Creating an Innovative Healthcare Campus via (PFI) The Private Finance Initiative

New Norfolk & Norwich Hospital

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Well before its completion the New Norfolk & Norwich Hospital has excited interest in the United Kingdom and internationally.

The project incorporates leading-edge planning concepts, which anticipate emerging trends in healthcare delivery. And the project is a flagship of the Government's pioneering Private Finance Initiative (PFI) programme for rebuilding the nation's healthcare infrastructure.

At 800 beds and 95,000m² the hospital is the largest PFI healthcare project under construction in England. Serving a catchment area of up to 800,000 which includes Norwich City and the surrounding region, the new hospital is developed on a greenfield site within a science and education park three miles from the urban centre.

The new facility replaces two antiquated hospitals, both located on urban sites incapable of supporting renewal. The increased efficiencies to be derived from a new single-site hospital essentially pay for the new development. The scheme 'stacks up' financially in that it requires no new revenues, beyond the payments that the NHS currently makes to provide healthcare for the catchment area.

In theory, the scheme *could have* been accomplished by traditional public-sector funding and development strategies used by the NHS since its inception in 1948, but it is generally acknowledged that the new hospital *would not have* been accomplished without PFI.

Private Finance Initiative (PFI)

The Government of the UK faces a massive bill to improve the public-service infrastructure, much of which dates from Victorian times, or from the years immediately following World War II when expediency in reproviding facilities often took precedence over quality. Much of the existing infrastructure has been poorly maintained and is increasingly burdened with the high costs of backlog maintenance. Most of it is poorly suited to the needs of an increasingly forward-looking society.

In the healthcare sector alone the need for more than £3 billion of new facilities has been identified – just to catch up with current needs.

The PFI programme, initiated by the Conservative Government in the mid 1990s, has, subsequently, been embraced and expanded by the current Labour Government. This unusual bi-partisan support comes from the realisation that PFI appears to be the only way to accomplish this development programme. PFI harnesses the ability of the private sector to design, build, finance and operate improved facilities,

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whilst assuming the up-front costs and a high degree of risk for initial development and long-term facility management. The Government, through the NHS, assesses the need for projects within the framework of the nationalised healthcare provision. Through a process of evaluating the healthcare and financial benefits, certain projects are prioritised for release to private-sector bidding. Throughout, the NHS maintains full responsibility for providing clinical services "free at the point of use", which remains a key element of the social contract between Government and the electorate in the UK.

Private-sector bidding teams generally consist of investor/developers who lead the effort and who shoulder the bulk of the risk, and paid team members in the areas of legal, financial, medical planning, architecture, engineering, facilities management, construction, equipment and information technology – all of whom are expected to share some element of the risk. The principal equity partners are often related to the construction and facilities management contractors, because these parties have the deepest pockets and stand to derive the biggest downstream benefit from a winning bid – a large construction contract and, thereafter, an even larger (25–50 year) facilities management contract.

Bidding generally consists of several stages: six competitors are invited to participate in a two-month Preliminary Invitation to Negotiate (PITN) stage; three competitors in a three-month Invitation to Negotiate (ITN) stage; two or three in a two-month Best and Final Offer (BAFO) stage – leading to the selection of a 'Preferred Partner'. At this point the NHS hospital management and Regional Health Authority work with their new private-sector partner to refine all aspects of the proposal – an eight-to-twelve-month process leading to 'Commercial Close'. This only occurs after it can be shown that the proposed private-sector scheme delivers better value for money than an independently-developed Public Sector Comparator.

After Commercial Close the design drawings are completed, construction commences, equipment is ordered and Facilities Management and Information Technology strategies are implemented to support the scheme as it becomes available for occupancy by the hospital. For a large project, bidding costs often approach £1 million at the point where Preferred Partner is selected, and £2 million at the point of Commercial Close – all of which are at risk to each bidder. This is not an enterprise for the faint-hearted.

It is in the above context that we view the development of the New Norfolk & Norwich Hospital.

