Borders Timber Buildings

Study Tour Guide **2**

24th September 2008

Scottish Borders COUNCIL

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Introduction

Wood is good.

Wood is a very versatile and tactile natural material. It can be used in all applications in a building, from external cladding and insulation to structure, flooring and internal joinery.

As trees grow they absorb carbon dioxide and other pollutants from the soil and air. Partly in recognition of this the Scottish Forest Strategy (2006) has suggested that the current forest cover of 17% should be increased to 25% by 2050 - equivalent to planting an area the size of Borders and the Lothians combined.

In turn, the Scottish Forest Strategy responds to the legal requirement for the UK government to reduce carbon dioxide emissions by 20.7 million tonnes of carbon (MtC) per annum by 2010. The Scottish share of this is a reduction of 1.7 MtC per annum. In the drive to meet these targets, maximizing use of materials with lower transport distances and lower processing energies will make a significant contribution. Timber is key amongst these low embodied energy(1) construction materials.

The origin of timber not only has an environmental impact: in many cases timber is illegally logged from ecologically sensitive areas, resulting in devastating loss of habitat for people, plants and animals. Though many sources are certified as 'sustainable' the preference should always be, in the first instance, for timber that is grown in this country.

Plantation forests in Scotland are predominantly managed and harvested by large companies seeking to maximise the economic return of their investment. Currently, the grants system that helps to fund this planting is biased in favour of faster-gowing, relatively low quality species such as Sitka spruce. Increased investment, and grant assistance, is required to increase the planting of species which are better for building with, such as larch and Douglas fir. In turn this will help to create a forest resource with greater economic value *in the long term*.

Construction timber generally requires to be of a certain quality to be fit for purpose. Sitka spruce has its uses, i.e. as ??? but will generally require treatment. Treatment of timber with toxic chemicals renders it hazardous waste at the end of its useful life.

There is a much lower ecological impact if a timber species is selected that is suitable for use without treatment. For example, untreated heartwood of larch is classed as 'durable'. For this reason it can be used untreated as timber cladding. A lower quality of timber such as Sitka spruce would require to be treated against rot, and a paint finish applied (with the maintenance costs that this implies) to achieve the same longevity.

When specifying timber there are basic good practice rules to follow when using timber in construction:
1. Keep timber away from sources of constant moisture. This means keeping the cladding around 150mm (6") off the ground.
2. Make sure timber can 'breathe'. Being a natural material, timber will move in response to temperature and moisture variations. If moisture is trapped in untreated timber there is an increased chance that it will rot. Ensure timber frame structures are not sealed in with plastic membranes, and that cladding is ventilated behind and spaced so it can dry properly.
3. Select species of timber to suit the different application (know your wood). Paint protects cladding: as such the cladding species does not have to be as durable as were it left unpainted. Similarly, structural timber generally needs to be straight and true: this is more achievable, for example, with Douglas fir than larch.

Scottish Borders Council support the increased use of timber in construciton in the Borders and are aware that to achieve this requries action in many areas.

The Study Tours that this booklet is designed to accompany are one means of educating those in decision-making roles (such as Councillors, planning officers, architects and builders) of the different applications of timber in construction, and, more specifically, the application of timber in different contexts. The projects on the following pages represent a varied cross section of projects in Scotland which have used timber.

In the current economic climate, the achievment of a significant increase in the use of Scottish timber in construction will only ever be demand-led. This will require appropriate knowledge and design solutions, and willingness on the part of the decision makers to encourage this approach.

(1). For embodied energy figures refer to http://www.bath.ac.uk/mech-eng/sert/embodied/

SCOTTISH PUBLIC PENSIONS AGENCY

Galashiels

Clients : **Scottish Public Pensions Agency**
Architect : **RMJM**
Structural engineer : **RMJM.**
Date of completion : **September 2002**
Internal floor area : **3000 m2**
Main timber elements : **Timber frame. Rafters on laminated timber purlins. Timber cladding, flooring and decking. ????**

The project: RMJM's new offi ces for the Scottish Public Pensions Agency are situated in a landscaped industrial park close to the banks of the river Tweed. The 3000sqm single storey building has been designed to meet high standards of sustainability and respond sympathetically to its context both in form and materials.

Brief:
Due to specifi c requirements of the user client a construction period of only 8 months was required. It was clear then from the outset that, to meet both the short programme and address the issues raised by the sustainable objectives, a solution employing rapid construction methods and, a carefully selected pallet of materials would be required.

The low-lying level of the building meant that the

roofscape of the building became an important additional elevation, the expression of which was provided by the clerestory and atria structures, and are fi nished with an insulated green roofi ng system providing excellent thermal insulation and replacement habitat following completion of the building.

The strong environmental aims of the scheme are achieved through the use of recycled materials such as newspaper based cellulose insulation, renewable materials such as timber for windows, doors, wall cladding etc. The energy strategy for the building also takes account both embodied energy in materials used, and operational energy use through solar collectors, effi cient heating systems, natural lighting / ventilation, effi cient insulation of the building envelope. The minimisation and recycling of waste materials during the construction process also contributed. The creation and replacement of habitat through the use of the green roof, the creation of a pond, and the use of meadow grass and indigenous plant landscaping, all help to limit the buildings impact on the local environment and positively contribute to the site's biodiversity.

HERONSHAW
BROCKHOUSE
Fountainhall

Clients : **Stephanie Tristam**
Architect : **Sally Ruel Architect**
Structural engineer : **Gordon Eadie.**
Main contractor : **A.F. Tough**
Date of completion : **October 2006**
Internal floor area : **159 m2**
Main timber elements : **Timber frame. Rafters on laminated timber purlins. Timber cladding, flooring and decking.**

Frame : 150 x 50 s.w. studs.
Cladding : Imported larch, finished with grey/blue translucent wood coating.

The project: Designed to suit an extremely steeply sloping site, Heronshaw is located to the north of a group of existing farm cottages. The house is T shaped on its main, middle level, with an entrance from the west side, up the hill. A lower level, below the main living area of the house is accessed through a porch on the south east corner, with an attic over the upper hall giving views west up the hill. An open plan living room and kitchen occupy the central part of the plan, with the dining room and a studio opening onto decks either side. The house has two bedrooms, one on the middle level, one below, opening directly onto the lower garden.

The house has 40 degree pitched, slated roof with a combination of coated cladding and rendered walls, with a grey brick base course. The gable facing east towards the A7 was changed from timber cladding to rendered blockwork during the design process, at the request of Scottish Borders Council Planning Department.

