South Liverpool NHS Treatment Centre
Reducing CO_2 Emissions Case Study

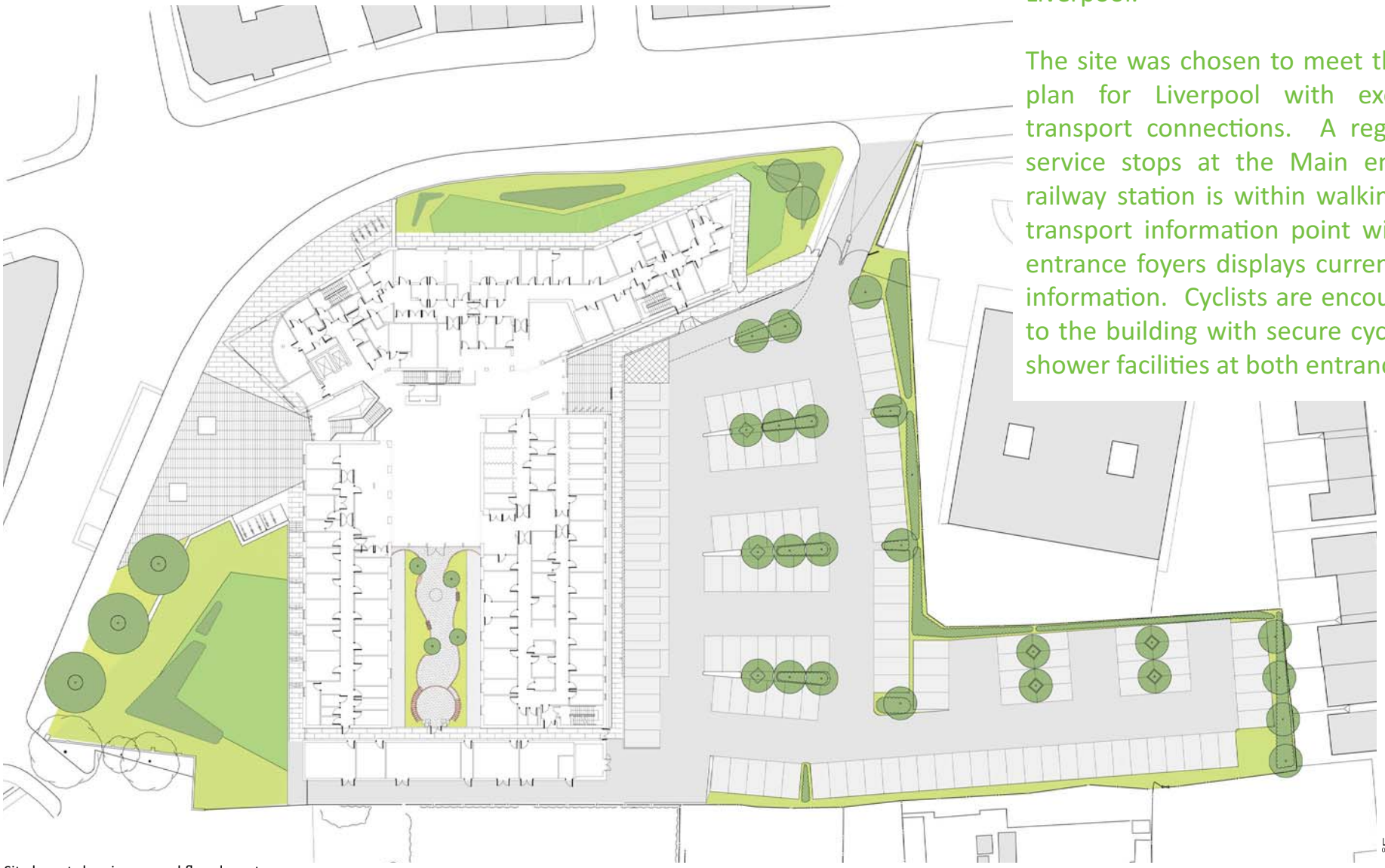
MBLA Architects+Urbanists

www.mbla.net

Site

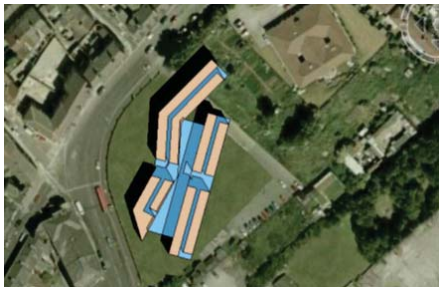
The PCT's Outside of Hospital Strategy aims to bring Secondary care services to local communities. South Liverpool NHS Treatment Centre is the first of three proposed Level two primary care treatment centres across Liverpool.

