
9	Figure for total expenditure to date provided by the National Paediatric Hospital Development Board
10	Under a letter of engagement dated 30 January 2019 and amended on 7 February 2019
11	Children's health first: McKinsey report 2006, McKinsey & Company, 2006
12	The NPHDB was re-established with new membership in August 2013 under statutory instrument and remains the body responsible for the oversight of the NPH Project. All future references to The NPHDB from this point forwards refer to the body created in August 2013 and not its previous incarnation
13	Enabling works for the site were procured separately and commenced in August 2015
14	New Children's Hospital Procurement Strategy, 7 May 2015, p4
15	New Children's Hospital Procurement Strategy, 7 May 2015, p4
16	New Children's Hospital Procurement Strategy, 7 May 2015, p10
17	New Children's Hospital Main Contract, Appendix 2, Main Works Contract, Appendix 2, item 10 - Sign off On Quantities/ Adjusted Contract Sum
18	ARM4 agreed rules for methods of measurement was used to provide a uniform basis for measuring the building work
19	Definitive Business Case, pg 245, February 2017
20	Definitive Business Case, pg 308, February 2017
21	The Public Spending Code: D. Standard Analytical Procedures, Guide to economic appraisal: carrying out a cost benefit analysis, D.03, p15
22	Capital Works Management Framework Guidance Note, Budget Development, GN1.3, 2009
23	The NPHDB and NPH Executive have informed us that an embedded contingency was included over and above the NCH Risk provision. It is not included as a line item in any of the cost or budget reports with which we have been provided and therefore has been excluded from our analysis.
24	We note that in response to the first €61m cost increase in August 2017, an instruction was given by the CHP&P Board to draw down €20m of the risk contingency. Our analysis of the NCH budget shows that this was not undertaken.
25	NCH Procurement Strategy Update, 23 February 2016
26	Public Spending Code guidelines
27	The Public Spending Code: D. Standard Analytical Procedures, Guide to economic appraisal: carrying out a cost benefit analysis, D.03, p15
28	Supplementary Green Book Guidance: Optimism Bias, April 2013
29	Definitive Business Case, Revision B, p243-244, 9 February 2017
30	Stage 2C Design commenced in July 2016. We note that as of the date of this report, the Stage 2C report has yet to be approved by NPHDB.
31	Table 23.1, page 310, Definitive Business Case, February 2017
32	Project Execution Plan, version 3.0, May 2015
33	Project Execution Plan, version 3.0, May 2015
34	NPH Change Management Procedures, Version 6, March 2016

#	Reference
35	Project Execution Plan, version 3.0, May 2015
36	GMP Summary Programme, July 2017
37	This document does not contain any dates or version control, so we cannot confirm when it was created or distributed
38	New Children's Hospital Procurement Strategy, Appendix A, 7 May 2015
39	GMP Summary Programme, September 2017
40	Conditions of Contract, Main Contract, Clause 14, August 2017
41	GMP Summary Programme, September 2017
42	Appendix 2 Summary Programme, January 2018
43	GMP Update Report (Internal), Linesight, 23 July 2018
44	Letter from Independent Expert to PwC, 15 March 2019
45	Weekly Cost Update, 04 May 2018
46	Project Execution Plan, version 3.0, May 2015
47	Project Execution Plan, version 4.2, July 2018 (despite the version numbering, the document control sheet contained in version 4.2 of the PEP states that version 3.0 issued in May 2015 was the most recent revision prior to the update)
48	NPH (Project Risk Register), Dec 2016. This is the earliest register that we have received.
49	NPH Document Management and Retention Policy, April 2017, p11
50	NPH Document Management and Retention Policy, April 2017, p10
51	BDP OCMA Leadership_1 (1), specific dates and version control are not evident on this document
52	Specific dates and version control are not evident on this document
53	Letter from NPH Executive to the Design Team, April 2018.
54	New Children's Hospital Procurement Strategy, 7 May 2015
55	New Children's Hospital Procurement Strategy Update, 23 February 2016
56	National Paediatric Hospital Project – Stage 2B Quantity Surveyor Report – Pre Tender Cost Valuation, 24 August 2016
57	There may be minor differences between the contractors settlements and the analysis presented above. We have relied on the Linesight reporting on the conclusion of the GMP packages for the split of the cost information.
58	Our full analysis is included in Appendix F.
59	Any variance can be attributed to rounding.
60	We note that certain tables contained within this report may not sum due to minor rounding differences
61	NPHDB Meeting Minutes, April 2017
62	NPHDB Meeting Minutes, August 2017
63	CHP&P Steering Group Meeting Minutes, August 2017 & CHP&P Board Meeting Minutes, September 2017
64	Memo to the Minister for Health from the Department of Health, 13 September 2017
65	Note written on the Memo to the Minister for Health from the Department of Health, 14 September 2017
66	NPHDB Meeting Minutes, November 2017
67	The final cost increase as a result of the fire cert specifications was €19.8m including VAT.
68	Various CHP&P Board Meeting Minutes (December 2017 – March 2018)
69	The Capital Backstop plans were developed to outline how cost overruns would be addressed. The plans included cost savings through descoping, the use of existing equipment and the generation of additional funds from philanthropic endeavours.
70	CHP&P Board Meeting Minutes, December 2018
71	CHP&P Steering Group Meeting Minutes, March 2017
72	CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, April – August 2018

#	Reference
73	NPHDB Meeting Minutes, June 2018
74	CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, August and September 2018
75	Memo to Minister for Health from Department of Health, 27 August 2018
76	CHP&P Board Meeting Minutes, September 2018
77	Memo to Minister for Health from Department of Health, 7 September 2018 and 1 October 2018
78	Memo to Minister for Health from the Department of Health, 7 September and 1 October 2018
79	CHP&P Board, CHP&P Steering Group, and NPHDB Meeting Minutes, October - December 2018
80	Letter to Department of Health from NPHDB, 8 November 2018
81	Memo from Minister for Health to the Government, 18 December 2018
82	Letter from Department for Health to HSE, 24 December 2018
83	Tender Price Index, Society of Chartered Surveyors Ireland, March 2019
84	Report on preliminary observations in relation to the construction capital cost escalation of the National Children's Hospital, Mazars, 17 December 2018
85	Review of Senior Management Team Structure and Related Governance Systems, Mazars, 20 December 2018

Appendix E: Glossary and Terms

Glossary

AHU	Air Handling Unit
BoQ	Bill of Quantities
CHI	Children's Health Ireland
CHIB	Children's Health Ireland Board
CHP	Children's Hospital Programme
CHP&P	Children's Hospital Programme & Project
CIR	Capital Investment Requirement
CM	Change Management
CSA	Civil, Structural and Architectural
CWMF	Capital Works Management Framework
DBC	Definitive Business Case
DoH	Department of Health
DPER	Department of Public Expenditure and Reform
DT	Design Team
EHR	Electronic Healthcare Record
ER	Employer's Representative
GMP	Guaranteed Maximum Price
HSE	Health Service Executive
ICT	Information and Communications Technology
IE	Independent Expert
IPS	In-plane Switching
KPIs	Key Performance Indicators
MES	Medical Equipment Services
NCH	New Children's Hospital
NPH	National Paediatric Hospital
NPHD	National Paediatric Hospital Development
NPHDB	National Paediatric Hospital Development Board
OBC	Outline Business Case
OLCHC	Our Lady's Children's Hospital Crumlin
P&B	Planning and Budgeting
PC	Prime Cost Sum
PEP	Project Execution Plan
QS	Quantity Surveyor
SEO	Sectoral Employment Order
TPI	Tender Price Index
VE	Value Engineering

Terms

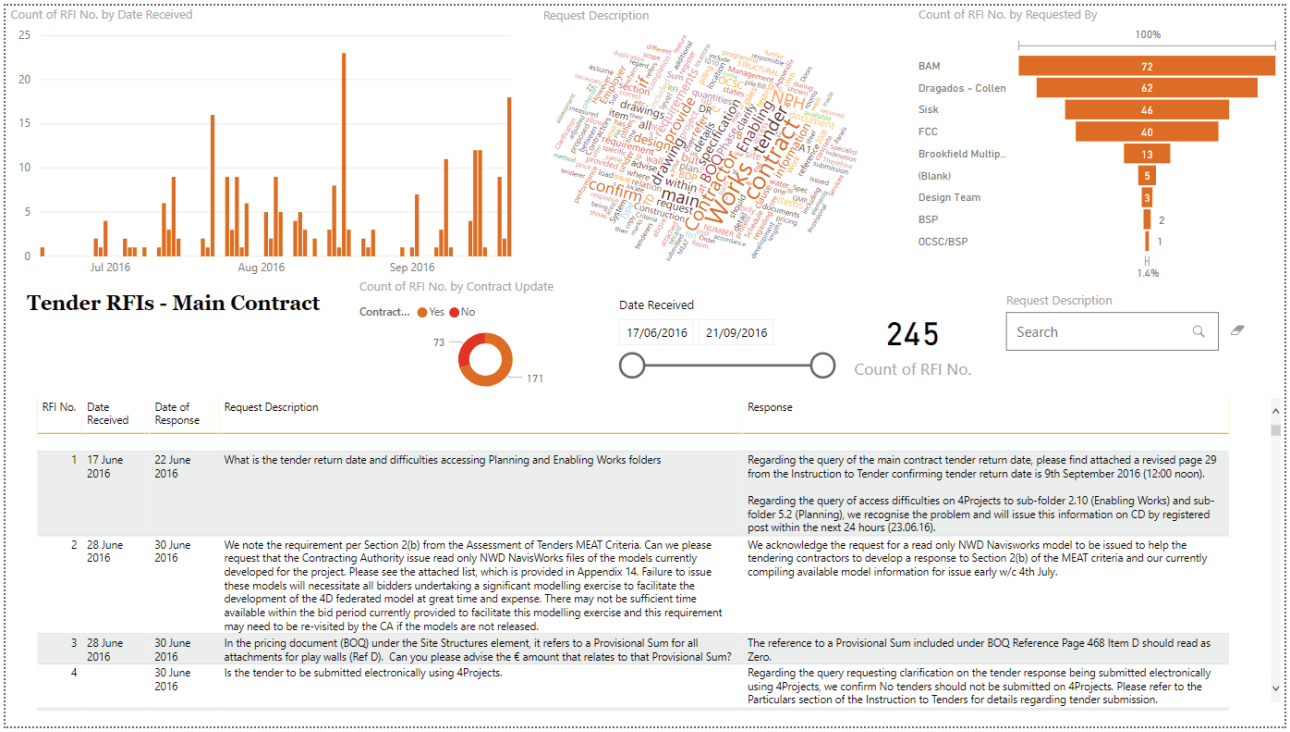
Term	Definition
Assurance framework	A framework that defines various levels of checks and controls over the project delivery, providing confidence and assurance of a successful outcome.
Audit Risk Sub-committee	A group that assists the NPHDB to carry out its governance and oversight responsibilities in relation to financial reporting, internal control systems, risk management systems and the external audit functions.
Basement / Substructure Works	All construction work carried out below ground including foundation and basement works.
Bills of Quantities	A list of measured quantities and the rates associate with the delivery of those items of work. There were three versions created across the lifecycle of this project: Tender BoQ, Contract BoQ and GMP BoQ.
Capital Backstop Plan	Capital Backstop Plans were developed to outline how cost overruns would be addressed and mitigated.
Capital Budget	The amount of agreed funding provided to the project for the delivery of the capital works (construction and capital equipment).
Capital Programmes	A capital programme is a capital-intensive investment programme with a purpose to build upon, add to, or improve a capital asset.
Capital Works Management Framework	A structure that has been developed to deliver the Government's objectives in relation to public sector construction procurement reform.
Change Management Procedure	The tools and processes for managing contractual change within a project.
Commercial Leverage	The strength of a particular party's negotiating position based on the contractual standing by which they hold.
Construction Tender Inflation	Fluctuations in the basic prices of labour, plant and equipment, and materials over time within the Irish Construction Industry.
Contract Sum Adjustment	Adjustments made to the original price agreed with the Contractor when entering into the contract.
Risk Contingency Funding	Amount of funds included within the project budget to cover risk exposure over the life of the project should these events occur.
Capital Investment Requirement	The total estimated cost of the NPH Project
Contractor	Third parties engaged by the NPHDB to deliver the construction of the NPH Project.
Contractual Claims	A request from parties engaged contractually by the NPHDB for reimbursement connected to the change or neglect of contractual terms.
Cost Certainty	Assurance that prices will remain stable from the point of budget estimation to final project delivery.
Cost Trending Report	Method of report during the GMP Process that focuses on the likely outturn of costs for the project.
Definitive Business Case	The final stage of the investment case presented to the approving authority outlining the justification for undertaking the project in order to receive approval to proceed and relevant funding allocation.
Design Team	The Design Team, comprised of Architects, Design Engineers and Quantity Surveyors.
Digital Hospital	A hospital where processes are streamlined to create a paperless automated digital workflow.
Direct Consequential Costs	Costs that arise due to increases in costs elsewhere in a project e.g. VAT
Guaranteed Maximum Price	A process which is undertaken to achieve a guaranteed maximum price for the final delivery of the project.

