

# Quantitative Benefit Methodology

August 2013



## 1.0 SFT's Quantitative Benefit Methodology

### 1.1 Part 1 - General Methodology

The methodology adopted for each individual benefit is as follows:

- 1 Identify and describe the interventions that have/will realise a financial benefit;
- 2 Allocate the benefit a unique reference number and benefit owner;
- 3 Allocate the benefit to one of SFT's value-for-money drivers:
  - a. Delivery;
  - b. Aggregation & Collaboration;
  - c. Funding and Finance;
  - d. Validation; and
  - e. Centre of Expertise
- 4 Allocate the benefit to one of six benefit types:
  - a. Avoided Cost;
  - b. Additional Investment;
  - c. Efficiency Gain – Funding and Finance;
  - d. Efficiency Gain – Centre of Expertise;
  - e. Efficiency Gain – Delivery; and
  - f. Efficiency Gain – Validation
- 5 Set out the actual/forecast annual financial benefit profile;
- 6 Apply a sharing percentage (described below) to take account of partnership working;
- 7 Apply a confidence factor (described below) depending on the stage of development;
- 8 Calculate the present value of the benefit profile multiplied by both the confidence factor and the sharing percentage; and
- 9 Allocate a percentage of the factored present value to the years in which SFT will/has undertaken work to realise the value of each benefit.

Sensitivities (described below) are applied to the forecast benefit profile and the confidence factors to show the range of possible benefit values. Each year the reported benefit value caps forecast benefits at ten years beyond the reporting year in question.

The overall benefit value reported each is determined by the following process:

- a. For each benefit determine the aggregate benefit value by summing the value for the reporting year and each of the previous years in the current financial model based on steps (1) to (9) above;
- b. Determine the Cumulative Net Value position for each benefit by deducting from (a) the aggregate of the value reported for each benefit the previous year's benefit statements increased by 3.5% to bring historical values into the same price base as the current reporting year.
- c. The reported benefit value each year is the summation of the Cumulative Net Value for each individual benefit less SFT's cost of operations for the reporting year.

The above process is repeated each year, whereby steps 5 to 9 above are updated to reflect the development of each benefit during the previous year, revising each benefit up or down as appropriate.

## 1.2 Sharing

SFT works in partnership with a number of parties across the public sector to deliver better value-for-money. The great majority of the benefit that we deliver could not be realised without the commitment and parallel activities of these other parties.

Accordingly the measurement of benefits has been shared with other parties. Benefits have been measured using one of the following sharing mechanisms:

| Sharing Mechanism | % of Benefit Attributable to: |                         |                           |
|-------------------|-------------------------------|-------------------------|---------------------------|
|                   | SFT                           | Partner (e.g. SG or LA) | Partner 2 (e.g. SG or LA) |
| 1                 | 100%                          | -                       | -                         |
| 2                 | 50%                           | 50%                     | -                         |
| 3                 | 33.3%                         | 33.3%                   | 33.3%                     |

By sharing benefits with other parties in our calculation methodology, we are rightly only attributing to SFT a proportion of the benefits accruing from the activities in which we are involved with others. The percentage splits are at a high level and do not attempt to quantify any proportionally of differing inputs from the various participants into the each benefit delivered.

## 1.3 Confidence Factors

Confidence factors are applied to each benefit recognising that some of our interventions during the year have some way to go before benefits are delivered, and others require support and input from third parties outside our control in order to deliver. The table below outlines a description of each confidence factor and the associated percentage of benefit recognised.

| Confidence Factor | Confidence Factor Description   | % of Benefit Recognised |
|-------------------|---|-------------------------|
| A - Certain       | Benefit has already been delivered  | 100%                    |
| B - Very Good     | Firm, deliverable plans are in place and being progressed for delivery of benefit, but stages remain to be completed  | 90%                     |
| C - Good          | Plans are in place to deliver the benefit but some third party commitment remains outstanding and/or significant stages remain outstanding to deliver the anticipated benefit | 75%                     |
| D - Moderate      | Deliverable benefit identified with discussions ongoing with third party(ies) to put firm plans in place for delivery   | 55%                     |

## 1.4 Range and Sensitivity

The measurement methodology recognises that the majority of SFT's activities drive benefits in the future. It is acknowledged that even given the confidence factors and discounting applied, the certainty of benefits delivered several years into the future is lower. It is therefore common practice in economic forecasting to ignore effects more than a set period into the future for sensitivity analysis. It is also possible to undertake sensitivity analysis on the confidence factors applied.

