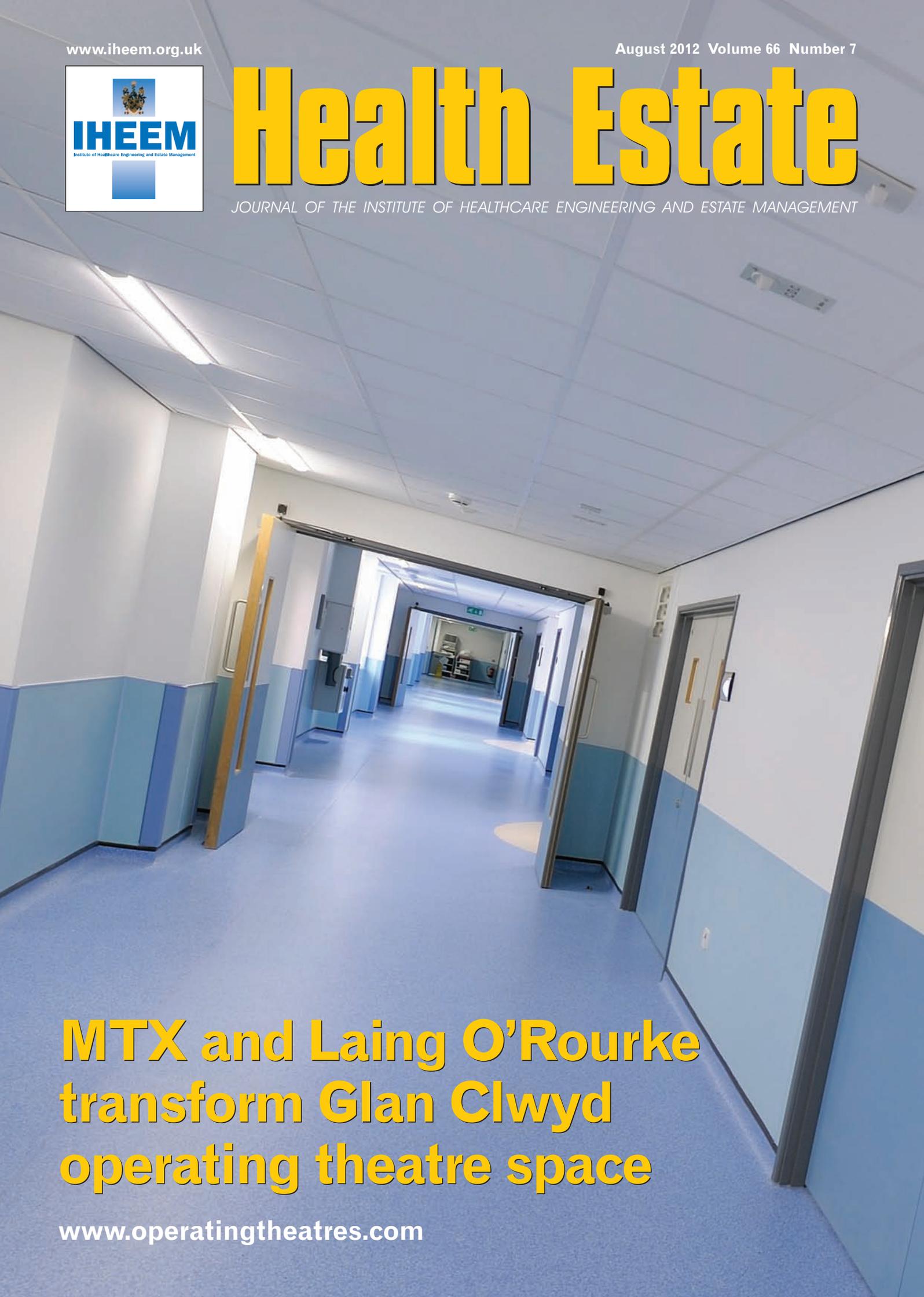


# Health Estate

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**MTX and Laing O'Rourke  
transform Glan Clwyd  
operating theatre space**

