West Hendon
United Kingdom

PROJECT SUMMARY

The West Hendon Regeneration scheme is located in a suburban area of northwest London, in the south east of the United Kingdom.

The project is a regeneration scheme of approximately 1500 dwellings, involving the partial demolition of local authority owned stock on the site & it's replacement with a range of new housing, at a very much higher density. This will be achieved while still providing a high quality environment. Some of this will be for rent & shared ownership by Ealing Family, but a much larger amount of new housing for outright sale on the private market will also be provided. A proportion of the existing buildings will be retained & refurbished, for rent, by the local authority.

The aim of the development is to investigate the range of renewable energy sources, systems & technologies, and to incorporate the most appropriate within the regeneration scheme, with the aim of creating a sustainable community with optimum renewable energy solutions.

Strategies will include the use of passive measures, such as daylighting, as well as the incorporation of active renewable energy sources & systems, assessed on the basis of technical performance, capital & operating cost, as well as the social & environmental impacts on the community.

SUMMARY STATISTICS

THE SITE

Location

Northwest London, United Kingdom. The site is approximately 10 miles, or 15 minutes by train, from the centre of London. It is a densely populated part of the city, with a number of important transport routes running through it (A5), or very close to it (M1 motorway, mainline trains, inner ring road - North Circular Road)

The site has a maritime inland climate, with a local climatic involvement of the Welsh Harp lake/ reservoir nearby.

It is very much an urban setting, but with a considerable extent of public open space for leisure purposes, particularly around the Welsh Harp reservoir.

Currently 680 dwellings on the site, but our proposals would increase that to 1300 homes. West Hendon is part of London Borough of Barnet, one of the outer London boroughs, approximately 10 miles from the centre.

PROJECT DESCRIPTION

THE BASE CASE

DESCRIPTION OF THE SETTLEMENT

Mixed residential & commercial site to be partly refurbished & partly redeveloped

1572 homes spread over a site area of 8.05 hectares.

315 new homes for rent & shared ownership through housing association, 233 rented units retained by Barnet Council & over 900 homes developed for sale.

Mixture of multi-storey flats for families & single people/couples, some single family houses

Mixed tenure, with housing association rented, local authority rented, private housing for sale & some commercial units for letting.

House types

- 1 & 2 bed private sale & shared ownership flats
- New homes for rent by Ealing Family, including 63 No. 3 & 4 bed houses & 1 & 2 bedroom flats
- All houses have private gardens & flats have generous balconies or private communal gardens
- Integration of tenures across the site

Number of storeys

- Houses for rent to be 3 storey maximum
- Flats for rent to be 4 storey maximum
- Private sale blocks up to 7 or 8 storeys in height overlooking the Welsh Harp reservoir, with average storey height across whole site of 5/6 storeys

Outdoor spaces

- New Civic Square proposed in centre of scheme, along with
- Village Square, linking both to the leisure facilities that are surrounding the Welsh Harp reservoir.
- More typical street pattern to be provided, rather than convoluted plan as exists at present. Plan to be attached
- New Community Centre to be provided, as well as Primary Health Care Centre

Microclimate (winds, vegetation)

Prevailing winds are from the southwest, speeds averaging 12-16 km/h throughout the year. Average temperatures range from +5C in winter to +18C in summer. Average rainfall is around 650mm, with 185 dry days per year.
Vegetation close to Welsh Harp is trees, bushes & grassland.

Terrain

70% of the site area is already built upon resulting in a general lack of unused space. Site lies on approximately 40 metres of London Clay, typical of the Thames valley

Orientation

Site slopes to the west down to the Welsh Harp reservoir but generally elevations are low. Alignment of the scheme allows good south to southwesterly aspects for dwellings giving good diurnal sun exposure.

Surroundings

The site is surrounded by west Hendon town centre, the A5 road from central London to the suburbs, the M1 motorway from London to Birmingham, the Welsh Harp reservoir & the main railway line to Birmingham & Manchester.

Other features or characteristics specific for the project

Due to the suburban nature of the site & the fact that the site is so land intensive there are few opportunities for large-scale renewable energy plants, such as wind turbines or systems that emit air pollutants, such as waste incineration plants. Planning policies in the UK will also make them impossible. Improving local air quality is a primary objective of the proposals while at the same time improving opportunities for renewable energy applications, many of them proposed being passive & measures to maximise efficiency of energy capture & conservation.

INFRASTRUCTURE

District heating/cooling system

The estate is served by gas & electricity. It is envisaged all units will have individual gas central heating and/or central gas fired CHP plants.