Independent Expert	An external and impartial advisor used to facilitate agreement on final costs.
NPH Client	The entity that procures the supply chain for the NPH Project and performance, manages it and oversees the NPH Project, takes budgetary responsibility for the NPH Project and is responsible for the delivery of the NPH Project outcomes. Where we refer to the NPH Client, we are describing the entity as a whole rather than any specific component of its governance or management structure (for example, the NPHDB or NPH Executive). For the avoidance of doubt, in using NPH Client, we are not referring to CHI.
Optimism Bias	The effect of estimation of project benefits and underestimation of costs and timing for project delivery.
Procurement Strategy	A defined and structured approach to engage and appoint a supply chain.
Programme Alignment	The alignment of the individual Contractors work schedules.
Project Controls	The processes and governance put in place to ensure successful project delivery against defined parameters.
Project Execution Plan	The document which specifies the project controls and governance requirements.
Public Spending Code	The rules that apply to ensure the best value-for-money is obtained where public money is being spent.
Residual Risks	Risks that still remain on the project.
Risk Transfer Premium	The cost of the contractual movement of risk to another party, in order to provide protection to the contracting party.
Sectoral Employment Order	This order sets the pay, pension or sick pay scheme for workers in the Irish Construction Industry.
Specialist Subcontractors	Professionals employed by the Main Contractor to undertake work that requires more in-depth knowledge or skills.
Tendered Market Rates	Rates applied at time of tender that reflect current market rates.
Value Engineering	The process to manage or reduce the cost of items by looking for more cost effective alternatives or more effective methods of delivery.
Works Package	Constituent parts of the CSA, Mechanical and Electrical Works.
Works Contracts	The CSA, Mechanical and Electrical installations.

Appendix F: Analysis Completed

Tender Stage RFIs

Tender Stage Request For Information (RFIs)



RFI No.	Date Received	Date of Response	Request Description	Response
1	17 June 2016	22 June 2016	What is the tender return date and difficulties accessing Planning and Enabling Works folders	Regarding the query of the main contract tender return date, please find attached a revised page 29 from the Instruction to Tender confirming tender return date is 9th September 2016 (12:00 noon). Regarding the query of access difficulties on 4Projects to sub-folder 2.10 (Enabling Works) and sub-folder 5.2 (Planning), we recognise the problem and will issue this information on CD by registered post within the next 24 hours (23.06.16).
2	28 June 2016	30 June 2016	We note the requirement per Section 2(b) from the Assessment of Tenders MEAT Criteria. Can we please request that the Contracting Authority issue read only NWD NavisWorks files of the models currently developed for the project. Please see the attached list, which is provided in Appendix 14. Failure to issue these models will necessitate all bidders undertaking a significant modelling exercise to facilitate the development of the 4D federated model at great time and expense. There may not be sufficient time available within the bid period currently provided to facilitate this modelling exercise and this requirement may need to be re-visited by the CA if the models are not released.	We acknowledge the request for a read only NWD Navisworks model to be issued to help the tendering contractors to develop a response to Section 2(b) of the MEAT criteria and our currently compiling available model information for issue early w/c 4th July.
3	28 June 2016	30 June 2016	In the pricing document (BOQ) under the Site Structures element, it refers to a Provisional Sum for all attachments for play walls (Ref D). Can you please advise the € amount that relates to that Provisional Sum?	The reference to a Provisional Sum included under BOQ Reference Page 468 Item D should read as Zero.
4		30 June 2016	Is the tender to be submitted electronically using 4Projects.	Regarding the query requesting clarification on the tender response being submitted electronically using 4Projects, we confirm No tenders should not be submitted on 4Projects. Please refer to the Particulars section of the Instruction to Tenders for details regarding tender submission.

Analysis overview

Our analysis involved the extraction of data from the GMP - Adjusted Contract Sum Summary, in order to determine the increase of RFIs over time, query originator, description of the RFI and keyword filters.

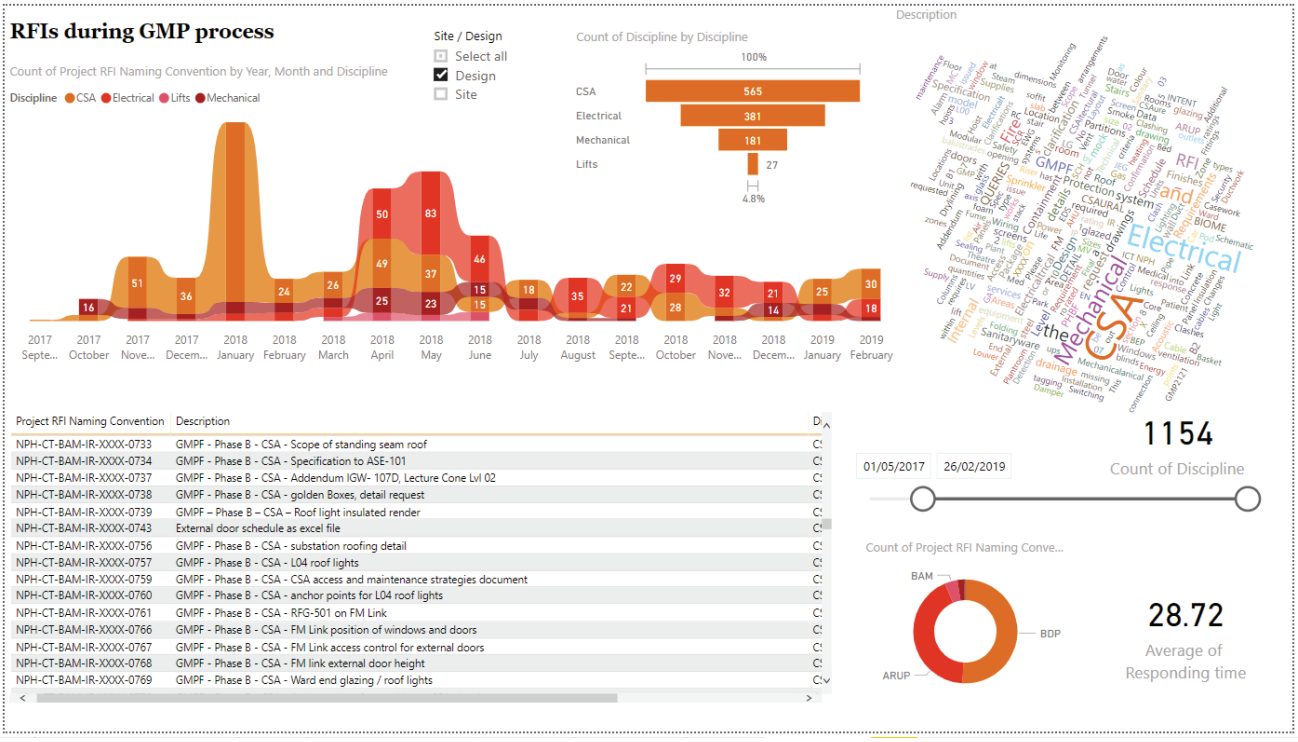
Data sources used

- Tender stage RFI register

Appendix F: Analysis Completed

Tender Stage RFIs

GMP Request For Information (RFIs)



Analysis overview

Our analysis involved the extraction of data from the GMP RFI register, in order to determine the number of RFIs over time, design package link, time period associated with approval and key themes.

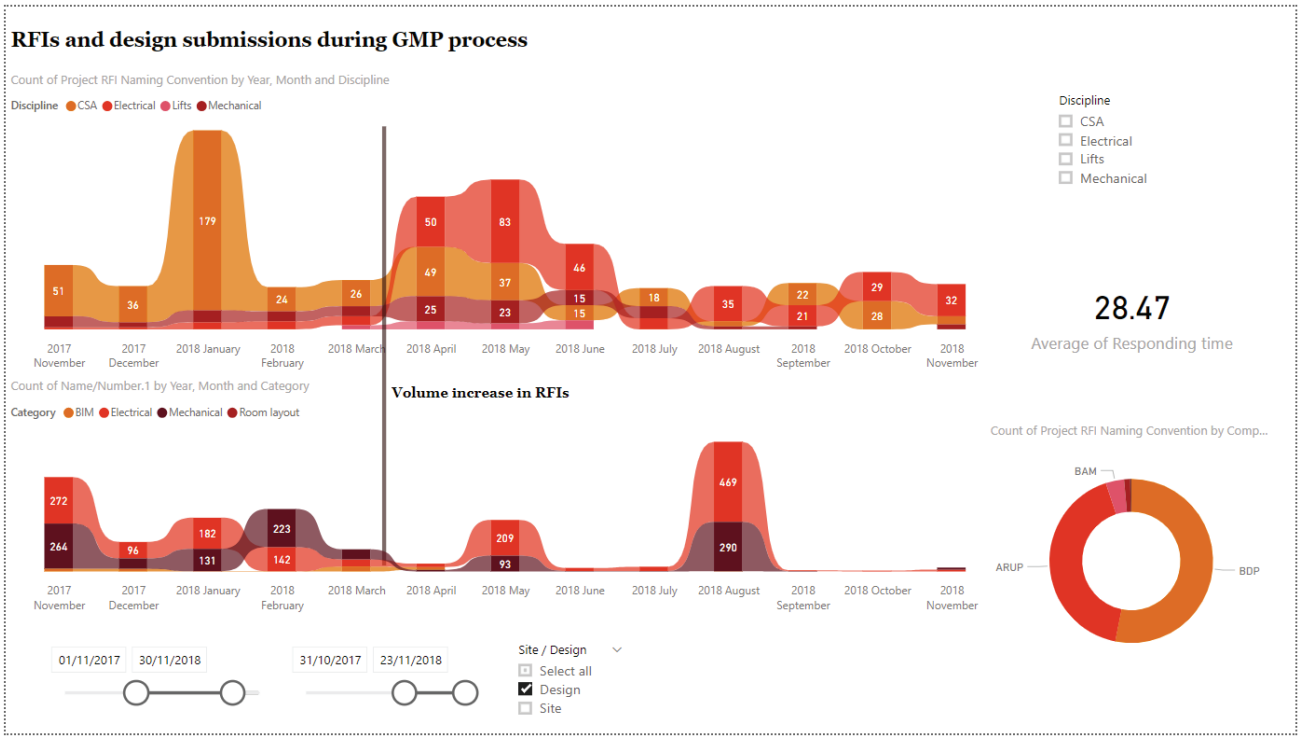
Data sources used

- GMP RFI Register

Appendix F: Analysis Completed

Design Analysis

Design submissions and RFI alignment



Analysis overview

Aligning GMP RFI register data and design submissions provided the opportunity to review trends and patterns over time.

