Department of Health & Social Care

Comprehensive Investment Appraisal (CIA) Model

User Guide

December 2019

Contents

1. Purpose

The purpose of this guidance is to show how the Comprehensive Investment Appraisal (CIA) Model can be used to support economic appraisals in business cases.

The Green Book: Appraisal and Evaluation in Central Government has been developed by HM Treasury to provide relevant guidance to departments and executive agencies seeking to invest in future services and facilities, either from public or private finance. The Green Book and its supplementary guidance offer a systematic, long-term and analytically robust approach to appraisal and evaluation.

The Five Case Model provides a clear framework for thinking about spending proposals and a structured process for appraising, developing and planning to deliver best social value.

The economic dimension of the Five Case Model is the analytical heart of a business case where detailed appraisal takes place. It should be prepared alongside the other dimensions of the Five Case Model, not in isolation. It considers the value of different options to the UK and, where appropriate, the impact on different groups of people or parts of the UK. The measure of value to the UK as a whole is referred to here as social value.

This document provides guidance on the use of the CIA model, together with a brief overview of key principles used to appraise the costs, benefits and risks for investment projects are outlined in this paper. These principles are relevant to the shortlisted options selected and appraised, irrespective of actual procurement.

It provides guidance on the key economic concepts and principles, how these are used in economic appraisals and how the outcome of these appraisals is interpreted. It is aimed at those who are responsible for drawing together and inputting the relevant data for options using the CIA Model. The CIA Model itself supports and facilitates economic appraisals in accordance with the principles outlined in this guide.

This guide on economic principles should be read in conjunction with the latest edition of The Green Book. Other existing guidance that provides useful information on NHS option appraisal is listed in Appendix A. A “quick reference” to the key economic principles for undertaking economic appraisals is presented in Appendix F.

The CIA Model and associated guidance is recommended for economic modelling for all investment business cases, except IT cases as a more appropriate model and guidance already exists. Please contact DHSC or NHSD for more detail.

2. Revisions to GEM and GEM Guidance

This model and guidance provide an updated and expanded version of the Generic Economic Model (GEM) and associated GEM guidance. The GEM is therefore discontinued and NHS organisations submitting investment business cases to DHSC/HMT for review are now required to use the CIA Model. The main changes are:

- Including quantitative and unmonetisable benefit and risk analysis in addition to the cost analysis
- Simplifying the risk quantification calculations register (previously known as the PFI risk register)
- Integrating optimism bias calculations (for capital costs for build schemes) into the model

The CIA Model also fulfils the requirements for both OBC and FBC appraisals and guidance for different stages of business cases to provide a more comprehensive, standardised appraisal and evaluation tool.

3. Economic Appraisal in the NHS

NHS economic appraisals are often represented by Discounted Cash Flow (DCF) analysis, a technique used to assess the relative costs, benefits and risks of investment options to **society as a whole** (that is, not only to individual NHS organisations). Net Present Social Value (NPSV) can be a means of expressing within a single criterion the total cost, benefit and risk implications of developments when considered over a given appraisal period and discounted.

The economic appraisal should consider the costs, benefits and risks of each option in comparison with a baseline option. In line with Green Book guidance, the Business As Usual option should be the baseline option and recorded as option 0 in the Factors sheet of the CIA Model. There may be a small number of cases where Business As Usual is not feasible, for example due to regulatory changes, and so the Do Minimum is a more appropriate baseline for comparison. In these rare cases, the Do Minimum should be recorded as option 0 in the Factors sheet of the CIA Model.

By anticipating future discounted costs, benefits and risks, the NPSV of the investment can be assessed and compared with alternative uses of public money.

The full costs of NHS investments can be assessed and aggregated to reflect:

- The total expected opportunity, capital, revenue, transitional, externality and net contribution costs of each investment option
- The total cost implications to UK society overall (for example, other NHS Trusts, social services, service users etc.) that arise as a consequence of the investment

The full economic benefits of NHS investments can be assessed and aggregated to reflect:

- Expected cash releasing, non-cash releasing and societal benefits of each investment option
- The unmonetisable benefits of each investment option

The full economic risks of NHS investments can be assessed and aggregated to reflect:

- Expected design, construction, performance, operating, revenue, termination, technology, control, residual value and other risks of each investment option
- The unmonetisable risks of each investment option

The Green Book provides guidance on the underlying principles, calculation, and use of discounted costs for public sector appraisals.

4. General Cost Appraisal Principles

4.1 Discounting

Discounting is a technique used to allow comparison of costs, benefits and risks that occur in different time periods. It is a separate concept from inflation, and is based on the principle that, generally, people prefer to receive goods and services now rather than later. This is known as 'time preference'. The discount rate is used to convert all costs, benefits and risks to 'present values', so they can be compared.

Annex 2 of the Green Book sets out the discount rates that should be used for economic appraisal. Quality-Adjusted Life Year (QALY) discount rates should be used for monetised QALY gains or losses. All other monetised values should use the non-QALY discount rates.

Discount rates	**Years 1 to 30**	**Years 31 to 75**
Non-QALY	3.5%	3%
QALY	1.5%	1.286%

Equivalent annual cost (EAC) is the cost per year of owning and operating an asset over its entire lifespan. It is calculated by dividing the Net Present Cost (NPC) by its 'present value annuity factor' (the sum of all the discount factors over the appraisal period).

The Model also calculates an equivalent annual benefit (EAB) using this method.

Relevance to the Model

The user should enter the project life of each option on the 'Factors' sheet and the Model will automatically discount monetised values, as well as calculating a present value annuity factor. The annuity factor will be used to calculate an equivalent annual value of costs and benefits.

4.2 Cost/Price Base

All costs included within economic appraisals are expressed in "real" terms, so that all future costs are converted into current values and reflect the prevailing general price level. By converting costs into "real" values, the effect of general inflation is removed and the real changes in values are isolated from inflationary impacts.

Costs and benefits in appraisal of public value should be estimated in 'real' base year prices (i.e. the first year of the proposal).

The following should be used to adjust prices from nominal to real terms:

- For short time horizons, whole economy inflation (the "GDP deflator") from the most recent forecasts by the Office for Budget Responsibility (OBR)
- For long time horizons, forecasts of the GDP deflator published in the OBR Fiscal Sustainability Report (FSR)

- For longer time horizons, beyond the end of the OBR's FSR, the GDP deflator should be extrapolated using the growth rate in the final year of the OBR's projection

For some goods or services there may be a relative price effect i.e. the movement of a specific price index (e.g. construction) may differ significantly from general inflation (such as the GDP deflator). Where there is historical evidence and an expectation that this will continue in the future, different rates of inflation can be used.

Relevance to the Model

Insert the base year (year 0) in the "Factors" sheet. For example, enter 2020 for the financial year 2020/21. Users will need to make any necessary adjustments to costs that are expected to be inflated at a different rate than general inflation to achieve an assessment of cost at this common price base.

4.3 Sunk Costs

Sunk costs are costs that have already been incurred and cannot be recovered even if the project ceases (for example, demolition costs). These costs are **excluded** from further consideration within economic appraisals. They should not be confused with opportunity costs (see below), which reflect the cost of continuing to tie up resources that have already been paid for such as buildings already in use.

Relevance to the Model

The user will need to check that all sunk/irrecoverable costs are excluded from costs estimates before entering data into the Model.

4.4 Opportunity Costs

When deciding to commit resources to an activity it is important to consider whether these resources could be more usefully employed elsewhere.

Opportunity costs represent the value that might have been obtained if the resources were used for some other purpose (their alternative, next best use). Public sector appraisals take account of the opportunity costs of resources that are currently in use or could be used in another way. In NHS appraisals, opportunity costs are most commonly relevant to the existing value of property or land (e.g. the opportunity cost of building a new A&E Department would be the next best alternative use, which may be gaining income from the sale of the land that the department is proposed to be built on.)

