

## Huddersfield Community EcoBuild Initiative

**Finding new uses for listed buildings is often hard enough but what happens if you also want to make the building energy efficient, using environmentally sound materials and practices?**

The Huddersfield Community EcoBuild Initiative is a unique European-funded project delivered in the UK by the Association of Community Rail Partnerships (ACoRP) and Transport Regeneration Ltd. It aims to show how listed buildings can be returned to community use using environmentally sound materials and practices. A joint operation between Network Rail and train operator First Transpennine, it's financed predominantly through the European Interreg Fund, with matching support from ACoRP, the Railway Heritage Trust and Kirklees Council.

### Introduction



The project will focus on a historic local building which will ultimately house a community eco demonstration facility and office space for ACoRP, itself a community based organisation.

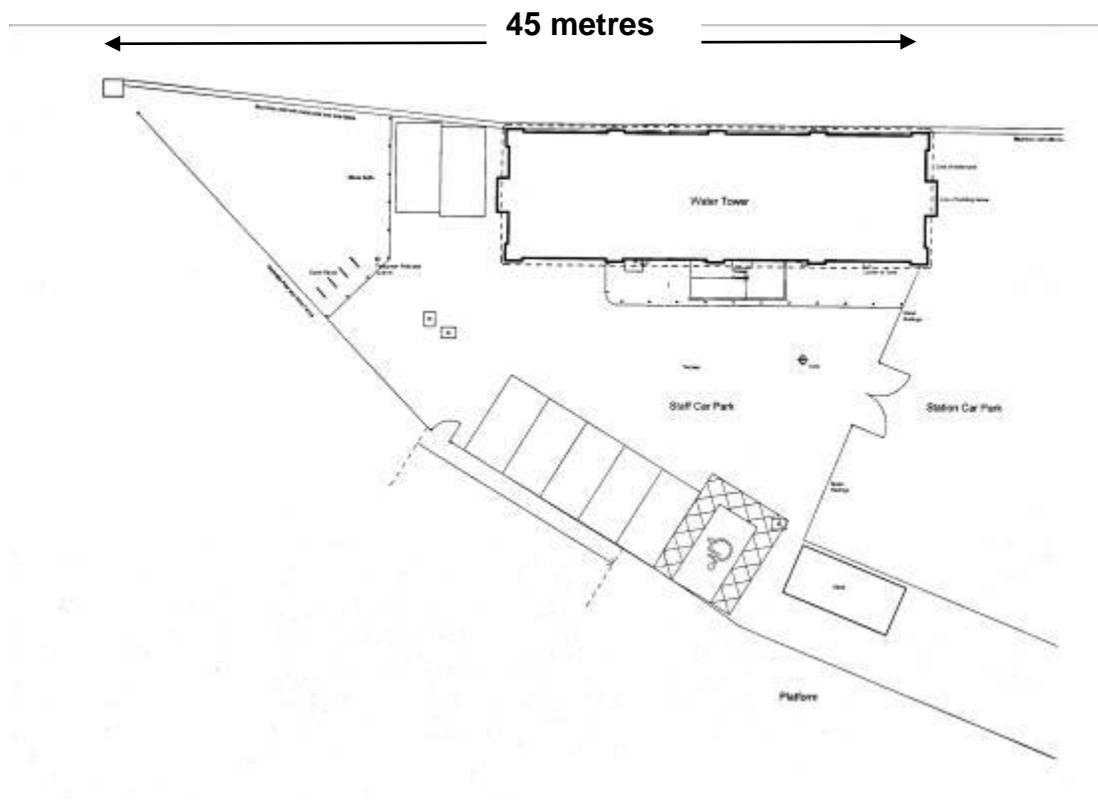


Across the UK and Europe there are many buildings of a historic nature which, because of their status, are difficult to maintain and operate with any meaningful concession to eco principles. The Huddersfield Community Eco Build initiative aims to capitalise on sustainable construction technology from various European countries, applying a

Europe wide recognised portfolio of sustainable materials. A key element of the project is highlighting and overcoming some of the barriers to environmentally sound historic building conservation/development. The primary aim of the project breaks down to three key objectives;

1. The demonstration of wider European recognised eco building materials and best practice
2. Exploring the use of Eco materials within a historic building,
3. Providing a community eco demonstration facility and ACoRP office space.

