

FERNAIG COTTAGE, WESTER ROSS

CASE STUDY: SUSTAINABLE REFURBISHMENT OF A RURAL SCOTTISH LONGHOUSE

This shepherd's cottage is located at the southern end of Loch Carron on the west coast of the Scottish Highlands. Originally purposed for sheep at one end and the shepherd at the other, the cottage had been used as a holiday home for some 20-30 years and was charming but derelict. The stone walls had no foundations, the floors were laid onto bare earth and the timber lined interiors were riddled with woodworm. The ceilings were low and the windows small. The location at the bottom of steep cliffs to the south west limits afternoon sunlight to the site. However there are beautiful views over the local and distant hills to the east and north, and the site is surrounded by open countryside.



The Cottage before works started



The cottage has been fully refurbished and extended to create a 3 bedroom house with a generous new living area with extensive glazing. Great care was taken with sustainability issues. The house was awarded an RIAS award in 2017 and longlisted for RIBA House of the Year 2017, and also won the Zero Waste Scotland 2017 Resource Efficiency Award.



South facing entrance



North elevation (cottage to right)



Extension interior

BRIEF

The brief was to retain the character of the existing cottage and to add an extension to create a more generously scaled living space which takes advantage of the great views around. The red oxide painted roof of the original cottage was a local landmark and this was to be retained. Materials were to be simple and robust.

DESIGN

The cottage was stripped back to the stone walls and the space remodeled internally to create 3 intimate bedrooms and a bathroom. A 'sister' extension was then constructed to the same height and width as the original cottage but located some 500mm down the slope to create a taller open kitchen/dining/living space with a large window and window seat overlooking the best views to the north. The two are connected by a flat roofed 'link' which forms a new entrance and is lined with coat hooks, a

boot cupboard and bookshelves. The space of the new extension is a single, airy, open plan room which extends up into the roof space and has extensive views out. Steps from the 'link' lead up to the original cottage which retains its original low ceilings and small windows with the walls lined with timber boarding to create a series of small and cosy rooms.



Plans, extension to right



Cross section

SUSTAINABILITY

We employed the following:

Materials were retained and re-used where possible. Stone from a demolished outhouse was reused in the construction of the new extension. The roof sheets to the cottage were removed but re-used by the Contractor.

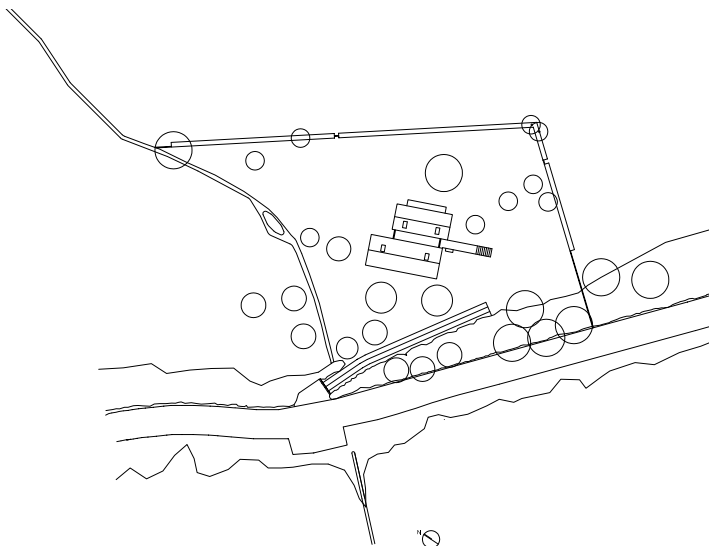
New materials were chosen for a low carbon footprint or to be recyclable – timber frame structure and timber cladding, roof sheets partly recycled steel and with a rapeseed oil colour coating, high performance aluminium windows with a recycled content.

Heating is provided by an air source heat pump and a wood burning stove. The site was assessed but found to be not suitable for renewable energy sources.

Ventilation is via a mechanical ventilation heat recovery system.

The Construction is air tight.

New windows and rooflights have been precisely positioned to make the most of the daylight and the limited sun.