Relevance to the Model

Opportunity costs should be entered in the Cost sheet for each option.

4.5 Transfer Payments

Transfers of resources between people (e.g. gifts, taxes, grants, subsidies or social security payments) should be excluded from the overall estimate of Net Present Social

Value (NPSV). Transfers pass purchasing power from one person to another and do not involve the consumption of resources. Transfers benefit the recipient and are a cost to the donor and therefore do not make society as a whole better or worse off. Likewise, income from other public sector bodies counts as a circular flow and must be excluded from the Economic Case.

Relevance to the Model

The user should ensure that all economic transfers are excluded from cost and benefit estimates in the Model.

4.6 Avoided Costs

Avoided costs are the costs that will be avoided by undertaking the proposed investment, such as avoided backlog maintenance or the additional costs of inefficient operation. These costs should be reflected in the baseline option 0, therefore, separately included within the costs of the development options.

Relevance to the Model

The Model includes option 0 as a baseline for the comparison of development options. Avoided costs will be reflected in the costs of this baseline option.

4.7 Scope of Appraisal

Economic appraisals embrace the whole costs of a proposed investment; these include both initial capital and revenue costs. The wider effects of the investment may impact on different parts of the sponsoring organisation ("knock-on" impacts), other NHS organisations and other parts of society. The total effects of the proposed investment, including these externalities, should be reflected in option appraisals.

Relevance to the Model

Users need to ensure that the relevant costs are included within the economic appraisal and that total costs, **rather than incremental/additional costs alone**, are added to the Model. The Model allows users to separately identify different elements of wider, external costs within the economic appraisal.

4.8 Optimism Bias

As stated in the Green Book, "Optimism bias is the systematic tendency for appraisers to be over-optimistic about key project parameters, including capital costs, operating costs, project duration and benefits delivery. This is particularly common in the early stages of developing and costing projects (e.g. at SOC and OBC stage).

To reduce this tendency, appraisals should make explicit adjustment for optimism bias. The Green Book recommends applying overall percentage adjustments at the outset of an appraisal. The initial optimism bias estimate should not be "locked in" but can be reduced as an appraisal develops and the costs of specific risks are identified.

Ideally adjustments should be based on an organisation's own robust evidence base for historic levels of optimism bias. In the absence of robust organisation-specific estimates the values to be used for costs are referenced in Annex A5 of the Green Book. For benefits, there are currently no values available, however an adjustment should be applied based on an organisation's own evidence base. An attempt to deal with the lack of recommended values for adjusting benefits for optimism bias, used at a local level, can be found in Supporting public service transformation: cost benefit analysis for local partnerships.

Optimism bias is a form of reference class forecasting which predicts future outcomes based on the outcomes for a group of similar past projects. It is important to note that adjustments for optimism bias are not the same as financial contingency."

Detailed guidance is available on methodologies for estimating the size of the adjustment to be made for optimism bias for NHS schemes (see Appendix C).

Increases in costs between OBC and FBC which are intended to be captured through the adjustment for optimism bias at OBC stage include unexpected changes to the scope of projects (due to, for example, developments in national policy or changes in local priorities and strategies). There may also be a tendency for costs to increase as more detailed design work and consultation are undertaken.

Relevance to the Model

The Model includes a sheet for the adjustment for optimism bias for each option (e.g. OB Option 0) as well as an information sheet to aid completion ("OB Mitigation Info"). These sheets are relevant to capital costs for build schemes only as indicated on page 90 of the Green Book.

If optimism bias has been calculated outside of the model, the monetary value for optimism bias should be entered in the cost sheet for each option. The value can be entered separately in the final section of Capital Costs. If calculated as an uplift of capital costs, it should be based on gross capital costs. This is capital costs, lifecycle capital costs and other capital costs, without taking out the residual value.

4.9 Sign Convention

Users should input all values as positive (absolute) values. Inputting costs or benefits as negative values will result in the outputs from the CIA Model being unusable.

4.10 Appraisal Period

Option appraisals for major (new build) investment will examine the discounted costs of investments over its lifetime, which is usually 60 years for a new build, plus the construction period, reflecting the anticipated life of most major capital investments. The 60 year operational period will commence in the first year of full operation of the new service.

Refurbishment schemes will normally be discounted over a shorter timescale, typically 25-30 years, depending on the anticipated life of the refurbished buildings. The advice of

professionals will need to be sought on such matters, as well as on the lifecycle costs that will be incurred to sustain the refurbished buildings.

Unless there are practical reasons why there are differences in the start date of options (for example due to the availability of property or complex decanting), the implementation of all options will be assumed to start on the same date.

Relevance to the Model

The Model generates NPCs and EACs over a time period specified by the user. The user will be prompted for the length of the project life/evaluation period for each option on the 'Factors' sheet.

4.11 Timing of Costs

The timing of costs will be reflected in cash flows in accordance with their expected occurrence and the implementation or change programme.

Property values (including opportunity costs) will be reflected in the DCFs of options so that:

- The opening values are included in year zero as positive numbers
- Property purchase, receipts and other transactions are included in the anticipated year of purchase, sale or transfer

Relevance to the Model

Enter data into the model in accordance with the timescales for which the costs are expected to be incurred. Each category of cost, benefit and risk will need to be considered in terms of its year on year changes throughout the appraisal period.

5. Capital Costs

Capital costs included within the economic appraisal will comprise each of the following:

- Initial capital development costs including land and buildings, construction and refurbishment costs, professional fees, equipment, cost of technology
- Lifecycle costs for the life of the scheme
- The cost of equipment

Where there is strong evidence that capital costs will not change at the same rate as general inflation (see 4.2 Cost/Price Base) capital assessments will need to reflect this to ensure that a constant price base is provided in option appraisals e.g. the PUBSEC index (Tender Price Index of Public Sector Building Non-Housing).

5.1 Initial Capital Costs

Initial capital costs are the costs that are incurred to implement the development and will include new build costs, refurbishment costs and equipment costs. Capital costs included in the DCF analysis will be the total "most likely" costs of the scheme and expressed at the most recent capital cost base. These costs will be **exclusive** of:

- VAT (as this is a transfer payment within the public sector and does not generate additional costs. See 4.5 Transfer Payments)
- Inflation adjustments (as prices will be "constant" within the DCF analysis) - unless there is evidence that capital costs might be expected to increase/decrease at a significantly different rate than general inflation (in which case this would be reflected in the baseline costs)

Equipment should already be included within the "initial capital costs" for each option. In addition, an upward adjustment to initial capital costs needs to be made to reflect optimism bias at the early stages of the business case process (see 4.8 Optimism Bias).

Relevance to the Model

The user will enter new build, refurbishment and equipment costs in the Cost sheets for each option. They should exclude VAT costs from the economic appraisal and enter estimates of the adjustment for optimism bias (see 4.8 Optimism Bias).

5.2 Lifecycle Costs

In addition to the initial capital costs of a scheme, all economic appraisals will also reflect the lifecycle investment associated with the options. Lifecycle costs are the costs required to maintain the capital stock throughout the life of the building (see 4.10 Appraisal Period), and will include capital costs in respect of buildings refurbishment, upgrade and replacement and the costs of replacing equipment.

Estimates of lifecycle costs should be based on an organisation's asset maintenance policies. In the absence of policies, any assumptions should be based on maintaining the service level and quality at the outset for the asset's lifetime.

Relevance to the Model

Subject to the above exclusions and inclusions, the total lifecycle costs that will be incurred in each year of the scheme's life are the relevant sums to be entered into the Cost sheet under the heading of "lifecycle" capital costs.

