

A Defence and National Rehabilitation Centre
Volume 1: Feasibility Study Report

ARUP

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Executive Summary

In June 2009 the Parliamentary Under-Secretary of State for Defence announced to Parliament that a Feasibility Study was to be undertaken into the possibility of establishing a Defence and National Rehabilitation Centre (DNRC). This report is the outcome of that announcement and it has been funded by a benefactor through a charity.

A DNRC looks to the future of rehabilitation in the United Kingdom. At its core is a new Defence rehabilitation facility to replace the existing Defence Medical Rehabilitation Centre at Headley Court. This new facility will not only allow Defence rehabilitation provided by Defence Medical Services to develop and expand, it will also provide the catalyst for improvements to civilian rehabilitation; offer research and development opportunities, and the potential for “train the trainer” schemes in relation to those Commonwealth countries which have large numbers of victims of recent conflicts. A DNRC will demonstrate how Defence expertise can benefit the Nation as a whole.

The capital costs of around £300m for the Defence core of a DNRC will be raised through a major charitable fundraising campaign. This follows the long and distinguished tradition of charitable involvement in the care of injured Servicemen and women. The Ministry of Defence will be responsible for day-to-day operating costs, as is the case at Headley Court. The National element of a DNRC will be funded separately depending on the nature and interest of institutions and organisations which will be co-located on a DNRC site.

The Feasibility Study was directed by a Project Board, chaired by a former Vice-Chief of the Defence Staff. It comprised of two phases and commenced in October 2009. The initial phase ascertained the degree of support for a DNRC, established the clinical requirements and considered, at high level, the operating costs. The second phase established the betterment provided by a DNRC and the likely capital costs. This was done through the selection of a test site and the preparation of a real design.

To inform the decisions of the Project Board, Judgement Panels of recognised experts were established to review contentious issues in a number of areas, and provide impartial opinion.

The Project Board recognizes the need to honour the remarkable achievements of Headley Court and is considering a range of options for using the name in the Defence core of a DNRC.

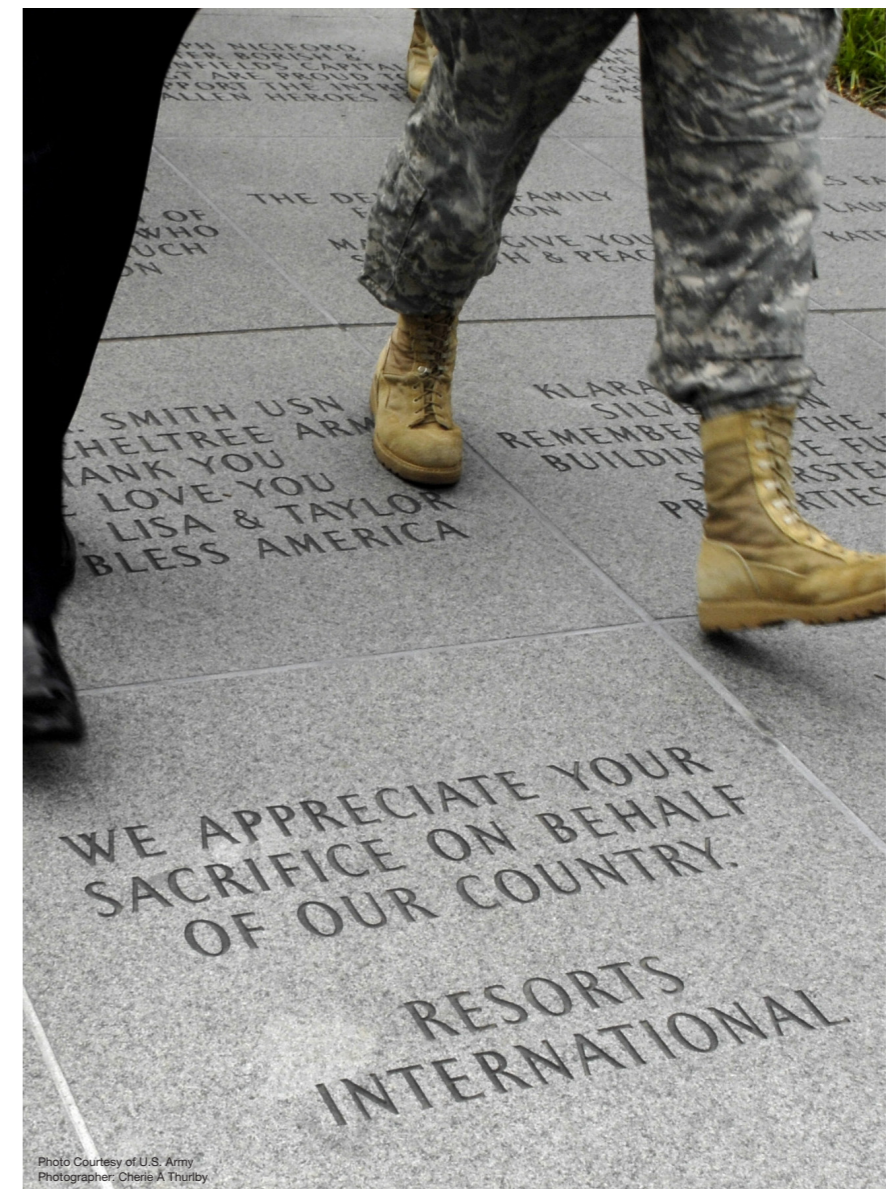


Photo Courtesy of U.S. Army
Photographer: Cherie A. Thurby

Phase 1

Phase 1 provided re-assurance that the concept of a DNRC had support from a representative cross-section of leading clinical and academic rehabilitation specialists, together with representatives from across Government – the Proof of Concept. It also established the clinical requirements and determined, at a high level, that the operating costs of a DNRC were likely to be less than those of Headley Court, and consequently be affordable for the Ministry of Defence (MoD).

An extensive consultation exercise was undertaken to consider how Defence rehabilitation works now, how it may develop in the future and the likely implications on new and existing facilities, recognizing that a DNRC will not be operational until 2017.

The Project Board took the view that while the UK may not be involved in Afghanistan in six years time, Defence planning following the Strategic Defence and Security Review assumes the capability to mount a medium sized operation outside the shores of the UK. The numbers in the Armed Forces will reduce over this period, but serious casualties arising from such operations, not least in view of the increasingly asymmetric nature of conflict, will continue to be likely. Furthermore, given that Headley Court and any successor establishment deals with routine injuries as well as operational ones (in fact they form the majority of the patients), the significance of being able to return routine injuries to operational service would increase with fewer numbers in the forces.

Civilian rehabilitation, particularly in the NHS, was also examined to understand what is currently provided, where there are gaps in the service and what will be required in the future.

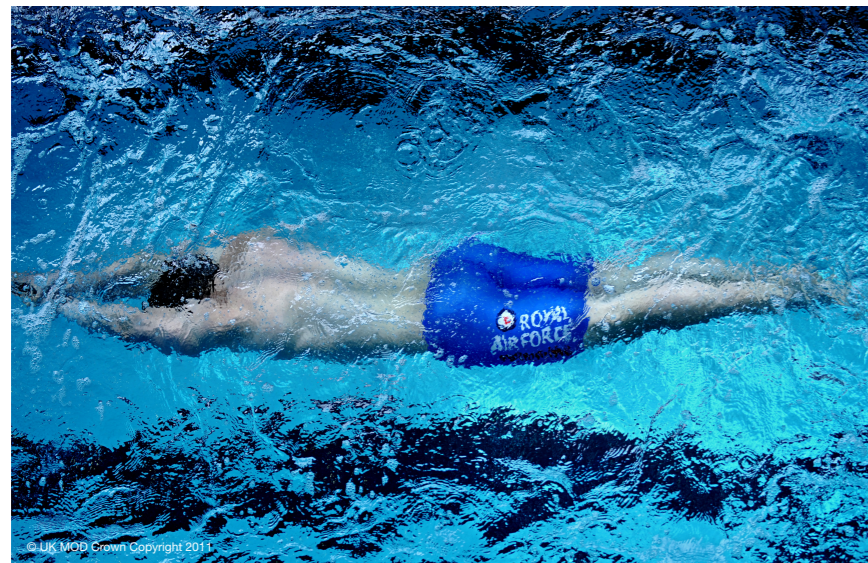
The consensus view of those consulted suggests that to provide Defence rehabilitation services in the 21st Century it will be increasingly necessary to:

- provide a world leading service so that the armed forces know that the nation will care for the injured in the best possible manner;
- provide easy access to rehabilitation facilities by Service people and their families and by clinical and other health professionals;
- provide adequate capacity;
- provide services which are affordable and efficient;
- maintain the outstanding reputation of Defence in the rehabilitative field; and
- use Defence rehabilitation to stimulate the rehabilitation of the disabled and those unable to work – providing a clear example of what Defence can do for the nation.

The work in Phase 1 demonstrated strong support for the creation of a DNRC, recognising that it would provide a unique opportunity for rehabilitation practice and research in the UK and promised to raise the profile of, support research into and improve the efficacy of rehabilitation for both the military and civilians. Those consulted also accepted that the core of a DNRC should be a military establishment like Headley Court in order to retain both the acknowledged expertise in military rehabilitation as a national asset and the unique benefits of a highly motivated patient group.

The clinical requirements of the Defence core of a DNRC were established through a series of meetings with the Surgeon General, the Commander, Joint Medical Command and practitioners at Headley Court. This determined that a DNRC should provide:

- 96 hospital beds for patients with complex trauma and neurological injuries;
- 126 hostel beds for patients with musculo-skeletal injuries and for outpatients who will receive complex interventions over two to three days;
- separate treatment centres for lower limb injuries, spinal injuries, complex trauma injuries, neurological injuries, together a specialist centre for other types (mainly upper body) injuries;
- five gymnasias;
- a 25 metre swimming pool, two hydro-therapy pools and a water treadmill;
- a fully equipped gait laboratory;
- a fully equipped prosthetic department;
- a computer assisted rehabilitation environment (CAREN); and
- an interactive education centre fully equipped for distance learning.



The floor area required for a DNRC was established as being 38,000m².

A high level review of operating costs of a DNRC was undertaken with Defence Estates, which compared the current operating cost of Headley Court, with the expected operating costs of a DNRC. Information about Headley Court was supplied by Defence Estates, while expected costs used Arup benchmark data.

The review demonstrated that a DNRC is likely to cost the Ministry of Defence less to operate than Headley Court. Operating costs were developed further during Phase 2.

An Office for Government Commerce (OGC) style Level 0 review was undertaken by the Project Board during Phase 1 to confirm that the project was being conducted properly and was ready to proceed to the next stage.

CAREW system at MRC Aardenburg, Doorn, Netherlands

Phase 2

Phase 2 considered in detail what the Defence core of a DNRC would cost to build and to operate. It did this by developing the detailed requirements of a DNRC through a Project and Design Brief, selecting a real site in the Midlands suitable for testing the feasibility of a DNRC through the development of a real design.

The Project and Design Brief was developed through a series of meetings with the Surgeon General, the Commander, Joint Medical Command and rehabilitation practitioners at Headley Court. It also benefitted from the Surgeon General's visit to Defence rehabilitation facilities in the USA and the design team's visit to a similar facility in Holland.

The Project and Design Brief for a DNRC provided for additional facilities, improved clinical adjacencies and additional area, when compared to the current facilities at Headley Court.

A number of sites in the Midlands were considered as a possible location for a DNRC. A short-list of three sites, including Headley Court, was then drawn up and the development potential of each site considered in detail, with the final choice of test site in the Midlands being made by a Judgement Panel of independent experts.

Establishing a DNRC at Headley Court was rejected by the Judgement Panel as:

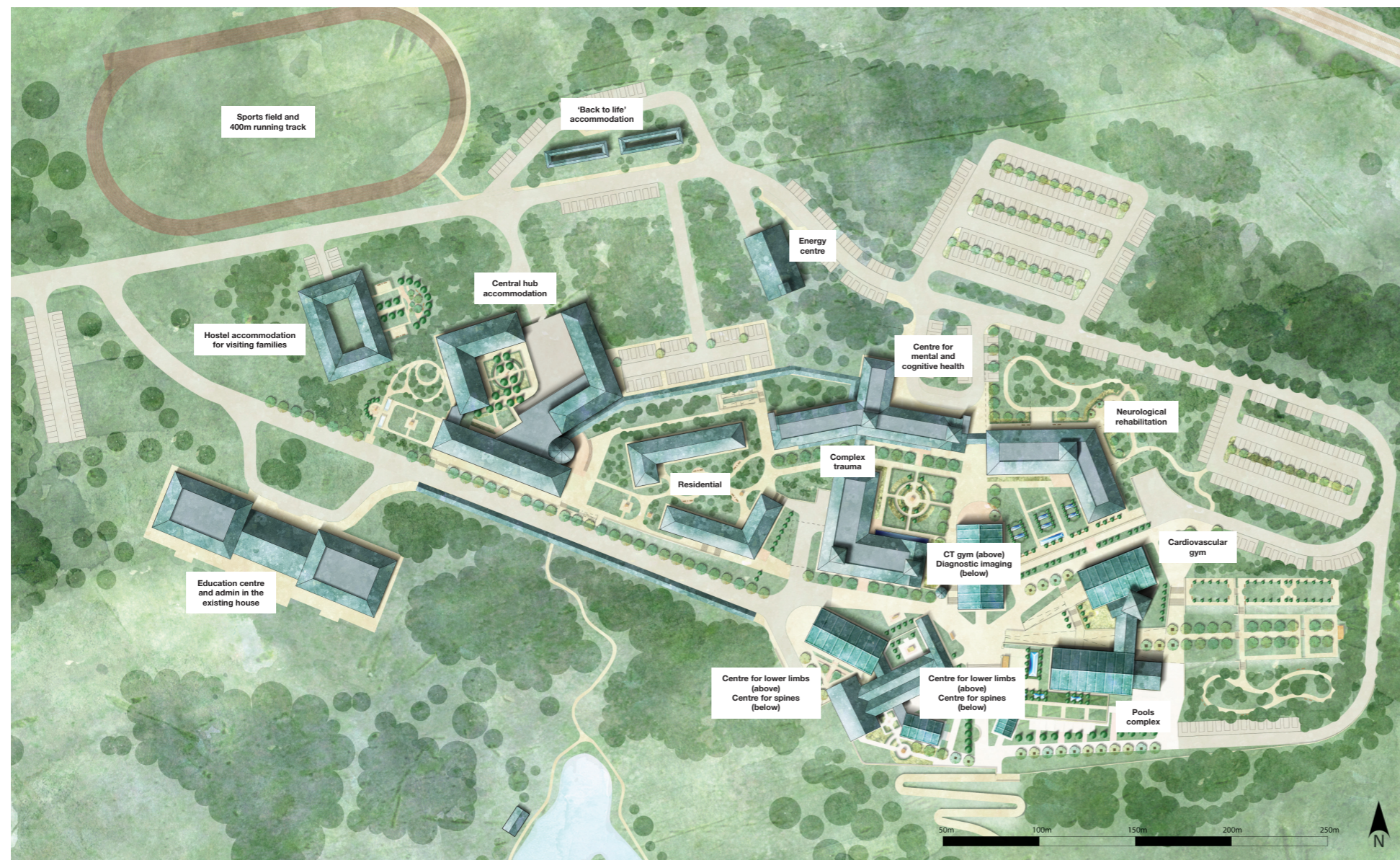
- the site is too small and restricted to allow the Defence core and, particularly, the National element to be developed to their full potential as all neighbouring land is in greenbelt and used for agriculture, thereby making expansion beyond existing site boundaries highly problematic;
- a large scale redevelopment of Headley Court would have to be carefully phased over three to four years which would add considerably to the costs of a DNRC and could disrupt the operation Headley Court to some degree; and
- a Surrey location, is not strategically well placed (nor easily accessible), for visiting families – given that the armed forces recruit country-wide, with a significant proportion having to travel from Scotland, Wales and the north of England.

Architectural, masterplanning, landscape and engineering designs were prepared to a level of detail sufficient for robust cost data to be established. The level of design ambition set for a DNRC recognized that it followed in the tradition of buildings which serve and honour the contribution of the armed forces, such as the Royal Hospital at Chelsea and the Royal Naval Hospital at Greenwich. To be worthy of this mantle the architecture of a DNRC has to be distinguished and stand apart from the ordinary.

The test design ensured that the concepts and clinical adjacencies embodied in the Project and Design Brief could be realised in practice and that the Feasibility Study provided confidence that the:

- betterment and increased efficiencies that a DNRC could provide had been fully considered and quantified;
- concepts underpinning a DNRC had been developed, tested and had the support of Defence rehabilitation practitioners; and
- likely capital and operating costs of a DNRC were robust.

In his announcement to Parliament the Under-Secretary of State made it clear that a DNRC had to offer a level of care which surpassed even that offered by Headley Court. A considerable amount of effort has been expended by the feasibility study team to ensure that a DNRC can do just that. The test design provides additional clinical facilities, such as Magnetic Resonance Imaging, X-ray fluoroscopy and Computer Assisted Rehabilitation Environments. Improved clinical adjacencies will allow more time for treatment, and facilities designed to modern standards will ensure that patients continue to be treated in a safe and secure environment.



Test site design

The major areas of betterment that a DNRC is expected to deliver are:

Quality

- improved space standards providing greater privacy;
- provision of some single room accommodation;
- modern prosthetic centre, designed to accommodate current activity levels, providing adequate space for the measurement, assembly, and fitting of prostheses and for confidential consultant/patient discussion;
- opportunity to develop new rehabilitation strategies and research their effectiveness, through the use of a Computer Assisted Rehabilitation Environment (CAREN);
- provision of a range of specially designed adaptable houses, flats and bedsits to allow patients to be monitored while adapting to independent living.



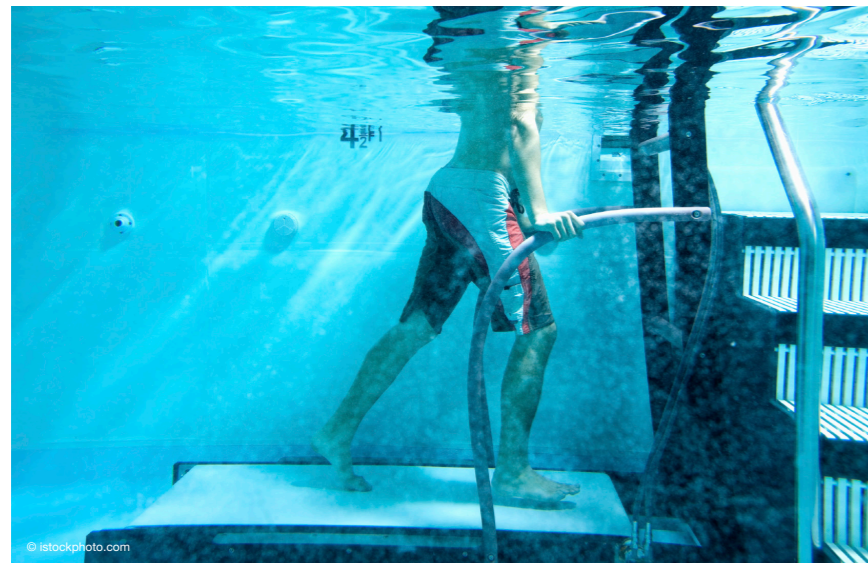
Accessibility

- location that will allow close links with Midlands universities and research centres such as the National Institute for Health Research (NIHR) and the Centre for Surgical Rehabilitation and Microbiology at the University Hospitals Birmingham NHS Foundation Trust;
- strategically central location close to RCDM, and providing easier visiting by families.