The site was chosen to meet the PCT's travel plan for Liverpool with excellent public transport connections. A regular local bus service stops at the Main entrance and a railway station is within walking distance. A transport information point within the main entrance foyers displays current public travel information. Cyclists are encouraged to cycle to the building with secure cycle storage and shower facilities at both entrances.

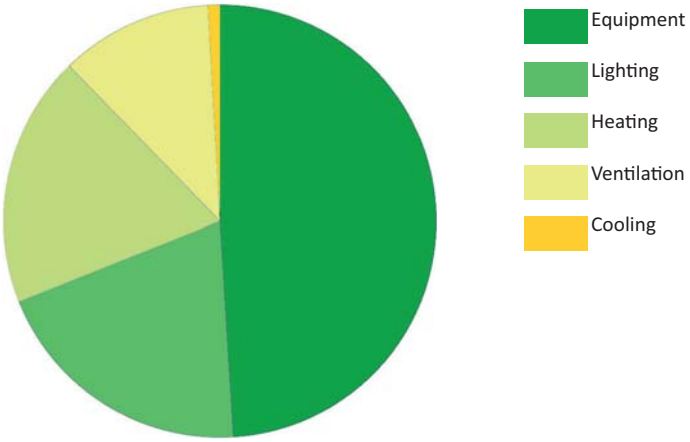


Site layout showing ground floor layout

Fabric + Energy



Early massing studies to determine best orientation and strategies for natural ventilation



Pie chart showing total buildings energy consumption

The design team set out to improve energy efficiency from initial to concept design stage. Through environmental simulation modelling software, orientation and layout were optimised. The building achieves a 23% improvement over the base level CO_2 emissions criteria set out in Building Regulations Part L, achieving BREEAM Excellent and an Energy Performance Certificate of B with a score of 37.

Maximum credits within BREEAM for 'Low or zero carbon technologies' were achieved by providing a highly insulated building with 50% improvement on Building Regulations limiting U values, a low air permeability figure of 7.5 m3/m2.hr and renewable technology combination.

The Project Services Engineer, PMA, ran early massing options through their thermal modelling software. These options differentiated only between solid, glazing, corridor and room. These early results started to set design parameters for the building; whether the communal space was heated or unheated or the optimum size of glazing on a particular elevation to influence the overall concept design.

These initial massing studies formed the basis of developing a strategy for achieving CO2 reductions in the fabric, with or without renewable technology. Software used by PMA allowed them to input varying figures into the software testing options in U value, air permeability and renewable energy supply to meet the projected buildings total energy consumption; calculated at 17.23GJ/100m^3 based on the building being in operation 24 hours a day, 7 days a week.

PMA advised that at the levels above, further enhancement of the insulation within the external fabric of the building would have little impact on CO_2 reduction. If CO_2 reduction would be required without renewable technology this would have to be achieved by reducing the air permeability further to hit the target figures.