Site plan



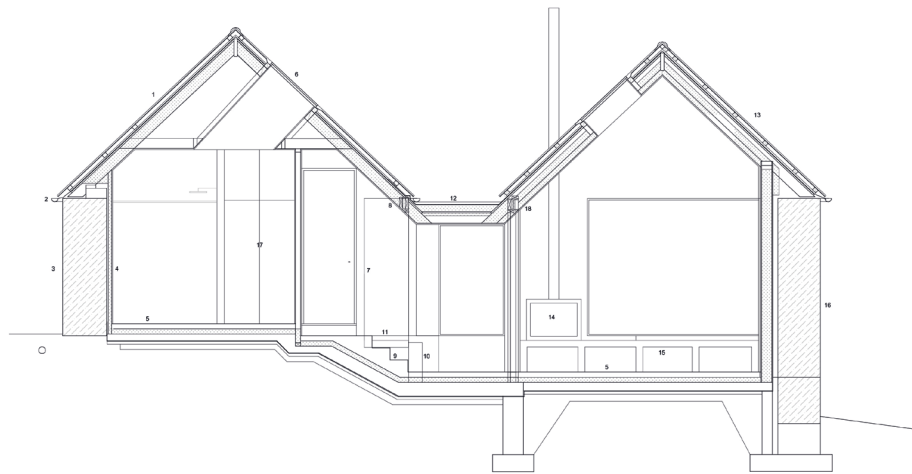
Rooflight photo

ENVIRONMENT AND CONSTRUCTION

The construction build ups were carefully tailored to the existing stone construction of the cottage and the highly performing timber frame construction of the new extension.

The priority for the cottage was to stabilise and weather protect the original stone walls. The new floor slab was excavated and poured in an underpinning sequence to avoid undermining the walls which had no foundations. French drains were laid to reduce the ground water around the walls. Cement pointing and paint was removed and the walls and cills repointed in lime mortar. Gutters were oversized and downpipes overprovided to reduce the risk of blockages and water saturating the stone. Internally the walls were lined with breathable sheeps wool insulation in a timber frame with a humidity variable diffusion airtight membrane and timber boarded finish. The U value was kept deliberately fairly low so that the stonework would benefit from the heat from inside the house in the winter to reduce the likelihood of frost damage.

1. Roof: Profiled, colour coated steel sheet roof cladding on new timber roof structure insulated with rigid foam insulation, intello airtight membrane, all joints taped, painted plasterboard ceiling.
2. Galvanised steel gutter on larch gutter board.
3. Stone walls cleaned, paint and cement mortar removed, repointed with lime mortar.
4. Old stone walls lined internally with timber framing and sheeps wool insulation on ventilated cavity.
5. New concrete slab laid in an underpinning sequence to avoid undermining the original stone walls built off the ground. Insulation, underfloor heating, polished screed finish.
6. Flush fitted rooflights - face east and west.
7. Line of stone wall behind.
8. New steel structure to long opening between cottage and extension.
9. In situ concrete steps with polished finish.
10. New retaining wall.
11. Upholstered cushion.
12. Timber roof structure suspended from new steels, epdm roof membrane.
13. Extension roof: profiled colour coated steel sheet cladding on timber structure, rigid foam insulation, intello airtight membrane taped to osb wall linings.
14. Wood burning stove.
15. In situ concrete bench with log storage below, upholstered cushion window seat.
16. East elevation to extension clad in stone reclaimed from cottage demolitions. Timber frame structure site fabricated. OSB lining with all joints taped. 20mm services cavity between osb and plasterboard facing.
17. Services cupboard-heat pump controls, hot water cylinder, MVHR system in roof.
18. Structural steel allows opening to the cottage the full length of the extension.



Construction section

A profiled metal roof sheet reflects the colour and appearance of the original roof. The same sheet is used on the cottage and the extension to tie the two together.

The new timber framed extension has timber and stone cladding and is heavily insulated to compensate for the reduced insulation to the stone walls in the cottage. For efficiency a Kingspan non breathable board insulation has been used. Structure and vent ducts have all been carefully threaded through the ceiling structure to allow a clean and uninterrupted ceiling line between the cottage and the extension.