STATES OF JERSEY

RADIOTHERAPY OPTIONS IN JERSEY

Presented to the States on 25th April 2022
by the Minister for Health and Social Services

STATES GREFFE

REPORT

Foreword

I am pleased to present this options appraisal report undertaken by independent consultants *In-Form Solutions* that examines the potential for providing radiotherapy services on-Island. In doing so, I am fulfilling the request of the States Assembly as set out in P113/2021 (as amended). This report looks at a range of options for establishing radiotherapy on-Island, alongside off-Island options.

Work has been ongoing for some time to examine the feasibility of providing radiotherapy services in the Island and this report provides additional information to help inform those deliberations.

I acknowledge that on-Island radiotherapy facilities are something that many Islanders would wish to have. It would allow people to be in a familiar environment and access support from family and friends at what can be a lonely and anxious time, often affecting their mental health and emotional wellbeing. Some off-Island stays can be as long as 45 nights. Some patients may choose not to travel – preferring to endure their illness without radiotherapy treatment, rather than undergo a protracted period away from friends and family.

Radiotherapy is a very specialist service which would not normally be available locally to a population of just over 100,000 people. The cancer centres we use in the UK provide excellent care and treatment with very good outcomes. Even if radiotherapy was to be provided in the Island, there would be some patients (we estimate approximately 20 per cent) who would still need specialist treatment off-Island.

Any consideration must ensure that clinical safety and the clinical outcomes that would flow from on-Island care must be as good as, if not better than, anywhere else. We must retain the high-quality service which presently is available to Islanders.

A move to a largely on-Island approach would need to consider the workforce implications, including the availability of staff and the skills that would be needed. The resilience of the single Linear Accelerator (LINAC) device and its back up would also be a key factor. While demand for radiotherapy is likely to increase as Jersey's population grows and ages, the report suggests that, even taking this into account and meeting some currently unmet demand from people declining to travel, an on-Island facility would still use only about half of the capacity available.

Alongside demand and capacity, the capital costs and the ongoing revenue costs would need to be considered. This may prove expensive but, nevertheless, may well be desirable.

It is for the next Council of Ministers and the next Assembly to decide the best way forward. I recommend that they consider the challenges and decide whether to take forward any new option. Given that any on-Island option would take at least five years to deliver, I recommend that time is spent exploring, reviewing and ultimately improving the experiences and outcomes for Islanders using the current off-Island provision, including travel support, accommodation arrangements and provider options, as well as approaches to improved palliative care.

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Radiotherapy options for Jersey

31st March 2022

Government of Jersey

Document control

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Reviewed by	Signed off by	Date	Version
		31st March 2022	V1.0
		12th April 2022	V2.0

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Executive Summary

This report presents an appraisal of a range of options to provide radiotherapy services to Jersey residents. It is intended as an objective assessment, drawing conclusions but not making specific recommendations on the way(s) forward.

It is based on baseline population and HCS cost data from Jersey, projected forwards to 2043. The overall period for the modelling and analysis is 2022 to 2043.

Current provision for Jersey patients requiring radiotherapy services is via one of five UK NHS Trusts. Most of these are internationally renowned centres of excellence for radiotherapy treatment. The Government of Jersey funds all treatment, travel, accommodation and most expenses costs for the patient and for someone to accompany them if needed. Further support is provided to patients from charities and other partner agencies in Jersey.

There are currently no radiotherapy facilities in Jersey due the highly specialised nature of equipment, facilities required and range of specialist staff to provide such services safely.

Treatment for radiotherapy requires multiple sessions of planning and delivery of radiotherapy, which can span 20-30 days, and sometimes as long as 45 days. For most of these treatment periods, patients need to stay in the UK, at or near the hospital treating them. For some treatments (circa 20% of all radiotherapy), only highly specialised NHS Trusts have the range of equipment and/ or clinical skills to deliver them safely and these would always be provided in the UK.

Stakeholders are fully supportive of the current NHS arrangements, in terms of the choice, quality and reliability of the services provided, but in general, patients do not like the impact of travelling and staying away in the UK for protracted periods of time while unwell and so would prefer services to be available in Jersey, as long as they were safe, reliable and of high quality.

Demand projections show a large increase (~50%) in the volume of radiotherapy treatment required for the residents in Jersey over the period to 2043. This is largely due to demographic changes on the Island, not significant changes in cancer incidence per capita or other healthcare factors. The older population on the Island is projected to increase and this age group is more likely to be impacted by cancer and is therefore more likely to require radiotherapy treatments.

As demand rises, so will the costs for current arrangements, increasing with both inflation and demand. Cost estimates of just under £2m in 2023 are projected to rise to just over £5m per annum by 2043. Total costs for current arrangements are projected to be £72.7m over the 20 years to 2043.

While there is no reason to significantly change from the current NHS arrangements unless GoJ wishes to (HCS has enjoyed a good relationship with the incumbent NHS providers over many years), a range of other potential options are possible, including developing radiotherapy services in Jersey. All other options, both in Jersey and in the UK, are more expensive than the current arrangements (by circa 10% to over 50%). The cheapest on-Island options are estimated at £92.6m over the 20 years to 2043.

For options that would provide radiotherapy services in Jersey, there are both benefits and challenges/ risks to be considered, including:

Key Benefits

- Patient experience and access to care. While recognising that 20% of patients would not be able to receive treatments in Jersey, this benefits the remainder, through being able to choose where to recover between treatments and to remain close to home, family and work. This also benefits the patients for whom travelling to the UK for treatment would not be a viable choice.
- Minimal waiting times. As a radiotherapy facility in Jersey would always have spare capacity (demand is projected to be never more than 50% of LINAC capacity) there would be minimal waiting time for patients to receive their treatments.

Key Challenges/ Risks

- Service resilience. Radiotherapy services in Jersey would be reliant on a single medical linear accelerator (LINAC) to administer treatments (there is insufficient demand to have more than one LINAC operating). Unlike in the UK, where greater volume enables NHS Trusts to operate multiple machines simultaneously, if the LINAC in Jersey were unavailable due to breakdown, then this would adversely impact the service and, in some cases, could cause patient harm. This is considered the most significant risk for an on-Island service.
- Service partnering. To ensure a safe and quality service, a partnering arrangement with an existing UK provider of radiotherapy services would be required. While such partnerships do exist, it is not certain that any UK NHS Trust or private sector organisation would be willing to support Jersey in this regard, and at what cost, without more detailed discussions with interested parties. Additionally, where partner staff were unable to operate on-Island facilities for any reason, the service would again be disrupted.
- Suitability of location. Potential provision of radiotherapy services on the site of the new hospital is severely limited. Due to the specialised construction required for radiotherapy equipment, other site locations would need detailed technical assessment.

This report considers and explores each of the options for radiotherapy in Jersey, together with its benefits and challenges, in order to present an objective analysis. In line with the parameters of the report, the appraisal is designed to be a tool to use to make a decision on the next steps to be taken but no option has been recommended.

1 Introduction

1.1 Purpose of this report

The purpose of this report is to present an **Options Appraisal**, for the future provision of radiotherapy services for residents in Jersey. It is based on the data available within the 10-week time period during which the work was undertaken. The report sets out the approach, findings and analysis taken to reach a set of feasible options for presentation for further debate within the States Assembly to determine which of the options should proceed to a further stage.

This work provides the precursor to whatever next steps are agreed, and which are likely to require the development of a formal business case to explore the identified options in more focus and detail.

Options have been assessed against demand, costs, and stakeholder expectations. Of necessity, this report contains some high-level assumptions and estimates which, while based published sources and, where sources are not available, prior experience, these all may be subject to change given the current, somewhat volatile, economic and market conditions.

1.2 Background

In November 2021 a pre-feasibility study was undertaken by the HCS Innovation and Change team[1]. In the context of high-level demand and capacity estimates, the study highlighted three potential options and went on to explore option 2, "*On-Island LINAC facility as a satellite facility with an NHS partner*", in further detail. The study also identified a range of factors to be considered and a set of drivers for change:

- Political
- Physical
- Financial
- Patient Experience
- Quality of Care

This study followed on from an earlier external options appraisal in 2014, which had focused on financial viability, which determined at that time that there was not a sufficient return on investment to proceed.

Building on this work, and in the context of increasing public interest, including an e-petition raised to the Assembly by patient Rosemarie Shepherd, the Minister for Health and Social Services Richard Renouf, committed to an independent unbiased assessment of options, for presentation to the States Assembly in April 2022.

This current work, set out in this report, was commissioned through a competitive tendering exercise by the Improvement and Innovation team within the Government of Jersey (GoJ) Health and Community Services (HCS). It has been undertaken over the months of February and March 2022 by a multi-disciplined team of experienced healthcare professionals from In-Form Solutions Limited.

[1] RT_PreFeasibility_presentation by GoJ HSC 2021.pptx

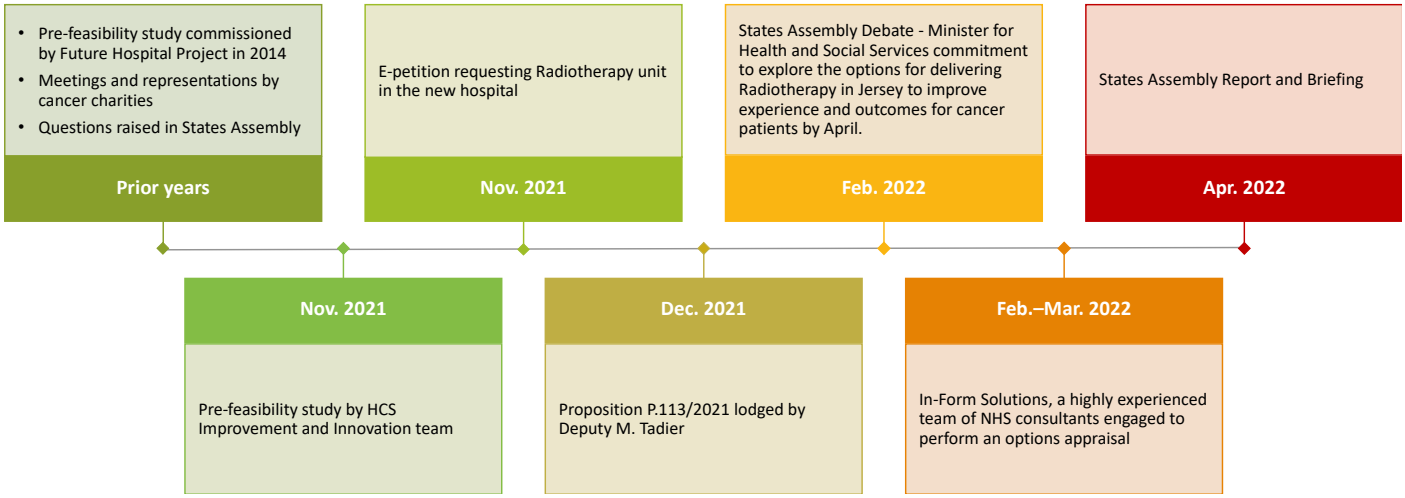

Figure 1: Timeline of activities leading to current Options Appraisal

1.3 Context

This options appraisal has been undertaken in the context of what health conditions radiotherapy services are used to treat, what radiotherapy services are currently available generally in the UK and more widely internationally, as outlined below.

1.3.1 Cancer and cancer treatments

Cancer is a devastating condition which causes significant morbidity and death. Cancer occurs when cells in the body begin to grow and reproduce uncontrollably, destroying adjacent healthy tissue. Cancerous cells can migrate to other parts of the body, a process that is known as metastasis.

Increases in cancer diagnoses are widely projected by all leading economies, arising from a combination of extensively evidenced demographic factors:

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

In Jersey, an average 242 deaths due to malignant cancers were registered each year between 2012 and 2016 [2] and this is expected to increase in future years (see section 3 below).

It is acknowledged by health services and health policy makers worldwide, underpinned by a well-established medical evidence base, that early diagnosis and rapid access to treatment are very important factors in improving outcomes for patients.

However, the diagnosis and treatment of cancer is complex, requiring the skills of different medical and health professionals who together comprise the oncology team or multidisciplinary care team (MDT). The oncology team will consider a range of factors and options in designing a treatment plan for an individual

[2] Channel Islands Cancer Report 2020

patient. The stage of a patient's cancer will be a key factor, with early or stage 1 focusing on treatments with a curative intent, through to advanced or stage 4 likely to focus on palliative care, treating and alleviating symptoms helping a person to achieve the best quality of life for them, with early intervention leading to better outcomes.[3] The frailty of individuals and their likely ability to cope with and benefit from more radical treatment options will also be a consideration.

The main treatment modalities currently used are:

- Surgery, to remove the cancer or as much of it as is possible.
- Chemotherapy, which uses drugs to kill cancer cells, and targeted drug treatment which focuses on specific abnormalities within cancer cells.
- Immunotherapy (or biological therapy), this works to "trigger" the body's immune system to fight the cancer.
- Radiation therapy (radiotherapy) using high-powered energy, such as X-rays or proton beams, to kill cancer cells. Radiation treatment can come from an external machine, a process known as external beam radiation which uses a medical linear accelerator (LINAC). Radiation therapy also includes brachytherapy, which involves placing radioactive isotopes inside the body.

External beam radiation therapy is particularly useful as a palliative treatment to:

- Relieve bone pain
- Treat spinal cord and nerve compression
- Treat the symptoms of cancer within the brain
- Shrink a tumour to relieve pressure or a blockage
- Stop bleeding

Figure 2: External beam radiotherapy machine (LINAC) in treatment bunker. Picture courtesy of The Royal Marsden Hospital

Other treatments include Hormone Therapy, Stem Cell or bone marrow transplants (used to treat some types of cancer including leukaemia, lymphoma and myeloma in conjunction with chemotherapy, and

[3] Haun MW, Estel S, Rücker G, Friederich H-C, Villalobos M, Thomas M, Hartmann M. (2017). Early palliative care for adults with advanced cancer doi.org/10.1002/14651858.CD011129.pub2

sometimes radiation therapy) and cryotherapy or radiofrequency ablation, to kill cancer cells using extreme cold or heat.

1.3.2 Radiotherapy and radiotherapy services

Radiotherapy is a long established, evidence based, and essential component of cancer treatment, as outlined above. Radiotherapy is used in the treatment of over 40% of all patients who have curative treatment of their cancer and worldwide around 50% of all cancer patients have radiotherapy as part of their clinical management.[4] In Europe it has been estimated that between 47% and 53% of new cancers will require external beam radiotherapy. [5]

The process of radiotherapy is complex, involving a team and individuals who understand the principles of medical physics, radiobiology, radiation safety, dosimetry, radiation treatment planning, simulation and interaction of radiation with other treatment modalities.

It is usual for the radiotherapy service to be a component of an MDT team, coordinating different aspects of the overall treatment plan for a patient. MDTs can, and often do, operate virtually, with not all the team present at the location where the radiotherapy treatment was being delivered to the patient. However, it is essential that the specialist staff qualified to manage and deploy the equipment and deliver radiotherapy are physically present to administer the treatment. This includes radiographers and specialist nursing support.

Whether the treatment intent is radical or palliative, treatment involves the calculation of an overall dose of radiation sufficient to achieve the aim of the treatment plan. The overall dose is usually divided into a number of smaller doses, called fractions. The purpose of delivering the overall dose in a number of fractions is to allow healthy cells to recover over the course of a treatment. It is important that such treatment regimes are not subject to interruption and adhere to relevant Royal College of Radiology (RCR) best practice and safety guidelines. [6]

Palliative radiotherapy is of value in life threatening situations, such as profuse bleeding from a tumour or compression of the superior vena cava. Radiotherapy also provides effective palliation of pain secondary to bone metastases, tumours causing bleeding, or compressive syndromes, such as spinal cord compression or cerebral metastatic disease. A single treatment or a small number of treatments will often have a significant palliative effect at very low cost and avoid the need for more protracted therapy schedules. [7] [8]

Palliative treatment is usually given in significantly fewer fractions in comparison with curative treatment. Often one fraction will be sufficient, (typically delivered on a daily basis, Monday to Friday).[9] Where more

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[4] Baskar R, Lee KA, Yeo R, Yeoh KW. Cancer and radiation therapy: current advances and future directions. Int J Med Sci. 2012;9(3):193-199. doi:10.7150/ijms.3635

[5] Borras JM, Lievens Y, Grau C. The need for radiotherapy in Europe in 2020: Not only data but also a cancer plan. Acta Oncol. 2015;54(9):1268-74. doi: 10.3109/0284186X.2015.1062139. Epub 2015 Jul 27. PMID: 26213310.Borras JM, Lievens Y, Grau C. The need for radiotherapy in Europe in 2020: Not only data but also a cancer plan. Acta Oncol. 2015;54(9):1268-74. doi: 10.3109/0284186X.2015.1062139. Epub 2015 Jul 27. PMID: 26213310.

[6] https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfco191_radiotherapy-treatment-interruptions.pdf

[7] https://www.bmj.com/content/360/bmj.k821

[8] Spencer K, Parrish R, Barton R, Henry A. Palliative radiotherapy. *BMJ*. 2018;360:k821. Published 2018 Mar 23. doi:10.1136/bmj.k821

[9]https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004721/full?highlightAbstract=radiotherapy%7Cradiotherapi

than one fraction is to be delivered, for example for brain metastases, this is usually administered over a number of weeks, depending on the tumour site.

Usually, radiotherapy treatment is provided on an outpatient (OPA) basis, however, some patients may need to be admitted or may have their treatment as an inpatient, as a result of their overall condition and/or any co-morbidities.

In the UK, it is a statutory requirement that all radiotherapy services are compliant with international standards for radiological protection, including the current (2017) Ionising Radiation Medical Physics (Medical Exposure) Regulations (IR(ME)R) and the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS).

1.4 Current arrangements in Jersey

The baseline for the options appraisal is the current radiotherapy services in Jersey, as part of the overall cancer services for Island residents.

Current cancer and non-malignant haematology services provided by HCS in Jersey include:

- Medical oncology (Chemotherapy)
- Haemato-oncology
- Non-malignant haematology

These services are currently being delivered from unmodernised outpatients, radiology, and laboratory facilities. A new Oncology Department, which will accommodate all these current services, is due to be part of the Our Hospital project, delivering a modern general hospital to the Island by 2027.

Jersey General Hospital Radiology Department does not currently have a radiotherapy treatment service, nor associated radiotherapy planning systems to support radiation therapy, and this is not planned within the Our Hospital project. Instead, Jersey Health and Community Services currently sends patients needing radiotherapy off Island to a range of providers.

Alongside these services, a range of wider social care and support services are funded and provided by the charity and third sector. These include hospice care, financial help for patients and their families, out of hospital nursing and personal care, and emotional support.

The key features of the current arrangements for a radiotherapy service for Jersey residents include:

- Radiotherapy is provided in the UK

  Jersey Health and Community Services currently sends patients needing radiotherapy off Island to a range of providers, the majority of which are NHS Trusts, primarily five[10] internationally renowned specialist cancer centres of excellence offering outstanding care, as assessed by the UK regulator for clinical quality and safety, the Care Quality Commission (CQC)[11]. Patients are referred

[10] The Royal Marsden NHS FT
University College London NHS FT
Guy's and St. Thomas' NHS FT
Cambridge University Hospitals NHS FT
University Hospital Southampton NHS FT

[11] https://www.cqc.org.uk/

to a specific provider according to their clinical needs and, based on a patient's locality, their choice[12].

- Patients travel to and stay in the UK during treatments

  Radiotherapy treatments depend on the cancer being treated. Treatment usually involves one or more visits with separate radiotherapy treatments spread over many days, with rest breaks in between. Typical stays are between 20 and 30 nights but can be up to 45 nights.

- HCS pay for the care, plus travel and accommodation

  The patient and an appropriate escort are funded for travel and accommodation, including a daily meals allowance. Payment is made by HCS for most of these costs, rather than patients incurring costs and being reimbursed. Dependent on the hospital, there are often choices of accommodation, from hotels to self-catering apartments.

- Referring Consultants have a good choice of high-quality NHS care

  The access to renowned NHS Centres of Excellence as a first choice of provider is as good if not better than some UK Consultants can access

- NHS providers provide a high level of assurance of service availability and resilience

  All the NHS hospitals have extensive facilities and staffing and are required by the statutory and regulatory framework of the NHS to maintain high standards of clinical and corporate governance, including business continuity, thus providing high levels of assurance that staff and equipment will be available. Once referred to one of the NHS hospitals, Jersey patients have the same waiting times as any UK patient, which require adherence to national UK objectives. Current waiting times in the NHS in England are routinely monitored and reported nationally and there is currently an ongoing consultation aiming to improve them[13].

- Staying away from family and friends during treatment is challenging for many patients

  There has been consistent feedback from patients that having to leave the Island and stay away during treatment can adversely affect patients' wellbeing. It disrupts family and work life, travel is very disruptive, particularly when unwell and being away at such a time can impact patients'

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[12] Note this range of choice is typically greater than that offered to many UK NHS patients

[13] https://www.england.nhs.uk/publication/national-cancer-waiting-times-monitoring-dataset-guidance/

mental health. There are also sometimes travel challenges such as adverse weather, which for up to 30 days each year can make the Island inaccessible.