Renewables

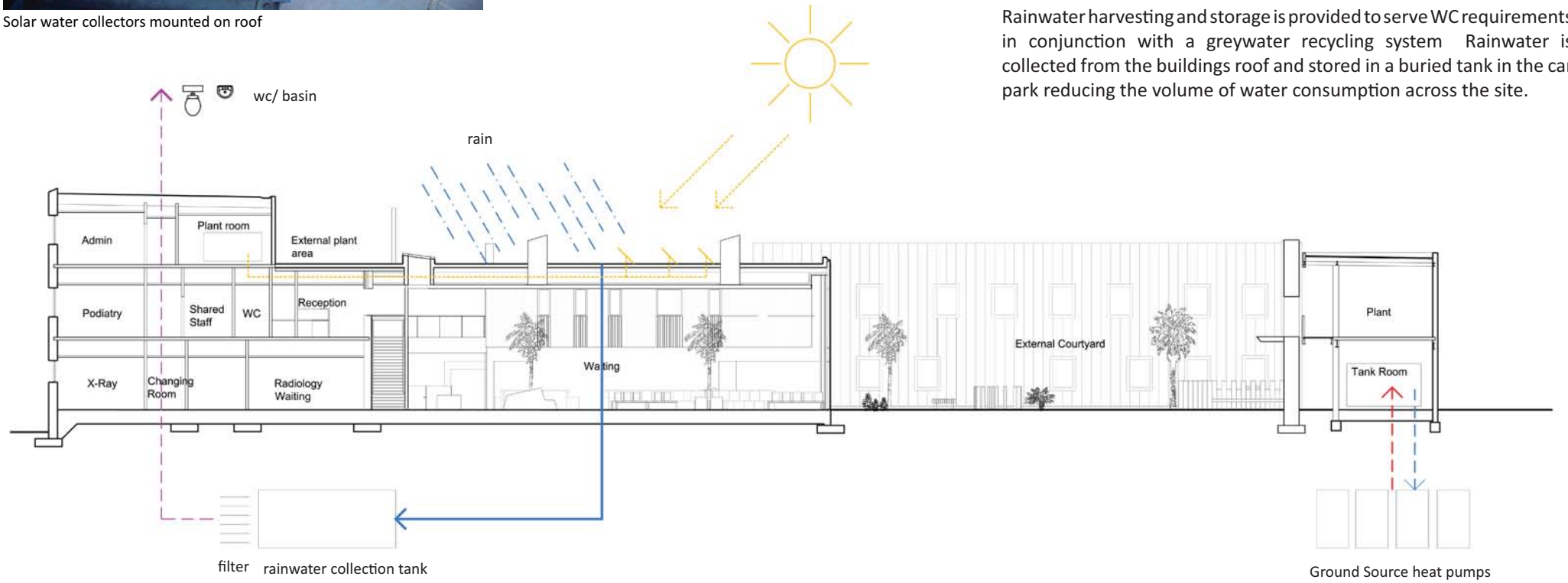
44% of the buildings energy demand is generated by renewable technology.

Ground Source heat pump's (GSHP) draw heat from the ground in winter converting it into energy through twenty six 150m deep boreholes located within the car park area via pre-insulated pipe work at 8m centres. The system is reversed in summer so that heat can be returned into the ground on a cooling cycle. GSHP's provide 50% of the buildings heating and cooling. The GSHP operates at coefficients of 5.5 in cooling, and 4.5 in heating. The annual energy draw anticipated from the ground is approximately 150MWh. This vastly outperforms the efficiency of conventional air conditioning units.

Solar water collectors are mounted onto the main roof facing the car park and provide the domestic hot water requirements of the building, proving particular advantageous in summer when the buildings heat load requirement is low and the GSHP provide cooling.

Rainwater harvesting and storage is provided to serve WC requirements in conjunction with a greywater recycling system Rainwater is collected from the buildings roof and stored in a buried tank in the car park reducing the volume of water consumption across the site.