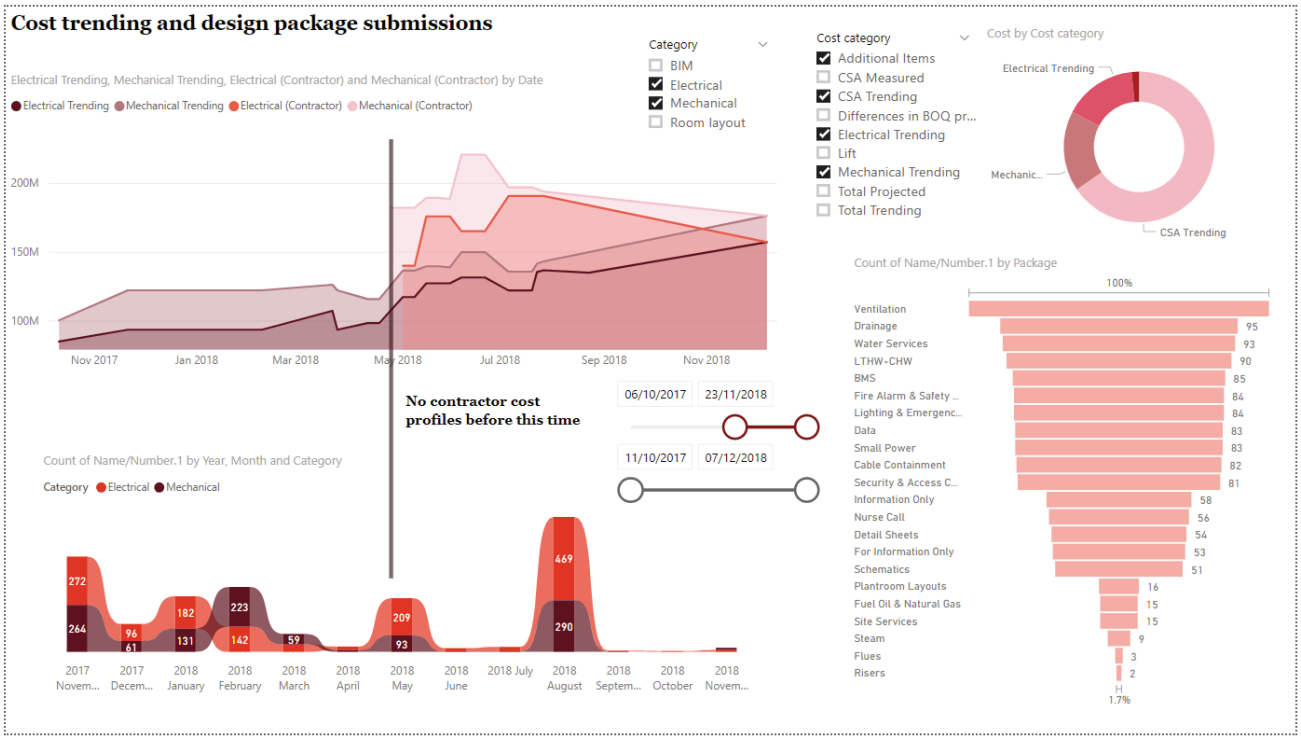
Data sources used

- GMP RFI registers;
- Document submission logs.

Appendix F: Analysis Completed

Design Analysis

Design submissions and cost trend analysis



Analysis overview

We utilised cost reports and design register information to determine trends of delivery and cost variations across the lifecycle of the project.

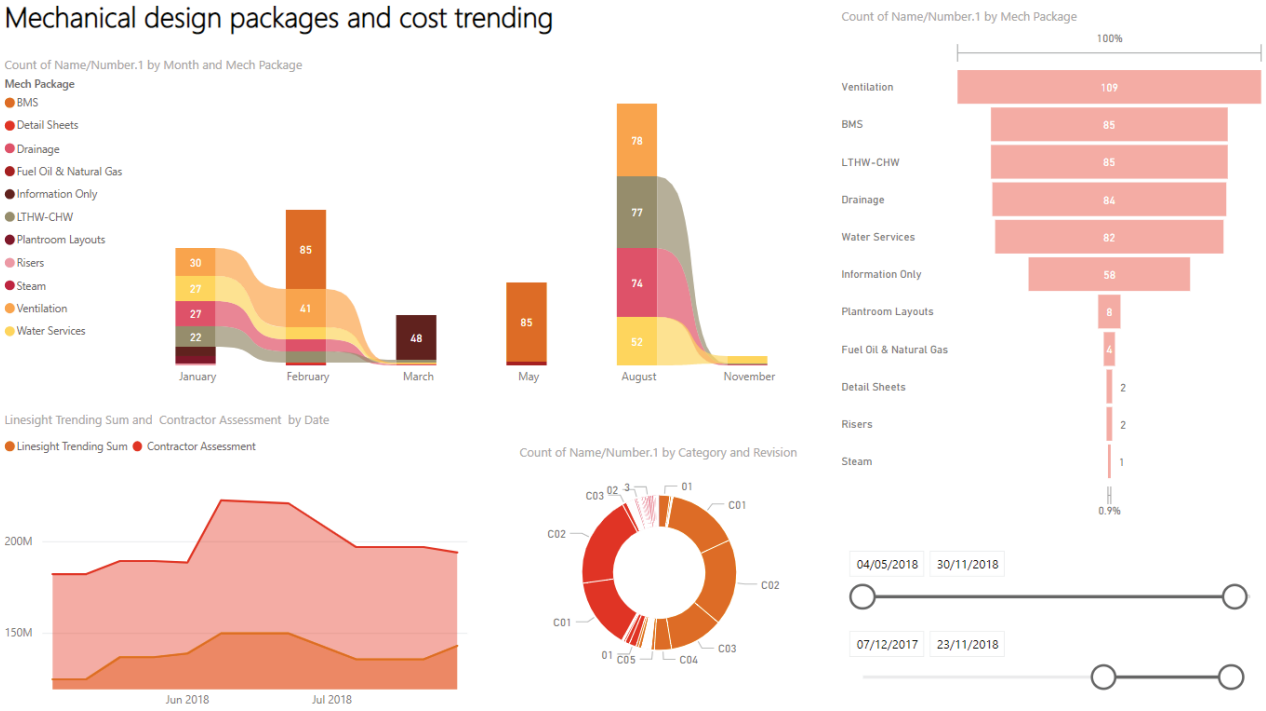
Data sources used

- Cost trending reports;
- Design submissions;
- Work package breakdown.

Appendix F: Analysis Completed

Design Analysis

Submitted Mechanical design packages



Analysis overview

We utilised cost reports and design register information to determine trends of delivery and cost variations across the lifecycle of the project.

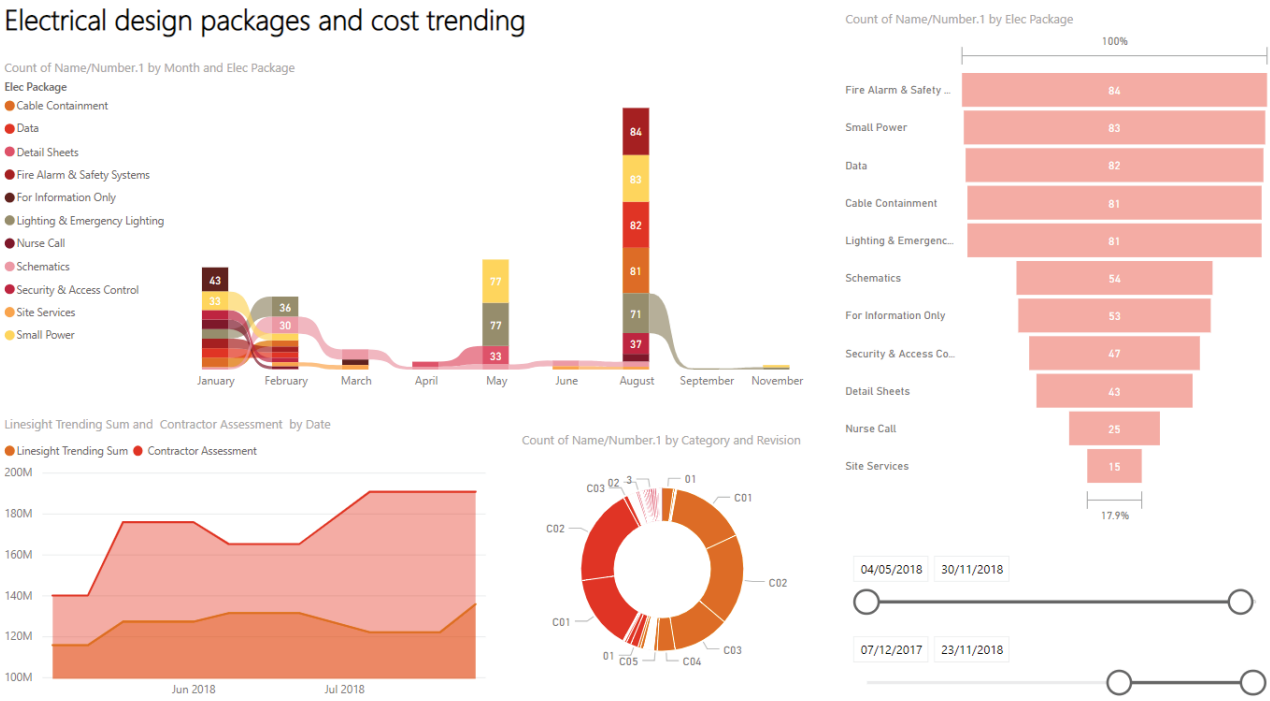
Data sources used

- Cost trending reports;
- Design submissions;
- Work package breakdown.

Appendix F: Analysis Completed

Design Analysis

Submitted Electrical design packages



Analysis overview

We utilised cost reports and design register information to determine trends of delivery and cost variations across the lifecycle of the project.

Data sources used

- Cost trending reports;
- Design submissions;
- Work package breakdown.

Appendix F: Analysis Completed

Classification of cost increases

		Classification					
Item	Increase €m	Underesti-mation	Execution issues	Conse-quential	Uncontrol-lable	Unclassi-fied	
Changes in Bill of Quantities during GMP process	158.3	X (90%)	X (10%)				Risk embedded in procurement strategy. The majority of the increase is ascribed to underestimation at tender stage. Whilst it is impossible to disaggregate, we do not believe that the execution issues identified were a material cause of this increase (assessed as 10%)
Legal settlements with contractors							
Preliminaries & programme alignment	58.2	X					Costs of alignment should have been included in the original budget
Addition to reserved specialists	9.0	X					Costs arising from procurement strategy and should therefore have been included in the original budget
Clash resolution and congestion	8.0	X					A provision for clashes should have been provisioned for in contingency
Tender inflation	5.3			X			Exposure to inflation in relation to items not included in the contract BoQ. These costs are a direct consequence of the changes in the Bill of Quantities
Secondary steel	4.4					X	In order to establish the relative significance of the issues identified, we have classified the cost increases into the following groups: Costs were associated with reallocation from the CSA package to the Mechanical package.
M&E Interface & increased attendances	3.5	X					Costs arising from procurement strategy and should therefore have been included in the original budget.
Gap analysis	2.5		X				Costs relate to re-issuance of design information and could not have reasonably been budgeted for.
Extension of pre-phase B engagement team	2.3		X				Costs related to the extension of the GMP and could not have reasonably been budgeted for.
Other (Extension related)	1.3	X					Costs relate to the extension of the overall programme due to alignment and should have been included in the original budget.