WATERWHEEL CAFE

Philiphaugh Estate, Selkirk

Clients : **Philiphaugh Estate**
Architect : **?**
Structural engineer : **?**
Main contractor : **?**
Date of completion : **?**
Internal floor area : **? m2**
Main timber elements : **Timber frame. Rafters on laminated timber purlins. Timber cladding, flooring and decking.**

Frame : ?.

The project:

KYLE COTTAGE
Midlem

Clients : **Callum and Clare Hay**
Architect : **William Grime Architect**
Structural engineer : **McKay & Partners**
Date of completion : **May 2007**
Internal floor area : **80m2**
Main timber elements : **framing and cladding, fl ooring and windows**

Frame : 200mm softwood studs in walls ; 200mm joists to first floor, 175mm rafters.

Initially T&G cladding specifi ed, but client, who undertook site monitoring, changed to board–on-board, giving a rather more aggressive look to building, and also amended cladding details around windows and doors.

Architectural design : Midlem is a village of cottages
around a village green, with a regular rhythm – masonry cottages with their roof axis parallel to the road, separated by garages at right angles. The extension was designed to continue this rhythm, and was accordingly set back from the building line and given small windows to make it somewhat self-effacing. The punchy surface texture of the board-onboard cladding compromises this approach, but in time the fading of the colour to a uniform silver grey may help the building 'regress' as initially desired. The simple rectangular fl oor plan with symmetrical 45º pitched roof hints at tradition, and the deep-set and small windows lend an air of Scottish robustness. The slate roof was a planning requirement:
the roof overhangs 500mm to protect timber cladding

Cladding : 150 x 20mm Siberian larch set board-onboard, stainless steel nailed to counter-battens.

Details : window sills, drips and fl ashings originally specifi ed in aluminium with reveals in Siberian larch. Subsequently constructed in larch only.

Timber sources : The timber studs are untreated Scottish softwood. Siberian larch supplied by Russwood.
Windows in Baltic whitewood by WR Matthews, Tweedmouth

Planning issues : The location – a sensitive conservation area in an historic village – saw the design continually modified over a year to refl ect planners' and local concerns over height and window sizes, but ultimately approved scheme was that initially submitted.

Difficulties & constraints : Architect favoured use of local home-grown larch for cladding but, after research felt that what was available locally was unsuitably – preponderance of knots and varying grain patterns compromised weathering ability, particularly as cladding to be left unpainted/unstained to weather naturally, and was also unattractive.

OLD PARR HOUSE
Minto

Clients : **Patrick Benson & Augusta Greenlees**
Architect : **William Grime Architect**
Structural engineer : **McKay & Partners**
Date of completion : **Feb 2007**
Internal fl oor area : **377m2**
Main timber elements : **timber framed and clad, some exterior decking and 2 bridges**

Frame : 200mm softwood studs in walls ; 225mm rafters and joists to first floor

Difficulties & constraints : Architect favoured use of local home-grown larch for cladding but, along with client, felt that what was available locally was unsuitably – preponderance of knots and varying grain patterns made dressing very difficult and compromised weathering ability, particularly as cladding to be left unpainted/unstained to weather naturally. Some problems also with movement in softwood framing and decking, but this now resolved by

judicious bracing and occasional replacement. Main timber frame remarkably stable so far.

Architectural design : A simple rectangular floorplan with symmetrical pitched roof lends the building a solid dignity that accords with Scottish architecture despite its external materials of timber and stainless steel. Roof overhangs to protect timber cladding are around 700m, with 45° roof pitch. The building is set into Playfair's gardens, the rectilinear nature of which had a powerful infl uence on the design

Decking : Oak (125 x 22mm) screwed to frames

Cladding : Siberian larch in fully profi led and dressed vertical pattern giving exposed face width of 150mm with groove of 4mm and finished depth of 22mm. Stainless steel nailed to larch counter-battens

Details : window sills in anodised aluminium, drips and flashings in stainless steel , reveals in Siberian larch.

Timber sources : The timber studs are untreated Scottish softwood. Siberian larch supplied by Russwood. Locally grown oak decking supplied by Woodschool of Ancrum. Windows by Nordan. Floors, doors, stair-cases and some internal joinery in European white oak.

Planning issues : On the site of a former Listed Building (demolished 1990) with Listed Gardens. A masonry/slate approach was preferred by Planning Department but case argued for timber/ stainless steel on sustainability grounds. Took a year to persuade planners, involving the building of a scale model.

Comments

The following are notes collated from the Study Tour on 24th September and have not been edited.

SPPA

Boring - too uniform. No 'wow' factor!
Where is the Scottish timber?
Uninspiring
Aesthetically dull
For me, this was on the edge of the 'concept' of wood finishes being a bit too apparent.
The different elements - horizpntal cladding, brise soleils and pergolas - didn't hag well together but they were quitre well executed standard details/construction.
Timber could have been used more. Majority cladding. (windows etc) Lack of knowledge of cedar may lead to differential opinions.
Loved it! Esp inside. Sat wonderfully in the landscape.
Do not like timber cladding, looked too grubby outside.
V. smart building / looks good after several years.

Heronshaw, Fountainhall

Very 'neat' and grey.
Why cover a beautiful surface?
Nice looking house
Obvious design. Seemed easy to maintain
There was something about the house that was really uncomfortable. If I knew I was going to paint the cladding I would have used a wood more 'paintable' and would sand it not plane it to get a better bond.
There were too many different greys, plus black and white. Plywood soffits not my thing either.
Paint requirement? Maintenance.
Nice airy house. If the client wished to paint the high-quality timber, that was up to her. The white painted masonry was not good to look at. Lovely birch flooring in kitchen/dining room.
I think the planner was correct. Paint finish thin, nail holes not filled correctly.
V. comfortable building - unpretentious. Like the colour. Would have preferred timber throughout.

Waterwheel Cafe, Philiphaugh Estate, Selkirk

OK but would look better deep in a forest
Standard building, nothing interesting
High quality simple, presumably v. cheap construction. We could probably copy it in unlaminated, inkilned Douglas Fir with an outer cladding (ADDED if necessary).
Umm...
The low-pitched roof and felt tiles are hard to take. I got the impression that it was a 'low-end' kit but as such still acceptable.
Never mind importing a building if it's better/cheaper. Trick is: to get the right kind of timber in Scotland.
The building looked as if it belonged and challenged anyone to move it on. I liked it.
Attractive Scots pine building, but style may be difficult to adopt widely - probably due to low roof angle.

