Derbyshire
Eco Centre

Derbyshire County Council
Corporate Property

Derbyshire
Eco Centre

philosophy

integrate with environment

innovative thinking and learning

eliminate circulation space

vernacular building materials

living roof

minimise solar gain

minimise energy consumption

promote education in sustainability

naturally ventilate

capture sun light

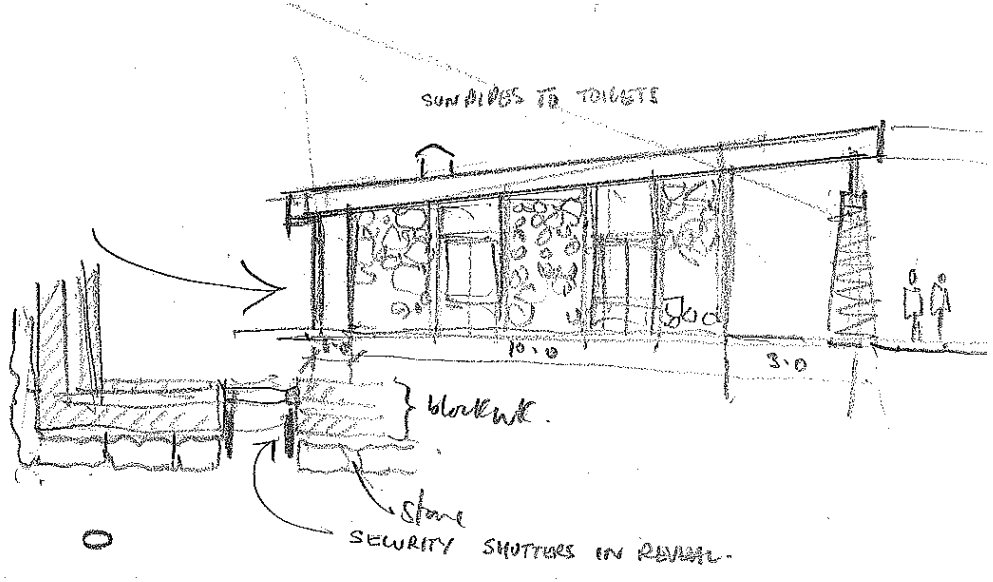
family learning

demonstrate sustainable design

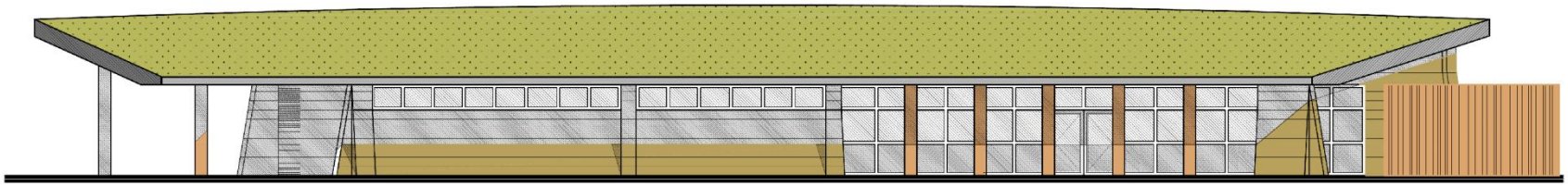
harvest rain water

fundamentals

- endeavour to achieve BREEAM “excellent” accreditation
- create a building with high thermal mass
- high levels of insulation to the external walls
- high levels of air tightness
- respect for the orientation
- integrate the building with the existing topography



concept



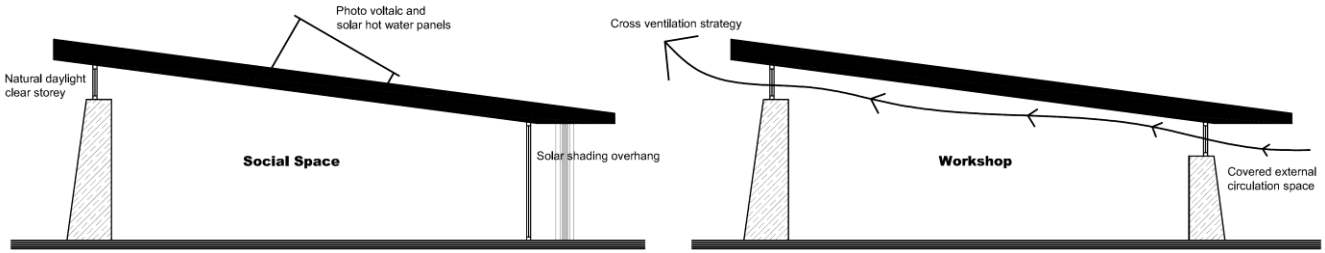


Photo voltaic and
solar hot water panels
Natural daylight
clear storey
Social Space
Solar shading overhang
Cross ventilation strategy
Workshop
Covered external
circulation space