Capacity

- greater capacity and improved facilities for the Multi-disciplinary Injury Assessment Clinics (MIACs) with access to a greater range of diagnostic facilities;
- potential to improve outcomes and treat more people by providing an increased range of procedures, such as fluoroscopy, MRI and the measurement of bone density;
- ability to develop specialist outpatient clinics enabling a multi-disciplinary team approach to the management and treatment of complex injuries;
- adequate space for professional training and development.





Affordability

- flexible hospital bedroom accommodation that can be used as residential when complex trauma demand is low;
- improved clinical adjacencies;
- efficient site logistics;

Reputation

- modern design standards to improve patient safety and to meet current and projected standards for control of infection;
- dedicated hydro-therapy pool to address control of infection concerns.

The 'N'

- site large enough to allow development of the 'N' overtime, with the real potential for cross-fertilization between the 'N' and the 'D';
- facilities allowing a DNRC to become the national focus for research for military and civilian rehabilitation;
- the research potential offered by a significant cohort of seriously disabled Service people whose treatment and interventions can be monitored over long periods, thereby providing a basis for understanding outcomes and allowing a DNRC to become the national focus for Defence and civilian research;
- potential for "train the trainer" schemes in relation to those Commonwealth countries which have large numbers of victims of recent conflicts.

Conclusion

The Feasibility Study shows that a DNRC can be built and be operational by 2017 and the detailed cost analysis shows that it will cost around £300m. A similar analysis of operating costs prepared in consultation with the Director General of Finance at the Ministry of Defence shows that a DNRC will cost the Ministry of Defence no more to operate than Headley Court and in all probability less, even though a DNRC represents an increase in area and provides additional facilities in comparison to those currently provided at Headley Court.

All short, medium and long-term risks have been assessed and there is a high degree of confidence that the project can be built on time and to a high quality.

The Feasibility Study concludes that a DNRC located in the Midlands can provide a quality of service which surpasses that offered by the Defence Medical Rehabilitation Centre at Headley Court, and that it can do so at no extra cost to the Ministry of Defence. The notion of a Defence rehabilitation facility forming the core of a National centre has widespread support from across Government, and from clinicians and academics involved in rehabilitation.



1 Introduction

1.1 Background

In June 2009 the Under-Secretary of State for Defence announced in Parliament¹ that a Feasibility Study was to be undertaken to look at “the possibility of establishing a Defence and National Rehabilitation Centre in around 10 years’ time, looking at how the whole issue of rehabilitation should be developed in 21st century terms.”

The announcement did not go into detail beyond indicating that the study would build on the remarkable achievements of the Defence Medical Rehabilitation Centre at Headley Court, and exploit what has been learnt in recent times about complex injury. The Feasibility Study was also to look into the potential of creating a national centre for civilian as well as military rehabilitation, which would include rehabilitation research, the potential for developing further our world-class paralympics athletes and a ‘train the trainer’ capability for rehabilitation in conflict and post-conflict afflicted states. The Feasibility Study was to be sponsored by an external benefactor, who for the time being wishes to remain anonymous.

Arup was appointed by the benefactor’s charity in September 2009 to undertake the Feasibility Study. In Phase 1 Arup provided Project Management, Healthcare Planning, and Financial Analysis, in Phase 2 they additionally provided engineering services, and security and logistics advice.

The DNRC project is about the future of rehabilitation in the UK – military and civilian. It is also about continuing a long and distinguished tradition of charitable involvement in the care of injured Service personnel. The fundamental reason that Ministers wished to look at the possibility of establishing a DNRC in the context of how rehabilitation should be developed in 21st century terms was not because Headley Court was in any sense failing to achieve the necessary clinical outcomes – indeed its reputation in the rehabilitation field is very well established – but because its longer term development potential was seen (not least by the Headley Court Trust) to be limited by virtue of where it is and the nature of its site.

The benefits that a DNRC could provide are:

- **For Defence** – it will encompass and enhance the functions already provided at Headley Court, by providing betterment of service through; additional clinical capabilities; improvements in clinical adjacencies; modern facilities designed to the latest space standards; and the removal of the physical constraints imposed by the existing facilities.
- **For the Nation and individuals requiring rehabilitation** – the Defence core will provide the catalyst for a national resource – the N in a DNRC – recognizing that rehabilitation of those disabled and unable to work is a major policy area within Government and acknowledging that the military rehabilitation expertise could be developed in partnership with the NHS and others to provide a national benefit. The full N potential could be considerable, the most obvious being research and development – rehabilitation being a field in which UK research activity is sparse – both in association with Defence and beyond.
- **For the Commonwealth** – the provision of some rehabilitation opportunities for Commonwealth citizens disabled in current or previous conflicts.



¹ Hansard, 24 June 2009

1.2 Study phases

The Feasibility Study commenced in October 2009 and was completed in December 2010. It was undertaken in two phases:

- Phase 1 – Proof of concept, which entailed testing support from a representative cross-section of leading clinical and academic rehabilitation specialists, together with representatives from across Government, consideration of operating costs, development of the clinical requirements, appointment of the Feasibility Study team, and selection of a short-list of potential sites.
- Phase 2 – Selection of test site, development of Project and Design Brief, development of test site design, financial analysis, and preparation of the Feasibility Study report.

Figure 1 provides an overview of the phases and the workstreams of the Feasibility Study.



Figure 1 – Feasibility Study phases and workstreams

1.3 Project governance structure

A project governance structure was established at the start of the project to ensure that the structure, relationships and management of information supported the overall direction and performance of the Feasibility Study. The project governance defined:

- functions and responsibilities;
- the membership of the Project Board and Judgement Panels; and
- information governance, and approvals processes.

The project governance structure is described in detail in Appendix B and is summarised in Figure 2 below.

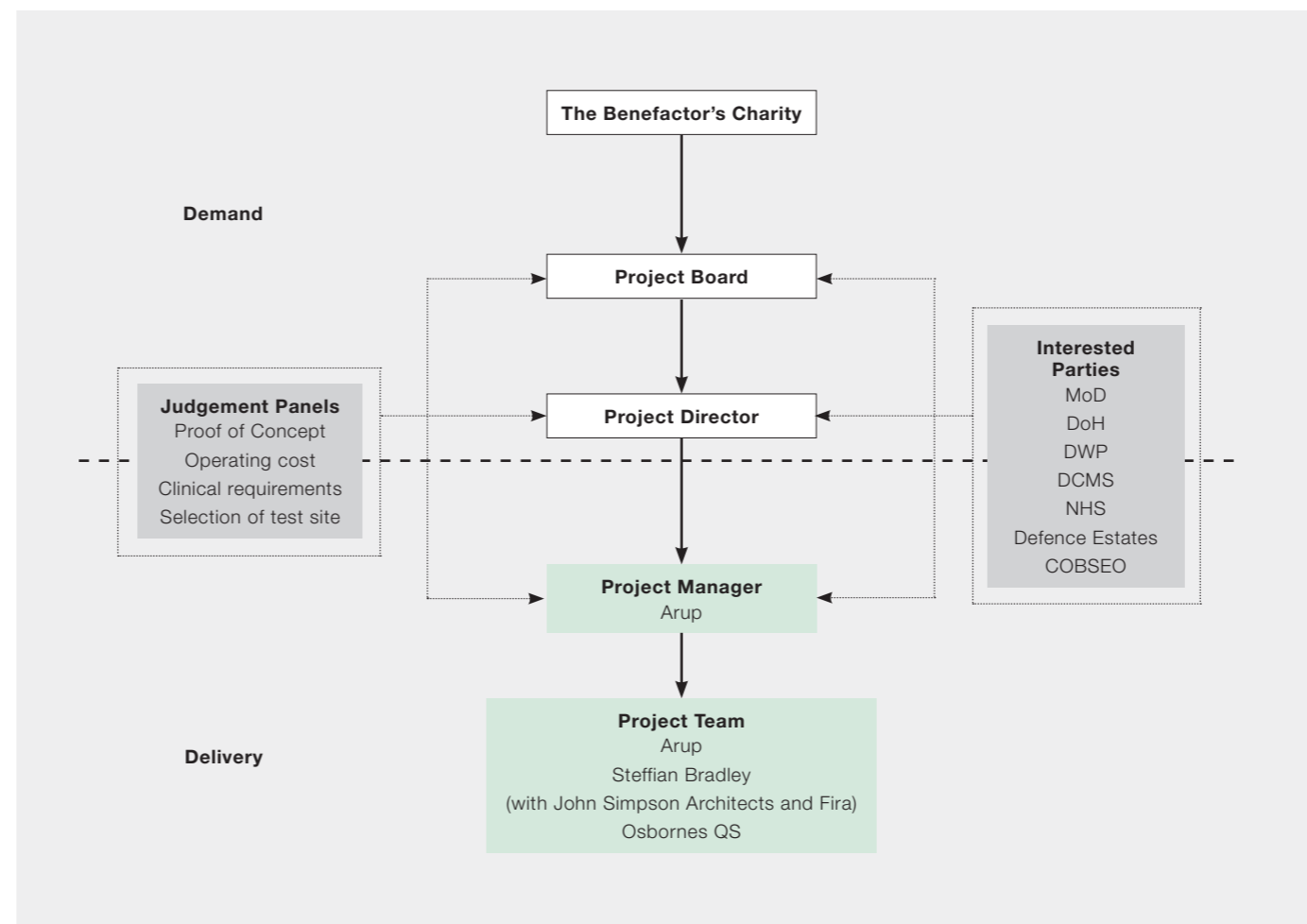


Figure 2 – Project governance structure

1.3.1 Project Board

The Project Board met at regular intervals to direct the work and monitor the project. The membership of the Project Board is shown in Table 1 below. The detail of roles and responsibility is included in Appendix B.

Name	Appointment	Function/Interest
General Sir Timothy Granville-Chapman	DNRC Project Director	Chairman
Mark Loveday	Benefactor's charity	Representing the interests of the benefactor's charity
Dame Carol Black	National Director for Health and Work	Government lead on 'back to work'
Surgeon Vice Admiral Philip Raffaelli	MoD Surgeon General	Defence Medical Services
Una O'Brien	DoH – Director General, Policy and Strategic Directorate	Department of Health
Dr Bill Gunnyeon	DWP, Director of Health, Work and Wellbeing and Chief Medical Advisor.	Department for Work and Pensions
Paul Bolt	DCMS – Director for Sport and Leisure	Department for Culture Media and Sport
Air Vice-Marshal Tony Stables	COBSEO and the Chairman of the Headley Court Trust	Representing the interests of all the Service charities and the Headley Court trustees
Joanna Kennedy	Arup	Project Manager

Table 1 – Membership of Project Board

1.3.2 Judgement Panels

A number of judgement panels were established to consider the evidence in detail and reach preliminary judgements for subsequent consideration by the Project Board. Membership of judgement panels was chosen to ensure that the appropriate levels of expertise and that their recommendations carried sufficient authority to provide the assurance required.

Judgement Panels were established to consider:

- the Proof of Concept – chaired by the National Director for Health and Work;
- operating costs – chaired by the MoD's Deputy Chief of the Defence Staff (Health), and attended by the MoD's Director General of Finance;
- the clinical requirements – chaired by the MoD's Surgeon General;
- the short list of sites – chaired by a property specialist nominated by the Project Board; and
- selection of the test site – chaired by the former Chief Executive of Defence Estates.

1.4 Phase 1A

To provide a degree of re-assurance before committing the resources required for the full study and appointing the full study team, it was necessary to determine whether:

- the concept of a DNRC had support from a broad range of interested parties from military and civilian backgrounds – the Proof of Concept; and
- at a high level, the operating costs of a DNRC were likely to be less than those of Headley Court, and consequently be affordable for the Ministry of Defence (MoD).

The Proof of Concept was developed through a number of interviews with interested parties, including leading clinical and academic rehabilitation specialists, and representatives from across Government, to canvas a wide cross-section of opinion (see Appendix A). These identified areas of firm ground and areas where additional judgements were required and as a result a series of questions were formulated for consideration by the Proof of Concept Judgement Panel.

The work on the operating costs was developed with support from Defence Estates, the Joint Medical Command (JMC) and the Headley Court management team. The findings of this work were tested by the Operating Costs Judgement Panel.

Phase 1A was completed at the end of February 2010. An Office for Government Commerce (OGC) style level 0 review was held at the end of this phase to confirm the findings of Phase 1A and the readiness to proceed to Phase 1B.

1.5 Phase 1B

Phase 1B commenced in March 2010 and had the following objectives:

- determining the detailed clinical requirements of a DNRC;
- appointment of the Feasibility Study team; and
- selection of a short list of suitable sites.

The detailed clinical requirements for a DNRC were developed through a series of meetings with clinicians and other health professional at Headley Court.

A Feasibility Study team was appointed during April and May, the architects being selected by a competitive tendering exercise.

To enable the relative benefits and costs of a DNRC to be evaluated against what is currently provided at Headley Court and what could be provided in the foreseeable future, a suitable test site was required to develop a DNRC design. A short-list of four potential sites was selected by a Site Selection Working Group established by the Project Board. These were further analyzed early in Phase 2, together with a DNRC option on the existing site at Headley Court to select a test site on which to develop the test site design.

Phase 1B was completed in early June 2010.

1.6 Phase 2

Phase 2 comprised:

- a site analysis and block concept study for each of the shortlisted sites;
- selection of the test site;
- preparation of the Project and Design Brief;
- development of the test site design;
- preparation of capital and operating costs; and
- preparation of the Feasibility Study report.

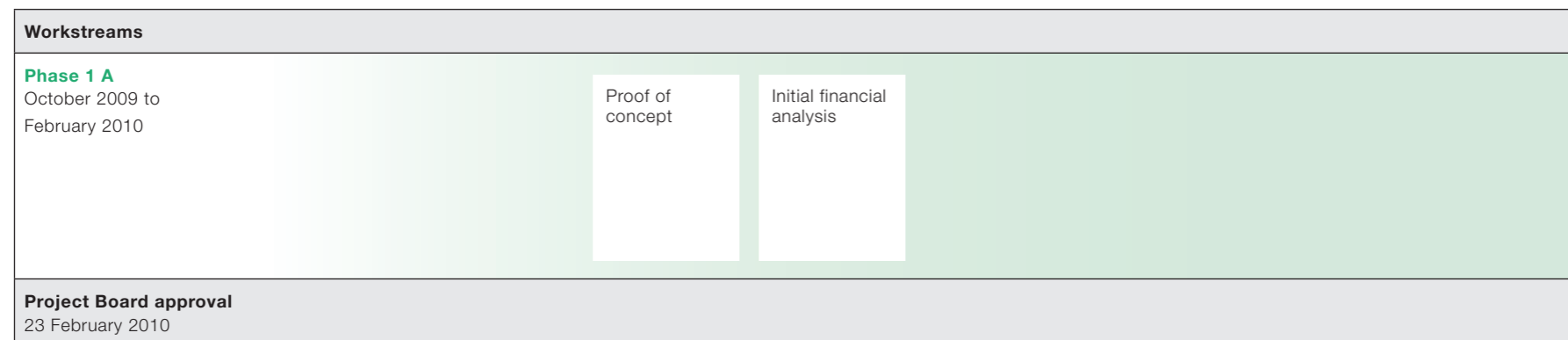
The above is described in more detail in subsequent sections.

2 Phase 1A

2.1 Objectives

The objective of Phase 1A was to re-assure the Project Board that:

- a DNRC had support from a broad range of recognized experts and interested parties, from Defence and civilian backgrounds – the Proof of Concept; and
- it would have the support of the MoD both in relation to Defence medicine and affordability.



2.2 Establishing the Proof of Concept

The announcement in Parliament in June 2009 postulated the broad notion of a DNRC, but did not go into the detail of what it would contain. So proving the concept to a greater or lesser degree, both in relation to the Defence core and to 'national' element (the N), was an important early strand in the Feasibility Study.

The Proof of Concept was developed through a number of interviews with interested parties, including leading clinical and academic rehabilitation specialists, and representatives from across Government, to canvass a wide cross-section of opinion (see Appendix A).

The interviews explored:

- how Defence rehabilitation works now, identifying its strengths and weaknesses;
- how Defence rehabilitation will develop in the future;
- the type of Defence rehabilitation facilities required in the future;
- how Defence rehabilitation can improve the National provision;
- national issues, particularly how civilian rehabilitation was provided, identifying strengths and weaknesses;
- provision of sporting facilities for people with a disability; and
- reasearch and development.

The interviews identified areas of firm ground and areas where additional judgements were required from a Judgement Panel.

Using the information obtained, a view on what a DNRC should provide was formed. This was tested by the Proof of Concept Judgement Panel on 29th January 2010. The process is summarised in Figure 3 below.

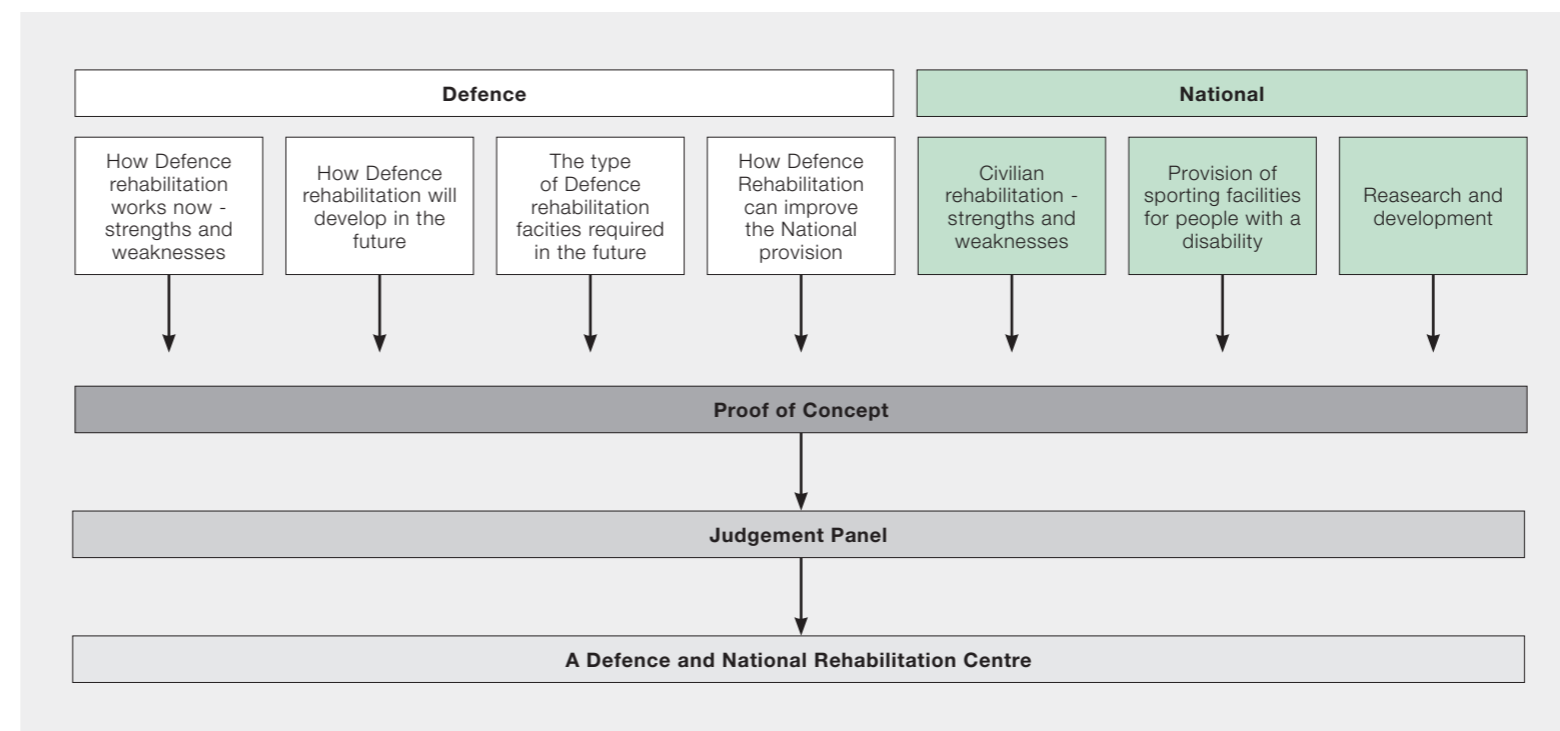


Figure 3 – Proof of Concept process

2.3 Defence rehabilitation

Defence Medical Services provides specialist rehabilitation services through the Defence Medical Rehabilitation Programme (DMRP) which began in 2002/03. The concept of the programme is that Service personnel with musculo-skeletal conditions have access to high quality, effective and timely advice, assessment diagnosis and treatment at the appropriate level to enable them to return to operationally deployable levels of fitness. The programme is underpinned by a three-tiered approach.