Determinants of the medical plan

- *Matrix Pattern of Organisation – Underlying Concept*

The aerial view reveals the underlying Matrix Pattern of Organisation: purpose-built facilities for Wards, Diagnosis & Treatment and Ambulatory Care are arranged in zones – each developed according to a specific range of requirements for configuration, servicing, environment and flexibility. Clinical services are arranged to cross these zones so that all aspects of each service can be physically integrated.

- *Linked Wards – Domestically Scaled*

Each Ward block has 36 beds per level, including 12 single rooms, configured to maximise visibility from nurse bases and access to support areas. Wards are linked in aggregations of 72 or 108 beds for flexibility. Adjacent to each ward is a Ward Support Block which accommodates clinical and non-clinical support functions, such as Physiotherapy, Day Hospital, staff facilities, catering, etc. These are best provided adjacent to, but not within, the ward and enable standardised inpatient areas to be adapted to specialist services.

- *Ambulatory Centre – Facilitates One-Stop Care*

Outpatient clinical modules combine high throughput with amenity. They are configured and serviced to suit their unique requirements. A reception area for each module controls access to an efficient cluster of clinical and support rooms. Modules are linked side by side for flexibility, and are reached through light-filled circulation spines that simplify wayfinding.

These modules are grouped with the Day Procedure Unit and the full diagnostic and therapeutic capability of the core hospital to create an integrated 25,000m Ambulatory Care Centre leading the way to one-stop care.

• *Diagnostic & Treatment Blocks – Loft-Style and Heavily Serviced*

The Diagnostic & Treatment Blocks are located at the heart of the hospital to directly support the inpatient wards and ambulatory services attached on either side. The D&T Blocks comprise heavily serviced loft-style spaces that support the most efficient and flexible arrangement of high-tech functions, including Operating Theatres, Radiology, A&E, Pathology, CSSD, etc.

• *Core Amenities – Enrich Environment*

Twin atria and hospital streets provide spacious, light-filled and clear access to all areas. They also accommodate amenities that enrich the environment for staff, patients and visitors: the staff-oriented Education Centre doubles for community health education; similarly chapel, retail and dining facilities are close at hand for all.

• *Welcoming Campus*

Despite its substantial size, the campus is welcoming and easy to use. Upon arrival, one turns left for car parking and entry to inpatient areas – right for A&E and outpatient areas. Atria connect both sides and provide hubs for hospital-wide activities. Large floor plates are enriched through the use of courtyards, controlled vistas and natural light and ventilation. Monolithic scale is minimised through the use of varied building types assembled in a tightly-knit, thoughtfully-scaled healthcare village.

Ezternal planning issues

• *Regional Planning*

The 55 acre greenfield site is located three miles from the centre of Norwich, adjacent to the University of East Anglia (UEA) and an emerging science park. The choice of the site was controversial owing to its distance from the town centre, poor public transportation and a local road system that is inadequately linked to regional motorways. Organised opposition from both urban commercial interests and environmental lobbyists backed rebuilding on the site of the large existing hospital in the town centre.

Whilst recognising that each of these concerns was valid, planning permission was granted because the project as proposed on the outskirts of town, provided the only feasible option for the provision of a modern healthcare centre. Furthermore, it was recognised that the synergy between the hospital and its academic and research neighbours would provide an important economic engine for the region overall. Also, closer study determined that, due to its widespread catchment area, 85% of patients would travel by car regardless of where the hospital was placed, and that improvement to roads and public transportation would mitigate traffic concerns.

• *Land Forms Influence Building Configuration*

The rectangular site, long in the east-west direction, is accessed from its lowest point, at the southeast corner. Land contours sweep in broad curves with the length of the site rising 12m to the north west corner.

This land pattern strongly influenced site planning. The long dimension of the building plan was placed along the principal contours, minimising the need for excavation, whilst imparting a gentle curve to the plan, and a one-storey offset between the wards to the south and ambulatory care elements to the north. The curve enabled the formation of two entrance forecourts along the southern edge and a single large entrance plaza along the northern edge. Atria connect the forecourts and plaza enabling easy travel between them. The change in level facilitates the separation of patient and visitor traffic in the atria, from the service traffic, which crosses at a lower level.

