

A &  
D S

# Case Study: Dumfries & Galloway Royal Infirmary



## Introduction

Dumfries and Galloway Royal Infirmary is a new 344-bed healthcare campus, situated on a greenfield site to the southwest of Dumfries. Completed in 2017, the £212 million building is described as a pioneering 'Garden Hospital' with a focus to provide a high quality, sustainable and flexible environment to support the comfort and wellbeing for patients and attract skilled NHS staff to serve the 150,000 population covered by NHS Dumfries and Galloway.

## Background

The new hospital is part of the approved Dumfries and Galloway Structure Plan and the adopted Nithsdale Local Plan and replaces the former Royal Infirmary which was situated in the centre of Dumfries.

## Place Making Strategy

In its new setting, the Garden Hospital sits amongst pasture land, trees and hedgerows, with a hillock bounding the site to North. The topography of this location has been embraced with the therapeutic value of the natural environment at the heart of its design.

Extensive landscaping measures were carried out to ensure that the natural environment was adequately protected and the impact of the new hospital on the existing landscape was minimised.



2 'Green hospital' sits amongst pasture.

Overview	
<b>Client</b>	NHS Dumfries and Galloway
<b>Architect</b>	Ryder Architecture
<b>Landscape Architect</b>	Fira Landscape
<b>Main Contractor</b>	Laing O'Rourke
<b>Location</b>	Dumfries and Galloway
<b>Area</b>	63,500sqm
<b>Complete</b>	2017
<b>Cost</b>	£212m
<b>Structural Engineer</b>	WSP
<b>Mechanical and Electrical Engineer</b>	Hoare Lea
<b>Timeline</b>	Planning Permission Granted January 2013 Tender Awarded in 2014 Construction began 2015 Decant from former hospital premises: September 2017 Fully operational December 2017
<b>Awards</b>	Scottish Awards for Quality in Planning Health Facilities Scotland 2018 Building Better Healthcare 2018 AJ Architecture - Shortlisted MIPIM 2018 - Finalist RIAS / RIBA 2018 - Shortlisted RTPI 2018 - Shortlisted Partnerships Award for Best Healthcare Project 2016

*“The environmental studies we carried out were extensive. It was extremely involved, with many different consultants doing reports on areas such as badger counts, bat counts, newt hunts...We’ve ended up with a far better ecological site than it was before, when it was silage fields.”*

Stephen Howie, Project Manager for NHS Dumfries and Galloway

## Procurement

### Pre-Tender Consultation

A pre-tender consultation between NHS healthcare planners and architecture and construction advisors resulted in an initial reference design by Keppie Design Ltd. This formed the starting point for the formal tender process and provided an overview for the Health Board’s clinical brief.

The project was procured by means of Non Profit Distributing (NPD) form of Private Finance Initiative (PFI).

“The reason for choosing the NPD route was that this was the best procurement package available for a project of this size, at the time. (In terms of evaluating the tender submissions) we developed a scoring mechanism for the submissions. In our reference design, we had been able to discuss with Keppie exactly what we wanted. Representatives from every clinical department involved in the new hospital had put scores down and we shared this with the bidders, which helped them to focus on where they should concentrate on trying to improve the design. We also had a scoring mechanism for the design quality and our accountants provided scores on the financial aspects of the bids.”  
Stephen Howie, Project Manager for NHS Dumfries and Galloway

Following consultation with representatives from the various clinical departments, who had contributed scoring sheets to the final selection process, the tender was awarded to High Wood Health, a consortium of Laing O'Rourke, Ryder Architecture and Serco, as the preferred bidder for the works contract.

“The Board had undertaken a scored review process on the reference design, which was an invaluable foundation for our design proposals. Some elements of the reference design had been highly scored by the Board, the inpatient wards for example, while others had received much lower scores – such as the emergency department/CAU. This gave us initial insight into the Board’s aspirations and allowed us to focus our design efforts where they would deliver the most value to the project.”

Ian Crow, Architectural Director, Ryder Architecture.

### Post-tender Consultation

Following the award of the contract in 2014, there was a short period where the client was able to discuss the development of the design with the architects.

“In the six months between our selection as preferred bidder and financial close (March 2015), we undertook a thorough review of all aspects of the design through an intense period of engagement with the Board – including their clinical, support and management teams, with input from wider stakeholders including patient representatives.