- Primary Care Rehabilitation
- Intermediate Rehabilitation
- Specialist Rehabilitation (Secondary and Tertiary Care)

2.3.1 Specialist rehabilitation

Specialist rehabilitation is provided at Headley Court in Surrey. It provides physiotherapy and rehabilitation for complex musculo-skeletal injuries and specialised neuro-rehabilitation for patients with brain injuries. The principle underlying specialist rehabilitation is to return patients to functional independence, and where possible, to active military duties.



Headley Court

2.3.2 Headley Court

The Headley Court site was in private ownership until the Second World War when it was requisitioned for use as a headquarters by Canadian Forces. After the War it was bought by the Estate Agents and Auctioneers Institute (now the Royal Institute of Chartered Surveyors) to endow it as a rehabilitation unit for (largely officer) aircrew in memory of the deeds of the RAF during the War. The unit was opened in 1947 and ever since has been in the ownership of the Headley Court Trust, a charity whose aims are to provide for the medical rehabilitation of armed forces personnel. That provision, more than 60 years on, now extends to the highly complex rehabilitation needs of all ranks from all three Services. The facilities, centred around the 19th Century Grade II listed house, have grown incrementally since 1947 in response to the developing role of Defence rehabilitation.

Headley Court is now a tertiary centre actively supporting the physical component of fighting power by returning those with relatively minor sports, exercise, recreational and occupational injury to full operational fitness. It provides rehabilitation for those with highly complicated battle injuries giving reassurance to those on the front line that care for the injured is second to none.

In February 2010 Headley Court employed 220 staff, half of whom were military and the other half civilian, and had 156 patient beds, 36 of which were ward-based.

A review of the DMRP was undertaken in 2008 to confirm the adequacy of the service. The review strongly supported the core role of Headley Court, recognizing that it provided a unique environment which met the clinical demand for secondary and tertiary care. It confirmed the continuing requirement for a specialist centre for rehabilitation and recommended that improvements be made to working practices and protocols to maximize effectiveness and ensure that specialist rehabilitation continued to deliver an excellent standard of care.

2.3.3 Activities and services

Specialist rehabilitation has two clear distinct approaches:

- **individual rehabilitation** – which accounts from approx 12 to 13% of cases and is related to severe poly trauma; and
- **group rehabilitation** – this accounts for approx 87% of the cases and is seen as the key to successful rehabilitation practice.

This approach has enabled Headley Court to respond to increases and decreases in patient activity and throughput.

2.3.4 Challenges for specialist rehabilitation

Staff at Headley Court and the interviewees identified the challenges for specialist rehabilitation as:

- **Provide a world leading service so that the armed forces know that the nation will care for the injured in the best possible manner.** Research and being able to respond to changing demands are essential to maintain such a service. The new working practices and protocols introduced by the DMRP review are increasing the range of interventions and research that Headley Court provides. Further impetus is provided when services are relocated in new modern facilities, as evidenced by the move of Lower Limbs rehabilitation to the new Help for Heroes gym, but lack of space and inappropriate buildings on the Headley Court site tend to restrict the scope for further development.

- **Provide easy access to services by Service people and their families and by clinical and other health professionals.** The main focus of Defence medicine is now in the Midlands – with the Royal Centre for Defence Medicine (RCDM) located at University Hospitals Birmingham NHS Foundation Trust, and the Headquarters of the Surgeon General together with the Joint Medical Command recently established at Lichfield. The majority of the complex trauma patients at Headley Court arrive from the RCDM where they return at regular intervals for further treatment. Consultants from Headley Court also regularly visit patients at the RCDM to advise and plan a patient's rehabilitation prior to discharge. The distance between the two establishments is depressing for patients, time consuming for consultants prolonging their working day, and generally does not provide efficient working arrangements.

For many people, particularly those with complex trauma and neurological injuries, rehabilitation will extend over a number of months, even years, and there is a natural desire for partners, children, and other family members to visit during this period. A Surrey location, not easily accessible, is not an ideal location for visiting families given that the armed forces recruit country-wide, with a very significant proportion having to travel from Scotland, Wales, and the north of England. Journeys by patients in general are not aided by the complexity of rail and other links

- **Provide adequate capacity.** Headley Court is located in the greenbelt with poor access. Current planning constraints do not allow an expansion of the overall footprint of the buildings. Interim solutions (some with less than five years planning life) have been applied to meet current demands, but the underlying problems of sustaining rehabilitation services at a world class level in the current circumstances have yet to be addressed.



Temporary ward at Headley Court

- **Provide services which are affordable and efficient.** This need speaks for itself, but Headley Court has grown incrementally over its 60 years with little consideration being given to operational efficiencies – the availability of suitable space dictating the location of new buildings rather than optimum clinical adjacencies. The current arrangement of buildings is not efficient in terms of internal layout and the time taken to move between buildings; the ability to improve clinical adjacencies and provide more time for rehabilitation is severely restricted by the constraints on site development (above).
- **Maintain the Defence reputation in the rehabilitative field.** Headley Court's clinical reputation is well, and deservedly, established. But there have been a number of concerns over safety, particularly with regard to cleanliness and hospital acquired infection. This has taken on greater importance in recent years due to the severity of wounds – many of the injured are now admitted with open wounds which require regular re-dressing. This has partly been addressed by the recent improvements, but the underlying problems and associated risk of providing a modern and increasingly sophisticated rehabilitation service from old and inappropriate buildings still remain.

- **Use Defence rehabilitation to stimulate the rehabilitation of the disabled and those unable to work – providing a clear example of what Defence can do for the nation.** The capabilities and success of the Defence rehabilitation programme are well recognized and provide an inspiring role model for the nation². They demonstrate how severely injured Service personnel can be rehabilitated with dignity and pride to lead full and active lives as Servicemen and women or as civilians. This is in stark contrast to the national picture described by Dame Carol Black in her Report in March 2008³, which identified that over 175 million working days were lost to illness in 2006 at a cost to the tax payer of £60bn. Her report emphasized the holistic nature of rehabilitation and lists as essential components: exercise and physical training; cognitive behavioural therapy and counselling, physiotherapy, occupational therapy; and other clinical interventions, plus advice and support for social concerns.

The components to which Dame Carol refers are found at Headley Court. But these alone would not provide the centre of excellence required to raise the profile and stimulate the rehabilitation of the disabled and those unable to work. It would also be necessary to undertake research, train and educate health professionals and other carers, and develop role models. But the site and planning constraints which limit the development of Defence rehabilitation at Headley Court would also severely restrict any advance towards a national rehabilitation facility.

² Treating Injury and Illness arising on Military Operations; National Audit Office, February 2010, TSO.

³ Professor Dame Carol Black. 'Working for a Healthier Tomorrow.' London: TSO, March 2008.

2.4 National issues

An analysis of the non-Defence requirements was undertaken to develop a greater understanding of what could be provided in the 'N'.



2.4.1 Health of working age adults

The Government's response to Dame Carol Black's report⁴ was published in November 2008; this accepted the conclusions and the recommendations made. The response is built around three key aspirations to meet the challenges and enable the delivery of a broader vision:

- creating new perspectives on health and work;
- improving work and workplaces; and
- supporting people to work.

The document set out a number of initiatives to support people with health conditions to stay in work or return to work, including:

- pilot schemes to support people who work;
- improving support for disabled people and those with fluctuating health conditions to work;
- working with employers to develop effective back-to-work action plans; and
- ensuring the welfare system supports people to work wherever possible.

The Government's response is about making better use of existing resources and launches a number of initiatives to improve the support available for working age adults with health problems.

2.4.2 NHS rehabilitation services

Rehabilitation services for acute patients in the NHS are focussed on returning people to health and enabling discharge from hospital. A number of speciality specific centres of excellence exist for the treatment of neurological injuries and spinal injuries, similar centres for complex physical trauma do not exist.

The NHS does not have a responsibility for providing vocational rehabilitation and this creates a gap, since once a person is discharged from hospital, there is no effective system in place to return people to their former levels of fitness and ability.

A report published in 2007⁵, found that trauma care in many NHS hospitals was deficient with over 60% of patients receiving a standard of care that was less than good practice with problems with organisational and clinical aspects of care frequently occurring.

In December 2009 the Royal College of Surgeons published interim guidance for commissioners on regional trauma systems⁶. The purpose of which was to "...provide generic guidance on trauma and trauma systems, and present a proven practical and evidence-based model suitable for regional trauma systems in the UK".

One of the key components of a regional trauma model is an acute rehabilitation service to improve outcomes and restore casualties back to productive roles in society; organised and integrated rehabilitation being key to the functioning and sustainability of a major trauma system.

⁴ Improving health and work: changing lives. London: TSO, November 2008

⁵ Trauma: who cares? National Confidential Enquiry into Patient Outcomes and Death, Nov 2007.

⁶ Regional Trauma Systems: Interim Guidance for Commissioners; The Intercollegiate Group on Trauma Standards; Royal College of Surgeons, Dec 2009.

2.4.3 Disability sport

There are 11 million disabled people in England and the English Federation of Disability Sport (EFDS) is the national body recognised by Sport England to develop sporting opportunities for these people.

2.4.4 Paralympic sport

The British Paralympic Association (BPA) is a registered charity which is responsible for selecting, preparing, entering, funding and managing Britain's teams at the Paralympic Games and Paralympic Winter Games. Currently there are 25 paralympic sports for both Summer and Winter Paralympics. Paralympic athletes tend to train at and make use of the same sporting facilities and sports science and medicine support used by able bodied athletes; they therefore naturally congregate alongside them in recognised national sporting centres of excellence.

A DNRC would, however, provide the opportunity to research issues related to paralympic sport, and provide a route to paralympic sport for highly motivated Service personnel.

2.4.5 Research and development

There is a paucity of UK research on the effectiveness of both civilian and Defence rehabilitation. The Medical Research Council (MRC) and the National Institute of Health Research (NIHR) have both indicated support in trauma and rehabilitation.



2.4.6 Commonwealth countries and victims of landmines

The world's largest and smallest, richest and poorest countries make up the Commonwealth and are home to two billion citizens of all faiths and ethnicities – over half of whom are 25 or under. Member countries span six continents and oceans from Africa (19) to Asia (8), the Americas (2), the Caribbean (12), Europe (3) and the South Pacific (10).

Within some Commonwealth countries investment in rehabilitation services is often minimal or non-existent, owing in part to the social stigma that attaches to disability in the third world. Consequently there is a need to provide rehabilitation services, particularly in those countries where there are likely to be major limb injuries and amputations arising from landmines from current and past conflicts.

In 2008 Landmine Monitor⁷ identified problems with landmines in the 13 Commonwealth countries. Casualty figures for individual Commonwealth countries are not readily available; however, worldwide in 2007 the number of landmine casualties exceeded 5,400, of which 1,400 were fatalities.

⁷ www.lm.icbl.org

2.5 A Defence and National Rehabilitation Centre

2.5.1 Military rehabilitation

A DNRC will be used by members of the armed forces who have been injured in service, sometimes as a result of armed conflict, and require rehabilitation to mitigate the impact of their injuries. Rehabilitation services are provided in two ways:

- Inpatients

- Musculo-skeletal rehabilitation groups
- Complex trauma rehabilitation teams
- Neurological rehabilitation teams

- Outpatients

- Multi-disciplinary Injury Assessment Clinics (MIACs)
- Defence rheumatology centre clinics
- Specialist outpatients
- Outreach clinics

Casemix includes; musculo-skeletal injury, complex trauma, neurological injury, rheumatological conditions. These conditions arise in the following ways:

- Military training, sporting activities, and accidents at work or off-duty
- Battle injury
- Non-battle injury on operations

Spontaneously arising conditions – usually rheumatological but may also include cardiovascular and respiratory disease, or conditions as a consequence of infection.

Patients are managed through multi-disciplinary teams organised as follows:

- Complex trauma rehabilitation
- Neurological rehabilitation
- Lower limbs rehabilitation
- Spines rehabilitation
- Specialist rehabilitation

Patients with routine musculo-skeletal injuries attend rehabilitation courses of three weeks duration. Depending on the severity of injury attendance on up to three courses may be required (early, intermediate and lates).

For neurological and complex trauma injuries, patients will have often have received acute care on the frontline and/or in the RCDM at Selly Oak; their medical condition will have been stabilised, their life is no longer in danger and they now require physical and/or neurological rehabilitation. The length of stay at a DNRC will vary from a few weeks to many months.



Trauma rehabilitation

It was clear from our interviews that the quality of trauma rehabilitation provided at Headley Court is superior to that found in the NHS. Headley Court provides both clinical and vocational rehabilitation and does not draw a distinction between two; its focus is on returning Servicemen and women to active duty. The NHS, in contrast, is focussed on discharging patients from acute care.

The current patient treatment plans employed at Headley Court are effective and provide positive patient outcomes. There is no evidence to suggest that the basic approach of group therapy and active case management should be changed. It was acknowledged that care-pathway inefficiencies are likely to exist as a result of poorly designed facilities, an issue which was addressed Phase 2 where there was in-depth discussions with Headley Court staff to review and improve current operating procedures and staffing models.

A DNRC will provide a number of simulated environments, such as driving simulators, weapons simulators, biometric/Wii⁸ assessment, and Computer Assisted Rehabilitation Environment (CAREN) to assist rehabilitation. These are in use in the Walter Reed Army Medical Center in Washington, the Center for the Intrepid in Fort Sam Houston and MRC Doorn in the Netherlands. There is little published research on their effectiveness; however, it is to be expected that their use and sophistication will increase during the planning period of a DNRC and consequently it was clear that they should be included in the planning brief for the new facility.

The view of the people interviewed was that betterment of service will arise from the design of new facilities enabling efficiencies and improved care pathways, and as the technology develops, from the use of new equipment. In the longer-term improvement will also arise from ongoing research and development informing rehabilitation practice.

Neurological rehabilitation

The service provided at Headley Court is similar to that provided in specialist centres in the NHS, such as the Oxford Centre of Enablement; the variations in quality between military provision and NHS provision apparent in trauma rehabilitation, do not exist in neurological rehabilitation.

A DNRC will provide a similar level of service as Headley Court, which has 20 post-acute neurological rehabilitation beds.

The level of external provision of specialised services by the Brain Injuries Rehabilitation Trust (BIRT), Banstead Place and the Royal Hospital for Neuro-disability is expected to remain at the same level for a DNRC.

Although the consultation exercise undertaken confirmed that some patients at Headley Court would have mental health problems alongside their physical injuries, it was agreed that a DNRC will not provide general mental health services or psychiatric beds.

Back to Life – Prosthetics

The current arrangement at Headley Court is a suitable model to be replicated and refined for a DNRC. Prostheses are supplied in modular form by a private company – currently Chas A Blatchford and Sons Ltd, with final assembly, enhancements and fitting being undertaken by civilian and military technicians.

Demand for the service is likely to increase over the coming years as in January 2010 the Government committed the NHS to providing the same standard of prosthetic care for veterans as that provided by Headley Court.⁹ It is thought that a DNRC could in future be commissioned by the NHS to provide prostheses to ex-Servicemen, where the local health service cannot provide the same ‘state-of-the-art’ prostheses as originally fitted.



⁹ Announcement by Health Minister Mike O'Brien and Veterans Minister Kevan Jones, 11 January 2010

⁸ Wii – A home video games console released by Nintendo in 2006. Experience at Headley Court indicates that the use of Wii games can be beneficial when used as part of a structured rehabilitation programme.

Back to Life – living with disability

On leaving a DNRC most people will return to active duty. Of the minority leaving military Service most will be capable of independent living, although some will require specially adapted housing. It is expected that a small number of people will require full-time support from carers and will not be capable of living independently.

The transition from living in a protected military environment such as a DNRC, to civilian life can be difficult and stressful for both Servicemen and their families. A DNRC will provide specially adapted housing to allow seriously disabled soldiers and their families to live together, prior to leaving the Service, so that they can adjust to, and come to terms with, living with a disability. A DNRC will also provide hostel accommodation for families when appropriate, in the manner of Norton House close by to Headley Court.

Headley Court provides vocational rehabilitation teams, staffed by occupational therapists to support a structured return to work programme. Liaison and relationships with military units are good and this provides all service personnel leaving Headley Court with a structured return to work programme.

For those people leaving the military the transition to civilian work is not as well managed; although the Services are developing a recovery centre programme to create regional centres with links to the Serious Illness Leavers Programme (SILP) and local industry. A DNRC will seek to support this initiative through establishing relationships with industry on a national basis.

Research and development

A DNRC would provide significant research potential as it would have a sizeable cohort of seriously disabled Service people whose treatment and interventions could be monitored over long periods, thereby providing a basis for understanding outcomes and allowing a DNRC to become the national focus for Defence and civilian research and development.

Sources of research funding could include the MRC, NIHR, the Wellcome Trust, the MoD and others. There is also the possibility of research collaboration with universities and academic centres, both nationally and internationally.

Effective use of capacity – the opportunities

The demand for services in the Defence core of a DNRC will remain constant but the nature and mix of injuries will change, depending on the tempo of military operations. Fluctuations in casemix might, at times, allow some facilities to be used on a commissioning basis by the NHS or other providers.

Rehabilitation is seen as the cornerstone of the NHS trauma networks currently being established. The NHS is well provided with spinal and neurological rehabilitation, but specialist trauma rehabilitation is not as widely available. The opportunity exists for the facilities in the Defence core to be used by civilians who have severe trauma injuries, perhaps from a major accident or terrorist attack, to benefit from Defence rehabilitation expertise and receive the best care possible, providing a good example of what Defence can do for the Nation.

Similar arrangements would also be available for the Commonwealth, particularly in relation to ‘train the trainer’ activity for those countries with large numbers injured in previous or current conflicts.

Co-location of services on the same site

The possibility of co-location of facilities on the DNRC site, but separate from the Defence core and with separate capital and operating cost provision, will be developed further as the project develops. Preliminary meetings suggest that there may be interest from the NHS and possibly private healthcare providers.