In order to understand the potential range of benefits delivered in terms of upper, lower and most likely, the following sensitivities are undertaken:

| Sensitivity                                       | Future Benefits Recognised  | Confidence Factor                |
|---|---|----------------------------------|
| <b>Upper Benefit Range (Scenario 1)</b>           | All future benefits recognised  | Evaluated confidence factor used |
| <b>Most Likely Benefit (Scenario 2)</b>           | Future benefits capped at 10 years  | Evaluated confidence factor used |
| <b>Lower Benefit Range (Scenario 3)</b>           | Future benefits capped at 10 years  | Reduce confidence factors by 20% |
| <b>Most Likely Benefit - Variant (Scenario 4)</b> | Future benefits capped at 10 years (except for benefits where there is a rationale to support the forecast benefit extending beyond 10 years) | Evaluated confidence factor used |

All reporting at a of SFT's annual benefit value is based on the **Most Likely Scenario** (Scenario 2).

## 2.0 Part 2 - Validation Methodology and Benefit Quantification

SFT undertakes Key Stage Reviews of complex procurements at critical decision points through the business case and procurement process. This section of SFT's Benefit Methodology sets out how SFT quantifies the benefits to a capital project of ongoing external validation as delivered by the SFT through Key Stage Reviews. Such a quantification, for any individual project, or generically for all projects subject to external validation, is challenging for the following reasons:

- Major complex procurements such as those validated by SFT are only ever undertaken once. There is never a "counterfactual" or un-validated project similar in all other respects against which to compare the outturn;
- The National Audit Office is currently completing a study into project validation and we understand that it is not going to quantify the benefits of external validation in that report; and
- The outcome of a validation review, where recommendations are acted upon, is most likely to be a substantial reduction in the aggregate probability of adverse events or poor performance impacting on outturn rather than a change being made that has an individually identifiable impact on a specific project cost line.

The approach taken in quantifying the benefit in outturn cost across a series of projects subject to external validation is therefore to:

- List a range of Validation Outcomes that could lead to improvements in project processes and outcomes;
- Consider the likely impact of such Validation Outcomes to the Optimism Bias associated with the project according to HM Treasury Green Book guidance<sup>1</sup>

### 2.1 Validation Outcomes

SFT undertakes Key Stage Review (KSR) as part on an external validation of major capital investment projects during the intensive commercial, financial and technical stages of a project between Outline Business Case (OBC) completion and award of the main delivery contract(s). Typical recommendations would refer to:

- Project governance arrangements and links to organisational governance;
- Skills and experience of key project team members;
- Resourcing of client side project team;
- Adequacy of the Business Case;
- Clarity of needs identification;
- Challenge of affordability and value-for-money assumptions;
- Commercial structure of the proposed procurement;
- Adequacy of cost and risk estimation at various project stages;
- Adequacy of technical specification at various project stages;
- Level of outstanding technical, commercial and financial issues at various stages through a procurement process; and
- Derogations from standard project commercial documentation.

In the case of Non-Profit Distributing (NPD) projects with part Government funding, the Project Team is mandated to follow through on recommendations of Key Stage Reviews as a condition of funding. This gives a good deal of certainty that key recommendations of the validation review at stages through the project development will be acted upon by project owners.

<sup>1</sup> [http://www.hm-treasury.gov.uk/data\\_greenbook\\_supguidance.htm#Optimism\\_bias\\_OB](http://www.hm-treasury.gov.uk/data_greenbook_supguidance.htm#Optimism_bias_OB)

## 2.2 Benefit Quantification Using Optimism Bias

The HM Treasury methodology for estimating optimism bias states that:

*“There is a demonstrated, systematic, tendency for project appraisers to be overly optimistic. To redress this tendency appraisers should make explicit, empirically based adjustments to the estimates of a project’s costs, benefits, and duration.”*

The guidance quantifies contributors to this optimism separately from general project risk contingencies. Each contributor represents a factor that has been demonstrated across a range of completed projects to lead to outcomes (in time or cost) less advantageous than had been predicted at the outset. The implementation of robust external validation will have a significant mitigating effect on a number of these contributors.