Solar water collectors mounted on roof



Cross section through building showing renewable technology strategy

User Comfort

Staff roof terrace

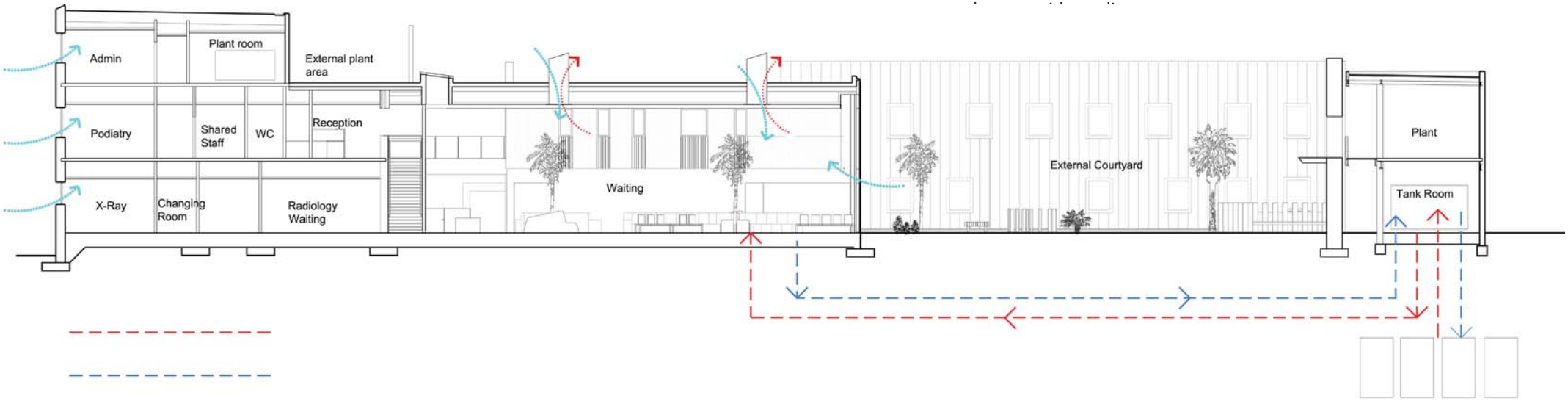
View out of atrium towards courtyard

A third of the buildings occupied spaces are naturally ventilated.
Staff have commented on the 'bright and airy' nature of the building and how fantastic it is to have access to fresh air as part of their working day.

Windows were sized around the perimeter to enhance passive natural ventilation provision and eliminate the requirement for mechanical ventilation, except for specialist rooms requiring such under healthcare technical guidance.

Two Monodraught SOLABOOST units were mounted on the roof directly above the central atrium area providing natural ventilation. These supply fresh air into the space and encourage the flow of warm air out of the building particularly for night time cooling. Their performance is significantly improved by the addition of a solar driven fan that brings in additional fresh air maintaining zero running costs for the unit.

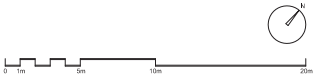
In winter months Ground source heat pumps provide the energy source for under floor heating within the atrium and radiant ceiling panels within habitable rooms.
In summer months the Ground Source heat pumps work on a reverse