The use by disabled sports organisations is also a distinct possibility and will be explored further because in most sports the emphasis nowadays is on integrated programmes of support for our elite able bodied and disabled athletes.

2.6 Initial financial analysis

In February 2010 a financial analysis was undertaken to reach a preliminary view on comparative operating costs between Headley Court and a DNRC. The information required to undertake the analysis was sourced from Defence Estates, JMC and the Headley Court management team supplemented by Arup benchmark data.

It was based on current Headley Court operating costs plus those expected to be incurred over the next five years through the completion of the swimming pool in April 2010, the centre for cognitive health, single living accommodation, the clinical block and other facilities identified in the current five year investment plan. All operating costs are at 2009/10¹⁰ prices.

Figure 4 presents a summary of the analysis of operating costs.

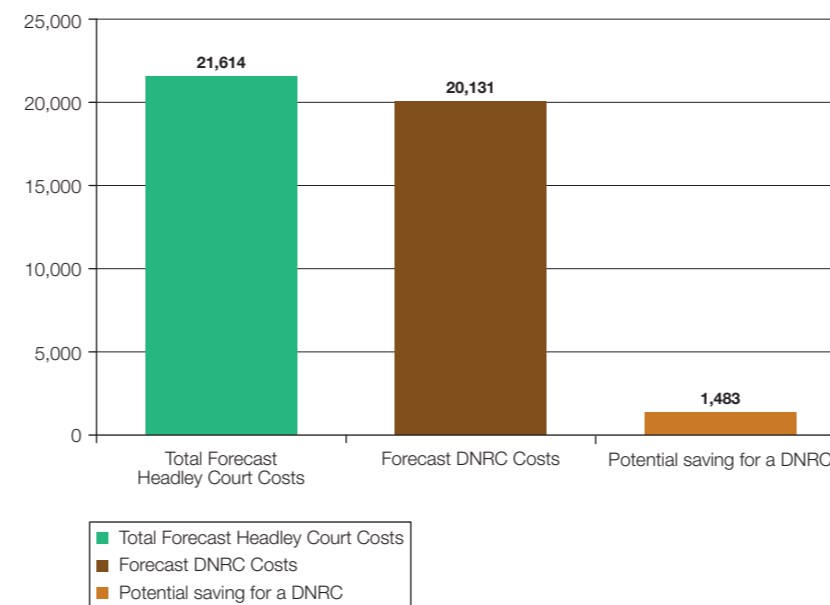


Figure 4 – Summary of comparative operating costs

The analysis illustrated that a DNRC is unlikely to increase the Ministry of Defence’s current operating costs when compared to Headley Court and the associated services. Further work on operating costs was undertaken in subsequent phases (see Section 6).

It also indicated that forecast costs for a DNRC would need to increase by more than £3.5m per annum (17%) before operating costs of the current facilities at Headley Court would compare favourably with the proposal for a DNRC. This level of contingency would allow for:

- staff costs to increase to £15m – a 30% increase (based on assumed staff costs of £11.5m); or
- maintenance costs, both and hard and soft FM, to increase to £7m – a 95% increase.

The operating costs were considered by a Judgement Panel on 25 January 2010. They accepted the findings and acknowledged that at the current stage of project development, there was a high degree of uncertainty attached to the operating cost data, but taking into account the level of contingency this uncertainty was assessed as a medium risk to the project.

¹⁰ 2009/10 prices calculated using 2.5% annual inflation (a large proportion of cost are employment related, Office of National Statistics recently reported employment cost increased between 2% between 2008 and 2009, whilst annual RPI to November 2009 is 0.3%, RPIx is 2.7%)

2.7 Level 0 Review

The DNRC Feasibility Study is privately funded and not subject to Government policy on reviews of major capital investment projects, but many of the interested parties are within Government and Ministers will retain a close interest in the study. The Project Board therefore considered it sensible that an OGC style level 0 review should take place at the end of Phase 1A to provide the Project Board with the assurance that the project was ready to proceed to the next stage.

The review was undertaken by the Project Board, but all the supporting material was independently assessed as being fit for purpose. The assessment was undertaken by Sir Ian Andrews, a former MoD Permanent Secretary, and Steve Brewer, Director, Project Management at Grosvenor Estates, in early February, with a de-brief being provided on 9 February. They expressed general content with the way in which the study was being conducted, with only a few minor comments. Project documentation was subsequently amended in light of their comments.

2.8 Approval of the outcomes of Phase 1A

The Project Board on 23 February 2010, noted the outcomes of the review of Level 0 material and approved the Proof of Concept and operating cost analysis as described in the Phase 1A report, subject to more detail being undertaken during Phase 2 to:

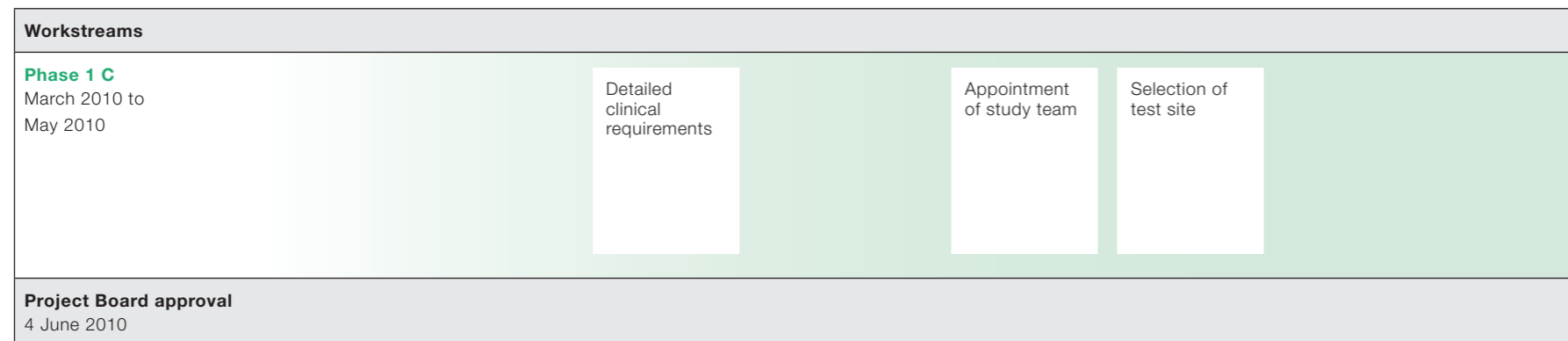
- define the requirements for the psychiatry service;
- confirm the capacity requirements; and
- define the outstanding N, back to life and R&D conceptual issues.

3 Phase 1B

3.1 Objectives

Phase 1B had the following objectives to:

- determine the detailed clinical requirements of a DNRC;
- appoint the Feasibility Study team; and
- draw up a short list of suitable sites from which to select a test site for the Business Case.



3.2 The detailed clinical requirements of a DNRC

The work in Phase 1A defined in broad terms the services to be provided from a DNRC. This was developed in Phase 1B to provide an in-depth understanding of rehabilitation at Headley Court – the type of patients; the level of demand; services provided; and the types of space required. This formed the basis for the clinical requirements of the Project and Design Brief.



CAREW system at MRC Aardenburg, Doorn, Netherlands

3.2.1 Consultations and visits

The detailed clinical requirements for a DNRC were developed through a series of meetings with senior clinicians and other health professionals at Headley Court, the Surgeon General and the Commander of Joint Medical Command.

In Phase 1B meetings were held with staff at Headley Court over 3.5 days, see Appendix C, to fully understand the current service provision, accommodation requirements and to identify areas where 'Betterment' could be realised.

A visit was also arranged to a military rehabilitation facility in Holland to gain a better understanding of the benefits that use of the latest rehabilitation technology may bring. This is described in more detail in below.

In Phase 2, further meetings were held with the Surgeon General, the Commander of JMC and the clinical staff at Headley Court to confirm, refine and finalise the clinical requirements.

Views of the patients at Headley Court

The views of patients were also recognised, using information from the National Audit Office report – 'Treating Injury and Illness arising on Military Operations'¹¹ and from internal focus groups which are held from time to time, particularly in relation to patient's perception of their care and treatment and further informed by the regular patient surveys undertaken at Headley Court. As the project develops focus groups of patients and their families will be established to refine the brief and inform the design process.

¹¹ Treating Injury and Illness arising on Military Operations, A report by the Comptroller and Auditor General, TSO, London Feb 2010.

Military rehabilitation in other countries

A desk top study was undertaken to identify comparable facilities elsewhere in the world. These included units in the USA, Holland and Israel. Of these the closest comparators were considered to be in the USA and Holland. The Surgeon General recently visited facilities in the USA and provided the project team with an overview of the developments there, including their strengths and weaknesses, with a view to identifying those elements which could usefully be incorporated into a DNRC.

Sebastian Greenall, Tim Woolcott of Steffian Bradley Architects, and Jonathan Ainley from Arup visited MRC Aardenburg in Doorn, Holland, as the guests of Lt Col van't Root.

The Dutch rehabilitation centre provides both Defence and civilian rehabilitation, and uses a similar intensive exercise therapy based approach. The facilities are similar to those provided at Headley Court but on a smaller scale. One of the reasons for visiting Aardenburg was to see the recently installed Computer Assisted Rehabilitation Environment (CAREN) equipment, as it proposed to provide similar equipment at a DNRC.

The visit confirmed that the real time 3D virtual environment provided by CAREN, as well as its tools for gait analysis, were considered beneficial in that they can improve outcomes through monitoring perceived behaviour against actual behaviour, enabling immediate balance corrections to be made, followed by progressive corrections as part of a rehabilitative process. CAREN is also an excellent tool for R&D and a number of universities are using the facility to undertake basis research.



3.2.2 Summary of the detailed clinical requirements of a DNRC

Following these meetings:

- detailed descriptions of the current delivery models for rehabilitation services were prepared;
- processes mapped; and
- the numbers of staff who deliver the service identified.

This work was summarised in a draft report ‘Current Service Provision at Headley Court’ which was reviewed by the Project Board on 29th April and subsequently included in the Project and Design Brief.

The clinical requirements section of the Project and Design Brief assumes that:

- the level of Defence demand is taken from a January 2010 starting point and that battle injury accounts for approximately 33% of cases treated, with just over 50% of clinical time being devoted to those with complex injuries and rehabilitation needs; and
- rehabilitation currently being done at Regional Rehabilitation Units (RRUs)¹², which in normal circumstances would be done at Headley Court, will be done at a DNRC.

The work on the clinical requirements determined that a DNRC should have:

- 96 inpatient beds (76 for Complex Trauma and 20 for Neurological Rehabilitation);
- 126 Hostel type beds for the musculo-skeletal rehabilitation groups (lower limbs, spines and specialist rehabilitation);
- two gymnasia for complex trauma exercise rehabilitation;
- one gymnasium for each of the musculo-skeletal rehabilitation groups;
- a swimming pool, hydro-therapy pool and water treadmill;
- a fully equipped gait laboratory;
- a fully equipped prosthetic department;
- a computer assisted rehabilitation environment (CAREN); and
- an interactive education centre fully equipped with video conferencing, to enable a DNRC to provide distance learning for Defence GPs and medical staff at PCRFS, RRUs.

The Project Board endorsed the clinical requirements but stipulated that maximum effort be devoted to reducing the area through further refinement of the requirement with the MoD and the application of design efficiencies.

Further meetings were held in May, June and July with the Surgeon General’s team, and staff at Headley Court. The outcome of these was a reduction in the number of gymnasia, and the area of the education centre, which together with other minor changes enabled the total floor area requirement to be established at 38,200m². The area requirement is summarised in Table 2 below.

A full version of the functional and spatial requirements for a DNRC is included in Volume 4 - The Project and Design Brief.

Department	Area (m ²)
Main Entrance and Reception	176
Diagnostic Imaging	395
Centre for Lower Limbs	1,872
Centre for Spines	968
Centre for Specialist Rehabilitation	1,065
Residential Accommodation (Rehabilitation)	2,597
Outpatient and short course accommodation	679
Complex Trauma Centre	8,457
Neurological Rehabilitation Centre	2,518
Pools, CV gym, running track, climbing wall etc.	1,955
Centre for Mental and Cognitive Health	459
Back to Life Accommodation	515
Education Centre	915
Health Centre	148
Infrastructure and Welfare	6,886
Hostel Accommodation for Families	1,024
Stores etc	556
	31,184
Energy Centre, Plant etc	15.0%
Main communication routes	7.5%
Total area	38,200

Table 2 – Schedule of areas for a DNRC

¹² RRUs provide an intermediate level of care to address the regular overall demand for Defence rehabilitation. Headley Court itself delivers both an RRU capability for London District and a tertiary capability. The current high incidence of conflict injuries being managed at Headley Court has meant that some intermediate rehabilitation and, on occasion, some low level tertiary rehabilitation, is being delivered by other RRUs as a temporary measure.

3.3 Appointment of the study team

The Arup team for Phase 1, providing Project Management, Healthcare Planning and Financial Analysis, was supplemented by a team of specialists for Phase 2 to help select a suitable test site and to develop the exemplar design for a DNRC. This enabled the relative benefits and costs of a DNRC to be evaluated against what is currently provided at Headley Court and what could be provided in the foreseeable future.

The Project Board agreed that the following specialist consultants should be appointed:

- consulting architect;
- quantity surveyor;
- structural, mechanical, electrical and public health (SMEP) engineering;
- other specialists, such as security, logistics, construction design and management (CDM) co-ordinator; and
- property agents, and town planning specialist to assist with the site selection .

Consulting architect

The consulting architects were appointed as sub-consultants to Arup through a competitive tender, with a short-list of four practices being chosen to tender, from a long-list of nine invited to pre-qualify.

The Invitation to Tender (ITT) was issued on 19 March and tender submissions were received from all four firms by the deadline specified. The architects were required to address a number of areas in their written technical proposals, against which they were scored.

To verify the scoring of their written technical proposals, an interview and evaluation session was held on 20 April at which they were invited to make a brief presentation.

Taking into account their written submissions and their performance at the interview session, the panel discussed and verified the scores for each practice against the criteria listed above and their lump sum fee proposal. The panel decided that Steffian Bradley supported John Simpson and Partners, should be appointed as they provided the most convincing architectural arguments and demonstrated a thorough appreciation of the architectural ambition for a DNRC.

Further details of the tender process for the appointment of consulting architect is included in Appendix D.

Quantity surveyor

A single tender action was taken to invite a proposal from Osbornes. Following submission of their proposal, their rates were benchmarked against similar services provided for feasibility studies and their appointment as sub-consultants to Arup was approved by the Project Director.

Oversight of the quantity surveying services and provision of specialist engineering quantity surveying was provided by the Arup in-house cost management team.

Engineering Services

Strategic level structural, and mechanical and electrical engineering, and geotechnical services were provided by Arup in-house teams. Fees were within overall benchmarked fees and the budget was approved by the Project Director.

Other specialists

Security, logistics, and construction design and management services were provided by Arup in-house teams.

Property agents and town planning

Property agents and town planning consultants, to support the site selection process, were procured direct by the Client.

A full list of the DNRC study team membership for Phase 2 is included in Appendix E.

3.4 Selection of a test site

To evaluate the relative benefits and costs of a DNRC it was necessary to develop a test design, and while this could be done as a desktop exercise using a hypothetical site the Project Board considered that the costs of testing options with real designs developed on real sites was justified to ensure that the resulting cost data was robust.

This section describes the selection of a test site on which to develop the design for a DNRC. The process spanned Phases 1 and 2 and is illustrated in Figure 5 below. The site selection component of the Feasibility Study was led by the Client team, with site due diligence support provided by the study team.

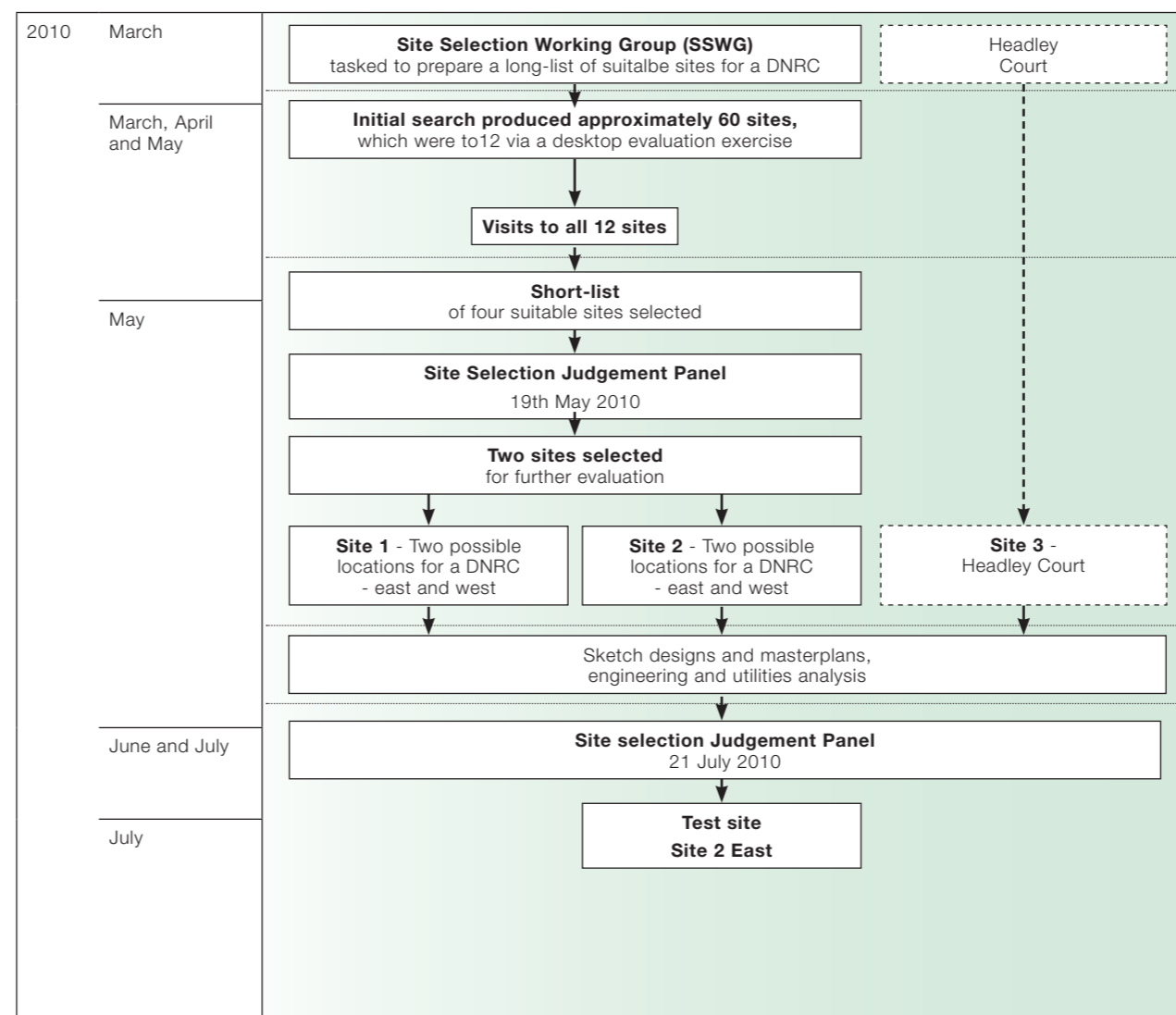


Figure 5 – Site selection process

3.4.1 Site Selection Working Group

A Site Selection Working Group (SSWG) was established to oversee the site search, develop the evaluation criteria and produce a short list of potential sites in the Midlands. The SSWG conducted the site search on a confidential basis.