5.3 Equipment Costs

Where equipment is purchased (rather than leased), these costs will be reflected in economic appraisals, both in terms of initial expenditure and equipment replacement throughout the life of the scheme. As they are included within the initial capital costs of the scheme (where appropriate abated for existing equipment that will be transferred to the new facility) and the associated lifecycle costs, these costs should not be double counted by inclusion elsewhere within the DCFs.

Where equipment is leased or is of a value less than £5,000, the costs should be included within revenue cost estimates.

Relevance to the Model

As equipment costs are either included within other capital costs estimates (where capital) or other revenue costs estimates (if leased or less than £5,000), the Model does not include a separate category for equipment.

5.4 Residual Value

While appraisals cover the full expected period of use of an asset, the asset may still have some residual value (e.g. in a second-hand market, or as scrap). These values should be included, and then tested for sensitivity, as it may be difficult to estimate the future residual value at the present time.

Relevance to the Model

The user should enter the residual value within the Cost sheets. This residual value should be entered by the user as a positive value, but the model will automatically subtract this to reduce the capital costs.

6. Revenue Costs

Revenue costs refer to the operating costs of a service or scheme. These include the total clinical and non-clinical costs of delivering the service, and should be consistent with the organisation's latest financial operating model.

Revenue costs should be assessed at a constant real price base, consistent with the price base adopted in respect of capital costs. To be consistent with capital cost assessments and non-financial appraisals, the total revenue cost of the service/scheme in question will be included in the DCF appraisal and not just the additional costs/savings of the proposed change.

Forecast annual revenue costs included in the economic appraisal will exclude:

- VAT (as this is a transfer payment within the public sector and does not generate additional costs. See 4.5 Transfer Payments)
- Income contribution from other public sector bodies (as these are transfer payments within the public sector)
- Capital charges and depreciation (as the impact of capital is taken into account in capital estimates and capital charges themselves represent transfer payments within the public sector)
- Inflation adjustments (as prices will be "constant" within the DCF analysis) - unless there is evidence that components of revenue costs might be expected to increase/decrease at a significantly different rate than general inflation (in which case this would be reflected in the baseline costs).

Buildings related running costs broadly cover the costs of running the facility, inclusive of ongoing buildings (revenue) maintenance, heat, light and power. Buildings related running costs will take account of the proposed facility design and other buildings characteristics, as well as other factors that will affect the different elements of these costs.

As buildings maintenance costs need to be consistent with lifecycle costs (i.e. capital), and because the cost of maintaining new buildings will not necessarily reflect historic maintenance costs, professional advice should be sought with respect to buildings related running costs and their relationship to lifecycle costs. These costs will be included within the total revenue costs of the options (rather than as part of capital).

Relevance to the Model

The Model organises the different elements of recurring revenue into four categories: clinical services, non-clinical services, buildings related, and other revenue costs. Within each category, users are free to define the relevant categories and level of detail for costing purposes.

7. Transitional Costs

A transition period usually occurs where costs are incurred to maintain current services and facilities until the new scheme is operational.

7.1 Capital Transitional Costs

Any capital investment required to maintain the existing estate in appropriate condition until the new building is open, will be included within DCFs. The amount of transition period investment will vary according to the option under consideration.

As with initial capital costs, transition period capital costs will exclude VAT. Inflation should also be excluded where this is not expected to be significantly different from general inflation (see 4.2 Cost/Price Base).

Relevance to the Model

Capital transitional costs should be entered in the Costs sheets under 'Transitional Costs', and presented separately from revenue transitional costs.

7.2 Revenue Transitional Costs

Transition costs will include the following non-recurrent costs:

- Double running costs associated with the implementation of the scheme
- Decanting costs associated with the implementation of the scheme
- Development/change costs, inclusive of the implications of new employment and any change management required to deliver the new service (such as, retraining for new roles).

They will, however, exclude redundancy payments (as these represent transfer payments. See 4.5 Transfer Payments).

The net effect of these factors will determine the annual transition revenue costs for each year prior to full implementation and operation of the scheme.

Relevance to the Model

Revenue transitional costs should be entered in the Costs sheets under 'Transitional Costs', and presented separately from capital transitional costs.

8. Externality Costs

"Externalities” are wider costs to society or indirect financial costs. They can be capital or revenue and will need to be assessed separately and included within the DCF analysis.

“Displacement costs” is also a term used to describe the costs that are incurred by one party as a consequence of the activities of another.

More information about externalities specifically relating to embedded accommodation and displacement costs can be found in Appendix E.

9. Net (Income) Contribution Costs

All income generated from other NHS or public bodies will be excluded from the DCF analysis undertaken in appraisals (see Transfer payments, section 4.5). However, the net (income) contribution generated from non-public sector organisations as a consequence of the investment will be included in appraisals in accordance with the contribution this generates to the NHS (for example, as a consequence of private patients facilities or other income generation activities). Net contributions will be counted as negative, reducing the value of Total Costs. A net contribution cannot be double-counted and should be included as either a benefit or a cost.

Relevance to the Model

To aid assessment and review, the revenue component of the CIA Model allows any net contribution from non-public sector bodies to be identified separately. This net contribution cost should be entered by the user as a positive value and the model will automatically subtract this to reduce the total costs.

10. Benefits

There are four types of benefit used within the model:

- Cash Releasing Benefits (CRB)
- Non-Cash Releasing Benefits (NCRB)
- Societal Benefits (SB)
- Unmonetisable Benefits (UB).

Each benefit category is described in more detail in subsequent sections and examples of each are provided in Appendix D. However, there are some general principles that apply:

- For assurance purposes it is important that the explanation of how each benefit is arrived at is recorded, so that the rationale is clear to an external reviewer
- Benefits must be specific and realistic otherwise there will be difficulty when it comes to quantifying them within the model
- CRBs, NCRBs and SBs are quantitative benefits and require financial values to be entered on a year by year basis over the lifetime of the investment
- Year zero (Yr0) is the year that the project will commence. Benefits are shown starting from when they are first realised, so benefits may be zero during the initial stages of a programme and ramp up year on year to a peak
- The values of the financial benefits entered into the model should not include VAT, inflation, depreciation or rate of return
- Users should be clear about the rationale behind each Unmonetisable Benefit within the UB sheet
- Historic benefits are not included within the model nor are future benefits beyond the life of the investment
- All benefits identified in the model must align with the benefits realisation plan (which will be part of the Management Case) and have the same estimated values and delivery profile
- A risk that impacts the ability to achieve the planned benefit is not shown as a “negative” benefit. It is included in the risk analysis but flagged as not being included within contingency. This has the effect of including the risk impact in the economic analysis but without impacting the financial analysis

10.1 Cash Releasing Benefits

Cash releasing benefits (CRBs) are quantified in financial terms, where budgets would be reduced by the value of the benefit. These benefits reduce the costs of organisations in such a way that the resources can be re-allocated elsewhere. This typically means that an entire resource is no longer needed for the task for which it was previously used.

Care must be taken to avoid double counting CRBs in both the cost and benefit analysis. The cost differential between options (i.e. one option being cheaper than another) is not a CRB as including it would be double counting the benefit.

Relevance to the Model

The user should complete the Benefit Log sheet, to show which Investment Objective each CRB relates to, how the benefit should be discounted, and an explanation of the calculations behind each benefit.

The user should then add the CRB value in each relevant year, in the CRBs sheet.

10.2 Non-Cash Releasing Benefits

Non-cash releasing benefits (NCRBs) are quantifiable in monetary terms but no money is actually released from a budget. It can represent productivity savings whereby small elements of time are saved, which is not sufficient to make headcount savings, or re-allocate that resource to a totally different area of work.