site

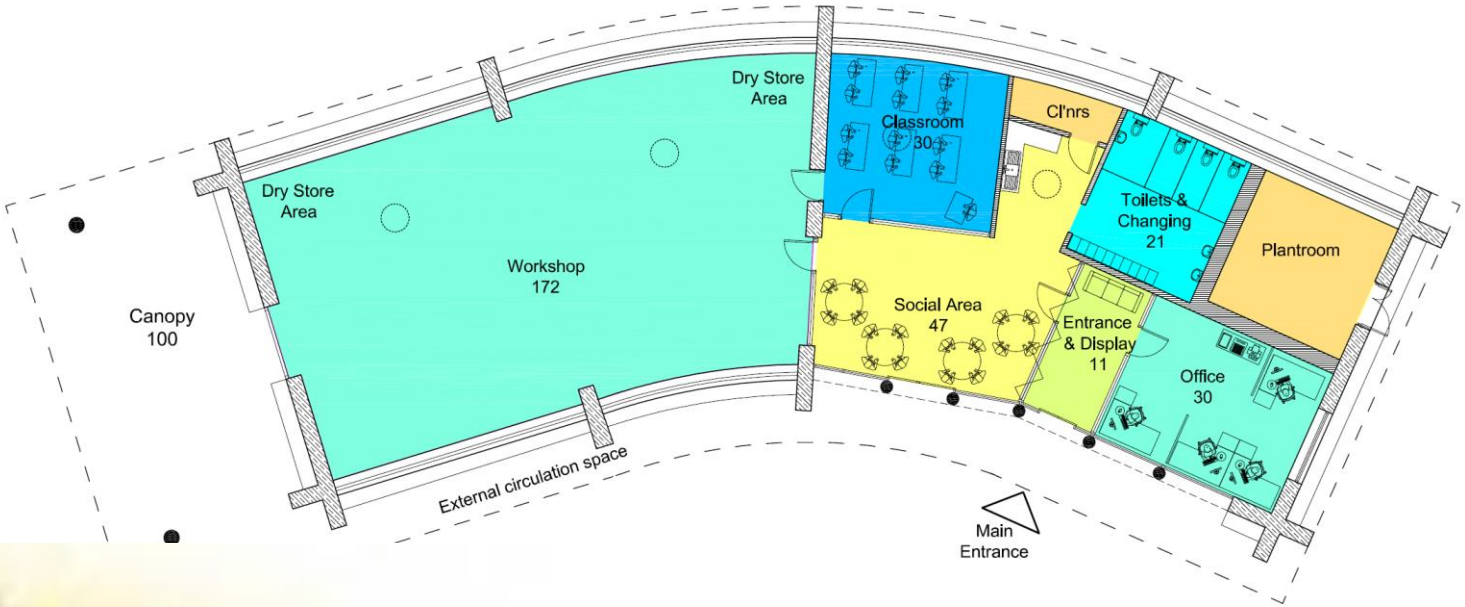
welcoming building approach

car free site

external teaching spaces

respect the existing topography

accommodation



The Centre will provide:

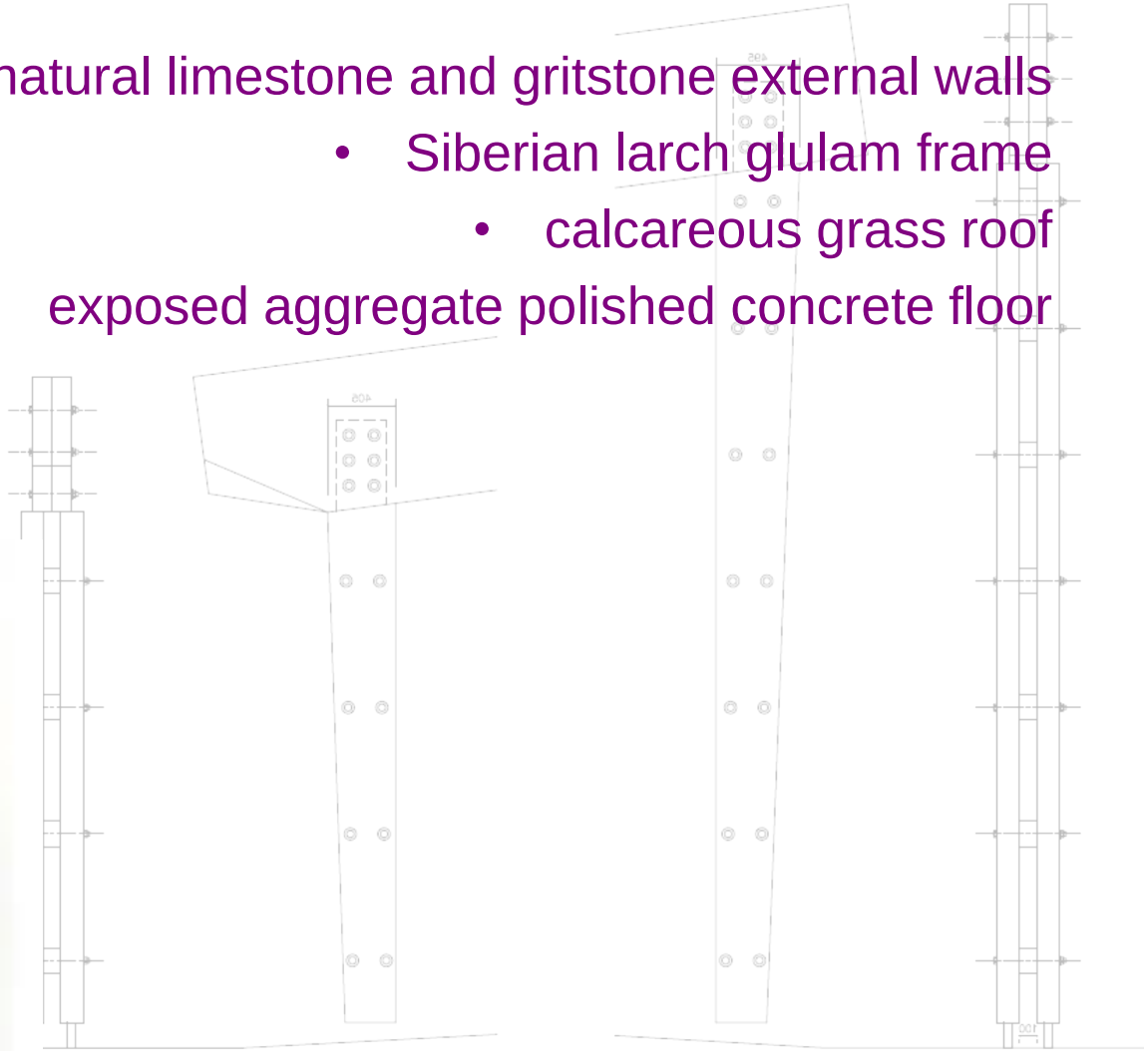
- A large multi purpose workshop and studio
- External canopy
- Social and exhibition space
- Classroom/meeting area with IT facilities
- Kitchen
- Office and reception
- Toilets and changing facilities

Gross Floor Areas

Workshop	**172sqm**
Social Area	**47sqm**
Classroom	**30sqm**
Entrance/Display	**11sqm**
Office	**30sqm**
Toilets	**21sqm**
Plantroom	**21sqm**
Cleaners	**4sqm**
Misc	**14sqm**
Total	**350sqm**
External Canopy	**100sqm**