A long-list search was conducted, on and off the market, with sites being assessed and scored against a set of characteristics endorsed by the Project Board (see Appendix F) covering: location; site specifics; transport links; and planning and the environment.

The option of using an existing military facility was also considered. In the opinion of the MoD no site is available in the Midlands of the right size in a rural setting to replicate the tranquillity and sense of Headley Court. This view has been substantiated by the recent Strategic Defence and Security Review; space within existing military facilities is now at a premium to accommodate land forces being withdrawn from Germany.

The initial search revealed nearly 60 sites which were reduced to a more manageable 12 on a desktop basis. The 12 sites were visited and reduced to the four offering the most potential.

These four sites were assessed in some depth by the Site Selection Judgement Panel on 19 May 2010; the assessment benefitting from the advice of the consulting architects and engineering expertise from Arup. The Judgement Panel recommended that two sites, known for the purposes of this report as Site 1 and Site 2, be selected for further consideration, to these was added the existing site at Headley Court, so that a total of three sites were developed and evaluated to select the best option for developing a DNRC.

3.4.2 Development of sketch designs and masterplans

Sites 1 and 2 each had two possible areas (known as East and West) which were suitable locations for a DNRC. It was agreed that each potential site – Site 1 East and West, Site 2 East and West – together with Headley Court (Site 3), would be developed in terms of:

- possible test site designs and masterplans;
- potential strategies for the supply of utilities;
- earthworks;
- phasing of works (were necessary);
- suggested standards of materials and finishes; and
- the associated outline costs.

This allowed criteria to drawn up against which the sites could be evaluated.

3.4.3 Evaluation of the site options for a DNRC

A preliminary in-house scoring exercise was undertaken involving the Project Director, the consulting architects, the quantity surveyor and others from Arup and elsewhere.

The scores were then scrutinized 21 July 2010, by the Options Evaluation Judgement Panel which recommended that Site 2 East should be the test site on which to develop the design for a DNRC. This recommendation was subsequently endorsed by the Project Board at their meeting on 27 July 2010.

A DNRC at Headley Court was rejected by the Judgement Panel as:

- the site is too small and restricted to allow the Defence core and, particularly, the National element to be developed to their full potential as all neighbouring land is in greenbelt and used for agriculture, thereby making expansion beyond existing site boundaries highly problematic;
- a large scale redevelopment of Headley Court would have to be carefully phased over three to four years which would add considerably to the costs of a DNRC and could disrupt the operation Headley Court to some degree; and
- a Surrey location, is not strategically well placed (nor easily accessible), for visiting families – given that the armed forces recruit country-wide, with a significant proportion having to travel from Scotland, Wales and the North of England.

4 Phase 2 – Development of test site design

4.1 Overview

The Project Board formally approved the launch of Phase 2 on 4 June 2010, which comprised:

- selection of the test site (Section 3);
- completion of the Project and Design Brief;
- preparation of the test site design; and
- establishment of capital and operating costs (Section 6).

This section describes the completion of the Project and Design Brief and the development of the test site design.

Workstreams							
Phase 2 June 2010 to February 2011		Project and Design Brief	Development of test site design	Betterment	Capital and operating costs	Governance arrangements	Feasibility study report

4.2 The Project and Design Brief

The Project and Design Brief provides the design information for the Defence core of a DNRC, it describes:

- the activities within the Defence core of a DNRC;
- the spatial requirements; and
- specific design requirements in relation to:
 - security
 - flexibility and technology insertion
 - sustainability; and
 - information technology.

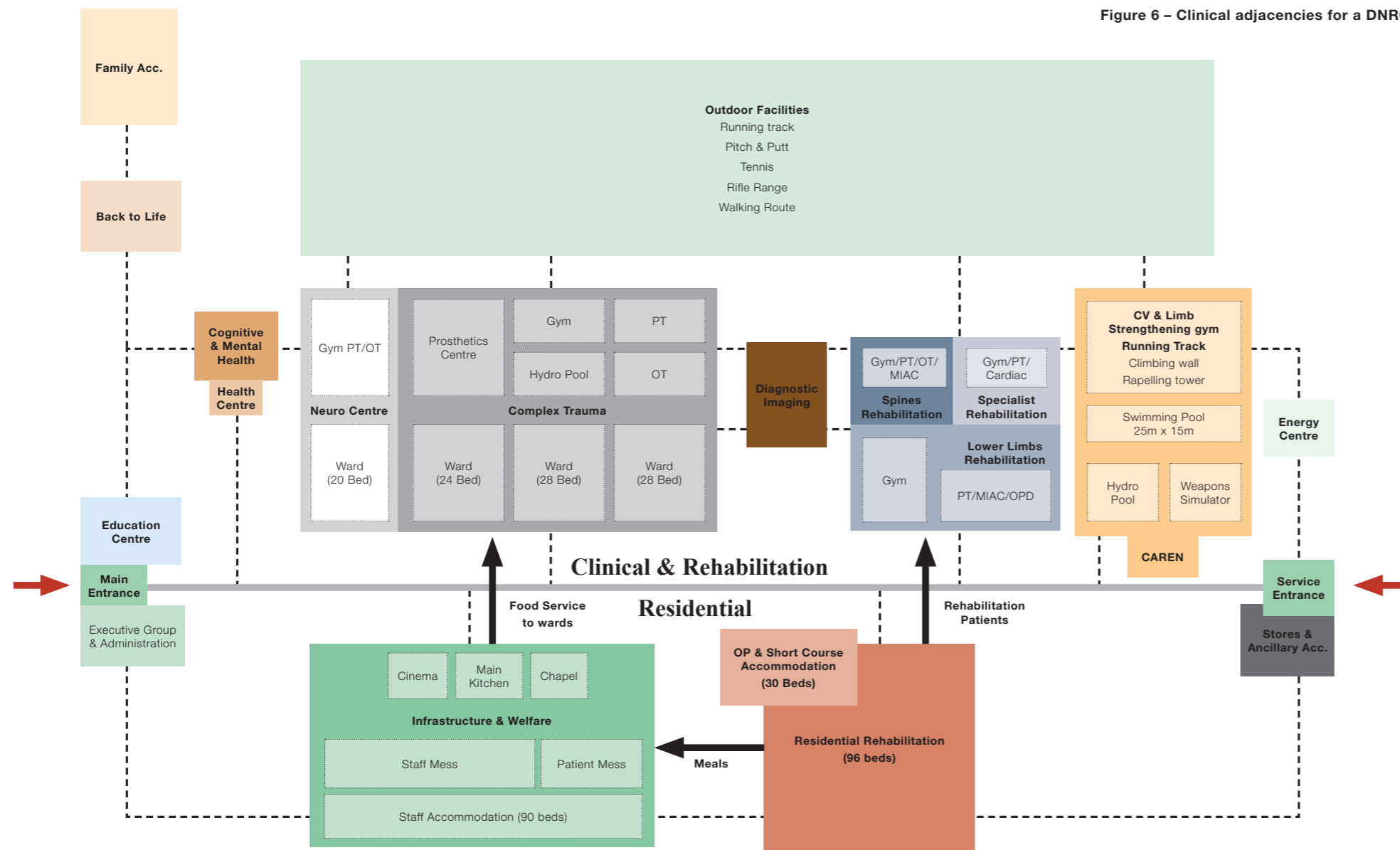
Work on the brief commenced in early March 2010, with the preparation of the clinical requirements (see Section 3) and was completed at the end of August 2010.

The Project and Design Brief is included in Volume 4.

4.2.1 Completion of the clinical requirements of a DNRC

The work in Phase 1B defined the majority of the clinical requirements for a DNRC. The outstanding items were resolved in Phase 2 through a series of meetings in June and July with the Surgeon General, the Commander, Joint Medical Command, and staff at Headley Court. The clinical requirements were confirmed by the Project Board at their meeting on 27 July 2010. Figure 6 below illustrates the agreed clinical adjacencies for a DNRC.

Figure 6 – Clinical adjacencies for a DNRC



4.2.2 Meetings with clinical staff at Headley Court

In August and September 2010 a half day meeting and two full day meetings were held at Headley Court to inform the development of the test design. At the first meeting on 31 August clinical adjacencies, and block plans were presented showing departmental relationships on the test site. Discussions with Headley Court staff confirmed that the clinical adjacencies shown in the design brief had been successfully interpreted and the design presented was a workable solution.

The subsequent two meetings on 30 September and 1 October considered the layouts of individual specialist departments, in particular clinical/functional connectivity, room relationships, opportunities for operational efficiencies and access to other departments. A number of issues of detail arose from these meetings, which the design team agreed to discuss with the Surgeon General and if appropriate amend the design during subsequent phases.

All three meetings were essential to develop a greater understanding of clinical requirements which can only be achieved through detailed discussions with the operational staff providing the service.

4.2.3 Meetings to develop the staff and patient hub, and main kitchen complex

As the clinical requirements were developed it became apparent that some of the assumptions around staff facilities needed further development. The Surgeon General's staff and the staff at Headley Court were very keen for staff and patients to have separate eating and recreational facilities. It was considered that the JSP 315¹³ guidance used to develop the brief was not appropriate for a DNRC, and that the more modern approach used at Tidworth Garrison would be a sensible basis on which to proceed. At the same time however, it was recognised that some of the pre-World War 2 mess designs were worthy of study, with features that could usefully be included in a DNRC solution.

A visit was made on 20 August to Tidworth Garrison and Army Air Corps Centre, Middle Wallop to compare the traditional approach with the more modern. The team was able to view and assess a variety of different dining and messing arrangements for officers, SNCOs and junior ranks and also developed a practical understanding of the different types of living and sleeping quarters in use.

A further visit was made to RAF Northolt on 17 September to view a modern mess facility opened in May 2009.

Following the visits and subsequent meetings with the Surgeon General's staff and the Project Director, the project team developed an innovative solution which provided a central kitchen, and separated staff and patients. For patients, the sharing of messing facilities by officers and Senior Non-Commissioned Officers (SNCOs) was considered appropriate at a DNRC, but junior ranks should retain their independence with their own hub. For staff, the officers, SNCOs and junior ranks each have their own dining/messing areas and separate living/sleeping quarters designed according to JSP entitlements. The result, reached through extensive research and consultation is an innovative and yet efficient solution to combining all the necessary uses within a single complex.



13 JSP 315 Services Accommodation Code sets out the official standards for MoD buildings, accommodation, offices and physical training grounds.

4.3 The test site design

To enable the relative benefits and costs of a DNRC to be evaluated against what is currently provided at Headley Court, and what could be provided in the foreseeable future, a real design for a DNRC on a real site was required. Whilst a case could be made on the basis of desktop analysis, the Project Board considered that the cost of selecting a test site and developing a real design was justified.

The test design ensured that the concepts and clinical adjacencies embodied in the Project and Design Brief could be realised in practice and that the Feasibility Study provided the confidence that the:

- betterment and increased efficiencies that a DNRC could provide had been fully quantified;
- concepts underpinning a DNRC had been developed, tested and had the support of rehabilitation practitioners; and
- likely costs of a DNRC were robust.

The description of the site selection process is included in 3.4 above. This section considers the design of a DNRC.

The development of the design for the test site took place over a four month period commencing in June 2010 and provided a level of detail equivalent to Work Stages B/C of the Royal Institute of British Architects (RIBA) Outline Plan of Work 2007¹⁴. A concept design was prepared which included outline proposals for structural and building services systems this allowed the preparation of outline specifications and a preliminary cost plan.

The early design studies concentrated on similar, campus plan type solutions that could be applied to each of the three test sites – site 1 (East and West), site 2 (East and West) and site 3 (Headley Court). The design was then refined and made site specific, once the final test site was selected on 21 July.

The design development was monitored through formal study team meetings, chaired and minuted by Arup, followed by less formal design team meetings, which took place every two weeks. These were supported by ad-hoc meetings between design team members as and when required.

Architectural, masterplanning and landscape drawings are included in Volume 2 – Design Drawings.

4.3.1 Architecture and masterplanning

A DNRC must be a place that supports healing in its widest sense, and architecture, design and setting will play a major part in the healing process and in helping people to adjust to their new circumstances.

The test site is on an existing country estate in a rural setting and the architectural design aspires to maximize the visual and therapeutic potential of:

- the natural landscape and distant views;
- trees and vegetation;
- natural light and ventilation;
- water and sound; and
- different spatial experiences, internally and externally.

14 The RIBA Outline Plan of Work organises the process of managing, and designing building contracts into a number of key Work Stages from A – Preparation, through to L – Post Practical Completion. Further detail can be found at <http://www.architecture.com/TheRIBA/AboutUs/Ourstructure/RIBAProfessionalServices/Departments/Practice/PracticeDepartment.aspx>

Architectural approach

Anecdotal evidence over the years has always favoured traditional architecture as more conducive to physical and mental rehabilitation. It creates the right kind of atmosphere and an environment more attuned to the human senses, and one that helps the recuperation of injured personnel.

The study team has therefore utilised this traditional approach to create a scheme that develops just that. It harmonises with its location in terms of the topography and builds upon both the architectural qualities of the locality and the natural qualities of the test site landscape. The vocabulary used reflects the local building tradition, particularly in the use of local materials.

The team is also aware that a DNRC will be an institution of national importance and one that belongs to a tradition of buildings which serve and honour the contribution of the military, such as the Royal Hospital at Chelsea and the Royal Naval Hospital at Greenwich. To be worthy of this mantle the architecture of a DNRC has to be distinguished and stand apart from the ordinary and possess a timeless quality which reflects the very best traditions of British design and construction and thus demonstrate respect and lasting support for armed forces of this country.

The materials and construction methods proposed are, in accordance with the overall architectural approach, timeless and traditional in nature, durable and of high quality. They have been chosen because they demand little maintenance whilst ageing elegantly. They will combine with facilities and amenities designed to the latest healthcare standards to create a fitting and dignified environment for the rehabilitation of injured Service men and women. Within this context, the latest contemporary technology and techniques are incorporated into the construction such as CAREN and the most current diagnostic imaging technology.





With the latest advances in the practice of physical and mental rehabilitation at the heart of a DNRC, it is important to remember that as with many medical disciplines, the science of rehabilitation is likely to develop considerably in future decades, both clinically and in the use of technology. The design is also conceived not only to accommodate the current technology but to enable the incorporation of future technology, where required, with minimal disruption and cost and without prejudice to the character and atmosphere of the buildings and the place. In a similar vein, specific areas have been designated as expansion zones to accommodate a possible future expansion of capacity with minimal disruption to service.

The masterplan

At a masterplanning level, the proposal encompasses the notion that architecture is a public art where each and every building facade forms the character and shape of the public realm - the external streets between buildings, the courts and the green squares which are the spaces that everyone experiences. As such the design uses a language of forms, spaces and elements which draw on our collective cultural experience - the inherited architectural symbolism that we all understand and which allows us to recognise different buildings and orientate ourselves around our communities, towns and cities.

In terms of the experience of staff, users and visitors, the objective of the design for a DNRC is to create a calm, therapeutic environment, medical in nature only where it is absolutely required, within which Service men and women can convalesce and recover from the physical and mental injuries they have sustained. The design will also provide a set of attractive and effective environments that support staff in their vocational and professional goals.

The different departments, each having their own architectural identity, are laid out in a “campus” arrangement across the often varied topography of the test site. The masterplan is set within a wider landscape design, which is described below. Between the buildings is a series of linked quadrangles, gardens and green squares combining smaller, private outdoor spaces with long distance views of the estate and countryside beyond. The buildings are kept at two or three storeys in height to relate to the existing buildings on the test site and to their rural location.

This “campus” approach enables a DNRC to have inherent legibility so that users and staff can easily find their way around. It also allows each department or discipline that makes up a DNRC to have distinctive and identifiable buildings with their own address whilst still being organised within a coherent architectural whole.

The layout of the buildings maximizes efficiency through optimal clinical adjacencies, reducing the time patients spend moving between wards, residential accommodation and their places of treatment – recognizing that a key issue at Headley Court is the unproductive time spent moving around the site. The principle of keeping travel distances to the minimum has been applied equally to the internal planning of the various departments, and efficient ‘flows’ have been achieved in relation to services, site vehicles, waste, supplies etc.

The design also uses the site and its characteristics to provide therapeutic external spaces, recognizing that an essential part of rehabilitation is experiencing and learning how to cope with everyday obstacles such as kerbs, ramps, steps, slopes and different types of surfaces such as tarmac, cobbles and gravel.



Test site design

Landscape

The landscape setting is a vitally important part of any healthcare project. Anecdotal evidence and research over the years has demonstrated that an attractive outdoor environment providing contact with nature can have a positive effect on recovery times and the well being of patients. A sensitively designed landscape can also have a beneficial effect on staff and visitors. The design of the external environment reflects this philosophy by providing a setting that is not only attractive and high quality, but also safe, stress free and therapeutic, based on the concept of a 'healing landscape.'

The hospital cloister garden is a centuries old landscape form, which allows people with illnesses or physical and mental impairments to experience the restorative properties of nature. The exemplar design provides the patients with a sense of control over their environments, places to interact with their friends and family for social support and the positive distraction of stress-reducing contact with nature, fauna, flora and wildlife. Patients have differing therapeutic needs and the outdoor environment can help to provide both active and passive forms of therapy and enjoyment that cater for a range of disabilities. This can be as simple as providing a view from the inside as a form of contact with the wider outdoors, to physical activities for rehabilitation. The landscape caters for this by providing an overall setting which can be used as physical therapy and also as a safe and tranquil environment where users of the facilities can sit and enjoy peaceful moments inside or out.

As with the buildings, the landscape has been designed in a traditional manner with long term maintenance and management in mind. Whilst there are areas of high maintenance, these have been restricted to areas of intensive use close to buildings where the gardens can be appreciated by many. Shrub beds are kept to a minimum with tree planting, lawns with hedges. Low maintenance parkland and woodland cover a greater area of the site. Once established the trees will require minimal maintenance. A grass mowing regime of a variety of heights will encourage wild flowers and wildlife, with closer mown grass adjacent to paths and building to give a neat and tidy appearance.



Access and circulation

Vehicles can access the estate from two entrances; the main entrance for all staff and visitors and the secondary entrance for deliveries and emergencies. On each route there is a gatehouse with the principal gatehouse at the main entrance.

From these roads the main DNRC area can be accessed for deliveries, refuse collection and car parking via a route to the north of the buildings. Most of the site will remain vehicle free with the exception of fire/emergency access and small, electric delivery vehicles. Visitors and staff cars will enter the site from the main entrance.

Car parking is distributed around the site to provide good access, with parking at the main entrance, the existing building and around the new development. There are 450 car parking spaces of which 150 are accessible bays for those with reduced mobility; these are evenly distributed around the development and located close to the buildings to allow easy access.

Staff and visitor parking has been located a set distance from the buildings to achieve the required security standard. Footpaths connect the car parks to the main pedestrian routes.

Pedestrians access the site from the main entrance. The footpath passes the gatehouse and follows the road into the site. The route divides with access to the house and access to the new development via the footpath through the walled garden.

A pedestrian friendly approach has been adopted in the design of the masterplan with all the buildings interconnected with footpaths and pedestrian priority routes, delineated by changes in paving materials. The principal routes are covered to give protection during inclement weather. Steps and ramps to building entrances are DDA compliant.