1.5 Case for Change

The case for change has been developing since the earlier options appraisal in 2014 and the pre-feasibility study in 2021, as outlined in the background section above. This has been refined and developed by the HSC Improvement and Innovation team and a set of key areas for consideration when assessing the viability of options have been identified, these are summarised and illustrated in figure 4, below:

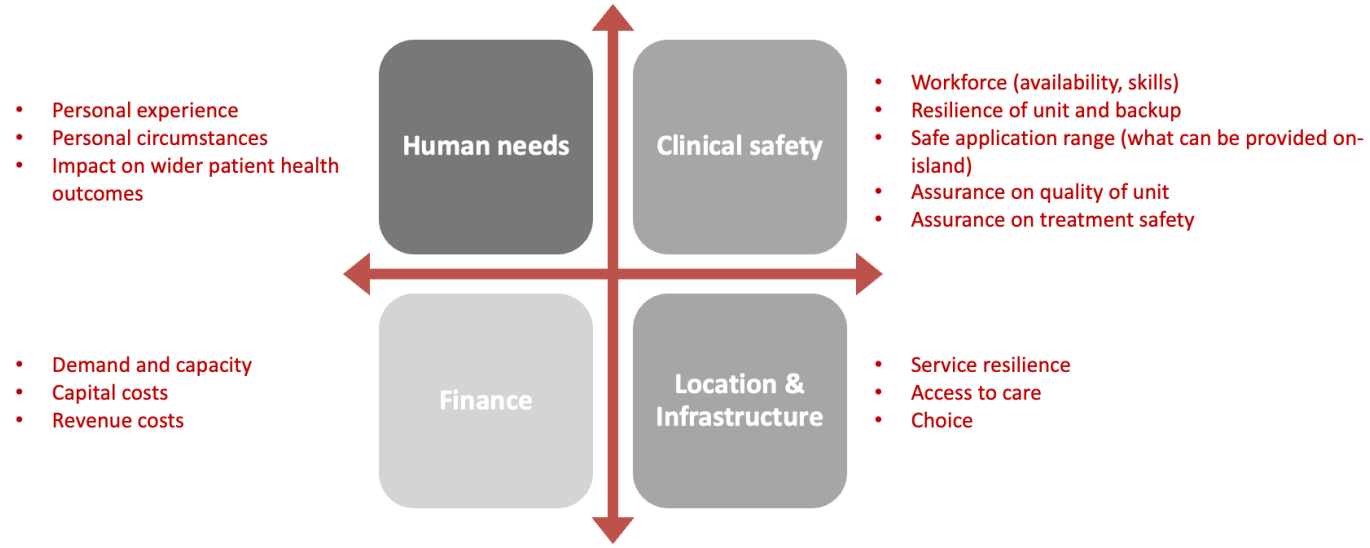

Figure 4: Key areas of consideration for option viability

2 Approach

2.1 Approach to the work

The overall approach taken to determine and assess the options is summarised as follows:

- Determine demand for radiotherapy up to 2043

  Based on data sources and evidence available from HSC and from wider UK and international sources.
- Determine baseline cost data for 2019
- Project cost data over 2022 to 2043

  In order to provide the time series for all options to be modelled against.
- Develop potential radiotherapy options

  In order to assess which of the numerous options identified were viable the following criteria were applied, options:
  - are considered clinically safe
  - have regulatory approval
  - seek to achieve the Island cancer priorities as defined in the Jersey Care Model
  - are technologically proven
  - are presently commercially available
  - do not present a materially negative impact on Our Hospital commitments
- Interview stakeholders on their opinions on radiotherapy needs

  In addition to providing information to help inform the identification and assessment of options, this sought to provide insights into the opinions and beliefs of individual and key groups of stakeholders. Such information will be an important basis for further stakeholder engagement, including any formal public consultation required, and will support effective communication and messaging to those stakeholders.
- Analyse options: costs, risks and benefits

2.2 Approach to the modelling

In respect of the capacity, demand and costs modelling set out in the detailed sections below, the following points apply:

- Modelling time period is 2022 to 2043
- 2019 HCS activity and cost data is used as the baseline year
- Projections are based on:
  - published information where available
  - discussions with multiple expert stakeholders in Jersey
  - other estimates and assumptions made by the In-Form team of healthcare professionals
- All HCS costs (NHS care, travel and accommodation) are included
- Wider opinions are drawn from the interviews with selected expert stakeholders

3 Capacity and Demand

3.1 Methodology

Planning for cancer services in the UK is a long-term endeavour which traditionally extrapolates UK cancer registration data. This data is considered to be of high quality, although it is historic and not reflective of any recent changes or trends. However, it does provide a robust baseline from which projections can be made. In this report, the specific evidence sources used to project demand volumes are:

- Incidence rates per cancer site from the Jersey Statistics document "Jersey Cancer Projections 2017 – 2037" (note this includes assumptions regarding population growth)
- Analysis of Patient Level Information Costing System (PLICS) pseudonymised data of radiotherapy volumes (and costs) at granular level from 2018 to 2021. This gives an accurate split of the volumes into the types of radiotherapy conducted (both preparations and delivery, the latter being expressed in fractions) by UK hospital provider, cancer location (body area) and also any other treatment undertaken for those persons undergoing radiotherapy.[14]

In addition, projections have been informed by:

- UK cancer projections
- Literature search on the need for radiotherapy
- Pre-Feasibility Study November 2021
- Oncologists and other medical opinions as to the proportion of radiotherapy by cancer location that may be suitable to repatriate to Jersey if there were an option to provide radiotherapy services on the Island
- An assessment of "potential demand" due to some people choosing not to travel to the UK for radiotherapy but who may use the service if it were to be provided on the Island
- Comparison with other Island communities

3.1.1 Current position

UK figures suggest that the number of people living with cancer in the UK is increasing by 3% every year. [15] This is being driven to a large extent by population growth, population ageing and people living longer, and more effective treatment, rather than an increase in the incidence of cancer. For some cancers e.g., breast cancer, there is evidence that incidence may be declining, although for cancers associated with obesity e.g., prostate and pancreatic cancer, incidence seems likely to increase as obesity rises. [16] The Statistics Jersey publication, "Cancer Projections 2017 – 2037" predicted that the number of new cases of cancer (excluding non-melanoma skin cancer), would increase from 680 cases per year in 2017, to 980 new cases per year in 2037. As noted earlier around 50% of new cases are likely to require radiotherapy treatment

[14] This gives substantial assurance for the demand forecasts because as it allows projections to be sensitive to differences in types of cancer (e.g., breast cancer tends to have a declining incidence so this would be modelled as such).

[15] https://www.cancerdata.nhs.uk/prevalence

[16] Agha M, Agha R. The rising prevalence of obesity: part A: impact on public health. Int J Surg Oncol (N Y). 2017;2(7):e17 and https://www.cancerdata.nhs.uk/prevalence

The Channel Islands Cancer Report 2020 [17] showed that the headline rate for all cancers, excluding non-melanoma skin cancer, in Jersey is higher than in the Southwest and all England. The figures show the age-standardised rate (ASR) for Jersey is 838 per 100,000 population. This a significantly higher than the Southwest (787/100,000) and the all-England rate (784/ 100,000). This in large part can be attributed to the high rate of head and neck cancers in Jersey, (43 per 100,000) which compares with the Southwest rate of 29/100,000, the all-England rate of, 32 per 100,000, and Guernsey; 33 per 100,000. The main risk factors are smoking and excessive alcohol use, especially when in combination. Around 32 new cases are diagnosed annually.

The rate of lung cancer in Jersey (103 per 100,000) is higher than in the Southwest, however it is not statistically different to the England average. Around 40 new cases of lung cancer are diagnosed each year. Smoking accounts for about 86% of lung cancers.

The rate of malignant melanoma in Jersey (72 per 100,000) is higher than in the Southwest and England, (Southwest 44 per 100,000, England 33 per 100,000). Around 52 new cases of malignant melanoma are diagnosed each year. The major risk factor is UV exposure through sunlight or sunbeds.

The incidence of these cancers, and gynaecological cancers, can be mediated by public health interventions and/or people choosing to limit their exposure to risk, although benefits will not be realised in the short and medium-term term. Growth assumptions have therefore not been downgraded for these cancer groups.

The rate for prostate cancer in Jersey is 275/100,000, (Southwest 240/100,000, England 233/100,000). No major environmental/lifestyle risks for prostate cancer are known; risks are increased in those having a family member with the disease, or in black men. Around 90 new cases of prostate cancer are diagnosed each year in Jersey.

Breast cancer rates are similar to the Southwest and a little higher than all England (Jersey 231/ 100,000, Southwest 227/100,000, England 216/100,000).

ASRs for brain, kidney, leukaemia and gynaecological cancers are lower than the Southwest and all England rates.

In the UK, all cancers combined incidence rates (excluding non-malignant melanoma) are projected to rise by 2% in the UK between 2014 and 2035, to 742 cases per 100,000 people by 2035. This includes a smaller increase for males than for females. Age standardised rates for males are projected to rises by less than 1% between 2014 and 2035, to 813 cases per 100,000 by 2035, and for females, rates are projected to rise by 3% between 2014 and 2035, to 685 cases per 100,000 by 2035[18]

3.1.2 Mortality Rates

The directly aged standardised rates for all cancers, excluding non-malignant melanoma show mortality rates similar to England rates but a little higher than in the Southwest region. This is likely to be because of

[17] Report produced by the Public Health England National Cancer Registration and Analysis Service (based on data up to 2016), for the Guernsey and Jersey Medical Officers of Health

[18] Smittenaar CR, Petersen KA, Stewart K, Moitt N. Cancer Incidence and Mortality Projections in the UK Until 2035 (link is external). British Journal of Cancer 2016.]

higher incidences for some of the cancers as noted above rather than deficiencies in access to treatment, suggesting that demand calculations do not need to be inflated to recognise under treatment.

Table 1: Cancer mortality rates

Location	ASR	Lower CI	Upper CI	Notes
Jersey	358	338	379	*High head & neck cancer mortality rate*
Southwest region	337	337	342	
All England	358	357	359	

While improved treatment for the common cancers has driven a drop in overall cancer mortality, the momentum does appear to be slowing and Covid-19 can be expected to have an adverse impact over the short and medium term.

In summary, population growth, ageing and increasing prevalence (due to improved survival) will drive demand more than incidence and this has been taken into account in the growth projections.

3.2 Analysis of Jersey HCS data

Cancers are classified by National Cancer Registration and Analysis Service (NCRAS) according to the World Health Organisation's International Classification of Disease (ICD). For the historic activity this coding is not available so the sub-specialty as determined by HCS has been used, from which the cancer location can be inferred.

For this very granular exercise, five UK providers have been analysed as these are judged to be accountable for the vast majority of total volumes from Jersey. These are University Hospital Southampton NHS Foundation Trust, Cambridge University Hospitals NHS Foundation Trust, The Royal Marsden NHS Foundation Trust, UCLH NHS Foundation Trust and Guys & St. Thomas' Hospitals NHS Foundation Trust. Actual volumes are thus likely to be slightly larger than those shown in the tables below.

As can be seen in Table 3 below, head and neck cancers are high in number and so are shown separately, but these are not separate in the Jersey Statistics incidence forecasts. In this instance 'other' is used in the modelling for this report.

Conversely, skin cancer tends to have very few radiotherapy volumes, but overall is a large proportion of cancer incidence, and so this is also shown separately.

3.3 Comparison with other Island communities

The two UK Islands of similar size are the Isle of Man (population 88K) and the Isle of Wight (population 133k), do not have on-Island radiotherapy facilities, utilising Clatterbridge Hospital, Wirral University Teaching Hospital NHS Foundation Trust and the University Hospital Southampton NHS Foundation Trust respectively. Guernsey has similar arrangements to Jersey.

According to the International Atomic Energy Authority's DIRAC database[19] of installed equipment, there are 41 countries with populations under 1 million. Around two thirds are classed as low and middle income countries, and 28 of these are Islands. Only 11 countries had their own radiotherapy service. Within the Caribbean Islands there are two facilities (both are private), which are:

- The Cancer Centre Bahamas (population c360K)
- The Cancer Centre Eastern Caribbean located on Antigua (population c96k). However, this also serves a number of the eastern Caribbean Islands giving an effective catchment area of around 400k population, or c1.8m if Trinidad and Tobago, also in the Eastern Caribbean, is included.

In the Pacific Islands there are no radiotherapy facilities, although a centre in Fiji (population c960k) is planned.

There are state funded radiotherapy facilities on Malta (population c444k, single LINAC) and Crete population c600k, single LINAC). There are no radiotherapy facilities on Corsica (population c350k); under the French health care system, residents access the Centre Antoine Lacassagne at Nice in France.

3.4 Findings

3.4.1 Historic Activity Volumes

Table 2 presents data on the activity undertaken in the NHS after referral from HCS.

Table 2: UK referrals for radiotherapy 2018-2021

	2018	2019	2020	2021
Patients	185	**221**	164	156
Preparations	259	**296**	232	224
Fractions	3,052	**3,121**	2,303	1,996

Some patients receive treatment across two years so ratios are not identical, but patients tend to have between one and two preparation attendances each, then approximately fifteen fractions of treatment per patient, although this does vary depending on the cancer location.

The pandemic temporarily and significantly depressed activity volumes in 2020 and 2021. For this reason, 2019 (highlighted above) was chosen as the base year for modelling and demand forecasting, and subsequently the financial calculations set out in section 4.

Table 3 shows the analysis of fractions delivered by tumour site.

Table 3: Fractions by tumour site

Tumour site	2018	2019	2020	2021
Breast	540	887	382	308
Colorectal	132	123	98	134
Head & Neck	394	380	282	333

[19] https://www.iaea.org/resources/databases/dirac

Tumour site	2018	2019	2020	2021
Lung	625	182	155	82
Prostate	767	744	445	456
Skin	15	62	30	75
Other	579	743	911	608
Total	**3,052**	**3,121**	**2,303**	**1,996**

3.4.2 Demand: activity-based projections

Table 4 below sets out projected growth rates by tumour site. The detailed modelling behind this has been provided separately to HCS as a working paper. As described above, it uses 2019 as a baseline year. At this stage it does not factor in any "potential new demand".

Table 4: Jersey Cancer Projections 2017 - 2037 growth rates

Tumour Site	Overall Growth
Non-melanoma Skin	50%
Prostate	54%
Breast	29%
Lung	55%
Colorectal	50%
All Other	50%

The growth in cancer prevalence has been used to create the second table (Table 5 below) and accompanying graph, which is the number of fractions that HCS would need to provide or commission to meet future demand

Table 5: Projected quinquennial demand from baseline year in fractions delivered (subject to no change in service provision

Tumour site	2019	2023	2028	2033	2038	2043
Breast	887	936	997	1,059	1,121	1,184
Colorectal	133	145	161	176	192	207
Head & Neck	380	415	460	504	548	592
Lung	182	200	223	246	269	292
Prostate	744	822	915	1,001	1,086	1,172
Skin	46	50	56	62	67	73
Other[20]	749	819	906	994	1,081	1,167
TOTAL	**3,121**	**3,387**	**3,718**	**4,042**	**4,364**	**4,687**

[20] This includes Neuro and Gynae body locations, which are separated out later in this analysis

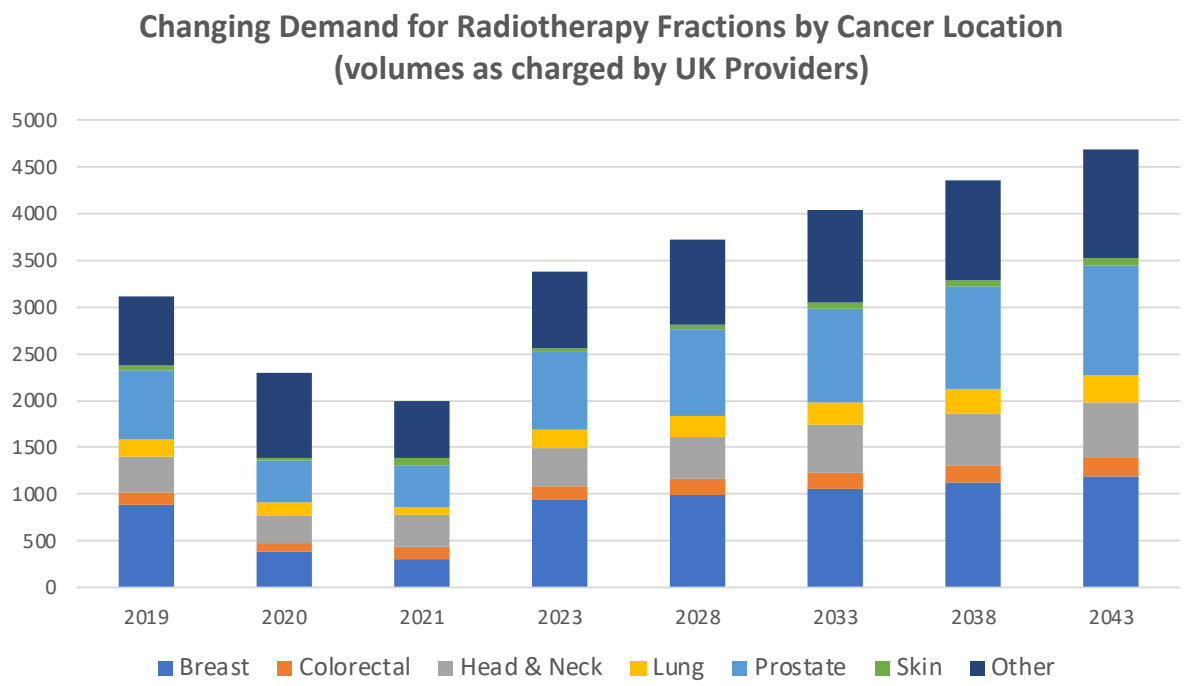

Figure 5: Changing demand for radiotherapy fractions by cancer location (projected volumes based on 2019 baseline data)

It can be seen in Figure 5 that breast cancer and other cancers represent the largest volumes however, breast cancer is not projected to rise as quickly as the other cancer types. Preparations (where the patient attends prior to the delivery of the treatment) are not shown above but are in the separate working paper. Preparations are approximately 10% of the volumes of the fractions and would be expected to follow the same demand trend.

3.4.3 Adjusting projections

It is not practical or clinically appropriate for all radiotherapy treatments to be delivered using an on-Island radiotherapy service with a small population. Some treatments require highly specialised, high-cost equipment and facilities which can only be provided at the scale of a larger population, for example proton beam therapy. Some cancers occur rarely and require referral to medical teams who specialise in the treatment of that cancer. It is therefore necessary to adjust the demand figures to take account of this.

Adjustment has been made on the basis of clinical judgement provided by HCS[21] and is shown on cancer body location and in Table 6 below.

Table 6: Proportion of radiotherapy potentially repatriating to Jersey

Cancer Location	% of RT to Jersey
Breast	95%
Colorectal	75%

[21] As indicated by Dr Rubin Soomal, Clinical Oncologist, HCS GoJ and wider discussions with other clinical stakeholders in Jersey

Cancer Location	% of RT to Jersey
Head and Neck	50%
Lung	82%
Neuro	100%
Prostate	79%
Gynae	100%
Other	64%
AVERAGE	79%

In the modelling, Neuro and Gynae are both contained within 'Other' within Table 4 and Table 5, but the different rates in the table above are applied as necessary. Applying these proportions to the overall activity levels (assuming the activity to be repatriated reaches a steady state in 2028), gives the estimated recurrent spilt between a new on-Island service and the residual activity for UK NHS providers This is shown in Table 7.

Table 7: Estimated split of UK and Jersey radiotherapy fractions delivered if an on-Island service were to be provided

	2019	2023	2028		2033		2038		2043	
	UK	UK	Jersey	UK	Jersey	UK	Jersey	UK	Jersey	UK
Breast	887	936	943	54	1,001	58	1,060	61	1,120	64
Breast New*			115		122		129		136	
Colorectal	133	145	121	40	132	44	144	48	155	52
Head & Neck	380	415	230	230	252	252	274	274	296	296
Lung	182	200	182	41	201	45	220	49	239	53
Prostate	744	822	719	196	787	215	853	233	921	251
Skin	46	50	56	0	62	0	67	0	73	0
Other	749	819	681	225	747	247	812	269	877	290
Palliative New*			50		55		60		65	
TOTAL	**3,121**	**3,387**	**3,097**	**786**	**3,359**	**861**	**3,619**	**934**	**3,882**	**1,006**

** See 3.4.4*

Observations on the above table are:

- Up to 1,000 fractions (~20%) would continue to be delivered in the UK (with the resulting impact on expenditure and on the patient experience.)
- "Breast new" and "Palliative new" are the estimated additional activity which would need to be provided to service potential demand, if this became actual demand.

3.4.4 Potential new demand

Three areas of potential new demand have been considered.

Breast Cancer: It has been shown that travel burden is an important factor affecting access to appropriate cancer diagnosis and treatments. Evidence from USA state-level studies suggests that women who live further from radiotherapy facilities may be more likely to choose mastectomy than those who have radiotherapy facilities nearby.[22]

The Jersey HCS surgical team estimated[23] that each year, between 5 and 10 Jersey women who have breast cancer may choose to have mastectomy when lumpectomy and adjuvant radiotherapy were offered, as they may not wish to leave the Island for the extended period necessary for this treatment. It is understood that the primary reason given for this is that women would prioritise their family and caring responsibilities and the needs of their children. There is evidence that some women in the UK are choosing prophylactic mastectomy where they have inherited a mutation in the BRCA1 or BRCA2 genes, a factor in around 5%-10% of all breast cancers, as there is good evidence for improved survival rates**.** It has been hypothesised that this may also be a factor in the decision taken by women in Jersey; confirmation of this is outside the scope of the report. It is estimated that meeting this unmet need equates to a capacity requirement of between 75-150 fractions per annum. Underlying this finding, it should be highlighted that breast and prostate cancers are the two tumour types responsible for the majority of radiotherapy treatment workload in the UK. However, for Jersey, radiotherapy treatment for breast cancer ranks third, suggesting there may well be under treatment.

Palliative radiotherapy: It has been stated that in some cases where palliative radiotherapy has been offered, Jersey residents chose not to take up treatment as they did not wish to leave the Island for personal or work-related reasons and/ or they felt too unwell to travel. The numbers of people falling into this category do not appear to have been recorded. Collecting and collating such numbers is outside the scope of the report

The evidence base for palliative radiotherapy in older adults with cancer is limited, however, research appears to show significant underutilisation in this group. The lack of recent studies makes it difficult to determine a valid base for a zero-based need estimate. Older surveys and benchmark data from different sources have suggested that 46-53% of all radiotherapy courses were administered with palliative intent and it does appear that palliative treatments undertaken for Jersey residents amount to around this figure. However, audit would need to be undertaken to determine the precise number. It is suggested that an extra 10 Jersey residents may wish to access palliative radiotherapy treatment each year if this treatment were available on-Island, equating to a requirement of around 25 fractions per annum.

Private patients: The third area of potential demand suggested was private patients, but having researched this, evidence to support increasing estimated demand could not be found at this time. People seek treatment with private sector providers for a number of reasons, for example because they want treatment to be undertaken at a specific location close to their family, privacy, or they are seeking a new treatment which might be available privately but is not provided by the NHS. A carefully designed study would be required in order to provide robust evidence of sufficient quality to amend the projections.

Having adjusted for the estimated impact of this potential demand, there would still be capacity to meet this need with no requirement for a second LINAC within a 20-year time horizon. It should be noted that for

[22] Longacre CF, Neprash HT, Shippee ND, Tuttle TM, Virnig BA. Travel, Treatment Choice, and Survival Among Breast Cancer Patients: A Population-Based Analysis. Womens Health Rep (New Rochelle). 2021;2(1):1-10. Published 2021 Jan 11. doi:10.1089/whr.2020.0094

[23] The surgical service at HCS have advised on estimates for breast cancer patients who may choose radiotherapy instead of surgery if this were to be provided in Jersey

the reasons given above, this potential demand will remain unmet, unless a local service is provided. The 2043 projected demand for 3,882 fractions of radiotherapy in Jersey is comfortably below the capacity of a single linear accelerator (this would be expected to be at least 7,500 fractions per annum) and so, if this potential demand did result in actual additional demand for radiotherapy treatments on-Island, there would be capacity for all of this.