# Glan Clwyd operating space is transformed

Turnkey construction company, MTX Contracts, has recently completed a suite of five 'modern and future-proofed' operating theatres at the Ysbyty Glan Clwyd in Bodelwyddan, Denbighshire, in the first phase of a 90-phase, £89.9 million redevelopment of facilities at the North Wales hospital being undertaken by Laing O'Rourke for the Betsi Cadwaladr University Health Board. According to Dr Eileen Williams, a consultant anaesthetist at the hospital, and the clinical lead on the hospital redevelopment project, the new theatre facilities will enable surgeons to undertake a wide range of surgical procedures, equipped with the most modern technology, in an environment that is not only lighter, brighter, and better laid out than the six previous theatres, but will also improve patient flow, aid infection control, and greatly enhance overall working efficiencies. *HEJ* editor, Jonathan Baillie, reports.

The five new operating theatres, three equipped for general surgery, and the other two for operations including orthopaedic procedures (thanks to the incorporation of MAT laminar flow canopies), are located on the first floor of the sizeable 1970s-built district general hospital, alongside a new eight-bed recovery bay, patient waiting area, staff changing facilities, and expanded clinical storage facilities. As part of a turnkey project – which also saw the company take on the scheme's design for Laing O'Rourke, working from Stage E onwards to plans developed by architects, The Design Buro – MTX also stripped out, expanded, and fitted out with new HVAC equipment, an existing third floor plant room, one storey above the new theatres. This serves both the new first floor operating suite, and two existing theatres on the ground floor below it. The plant room re-fit entailed not only structural alterations to the existing plant space, but also raising the existing structure and roof by 1,500 mm to accommodate new equipment including new Barkell air-handling units.

One of the biggest challenges MTX and Laing O'Rourke faced on the project was creating the five new theatres and new plant room while two theatres on the first floor, and the two on the ground floor, remained fully operational. The Health Board did, however, supplement its surgical capacity during the construction work with two temporary Vanguard mobile operating theatres, located in the hospital car park near the cardiac catheterisation laboratory, and an additional refurbished 'secondhand' modular theatre, which



Courtesy of the Betsi Cadwaladr University Health Board

*The Ysbyty Glan Clwyd near Rhyl is the subject of a £90-phase, £89.9 m redevelopment project to modernise its facilities.*

MTX had stripped out and re-equipped off site, before installing it adjacent to the Vanguard theatres.

## Part of a 90-phase project

The new operating theatres represent the first phase in a project expected to incorporate up to 90 to refurbish and modernise the Glan Clwyd Hospital. The healthcare facility, which is located just outside Rhyl, and the two other major hospitals operated by the Betsi Cadwaladr University Health Board – the Ysbyty Gwynedd in Bangor, and Wrexham Maelor

Hospital, serve a population of around 676,000 people living across the six counties of North Wales, as well as in some parts of mid-Wales, Cheshire, and Shropshire.

The final go-ahead for the £89.9 million redevelopment at the Ysbyty Glan Clwyd was given by the Welsh Government in February this year. The multi-phase project will not only see a number of key departments and services redesigned and relocated to improve care, but will also entail the removal of asbestos from substantial parts of the hospital's

steel frame to ensure compliance with 21st-century health and safety standards.

During a meeting at the Glan Clwyd site offices of Laing O'Rourke (LOR), the main contractor on this complex, multi-stage redevelopment, project leader for Laing O'Rourke, Colin Chong, explained the background to the redevelopment, before he, and two of the key MTX Contracts staff on the theatre redevelopment, contracts manager, David Peacock, and project manager, Scott McCaskie, went on to discuss with me how the new operating suite was designed and built. Colin Chong said: "The Glan Clwyd Hospital was built in the 1970s, and, at the time, spraying on a layer of fire-retardant asbestos to the steel framed-structure of a building, as occurred throughout the original ground and first floors, and parts of the main 'H' Block building here, was common practice. Over the years thinking on safe use of fire-retardant material has changed quite markedly, and the Health Board recognised the need for removal of the asbestos to allow the redevelopment to proceed.