*any variances can be accounted for by rounding.

Appendix F: Analysis Completed

Classification of cost increases

Cost savings not achieved	50.0	X					Categorised as underestimation as the commercial construct and tender evaluation strategy made its achievement unlikely
VAT	50.0			X			Consequential costs relating to cost increases elsewhere
Design team fees	27.0	X (50%)	X (50%)				50:50 split between underestimation (arising from programme alignment) and execution (arising from extension of the GMP process)
Medical equipment	16.0					X	Increased costs as a result of market testing
Regulatory change	16.0				X		Costs associated with fire certification over which the NPH Executive had no control
Project staff & overheads	16.0	X (50%)	X (50%)				50:50 split between underestimation (arising from programme alignment) and execution (arising from extension of the GMP process)
Satellites & Decant	14.0		X				Additional costs that arose during the construction of the satellites and decant activities
Contingency	9.0			X			Consequential increase associated with the increased contract sum
Total	**450**						

*any variances can be accounted for by rounding.

Appendix F: Cost model outputs

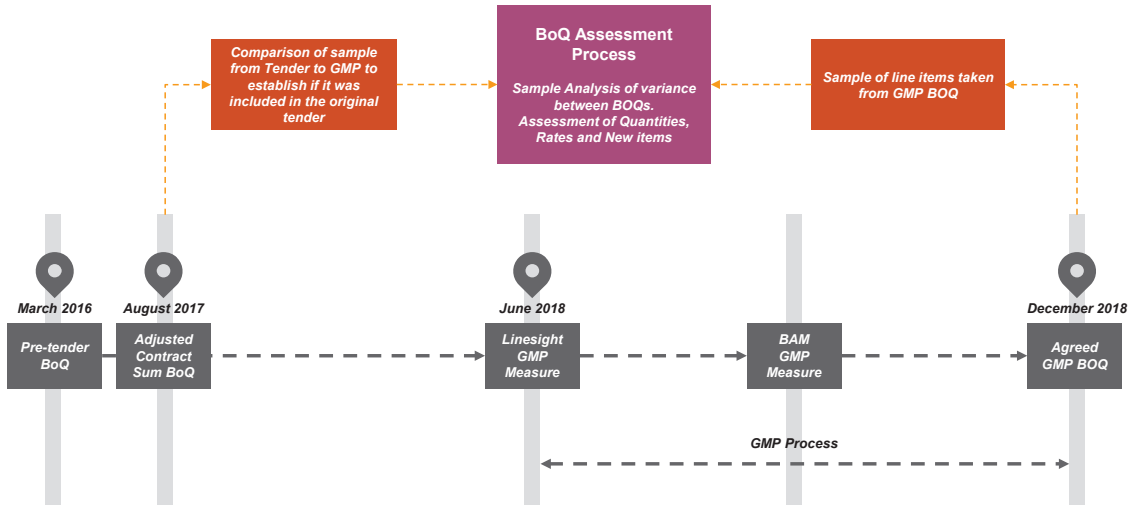
Due to commercially sensitive information in the analysis of the individual Work Packages, we have not included our entire working documents here. See below the methodology used for the sampling of the BoQ.

Sampling Approach Summary:

1. Each work package was categorised into elements, per measured works summary.
2. Five Elements from each work package (CSA, Mechanical and Electrical) were selected for further analysis.
3. For each Element, Ten line items were selected on a value basis and extracted to facilitate comparison between Tender and GMP.
4. This allowed for analysis of variances in quantity, rate and new items on a percentage basis.

Methodology adopted for the comparisons and final assessments.

1. Identified each work package (e.g. CSA, Mechanical, Electrical. Analysis excluded Lifts as there was no significant increase)
2. Subsequently split each work package into its individual component elements
3. Analysed differences in value between Tendered amount of each element to GMP
4. Ranked differences based on the scale of the increase in Element value
5. Selected top five element differences between GMP and Tender BoQs
6. Isolated the ten most expensive individual line items within each selected element
7. Analysed description of each selected line item to determine if it existed in the original tender BoQ
8. Where that description was common to tender and GMP we analysed movements in quantities and rates
9. Where no evidence existed that the line item was included in the original tender, this is deemed a new item
10. The percentage difference is calculated for each outcome



Appendix F: Cost model outputs

We analysed the CSA, Electrical and Mechanical packages. This involved the extraction of data from the following sources:

- Adjust Contract Sum Summary
- NCH Adjusted Contract Sum - Mechanical Package
- NCH Adjusted Contract Sum - Electrical Package
- HAON-NPH-Q-BSP-TD-BQ-0003- Volume C Pricing Document
- Mechanical Services Tender_20-10-16 (ID 46987).xlsm
- NCH_Volume C_Electrical Services Tender Pricing Document Addendum (ID 46988).xlsm

This information has been excluded as it's commercially sensitive.

Appendix G: Key Artefacts

The New Children's Hospital Procurement Strategy

It was noted in the ITT that a two-stage procurement approach is a more appropriate method to deliver the clients goals in the current market but that the exact content of each of the contracts, the Form of Contract, and the procurement approach will be developed and tested by the Design Team following appointment .

A target programme was issued to the design team indicating the client's preliminary views on the design and construction stages to completion.

L4. Design Team Review of Procurement Strategy

The Architect and Quantity Surveyors held a number of review discussions regarding the optimum programme and procurement approach through Stage 1 and consulted with other members of the Design Team, in particular with the Consultant Engineers, and others. The procurement approach was developed and tested by the Design Team in consultation with the NPHDB. Preliminary studies were undertaken to assess the options and to optimise the process having regard to the above objectives. The preliminary studies also considered how specialist contracts might be procured and integrated into the main contract.

In general the design team supported the broad logic of the client's target programme and **two stage procurement strategy** which optimised the programme for completion, through commencement of enabling works immediately following receipt of planning permission; however, one further key refinement was identified by the design team to enhance the strategy:

The design team sees considerable merit in tendering the works as one overall contract with two parts, Phase A and Phase B. Phase A will comprise an Enabling Works contract (decommissioning, demolitions, services diversions), and also piling, excavation works and substantial concrete works to basement areas, whilst Phase B will comprise the balance of the New Children's Hospital building works. The two-stage tender process will **apply only to the Tender Phase B** works as the Phase A tender will be based on detailed design and full bills of quantities.

New Children's Hospital Procurement Strategy, 7 May 2015, p4

Risk Mitigation Strategy

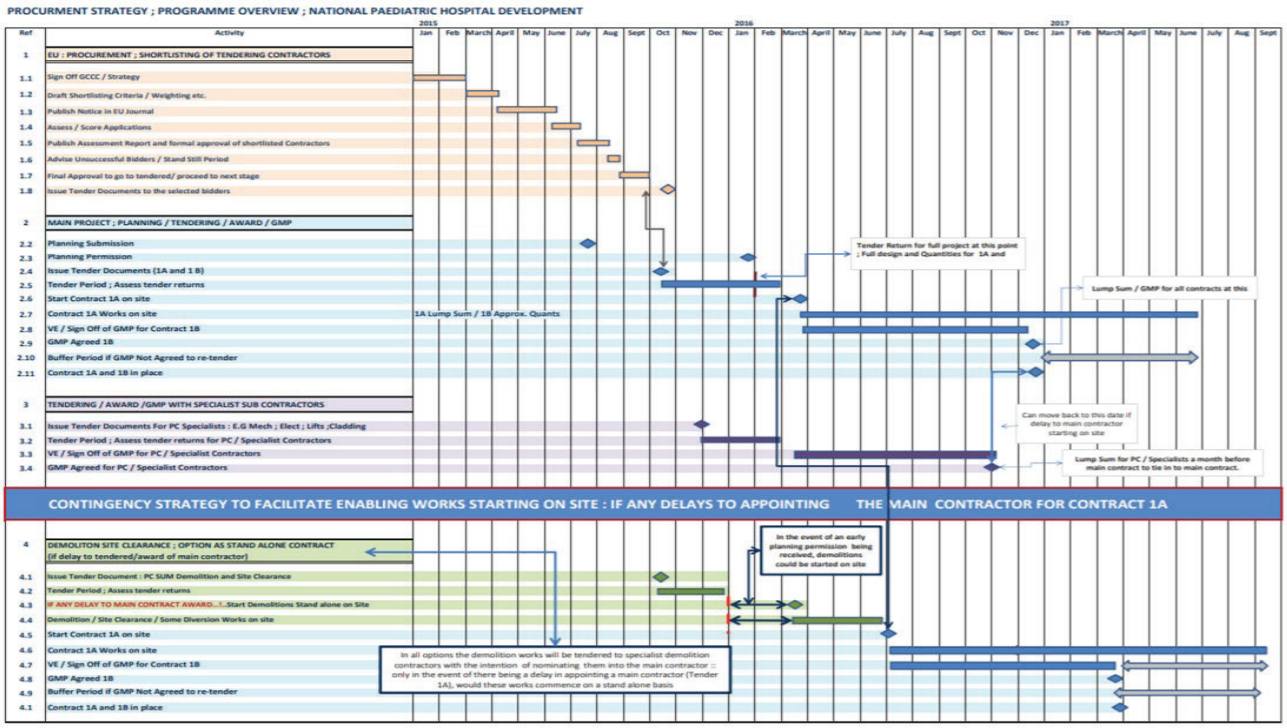
In reviewing these potential risks the following risk mitigation strategies have been identified;-

1. Liaison with planning authorities prior to planning submission and working to ensure design as it develops complies with appropriate guidelines and feedback from relevant authorities
2. Ensuring adequate and appropriate programme allowances for critical EU requirements and review periods. Careful drafting of all notices to ensure they address all the requirements of the procurement strategy (two stage tendering; GMP etc.) Liaise with GCC and ensure their agreement to the contractual amendments, etc. necessary to support the procurement strategy proposed.
3. Ensuring adequate design team resources committed to delivery of comprehensive tender documents. OS to prepare a detailed elemental tender documents programme delivery with identified resources against each element/sub element. All design team member sot identify appropriate stand-alone resources against relevant deliverables. Regular monitoring of information flow against pre-agreed milestones.
4. Cleary established and defined "Design Deliverables" with delivery stages provided by each of the designers. Detailed schedule produced as part of the Procurement strategy report.
5. Ensuring the project will be well received by the market, achieved by strategies such as;-
   a. Primacy of BOQ (contractors can rely on quantiles measured in BOQ) and utilisation of two stage tendering facilitating contractor VE input etc.
   b. Traditional employer design, not contractor design and build (reducing tender costs + risk to contractors).
   c. Nominated/ Specialist sub-contractors (not domestic sub-contractors). Ensuring specialist sub-contractor interest in the project as they will have better protection afforded by nomination.
   d. Opportunity to be engage in value engineering process/early contractor involvement.
   e. Selection criteria which will encourage contractor engagement /applications.
6. Many of the points identified in 5 address this. Complimented by regular cost planning and review of tender market generally. Use of nominated/PC sums to spread the tendering risk over several specialist contractors. Consideration of strategies such as mid tender reviews with contractors to ensure early engagement with tendering documentation, etc. Two stage tendering process providing value engineering opportunities.