Water Supply

The site is already serviced by water mains throughout the development, through the Three Valleys Water Company, & these will be updated where necessary as part of the development & refurbishment proposals.

Sewage system

A network of existing Thames Water sewers serves the site.

Foul: The principle Thames Water foul sewer serving the site is a 975mm diameter sewer which enters the site from West Hendon Broadway and then runs through the site close to and parallel to the Welsh Harp to leave the site in the South West carrier across the site in the South West corner across Cool Oak Lane near Rosemead. Smaller sewers, generally 225 mm Diameter, run down the site to join this main sewer.

Surface Water: A number of relatively small Thames Water surface water sewers, generally 225mm and 300mm diameter, run from the higher ground near West Hendon Broadway in a Westerly direction to three number outfalls directly into the Welsh Harp (spaced roughly equally). The outfalls are approximately:

- 300 mm diameter
- 450 mm diameter
- 375 mm diameter

respectively, (North to South). A further 225mm diameter sewer discharges under the Cool Oak Lane bridge.

Some surface water at the southern end of West Hendon Broadway runs southward under the A5. Some areas of the development apparently discharge surface water directly to the foul system.

Transport system

Several major transport arteries bisect West Hendon:

- Thameslink rail link, providing services to Luton to the north & central London to Brighton to the south
- Major highway links including the A5 & M1 motorway

The area has good strategic rail & road links, however the high volumes of traffic are having a negative impact on the local environment. The streetscape is dominated by the traffic & poor pedestrian links to the station. The are problems caused by existing movement patterns:

- Conflicts between bus lanes on the High Street & the need for parking & services for shopping
- The gyratory road systems cause conflicting vehicle movements & some of the principle flows are displaced onto residential streets
- Pedestrian flows from the station to the High Street & reservoir are poor. The A5 is divisive, difficult to cross & the extreme levels of traffic result in considerable amounts of pollution to the area.

BUILDING DESCRIPTION

The **existing buildings** on the site comprise a variety of buildings as follows:

- Traditional masonry constructed 2 storey houses.
- 3-6 storey precast concrete framed blocks of flats/maisonettes.
- 1No. 14 storey precast concrete framed tower block.

The precast concrete frames are clad in a variety of materials, typically the low rise blocks have brick or UPVC panel cladding to the gable elevations whilst the front and rear elevations are believed to be timber. Cantilevered balconies are present on most of the low-rise blocks at each level with continuous walkways being formed at alternate levels to provide access to the maisonettes.

Of this total, 233 No. homes will be refurbished for rent.

The **new housing** to be built on the site includes:

Rented
- 326 No. 1 bed flats
- 327 No. 2 bed flats
- 63 No. 3 & 4 bedroom houses
- 52 bedspace Care Home for the elderly

Sale, shared equity & shared ownership
- 319 No. 1 bedroom flats
- 243 No. 2 bedroom flats

New Housing

The aim is to provide very energy efficient new build & refurbished housing & other buildings to ensure low fuel bills, by incorporating measures to reduce energy use & carbon dioxide emissions.

- High insulation standards including
    - low emissivity argon filled double-glazing,
    - 150 mm in walls,
    - 300 mm in roofs &
    - 100 mm in floors
- Efficient heat distribution system such as gas fired condensing combination boilers & controls
- Lighting energy reduced by good daylighting & low energy lamps
- Passive stack ventilation to kitchens & bathrooms
- Buildings designed for future integration of solar water panel heaters & photovoltaic panels by providing a proportion of south facing roofs

Dwellings will be designed to achieve an EcoHomes rating of at least Very Good.

Other sustainability objectives & measures include:

- Reduced water consumption
- Domestic & commercial waste management
- Encouraging less car use
- Reduce environmental blight during construction
- Specifying sustainable materials used for construction
- Re-using existing buildings where possible.

Heating floor areas for the buildings are likely to be:

- 1 bedroom flats – 47-52m^2
- 2 bedroom flats – 67-72m^2
- 3 bedroom houses – 91-105m^2
- 4 bedroom houses – 115-130m^2

Annual heat/cooling consumption (total space heating/cooling load) (kWh/m^2a)

- Assumed CO_2 emissions less than 30kg/ m^2/yr
- Assumed boiler burners with NOx emitting burners of less than 70mg/kWh
- Assumed insulation levels 6% lower than UK Building Regulation standards

Electricity consumption

- Assumed low energy lighting to halls, staircases & landings
- External lighting also to be low energy lamps with security fittings, max 150W& PIR

SCENARIO

MICROCLIMATE IMPROVEMENTS

West Hendon benefits from the proximity of the Welsh Harp lake and York Park. Maximising and opening up green spaces and access to these areas will improve the well being of the community. Furthermore green spaces offer a major opportunity for the protection of the existing site ecology and for enhancing and creating new habitats.