### Changing clinical demands

"Clinical needs and demands, and models and standards of care, have also evolved considerably, and it was for a combination of these factors that plans were drawn up for a multi-phase redevelopment of the hospital buildings. The very first phase, which commenced with enabling works to allow the construction of the new theatres, included removal of the asbestos on the hospital's first floor by a specialist sub-contractor, and began in March 2011."

Colin Chong went on to explain that the Laing O'Rourke project team, including representatives from clinical and medical specialities, patients, and a wide range of other local stakeholders, had developed plans, which were taken forward to Stage D by the main contractor's healthcare architects, The Design Buro, for five new replacement theatres, the eight-bedded recovery bay, staff change and waiting areas, and extensive new storage space,



*The five new theatres include three equipped for general surgery, and two – featuring MAT laminar flow canopies – for operations including orthopaedic procedures.*

to replace the previous six theatres on the hospital's first floor. These existing theatres were 'showing signs of age', and were not fully compliant with current standards.

### Past track record

Colin Chong said: "Laing O'Rourke has good past experience of working with MTX Contracts, and I am delighted to say that, working closely with my project team, clinicians, nursing, and estates and facilities personnel, at the Health Board, the MTX team has made an excellent job of the new theatres, ancillary areas, and rooftop plant room, with the absolute minimum of disruption to clinical activities throughout their five months on site."

David Peacock, contracts manager at MTX, explained some of the challenges of the theatre redevelopment: "We came on board and really got started with the construction work on site in October 2011, after Laing O'Rourke and the asbestos removal contractor had completely

stripped out the area on the first floor of the 'H' block that housed the six former theatres. Working from a design brief originally developed by the LOR project team, the Trust – including clinical and medical staff, and the architects, we took the project on from Stage E of the design process to completion of the theatre facilities, adjoining recovery bay, anaesthetic rooms, waiting and staff change areas, and the third-floor plant room, in late April this year, about month ahead of schedule, and on budget.

"One of the most challenging aspects was that, while we undertook the construction work, two existing theatres, numbers 9 and 10 on the same, first floor, as we were working, had to remain fully operational, as did theatres 7 and 8 on the ground floor directly below. This meant extremely meticulous planning and scheduling, for instance when we were connecting up drainage, power cables, and medical gas etc, for the new theatres. Here, at various stages, we were having to



*Among a raft of sophisticated equipment within the light, airy, and modern-looking operating suite, are a ceiling-mounted Carl Zeiss surgical microscope (left); surgeons' control panels (centre) and KLS Martin marLED surgical lighting (right) supplied by Starkstrom, and MAT laminar flow canopies.*

drill into the ceiling voids both above the ground floor, which houses two '24-hour-a-day' operation emergency theatres that had to be kept available, and above the new theatres themselves. This was not to mention connecting new plant in the third floor plant room to the new first floor theatres, a process which meant passing various mechanical, electrical, and plumbing services infrastructure through ductwork and voiding on the second floor.

### Plant room re-fit

"The renovation of the third floor plant room," he continued, "saw us install not only new air-handling equipment, but also anaesthetic gas scavenging services and new electrical switchgear, while in the first floor theatres we were responsible for the installation of UPS and IPS panels, surgeons' control panels, lighting, ceiling-mounted pendants, MAT ultra-clean canopies for the two theatres earmarked for orthopaedic work, and even a large ceiling-mounted Carl Zeiss surgical microscope in theatre D. The complexity of connecting up the various building services elements saw us work closely with the Health Board's project team. This incorporated clinical personnel including surgeons, anaesthetists, and nursing personnel. The aim was to ensure minimal disruption to any procedures in the theatres being retained for use. (In fact theatres 9 and 10 on the same floor as the new theatres will continue to be used for some time to come, while theatres 7 and 8, on the ground floor, will soon be decommissioned). We were greatly assisted in our task by our MEP consultants, DSSR, and by the MEP company working for Laing O'Rourke, BDP."