HM Treasury Guidance provides an estimate as a percentage of the capital cost of projects for the maximum and minimum level of optimism bias across different types of project (standard and non-standard building projects and standard and non-standard civil engineering projects). Experience across a wide range of projects is that often project teams undertake internal mitigations strategies that reduce the level of optimism bias to approximately half way between the maximum and minimum percentage values from the guidance.

SFT has considered the range of contributing factors to optimism bias listed in the guidance, and the likely impact of external validation in mitigating these factors. The impact on some factors (e.g. ‘adequacy of the business case’ where a review will provide detailed comment) is likely to be high whereas for others (such as the impact of ‘poor intelligence’ on ground conditions where a validation exercise will have a passing consideration on processes undertaken) will be significantly lower. Other areas such as the complexity of design are inherent in the project and cannot be impacted at all by validation. Annex 1 of SFT 2009-10 Benefits Statement details our consideration of the impact of validation on individual contributing factors to optimism bias.

Applying the mitigating effect of validation to the likely optimism bias level following project team mitigation gives an overall percentage of capital cost benefit most likely to be attributable to external validation.

Many projects validated by SFT are also subject to other central validation such as Gateway Review, or internal peer review within the procuring organisation. We therefore attribute 33% of the overall benefit of validation to the SFT process.

The following table shows in columns 2 and 3, the upper and lower bounds of likely project optimism bias for different types of project taken from the HM Treasury Guidance. Column 4 shows the likely level of optimism bias following internal project team mitigation. Column 5 is taken from Annex 1 of SFT 2009-10 Benefit Statement and shows the percentage by which validation should reduce the optimism bias in column 4. Column 6 therefore shows the percentage of overall capital cost benefit attributable to external validation, and column 7, the percentage attributable to SFT key stage review validation.

|                                       | Optimism Bias % Capital Expenditure |       | Post internal mitigation 50% | Validation Mitigation | Validation Impact | SFT Validation Impact |
|---------------------------------------|-------------------------------------|-------|------------------------------|-----------------------|-------------------|-----------------------|
|                                       | Upper                               | Lower |                              |                       |                   |                       |
| <b>Standard Buildings</b>             | 24                                  | 2     | 13%                          | 27%                   | 3.5%              | 1.2%                  |
| <b>Non-Standard Buildings</b>         | 51                                  | 4     | 27.5%                        | 24%                   | 6.6%              | 2.2%                  |
| <b>Standard Civil Engineering</b>     | 44                                  | 3     | 23.5%                        | 21%                   | 4.9%              | 1.6%                  |
| <b>Non-standard Civil engineering</b> | 66                                  | 6     | 36%                          | 26%                   | 9.3%              | 3.1%                  |

**TABLE 1**

The above level of benefits reflects the full scope of SFT’s Key Stage Review validation process. On some projects, SFT will not be involved from the early Outline Business Case stage, or may be asked to undertake a one-off review. In such cases, the potential benefits of the validation input would be reduced. SFT’s conservative estimate is that the benefit of validation should be reduced by 25% if a substantially complete scope of reviews has been undertaken, 50% if an incomplete suite of reviews is undertaken, and 75% if only a one-off review is undertaken. The benefit of SFT’s external project validation, as a percentage of a project’s capital cost is therefore estimated as:

|                                       | Full Scope | Substantial scope | Partial | One-off |
|---------------------------------------|------------|-------------------|---------|---------|
| <b>Standard Buildings</b>             | 1.2%       | 0.9%              | 0.6%    | 0.3%    |
| <b>Non-Standard Buildings</b>         | 2.2%       | 1.6%              | 1.1%    | 0.5%    |
| <b>Standard Civil Engineering</b>     | 1.6%       | 1.2%              | 0.8%    | 0.4%    |
| <b>Non-standard civil engineering</b> | 3.1%       | 2.3%              | 1.5%    | 0.8%    |