New Children's Hospital Procurement Strategy, 7 May 2015, p10

Appendix G: Key Artefacts

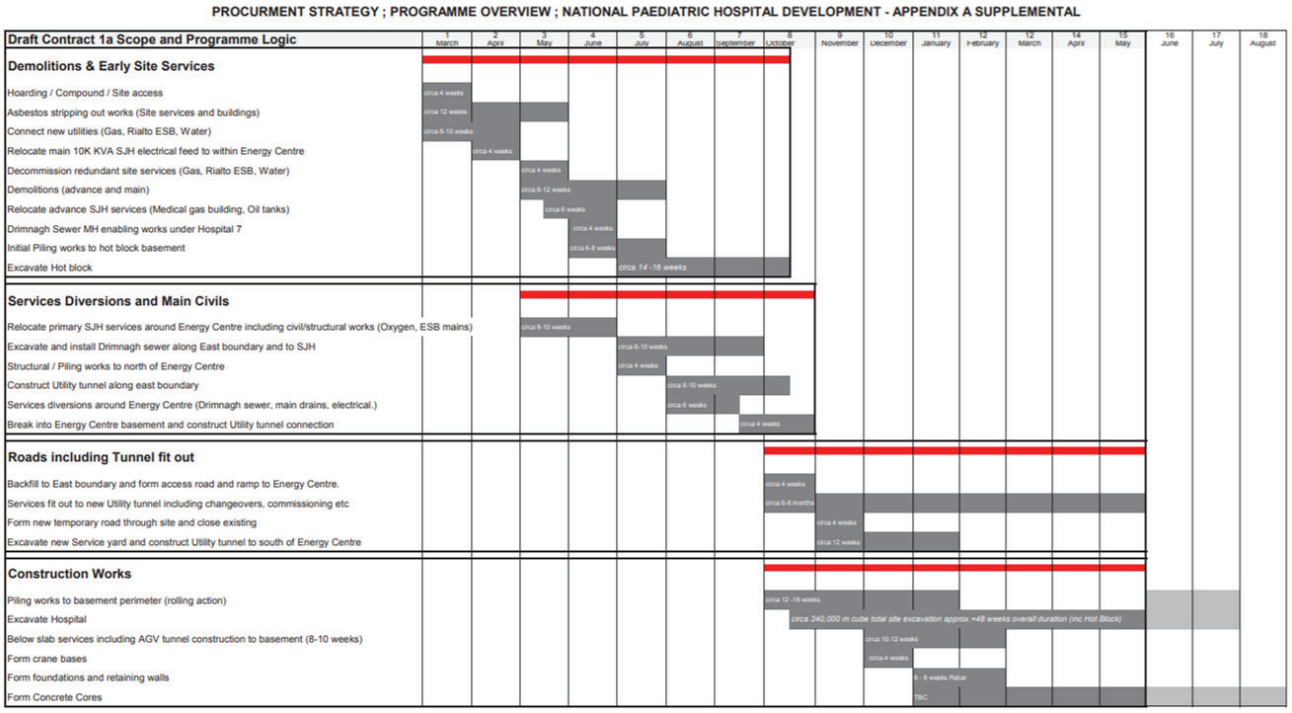
The New Children's Hospital Procurement Strategy



New Children's Hospital Procurement Strategy, 7 May 2015, Appendix A

Appendix G: Key Artefacts

The New Children's Hospital Procurement Strategy



New Children's Hospital Procurement Strategy, 7 May 2015, Appendix A

Appendix G: Key Artefacts

The New Children's Hospital Procurement Strategy

- Two additional specialist theatres are planned, one for orthopaedic trauma and the second for emergency cases. This brings the planned total to 18 theatres.
- In addition to this requirement, a Paediatric Interventional Radiology Suite, a Cardiac Catheterisation Laboratory and two Endoscopy suites are included in the capacity requirements. In relation to the potential further required capacity for Interventional Paediatric Interventional Radiology (PIR), one of the general operating suites is sized to accommodate the future conversion should activity support this change.

Table 6.9 Theatres and specialist suites

Operating theatre Department	Design Brief Total
General Theatres	12
Specialist Theatres	6
PIR Suite	1
Endoscopy	2
Catheterisation Laboratory	1
Total	**22**

Source: Activity and Capacity Plan, June 2016

6.4 Summary of capacity plan

The subsequent capacity requirements from the projected activity are shown in Table 6.10.

Table 6.10 Summary of capacity requirements

Service line	Planned facilities
Inpatient Beds – Non Critical Care	320
Critical Care Beds	60
Total Inpatient Beds	**380**
Total Day-Care Beds	93
Total Inpatient and Day beds	**473***
Operating Theatres	18
PIR suites, Endoscopy suites, Cardiac Catheterisation Laboratory	1+2+1
Total Theatres / Procedure Rooms / PIR and Catheterisation Lab	**22****
Total Consulting / Examination Rooms in Outpatients	**122**

Source: Activity and Capacity Plan, June 2016
**Existing number of beds: 412*
***Existing number of theatres and Catheterisation Lab: 13*

These requirements inform a range of considerations relevant to all aspects of the programme including the physical facilities required, the workforce requirements and ICT and equipment needs. These issues are discussed further in the coming Sections. In particular, Section 7 discusses the workforce requirements arising from forecast activity levels, and the implementation of the Hospital Operating Model and the National Model of Care.

Definitive Business Case, February 2017, Rev B, p121

Appendix G: Key Artefacts

The New Children's Hospital Definitive Business Case

18. Programme financial analysis and funding

18.1 Overview

The quantification of financial flows is critical to the business case for the new children's hospital and satellite centres. This Section outlines the estimated cost of delivering the programme and compares the total cost with the "counterfactual" costs of the existing hospitals discussed in Section 17.

The financial appraisal relates to the specific group of costs that are associated with the decision to proceed to development of the new children's hospital and satellite centres programme. It includes all elements of the programme as outlined previously:

- Capital
- ICT
- Operational integration, commissioning and transitioning
- Payroll costs, including those related to the National Model of Care
- Non-pay operating costs and revenues

This Section explains the costs of the programme in three ways:

- First, in Sections 18.2 to 18.4, estimates of the gross cost of the programme are provided in order to give the reader a full understanding of the level of investment required to deliver the new children's hospital and satellite centres. The anticipated sources of funding for each cost are discussed, in line with the *Public Spending Code*
- Second, in Sections 18.5 to 18.8, the ongoing operating costs and revenues of the new children's hospital and satellite centres are projected. For ease of reference, the operating costs and revenues of the existing hospitals are shown alongside these projections
- Third, Section 18.9 shows the incremental cost of delivering the new children's hospital and satellite centres in present value terms, over and above the counterfactual scenario set out in Section 17

It should be noted that the calculation of financial cash-flows is an iterative exercise in the appraisal process. The assumptions around the capital costs have now been tested through the tendering process and updates have been made to the costs to reflect the information provided.

The assumptions and methodologies adopted in the financial analysis are presented at a high level throughout this Section. Further detail regarding the assumptions and methodologies used in calculating the costs and revenues for the programme and counterfactual are shown in Annex C.

18.2 Capital costs and funding

The NPHDB Capital Budget

The NPHDB's budget for the capital element of the programme was determined in 2013 and finalised in 2014. The NPHDB then proceeded to develop the Project Brief which was approved by the Minister for Health and the Health Service Executive in June 2014. This allowed NPHDB to tender for and appoint a design team.

In accordance with the Capital Works Management Framework (CWMF), the programme is progressing through the following Stages:

- Stage 1: Preliminary Design (completed)
- Stage 2A: Scheme Design (completed)
- Stage 2B: Developed Design and Planning, Pre-qualification (completed)
- Stage 2C: Detailed Design, Tender Documentation (completed)

- Stage 3: Tender Issue and Evaluation, Award
- Stage 4: Construction, Tender Specialised Contracts
- Stage 5: Handover and Final Account

The design team progressed the design through the approved stages; submitted a planning application (August 2015) and the capital build received planning approval on April 28th 2016.

The design team have progressed to Stage 2C and the tender documentation went to market in summer 2016. The tender responses have been received. The enabling works for the capital build were tendered in May 2016 and started on site in summer 2016.

Table 18.1 provides an overview of the NPHDB capital budget. The total figures included in this table provide for the construction, planning, design and contingency costs relating to the new children's hospital, the car park, commercial space, the hospital school and the third level education components of the project. These elements of the capital build are all part of the current procurement package which went to market in summer 2016. The Children's Research and Innovation Centre (CRIC) was approved as part of the planning approval but it is located on a separate location on the campus with St. James's Hospital and will therefore be part of a separate procurement process.

The construction costs associated with the satellite centres are included in Table 18.1.

These costs are separated in the annual capital cash-flow for the programme in Table 18.4.

Definitive Business Case, February 2017, Rev B, p243-244

Appendix G: Key Artefacts

The New Children's Hospital Definitive Business Case

Table 18.1 NPHDB capital budget (€ million)

Cost	€
NCH Project Direct	32,500,000
NCH Planning Fees / Contributions	13,700,000
Specialist Consultants	19,500,000
NCH Design Team Fees	40,500,000
Decant Project (NPH Allocation)	16,000,000
NCH Construction Costs	415,000,000
NCH Risk	38,000,000
NCH Inflation	160,000,000
NCH Equipment	68,100,000
Satellite Centres Design Team Fees	3,200,000
Satellite Centres Construction	32,000,000
Satellite Centres Equipment	3,500,000
Satellite Centres Planning	1,200,000
Satellite Centres Risk	1,000,000
Satellite Centres Inflation	6,000,000
Satellite Centres Aspergillus	3,000,000
VAT	129,800,000
Total	983,000,000
Exclusions	
Mater site costs *Decant provision for NPH allocation only* *ICT part of national strategy and separate HSE funding* *Ronald McDonald House* *CHG Programme; investment case* *CRIC (separate procurement)*	

*Source: NPHDB Programme Cost Report, June 2016. Note: Rounding affects totals. *includes car park, the hospital school and third level education facility. ** Source: Cost Consultant Linesight Irish Construction Inflation Report January 2017.*

The latest estimate of the capital costs associated with the construction of the new children's hospital and satellite centres is €983m (VAT inclusive), a €147.0 increase from the previous version of the Definitive Business Case estimate.

The increase in the estimated costs relate to:

- Construction inflation: In late November 2016 the NPHDB received an updated draft report "Construction Inflation Overview in the Irish Construction Industry and its Specific Impact on the National Paediatric Hospital", from its cost consultants Linesight (see Annex E). This reported that tender inflation as applicable to the National Paediatric Hospital would be of the order of 9.5% in 2016. **As a result we have included an additional inflation component of €79m[171] for the period of construction of the hospital to account for this.** This is split between €34m for the re-profiled timeline and €45m for the increased inflation. This has now been validated by the tender costs

[171] This includes both inflation adjustments and the associated increases in VAT payments

Definitive Business Case, February 2017, Rev B, p245

Appendix G: Key Artefacts

The New Children's Hospital Definitive Business Case

Procurement

The focus from a risk management perspective will be to ensure the tendering process through the appointment of the various works contractors is managed to minimise the risk of a legal challenge which would delay the award of contracts and the commencements of the works (Section 22 provides further detail on the procurement strategy).

Contract Administration

The effective management and administration of the works contracts will ensure the NPHDB requirements are met in terms of delivering to the highest quality, within budget and to programme to support the CHG with the transition from the existing hospitals.