Ground source heat pumps

Cross section through building showing heating and cooling strategy

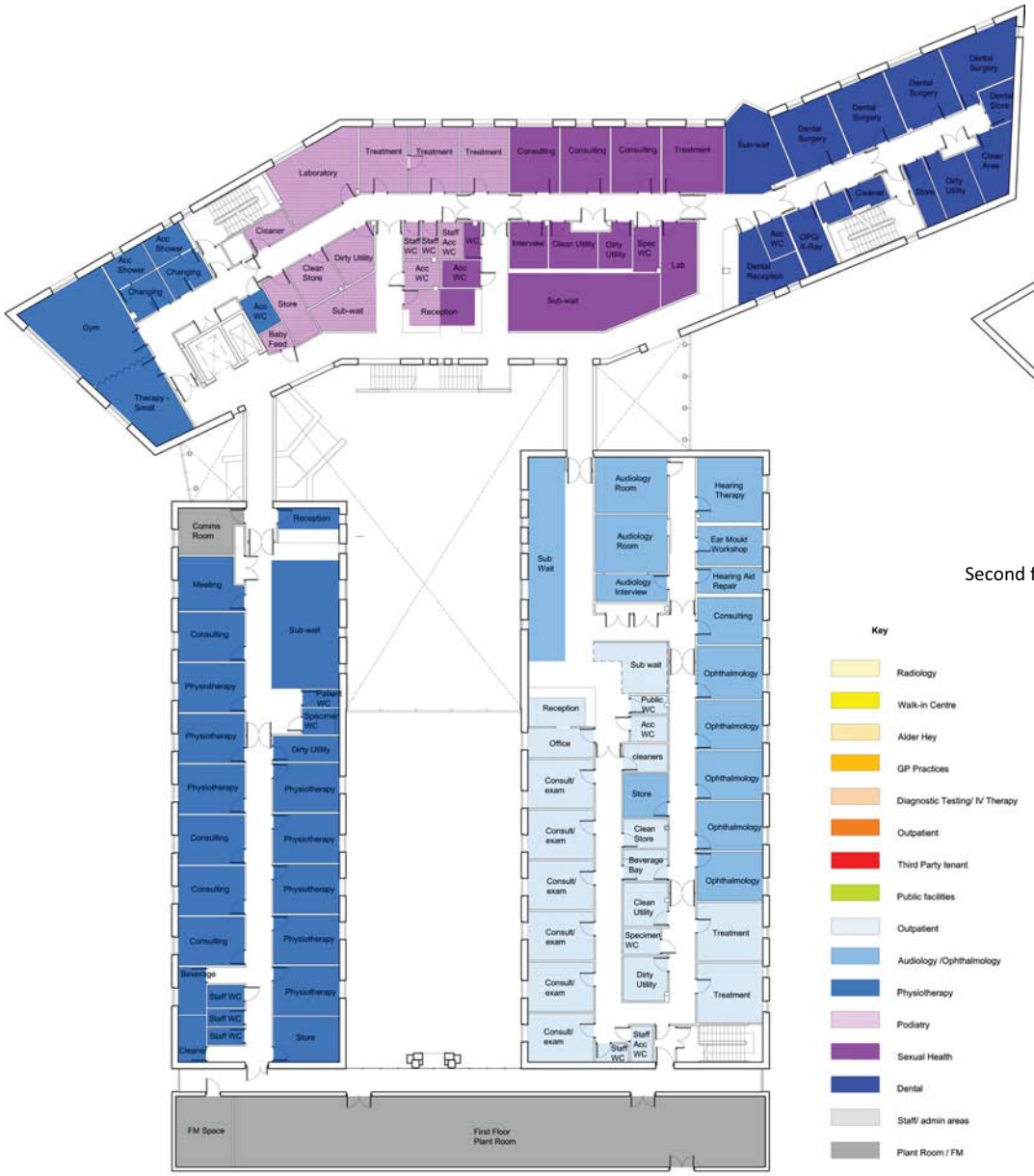
Layout



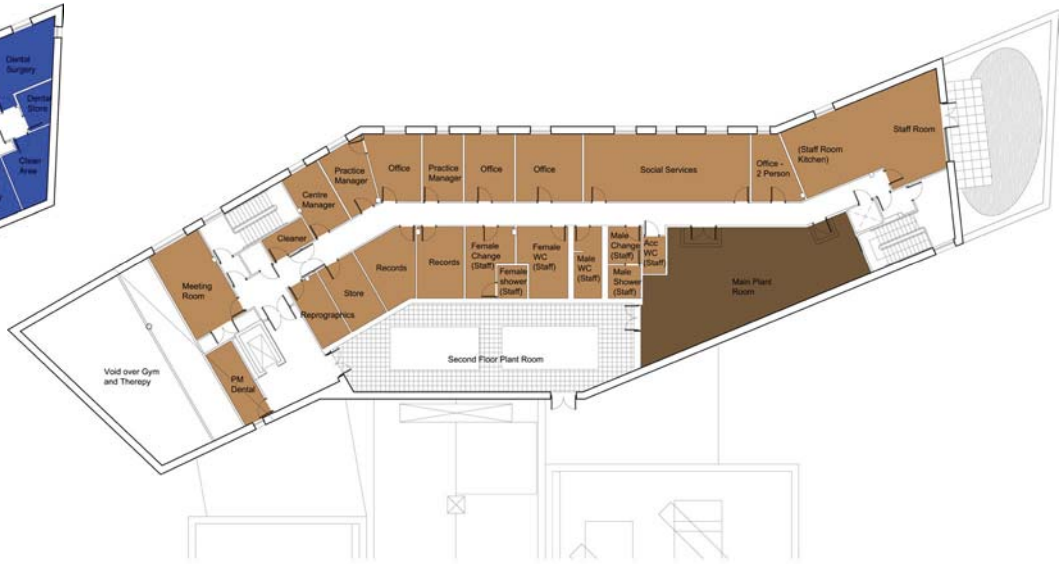
Lower Ground floor layout

Upper Ground floor layout

Natural Light



First floor layout



Second floor layout

The buildings layout configuration has allowed day lighting to be maximised with high natural light levels into habitable spaces reducing the energy required to artificially light spaces whilst providing an uplifting environment for public and staff.

Accommodation blocks are arranged around a central atrium space which provides natural light into internal spaces located directly off it as well as views out into the external courtyard.

Rooflights were utilised to further enhance natural daylight within waiting spaces located directly off the atrium area.

Manual day lighting controls allow the levels of lighting to be controlled within clinical rooms whilst PIR automatic lighting was specified in rooms where use was infrequent further minimising unnecessary energy needs.

Materials

Form of the building leads public towards entrance from car park

Materials were chosen so that their impact on the environment was kept to a minimum and specified so that they were resourced responsibly.