3.4.5 Guernsey demand

It has been suggested that should a radiotherapy service be established in Jersey then Guernsey residents may wish to access the service. While estimating the demand for Guernsey is outside the scope of this report, consideration has been given to the impact on capacity, should the Government of Jersey wish to offer access to Guernsey residents and they decide to use the service.

The ASR for all cancers, all persons, for Guernsey is slightly lower than Jersey. The annual Guernsey Population on Projection Bulletin issued on in December 2021 forecasts a 0.4% increase to approximately 63,400 people by 2027, beyond which date the population is projected to fall. However, a significant increase in the number of people aged 65 and over is projected, with the number of people aged 85 and over likely to double by 2045. This group will typically have a higher medical and care needs and for cancer/ radiotherapy treatment. The probable increase in demand for radiotherapy (See Figure 6) has been estimated but has not been adjusted for activity which would need to remain with UK providers (this is assumed to be ~20% as with Jersey projections).

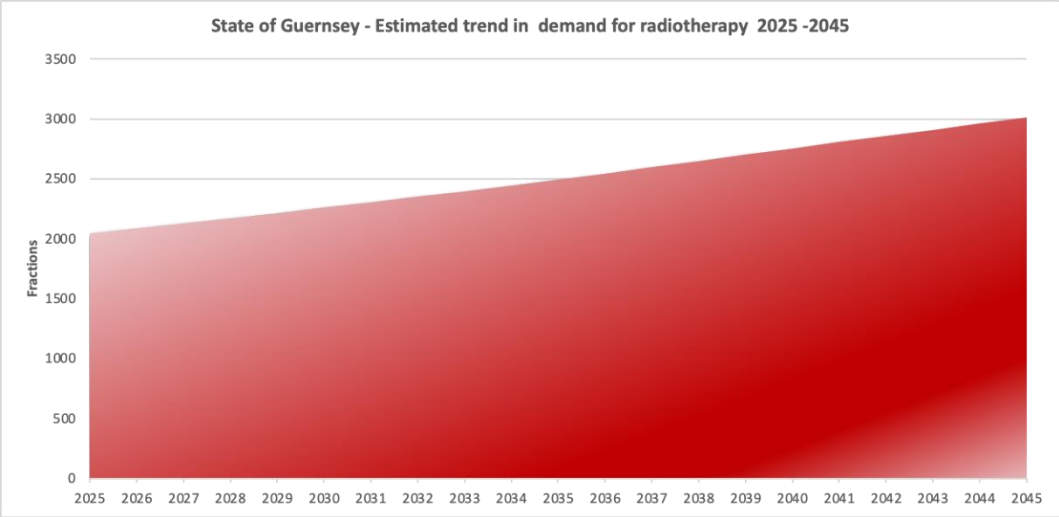

Figure 6: Unadjusted estimate of demand for radiotherapy

Even though potential demand from Guernsey would be high, it would still not breach the capacity for a single LINAC if this became actual demand. Moreover, it is not considered likely that Guernsey would shift most or all of their radiotherapy to Jersey if there were a radiotherapy service in Jersey. For Guernsey patients, their radiotherapy would still be off-Island, still with travel and accommodation challenges, and the full range of NHS services and facilities available at Southampton may not be the same for a Jersey treatment stay. No data is available to determine how much, if any, of Guernsey radiotherapy treatments would transfer to Jersey actual demand, therefore this potential demand will not be factored into the costs analysis of the options.

3.4.6 Risks and other considerations which may affect projections

- Projections are neither forecasts nor predictions of the future and therefore will be subject to random variation and a reducing level of confidence over time.
- It is assumed that the overall incidence of cancer will remain broadly stable, should this change in future this is likely to impact on projections.
- "Jersey Cancer Projections 2017 to 2037" are based on data prior to 2016. While this data is considered to be robust, the projections may become outdated
- New technologies may impact on the treatment of cancer and the need for radiotherapy; this is discussed further in the following section.

3.4.7 Impact of new technologies on demand

In undertaking horizon scanning for this report a number of emerging technologies have been identified which might impact on demand for external beam radiotherapy. Immunotherapies are probably at the most advanced state of development, though as yet there is no firm evidence to show the these have, or will have, an impact on the demand for radiotherapy.

Nanotechnology is an emerging science and an engineering approach to controlling matter at a molecular scale, with the potential to create novel chemical, and/or biological medications and/or devices. While this technology has demonstrated a potential to help bring about earlier detection, as yet clinical interventions are at a very early stage and clinical trials are needed to determine their effectiveness and cost benefit.

Extensive research is being undertaken into novel therapies, such as radiopharmaceuticals[24], which deliver radiation therapy directly and to specific cancer cells. While a number of clinical trials are under way there is as yet insufficient evidence to infer what impact on the demand for radiotherapy this technology may have.

Gene therapy is a novel treatment, however it remains at an early stage of development. The potential of gene therapy treatment has been demonstrated, for example in the treatment of breast cancer[25] but further basic and clinical research is needed before these therapies can be successful in patients.

China's regulatory agency approved the first commercially available gene therapy in 2003 (Gendicine[26]) to treat head and neck squamous cell carcinoma, a form of skin cancer. This drug is still awaiting European and FDA approval.

It is concluded that it is unlikely that such technologies will materially reduce, and in no way eliminate, the need for external beam radiotherapy in the next 15 years.

Public health and lifestyle interventions and campaigns can be expected to reduce the incidence of cancers, particularly Skin Cancer, Small Cell Lung Cancer and Mouth and Throat Cancers over time but are unlikely to reduce the need for radiotherapy in the next 10 years.

[24] https://www.cancer.gov/publications/dictionaries/cancer-terms/def/radiopharmaceutical
[25] https://breast-cancer-research.biomedcentral.com/articles/10.1186/bcr26#citeas
[26] https://www.nature.com/articles/d41586-019-03716-9

Accordingly, demand forecasts have not been adjusted. However, this matter should be revisited as part of the business planning process, should the Government of Jersey wish to take up any of the options set out in this report.

There is no firm evidence of a potential increase in indications for radiotherapy in clinical practice which might indicate a need to increase or reduce capacity. Estimates of optimal radiotherapy utilisation rates can vary over time due to changes in the relative frequency of cancer types and some changes in indications for radiotherapy.

The NHS is developing a new 10-Year Cancer Plan to cover the period 2022 – 2032. It is currently seeking evidence for a stocktake of innovations and improvements and research, which it believes the pandemic has helped to accelerate, with the aim of incorporating them in the forward plan. This work should be reviewed (when published) as part of the development of any future business case.

3.4.8 Waiting times and delays to treatment

There is no evidence that Jersey patients are waiting for treatment any longer than UK NHS patients are.

With current high levels of activity at all NHS Trusts treating Jersey patients, and rising prevalence over the next ten to fifteen years, it can be expected that there will further pressure on current capacity for radiotherapy in the NHS, with commensurate pressure on waiting times. This will need to be taken into account when considering the options set out in this report. [27]

Stakeholder interviews provided examples of patients whose radiotherapy treatment has been delayed because of a need to refer patients with more complex cancers from one UK provider to another. In the UK, Cancer Alliances have been formed to bring together key stakeholders from different service providers and other care organisations, in order to improve care pathways in their local area and to allow care to be more effectively planned across the local cancer pathway. It is unclear whether Alliance pathways have resulted in these referral transfers, but it is considered unlikely, as the incidence is low.

3.5 Capacity Conclusions

The UK Department of Health's (2012) report, 'Radiotherapy Services in England', provides a benchmark throughput indicator of 7,300 patient attendances per linear accelerator per year for a LINAC working a standard day, five days a week; this equates to circa 9,000 fractions per annum.[28] For single machine working it would be prudent to derate this figure to allow for machine downtime for reason of breakdown or other eventuality. Therefore, a working capacity of up to 7,500 fractions per annum is assumed.

The projections above show a demand for 3,882 fractions by 2043, equivalent to a working capacity utilisation of 52% (at 7,500 fractions adjusted capacity). This shows that a single LINAC would be sufficient to meet the repatriated demand for radiotherapy for Jersey residents and that the capacity limit would still not be reached prior to the year 2045, even if Guernsey residents wished to utilise the service and other potential demand were factored in as actual demand.

[27] https://www.kingsfund.org.uk/projects/positions/nhs-waiting-times

[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/213151/Radiotherapy-Services-in-England-2012.pdf

The assessment of activity which could be repatriated has been based on clinical opinion provided by HCS however, this is subject to the ability to establish an effective clinical network with a UK provider which satisfies clinical governance requirements.

Overall, demand projections show a large increase (~50%) in the volume of radiotherapy treatment required for the residents in Jersey over the period to 2043. This is largely due to demographic changes on the Island, not significant changes in cancer incidence or other healthcare factors. The older population on the Island is projected to increase and this age group is more likely to be impacted by cancer and is therefore more likely to require radiotherapy treatments.

4 Costs

4.1 Assumptions and Methodology

The financial element of this options appraisal is a mixture of detailed and high-level analysis. A business case (currently not in scope) would more rigorously build up the economic and financial cases and calculate a return on investment and other key indicators. For this report, the focus is on firming up the overall financial envelope and what may or may not be incurred under options for on and off-Island radiotherapy.

As explained in the demand section of this report, the expenditure connected to the current radiotherapy services commissioned from the UK has been captured at person level.

This granularity would be unusual even for a business case and offers many advantages, allowing costs to be projected forward more accurately, allowing for differences such as costs of radiotherapy relating to different types of cancer.

The granularity comes from two main sources:

- Billing data – UK providers give detailed backing information to explain the treatment charges made to HCS historically
- Travel and accommodation data – HCS maintain a very detailed OTTA database which tracks all costs for the patients referred to the UK

Some of this treatment and travel data relates to a radiotherapy patient's wider Oncology treatment, some of which would be relevant to where the radiotherapy service is situated in the future, and some would not. A proportion of 80% relevancy has been estimated based on the volumes of each treatment type for these patients. This is intended to ensure that these costs are not overstated when added to the costs of the radiotherapy itself.

HCS have identified five UK providers as providing the vast majority of radiotherapy to Jersey. These are: University Hospital Southampton NHS Foundation Trust, Cambridge University Hospitals NHS Foundation Trust, The Royal Marsden NHS Foundation Trust, University College London Hospitals NHS Foundation Trust and Guys & St. Thomas' Hospitals NHS Foundation Trust.

The activity for these providers has been used as the basis for the modelling. Other activity elsewhere in the UK NHS or private sector is deemed to be not material.

This costs section summarises the three main areas of costs:

- Activity expenditure – what radiotherapy costs now and how this will change over time
- Staffing costs – should an option for radiotherapy in Jersey be pursued, the costs of staffing said option
- Capital costs - should an option for radiotherapy in Jersey be pursued, the costs of providing facilities for said option

Inflation has been applied consistently to UK NHS costs and potential costs relating to a Jersey service. This has been deemed to be 3% per annum[29] in both instances. It is also assumed that UK provider charges continue to be based on 100% of the UK NHS National Tariff.

There is also a Costs Appendix (Appendix A), where the detail behind this summary can be found, and a separate set of working papers for relevant HCS staff members.

4.2 Activity Expenditure

4.2.1 Baseline expenditure

The summary presented below is a comprehensive and accurate assessment of current HCS expenditure on radiotherapy for the 2019 baseline year.

Costs are split by the type of cancer (which links to the demand section) and by the type of expenditure. Expenditure types are as follows:

- Radiotherapy Preparation – the initial attendance(s) that allow the clinical team to plan for the treatment
- Radiotherapy Delivery – the treatment itself, measured and charged in 'fractions'
- Other Related Activity – outpatient consultations and similar activity that is deemed likely to relate to the radiotherapy treatment (this was set at 80% as explained above so 20% of these costs are excluded from this modelling)
- Travel and Accommodation (this was also set at 80% as explained above)

Table 8: 2019 Radiotherapy costs and travel and accommodation for these patients

Cancer Location	RT Prep.	RT Delivery	Other Related Activity	Travel Booking	Accom. Invoices	Rented Accom.	Charter Flights	Expense Claims	Taxis and Other	Grand Total
Breast	£80,544	£116,380	£65,045	£38,102	£6,643	£133,667	£0	£445	£353	**£441,179**
Colorectal	£6,397	£17,169	£6,883	£11,473	£461	£16,347	£0	£234	£0	**£58,964**
Head & Neck	£22,191	£54,243	£30,172	£18,058	£4,600	£25,134	£0	£28	£0	**£154,426**
Lung	£11,954	£24,596	£10,961	£23,275	£980	£13,309	£1,784	£1,110	£0	**£87,969**
Prostate	£49,238	£162,525	£14,911	£24,165	£59,112	£10,881	£4,182	£4,580	£19,855	**£349,449**
Skin	£4,489	£9,852	£3,450	£8,577	£3,356	£3,617	£4,421	£524	£0	**£38,286**
Other	£58,143	£121,881	£114,959	£78,819	£49,756	£74,790	£28,145	£4,428	£1,289	**£532,210**
Total	**£232,956**	**£506,646**	**£246,380**	**£202,470**	**£124,908**	**£277,745**	**£38,532**	**£11,349**	**£21,497**	**£1,662,483**

[29] UK NHS National Tariff cost uplift element for 2022 is 2.8%, this is rounded up to 3% annually for this model due to the current inflationary environment

As Figure 7 illustrates, approximately 40% of the £1.66m expenditure relates to travel, accommodation and other expenses.

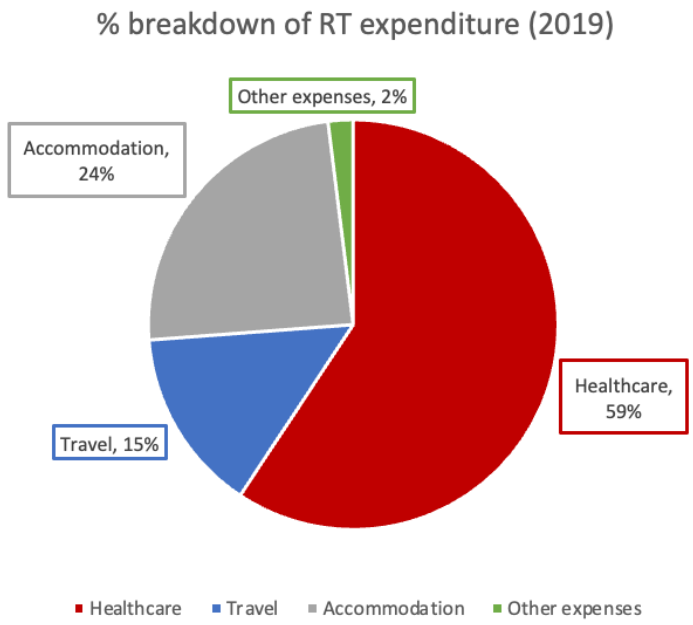

Figure 7: % breakdown of RT expenditure (2019)

4.2.2 Projected expenditure

Forward projections for the above expenditure are made in line with the trends in the Demand section 3.

Table 9: Estimated HCS revenue expenditure with status quo (full UK provision)

	2019	2023	2028	2033	2038	2043
Breast	£441,179	£523,981	£647,025	£796,725	£977,696	£1,197,116
Colorectal	£58,964	£72,352	£93,131	£118,023	£149,259	£186,550
Head & Neck	£154,426	£189,816	£243,910	£309,805	£390,503	£489,049
Lung	£87,968	£108,801	£140,635	£179,849	£227,988	£286,899
Prostate	£349,450	£434,544	£560,749	£711,161	£894,437	£1,119,009
Skin	£38,286	£46,838	£60,814	£78,053	£97,782	£123,508
Other	£532,211	£654,990	£839,972	£1,068,339	£1,346,898	£1,685,644
	£1,662,483	**£2,031,322**	**£2,586,236**	**£3,261,955**	**£4,084,564**	**£5,087,775**

The 3% inflation applied to this modelling would approximately double the £1.66m costs by 2043. The remainder of the increase relates to the growth in demand explained in section 3.

4.3 Staffing Costs (projected)

This is a typical staffing model for a similarly sized radiotherapy service should a service be provided in Jersey in the future.

An estimate has been made of the typical NHS payscale, NHS gross costs[30] and the equivalent HCS payscale. The last NHS financial year has been used as a baseline but inflated to 2027, the estimated earliest start date for any radiotherapy service in Jersey.

Two unavoidable elements of non-pay expenditure are also included at the bottom of the table, equipment maintenance costs and increased energy costs from the linear accelerator and other equipment.

Because a partnership with a current radiotherapy provider is discussed as being required elsewhere in this report (see section 5.5), a further cost has been shown at the bottom of this table that is likely to result from such an agreement with an NHS provider. These costs would include a management charge element plus the costs of staffing cover, travel and accommodation for any on-site work in Jersey, governance and training, so are likely to be substantial.

Some efficiencies may be found in the numbers or grades of staff required, but if a partnership service is to cover any of these roles, that provider would be likely to de-risk the service by ensuring it is comprehensively staffed.

These indicative costs would provide cover for the 80% of radiotherapy treatment that would be repatriated in Jersey if such an option was pursued.

Table 10: Typical staffing model for a single linear accelerator

Staff group	WTE	NHS Payscale	HCS Payscale	Estimated NHS Cost flexed to 2027
Managerial & Administrative Staff				
Operational Manager	1	Band 8B	CS12.3	£101,091
IT support	1	Band 6	CS08.3	£59,386
Reception	1	Band 4	CS06.3	£34,967
Clerical	1	Band 3	CS06.3	£32,492
Medical Staff				
Clinical Oncologist	1	Consultant	CONN.17	£196,601
Locum Cover		6 weeks		£35,821
Radiotherapy Physicists				
Medical Physicist	2	Band 8B	CS13.4	£202,181
Specialist Radiography or Nursing				
Advanced Clinical Practitioner	1	Band 8A	NM05.4	£83,999
Therapeutic Radiographers				
Therapeutic Radiographer	1	Band 7	CS12.3	£70,006
Therapeutic Radiographer	1	Band 6	CS10.3	£59,386
Nursing Staff				
Prep Nurse	2	Band 6	NM04.3	£118,772
Dosimetry / Technologists				
Technician	2	Band 6	CS10.3	£118,772
Dosimetrist	2	Band 6	CS10.3	£118,772
Estates				

[30] NHS gross costs include an estimate for employer's taxation and superannuation

Staff group	WTE	NHS Payscale	HCS Payscale	Estimated NHS Cost flexed to 2027
Domestic		Internal recharge		£9,313
Estates		Internal recharge		£5,971
TYPICAL FULLY STAFFED RADIOTHERAPY SERVICE				**£1,247,525**
Partnership Arrangement				
Potential NHS Management Costs[31]				£623,763
Non-Staffing Expenditure				
Equipment Maintenance and Other				£238,810
Energy				£119,406
TOTAL STAFFING AND OTHER REVENUE COSTS				**£2,229,504**

4.4 Capital costs (projected)

A Jersey-based radiotherapy service would also have capital implications [32] (these costs could be reduced by any charitable donation).

As with staffing, this table is intended to be comprehensive. Some efficiencies may be found in some of these regards, but judgement has been applied to ensure the estimate does not understate the costs of building such a service in Jersey.

The costs are based on 2026 because this is deemed to be the earliest build year ahead of a 2027 start date.

The equipment is assumed to have a 10-year life and so would require one replacement cycle in 2036.

This base capital position does not allow for dual bunkers, any leaseback arrangements or a wider cancer centre. Those would all be deemed to cost more, as explained in the separate analysis of different options.

More details of wider assumptions are contained in the Cost Appendix.

Table 11: Summary of projected capital costs for an on-Island service

Cost Element	Estimated Capital Cost in 2026
Site Acquisition	
Costs of acquiring site (subject to location, remove / alter as applicable)	£2.0m
Building Infrastructure	
Bunker for linear accelerator (single bunker) 141m2	£1.1m
Reception and other areas 250m2	£1.5m
Circulation space 122m2	£0.7m

[31] The result of a partnership agreement tender can only be broadly estimated, additional costs are judged to be 50% on top of staffing costs for an NHS partnership, this could rise to 75% with the private sector

[32] Capital broadly estimated by experience of similar capital schemes in the UK NHS, with adjustments made for current market conditions and the geographical location

Cost Element	Estimated Capital Cost in 2026
Consultation area 277m2	£1.6m
Treatment Preparation (simulation, planning) 332m2	£1.8m
Electrical station, external and internal plant areas	£0.4m
Other utilities such as heating, drainage and water infrastructure	£0.2m
On-Island premium	£1.0m
Contingency	£1.0m
Equipment	
Linear accelerator purchase (note a leasing option is available at a higher price – not evaluated here)	£2.3m
IT Configuration	
Adaptation of CT scanner	£0.2m
Software	£0.3m
Hardware	£0.1m
Implementation costs for linear accelerator	£0.3m
Other Costs	
Professional fees (architects, engineers, surveyors, legal etc)	£1.0m
Total	**£15.5m**

4.5 Conclusions

The current service as provided by UK providers has a 2019 cost of £1.66m for the radiotherapy, including treatment, travel and accommodation expenses. This then projects up to circa £5m per annum by 2043. The reason for this increase is partly inflation (at 3% per annum it would take only 24 years for costs to double). However, it also relates to an approximate 50% increase in demand, which as explained elsewhere largely relates to the aging population and the impact this has on the costs of radiotherapy.

All options under consideration would need to be compared not to the current 2019 costs but to how these would rise in the years to come.

A full business case would explore this further, especially the inflationary assumptions (this report assumes equal impact of Jersey pay uplifts and NHS tariff uplifts) and the incidence assumptions from Statistics Jersey. Some initial assurance has been carried out in these regards. Some of the costs and uplifts relating to an on-Island service are broadly estimated and would benefit from the larger exercise that would form part of the business case.

As set out in Section 7, costs do vary for each option. However, whatever the eventual location and type of service provision, the financial impact of an ageing population on radiotherapy treatment will have to be addressed.

5 Options Identification

5.1 Purpose and Approach

There are a broad range of options for how radiotherapy services could be provided to the population in Jersey. For the purposes of this report this has been broken down into the core elements required of any radiotherapy service and then considered options using these elements. The core elements of the radiotherapy Service are:

- Geographical location
- Scope of the radiotherapy Service
- Design of on-Island facilities
- Staffing of the radiotherapy Service

The remainder of this section considers each of the four core elements in detail before making conclusions on the final set of options to be evaluated further within this work.

5.2 Geographical Location

This element relates to the physical placement of the radiotherapy Services. There are two approaches:

- **In Jersey**: This approach contains options for radiotherapy services provided primarily in facilities in Jersey.
- **In the UK**: This represents all of the off-Island approaches.