Environmental materials and equipment, with a view to historic buildings, could be selected from a wide range of options and would ideally offer no visible difference. Examples could include aggregate alternatives, vegetable based paints, organic based insulation, locating of energy generation equipment etc.



The building is in a prominent position alongside Huddersfield's historic station, the plan above giving some idea of its scale.

**Huddersfield EcoBuild Initiative – A Community Learning Resource**

An important element of the project will be the provision of a community learning space. This area of the building will encourage a greater awareness of the issues relating to global warming. A particular emphasis on highlighting methods by which the impacts of key everyday activities can be minimised will be an important learning output. There will also be a focus on the environmental impact of damaging activities such as building development/operation, together with transport and other issues locally.

Access to the building will enable interested parties to fully experience the eco building concept at first hand and will complement the siting within the tower, of a not for profit, national sustainable transport organisation. The intention is to link the actual construction phase to Kirklees College programme of construction training.

The project is seen as a demonstration of European best practice, the wide dissemination of project outputs being a high priority. The building will also be used as a learning resource which will be supported through the provision of a facility to allow on site research into complementary initiatives and developments.

### **Demonstration of Sustainable Building in an Historic Context**

The restoration and use of historic buildings is an important facet in maintaining the heritage of the European Community. However, this is often at odds with other priorities both within the UK and the wider European community. A good example of this would be the growing emphasis on sustainable building materials and building operation. Furthermore the European Union recognises the growing urgency to reduce greenhouse gas emissions which, in terms of the built environment, has resulted in the need to increase energy efficiency, exploit low carbon technologies and utilise renewable energy sources.

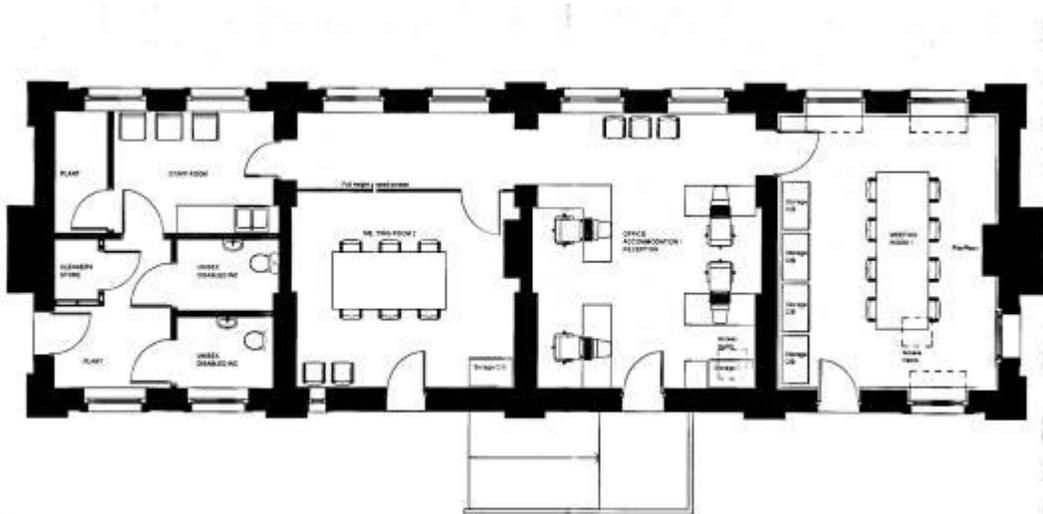
While an environmentally based approach may be widely regarded as appropriate in 'conventional' building practice, there is a growing recognition that today's historic built environment also needs to adapt, firstly to become more resilient to unavoidable climate change over the next 20 to 40 years and secondly, to develop appropriate initiatives with a view to reducing its own carbon foot print.