The innovative procurement strategy and bespoke contract conditions need to be fully understood by all to ensure these are managed and operated appropriately, particularly in terms of the programme delivery, payment mechanisms and GMP process.

Construction

The management of risk during construction phase will consider a number of key elements:

- Contractor performance
- Managing stakeholder expectations
- Installation of ICT
- Equipping the hospital
- Delivering the hospital to programme, within budget and to the required quality

Risk / Contingency Provision

In line with the *Public Spending Code* which advises that projects with large capital outlays should include a contingency provision for escalating construction costs or delays in the delivery of the building, the current programme budget contains a risk provision of €52.3m for both the new children's hospital (€50.5m) and satellite centres (€1.8m).

This risk provision reflects the current delivery stage of the programme (pre-tender issue) and the level of design detail for both the new children's hospital and satellite centres. In line with risk management best practise this provision will be released as appropriate as the programme progresses through its delivery cycle and controlled such that a sufficient risk provision is retained at any one stage to cover the risks included in the programme risk register.

ICT risk

The Risk Register for the ICT programme contains a comprehensive record of all risks identified and how they are being managed. It identifies and categorises risks, allocates a risk rating and identifies the likely impact the risk could have on the overall programme schedule. Risk management activities and mitigation measures are tracked and assigned an owner. Where possible, costs associated with particular risks are quantified and tracked.

As part of this activity, the top risks of the ICT programme have been identified. Given the critical importance and dependency of ICT for the success of overall programme, the inherent risks associated with an ICT investment of this scale have been closely monitored and actions to mitigate those risks have been implemented or are planned. These are outlined in detail in the ICT Business Case.[212]

These risks will be monitored on a periodic basis and re-assessed throughout the lifecycle of the ICT project.

[212] See ICT Business Case, June 2016 for more detail

Definitive Business Case, February 2017, Rev B, p308

Appendix G: Key Artefacts

The New Children's Hospital Definitive Business Case

Table 23.1 Top Programme Risks

Risk Description	Risk	Mitigation
Approval	Approval by HSE/DoH of Definitive Business Case does not occur in a timely manner. Delay to awarding of contracts, increased construction inflation costs of €3m/month, and delivery programme delayed.	Engage with key stakeholders to communicate business case content and ensure this is understood and messages agreed. Ensure the financial content of the business is as robust as is reasonably practically.
Approval	ICT Programme funding is not approved to meet programme objectives and timelines.	Approval process has been agreed between all parties. Dependencies on the hospital physical design, its operability and the workforce plan have been acknowledged and contingency planning is in development.
Budget	Market tender responses not aligned with cost plan expectations. Delay to programme and/or additional programme costs.	Monitor market benchmarks and factor into capital budget. Design team to establish Value Engineering strategy and identify opportunities for Value Engineering to progress with the contractor as part of the GMP process. Drawdown on contingency provision and seek additional funding as appropriate.
Procurement	Nomination/awarding of the specialist works contracts by the main works contractor is delayed and/or protracted.	Ensure robust process in place to facilitate awarding of contracts by main works contractor.
Procurement	Risk of a legal challenge which would delay the award of contracts and the commencements of the works.	Liaise with NPH legal advisor to ensure notification letters are appropriate and process for closing out the procurement of the works contracts complies fully with legislative requirements.
Decant	Completion of Satellite Centre aspergillus works becomes protracted and/or delayed.	Robust management of aspergillus works to maintain programme. Maintain regular communication and engagement with host hospitals to identify and resolve issues. Pursue opportunities with host hospitals to increase room release rate to accelerate programme.
Construction	Continual review and requests from end users for changes to nch and Satellite Centre designs during construction phase	Implement and comply fully with change control procedure.
Equipment	Equipping of the hospital and implementation of ICT do not align (funding, implementation, technical integration).	Develop an integrated implementation plan for equipping and ICT aligned to the nch construction programme.
Equipment	Preferred option for procuring healthcare technology is not approved requiring an alternative approach resulting in programme delay and increased costs.	Engage with key stakeholders to present the benefits and opportunities of the preferred healthcare technology approach supported by appropriate business case. Consider alternative procurement routes and funding options.
ICT	National EHR solution is not available to meet the new children's hospital timeframe.	Maintain regular engagement with key stakeholders on progress with delivery of national EHR solution. Develop contingency strategy and plan and seek to agree with HSE in event national EHR solution is delayed.
ICT	Implementation of strategy and plan to address ICT requirements for the opening of the satellite centres does not progress in the required timeframe due to priority conflicts with existing hospitals work programmes.	Cross hospital ICT programme developed and approved. ICT Steering group to be oversight group and re-structured to meet this role and manage and mitigate this risk.
Programme	Deliverability of the Campus Mobility Management Plan is hindered due to limited, unavailable or unsupported sustainable alternatives.	Comprehensive Mobility Management Plan for the SJH campus has been developed. A sustainability officer appointed and a mobility management steering group and working group have been established. Comprehensive package of information outlining alternative travels options to the work. Plans for engagement with staff representative bodies underway (SJH).
Programme	The challenging programme timeframe does not accommodate the delivery of all planned activities and outputs (e.g. design development; preparation of operational policies; user engagement; procurement process; etc.).	Critical path analysis of all programme work streams underway to identify "pressure points" that impact on programme and agree with stakeholder groups the allocation of personnel to address "pressure point" areas.
Programme	Organisational change is not actively managed causing a delay to the integration, commissioning and transitioning programme.	Utilise best practise change management approach and extensively engage and consult with stakeholders including staff and their representative bodies.
Resources	Limited availability of CHG resources impacts on NPH works streams and programme.	Schedule of CHG input to NPH work streams prepared. NPH work streams prioritised and agreed with CHG. Implications of CHG resources on programme (and budget) identified and communicated to HSE/DoH.
Sharing of Infrastructure and Associated Services	Limited availability of SJH personnel to manage campus interface with NPH on matters such as: - shared services (CSIAS) - governance - communications - NPH contractor interface / liaison - etc.	Maintain engagement with SJH through weekly meetings. Tri-Board governance body to be established and schedule of regular meetings arranged. Campus Tri-Location Committee to provide ongoing support and guidance.

Source: Adaption from Joint Risk Register, NPHDB, November 2016

The Risk Registers will continue to be reviewed and the risks re-assessed throughout the lifecycle of the project. As risks are mitigated, changed or introduced over time, the implications of these will continue to be assessed and integrated into the programme management process. Formal risk reviews are occurring on a monthly basis by the PRWG and on a quarterly basis with the NPH Audit Committee and at key programme milestones, to ensure that the Risk Register continues to accurately reflects the current state of the programme and that any assigned management actions are completed.

23.4 Concluding comments

The effective management of risk will continue to be an integral component in the delivery of the new children's hospital and satellite centres in order to achieve the planned objectives and realise the benefits, within the stated timelines, and within budget. The NPHDB, the CHG and St. James's Hospital will continue to ensure the necessary measures required to deliver these objectives, and recognise the importance of continuous risk management activities remain in place.

Definitive Business Case, February 2017, Rev B, p310, Table 23.1

Appendix G: Key Artefacts

Main Contract Pre Phase B Engagement Process

Execution Version

for example, the plans required for commissioning, completions and handover following consultation with the Employer's equipping team and scheduler, so that there is a clear understanding of the expectations and requirements on both sides around equipment installations.

10 Sign off On Quantities/ Adjusted Contract Sum

Whilst all tenderers will price the Phase B Works during the tender preparation period, the finalisation of the quantities for the Phase B Works for the Contractor will take place during the Pre Phase B Engagement Process in accordance with the process set out in Exhibit A attached. On the instruction to commence the Phase B Works the Contractor and Specialist Sub-Contractors will take responsibility for all quantities relating to the Works, as set out and shown on all drawings, specifications and supporting documentation, which will have been developed as part of the Pre Phase B Engagement Process. Upon finalisation of the Adjusted Contract Sum, the Main Contract will be a lump sum contract with the Contractor and Specialist Sub-Contractors assuming responsibility for quantities.

The Contractor/Specialist Sub-Contractors shall be provided with every opportunity to check and confirm quantities and to present any reasonable proposition with regard to the risk around particular quantities. In this regard it is important to note that during Pre Phase B Engagement Process the drawings and specifications shall continue to be developed and the bills of quantities will be updated (with the input from the Contractor/Specialist Sub-Contractors) to reflect all such design development prior to final conversion to a lump sum contract, with the Contractor/Specialist Sub-Contractors assuming responsibility for quantities thereafter.

Definitive Business Case, February 2017, Rev B, p310, Table 23.1

Appendix G: Key Artefacts

The Public Spending Code

planning/design specifications. The design for a proposal can be a driver of high costs, particularly if the planned capacity is unnecessary given projected demand.

Some additional cost estimation issues are set out below.

3.3.1 Sunk and Opportunity Costs

Sunk costs are costs incurred before the appraisal period and for which there is no opportunity cost. Sunk costs could include expenditure on previous feasibility studies. CBA is only concerned with costs about which decisions can still be made[3].

3.3.2 Contingency costs

Allowance should be made where contingencies are part of the expected costs of the proposal and included in the CBA. Projects with large initial capital outlays should include a contingency provision for escalating construction costs or delays. There may also be specific contingencies arising from contractual obligations which are triggered by certain events occurring. The project analyst should consider whether there is any applicable evidence regarding contingency costs from similar projects in the same sector.

3.3.3 Shadow Prices

The project inputs should be valued at their opportunity cost. It is generally recommended that market prices are used to value the cost of inputs as these best reflect the opportunity cost involved. Market prices are generally reliable and verifiable. However, in some cases

[3] UK Green Book Chapter 5

The Public Spending Code: D. Standard Analytical Procedures, Guide to economic appraisal: carrying out a cost benefit analysis, D.03, p15.

Appendix G: Key Artefacts

The Public Spending Code

7. Review using Tender Price

When a tender price and other relevant information become available, the case for proceeding with the proposal should again be reviewed. The analysis contained in the detailed appraisal once again provides the framework for undertaking this review. The award criteria in the tender document will be used to select the best proposal received. The best proposal is then compared with what was expected at the Approval in Principle point. If the costs and output from the best proposal do not match the costs and benefits that led to the Approval in Principle then the Appraisal decision may have to be reviewed.

If tenders exceed the approved budget, the project should be re-examined and reductions achieved without lowering the quality standard of the project below acceptable levels, in order to bring the project within the approved limit. Works should not be omitted so as to achieve reductions if they will have to be reintroduced later as being essential for the completion of the project, or for the generation of its full benefits, or if they significantly change the nature of the project. The Sanctioning Authority must be informed of all significant works omissions.

If serious additional costs have arisen, the sanctioning authority should require the Sponsoring Agency to undertake, as appropriate, a revised cost-effectiveness analysis or cost benefit analysis having regard to the increased costs. Where a revised cost-effectiveness analysis or cost benefit analysis has been carried out and the project is either no longer affordable or the best value option, the procurement should be terminated and the resources diverted to more worthwhile projects.

If tenders are over the approved limit re-appraisal may be required to determine whether the project should be abandoned or proceeded with. If this re-appraisal suggests proceeding at higher cost the approval of the Sanctioning Authority to a raised financial limit must be sought before contracts are placed. If it is decided that the project should be abandoned at this post-tender stage, and if substantial amounts have already been spent on planning etc. at this stage, the position should be reviewed to determine why the project came to proceed to this stage and was then abandoned.

The Public Spending Code: B. Expenditure under Consideration,
The Planning Stage, B-02

Appendix G: Key Artefacts

"Project Governance for new children's hospital" letter from Secretary General (DoH)

Appendix 1: Project governance structure

- **Children's Hospital Project and Programme (CHP&P) Board**

Responsibility:
The Board will oversee and monitor the progress of the CHP&P to ensure that the programme is delivered against the agreed parameters for the programme in relation to timeline, scope and funding.