5.3 Scope

The element relates to the overall scope of radiotherapy Services for Jersey. The analysis has considered the following approaches:

- **Non-radiotherapy Provision**: This envisages not using (or minimising) radiotherapy services at all for the population in Jersey. There is some international research underway that suggests, in time, radiotherapy may decline due to i) better prevention, i.e. lessening public exposure to carcinogens, ii) earlier detection, e.g., through advances in cancer screening and iii) replacement with other ways to treat tumours, for example through wider use of radiopharmaceuticals and the use of nanodevices to deliver targeted treatments to tumour sites. While none of the research seen suggests radiotherapy will be removed entirely as a treatment option, these approaches, if successful, should see the scale of radiotherapy use decline. While i) and ii) above are already progressing, iii) is at an early stage and timescales for any material changes in radiotherapy use from these alternative treatments are considered as long term.

There are three **on-Island** approaches considered:

- **Within the Our Hospital Footprint**: This approach envisages the radiotherapy service to be located and operated from the Our Hospital site. Following discussions with the Our Hospital team, specific options here are severely limited and no radiotherapy facilities can be incorporated within the planned hospital structure itself without material impacts to planning, cost and delivery timescales. Use of a small part of the site, such as part of the car park, could be possible but this would only accommodate the "Simple Bunker" approach (as set out in Section 5.4) and its implementation would be linked to the opening of the new hospital[33] at the earliest. Utilising

[33] Currently planned for 2027

additional land adjacent to the new hospital site, i.e., outside of its current footprint, is considered further under the two approaches below.

- **Standalone radiotherapy Facility**: This envisages radiotherapy services on-Island which only provide radiotherapy Services and does not include wider cancer care, for example chemotherapy, palliative care, pre-habilitation and rehabilitation. It would work within either a hospital or a separate location.
- **radiotherapy as part of a new Cancer Centre**: This envisages radiotherapy services on-Island which form part of a broader, integrated cancer care service, for example including chemotherapy, palliative care, pre-habilitation and rehabilitation. This approach would also include potential for non-HSC partners to operate from the same site, for example MacMillan Care.

The six approaches below relate to an **off-Island** radiotherapy Service:

- **NHS existing Providers:** This approach is part of the status quo option in this analysis. The radiotherapy Services are provided from the NHS Trusts that GoJ currently receives radiotherapy Services from, utilising their locations and facilities in the UK.
- **NHS existing Providers (Enhanced):** This approach is an evolution of the status quo option in this analysis. The radiotherapy Services are provided from the NHS Trusts that GoJ currently receives radiotherapy Services from, utilising their locations and facilities in the UK, but the overall Service is modified to optimise value and benefits. For example, this could involve adjusting patient volumes between Trusts to make best use of variable wait times, or investing more in travel, accommodation and subsistence arrangements for patients, carers and families. Note that the NHS is unable to offer preferential pricing and/or access to services to patients, unless they utilise the private sector elements of NHS Trusts (which would then fall under the Private Sector approach below), so any enhancements to radiotherapy Services provision would be outside of the NHS care provision.
- **NHS new Providers:** This approach obtains radiotherapy services from a new set of NHS Trusts that GoJ does not currently use for radiotherapy Services, utilising their locations and facilities in the UK.
- **NHS Prime Provider:** This approach largely centralises/ focuses radiotherapy Services from a single NHS Trust, likely to be one from which GoJ currently receives radiotherapy Services, utilising their locations and facilities in the UK.
- **Private Sector:** This approach would deliver off-Island radiotherapy Services through a Private Sector organisation[34], utilising their locations and facilities in the UK.
- **EU healthcare staffing:** This approach would require GoJ to make arrangements with one or more non UK/ non NHS care organisations in another EU country, for example France, to access their radiotherapy Services for Jersey Patients.

5.4 Design

This element relates to the design of the radiotherapy Service. Radiotherapy uses radiation treatment and therefore requires specialised equipment, infrastructure and buildings (including a radiation proof bunker) in order to operate safely. The primary equipment for administering the radiation treatment is known as a Medical Linear Accelerator (LINAC). All LINACs have a less than 10 year lifespan, after which the device needs replacing to maintain safe and accurate use.

Note that all forms of bunker design must be regulatory approved and fit for purpose with regard to the type of LINAC being installed within them. While there are many other necessary structures required in the

[34] Note there are a number of commercial organisations that offer these services, for example HCA or GenesisCare

overall provision of radiotherapy, for example reception, changing rooms, control rooms, etc., the primary part of the design relates to the bunker within which radiotherapy is delivered. A bunker consists of several modules, which together provide secure and safe access, control, and delivery of radiotherapy services. The design of bunkers varies, as most are bespoke builds to suit the surrounding facilities, but, for the purpose of this analysis, the bunker design has been categorised at a higher level to consider four main aspects:

- **Simple Bunker**: This category represents modular or prefabricated design products with an intended lifespan of 10 years. With this approach, GoJ would install one LINAC in the modular bunker and, towards the end of its operational life (~9.5 years), replace both the modular bunker and the LINAC, but continue to use other non-radiation related structures/ modules associated with the radiotherapy service. Two modular bunkers and two LINACs would be needed over the twenty year modelling period. This approach requires the least amount of land and, subject to ground conditions and necessary infrastructure availability, it does not require major construction work and so is the fastest of all these approaches to deploy. This approach may also be viable where existing buildings could be reused. The timescale for "decision to deployment" is estimate at 1 to 2 years, as this would approach would not have any bespoke construction or groundworks to be factored in but would still require linkages to existing utilities infrastructure.
- **Bespoke Bunker**: This approach has a custom single bunker designed and constructed on its intended location on-Island with an intended lifespan well in excess of 20 years (likely 40 years plus, subject to necessary refurbishment.) With this approach, GoJ would install the LINAC in the bespoke bunker and, once the LINAC needed replacing (estimated at ~9.5 years), the bespoke bunker would experience a period of circa 6 months downtime for the old LINAC to be removed and the new LINAC installed before operational services recommenced. Two LINACs would be needed over the twenty year modelling period. This approach requires more land use than the Simple Bunker as well as major construction and groundworks. The timescale for deployment is highly dependent on planning considerations, ground conditions, construction and infrastructure requirements but an estimate of 4-5 years should be planned, to reflect timings and complexities of new large-scale construction in Jersey.
- **Bespoke Bunker and Simple Bunker**: This approach has a custom single bunker designed and constructed on on-Island with an intended lifespan well in excess of 20 years, together with a temporary prefabricated bunker with a circa 1 year lifespan, deployed towards the end of the LINAC's operational life, i.e. in year 9. With this approach, GoJ would install the LINAC in the bespoke bunker and, prior to the LINAC needing replacing (estimated at ~9.5 years), the temporary prefabricated bunker would be introduced nearby containing the new LINAC. Once the bespoke bunker was ready for service again, the new LINAC would be relocated to it, resulting in some service downtime but this is estimated to be circa two months, instead of six months. Two LINACs would be needed over the twenty year modelling period and one temporary bunker in addition to the bespoke bunker. This approach requires slightly more land use than the single bespoke bunker and will still require major construction and groundworks. The timescale for "decision to deployment" is highly dependent on planning considerations, ground conditions, construction, and infrastructure requirements, but an estimate of 4-5 years should be planned, to reflect timings and complexities of new large-scale construction in Jersey.
- **Dual Bespoke Bunkers**: This approach has two custom bunkers designed and constructed on-Island with intended lifespans well in excess of 20 years. With this approach, GoJ would install a LINAC in one bunker and, prior to the current LINAC reaching the end of its operational life (estimated at ~9.5 years), the second bunker would operate with the new LINAC, resulting in no period of service downtime. Two LINACs would be needed over the twenty year modelling period. This approach requires the most land use and will require major construction and groundworks. The timescale for "decision to deployment" is highly dependent on planning considerations, ground conditions, construction, and infrastructure requirements but an estimate of 4-5 years

should be planned, to reflect timings and complexities of new large-scale construction in Jersey. Note this is also the only approach where there would be facilities to operate two LINACs in parallel, although the demand estimates show that there is no scenario where capacity greater than that of a single LINAC would be required.

5.5 Staffing

This element relates to how the radiotherapy Service would be staffed. The following potential aspects were considered:

The five approaches below all relate to an **on-Island** radiotherapy Service. A commercial agreement would be required with the resource supplier in all but one case (GoJ Staffed provision.)

- **Private Sector**: Staffing would be through a private sector provider of radiotherapy staff. The resource provider would ensure all necessary staff were made available to operate the radiotherapy Service, likely using a mix of on- and off-Island staff. The private sector organisation would be responsible for effective staffing provision at all times and would be accountable for any staff governance arrangements.
- **Private Sector and GoJ**: Staffing would be provided through a mix of private sector provider resources and some staff directly employed by HCS. The resource provider would be responsible for their staffing provision, while GoJ would be responsible for any staff they employed. Governance would also be split according to where the staff were resourced from.
- **NHS Trust**: Staffing would be provided through an NHS Trust[35]. The NHS Trust would ensure all necessary staff were made available to operate the radiotherapy Service, likely using a mix of on- and off-Island staff. The NHS Trust would be responsible for effective staffing provision at all times and would be accountable for any staff governance arrangements.
- **NHS Trust and GoJ:** Staffing would be provided through a mix of NHS Trust provided resources and some staff directly employed by HCS. The NHS Trust would be responsible for their staffing provision while GoJ would be responsible for any staff they employed. Governance would also be split according to where the staff were resourced from.
- **GoJ staffed**: Staffing would be provided through direct employment by GoJ. GoJ would be responsible for all staffing provision and accountable for all staff governance requirements

There is only one off-Island approach to staffing, as all workforce provision would be linked to the off-Island radiotherapy arrangements Jersey was commissioning.

- Off-Island staffing

5.6 Refining Options

An expert panel (see Appendix E) met as part of this work to refine potential options into a smaller set of viable options. As part of this work, the following approaches were ruled out from further analysis:

- **Non-radiotherapy Provision**: In the longer term this may present a step change in the demand for radiotherapy services, however over the 20-year modelling period for this analysis it is not considered that these approaches will have a demonstrable impact on radiotherapy demand.
- **NHS new Providers**: Provision of off-Island radiotherapy from a new NHS Trust or Trusts offers no obvious benefits over what is currently provided from the UK arrangements, which may not be optimal for Jersey, but do deliver a safe and reliable service.

[35] This would need to be an arrangement with a single NHS Trust, not multiple agreements.

- **EU Healthcare**: For GoJ to obtain off-Island radiotherapy from another EU country would present risks and no obvious benefits over what is currently provided from the UK arrangements, for example:
    - Language barriers may be a problem for many patients, carers, families and clinicians interacting with EU staff
    - Different ways of working/ governance arrangements may present challenges
    - Transportation and accommodation may be more expensive and complicated to organise
- **Bespoke Bunker and Simple Bunker**: This approach adds few benefits over and above the single bespoke bunker approach as, although the refit downtime is lower, the costs of the temporary bunker remain high and the downtime period can be planned well in advance, enabling alternate radiotherapy provision for that refit/ refurbishment period to be arranged.
- **GoJ staffed**: For GoJ to directly employ all or the majority of staff associated with an on-Island radiotherapy Service, there would be some potential benefits but also considerable risks:
    - The radiotherapy service would benefit from growing its own capacity and capability of staff on Island, adding to the wider staff capability of the HCS.
    - A major risk would be workforce non-availability undermining the sustainability and resilience of the service. Having to provision what are often quite specialised staff to ensure the radiotherapy Service is always staffed when needed would require employing more staff than needed to take account of staff churn and planned and unplanned absence, which increases the revenue (pay) costs. While some staff could also work within the main hospital complex, this is not always an option for specialised radiotherapy staff.
    - A major risk would be the retention of staff on Island, given the limited volume of radiotherapy Services required and the need for specialised staff to maintain their professional skills. Unforeseen staff churn could have serious operational consequences given the time it is likely to take to recruit new radiotherapy staff on-Island.
    - A further risk relates to the governance and accountability for employing radiotherapy staff. This is not an area that has been managed by GoJ previously and organising and maintaining it will present an additional management burden on HCS.

Additionally, the following Staffing aspects, while not ruled out, were considered sufficiently close to be amalgamated for this analysis:

- **Private Sector/ Private Sector and GoJ**: Although initially this approach is likely to start with 100% Private sector staffing, over the twenty-year analysis term this is likely to evolve to a model where some staff may be employed directly by GoJ. This allows time for GoJ to fully understand and manage any workforce availability and/ or governance arrangements required, while still obtaining full staff services from the Private Sector partner.
- **NHS Trust/ NHS Trust and GoJ**: Although initially this approach is likely to start with 100% NHS Trust staffing, over the twenty-year analysis term this is likely to evolve to a model where some staff may be employed directly by GoJ. This allows time for GoJ to fully understand and manage any workforce availability and/ or governance arrangements required, while still obtaining full staff services from the NHS Trust partner.

5.7 Options identification: conclusion

Based on the above process, the analysis has identified 18 discrete options, shown in **Error! Reference source not found.** below, that will be considered within the full analysis.

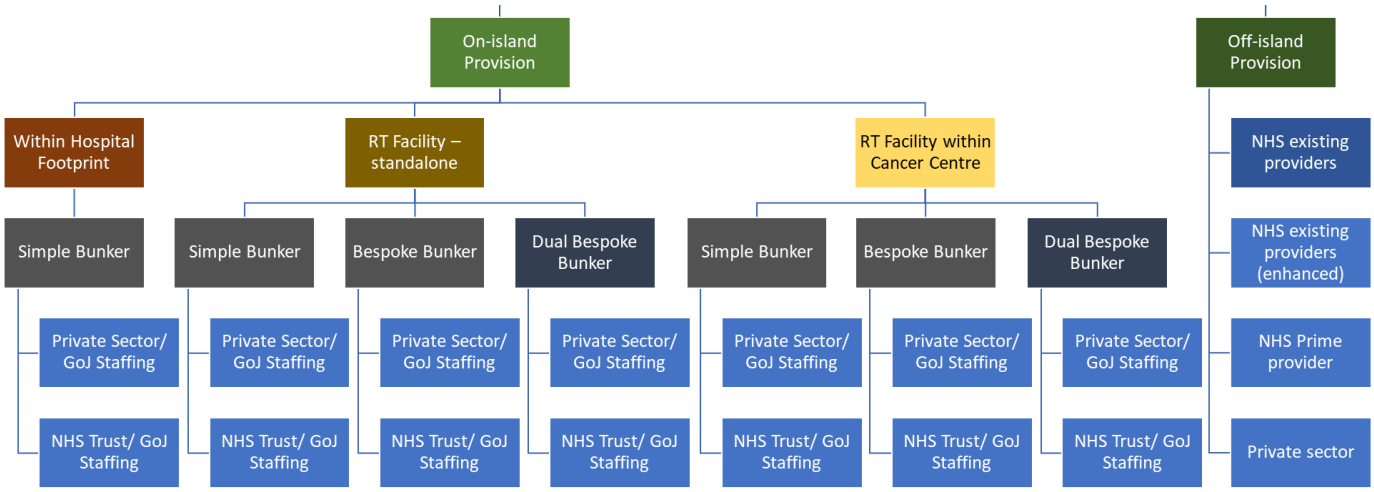

Figure 8: viable options

For off Island options, these 4 reflect four different approaches:

- Current arrangements with NHS Trusts. This is the "status quo" option against which others are compared
- Continuing current arrangements for radiotherapy treatments but with improvements and investments in travel and accommodation to improve the patient experience
- More centralisation of referrals[36], focusing on fewer (or one) NHS Trust(s), likely to be London-centric
- Transferring most radiotherapy away from the NHS to a private sector provider in the UK

For on Island options, these 14 are variations on three main approaches:

- Utilising a part of the Our Hospital site, likely part of the car park, to install some basic radiotherapy services, operated in partnership with either an NHS or private sector provider. Other cancer care services in Jersey would continue to be delivered via existing arrangements
- Creating a separate radiotherapy facility somewhere else in Jersey, again operated in partnership with either an NHS or private sector provider. Other cancer care services in Jersey would continue to be delivered via existing arrangements
- Creating a separate comprehensive cancer centre somewhere else in Jersey, again operated in partnership with either an NHS or private sector provider. All cancer care services provided in Jersey, including partner charities and other agencies, would be co-located on the same site

Each on Island option also includes the enhanced NHS provision for the residual (20%) of off Island referrals to maximise the possible benefits for all patients.

The options analysis in Section 7 will provide detailed assessment against:

- Demand
- Costs

[36] Always subject to clinical safety and patient needs

- Stakeholder Impacts, as further discussed in Section 6

6 Stakeholder Views

6.1 Approach

As part of this Options Appraisal, views have been sought from a range of stakeholders in key groups. Most of their feedback was provided via interviews, supplemented by questionnaires where individuals were not available for interview in the timeframe of this assignment.

The stakeholder list was compiled in consultation with the Innovation and Improvement team within Health and Community Services seeking to ensure there was representation from the key groups identified. Wider public and direct patient consultation was not sought at this current stage but would be expected to occur at later stages if an investment decision went ahead.

Feedback was successfully sought from 28 individual stakeholders, which were grouped into 3 main categories, which are shown in ***Error! Reference source not found.***, below. Feedback was sought via a semi-structured interview (see Appendix F) using a video link.

It should be noted that all stakeholders were keen to participate and were accommodating in making time for interviews, indicating a high level of interest in the future of radiotherapy services for Jersey.

The interview questions were designed to be neutral, allowing stakeholders to voice their own views and opinions without being led in any specific direction. This is reflected in the analysis and feedback below, which highlights the key factors that the stakeholders themselves raised within the topic areas.

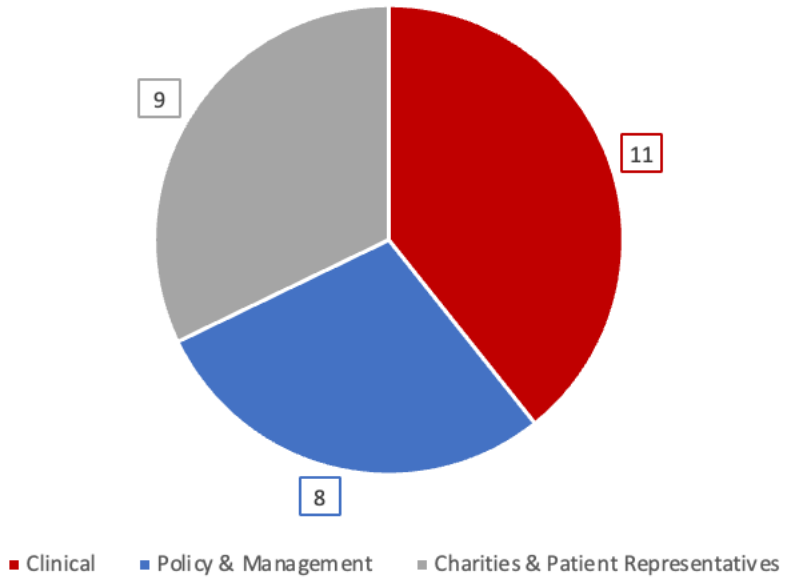

Figure 9: Numbers and category of stakeholders interviewed

The key areas for which stakeholder views were sought were:

- Stakeholder vision
- Current provision of radiotherapy for Jersey residents

- Current and anticipated future demand for radiotherapy
- Patient experience of current radiotherapy provision
- Workforce and staffing
- Feasibility of an on-Island radiotherapy service, including:
    - Costs and potential savings
    - Location
    - Sustainability

A summary of the feedback for each of these is set out in the following section and further details in a supporting to this report.

The information provided by undertaking this stakeholder engagement has been considered alongside the collection and analysis of extensive qualitative and quantitative data. In many cases the interviews have provided links to quantitative data and evidence that have been a helpful additional source of information in identifying and considering the possible options.

Whilst stakeholder feedback is soft and qualitative in nature, informed by individuals' opinions, backgrounds and experience, it provides an important set of insights into their preferences and beliefs. The analysis set out below indicates where there are strong and sometimes polarized views and possible misconceptions. These insights were used in forming the final options identification and also in the final options assessment within this report.

One key output of this feedback was to form a set of criteria, which captured the key themes that could impact radiotherapy options. These impact criteria are set out in Section 6.3 below and have been used in the assessment of viable options in Section 7.3.

6.2 Findings

6.2.1 Stakeholders' vision

The majority vision was that radiotherapy would be part of an integrated cancer service, voiced strongest amongst the clinicians interviewed, with an even stronger desire across all stakeholders to remove, or at least reduce, the need to travel and be away for long periods where possible. Clinical stakeholders' vision and strong preference was for an on-Island radiotherapy service, with almost all clinicians interviewed expressing this view. Only one stakeholder was firmly against this option, other stakeholders were neutral or did not express a view.

Whilst proximity to the main hospital was considered as a positive, it was not universally considered to be crucial. More importance was given to a self-contained, holistic service for cancer patients and their families, providing emotional and social support, as well as a full range of clinical treatments.

A number of respondents highlighted that their vision would include radiotherapy services that are sustainable over time, reliable and not subject to periods of non-availability.

All groups identified the timeliness, quality, and safety of the service and for it to be able to deliver comparable outcomes and be accessible to the whole population in Jersey as key features required.

6.2.2 Current provision

The overriding view of current provision is that the radiotherapy services provided from the range of specialist providers in the UK are excellent in terms of quality, safety and outcomes. This included views about the experience of patients at point of treatment and held true across all individual stakeholders and groups, notwithstanding which tertiary NHS provider they were referring to. Any option for alternative provision must be at least as good was a point strongly made by a number of those interviewed.

On the other hand, having to travel and stay away from home to receive radiotherapy treatment is seen as a significant negative factor across all groups.

Some stakeholders reported that waiting times and delays in accessing radiotherapy treatment were a concern. Stakeholders fed back that the current arrangements are not always straightforward, requiring a referral by a Jersey clinician to the tertiary NHS provider, which, to follow NHS governance protocols, is then reassessed by the receiving service, even when the referral is by a consultant. Stakeholders raised the concern that this may contribute to some patients becoming more ill before they are treated, resulting in the need for more invasive and extensive treatments and poorer outcomes.

A significant number of stakeholders identified potential risks and some concern that currently the best radiotherapy treatment options are not accessible to all patients. Main reasons included inability or unwillingness of patients to travel when ill.

A number of stakeholders spoke about the wider non-clinical and community social support currently available. This was reported to be a significant help to patients and their families, but its provision and funding is reliant on charitable donations. A further observation was that patients travelling and staying off-Island sometimes provided mutual peer support to each other.

6.2.3 Demand

The most common factor raised by all stakeholders in this section was that of unmet demand due to patients being unable or unwilling to travel off-Island to access radiotherapy treatments, which could cause patients to have poorer outcomes and suffer greater pain and distress than would be the case if they did access radiotherapy. A range of reasons, often a combination of some or all of them, were offered, most consistent were:

- Patients who are too ill or too frail to travel
- Patients at the palliative care stage, who do not want to be away from family, friends, or local support networks for weeks
- Patients who choose not to leave the Island for family or work-related reasons
- Patients who would find the travel and weeks away in unfamiliar surroundings too stressful, alongside dealing with the anxiety of serious illness

Some stakeholders expressed the view that this unmet demand could be potentially significant in terms of increased illness and poorer outcomes. Stakeholders were unable to provide definitive data on the volume of patients involved in this overall unmet demand, but suggested volumes of circa 10-20 patients per annum.