- *Internal Roads and Car Parking*

A ring road is provided within the hospital site from which all internal entry points are reached. Roads and parking for wards are configured informally along the southern edge, integrated with the similarly informal landscaping of that zone. This satisfies the dual requirement of placing car parking close to ward entrance points, whilst preserving a favourable outlook from patient rooms.

A denser, more formal arrangement of roads and car parking is provided for ambulatory care along the northern edge, in a series of squares defined by hedgerows. A similar car parking arrangement is provided for Accident and Emergency. A large staff car park, to the west, and a walled service yard to the southwest, complete the arrangement of roads and a total parking provision on site for 2,300 cars.

- *Landscaping*

The pattern of informal landscaping to the south extends to the adjacent open fields and the campus of University of East Anglia. This is developed with particular care at the entrance point to the hospital site at the southeast corner. The more formal and geometric landscaping to the north, in addition to supporting the car-parking scheme described above, relates to the dense development of the science park proposed along that edge. Additional landscaping in the form of pocket gardens, is provided within the internal courtyards and spaces between building elements.

- *Massing*

The massing of the building complex was determined by three principal factors. Firstly, the Matrix Pattern of Organisation contributed varied, purpose-driven building types linked via the hospital street and atria. Secondly, the form and orientation of the land contributed to the contour-hugging gently curved form broken by entrance courtyards. And finally, the requirements of planning authorities and public sensibility required that the building be low (rarely exceeding three storeys) and be fitted with tern-coated-steel pitched roofs. The result is a building complex which, despite its great size and technical complexity, is composed of a series of modestly scaled, approachable buildings.

Building issues

- *Flexibility & Adaptability*

Measures to enhance adaptability to changing healthcare needs are manifest throughout aspects of planning and design. Clinical modules for ambulatory care are based on clusters of standardised examination and consulting rooms, the numbers of which can be adjusted by varying the soft boundaries between services, and the support of which can be adjusted by varying procedures and equipment in adjacent clinical support areas. Similarly, standardised wards can be adapted to specialist needs through modifications to the highly adaptable Ward Support Blocks which are located adjacent to each ward. And, the highly-serviced, loft-type spaces of the D&T block are, by their nature, planned to accommodate the constantly evolving techniques and equipment therein.

To enable an appropriate level of adaptability, principal elements of the building fabric have been prepared to support change. Fire compartments are made to be as large as possible to maximise the number of non-rated partitions – which can be more readily moved. A group of standardised, interchangeable components provides the majority of elements for walls, ceilings, doors, fixtures and fittings. Service systems, described more fully in the next section, are designed to support future shifts in requirements for environment and equipment. The facility is fitted with a highly adaptable Information Technology infrastructure, which eventually will support a fully paperless hospital.

Furthermore, the overall plan sets out areas for expansion of wards, diagnostic and treatment and ambulatory care functions, as well as sites for the development of research facilities, staff housing and further educational facilities.

Taken together, the above measures, based on the Matrix Pattern, support a degree of flexibility exceeding that which is practically achievable through modular, universal building systems.

- *Deep Plan vs. Shallow Plan – Hybrid Approach*

Before 1950, hospitals worldwide, were developed on the basis of shallow floor plans with rarely more than 8m between outside window walls. This accommodated the relatively simple planning requirements of the time, whilst providing natural light and ventilation to most rooms. The advent of more complex equipment and clinical plans, often based on clustering rooms, plus the advent of air conditioning enabling the use of interior space, resulted in deep planning. This particularly took hold in North America where energy was relatively cheap and it was felt that significant planning efficiencies could be derived via deep planning.