The saving from the benefit will be re-invested in the business in some other form, and especially by impacted staff putting any time savings to productive use. These benefits cannot be used as funding instruments within the business case.

These benefits are internal to DHSC and/or the NHS. When modelling the benefits, consideration should be given to turning NCRBs into CRBs. For example, it is sometimes possible to re-engineer working practices to consolidate NCRBs and obtain a cash releasing benefit. For example, reducing the effort of 5 full-time members of staff by 20% each could result in release of 1 FTE if working practices were re-engineered.

Relevance to the Model

The user should complete the Benefit Log sheet, to show which Investment Objective each NCRB relates to, how the benefit should be discounted, and an explanation of the calculations behind each benefit.

The user should then add the NCRB value in each relevant year, in the NCRBs sheet.

10.3 Societal Benefits

A societal benefit (SB) is one which is quantifiable in monetary terms but the benefit is realised by society outside DHSC/the NHS. For example, helping someone to recover from ill health and return to work earlier than otherwise, increases economic activity but does not impact DHSC or the NHS. QALYs are a common example of societal benefits arising from health care investments.

Relevance to the Model

The user should complete the Benefit Log sheet, to show which Investment Objective each SB relates to, how the benefit should be discounted, and an explanation of the calculations behind each benefit.

The user should then add the SB value in each relevant year, in the SBs sheet.

10.4 Unmonetisable Benefits

Unmonetisable benefits (UBs) are benefits which are of value to society but cannot be monetised. Where it is not possible to monetise certain costs or benefits they should be recorded and presented as part of the appraisal. Where possible these unmonetisable values should be quantified in another way, providing an understanding of their magnitude. For example, plans to deliver a five percentage point improvement in patient experience survey scores.

Given more detailed analysis some UBs can be quantified. For example, a UB relating to the reduction in patient complaints might be turned into a CRB by quantifying the reduction in litigation costs.

Relevance to the Model

The user will need to complete the Benefit Log sheet to provide detail on each UB and identify which Investment Objective each UB relates to.

10.5 Double-Counting Costs and Benefits

A common pitfall of economic appraisals is the double-counting of costs and benefits by including the same economic impact more than once, in what incorrectly seem to be different measures. Sometimes an impact of a project can be measured in two or more ways.

For example, a new A&E department could improve staff retention through an enhanced working environment and availability of latest technology. If the costs of the new A&E department are shown to be lower than the Business As Usual option due to improved staff retention, but the same staff cost savings are also included as a CRB, this is double-counting as the same impact has been included as both a cost saving and a CRB. Cost reductions will be reflected in the differences between total costs, so these should not also be reflected in the benefits sheets.

11. Risk

11.1 Risk Analysis

Risk analysis is an important component of a full option appraisal and VfM test. The focus of the risk analysis is threefold:

- To contribute towards the selection of the preferred option
- To help generate a risk register and associated risk management plan for the development and implementation of the scheme
- To identify potential risks and benefits associated with delivering the scheme as a Private Finance Initiative (where applicable)

In undertaking assessments of risk, care needs to be taken not to “double count” the risks reflected in the contingency allowance of the initial capital costs or in the adjustment for optimism bias, by including the same risks in both the contingency and risk allowances, or in both the optimism bias adjustment and the risk allowances.

11.2 Types of Risks

Risks fall into three main categories: **business, service and external risks**. Business related risks remain with the public sector and can never be transferred. Service related risks occur in the design, build and operational phases of a project and may be shared between the public and private sectors. External environmental risks relate to society and impact on the economy as a whole. Within each of these categories there are different types of risk. The generic types of service risk that are likely to be encountered in capital projects are set out below (a longer list of risks can be found in Annex A5 of the Green Book).

Risk	**Description**
Design	The risk that design cannot deliver the services at the required performance or quality standards;
Construction	The risk that the construction of physical assets is not completed on time, to budget and to specification.
Performance	The risk that the completed project fails to perform as intended or fails to meet specific criteria that justified it.
Operating	The risk that operating costs vary from the budget, that performance standards slip or that service cannot be provided.
Revenue	The risks associated with factors that cause a loss of revenue.
Termination	The risk associated with termination of services.
Technology	The risk that changes in technology result in services being provided using non-optimal technology.

Control	The risk that internal control systems are not effective over the project time period.
Residual Value	The risk relating to the uncertainty of the values of physical assets at the end of the contract period.
Other	This refers to risks that do not fall under the aforementioned categories.

11.3 Valuing Risk

The model uses multi-point probability analysis to determine the monetary value of risk.

There are a range of possible values for any risk. A probability distribution recognises some are more likely than others. The expected value is the sum of the possible values, taking into account their probabilities. An example is given below.

A facility is estimated to cost £50m to build. The expected costs associated with construction uncertainties are:

(a) Possible cost (£m)	**(b) Difference from estimated cost (£m)**	**(c) Impact**	**(d) Estimated probability of the event occurring**	**(e) Risk value (£m) (b)*(d)**
50	0	No impact	70% (0.7)	0
55	5	Low	10% (0.1)	0.5
60	10	Medium	10% (0.1)	1
65	15	High	10% (0.1)	1.5
			100% (1)	**2**

The most likely result is no extra cost (probability 70%). However, the expected additional cost (the sum of each possible result multiplied by its probability) is £2 million. This needs to be calculated in NPSV terms, taking into account the time period over which the risk occurs.

Relevance to the Model

For each option, the user should enter the probability of each risk materialising (for a scenario of high, medium, low and no impact), as well as the monetary cost of each of the four scenarios materialising in the Risk (£) sheets. The model will calculate the risk in NPSV terms.

If a risk does not apply to the project/programme, no other details need to be filled out in the model for that risk.

11.4 Assessment of Risk at OBC and FBC

In early stages of an appraisal, the risk premium may be encompassed by a general uplift through optimism bias. A risk register identifying all potential risks followed by a weighting and scoring exercise of the key risks could be sufficient as long as it accounts for the differential riskiness of each option. But as the appraisal proceeds, more specific risks will be identified, thus reducing the more general optimism bias uplift. At OBC a fully quantified risk analysis for each option would be expected in the option appraisal and OB uplift reduced accordingly.

At FBC stage, risks should be re-assessed based on enhanced knowledge of the project and contractual details. As more mitigating measures are in place, some risks might have been partially mitigated while others will have more certain impact values.

Relevance to the Model

The user will need to populate a sheet for each shortlisted option using information from the Risk sheets. By assigning a monetary value and probability for three expected scenarios (high, medium and low impact), a total risk value can be calculated as the sum of these three expected values.

Some generic risk descriptions have already been added based on previous investment projects. The user is expected to use their own risk register to supplement the generic risk descriptions. Conversely, the user is not expected to complete all the suggestions if they are not relevant to the project.

There is a separate sheet for unmonetisable risks. Probability multiplied by impact is used and a relative weighting is assigned to prioritise the importance of risks.

12. Sensitivity Analysis

Figures used in economic appraisals are rarely certain and it is not possible to remove all uncertainties. Sensitivity analysis is used to test the robustness of the appraisal's conclusions to variations in key assumptions - and so determine whether the conclusions of the option appraisal are robust or in any way "sensitive" to particular assumptions.

As such, sensitivity testing represents a systematic analysis of the effects of varying the values assumed for the important and uncertain variables and the impact on the overall conclusions of the appraisal. It is important to examine the differential uncertainties likely to face options and any changes in option ranks (or strengths of preference) should the values included in the appraisal be wrong. Therefore, at OBC and FBC, sensitivity analysis is undertaken to examine the robustness of the ranking of options generated by the economic appraisal.