**TABLE 2**

To reflect the fact that SFT has a different level of direct involvement in the actual delivery of individual projects, the validation percentages in Table 2 above are multiplied by the following factors to reflect SFT’s role in project delivery.

|                               |   |     |                                 |
|-------------------------------|---|-----|---------------------------------|
| <b>Separate Delivery Body</b> | SFT’s role restricted to independent validation   | 1.0 | e.g. Forth Replacement Crossing |
| <b>Support Delivery Body</b>  | SFT supports delivery and provides validation   | 0.5 | e.g. hub Projects               |
| <b>Self Delivered Project</b> | SFT takes a leading role in delivery and undertakes validation as part of an internal assurance function. | 0   | NHT Projects                    |

**TABLE 3**

Whilst SFT does not recognise any financial benefit from the validation of self delivered projects it fully recognises that undertaking such reviews reflects best practice and is a key management tool in helping secure successful outcomes for infrastructure projects.

These figures ignore factors not considered in optimism bias such as those listed below and is therefore considered to be a robust minimum value for the benefit of external validation:

- Enhanced competition - brought about through the confidence given to market participants by a trusted validation process, and the commercial fine-tuning possible through external review by commercially experienced parties;
- Tautness of financing terms (if applicable) - delivered through ongoing review and market benchmarking in the final stages of negotiation;
- Reduced procurement cost and timescale - delivered through an external scrutiny process at relatively close intervals during the critical structuring and procurement phases of the project where specification, affordability and value-for-money issues often lead to delays.

Relevant comparators of VfM delivered by validation include:

- Department of Health review showing: "For the financial year 2006-2007, vfm assessments were carried out on 11 major projects and programmes where a Department of Health Gateway Review had been carried out. A vfm benefit of £173 million was identified which is about 4% of the total whole life costs of the projects of £4.28 billion"<sup>2</sup>
- Office of Government and Commerce Value-for-money reviews have confirmed that average cost avoidance of 3-5 per cent are being achieved when best practice recommendations from review reports are implemented<sup>3</sup>
- OGC Press Release<sup>4</sup>: Gateway Reviews: the value-for-money gains from Gateway Reviews in 2003-04 is £730 million. Over 850 reviews have been completed covering in excess of 500 projects and programmes since the process started in February 2001. Gateways are reviews of procurement projects and programmes carried out at key decision points by a team of experienced people, independent of the project team. A total of 119 separate departments, NDPBs and agencies have had a Gateway review of their medium, high-risk or mission critical projects and programmes.
- NAO Report - Improving Public Services Through Better Construction "applying the Gateway Review scrutiny process to construction programmes and projects. Gateway Reviews in particular, have generally assisted clients and their professional advisers in identifying and addressing the risks to, and opportunities for, successful delivery."

OGC "Gateway Reviews for Low Risk Projects" - OGC undertook sixteen pilots on "high risk" projects with an overall value of some £3 billion. These reviews produced added value benefits of 5% for a cost less than 0.1%. The pilot projects demonstrated that the Gateway Review Process can produce significant added value benefits to Departments' projects.

<sup>2</sup> [http://www.dh.gov.uk/en/Aboutus/Procurementandproposals/Projectmanagement/DH\\_081530](http://www.dh.gov.uk/en/Aboutus/Procurementandproposals/Projectmanagement/DH_081530)

<sup>3</sup> [http://epress.anu.edu.au/anzsog/imp/mobile\\_devices/ch17s04.html](http://epress.anu.edu.au/anzsog/imp/mobile_devices/ch17s04.html)

<sup>4</sup> [http://www.ogc.gov.uk/7023\\_4247.asp](http://www.ogc.gov.uk/7023_4247.asp)