However, whilst widely recognising the need for a greener approach it is important to also acknowledge a number of European sources which suggest that some policies for adaptation and mitigation will have a damaging effect on historic buildings. There is concern that these impacts could diminish quality of life and be detrimental to the important social and economic contribution to the wider European cultural heritage.

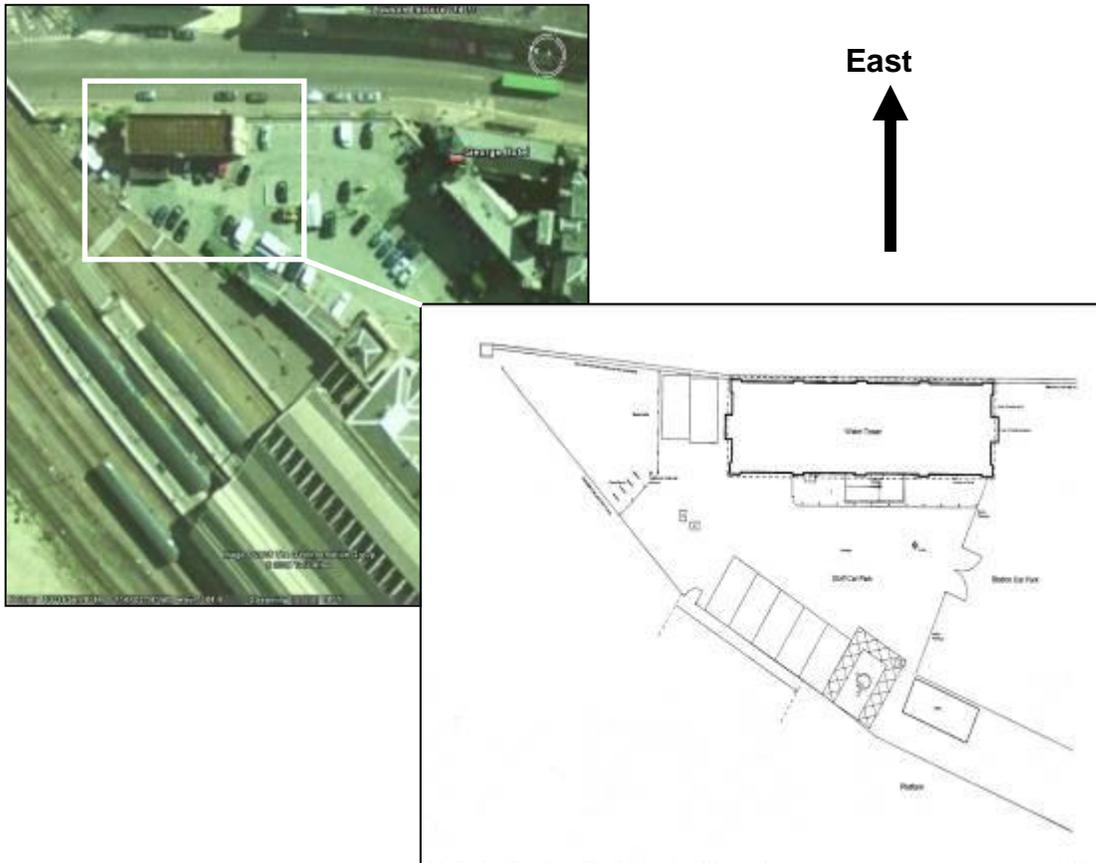
It is against this background that the Huddersfield Community EcoBuild Initiative has evolved. Highly innovative, the project will, within a historic context, explore alternatives to conventional building, waste management and power use. It is very much in synergy with the EU Sixth Action Programme for the Environment, offering a proactive and practical approach to EU Community policy. Energy saving techniques will complement environmentally sound materials and technology and collectively offer alternatives to the building sector.

## Design/Specification

Initial internal plans have been produced and presented for discussion (floor plan below). Revised plans based on local discussion are now being prepared which also take account of the wider remit of the construction project.



In order to fully appreciate the problems faced, it is important to firstly understand the building's construction.