Products were chosen from manufacturer's who had IS014001 environmental accreditation where possible and external fabric build-ups would have a Green guide to specification ratings of A/ A+.

Insulation products within the external fabric have a low thermal conductivity value of 0.022 W/mk which resulted in reduced wall construction thickness.

The choice of building materials resulted in maximum credits being awarded in both BREEAM 'MAT 1 - materials' and 'MAT 6 - insulation'.

Stainless steel clad 'zig-zag' cantilevers over the Main Entrance

Community

The community were engaged in the development of the Centre with elements of the previous hospital introduced into the buildings fabric. Many of the building facilities can be used by the community and they are maintaining the plants within the waiting area.

The previous hospital building was named after Sir Alfred Jones who imported tropical fruit to Liverpool and funded research into tropical disease. Vibrant colours, materials and textures were specified within the public spaces. Working alongside a local artist, themed internal tropical planters, interactive audio and visual installations were introduced in the central internal and external public spaces to reflect the legacy of Sir Alfred Jones.

The café sited at lower ground floor is accessible from both the street and the buildings 'hub' space and is run by 'Can Cook' who are a Community enterprise. Their aim is to teach adults to be able to cook for themselves rather than rely on 'fast food' and they educate the benefits of healthy eating and that cooking itself can be fun.

View towards staircase within central waiting area

Previous buildings Portico sits within external courtyard

Biodiversity

Tropical planting has been loaned from Liverpool's botanical collection and are housed in both internal and external public spaces.
Internal planters are themed around medicinal and edible planting, educating the public on the benefits of each.

The courtyard has proved incredibly popular with visitors to the centre, the public has asked that interaction with the space to be further enhanced.

An extensive Landscaping scheme enhances the local biodiversity. Lawned areas around the perimeter of the building soften the buildings impact whilst Wildflower lawns bring colour and variety to the soft landscaping balanced against the tropical plants within the buildings waiting and courtyard areas.

External courtyard

Selection of wildflower and tropical planting chosen for the soft landscaping scheme by Landscape Architect

Project Summary

Site - The site was chosen for its excellent links to local bus and rail connections so that public transport could be used to visit the building, meeting the requirements of Liverpool PCT's Liverpool Travel Plan. Public transport is encouraged with 'real-time' bus/ train information through a Travel Information Point at reception. Access by cycle is encouraged by secure storage and changing facilities.

Fabric + energy - CO_2 emissions are reduced by 23% from standard building regulations standards. $C0_2$ emissions are predicted to be 23.1Kg CO_2/m^2/annum.

Renewables - 44% of the buildings energy supply comes from renewable technology.

User Comfort - Building relies on natural ventilation. Heating and cooling demands are met by Ground Source heat pumps and solar water collectors.

Layout - Maximises daylight potential and views out into external landscaped spaces.

Natural light - Rooflights further enhance natural light provision into internal spaces. Artificial lighting is controlled to minimise energy needs.

Materials - Chosen for their strong aesthetic qualities and environmental certification.

Community - Engaged through design process and taking ownership of building through tropical art. A healthier lifestyle is promoted by specialised clinics and a community cafe which runs cooking classes.

Biodiversity - Tropical planting is loaned from Liverpool's botanical collection highlighting the role of plants within medicine. Landscaping scheme around the perimeter of the building further enhances biodiversity with wildflower lawns.

The building has achieved a BREEAM Healthcare Excellent rating.

Completed	April 2011
Gross Area	5,400 sqm
Value	£15 million
Developer	Liverpool and Sefton Health Partnership
Tenant	Liverpool Primary Care Trust
Main Contractor	Galliford Try Construction
Architect	MBLA Architects and Urbanists
Services Engineer	PMA
Structural Engineer	Clancy Consulting
Landscape Architect	TPM Landscape
Fire Engineer	ARUP Fire
CDM Coordinator	Edmund Shipway
Approved Inspector	RBC
BREEAM Assessor	White Young Green

Architects+Urbanists

41 Bengal Street
Manchester M4 6AF
Phone: +44(0)161 237 5500
Fax: +44(0)161 237 5544
Email: mbla@mbla.net
www.mbla.net

South Liverpool NHS Treatment Centre
Reducing CO2 Emissions Case Study
September 2011