This was structured around weeklong workshops at monthly intervals with the design team. Through this process, the internal layouts were thoroughly tested”  
Ian Crow, Ryder Architecture



3 Extensive landscaping measures were carried out to ensure that the natural environment was adequately protected.

## Design

### Masterplan

The new healthcare campus has been designed as a radial plan or sundial layout.

1. The main building occupies a rectangular footprint, arranged over three floors containing the main entrance, A&E outpatients, theatres and imaging department, with plant accommodated in the roof space.
2. Radiating out from the main technical block are three inpatient wards, or pavilions, three levels high with pitched roofs. The wards feature single en-suite bedrooms for every patient.
3. The final element is the women and children's block which adjoins the main hospital block. This element of the build varies between two and three storey and has been designed around its own internal courtyards.

Located in a site adjacent to the hospital are three residences on three levels housing 104 units designed to create a high quality short-term living environment to attract medical staff.

"The cost was a key criterion at the formal tender stage... using off site construction for the external envelope, the construction programme was six months shorter than traditional construction resulting in reduced preliminaries and labour costs and providing significant operations savings for the client on their existing operational costs."

Our team collaborated between design and construction partners, to ensure the design for manufacture and assembly process made best use of the material qualities of the concrete panelised structure whilst maximising efficiency in both the technical design and assembly process."  
Ian Crow, Ryder Architecture

*"Mental health accommodation across the former hospital sites all had serious shortcomings, particularly in their lack of access to safe outdoor spaces. This necessitated staff having to escort patients, often leading to frequent frustration points. The final design was very close to what we described in our design brief, for all single bedroom accommodation on the ground floor."*

William Lauder, General Manager Ayrshire Central Hospital, Senior Manager Inpatient (Mental Health) and Forensic Services, Ayrshire Central Hospital

### Form

The design of the campus has been considered 'holistically' in terms of its form and massing. The form of the building clearly expresses the inpatient accommodation as a separate entity to the diagnostic and treatment areas and a clear identity has been given to the women's and children's facility as 'a hospital within a hospital'.