Kyle Cottage, Midlem

Like the rough-sawn cladding
Probably would only work on site specific basis
Timber quality looks very good. Will actually have been cheaper (per unit volume) than others because of lower processing costs. Potentially easier maintenance than horizontal tongue and grooved cladding.
Very neatly executed (but incorrect) cladding. Rough sawn boards a bit 'agricultural' for my taste.
Looked out of place.
The windows facing the street were too small, aesthetically. The back of the house was wonderful. The front should have been finished to match the rest of the village.
Did not feel that it sat comfortably in the village, but didn't object to its design.
An attractive addition & contrast to the conservation village. Stainless steel nails / rainwater goods look sharp.

Old Parr House, Minto

Stunning. I want it!
Looked very 'industrial'.
No relation at all to surroundings.
Entrance feature looked very poor
Design of house: standard rectangular footprint, with pitched roof
Toff's Lodge - he'll be bored with it inside 10 years.
Not quite enough attention to detailing - inelegant eaves and soffit to gable. Again the idea of the architecture was stronger than its visual effect. Too many greys again in metalwork.
Overall design wasn't in keeping with surroundings. Time for cedar to change colour too long and different shades may not be appreciated.
Would have loved to see inside. Did not like the steel roof - too pale. Workmanship was superb. I would not want this house myself but am glad this one got built.
Did not like the design especially roof. Should have been copper. The building looked more like an office block.
Interesting design but i suspect a v. expensive stainless steel roof. Overall: pity no examples of local timber facade on this tour.

QUESTIONS:

Q. What is the difference in embodied energy between timber coming by road from the north of Scotland and by boat from further afield.

A. Despite various attempts at researching this information there are still no definitive figures. The Inventory of Carbon and Energy (refer introduction) only contains general figures for timber.

OTHER TIMBER PROJECTS IN SCOTTISH BORDERS

HOUSE IN GRANGEWOOD

Coldingham

Clients : **Richard & Elaine Thomas**
Architect : **Quercus Rural Building Design**
Structural engineer : **David Narro Associates**
Main contractor : **Quercus Rural Building Design**
Date of completion : **September 2006**
Internal floor area : **117m2**

Main timber elements: **timber ground beams, post and beam structure, cladding, exterior decking and prefab stud frame.**

Architectural design : The brief for this house had some ecological objectives that included the use of natural wool insulation, untreated timber for structure, cladding and linings and as much as practical from Scottish sources. Quercus are both Architects and Builders so were able to provide a turnkey project for the house which is one and a half storeys and a simple rectangle on plan. The main spaces are orientated to the south with glazing maximised for solar gain. Utility spaces are located on the north side of the plan where the back entrance deck comes in from the farm directly to the washing area. The main entrance to the front is also via a timber deck which is itself a useful outdoor space.
Energy design : As the site has no connection to the national electricity grid consumption is reduced by high level of insulation and passive solar gain with a combination of energy sources being a windmill, solar panels, photovoltaic and a wood burning stove.

Ground Beam : 300mm deep Scottish Douglas fir.
Structural Post & Beam : glulam Scots pine of varies sizes, finished with fire retardant paint.
Frame : 144 x 44 mm Scottish softwood studs; 245 x 44 mm rafters and 160 x 44 mm joists.
Cladding : 140 x 22 mm untreated roughsawn European larch board stainless steel nailed onto 50 x 22 mm vertical larch battens.
Flooring : Scottish ash, marmoleum or wool carpet.
Decking : 125 x 30mm untreated European larch screwed to softwood framing.
Windows : redwood framed, subsill clad in lead. Reveals in European larch.
Timber sources : The timber frames are untreated Scottish softwood in prefabricated panels supplied by ARM Buildings. Ash flooring, Douglas fir beams and European larch supplied by local sawmill, Abbey Timber. Scots Pine glulam post and beam supplied by Norbuild of Forres. Redwood windows and external doors from Allan Brothers of Berwick.

Difficulties & constraints : As both the clients and the architect were in favour of a low impact foundation the initial idea was to sit the building on reclaimed telegraph poles stilts. Dictated by the impermeable soil condition, the heavy grid of Douglas fir floor beams are supported on concrete pads instead.

HERIOT TOUN STUDIO

Heriot

Clients : **Andy and Pat Law**
Architect : **Reiach and Hall Architects**
Structural engineer : **David Narro Associates**
Main contractor : **Quercus Rural Building Design**
Date of completion : **November 2005**
Internal floor area : **78m2**
Main timber elements: **timber ground beams and stilt foundations, post and beam structure, cladding, exterior decking and prefab stud frame.**

Stilt foundations : reclaimed treated telegraph poles embedded in ground on hard base. Average pole diameter 250mm.
Ground Beams : 200mm deep Scottish Douglas fir.
Structural Post & Beam : glulam Scots pine of varies sizes.
Frame : 144 x 44 mm Scottish softwood studs; 245 x 44 mm rafters and 160 x 44 mm joists.
Cladding : 120 x 19 mm untreated European larch horizontal shiplap boarding stainless steel nailed onto 50 x 38 mm vertical larch battens.
Flooring : Scottish Ash, painted European larch, marmoleum or slate.
Decking : 125 x 30mm untreated European larch screwed to softwood framing.
Windows : redwood framed, subsill clad in lead. Reveals in European larch.

Timber sources : The timber frames are untreated Scottish softwood in prefabricated panels supplied by ARM Buildings. Douglas fir beams and European larch supplied by local sawmill, Abbey Timber. Scots Pine glulam post and beam supplied by Norbuild of Forres. Redwood windows and external doors from various sources.

Project background : The studio is designed by architect Andy Law for his artist wife Pat, who wanted a painting studio in their back garden which also functions as a gathering place for collaboration with other artists. Their neighbour Peter Caunt, who is an architect and a builder, with his company Quercus became the ideal partner to take on the design and build of the project after planning stage. Quercus's experience in construction with local timber and ecological design has helped Andy to deliver his aspirations for this project. Delays were experienced with timber supply and heat pump installation.

Architectural design : The design is a simple timber longhouse that uses timber post foundations to sit lightly on the ground. The studio takes one end, which flows into a living space of sitting and kitchen areas, which then connects to discrete bedroom and shower room at the other end. The main studio space is open into the roof with cool daylight from North facing rooflights and a great deal of warm daylight from full height glazed screens to the South. Perched in the steeply sloping back garden to the original farmhouse at Heriot Toun there are great views from both studio and its deck over the Heriot Water valley.