In Europe, higher energy costs, together with a culture more oriented to green issues, adopted deep planning more cautiously – or in certain instances, not at all. For instance the Nucleus system, developed by the NHS as the principal template for all clinical areas, is essentially a shallow-plan system, achieved by imposing the benefits of which are various compromises to departmental planning.

The Norwich scheme attempts to find a middle road, in which flexible deep and shallow plans are mixed for greatest benefit. Studies revealed that, for wards, patient rooms requiring windows can be wrapped around a core of internally placed support areas where resulting staff efficiencies offset higher energy costs. This is also true of ambulatory care areas where the most efficient grouping of examination and consulting rooms can be achieved by wrapping these around an internal core of clinical support.

For diagnostic & treatment areas deeper planning is typically required to achieve maximum clinical efficiency. This is reinforced by the functional requirement for high environmental control – air conditioning to many rooms regardless of their location vis-à-vis outside walls. However, this runs counter to clinicians preference for natural light and view in most clinical areas, even in high-tech rooms such as theatres – which we took to be a significant requirement.

The plan for Norwich addresses the above issues as follows: bespoke ward and ambulatory care blocks are planned in what could be called hybrid floorplates in which two-thirds of rooms benefit from outside light and ventilation. Diagnostic & Treatment areas are afforded large deep-plan space for efficiency; however they are leavened by the insertion of courtyards in cases where environmental requirements outweigh functional efficiency. In these areas approximately one third of all rooms and two thirds of key clinical rooms benefit from outside light.

No doubt the appropriateness of this hybrid approach could be debated, but it appears to strike the best balance for Norwich. It could be varied to suit differing requirements of other projects.

- *Sustainability*

By their nature major hospital complexes consume much space and energy – which has tended to *increase* with the advancement of high-tech equipment, more stringent requirements for patient support, and the use of deep planning for improved clinical efficiency.

Furthermore, the location of such a complex away from a city centre and established routes of public transportation further tends to be energy inefficient. To the extent that was feasible within the context of the Norfolk & Norwich project, each of the above issues was addressed, resulting in a project that thoughtfully responds to issues of Sustainability.

The Matrix Pattern results in building blocks that are well suited to their designated range of functions. These blocks optimise the use of natural means to meet clinical and statutory requirements – whilst avoiding wasteful over-provision of mechanical and electrical services. When services are required they have been configured to gain economies of scale, through appropriate centralisation as well as fine-tuning that can be best achieved by appropriate dispersal of function-specific services in each of the building blocks.

Similarly, achieving a sound balance between deep-planning and shallow-planning contributes to the prudent use of natural light and ventilation whilst enabling the benefits of efficient departmental planning.

The overall building configuration, following the curved line of land contours minimises the need for large-scale earth movement. It also ensures a southerly orientation for the majority of patient rooms. These rooms have vertically proportioned floor-to-ceiling windows that enable light to penetrate deep into occupied spaces. Sun screening and double glazing is provided to minimise extremes of heat gain and loss through windows. The principal wall material is heavy masonry, which modulates temperature fluctuations through energy saving thermal mass.

External materials are selected to weather naturally and require little maintenance: walls are brick and glass; roofs are tern-coated stainless steel. Internal materials consist primarily of gypsum board partitions over metal stud, with timber doors. Ceilings are of mineral fibre. Ninety percent of all materials in the construction of the building are recyclable.

To reduce dependence on private automobiles, a Green Travel Plan was developed which includes car parking by staff – and the subsidy, by the hospital, of a public bus service to the hospital site.

Each of the elements described in the above outline is more fully developed in related sections of this paper.

- *Structure*

The structure of the building was developed to enable optimal medical planning, future flexibility, integration with services and speed of construction. As with other aspects of the project, the structure varies with each of the three principal building types that comprise the overall project. Notably, the central Diagnostic and Treatment zone is structured in concrete, whilst the wards and ambulatory care blocks are structured in steel. This mix was driven by both functional planning and buildability issues.