There was a significant view that demand from Jersey alone will not be sufficient to justify an on-Island radiotherapy service. This view was held most strongly amongst the Policy & Management Group, followed by the Clinical Group, whilst none of the Charity Patient Group raised this point. A few stakeholders

considered that an on-Island radiotherapy service would increase demand, although volumes or sources of this demand were not specified.

A final factor identified in this section was the view held by a number of stakeholders that private and insurance funded demand (private radiotherapy) could be kept on Island rather than using off-Island facilities. No definitive volume data was made available, but the overall volumes were considered to be relatively low, circa 20 per annum, and it would still remain a matter of personal choice as to where these patients received their radiotherapy.

6.2.4 Patient Experience

Unsurprisingly, the major factor under this heading, identified by almost three quarters of stakeholders, was the challenge of travelling and staying off-Island, often for several weeks, to access radiotherapy treatments. This issue affects not just the patient, but also patients' families and wider communities. A common factor identified was how having to be away for weeks at a time impacts patients' privacy and their ability to carry on with normal life as far as possible. Other challenges consistently highlighted included:

- Patients feeling isolated
- Patients struggling with activities of daily living in unsupported self-catering accommodation
- Maintaining contact with family, friends, and wider support networks whilst away

Consistent with the feedback in the Current Service section above, there was a high level of satisfaction with the radiotherapy treatments received by patients from the off-Island NHS providers across all stakeholder groups. Stakeholders recognised that the care was being provided by leading national (and international) specialised centres of excellence.

Of those that expressed a view, there were generally high levels of satisfaction with the overall transport arrangements provided for patients.

There was some anecdotal feedback about things not always going smoothly, where travel arrangements were mixed up or cancelled, but these appeared to be isolated incidences.

Where stakeholders provided feedback on the quality of accommodation it was generally good. However, for some patients, the accommodation arrangements prove challenging. A significant number of patients struggle with the isolation of unsupported self-catering accommodation, particularly where they feel too ill to shop and cook if alone.

6.2.5 Workforce and staffing

Overall, over half of those interviewed expressed the view that recruitment and retention of the workforce required to run a sustainable and high quality on-Island radiotherapy service would be challenging. This factor is already an acknowledged issue in attracting and keeping healthcare staff in Jersey, reflecting the wider staff shortages across the NHS in the UK. The specialist requirements of staffing a radiotherapy Service were also widely referred to as a further challenge, with some aspects, such as clinical governance for a radiotherapy service, being a new set of requirements for HCS to develop and manage.

An important factor raised was that any proposed on-Island service would be serving a small population and this raises a number of potential challenges, including:

- Health professionals having sufficient numbers of patients to develop and maintain skills and experience

- Appropriate professional oversight and clinical governance and access to CPD
- Staying up to date, with technology, equipment, treatment protocols

Many of the stakeholders who raised this countered the risk with the potential of developing an on-Island service in partnership with one or more of the current providers. These suggestions included staff being employed and developed by those providers, as opposed to being employed by HCS, and, rather than living on-Island, coming on-Island to deliver the service, as well as using digital capabilities to work remotely.

6.2.6 Feasibility

Stakeholders were asked for their views about the overall feasibility of establishing and running a radiotherapy Service in Jersey. Some stakeholders emphasised that sustaining such a service over time was a key risk factor to be considered.

The costs of building and maintaining a radiotherapy service in Jersey and the challenge of balancing the costs, risks and benefits was raised by a third of stakeholders overall.

Over a third of stakeholders held the view that there is the potential for significant income from private and insured patients that would have a potentially significant positive impact on the affordability of the investment, although volumes of these patients are not known but considered to be low. Charitable donations for an on-Island facility were suggested as a funding possibility.

The Charity and Patient Group also indicated the potential for significant funding support likely to be available from the charity organisations.

A minority of stakeholders held the view that considerable savings could be achieved by not having to send patients off-Island for radiotherapy and that these could be reinvested in an on-Island service.

In all cases above, stakeholders did not provide definitive data on the potential of opportunities expressed.

A second aspect of feasibility raised by stakeholders was that of the potential to work with other health economies, in particular Guernsey. Whilst over a third of stakeholders raised this as a possibility, the history of such partnership working was also raised as challenging, thus likely to be difficult to achieve in a reasonable timeframe and with any guaranteed stability over time.

One stakeholder highlighted the potential risks of affecting the wider (non-radiotherapy) relationships with current NHS providers in respect of other health services by moving radiotherapy services on-Island.

The location of an on-Island radiotherapy service was identified as a major factor, but this was an area where there was a diversity of views. Almost a third of stakeholders reported that they did not consider finding a location would be a problem. Alternatively, some stakeholders felt strongly that finding a location and getting through planning would be significant challenges.

Many of the stakeholders expressed a preference for radiotherapy services to be co-located with other cancer and health services. However, this was seen as the ideal and there was broad acceptance that this may not be achievable, with a widely held view that co-location on the planned new hospital site would not be possible.

6.3 Stakeholder impact criteria

The collation of stakeholder inputs and the distillation of them has created a set of themes which have been used in this analysis to:

- Facilitate an impact assessment of options by a stakeholder panel (see Appendix E) to produce a viable shortlist of options; and
- Be considered in the overall analysis of these options alongside demand and cost criteria.

The themes are summarised in Table 12 below.

Table 12: Stakeholder themes

Heading	Description
Access to Care	The opportunity for patients to obtain optimal access to radiotherapy (and associated) services to meet clinical need
Patient Experience	The overall experience from the patient's perspective, including their confidence in and comfort from the care regime
Carer/ Family Experience	The overall experience from the carer/ family's perspective, including their confidence in and comfort from the care regime
Health Outcomes	Measurable effect on the patient's length and quality of life
Patient-centred Care	The extent of localisation of radiotherapy services to the patient
Waiting Times	Impact of radiotherapy service provision on reducing waiting times between referral and treatments occurring
Other Support agencies	Ability for non-HCS partner agencies to provide optimum services to support radiotherapy-related care
Health workforce availability	Likelihood of the staffing resources always being available when needed
Governance	The processes and accountability for appropriate and regulatory corporate and clinical governance of the radiotherapy service
Service resilience	Ability to overcome breakdowns and gaps in service availability
Implementation timescale	The time taken to deploy the radiotherapy services to an operational state once an options decision has been taken
Capital and revenue costs	Impact of costs of any radiotherapy provision
Our Hospital delivery	Impact on the scope, cost or timeframe for delivery of the new hospital
Additional Land use	The impact for any further on-Island land appropriation outside of the Hospital Footprint

7 Options Analysis

Using the options determined in Section 5.7, each of these is assessed in this section. **Error! Reference source not found.** and Table 13 below set out the 18 viable options.

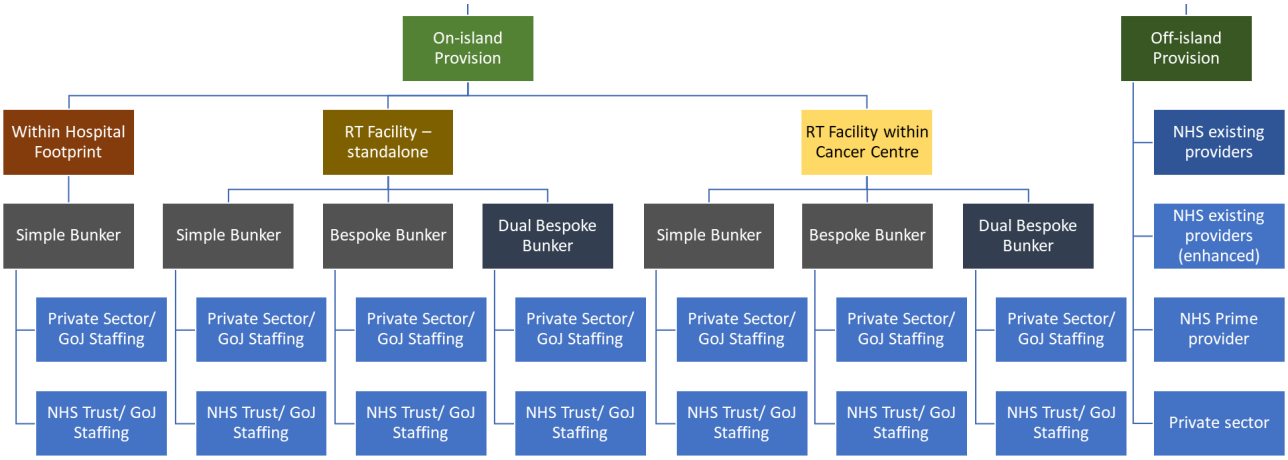

Figure 10: Viable Options

Table 13: Viable Options summary

#ID	Location	Facility scope	Design	Staffing
1	On-Island	Hospital	Simple	Private/ GoJ
2	On-Island	Hospital	Simple	NHS/ GoJ
3	On-Island	Separate radiotherapy	Simple	Private/ GoJ
4	On-Island	Separate radiotherapy	Simple	NHS/ GoJ
5	On-Island	Separate radiotherapy	Bespoke	Private/ GoJ
6	On-Island	Separate radiotherapy	Bespoke	NHS/ GoJ
7	On-Island	Separate radiotherapy	Dual	Private/ GoJ
8	On-Island	Separate radiotherapy	Dual	NHS/ GoJ
9	On-Island	Part of Cancer Centre	Simple	Private/ GoJ
10	On-Island	Part of Cancer Centre	Simple	NHS/ GoJ
11	On-Island	Part of Cancer Centre	Bespoke	Private/ GoJ
12	On-Island	Part of Cancer Centre	Bespoke	NHS/ GoJ
13	On-Island	Part of Cancer Centre	Dual	Private/ GoJ
14	On-Island	Part of Cancer Centre	Dual	NHS/ GoJ
15	Off-Island	UK radiotherapy	N/A	NHS
16	Off-Island	UK radiotherapy	N/A	NHS Enhanced
17	Off-Island	UK radiotherapy	N/A	NHS Prime
18	Off-Island	UK radiotherapy	N/A	Private sector

The assessment has been made against three areas:

- Demand
- Costs
- Stakeholder Impacts

7.1 Demand analysis

As detailed in Section 3, the delivery capacity of a single LINAC is ~9,000 fractions per annum. Even allowing significant downtime for planned preventive maintenance, a single LINAC would still easily manage 7,500 factions per annum. Even after 20 years of operation, there will still be capacity available to meet projected demand, including where potential demand does become actual demand, including all Guernsey potential demand. The total demand is always less than 4,000 fractions per annum.

Because of this, there is no option where more than one LINAC is operating in a Jersey facility. While there are some options (options 7, 8, 13 and 14) where there is the potential to install two LINACs, these are to reduce service downtime when a LINAC is being replaced at the end of its lifetime (not more than 10 years), not to have two LINACs operating at the same time. The staffing model only plans staff support for a single LINAC and there are no envisaged scenarios where demand could suddenly peak and require a second machine to operate.

Operating with a single LINAC in an on-Island solution does create resilience risks around ensuring availability of the radiotherapy service. Because of the gap between demand and capacity, there will be sufficient time where the LINAC will not be fully utilised to organise and conduct planned maintenance activities. The risk is where there is an unforeseen breakdown in the equipment that stops the radiotherapy service from operating until it is repaired/ replaced. Having a second LINAC on site in case of unforeseen problems increases costs substantially and, unless there were a breakdown, it would never be used. More practically, this risk would be better mitigated by agreeing with an off-Island NHS or Private provider that Jersey could send patients to them in the event of a prolonged outage, and, for short term outages, those affected patients' radiotherapy treatments would have to be delayed or diverted off-Island. Given Jersey will continue to require off-Island radiotherapy for circa 20% of overall referrals, there will also be NHS or private sector providers with which HCS have arrangements in place that can be modified to partly mitigate these risks.

For UK facilities, the volume of patients and treatments means they will always have multiple LINACs available.

In conclusion, there are no demand impacts from any of the 18 viable options, other than the service resilience risk stated above.

7.2 Cost Analysis

All options are based on the baseline costs set out in Section 4 with adjustments made for the different option elements. Dependent on the composition of each option, up to a dozen different uplifts may be applied to reflect different costs for these options and these uplift assumptions have been detailed in Section 4 and the Cost Appendix. Note that the status quo option (current NHS arrangements) is option 15.

The costs shown below in
represent the total estimated expenditure, capital and revenue, over the period 2022 to 2043. The working papers (not contained within this report) show fully how these have been derived from the cost model.

Table 14: Estimated HCS expenditure for each option

#ID	Location	Facility scope	Design	Staffing	2022-2043 Estimated Total Costs £m
1	On-Island	Hospital	Simple	Private/ GoJ	99.4
2	On-Island	Hospital	Simple	NHS/ GoJ	92.6
3	On-Island	Separate radiotherapy	Simple	Private/ GoJ	99.4
4	On-Island	Separate radiotherapy	Simple	NHS/ GoJ	92.6
5	On-Island	Separate radiotherapy	Bespoke	Private/ GoJ	99.4
6	On-Island	Separate radiotherapy	Bespoke	NHS/ GoJ	92.6
7	On-Island	Separate radiotherapy	Dual	Private/ GoJ	101.2
8	On-Island	Separate radiotherapy	Dual	NHS/ GoJ	94.5
9	On-Island	Part of Cancer Centre	Simple	Private/ GoJ	104.3
10	On-Island	Part of Cancer Centre	Simple	NHS/ GoJ	97.5
11	On-Island	Part of Cancer Centre	Bespoke	Private/ GoJ	104.3
12	On-Island	Part of Cancer Centre	Bespoke	NHS/ GoJ	97.5
13	On-Island	Part of Cancer Centre	Dual	Private/ GoJ	106.9
14	On-Island	Part of Cancer Centre	Dual	NHS/ GoJ	100.1
15	Off-Island	UK radiotherapy	N/A	NHS	72.7
16	Off-Island	UK radiotherapy	N/A	NHS Enhanced	80.0
17	Off-Island	UK radiotherapy	N/A	NHS Prime	90.9
18	Off-Island	UK radiotherapy	N/A	Private sector	109.1

Note that these costs are all modelled on a costing model with a 2027 "go live' date. The actual date may be slightly later than this for some larger options, such as a Cancer Centre, so numbers may vary, but not significantly.

Costs include both capital and revenue, the ratios of which vary by option.

The main reasons for cost variations are summarised below in Table 15.

All options appear potentially more costly than the existing UK service although the situation in 2043 may be different as indicated by Figure 11 showing the revenue expenditure trend over time. The importance of addressing this almost certain rise in costs due to demand growth is a key conclusion of this analysis, although if the growth is revised by Statistics Jersey in the future this would change these numbers.

Some options increase in cost at a different rate than others. Figure 11 demonstrates that although there is a spike when the service commences, UK options rise in cost at a faster rate than Jersey options because these charges are made at the full UK NHS National Tariff thus cannot benefit from any economies of scale (note that capital costs are excluded from this chart because they have a spike in single years, so the options are not comparable).

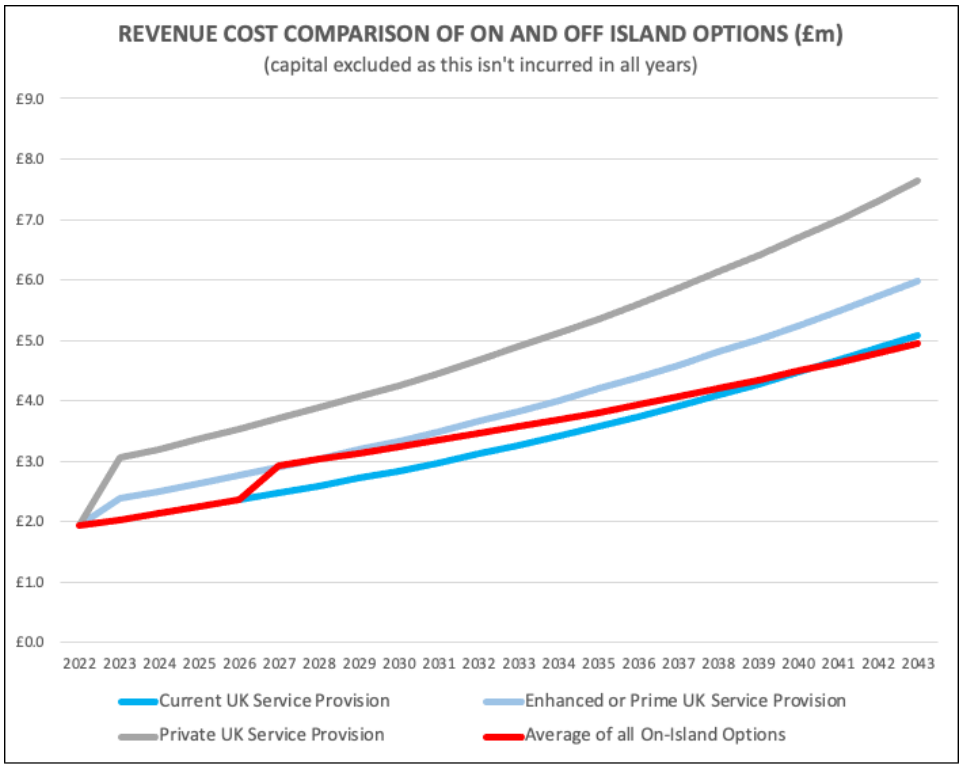

Figure 11: Revenue cost comparisons on and off island

Table 15: Reasons for cost variation

#ID	Variation summary	2022-2043 Estimated Total Costs £m
1	Prior to 2027, existing arrangements continue, Post 2027, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. Capital costs are as set out Section 4.4. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect increased investment in planning and delivering a range of improvements in travel, accommodation, catering and support services. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	99.4
2	Prior to 2027, existing arrangements continue, Post 2027, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. Capital costs are as set out Section 4.4. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect increased investment in planning and delivering a range of improvements in travel, accommodation, catering and support services. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	92.6
3	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect increased investment in planning and delivering a range of improvements in travel, accommodation, catering and support services. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	99.4

#ID	Variation summary	2022-2043 Estimated Total Costs £m
4	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect increased investment in planning and delivering a range of improvements in travel, accommodation, catering and support services. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	92.6
5	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	99.4
6	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	92.6
7	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 15% to reflect the dual bunker design. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	101.2
8	Prior to 2028, existing arrangements continue, Post 2028, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 15% to reflect the dual bunker design. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	94.5
9	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	104.3
10	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	97.5
11	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	104.3
12	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	97.5
13	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is	106.9

#ID	Variation summary	2022-2043 Estimated Total Costs £m
	applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre and another uplift of 15% to reflect the dual bunker design. An uplift of 75% to the staffing model (section 4.3) is applied to reflect the additional management and staff charges and costs for travel and accommodation where private sector staff have to work in Jersey	
14	Prior to 2029, existing arrangements continue, Post 2029, NHS costs are reduced by circa 80% and capital costs and staffing costs apply. An uplift of 10% for the remaining 20% of UK referrals is applied to reflect enhanced travel, accommodation and support. Capital costs are uplifted by 40% to reflect the larger build costs for a cancer centre and another uplift of 15% to reflect the dual bunker design. An uplift of 50% to the staffing model (section 4.3) is applied to reflect the additional management charges and costs for travel and accommodation where NHS staff have to work in Jersey	100.1
15	There are no cost variations. This is the projected cost of staying with current arrangements	72.7
16	An uplift of 10% is applied, to reflect increased investment in planning and delivering a range of improvements in travel, accommodation, catering and support services	80.0
17	An uplift of 25% is applied, to reflect the greater tariff costs of using a larger proportion of London-centric Trusts (as opposed to Southampton) and increased travel, accommodation, catering and support services for care in the London area	90.9
18	An uplift of 50% is applied, to reflect the estimated higher charges set by the private sector for radiotherapy treatments. Note this uplift is the same rate that NHS Trusts charge for "Overseas Patient" tariffs (not applied to the Channel Islands). Exact costs for private sector provision would be subject to a formal competitive procurement if this option was pursued	109.1

7.3 Impact Analysis

Figure 12 summarises the 18 viable options against the impact criteria described in Section 6.3.

Note this is qualitative information, extracted from the stakeholder discussions, that expresses a consensus opinion as made by the expert panel listed in Appendix E.

It should be noted that not all views were universal, for example there were mixed views on whether care delivered in Jersey would be as good/ safe/ reliable as the same care delivered in the UK. These are always subjective opinions, and this report has sought to take account of diverse views where expressed.

The panel were asked to consider each option against the 14 impact criteria and decide whether each was:

- +/++ Better or much better than the current arrangements (option 15)
- +/- No or minimal difference to the current arrangements
- -/-- Worse or much worse than the current arrangements

Some key points of note follow.

#ID	Location	Facility	Bunker Design	Staffing	Access to care	Patient experience	Carer / Family experience	Health outcomes	Patient-centric care	Waiting times	Other Support Agencies	Health workforce availability	Governance	Service resilience	Implementation timescale	Capital & revenue costs	Our Hospital delivery	Additional land need
1	On-Island	Hospital	Simple	GoJ & Private sector	+	+	+	+	+	++	+	-	+/-	-	--	-	-	+/-
2	On-Island	Hospital	Simple	GoJ & NHS	+	+	+	+	+	++	+	-	+/-	-	--	-	-	+/-
3	On-Island	RT facility	Simple	GoJ & Private sector	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	-
4	On-Island	RT facility	Simple	GoJ & NHS	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	-
5	On-Island	RT facility	Bespoke	GoJ & Private sector	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	-
6	On-Island	RT facility	Bespoke	GoJ & NHS	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	-
7	On-Island	RT facility	Dual	GoJ & Private sector	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	--
8	On-Island	RT facility	Dual	GoJ & NHS	+	+	+	+	+	++	+	-	+/-	-	--	-	+/-	--
9	On-Island	Cancer Centre	Simple	GoJ & Private sector	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
10	On-Island	Cancer Centre	Simple	GoJ & NHS	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
11	On-Island	Cancer Centre	Bespoke	GoJ & Private sector	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
12	On-Island	Cancer Centre	Bespoke	GoJ & NHS	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
13	On-Island	Cancer Centre	Dual	GoJ & Private sector	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
14	On-Island	Cancer Centre	Dual	GoJ & NHS	++	+	+	+	++	++	++	-	+/-	-	--	--	+/-	--
15	Off-Island	Off-Island Locations	N/a	Existing NHS Providers	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
16	Off-Island	Off-Island Locations	N/a	NHS Providers (enhanced)	+/-	+	+	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-	+/-	+/-
17	Off-Island	Off-Island Locations	N/a	NHS "Prime" provider	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-	+/-	+/-
18	Off-Island	Off-Island Locations	N/a	Private sector	-	+	+	+/-	+/-	+	+/-	+/-	+/-	+/-	+/-	--	+/-	+/-

Figure 12: Summary of options against impact criteria

There is strong agreement from stakeholders that providing radiotherapy treatment in Jersey[37] (options 1-14) is considered better (or much better) than in the UK when focused on the overall care experience. Staying in Jersey for care, where possible, is something that generally benefits the patient, their families, and the wider care services. This is particularly true for treatment waiting times, which are currently tied to the NHS overall waiting times and in Jersey would be minimal. In treating cancers, rapid access to radiotherapy where it is clinically needed will reduce the risk of further problems for the patient.