Terms of Reference:
- Oversee and monitor the progress of the CHP&P against the agreed parameters for the programme in relation to timeline, scope and funding.
- Act as the escalation point for decisions which cannot be resolved by the CHP&P Steering Group.
- Approve key project and programme gateways and parameters as recommended by the CHP&P Steering Group.
- Assist the Accounting Officer in the discharge of his duties in respect of this programme.

Membership of the CHP&P Board
The Board will be chaired by the Secretary General DoH with membership consisting of Director General HSE, Assistant Secretary Acute Hospitals Policy DoH and COO HSE. Other Department and HSE officials to attend as required. The Board will meet on a quarterly basis. The Board will be supported by a DoH Secretariat. The Board will receive regular reports in an agreed format from the Steering Group and will also receive expceptional reporting from the Steering Group in the event that variances from plan require escalation.

- **Children's Hospital Project and Programme (CHP&P) Steering Group**

Responsibility:
The Steering Group will direct the overall programme of work within the agreed parameters.

Terms of Reference:
- Ensure a coordinated and aligned approach within the HSE to the three elements of the CHP (the building, ICT infrastructure, and operational integration of the three existing children's hospitals), in particular, dependencies with other national HSE projects / programmes.
- Provide inputs and decisions in accordance with agreed programme timelines, taking reports from the relevant National Directors, the Group CEO - CHG, and the Project Director, NPHDB, to ensure alignment with overall programme timelines.
- Oversee timely HSE approval, signoff and funding decisions for the three Children's Hospital Programme elements.
- Oversee the implementation of the EHR plan for the new children's hospital.
- Determine revenue and staff approvals in relation to the integration, service developments and transition to the satellites and new hospital in line with the business case approved and delegated authorities.
- Assist the Accountable Officer in the discharge of his duties in respect of this programme.

"Project Governance for new children's hospital", Letter from Secretary General DoH to Minister for Health, 23 May 2017

Appendix G: Key Artefacts

BIM Execution Plan

BIM Model Status at GMP

The pre-tender design and works requirement documentation has been derived from a federated BIM 'design intent' model, incorporating architectural, engineering and building services models. The design team retain responsibility of the BIM on behalf of the NPHDB during Stage 2C (Detailed Design). At the completion of Stage 2C the BIM is issued to the main contractor for the purpose of agreeing the GMP. On agreement of the GMP the responsibility for the BIM transfers to the Main Contractor.

The status of the design intent BIM model at GMP will be as follows:-

1. **Level of Detail:** The federated BIM model will be developed to a **LOD 300** standard across the Architectural, Structural, Mechanical & Electrical elements.
2. **Classification**: The federated BIM model will be developed using **Uniclass 2015** classification standard.
3. **COBie:** The Design Team are not providing COBie data drops within the model. COBie drops are a requirement of PAS 1192-2 and are the responsibility in whole of the Contractor during stages 4-5.
4. **Model Issue:** The Contract will be administered with drawings, specifications and schedules via 4-P and the Revit model will be issued 'for information supplementary to the contract design information'. **In all cases the contract drawings, specifications and schedules take precedent over the model**.
5. **Model Coordination:** The federated BIM model will not be completely clash free but will be clash resolvable and coordinated to a point where it has been demonstrated that the services installations can be accommodated in the plant rooms, service routes and risers and that the contractor will be able to develop the construction / coordination model without having to make material changes to the structure or architecture.

BIM Execution Plan, Main Contract Tender, Doc No. NPH-A-BDP-TD-EP-0001. 20. September 2016.

Appendix G: Key Artefacts

NCH Design Team Technical Requirements

TECHNICAL REQUIREMENTS

Section 4: Appendices

Appendix Nr. 5: Employer's Representative (ER) Services.

1. Employer's Representative Role

a) The Employer's Representative [ER] shall be the Design Team Leader [usually the Architect] as nominated by the Contracting Authority.

b) The ER is appointed to administer the Contract. The ER shall perform a full Contract Administration role in accordance with the Public Works Contract for Building Works Designed by the Employer and the Capital Works Management Framework Guidance Notes as published by the Department of Public Expenditure and Reform.

c) The Employers Representative with the objective of project cost certainty, value for money and efficiency of delivery.

d) Roles and Responsibilities of the Employers Responsibilities include the following:

I. Liaising with the Contractor on the Employers behalf.
II. Determination of Contract Sum Adjustments.
III. Issuing Instructions, Objections, Clarifications, Opinions, Assessments and Directions in accordance with the Contract.
IV. Certifying Payments, Completion and Compliance.
V. Assessing Claims.
VI. Managing Meetings and Communication to the Contractor.
VII. Monitoring, Auditing and Spot checking the works.

e) The limitations of the ER's authority are stated in the Contract. These concern the following:

I. The maximum adjustment to the Contract Sum for a single Change Order.
II. The maximum cumulative value of adjustments to the Contract Sum for Change Orders in any three month period.
III. The issue of Change Orders that cause or contribute to a reduction in safety, quality, usefulness, or scope of the Works Requirements are prohibited unless approved beforehand by the Contracting Authority.
IV. An obligation to consult with the Contracting Authority on any adjustment to the Contract Sum before deciding on the adjustment.
V. Taking direction from the Contracting Authority as to whether to accept or reject a value engineering proposal; and
VI. Consulting with the Design Team [Quantity Surveyor] in relation to any adjustment to the Contract Sum before deciding on the adjustment;

The limitations on authority for maximum adjustments to the Contract Sum will be agreed with the Contracting Authority prior to Construction Contract commencement.

NCH Design Team Technical Requirements (ID 17019), p106, p128

Appendix G: Key Artefacts

Cost forecasting and reporting

In the following section a series of inconsistencies and information presented in a misleading way are presented through a selection of screenshots from the NCH cost reports prepared by Linesight.

Report screenshots are presented in the following way:

1. CSA section is presented and explained how the Linesight Assessment and Linesight Trending were calculated/ represent.
2. The Electrical (Elec) and Mechanical (Mech) work packages are presented and explained in the same way as the CSA;
3. Each of the work packages presented in the following section are from the Linesight cost reports indicated at the top of each respective section;
4. The Lifts work package is not examined here;
5. Explanatory comments are provided in yellow boxes.

The following cost trending reports are presented:

- Weekly Cost Update , 04 May 2018
- Weekly GMP Commercial Update, 25 May 2018
- GMP Close Out Tracker, 20 July 2018

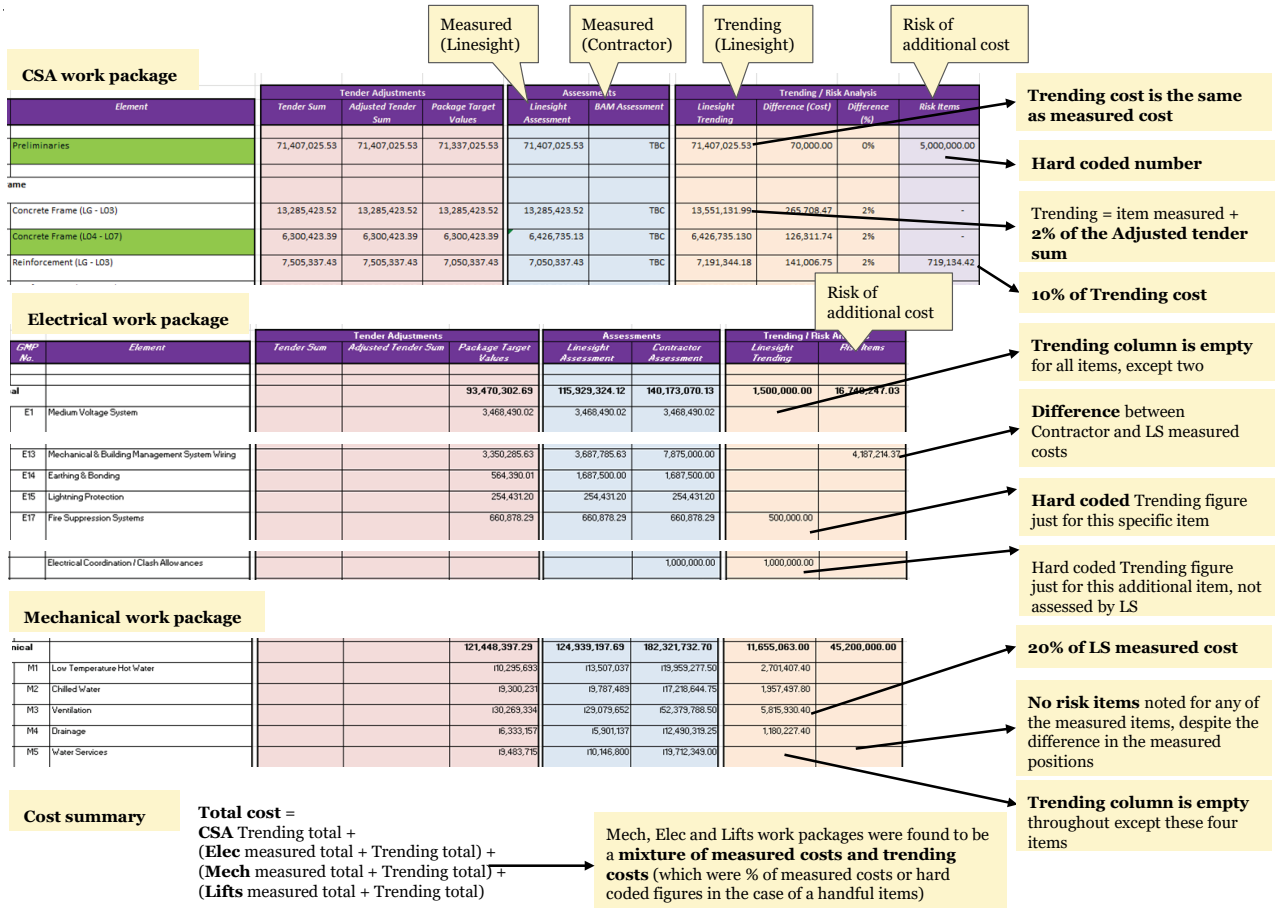
Terms used in the cost trending report:

- Assessment: Cost based on the re-measurement of the Stage 2C design at the time of the report.
- Trending: Cost estimated by Linesight (LS) as the likely final outturn cost for the item at the time of the report.
- Risk Item: Potential additional cost identified for the related item at the time of the report.