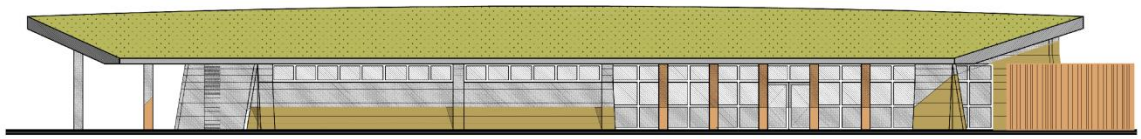
materials

- natural limestone and gritstone external walls
- Siberian larch glulam frame
- calcareous grass roof
- exposed aggregate polished concrete floor



design & energy principles

- to provide a strong inspirational design concept whilst keeping the building simple to maintain and use
- to create a building to showcase sustainability
- to keep energy consumption to a minimum
- to keep the carbon footprint as low as feasibly possible
- to achieve a BREEAM rating of ‘excellent’
- to encourage biodiversity from the living roof



carbon footprint

- predicted annual CO_2 emissions from the building will be 25 tonnes using conventional methods of heating, lighting etc
- using LZC technologies we anticipate that we will reduce the CO_2 emissions from the building by 6.46 tonnes (25%) which will reduce our CRC commitment and convey to the public our 'green' credentials
- this reduction of 25% will meet DCCs commitment to reduce CO_2 and also meet the BREEAM requirements
- with further investment in LZC technology in the future, it is possible to reduce the CO_2 emissions to approach zero

LZC technologies

air source heat pump

solar thermal hot water

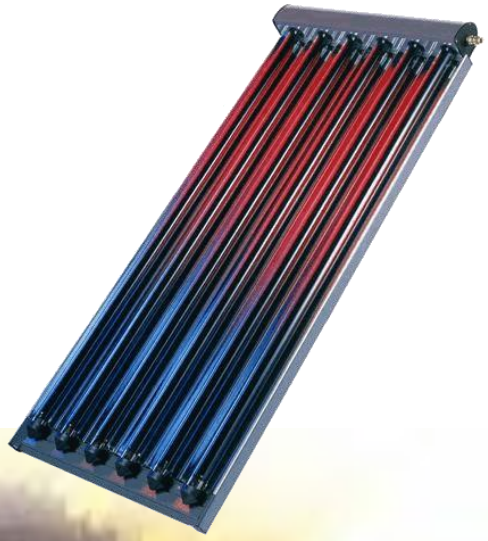
solar photovoltaic panels

rain water harvesting

LZC technologies
Air Source Heat Pump

- refrigeration that works in reverse
- an ASHP can be used with an external air temperature as low as -15°C
- predicted CO_2 saving 5.14 tonnes/yr
- natural gas has cheaper running costs but would take an estimated 11 years to recover the capital investment of bringing gas on to the site

LZC technologies
Solar thermal hot water



- heat captured from the sun is used to generate hot water.
- with no natural gas on site electricity would be the only alternative. A solar hot water system can assist in this generation and help reduce the CO_2 emissions and running cost.
- predicted CO_2 saving 680 kg/yr
- also provides a visible demonstration of the technology to visitors

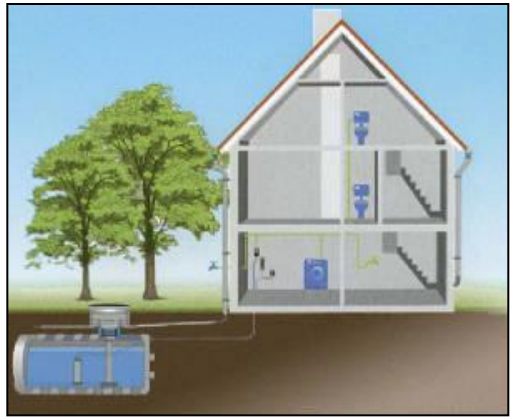
LZC technologies
Solar photovoltaic panels

Phase 1 array 1.5kWp

Phase 2 array 15kWp

- converts daylight into electricity
- predicted CO_2 saving of phase 1 array 475kg/yr and £87 saving in running costs p.a
- predicted CO_2 saving of phase 2 array 5381kg/yr and £985 saving in running costs p.a
- export tariff costs may dictate future policy

rain water harvesting



- collects rain water that would otherwise go down the drain
- reduces the risk of flooding in heavy rain
- provides recycled water to facilities that would otherwise use drinking quality water, i.e. toilets.
- estimation is that rain water harvesting would reduce running costs by £28/yr whilst also reducing the carbon footprint of the building

achievements

- to reduce the CO_2 footprint of the building
- to assist in reducing the buildings energy running costs
- to provide an interactive facility to demonstrate low and zero carbon technologies to the public
- to celebrate qualities of design and construction
- to inspire

Any
Questions ?