The building, which is approximately 160 years old, sits on a large retaining wall to the east and has made up levels to north and west, forming a pedestrian and vehicle parking area. Briefly, its construction is as follows:

- **Walls:** solid single leaf stone walls, painted internally
- **Internal walls:** solid 9" (225 mm.) brickwork, emulsion painted
- **Internal partitions:** timber and glass partitions with timber doors
- **Windows:** timber single glazed vertical sliding sash,
- **Ground floor:** suspended timber floor, partly finished with soft tiling
- **Foundations:** believed to be rock
- **Roof:** Open-topped sectional cast iron water tank.
- **Ceiling:** suspended plaster/plasterboard ceiling dropping below the top of the windows in places

As previously mentioned, the building is grade 1 listed – the most restrictive heritage clarification within the UK and therefore an ideal demonstration project. If the lessons from this project are to be credible and thus transferable, then an

emphasis needs to be placed on recognising the economic and legislative barriers, in addition to technical issues.

So what are we planning to do?

### **Windows & Doors:**

The building's windows are predominantly located on the east side, with a door on the west. This means that the morning sun will be a benefit in the winter whilst not a major burden in the summer. With the windows placed as they are, the interior of the building is mostly protected from afternoon sun.

In keeping with the historic nature of the building we propose to replace the windows to match the current 6 + 6 pane design but with improved glazing properties.

We hope to further improve performance of the windows by exploring opportunities for draught proofing. A proven perimeter sealing system has been suggested which should improve energy efficiency, without altering the appearance. Once installed, this system should eliminate draughts and rattles and greatly reduce heat loss and dust ingress.

We are also considering secondary glazing. A bespoke system designed to fit into the original frame, there are a number of companies which offer this service for historic buildings.

While the building is unlikely to have had shutters fitted originally, their inclusion within the refurbished building may also offer a number of benefits without compromising on its aesthetics. Favoured by conservation bodies, shutters would offer privacy, solar shading on sunny days and reduce heat loss during winter evenings.

To maximize use of natural daylight, consideration is being given to light shelves. These are used to bounce daylight and sunlight off the shelf and onto the ceiling, pushing light deeper into the building. These are likely to be mounted externally to avoid heat gains in summer.

### **Ground Floors**

It is widely accepted that up to 15% of heat can be lost through floors. An uninsulated suspended timber framed ground floor, such as the one within the building, is likely to be even worse. We therefore propose to remove existing soft tiled floor finishes and if in good condition, retain the existing timber floor boarding but add appropriate insulation. To reduce the impact on the building

and minimize depth issues, the proposal is to use an insulating product called Aerogel.

Aerogel is a lightweight, low-density material made from silica and air. Relatively new on the market, aerogel blankets are beginning to appear as a component in laminate panels bonded to boards including plasterboard, wood fibre reinforced gypsum board, plywood, and chipboard. The panels are distinguished by their outstanding insulation properties.

### **External Walls**

Approximately 35% of heat can be lost through walls and in terms of insulation, external walls are notoriously hard to treat, with planning issues affecting external work and design/layout issues affecting internal work. Furthermore, there can be practical issues when considering the values of modern building materials against older, more traditional techniques – water permeability is an example. Internal insulation can also remove thermal mass benefits.

Thermal insulation thickness, as with insulating floors, is being carefully considered so that a balance can be maintained between unnecessary loss of space and loss of heat and wasted energy. It has therefore been suggested that Aerogel quilt Slim-line is used together with moisture permeable wall board lining. As with the floor, the use of Aerogel quilt will minimize thickness issues as well as any impact on the building.

### **Roof**

The roof includes a redundant water tank previously used for supplying steam locomotives. The tank is part of the listed status of the overall building and will therefore need to form an integral part of the overall project. Avoiding bitumen and pitch based materials, we plan to preserve the tank with both visual impact and 'sustainability' in mind.

Opportunities for installing some kind of insulation and the siting of solar panels (within the tank to avoid visual impact) are being considered, as is the use of the tank for rainwater harvesting.

### **Room heights & Ceilings:**

The under-croft will be cleared to provide useful storage space. The removal of existing low ceilings and bulkheads around the windows, together with the addition of a new ceiling at higher level will maximise daylight gain. We propose to install the new ceiling using high thermal mass and hygroscopic clayboard or clay plaster finish materials.