4.3.2 Engineering strategy

An engineering strategy was developed alongside the architectural and landscape, this consisted of high level appraisal the following issues:

- Utilities
- Highways and transport
- Geo-environmental
- Surface water drainage
- Building services distribution
- Building structures
- Waste management

Utilities

A desktop search was undertaken to determine the presence, or otherwise, of mains supplies for gas, electricity, water, telecoms, and drainage. This revealed:

- **Gas** – there is no mains gas supply within the immediate vicinity but there are medium pressure mains nearby in local villages; consequently gas is considered to be a viable energy source.
- **Electricity** – overhead high voltage (HV) electricity cables cross the test site, these will need to be diverted to enable development of the site. The capacity of HV supply may not be adequate and a new HV supply from the main highway may be required.
- **Water** – an eight inch diameter water main crosses the site. The capacity of the main needs to be reviewed with the utility provider to determine if it is adequate, the practical limits of on-site storage will then be balanced with the possibility of reinforcing the supply.
- **Telecoms** – British Telecom cables cross the test site and it is understood that Business Broadband is also available in local areas.
- **Foul drainage** – the test site does not have a connection to mains drainage, but mains drainage is available in nearby villages and a sewage treatment works is located within 4.5km of the site. Two options were considered – treatment on site, or pumping to the sewer in the main road.

Highways

It is envisaged that traffic flows for the proposed development will be relatively modest and consequently a DNRC will have a minor impact on the existing highway.

Geo-environmental

There are no sites of special scientific interest (SSSIs), nature reserves or other protected areas within 1km of the test site.

A desk study was undertaken of existing information to identify probable ground conditions. The majority of the soils and rocks anticipated to be under the site should be relatively easy to excavate. It is anticipated that shallow conventional spread foundations will be feasible for the majority of the buildings.

A full site study and ground investigation will be required early in the next phase.

Surface water drainage

Where possible, run-off will be attenuated at source, with some storage provided beneath hard surfaced external areas. A piped drainage network will carry surface water to the edge of the test site, where it will be collected by a series of swales¹⁵ (and possibly ponds) that provide further attenuation and infiltration. The swales will then convey the surface water to an existing watercourse to the south of the test site.

Building services

The proposed services distribution strategy allows for power cabling, heating, hot and cold water and gas pipework to emanate from a centralised energy centre.

The energy centre would contain most of the major mechanical and electrical plant items, including heating and hot water generation plant, HV and LV switchgear, diesel generators, and domestic water storage.

From the energy centre, the buried cables and pipework would be routed around the site, connecting to each building as required via a sub-distribution plantroom located within each of the buildings served. The HV would be distributed as a ring main around the site – this will give resilience should any individual part of the ring fail, as power will continue to be supplied to other buildings connected to the rest of the unaffected ring.

Where mechanical ventilation is required, this will be provided local to the building served and typically located at roof level. The supply and extract air will be conveyed through the building via a ductwork system.

Building structures

All of the proposed buildings are low-rise, no more than three storeys high. Spread footings are considered feasible and a mixture of ground bearing and suspended ground floor slabs are likely to be required given the anticipated ground conditions at the test site. However, this will need to be confirmed during the next design stage following a full site investigation. Reinforced concrete retaining walls will be required to accommodate changes in external levels in some of the buildings.

Waste management

A high-level waste volume forecast was done, based on the schedule of accommodation. This indicated that a DNRC will produce a total of almost 1,300 tonnes of waste per annum. The study recommended that waste minimisation and re-use should be promoted on site. The waste strategy is based on the segregation of wastes at source.

Further detail of the engineering studies is provided in Appendix G.

4.3.3 Security

A desk top analysis of security requirements for a DNRC was undertaken by Arup Security. All the main security issues were assessed and appropriate allowance made cost plan.

Sustainable design

The Project and Design Brief has an aspiration for an exemplar sustainable design which requires that a DNRC, achieve an 'Excellent' standard when assessed by both BREEAM¹⁶ and DREAM¹⁷ environmental assessment methods.

BREEAM is the commonly used assessment method in the UK and is required by many local authorities as a planning requirement. It can be used to assess any type of building, although some building types, such as offices and healthcare facilities have particular schemes. The clinical buildings on the site all fall under the scope of the BREEAM Healthcare scheme.

A BREEAM assessment takes place over two stages, design and post construction. Each credit is assessed at the design stage and an interim score and rating is recorded. At the end of the construction process, the project is assessed against the same credits and criteria to ensure that the building has been constructed as designed. Evidence such as purchase orders, manufacturer's information and calculations using 'as-built' information is assessed. This is confirmed by the assessor's site visit. The final score, rating and certificate can then be awarded.

A number of aspects have minimum standards which have to be met to achieve an 'Excellent' rating.

The MoD's sustainable procurement strategy requires that a DREAM 'Excellent' rating is achieved on all new build and refurbishment projects.

¹⁵ Swales are vegetated surface features that drain water evenly off impermeable areas.

DREAM assesses four building types:

- hangers and workshops;
- commercial space, including office and conference facilities;
- kitchens and dining facilities, including messes; and
- living accommodation.

The assessment comprises of a number of questions to determine the level which can be achieved (Good, Very Good, or Excellent)

Score summary – clinical buildings (BREEAM Healthcare)

The predicted scores and ratings for the BREEAM assessment are:

- worst case – 68.73% giving a ‘Very Good’ rating; and
- best case – 77.57% giving an ‘Excellent’ rating.

Further details of the DREAM and BREEAM assessments are contained in Appendix H.

Score summary – defence building (DREAM)

At ‘Survey stage’ all the Defence building types were assessed and given a rating of ‘Excellent’. The assessment at ‘Design stage’ gave all building types except one an excellent rating; the exception being the refurbishment element of the project associated with the re-use of an existing stately home.

4.3.4 Construction Design and Management (CDM)

The design team has confirmed that the client is aware of his duties under the Construction (Design and Management) Regulations 2007 and that the architect is adopting the role of lead designer.

The CDM coordinator has outlined the design management process and issued by request, a suggested format for the design hazard register, which has been adopted by the design team. The register has been provisionally populated with both design and construction hazards, identified as RIBA stage C level input. However the results of the mitigation process, and consequently the residual risks, have not yet been recorded on the register.

The design risk register is included in Appendix K.

5 Betterment

5.1 Background

The Ministerial statement in June 2009 was clear that the MoD “.....would only envisage leaving Headley Court if there were an assured level of future care that surpassed even that which is offered by DMRC’s current and planned capabilities.” Therefore from the outset of the Project Board was clear that a DNRC had to provide substantial betterment.

5.2 Potential for betterment

To understand the potential for betterment opinion was canvassed from a wide range of experts and interested parties including leading clinical and academic rehabilitation specialists see Appendix A. Meetings were also held with clinicians and staff at Headley Court to understand the clinical requirements (see Section 3).

Through these interviews those parts of the current service at Headley Court that work well, those parts which work not so well, and areas where betterment could be reasonably expected were identified. A number of challenges which need to be addressed to develop a 21st Century rehabilitation service were subsequently formulated; these are:

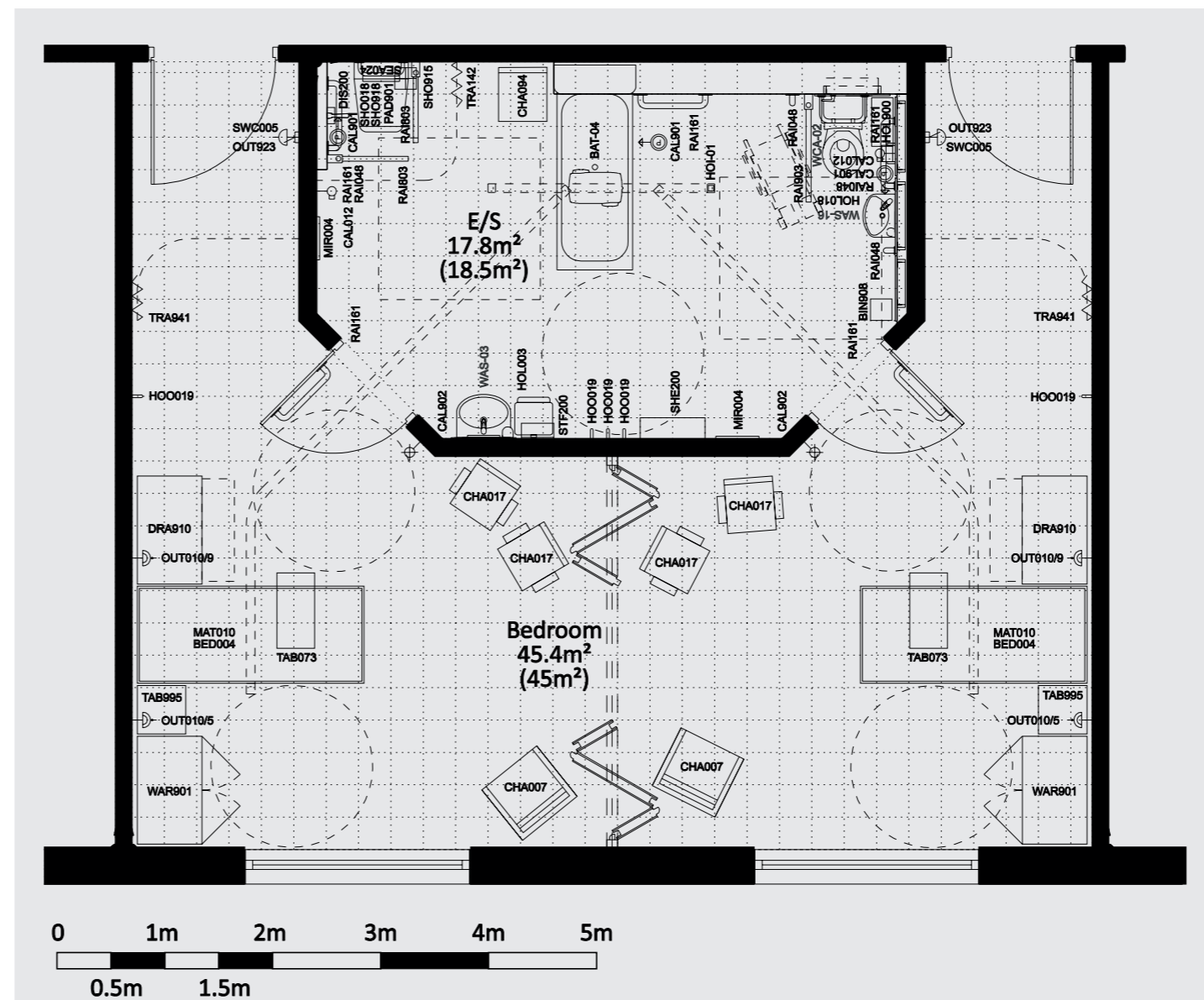
- providing a **world leading service (quality)**, so that the armed forces know that the Nation will care for the injured in the best possible manner;
- services located so they provide ease of **access** for injured Service personnel, their families and for clinical and other health professionals;
- providing adequate **capacity**;
- providing services which are **affordable and efficient**;
- maintaining the **reputation** of Defence rehabilitation; and
- using Defence rehabilitation as an example, **to stimulate the rehabilitation of the disabled and those unable to work**; providing a clear example of what Defence can do for the Nation.

5.3 Betterment provided by a DNRC

The major areas of betterment that a DNRC is expected to provide are:

- additional capabilities and capacity with the potential to improve outcomes and treat more people;
- flexible accommodation that will allow future expansion and technology insertion;
- systems redesign to enhance clinical facilities and patient flows, leading to improved quality, efficiency and timeliness of care for patients;
- modern design standards to improve patient safety;
- provision of access for all users – in particular wheelchair users and ambulant amputees;
- a tranquil and extensive parkland setting with therapeutic landscaping; and
- purpose designed parking arrangements with a greater than usual proportion of accessible spaces – and close to the buildings they serve;

Table 3 opposite, provides more detail how betterment will manifest itself in a DNRC.



Proposed ward bedroom

Challenge	Function	Betterment
Quality	Rehabilitation Centres (lower limbs, spines, specialist)	- Improved privacy as a result of increased space in physiotherapy. - Gyms provided with dedicated external exercise space.
	Complex trauma	- Modern prosthetic centre, designed to accommodate current activity levels, providing adequate space for the measurement, assembly and fitting of prostheses and for confidential consultant/patient discussions. - Provision of some single room accommodation. - Improved space standards providing greater privacy in treatment areas. - The neurological function is given a distinct presence in the rehabilitation process. - Gyms provided with dedicated external exercise space.
	Neurological rehabilitation	- The neurological function is given a distinct presence in the rehabilitation process. - A single facility drawing together assessment, treatment and occupational support. - Provision of some single room accommodation.
	Cognitive and mental health	- Better proximity to neurological rehabilitation. - Integrated into the facility rather than separate as at HC
	Hydrotherapy pools, CAREN, indoor running track, climbing wall etc.	- New facilities not available at HC. - Opportunity to develop new rehabilitation strategies, and research their effectiveness, through the use of a Computer Assisted Rehabilitation Environment (CAREN). - Running track with overhead harness allowing patients greater independence and independent grading.
	Back to life accommodation	- Provision of a range of specially designed adaptable houses, flats and bedsits to allow patients to be monitored while adapting to independent living.
	Infrastructure and welfare	- Innovative hub facilities for staff and patient mess accommodation.

Challenge	Function	Betterment
Accessibility	Rehabilitation Centres (lower limbs, spines, specialist)	- Strategically central location.
	Outpatient and short course accommodation	
	Neurological rehabilitation	
	Complex trauma	- Strategically central location, and close to RCDM.
	Education centre	- Location that will allow close links with Midlands universities such as the National Institute for Health Research (NIHR) and the Centre for Surgical Rehabilitation and Microbiology at the new Queen Elizabeth Hospital in Birmingham.
	Hostel accommodation for families	- Strategically central location making visiting by families from across the UK easier.
Capacity	Diagnostic imaging	- Potential to improve outcomes and treat more people by providing an increased range of procedures, such as fluoroscopy, MRI and the measurement of bone density.
	Rehabilitation Centres (lower limbs, spines, specialist)	- Additional capabilities such as specialist cardiac rehabilitation. - Dedicated gyms for each specialization.
	Outpatient and short course accommodation	- Greater capacity and improved facilities for the Multi-disciplinary Injury Assessment Clinics (MIAC) with access to a greater range of diagnostic facilities. - Ability to develop specialist outpatient clinics enabling a multi disciplinary team approach to the management and treatment of complex injuries.
	Complex trauma	- Modern prosthetic centre, designed to accommodate current activity levels, providing adequate space for the measurement, assembly and fitting of prostheses and for confidential consultant/patient discussions.
	Hydrotherapy pools, CAREN, indoor running track, climbing wall etc.	- New facilities not available at HC. - Additional hydrotherapy pool providing increased capacity.
	Education centre	- Adequate space for professional training and development. - Facilities to allow staff to undertake appropriate research. - Space allowed for specialist training of clinicians and other health professionals.

Table 3 – Betterment at a DNRC

Challenge	Function	Betterment
Affordability and efficiency	Rehabilitation Centres (lower limbs, spines, specialist)	- Flexible bedroom accommodation that can be used as residential when complex trauma demand is low. - Improved clinical adjacencies.
	Residential accommodation (rehabilitation)	- Improved proximity to rehabilitation facilities.
	Outpatient and short course accommodation	- Improved proximity to diagnostic facilities.
	Complex trauma	- Improved clinical adjacencies with imaging and prosthetics.
	Neurological rehabilitation	- A single facility drawing together assessment, treatment and occupational support.
	Cognitive and mental health	- Better proximity to neurological rehabilitation (integrated into the facility rather than separate as at HC).
	Infrastructure and welfare	- Innovative hub facilities for staff and patient mess accommodation.
	Circulation, plant, main entrance etc.	- Greater efficiency in moving around the site. - More efficient site logistics for receipt and distribution.
Reputation	Rehabilitation Centres (lower limbs, spines, specialist)	- Modern design standards to improve patient safety and to meet current and projected standards for the control of infection.
	Outpatient and short course accommodation	
	Neurological rehabilitation	
	Complex trauma	- Dedicated CT hydrotherapy pool which addresses control of infection concerns. - Modern design standards to improve patient safety.
	Back to life accommodation	- Provision of a range of specially designed adaptable houses, flats and bedsits to allow patients to be monitored while adapting to independent living.

Challenge	Function	Betterment
The 'N'		- Site large enough to allow development of the 'N' over time with real potential for cross-fertilization between the 'N' and the 'D'. - Facilities allowing a DNRC to become the national focus for research for military and civilian rehabilitation (attracting the associated funding). - The research potential offered by a significant cohort of seriously disabled Service people whose treatment and interventions can be monitored over long periods, thereby providing a basis for understanding outcomes and allowing a DNRC to become the national focus for Defence and civilian R&D. - Potential for co-location of non-military facilities, not least by the NHS and private healthcare providers, but from which the 'D' element could derive benefit – and vice versa. - Potential for the NHS to commission services at a DNRC when levels of Defence demand permits. - Potential for 'train the trainer' schemes in relation to those Commonwealth countries which have large numbers of victims of recent conflicts (notably mine injuries) to benefit from a DNRC when levels of Defence demand permits. - Potential to provoke 'take-off' in some areas of disabled sport.

Table 3 – Betterment at a DNRC

5.4 Betterment – Back to Life and beyond

Severely injured patients at a DNRC will have access to range of specially designed adaptable houses, flats and bedsits to allow them to be monitored while adapting to independent living either alone or with their immediate family.

A DNRC will mesh readily with the developing work on a Defence Recovery capability, which will create with the capacity to deal with about 1,500 Service people a year, of whom 500 will have been wounded. This will allow more effective active vocational rehabilitation, thereby addressing concerns expressed by many people during the initial consultation.

5.5 Efficiency study

From the outset the Project Board was very keen that a DNRC provide real efficiency savings and that the project team familiarise themselves with the latest 'Lean' methodology¹⁸ being adopted in the NHS.

It was apparent from the initial visits that Headley Court has now reached the limits of its development in terms of delivering the most appropriate clinically efficient environment. Patients have to travel excessive distances between exercise rehabilitation sessions in the gymnasium, physiotherapy and occupational therapy areas, the buildings have insufficient space for patient consultation, treatment and storage. All of which contribute to efficient operations.

To demonstrate that a DNRC has the potential to improve efficiency, a study was undertaken looking at travelling time for both patients and staff, compared to the same journeys at Headley Court. Average journey times for patients currently receiving complex trauma, musculo-skeletal and neurological rehabilitation at Headley Court were analysed, the different levels of mobility of patients studied are listed below:

- complex trauma rehabilitation patient using an electric wheelchair;
- complex trauma rehabilitation patient with unilateral below knee amputation;
- able bodied complex trauma rehabilitation patient with a unilateral lower limb injury;
- complex trauma rehabilitation patient who uses a manual wheelchair
- complex trauma rehabilitation patient with bilateral amputation above the knees using C-legs;
- complex trauma rehabilitation patient with bilateral amputation above the knee using 'stubbies';
- musculo-skeletal rehabilitation patient from the early lower limbs group;
- musculo-skeletal rehabilitation patient from the early spines group; and
- neurological rehabilitation patient.

On the advice of the medical staff at Headley Court it was decided that the variation in mobility in the patients in Specialist Musculo-skeletal Rehabilitation Group is so great that it is not possible to accurately represent an average patient speed and the group was excluded from the study.

18 Lean methodology is based on the notion of continuous improvement, and focuses on the removal of waste and unnecessary activity from a system.