Sensitivity analysis can also be used to identify switching values (values at which preference for one option is "switched" to preference for another), together with an understanding of the likelihood that this situation might arise. Throughout sensitivity testing, attention is also focused on the possibility of potentially differential impacts on options, as these could affect some options more than others. For example, uniform changes in revenue costs (of say a 5% reduction) are likely to show that all options are reduced in NPSV terms by broadly equivalent amounts and that preference for a particular option continues. Differential changes to revenue costs of one or more options may, however, alter the preference ranking of options.

The specific sensitivity tests undertaken for any particular business case will depend on the areas of greatest uncertainty. It is not sufficient simply to adjust all costs or broad categories of costs by a given percentage (for example 10% of capital costs), but to address a wide range of "what if" questions. The areas of uncertainty that will need to be considered in NHS appraisals include variations in assumptions in respect of:

- Benefit estimates
- Capital cost estimates
- Revenue cost estimates
- Risk estimates
- Unmonetisable risk score

Relevance to the Model

Sensitivity analysis should be performed outside of the CIA Model, whilst using data from the CIA Model.

13. Presenting Results and Drawing Conclusions

13.1 Presentation of Results

The Green Book recommends:

- Presenting results in summary form, supported by more detailed tables and written analysis. The summary should include key measures such as NPSV, Benefit-Cost Ratio (BCR), risks and significant unmonetised costs and benefits or other unquantifiable factors. It should clearly state the choice of time horizon for the appraisal and rationale for that choice
- Listing key assumptions used alongside the results of the quantitative analysis and providing a statement on any unquantified values. Assumptions which have a big effect should be made clear alongside the results of Social Cost Benefit Analysis
- Providing clear references and justifications, with links to sources. Sensitivity analysis of the preferred option should be presented and may be required for other options
- That Business As Usual should be quantified in absolute terms and presented alongside the results of appraisal which show the incremental effect of options
- Clearly presenting uncertainty in the estimates of BCRs or NPSVs and where possible graphical presentation should be used

13.2 Value for Money Conclusions

The absolute value for money (AVFM) threshold for health spending is 4. So, for every £1 spent, £4 is generated in quantified benefits. However, achieving the threshold is not a simple pass/fail test as there may be other non-quantified factors that show VfM. Some investments are strategic and enabling investment rather than deliver benefits in themselves. The final decision on an NHS investment scheme will also take account of the non-financial advantages and disadvantages of the shortlisted option. In short, each business case will be assessed on an individual basis.

Relevance to the Model

The user will need to use the ‘Economic Summary’ sheet to compare key economic and financial figures of the shortlisted options.

14. Appendix A: Bibliography & Further Reading

HM Treasury 2018. The Green Book: Appraisal and Evaluation in Central Government. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

The Magenta Book provides in-depth guidance on how evaluation should be designed and undertaken.
HM Treasury. 2011. The Magenta Book: Guidance for evaluation. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220542/magenta_book_combined.pdf

There is also a range of Green Book supplementary guidance. The reference below provides a detailed breakdown of the different types of business cases (SOP; SOC; OBC; and FBC).
Public Sector Business Cases Using the Five Case Model: Delivering Public Value from Spending Proposals. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/469317/green_book_guidance_public_sector_business_cases_2015_update.pdf

The supplementary and Departmental guidance contains more detailed guidance on specific issues (including optimism bias and risk) and applying the Green Book in particular contexts including health.
HM Treasury. 2018. HMT Green Book: supplementary guidance. Available from: https://www.gov.uk/government/collections/the-green-book-supplementary-guidance

15. Appendix B: Reference Table of Key Cost Terms

15.1 General

Term	Include/Exclude	Treatment
Avoided costs	Include	Reflect in baseline option 0
Opportunity costs	Include	Most commonly reflected in property values
Optimism bias	Include	
Sunk costs	Exclude	
Transfer payments: Taxes Redundancy payments Capital charges	 Exclude Exclude Exclude	
Price/cost base	-	Common for all elements of costs Constant prices Where there is sound evidence of variations from general inflation, the difference will be reflected in the base costings, otherwise the impact of inflation is considered in risk or sensitivity analysis
Scope of costs	-	All direct and indirect implications of the investment Total (as opposed to the change in) property, capital and revenue costs
Sign convention	-	Costs, benefits and risks should be positive values

15.2 Property Values/ Opportunity Costs

Term	Include/Exclude	Treatment
Property in NHS use	Include	
Property bought and sold by NHS	Include	
Other property transactions (transfers between public sector bodies)	Include	
Property rented	Include	Include in revenue costs

15.3 Capital Costs

Term	Include/Exclude	Treatment
Initial capital costs	Include	Exclude VAT, inflation (subject to guidance on cost/price base above) and contingency allowance if reflected in the risk analysis Include adjustment for optimism bias Timing as per timing of implementation and expenditure cash flows
Lifecycle costs	Include	Exclude VAT, inflation (subject to guidance on cost/price base above) and contingency allowance if reflected in the risk analysis Consistent with initial capital costs and on-going buildings related running costs
Transition period capital	Include	Exclude VAT, inflation (subject to guidance on cost/price base above) and contingency if reflected in the risk analysis Timing as per timing of implementation and expenditure cash flows
Equipment	Include	Where purchased, included in lifecycle costs and, hence, already included in capital costs Where leased or less than £5,000, include in revenue costs
"Embedded accommodation"	Include	Included within capital cost hence: Initial capital as per above Lifecycle as per above Transition period capital as per above

15.4 Annual Revenue Costs

Term	Include/Exclude	Treatment
Buildings related running costs	Include	Reflect design and other buildings related impacts on cost Consistent with initial capital costs and lifecycle costs
Clinical & non-clinical services	Include	Consider and assess explicitly, impact of: Future levels of provision Future model of care Key differences across options
Embedded accommodation	Include	Assume revenue "neutral" unless indications to the contrary
Forecast savings	Include	Reflected in assessment of revenue costs

Transition years	Include	Include revenue costs required to deliver the service Also include (the 3 “Ds”): Double running costs Decanting costs Development/change costs Exclude: Redundancy costs
General	Varies	Include: All relevant revenue costs Annual savings attributable to the investment (see forecast savings below) Net income contribution from non-public sector bodies (see net (income) contribution below) Exclude: VAT Net income contribution from public sector bodies (see net (income) contribution below) Capital charges Inflation (subject to above guidance on price/cost base above)
Net (Income) contribution	Varies	Include net income from non-public sector bodies Exclude net income from public sector bodies

15.5 Displacement Costs

Term	Include/Exclude	Treatment
Displacement costs	Include	Reflect all cost implications (property, capital and revenue and to public/private sectors) as appropriate Ensure like for like comparison across options

15.6 Appraisal Period/ Timescales

Term	Include/Exclude	Treatment
Capital cash flows	Include	Initial capital, as determined by capital cash flows and consistent with DHSC OB cost forms, plus optimism bias Lifecycle and transition period capital
Revenue cash flows	Include	As determined by plans for transition period and scheme implementation programme
Property cash flows	Include	As determined by timing of property use, purchase and sale:

		Open and residual values at end beginning and end of discount period respectively Purchase and receipt to reflect timing of purchase/sale Other property transactions (transfers within the public sector) to reflect timing of transaction
Appraisal period	-	New build options – construction period plus 60 years operational life Refurbishment options - 25-30 years Appraisal of different new build/refurbishment options, use NPC residual value method or EACs
Completion date	-	Planned completion date, as determined by implementation programme and consistent with capital cash flows
Start date	-	Planned start date for DCFs generally common for all options, unless there are reasons why they must start at different times

16. Appendix C: Optimism Bias

There are three steps in calculating optimism bias for an option:
(i) Setting **the upper bound.**
(ii) **Apply mitigating factors to the upper bound.**
(iii) **Apply the resulting optimism rate to the option.**

16.1 Setting the Upper Bound

The Department of Health and Social Care has analysed "cost drift" in NHS projects. This has shown that:

- Building projects with capital values from £10m to £25m increase on average by 40% from OBC to FBC, excluding the effect of inflation
- Building projects with capital values over £25m increase on average by 30% from OBC to FBC, excluding the effect of inflation

This therefore provides the initial empirical base for setting an upper bound for NHS building projects. However, these figures are averages of a number of projects, and any one project could diverge from the average, either upwards or downwards. A number of factors could cause this divergence, including:

- Complexity of the site (e.g. is it particularly constrained? Could it suffer from contamination? Is it a Greenfield site?)
- Complexity of the project (e.g. Does it introduce new ways of working? Will it require buy-in from a large number of stakeholders?)
- Experience of the project team

Therefore, a project team deciding on the upper bound for the calculation should take these factors into account, and set out their reasoning for deciding on a particular percentage in any business case.

