HEALTH CAMPUS PROGRAMME

Replacement Linear Accelerator Project - Phase 2

OUTLINE BUSINESS CASE

Implementing health fit
# TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY ................................................................. 7
   Introduction ...................................................................................... 7
   Structure and content of the document .............................................. 7
1.1 Strategic Case ................................................................................ 8
   1.1.1 The Strategic Context ............................................................. 8
   1.1.2 The Case for Change ............................................................... 10
1.2 Economic Case .............................................................................. 13
   1.2.1 The Procurement ................................................................. 13
   1.2.2 Long List and Short List ....................................................... 13
   1.2.3 The Preferred Option ........................................................... 13
1.3 Commercial Case .......................................................................... 14
   1.3.1 Agreed Products and Services .............................................. 14
   1.3.2 Agreed Risk Allocation ......................................................... 15
   1.3.3 Key Contractual Arrangements ......................................... 15
   1.3.4 Agreed Implementation Timescales .................................... 15
1.4 Financial Case ................................................................................ 17
   1.4.1 Capital Costs Allocation and Funding .................................. 17
   1.4.2 Overall Affordability and Balance Sheet Treatment ........... 18
1.5 Management Case .......................................................................... 20
   1.5.1 Project Management Arrangements ..................................... 20
   1.5.2 Benefits Realisation and Risk Management ....................... 20
   1.5.3 Risk Management ................................................................. 20
   1.5.4 Post Project Evaluation Arrangements ............................... 20
1.6 Recommendation ........................................................................... 21
2.0 THE STRATEGIC CASE ............................................................... 22
2.1 Introduction .................................................................................... 22
2.2 Part A: The Strategic Context ....................................................... 22
   2.2.1 Business Strategies ............................................................. 23
   2.2.2 Local Context ................................................................. 25
2.3 Part B: The Case for Change ........................................................ 27
   2.3.1 Health Inequalities ............................................................. 27
   2.3.2 Future Investment Objectives .............................................. 27
   2.3.3 Activity / Population Analysis ........................................... 28
   2.3.4 Radiotherapy Facilities at ARI .......................................... 33
   2.3.5 Optimisation of Resources and Value for Money ............... 36
   2.3.6 Need for Action, Recent Review by SGHD .................. 37
2.4 Part C - Benefits Realisation ........................................................ 37
   2.4.1 Main Benefits Criteria ......................................................... 37
   2.4.2 Main Risks ............................................................................ 38
   2.4.3 Constraints ........................................................................... 38
   2.4.4 Dependencies ....................................................................... 39
3.0 THE ECONOMIC CASE ............................................................. 40
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Introduction</td>
<td>40</td>
</tr>
<tr>
<td>3.2 Critical Success Factors</td>
<td>40</td>
</tr>
<tr>
<td>3.3 The Long-Listed and Short Listed Options</td>
<td>42</td>
</tr>
<tr>
<td>3.4 The Benefits of Appraisal</td>
<td>44</td>
</tr>
<tr>
<td>3.4.1 Overview</td>
<td>44</td>
</tr>
<tr>
<td>3.4.2 The Benefit Criteria</td>
<td>45</td>
</tr>
<tr>
<td>3.4.3 Ranking and Weighting the Options</td>
<td>45</td>
</tr>
<tr>
<td>3.4.4 Process for Scoring the Options</td>
<td>46</td>
</tr>
<tr>
<td>3.4.5 Option Scoring and Results</td>
<td>47</td>
</tr>
<tr>
<td>3.4.6 Sensitivity Analysis</td>
<td>47</td>
</tr>
<tr>
<td>3.4.7 Summary of Results</td>
<td>48</td>
</tr>
<tr>
<td>3.5 The Procurement Process</td>
<td>48</td>
</tr>
<tr>
<td>3.6 Economic Appraisal</td>
<td>49</td>
</tr>
<tr>
<td>3.6.1 Introduction</td>
<td>49</td>
</tr>
<tr>
<td>3.6.2 Estimating Cost</td>
<td>49</td>
</tr>
<tr>
<td>3.6.3 Revenue Costs</td>
<td>52</td>
</tr>
<tr>
<td>3.6.4 Life Cycle Costs</td>
<td>52</td>
</tr>
<tr>
<td>3.6.5 Net Present Cost Findings</td>
<td>53</td>
</tr>
<tr>
<td>3.7 Qualitative Benefits Appraisal</td>
<td>54</td>
</tr>
<tr>
<td>3.7.1 Methodology</td>
<td>54</td>
</tr>
<tr>
<td>3.7.2 Risk Scores</td>
<td>54</td>
</tr>
<tr>
<td>3.7.3 Summary of Economic, Risk and Financial Appraisals</td>
<td>55</td>
</tr>
<tr>
<td>3.8 Sensitivity Analysis</td>
<td>56</td>
</tr>
<tr>
<td>3.9 Option 9b: Staged Approach to Proceeding with Option 9</td>
<td>57</td>
</tr>
<tr>
<td>Life Cycle Costs</td>
<td>58</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>59</td>
</tr>
<tr>
<td>4.2 Project / Scheme Objectives</td>
<td>59</td>
</tr>
<tr>
<td>4.3 Required Services</td>
<td>59</td>
</tr>
<tr>
<td>4.4 Agreed Risk Transfer</td>
<td>60</td>
</tr>
<tr>
<td>4.5 Agreed Charging Mechanisms</td>
<td>60</td>
</tr>
<tr>
<td>4.6 Agreed Contract Length</td>
<td>60</td>
</tr>
<tr>
<td>4.7 Contractual Clauses</td>
<td>60</td>
</tr>
<tr>
<td>4.8 Personnel Implications (Including TUPE)</td>
<td>61</td>
</tr>
<tr>
<td>4.9 Procurement Strategy and Implementation Timescales</td>
<td>61</td>
</tr>
<tr>
<td>4.10 Capital Funding</td>
<td>61</td>
</tr>
<tr>
<td>4.11 Accountancy Treatment</td>
<td>61</td>
</tr>
<tr>
<td>5 THE FINANCIAL CASE</td>
<td>62</td>
</tr>
<tr>
<td>5.1 Introduction</td>
<td>62</td>
</tr>
<tr>
<td>5.2 Costing Methodology</td>
<td>62</td>
</tr>
<tr>
<td>5.3 Capital Costing &amp; Risk Allowance</td>
<td>62</td>
</tr>
<tr>
<td>5.4 Operating Costs</td>
<td>62</td>
</tr>
<tr>
<td>5.5 Depreciation</td>
<td>62</td>
</tr>
<tr>
<td>5.6 Lifecycle Costing</td>
<td>62</td>
</tr>
</tbody>
</table>
5.7 Financial Profile of Short-Listed Options............................... 63
5.8 Preferred Option..................................................................... 63
5.9 Impact on the Income and Expenditure Account...................... 64
5.10 Impact on the Balance Sheet ............................................... 67
5.11 Overall Affordability............................................................ 67
5.11.1 Capital.............................................................................. 67
5.11.2 Lifecycle Costs .................................................................. 67
5.11.3 Depreciation .................................................................. 67
5.12 Sensitivity Analysis............................................................... 68

6 THE MANAGEMENT CASE ..................................................... 69
6.1 Introduction............................................................................ 69
6.2 Programme and Project Management Arrangements................. 69
6.3 Governance and Accountability............................................... 69
6.4 Programme Organisation........................................................ 71
6.5 Stakeholder Involvement......................................................... 72
6.6 Project Reporting Structure..................................................... 72
6.7 Principal Project Roles and Responsibilities............................ 73
6.8 Standardised Documents and Controls................................. 74
6.9 Arrangements for Contract Management................................. 74
6.10 Project Plan........................................................................... 75
6.11 Arrangements for Change Management................................. 76
6.12 Arrangements for Risk Management....................................... 76
6.13 Technical Solution................................................................. 77
6.14 Consultations......................................................................... 77
6.15 Arrangements for Benefits Realisation................................. 77
6.16 Performance Measurements - Key Performance Indicators.... 78
6.17 Arrangements for Post Project Evaluation.............................. 78
   6.17.1 Aim and Scope of Evaluation ........................................ 79
6.17.2 Evaluation Stages............................................................... 79
   6.17.2.1 Evaluation Requirements for Construction Phase ....... 80
Stage 3 - Evaluation Requirement during Operational Stage........ 80
Stage 4 – Evaluating Longer Term Consequences....................... 80
6.18 Contingency Plans............................................................... 80
LIST OF TABLES

Table 1.1 Five Strategic Issues
Table 1.2 Short Listed Options
Table 1.3 Summary Option Appraisal
Table 1.4 Milestone Dates
Table 1.5 Option 9 Costs
Table 1.6 Option 9b Costs
Table 1.7 Impact on Income and Expenditure

Table 2.1 5 Year Incidence Projections
Table 2.2 Analysis on the Existing Estate – Six Facet Survey
Table 2.3 Key Project Constraints

Table 3.1 Critical Success Factors
Table 3.2 Summary of Long Listed to Short Listed Results
Table 3.3 Summary of Short Listed Options
Table 3.4 Benefits Criteria
Table 3.5 Weighting/Ranking of Benefits Criteria
Table 3.6 Option Scoring Scale
Table 3.7 Benefits Appraisal - Summary of Weighted Scores
Table 3.8 Results of Sensitivity Analysis
Table 3.9 Contingency and Optimism Bias Allowances
Table 3.10 Capital Costs
Table 3.11 Capital Expenditure Phasing
Table 3.12 Facilities Management Costs
Table 3.13 Life Cycle Costs
Table 3.14 Summary of Key GEM Elements
Table 3.15 Summary of Clinical Risks
Table 3.16 Summary Option Appraisal
Table 3.17 Financial Sensitivities (respective increase by 10%)
Table 3.18 Financial Sensitivities (respective increase by 10%) – Effect on NPC
Table 3.19 Financial Sensitivities Analysis
Table 3.20 Option 9b Capital Cost
Table 3.21 Option 9b Revenue Cost

Table 5.1 Option Summaries
Table 5.2 Additional Operating Costs of Option 9
Table 5.3 Additional Annual Depreciation of Option 9
Table 5.4 Option 9b Capital and Revenue Costs
Table 5.5 Option 9b Capital Costs
Table 5.6 Summary of Financial Appraisal
Table 5.7 Sensitivity Analysis

Table 6.1 NHS Grampian Project Governance
Table 6.2 Health Campus Programme Structure
Table 6.3 Project Reporting Structure
Table 6.4 NHS Grampian Advisors
Table 6.5 Principal Supply Chain Members
Table 6.6 Key Dates
Table 6.7 Main Risks of Short Listed Options
LIST OF FIGURES

Figure 2.1 Demonstrates how National, Regional and Local Advisory Groups support the planning and implementation of the local action plan for cancer services at ARI.

Figure 2.2 Population Projections for the 75 & Over Age Group in Grampian

Figure 2.3 Demonstrate Treatment delivered / M population in 2007/2008

Figure 2.4 Demonstrate Efficiency by Centres in 2007/8

Figure 2.5 Recommended Number of Linear Accelerates / M population

Figure 3.1 Proposed Site

APPENDIX A – COMMERCIAL VOLUME

A-1 Capital OB Forms: Preferred Option
A-2 Project Risk Register: Preferred Option
A-3 Optimism Bias Calculation
A-4 Recurrent Costs: Preferred Option
A-5 Lifecycle Costing
A-6 Capital Cash Flows
A-7 General Economic Model: Preferred Option
A-8 Non Financial Benefits Scores
A-9 Clinical Risks Scores

APPENDIX B – PROJECT TECHNICAL VOLUME

B-1 Cancer Care Phased Development Report
B-2 Schedule of Accommodation
B-3 Design Information
B-4 BREEAM
B-5 AEDET Report
B-6 HAI Scribe Report
B-7 Programme
B-8 Derogation List
1.0 EXECUTIVE SUMMARY

Introduction

Background / Context

This Outline Business Case for Phase 2 of the Replacement Linear Accelerator Project at Aberdeen Royal Infirmary (ARI) forms part of the Cancer and Haematology Centre Project, which was included in the Health Campus Programme Initial Agreement. This Initial Agreement was approved by NHS Grampian in February 2008 and by the Scottish Government in March 2008.

The Outline Business Case and Full Business Case for Phase 1 of the Replacement Linear Accelerator Project were approved by the Scottish Government in April 2011 and June 2011 respectively. This Phase 1 facility to provide the first two Linear Accelerators along with the required support accommodation (including an entrance at street level) is currently under construction and will be completed in June 2012.

Funding for Phase 2 of this OBC has been provided for within the National Radiotherapy Replacement Programme and includes funding for Pre-Treatment facilities. Phase 2 will be consistent with Phase 1 and will complete the required number of Replacement High Energy bunkers at ARI.

Structure and content of the document

The Outline Business Case has been prepared using the agreed standards and format from HM Treasury for Business Cases, as set out in the Scottish Investment Manual (SCIM). The approved format is the Five Case Model adopted as part of the SCIM, which comprises the following key components:

- The strategic case - this sets out the case for change, together with the supporting investment objectives for the scheme
- The economic case - this demonstrates that the organisation has selected the most economically advantageous offer, which best meets the existing and future needs of the service and optimises value for money (VFM)
- The commercial case - this sets out the content of the proposed deal
- The financial case - confirming funding arrangements, affordability and the effect on the balance sheet of the organisation
- The management case - detailing the plans for the successful delivery of the scheme to cost, time and quality.

These elements broadly mirror the main functional units within modern business organisations; planning and corporate affairs (strategy); financing and purchasing (economic and financial); production and marketing (commercial) and organisation development and project management (management). Viewed from another perspective, the model mirrors the five sets of strategic issues which all businesses need to address if they are to prosper as follows:
Table 1.1: Five Strategic Issues

<table>
<thead>
<tr>
<th>Key Strategic Issues</th>
<th>The Five Case Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where is NHS Grampian now and where do they want to be?</td>
<td>The Strategic Case</td>
</tr>
<tr>
<td>What are the available options for getting NHS Grampian there? Which is the best route to adopt?</td>
<td>The Economic Case</td>
</tr>
<tr>
<td>Can NHS Grampian afford to get there within the given timescales?</td>
<td>The Financial Case</td>
</tr>
<tr>
<td>Who is going to assist NHS Grampian in getting there?</td>
<td>The Commercial Case</td>
</tr>
<tr>
<td>How will NHS Grampian ensure they get there? Will they know when they arrive?</td>
<td>The Management Case</td>
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</table>

This model supports a clear, authoritative and practical approach to Outline Business Case production providing a systematic and comprehensive framework for decision making, particularly capital investment decisions, while ensuring that the preferred option satisfies the following crucial tests:

- Applicable to business needs and strategic direction
- Optimum value for money
- Attractiveness to the market place (suppliers and contractors)
- Affordability to the organisation (The Health Board)
- Achievable in terms of timescale, resources and other business parameters

This Outline Business Case has been developed with full staff, patient and public involvement and is supported by the NHS Grampian Board and the Scottish Government Health Directorate. This also incorporates intellectual clinical input and support from North of Scotland Cancer Network (NOSCAN).

In May 2009 the NHS Grampian Board appointed Laing O’Rourke (LOR) as their Principal Supply Chain Partner (PSCP) and the project has been taken forward under the Health Facilities Scotland Frameworks Scotland Agreement.

1.1 Strategic Case

1.1.1 The Strategic Context

Since 2005 a number of national, regional and local strategies have been adopted by NHS Grampian that has informed the planning of the project and this Outline Business Case. These have been crucial in providing the framework in which options for this project have been developed and ultimately have been fundamental in determining the preferred solution.

The driving force for service change and redesign in Grampian is the Health Plan and its delivery model, the Health Care Framework. The latter is a 2020 vision for the implementation of the Health Plan. Within the Health Plan, five strategic themes underpin the main areas of work that need to be addressed to meet the challenges in the future, arising from changes in population structure, need for services, workforce and technology to improve treatment and care for patients.

These are:
1. Improving health and reducing health inequalities
2. Involving patients, carers, the public, staff and partner mutuality
3. Delivering safe, effective and timely care in the right place
4. Developing the workforce and empowering staff
5. Getting the best from available resources

The health campus on the Foresterhill site provides the focus for a wide range of clinical related activity and is the workplace for approximately 7,000 staff and the place where over 2,000 patients are treated and a further 1,000 people visit every day. Moreover, the University of Aberdeen has 1,000 staff and 1,500 students based at Foresterhill, which also attracts a wide range of visitors.

The NHS Grampian long term strategy recognises the increasing importance of the Foresterhill site and the intention is to fully utilise it as effectively as possible. The strategy anticipates changes in population structure, workforce, technology and best practice. At its core it also anticipates services being redesigned to improve treatment and care for patients, together with the projected improvement in maximising value for money and health outcomes.

In the case of specialist cancer services, it is important to note that within a strategic context, NHS Grampian’s plan also includes regionally provided services to the Northern Isles Boards, NHS Highland and to a lesser extent, NHS Tayside. From that perspective there is a requirement to assure quality and value for money for partner Boards and their constituent populations who require access to specialist services. NHS Grampian has the largest patient population in the north and is the provider of a wide-range of clinical services. In addition, Aberdeen is a key transport hub for the north with road, rail, ferry and flight making good access to services at ARI from all parts of the country. The strategic positioning of Grampian as a cancer centre is therefore very important.

The key stakeholders within which cancer services planning and implementation is progressed is shown in figure 2.1 (Section 2). Central to this planning and implementation is the action plan as set out in the Scottish Government document, Better Cancer Care. This action plan sets the national policy direction against which the NHS Grampian Board, through the Northeast Cancer Steering Group, has developed its local and regional action plans.

National Context

The number of patients diagnosed with cancer is anticipated to increase substantially over the forthcoming decade. It is projected that during the period 2016 – 2020, there will be, on average, 35,000 patients in Scotland diagnosed with cancer each year, an increase of 5,000 patients per annum relative to each of the years during the period 2006 and 2010. In common with the rest of the NHS in Scotland, the healthcare system in Grampian is responding to the Government’s national cancer agenda for Scotland as a whole, as set out below. This Business Case forms a major part of the response to these requirements.

The successful outcome from this Outline Business Case seeks to achieve the national priorities as defined in the ‘Better Cancer Care; An Action Plan’, together with ‘Better Health, Better Care’.

Local Context

The local context is captured within the ARI Blueprint 2008 and more recently within the ARI Reconfiguration report. Both documents align with the Health Campus Plan and the Foresterhill Development Framework. This Outline Business Case forms an integral part of the aforementioned policies and frameworks.
1.1.2 The Case for Change

Health Inequalities

Tackling health inequalities is a priority for both the Scottish Government and NHS Grampian. This is a key feature in local and national policy documents. Incidence and mortality of most cancer types increases with deprivation and this association is particularly strong for several cancers (e.g. head and neck cancer, lung cancer, stomach cancer). Addressing inequalities in cancer will require a range of approaches including health promotion initiatives which contribute to improving population health, encouraging the uptake of cancer screening opportunities and ensuring that all patients have equitable and timely access to effective treatment and care.

Demographics

This Outline Business Case addresses the need to improve access to diagnostic and treatment facilities for the following reasons:

- A rising population
- An ageing population
- Increasing incidence of cancer
- Increasing mortality rates
- Increasing deprivation

Demand and Capacity

The Radiotherapy Department is currently served by three networked, beam matched linear accelerators (two high-energy), all of which have multi-leaf collimators, electronic portal imaging and verification systems, and a computerised treatment planning system. A new CT simulator was installed in a purpose built facility in 2006 and more recently, in 2011, the original conventional simulator was replaced. The department currently delivers approximately 7,000 treatment fractions per annum per Linac.

It is predicted that one might expect to treat 50,900 fractions per million population, for NHS Grampian, serving a North of Scotland population of circa 580,000, this equates to delivering 29,522 fractions. Assuming efficiency at ARI is improved to deliver the NRAG recommendation of 8,300 treatment fractions per Linac, the number of Linacs required to meet demand would be 3.56. This is comparable with the Royal College of Radiology’s recommendation that there should be 5.5 Linear Accelerators (Linacs) per million population, which equates to a requirement of 3.2 Linacs at ARI.

Therefore, given the predicted increase in number of patients requiring radiotherapy in the next 10 years, it is anticipated that 3 full time Linacs will be insufficient for the volume of work at the end of this decade. Further consideration must also be given to the NRAG recommendation that individual Linear Accelerators require replacement on a 10 year cycle.