### Removing asbestos

Before MTX could begin construction of the new operating theatres, and connecting up the new and old infrastructure, the asbestos contractor had, Colin Chong explained, to ensure that the 1,500 m<sup>2</sup> of floor area that would accommodate the new theatres, and adjoining recovery, waiting, and staff changing facilities, as well as an anaesthetic room for each of the five theatres, was entirely asbestos-free. He said: "This entailed the asbestos contractor's team essentially dividing the first floor space into two halves, in terms of sealed enclosures, with a buffer zone used at all times to separate the area where they were working from existing 'live' facilities."

In fact, MTX was able to start some of its preparatory work at one 'end' of the first floor area where the new theatre suite was to be located while the asbestos-clearing team were within their enclosure at the other. Kitted out in disposable paper suits and specialist respiratory equipment, the asbestos contractors working at Glan



*As part of its contract, MTX also stripped out, expanded, and fitted out with new HVAC equipment, a new third-floor plant room above the new theatres.*

Clwyd effectively remove the asbestos from the building's steel frame by hand, explained Colin Chong; the 'flock' asbestos is present not only on many parts of the steel frame, but also on the external façade walls. He said: "There are very strict protocols under the Control of Asbestos Regulations governing how the asbestos is removed, subsequently bagged up, stored, and removed, from a site like this.

### Preventing uncontrolled release

"Our key priority throughout the project has to be to prevent any uncontrolled release of asbestos which can cause serious health problems to those exposed

to it, including a variety of respiratory diseases, longer term. The asbestos contractors are extremely experienced, and their work, and any asbestos emissions, are scrupulously monitored, both by Laing O'Rourke, and by the Health Board's own external consultants.

"Within the sealed enclosures there is effectively a negative pressure to ensure that no asbestos material can get escape." He added: "Asbestos removal is not only laborious and painstaking work, but quite uncomfortable for those involved. After each shift, and having bagged up the asbestos for removal, each operative has to enter special decontamination facilities to ensure that, when they leave the site, they are entirely free of contamination. The asbestos removal programme will continue for many years here."

Back to the theatre redevelopment project, and MTX's David Peacock explained that, as soon as the area set to house the new operating theatres was asbestos-free and 'an empty shell', the MTX team set about building the five new theatres, new reception area, recovery bay, including a single room for patients who might be distressed or simply in a 'delicate' medical condition post-surgery, staff changing areas, and storage facilities, as well as the connecting corridors, and anaesthetic rooms, to the extremely high standard demanded by the client.

### Transforming the operating environment

David Peacock said: "Changing care pathways mean that surgical teams at a large NHS district hospital like this now not only undertake an ever wider range of procedures, but are also under pressure to optimise patient flow – both major considerations in our design and construction of the new theatres. Our



*MTX says undertaking some of the connection of building services, including wiring, plumbing, medical gases (pictured), and HVAC equipment, required 'intricate scheduling'.*



The new theatre suite is located on the first floor of the sizeable 1970s-built district general hospital, alongside a new eight-bed recovery bay (above left), patient waiting area (above right), staff changing facilities (below right), and expanded clinical storage facilities (below left). The latter are based around a new working method which will see surgical sundries delivered to the required location on trolleys.



goal, based on the Health Board's original brief, as well as on the views of surgeons, clinicians, and other stakeholders, and the architects' original plans, was to make the new operating suite light, airy, and extremely modern-looking, so as to provide surgeons and theatre teams with the best possible working environment, and minimise the anxiety and stress of patients coming in for a wide range of operations."