Relevance to the Model

For build schemes, the user can complete the Optimism Bias tabs in the model, using one sheet per option (0 to 6). The form establishes a number of factors about the project, and calculates an upper bound from them. For non build schemes the user should calculate OB outside of the model and add it in the Cost tab for each option.

16.2 Apply Mitigating Factors to the Upper Bound Percentage

Once an upper bound percentage for the optimism bias adjustment has been determined, 'mitigation' is then applied to the upper bound to give the actual, lower size of the percentage adjustment to be made for the scheme in question at its current stage of development.
HM Treasury's guidance gives a set of contributory factors that are said to cause optimism bias. Each contributory factor is assigned a weight to reflect its relative importance in

causing the upper bound optimism bias. The weights are expressed as percentages, summing across all the contributory factors to 100%.

Mitigation is applied by going through each contributory factor and assessing to what extent each contributory factor is still applicable to the case in question at its present stage of development. It may be that it is judged some contributory factors have not been mitigated at all, while others have been fully or partially mitigated. Where a factor has been fully mitigated, its percentage share is reduced to zero, where a factor has not been mitigated at all the percentage share of that factor is left unchanged, and where a factor has been partially mitigated, its percentage share is reduced but still positive.

The revised percentage shares of each contributory factor are then summed. The revised sum may be, say, 50% or 70% compared with the original 100%.

Contributory factors and mitigation for NHS schemes

A set of contributory factors that is tailored more to NHS schemes has been developed through a workshop and further adjusted based on experience. This draws on and develops HM Treasury's own guidance on contributory factors. Unlike HM Treasury's original guidance, there is only one set of contributory factors rather than a set for 'standard build' schemes and a different set for 'non-standard' build schemes.

16.3 Apply the Resulting Optimism Bias Rate to the Option

If the upper bound adjustment were for example 40% and after mitigation, the mitigation adjustment is 50%, the actual upward uplift to costs would be 20% (i.e. 50% of 40%). If the mitigation adjustment were 70%, the final Optimism Bias uplift would be 28% (i.e. 70% of 40%).

16.4 The relationship between Optimism Bias, Contingencies and Risk

The following scenario is written with initial capital costs for build schemes in mind, but the same framework applies in principle to optimism bias in relation to works duration, revenue costs and benefits. However, as explained in the more general guidance, it is unlikely that in practice quantified adjustments for optimism bias can be made to revenue costs and benefits. This is because of the lack of evidence as to the level of explicit adjustments for optimism bias to apply. For revenue costs and benefits, Treasury recommend that sensitivity analysis is used instead to assess the effects of underestimating revenue costs and over estimating benefits.
The following terminology is used:

- Quantified risk analysis: work undertaken in business cases to obtain the expected value of risks in monetary terms. This is through the development of a risk register and for each individual risk the estimation of impact values and probabilities of occurrence. An example risk register template and risk allocation can be found on page 99 of the Green Book.
- Optimism bias: the upward adjustment to estimated costs to counteract the known tendency for the costs of projects to be underestimated

- Contingencies: planning contingencies

Optimism bias, contingencies and quantified risk analysis are all types of risk analysis, but should differ in terms the types of risks they cover and to some extent the stages of development of business cases to which they are most applicable, as described below.

However, there is a need in the development of a business case to guard against the same risks being included in two or more of optimism bias, contingencies and quantified risks.

Optimism bias relates mainly to changes to the scope of projects (as defined by the output specification) which increases costs between OBC (or earlier) and FBC. There is firm evidence that costs do increase between OBC and FBC. The output specification may change for some of the following reasons:

- Developments in national policy (e.g. the introduction of consumerism, National Service Frameworks, new Health and Safety Regulations, and the Disability and Discrimination Act)
- Changes in local priorities and strategies
- Changes in medical technology (e.g. new scanners are developed which have different estates requirements);
- Changes in how services are to be delivered.

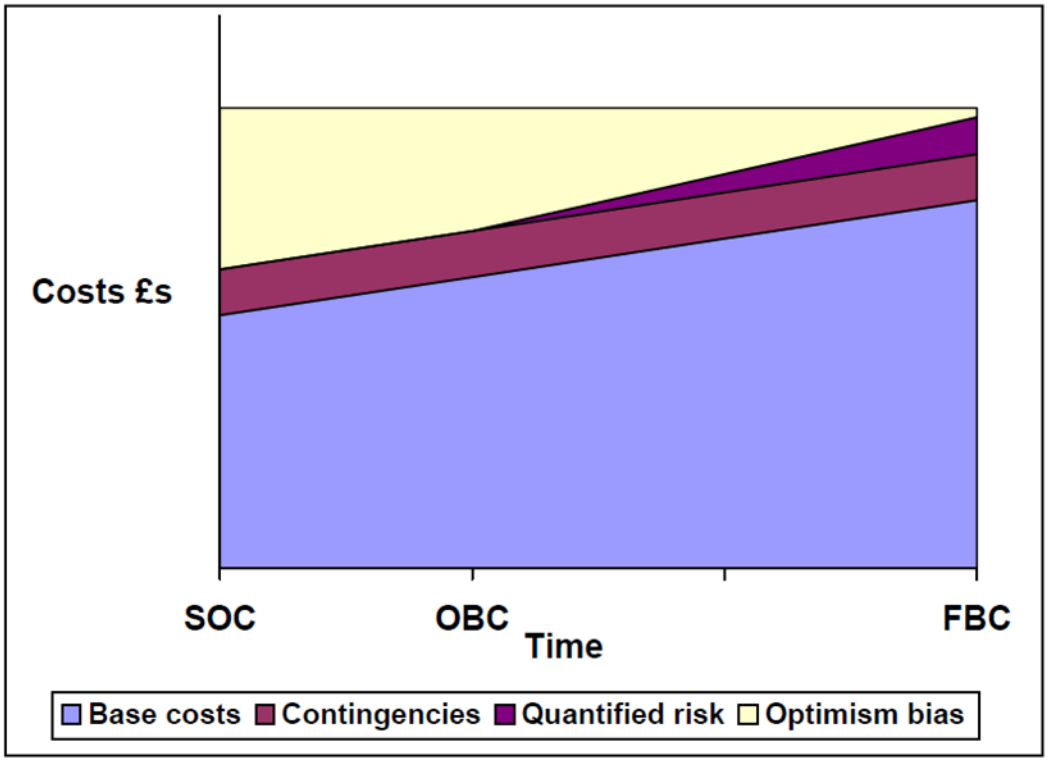
There may also be a tendency for costs to increase as more detailed design work and consultation is undertaken, including consultation with staff and local planning authorities. This may include:

- The realisation of omissions (or errors) at OBC of desired services, or of certain facilities needed to deliver required services
- The inclusion of users' aspirations
- The desire to exploit a window of opportunity provided by a scheme to address other priorities, 'hot spots' or bottlenecks

The risks that are covered by optimism bias cannot be quantified and valued individually (in theory some of them could be quantified individually but there is a lack of an evidence base). For this reason, optimism bias is an overall upward adjustment factor applied to total costs. As described above, this is carried out by assessing the relevant upper bound for the size of the adjustment and applying mitigation factors to that upper bound to determine the actual adjustment to be made.