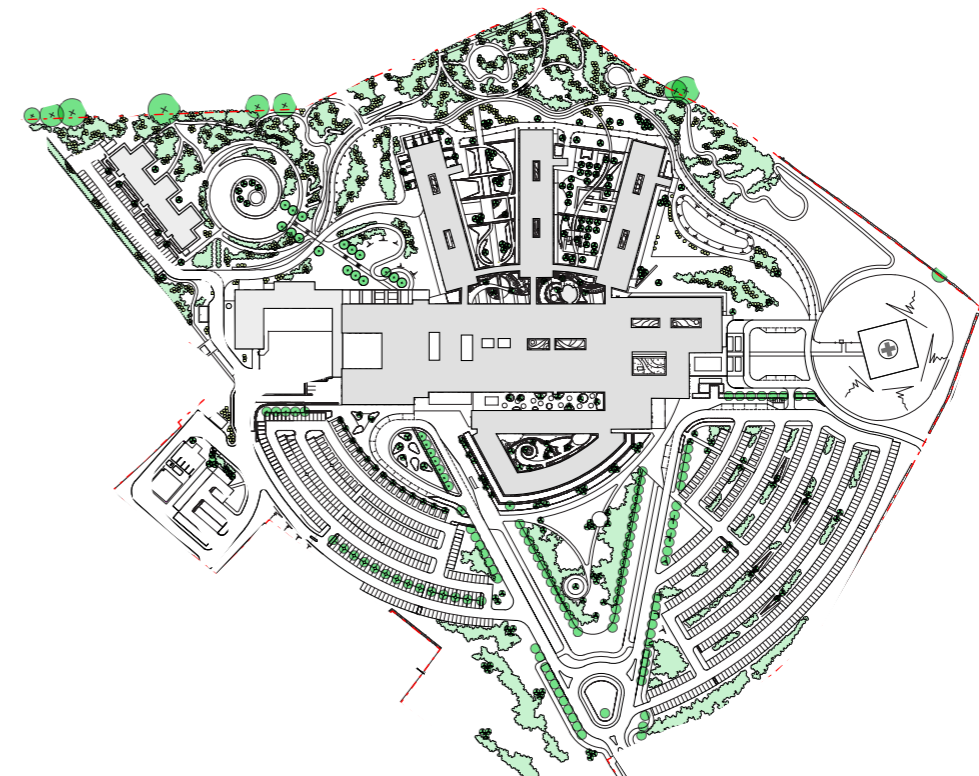
### Mass

The massing of the building has been designed on a human scale through creative forms such as the roofscape. A series of pitches reduce the impact of what otherwise could have been a large flat horizontal building and forms a silhouette against the backdrop of the hills. Higher and more dynamic roof forms signal the main hospital entrance, creating a welcoming environment and the feeling of a 'hamlet' that eases the approach to the hospital.

### Garden Hospital Principles

Connection and good access to the outdoors has been established for the positive health outcomes it delivers for both patients and staff. Seventeen courtyards and gardens feature throughout the building, providing calming views and places for restful healing. Patient wards are surrounded by garden spaces, many of which play an integral part in therapeutic practice. Palliative care bedrooms have their own private gardens, with dedicated space for beds to be wheeled outside, allowing patients to experience the natural outdoor environment.

Central to the Garden Hospital design is an emphasis on natural daylight. Light 'courts' throughout the inpatient pavilions allow for clear views across wards for both patients and staff, opening up interiors and filling spaces with natural daylight. This approach 'designs out' any sense of enclosed isolation for the patients.



Extensive planting has been implemented throughout the hospital site.

*“We were initially worried about the heat, and the noise, but there’s such a great buzz and atmosphere in the atrium. One of the biggest changes from the old hospital to the new building is that staff restrooms were taken away from departments. This was designed to encourage staff to be able to leave their specific work areas at break-time. Now staff from all departments congregate in the atrium, and this has helped to create an integrated working environment, which is a huge improvement.”*

Justine Laurie, Assistant Contract Manager, NHS Dumfries and Galloway



### Wayfinding

The hospital campus is underpinned by a clear zoning strategy to ensure a person-centred environment that is designed to be safe, effective and efficient to operate. Key patient journeys were tested and measured to ensure an optimised design that minimised travel distances between departments. Circulation routes are designed to segregate flows and provide intuitive wayfinding. Principal circulation routes are also separated by floor to minimise cross flows. Routes include rest opportunities for elderly users and areas that promote interaction between staff disciplines within the hospital.

“It’s a very intuitive building to find your way around. The single loading of a lot of the corridors has made a huge difference. It creates a pleasant distraction going along the corridor, looking at the views, and seeing what the weather’s like – it’s not just door, after door, after door, both sides of you. The lightwells on the wards are an important part of the design. The bidders could have quite easily taken those out to make savings. But we wanted to keep hold of this feature and we let bidders know that it featured high (on the scoring mechanism in place to evaluate the bids).”

Stephen Howie, Project Manager for NHS Dumfries and Galloway

### Entrance Atrium

The main entrance atrium was designed as a welcoming civic space, lit from above by a long row of skylights, and a large bay window providing views across the surrounding countryside.

“The atrium is not just an entrance to the local hospital, it’s a place to come and hold events, use the café, or go for a walk out onto the terraces. It’s a community facility and we want to encourage this. We want the community to feel that this is their hospital.”

Stephen Howie, Project Manager for NHS Dumfries and Galloway

### Flexibility

The design development considered the means for departments to be used flexibly, adapted or expanded as far as is practical to future changes in national policy or clinical and technological advancements.

Consideration was given to departmental planning in terms of how the building will be managed efficiently and effectively to cope with seasonal and strategic variations in activity. The relationship between the components of the Emergency Care Centre (ECC), as well as the arrangement of suites of generic rooms, allow for a great degree of flexibility in both initial use and to accommodate future change.

“Throughout the design process, we adopted a principle of including standard rooms wherever possible to allow for as much flexibility in the use of the rooms and staffing as possible, with minimal work or disruption. This process is now considered best practice in the design of healthcare facilities.

Areas where we understand that equipment will be liable to change – such as imaging – were designed with recessed, infilled floor areas to allow for future rewiring and services. Equipment replacement routes were also considered, and removable panels or enlarged doors provided in appropriate locations.