5.5.1 Methodology

The average patient travelling time was calculated for each patient group, based on anonymized patient timetables, the distances between areas at Headley Court and the speed of each patient group recorded when travel distances exceeded 20m.

For each of the nine categories of patients the total amount of travel time throughout the day was calculated and the amount of direct rehabilitation time that was lost e.g. where a patient had to travel between two rehabilitation sessions. The same travel times were then calculated based on the test site design and the results compared.

The study demonstrated that for the patient groups studied an additional 5% to 30% of rehabilitation time could be provided through the more efficient design of a DNRC, these savings are illustrated in figures 7, 8, 9 and 10 opposite.

Drawings showing the typical journey details for the test design are included in Volume 3.

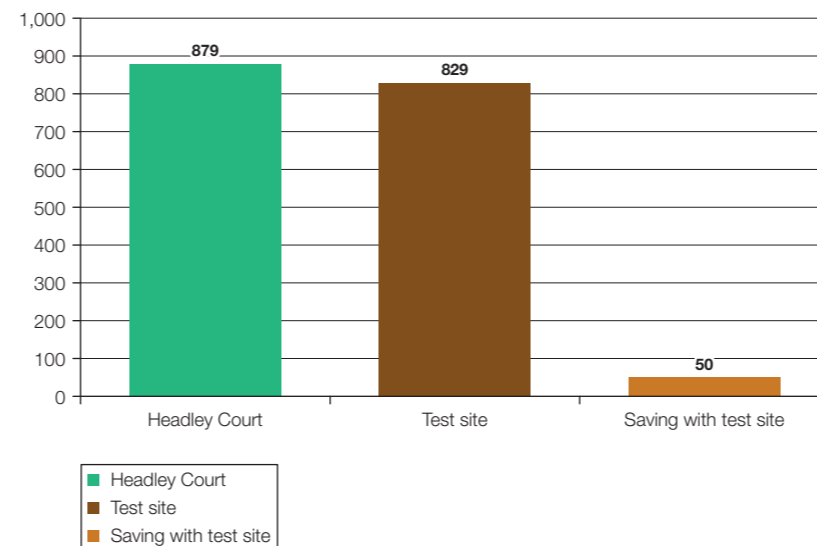


Figure 7 – Complex trauma - total travel distance (metres)

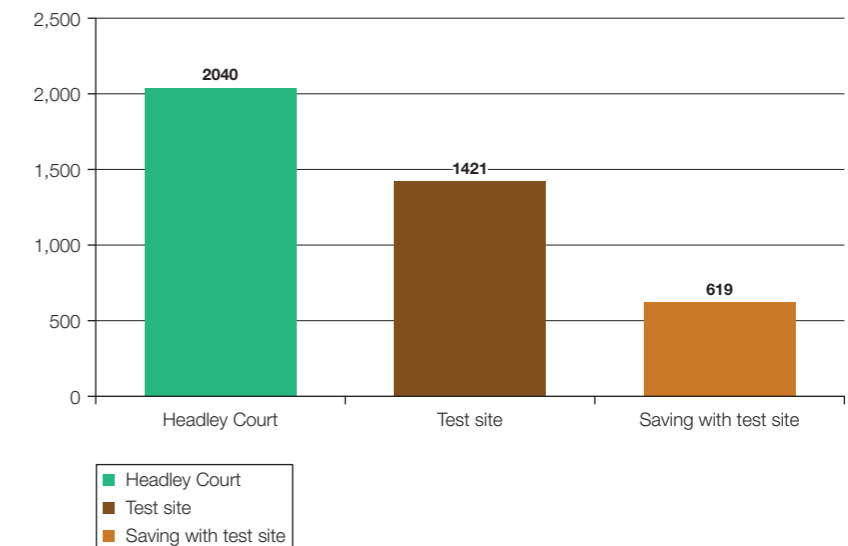


Figure 8 – Early lower limbs - total travel distance (metres)

5.6 Lean thinking

One of the leading exponents of Lean Methodology in the NHS is the Royal Bolton Hospital NHS Foundation Trust. Over the last four years they have developed the Bolton Improving Care System (BICS). Air Vice-Marshal Paul Evans – Commander, JMC, John Ashcroft and Jonathan Ainley visited Bolton during October to study BICS in more detail and understand how it could be applied in subsequent phases to improve the efficiency of Defence rehabilitation.

The visit demonstrated that many management processes in the NHS could be improved by adopting a Lean methodology and the team visiting Bolton thought that a similar approach could deliver significant benefits in Defence rehabilitation. It was agreed that this should be considered in more detail if the project receives approval to proceed.

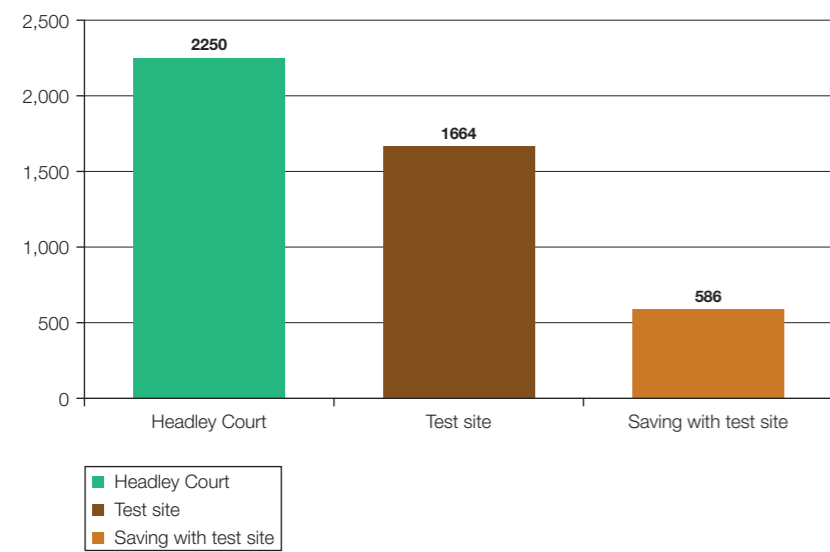


Figure 9 – Early spines - total travel distance (metres)

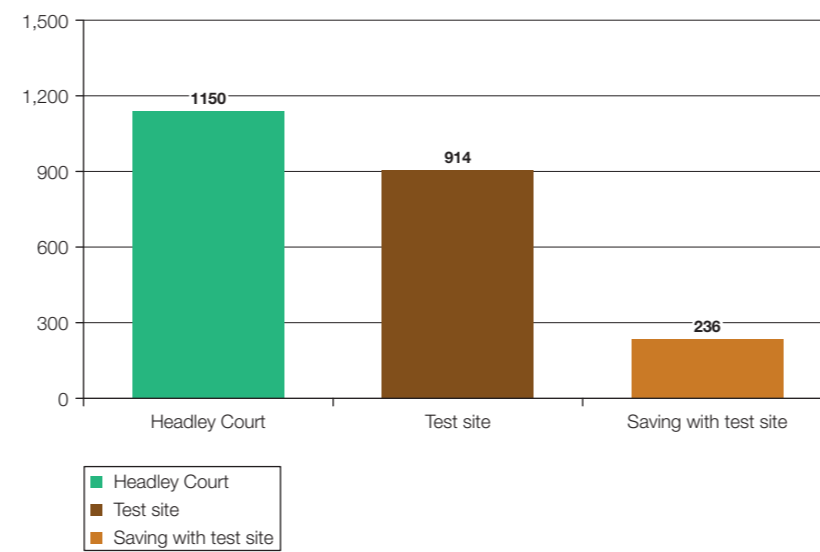


Figure 10 – Neurological rehabilitation - total travel distance (meters)

6 Phase 2 – Capital and operating costs

6.1 Financial parameters

It is expected that the capital costs of a DNRC (acquiring a site and constructing the MoD facility) will be raised through fundraising with major donors funding the majority of these costs. The MoD will be responsible for the operating costs relating to the military establishment that will be the core of a DNRC. The MoD requires a DNRC to cost no more in operating cost terms than the current arrangements at Headley Court.

Throughout the study regular meetings took place with the Surgeon General's finance team and the MoD's Director of Finance to discuss a wide range of financial issues including current and future costs, financial and commercial risk and potential governance arrangement. The expected lease arrangements were also discussed and have been developed to protect a DNRC's interests at the same time as developing a sensible and acceptable proposition for the MoD (see Section 8).

6.2 Basis of capital costs

6.2.1 Works cost

Rates and prices within the indicative cost plans are based on:

- historic cost data;
- information from the Building Cost Information Service (BCIS) and the Department of Health's (DoH) health premises cost guides; and
- cost data received from specialists for external envelope materials (stonework, copper and slate roofing, and timber and aluminium windows), security features, the running track and outdoor pitches, firing range, and obstacle course and trim trail.

Basic elemental costs plans have been prepared based on the above using basic building quantities derived from site plans, departmental layout plans, and typical elevations and sections. Where possible the individual elemental quantities have been calculated for each of the buildings. However, due to the level of information available, certain elements are based on an overall rate per m², in particular the fixtures and fittings and the mechanical and electrical engineering installations.

External works and abnormal cost are based on a combination of quantified areas and lump sum allowances. The works costs include for data cabling and wireways but exclude all computer hardware and software costs. The refurbished accommodation is not fully detailed and allowances have been made for upgrading the external building fabric.

The scheme cost plan includes for the full security measures, to which the MoD is expected to make a contribution of approximately £2m.

A 5% allowance has been included for the normal works cost contingency to be carried through to the tender stage and 2.5% for the small sundry items not yet allowed for in the cost plan, due the limited level of detail available at this stage.

The works cost total on the Cost Summary is at Q4 2010 price levels reflecting the date for completion of the Feasibility Study. An inflation allowance is made for a midpoint for construction in Q1 2016, which assumes the following timetable:

- Appoint consultant team	2011
- Initial design	2011 – 2012
- Planning consent	2013
- Detail design and procurement (construction)	2013 - 2014
- Construction	2014 – 2017
- Opening and full occupation	2017

6.2.2 Fees and charges

Fees and charges are based on an allowance of 16% of the works cost. This percentage reflects the wide variety of specialist consultants particularly in relation to specialized equipment, planning consultations, transport and environmental aspects of the scheme. This figure reflects the need for specialist consultants to advise the client, but excludes fees associated with land purchase.

6.2.3 Non-works costs

The non-works costs include an allowance of £10m for potential Section 106/278 agreements associated with the development. Until detail planning consultations are undertaken these cost cannot be defined but are based on experience of other projects of similar size and complexity. There are no allowances for future statutory and local authority charges, decanting costs, temporary accommodation, or land purchase.

6.2.4 Equipment costs

Costs are included for basic furniture and equipment only e.g. beds, tables, chairs, cabinets and the like. These are calculated on a rate per m² and are based on information from DoH guidance. All major diagnostic and IT equipment is excluded.

6.2.5 Planning contingency

A high level risk analysis has been undertaken but a full design and construction risk assessment has yet to be carried out. A planning contingency of 10% has therefore been included which is typical for this type of scheme at this stage of planning. A costed risk analysis, involving the client and design team representatives, needs to be undertaken early in any next phase to verify this allowance.

6.2.6 Optimism bias

Optimism Bias is used on Government projects and describes systematic tendency for project appraisers to be overly optimistic about project costs, duration and benefits. HM Treasury guidance recommends that project appraisers should make explicit adjustments to the estimates of project costs, benefits and duration based on empirical data to inform project decisions.

An optimism bias workshop was held on 26th October and a full assessment of the upper bound and mitigation was undertaken. The main risk areas contributing to the upper bound were:

- build complexity (e.g. length of build, number of phases);
- location (e.g. greenfield, brownfield);
- scope of scheme (e.g. inclusion of IT infrastructure, medical equipment); and
- service changes (potential for change)

The assessment determined that the upper bound for optimism bias was 30.5%. The extent to which factors contributing to the upper bound figure can be mitigated was then assessed. The maximum mitigation level is pre-determined and the two factors with the greatest contribution are:

- robustness of Output Specification (brief); and
- stable policy environment

In total 18 mitigation factors were assessed, generating a mitigation factor of 58.35% to be applied to the upper bound. This resulted in a mitigated optimism bias rate for inclusion in the cost plan of 13%. Further details of the workshop are included in Appendix J.

6.2.7 Inflation adjustments

A calculation for inflation to the midpoint of construction (Q1 2016) based on completion in mid-2017 has been calculated. An alternative is shown on the cost summary for completion one year later in mid-2018. The percentages used are indicated in Table 4 below.

The percentages are based on previous forecast indices from DoH data and BCIS for the period to Q4 2013 and on interpolation for the following years.

Current market data available from other sources is varied ranging from 1% to 3.4% (with one at 6%) for 2013/14 and 2.9% to 4% for 2014/15. This will be monitored on the risk register.

Construction price inflation of 3.5% per annum has been allowed from 2014, which is in excess of MoD's current planning assumptions. This will be monitored on the risk register.

Year	2011	2012	2013	2014	2015	2016	2017	Total (Compound)
For completion mid-2017 (mid-point Q1 2016)	1.35%	3.54%	3.42%	3.5%	3.5%	0.88% ¹⁹		17.3%
For completion mid-2018 (mid-point Q1 2017)	1.35%	3.54%	3.42%	3.5%	3.5%	3.5%	0.88% ²⁰	21.4%

Table 4 – Inflation adjustments

¹⁹ Inflation to mid-point Q1 2016

²⁰ Inflation to mid-point Q1 2017

6.2.8 VAT

No allowance has been made for any VAT reclaim but, should the project receive approval to proceed, the matter will be considered when the nature of charitable vehicle is developed further. Tax advice will also be obtained to limit liability to other taxes.

6.2.9 Sensitivity analysis and additional cost information

Sensitivity analyses have been carried out on three key variables identified as follows:

This shows that the choice of test site formed a sound basis on which to develop the Feasibility Study and that a similar design on another site is unlikely to incur a cost penalty as:

- the variation in the refurbishment percentage has minimal effect;
- a saving may be achieved if the refurbished accommodation were to become new build, as the refurbished buildings currently provide low cost accommodation – offices and residential; it should be noted however, that this may differ on other sites dependent on the condition and grade of existing buildings;

The analysis of changes to inflation indicates that a 5% increase in the overall inflation forecast, from 17.3% to 22.3% would increase the bottom line costs by approximately £13m.

Variable	Impact (£m, approx)
Variation in refurbishment percentage of +/- 10%	+ £0.25 - £0.25
Variation if all of the refurbishment become new build	-£1.0
Increase and decrease in total inflation of 1%, 3% and 5%	+ £2.7 + £7.8 + £13.0

Table 5 – Sensitivity Analysis

6.2.10 Life cycle costs

A preliminary analysis of life cycle costs over a 30 year period – the expected period of the lease – has been carried out on an elemental basis to establish the likely annual cost per m² of floor area. The typical life expectancies for materials have been based on Building Maintenance Information (BMI) and BCIS data with further information from suppliers and specialist trade organisations, such as the Wood Windows Association.

This early analysis indicates that life cycle costs of £28.95 per m² can be expected, this is close to benchmarks of £27 per m² for Private Finance Initiative (PFI) hospital schemes with a 30 year life. It should be noted that the expected design life for a DNRC will be 100 years as stated in the Project and Design Brief.

Further component level option appraisals have been carried out in relation to the quality uplift to realise the level of architectural ambition. This showed that the associated increased capital cost of these elements has delivered benefits in terms of reduced life cycle costs.

6.3 Summary of capital costs

A summary of the forecast out-turn costs with a VAT rate of 20% and completion date options discussed previously are shown in Table 6 below.

	Completion mid-2017	Completion mid- 2018
	£m	£m
Works cost	136.2	136.2
Fees and charges	21.8	21.8
Non-works costs	10.0	10.0
Furniture and equipment costs	6.0	6.0
Sub-total	174.0	174.0
Planning contingencies	17.4	17.4
Total at Q1 2010 (excl optimism bias, inflation, and VAT)	191.5	191.5
Mitigated optimism bias	24.9	24.9
VAT at 20%	43.3	43.3
Inflation	45.2	55.6
Forecast out-turn costs	304.8	315.2

Table 6 Summary of capital costs for a DNRC

6.3.1 Assumptions

In the absence of detailed design information, a number of assumptions have been made in formulating the outline costs; these are included in Appendix J.

Exclusions

The following major cost items are excluded from the basic capital cost allowances; any expenditure on risk items will need to be funded from the planning contingency and optimism bias allowances:

- major items of medical equipment, such as X-ray, MRI, CAREN, and simulators;
- sports equipment, for the gymnasias and outside;
- IT hardware;
- telephone systems and equipment;
- specialist window cleaning systems and electrically operated solar shading;
- major external services diversion;
- site remediation works
- Section 106/278 costs over and above the £10m allowance
- any changes to local authority infrastructure charges for the new development;
- VAT reclaim on any cost elements and future changes to the applied rate of VAT;
- transition costs;
- decanting costs and/or the provision of temporary accommodation;
- land purchase and associated legal and surveyor fees and charges; and
- inflation costs beyond the current projected completion dates as stated above.

²¹ The figure of £2m is for basic equipment only; it does not include major items of medical equipment such as MRI, CAREN, etc., whose purchase will be subject to a separate MoD business case.

²² Group 1 items are those bought and installed by the contractor. Group 2 items are those bought by the client but installed by the contractor. Group 3 items are both bought and installed by the client.

6.4 Capital cost responsibility

The responsibility for capital costs are summarized in the Table 7 below.

Benefactor	Ministry of Defence (MoD)
Programme management and delivery of the DNRC programme (including the procurement of a building contractor)	Legal costs relating to the MoD lease and other commercial arrangements.
Establishment of the DNRC entity	Capital costs of security measures (expected to be in the region of £2m), representing the cost difference between the existing HC security specification and current MoD security requirement.
Site acquisition	Equipment cost (expected to be in the region of £2m ²¹), in addition to the £6m for group 2 and 3 ²² equipment included in the capital cost plan.
Buildings and construction of the defence core, plus £6m groups 2 and 3 equipment.	

Table 7 – Capital cost responsibility

6.5 Operating costs

Current operating costs for Headley Court were identified with assistance of the Surgeon General’s finance manager and head of corporate services, and are shown in Figure 11 below.

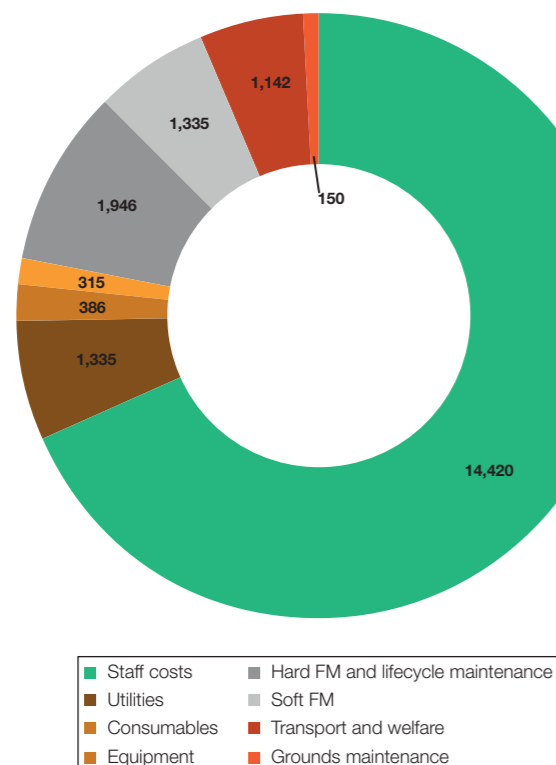


Figure 11 – Current operating costs at Headley Court

6.5.1 The de-minimis option at Headley Court

To compare the costs and benefits of providing services from a DNRC against the cost of continuing provision from Headley Court a ‘do nothing’ or de-minimis option was required. As ‘do nothing’ would lead to inability keep the clinical services operational, this option is not realistic and a de-minimis option was therefore agreed with the MoD Director General of Finance as the most meaningful approach, identifying the costs (capital and operating) of continuing to operate Headley Court and taking into account the following:

- increases in operating costs as a result of recently completed works at Headley Court;
- projected maintenance costs (as provided by Defence Estates); and
- increases in operating costs as a result of known developments which are expected to provide Headley Court with the capacity to accommodate an equivalent number of personnel as could be accommodated at a DNRC.