The benefit to the overall care experience is stronger still where treatments in Jersey are co-located in an integrated cancer centre (options 9-14) and so would operate in a coordinated way, all central to the patients.

However, there are risks and challenges for provision in Jersey, such as guaranteeing service availability (either through staffing or breakdown problems), increased costs and particularly location requirements. The guaranteed availability and reliability of any radiotherapy service were two of the strongest opinions made by all stakeholders and probably represents the biggest risk for these on-Island options. The implications of new construction in Jersey that require specialised construction to sensitive tolerances for the radiotherapy bunker(s) also present high risks where locations are likely to be somewhat limited.

With regard to off-Island provision by the NHS (options 15-17), there remains strong agreement that the services provided are safe, reliable and of very high quality. It is not the provision of the health care that is debated in the arguments for change, it is the challenges of travelling and staying away for that treatment.

Option 16 was agreed as a way that would, to some extent, improve the patient experience where treatment in the UK occurred, but that would also incur some increase in costs. Whether this improvement was for 100% of patients or 20% of patients, it was agreed that this was still an improvement worth pursuing.

[37] Note that only 80% of patients are likely to benefit from radiotherapy in Jersey. 20% would still require UK-based care.

While UK private sector provision (option 18) was considered to have some benefits over current arrangements, this was countered by a view that costs were likely to be a lot higher (typically 50%) and not being part of the NHS system could create risks in circumstances where unforeseen complications occurred that the private sector was not equipped to deal with.

7.4 Options Analysis Conclusions

The purpose of this report is not to provide recommendations or a "preferred "option, but to provide comparisons and some conclusions based on the quantitative data and the qualitative views expressed. Formal recommendations still require further debate and direction from the States Assembly and the subsequent production of a formal business case fully evaluating a much smaller set of options.

The following are the overall conclusions from this options analysis.

7.4.1 Demand (and cost) will rise

Increasing demand through an aging population and the impact of inflation will increase costs substantially, irrespective of which option is pursued.

7.4.2 UK provision through the NHS

It is important to recognise that recent patient care (within the last two years) has occurred in the context of a global pandemic and, as such, circumstances were beyond the control of any organisation, despite best efforts. Future planning changes should learn from the experiences of the pandemic years but not assume they will reoccur. While it cannot be assumed that the general impacts of the pandemic will disappear soon, it is also impractical to presume that disaster scenarios such as these will need to be factored into business as usual planning.

Radiotherapy provision through the NHS in the UK remains the cheapest option over the next 20 years, although there is the opportunity to invest more and improve the patient experience to some extent.

Such arrangements offer the best opportunities in terms of service availability, resilience and delivery of consistent quality and safety, including where unforeseen complications occur. Yet these arrangements still require patients to spend considerable time away from home and families while they are unwell and, for a small number of patients, may restrict their ability to obtain radiotherapy services at all through their inability to travel.

For travel arrangements, options are often limited by the state of the patient's health and the travel routes available. It is difficult to make general improvements for all patients as much of the travel is beyond the control of HCS and its partners, however some changes can be explored to create a better and more efficient experience, for example use of private cars as opposed to using public or shared transport. All of these will increase current costs.

For accommodation, the nature of radiotherapy treatment often requires an extended period of treatment(s) spanning many days, with intervals between treatments. For Jersey patients, this will require them to stay away from home in accommodation near the treating hospital, either alone or with support from carers or family for extended periods of time. Radiotherapy treatment is debilitating, and patients will be unwell over the course of treatment. Changes can be explored now to invest in more appropriate off-Island accommodation and/or more support for personal care for radiotherapy patients to better take account of their circumstances, including where carers or family members are also involved. Again, this is likely to increase current costs.

Stakeholder discussions and data analysis identified a common theme where some stakeholders expressed concerns that some patients were experiencing delays in receiving their radiotherapy treatment that resulted in deterioration of their condition beyond what was planned or anticipated. It is not clear what volume of patients fall into this category and it is not within the scope of this report to investigate individual cases, but some stakeholders did express concerns of this nature.

For clinical referral protocols, delays can occur where an NHS Trust's clinical protocol requires it to undertake a treatment assessment despite this already being undertaken by an on-Island oncologist. This is the same clinical protocol that is applied for any referring clinician in the NHS. This can increase overall wait times by many days. This may be an area where Jersey can improve off-Island services by agreeing a different clinical approach which avoids this duplication of effort and incorporating that within the next round of radiotherapy services commissioning with NHS Trusts, although any changes must remain in line with NHS clinical governance protocols.

For NHS wait times, the analysis has shown that Jersey patients are treated the same as any other NHS patient. It was found that, in general, wait times have not significantly improved anywhere in the NHS and for some NHS Trusts these have worsened, but this is considered to be pandemic related. It is not expected that NHS wait times will worsen further, but also that they will not significantly improve, over the next five years. Beyond that there may be some improvements to bring the NHS back to pre-pandemic wait times, dependent on continued funding. The only routes to improve off-Island wait times for Jersey patients are either i) to monitor current waiting times of different providers, which do vary between each other from time to time, to inform referral decisions, or ii) procure services outside of the NHS. For ii) this would be through a private care provider or via NHS Trust private patient routes that most NHS Trusts can offer, although these are more expensive than using the standard NHS Tariff prices.

7.4.3 Jersey provision

The cheapest estimation for any facility in Jersey (options 2 and 4) is 27% (£19.9m) greater than the current arrangements (option 15) and 10% (£7.3m) greater than UK provision when this includes further investment to improve the patient experience (option 16). Providing the most comprehensive, integrated services in Jersey (options 9 – 14) could increase costs to between £97.5m and over £106.9m in total (£24.8m and £34.2m) more than current arrangements).

While this report cannot speculate on alternative sources of funding for options (other than GoJ capital financing), facilities built in Jersey have the potential to attract alternative sources of funding, such as charitable donations, which very unlikely for UK-based services. Such alternate funding could make radiotherapy facilities in Jersey more comparable to UK current arrangements if they were guaranteed. For example, the estimated minimum capital cost for a Jersey facility is circa £15m and the difference between current arrangements and the cheapest Jersey facility is £17.5m. Having the capital cost donated would make the two options very close on cost.

Partnering with a UK provider removes much of the major risks of delivering safe and high quality care, but unforeseen problems may not be treatable in Jersey, requiring emergency transit to the UK if they occur. While such partnerships do exist with other countries, it is not certain that any UK NHS Trust would be willing to support Jersey in this regard, and at what cost. This would need testing through further discussions with UK organisations prior to any decision being taken. Guaranteeing workforce availability for any facility in Jersey is substantially reduced through UK partnering arrangements, but there are still risks that the necessary workforce may not always be available when the facility wants to operate, for example in adverse weather conditions or due to unforeseen staff shortages with the partner provider.

It is important to note that any facility in Jersey would only benefit 80% of patients; 20% of care would still be dealt with in the UK.

The overall patient experience benefits most from facilities in Jersey. Waiting times for treatment should be minimal (there will always be plenty of capacity) and most patients will not have to travel and stay away from home while unwell. With the highest level of investment to provide the most comprehensive, integrated services provided in Jersey, the full array of care and support services (HCS and charity/ other support agencies) could be co-located to provide the widest range of cancer care support for those patients able to receive care in Jersey.

Service resilience would be a real risk for any Jersey facility. It is not cost effective to have more than one LINAC in Jersey (at best this will operate at ~50% capacity) but if it is not available through unforeseen circumstances then patient care will suffer and, in some cases, may cause patient harm. At the very least, patients would be inconvenienced in having to travel to the UK or having to wait longer for their treatments in Jersey until the service recommences.

All options that consider the delivery of radiotherapy services in Jersey will be impacted by the lead times required to establish any staffing provision and, more importantly, the medical, technical and construction assets required on-Island to operate the service. The "decision to deployment" timescale varies by discrete option but, in all cases, there will be a requirement to continue with some form of off-Island radiotherapy service prior to its operating in Jersey. There is also likely to be some timescale for transition, where costs for creating the on-Island service will overlap with the costs of maintaining an off-Island service. The costs of such parallel running of services will need to be factored in.

Given the timing of this report, it will not be possible to enact any decisions that materially shift radiotherapy services away from the current NHS Trust arrangements for the next 12 months. This is because the contracts for these services for the forthcoming year are due to be agreed over the next two months and will have a notice period within them, which is typically a minimum of 6 months. With any change there is also going to be a transition period with some overlap of and old and new arrangements.

7.4.4 Private sector partnering

Collaborations with the private sector, for any option, are expected to be significantly more expensive than respective options with NHS partnering. Cost estimates range from £99.4m to over £109.1m, 37% to 50% more than current arrangements.

Of course, unlike the NHS, the private sector can be creative in how and what it charges for services and any final costs would be subject to a formal competitive procurement if such an approach was pursued, however the treatment volume that Jersey can offer falls far short of optimum utility for such facilities and this makes it less attractive for the private sector to offer better deals for a Jersey facility, unless they have other plans for the rest of the facility, and substantial cost reductions for UK-based treatment are consider highly unlikely, again due to the low volumes Jersey can offer and the higher base cost of their services.

Private sector provision in the UK still requires patients to travel, although the overall experience may be somewhat better and the waiting times certainly shorter, but this comes at a cost premium. Use of the private sector is also not as extensive as working with the NHS. Private sector facilities do not always offer the range of services that NHS can, especially for emergency services, so the full range of care quality may not always be there.

Private sector partnering in a Jersey facility gives all the benefits of on Island provision, but it is expected to be at a premium cost when compared to the NHS.

7.4.5 On-Island locations for a radiotherapy service

The options identification sets out two primary choices for an on-Island location: on the Our Hospital site or at a separate location. Options using the Our Hospital site are very limited, due to the adverse impacts on time, cost and delivery of the new hospital.

For a separate location, it is beyond the scope of this report to identify specific locations, however there is the potential to explore the use of existing buildings on the Island as well as new build sites. This will depend on the full scope of services being provided under each option and the space demands of each. However, every option for radiotherapy services on-Island will require specialised constructions, either prefabricated or custom built, which are suitable for radiation treatments using the LINAC to be undertaken safely. This is specialised work, and any sites will need to be carefully assessed for their suitability, particularly ground conditions and access to utilities.

Advice[38] received has resulted in the following broad timeline to be considered for each relevant option once a decision to proceed has been made:

- Site identification/ assessment – ~12 months
- Design/ planning/ procurement – ~18-24 months
- Build – ~24 months

7.4.6 Non-capital considerations for on-Island build options

None of the options in this section present schemes for on-Island services which are through leasing agreements or part/ fully funded through charitable donations. These options only become possible if private financing or donations are available for them to be constructed and this report has not undertaken any identification of possible sources of this financing. Either of these routes would change the overall cost position for an option; likely increasing the overall cost for any facility leasing agreement and reducing the cost if charitable donations funded part of the option.

The other point of consideration with regard to any facility leasing is that any construction on the Island will have an expected life substantially longer than the 20-year modelling period in this analysis and as such any leases for facilities are likely to extend beyond the modelling period. While many standard constructions can be repurposed, which would mitigate a longer term lease risk, the hardened bunker(s) required for radiotherapy treatments have very limited uses beyond what they are constructed for, and this may be a risk for attracting private finance in the first place and/or the terms of any lease agreed.

[38] Guidance from Andrew Scate, GoJ

Glossary

Clinical and Technical Terms

Adjuvant therapy: treatment used in addition to the primary therapy. Radiation therapy often is used as an adjuvant to surgery.

Benign Tumour: term used to describe a tumour that is not cancerous.

Biologic Therapy: treatment that stimulates the body's immune defence system to fight infection and disease. Also called immunotherapy or immune therapy.

Brachytherapy: internal radiation treatment achieved by implanting radioactive material directly into the tumour or close to it.

Bunker: generic term to describe the room used to house radiotherapy equipment and provides provide radiation shielding. Usually constructed from thick, high density concrete with a maze entrance. The control room located next to the bunker room. UK practice is to provide one redundant or decant bunker per 4 active bunkers to allow for replacement of equipment without service interruption. Temporary or “flat pack” bunkers can be used as an alternative.

Cancer: general term for more than 100 diseases that have uncontrolled, abnormal growth of cells that can invade and destroy healthy tissues.

Chemotherapy: the use of drugs to treat cancer.

Clinical oncologist: a doctor who is trained in prescribing both radiotherapy and systemic therapies such as chemotherapy.

Cobalt 60: radioactive isotope sometimes used as a radiation source to treat cancer.

Dosimetrist: person who plans and calculates the proper radiation dose for treatment.

Electron Beam: stream of high-energy particles called electrons used to treat cancer.

External Radiation: radiation therapy that uses a machine located outside of the body to aim high-energy rays at cancer cells. External radiotherapy does not make people radioactive and patients can mix safely with people at any time during and after treatment.

Fractions / Fractionation: division of the total dose of radiation into smaller doses in order to give healthy tissue time to repair itself.

Gamma Rays: high-energy rays that come from a radioactive source such as cobalt-60.

Gray: A measurement of the amount of radiation dose absorbed by the body (1 Gray = 100 rads).

Hemato-oncology: study and treatment of cancers of the blood, bone marrow and related tissues.

Hyperfractionated Radiation: division of the total dose of radiation into smaller doses that are given more than once a day.

Immunotherapy Therapy: treatment that stimulates the body's immune defence system to fight infection and disease. Also called biologic therapy or immune therapy.

Implant: a small container of radioactive material placed in or near a cancer.

Internal Radiation: also called brachytherapy, is a type of therapy in which a radioactive substance is implanted into or close to the area needing treatment. Treatment is usually on and outpatient basis though in some cases, a patient may need to stay in hospital for a few days until the radioactive source has been removed.

Interstitial Radiation: type of internal radiation in which a radioactive source (implant) is placed directly into the tissue (not in a body cavity).

Intracavitary Radiation: type of internal radiation in which a radioactive source (implant) is placed in a body cavity, such as the vagina.

Intraoperative Radiation: type of external radiation therapy used to deliver a large dose of radiation to the tumour and surrounding tissue at the time of surgery.

Ionising radiation: artificially created or naturally occurring radiation that has enough energy to remove an electron (negative particle) from an atom or molecule, causing it to become ionised. Low energy Ionising radiation is emitted by medical imaging equipment, such as x-ray, CT scan, or PET scan machines. Ionising radiation is emitted by radiotherapy equipment. Ionising radiation can cause chemical or biological changes in cells and damage DNA. Its use is highly regulated. (*See also radiological protection)*

Isotope: a form of a chemical element having the same or very closely related chemical properties and the same atomic number but different atomic weights. Medical isotopes, or radionuclides, are radiologically active atoms that can provide a highly targeted dose directly at a tumour site.

Linear Accelerator: a machine that creates high-energy radiation to treat cancers, using electricity to form a stream of fast-moving subatomic particles. Also called mega-voltage (MeV) linear accelerator or LINAC.

Malignant: cancerous.

Medical Oncologist: doctor who is specially trained in the diagnosis and treatment of cancer and who specializes in the use of chemotherapy and other drugs to treat cancer.

Medical Physicist: person who is qualified and trained in methods and techniques for the prevention, diagnosis and treatment of human specialising on one or more fields including Radiation Oncology Physics, Medical Imaging Physics, Nuclear Medicine Physics and Radiological Protection. Medical physicists work directly with the oncologist during treatment planning and delivery and oversee the work of the dosimetrist. They are also responsible for calculating the proper dose for radiation treatment and ensuring the equipment works properly.

Metastasis: the spread of cancer cells to distant areas of the body by way of the lymph system or bloodstream. Almost all cancers can spread to the bone where they can as pain, or more serious event. Bony metastasis is often treated with radiotherapy.

Neoplasm: any new growth, lesion, or ulcer that is abnormal.

Oncology: branch of medicine devoted to the diagnosis and treatment of cancer.

Palliative Care: treatment to relieve, rather than cure, symptoms caused by cancer. Palliative care can help people live more comfortably.

Port (also treatment field): the area of the body through which external beam radiation is directed to reach a tumour.

Proton beam therapy: type of radiotherapy that uses a beam of high energy protons, as opposed to x-rays (called “photons”) to treat specific types of cancer. Proton beam therapy is reserved for particular cancers for example, highly complex brain, head and neck cancers. The equipment is high cost and needs to be installed in purpose built facilities. There are two NHS centres in England (Manchester and London).

Protraction: time during which a course of radiation is given.

Our Hospital: the Our Hospital Project in Jersey.

Rad: Short form for "radiation absorbed dose"; a measurement of the amount of radiation absorbed by the body (100 rad = 1 Gray).

Radiation: energy carried by waves or a stream of particles.

Radiation Oncologist: doctor who specializes in using radiation to treat cancer.

Radiation Therapist: person usually a radiographer with special training to work the equipment that delivers the radiation dose.

Radiation Therapy: use of high-energy penetrating rays or subatomic particles to treat disease. Types of radiation include: x-ray, conformal, electron beam, alpha and beta particle, and gamma ray. Radioactive substances include: cobalt, radium, iridium caesium, iodine, and palladium.

Radiological protection: system of regulation and practice designed to restrict exposure to ionising radiation and to ensure that exposure does not exceed specified dose limits. Restriction of exposure should be achieved first by means of engineering control and design features and secondly by safe systems of work. Reliance on PPE is considered the protection of last resort.

Radiologist: a physician with special training in reading and interpreting diagnostic x-rays and performing specialized x-ray procedures.

Radioresistance: when cells do not respond easily to radiation.

Radiosensitivity: how susceptible a cell, cancerous or healthy, is to radiation. Cells that divide frequently are especially radiosensitive and are more affected by radiation.

Recurrence: where a person's cancer has returned, radiation may be used after recurrence though this is dependent on a number of factors including where the cancer has recurred and the dose of radiation previously given.

Simulation: process involving special x-ray pictures that are used to plan radiation treatment so that the area to be treated is precisely located and marked.

Stereotactic ablative radiotherapy (SABR) or stereotactic body radiotherapy (SBRT): type of radiotherapy using smaller beams of radiation which are directed from different angles towards the tumour. This enables higher doses of radiation to be delivered without the risk of damage to the surrounding tissues than with standard external beam radiation and can be given with fewer treatments.

Treatment Field: *See Port*

Tumour: An abnormal lump or mass of tissue. Tumours are either benign (noncancerous) or malignant (cancerous).

X-ray: One form of radiation that can be used at low levels to produce an image of the body on film (or digitally) or can be used at high energy levels to destroy cancer cells.

Abbreviations

ASR: Age standardised rate

BRCA1: Breast Cancer Gene 1

BRCA2: Breast Cancer Gene 2

CT (Simulator): Computed Tomography (Simulator)

NHS: UK National Health Service

BSS: International Basic Safety Standards

GoJ:: Government of Jersey

HCS: Health and Community Services

HRG: Healthcare Resource Group

IAEA: International Atomic Energy Agency

ICD: World Health Organisation's International Classification of Disease

(IR(ME)R): Ionising Radiation Medical Physics (Medical Exposure) Regulations

LINAC: Medical linear accelerator

MDT: Multidisciplinary Team

NCRAS: National Cancer Registration and Analysis Service

WHO: World Health Organisations

PLICS: Patient Level Costing System

RT: Radiotherapy

RCR: Royal College of Radiology

UCLH: NHS Trust University College Hospital London NHS Trust

UHS: University Hospital Southampton

UV: Ultraviolet

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Appendix A: Demand (supporting information)

The graphics below show the Statistics Jersey population changes and impact on prostate cancer incidence.