Appendix G: Key Artefacts

Cost forecasting and reporting

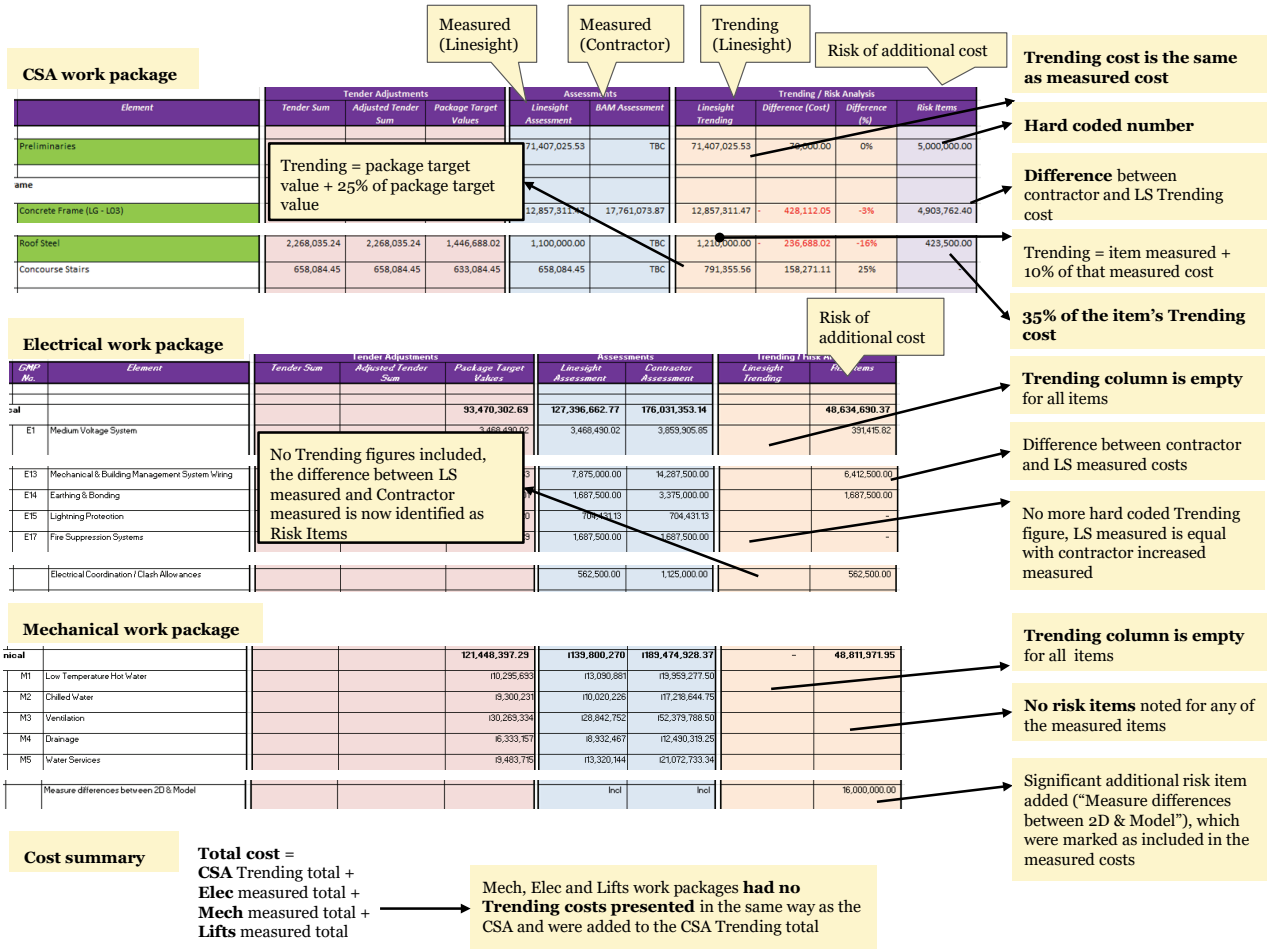
Weekly Cost Update, 04 May 2018



Appendix G: Key Artefacts

Cost forecasting and reporting

Weekly GMP Commercial Update, 25 May 2018



Appendix G: Key Artefacts

Cost forecasting and reporting

GMP Close Out Tracker, 20 July 2018

Trending (Linesight) | Measured (Linesight) | Measured (Contractor) | Measured final (Contractor)

CSA work package

Element	Linesight Trending	Linesight Final Assessment	BAM Submissions	BAM Final Assessment	Delta (H-E)	Provisional Sums	Balance
Preliminaries	71,407,025.53		71,407,025.53		-		
Concrete Frame (LG - L03)	16,398,875.33		18,843,174.23		-		
Façade - Ward Block Glazing	1,177,777.16	942,221.73	2,637,074.62	2,637,074.62	1,694,852.89	-	1,694,852.89
Façade - Biome	3,469,817.26		3,438,317.70		-		

Difference between LS measured and Measured final (Contractor) - Previously "Risk Items"

Balance represents the difference between Delta and Provisional sum

Difference between LS Trending and Contract Assessment - **Previously "Risk Items"**

Electrical work package

ELECTRICAL INSTALLATION		Assessments				DELTA	
GMP No.	Element	Current Trending	Linesight Final Assessment	Contractor Assessment Current	Delta	Provisionl Sums	Balance
E1	Medium Voltage System	3,096,461		3,664,052	567,592		
E13	Mechanical & Building Management System Wiring	5,897,610		5,897,610	0		
e13.1	Specialist Mechanical Systems	3,224,007		3,634,439	410,432		
E14	Earthing & Bonding	2,755,718		3,825,853	1,070,135		
E15	Lightning Protection	700,710		700,710	0		
E17	Fire Suppression Systems	1,689,270		1,689,270	0		

LS Assessment column is empty for all items

Difference between Contractor Assessment and now LS trending costs for all items - previously it was the difference between the assessment costs

Mechanical work package

MECHANICAL INSTALLATION		Assessments				DELTA	
GMP No.	Element	Current Trending	Linesight Final Assessment	Contractor Assessment Current	Delta	Provisionl Sums	Balance
M1	Low Temperature Hot Water	13,149,062.87		14,261,824.00	1,112,761.13		
M2	Chilled Water	10,064,760.52		11,124,255.00	1,059,494.48		
M3	Ventilation	35,083,702.49		42,240,551.00	7,156,848.51		
M4	Drainage	9,000,000.00		9,402,653.00	402,653.00		
M5	Water Services	13,600,000.00		15,155,732.00	1,555,732.00		

LS Assessment column is empty for all items

Difference between Contractor Assessment and now LS trending costs for all items -previously it was not calculated for the Mech items

Cost summary

Total cost =
CSA Trending total +
Elec Current Trending total +
Mech Current Trending total +
Lifts Current Trending total

Mech, Elec and Lifts work packages **had no measured costs presented** as in previous reports, just Current Trending

Completely new report layout - Risk Items not presented in the summary page in the same way as in previous reports

Appendix G: Key Artefacts

Wider Evidence

Filename: NPH Letter to Design Team Re GMP Process 16.04.18 (ID 24081)
FW GMP Process
Ref number: 16

NATIONAL PAEDIATRIC HOSPITAL DEVELOPMENT BOARD

Attn:

Date: 16th April 2018

Re: GMP Process

Dear Design Team Principals

Following recent meetings and correspondence, it is clear that the GMP budget and programme is in jeopardy. The process requires significant intervention, leadership, and ownership by the design team to deliver within the agreed programme and budget allocation.

It is extremely disappointing that the NPHDB finds itself in this current position. We are answerable to our Board and other project sponsors. Our Board, in particular stressed their concern regarding the GMP Process when reviewing project risk at the recent April meeting. There is no doubt that if the process is not delivered within the revised date of end of June for GMP cost, and end of July for a government decision, then a full review will be required. On this basis we will require a report from the design team which is referenced below.

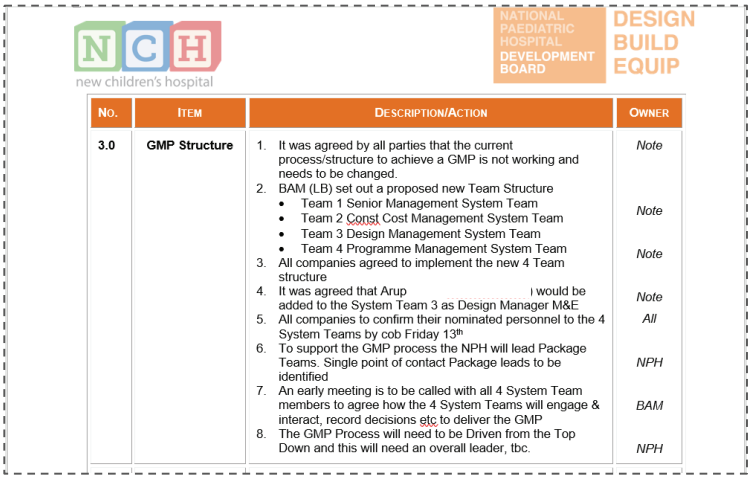
To mitigate the delay the NPHDB is stepping up resources to provide project management skills to ensure:

- That design packages are owned;
- Information is complete and robust;
- To focus on changed specification and quantity leading to budget over-runs;
- and to manage the closure of these issues efficiently to meet the programme and the available budget.

This is the clear responsibility of the Design Team, and the not the NPHDB.

As you are aware the original programme for the completion of the second stage design information as set out in the first stage tender was seven months with two clear months at the end of the process to agree the adjusted contract sum and GMP cumulating in a total of 9 months. As the contract evaluation and award was delayed by a significant number of months additional time was afforded to the design team to complete the design packages. This resulted in the agreement of an increased Stage 2C period which the NPHDB funded. This evolved as additional design time and an additional 2 months of float (QS time) at the end of the

Filename: FW GMP Alignment Meeting 13 Apr 18 - email from NPH Executive
Ref number: 15



NCH new children's hospital

NATIONAL PAEDIATRIC HOSPITAL DEVELOPMENT BOARD DESIGN BUILD EQUIP

No.	Item	Description/Action	Owner
3.0	**GMP Structure**	1. It was agreed by all parties that the current process/structure to achieve a GMP is not working and needs to be changed. 2. BAM (LB) set out a proposed new Team Structure • Team 1 Senior Management System Team • Team 2 Const Cost Management System Team • Team 3 Design Management System Team • Team 4 Programme Management System Team 3. All companies agreed to implement the new 4 Team structure 4. It was agreed that Arup I would be added to the System Team 3 as Design Manager M&E 5. All companies to confirm their nominated personnel to the 4 System Teams by cob Friday 13th 6. To support the GMP process the NPH will lead Package Teams. Single point of contact Package leads to be identified 7. An early meeting is to be called with all 4 System Team members to agree how the 4 System Teams will engage & interact, record decisions etc to deliver the GMP 8. The GMP Process will need to be Driven from the Top Down and this will need an overall leader, tbc.	*Note* *Note* *Note* *Note* *All* *NPH* *BAM* *NPH*

Appendix G: Key Artefacts

Wider Evidence

An Roinn Sláinte
DEPARTMENT OF HEALTH

Oifig an Ard Rúnaí
Office of the
Secretary General

23rd May 2017

Re: Project Governance for new children's hospital

I refer to the Minister's letter of 27th April 2017 in relation to consent to the Final Project Brief for the new children's hospital. As set out in that letter, the Department and the HSE have reviewed the existing governance structures in terms of their appropriateness as we move into the next phase of the project, where there will be an increasing focus on the service integration and preparation for the opening of the satellite centres and the need to manage dependencies across the various elements which will support the operation of the new hospital.

The revised governance structures for the Children's Hospital Project and Programme (CHP&P) have been agreed with the Department of Public Expenditure and Reform and include the establishment of a CHP&P Board, which I will chair, and a CHP&P Steering Group, to be chaired by the Chief Operating Officer, to direct the overall programme of work within the agreed parameters.

The new project governance structure is set out in **Appendix 1** with the governance diagram at **Appendix 2**. An outline of the statutory roles of the relevant organisations and key individuals is provided at **Appendix 3.**

I am anxious that the new arrangements are put in place as soon as possible and I will be convening the first meeting of the CHP&P Board shortly. I understand that the HSE has arranged the first meeting of the HSE Steering Group for 26th May.

Finally, I would like to acknowledge the work of the HSE, the NPHDB and the CHGB and staff of the three children's hospitals in bringing this vital project forward to this stage. The Department will continue to engage closely with the HSE, within the new project governance structures as the project progresses.

Letter from DoH in relation to Governance of the NPH Project.