## **Finishes:**

Synthetic paints will be avoided to maintain good indoor air quality and reduce the risk of 'sick building syndrome'. In addition, it is planned to limit the use of low VOC (volatile organic compound) paints as they currently use more chemicals to make them work like oil paints. For painted finishes the intention is to use clay paints, clay finishes and mineral based paints wherever possible.

The intention is also to avoid synthetic carpets, again to maintain good indoor air quality and reduce the risk of 'sick building syndrome'. The use of commercial grades of natural carpeting will be explored. It's worth noting that carpets act as thermal insulation, so they will not be used if underfloor heating is specified.

## **Services**

**Water:** In addition to rainwater harvesting, emphasis will be placed on minimising water consumption. This will include:

- **WCs:** Dual low flush cisterns using 4 or 2.5 litres rainwater or grey water per flush
- **Basins:** low-flow taps operated using proximity detection and on-flow regulator/isolation valves (i.e. not push/percussion taps)
- **Shower for cyclists:** low-flow with a maximum 9 litres per minute

There are a number of possibilities for hot water provision, including local instantaneous water heaters over sinks with the supply piped through a solar heated inter-seasonal thermal storage vessel. All hot water pipes will have as short a run as possible and be well insulated along the full length.

**Drainage:** With regard to the below ground drainage, consideration will be given to cast iron, stainless steel, or clay. All plastics, especially PVC, will be avoided.

**Heating:** Consideration is being given to solar thermal panels which would be roof mounted in the water tank.

**Lighting:** An important element of the project is to demonstrate a reduction in energy use. Lighting can account for 20% of electricity consumption although only 5% of energy used by the traditional light-bulb is emitted as light, the rest being heat. The use of alternative lighting will be vigorously explored. For example, LEDs as low as 1.1 watts are available which are both brighter and whiter than halogen.

## **Collective Benefits**

For both the UK and Europe, this project demonstrates a number of important aspirations in terms of building, and energy provision/efficiency. These include:

- Improving energy efficiency and use, in particular in the building sector
- Promoting new and renewable energy sources
- Use of alternatives to conventional aggregates
- Reduction of CO<sub>2</sub> and other environmentally damaging emissions

The choice of this particular location is also important so that the project outputs can receive maximum exposure. An historic building, which is also a local landmark, will provide a highly visible impact on public perceptions and is therefore ideal as a vehicle to promote new ideas.

#### **Wider Benefits – ACoRP**

- The organisation is able to create a fit-for-purpose office space, more easily accessed from elsewhere
- are able to fully develop their environmental policy and credentials
- benefit from reduced rent and utilities bills

#### **Wider Benefits - Network Rail**

- An unused and relatively derelict building is put back into use
- The company are able to further support ACoRP in a meaningful and valuable way, at relatively little cost to themselves
- Can learn more about converting listed railway buildings in an environmentally sensitive way.

#### **Wider benefits - Kirklees**

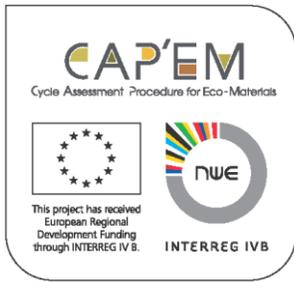
- The council benefits from the completion of a further piece of the local redevelopment jigsaw in and around Huddersfield station
- has an area improved to the benefit of all

#### **Wider benefits - Other**

- Creates a high profile demonstration project for this kind of work
- Creates a centre of excellence for recycling/environmental issues
- Meets government aims for reduction in use of fossil fuels etc

#### **The project partners**

- The project is being delivered by ACoRP, together with Transport Regeneration, a consultancy specialising in environmental projects and European funding.
- The scheme is part of the wider CAP'EM project funded through the European Interreg IVB programme
- The building is owned by Network Rail who, together with the train operator, First Transpennine are arranging to lease the building to ACoRP
- Further assistance is being provided by Kirklees Council
- Funding for exterior work to the listed structure is being provided by the Railway Heritage Trust



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