It is intended to plant a significant number of new trees particularly around residential streets, the Broadway and around the New Square. These will filter and clean the air producing a significant improvement in local air quality.

The development will bring forward significant improvements to the landscape character of the site. This will also have a positive impact on the surrounding areas. External accreditation will be sought for our proposals to ensure that recognised standards for ecological improvement are established.

The landscape proposals maximise the potential landscape benefits of the development with a significant number of new trees planted to mitigate the loss of a low number of aged trees.

For important public open spaces the design will include an analysis of solar and wind patterns to ensure that sheltered sunny areas are available to people. For these locations, seating will be provided to further encourage their use.

The materials specification for public open spaces will be durable, robust and requiring low maintenance. The emphasis will be to create robust areas, which are not liable to local damage.

It is planned to interconnect the green spaces within the development to further encourage bio-diversity. During the development phase, existing ecology species will be protected to ensure that any existing bio-diversity on the site is maintained.

To improve the comfort levels around public areas the following design proposals are to be included within the landscape design:

- Street trees will be planted within properly constructed tree pits to provide shade and reduce the heat build up and reflectivity of hard surfaces
- To improve air quality locally within the scheme street trees will be used to filter and absorb pollution and dust particles and to additionally reduce Carbon Dioxide levels.
- Street trees will be positioned such that they will reduce wind-funneling effects around buildings.
- The deciduous tree species selected will effectively provide shade in the summer and allow solar warmth in the winter months.
- Soft ground surfaces (areas of grass and shrubs) reduce diurnal (daily) and seasonal temperature fluctuations

As an alternative to routing surface water as quickly as possible into drains and discharging to water courses it is proposed that porous hard landscaping materials with porous drains be used to infiltrate the local water table and reduce surface water discharges. Special measures will be taken to allow for peak rainfall conditions. These solutions will be engineered to avoid any compromise of the brownfield remediation strategy.

Design proposals to achieve these objectives will include:

- Open block paving
- French drains
- Ponds and wet areas to store water in the green belt area

BUILDING ENVELOPE IMPROVEMENTS

The energy strategy for the development will be to provide efficient heat to each home through local condensing boilers that meet defined environmental performance standards and to provide high levels of insulation to both glazed and solid areas.

Insulation

In general, insulation and air tightness levels will exceed the requirements of Part L of the Building Regulations.

Insulation will be selected to give a U-value of 0.25 W/m^2K for solid area walls and 0.15 W/m^2K for roofs.

Insulation will comprise mineral or glass wool with a respective density less than $150Kg/m^3$ (mineral) or $160Kg/m^3$ (glass) to meet environmental limits for ozone depletion.

Windows and glazing

For all glazing areas double glazing will be used to give a U-value of 1.8 W/m^2K for glazed areas. Window frames, with an equivalent thermal insulation, that also meet air tightness requirements will be used.

Glazing to South facing elevations will be increased to maximise solar gain, and for North facing elevations reduced to limit thermal losses. These factors will be considered together with internal layouts and aspect to achieve the most appropriate glazing level.

Windows will be provided with lockable openings to provide natural ventilation

Where large glazed areas are used for south facing elevations significant risk of internal over-heating from solar gain exists. Suitable shading will be provided. Avoid overheating to glazed areas by shading.

PASSIVE COOLING AND VENTILATION TECHNIQUES

Ventilation technologies including passive & breathing walls

Timber frame construction has proved itself to be a sound & durable form of construction over many years, offering superior levels of thermal performance. Breathing Wall is the name for a particular timber frame construction, which has a higher vapour permeability than conventional designs & hence increased moisture migration from the inside to the outside of the structure. Because breathing wall components are selected to work together in a natural way, without the need for additional vapour barriers, any moisture entering the wall can escape, freely & harmlessly, to the outside atmosphere. Some systems with hygroscopic properties enable them to absorb surplus water vapour at times of high internal humidity & to release it when conditions demand.

The components of the Breathing Wall are selected so that they are of the correct vapour resistance to allow vapour to diffuse naturally through the structure. The inside boarding must have more moisture resistance that the outside sheathing, by a factor of 5 times.

Ventilation for Bathrooms and Kitchens

To maintain high standards for internal air quality and energy efficiency in bathrooms and kitchens these will be ventilated by passive means, using the Passivent system, utilised by Ealing Family on their SUNH project at Amersham Road, Reading.