The Board had also identified several areas where they felt future building expansion might be required, and proposals on how to address these were included at bid stage.”

Ian Crow, Ryder Architecture.



6 Top to bottom right: Main hospital atrium was designed as a welcoming civic space | Staff in wards underpinned by clear zoning strategy | Corridors are well lit and make good use of natural daylight.

## Art Strategy

The Arts Strategy was integrated in the development rather than bolted on at the end. Stakeholder groups, staff, and an arts curator oversaw all the work in a building wide art strategy, All Our Stories, was produced by Wide Open, a regional public art production company, to form the basis of commissioning and programme development.

“The arts strategy was a fundamental part of the interior design proposals developed through the design process. Colours and textures from the Dumfries and Galloway landscape were established through a departmental interior design strategy and opportunities were identified to enhance key areas such as the café, waiting areas and patient bedrooms with bespoke artworks designed to work with the building’s interior. On completion of the strategy, the design team worked closely with the hospital board to engage with and appoint local artists in the development of these works.”  
Ian Crow, Ryder Architecture.

“It became difficult to fundraise for the arts side of things. But the construction company, Laing O’Rourke, put up substantial money (£100,000) to assist with the arts strategy. Due to the integration of the art strategy early in the development, we were able to incorporate it into the building costs. So we used some of the construction money to deliver some of the integrated arts, which was a much better plan for our work.”

Stephen Howie, Project Manager for NHS Dumfries and Galloway



The Arts Strategy was integrated into the development rather than bolted on at the end.

## Collaborative Approach

The architects have sited collaboration as key to the success of the project.

“A clear team structure (is important) but with the ability to be flexible and dynamic to respond to needs of a very complex and fast moving project.

Planning and communication is also key, as is understanding the role of everyone in the team, whether concept, clinical or technical and across all locations. Regular planning meetings over Skype were crucial to ensure the full team understood deliverables for the coming weeks, particularly during the initial tender stage where technical and cost information was being developed alongside the evolving clinical design. Clear planning of content for presentation at dialogue sessions kept the full team focused and ready to react to responses quickly ahead of the next sessions.”

Ian Crow, Ryder Architecture.

From the client perspective the inclusion and input of clinical staff throughout the various design stages is key to the success of the new building.

“One of the huge factors (in its success) was the engagement with the different staff groups during the design stages. This helped to develop a sense of ownership in the different clinical groups. Having staff members around the table with the architects and designers (was important). The staff members would then cascade the meeting ideas to their teams, and report feedback. So for those who wanted to be involved, they could get a say in it. And the departments that work particularly well are the ones that had a big input from the clinicians.”

Stephen Howie, Project Manager for NHS Dumfries and Galloway

## Construction

### Materials

Reconstituted pre-cast stone panels provide both structural qualities in a load-bearing capacity and visual continuity across the three principle forms of the hospital. A granite mix, similar to Galloway white granite, has been used for the inpatient pavilions and women's and children's hospital. A honey blonde sandstone mix chosen to clad the diagnostic and treatment blocks reflects the sandstone found throughout the west of Scotland. The materials are detailed with reference to the local woodland through vertical patterns which provides texture and casts of light and shadow across the façade. This effect resembles the dappled light seen through a collection of multi-stemmed trees.

### Sustainability

A key element of the sustainability strategy was the provision of a fully functioning hospital while respecting the environment and indigenous wildlife. This has been achieved by growing a diverse range of plants, particularly native species, encouraging a wide variety of insect and animal species, with the aim of bringing biodiversity back to the altered landscape.

Green roofs are included on the women's and children's hospital and to some areas of the diagnostic and treatment areas; enhancing the site-wide strategy for habitat and helping to meet the criteria for local authority sustainable environment policies. The use of a green roofs also assists with storm water drainage, providing natural attenuation and reducing the capacity demands for tanks and ponds. The use of native species contributed to the BREEAM Very Good minimum requirements. Water management features, such as sustainable urban drainage systems, are integrated into the layout to optimise the amenity and biodiversity value of water features and green areas.

### Decanting Strategy

During the construction from late 2015 to handover in September 2017, planning for the decanting and transfer from the former Infirmary building into the new hospital took place.