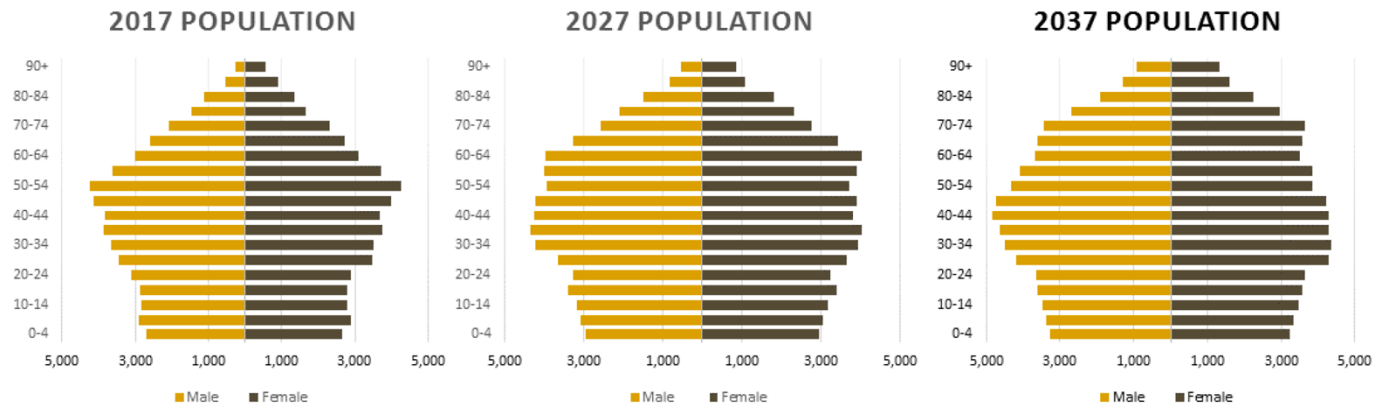

Figure 13: Population pyramids + 1000 net immigration model

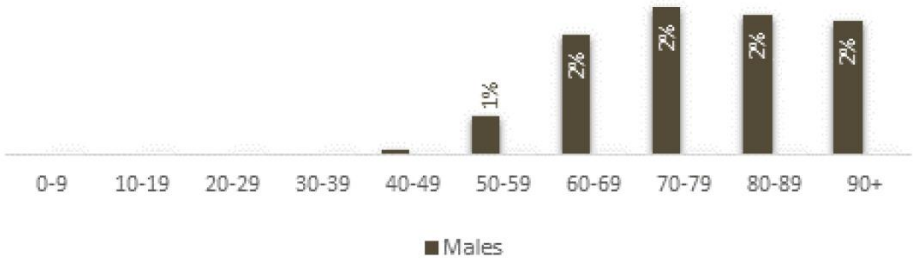

Figure 14: Prostate cancer incidence rate for each age 2012-2014

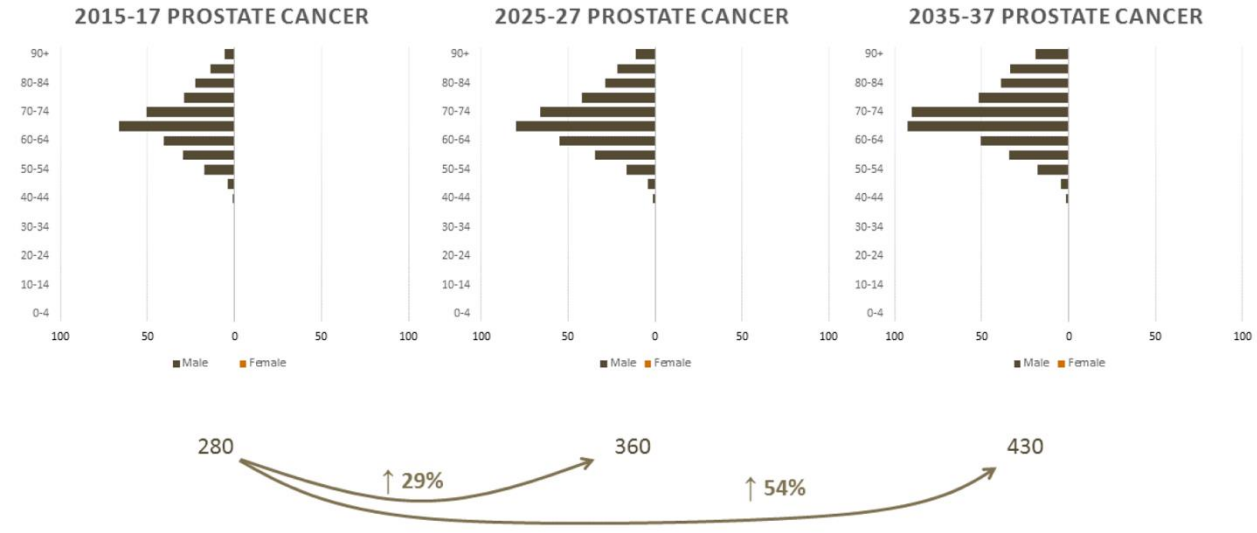

Figure 15: Projected numbers of new male diagnoses of prostate cancer by age per 3 years

Appendix B: Costs (supporting information)

This Costs Appendix goes into much more technical detail on several aspects discussed in the main body of the report. In addition to this, the detailed modelling has been separately provided to HCS.

Together, the detail in support of the main report provides a full audit trail and link to source HCS data, with justification for judgements made. This will allow technical specialists within HCS to take forward this modelling in the future.

Basis for Radiotherapy Charges from UK Providers

The UK charges are based on Healthcare Resource Groups (HRGs) which underpin the UK NHS National Tariff and are intended to represent national average costs of treatment, which in turn reflect resources consumed. Current unit prices in the 2022/23 National Tariff are shown below for those HRGs where a national price is set (UK providers can then only modify this price by their 'market forces factor', a geographical adjustment to allow for local cost differences, such as London pay-scales).

HRGs not shown on this list tend to be more specialist and providers have more discretion to determine the charge locally.

Table 16: The 22/23 NHS National Tariff for Radiotherapy (HRGs not shown are locally negotiable

3. Unbundled external beam radiotherapy

HRG Code	HRG Name	Price (£)
SC21Z	Deliver a Fraction of Treatment on a Superficial or Orthovoltage Machine	84
SC22Z	Deliver a Fraction of Treatment on a Megavoltage Machine	98
SC23Z	Deliver a Fraction of Complex Treatment on a Megavoltage Machine	123
SC24Z	Deliver a Fraction of Radiotherapy on a Megavoltage Machine using General Anaesthetic	319
SC25Z	Deliver a Fraction of Total Body Irradiation	248
SC31Z	Deliver a Fraction of Adaptive Radiotherapy on a Megavoltage Machine	163
SC40Z	Preparation for Intensity Modulated Radiation Therapy	962
SC41Z	Preparation for Intensity Modulated Radiation Therapy, with Technical Support	1,266
SC42Z	Preparation for Total Body Irradiation	988
SC43Z	Preparation for Total Body Irradiation, with Technical Support	1,259
SC44Z	Preparation for Hemi-Body Irradiation	423
SC45Z	Preparation for Simple Radiotherapy with Imaging and Dosimetry	439
SC46Z	Preparation for Simple Radiotherapy with Imaging and Dosimetry, with Technical Support	478
SC47Z	Preparation for Simple Radiotherapy with Imaging and Simple Calculation	271
SC48Z	Preparation for Simple Radiotherapy with Imaging and Simple Calculation, with Technical Support	440
SC49Z	Preparation for Superficial Radiotherapy with Simple Calculation	359
SC50Z	Preparation for Superficial Radiotherapy with Simple Calculation, with Technical Support	566
SC51Z	Preparation for Complex Conformal Radiotherapy	649
SC52Z	Preparation for Complex Conformal Radiotherapy, with Technical Support	863

The below table shows the £740k cost for the 2019 baseline year just for radiotherapy charges. This is part of the £1.66m baseline expenditure discussed in the costing section.

Treatment (and thus costs) vary by body area, hence the importance of showing it. For example:

- Breast cancer would typically be "complex treatment" with 15 fractions (sometimes 20) per patient and with relatively high costs of preparation (more than one attendance is typical).
- Prostate cancer would usually be "adaptive treatment" (because the tumour location can move), this is more expensive per fraction and is also typically a 20 fraction course of treatment.

So, despite similar incidence and despite slightly fewer unique patients receiving radiotherapy, the costs of prostate radiotherapy can be seen to be higher than breast radiotherapy despite affecting fewer patients and receiving fewer fractions of treatment.

The granular data used in this analysis allows the activity and financial relationships to be linked with discussions over clinical service provision. It is also relevant for capacity planning, which should not be based on a count of patients or even a total fraction limit; as shown, one type of fraction can take more time than another so, to use the same two examples, more breast cancer patients could be booked into a single radiotherapy session than prostate cancer patients.

Table 17: 2019 Radiotherapy charges by cancer location and healthcare resource group (type of radiotherapy or preparation)

Code	Description	Breast	Colorectal	Head & Neck	Lung	Skin	Prostate	Other	Grand Total
SC21Z	Deliver a fraction of Treatment on a Superficial or Orthovoltage Machine							£276	**£276**
SC22Z	Deliver a fraction of treatment on a megavoltage machine	£3,296	£1,096		£6,125	£3,460	£2,614	£5,652	**£22,242**
SC23Z	Deliver a fraction of complex treatment on a megavoltage machine	£106,813	£9,906	£34,331	£8,792	£2,998	£6,296	£39,810	**£208,947**
SC26Z	Deliver a fraction of Intracavitary radiotherapy without General Anaesthetic							£2,075	**£2,075**
SC28Z	Deliver a fraction of Interstitial radiotherapy						£203	£3,380	**£3,583**
SC28ZYADC	Deliver a fraction of Interstitial radiotherapy						£1,228		**£1,228**
SC29Z	Other radiotherapy Treatment	£662	£426	£1,609	£1,514	£3,066	£1,400	£12,635	**£21,312**
SC31Z	Deliver a fraction of adaptive radiotherapy on a megavoltage machine	£5,610	£5,741	£18,302	£8,164	£328	£150,783	£58,053	**£246,983**
SC40Z	Preparation for intensity modulated radiation therapy	£51,704	£4,089		£3,984		£41,237	£16,312	**£117,326**
SC41Z	Preparation for Intensity Modulated Radiation Therapy, with Technical Support	£1,431		£20,028	£1,431		£1,431	£15,899	**£40,218**
SC47Z	Preparation for simple radiotherapy with imaging and simple calculation	£1,545	£317		£2,794	£634	£2,477	£7,268	**£15,036**
SC48Z	Preparation for Simple radiotherapy with Imaging and Simple Calculation, with Technical Support	£1,967	£984	£1,021	£3,424	£511	£473	£2,515	**£10,895**
SC49Z	Preparation for superficial radiotherapy with simple calculation							£326	**£326**
SC50Z	Preparation for Superficial radiotherapy with Simple Calculation, with Technical Support							£430	**£430**
SC51Z	Preparation for complex conformal radiotherapy	£23,897	£659			£659		£4,651	**£29,866**
SC52Z	Preparation for Complex Conformal radiotherapy, with Technical Support			£794				£4,622	**£5,416**
SC54Z	Preparation for Intracavitary Brachytherapy							£1,283	**£1,283**
SC55Z	Preparation for Interstitial Brachytherapy						£2,952	£1,035	**£3,987**
SC56Z	Other external beam radiotherapy preparation		£348	£348	£321	£2,685	£669	£3,801	**£8,172**
Grand Total		**£196,924**	**£23,566**	**£76,434**	**£36,550**	**£14,341**	**£211,763**	**£180,024**	**£739,602**

Historic costs of Radiotherapy and Other Treatment

The table shows all four years from 2018 to 2021, to give a broad indication of the expenditure involved, showing the dip in the pandemic period (the rise in 'other treatment' in 2021 is for a very small number of patients receiving some very specialist treatment that is not relevant to this options appraisal).

The table is all costs relating to those patients receiving radiotherapy. The judgement then made in the modelling is which of these wider costs can be deemed to relate to radiotherapy for this modelling exercise.

Table 18: All expenditure charged by 5 UK providers for all treatments for those patients undergoing radiotherapy

	2018	2019	2020	2021
Radiotherapy Treatment				
Radiotherapy Preparation	£194,018	£232,956	£199,571	£204,165
Radiotherapy Delivery	£454,101	£506,646	£402,535	£379,543
	£648,119	**£739,602**	**£602,107**	**£583,708**
Other Treatment (RT Patients)				
Admissions	£503,432	£609,301	£576,585	£430,784
Outpatients	£177,909	£205,070	£183,211	£190,836
Chemotherapy	£73,569	£102,905	£86,659	£99,812
Specialist Radiotherapy / Brachytherapy	£46,994	£95,165	£80,935	£31,970
Other	£255,831	£199,834	£64,517	£459,128
	£1,057,735	**£1,212,275**	**£991,906**	**£1,212,530**
Travel and Accommodation Costs (RT and non-RT)				
Other Expenses (mainly transport)	£32,381	£26,871	£17,107	£15,471
Reimbursements	£6,002	£14,187	£14,620	£16,448
Travel Bookings	£204,340	£253,088	£161,243	£169,627
Accommodation (ad hoc payments)	£111,378	£156,135	£146,281	£141,146
Rented Accommodation (GoJ long-term rentals)	£295,143	£347,181	£223,985	£277,275
Charter Flights	£48,165	£48,165	£48,165	£48,165
	£697,409	**£845,627**	**£611,401**	**£668,132**
TOTAL COSTS FOR PATIENTS UNDERGOING RADIOTHERAPY	**£2,403,263**	**£2,797,504**	**£2,205,414**	**£2,464,370**

The table demonstrates the following:

- The baseline year 2019 has a total of £2.8m for approximately 220 unique patients. The exact number of patients will vary because some patients will have radiotherapy in one year but may have other treatments in a different year.

- These costs are therefore likely to be in excess of £12,000 per patient, plus the costs of the wider consultations and treatment these patients receive in Jersey.

Regarding the "Other Treatment" section:

- The demand projections affect the radiotherapy costs and activity, but other treatment may or may not transfer in connection with this – some will remain in the UK despite the related radiotherapy being in Jersey so estimates are made how much of this there will be (which will also affect the expenses for this activity).
- Admissions, Specialist and Brachytherapy and Other appear to be specialist in nature and unlikely to be treated in Jersey under any on-Island option. 0% is therefore used for the forward projections.
- Chemotherapy would appear generally suitable to mostly repatriate if the patient is also receiving radiotherapy in Jersey, as would outpatients. Therefore, for the patient numbers whom the demand modelling assume would repatriate, 80% of the other treatments for these patients would be assumed to repatriate too.

Travel and accommodation relates to a combination of radiotherapy and other treatment for these patients.

It appears highly likely that the vast majority of these costs will relate to either the radiotherapy or the other services which may repatriate, such as chemotherapy or outpatients. Therefore 80% of these costs for repatriated activity are considered part of the forward projections.

If this exercise was to proceed to a full business case, the detail as to what to include or exclude from a potential repatriation could, and should, be refined further, but the above approach is deemed to be inside an acceptable margin of error and, with the exception of chemotherapy drugs, the marginal costs of providing other treatment in Jersey would be minimal.

While some broad assumptions have been made as described, the granularity of this modelling is extremely unusual, even for full business cases, and should provide significant assurance as to the robustness of the forward projections.

Baseline for forward projections

The projections are calculated in the following steps:

- Identify the entire 2019 UK expenditure charged to HCS for those patients undergoing radiotherapy in the UK (the £2.8m shown above).
- Adjust this down by excluding the specialist treatment (and related expenses) that would not be performed in Jersey in the future using the above assumptions (£1.66m after these adjustments, shown below).
- Apply the £1.66m to the demand repatriation modelling, with varying repatriation rates by cancer location that are informed by clinical opinion (performed subsequently in this section).

Step 2 of the above staged calculation results in the below table (the variation in this table is due to different arrangements in different UK providers, such as the taxi service at Cambridge and the Daisy Bus Service run by the Wessex Cancer Trust in Southampton):

Table 19: 2019 Radiotherapy costs and travel and accommodation for these patients

Cancer Location	RT Prep.	RT Delivery	Other Related Activity	Travel Booking	Accom. Invoices	Rented Accom.	Charter Flights	Expense Claims	Taxis and Other	Grand Total
Breast	£80,544	£116,380	£65,045	£38,102	£6,643	£133,667	£0	£445	£353	**£441,179**
Colorectal	£6,397	£17,169	£6,883	£11,473	£461	£16,347	£0	£234	£0	**£58,964**
Head & Neck	£22,191	£54,243	£30,172	£18,058	£4,600	£25,134	£0	£28	£0	**£154,426**
Lung	£11,954	£24,596	£10,961	£23,275	£980	£13,309	£1,784	£1,110	£0	**£87,969**
Prostate	£49,238	£162,525	£14,911	£24,165	£59,112	£10,881	£4,182	£4,580	£19,855	**£349,449**
Skin	£4,489	£9,852	£3,450	£8,577	£3,356	£3,617	£4,421	£524	£0	**£38,286**
Other	£58,143	£121,881	£114,959	£78,819	£49,756	£74,790	£28,145	£4,428	£1,289	**£532,210**
Total	**£232,956**	**£506,646**	**£246,380**	**£202,470**	**£124,908**	**£277,745**	**£38,532**	**£11,349**	**£21,497**	**£1,662,483**

For the reasons outlined earlier in this appendix, the £1.66m total in Table 19 can be deemed to approximate the baseline costs of the radiotherapy service and other treatment that could be treatable in Jersey if a radiotherapy service was available on-Island.

The demand modelling then splits this cost out into UK and Jersey provision depending on the service options being modelled.

The £1.66m is a higher figure than the £1.1m estimated in the earlier HCS pre-feasibility study. The reason for this is the improvement in demand and cost granularity, both in analysis of UK provider charges (Cambridge data was not available at person level in HCS's PLICS model for 2019) and in travel and accommodation (particularly rented accommodation, where additional detail has been extracted to show which patients have used the accommodation that HCS procure on a long-term basis).

Stakeholders should therefore be assured that the methodology used is robust and granular.

Forward projections – current provision

The "status quo" option would assume all service provision remains unchanged apart from growth in demand and inflationary elements.

All other options result in changes to these costs in various ways.

The UK treatment projections take the £1.66m and split it into two parts, that which may repatriate based on clinical opinion, and that which is unlikely to. Those proportions per cancer location were analysed in the demand section following clinical feedback from HCS stakeholders, leading to a portion of the activity that would continue to be treated in the UK, and a portion that could be treated in Jersey (for those options with an on-Island service).

The way in which different cancer types may see different proportions of Jersey or UK treatment is clearly shown in the working papers.

Assumptions made specifically for the UK forward projections are:

- Inflationary uplift of net 3% per annum for all costs on and off Island (the NHS tariff has a 2.8% cost uplift in 2022/23 and with the current inflationary environment and the continual need for efficiencies it has been judged that 3% could be an average annual rise)
- Demand uplifts feed through from the demand calculations
- 10% increases to the UK tariff prices for an Enhanced provider service, this may shift some activity to a London provider because the option allows for the mix of providers to better reflect issues such as current waiting times. Given the impact this would have on both treatment charges and accommodation this is why an increase is applied.
- 25% increases to the UK tariff prices for a Prime provider service, this would be likely to be a London provider and the market forces factor applicable to the tariff is higher, as could be travel and accommodation. This is a broad estimate across the entire costs of radiotherapy, some provider costs could increase by more than this amount, others not at all.
- 50% increase[39] on NHS tariff prices for a private sector provided service

This approach results in the £5m cost by 2043 shown in the cost section, which depending on the UK option could increase by 10%, 25% or 50% if there was an enhanced, prime or private UK service40.

Forward projections – Jersey service staffing

The exact staffing model while estimated in the costing section based on UK NHS service models would be subject to internal discussion within HCS and would consider many factors entailing much lengthier discussion than for this options appraisal, including:

- Expected utilisation of existing staffing
- Job planning across the wider oncology service and whether some economies of scale could result
- The sessional capacity to be staffed considering the demand

This report identifies a typical staffing mix for a satellite radiotherapy service that could resemble the likely structure in Jersey. Even across the UK, NHS job titles and whole-time equivalent numbers differ, some use nursing staff and other roles. Whoever is chosen for a partner (see below) would have their own structure for staffing the service.

The cost is deemed to relate to 2021 staffing levels and will be uplifted by 3% per annum to remain consistent with the UK charging assumptions.

The uplift to a 2027 potential start date is used for the table in the costing section.

HCS pay-scales have been estimated and the total staffing numbers and costs are not dissimilar to those estimated in the HCS pre-feasibility study. However, in the options relating to UK provider staff coming to Jersey to provide the service, this baseline cost is adjusted to the staffing costs a UK provider would incur plus likely travel, accommodation and management charges.

Jersey service staffing - partnership arrangement

Given the need to ensure clinical governance and safety, and to ensure workforce availability and access to wider clinical specialists, Jersey would require a partnership contract with a UK provider for at least the first

[39] This is consistent with NHS Overseas patient rates, which are 150% of NHS Tariff rates

[40] The 10%, 25% and 50% uplifts are judgements based on experience using the rationale outlined, including In-Form Solutions coordination of the HCS commissioning arrangements with the UK providers

5 years of operation if an on-Island service was to be progressed. This would provide service resilience and governance, but the base costs covered here will increase with a partnership staffing model.

Staffing costs for insourcing either NHS or private sector staff to support the operation of an on-Island radiotherapy service, which would likely include a mix of on- and off-Island staffing to minimise travel costs and loss of utilisation, will involve assuming a price uplift on the typical staffing model.

While the radiotherapy service will not be fully utilised by Jersey, it is pragmatic for this analysis to cost for full time staffing, as the partner will have to consider travel time to and from the Island and may also struggle to provide work for these staff in their downtime. Additionally, a cost assumption is required to factor in travel and accommodation costs on-Island for staff and, for a private sector partner, a further uplift to take account of their higher staff costs and management charges.

This also assumes, at inception of any radiotherapy on-Island, that 100% of the staff are insourced. While more in-depth examination of staffing as part of a full business case for a discrete option (not within the scope of this report) may reduce these costs, this initial estimate is prudent and should protect against a future tender coming back at a higher level than is anticipated.

The partnership agreement as detailed could be provided by the NHS or by the private sector. In the options modelling, uplifts are applied to the typical staffing costs of 50% and 75% respectively[41] to allow for the staffing cover, training, governance, management charges, travel arrangements and other applicable costs of providing insourced staffing. Even if the service was to be entirely run by HCS further into the future, some of this partnership uplift would continue to apply to give the resilience needed.

Forward projections – other revenue costs

Maintenance costs for the equipment and other non-pay such as consumables would be a substantial annual cost and are estimated at £200,000 per annum at 2021 levels.

There would be a cost associated with other treatments repatriated along with radiotherapy. It is assumed that clinic staffing would be unaffected and that most of the outpatient charges could be saved, but there would be a continued cost for the chemotherapy drugs that would be provided on Jersey for those patients who were only seen in the UK for their radiotherapy but receive chemotherapy too. These are expensive, so only 50% of the costs of all the other treatment described as “Other Related Activity” has been estimated as a revenue saving of providing on-Island.

Other revenue savings outside the model

In addition to the costs incurred by HCS for UK treatment, substantial charitable expenditure is incurred from various cancer charities on the Island that may be saved if treatment repatriates:

- Jersey Cancer Relief provide grants to patients as financial support: this is believed to be the largest charitable element
- Macmillan provide loan phones to patients to keep in touch with relatives free of charge
- After Breast Cancer Jersey provide support with flight costs

Specific figures for this support have not been able to be acquired in time for this report but the potential wider benefit to the charitable sector in Jersey should be noted.

[41] Broad estimates based on experience of insourcing contracts in the UK NHS and who provides them

Forward projections - capital

When a cost is referred to as being “capitalised” it is funded from a separate capital pool and this does not immediately appear in the annual revenue accounts. Instead it is depreciated over the life of the asset. This depreciation and other elements of the calculation are referred to as “capital charges”.

Capital charges are not within the HCS budget but should be borne in mind as a wider Government of Jersey consideration. Capital charges are left of this modelling so to avoid the risk of double counting when considering both capital and revenue costs.

No assumptions have been made regarding charitable donations or other sources of non-GoJ revenue or capital. While these may occur, they are not certain and therefore the analysis has not adjusted costs for them.

The cost of a linear accelerator is historically between £1.7m and £2m but costs have recently risen and by the implementation date are likely to have risen further. £2.3m would be a realistic estimate for a fairly basic linear accelerator[42].

Other costs relating to the equipment have been broadly estimated and include new IT hardware and software, adaptations to the existing CT scanner and the costs of implementation, which would typically be capitalised.

In addition, there will be costs to establish its bunker and the other areas.

£2m has been included for a potential site purchase. This is a very broad estimate to ensure that some allowance is made for this possibility. This would be refined or ruled out during a further stage of this decision-making process.

Typically building costs can range from £1,000 to £10,000 per square metre[43] for a radiotherapy building, depending on the nature of the room (the bunker housing the linear accelerator itself typically being the most expensive). Construction is extremely specialist (e.g., the need to ensure no micro-cracks or cavities develop in the concrete); due to this and the unlikely event of suitable contractors being resident in Jersey the capital estimates have been put at the upper end of this range.