Solar shading

The provision of adequate daylighting brings with it the potential for overheating of dwellings during the summer months. Shading protection can be provided through selected planting &/or through the provision of mechanical blinds or permanent shading features (bris soleil) as features of building cladding. The use of coated or reflective glass can also help in some circumstances but the balance has to be struck between the aim for solar gain in winter against solar protection in summer.

External Drying

An external drying space will be provided whenever possible, rather than allowing drying within homes & consequent build up of condensation.

Building Integrated Renewable Energy techniques

Active Solar DHW systems

We are looking at $3m^2$ collectors, either flat plate or evacuated tube, integrated into the roof structure on free south facing elevations of houses & blocks of flats, with the expectation of delivering around 1800 kWh per year per unit.

The market for solar for pre-heating DHW is relatively more established in the UK than for PV & the site layout & south/south-westerly orientation make this a particularly attractive option as a renewable energy source on West Hendon.

PV systems

Proposed for communal safety & feature lighting. Lighting to communal areas will also be boosted by passive systems such as sun pipes, light wells & light trays.

In the UK roof mounted PV panels can generate sufficient power for most of the summer domestic needs for the individual home they supply. For the winter months additional energy is required. The generation of electricity is not always at the time it is needed so surplus is exported onto the national grid, but price to export is not always competitive compared with imported costs. Capital costs are expensive & repayment periods, without grants, are very high. Strategic alliances with an electricity supplier & an equipment supplier may be necessary to make it competitive on the scheme. Even if homes are not fitted with PV at present, they should be designed to cater for retrofit at a later date if the economics of PV make it much more cost effective in the future.

On the multi-storey apartment blocks the roof could accommodate an array of PV panels to produce electricity to provide communal lighting throughout the block, in communal areas & where landlord supplies are required. A modest stand-alone system could be provided on a number of blocks to provide safety & feature lighting. This will however be subject to discussion with the planning authority with a view to implementation, but local authorities are being pushed by central government to achieve 15% of energy from renewable sources, so it is to be hoped that this will be acceptable.

DEMAND SIDE MANAGEMENT

Heating boilers and system

All residential units will have a high performance gas fired condensing boiler to achieve a boiler emission NOx rating < 70mg/KWh.

Controls will be provided to ensure that the boiler works efficiently to deliver both hot water and space heating. Information sheets will be given to residents to advise on its optimal use.

Building energy management systems

There will be a need for a realistic & a fair charging regime to cope with individual home's usage of power & water. Careful arrangements for metering must be included in the early design for blocks & rented homes to ensure that simply & (ideally) remote reading of maters is possible, while allowing individual homeowners to be aware of their consumption.

System controls for common area systems must be set with a view to efficiency. For example, common area lighting should where possible be "on demand" rather than on all the time.

Operational monitoring is also important in confirming the efficiency of systems & that manufacturer claims for performance are achieved in practice. Education of occupiers in the use of the systems is important & is required by UK Building Regulations.

SUSTAINABLE BUILDING

Local Building materials

Wherever possible materials from demolition will be used in the regeneration scheme. The most likely use will be the use of crushed concrete for the base course of new roads, etc. The whole operation of demolition will be closely controlled to maximise re-use & recycling as well as minimising disturbance & nuisance to residents. Local building materials will be used wherever possible, within budget constraints & the constraints of the constructors supply chain commitments.

Design & construction will be constrained to minimise embodied energy & the impact of environmental nuisance to residents.

Recycling systems

The site is close to the Edmonton Waste Incineration Plant, as well as the Brent Cross railway waste depot, & while neither should be seen as solutions to the community waste issues they should be considered as part of the exercise to reduce waste & maximise its' future potential as an energy source.

Barnet council do operate a doorstep "green box" recycling scheme & part of the community development work will involve demonstrations of the principles of recycling to encourage greater take up & recycling from households within the regeneration scheme. Individual composting will also be encouraged, principally from the houses but also with residents of the flats.

Water saving techniques

A standard specification item will be for provision of 6/4 litre dual flush WC's, medium capacity baths, with additional showers facilities with flow rates between 6-9 litres per minute. In addition mixer taps with spray diffusers will be provided for baths, kitchen sinks & wash hand basins.

Rainwater collection systems will also be considered for implementation, to provide water for flushing WC's, particularly for potential large users of water, i.e. houses. Greywater recycling will not be considered, as there are still concerns about the cost of additives required to "treat" the water before it can be used for flushing. In addition there are significant legal implications, as landlords, in carrying out these maintenance activities, which have a bearing on their use in this scheme.