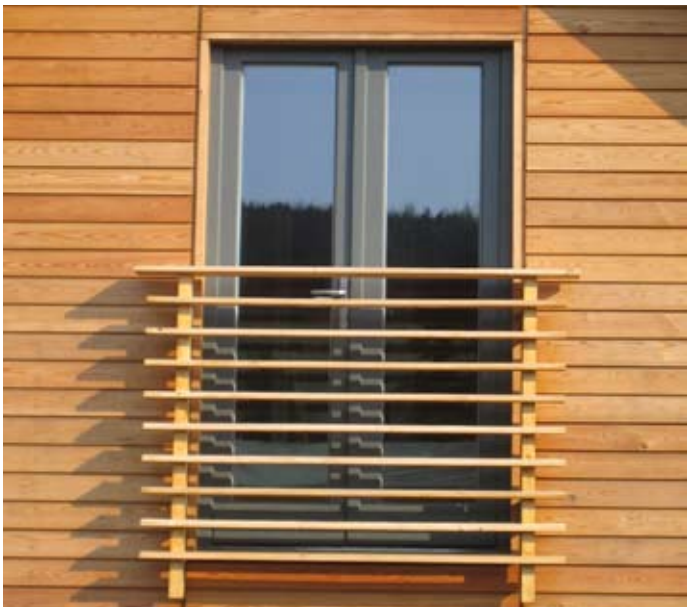
Energy design : To reduce the eco-footprint and give long term economies, the studio is heated with underfloor heating running on a ground source heat pump. A wood stove is also installed as a back up and as a focus of the living space.

EXTENSION TO PRIVATE HOUSE

Heriot

Clients : **Jenny and Chris Humphreys**
Architect : **Jenny and Chris Humphreys**
Structural engineer : **Wren & Bell**
Main contractor : **Denholm & Sutherland**
Date of completion : **June 2006**
Internal floor area : **65m2**
Main timber elements : **timber framed and clad, with some exterior decking, timber windows and doors**

Frame : 150mm softwood studs in walls ; 250 mm rafters and joists to first floor.
Cladding : Siberian larch in horizontal shiplap profile giving exposed face width of 100mm with shadow gap detail of 14mm and finished depth of 26mm. Stainless steel nailed to SW battens. No treatment.



Architectural design : The extension's orientation is perpendicular to the predominant axis of the terrace, and as a result it forms an effective bookend to the group of buildings. Scale, proportion and orientation of major elements accord with the original buildings. The architect has maximised the opportunity to raise the eaves height of the extension through the use of a narrower plan and similar roof pitch, with the effect of further signifying the extension as the end of the buildings. By utilising a horizontal cladding profile, rather than vertical, the overall mass of the extension is reduced. Interestingly, the extension is visually separated from the main house by an offset glazed entrance, which would accord with standard planning guidance which stipulates extensions to historic buildings should be subservient to the original. Conversely, the overall mass of the building is significantly larger, and pushed forward of the building line.

Details : Windows are FCS redwood. Oak window sills, with sub-frames and facings in Douglas Fir. Internal door reveals in oak. Front door is Douglas Fir stiles and rails with Siberian Larch infill panels.

Timber sources : Siberian larch, softwood decking, Douglas Fir and Oak facings and internal oak flooring all supplied by St Andrews Timber, Edinburgh.

Planning issues : The extension has been built on to the original grooms cottage of a traditional U-shaped steading. A consent already existed for a 2 storey extension, and no planning difficulties or constraints were met with this renewed application.

NEW HOUSE
Fountainhall

Clients : **Wendy and Jeremy Cunningham**
Architect : **Sally Ruel Architect**
Structural engineer : **David Narro Associates**
Main contractor : **Self built with assistance from friends and local tradesmen.**
Date of completion : **October 2005**
Internal floor area : **166 m2**
Main timber elements : **Timber frame with timber flitch beams. Timber cladding, flooring and internal internal joinery. External decks.**

Frame : 200 x 50 sw studs.
Cladding : Feather edge Scottish larch, supplied by Abbey St. Bathans Timber.

The project: A collaborative project between Sally Ruel, Architect, and Jeremy Cunningham, sculptor and builder, the new house at Nether Linnfall was designed to be a simple, environmentally friendly building, using materials from renewable or recycled sources, with as many as possible obtained
locally. It is energy efficient in its design and orientation, with high levels of insulation in the construction, triple glazed windows, and orientated to the south and west to maximise passive solar gain. The water supply and drainage system has been designed to have as low as impact as possible on the environment, and there are plans in future to install solar and hydro electric power sources.

Materials: Timber clad, with larch from a local supplier, and a Welsh slate roof, the structure is a timber frame, built almost entirely from 200 x 50 mm sections of timber. With the help of David Narro Associates, Structural Engineers, the frame was designed to be as simple as possible, with the floors and rafters spanning between wall frames and a beam at each level supported off a central column. This allows flexibility in the plan - both at present and in the future, as all the partitions are non loadbearing.

Insulation in the walls and roof is natural wool - 'Thermafleece' - from Cumbria, floors and finishing joinery are all made from Scottish timber, with reclaimed doors and other internal elements.
Architectural design : The house is built on three levels, against the side of an existing bank, with the main entrance at the middle level, from the top of the bank, into a hall leading onto an open plan living/kitchen/dining room. Stairs from the hall lead to the lower level, where three bedrooms open off a family room, containing the only heating source in the house - a woodburning stove. French windows from the family room lead directly out to the lower level. Entered separately from a rear staircase, the upper level contains studio and guest accommodation.

NEW HOUSING DEVELOPMENT
Gattonside

Clients: **Eildon Housing Association**
Architect: **Bain Swan Architects**
Structural and Civil Engineer: **Wardell Armstrong. Edinburgh**
QS: **Thomas and Adamson. Edinburgh**
Main Contractor: **Hart Builders (Edinburgh) Ltd**
Cladding Timber: **BSW, Earlston**
Timber Frame Manufacturer: **Walker Timber**
Date of Completion: **November 2007**

Details: The site is adjacent to parkland at Tweedbank and slopes gently to the south. The houses on the upper part of the slope (not prone to shading by existing mature trees) have sun porches facing south to optimise solar gain. Thermal insulation values are in excess of those required by the Building Standards. Heating and hot water to 19 of the houses is generated by high SEDBUK rated gas fired boilers but in 2 of the houses the client has had installed air to water heat pumps to compare efficiencies and running costs. (NIBE 'Fighter' 310 supplied by Ecoliving, Glasgow).

Planning issues: The site was zoned for housing in SBC's Local Plan. Care had to be taken in the design and construction to minimise disruption to the adjacent houses and primary school.