As a business case develops, the level of optimism bias remaining should diminish as there is less scope for the output specification to change. In addition, costings are finalised and individual risks can be quantified (strictly speaking, the level of mitigation of optimism bias increases thus causing the remaining level of optimism bias to fall). By FBC stage, any remaining optimism bias should be very low. However, account needs to be taken of the possibility for further scope change due to further elapsed time before contract signature, detailed designs not being complete or there not being a contractor appointed. Schematically, this is shown in Figure 1 below. The horizontal axis represents the passage of time as the business case develops from SOC to OBC to FBC. The vertical axis represents total estimated capital costs. The area shaded pale yellow is the optimism bias adjustment, which diminishes as the business case develops towards FBC. The starting level of optimism bias in Figure 1 at SOC stage is after deducting the appropriate level of mitigation for the project in question at that stage of development.

Figure 1: Changes in base costs, planning contingencies, quantified risks and optimism bias between SOC, OBC and FBC



NB Figure 1 is at the same MIPS index, so changes in costs due to inflation have been stripped out.

In Figure 1 the area shaded blue represents 'base costs' or 'known' costs. As the business case develops, typically base costs increase in real terms (i.e. at a constant PUBSEC index) as the output specification and 'brief' develops and costings become firmer.

The level of planning contingencies is shown by the area shaded in a 'plum' colour. In this particular example, contingencies are applied throughout the development of the business case at a slowing declining percentage of 'known' costs between SOC, OBC and FBC.

'Building contract contingencies' are thus already included within the area shaded blue in Figure 1 and their level does not vary between builds for a given type of department. They typically represent the costs of business risks, often relating to technical matters or detailed design changes. Examples include unexpected ground conditions, the unexpected need to re-position water mains compared with the plans, the unanticipated need for doors to be slightly wider than planned.

A 'planning contingency' is also included in estimated capital costs, to cover cost overruns for other issues, e.g. cost overruns that cannot be contained within the building contract contingencies, claims for disruption and loss and expense cost overruns on the equipment budget, claims for additional professional fees, etc. These changes are different from the more fundamental changes in scope reflected in optimism bias. The figure assessed is in practice routinely applied throughout the development of the business case at the same percentage level, or only showing a very modest fall between SOC, OBC and FBC.

In Figure 1, there is also an area shaded purple, labelled ‘quantified risks’. This relates to the monetary value of the quantified risks that is usually developed by FBC stage. In some business cases, in the economic analysis a full quantified risk analysis replaces planning contingencies and would thus be represented in Figure 1 by the combined plum and purple areas at FBC stage. In other business cases, by FBC planning contingencies are themselves based on a full risk analysis, but there are often other risks over and above planning contingencies, and the latter are represented by the area shaded purple.

Optimism bias and quantified risk analysis are also to some degree substitutes. As the degree of quantification of risks in monetary terms increases, the level of remaining optimism bias should be lower (strictly speaking, the level of mitigation of optimism bias should increase thus causing the remaining level of optimism bias to fall). Thus, while optimism bias relates mainly to changes to the scope of projects which increase costs between SOC/OBC and FBC, it may relate also to any post-contract risks that are not covered by planning contingencies or a quantified risk analysis. Indeed, one reason why optimism bias should be low at FBC stage is because a quantified risk analysis has been undertaken. If a quantified risk analysis had not been undertaken at FBC stage, the remaining level of optimism bias would not necessarily be low.

It should be noted that Figure 1 is schematic and designed to portray the general picture. It does not cover all the intricacies and the relative size of the shaded areas is for illustrative purposes only.

17. Appendix D - Examples of Benefit Types and Modelling Assumptions

The table below outlines typical benefits that may arise from a capital project. It also describes the sources of data and assumptions that would be used to quantify the benefits. For these purposes, the capital project is the construction of a new A&E department in a hospital. The existing A&E department will be demolished and this land will be used for housing, with improved access to the hospital.

Benefit	**Benefit Type**	**Benefit Description**	**Data & Assumptions used to Quantify Benefit**
Sale of decommissioned equipment	CRB	The sale of items from the old building (e.g. IT, office equipment) will generate income.	Second-hand market price.
QALY gains	SB	Reduced mortality rates and improve patient outcomes by using the best/latest technology.	Case study of a similar project or programme may provide evidence of effects on mortality rates and patient outcomes. Value of a QALY = £60,000
Increased staff efficiency	NCRB	More streamlined processes through reduced movement and travel distances for staff. A more efficient layout of the building (e.g. improved patient pathways)	Estimated time savings (e.g. 20 minutes walking a day) multiplied by staff's hourly wage.
Reduced traffic and congestion	SB	The nature of the build will improve traffic management on the hospital site, reducing congestion.	Cost of congestion (e.g. DfT's estimate)
Improved air quality	SB	A more energy efficient facility will reduce air pollution.	The difference between CO2 emissions of the current and new energy system (e.g. using annual energy bills). Price of pollution (EU damage cost per tonne of CO2 pollution)
Releases land to build houses	UB	Allows construction of housing to meet the demands of the local population.	N/A

Increased patient satisfaction	UB	Patients will feel more assured that they are receiving high quality treatment as a result of the improvements.	N/A

Key:

- Cash Releasing Benefits (CRB)
- Non-Cash Releasing Benefits (NCRB)
- Societal Benefits (SB)
- Unmonetisable Benefits (UB).

18. Appendix E – Externalities. Embedded Accommodation and Displacement Costs

18.1 Capital Externalities - “Embedded Accommodation”

The term “embedded accommodation” refers to accommodation that is embedded, or enclosed, within the buildings of one public sector organisation, the "host" (typically, an NHS Trust) that belongs to another public sector organisation (typically, a University or another Trust). When the host (or sponsoring) organisation plans to undertake a significant change the impact on the organisation whose accommodation is embedded in the host must also be included within the economic appraisal (typically reflected in the costs of replacing “embedded accommodation”).

Relevance to the Model

As the capital implications of “embedded accommodation” will be included within the initial costs estimates and lifecycle cost estimates, the Model does not provide a separate category for these costs. Users will need to ensure that these costs are reflected appropriately in the costing appraisal.

18.2 Revenue Externalities - “Embedded Accommodation”

It is possible that the re-provision of accommodation that is embedded in the NHS may generate slightly different (higher or lower) costs for the organisation that is embedded in NHS buildings. Revenue costs associated with embedded accommodation can be assumed to continue at the current level, unless there are clear reasons why they will not be “neutral”. This can be tested as the case proceeds or if significant to the ranking of options, through sensitivity analysis. As the revenue costs of other organisations with embedded accommodation are not included within cash flows, “neutral” revenue costs will be reflected by the absence of any revenue costs of “embedded accommodation”.

Relevance to the Model

Although, the revenue implications of “embedded accommodation” may be assessed by the user to be “neutral”, the Model facilitates the inclusion of these costs as a separate category should they be considered relevant at the OBC stage of a schemes appraisal. These costs can be entered into the appropriate line in the Externalities rows of the cost tabs in the CIA Model.

18.3 Revenue Externalities - Displacement Costs

Displaced costs are costs that are incurred by another party as a consequence of changes in service provision (location or modality).