The Surgeon General’s team provided an overview of the planned improvements to Headley Court. Detailed plans and capital expenditure requirements have been identified up to 2013/14. A recurring level of capital expenditure would be expected beyond 2013/14 as small scale improvement will continue to be made to Headley Court in the event that a DNRC option is not pursued.

Forecast capital and operating expenditure for the de-minimis option are summarized in Table 9 below. Beyond 2013/14 the recurring level of capital expenditure is expected to be in the region of £4m.

Recent improvements at Headley Court	Planned improvements at Headley Court
Additional ward accommodation project	Replacement 96 bed ward, expected to result in an increase in area of 640m ²
Centre for mental and cognitive health	Improvements to staff and mess accommodation expected to result in an increase in area of 5,900m ²
Utility upgrades	
Pool (largely funded by H4H)	

Table 8 – recent and planned improvements at Headley Court

	Operating costs (£k at 2009/10 prices)	Capital costs between 2010/11 and 2013/14 (£m at 2009/10 prices)
Current operating costs (actual)	20,911	
Adjustment for additional ward accommodation project (not included in the above)	1,830	
Replacement 96 bed ward (increase in costs due to increase in area)	150	18
Improvements to staff and mess accommodation	830	6
Improvements to security and perimeter fencing	Not yet known	Not yet known
Forecast costs of de-minimis option	23,721	24

Table 9 – Forecast capital and operating expenditure at Headley Court

6.5.2 DNRC operating costs

The projected operating costs for a DNRC have been prepared on the following basis:

- Defence core

- Staff costs (both military and civilian) based on current staffing levels assuming that staff do not receive the 4% outer London pay enhancement and having allowed for staff increase as a result of the additional ward accommodation project. In reality the design of new buildings will promote improvements in working practices although we have not sought to adjust staff costs for this potential saving. Further cost savings may also be possible as pay scales (both military and civilian) are likely to be lower in the Midlands than in Surrey.
- Major maintenance (life cycle) costs – see para. 5.2.10
- Soft FM and routine maintenance costs based on benchmark data and comparison against the current Headley Court costs.
- Utility costs based on benchmark data for new buildings of a similar type.
- Consumables and other costs are based on current Headley Court costs.
- Benchmark costs have been adjusted to reflect the location of the test site (except staff costs), consideration has also been given to the cost of providing utilities to accommodation which is approximately 0.5 miles from the public highway.
- **A DNRC vehicle** - as described later in this study, a legal entity (a DNRC vehicle) is expected to be established to facilitate the delivery and management of the DNRC estate. Forecast costs relating to the activities of a DNRC vehicle (including the running costs for an estate) have been prepared with the assistance of individuals with experience of operating similar charitable entities and country estates.

The forecast DNRC operating costs are summarised in figures 12 and 13 opposite.

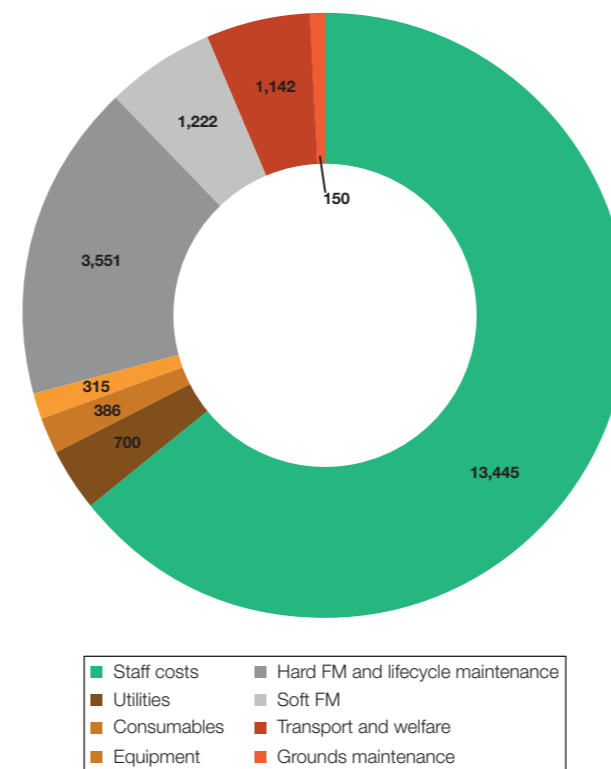


Figure 12 – Operating costs of the Defence core

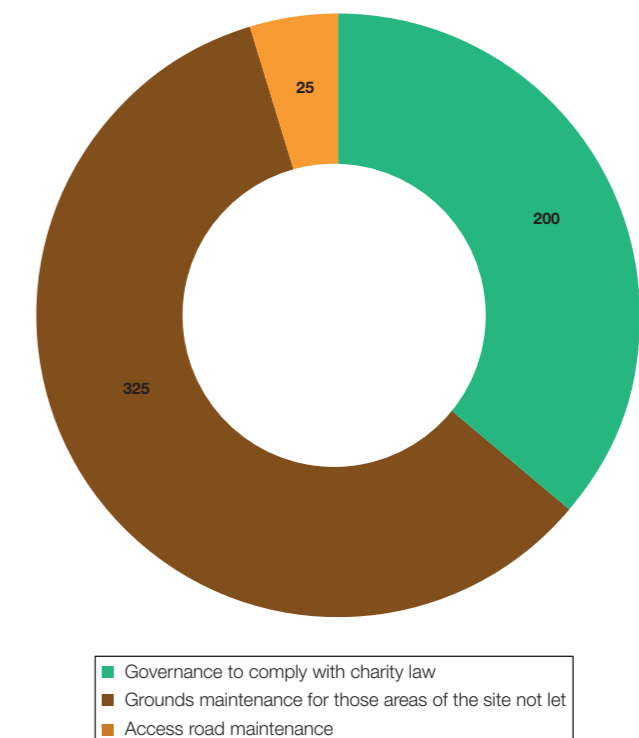


Figure 13 – Operating costs of a DNRC vehicle and the un-let areas of the estate

The MoD is expected to agree to an initial 30 to 35 year lease with a DNRC vehicle. A summary of the key lease obligations are described below:

- Notional rent similar to the current arrangements for Headley Court.
- Commitment to reimburse any DNRC maintenance company for the cost of routine and lifecycle maintenance based on a pre agreed maintenance regime (a DNRC maintenance company would be expected to procure and provide maintenance services for the entire DNRC site). The MoD will be expected to make an annual linear payment to any DNRC maintenance company in return for its services. This payment has been included in the analysis below.
- It is likely, through the lease/commercial arrangements that will be put in place, that an annual contribution will need to be made by the MoD to part fund a DNRC's operational and maintenance costs relating to the public (i.e. not let) parts of a DNRC estate. Such a contribution is unlikely to be greater than £550K per annum and has been included within the operating cost analysis. It is expected that the MoD's contribution would reduce as the number of occupants on a DNRC site increase.

6.5.3 Forecast MoD operating costs.

Figure 14 below suggests that the MoD operating costs of a DNRC are expected to be no more than those relating the de-minimis option. The MoD considers the level of operating cost contingency, £2.1m (10% of forecast costs), to provide sufficient assurance that a DNRC is most unlikely to cost more than the current arrangement at Headley Court.

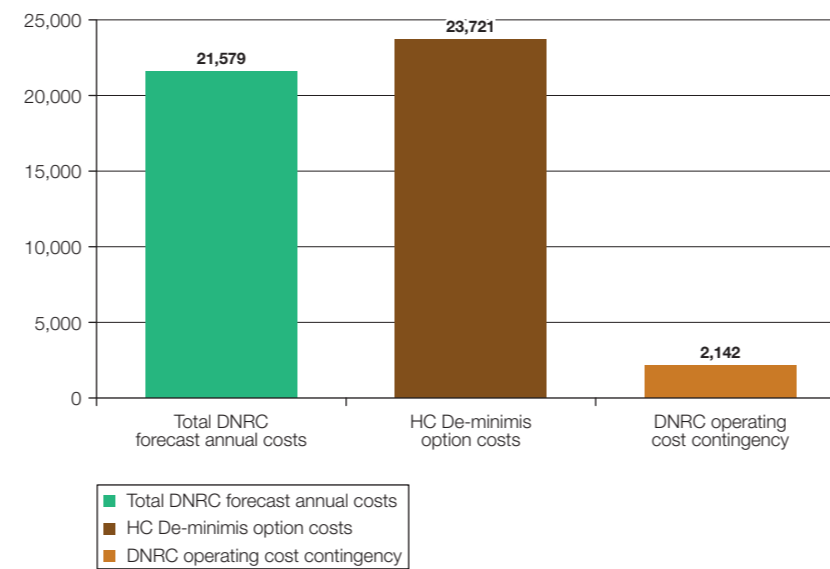


Figure 14 – Comparison of forecast running costs

6.6 Transition costs.

Forecast transition costs have been considered by the project team and the Surgeon General's finance team, and are summarized in the Table 10 below:

Item	£k
Dilapidations	5,000
Staff relocation (military)	1,000
Staff relocation (civilian)	2,200
Move costs	100
Total transition costs	8,300

Table 10 – Summary of transitions costs

It is expected that the above costs will be for the MoD's account. These costs which are expected to be incurred in 2016/17 are described in greater detail below:

- **Dilapidations** – Following any transfer of services to a DNRC and the expiry of the current lease arrangements (the MoD is required to give a minimum of five years notice of its intention to surrender its lease) the HC Trust would be expected to dispose of HC. Dilapidations may be payable by MoD in accordance with the lease requirements. Preliminary discussions with the HC Trust suggest that they may seek dilapidations to the extent that they are required to maximize sale proceeds (the scale of dilapidations would therefore be dependent on the site's alternative use). For planning purposes, and until further information becomes available, a cost of up to £5m should be allowed (up to £2m for site clearance and £3m for works to the house). It should be noted that limited analysis has been undertaken on these costs and further discussions between MoD and the HC Trust will be required.
- **Staff Relocation (Military)** – The relocation of military staff is a straight forward process driven activity that would be expected to require 6 months notice. The cost of relocating military staff is expected to be £8,000 per person (a total cost of £1m is anticipated based on current staff numbers).
- **Staff Relocation (Civilian)** – The Surgeon General's human resources team will be expected to undertake a formal consultation concerning the relocation of civilian staff. The cost of assisting the relocation of civilian staff is expected to range between £35,000 and £45,000 per person. A total cost in the region of £2.2m is anticipated based on current staff numbers, albeit that this cost may be able to be reduced if permanent staff numbers can be managed down before any relocation is required.
- **Move Costs** - There will be a need to relocate equipment, fixtures and fittings, at this stage the items to be moved have yet to be identified and cost quantified. An allowance has been made for move costs, these are shown in the table, the adequacy of this allowance will be subject to further review by the MoD in subsequent phases.

7 Treatment of risk

7.1 Introduction

All short, medium and long term risks were assessed to give a high degree of confidence that all project deliverables will be achieved on time and to a high quality.

7.2 Risk reporting

A high level summary of risks identified and scored was reported to the Project Board. Areas of risk the Board considered can be summarised under the following headings:

- Strategic Defence Security Review (SDSR) reduces UK involvement in medium scale enduring operations;
- failure to acquire a suitable site;
- loss of support from Interested Parties;
- inability to establish a suitably skilled workforce in a new location;
- opposition to the proposals for a DNRC from a variety of sources; and
- failure to achieve efficiencies in patient flows.

7.3 Financial risk

The key financial risks of proceeding with a DNRC were also analyzed and the following areas of risk were considered by the Board:

- inaccurate forecasts of construction cost inflation;
- delays leading to an extended programme and increased capital cost;
- dilapidations costs on exiting from Headley Court higher than anticipated; and
- future MoD policy on provision of Service families accommodation results in higher operating costs.

8 Governance arrangements for a DNRC

The current Headley Court site has been owned by the Headley Court Trust since 1947 and the Trust leases the entire 33 hectares to the MoD for use as a military rehabilitation establishment. In a DNRC situation there will be much greater complexity: the site is likely to be considerably larger than that at Headley Court and over time should, in addition to the Defence core, accommodate a number of ‘N’ users within its perimeter – perhaps as many as six, some government-related, some not; there will need to be appropriate high level policy decisions made to ensure that the ‘N’ component’s potential is realized; and the site as a whole will need to be managed in estate terms. To address this complexity, a Governance working group was established, chaired by the Project Director and including legal advisors, to consider the governance arrangements required and the most suitable vehicle to achieve the purpose.

The Group determined that none of the complications associated with a DNRC lessened the desirability of it being put on a charitable basis from the outset with the leaseholders paying the operating costs of their concern – mirroring Headley Court. But it was evident that the governance arrangements would need to attend to the complexity by being suitably high-powered and flexible, and that it would be necessary to ensure that:

- a DNRC remained true to its purpose and realized its full potential;
- a DNRC was able to benefit from its charitable status to an appropriate degree;
- the ‘N’ element of a DNRC was properly reflected in the governance outcome in a way that complements the core element (the ‘D’); and
- the arrangements between the legal entity and government lessees in relation to the mix of private and public money were satisfactory.

Extensive consultation was undertaken to test the appropriateness of models. Consultations included the Department of Health, Department for Work and Pensions, MoD, Department for Culture Media and Sport, the Headley Court Trust, and representatives from the client. Consideration was given to the different forms of charitable vehicle, including a charitable trust and a charitable incorporated organization. The Group concluded that the most suitable vehicle to achieve the DNRC purpose was a charitable company limited by guarantee. Such a vehicle is now one of the most usual forms of charity. Corporate status gives the charity the ability to contract in its own name (a charitable trust does not have this ability which can give rise to practical difficulties in sizeable projects) and also confers the limited liability necessary for large projects of the DNRC sort. The structure permits trading activity. The trustees act as (unpaid) directors of the company with the membership able to be tiered (voting and non-voting) – and there would be an executive tailored to its task.

In looking at a DNRC’s charitable objects, reflecting its breadth of interests, it was felt that they should refer to advancement of health by the provision of facilities, equipment or services for rehabilitation, the promotion generally of rehabilitation medicine and promotion of vocational rehabilitation. Such objects would be expressed in wide terms to give the charity the scope and flexibility to develop the national component, in particular, as circumstances evolve. They would cover the general case and individual leases would be granted to the various parties on the site, attending to any specific user needs.

Glossary

Term	Definition
BIRT	Brian Injuries Research Trust BIRT is a division of The Disabilities Trust and is the means by which The Disabilities Trust provides its brain injury services. It helps people regain the skills lost as a result of brain injury – whether caused by road accident, assault, stroke or illness.
BREEAM	BRE Environmental Assessment Method BREEAM is the leading and most widely used environmental assessment method for buildings and establishes a standard for best practice in sustainable design.
CAREN	Computer Assisted Rehabilitation Environment Equipment which combines a panoramic image with a motion capture system and treadmill to create a virtual world that responds to a patient's movement.
CDM	Construction Design and Management CDM is controlled through the Construction (Design and Management) Regulations 2007, which are designed to improve the overall management and co-ordination of health, safety and welfare throughout all stages of a construction project.
COBSEO	Confederation of British Service and Ex-Service Organisations COBSEO is an organisation that exists to work for the interests of the Armed Forces community in order to: - Represent and support the needs and opinions of members - to all levels of government and other organisations - Identify, communicate and act on issues of common interest on behalf of members - Exchange and coordinate information between members - Act as a single point of contact for external enquiries
DMRC	The Defence Medical Rehabilitation Centre The Ministry of Defence's premier facility for the rehabilitation of injured Service personnel, providing world-class levels of care for patients. Located at Headley Court, Surrey.
DMRP	Defence Medical Rehabilitation Programme A rehabilitation programme to provide Service personnel with musculoskeletal conditions access to high quality, effective and timely advice, assessment, diagnosis and treatment, at an appropriate level to enable them to return to operationally deployable levels of fitness.

Term	Definition
DMS	Defence Medical Services DMS includes the Headquarters Surgeon General, Joint Medical Command, Defence Dental Services and the three single Service medical organisations. It is headed by the Surgeon General.
DREAM	Defence Related Environmental Assessment Method DREAM is the Ministry of Defence's web-based tool for environmental performance assessments. DREAM addresses environmental aspects of MoD construction projects at survey, design, construction and operation phases.
HV	High Voltage HV electrical circuits are those with more than 1000 volts for alternating current or more than 1500 volts for direct current.
JMC	Joint Medical Command JMC supports Permanent Joint Headquarters, in delivering medical operational capability, healthcare, education, training and research in order to maximise fighting power and medical excellence within the Armed Forces.
JSP	Joint Service Publication
LV	Low Voltage LV electrical circuits are those with between 50 -1000 volts alternating current or between 120 – 1500 volts direct current.
MRC	Medical Research Council The Medical Research Council is a publicly-funded organisation dedicated to improving human health. It supports research across the entire spectrum of medical sciences, in universities and hospitals, in its own units, centres and institutes in the UK, and in Africa.
MIAC	Multi-disciplinary Injury Assessment Clinics MIACs provide a multi-disciplinary clinical assessment of a patient's condition to determine the appropriate method of treatment.
MRI	Magnetic Resonance Imaging MRI is a imaging technique used in radiology to visualize detailed internal structures. MRI makes use of the property of Nuclear magnetic resonance to image nuclei of atoms inside the body.

Term	Definition
NIHR	National Institute of Health Research The goal of the NIHR is to create a health research system in which the NHS supports outstanding individuals, working in world class facilities, conducting leading edge research focused on the needs of patients and the public.
OGC	Office of Government Commerce An independent office of HM Treasury, established to help Government deliver best value from its spending.
PCRF	Primary Care Rehabilitation Facility The first tier of rehabilitation in the DMRP. It provides local access to a detailed assessment by an experienced medical officer and/or physiotherapist within two working days of initial consultation. Ideally the patient is managed locally with appropriate treatment and rehabilitation
RCDM	Royal Centre for Defence Medicine A tri-Service establishment located at the University Hospitals Birmingham NHS Foundation Trust, the primary function of the RCDM is to provide medical support to military operational deployments. It also provides secondary and specialist care for members of the armed forces.
RRU	Regional Rehabilitation Facility The intermediate tier in the DMRP. RRU's provide rehabilitation within a defined catchment area crossing single Service boundaries. They provide a multi-disciplinary injury assessment clinic that aims to establish a firm diagnosis where this is not possible at the PCRF and identify the most appropriate care pathway. They also have a treatment role that involves physiotherapy and group exercise therapy.
Wellcome Trust	The Wellcome Trust is a global charitable foundation dedicated to achieving extraordinary improvements in human and animal health.

ARUP