"A lot of time and preparation was put into planning the move. Workshops were held at the local college with all our partners: including representatives from the local Council, the Ambulance Service, Fire Service. We even had army cadets come in. We did a test with the Scottish Ambulance service, carrying out a couple of mock moving days. We physically had ambulances, and volunteers in the ambulances, bringing people back and forward. This allowed senior charge nurses and their teams to experience what it would feel like bringing patients over, during the course of a weekend. In terms of the actual move, we had planned four days, and we did it in three. It started on the Friday, and we were all in by the Sunday night."

Gail Robertson, Lead Nurse, NHS Dumfries and Galloway



Patient room with direct access to the hospital's greenspace.

## Post Occupancy Evaluation

All bedrooms in the new hospital are single occupancy, which is proving to be extremely effective, particularly in control of infection and management of wards, however within the rapid assessment area (which traditionally is an open ward with curtains around patient beds) this is proving to be more challenging.

“As we were moving from four bedded areas (in the former hospital building) to a much longer ward area, with single rooms in the new hospital, we had to change the way in which we practice. We’ve adopted a new way of working, ‘Pod Working’, which we tested before we left the old building. And it has thrown up some challenges, particularly in the elderly wards. The single rooms increase a falls risk. In the past we would have four patients in a room together, and it meant one person could keep an eye on four patients. But the single rooms don’t lend themselves to this observation. Some of the patients, probably our more elderly patients can also feel quite isolated. But we are making the most of our social spaces in the elderly care wards and the outdoor spaces are well used.”

Gail Robertson, Lead Nurse, NHS Dumfries and Galloway

“The hospital has been filled almost to capacity continuously since it opened in 2017, however patients and visitors frequently remark on how quiet the building is. “There’s just a calmness about the place. The sound insulation has made a very good job of achieving deadening. So much so that, it’s given us a challenge in hearing emergency buzzers in the bedrooms. However many patients say that it’s best night’s sleep they’ve had in a hospital.”

Stephen Howie, Project Manager for NHS Dumfries and Galloway



Top to bottom: Single occupancy rooms can be effective in preventing the spread of infection | Main atrium and cafe area.



The use of native wildlife species in the green space contributed to the BREEAM very good standard achieved.

## Conclusion

In creating a welcoming experience, and with the themes of comfort and wellbeing foremost in the client and design team's minds, the calm and light filled therapeutic environment as exemplified in the new Garden Hospital, has set a benchmark for future healthcare developments.

"Feedback from patients, visitors and staff has been very positive. One of the clearest pieces of feedback is the emphasis on natural light and connections to landscape and outdoor space. People centred interior environments with a connection to garden and courtyard spaces are a key aspect of the healthcare provision and provide clear wayfinding around what is a very large and complex building. The success of this strategy has only improved as the trees and planting have matured.

(From an architectural viewpoint) the use of precast reconstituted stone in the building envelope was central to the team's offer from the start of the initial tender stage. The natural material palette and patination has softened into the landscape. A clear concept and diagram of roofscape, pattern and scale responding to the building's context helps break down the mass of the building and welcomes patients and visitors,"  
Ian Crow, Ryder Architecture.

"Often people come to a big hospital with trepidation, but this building doesn't have that feel. When you're walking into it, you could be in a hotel or an airport terminal. There's the brightness and the views out. It doesn't have an oppressive, clinical feel to it, and this is important,"  
Stephen Howie, Project Manager for NHS Dumfries and Galloway

Images courtesy of:  
NBBJ / [www.paulmcmullin.com](http://www.paulmcmullin.com).  
NHS Dumfries & Galloway Health & Social Care Partnership



The calm and light-filled therapeutic environment as exemplified in the new Garden Hospital has set a benchmark for future healthcare developments.



# Architecture & Design Scotland

Ailtearachd is Dealbhadh na h-Alba

We believe in the power of  
design to improve people's lives

If you are interested in getting involved with our work, contact us at [info@ads.org.uk](mailto:info@ads.org.uk)

Bakehouse Close, 146 Canongate,  
Edinburgh EH8 8DD

The Lighthouse,  
Level 2, 11 Mitchell Lane,  
Glasgow G1 3NU

T: 0131 556 6699  
E: [info@ads.org.uk](mailto:info@ads.org.uk)  
@: ArcDesSco  
[ADS.org.uk](http://ADS.org.uk)