Architectural design: All but the wheelchair users' houses are two storey and are in terraced form to optimise site use and further reduce heat losses. In the layout, particular attention was paid to external areas and soft landscaping because of its proximity to the park. The minimisation of the footprint of the buildings by using terraces allowed an area of rough grass and wild flowers to be created for the encouragement of insects and wildlife. Existing hedgerows on the site were retained and reinforced with indigenous species.

The scheme: comprises 19 general needs houses for four, five and 7 persons and 2 houses for wheelchair users.

Main timber elements: Timber frame, timber cladding ('Accoya', factory stained with microporous stain), timber windows and doors (factory stained with microporous stain).

Frame: External walls, timber intermediate floors (I beams), roof trusses, stairs, internal partitions.

Timber Cladding: Softwood, from sustainable forests or plantations, treated by the 'Accoya' process in which additional 'acetyl' molecules, which are already present, are added to the timber. The timber then absorbs less moisture and the modified cells are resistant to micro-organisms and thus decay. When this timber is factory stained (in this case with Sikkens Exterior Opaque Coating) it is guaranteed against decay for 50 years.

Facing Brick Cladding: This is used in areas where fire protection or where defence from mechanical damage is required.

GARDEN HOUSE
HUMEHALL HOLDINGS
Near Duns

Clients : **Martin & Jane Worrall**
Designer : **ICOSIS Architects**
Main contractor : **Client Managed Self-build**
Timber Frame Manufacturer: **Lindisfarne Timber Frame (also installed windows & rooflights)**
Date of completion : **October 2007**
Internal floor area : **154 m2**
Main timber elements : **Timber frame (from ground floor wallplate level); larch cladding (untreated); engineered pine windows (microporous paint finish); oak t&g flooring (oiled finish); oak internal & external doors (oiled finish); softwood stair.**

Planning issues : The plot was purchased with outline permission for a 1½ storey house. The proposed design was well received, and was passed with no adverse issues raised by the Planning Department. The permission includes a small wind turbine, which may be installed in the future.

Difficulties & constraints : The overall site is bisected by a small road, with permission to build on the smaller, higher part of the site, and the larger area retained for views and siting of septic tank and drainage fields. The house therefore sits between an existing traditional stone cottage, and a farm-yard, and is orientated southeast / northwest to fit with the plot and the existing building line, rather than directly due south as would have been more desirable to maximise solar gains. The frame was manufactured in large panels off-site, to reduce construction time, wastage, and storage of materials on the tight site.

Architectural design : The ground floor is largely open-plan, with large windows to the south-east for solar gain and to make the most of spectacular views over the valley & Cheviot hills beyond. Large rooflights over the stair and sunroom allow daylight to flood into the heart of the house. The flat-roofed sunroom and garage tuck under the eaves of the main house. Garage, utility room, and entrance lobby are located on the north-east to act as buffer-zones. Simple, good quality, natural materials were used throughout.

Frame : Roof, external walls & first floor structure in 350 & 300mm deep Masonite engineered I-joists; softwood framing for internal partitions.

Cladding : Untreated European larch fixed with stainless steel nails to treated softwood battens (installation of cladding undertaken by the client). 8mm spacing has been retained at ends of boards to prevent moisture being trapped at the end-grain, tie-in with window openings to prevent differential staining from rainwater run-off below sills.

Details : All walls and roofs are “breathing” (moisture transfusive) construction, with Warmcel recycled cellulose insulation. The main roof is slate, with cast iron rainwater goods, and aluminium cappings to the roofs on the garage and sunroom. A flat-bed solar panel provides domestic hot water, and the only space heating is provided by a 12kW multifuel stove, with a whole house ventilation and heat recovery system. Internal stud partitions were infilled with unfired clay bricks to increase both thermal mass and acoustic separation.

Timber sources : Engineered I-beams from Masonite; European larch shiplap cladding from Russwood Ltd. Internal stud framing in Scandinavian softwood.

TODLAW SUPPORTED HOUSING

Todlaw, Duns, Berwickshire

Clients : **Partnership between**
Berwickshire Housing Association
NHS Borders
SBC Social Work Dept
Architect : **Oliver Chapman Architects**
Structural engineer : **David Narro Associates**
Main contractor : **J Swintons, Hawick**
Date of completion : **October 2007**
Internal floor area : **14 housing units of approx 75m2 each (mixture of 1 & 2 bedrooms house types) and a shared core services building (SCSB)150m2**

Main timber elements: **timber frame wall panels, trussed rafters with plyweb beams for longer spans and cladding**

Project background : Our Client, Berwickshire Housing Association, entered into a partnering agreement with NHS Borders and Scottish Borders Council Social Work Department and appointed OCA as lead consultant to design and deliver 14 fully accessible semi-detached houses and a shared services facility with 24 hour care for people with substantial disabilities and illnesses at Duns. Joint funding was by Communities Scotland, Scottish Borders Council and Berwickshire Housing Association. The project is the first care home in Scotland that is based on a housing model rather than traditional institutional provision and the houses and surroundings are designed to maximize independence and links to the local community and amenities.

Architectural design : All the houses are set out around a 'tartan grid' which creates a varying relationship between houses and the quiet street. Some houses are set back further from the road than the conventional building line, whilst others are set close to the road edge. There is also a mixture of gables and eaves adjacent to the road which adds to the streetscape character and screens parked cars from view. The commonly understood character of a home is created by designing duo pitched roof forms with gables at either end. The housing is a variety of 'core' and 'cluster' types. Core houses are for individuals with a greater care need and are located closer to the services building where care managers are based and meals are provided for those that wish to eat communally. The core houses are connected to the services building via a linear covered way structure.

Substructure: vibro compacted piles in sandy soil with insitu concrete ground beams. Concrete block perimeter walls faced in Baggeridge Staffordshire Blue engineering brick.
Ground Floor: Bison pre cast beam and block with ventilated solum – allows for future disassembly and re-use.
Frame : 144 x 44 mm Scottish softwood studs
Roof Structure: Trussed rafters with plyweb (fabricated timber/OSB beams) for longer diagonal spans where ceiling/soffit follows the line of pitch at gables and in SCSB dining area.
Cladding : 120 x 19 mm stained dressed Siberian larch vertical board on board fixed to treated sw battens and counter battens
Flooring : By others
Windows : redwood framed. Reveals in larch.

Energy design : To reduce the eco-footprint and give long term economies, the studio is heated with underfloor heating running on a ground source heat pump. A wood stove is also installed as a back up and as a focus of the living space.