Displacement costs result from the development of a scheme by one organisation that results in the displacement of service activity, and hence costs, to another or others (whether or not this is intended) - in this sense, the costs are “displaced” elsewhere in the public sector. They arise because activity that was once undertaken by the organisation/Trust sponsoring the investment will transfer elsewhere within the public sector as a consequence. An extreme version of displacement is represented by complete “dispersal” options, in which all service activity and the majority, if not all, the costs are displaced from one organisation to another (or others). Costs to the NHS that are incurred as a consequence of the transfer of workload to the private sector will also be included as a displacement cost.

Relevance to the Model

Within the Model, there is an input area for cost “externalities” which allows the user to identify separately three categories of “external” costs - those related to patient flow changes (resulting from changes in “market share”), service model changes and any revenue implications of “embedded accommodation”. Within each category the user can specify different displacement costs. The costs incurred by individuals (such as, patients, carers and visitors) could be reflected in any or all of these categories should they be required.

19. Appendix F - Table of Key Terms & Acronyms

Term/Acronym	Definition
Absolute value for money threshold (AVFM)	Spending in the health and social care sector uses an AVFM of 4. So, for every £1 spent, £4 is generated in quantified benefits to make an investment economically viable.
Appraisal	The process of defining objectives, examining options and weighing up the costs, benefits, risks and uncertainties of those options before a decision is made.
Benefit	Economic measure of the outcome that is expected in return for an investment. Benefits are categorised in terms of Cash Releasing Benefits (CRBs), non-cash releasing benefits (NCRBs), Unmonetisable Benefits (UBs) and Societal Benefits (SBs).
Business As Usual option	The continuation of current arrangements as if the intervention under consideration was not to happen. This serves as a benchmark to compare alternative interventions. Note this previously has been referred to as the Do Nothing option.
Business case	A management vehicle for scoping and planning the proposal and documenting the outcome, often a requirement of the approval process.
Cash flow	The pattern of Income and Expenditure, as a consequence of the investment, that results in availability of cash and movement in and out of the organisation.
Capital expenditure	Expenditure on durable assets such as land, buildings and equipment.
Cash releasing benefit (CRB)	A benefit that releases cash from an existing budget. A cash releasing benefit may be used as a funding mechanism to fund a business case if funds are genuinely released.
Contingency	An allowance made for the cost of known risk and any unforeseen outcomes.
Discount rate	The annual percentage rate at which the present value of future monetary values are estimated to decrease over time.
Discounted cash flow (DCF)	A technique for appraising investments. It reflects the principles that the value to an investor (whether an individual or firm) of a sum of money depends on when it is received.
Discounting	A method used to convert future costs or benefits to present values using a discount rate.
Displacement costs	Displacement costs are costs that are incurred by one party as a consequence of the activities of another.

Do minimum option	An option which involves the minimum amount of action necessary to deliver some or all strategic objectives.
Double-counting	Double-counting of certain costs and benefits by including the same economic impact more than once.
Economic case	A business case captures the reasoning for initiating a programme of work. The "Economic case" examines the costs, benefits and risks associated with an investment.
Economic transfer	Transfers of resources between people (e.g. gifts, taxes, grants, subsidies or social security payments) should be excluded from the overall estimate of Net Present Social Value (NPSV). Transfers pass purchasing power from one person to another and do not involve the consumption of resources. Transfers benefit the recipient and are a cost to the donor and therefore do not make society as a whole better or worse off.
Equivalent annual benefit (EAB)	The quantified benefits per year of owning and operating an asset over its entire lifespan. It is calculated by dividing the NPSV of a project by its 'present value annuity factor'.
Equivalent annual cost (EAC)	The cost per year of owning and operating an asset over its entire lifespan. It is calculated by dividing the NPC of a project by its 'present value annuity factor'.
Externality costs or benefits	The non-market impacts of an intervention or activity which is not borne by those who generate them.
Full Business Case (FBC)	The purpose of the FBC is to revisit and where required rework the OBC analysis and assumptions building in and recording the findings of the formal procurement. This case at its conclusions recommends the "most economically advantageous offer", documents the contractual arrangements, confirms funding and affordability and sets out the detailed management arrangements and plans for successful delivery and post evaluation.
Five case model	A systematic framework for the development and the presentation of the business case over time (SOC, OBC, ABC and FBC).
Full Time Equivalent (FTE)	FTE allows part-time workers' working hours to be standardised against those working full-time. The standardised figure is 1.0, which refers to one full-time worker. 0.5 could refer to an employee that works half full-time hours.
Funding	The amount of money that an organisation will need to contribute towards the investment. This is allocated as either capital or revenue.
Net present benefit (NPB)	The present (discounted) value of a stream of future benefits.
Net present cost (NPC)	The present (discounted) value of a stream of future costs.

Net present social value (NPSV)	The present value of a stream of future costs and benefits to UK society (that are already in real prices) that have been discounted over the life of a proposal by the social time preference rate.
Non cash releasing benefit (NCRB)	A benefit which is quantifiable in monetary terms but no money is actually released in a budget. For example, these may be productivity savings whereby small elements of time are saved, which is not sufficient to make headcount savings.
Outline Business Case (OBC)	The purpose of this stage is to revisit earlier SOC assumptions and analysis in order to identify a "preferred option" which demonstrably optimises value for money. It also sets out the likely Deal; demonstrates its affordability; and details the supporting procurement strategy, together with management arrangements for the successful delivery of the proposal.
Opportunity cost	The value of the most valuable alternative use of a resource or the cost in terms of an opportunity forgone.
Optimism bias	The demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters, including capital costs, operating costs, project duration and benefits delivery.
Options appraisal	The appraisal of various options chosen to achieve specific objectives.
Public Private Partnership (PPP)	This includes PFI which refers to a Private Finance Initiative which is an option involving private sector agents in the design, creation (or construction) operation and initial financing of a publicly provided service. This may apply to a wide range of services for instance road transportation services from provision and operation of a toll road, bridge or tunnel or to information services involving software and a share in virtual hardware. PF2 is a specific form of Private Finance Initiative as defined in "A new approach to public private partnerships" published December 2012.
Quality-Adjusted Life Year (QALY)	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYs are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale). It is often measured in terms of the person's ability to carry out the activities of daily life, and freedom from pain and mental disturbance.
Quantified risk	Economic measure of the quantitative value of the risk associated with an investment should things not go to plan.
Residual value	The remaining value of an asset after it has been fully depreciated (i.e. the end of its lease, or useful life).

Revenue cost	A cost or income associated with day to day operating costs of the Department such as maintenance or operational staff salaries.
Sensitivity analysis	Involves exploring the sensitivity of expected outcomes of an intervention to potential changes in key input variables. It can be used to test the impact of changes in assumptions and should be clearly presented in the results of appraisal.
Social cost benefit analysis (CBA)	Quantifies in monetary terms all effects on UK social welfare. Costs to society are given a negative value and benefits to society a positive value. Costs to the public sector are counted as a social welfare cost.
Social value	The net measure of total welfare resulting from an option or intervention. Alternatively, the sum of total benefits and total costs of an intervention, including private and social costs and benefits.
Societal benefit (SB)	A benefit which is quantifiable in monetary terms but the benefit is realised by society outside DHSC/the NHS. For example, getting a sick person back to work earlier saves the economy money but does not impact DHSC or the NHS.
Strategic Outline Case (SOC)	The purpose of this stage is to confirm the strategic context of the proposal and to make a robust case for change, providing stakeholders and customers with an early indication of the “preferred way forward” (not the preferred option). The SOC identifies and undertakes a SWOT analysis on a wide range of available options, together where possible with an early analysis of the shortlist based on indicative costs and benefits and application of allowances for optimism bias.
Sunk cost	Costs that have already been incurred and cannot be recovered.
Unmonetisable benefit (UB)	A benefit which cannot be quantified in terms of money.