Structural bays of the Diagnostic and Treatment blocks, measuring 7.8 x 7.8m, are spanned by beams along column lines and are infilled with one-way ribbed slabs. Voids cast at column-beam intersections enable placement of service piping at column points. Shear walls are placed at lift and service shafts. The strength and mass of the concrete system provides secure mounting points for heavy equipment, whilst limiting vibration as is required for delicate diagnostic equipment and procedures. This system, thoughtfully coordinated with medical planning, ensures flexibility for initial layouts and for the accommodation of future change.

The Wards and Ambulatory Care blocks are structured in steel with floors of concrete-topped metal decking, in a pattern that reflects the repetitive spacing of clinical rooms. The system readily adapts to numerous penetrations by service piping, as well as to the special conditions such as projecting day rooms and pitched roofs.

The atria are structured in steel to maximise the impression of weightlessness and coordination with the subsidiary structures that support large glazed areas, bridges and freestanding staircases.

• *Service Systems*

The Central Energy Centre contains a hot-water boiler plant which uses either natural gas or light fuel to allow the most economical selection. The plant includes a Combined Heat and Power (CHP) unit which will meet the base electrical and heating load throughout the year in an energy efficient manner. Waste heat produced by the CHP is recovered and used to heat the cooled return water from the heating system. This can produce enough hot water to meet the hospital's night-time heating and domestic hot water load.

The Energy Centre also incorporates the Main Electrical Incoming Supplies together with the site Standby Generator plant, the Main Incoming Water Storage and Pumping systems and the Medical Gases primary installation. A fully-computerised Building Management System (BMS) controls the heating and ventilation systems throughout the hospital.

Services are distributed horizontally, at Level 1, through a tunnel running the length of the complex, with risers serving roof-top plant rooms located above each of the principal building blocks. HVAC units, appropriately sized to functional need, are located in each of the plant rooms – the largest being that over the Diagnostic & Treatment block which serves the theatre suite.

User perspective

• *Women's & Children's Centre*

The integrated Women's & Children's Centre, located at the western end of the complex, provides inpatient and ambulatory services for Maternity, Gynaecology and Paediatric patients. The inpatient components are accessed through the southwestern entrance drive and adjacent car park, via the reception/information point inside the atrium lobby and lifts to Paediatrics on Level 2 and Maternity and Gynaecology on Level 3. The southerly view, over the Yar Valley from the lift platforms and bridges at the upper levels, is not only pleasing, but provides a reassuring point of orientation.

The Maternity Suite is based on the single-room Labour-Delivery-Recovery concept, with integral Obstetrics Theatre and Special Care Baby Unit. Further back-up is available in the adjacent main theatre suite. Women requiring an extended stay, pre- or post-birth, are placed in the adjacent Maternity ward with light-filled single and multi-bed rooms, well-baby nursery and amenities for mothers and partners.

Gynaecology patients occupy an adjacent, separate ward, located close to the main theatre complex. On the same level, to the north, are Maternity and Gynaecology ambulatory care facilities reached via internal corridors, (which are particularly helpful for staff movement), and via the entrance to ambulatory care from the North Entrance Plaza.

A similar pattern underpins the plan for the Paediatric Unit. A core of high-tech diagnostic and treatment functions, including a dedicated Paediatric A+E, is located between wards to the south and ambulatory care to the north. The principal waiting area for Paediatrics is located across from a protected outdoor play area, and benefits from special interior design, graphics and art which are unique to the Unit.

• *Ambulatory Care Centre (ACC)*

A comprehensive Ambulatory Care Centre, occupying 25,000m², supports the hospital's commitment to innovative use of outpatient and day-case procedures – 'one-stop' when possible. The ACC comprises a horseshoe-shaped cluster of facilities which surround the North Entrance Plaza. Patients arriving by private car, taxi, ambulance and public bus transport are discharged under weather-protected canopies that lead to the entrance points of the ACC and the atrium spaces of the core hospital.

Outpatient clinics are located in the legs of the horseshoe, along an internal spine that provides a clear, light-filled path from entry and reception, to departmental waiting and clinic areas and to the core hospital diagnostic and treatment facilities for specialised support.