Testimonials: "It has allowed the tenants to live in a much more flexible way, enabling them to live their lives more in the way they want to."
- Physiotherapist, NHS Borders.

Awards: Recent winner of a Community Care Partnership Working Award, Shortlisted for an RIBA regional award and an EAA Award.

THE STEADING
Morebattle

Clients : **Paul & Helen Grime**
Architect : **William Grime Architect**
Structural engineer : **McKay & Partners**
Date of completion : **August 2006**
Internal fl oor area : **396m2**
Main timber elements : **timber framing and cladding, roofing, internal flooring, doors and windows**

Frame : 200mm softwood studs in walls; 200mm joists to first floor, 175mm rafters.

Planning issues : None, thanks to a remarkably open-minded Planning officer and no neighbour objections

Difficulties & constraints : Architect favoured vertical cladding for longevity, but client wanted horizontal cladding for appearances sake. Local timber for cladding reluctantly abandoned due to preponderance of knots, hideous orange colouring and lack of reasonable dressed finish, particularly as cladding to be left unpainted/unstained to weather naturally. Timber roof set board-on-board: recognised as a short-life option, but can be recycled, and met budget

Architectural design: The clients wanted a simple house with a minimal ecological footprint. Re-using the old steading building was a good start; the alterations were all constructed using timber frames and cladding, sheep wool insulation, and heating uses a ground-source heat pump. The stainless steel cladding (a recycled product) was a little bit of fun, and was used to 'lift' the enclosed courtyard and add interesting reflections to the pools.

Cladding : 150 x 20mm Siberian larch shiplap boarding with plane angled exposed surface, stainless steel nailed to counter-battens. Stainless steel cladding to link corridor.

Details : window sills, drips and flashings in stainless steel with reveals in Siberian larch.

Timber sources : Timber frames are untreated Scottish softwood. Siberian larch cladding, roofi ng and used for external doors) and oak flooring supplied by Russwood. Windows in Baltic whitewood by WR Matthews, Tweedmouth. Timber decking in treated Baltic whitewood.

OTHER TIMBER PROJECTS IN SCOTLAND

HOPE
Pathhead

Clients : **Richard & Pru Irvine**
Designer : **ICOSIS Architects**
Structural engineer : **John Watt Structures**
Main contractor : **John Winthrope Ltd**
Date of completion : **December 2007**
Internal floor area : **390 m2**
Main timber elements : **timber 'I' frame clad with larch sleepers, shingles & "brise-soleil", and with timber windows and a monocoque internal timber stair**

Difficulties & constraints : House half cut into site with the entrance at upper floor level, meant the non-timber elements (retaining wall & tanking)) were the most complicated to build. Once this was complete, the main frame & form of the building was relatively straightforward, with detailing & junctions the only real issues.

Architectural design : The basic design aims to maximise passive solar design, with smaller windows to the north and large windows to the south & west, partly shaded by overhanging roof and brille-soleil. The bedrooms are located on the ground floor with the kitchen, dining & living room upstairs elevated views. The roof is seen from above and has a sedum blanket on the main section with crushed slate on the lower north roof. 'I' beams consisting of 2 timber flanges & an 8mm wide web, minimises cold-bridging & uses 40 to 65% less raw material than conventional timber building methods. Otherwise, local, natural (unprocessed) materials have been used wherever possible.

Frame : All timber framed: Parallam beams with masonite walls, floor & roof fully-filled with recycled newspaper insulation, built off a concrete slab foundation.

Cladding : All untreated Scottish larch, stainless steel nailed to treated softwood battens on panelvent sheathing. Lime render on pavatex boards used on the two storey front elevation.

Details : powder coated aluminium sills, otherwise zinc rainwater goods, hoppers & capping details.

Timber sources : Masonite & parallam timbers from Keyline. Scottish larch sleepers & shingles supplied by E.G. Johnston & Co, Campbelltown.

Planning issues : Great effort gaining Planning permission, eventually swayed at committee through emphasis on the sustainable aspects of the project and "brownfield" nature of site (replacement of existing shed), rather than new house on "greenfield" site, as originally contested by the Planners.

CEOL MARA
Lochbroom

Clients : **Roz & William Wordie**
Designer : **Bernard Planterose, North Woods Construction Ltd**
Structural engineer : **Wallace Stone & Partners**
Main contractor : **North Woods Construction Ltd**
Post and beam fabricator : **Strong Bridges**
Date of completion : **April 2006**
Internal floor area : **150 m2**
Main timber elements : **timber framed and clad, with exterior raised deck**

Planning issues : There were no planning objections but Planning Department forced an increase to roof pitches for no understandable reason.

Difficulties & constraints : The post and beam framework plus 3 storey stair of this high quality build required very straight timber, particularly for direct fixing of glazing bar system. Past experience of home-grown Douglas fir suggested over-ordering the quantity by some 20% to allow choice of beams during fabrication and this proved to be wise. All 'rejected' timber was used on less demanding projects.

Architectural design : A complex design in two parts on a steeply sloping site. The open plan mono-pitched section includes a massive bolted Douglas fir frame with steel flitch plate connectors and exposed stainless steel tensioning wires above head height in the main internal space. Extensive floor to ceiling glazing and rooflights give an exceptionally light living space. Potential heat loss is well compensated for by deep sheep's wool insulation throughout with a floor and roof U value of 0.09W/ m2/K in the open plan zone. The canted and shaped post and beam walkway with roof glazed entrance is particularly sculptural.

Frame : A hybrid post and beam frame with stud framed exterior walls. 200mm softwood framing in walls ; 250mm in roof. The elevated ground floor area and adjoining deck is on a steel sub-base.

Cladding : All European larch workshop stained: part of building in fully profiled and dressed horizontal boards stained with Osmo white ; other part in semi-dressed vertical board on board stained in Valtti. Stainless steel screwed to larch battens.

Decking : Untreated European larch structure and decking boards.

Details : Sills, drips reveals and cladding dividers in coated steel and aluminium. Framed windows and doors by Treecraft in Scandinavian redwood and factory coated. Roof glazing and large fixed glazing, site fixed to frame with Guttman aluminium glazing profiles.

Timber sources : Post and beam Douglas fir framework plus internal joinery including 3 storey stair, all Highland grown timber sourced, kilned and dressed by Russwood. Vertical European larch cladding also by Russwood. Horizontal profiled larch cladding by Norbuild. Stud framing in solid Scandinavian softwood.