Dr Eileen Williams, a consultant anaesthetist at Ysbyty Glan Clwyd, who has been involved in the hospital development project since 2007, and is the clinical lead on the redevelopment scheme, said: "I am extremely impressed with the standard of the new theatres we now have, and, equally, that they were delivered on time, and on budget, to a very tight schedule. Meeting the project time deadlines was extremely important to us, and to the Health Board, since, while the asbestos clearing and other enabling work, and the actual construction of the theatres were ongoing, to continue to achieve the required patient flow, we switched quite a number of operations to two Vanguard mobile laminar flow theatres located in the hospital car park near the cardiac catheterisation laboratory, and to a refurbished MTX-supplied modular theatre. (The Vanguard theatres will be on site until May 2013).

"The co-operation between all the project partners really has been excellent.

MTX and Laing O'Rourke have proven highly responsive, and disruption to our surgical schedules has been minimal. This is despite the proximity of the ongoing building work to theatres which remained operational throughout much of the construction work. We were particularly keen that the new theatres should be future-proof, since surgical technology and techniques are advancing fast. For instance, one of the theatres is fitted out in such a way that subsequent incorporation of cameras above the operating field should be quite simple; one of our aims is to be able to stream and record footage of operations as a training and teaching resource.

### Looking to the future

"The theatres are also designed in such a way that they will accommodate robotic surgical equipment should we acquire it in future, and three incorporate laser cutting equipment and anti-coagulation systems for use during surgery. Each theatre now has its own dedicated anaesthetic room, and, with the layout of all the theatres the same, we know that locating equipment or consumables will be a much easier, more efficient process. We also have some excellent new storage facilities, based around a new working method which will see surgical sundries delivered to the required location on trolleys.

"From a broader point of view of overall

ambience and comfort, MTX has replaced a number of former glass panels with glazing, which makes the environment much brighter, and considerably less claustrophobic. The anti-bacterial paint (from Liquid Plastics) used on the walls, and the (Polyflor) anti-bacterial flooring, will greatly enhance infection control. In terms of the rooms themselves, while the new theatres are first-class, we are equally pleased with the new recovery area, which incorporates a single room for when a patient needs to be segregated, while, with ceiling-mounted pendants for much of the equipment, there are now fewer trailing leads, which makes surgery far easier, more efficient, and safer."

Dr Emma Hosking, consultant anaesthetist, spearheaded the theatre redevelopment scheme – a role which entailed her discussing with her surgical and other clinical colleagues their key requirements and priorities for the new theatres, and reflecting these back at project team meetings, as well as continuing to liaise with the architects and construction personnel as the building of the new theatres progressed. Dr Williams said: "We are quite proud that, as a Clinical Team, spearheaded by myself and my colleague, Dr Emma Hosking, we managed to work together to get the 1:50 plans drawn up in just under three months, culminating in a facility we are all very proud of."



One of the connecting corridors (left), and the new reception.

### Commissioning and training

In fact the new operating theatres became fully operational in late May this year, with around a month needed between MTX's completion of the new surgical suite for the equipment and facilities to be commissioned, and for surgical staff to be given initial training and induction, before surgeons could begin work in them.

David Peacock said of the project: "We are well used to complex theatre construction projects at MTX, whether using modular structures, or, as here, conventional building techniques. However undertaking some of the connection of building services, including wiring, plumbing, and medical gases, as well as new HVAC equipment, to the new theatres, while those remaining operational during our work could operate as normal, required some intricate scheduling, and the co-operation of the clinical and estates personnel at the Health Board. We were principally drilling into ceiling voids and working through ducting, the priority obviously being, as far as possible, to minimise noise and dust. The Health Board, in common with all large NHS healthcare providers these days, puts a very high priority on patient comfort, dignity, and well-being, and our aim was to ensure that, as far as possible, patients were unaware that we were there."