## Benefit Proforma

| Benefit Ref:    | Benefit Unique Reference Number (Prefix 'A' - Avoided Cost, B - Additional Investment, 'C' - Funding and Finance, 'D' - Delivery, 'E' - Validation, 'F' & 'G' - Centre of Expertise)   |
|-----------------|--|
| Title:          | Benefit Title  |
|                 | The basis for the benefit as well as a concise description of the benefit.   |
| Description:    | <p><b>2009/10 Benefit Quantification &amp; Realisation:</b></p> <p>A restatement of the benefit quantification for 09/10 and the forecast period over which the benefit will be realised, revised to take account of changes to any previous assumptions.</p>  |
| Quantification: | <p><b>2009/10 &amp; 2010/11 Benefit Quantification Realisation:</b></p> <p>A summation of the 2009/10 benefit (revised if required) plus any additional activity under the same heading carried out in 2010/11.</p>  |
| Sharing:        | The percentage share attributable to SFT to reflect the input of other stakeholders - 100%, 50% or 33.3%.  |
| Confidence:     | <p>The confidence factor attached to reflect the likelihood of the estimated benefit being delivered.</p> <p>A - Certain - Benefit has already been delivered. - 100%</p> <p>B - Very Good - Firm, deliverable plans are in place and being progressed for delivery of benefit, but stages remain to be completed - 90%</p> <p>C - Good - Plans are in place to deliver the benefit but some third party commitment remains outstanding and/or significant stages remain outstanding to deliver the anticipated benefit. - 75%</p> <p>D - Moderate - Deliverable benefit identified with discussions ongoing with third party(ies) to put firm plans in place for delivery. - 55%</p> <p>Note: Different years may have different confidence factors</p> |
| Phasing:        | The period in which SFT will undertake the work to deliver the benefits quantified, expressed as a percentage of the work attributable to each year.   |

**Scottish Futures Trust  
Benefits Statement**

**Calculations**

Benefit Year Commencing April

Discount Rate

Confidence Reduction Factor for Scenario 3

|       |
|-------|
| 2012  |
| 3.50% |
| 20%   |

|                               |      |      |      |      |      |      |      |   |             |           |             |
|-------------------------------|------|------|------|------|------|------|------|---|-------------|-----------|-------------|
| Discount Factor Scenario 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1 | 0.966183575 | 0.9335107 | 0.901942706 |
| Discount Factor Scenarios 2&3 | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1 | 0.966183575 | 0.9335107 | 0.901942706 |
| Years Commencing April        | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |   |             |           |             |

| <b>SFT Consolidated Avoided Cost Benefit</b> |                     |           |           |           |           |           |   |   |   |   |   |
|--|---------------------|-----------|-----------|-----------|-----------|-----------|---|---|---|---|---|
| Benefit Ref & Title                          | A1                  |           |           |           |           |           |   |   |   |   |   |
| Benefit Owner & Description                  | AY                  |           |           |           |           |           |   |   |   |   |   |
| VFM Driver (Select From Menu)                | Centre of Expertise |           |           |           |           |           |   |   |   |   |   |
| Benefit Type (Select From Menu)              | Avoided Cost        |           |           |           |           |           |   |   |   |   |   |
| Benefit Sharing (Select From Menu)           | SFT                 | 100%      |           |           |           |           |   |   |   |   |   |
| Confidence Level (Select From Menu)          | A - High            | 100%      |           |           |           |           |   |   |   |   |   |
| Unfactored Cashflow of Benefit               | 11,048,400          | 2,217,600 | 2,217,600 | 2,217,600 | 2,217,600 | 4,395,600 |   |   |   |   |   |
| Factored Cashflow of Benefit                 | 11,048,400          | 2,217,600 | 2,217,600 | 2,217,600 | 2,217,600 | 4,395,600 | - | - | - | - | - |
| % Benefit Recognition                        | 100%                | 20%       | 20%       | 20%       | 20%       | 40%       |   |   |   |   |   |
| NPV & Annual Measured Value - Scenario 1     | 11,048,400          | 2,217,600 | 2,217,600 | 2,217,600 | 2,217,600 | 4,395,600 | - | - | - | - | - |
| NPV & Annual Measured Value - Scenario 2     | 11,048,400          | 2,217,600 | 2,217,600 | 2,217,600 | 2,217,600 | 4,395,600 | - | - | - | - | - |
| NPV & Annual Measured Value - Scenario 3     | 8,838,720           | 1,774,080 | 1,774,080 | 1,774,080 | 1,774,080 | 3,516,480 | - | - | - | - | - |

**Benefit Proforma - Excel Version**

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