MACIVER HOUSE

Newton of Novar, Evanton

Client: **Cairine MacIver**
Architect: ***Neil Sutherland Architects LLP***
Structural Engineer: **W A Fairhurst & Partners**
Main Contractor: **MAKAR Ltd**
Date of Completion: **December 2007**
Internal Floor area: **75 m2**
Main Timber Elements: **Timber Panel construction with exposed Douglas fir trusses on 3.0 metres centres. Roofed balcony to upper floor in exposed Larch to structure and decking, timber clad with further areas of external decking to lower areas.**

Planning issues: The house while visually unusual was supported by the planning department. Concerns over the upper floor balcony and overlooking to neighbouring houses eventually evaporated.

Difficulties and constraints: The site was challenging in terms of drainage which unfortunately had not been identified by the original engineers this resulted in cost increases during the project. Timber operations all went smoothly the main challenges were in logistical sequencing and input of separate trades which became painful at certain times.

Architectural design: This small house with a footprint of around 40 square metres is fully two storey. The living accommodation is located on the upper floor and consists of an open plan area with Kitchen Dining and Living. A 9 square metre balcony area is accessed off the kitchen. On the ground floor a small entry hall serves as a utility area with access to the only bathroom toilet. Two bedrooms are located on this floor with doors to small decked areas. The house was constructed to very high air-tightness standards. The heating and domestic hot water is provided by way of an air source heat pump and linked solar panel resulting in extremely low budget servicing. The house was partly funded with a Rural Home Ownership Grant from Communities Scotland.

Frame: The entire structure with the exception of the large section exposed Douglas and Larch elements was resourced in 220x44 C16 regularised Spruce supplied by James Jones. This was an intentional simplification and design response to the material rather than the material responding to the design intention.

Cladding: Vertical board on board rough sawn boards in Highland European Larch, boards 75x20 then covered with 20x150mm.

Decking: Structure and Decking in Highland European Larch throughout.

Details: Glazing system sourced from Treecraft Woodwork in Dornoch. Cills and horizontal break in cladding in standard extruded aluminium cill painted to match the window colour. Rainwater gear in galvanised steel from Lindab. Roofing in Eternite P6 profiled sheet with integrated solar collector.

Timber sources: The entire structure and cladding was sourced in the Highlands supplied by James Jones and MAKAR Ltd. Internals were undertaken in French Oak throughout supplied by Russwood.

GLENCOE VISITOR CENTRE
Glencoe

Clients : **National Trust for Scotland**
Architect : **Gaia Architects**
Structural engineer : **John Peden Associates**
Main contractor : **RJ McLeod**
Date of completion : **February 2002**
Internal floor area : **1078m2**
Main timber elements : **timber framed and clad, exterior decking and 2 bridges**

Timber sources : The timber studs are untreated Scottish Douglas Fir. European Larch supplied by Russwood. Floors are from Scottish-sourced character-grade Oak. Stair-cases and some internal joinery in Scottish sourced birch.

Difficulties & constraints : In order to avoid problems associated with the slope of the site, most buildings were raised off the ground on steel posts. This also ensured the timber avoided potential problems associated with ground contact. The planners were sympathetic to the forms of the buildings and their relationship to the site and surroundings.

Architectural design : The centre comprises a series of detached and linked buildings raised off the ground on steel supports, and laid out in the form of a 'clachan', or highland village. The buildings consist of simple rectangular floorplans with symmetrically pitched roofs. Floor levels and rooflines are stepped to respond to the fall of the site, which echoes the layout of the houses in the nearby village. As a direct response to the local climate, there are no projecting eaves on the buildings, save for the open entrance pavilions.

Frame : 250x75mm softwood studs in walls ; 2250x75mm rafters.

Cladding : Vertical untreated heartwood of homegrown European Larch in square profile with sawn face and planed edges giving exposed face width of 144mm with groove of 6mm to form 150mm rhythm, and finished depth of 25mm. Stainless steel screw-fixed to Larch battens and counter-battens.

Decking : 94 x 32mm untreated Scottish C16 timber boarding laid flat with 10mm gaps, screwed to 69 x 38 heartwood of European Larch runners

Details : Windows formed from laminated Scottish Oak with sub-cills in aluminium, drips and flashings in aluminium to match roof. Reveals in untreated heartwood of homegrown European Larch.

STOCKL HOUSE

Lochbroom

Clients : **Meira & Eric Stockl**
Designer : **Bernard Planterose, North Woods Construction Ltd**
Structural engineer : **John Talbott, Findhorn Engineering**
Main contractor : **North Woods Construction Ltd**
Fabricator and builder : **Norbuild Ltd**
Date of completion : **April 2001**
Internal floor area : **136 m2**
Main timber elements : **timber framed and clad, with exterior raised deck**

Planning issues : On the site of a former FCS sawmill supplying local timber to the NW Highlands, the house provides an ironical reminder of that lost resource. There were no planning objections or changes required to the design.

Difficulties & constraints : The timber has all performed well so far and the house has been repainted once already though this was not really necessary. The panels proved difficult to handle on site due to small size of crane and some water damage lead to relining of some panels after erection.

Architectural design : A relatively simple rectilinear design with 45 degree pitched roofs in black sheet steel give echoes of the former sawmill building. Floor to ceiling windows contrast with carefully placed small square windows. The internal post and beam frame by Norbuild is a masterpiece of joinery with all hidden fixings and gives to the interior a great sculptural beauty.

Frame : Post and beam spine in Douglas fir with pre-fabricated, pre-insulated panel construction. 200mm softwood framing in walls ; 225mm in roof and exposed Douglas fir joists to first floor.

Cladding : European larch workshop treated in Osmo WD preservative and site stained in Osmo colour. Fully profiled and dressed to 19mm depth, installed horizontally at ground floor and vertically at 1st floor. Galvanized gun-nailed to larch battens.

Decking : All European larch structure, decking boards and stairs brush treated with Osmo WD preservative.

Details : All sills, drips and reveals in European larch, with site brushed Osmo WD and stain. Windows and doors by Treecraft in Scandinavian redwood and factory coated.

Timber sources : Other than windows and doors, the entire post and beam and other framework was sourced, milled and fabricated from Highland grown timber (mostly Douglas fir) by Norbuild Ltd. The first floor boards, main stair and all internal joinery is also home grown Douglas fir with worktops of home-grown sycamore.