The Day Procedure Unit, with six operating theatres, four endoscopy suites and support areas, occupies the centre of the horseshoe – which is located directly below the main theatre complex, above CSSD and close to the full diagnostic and treatment capability of the core hospital.

• *Emergency Services Centre*

Emergency Services are organised to enable assessment and treatment of unscheduled patients in a comprehensive and orderly fashion. This minimises the disruption to scheduled clinical procedures, which impedes the ability of many hospitals to optimise care. The principal elements of Emergency Services are the Accident & Emergency Unit, the Assessment Ward and emergency-oriented components of investigative services.

Accident & Emergency is located at the easternmost end of the hospital, closest to the site entrance point. A+E is accessed from the hospital ring road, via a dedicated drive that leads to the covered ambulance bay. A helicopter landing pad is located adjacent, for use in bringing emergency patients from long distances. From there patients enter the trauma or general treatment areas of A+E, or the Assessment Unit via the eastern-most end of the Hospital Street.

Walk-in patients to A+E are dropped off at a dedicated vehicular entrance with adjacent car parking. A triage nurse makes an initial determination of the patient's condition and directs the patient to the appropriate component of emergency services.

The Assessment Unit is more comprehensive than that found in most hospitals. It is divided into Medical and Surgical zones, each consultant-led. Patients are directed to the Assessment Unit via A+E or by General Practitioner. Clinical assessment, which may involve investigative procedures such as imaging, clinical measurement and endoscopy, typically require less than a six-hour stay, after which a patient will be discharged or admitted to an appropriate part of the hospital for continuing treatment.

• *Cancer Care*

A comprehensive Cancer Centre comprises inpatient wards, a day hospital for infusion therapies, an outpatient consulting and examination suite, a radiation therapy suite with four linear accelerators, and research labs and offices. Owing to the delicate condition of many of its patients, and the fact that many of them come repeatedly, the Cancer Centre is planned as a discrete unit, accessed via its own entrance drive and car park. All patients are received at a central reception point and waiting area, from which they are directed to appropriate clinical areas.

Despite its separateness, the Centre is located adjacent to the pathology laboratory with which it has much interaction, and close to the core diagnostic and treatment facilities of the hospital. Internally, the components of the Centre are closely linked for efficiency, and various measures have been taken to create a welcoming and supportive environment: the wards benefit from southerly exposure, the main waiting area overlooks the landscaped forecourt of the hospital, the day hospital is positioned adjacent to a large internal courtyard, circulation paths are direct, easily understood and will be enhanced by the Trust's art programme – as will the high-tech treatment areas. The colour scheme, selected from the flexible palette developed for the hospital overall, was chosen with particular care to quietly connote life-affirming optimism.

• *Inpatient Surgery*

The main theatre suite is located in the central Diagnostic & Treatment block, directly beneath the plant room for efficient provision of mechanical services. The suite comprises 14 theatres, plus two misused spaces which are prepared for future conversion to theatres. Theatres

The Norfolk & Norwich PFI Hospital under construction.

are generously sized, for flexible use. They are arranged in pairs, to share exit bays and preparation areas, but are otherwise individually supported by anaesthesia, scrub and utility areas. Four theatres are fitted with Laminar Flow, for ultra-clean air distribution to the surgical site.

In response to the requests of surgeons and operating staff, theatres are positioned at exterior walls and are fitted with windows and integral, adjustable screens to afford controlled, natural light and view.

Surgical patients require only a short journey from ward to theatre suite, which enables more precise scheduling and convenience to patients and staff. Patients enter at a point central to the unit and follow a daylit path to theatre. Following surgical procedure, patients recover in an innovative 24-bay unit arranged, radially, to optimise nursing support.