A further premium of £1m has been added due to the probability of general construction costs in Jersey being higher than in the UK, and also to allow for the current inflationary impact on commodities and raw materials.

Linear accelerators require large amounts of electricity, so the electrical station and wider plant have been priced to allow for this.

Professional fees can be substantial, so an allowance is made for this too. Typically these would also be capitalised.

[42] The current equipment costs are typical of the market, as seen in many publicly available business cases. The increase in price by 2026 is a judgement based on experience of known pressures faced by UK NHS Trusts
[43] Research has been carried out to ensure that all radiotherapy costs publicly available stating the floor area are within this range

Because of the complexity of the estimates for capital purchases the table in the main costing section is repeated here.

Table 20: Summary of projected capital costs for an on-Island service

Cost Element	Estimated Capital Cost in 2026
Site Acquisition	
Costs of acquiring site (subject to location, remove / alter as applicable)	£2.0m
Building Infrastructure	
Bunker for linear accelerator (single bunker) 141m2	£1.1m
Reception and other areas 250m2	£1.5m
Circulation space 122m2	£0.7m
Consultation area 277m2	£1.6m
Treatment Preparation (simulation, planning) 332m2	£1.8m
Electrical station, external and internal plant areas	£0.4m
Other utilities such as heating, drainage and water infrastructure	£0.2m
On-Island premium	£1.0m
Contingency	£1.0m
Equipment	
Linear accelerator purchase (note lease option alternatively)	£2.3m
IT Configuration	
Adaptation of CT scanner	£0.2m
Software	£0.3m
Hardware	£0.1m
Implementation costs for linear accelerator	£0.3m
Other Costs	
Professional fees (architects, engineers, surveyors, legal etc)	£1.0m
Total	**£15.5m**

There remains considerable uncertainty around these capital costs, which have been based on similar sized schemes previously planned in the UK. More precise costs could only be determined through a full design process, which is beyond the scope of this work. A further £1m contingency has been added due to this uncertainty. This options appraisal is some way short of a full business case and so the costings are indicative estimates only but adjusted for known considerations.

Capital costs are very dependent on the preferred option so would have a very broad range until those options are narrowed down. The approach take is to use the above costs but to potentially inflate them in the following scenarios:

- A dual bunker has been deemed to add 15% to the land and buildings elements[44]
- A larger cancer centre would have more space but this would be less complex to build. The exact size of this would be unknown but it has been assumed this would be at least half again the size of the site and buildings, and a 40% uplift has been deemed appropriate[45]. There is scope for this to be reduced depending on the specific design.

The possibility of reducing costs by installing a pre-fabricated bunker was considered.

Bunker design can sometimes use a modular construction, called a "flat pack" bunker or vault. Modular radiotherapy vaults were originally developed in the US to provide temporary facilities for decant or during periods of refurbishment. While widely used in the US health and veterinary markets, there has been very limited use in the UK. The product has since been developed to provide longer-term solutions. The main benefit is that on-site construction times are reduced by up to 50%. Vaults can be purchased outright or leased. Cost is dependent on specification and as prices are commercial in confidence, it has been difficult to obtain a precise figure. Findings so far indicate cost equivalency to that of a single conventional bunker at c £7m including enabling works. Therefore no changes have been made to the model for this possibility.

[44] The 15% uplift for a dual bunker is based on approximate square metres, there is no visibility of relative single and dual bunker options for a specific installation, business cases have typically already narrowed down the choices by that point.

[45] The 40% cancer centre uplift is based on approximate square metres with a reduction for this being larger but less complex than a bunker

Appendix C: Stakeholders (supporting information)

This section contains more detailed information on the stakeholder views expressed during interviews. Note some of this content duplicates that found in Section 6.

Stakeholders' vision

The majority vision was that radiotherapy would be part of an integrated cancer service, voiced strongest amongst the clinicians interviewed, with an even stronger desire across all stakeholders to remove, or at least reduce, the need to travel and be away for long periods where possible. Clinical stakeholders' vision and strong preference was for an on-Island radiotherapy service, with almost all clinicians interviewed expressing this view. Only one stakeholder was firmly against this option, other stakeholders were neutral or did not express a view.

Whilst proximity to the main hospital was considered as a positive, it was not universally considered to be crucial. More importance was given to a self-contained, holistic service for cancer patients and their families, providing emotional and social support, as well as a full range of clinical treatments.

A number of respondents highlighted that their vision would include radiotherapy services that are sustainable over time, reliable and not subject to periods of non-availability.

All groups identified the timeliness, quality, and safety of the service and for it to be able to deliver comparable outcomes and be accessible to the whole population in Jersey as key features required. This was most strongly highlighted by the Charity and Patient Representative Group.

Table 21: Key features of stakeholders' vision

Feature	Issue identified by number of respondents
On-Island RT service to remove the need to travel and be away for long periods	18
Integrated cancer services providing full range of clinical care and support services	16
Preference for on-Island RT, in an ideal world	12
Sustainable/reliable/timely high-quality service providing excellent service and outcomes to all population	9

Current provision

The overriding view of current provision is that the radiotherapy services provided from the range of specialist providers in the UK are excellent in terms of quality, safety and outcomes. This included views about the experience of patients at point of treatment and held true across all individual stakeholders and groups, notwithstanding which tertiary NHS provider they were referring to. Any option for alternative provision must be at least as good was a point strongly made by a number of those interviewed.

On the other hand, having to travel and stay away from home to receive radiotherapy treatment is seen as a significant negative factor across all groups. It is considered of higher significance by the Charity and Patient Representative Group than other groups interviewed.

Some stakeholders reported that waiting times and delays in accessing radiotherapy treatment were a concern. This was of most concern to the Clinical Group. Stakeholders fed back that the current arrangements are not always straightforward, requiring a referral by a Jersey clinician to the tertiary NHS provider, which, to follow NHS governance protocols, is then reassessed by the receiving service, even when the referral is by a consultant doctor. Stakeholders raised the concern that this may contribute to some patients becoming more ill before they are treated, resulting in the need for more invasive and extensive treatments and poorer outcomes.

A significant number of stakeholders, in particular the Clinicians, identified potential risks and some concern that currently the best radiotherapy treatment options are not accessible to all patients. Main reasons included inability or unwillingness of patients to travel when ill. Clinicians in particular expressed concerns that this may have led to some patients receiving sub-optimal treatment, such as more invasive treatments on-Island (e.g. mastectomy), larger doses or more intensive radiotherapy treatments over shorter time periods, or not being able to access combined treatments in a single location. All stakeholder groups also highlighted unmet demand, particularly for palliative radiotherapy, due to patients not being well enough or choosing not to leave the Island due to their fragile condition.

Table 22: Stakeholders' view of current provision, key factor

Key factor	Issue identified by number of respondents
Clinically excellent – quality, safety, outcomes, patient experience	16
Travel and staying off-Island are major challenges for patients and their families	14
Waiting times for treatment	12
Risk that treatment is sub-optimal due to requirement to attend off-Island	12

A number of stakeholders in the Policy & Management and Charity & Patient Groups spoke about the wider non-clinical and community social support currently available. This was reported to be a significant help to patients and their families, but its provision and funding is reliant on charitable donations. A further observation was that patients travelling and staying off-Island sometimes provided mutual peer support to each other and there could be further opportunities to encourage and facilitate this in a more focused way.

Observations:

- It may be possible to improve waiting times and the efficiency of end-to-end care pathways and streamline referral protocols by clinical services working in closer partnership with tertiary providers, however NHS providers cannot circumvent their own clinical governance.
- Further improvements to the current model of radiotherapy services, building on the existing and pilot liaison arrangements, may be achievable through greater coordination and enhancements to the wider support arrangements for patients and their families. This observation is further emphasised by the stakeholder views and feedback on Patient Experience, below.

Demand

The most common factor raised by all stakeholders in this section was that of unmet demand due to patients being unable or unwilling to travel off-Island to access radiotherapy treatments, which could cause patients to have poorer outcomes and suffer greater pain and distress than would be the case if they did access radiotherapy. A range of reasons, often a combination of some or all of them, were offered, most consistent were:

- Patients who are too ill or too frail to travel
- Patients at the palliative care stage, who do not want to be away from family, friends, or local support networks for weeks
- Patients who choose not to leave the Island for family or work-related reasons
- Patients who would find the travel and weeks away in unfamiliar surroundings too stressful, alongside dealing with the anxiety of serious illness

Some stakeholders expressed the view that this unmet demand could be potentially significant in terms of increased illness and poorer outcomes. A number of stakeholders raised this point, combined with the issue of waiting times with delays to treatment also potentially increasing the severity of illness, treatability and outcomes. Stakeholders were unable to provide definitive data on the volume of patients involved in this overall unmet demand, but suggested volumes of circa 10-20 patients per annum.

There were variable views on whether demand is rising, decreasing or stable. Overall, about a third of stakeholders held the view that it was rising year on year as a result of an increasing population in age bands where cancer is more prevalent, an aging population where people live longer and are thus more susceptible to cancer, and better diagnoses and new treatments being available. This view was more widely held by the Clinical Group, followed by the Charity and Patient Group.

Conversely, around a quarter of stakeholders overall held the view that demand will fall, in particular over the longer term (more than 10 years), due to the emergence and widespread adoption of new therapies and treatments, such as immunotherapy, as alternatives to radiotherapy. This view was most strongly held by clinicians, whilst none of the stakeholders in the Charity & Patient Group articulated this view.

There was a significant view that demand from Jersey alone will not be sufficient to justify an on-Island radiotherapy service. This view was held most strongly amongst the Policy & Management Group, followed by the Clinical Group, whilst none of the Charity Patient Group raised this point. A minority of the Clinical Group voiced the opinion that an on-Island radiotherapy service would increase demand, although volumes or sources of this demand were not specified.

A final factor identified in this section was the view held by a number of stakeholders that private and insurance funded demand (private radiotherapy) could be kept on Island rather than using off-Island facilities. No definitive volume data was made available, but the overall volumes were considered to be relatively low, circa 20 per annum, and it would still remain a matter of personal choice as to where these patients received their radiotherapy. This factor is considered further in the Feasibility section, below. Across the stakeholder groups this viewpoint was expressed by about a quarter of both the Clinician and Policy & Management Groups. None of the stakeholders in the Charity & Patient Group raised this point.

Table 23: Stakeholders' views of key factors affecting demand

Key factor	Issue identified by number of respondents
Unmet demand - patients unable or unwilling to travel to access radiotherapy treatment	16
Demand from Jersey alone will not be sufficient to justify an on-Island radiotherapy service	11
Demand is rising due to increasing and aging population and new radiotherapy treatments	10
Demand will fall over longer term due to newer therapies and treatments	6
Private and insurance funded demand could be kept on Island if there was a radiotherapy provision in Jersey	5

Patient Experience

Unsurprisingly, the major factor under this heading, identified by almost three quarters of stakeholders, was the challenge of travelling and staying off-Island, often for several weeks, to access radiotherapy treatments. This issue affects not just the patient, but also patients' families and wider communities. A common factor identified was how having to be away for weeks at a time impacts patients' privacy and their ability to carry on with normal life as far as possible. Other challenges consistently highlighted included:

- Patients feeling isolated
- Patients struggling with activities of daily living in unsupported self-catering accommodation
- Maintaining contact with family, friends, and wider support networks whilst away

Consistent with the feedback in the Current Service section above, there was a high level of satisfaction with the radiotherapy treatments received by patients from the off-Island NHS providers across all stakeholder groups. Stakeholders recognised that the care was being provided by leading national (and international) specialised centres of excellence.

Of those that expressed a view, there were generally high levels of satisfaction with the overall transport arrangements provided for patients. It is notable that the Charity and Patient Group voiced this opinion most strongly.

There was some anecdotal feedback about things not always going smoothly, where travel arrangements were mixed up or cancelled, but these were in the minority. It is understood that a new Liaison Post is currently being piloted, funded by the MacMillan Jersey Charity to support a better coordinated end to end experience for patients.

Where stakeholders provided feedback on the quality of accommodation it was generally good. However, for some patients, the accommodation arrangements prove challenging; this was raised by a majority of the stakeholders in the Charity and Patient Group. A significant number of patients struggle with the isolation of unsupported self-catering accommodation, particularly where they feel too ill to shop and cook

if alone. The feedback included numerous anecdotal examples of patients who are not able to cook or properly care for themselves, for whom self-catering accommodation on their own is not suitable.

Table 24: Stakeholders' views of key factors affecting patient experience

Key factor	Issue identified by number of respondents
Travelling and staying off-Island is a major challenge to patients, their families, and communities	20
The radiotherapy treatment in the tertiary cancer providers is considered excellent	13
Transport arrangements are good.	8
Going away for weeks impacts patients' privacy and ability to carry on with normal life	8
Some patients struggle with unsupported self-catering accommodation	7

Workforce and staffing

Overall, over half of those interviewed expressed the view that recruitment and retention of the workforce required to run a sustainable and high quality on-Island radiotherapy service would be challenging. This was most strongly expressed by the Policy and Management Group. This factor is already an acknowledged issue in attracting and keeping healthcare staff in Jersey, reflecting the wider staff shortages across the NHS in the UK. The specialist requirements of staffing a radiotherapy Service were also widely referred to as a further challenge, with some aspects, such as clinical governance for a radiotherapy service, being a new set of requirements for HCS to develop and manage.

Specific factors raised in respect of attracting staff to Jersey were both positive and negative. On the positive side, Jersey is seen to be an attractive and safe place to live and bring up a family; this was highlighted in particular by the Clinical Group. However, the cost of living in Jersey was seen as a major obstacle by all stakeholder groups, in particular by the Policy and Management Group. This was despite salaries being higher than in the UK and taxes being lower. It was also pointed out that Island life is not for everyone culturally, with feelings of isolation and a reluctance to leave behind their family and friends living elsewhere.

An important factor raised was that any proposed on-Island service would be serving a small population and this raises a number of potential challenges, including:

- Health professionals having sufficient numbers of patients to develop and maintain skills and experience
- Appropriate professional oversight and clinical governance and access to CPD
- Staying up to date, with technology, equipment, treatment protocols

It is noteworthy that many of the stakeholders, in particular the Clinical Group, who raised this countered the risk with the potential of developing an on-Island service in partnership with one or more of the current providers. These suggestions included staff being employed and developed by those providers, as opposed to being employed by HCS, and, rather than living on-Island, coming on-Island to deliver the service, as well

as using digital capabilities to work remotely. Another factor raised is the potential to attract young Islanders into the health sector and having to compete with the attractions in Jersey's financial services opportunities. It was also mentioned that current government policy is to minimise immigration.

Table 25:Stakeholders' view of key factors in recruiting and retaining an on-Island workforce

Key factor	Issue identified by number of respondents
High cost of living, bringing family affected by high costs of housing	16
Potential challenge to attract and retain the right calibre and numbers of staff	15
Potential to have a hybrid service in partnership with current provider(s), staff not all required to live on-Island/using digital capabilities	15
Health professionals staying up to date, with technology, equipment, treatment protocols, and access to CPD potentially being a challenge.	7

Observation:

- There is clear support from clinicians for the potential to develop a hybrid 'satellite' model in partnership with tertiary centres of excellence. Suggestions included key workforce from the tertiary centres coming on Island to run clinics; greater use of digital technology for remote consultations and planning; and the development of more efficient joint protocols.

Feasibility

Stakeholders were asked for their views about the overall feasibility of establishing and running a radiotherapy service in Jersey. Some stakeholders emphasised that sustaining such a service over time was a key risk factor to be considered, this was strongest in the Policy and Management stakeholder group.

The costs of building and maintaining a radiotherapy service in Jersey and the challenge of balancing the costs, risks and benefits was raised by a third of stakeholders overall. This was of particular concern to the Policy and Management Group.

Over a third of stakeholders held the view that there is the potential for significant income from private and insured patients that would have a potentially significant positive impact on the affordability of the investment. This was most strongly voiced by the Clinician and Charity and Patient Groups. The Charity and Patient Group also indicated the potential for significant funding support likely to be available from the charity organisations.

Alongside this, a minority of stakeholders in the Clinical and Charity & Patient Groups held the view that considerable savings could be achieved by not having to send patients off-Island for radiotherapy and that these could be reinvested in an on-Island service.

In all cases above, stakeholders did not provide definitive data on the potential of opportunities expressed.

Table 26: Stakeholders' view of key factors affecting the feasibility (costs and savings) of an on-Island service

Key factor	Issue identified by number of respondents
Potential for significant income from private /insured patients	10
Costs to build on Island facility would be very high - VFM will be hard to achieve	9
Potential for significant charitable donation and partnership working.	5
Substantial savings from travel & accommodation if RT on-Island would provide a significant contribution towards a positive Return on Investment	3

Observation:

- Consideration should be given to undertaking a review of historic and anticipated private/ insured demand, in collaboration with major insurers, to inform the further assessment of an on-Island facility.

A second aspect of feasibility raised by stakeholders was that of the potential to work with other health economies, in particular Guernsey. Whilst over a third of stakeholders raised this as a possibility, the history of such partnership working was also raised as challenging, thus likely to be difficult to achieve in a reasonable timeframe and with any guaranteed stability over time.

One stakeholder highlighted the potential risks of affecting the wider (non-radiotherapy) relationships with current NHS providers in respect of other health services by moving radiotherapy services on-Island.

Table 27: Stakeholder view of key factors affecting the feasibility (partnership) of an on-Island service

Key factor	Issue identified by number of respondents
Potential to provide services to others – Guernsey/France/UK	11
Partnership with Guernsey has been challenging in the past	4

Location

The location of an on-Island radiotherapy service was identified as a major factor, but this was an area where there was a diversity of views. Almost a third of stakeholders reported that they did not consider finding a location would be a problem, this view was most strongly held by the Clinical and Charity & Patient Groups. Alternatively, two stakeholders in the Policy & Management Group felt strongly that finding a location and getting through planning would be a significant challenge.

Many of the stakeholders, in particular the Charity and Patient Group, expressed a preference for radiotherapy services to be co-located with other cancer and health services, as articulated by many in their vision of the optimum solution. However, this was seen as the ideal and there was broad acceptance that this may not be achievable, with a widely held view that co-location on the planned new hospital site would not be possible. This latter view was most firmly articulated by the Policy & Management Group, with most respondents holding this opinion. In particular, the representatives of the 'Our Hospital' Project were unanimous and unequivocal on this point.

Table 28: Stakeholders' view of key factors affecting the feasibility (location) of an on-Island service

Key factor	Issue identified by number of respondents
Preference would be to have co-located services with new hospital	9
Location on Island not considered a barrier	8
Not considered possible to co-locate RT services with new hospital	8
Location on Island will be a significant challenge	2

Appendix D: Stakeholders interviewed

Area	Role	Name
Government	Minister for Health and Social Services	Richard Renouf
Government	Deputy, States Assembly Member	Montfort Tadier
Exec staff	Director General	Caroline Landon
Exec staff	Director of Improvement and Innovation	Anuschka Muller
Management	General Manager, Medical Care Group	James Mason
Clinical	Consultant in Clinical Oncology	Rubin Soomal
Clinical	Consultant in Medical Oncology	Elizabet Gomes dos Santos
Clinical	Locum consultant	Bruce Sizer
Clinical	Locum consultant	Rekha Neupane
Clinical	Consultant Urologist	Ben Hughes
Clinical	Consultant in Acute Medicine	Petra Schinle
Clinical	Consultant General and European Colorectal Surgeon	Miklos Kassai
Clinical	Consultant in Radiology	Alex Crowther
Clinical	Consultant Gynaecologist	Kathy Gillies
Clinical	Consultant in ENT	Martyn Siodlak
Clinical	Medical Director	Patrick Armstrong
Charities	Macmillan Jersey – Therapeutic Radiographer/ Radiotherapy Support Specialist	Lauren Perchard-Rees
Charities	Jersey Cancer Relief	Anne Pryke
Charities	Jersey Cancer Relief	Hannah O'Brien
Charities	Jersey Cancer Relief	Kerry Moisan
Charities	Friends of Jersey Oncology	Kerry Burnett
Charities	Friends of Jersey Oncology	Brian Mwanga
Jersey Hospice	Associate Specialist in Palliative Care	Nicky Bailhache
Jersey Hospice	Consultant in Palliative Care	James Grose
Our Hospital Project	Clinical Director for Our Hospital	Ashok Handa
Our Hospital Project	Our Hospital Development Director	Richard Bannister
Patient	Patient/Petitioner for on island service	Rose Shepherd
Service Lead (Management)	Manager, Jersey Emergency Transfer Service (JETS)	Ryan McNay

Appendix E: Shortlisting panel

Organisation	Role	Name
GoJ HCS	Consultant in Clinical Oncology	Dr Rubin Soomal
Macmillan Jersey	CEO, Macmillan Jersey	Lauren Perchard-Rees
GoJ HCS	Director of Improvement and Innovation	Anuschka Muller
GoJ HCS	Associate Medical Director	Dr Adrian Noon
GoJ HCS	HCS Finance Business Partner	Mark Queree

Appendix F: Semi-structured stakeholder interview

1. Introduction

- My name is …….. , I work for In-Form Solutions, who have been appointed to undertake an Options Appraisal of radiotherapy provision for Jersey in the future. including analysis of demand, finance, delivery and patient experience.
- Thank you for giving your time for this interview, which is scheduled for 45 minutes to an hour, may I just check that is still ok?
- We are interviewing a range of key stakeholders to gather their views in order to inform the Appraisal. The key areas I would like to cover are demand, finance, delivery and patient experience. Are there any other key aspects that you would like to include?
- Are you happy for me to record this meeting? We use this internally to review the interviews alongside our written notes to ensure that they are complete and accurate. The recording and notes of the meeting are held confidentially and will not be shared beyond the team undertaking the stakeholder analysis.
- Are you happy for specific comments to be attributed to you?

2. Stakeholder vision

- Could you outline your vision of what you would like to see, what would be the best option that could be achieved? What would 'Good Look Like'?
- Could you give your key reasons why this would be the optimum solution?
- Use the Options Slide to help focus discussion

3. Current provision

- What are your views about the current provision?
- What are the pros and cons?

4. Demand

- What are your views/thoughts about current and future demand for radiotherapy services?
- Do you think recovery from the pandemic will affect demand? How, for how long?

5. Patient Experience

- What are your views/thoughts about the current Patient Experience?
- Do you consider it could be improved?
- If so, what are the key elements that could be improved?

6. Workforce and staffing

- Is workforce in the health sector on the Island currently an issue of concern?
- What are your thoughts/views on recruiting and retaining additional and specialist health professionals?

7. Feasibility, costs, timescales

- How do you think these factors play into the various options?
- Do you consider any or all of these factors as constraints?

8. Any other points

- Are there any other factors that you consider to be material that we haven't covered?