Existing Facilities

The case for change for radiotherapy provision at ARI centres on the need of patients requiring radiotherapy treatment and for the staff who provide this care, to have these provided in an appropriate, safe and healthy environment designed to enhance patient experience. Maintaining services in functionally unsuitable buildings is inherently inefficient and inappropriate from a clinical and a non-clinical perspective and not an appropriate strategy for the future.
In summary:

- Ageing radiotherapy facilities impose rigidity in the service model adopted by the oncologists and constrain capacity, flexibility and innovation
- Existing accommodation limits the development of efficient service models for which different layouts, functional relationships and on-site service integration is required
- Patient pathways around the hospital sites are poor as a consequence of the current estate, for example, there is no direct access to radiotherapy facilities at ground level

The campus has been developed in a piecemeal way and many departments are no longer functionally suitable or are nearing the end of their lifespan. This position is particularly the case with respect to the accommodation for radiotherapy planning and treatment and other cancer services.

A 6-facet survey exercise has identified that there is backlog maintenance requirement of £8.2m. However, this investment would not satisfy the deficiencies in space utilisation, functional suitability and environmental management aspects of the existing facilities. In light of the above it has been deemed that investment of this magnitude would not satisfy best value objectives and thus the preferred option is a new build facility.

This OBC takes forward the new build option with the construction of a further two treatment bunkers and maximises the usage of associated supporting facilities including the new entrance and link corridor to the new Phase 1 facilities. This Phase 2 of the new build option would further help to obviate the identified backlog requirements, and further support NHS Grampian’s strategic objectives in respect of Radiotherapy service provision.

**Optimisation of Resources and Value for Money**

All options take into consideration the need to build two further new bunkers in time for the commissioning of the third replacement Linear Accelerator in 2014, consistent with the national equipment procurement programme.

The logic behind this strategic decision to build both bunkers under one construction programme centres on the optimisation of resources to achieve maximum value for money.

Key principles underpinning this strategy are as follows:

- Given that each Linac requires replacement on a 10 year cycle, it is accepted that the Radiotherapy Department should have a spare bunker available to allow Linac replacement without affecting service provision (i.e. avoid operational down-time).
- Notwithstanding the buying gains that would be achieved, the estimated savings likely to be realised from building two bunkers simultaneously rather than separately would be in the region of £1.381m.
- Construction work on Phase 1 is now well advanced, with completion planned for June 2012. The proposed Phase 2 works are virtually a repeat of Phase 1, and the opportunity exists to harness the experience gained on Phase 1, in constructing a technically demanding facility, to the mutual benefit of all concerned. Should this opportunity be lost it is likely that this expertise will be lost to Phase 2 of the project, to the potential detriment of the completed facility.
- A greater degree of cost certainty and a consequent reduction in risk is available on Phase 2, through the deployment of the same design and construction team, thereby ensuring best value is realised on the project.
**Need for Action, Recent Review by SGHD**

In 2008, Professor Alan Rodger was commissioned by the Scottish Government Health Directorate (SGHD) to assist NHS Grampian in relation to a number of issues related to cancer services, including the development of the Aberdeen Cancer and Haematology Centre. In his subsequent report, Professor Rodger stressed that:

“The new Project Board should address, as a matter of urgency, the need to plan, site and build sufficient new bunkers for linac capacity plus one extra for future replacement programmes. This should be phase one of the new cancer and haematology centre project and its location should ensure effective and efficient radiation treatment delivery in the new centre”.

**Benefits Realisation**

The benefits criteria were developed by members of the Cancer Centre Project Team on 30th September 2009. Two patient / public representatives attended this meeting. The benefit criteria are shown below:

- Capacity & Efficiency
- Supports Strategy – National / Regional / Local
- Timing
- Patient Experience
- Quality of Building Environment
- Flexibility and Future Proofing
- Staff Recruitment, Training and Development

In conjunction with the above the following project risks have also been established and assessed. These are detailed within the risk register and will be mitigated through appropriate risk management:

- Strategic Fit
- Clinical Management and Practice
- Safety
- Workforce
- Infrastructure
- Finance
- Politics and public

The implementation of the project is constrained by the following, for which robust management plans are in place:

- Delivery Programme for Linacs
- Planning acceptability
- Affordability
- Programme
- Site Logistics

Moreover, the project has the following interdependencies that will be carefully monitored and managed throughout the lifespan of the scheme:

- Prompt approval by the NHS Grampian Board
- The approval by the Scottish Capital Investment Group
- Receipt of Local Authority (Planning Department Aberdeen City Council) Planning Approval for the preferred location taking account of the consultation process.
1.2 Economic Case

1.2.1 The Procurement

In line with guidance from Health Facilities Scotland the project has been procured via Frameworks Scotland. Each of the Principal Supply Chain Partners (PSCP), were selected by Health Facilities Scotland for the Framework and were further invited by NHS Grampian to submit Expressions of Interest and attend an open day. Following this the PSCPs were interviewed and scored. The selection process resulted in the appointment of Laing O’Rourke as the PSCP to work with NHS Grampian to complete the Outline Business Case.

The PSCP is responsible for developing the design solution in conjunction with NHS Grampian to permit the finalisation of a Target Price which will be incorporated into the subsequent Full Business Case.

1.2.2 Long List and Short List

A key component of developing a Business Case is the option appraisal exercise with comparison of alternative courses of action at the heart of this. It is only by comparing the alternatives that the real merits of any particular course of action are exposed. In order to achieve this, a ‘long list’ of options was generated by the Cancer Centre Project Team on the 5th August 2009 and this is recorded in Section 3.0 of this Business Case.

The next stage in the process was for the long-listed options to be reduced to a more manageable ‘short list’ of options for in-depth appraisal and evaluation and this list was derived at a Cancer Centre Project Team meeting on the 19th August 2009. The short listed options are as recorded below.

Table 1.2: Short Listed Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Do nothing</td>
</tr>
<tr>
<td>3</td>
<td>Do minimal - replace 2 of the existing linacs in their existing bunkers. Provide 2 new bunkers (one to be spare) and 1 new linac</td>
</tr>
<tr>
<td>5</td>
<td>Upgrade existing Facilities and Extend</td>
</tr>
<tr>
<td>5a</td>
<td>Upgrade existing facilities and extend; part demolition of existing accommodation</td>
</tr>
<tr>
<td>9</td>
<td>New facility (new build) – East End. South of existing facilities</td>
</tr>
<tr>
<td>13</td>
<td>Construct linacs sandwiched in between accommodation.</td>
</tr>
</tbody>
</table>

1.2.3 The Preferred Option

Table 1.3 Summary Option Appraisal

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<thead>
<tr>
<th>Appraisal Element</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
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<tbody>
<tr>
<td>Benefit Score (a)</td>
<td>74</td>
<td>378</td>
<td>584</td>
<td>647</td>
<td>919</td>
<td>781</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
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<td>Net Present Cost (b)</td>
<td>5,184.2</td>
<td>25,708.5</td>
<td>36,315.6</td>
<td>36,879.1</td>
<td>35,545.4</td>
<td>33,691.4</td>
</tr>
<tr>
<td>Rank</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Cost per Benefit Point</td>
<td>70.06</td>
<td>68.01</td>
<td>62.18</td>
<td>57.00</td>
<td>38.68</td>
<td>43.14</td>
</tr>
</tbody>
</table>
The above summary provides an overview of the impact of the process to arrive at the preferred option. This ultimately concludes with the lowest cost per benefit point, whilst arriving at the greatest mitigated clinical risk total.

The preferred option is Option 9. The Financial Case (section 5 of this Business Case) will demonstrate that proceeding with all cancer and haematology facilities in full continues to be unaffordable to NHS Grampian at this time. It is therefore proposed that Option 9b (Phase 2) is undertaken as a second stage development to complete the accommodation for the linear accelerator replacement programme.

Option 9b consists of the construction of 2 new Linear Accelerator bunkers (one for the 3rd Linear accelerator and the other as a spare / turnaround bunker), pre-treatment and minimal associated support facilities. As Option 9b is Phase 2 of the preferred option and not a new option, the Economic Case above remains valid. The costs of Option 9b are considered in full in both Sections 3 and 5.

### 1.3 Commercial Case

#### 1.3.1 Agreed Products and Services

It is proposed that the facility will be built by the selected PSCP under the Frameworks Scotland Agreement, NEC 3 Option C Target Contract with Activity Schedule. An open book approach will be used with full details provided within Section 4.0 of this Outline Business Case. This methodology will provide the following benefits:

- Completion of Schemes to the standard and functionality that meets the requirements set out in the Scheme Contract;
  - Value for money, not only in the initial capital cost, but also for the whole life costs through the application of the principles of value management;
  - Certainty of delivery in terms of time and cost;
  - Consistent delivery in terms of quality in both design and construction;
  - The introduction of continuous improvement through collaborative working, the adoption of benchmarking and performance management;
  - Improved management of risk; and
  - Optimised delivery of sustainable development on all major NHS schemes in Scotland procured through the Frameworks Scotland Agreement.
The PSCP will enter into an individual project specific Scheme Contract with NHS Grampian at the beginning of each Stage of the Scheme. The next stage, following approval of this Outline Business Case is Stage 3 – Development of the Full Business Case.

The products and services under contract are for a single point deliverer. This offers a procurement vehicle with an integrated supply chain for the delivery of design, manufacture, construction and commissioning of a facility to accommodate the linear accelerator replacement programme. This will ultimately form an integral part of the Cancer and Haematology service for the Foresterhill site.

With regard to the Linear Accelerator and other radiotherapy equipment, the national procurement process has procured the services of Varian for the supply of the equipment for NHS Grampian that is consistent with other Boards. Varian will supply three replacement linear accelerators and other radiotherapy equipment, and the programme for supply and installation will be co-ordinated by NHS Grampian and the PSCP as appropriate.

1.3.2 Agreed Risk Allocation

As the scheme has been developed the risks within the scheme have been identified, allocated to the party best placed to manage them and quantified in a number of workshops. This has resulted in the agreed risk register which can be found in Appendix A-2 which records the allocation and quantification of each risk.

1.3.3 Key Contractual Arrangements

The design and construction of the new facilities will be undertaken using the Frameworks Scotland suite of contract documents which is based on the NEC 3 Option C Target Contract with Activity Schedule. Subject to the Early Warning and Compensation Event mechanisms within NEC 3 the amount paid for the project by NHS Grampian is the Actual Cost of the Works, adjusted as follows:

In the event that the actual cost exceeds the Target Price the additional cost will be borne by the PSCP and no additional cost is borne by NHS Grampian

In the event that the Actual Cost is less than the Target Price the first five percent of the difference is equally shared between NHS Grampian and the PSCP, any remaining difference is wholly retained by NHS Grampian

The staff currently deployed within the existing radiotherapy department will be redeployed within NHS Grampian to undertake similar tasks. TUPE does not apply to this project.

1.3.4 Agreed Implementation Timescales

The development of the third and fourth linear accelerator bunkers within the project is essential for completing the new accommodation (separated from existing department by link corridor that was built during Phase 1 Developments) for the linear accelerator replacement programme. The third replacement equipment will be installed into the third new bunker with the fourth new bunker acting as a spare for “turn-around” support for future replacements. The key milestones for the completion of the facilities and bringing the final new equipment into service are shown below:
<table>
<thead>
<tr>
<th>Milestone</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Capital Investment Group Approval of OBC and FBC for <strong>Phase 1</strong>, Replacement Linear Accelerator Project.</td>
<td>April and June 2011 respectively</td>
</tr>
<tr>
<td>Planning Approval for <strong>Phase 1</strong>, Replacement Linear Accelerator Project.</td>
<td>May 2011</td>
</tr>
<tr>
<td>NHS Grampian AIG Approval of OBC for <strong>Phase 2</strong>, Replacement Linear Accelerator Project.</td>
<td>April 2012</td>
</tr>
<tr>
<td>NHS Grampian Board Approval of OBC for <strong>Phase 2</strong>, Replacement Linear Accelerator Project.</td>
<td>June 2012</td>
</tr>
<tr>
<td>Scottish Capital Investment Group Approval of OBC for <strong>Phase 2</strong>, Replacement Linear Accelerator Project</td>
<td>June 2012</td>
</tr>
<tr>
<td>Scottish Capital Investment Group Approval of FBC for <strong>Phase 2</strong>, Replacement Linear Accelerator Project</td>
<td>July 2012</td>
</tr>
<tr>
<td>Start on Site - <strong>Phase 2</strong></td>
<td>December 2012</td>
</tr>
<tr>
<td>Completion of Build Work – <strong>Phase 2</strong></td>
<td>February / March 2014</td>
</tr>
<tr>
<td>Delivery of Third Linear Accelerator</td>
<td>December 2013 – delayed from original May Date, to allow build work for first Phase 2 bunker to be completed.</td>
</tr>
<tr>
<td>Third Linear Accelerator Operational (within new bunker)</td>
<td>March 2014</td>
</tr>
</tbody>
</table>
1.4 Financial Case

1.4.1 Capital Costs Allocation and Funding

The preferred option, as identified in the Economic Case, is Option 9 – New Build for all Cancer and Haematology facilities.

The costs associated with option 9 are tabled below:

Table 1.5: Option 9 Costs

<table>
<thead>
<tr>
<th>Option</th>
<th>Capital Cost (Excl Radiotherapy Equip) £000s</th>
<th>Net Additional Annual Operating Costs £000s</th>
<th>Maximum Additional Annual Depreciation £000s</th>
<th>Lifecycle Costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>25,498</td>
<td>459</td>
<td>582</td>
<td>13,537</td>
</tr>
</tbody>
</table>

The building cost of the preferred option (Option 9) of £25.5M is not affordable to NHS Grampian at this time.

Option 9a was developed as a first phase towards the full Option 9 and this option was approved via its Outline Business Case in 2011, at a construction cost of £6.693M. Construction of this phase will be complete in June 2012.

Option 9b, as a second phase of Option 9, allows NHS Grampian to provide 2 further new Linear Accelerator Bunkers and pre-treatment facilities, along with the required support accommodation, at a further cost of £6.706M. This Outline Business Case seeks the approval to proceed with this second phase.

Indicative funding of £6.706M has been made available for the build element of Option 9b, as part of the National Radiotherapy Allocation. Confirmation of that funding is dependent on approval of this Outline Business Case and subsequent Full Business Case.

The costs of this phase at Outline Business Case stage are as follows:

Table 1.6: Option 9b Costs

<table>
<thead>
<tr>
<th>Option</th>
<th>Capital Cost £000s</th>
<th>Net Additional Annual Operating Costs £000s</th>
<th>Maximum Additional Annual Depreciation £000s</th>
<th>Average Annual Life-cycle Costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>9b</td>
<td>6,706</td>
<td>113</td>
<td>159</td>
<td>87</td>
</tr>
</tbody>
</table>
1.4.2 Overall Affordability and Balance Sheet Treatment

The capital and revenue costs and funding streams over the intended lifespan of the project assume a build completion date of December 2013.

Capital

As stated above, indicative funding has been made available from the National Radiotherapy Replacement Programme of £6.706M for the cost of the Linear Accelerator Facility within this Business Case, subject to its approval. The capital cost of £6.706M is therefore within the national funding available. There are however, significant timing issues regarding the funding, which are highlighted in Table 1.7.

The impact on capital funding and expenditure is illustrated below:

<table>
<thead>
<tr>
<th>Table 1.7: Impact on Income and Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>£ 000</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Expenditure:</td>
</tr>
<tr>
<td>Linear Accelerator Facility (Option 9b)</td>
</tr>
<tr>
<td>Linear Accelerator Machine no.3*</td>
</tr>
<tr>
<td>Total Capital Cost</td>
</tr>
<tr>
<td>Funding:</td>
</tr>
<tr>
<td>National Radiotherapy Funding (Option 9b)</td>
</tr>
<tr>
<td>National Radiotherapy Funding (Linear Accelerator no.3)*</td>
</tr>
<tr>
<td>Total Funding</td>
</tr>
<tr>
<td>Net Capital Surplus (Shortfall)</td>
</tr>
</tbody>
</table>

* Timing of the Purchase of Linear Accelerator Machine No. 3

The current National Radiotherapy funding profile (version 19) schedules the purchase of Linear Accelerator No.3 (cost £1.793M) for 2012/13, which means that it would need to be installed in one of the old bunkers until the new facility (Option 9b) is completed.

This OBC proposes that the 3rd Linear Accelerator purchase is delayed until late 2013, once the new facility is complete. By doing this, the funding in 2012/13 of £1.793M intended to pay for the machine, can be used to commence the build work instead (per table 1.7). It would also avoid installing the machine in the old facility and the significant cost of transferring the machine to the new facility upon completion of the build.

However, the funding for the 3rd machine (and indeed a significant proportion of the funding for the construction) will then not be available from the National Programme until 1st April 2014.
(from the balance of the funding for the build of £3.353M, per table 1.7). It will not be possible for NHS Grampian to balance this position from within its own capital programme in 2012/13 and 2013/14.

**Timing Issues with the Overall Funding Package**

As indicated in table 1.7 above, significant shortfalls in capital funding for the project are anticipated in 2012/13 and 2013/14, due to the timing of the National Allocations. This situation is balanced out in 2014/15, giving an overall break-even position. NHS Grampian is requesting that the SGHD consider the possibility of re-aligning the National Funding position when evaluating this OBC, to allow the project to proceed as scheduled and at the cost stated here-in.

**Revenue Operating Costs**

The additional funding requirement in operating costs associated with Option 9b is £113k per annum, a breakdown of which can be seen in Appendix A-4. This is entirely made up of running costs of the new build extension (rates, heat light and power (HLP) and cleaning), net of savings on areas which will be vacated upon completion.

These additional costs will be highlighted as part of NHS Grampian’s annual budget setting process and will be included in the 5 year revenue plans. The impact of these will therefore be managed within the overall NHS Grampian budget.

**Depreciation**

The estimated annual depreciation of the asset is £159k. The National Radiotherapy funding forms part of the capital programme of NHS Grampian. Estimates of depreciation resulting from this programme are included in the 5 year revenue plans. The current plan is based on a capital cost of £6.706M and therefore there will be no increase in depreciation beyond the level that is included in the 5 year revenue plan.

**Lifecycle Costs**

The estimated average annual lifecycle cost is £87k. The lifecycle maintenance programme will be undertaken as part of the overall maintenance prioritisation process of NHS Grampian. There is a significant back-log maintenance cost avoided on the old bunker facility by undertaking this project, which will more than offset any maintenance costs in the early years of the new building’s life.

**Balance Sheet Treatment**

Upon completion of the new linear accelerator bunker facility and associated support accommodation, the asset will be capitalised on the Balance Sheet of NHS Grampian in accordance with the rules governing all of its assets.

The asset will be capitalised at depreciated replacement cost, in line with NHS in Scotland policy in the month in which the asset formally becomes the property of NHS Grampian. It will then be straight-line depreciated over the estimated useful life of the asset.
1.5 Management Case

1.5.1 Project Management Arrangements

The technical leadership and project management will be provided internally by NHS Grampian. The internal project manager will be supported as appropriate by the Cost Advisor, Gardiner & Theobald (appointed for the project under the Frameworks Scotland Agreement) and the PSCP team.

The governance arrangements are covered by the Health Campus Programme. The Health Campus Programme structure has been organised to ensure that the high priority approved projects, and those currently under consideration, can be taken forward efficiently in support of the NHS Grampian Health Plan. The main aims are to:

- Ensure the decision making can be integrated with NHS Grampian’s normal management processes as much as possible
- Clinical leadership and project management support can be targeted effectively and efficiently
- Best practice is applied in terms of project management and governance

1.5.2 Benefits Realisation and Risk Management

The benefits identified within this Outline Business Case and set out below will be monitored throughout the development of the scheme, via project evaluation reviews (PER) and post implementation reviews (PIR), to maximise the opportunities for them to be realised.

- Supports Strategy – National / Regional / Local, including flexibility and future proofing
- Secures value for money
- The scheme is developed to have sufficient flexibility and future proofing to meet capacity requirements and efficiency targets
- Further improves patient and public experience through the quality of the built environment
- Patient experience is enhanced through improvement against current outcomes and performance and aligned against national and international achievements
- Measured improvement in recruitment and retention of staff
- The facility encourages improvements in staff overall performance, morale and job satisfaction

1.5.3 Risk Management

The project uses a standard Frameworks Scotland NEC 3 Option C Target Contract with Activity Schedule with a pain/gain mechanism and a priced project risk register. During the Outline Business Case process a project risk register was developed with the Project Team and this has been further developed for this Phase 2 OBC based on experiences gained during Phase 1 construction. A cost inclusive risk register is included within Appendix A-2.

1.5.4 Post Project Evaluation Arrangements

Post Project Evaluation (PPE) will be undertaken to improve future project briefing, project management, and implementation for future projects. It will also be used to measure the
performance of the completed facility against the benefits identified within this Business Case. Moreover, it is proposed to implement this principle to undertake post stage reviews to ensure that lessons learnt from Phase 1 developments can be of benefit to this project.