- *Inpatient Wards*

Each of the 23 typical wards comprises 36 beds arranged in a square shape around a core of nursing support. Twelve beds are in single rooms, each with en-suite facilities. The remaining beds are in 4, multi-bedded rooms configured in pairs around sub-nursing stations. This arrangement provides accommodation for all patients requiring single rooms for clinical reasons, and provides HDU-like observation for all remaining patients – whilst enabling the requisite separation by medical condition and sex. The environment experienced by each patient is that of a 12-bed sub-ward, domestically scaled.

Each bed space is fitted with a headwall containing medical gases, data points, patient communication, entertainment and lighting. General room lighting is provided from wall-mounted uplighters, which minimise glare. Large floor-to-ceiling windows enable natural light to penetrate deep into patient rooms. Light-filled day rooms provide additional amenity at the corners of the ward.

The main staff base is located at the entrance to the unit, enabling 24-hour reception and control. The nursing support core (which contains clean and dirty utility rooms, treatment room, beverage bay and assisted bathroom) is readily accessed from the main staff base as well as from the decentralised bases.

Ward blocks have been developed to a standard plan which enables flexibility of assignment and use. Further flexibility is provided by linking ward blocks side by side to form groupings of 72 and 108 contiguous beds.

A Ward Support Block is placed adjacent to each ward. This provides accommodation for those functions that need to be *near* but not *in* the ward (such as staff changing, catering and conference rooms). It also provides accommodation for specialised functions required to tailor each ward to the unique clinical requirements of specialities (such as Physiotherapy in support of Orthopaedics) – and other decentralised clinical support, used to minimise unnecessary movement of patient and staff. This anticipates a significant objective of Patient-Focused Care.

- *Supportive Environment*

Underlying the design of the hospital is the belief that environment strongly affects the well-being of patients and staff, and that the designer’s tools must be used to achieve a supportive environment.

The varied building types and massing derived from the Matrix Pattern contribute reassuring, domestic scale to what otherwise could appear to be an overlarge, forbidding complex. The Atrium spaces, along with external and internal courtyards and nodes along the hospital street not only add amenity, but also create events that assist in wayfinding. This is reinforced by the use of colour-coded ‘clouds’ that mark department entry points and waiting areas. Whenever possible, departments are configured with clear paths of circulation and points of reception enhanced with natural light and air, directional signage and a Trust-sponsored art programme.

A palette of interior finishes and colours enables individual selection within a coordinated building-wide framework. Thoughtful posi-

Key statistics

Catchment Population:	500,000 for secondary services 800,000 for tertiary services
Clinical Activity (per annum):	96,000 FCEs 300,000 Outpatient visits 60,000 A&E Attendances
Site Area:	55 acres / 22 hectares
Gross Building Area:	95,000 m^2
Car Parking:	2,300 spaces
Inpatient Beds:	809

Core functional content

Operating Theatres:	Inpatient Theatres x 15, Daycase Theatres x 8
Gastroenterology:	Endoscopy Suites x 4
Angio / Cath:	Cardiac Cath Lab, Angiography Procedure suite
Imaging:	MRI x 1, CT x 2, General Radiodiagnostic x 9, Ultrasound x 4, Fluoroscopy x 3, Skull x-ray x 1, Chest x-ray x 1
Maternity:	Labour Delivery Recovery Rooms x 13
Chronic Renal Unit:	Dialysis Bays x 17
Critical Care Unit:	30 Beds (ICU/HDU/CCU)
Oncology / Haematology:	Linear Accelerators x 4, Infusion Bays x 11
Specialist Outpatient Departments:	Cardiology, Respiratory, Rehabilitation, Orthopaedics, Rheumatology, Renal, Diabetes, Paediatrics, Obstetrics, Gynaecology, Breast Imaging, G.U. Medicine, General surgery, Plastics, Oral / Maxillo-Facial / Dental, Neurology

Credits

Client:	Norfolk & Norwich Healthcare NHS Trust
Consortium Leader:	Octagon Healthcare
Building Contractor:	Laing Limited
Facilities Manager:	Serco
Architect:	Anshen Dyer
Services Engineer:	Hoare Lea & Partners
Structural Engineer:	WSP Consulting Engineers