### Not an ideal location

Colin Chong of Laing O'Rourke added: "To be honest, if you'd asked me where I'd like

to have started this redevelopment project, I doubt very much that I'd have plumped right at the heart of the hospital, and, looking back on the project's complexity, I frankly don't know how we all completed it so successfully."

### Further phases

The theatre design and construction project is, of course, only the first phase of a multi-phase redevelopment of the hospital that will see Laing O'Rourke on site until mid-2017. Colin Chong explained: "In the short-term we will be decommissioning theatres 7 and 8 on the ground floor below the new operating suite, which is in itself a complex process." Decommissioning, he explained, would not only entail prior removal of any existing asbestos, but also bacterial decontamination, involving soft stripping work, and the deployment of specialist decontamination equipment. The decommissioning is, he explained, governed by a 12-stage protocol 'to ensure that it is undertaken in a controlled manner, ensuring that the clinical functioning of adjacent departments is not interrupted'. The ground floor theatres previously known as 9 and 10 have now been re-named A&B, with the new MTX-built theatres designated C-G (Theatres F and G are equipped with laminar flow facilities).

"As part of its contract," Colin Chong explained, "MTX also modified the existing

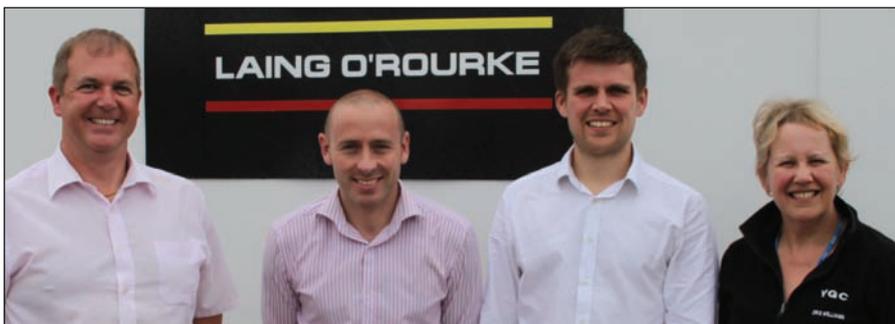
ventilation system to the hospital's mortuary, which is close to theatres 7 and 8 on the ground floor, and has just won the contract to construct a new mortuary, which will be modular build, comprising 15 separate modules." MTX has already started construction of the 400 m<sup>2</sup> facility, and is scheduled to complete it by Christmas this year. The £2.4 m contract will not only see MTX deliver the building, but also co-ordinate the supply and installation of specialist equipment, including mortuary tables, and refrigerant units, as well as the required MEP services, including large air-handling units, and a specialist drainage system.

### Mortuary project

"The new mortuary will be built on a greenfield site, some distance from patient areas, in line with current models of care," Colin Chong explained, "while, although this is still to be confirmed, the probability is that the existing mortuary will be decommissioned and redeveloped as part of the new Emergency Care quarter."

The LOR project team will also be starting work on a new Accident and Emergency facility extension, due for completion in September 2013, with the existing A&E facilities to be redeveloped into new outpatient and support facilities. Other firm plans unveiled as part of the 90-phase programme include the redevelopment of three existing floors of 30-bed wards into a combination of 24-bed, four-bedded bays, and single rooms, in a phase expected to commence in early 2014.

The LOR project leader added: "The risk profile on the redevelopment project as a whole is considerable given the extent of the asbestos still attached to the steel frame, walls, cladding, and in risers. The extent, scale, and scope, of the project as a whole are clearly very substantial. In this first phase, MTX must take great credit for the standard of its work, for its excellent planning and liaison with us as main contractor, and for the calm way in which it went about a complex contract delivery."



Key project team members on the theatre build project (from left to right): Colin Chong of Laing O'Rourke; David Peacock and Scott McCaskie of MTX, and Dr Eileen Williams, who is also clinical lead on the hospital redevelopment as a whole.