During the course of the project, Health Facilities Scotland may implement a performance measurement system on Frameworks Scotland projects based on a series of Key Performance Indicators (KPIs). It is anticipated that these KPIs will be utilised as they come on line and as far as they are applicable given the nature and timing of the project.

1.6  Recommendation

This Outline Business Case for Phase 2 of the Replacement Linear Accelerator Project has been endorsed by the NHS Grampian Asset Investment Group and the NHS Grampian Health Board, with recommendation for approval by SGHD Capital Investment Group.
2.0 THE STRATEGIC CASE

2.1 Introduction

This section sets out the strategic context to this Outline Business Case, which informs the project objectives and the planning assumptions. It explains the review of health provision in Grampian as set out in the three-year Health Plan (Grampian Heath Plan (2010 – 2013)) and the parallel report, informing the NHS Grampian Cancer Plan (2009). It also explains the work of the Health Campus Programme Board which is responsible for commissioning the development of the ARI Blue Print and ARI Reconfiguration Report; the latter two outlines the acute sector’s strategic vision for 2015.

Since 2005 a number of national, regional and local strategies have been adopted by NHS Grampian that has informed the planning of the Grampian Linac replacement project. These have been crucial in providing the framework in which options for this project have been developed and ultimately the key to determining the preferred solution.

2.2 Part A: The Strategic Context

The driving force for service change and redesign in Grampian is the 3-year Health Plan. Within the Health Plan, five strategic themes underpin the main areas of work that need to be addressed to meet the challenges in the future arising from changes in population structure, need for services, workforce and technology to improve treatment and care for patients.

These are:

1. Improving health and reducing health inequalities
2. Involving patients, carers, the public, staff and partner mutuality
3. Delivering safe, effective and timely care in the right place
4. Developing the workforce and empowering staff
5. Getting the best from available resources

To enable and support the above strategic themes, NHS Grampian is developing a long term strategy to redevelop the Foresterhill site to improve patient facilities in keeping with a 21st Century hospital. This strategy is outlined within the Health Campus Programme Board’s high level objectives for 2008/09 – 2011/12, these can be summarised as:

1. Complete the Emergency Care Centre project within the context of re-organised unscheduled care services across Grampian
2. Develop clear staged redevelopment plans for Ambulatory Care consistent with the activity shifts agreed in the Health Plan
3. Develop clear staged redevelopment plans for inpatient services in Aberdeen consistent with the activity shifts agreed in the Health Plan
4. Develop a plan for the development of a cancer centre at Foresterhill in the context of an agreed Grampian and North of Scotland cancer services plan.
5. Develop redevelopment plans for maternity/women’s clinic/children’s services on the Foresterhill site in the context of agreed service strategies
6. Formulate and commence implementation of a facilities and infrastructure improvement programme to support all clinical developments within the Health Campus Programme

Foresterhill Health Campus - Background & Context

The Foresterhill health campus covers 56 hectares and has been jointly owned and occupied by the NHS and the University of Aberdeen since the site was acquired in the early 20th Century. The Aberdeen Royal Infirmary (East End) hospital was constructed in the 1930s with the addition of Phase 1 in 1960s and Phase 2 in the 1970s. The campus was originally founded on the vision of Professor Matthew Hay, Medical Officer of Health for Aberdeen City. NHS Grampian provides all healthcare services for the population of the Grampian area and
specialist tertiary services for the North of Scotland. The University of Aberdeen is one of the oldest Universities in the UK and remains at the forefront of teaching and research in medicine, humanities and sciences.

The health campus on the Foresterhill site provides the focus for a wide range of clinical related activity and is the workplace for approximately 7,000 staff and the place where over 2,000 patients are treated and a further 1,000 people visit every day. Moreover, the University has 1,000 staff and 1,500 students based at Foresterhill which also attracts a wide range of visitors.

The NHS Grampian long term strategy recognises the increasing importance of the Foresterhill site and the intention is to fully utilise it as effectively as possible. The strategy anticipates changes in population structure, workforce, technology and best practice. At its core it also anticipates services being redesigned to improve treatment and care for patients, together with the projected improvement in maximising value for money and health outcomes. This Outline Business Case for Phase 2 of the Linac Replacement Project concludes the first part of a longer term strategy that NHS Grampian is developing. The second part of this strategy is to develop a Business Case for the provision of a unified Cancer and Haematology Centre (see phased development report, B1) to meet the future needs of the people of Grampian and residents within the catchment areas of Health Boards within the North of Scotland.

2.2.1 Business Strategies

National Context

The number of patients diagnosed with cancer is anticipated to increase substantially over the forthcoming decade. It is projected that during the period 2016 – 2020, there will be, on average, 35,000 patients in Scotland diagnosed with cancer each year, an increase of 5,000 patients per annum relative to each of the years during the period 2006 and 2010. In common with the rest of the NHS in Scotland the healthcare system in Grampian is responding to the Government’s national cancer agenda for Scotland as a whole, as set out below. This Business Case forms a major part of the response to these requirements.

Better Cancer Care – An Action Plan

Better Cancer Care; An Action Plan highlights national priorities for the delivery of cancer services. In particular the commitment to improve access stipulated within the Better Health, Better Care, is reiterated and emphasised in relation to the delivery of care as close to people’s homes as possible and in reducing waiting times.

The Better Cancer Care action plan, which was published in 2008, took forward the cancer agenda in the context of services addressing the following key commitments:

- Improving outcomes through early diagnosis, more timely treatment and improvements in treatment with advances in technology
- Cancer prevention
- Reducing inequalities in outcome
- Support and treat the increasing number of patients living with cancer
- Improving the quality of cancer care for patients

In 2010, a progress report was published to give an indication of progress made in achieving these commitments and reflected on the changing priorities in the context of new challenges and opportunities.

Figure 2.1, outlines the key stake-holders within which NHS Grampian cancer services planning and implementation is progressed. Central to this planning and implementation is the action plan as set out in the Scottish Government document, Better Cancer Care.
Improving Quality – Better Health, Better Care

*Better Health, Better Care (2007)*, provides a blueprint for effective, consistent, mutuality-focused healthcare, which will be more responsive to the needs and wishes of patients and will remove local and national variations in service availability and quality. *The Healthcare Quality Strategy for NHS Scotland (2010)* builds on the basic principles and commitments described in the Better Health, Better care Action Plan and it is about the following three things:

- Putting people at the heart of our NHS.
- Building on the values of the people working in and with NHS Scotland and their commitment to provide the best possible care and advice compassionately and reliably by making the right thing easier to do for every person, every time.
- Making measurable improvements in the aspects of quality care that patients, their families and carers and those providing healthcare services see as really important.

In recent years a number of new national initiatives have been launched. Of particular importance to this Business Case is “delivering patient-centred care” and “Improving the patient experience”. This is being informed by Better Together, Scotland’s patient experience programme. Better Together is an innovative programme designed to support NHS Staff in delivering high quality, equitable patient centred care. By listening to patients, carers and staff, and through supporting and empowering them to work together in partnership, the programme will help achieve the goal of world class care that is focused firmly on patient experience. Better Together is funding pilot work in NHS Grampian to develop patient experience service improvement work in cancer services, and the local project team will play a key role in supporting patient experience work for cancer services at Aberdeen Royal Infirmary. Public consultation during the development of the programme made it clear that patients expected their care to be delivered in a warm, clean and welcoming environment.
This research also identified what patients and users of the NHS see as most important. The key issues identified fall into five broad themes:

- Access to systems and staff
- Environment and facilities
- Good communication
- Expert clinical care
- Well co-ordinated care and treatment

It is noteworthy that these five broad themes are similar to those identified from comparable research undertaken by the NHS Estates in England where they published ten headline ‘Improving the Patient Experience’ criteria in 2002. These were:

- Privacy and dignity;
- Quality of environment;
- Patient accommodation;
- Entrances, reception and waiting;
- Security and safety;
- Barrier free access;
- Patient control of environment;
- Catering;
- Patient advocacy;
- Information and communication

The lists of issues and criteria identified above are reflected in the benefits generated for the non-financial appraisal of the short listed options (see section 3).

2.2.2 Local Context

Coherent Grampian – Wide Planning

NHS Grampian has taken a whole systems approach to the provision of unscheduled, planned and specialist care. The model of care developed and owned by the acute sector aims to provide high quality patient pathways from purpose built facilities supported by robust information systems. Models of care underpinning clinical strategy respond to patient need and seek to eliminate the existing deficiencies in local healthcare delivery to develop a “lean” process.

Clinical Strategy – Aberdeen Royal Infirmary Blueprint

The acute services vision and clinical strategy for ARI on the Foresterhill Site was first captured within the “ARI Blue Print” document (2008) and more recently within the ARI Reconfiguration report. Both documents have been informed by the Health Plan (2010 – 2013) and the Better Health, Better Care national Scottish health policy. This document reflects the acute services 2015 vision to develop modern and sustainable facilities that support the provision of the ‘right care’ in the ‘right place’ by the ‘right people’. For cancer services the model of care assumes that non-complex treatment will be provided through outpatient and day care clinics in Aberdeen Royal Infirmary and Dr Gray's Hospital, Elgin, in local Community Hospitals across the region, and in the Balfour and Gilbert Bain Hospitals of the Northern Isles. Complex cancer therapy including radiotherapy will be delivered by specialist teams working in Aberdeen Royal Infirmary, Aberdeen.

Aberdeen Royal Infirmary (ARI) will be modernised in response to the facilities/functional suitability risks that have been identified in a way which meets the needs of patients and service efficiency, and on a staged basis consistent with the Foresterhill Development Framework. The modernisation will take account of the transfer of intermediate care to other settings and flexibility will be built-in to help manage uncertainty in the future.
The modernisation plans for the hospital have been the subject of consultation with clinicians, managers, patients and the public and the “blueprint” for change has been agreed.

**Foresterhill Development Framework**

The single Foresterhill site is acknowledged to be a major strength for acute service provision, research, and education by both NHS Grampian and the University of Aberdeen. Being a joint University/NHS owned site it is important that it is organised to meet the strategic needs of both organisations for the future. The process to develop a joint NHS/University of Aberdeen Development Framework for the Foresterhill site was commissioned during 2007 with wide staff and public involvement. The Foresterhill Development Framework now provides strategic design guidance for the redevelopment of the Foresterhill campus over the next 20-30 years, and influences how major capital projects are shaped on the site. As well as providing a “template” for change, the Foresterhill Development Framework process has resulted in the agreement of a realistic approach to the redevelopment and modernisation of facilities. The Foresterhill Development Framework was approved by Aberdeen City Council in November 2008 and has been adopted as supplementary planning guidance.

**North of Scotland – Cancer Services**

Aberdeen Royal infirmary, situated on the Foresterhill Site, operates as a specialist hospital with well-established Community Health Partnerships (CHPs) and managed clinical networks (MCN). The activity profile has a national, regional and local base and active networks exist in the North of Scotland, which will continue to develop into the future.

The planned cancer services at ARI are tertiary in nature and will develop ARI’s historical role as the regional provider of a wide range of cancer services to patients of all ages, including complex and rare malignancies, requiring expertise not available in other acute hospitals in the North of Scotland.

It is anticipated that, by these means, the pattern of ARI cancer services will be advanced in such a way that they are consistent with the anticipated services models and levels of performance required to optimally exploit the new facilities of the proposed radiotherapy delivery – should this Outline Business Case, for Phase 2 of the Replacement Linear Accelerator Project, be approved.

**Existing Arrangements**

Specialist cancer services (including non-malignant Haematology) are centred within ARI. It is currently the third largest cancer centre in Scotland and provides services to the North East Scotland Cancer Care Advisory Group (NESCCAG) region (NHS Grampian, Orkney and Shetland). As the 3rd largest centre it provides a number of specialist services to Highland and Tayside, primarily in surgery but also for a few specialist oncology and haematology patients. This further development of regional specialist services at ARI has already started to be established e.g. regional Brachytherapy services for gynaecological cancers.

Specialist Cancer & Non Malignant Haematology Services include:

- Radiation oncology (Radiotherapy)
- Medical oncology (Chemotherapy)
- Haemato-oncology including Stem Cell Transplant services
- Non-malignant haematology

Broadly the clinical roles of these services include:

- Multidisciplinary team discussion of all new malignancies and expert planning of appropriate treatment plan
- Delivery of radical radiotherapy with curative intent, either alone or in combination with surgery and/or systemic treatment such as chemotherapy
• Delivery of palliative radiotherapy where disease is incurable but quality of life and/or life expectancy can be improved by such treatment
• Delivery of curative chemotherapy, either alone or in combination with surgery and/or radiotherapy
• Delivery of palliative chemotherapy where disease is incurable but quality of life and/or life expectancy can be improved by such treatment
• Provision of holistic care, symptom control, and support throughout the course of the illness
• Provision of appropriate follow-up to identify recurrent/progressive disease and institute subsequent therapies
• Provision of chronic disease management including specialist monitoring and interventions in non-malignant haematology patients
• Liaison with primary care and other relevant specialties including palliative care throughout the illness

Current Cancer and Haematology Services in Aberdeen Royal Infirmary are being delivered from a number of areas throughout the hospital estates. The proposed solution for Phase 2 of the Replacement Linear Accelerator Project, set-out in this OBC, adopts a more coalesced approach to service provision. The development of Phases 1 & 2, new linear accelerator bunkers represents the initial steps in the process of bringing the Oncology and Haematology Services together in a unified centre.

2.3 Part B: The Case for Change

2.3.1 Health Inequalities

Tackling health inequalities is a priority for both the Scottish Government and NHS Grampian. This is a key feature in local and national policy documents. Incidence and mortality of most cancer types increases with deprivation and this association is particularly strong for several cancers (e.g. head and neck cancer, lung cancer, stomach cancer). Addressing inequalities in cancer will require a range of approaches including health promotion initiatives which contribute to improving population health, encouraging the uptake of cancer screening opportunities and ensuring that all patients have equitable and timely access to effective treatment and care.

2.3.2 Future Investment Objectives

A clear development pathway for services in the Acute Sector, within NHS Grampian, has been set down through the adoption of the Aberdeen Royal Infirmary (ARI) Blue Print and more recently the ARI Reconfiguration document (2012). An overarching strategic objective for NHS Grampian is therefore to implement the ARI Blue Print recommendations and to improve the quality of patient services at Foresterhill site, through the better use of the healthcare resources in Grampian. For cancer services, this strategic direction is underpinned by the need to respond to national, regional and local strategic drivers and to provide future proof solutions that are able to withstand any downstream scrutiny of investment decisions. Build solutions will therefore be judged upon their ability to deliver modern, clinically safe and efficient patient flows that are supported by coherent and robust information systems.

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1 Grampian Health Plan (2010 – 2013), NHS Grampian Board.
4 Better Cancer Care, An Action Plan (2007), Crown Copyright
5 ARI Blue Print II (2008 – 2015), Acute Services Clinical Strategy and Bed Modelling, Grampian OMT
6 ARI Inpatient Reconfiguration Report (February 2012), Grampian OMT.
The overarching aim of NHS Grampian is to ensure that when someone has a need for healthcare they have access to the right response and the right form of treatment and care as quickly as possible. This aim, expressed in “Better Health, Better Care”, shapes the continuous programme of change in Grampian. Supporting this aim is NHS Grampian’s desire to deliver services from high quality facilities which support the most modern clinical practices, improve the experience for patients and motivate staff.

With quality and patient centred care in mind, the key objectives of this OBC for Phase 2 of the Replacement Linear Accelerator Project are:

- To identify the optimal configuration of radiotherapy services that allows the right oncology care and treatment to be provided to the right patient at the right time
- To identify the optimal configuration of facilities which will match to provide quality and effective treatment, taking account of existing facilities where appropriate
- To enable NHS Grampian to plan within a clear framework of service requirements and to make the right investment decisions
- To identify the workforce profile required to deliver cancer services as a whole at ARI for the next 10 years
- To produce a programme of redesign that will support the acute sector in delivering this strategy
- To ensure there is alignment between patient services and teaching and research such that they take into account the health needs of the local community

2.3.3 Activity / Population Analysis

Grampian Wide

- A Rising Population: The population of Grampian is projected to rise steadily until around 2026 after which time modest decreases in the population are expected. It is predicted that the population increase by around 4.8% from the 2006 population estimate of 529,890 people, with the majority of that increase seen by 2016. Within Grampian patterns of change will vary. With projections for a falling population on Aberdeen City from 2011 and increases of around 19% in the Aberdeenshire population, it is predicted that Aberdeenshire will account for over 50% of the Grampian population by 2031

- An Ageing Population7: The population is projected to age significantly with a falling number of children and large increases in the elderly population. The projected increase in the population aged 75 and over is 27.6% (49,304) by 2016. By 2031 the estimated increase in this section of the population is around 111% on 2006 values. This increase in Grampian is above the national figure of 81%

Figure 2.2 Population Projections for the 75 and Over Age Group in Grampian

source:GROS population projection figures (2006 based).
• **Incidence of cancer**: Between 2001 and 2005 the crude incidence rate for all cancers among men and women in Grampian was 486.3 and 498.7 per 100,000 person years at risk respectively. This equates to 6,308 male cases and 6,609 female cases in Grampian over this 5 year period.

• The age-standardised incidence rates for all cancer types (excluding non-melanoma skin cancer) have reduced in men and levelled off in women over the last 10 years, having increased steadily before this. However with an ageing population and changing incidence within some cancer groups, increasing numbers of patients with cancer are anticipated.

• During the period 2016-2020, it is predicted that there will be 18,443 new cases of cancer among Grampian residents, a 43% increase on the number of recorded cases during 2001-2005. 5 year incidence projections for Grampian are shown in the table below.

**Table 2.1: 5 Year Incidence Projections**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cases per 5 year period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Average per annum)</td>
<td>12917 (2583)</td>
<td>14841 (2968)</td>
<td>16517 (3303)</td>
<td>18443 (3689)</td>
</tr>
</tbody>
</table>

Information received from ISD for ‘Informing the NHG Grampian Cancer Plan (March 2009)

• **Mortality**: Between 2003 and 2007 there were 7,137 deaths from cancer in Grampian

• **Deprivation**: The risk of many cancers increases with increasing deprivation. Stage for stage, deprivation is also associated with worse survival rates. Those cancers which show this relationship with deprivation often have modifiable lifestyle risk factors (i.e. smoking, alcohol and obesity) which are more prevalent in deprived communities. This patient population also has less contact with primary health services, and late presentation with malignancy is common.

• **Diagnosis**: The number of patients diagnosed with cancer is anticipated to increase substantially over the coming decade, through a combination of increased early diagnosis by screening or coincidental imaging, growing elderly patient population, and improved survival from first cancer in smokers, genetically predisposed children and young adults.
• It is projected that during the period 2016 – 2020, there will be, on average, 3689 patients in Grampian diagnosed with cancer each year, an increase of 1106 patients per annum relative to each of the years during the period 2001 – 2005. Of these 50-60% will require radiotherapy as part of their treatment.

Orkney & Shetland

• **Population:** Orkney and Shetland currently account for around 3% each of the population of North-East Scotland. This is not predicted to change overall. However, whilst the Orkney population is projected to increase by around 15% by 2031, the Shetland population is projected to fall by around 10% in this time scale.

• **Incidence:** In Orkney there were 504 cases and Shetland 538 cases of cancer seen during the period 2001 - 2005.

**Radiotherapy Department at ARI**

The Radiotherapy Department provides comprehensive radiotherapy services for the population of Grampian, Orkney and Shetland (population circa 580,000), and brachytherapy and some other specialised services to Highland and Tayside patients, delivering in total around 1,500 courses of treatment each year. A course of treatment may comprise anything between 1 and 36 fractions of radiation and is conventionally given on a daily basis. The department treats on average 80-100 fractions per day (21000-26000 per annum) with radiotherapy.

The proposed facilities will allow delivery of a high quality modern radiotherapy, including intensity modulated radiotherapy (IMRT), image guided radiotherapy (IGRT), gated radiotherapy and stereotactic radiotherapy. Less than 10 children each year require radiotherapy in Aberdeen, but it is a great benefit to these children and their families to be able to have treatment delivered closer to home rather than in Glasgow or Edinburgh.

The Radiotherapy Department is currently served by three networked, beam matched linear accelerators (two high-energy), all of which have multi-leaf collimators, electronic portal imaging and verification systems, and a computerised treatment planning system. A new CT simulator, supplementary to a conventional simulator, was installed in a purpose built facility in 2006 and more recently the conventional simulator was replaced in 2011.

The services provided by the Physics Department of Radiotherapy includes radiation dosimetry, quality assurance, treatment planning, first-line repair and maintenance, mould room and computing services to support the use of this equipment.

**Radiotherapy Treatment at ARI – Projected Demand for 2011**

Current recommendations by the National Radiotherapy Advisory Group (NRAG) are that by 2011, each centre should be delivering 50 900 fractions per million population (see figure 2.3 below). For NHS Grampian, serving a North of Scotland population of circa 580,000, this equates to delivering 29,522 fractions.
Radiotherapy Efficiency and Number of Linacs at ARI

The department currently delivers approximately 7,000 treatment fractions per annum per Linear Accelerator (Linac). Assuming efficiency at ARI is improved to deliver NRAG recommendation of 8,300 treatment fractions per Linac (see Figure 2.4, below); the number of Linacs required to meet demand for 2011 is 3.56 Linacs. This number of Linacs is consistent with the Royal College of Radiology's recommendation of 5.5 Linacs per million populations which, for the radiotherapy department at ARI, equates to a requirement of 3.2 Linacs (see Figure 2.5 below).
Therefore, given the predicted increase in number of patients requiring radiotherapy in the next 10 years, it is anticipated that 3 full time Linacs will be insufficient for the volume of work at the end of this decade. Furthermore, with NRAG’s recommendation that an individual Linear Accelerator requires replacement on a 10 year cycle, it is accepted that cancer centres should have a spare bunker available to allow Linac replacement without affecting service provision.

The above stipulated radiotherapy provision throughout Scotland is determined by the Scottish Radiotherapy Advisory Group (SRAG), and the activity based modelling is detailed in Radiotherapy Activity Planning for Scotland 20011 -2015 (2006). This is kept under review by
SRAG who also co-ordinate the national rolling radiotherapy equipment replacement programmes.

**New Bunkers and Linear accelerator phasing at ARI**

The Radiotherapy department as part of the Grampian wide Cancer Care and Haematology Centre is required to replace the existing three linacs over the next five financial years (2010/11 – 2014/15). The aim is to replace them as part of an integrated plan for a future Cancer and Haematology Centre (see appendix B1) and to avoid incremental development of the Foresterhill site.

### Existing Building - 2011
- High Energy linear accelerator located within existing bunker 1
- High Energy linear accelerator located within existing bunker 2
- Low Energy linear accelerator located within existing bunker 3

### Existing Building
- High Energy linear accelerators decommissioned within bunker 1.
- High Energy linear accelerator located within existing bunker 2 retained
- Existing Low Energy linear accelerator located within existing bunker 3 retained

### Phase 1 New Build - 2012
- New High Energy Linear Accelerator located within new bunker 4 as replacement for Bunker 1

### Phase 1 New Build - 2013
- High Energy linear accelerators decommissioned within bunker 2.
- Low Energy linear accelerator located within existing bunker 3 retained

### Phase 1 New Build - 2013
- High Energy Linear Accelerator located within new bunker 5 as replacement for Bunker 2

### Phase 2 New Build - 2014
- High Energy Linear Accelerator located within new bunker 6 as replacement for Bunker 3
- Bunker 7 used as a 'turnaround' bunker for future linac replacement

**Completes Bunker and Linear Accelerator requirements at ARI**

### 2.3.4 Radiotherapy Facilities at ARI

The case for change for radiotherapy provision at ARI centres on the need for patients requiring radiotherapy treatment, and for the staff who provide this care, to have these provided in an appropriate, safe and healthy environment. Maintaining services in functionally
unsuitable buildings is inherently inefficient and inappropriate from a clinical and a non-clinical perspective and not an appropriate strategy for the future.

In summary:

- Ageing radiotherapy facilities impose rigidity in the service model adopted by the oncologists and constrain capacity, flexibility and innovation.
- New Linear Accelerator accommodation without Phase 2 developments, limits the development of efficient service models for which different layouts, functional relationships and on-site service integration is required.
- Patient pathways around the hospital sites are poor as a consequence of the current estate. For example, in the absence of completing Phases 1 & 2 there is no direct access to radiotherapy treatment at street level.

**Status of Estate**

The health campus on the Foresterhill site has been developed in a piecemeal way and many departments are no longer functionally suitable or are nearing the end of their lifespan. This position is particularly the case with respect to the accommodation for radiotherapy planning and treatment and other cancer services.

At the Aberdeen Royal Infirmary, 80% of current Radiotherapy accommodation fails to meet the minimum suitable Physical Condition classification within Estate Code\(^8\) – condition B. The ageing radiotherapy estate (excluding the second bunker and associated waiting area, which was opened in 1999) requires either major redevelopment or re-provision elsewhere. The cost of backlog maintenance for this part of the East End site has been estimated to be £8.2 million. An Estatecode building appraisal (6 Facet Survey) has been carried out and the existing estate deficiencies are summarised in the table 2.2.

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\(^8\) Condition B as defined in NHS Estatecode: Sound, Operationally safe and exhibits only minor deterioration.
Table 2.2: Analysis of the Existing Estate – Six Facet Survey

<table>
<thead>
<tr>
<th>Facet Description</th>
<th>Analysis of existing estate</th>
<th>Backlog maintenance costs to bring estates to acceptable standards (at minimum, estate code condition B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Condition</td>
<td>The physical conditions survey examined the building structure and fabric together with mechanical and electrical engineering installations. The survey identified the current estates condition as category C, the element is operational but major repair or replacement will be needed soon, that is, within three years for building and one year for an engineering element.</td>
<td>The survey assessed the backlog maintenance at £4.8 million</td>
</tr>
<tr>
<td>Energy Performance</td>
<td>The energy performance profile examined the building structure and fabric together with mechanical and electrical engineering installations for energy efficiency. The NHS target for the healthcare estate is 35-55 GJ/100 cu m. Current energy performance is at category c, 65 – 75 GJ/100 cu m.</td>
<td>The energy audit assessed improvements at a cost of £150 thousand</td>
</tr>
<tr>
<td>Compliance with Statutory &amp; Non Statutory Standards</td>
<td>There is a wide range of statutory standards relating to hospitals and a number of non-statutory standards required by SGHD, with which compliance is required through controls assurance and will result in risk register. The estates survey identified a proportion of the buildings that failed to comply fully with these standards</td>
<td>Cost to ensure full compliance is c. £600 thousand</td>
</tr>
<tr>
<td>Functional Suitability</td>
<td>The functional suitability analysis demonstrated how effectively the building supports the delivery of the radiotherapy service. The criteria used in assessments included: Space relationships, Services, Amenity, Location, Environmental conditions, Overall effectiveness.</td>
<td>Using BCSI standards for functional suitability. The cost to bring radiotherapy area to functional suitability is £2.5 million</td>
</tr>
<tr>
<td>Space Utilisation</td>
<td>Spot surveys indicated over utilised space.</td>
<td>This impedes effective delivery of radiotherapy services.</td>
</tr>
</tbody>
</table>

The 6-facet survey exercise has identified that there is **backlog maintenance requirement of £8.2m**, to bring this part of the East End block to acceptable standards. However, this investment would not satisfy the deficiencies in space utilisation, functional suitability and environmental management aspects of the existing facilities. In light of the above it has been deemed that investment of this magnitude would not satisfy best value objectives and thus the preferred option would be a new build facility.

For Radiotherapy facilities this would involve a new build of four treatment bunkers (with the fourth bunker acting as a spare bunker for future replacement strategy) and associated supporting facilities including a main entrance for Radiotherapy at ground level and a link
corridor to existing facilities. This new build option would therefore obviate the identified backlog requirements and support NHS Grampian’s strategic objectives in respect of Radiotherapy service provision.

2.3.5 Optimisation of Resources and Value for Money

All options take into consideration the need to build two further new bunkers in time for the third replacement Linear Accelerator to be commissioned and clinically operational in 2013 and 2014 respectively, consistent with the national equipment procurement programme.

The logic behind this strategic decision to build both bunkers under one construction programme centres on the optimisation of resources to achieve maximum value for money.

Key principles underpinning this strategy are as follows:

- Given that each Linac requires replacement on a 10 year cycle, it is accepted that the Radiotherapy department should have a spare bunker available to allow Linac replacement without affecting service provision (i.e. avoid operational down-time).

- Notwithstanding the buying gains on materials that would be achieved, the estimated savings likely to be realised from building two bunkers simultaneously rather than separately would be in the region of £1.381m.

- Construction work on Phase 1 is now well advanced, with completion planned for June 2012. The proposed Phase 2 works are virtually a repeat of Phase 1, and the opportunity exists to harness the experience gained on Phase 1, in constructing a technically demanding facility, to the mutual benefit of all concerned. Should this opportunity be lost it is likely that this expertise will be lost to Phase 2 of the project, to the potential detriment of the completed facility.

- A greater degree of cost certainty and a consequent reduction in risk is available on Phase 2, through the deployment of the same design and construction team, thereby ensuring best value is realised on the project.

- It is more cost effective to build the two bunkers simultaneously for the following reasons:
  - To derive economy of shared elements of construction e.g. the party wall between Linac bunkers;
  - To avoid the need to add costly interfaces to the structure and internal areas caused by constructing at different times;
  - Enable savings to be achieved from PSCP preliminary items such as site accommodation and staff costs;

Through working with the Principal Supply Chain Partner, the Board elected to develop the Medical Physics & Radiotherapy Department in Phase 1 (previously included within the Phase 2 configuration) in order to provide a more economically advantageous solution at Phase 1, and to take advantage of a number of benefits, such as:

- To minimise disruption to the Phase 1 clinical activities during the Phase 2 construction, including continued operation of the linear accelerators during Phase 2 construction
- Efficiency savings in the design and construction activities
- To take advantage of the Contractor’s preliminary set up
- Avoidance of costly interfaces between the respective structures, linking with an operational building
- Buying gains through bulk and early procurement
This provision of Medical Physics and Radiotherapy Staff accommodation in Phase 1 takes away the financial burden for paying for this service improvement within this business case for Phase 2 developments.

2.3.6 Need for Action, Recent Review by SGHD

In 2008, Professor Alan Rodger was commissioned by the Scottish Government Health Directorate (SGHD) to assist NHS Grampian in relation to a number of issues related to cancer services, including the development of the Aberdeen Cancer and Haematology Centre. In his subsequent report, Professor Rodger referred to the need for NHS Grampian to take forward the SGHD approved programme and funding for the replacement of the three existing linear accelerators (Linac), at Aberdeen Royal Infirmary on the Foresterhill Site.

In addition to this Professor Roger stressed that “The new Project Board should address, as a matter of urgency, the need to plan, site and build sufficient new bunkers for linac capacity plus one extra for future replacement programmes. This should be phase one of the new cancer and haematology centre project and its location should ensure effective and efficient radiation treatment delivery in the new centre”.

The NHS Grampian Board has followed this recommendation within Professor Rodger’s report and is now taking forward proposals to complete the Linac Replacement Programme as an essential step forward towards the future Cancer and Haematology Centre.

2.4 Part C - Benefits Realisation

This OBC for the third and fourth new Linear accelerator bunkers provides the necessary detail and assurances to support the Linear Accelerator Replacement Programme and its associated Radiotherapy Services.

Potential business scope and key service requirements are:

- The overall capital cost for this OBC will not exceed £6.693 million based on the Phase 1 provision of 1386m², of the total multi-phased inclusive radiotherapy facilities which has a gross internal area of 3294 m²
- The Phase 2 Radiotherapy development will take into consideration any future Cancer and Haematology Centre developments
- The Phase 2 development will be complete in time for the third Linear Accelerator to become operational in January 2014.
- The proposed Phase 2 development is supported by the three Community Health Partnerships (CHPs), Aberdeen City, Aberdeenshire and Moray.

2.4.1 Main Benefits Criteria

To satisfy the potential scope for this investment NHS Grampian will deliver the following high-level strategic and operational benefits.

- Achieve, to the maximum extent possible, the recommendations of the Better Cancer Care; Action Plan for people in Scotland.
- Achieve, to the maximum extent possible, the clinical strategy for cancer services in NHS Grampian, as outlined in the ARI Blue Print document.
- Address the national strategy and priorities and consider the changing demography of Grampian, the increasing incidence of several cancers, and the improving survival from cancer⁹.

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⁹ Informing the NHS Grampian Cancer Plan (2009), Grampian & NOS, Cancer MCN.
• Enable NHS Grampian to achieve the requirements of national initiatives outlined in the action plan, Better Health, Better Care and Better Together: Scotland’s Patient Experience Programme.
• Enable NHS Grampian to improve their Acute Sector estate so that all buildings on Foresterhill Site achieve at minimum, Estate Code Condition B classification.
• Facilitate the improvement of local acute healthcare services through changes to service model and estate as described in the ARI Blue Print / Reconfiguration Report and Master Planning document for Foresterhill Site.
• Provide a standard of radiotherapy premises in a location that consolidates and improves the ability to continue clinical research in conjunction with the University of Aberdeen, for the benefit of patients.
• Provide radiotherapy premises that enable the continued provision of high-quality clinical undergraduate and postgraduate education and training.
• Facilitate an improvement in the ability of the Acute Sector to recruit and retain staff, through the provision of better working conditions and premises that enable the provision of contemporary best practice services in radiotherapy healthcare, research and education.
• Improve the accessibility, by all means of transport, for patients served by NHS Grampian’s specialist cancer treatment service.

2.4.2 Main Risks

The main business and service risks (design, build and operational over the lifespan of the scheme) associated with the scope for this project are contained within the project Risk Register. The Project Risk Register has been developed during the production of this Outline Business Case and includes appropriate mitigation measures put in place to reduce the risk profile of the project.

For further details, please see the summary of main risks in table 6.6 and the full Risk Register included within Appendix A-2.

2.4.3 Constraints

The likely constraints on achieving the project objectives are set out in the table below:

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Delivery Programme</td>
<td>NHS Grampian representatives continue to be active members in the development of the national linear accelerators replacement programme. Notwithstanding this involvement, the agreed Scotland-wide delivery programme will require all centres to deliver within the agreed replacement time frame.</td>
</tr>
<tr>
<td>Programme for Linacs</td>
<td>The preferred option will require planning approval from the local planning authority, Aberdeen City Council.</td>
</tr>
<tr>
<td>Planning acceptability</td>
<td>The new clinical facilities proposed in this Business Case will require significant capital investment which would be paid for by the Scottish Government through the money ring-fenced for the Linear Accelerators Replacement Programme for Scotland. Section 5 (Affordability Analysis and Accounting Treatment) explains how the preferred option is affordable.</td>
</tr>
<tr>
<td>Affordability of project</td>
<td>Timely construction of the third and fourth bunkers is essential and non-negotiable to the Scotland-wide Linear Replacement Programme. The availability of a fourth spare bunker (for turning space) is essential given the 10 year replacement strategy.</td>
</tr>
<tr>
<td>Timing of construction</td>
<td>Development on any part of the Foresterhill site is challenging because of the need to create turning space. For the Cancer and Haematology Centre, however, the turning space can be made available in the east end area through the diversion of the road to the south of the site.</td>
</tr>
</tbody>
</table>
The timing of the delivery programme for the linear accelerators is acknowledged as a constraint with the third linear accelerator to be commissioned (2013) and operational by January 2014. This Linear Accelerator Outline Business Case will be delivered as Phase 2 of any future redesign / modernisation of Cancer and Haematology Services on the FHS (see Appendix B-1, Cancer Care Phased development).

Linear Accelerator replacement programme for NHSG is as outlined below, with replacements for Linac 3 covered under this OBC:

**Replacement for Linac 1**
- National Business Case Approved by NHSG March 2011
- Procurement Start (National) Jul 2010
- Accepted Mar 12
- Clinical August 2012

**Replacement for Linac 2**
- National Business Case Approved by NHSG March 2011
- Procurement Start (National) Jul 2010
- Accepted May 12
- Clinical Jan 2013

**Replacement for Linac 3**
- National Business Case Approved by NHSG March 2011
- Procurement Start (National) Jul 2010
- Clinical Jan 2014

### 2.4.4 Dependencies

The project is subject to the following dependencies that will be carefully monitored and managed throughout the lifespan of the scheme:

- Prompt approval by the NHS Grampian Board
- The approval by the Scottish Capital Investment Group
- Receipt of Local Authority (Planning Department Aberdeen City Council) Planning Approval for the preferred location taking account of the consultation process.

These dependencies remain unchanged from those identified at the time of the initial Agreement.
3.0 THE ECONOMIC CASE

3.1 Introduction

In accordance with the Scottish Capital Investment Manual and requirements of HM Treasury's Green Book (A Guide to Investment Appraisal in the Public Sector), this section of the Outline Business Case documents the process and provides evidence to show that the selection of the preferred option is derived from the most economically advantageous option, which best meets service needs and optimises value for money.

In accordance with the five case model recommended by the Scottish Government the economic case sets out:

- Critical success factors;
- Long listed options;
- Short listed options;
- Economic appraisal;
- Qualitative benefits appraisal;
- Risk appraisal;
- Preferred option;
- Sensitivity analysis;
- Preferred option.

3.2 Critical Success Factors

The Office of Government Commerce (OGC) places significant importance on the identification of Critical Success Factors (CSFs) or Performance Criteria for projects. CSFs define the essential areas of activity that must be performed well if the objectives of the project are to be achieved. CSFs must therefore be strictly aligned with the project objectives and must be Specific, Measurable, Achievable, Realistic and Time bound (SMART).

The CSFs for this project are included in the table overleaf and were identified in conjunction with the Cancer Centre Project Team members at two workshops on the 30th September and the 14th October 09. These CSFs were then used to evaluate the various options considered in order to fulfil the Project Objectives. Table 3.1 includes the CSFs, associated SMART criteria and baseline information required to assess the CSFs.
<table>
<thead>
<tr>
<th>Critical Success Factor (CSF)</th>
<th>SMART</th>
<th>Information required for SMART baseline</th>
<th>Alignment with Benefits / Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regional</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS Grampian establish a fully functional Radiotherapy centre with supporting regional network that meets all the required criteria at a national and regional level;</td>
<td>Measurement against regional and national criteria</td>
<td>Regional and national criteria</td>
<td>Supports Strategy – National / Regional / Local Flexibility and Future Proofing</td>
</tr>
<tr>
<td>The preferred option secures Value for Money</td>
<td>Alignment with benchmark schemes and achievement of value criteria</td>
<td>Establishment of value chain and selection of schemes to benchmark against</td>
<td>All</td>
</tr>
<tr>
<td>The finished project is designed to deliver positive reputational advantages.</td>
<td>Marked improvements against baseline</td>
<td>Baseline of patient feedback and Board reputation position</td>
<td>Patient Experience; Quality of Building Environment</td>
</tr>
<tr>
<td><strong>Board</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The finished project is designed to establish the NHSG Radiotherapy Centre as world class with national and international recognition</td>
<td>Marked improvements against baseline</td>
<td>Baseline of patient feedback and Board reputation position</td>
<td>Supports Strategy – National / Regional / Local</td>
</tr>
<tr>
<td>By (Year) targeted improvements in clinical care and efficiency</td>
<td>Measured improvements against baseline and alignment with targets</td>
<td>Current achievement against KPIs and patient throughput</td>
<td>Capacity and Efficiency Flexibility and Future Proofing</td>
</tr>
<tr>
<td><strong>Patients</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS Grampian through this development will deliver targeted national outcomes for cancer patients in terms of improved care;</td>
<td>Improvement against current outcomes, aligned against national and international achievements</td>
<td>Current outcomes; National data; international data</td>
<td>Patient Experience</td>
</tr>
<tr>
<td>The finished project is designed to deliver measurable improvements in the provision of healthcare, levels of cleanliness/ infections, the patient experience, reduced lengths of visits, reduced numbers of transfers, and improved communication with patients.</td>
<td>Achievement of recommendations for improvement with measured data capture.</td>
<td>Current assessment data, reports and recommendations</td>
<td>Capacity and Efficiency Patient Experience Timing Quality of Building Environment</td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The finished project is designed to secure increased levels of attraction and retention of staff;</td>
<td>Measured improvement in recruitment and retention of staff</td>
<td>Details of exit interviews. Existing staff turnover rates.</td>
<td>Staff Recruitment, Training and Development</td>
</tr>
<tr>
<td>The finished project is designed to encourage improvements in staff overall performance – based on them wanting to work there, with high levels of job satisfaction and appropriate recognition.</td>
<td>Measured improvement from job satisfaction surveys.</td>
<td>Existing HR data to measure against</td>
<td>Staff Recruitment, Training and Development</td>
</tr>
</tbody>
</table>
3.3 The Long-Listed and Short Listed Options

A key component of developing a Business Case is the option appraisal exercise (which was undertaken as part of the initial Outline Business Case production for a Cancer and Haematology Centre) with comparison of alternative courses of action at the heart of this. It is only by comparing the alternatives that the real merits of any particular course of action are exposed. In order to achieve this, the Scottish Capital Investment Manual (SCIM) Optional Appraisal Guide recommends beginning with identifying a ‘long list’ of options, containing all the initial ideas about possible solutions. It is recommended that this should include not only the conventional solutions, but also any more innovative suggestions, however unlikely they may at first appear. Imaginative thinking is encouraged through brain storming and the range of options considered should be as wide as possible.

This exercise of generating the long list was undertaken by the Cancer Centre Project Team on the 5th August 2009 and is recorded over leaf.

To commence the exercise an overview was presented of the anticipated options, as contained within the New Cancer Centre Project High Level Information Pack, with the following range listed:

- Deliver the brief for the Cancer Centre in upgraded facilities at the east end area of the site
- Do not develop a Cancer Centre – facilities for cancer services will be incorporated into other inpatient and ambulatory care developments on the Foresterhill site
- Deliver the brief for the Cancer Centre in new facilities at the east end area of the site
- Deliver the brief for the Cancer Centre in a combination of new and upgraded facilities at the east end area of the site
- Deliver the brief for the Cancer Centre in another part of the Foresterhill site

Whilst constraints were not considered at the workshop when compiling the long list the requirement for a solution to permit a phased replacement of the linear accelerators was acknowledged, with the first replacement linear accelerator to be operational by early 2012. In addition to this it was acknowledged that any solution must be considered as an integral part of the new Cancer and Haematology Centre project, thus avoiding any potential further incremental development of the Foresterhill site.

The next stage in the process was for the long-listed options to be reduced to a more manageable ‘short list’ of options for in-depth appraisal and evaluation. Through utilising a standard table illustrated in the SCIM, advantages and disadvantages for each option were compiled and these were debated at a Cancer Centre Project Team meeting on the 19th August 2009 to derive a short list of options. The short listed options are those indicated green in the ‘Take Forward’ column, those indicated red have not been taken forward.

The SCIM calls for a do nothing / minimum option to be short-listed and appraised even where it is not considered to be a realistic option. Its function is to provide a benchmark so that the value of the alternative ‘do something’ options may be judged by reference to current service provision.
Table 3.2: Summary of Long-Listed to Short Listed Results

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Take Forward</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do nothing</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Upgrade Existing Facilities (minimum refurbishment)</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Do minimal – replace 2 of the existing linacs in their existing bunkers. Provide 2 new bunkers (one to be spare) and 1 new linac.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Conversion of ‘whole’ of east end to form integrated cancer centre (no new build)</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Upgrade existing Facilities and Extend</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>5a</td>
<td>Upgrade existing Facilities and Extend; part demolition of existing accommodation</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Retain existing linacs and build on top.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Extend ECC to house linacs and cancer care centre.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Retain existing linacs and provide 2 new linac bunkers (not linked to existing linac but to the GCC)</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>New Facility (new build) – East End. South of existing facilities.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>Multi storey new build option</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Linac terraced formation build option.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>Build cancer centre adjacent to Westburn House.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>Construct linacs sandwiched in between accommodation.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>14</td>
<td>Decommission maternity services in current location and relocate – replace with radiotherapy</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>Extend ambulatory care centre to include cancer OPD / day patients &amp; stand-alone radiotherapy</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>New Facilities to be incorporated with IP and ambulatory Care Service (phase 1 location)</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>17</td>
<td>Upgrade IP facilities; refurbishment and conversion of OP facilities (clinic ‘D’).</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>18</td>
<td>New build off site.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>19</td>
<td>Disperse all cancer facilities around ARI</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>20</td>
<td>Disperse all cancer facilities throughout Grampian, utilising Elgin.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>21</td>
<td>Disband Service</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>22</td>
<td>Outsource and / or privatise service</td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

This long list of options was measured against the achievement of the aforementioned Critical Success Factors.

Table 3.3: Summary of Short Listed Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Take Forward</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do nothing</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Do minimal – replace 2 of the existing linacs in their existing bunkers. Provide 2 new bunkers (one to be spare) and 1 new linac.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Upgrade existing Facilities and Extend</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>5a</td>
<td>Upgrade existing Facilities and Extend; part demolition of existing accommodation</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>New Facility (new build) – East End. South of existing facilities.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Construct linacs sandwiched in between accommodation.</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Figure 3.1: Proposed Site

Phase 2 of the two-part Radiotherapy development on the East side of the Foresterhill Health Campus is indicated in the picture below in light green. The location of Phase 1 and 2 are designed to align with any further Phased development of the Cancer and Haematology Centre. The adjacent Emergency Care Centre and the Royal Aberdeen Children’s Hospital

3.4 The Benefits of Appraisal

3.4.1 Overview

A key component of any formal option appraisal is the assessment of the non-financial benefits that are likely to accrue from the options under consideration. The Board elected to carry out the benefits appraisal in an open and transparent environment, inviting a range of stakeholders to participate in the process.

The benefits appraisal process had three main stages:

- Identification of the benefits criteria;
- Weighting of the benefits criteria;
- Scoring of the short-listed options against the benefits criteria.
Although comparison of the relative non-financial benefits of the options presented allows comparisons to be made in these terms, the outcome is also critical in assessing the overall value for money presented by each of the options. This is most commonly measured by the Net Present Cost (NPC) per unit of benefit delivered.

The following sub-sections provide a detailed description of the process used to assess the potential benefits of the short-listed options, along with the outcomes of the exercise.

### 3.4.2 The Benefit Criteria

The role of benefit criteria in the non-financial appraisal is to provide a basis against which each of the options can be evaluated in terms of their potential for meeting the critical success factors for the proposed capital investment.

Individual criteria will, generally speaking, have differing degrees of importance in determining the preferred solution to emerge from the benefits appraisal. As a result it is necessary to rank the criteria in order of importance and then to allocate a weighting, which reflects the degree to which each criterion will affect the outcome of the options scoring exercise.

The benefits criteria were developed by members of the Cancer Centre Project Team on 30th September 2009, two patient / public representatives attended this meeting. The benefit criteria are shown below:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Benefit Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Capacity &amp; Efficiency</td>
</tr>
<tr>
<td>A2</td>
<td>Supports Strategy – National / Regional / Local</td>
</tr>
<tr>
<td>A3</td>
<td>Timing</td>
</tr>
<tr>
<td>A4</td>
<td>Patient Experience</td>
</tr>
<tr>
<td>A5</td>
<td>Quality of Building Environment</td>
</tr>
<tr>
<td>A6</td>
<td>Flexibility and Future Proofing</td>
</tr>
<tr>
<td>A7</td>
<td>Staff Recruitment, Training and Development</td>
</tr>
</tbody>
</table>

### 3.4.3 Ranking and Weighting the Criteria

As some criteria have a greater bearing than others on the outcome of the benefits appraisal it is necessary to rank criteria in order of importance. This is linked with the weighting exercise undertaken. This exercise was undertaken by the Cancer Centre Project Team on 14th October 2009 (included in attendance were the same two patient / public representatives previously involved in the development of the criteria), the results of which were collated and averaged to derive an overall order. The results of this are shown below. The criterion deemed to be the most important is ranked number 1. This exercise was subsequently ratified by the Patient Public Involvement Group on 15th October 2009. The output of the weighting exercise is summarised below.

<table>
<thead>
<tr>
<th>Criteria Heading</th>
<th>Rank</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity &amp; Efficiency</td>
<td>1</td>
<td>25%</td>
</tr>
<tr>
<td>Supports Strategy – National / Regional / Local</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td>Timing</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Patient Experience</td>
<td>4</td>
<td>12%</td>
</tr>
<tr>
<td>Quality of Building Environment</td>
<td>5</td>
<td>11%</td>
</tr>
<tr>
<td>Flexibility and Future Proofing</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Staff Recruitment, Training and Development</td>
<td>7</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
In comparative terms, the top weighted criterion – Capacity and Efficiency, will have three and half times the bearing on the final outcome of the scoring exercise when compared to the lowest weighted criterion, Staff Recruitment, Training and Development.

3.4.4 Process for Scoring the Options

The scoring of the options against the benefit criteria is designed to assess the extent to which the potential solutions meet the critical success factors of the proposed investment.

Scoring provides a means to assess how each of the options compares, both in relation to the optimal position (i.e. meeting all of the criteria in their totality), as well as with the other options.

The benefit scores, when contrasted with the whole life cost (derived from the Net Present Cost within the Economic Appraisal), provide a means by which the overall value for money delivered by the short listed options can be assessed.
3.4.5 Option Scoring and Results

Delegates in attendance at the non-financial benefits workshop, on the 26th October 09, were selected from a cross section of the following distinct groups:

- Public/Patient Representatives
- Clinical Representatives
- Management Representatives

The workshop was opened with an explanation of the background and context to explain how this fits into the overall option appraisal process. This was followed by an explanation of the options which was illustrated in an information pack provided on the day. Questions were invited at this point before delegates were asked to score each of the options against the benefit criteria.

**Table 3.6: Option Scoring Scale**

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>Could hardly be worse</td>
<td>Extremely Badly</td>
<td>Very Badly</td>
<td>Badly</td>
<td>Somewhat Adequate</td>
<td>Adequate</td>
<td>Quite Well</td>
<td>Well</td>
<td>Very Well</td>
<td>Excellent</td>
<td>Could hardly be better</td>
</tr>
</tbody>
</table>

The application of a relatively wide scoring scale allowed for significant scope to differentiate the options against each of the criteria, as such the resultant output provided a more robust overall assessment of the options.

The group, with the assistance of the facilitator, debated each of the benefit criteria in the context of each option and a single consensus score was generated using the scale illustrated above.

The team’s total consensus score for each option were then collated and the options ranked according to the weighted scores. The results of the benefits scoring are summarised below while further analysis is available in Appendix A-8.

**Table 3.7: Benefits Appraisal – Summary of Weighted Scores**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Weighted Score</th>
<th>Ranks</th>
<th>% of Maximum Possible Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do Nothing</td>
<td>74</td>
<td>6</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>Do Minimum (Part New Build)</td>
<td>378</td>
<td>5</td>
<td>38%</td>
</tr>
<tr>
<td>5</td>
<td>Part New Build and Part Refurbishment</td>
<td>584</td>
<td>4</td>
<td>58%</td>
</tr>
<tr>
<td>5a</td>
<td>Part New Build and Part Refurbishment including demolition.</td>
<td>647</td>
<td>3</td>
<td>65%</td>
</tr>
<tr>
<td>9</td>
<td>New Build</td>
<td>919</td>
<td>1</td>
<td>92%</td>
</tr>
<tr>
<td>13</td>
<td>Phased New Build</td>
<td>781</td>
<td>2</td>
<td>78%</td>
</tr>
</tbody>
</table>

3.4.6 Sensitivity Analysis

In order to test the robustness of the results of the benefits appraisal it is necessary to assess the sensitivity of the ranking of the scores to changes in key variables and assumptions.

This exercise provides an indication as to the elements of the evaluation that are critical in influencing the outcome. As such it is often of benefit to cross reference these features to the key project risks and to the development of the related management strategy.

Further work has been undertaken by way of sensitivity analysis to evaluate what the ranking might be if some of the weights and/or scores were changed. A range of sensitivities were applied to the benefits scores, namely:
• Equal weighting applied to all criteria
• Excluding benefit scores for top ranked criteria (Capacity & Efficiency)
• Altering the scores of the criteria with the greatest scoring range of the ‘do something’ options (Quality of Built Environment) so that all options score the mid-range value i.e. 5.0.

The sensitivity tests detailed above have been applied to the baseline benefit scores outlined above, the results of which are shown below.

### Table 3.8: Results of Sensitivity Analysis

<table>
<thead>
<tr>
<th>Sensitivity Test</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Scores</td>
<td>74</td>
<td>378</td>
<td>584</td>
<td>647</td>
<td>919</td>
<td>781</td>
</tr>
<tr>
<td>Ranking</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Equal Weighting of Criteria</td>
<td>86</td>
<td>400</td>
<td>600</td>
<td>657</td>
<td>929</td>
<td>800</td>
</tr>
<tr>
<td>Ranking</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Exclusion of top ranked criteria scores</td>
<td>74</td>
<td>303</td>
<td>459</td>
<td>497</td>
<td>694</td>
<td>600</td>
</tr>
<tr>
<td>Ranking</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Alter scores of criterion with greatest range</td>
<td>118</td>
<td>400</td>
<td>573</td>
<td>625</td>
<td>875</td>
<td>737</td>
</tr>
<tr>
<td>Ranking</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

The analysis above indicates that none of the sensitivity tests applied altered the overall ranking of options from the baseline position demonstrating the robustness of the results.

### 3.4.7 Summary of Results

The results of the benefit scoring exercise indicate a clear hierarchy and consistent gap with regard to their relative overall performance in relation to the level of benefits.

Option 9: New Build consistently outperforms the other options with 92% of the available maximum score. The gap between this option and the other options is largely consistent through the sensitivity analysis.

Option 13: Phased New Build scores 78% of a maximum available score.

Options 5 and 5a: Part new build and part refurbishment score 58% and 65% respectively of the available maximum score.

Option 3: Do nothing scores 38% of the available maximum score.

Unsurprisingly the do nothing option results in the lowest level of overall benefits.

The robustness of the results is demonstrated through sensitivity testing whereby the overall ranking of the scores is unaltered by changes in key variables.

### 3.5 The Procurement Process

Following guidance from Health Facilities Scotland the construction element of the project and the radiotherapy equipment will be procured via Frameworks Scotland and the National Equipment Procurement Programme respectively.
3.6 Economic Appraisal

3.6.1 Introduction

An economic appraisal of all the short listed options has been carried out in accordance with the 2003 edition of the HM Treasury Green Book. The economic appraisal takes account of all costs related to the project over the project lifetime. The Department of Health’s Generic Economic Model (GEM) has been used to assess the total cost of each option.

Under normal circumstances, with the appropriate time and resources available, a full economic appraisal would be undertaken across all options. However, since the FBC production for Phase 1, there has been some delays in commencing OBC activities for Phase 2 and subsequent pressures on the budgets and programme. It has therefore been agreed that to reduce the impact of additional fees in production that it should be viable to retain within this Phase 2 development the original economic appraisal undertaken within the Phase 1 /OBC, however with updated costings.

As with the Phase 1 OBC, it has been agreed to update only the preferred option. This is due to the principles of the assessment criteria and development of the options not changing from those originally set down.

As such, the following assumptions have been used in the economic appraisal:-

- A project life of 60 years plus build period has been used based on the expected lifespan of the buildings;
- Discount rate of 3.5% for the first 30 years, 3% thereafter in accordance with the Treasury Green Book.
- The base year for the appraisal is 2011/12 and all future costs have been discounted back to this year;
- Capital charges are included with a straight-line depreciation of assets. Building assets have been depreciated over a 60-year period. Large equipment, e.g. Linear Accelerators over 10 years;
- All VAT costs are excluded, with the exception of those associated with the capital costs for each option, in which case, this is highlighted separately in the OB Forms (at 20%). The preferred option (option 9B, as a development of option 9) The Net Present Costs (within the GEM) are exclusive of VAT.
- All cash flows relating to the project are included (both capital and revenue).
- Capital costs have been assessed by the respective Framework Cost Advisors at BIS PUBSEC reporting level of 173 (effective 1st June 2011). The OB Forms include an inflation adjustment to BIS PUBSEC (start on site Q4 2012).
- Contingency levels have been quantified for each option and are expressed as a percentage of total works cost. This is backed up by a quantified Risk Register;
- Outsourcing costs have been excluded;
- While workforce costs have been excluded and assumed to be neutral for each option, NHS Grampian acknowledges the contents of Professor Alan Rodger’s ‘Report to the Scottish Government Health Department and NHS Grampian, Aberdeen Cancer Centre’ where concerns over the level of staffing across clerical, administrative and medical disciplines have been recorded.

3.6.2 Estimating Cost

3.6.2.1 Capital Costs

The capital costs of each option are shown in table 3.10 below and the OB forms are attached in Appendix A-1
3.6.2.2 Methodology

The capital costs for the OBC have been calculated using Departmental Cost Allowance Guidance (DCAGs) from Healthcare Capital Investment NHS SHA Estates Newsletter 11/4 Business Innovation and Skill (BIS) PUBSEC indices (the Tender Price Index for Non-Housing). The principles of ‘How to Cost a Hospital’ were used in the formulation of the capital costings. The respective schedules of accommodation were prepared and added to the OB Forms with rates per square metre. These were then added to the option specific on-costs (which were quantified and calculated where reasonably possible), together with equipment costs, fees and VAT. OB Forms for all of the short listed options are included within Appendix A-1. The OB Forms for the preferred option are also provided.

3.6.2.3 Contingencies and Optimism Bias

A quantified Risk Register was prepared and agreed by the respective Framework Cost Advisors and this is included within Appendix A-2. A summary of the percentage allocations for each option are included within table 3.9 below.

NHS Grampian, in conjunction with its advisors assessed the Optimism Bias for each option using the standard methodology set out in the Green Book and adapted by the Department of Health. Optimism Bias figures for each of the short listed options are shown in Table 3.9 below.

During the development of the target price and the production of the Outline Business Case, the allowance of Optimism Bias will diminish to zero as greater design and cost certainty has been achieved.

Table 3.9: Contingency and Optimism Bias Allowances

<table>
<thead>
<tr>
<th>Sensitivity Test</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contingency</td>
<td>4.07%</td>
<td>13.50%</td>
<td>11.36%</td>
<td>10.96%</td>
<td>9.25%</td>
<td>10.11%</td>
</tr>
<tr>
<td>Optimism Bias</td>
<td>1.98%</td>
<td>11.02%</td>
<td>15.05%</td>
<td>15.75%</td>
<td>11.34%</td>
<td>14.65%</td>
</tr>
</tbody>
</table>

Each option has a specific Optimism Bias calculation. A summary of the percentage allocations for each option are included within table 3.10 below. For the avoidance of doubt, optimism bias is currently included within the capital cash flows in Table 3.11.
Table 3.10: Capital Costs

<table>
<thead>
<tr>
<th>Capital Costs</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td>Departmental Costs</td>
<td>-</td>
<td>2,708.03</td>
<td>4,894.62</td>
<td>5,120.83</td>
<td>7,699.73</td>
<td>5,547.50</td>
</tr>
<tr>
<td>On-Costs</td>
<td>645.00</td>
<td>2,879.18</td>
<td>4,124.91</td>
<td>4,510.82</td>
<td>5,046.01</td>
<td>4,460.20</td>
</tr>
<tr>
<td><strong>Works Cost Total</strong></td>
<td>645.00</td>
<td>5,587.21</td>
<td>9,019.54</td>
<td>9,631.65</td>
<td>12,745.73</td>
<td><strong>10,007.70</strong></td>
</tr>
<tr>
<td>Provisional location</td>
<td>6.45</td>
<td>55.87</td>
<td>90.20</td>
<td>96.32</td>
<td>127.46</td>
<td>100.08</td>
</tr>
<tr>
<td>adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td>651.45</td>
<td>5,643.08</td>
<td>9,109.73</td>
<td>9,727.97</td>
<td>12,873.19</td>
<td><strong>10,107.78</strong></td>
</tr>
<tr>
<td>Fees</td>
<td>711.46</td>
<td>1,565.93</td>
<td>2,129.69</td>
<td>2,220.87</td>
<td>2,639.74</td>
<td>2,276.90</td>
</tr>
<tr>
<td>Non-Works Costs</td>
<td>103.51</td>
<td>210.58</td>
<td>234.15</td>
<td>229.57</td>
<td>235.73</td>
<td>233.37</td>
</tr>
<tr>
<td>Equipment Cost</td>
<td>-</td>
<td>332.52</td>
<td>647.45</td>
<td>675.92</td>
<td>1,020.08</td>
<td>731.97</td>
</tr>
<tr>
<td>Planning Contingency</td>
<td>297.71</td>
<td>1,853.97</td>
<td>2,153.76</td>
<td>2,162.28</td>
<td>2,104.14</td>
<td>2,049.94</td>
</tr>
<tr>
<td><strong>TOTAL @ BIS PUBSEC 173</strong></td>
<td>1,764.13</td>
<td>9,606.07</td>
<td>14,274.78</td>
<td>15,016.61</td>
<td>18,872.88</td>
<td><strong>15,399.95</strong></td>
</tr>
<tr>
<td>VAT @ 20%</td>
<td>210.53</td>
<td>1,608.03</td>
<td>2,429.02</td>
<td>2,559.15</td>
<td>3,246.63</td>
<td>2,624.61</td>
</tr>
<tr>
<td><strong>Total Including VAT</strong></td>
<td>1,974.67</td>
<td>11,214.10</td>
<td>16,703.80</td>
<td>17,575.75</td>
<td>22,119.51</td>
<td><strong>18,024.56</strong></td>
</tr>
<tr>
<td>Optimism bias</td>
<td>41.92</td>
<td>1,270.31</td>
<td>2,578.03</td>
<td>2,838.14</td>
<td>2,568.22</td>
<td>2,707.31</td>
</tr>
<tr>
<td><strong>Total inc Opt. Bias</strong></td>
<td>2,016.58</td>
<td>12,484.40</td>
<td>19,281.82</td>
<td>20,413.89</td>
<td>24,687.73</td>
<td><strong>20,731.87</strong></td>
</tr>
<tr>
<td>Inflation (to BIS PUBSEC 180)</td>
<td>38.97</td>
<td>383.50</td>
<td>608.81</td>
<td>648.25</td>
<td>810.44</td>
<td>658.08</td>
</tr>
<tr>
<td><strong>Total Forecast Outturn</strong></td>
<td>2,055.55</td>
<td>12,867.91</td>
<td>19,890.63</td>
<td>21,062.14</td>
<td>25,498.17</td>
<td><strong>21,389.95</strong></td>
</tr>
</tbody>
</table>

Table 3.11: Capital Expenditure Phasing

Figures Exclusive of VAT (inclusive of Optimism Bias)

<table>
<thead>
<tr>
<th>Capital Costs</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td>2012/2013</td>
<td>1,831.5</td>
<td>2,619.3</td>
<td>2,385.2</td>
<td>2,526.1</td>
<td>2,860.9</td>
<td>2,557.9</td>
</tr>
<tr>
<td>2013/2014</td>
<td>-</td>
<td>8269.0</td>
<td>11,990.2</td>
<td>12,694.1</td>
<td>14,377.8</td>
<td>12,858.2</td>
</tr>
<tr>
<td>2014/2015</td>
<td>-</td>
<td>96.8</td>
<td>2393.1</td>
<td>2,527.6</td>
<td>3,008.9</td>
<td>2,609.1</td>
</tr>
<tr>
<td>2015/2016</td>
<td>-</td>
<td>-</td>
<td>162.1</td>
<td>174.1</td>
<td>207.3</td>
<td>179.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,831.5</td>
<td>10,985.0</td>
<td>16,930.5</td>
<td>17,921.9</td>
<td>20,454.9</td>
<td>18,204.4</td>
</tr>
</tbody>
</table>
3.6.3 Revenue Costs

The information used is the running costs developed from the baseline option in respect of the facilities management elements. The assessment of revenue costs includes a separate analysis for each option. An explanation of the differences and assumptions made are included within Appendix A-4. Such assumptions include an estimate for energy efficiency savings relative to each option, accounting for a degree of refurbishment (minor or major) and/or new build provision.

The costs currently exclude staffing costs for all options. It is however important to acknowledge the contents Professor Alan Rodgers `Report to the Scottish Government Health Department and NHS Grampian, Aberdeen Cancer Centre` where concerns over the level of staffing across clerical, administrative and medical disciplines have been recorded.

<table>
<thead>
<tr>
<th>Facilities Management Costs</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td></td>
<td>125.80</td>
<td>391.9</td>
<td>542.8</td>
<td>540.80</td>
<td>424.00</td>
<td>413.00</td>
</tr>
</tbody>
</table>

3.6.4 Life Cycle Costs

Life cycle costs have been developed by the respective Framework Cost Advisors using benchmark scheme information based on rates per square metre. At this stage it has not been possible to develop a full and detailed life cycle cost model due to the status of the design information. 6-Facet Land and Property Appraisal information was not available at the time of this assessment therefore general assumptions have been made. This has been subsequently ratified following receipt of such information.

Each option is unique in respect of the new build and refurbishment provision. The following assumptions have been made:

**Minor Refurbishment** - Assumed to include only replacement/renewal of existing finishes. Rate predicated on new build costs with uplift to accommodate removal and replacement of dedicated LINAC bunker plant - understood to be in urgent need of replacement but at the latest within 2-3 years. Rate increased by 15% to accommodate immediate plant replacement.

**Major Refurbishment** - Based upon strip out back to shell with full reinstatement (including replacement of windows etc. within external envelope). Rate predicated on new build costs with uplift to accommodate removal and replacement of general and dedicated LINAC bunker plant - although timescales have been elongated to accord with longer life expectancy. Rate increased by 10 % to accommodate medium term building services installation replacement.

**Existing Accommodation** - Utilisation of discrete rate for existing accommodation derived from empirical data

**Scheme Specifications** - The project data utilised for this exercise are based upon the following specifications: framed constructions with one scheme being predominantly single storey with some two storey, the other comprising single or double height accommodation; external envelopes comprising traditional masonry with alternate scheme involving mixture of traditional masonry, timber cladding and proprietary coloured render systems.

Adjustments to reflect the particulars of the actual designs are reflected in the On-Costs contained in the OB Forms, reference Appendix A-1.

The following table summarises the life cycle costs (per annum) for each option.
3.6.5 Net Present Cost Findings

The detailed economic appraisals for each option are included in this Outline Business Case, together with detailed descriptions for costs and benefits, and their sources and assumptions.

In respect of the Net Present Cost, Option 1, do nothing is the cheapest option in respect of capital and revenue expenditure. This is of course offset by being the highest clinical risk and lowest scoring in respect of benefits criteria. The lowest ranked option from an NPC perspective is Option 5a. However, it is not sufficient to undertake the analysis based on cost alone; therefore, one must take into account clinical risk mitigation and alliance with benefits criteria.

Table 3.13: Life Cycle Costs

<table>
<thead>
<tr>
<th>Life Cycle Costs</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td></td>
</tr>
<tr>
<td>Average Annual</td>
<td>n/a</td>
<td>206.0</td>
<td>282.3</td>
<td>267.70</td>
<td>225.60</td>
<td>249.90</td>
</tr>
</tbody>
</table>

Table 3.14: Summary of Key GEM Elements

*Figures Exclusive of VAT (inclusive of Optimism Bias)*

<table>
<thead>
<tr>
<th>Capital Costs</th>
<th>Capital Costs</th>
<th>Life Cycle Costs</th>
<th>Revenue (FM) Costs</th>
<th>Total Costs</th>
<th>Net Present Cost</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1</td>
<td>1,831.5</td>
<td>-</td>
<td>7,923.8</td>
<td>16,398.0</td>
<td>5,184.2</td>
<td>1</td>
</tr>
<tr>
<td>Option 3</td>
<td>10,985.0</td>
<td>12,565.8</td>
<td>23,906.4</td>
<td>47,457.2</td>
<td>25,708.5</td>
<td>2</td>
</tr>
<tr>
<td>Option 5</td>
<td>16,930.5</td>
<td>16,938.2</td>
<td>32,566.5</td>
<td>66,435.2</td>
<td>36,315.6</td>
<td>5</td>
</tr>
<tr>
<td>Option 5a</td>
<td>17,921.9</td>
<td>16,063.1</td>
<td>32,446.5</td>
<td>66,431.5</td>
<td>36,879.1</td>
<td>6</td>
</tr>
<tr>
<td>Option 9</td>
<td>20,454.9</td>
<td>13,536.6</td>
<td>25,817.3</td>
<td>59,808.8</td>
<td>35,545.4</td>
<td>4</td>
</tr>
<tr>
<td>Option 13</td>
<td>18,204.4</td>
<td>14,993.9</td>
<td>25,157.3</td>
<td>58,355.6</td>
<td>33,691.4</td>
<td>3</td>
</tr>
</tbody>
</table>
3.7 Qualitative Benefits Appraisal

During the development of the Outline Business Case for Phase 1 a risk workshop was held to evaluate the risks associated with the project, these risks were then evaluated on the 14th October 2009 with key members of the NHS Grampian team, their advisers and the Principal Supply Chain Partner and Members (PSCP and PSCM). During the development of the Outline Business Case for Phase 1, these risks were developed and appropriately managed. NHS Grampian will enter into a Target Price contract with the PSCP. At this juncture NHS Grampian will retain a risk provision within the overall projected capital cost of the project. This aspect deals with the quantifiable risk. This does however leave a residual risk which is unquantifiable, i.e. un-costed. These risks are referred to as ‘Clinical Risks’; those which impact upon clinical delivery. These have been scheduled using the standard approach for all NHS Grampian capital projects.

3.7.1 Methodology

The methodology used to appraise the risks during the development of the Outline Business Case involved the following distinct elements:

- Identifying all the possible business and service risks associated with each option
- Assessing the impact and probability for each option
- Calculating a risk score.
- Identifying the cost and time allocated to each risk
- PERT Analysis (from Optimistic, Pessimistic and Realistic Costs)
- Expected Monetary Value of the risk linked to the probability percentage of the risk occurring
- Allocating risk to the appropriate party

The quantifiable risks have been costed and included within the capital costings, set as contingency, as stated. The residual unquantifiable risks are deemed to be included within the Optimism Bias element of the capital costs. These have been scheduled using the standard approach for all NHS Grampian capital projects.

3.7.2 Risk Scores

The workshops assigned the risk scores on the basis of participants’ knowledge, judgements and experience. A more detailed assessment of the individual risks is shown in the Risk Register within Appendix A-2.

The Clinical Risks were scored from one to five for probability and impact with one being low and five being high. A summary of the clinical risks that were assessed is illustrated below, while the full risk scores are contained in appendix A-9.

<table>
<thead>
<tr>
<th>Clinical Risks</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Fit</td>
<td>20</td>
<td>16</td>
<td>12</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clinical Management and Practice</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>10</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>Safety</td>
<td>15</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Workforce</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>16</td>
<td>10.5</td>
<td>7.5</td>
<td>7.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Finance</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>15</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Politics and public</td>
<td>15</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total Risk Score</td>
<td>113</td>
<td>90.5</td>
<td>71</td>
<td>64.5</td>
<td>41</td>
<td>46</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
As can be seen from the table above, Option 1 demonstrates the current and highest position of clinical risk. The delivery of any of the other Options will mitigate these risks to varying degrees. The highest ranking option for best risk mitigation is Option 9.

### 3.7.3 Summary of Economic, Risk and Financial Appraisals

The summary of the economic, risk and benefits appraisal is shown in Table 3.16 below. The cost and benefits of each option have been brought together by calculating a cost per benefit point for each option.

<table>
<thead>
<tr>
<th>Appraisal Element</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit Score (a)</td>
<td>74</td>
<td>378</td>
<td>584</td>
<td>647</td>
<td>919</td>
<td>781</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Net Present Cost (b)</td>
<td>5,184.2</td>
<td>25,708.5</td>
<td>36,315.6</td>
<td>36,879.1</td>
<td>35,545.4</td>
<td>33,691.4</td>
</tr>
<tr>
<td>Rank</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Cost per Benefit Point (b/a)</td>
<td>70.06</td>
<td>68.01</td>
<td>62.18</td>
<td>57.00</td>
<td>38.68</td>
<td>43.14</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Clinical Risk (c)</td>
<td>113.0</td>
<td>90.5</td>
<td>71.0</td>
<td>64.5</td>
<td>41.0</td>
<td>46.0</td>
</tr>
<tr>
<td>Clinical Risk % (out of 175 max) (d)</td>
<td>64.57%</td>
<td>51.71%</td>
<td>40.57%</td>
<td>36.86%</td>
<td>23.43%</td>
<td>26.29%</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Risk Adjusted Cost per Benefit Point (b/a x d)</td>
<td>45.24</td>
<td>35.17</td>
<td>25.23</td>
<td>21.01</td>
<td>9.06</td>
<td>11.34</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

The above summary provides an overview of the impact of the process in arriving at the preferred option, ultimately concluding with the lowest cost per benefit point, whilst arriving at the greatest mitigated clinical risk total. The preferred option, therefore to be carried forward into the Financial Case for affordability assessment is Option 9.
3.8 Sensitivity Analysis

In order to determine the robustness of the above economic and benefits appraisals the key variables for each of the appraisals have been flexed.

In relation to the financial variables the following have been flexed:
- Capital Costs
- Life Cycle Costs
- Facilities Management Costs

Table 3.17 – Financial Sensitivities (respective increase by 10%)

<table>
<thead>
<tr>
<th>Financial Sensitivities</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td>Capital</td>
<td>2,015</td>
<td>12,084</td>
<td>18,624</td>
<td>19,714</td>
<td>22,500</td>
<td>20,025</td>
</tr>
<tr>
<td>Life Cycle</td>
<td>n/a</td>
<td>226.6</td>
<td>310.53</td>
<td>294.47</td>
<td>248.16</td>
<td>274.89</td>
</tr>
<tr>
<td>Facilities Management</td>
<td>138.38</td>
<td>431.09</td>
<td>597.08</td>
<td>594.88</td>
<td>466.40</td>
<td>454.30</td>
</tr>
</tbody>
</table>

Table 3.18 – Financial Sensitivities (respective increase by 10%) - Effect on NPC

<table>
<thead>
<tr>
<th>Financial Sensitivities</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPC</td>
<td>£000</td>
<td>£000</td>
<td>£00</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td>10% increase in capital costs (incl. Life Cycle) £m</td>
<td>5,367.4</td>
<td>27,287.0</td>
<td>38,617.4</td>
<td>39,242.2</td>
<td>47,077.0</td>
<td>36,039.4</td>
</tr>
<tr>
<td>10% increase in revenue costs (FM)</td>
<td>5,517.7</td>
<td>26,695.4</td>
<td>37,634.0</td>
<td>38,192.8</td>
<td>44,786.8</td>
<td>34,703.3</td>
</tr>
</tbody>
</table>

Table 3.19 – Financial Sensitivities Analysis

<table>
<thead>
<tr>
<th>Sensitivity Analysis</th>
<th>Option 1</th>
<th>Option 3</th>
<th>Option 5</th>
<th>Option 5a</th>
<th>Option 9</th>
<th>Option 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Adjusted Base Cost per Benefit Point (As previous)</td>
<td>45.24</td>
<td>35.17</td>
<td>25.23</td>
<td>21.01</td>
<td>9.06</td>
<td>11.34</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10% increase in capital costs Risk Adjusted cost per benefit point (include Life Cycle) £m</td>
<td>46.84</td>
<td>37.33</td>
<td>26.83</td>
<td>22.35</td>
<td>12.00</td>
<td>12.13</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10% increase in revenue costs (FM) Risk Adjusted Cost per benefit point £m</td>
<td>48.15</td>
<td>36.52</td>
<td>26.14</td>
<td>21.76</td>
<td>11.42</td>
<td>11.68</td>
</tr>
<tr>
<td>Rank</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Even after flexing the revenue and capital costs the ranking remains the same thus, overall, the preferred option is Option 9.

### 3.9 Option 9b: Staged Approach to Proceeding with Option 9

The Financial Case (section 5 of this Business Case) will demonstrate that proceeding with the preferred option (Option 9) of the Cancer and haematology centre in full, continues to be unaffordable to NHS Grampian at this time. It is therefore proposed that Option 9b (Phase 2) is undertaken as a second stage development to conclude the Replacement Linear Accelerator Project.

Option 9b consists of the construction of 2 new Linear Accelerator bunkers (one for the 3rd Linear accelerator and the other as a spare / turnaround bunker), pre-treatment and minimal associated support facilities.

As Option 9b is the second stage of the preferred option and not a new option, the Economic Case above remains valid. The costs of Option 9b are considered in full in both Sections 3 and 5.

The affordability of Option 9b in terms of Capital and Revenue is considered in Section 5 – The Financial Case. The cost of VAT has been calculated at 20% for Option 9b as the development of the preferred option.

### Table 3.20 – Option 9b Capital Cost

<table>
<thead>
<tr>
<th>Capital Costs</th>
<th>Option 9b £000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmental Costs</td>
<td>3,225.35</td>
</tr>
<tr>
<td>On-Costs</td>
<td>968.07</td>
</tr>
<tr>
<td><strong>Works Cost Total</strong></td>
<td><strong>4,193.42</strong></td>
</tr>
<tr>
<td>Provisional location adjustment</td>
<td>41.93</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td><strong>4,235.36</strong></td>
</tr>
<tr>
<td>Fees</td>
<td>565.42</td>
</tr>
<tr>
<td>Non-Works Costs (including minor equipment)</td>
<td>39.38</td>
</tr>
<tr>
<td>Equipment Cost (major equipment excluded)</td>
<td>391.11</td>
</tr>
<tr>
<td>Planning Contingency</td>
<td>268.70</td>
</tr>
<tr>
<td><strong>TOTAL @ BIS PUBSEC 173</strong></td>
<td><strong>5,499.97</strong></td>
</tr>
<tr>
<td>VAT @ 20%</td>
<td>986.91</td>
</tr>
<tr>
<td><strong>Total Including VAT</strong></td>
<td><strong>6,486.88</strong></td>
</tr>
<tr>
<td>Optimism bias</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total inc Opt. Bias</strong></td>
<td><strong>6,486.88</strong></td>
</tr>
<tr>
<td>Inflation (to 4Q2012 BIS PUBSEC 180)</td>
<td>218.90</td>
</tr>
<tr>
<td><strong>Total Forecast Outturn</strong></td>
<td><strong>6,705.78</strong></td>
</tr>
</tbody>
</table>

Sitting below the line, and the subject of a separate funding stream, is the major equipment procurement.
The Planning Contingency of 5.14% is derived by dividing the figure of £268.7k in table 3.20 above by the sum of the figures above it. Due to the benefits of the knowledge gained on Phase 1, the optimism bias element has diminished to zero for this option as the issues have been mitigated accordingly and/or included into the design and cost solution for Phase 2.

<table>
<thead>
<tr>
<th>Sensitivity Test</th>
<th>Option 9b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contingency</td>
<td>5.14%</td>
</tr>
<tr>
<td>Optimism Bias</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 3.21 – Option 9b Revenue Cost

Facilities Management Costs

<table>
<thead>
<tr>
<th>Facilities Management Costs</th>
<th>Option 9b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£000</td>
</tr>
<tr>
<td>Average Annual</td>
<td>137.0</td>
</tr>
</tbody>
</table>

The cost above is taken from Appendix A-4.

Life Cycle Costs

<table>
<thead>
<tr>
<th>Life Cycle Costs</th>
<th>Option 9b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£000</td>
</tr>
<tr>
<td>Average Annual</td>
<td>86.8</td>
</tr>
</tbody>
</table>

The cost above is taken from Appendix A-5.

Summary of Key GEM Elements

Figures Exclusive of VAT (inclusive of Optimism Bias)

<table>
<thead>
<tr>
<th>Capital Costs</th>
<th>Capital Costs</th>
<th>Life Cycle Costs</th>
<th>Revenue (FM) Costs</th>
<th>Total Costs</th>
<th>Net Present Cost</th>
<th>Equivalent Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
<td>£000</td>
</tr>
<tr>
<td>Option 9b</td>
<td>5,682.4</td>
<td>5,208.0</td>
<td>8,357.0</td>
<td>19,247.4</td>
<td>10,967.7</td>
<td>411.5</td>
</tr>
</tbody>
</table>

The GEM model for option 9b is at Appendix A-7.
4 THE COMMERCIAL CASE

4.1 Introduction

This section of the Outline Business Case describes the agreement between the Board and the PSCP, who as the solution provider has undertaken a wide range of services and duties to assist and support NHS Grampian through each of the Business Case stages, and will ultimately lead onto the construction and commissioning of the new facility.

This agreement shall reflect the guiding principles of the Frameworks Scotland Agreement which has been entered into between The PSCP and the NHS National Services Scotland and the project will be developed under this national framework. The Framework Agreement is managed by Health Facilities Scotland (a division of NHS National Services Scotland) on behalf of the Scottish Government Health Directorate.

The Framework embraces the principles of collaborative working, public and private sectors working together effectively, and it is designed to deliver on-going tangible performance improvements due to repeat work being undertaken by the supply chains.

‘The Guide’ developed by Health Facilities Scotland for use on all the Frameworks Scotland initiatives highlights that the Framework has been established to achieve the following key benefits:

- Earlier and faster delivery of projects.
- Certainty of time, cost and quality.
- Value for money
- Well-designed buildings procured within a positive collaborative working environment.

4.2 Project / Scheme Objectives

The benefits to be derived from the Framework are married with the objectives of the individual projects / schemes, which are defined within the Framework Agreement as:

- Completion of schemes to the standard and functionality that meets the requirements set out in the Scheme Contract;
- Value for money, not only in the initial capital cost, but also for the whole asset life cycle through the application of the principles of value engineering;
- Certainty of delivery in terms of time and cost;
- Consistent delivery in terms of quality in both design and construction;
- The introduction of continuous improvement through collaborative working, the adoption of benchmarking and performance management;
- Improved management of risk; and
- Optimised delivery of sustainable development on all major NHS schemes in Scotland procured through the Frameworks Scotland initiative.

The PSCP will enter into an individual project specific Scheme Contract with NHS Grampian at the beginning of each Stage of the Scheme, and ultimately for the construction and commissioning element of the project.

4.3 Required Services

The products and services under contract are for a single point deliverer. This offers a procurement vehicle with an integrated supply chain for the delivery of design, manufacture, construction and commissioning of a facility to accommodate the linear accelerator replacement programme.

With regard to the Linear Accelerator and other radiotherapy equipment, the national procurement process has procured the services of Varian for the supply of the equipment for NHS Grampian that is consistent with other Boards. Varian will supply three replacement
linear accelerators and other radiotherapy equipment, and the programme for supply and installation will be co-ordinated by NHS Grampian and the PSCP as appropriate.

4.4 Agreed Risk Transfer

The general principle is that risks are passed to 'the party best able to manage them', subject to value for money. This is reflected in the Risk Register within Appendix A-2.

4.5 Agreed Charging Mechanisms

The payment mechanism under the National Framework NEC3 Engineering and Construction Contract, Option C Target Contract with Activity Schedule involves an open book auditable approach. At the preconstruction stages payment is based on a fee forecast schedule, (which is intrinsically linked to an agreed programme and set of deliverables) based on hours expended, multiplied by the Framework agreed rates supported by timesheets, along with ancillary cost payments such as surveys.

The PSCP and its supply chain members commercial rates and profit levels for duties undertaken during each of the pre-construction Business Case development stages have been tendered competitively as part of the Framework selection process.

At the construction stage the payment is based on accounting ledger cost from the PSCP under the NEC3 Engineering and Construction Contract Option C Target Contract with Activity Schedule. Payments are checked and verified through the independent Board Cost Advisor, Gardiner & Theobald.

4.6 Agreed Contract Length

The PSCP enters into a Scheme Contract at each of the Business Case stages following agreement of the deliverables to be produced, the programme and price. The contract length is therefore set out in the Scheme Contract and for this submission covers the pre-construction period during Stage 2 Outline Business Case, Stage 3 Full Business Case and Stage 4 Construction and Commissioning.

4.7 Contractual Clauses

The form of contract is the Engineering and Construction Contract NEC 3, Option C Target Contract with Activity Schedule and supports the principles, culture and ethos of Frameworks Scotland. The key principle of this option is that the PSCP agrees a target price with the NHS Board, working to agreed margins and organising open book accounting.

The combination of Main Options, Core and Secondary Clauses means it is flexible, focuses on collaborative procedures and good practice, and acts as a stimulus to good management. The Core Clauses provide a backbone covering items such as responsibilities (Works Information), Early Warnings (Clause 16), Time (Clause 3), Payments (Clause 5) and Risk (Clause 8). The Early Warning system typifies the proactive nature of the NEC bringing the parties together to minimise risk. The Secondary Option Clauses provide a further list of components for items such as retention and inflation.

A number of alterations have been made to the standard contract in order to tailor it to the requirements of the Frameworks Scotland Agreement. Key alterations include:

- Cash flow forecasts regularly updated by the PSCP and related to the programme
- Payment of accrued costs to the supply chain
- Gain share potential for Client and the PSCP (but overspend of the final target price is funded by the PSCP)
- An firmer definition of Defined Cost

The Scheme Contract is structured to enable it to be reviewed and updated as works proceed for each stage up to agreement of the Target Price during Stage 3, this includes:
4.8 Personnel Implications (Including TUPE)

TUPE – the Transfer of Undertakings (Protection of Employment) Regulations 1981 – will not apply to this investment because there will be no transfer of staff. Those staff currently employed within the existing facility will be re-deployed on other similar duties within NHS Grampian.

4.9 Procurement Strategy and Implementation Timescales

It is anticipated that the procurement strategy will continue to follow the national framework as set out in the Frameworks Scotland Agreement between National Services Scotland and the PSCP.

It is thus intended that NHS Grampian and the PSCP will enter into Scheme Contracts for services and work to maintain the development of the linear accelerator replacement programme from Business Case development through to construction and commissioning activities.

4.10 Capital Funding

The first step in securing any capital funding is approval of the ‘Initial Agreement’; the Health Campus Programme Initial Agreement was approved by NHS Grampian in February 2008 and by the Scottish Government in March 2008.

Within this Initial Agreement NHS Grampian provisionally identified a capital requirement of approximately £50m gross development budget (in years 5 to 10 of its 15 year capital plan) for a Cancer and Haematology Centre. Included within these figures is a dedicated Scottish Government Health Directorate (SGHD) capital funding of approximately £13.7m which is available to NHS Grampian over the next five years (which constitutes years 2009/10 to 2013/14 in the capital plan) for the replacement of linear accelerators and other radiotherapy equipment.

In order to secure this dedicated budget from the SGHD the development of the Cancer and Haematology Centre must be capable of being undertaken on a staged basis, with the first stage being the provision of suitable radiotherapy treatment facilities to accommodate the linear accelerator replacement programme. This staged approach has led to the separate individual submission of Business Cases for the Replacement Linear Accelerator Project. Phase 2 of the project as detailed and costed in this OBC completes the bunker construction works.

4.11 Accountancy Treatment

The project is publicly funded and thus the values on completion will be debited to the balance sheet of the NHS Grampian Board. The asset will then depreciate over its useful life and will be accounted for in accordance with the rules governing all assets.
5 THE FINANCIAL CASE

5.1 Introduction

The purpose of this section is to set out firm financial implications of the preferred solution and an examination of the affordability of that solution to NHS Grampian.

5.2 Costing Methodology

A detailed financial analysis of all the short-listed options considered for the proposed Linear Accelerator and associated Radiotherapy Department replacement has been carried out based on estimates of capital, operating, maintenance, and lifecycle costs. A bespoke financial model was developed and implemented to consider the likely financial impact for NHS Grampian. This cost was also subjected to a sensitivity analysis and the application of a risk contingency.

5.3 Capital Costing & Risk Allowance

The capital cost estimated for each option has been developed in considerable detail in partnership with NHS Grampian’s Principal Supply Chain Partner (PSCP), Laing O’Rourke, as part of Health Frameworks Scotland.

These costs include elements for both a Risk Register and Optimism Bias, unique to each option, in accordance with the SCIM guidelines.

5.4 Operating Costs

Operating costs for each of the options have been calculated by NHS Grampian using their standard floor area rates. Savings offsets have been implemented where they will be achieved in old buildings which are emptied or demolished.

5.5 Depreciation

Depreciation of the funding has been included in the calculation on a straight-line basis over the useful life of the asset.

Depreciation will be incurred on the whole of the capital cost of the scheme and this has been allowed for in the financial model.

5.6 Lifecycle Costing

A discount rate of 3.5% has been used to calculate the lifecycle cost over the 30 year life and 60 year life of the scheme. The latter additional life cycle analysis has been applied to comply with BREEAM Excellent good practice and requirements.
5.7 Financial Profile of Short-Listed Options

The following table summarises the profile of each of the options in terms of the various cost headings above.

Table 5.1: Option Summaries

<table>
<thead>
<tr>
<th>Option</th>
<th>Capital Cost (Excl Radiotherapy Equip) £000’s</th>
<th>Net Additional Annual Operating Costs £000s</th>
<th>Net Additional Annual Depreciation £000s</th>
<th>Lifecycle Costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,056</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>12,868</td>
<td>87</td>
<td>289</td>
<td>12,566</td>
</tr>
<tr>
<td>5</td>
<td>19,891</td>
<td>291</td>
<td>455</td>
<td>16,938</td>
</tr>
<tr>
<td>5a</td>
<td>21,062</td>
<td>316</td>
<td>481</td>
<td>16,063</td>
</tr>
<tr>
<td>9</td>
<td>25,498</td>
<td>459</td>
<td>582</td>
<td>13,537</td>
</tr>
<tr>
<td>13</td>
<td>21,390</td>
<td>370</td>
<td>491</td>
<td>14,994</td>
</tr>
</tbody>
</table>

5.8 Preferred Option

The preferred option, as indicated by both the Qualitative Benefits exercise and Economic Appraisal, is Option 9 – New build for all Cancer and Haematology facilities.

The estimated capital cost for the construction of Option 9 is £25.5M, a breakdown of which is within the Economic Case (Table 3.10).

The net additional annual estimated operating costs of Option 9 are:

Table 5.2: Additional Operating Costs of Option 9

<table>
<thead>
<tr>
<th>Operating Cost</th>
<th>Net Additional Annual Cost £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates &amp; Water</td>
<td>127</td>
</tr>
<tr>
<td>Heat, Light and Power</td>
<td>167</td>
</tr>
<tr>
<td>Maintenance</td>
<td>56</td>
</tr>
<tr>
<td>Cleaning</td>
<td>109</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>459</strong></td>
</tr>
</tbody>
</table>

The net additional maximum annual capital charges associated with Option 9 are:

Table 5.3: Additional Annual Depreciation of Option 9

<table>
<thead>
<tr>
<th>Depreciation</th>
<th>Net Additional Depreciation £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Works</td>
<td>518</td>
</tr>
<tr>
<td>General Equipment</td>
<td>64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>582</strong></td>
</tr>
</tbody>
</table>
The building cost of the preferred option (Option 9) of £25.5M is not affordable to NHS Grampian at this time.

Option 9a was developed as a first phase towards the full Option 9 and this option was approved via its Full Business Case in 2011, at a construction cost of £6.693M. Construction of this phase 1 will be complete in June 2012.

Option 9b, as a second phase of Option 9, allows NHS Grampian to provide 2 further new Linear Accelerator Bunkers and pre-treatment facilities, along with the required support accommodation, at a further cost of £6.706M. This Outline Business Case seeks the approval to proceed with this second phase.

Indicative funding of £6.706M has been made available for the build element of Phase 2, as part of the National Radiotherapy Allocation. Confirmation of that funding is dependent on approval of this Outline Business Case and subsequent Full Business Case.

The costs of Option 9b at Outline Business Case stage are as follows:

**Table 5.4: Option 9b Capital and Revenue Costs**

<table>
<thead>
<tr>
<th>Option</th>
<th>Capital Cost £000s</th>
<th>Net Additional Annual Operating Costs £000s</th>
<th>Maximum Additional Annual Depreciation £000s</th>
<th>Average Annual Life-cycle Costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>9b</td>
<td>6,706</td>
<td>113</td>
<td>159</td>
<td>87</td>
</tr>
</tbody>
</table>

The capital costs are broken down into the following components:

**Table 5.5: Option 9b Capital Costs**

<table>
<thead>
<tr>
<th>Capital Cost Elements</th>
<th>Cost £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmental Costs</td>
<td>3,225</td>
</tr>
<tr>
<td>On-Costs</td>
<td>968</td>
</tr>
<tr>
<td>Location Adjustment</td>
<td>42</td>
</tr>
<tr>
<td>Fees</td>
<td>565</td>
</tr>
<tr>
<td>Non-works Costs</td>
<td>39</td>
</tr>
<tr>
<td>Equipment</td>
<td>391</td>
</tr>
<tr>
<td>Contingencies (Risk Register) 5.14%</td>
<td>269</td>
</tr>
<tr>
<td>Inflation Adjustments</td>
<td>182</td>
</tr>
<tr>
<td>VAT</td>
<td>1,023</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,706</strong></td>
</tr>
</tbody>
</table>

5.9 Impact on the Income and Expenditure Account

The Capital and Revenue costs and funding streams over the intended lifespan of the project assume a build completion date of 31st December 2013.

Indicative capital funding has been made available from the National Radiotherapy Replacement Programme of £6.706M for the cost of the Linear Accelerator Facility within this Business Case, subject to its approval. The capital cost of £6.706M is therefore within the national funding available. There are however, significant timing issues regarding the funding, which are highlighted in Table 5.6.

The following tables detail the estimated impact on Income and Expenditure.
Table 5.6: Summary of Financial Appraisal

<table>
<thead>
<tr>
<th>£ 000</th>
<th>2012/13</th>
<th>2013/14</th>
<th>2014/15</th>
<th>2015/16</th>
<th>2016/17</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expenditure:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear Accelerator Facility (Option 9b)</td>
<td>2,140</td>
<td>4,566</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6,706</td>
</tr>
<tr>
<td>Linear Accelerator Machine no.3*</td>
<td>0</td>
<td>1,793</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,793</td>
</tr>
<tr>
<td><strong>Total Capital Cost</strong></td>
<td>2,140</td>
<td>6,359</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8,499</td>
</tr>
<tr>
<td><strong>Funding:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Radiotherapy Funding (Option 9b)</td>
<td>0</td>
<td>3,353</td>
<td>3,353</td>
<td>0</td>
<td>0</td>
<td>6,706</td>
</tr>
<tr>
<td>National Radiotherapy Funding (Linear Accelerator no.3)*</td>
<td>1,793</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,793</td>
</tr>
<tr>
<td><strong>Total Funding</strong></td>
<td>1,793</td>
<td>3,353</td>
<td>3,353</td>
<td>0</td>
<td>0</td>
<td>8,499</td>
</tr>
<tr>
<td><strong>Net Capital Surplus (Shortfall)</strong></td>
<td>(347)**</td>
<td>(3,006)**</td>
<td>3,353**</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Timing of the Purchase of Linear Accelerator Machine No. 3*

The current National Radiotherapy funding profile (version 19) schedules the purchase of Linear Accelerator No.3 (cost £1.793M) for 2012/13, which means that it would need to be installed in one of the old bunkers until the new facility (Option 9b) is completed.

This OBC proposes that the 3rd Linear Accelerator purchase is delayed until late 2013, once the new facility is complete. By doing this, the funding in 2012/13 of £1.793M intended to pay for the machine, can be used to commence the build work instead (per table 1.7). It would also avoid installing the machine in the old facility and the significant cost of transferring the machine to the new facility upon completion of the build.

However, the funding for the 3rd machine (and indeed a significant proportion of the funding for the construction) will then not be available from the National Programme until 1st April 2014 (from the balance of the funding for the build of £3.353M, per table 1.7). It will not be possible for NHS Grampian to balance this position from within its own capital programme in 2012/13 and 2013/14.

**Timing Issues with the Overall Funding Package**

As indicated in the table above, significant shortfalls in capital funding for the project are anticipated in 2012/13 and 2013/14, due to the timing of the National Allocations. This situation is balanced out in 2014/15, giving an overall break-even position. NHS Grampian is requesting that the SGHD consider the possibility of re-aligning the National Funding position when evaluating this OBC, to allow the project to proceed as scheduled and at the cost stated here-in.
### Revenue

<table>
<thead>
<tr>
<th>£ 000</th>
<th>2012/13</th>
<th>2013/14</th>
<th>2014/15</th>
<th>2015/16</th>
<th>2016/17</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expenditure:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Costs*</td>
<td>0</td>
<td>28</td>
<td>113</td>
<td>113</td>
<td>113</td>
<td>367</td>
</tr>
<tr>
<td>Depreciation</td>
<td>0</td>
<td>40</td>
<td>159</td>
<td>159</td>
<td>159</td>
<td>517</td>
</tr>
<tr>
<td><strong>Total Expend</strong></td>
<td>0</td>
<td>68</td>
<td>272</td>
<td>272</td>
<td>272</td>
<td>884</td>
</tr>
<tr>
<td><strong>Funding:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Revenue Funding</td>
<td>0</td>
<td>40</td>
<td>159</td>
<td>159</td>
<td>159</td>
<td>517</td>
</tr>
<tr>
<td>NHS SG 5 year Revenue Funding</td>
<td>0</td>
<td>28</td>
<td>113</td>
<td>113</td>
<td>113</td>
<td>367</td>
</tr>
<tr>
<td><strong>Total Funding</strong></td>
<td>0</td>
<td>68</td>
<td>272</td>
<td>272</td>
<td>272</td>
<td>884</td>
</tr>
<tr>
<td><strong>Net Revenue Surplus (Shortfall)</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Operational expenditure relates entirely to the net additional property running costs of the new extension.

### National Radiotherapy Capital Funding - NHS Grampian

The following table shows the complete funding profile for NHS Grampian from the National Radiotherapy Programme, in order to fully reconcile the figures in this OBC with the SGHD.

<table>
<thead>
<tr>
<th>£ 000</th>
<th>2012/13</th>
<th>2013/14</th>
<th>2014/15</th>
<th>2015/16</th>
<th>2016/17</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linac Phase 1 Build</td>
<td>207</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>207</td>
</tr>
<tr>
<td>Linear Accelerator No.1</td>
<td>2239</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2239</td>
</tr>
<tr>
<td>Linear Accelerator No.2</td>
<td>1686</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1686</td>
</tr>
<tr>
<td>Linear Accelerator No.3</td>
<td>1793</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1793</td>
</tr>
<tr>
<td>Linac Phase 2 Build</td>
<td>0</td>
<td>3353</td>
<td>3353</td>
<td>0</td>
<td>0</td>
<td>6706</td>
</tr>
<tr>
<td>Brachytherapy</td>
<td>0</td>
<td>0</td>
<td>540</td>
<td>0</td>
<td>0</td>
<td>540</td>
</tr>
<tr>
<td>V&amp;R System</td>
<td>0</td>
<td>0</td>
<td>400</td>
<td>0</td>
<td>0</td>
<td>400</td>
</tr>
<tr>
<td>CT Simulator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>704</td>
<td>704</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>5925</td>
<td>3353</td>
<td>4293</td>
<td>0</td>
<td>704</td>
<td>14275</td>
</tr>
</tbody>
</table>
5.10 Impact on the Balance Sheet

Upon completion of the new linear accelerator bunker facility and associated support accommodation, the asset will be capitalised on the Balance Sheet of NHS Grampian in accordance with the rules governing all of its assets.

The asset will be capitalised at depreciated replacement cost, in line with NHS in Scotland policy in the month in which the asset formally becomes the property of NHS Grampian. It will then be straight-line depreciated over the estimated useful life of the asset.

5.11 Overall Affordability

5.11.1 Capital

The cost of the project is estimated at £6.706M as per table 5.5, with National Funding available in total of £6.706M, as per table 5.6. The capital cost of the project is therefore within the funding available.

The timing of the national funding is not currently consistent with the expenditure planned in this OBC. Section 5.9 indicates how NHS Grampian proposes to manage this position, with assistance requested from the SGHD.

Operating Costs

The additional funding requirement in operating costs associated with Option 9b is £113k per annum. This is entirely made up of running costs of the new build extension (Rates, Heat Light and Power (HLP), Cleaning & Maintenance), net of savings on areas which will be vacated upon completion.

These additional costs will be highlighted as part of NHS Grampian’s annual budget setting process and will be included in the 5 year revenue plans. The impact of these will therefore be managed within the overall NHS Grampian budget.

5.11.2 Lifecycle Costs

The lifecycle maintenance programme will be undertaken as part of the overall maintenance prioritisation process of NHS Grampian. There is a significant back-log maintenance cost avoided on the old bunker facility by undertaking this project, which will more than offset any maintenance costs in the early years of the new building’s life.

5.11.3 Depreciation

The National Radiotherapy funding forms part of the capital programme of NHS Grampian. Estimates of depreciation resulting from this programme are fed into the 5 year revenue plans. The current plan is based on a capital cost of £6.706M and therefore there will be no increase in depreciation beyond the level that is included in the 5 year revenue plan.
5.12 Sensitivity Analysis

The Table below indicates the change in the funding shortfall, operating costs and depreciation for a number of permutations of cost fluctuation in both capital and revenue costs.

Table 5.7: Sensitivity Analysis

<table>
<thead>
<tr>
<th>% Change in Cost</th>
<th>Change in Capital Cost £000s</th>
<th>Change in Operational Cost £000s</th>
<th>Depreciation Change £000s</th>
<th>Average Annual Life-cycle Costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 5%</td>
<td>+335</td>
<td>+6</td>
<td>+8</td>
<td>+4</td>
</tr>
<tr>
<td>+ 10%</td>
<td>+670</td>
<td>+12</td>
<td>+16</td>
<td>+8</td>
</tr>
<tr>
<td>+15%</td>
<td>+1005</td>
<td>+18</td>
<td>+24</td>
<td>+12</td>
</tr>
<tr>
<td>- 5%</td>
<td>-335</td>
<td>-6</td>
<td>-8</td>
<td>-4</td>
</tr>
<tr>
<td>- 10%</td>
<td>-670</td>
<td>-12</td>
<td>-16</td>
<td>-8</td>
</tr>
<tr>
<td>- 15%</td>
<td>-1005</td>
<td>-18</td>
<td>-24</td>
<td>-12</td>
</tr>
</tbody>
</table>
6 THE MANAGEMENT CASE

6.1 Introduction

This section of the Outline Business Case addresses the “achievability” of the Scheme. This section sets out the actions that will be required to ensure the successful delivery of Phase 2 (i.e. Option 9b) of the scheme in accordance with best practice.

6.2 Programme and Project Management Arrangements

An infrastructure programme requires to be managed through a structured programme and project management approach.

The scheme for the replacement linear accelerator programme (which is an integral part of any future Cancer and Haematology Centre) forms an important part of the infrastructure programme to re-develop the Foresterhill Health campus and is therefore linked to other elements of the overall campus both in terms of programme and management / governance structure. Responsibility for the overall co-ordination of development activities on the Foresterhill Health campus will be retained by NHS Grampian, while the delivery of the replacement linear accelerator project primarily rests with the PSCP.

6.3 Governance and Accountability

It is essential that before any project is initiated, it has to be established where the decision-making authority will rest and what management structure will be put in place.

The governance arrangements are covered by the Health Campus Programme. The Health Campus programme structure has been organised to ensure that the high priority approved projects and those currently under consideration can be taken forward efficiently in support of the Health Plan implementation. The main aims of the Health Campus Programme are to:

- Ensure that decision making can be integrated with NHS Grampian’s normal management processes as much as possible
- Clinical leadership and project management support can be targeted effectively and efficiently
- Best practice is applied in terms of project management and governance

The following structure provides clarity in terms of governance and accountability consistent with best practice in programme management.
Table 6.1: NHS Grampian Project Governance

The Sponsoring Group and leadership of the OMT by the Chief Operating Officer ensure a strong link to the aims and priorities of NHS Grampian. The OMT also make key revenue cost/funding decisions required within the programme.

**Operational Management Team**
Chair: Pauline Strachan, Chief Operating Officer

**Asset Investment Group**
Chair: Graeme Smith, Director of Modernisation

**Health Campus Programme Board**
Clinical Sponsor: R Dijkhuizen
Programme Director: Graeme Smith

Corporate governance of the programme, high level stakeholder involvement and overall strategic direction. Strategic agreement and control of the use of the main healthcare sites in Aberdeen. High level co-ordination and standard setting for individual projects.

**Project Boards**

Strategic management of projects and implementation of plans consistent with NHS Grampian strategy and the detailed commission agreed by the Programme Board.

**Project Teams**

Preparation of Business Cases and design briefs, together with management and control of projects through to completion and bringing into service.
6.4 Programme Organisation

The Health Campus Programme Board leads and co-ordinates a range of projects set out in the structure below, ensuring a high level of co-ordination with service change and redesign:

Table 6.2: Health Campus Programme Structure
6.5 **Stakeholder Involvement**

The production of the Outline Business Case is led by Manju Patel, NHS Grampian Project Manager. The project structure supporting the scheme is outlined below.

The Project Board operates as the overarching steering group for the project. The primary project ‘delivery unit’ is the Project Team and, together with the Principals Group (provide project guidance from HCPB); it sits at the heart of the scheme. The Project Team is supported by other work streams as appropriate, and has been the prime mover in establishing the long list, short list, benefit criteria and project risks and driving the design solution through the Outline Business Case process.

6.6 **Project Reporting Structure**

**Table 6.3: Project Reporting Structure**

INTEGRATED CANCER CARE CENTRE MANAGEMENT STRUCTURE

- **Cancer Care Project Board**
  - Chair: RDijkhuizen Medical Director

- **Cancer Care Project Team**
  - Lead: Manju Patel
  - Steven Kinninmonth (LOR)

- **Principals Meeting**
  - Graeme Smith
  - Programme Director

- **Medical Equipment Group**
  - Graeme Robertson – Lead
  - Head of Radiotherapy Physics

- **Planning & Operational Policies Group**
  - Sue Brown – Lead
  - Unit Operational Manager

- **Workforce Redesign Group**
  - David Tosh – Lead
  - Nursing & Workforce Redesign Group

- **Communications & Involvement Group**
  - Andrea Gray – Lead

- **Design/Technical Working Group**
  - Steven Kinninmonth – Lead
  - PSCM Project Leader

- **Cost Review Working Group**
  - Jonathan Lewis – Lead
  - PSCP QS

- **End User Group**
  - Peter Moran – Lead Architect

- **Clinical Reference Group**
  - Manju Patel
  - Project Manager

- **Operational Management Team (OMT)**

- **Health Campus Board**

- **Asset Investment Group**
Project Team Core Members:
- Manju Patel – Project Manager
- Steven Kinninmonth – PSCP Project Leader
- Vince Shields – General Manager (Acute Services)
- Gary Mortimer – General Manager of Facilities and Estates
- Ross Davidson – Finance Manager
- Nicola Redgwell – Head of Radiography
- Graeme Robertson – Head of Radiotherapy Physics
- Andrea Gray – PFPI Officer (Corporate Communications)
- Dr Jane Tighe – Clinical Director for Oncology & Haematology
- Dr Graham MacDonald – Oncology Consultant
- Nicola Redgwell – Head of Radiography
- Andrea Gray – PFPI Officer (Corporate Communications)
- Dr Jane Tighe – Clinical Director for Oncology & Haematology
- Dr Graham MacDonald – Oncology Consultant
- Professor Alan Rodger – External Consultant
- Sue Brown – Unit Operational Manager

To be co-opted as and when required:
- Neil Cowan – Cost Advisor to NHS Grampian
- Peter Moran – PSCM Architect
- Mark Simpson – PSCM Cost Advisor

6.7 Principal Project Roles and Responsibilities

In order to achieve the full potential of the framework it is vital that all members of the team (which are wide and varied) play an active part, the principle project roles as defined below:

Programme Director
The Project Director of NHS Grampian leads the whole process from the outset of the project and is accountable directly to the Health Campus Programme Board. The Project Director provides strategic direction, leadership, and ensures that the Business Case reflects the views of all stakeholders. The Programme Director is supported by a Project Manager who undertakes the delivery function.

Project Manager
The Project Manager employed by NHS Grampian takes over the delivery function for a scheme from the Project Director and will perform the functions required by the Frameworks Scotland NEC 3 Scheme Contract. In addition the Project Manager will be the primary point of contact between the project team, NHS Grampian and the PSCP Project Leader.

PSCP Project Leader
The Project Leader employed by the PSCP will lead the PSCP team members and be the primary contact between the PSCP and NHS Grampian.

NHS Grampian has made internal appointments to the key positions of Project Director and Project Manager and has appointed Laing O’Rourke as its Principal Supply Chain Partner for Stage 2, Outline Business Case. In addition to this they have made the following other appointments:

Table 6.4: NHS Grampian Advisors

<table>
<thead>
<tr>
<th>Specialist Area</th>
<th>Adviser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Advisor</td>
<td>Gardiner &amp; Theobald</td>
</tr>
<tr>
<td>CDM Co-ordinator</td>
<td>NHS Grampian</td>
</tr>
<tr>
<td>Supervisor</td>
<td>NHS Grampian</td>
</tr>
<tr>
<td>BREEAM</td>
<td>BRE Scotland</td>
</tr>
</tbody>
</table>
Laing O’Rourke is supported in its role as Principal Supply Chain Partner in key disciplines by the following members:

Table 6.5: Principal Supply Chain Members

<table>
<thead>
<tr>
<th>Principal Supply Chain Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture</td>
</tr>
<tr>
<td>Civil &amp; Structural Eng</td>
</tr>
<tr>
<td>Mechanical &amp; Electrical Eng</td>
</tr>
<tr>
<td>Cost Management</td>
</tr>
<tr>
<td>Radiation Protection Adviser</td>
</tr>
</tbody>
</table>

6.8 Standardised Documents and Controls

This Outline Business Case has been developed in accordance with the mandatory suite of guidance documents that make up the Scottish Capital Investment Manual (SCIM) and the other guidance documents identified therein. The project management arrangements indicated in this document will remain in place during this next stage.

6.9 Arrangements for Contract Management

The strategy, framework and plan for contract management have been agreed between NHS Grampian and the PSCP. These are reflected in the project cost plan and associated OB Forms which form part of the Stage 2, Outline Business Case Scheme Contract.

The Contract (NEC3, Engineering and Construction Contract Option C Target Contract with Activity Schedule) has continued to be used through each stage of the Business Case process to ensure a systematic and robust approach is adopted in defining project parameters. This will ultimately culminate in the formulation of the Target Price which is based on the information contained within this Outline Business Case and a confirmed set of deliverables (Works Information). These project parameters form the cornerstone of the project management on the project.

Programme, risk management and change management procedures will ensure that issues are dealt with in a timely and equitable manner. Effective use of the CAT (Contract Administration Toolkit) communication, instruction, and submission and acceptance pro-forma will also ensure that an audit trail is maintained.
6.10  Project Plan

The development of Phase 2 of the Linear Accelerator Project is essential for completing the required accommodation for the linear accelerator replacement programme at Aberdeen Royal Infirmary. The third item of replacement equipment will be installed into the third new bunker with the fourth new bunker acting as a spare for “turn-around” support for future replacements. The key milestones for the completion of the facilities and bringing the final new equipment into service are shown below in Table 6.6:

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Target Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Capital Investment Group Approval of OBC and FBC for Phase 1,</td>
<td>April and June 2011 respectively</td>
</tr>
<tr>
<td>Replacement Linear Accelerator Project.</td>
<td></td>
</tr>
<tr>
<td>Planning Approval for Phase 1, Replacement Linear Accelerator Project.</td>
<td>May 2011</td>
</tr>
<tr>
<td>NHS Grampian AIG Approval of OBC for Phase 2, Replacement Linear</td>
<td>April 2012</td>
</tr>
<tr>
<td>Accelerator Project.</td>
<td></td>
</tr>
<tr>
<td>NHS Grampian Board Approval of OBC for Phase 2, Replacement Linear</td>
<td>June 2012</td>
</tr>
<tr>
<td>Accelerator Project.</td>
<td></td>
</tr>
<tr>
<td>Scottish Capital Investment Group Approval of OBC for Phase 2, Replacement</td>
<td>June 2012</td>
</tr>
<tr>
<td>Linear Accelerator Project.</td>
<td></td>
</tr>
<tr>
<td>Scottish Capital Investment Group Approval of FBC for Phase 2, Replacement</td>
<td>July 2012</td>
</tr>
<tr>
<td>Linear Accelerator Project.</td>
<td></td>
</tr>
<tr>
<td>Start on Site - Phase 2</td>
<td>December 2012</td>
</tr>
<tr>
<td>Completion of Build Work – Phase 2</td>
<td>February / March 2014</td>
</tr>
<tr>
<td>Delivery of Third Linear Accelerator</td>
<td>December 2013 – delayed from original May Date, to allow build work for first Phase 2 bunker to be completed.</td>
</tr>
<tr>
<td>Third Linear Accelerator Operational (within new bunker)</td>
<td>March 2014</td>
</tr>
</tbody>
</table>
6.11 Arrangements for Change Management

For change management the project will utilise the processes from the Frameworks Scotland procurement route which uses the NEC3 Engineering and Construction Contract Option C Target Contract with Activity Schedule and creates a structure and discipline to manage change via the use of Early Warning Notices and Compensation Events. This ensures change is identified early and is proactively managed by the project team.

6.12 Arrangements for Risk Management

The strategy, framework and plan for dealing with the management of risk are as required by the Frameworks Scotland Agreement and a copy of the full project Risk Register is attached at Appendix A-2. This sets out who is responsible for the management of risks and the required counter measures. A summary of the main risks is set out in the following table.

Overview
Risk analysis has three main uses:

- To deliver a robust financial and contractual structure for the project;
- To create a risk management process during procurement and execution of the contract; and
- To demonstrate value for money for the Board's financial commitments and estimate the project out-turn cost.

The Project Team in conjunction with the PSCP team have carried out a qualitative risk assessment, the results of which have been used to develop the risk management strategy.

Methodology
The methodology used to analyse the risks for the project are as follows:

- Define as project has developed;
- Record on Project Risk Register; and
- Control through defined mitigation strategies.

The main risks (top 5) associated with the preferred option are described in the following table:

<table>
<thead>
<tr>
<th>Table 6.7: Main Risks of Short Listed Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
</tr>
<tr>
<td>(1-5)</td>
</tr>
<tr>
<td>Interface with Aberdeen Eye Clinic</td>
</tr>
<tr>
<td>Construction Programme overrun in relation to Sectional Completion</td>
</tr>
<tr>
<td>Disturbance to adjacent live Phase 1 working environments</td>
</tr>
</tbody>
</table>

Risk Management
As the project develops, each identified risk will be assigned to a responsible manager to manage, mitigate where possible and to provide pre- and post-mitigation rankings. The risk profile for the project will be kept under regular review and the Risk Register will be maintained and updated to reflect the changing risk profiles throughout the development and construction of the scheme.

Throughout the project a triangulation exercise will be carried out to ensure correlation between the contingency allowances included and the detailed Risk Register.
6.13 **Technical Solution**

The technical solution for the scheme is set throughout Appendix B, which illustrates and describes the preferred option.

6.14 **Consultations**

This section details both consultations that have taken place and those that are on-going.

**Consultation with NHS Grampian Stakeholders**

Consultation has taken place with NHS Grampian Stakeholders, with Health Facilities Scotland and with the Foresterhill Master Planning Team.

**Consultation with the Public & Patients**

Consultation has been undertaken with the public. This has been done in the context both with the Health Campus as a whole and in detail through a cancer services Public & Patient Involvement Group. Members from these groups and the wider public have been seconded onto appropriate working groups to help inform key decision making in relation to the long list, short list, establishing the benefit criteria and scoring of the non-financial benefits. There has also been formal consultation with the University of Aberdeen, Aberdeen City Council and Aberdeenshire Council.

**Aberdeen City Council Planning and Infrastructure**

Consultation with Aberdeen City Council Planning Department is taking place. The main issue raised concerned drainage capacity, however the SUDS system installed as part of Phase 1 has capacity for the Phase 2 works. It was established that no pre-consultation period was required for structures less than 5,000m², or where the site is less than 2 hectares. All build options fall within these criteria and no pre-consultation is therefore required.

6.15 **Arrangements for Benefits Realisation**

The benefits identified within this Outline Business Case and set out below will be monitored during the development of the scheme through to completion of the Post Project Evaluation to maximise the opportunities for them to be realised.

- Supports Strategy – National / Regional / Local, including flexibility and future proofing.
- Secures value for money.
- The scheme is designed to have sufficient flexibility and future proofing to meet capacity and efficient targets.
- Improves patient public experience through the quality of the built environment.
- Patient experience is enhanced through improvement against current outcomes and performance and aligned against national and international achievements.
- Measured improvement in recruitment and retention of staff.
- The centre encourages improvements in staff overall performance, morale and job satisfaction.

The benefits identified are specific, measurable, achievable, realistic and time bound (SMART) and the arrangements criteria for monitoring the achievement of these through the development of the scheme are set out section 3.2 of this Outline Business Case.

It is proposed that the benefits realisation plan in respect of the project be reviewed and developed in stages and consideration be given to the following aspects during the next phase of the project:

- Review and agree the specific aforementioned measures to be assessed
- Identify the current baseline position (as applicable) to become the benchmark against which any improvements can be measured
• Agree a target and rationale for delivery of any benefits falling short of initial objectives which can be implemented / realised during subsequent phases of the masterplan development.

6.16 Performance Measurements - Key Performance Indicators

In order to improve the quality of service delivery and to drive continuous improvement within Frameworks Scotland there is a series of KPIs against which the performance of the Principal Supply Chain Partner and Members (PSCP and PSCM) will be measured.

It is ultimately anticipated that the PSCPs will be required to complete relevant KPIs at key milestone dates throughout the project and a toolkit will be used as a means of assessing and scoring the performance measurement criteria. It is understood that the KPIs will be formally reviewed at an interval no greater than on an annual basis at a performance review meeting and that the KPIs that will be used to benchmark performance will be as listed below:

**Quality of Design:** Assessing and evaluating the quality of design

**Sustainability:** To measure the sustainability rating of the construction scheme, including Waste Resource Action Plan (WRAP) guidance

**Client Satisfaction:** How satisfied is the client with the PSCP

**Cost Predictability:** To measure the accuracy of forecasting. Programme used to measure against.

**Time Predictability:** To measure the accuracy of forecasting. Programme use to measure against.

**Quality of Construction:** Life cycle costs, to measure the performance of the life cycle costs against a model to be agreed between the Framework Manager and the PSCP’s

**Safety:** To measure the number of reportable (RIDDOR) accidents in a given period

**Defects:** To assess the impact on the client of any defects at the point of handover and the number of defects

**Collaboration:** Questionnaire to be completed by all parties involved in the scheme

6.17 Arrangements for Post Project Evaluation

The ethos of continuous review and the search for improvements in construction should be present throughout the entire process. The arrangements for project evaluation review (PER) and post implementation review (PIR) for Phase 2 will be undertaken by the same integrated project team involved with the Phase 1 Linac replacement development to ensure all lessons learnt are put in place in advance of starting Phase 2 construction (Stage 4).
6.17.1 Aim and Scope of Evaluation

Project completion: a process will be put in place to appraise/assess the outcome of a range of areas relating to the project as a whole. The key work streams that will be undertaken will consist of:

- A review of the strategic case made for the project to confirm that it is still relevant;
- A review of the business case capital and revenue costs;
- A review of the project timetable and adherence to it throughout the life of the project;
- A review of the benefits detailed on the Benefits Realisation Plan and confirmation that the key performance indicators and core project objectives have in fact been met;
- Confirmation that the Project Management and Implementation plan were realistic and ultimately adhered to.

The work streams will focus upon three client groups:

- **Patients and Carers** – for their perspective on the new services;
- **Clinical Users** – for their views on whether they were sufficiently involved in the planning of the scheme; to confirm that their clinical needs have been met; and to confirm that project plans ensured minimum disruption to clinical services;
- **Project Team** – for their views on the overall project from planning through the building phase and ultimately to commissioning and handover.

The assessment and views of the aforementioned groups will be sought initially by the use of questionnaires. These will in turn be analysed, and the findings debated in discussion group meetings. It is envisaged that patient representatives will be consulted prior to, during and after the above exercise has been concluded.

6.17.2 Evaluation Stages

The Project Manager shall co-ordinate the evaluation process. The process will be developed to reflect the requirements detailed in the most up-to-date guidance issued by the Department of Health.

The first stage of the process will be to undertake a workshop with the key stakeholders to establish the scope of the exercise, roles/responsibilities and the programme that will require to be put in place to deliver a successful evaluation process.

The evaluation process will be co-ordinated by a multi-disciplinary team of key personnel from both service providers and clinical users, as well as the Project Team and other key stakeholders detailed below:

- Evaluation Team;
- Executive Directors / Managers of NHS Grampian;
- Representatives from Clinical Service Users / Carers;
- Director of Estates and Facilities Management.
- A detailed evaluation framework will be developed which embraces all elements of the project, including:
  - The service benefits/aspirations detailed in the Benefits Realisation Plan;
  - The design/construction related objectives for the project;
  - The management of the process during the various stages of the project.

It is proposed to review the service benefits of the project after it has been operational for six months following which a full evaluation will take place after twelve months.
Stage 1 – Development of an Evaluation Plan

An Evaluation Plan will be developed in close conjunction with the Benefits Realisation Plan and Risk Management Strategy. It will act as a live working document, which will be constantly reviewed throughout the life of the project.

The Plan will outline:

- The objectives of the evaluation;
- The scope of the evaluation;
- The outputs to be evaluated and the success criteria against which they will be measured;
- The performance indicators and measures for these criteria;
- More detailed information about the Evaluation Group;
- Identification of the budget and resources for this work;
- A dissemination plan for ensuring the evaluation results are distributed and used to re-appraise the project; and
- Clarification on the timings for evaluation.

Stage 2 – Evaluation Requirements for Construction Phase

Progress will be monitored during the construction phase, with outputs evaluated upon completion of this stage of works. Aspects to be evaluated will cover time, cost, service performance as well as management procedures, the design solution and contractor’s performance etc.

Stage 3 - Evaluation Requirement during Operational Stage

An evaluation covering a wider range of project evaluation criteria and benefits will be undertaken after a suitable bedding-in period after the construction phase has been completed. It is anticipated that this will take place circa 6 to 12 months following completion of construction works.

Stage 4 – Evaluating Longer Term Consequences

Further post-project evaluations will take place at a later stage, to assess the longer-term outcomes of the project, when the full effects have arisen. This will also need to align with the subsequent phasing of the overall masterplan of the development.

6.18 Contingency Plans

In the event that this project does not proceed, the following arrangements are in place to guarantee the continued delivery of the required services and outputs.

- The first replaced Linear Accelerator within the existing facility is decommissioned and the bunker made “good” for replacement.
- The third new linear accelerator will be installed within the existing facility.
- A review of staffing arrangements and work patterns will be undertaken to ensure that capacity is increased to cope with future demand (this can only reasonably be put in place for a short period of time).
- Funding will be provided to replace the existing plant that currently services these areas.

Signed:
Date:

Senior Responsible Owner
Chief Executive – NHS Grampian