NEW HOUSE
Tranent

Clients : **Paterson family**
Architect : **Paterson Associates**

SYCAMORE HOUSE

Dolphinton

Clients : **Steve Cowen & Caroline Hawkes**
Designer : **ICOSIS Architects**
Structural engineer : **Structural Design Consultants**
Main contractor : **Ross Building & Joinery Ltd**
(expected) Date of completion : **December 2007**
Internal floor area : **190 m2**
Main timber elements : **timber framed and larch clad with engineered pine windows & louvres and laminated oak cantilever stair.**

Planning issues : The Planning Department insisted that the original flat roof design was altered to a pitch gabled elevation to fit in better with the village aesthetic, also that the Front elevation be changed from larch clad to render for the same reason.

Difficulties & constraints : 1. The tight L-shaped sloping site resulted in the design of the building being positioned at the corner of the “L”, with the formal drive & entrance to the front/road and the informal garden to the side. The slope was levelled so that the building is half sunk into the side, raised garden. 2. The main contractor are primarily a joinery company and made the windows themselves - agreeing samples of these took longer than it would normally. 3. the larch board widths varied slightly (+/- 5mm) which meant getting the boards to line through exactly took much longer than if all the boards were exactly the same width.

Architectural design : The bedrooms, utility & garage are located on the ground floor with the main bedrooms window cills at grass level to the raised garden, allowing the open kitchen/dining/ living room upstairs elevated views across the valley and onto the grass roof terrace. Simple, good quality, natural materials were used throughout: larch boards, recycled newspaper insulation, lime render, bamboo/rubber flooring & rubber epdm roofing.)

Frame : 225mm softwood framing in walls & roof, with steel frame around main stair and large glazed openings in Upper floor.

Cladding : All untreated European larch, stainless steel nailed to treated softwood battens.

Details : powder coated aluminium sills & rainwater goods, zinc hoppers & capping details, otherwise all external details in untreated larch. Lime render used on front gable.

Timber sources : larch cladding (Sila A/B) from Russwood. Stud framing in solid Scandinavian softwood.

DAVID DOUGLAS PAVILION

Pitlochry

Clients : **Scottish Plant Collector's Garden**
Architect : **Gaia Architects**
Structural engineer : **Allen Gordon & Co**
Main contractor : **Carpenter Oak and Woodland**
Date of completion : **August 2002**
Internal floor area : **40m2**
Main timber elements : **timber framed and clad, exterior decking, large section timber components**

Frame : 350x200mm rafters and 200x475mm ridge beam. 195x47mm softwood studs in walls with external face of studs lined with double layer 9mm OSB to act as ring beam. Purlins span between the front, loadbearing timber wall and 300mmØ solid timber posts with tapered tops. Posts are fixed to concrete pads with stainless steel flitch plates so timber can be kept clear of the ground.

Cladding : Roof: 150x450mm untreated Larch shingles, centre nailed with 6mm gaps between on battens and counterbattens.

Timber sources : All timber used was grown and milled in Scotland. All Larch is heartwood of European Larch. The building has been detailed to ensure that timber is allowed to dry properly if it gets wet - this allows it to be used untreated.

Planning issues : As the building is designed as a pavilion within the setting of a purpose-designed landscape, the Planning department did not have any issue with the design.

Architectural design : The building was originally conceived of as a folded leaf supported on posts. This concept has largely remained intact through construction to the final product. The building is a test bed for a number of ideas including: the use of untreated larch as shingles; the viability of sourcing large-section timber elements from Scottish sources, and; using good design as a catalyst to encourage visitors numbers. The roof provides a generous overhang to protect the timber cladding. In order to minimise the number of trees to be felled on the site, the roof has also been cut around an existing Scots Pine.

Walls: Upper part - vertical untreated Douglas Fir, square profile 250x25 and 200x25mm in board on board pattern on 25x47mm untreated battens and counterbattens. Lower part - 150x25mm horizontal Douglas Fir cladding with chamfered edges. All walls lined internally with v-jointed t&g softwood boards. All cladding stainless steel screw-fixed to battens.

Decking : 38 x 100mm untreated Oak laid with 10mm gaps, screwed to 69 x 38 heartwood of European Larch runners. Ex. 200x75mm 'leaning rail' along top of handrail.

Details : Windows and Doors formed from laminated Scottish Oak, drips and flashings in lead, corrugated copper ridge flashing to produce a weak copper sulphate solution to inhibit moss growth on the shingles. Floor formed from Scottish Oak and Ash laid in random strips.

ROBINSON HOUSE

Glen Urquhart

Clients: **Rory and Sylvie Robinson**
Architect: **Neil Sutherland Architects LLP**
Structural Engineer: **A F Cruden Associates**
Main Contractor: **MAKAR Ltd**
Date of Completion: **April 2004**
Internal Floor area: **130 m2**
Main Timber Elements: **Large section Post & Beam and Timber Panel Hybrid, timber clad with external decking**

Planning issues: The site had outline consent and the design proposal was supported by the Highland Council planning authority. The site is secluded and the unusual external appearance was generally deemed of little consequence to the public interest.

Difficulties and constraints: The budget was very tight and as a consequence the main contractors operations were reduced and limited to essential elements. The client cheerfully took on the completion of the house at decoration stage but found it difficult to co ordinate separate trades to completion. The client undertook the grass roof finish with contractor assistance. Client input inevitably resulted in design compromises and inconsistencies in various ways but the overall project was a success for all involved.

Architectural design: Simple long narrow floor plan widening to the middle section to accommodate entry and serviced spaces, covered decked outdoor space adjacent to entry the only extravagance. Glazed gable orientated west towards distant views and stepping down with the natural grade in the site. Bedrooms generally orientated to the east and the timber panel constructed portion with Post & Beam structure and large amounts of natural daylight to the west and public rooms. Each room receives natural daylight. Roof pitch 35 degrees pretty much the maximum for a grass finish.

Frame: Highland Douglas fir 200x200mm posts, doubled 100x350mm beams to Post & Beam frame. Wall Panel and purlin framing in 44x197 regularised C16 Highland Spruce.

Cladding: Vertical board on board rough sawn boards in Highland European Larch, boards 20x150mm. Horizontal cladding to entry area in Siberian Larch – an idea of the clients.

Decking: Structure and Decking in Highland European Larch

Details: Glazing system sourced from Treecraft Woodwork in Dornoch. Cills, horizontal break in cladding and rainwater gear all in galvanised steel from Lindab. Drystone wall cladding with Caithness slab cill. Living grass roof with integrated solar collector.

Timber sources: The entire structure – Douglas large section, carcassing and cladding was sourced in the Highlands supplied by James Jones and MAKAR Ltd. Internals in Douglas fir were sourced from Norbuild Forres.

NOTES: