Cherry Tree New Buildings Progress Report

Criteria for the buildings

1. **The buildings are a vital part of the operation of Cherry Tree, so removal of the existing ones during a new build would severely interrupt the operation of the site. The very nature of the work carried out means that there must be continuity. The design of the new buildings will be of a modular nature to allow a phased build programme.**
2. **The new buildings will be an exemplary demonstration of sustainable construction in both the methods and materials used, and the energy efficiency in running them. This will mean that the development will have a very low carbon footprint.**
3. **The cost of the development must not be prohibitive, and should be less than a conventional build.**
4. **The use of space must be highly efficient to achieve an increase in usable area on a limited site.**
5. **The buildings should be adaptable for future changes in need.**
6. **The design should provide a safe, welcoming environment for volunteers and staff.**

The build so far

The ground conditions for the screwpiles were investigated by means of boreholes at different areas on the site. The tests showed that the subsoil, up to a depth of 8 metres, was an unsatisfactory material for screwpiles to take the load of the building, and unknown at deeper levels. This information resulted in a prohibitive and open-ended cost for the screwpiles.

A suitable engineering solution was to put the building on a ground-bearing concrete slab, this was calculated by the structural engineers and approved by Building Control.

Concrete had not been considered in the original specification, due to the high levels of embodied energy in cement manufacture, so the concrete for this slab was sourced from a supplier that uses a 50% PFA (Pulverised Fly Ash – a waste product from coal fired power stations) cement replacement. The majority of concrete suppliers now use this cement replacement, a great improvement in the carbon footprint of the industry.

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The test holes showed a sandy clay layer suitable to support the slab at approximately 600mm below ground level, but when excavations started a very different condition was uncovered. It appears that at some time in the history of the site it was used to dispose of large quantities of concrete and masonry rubble, which was unfortunately missed by the test holes. The infilled ground had to be removed from the site and disposed of, as it had many voids. As much as possible of the rubble was crushed on site to provide infill that could be compacted back into the excavation, but bringing the level back to cast the slab required a large amount of infill being imported. Similar conditions were discovered for the verandah footings. These unforeseen conditions have considerably increased the time taken and the cost of the foundations.

The rubble infill would have made the use of screwpiles impossible in any case, as the concrete lumps were anything up to 1 metre across.

The proximity of a waste disposal site triggered a requirement for a specialist Vapour Proof Membrane to be installed across the entire slab, sealed at the edges and the junction with the building, to prevent any toxic gases such as Methane, Radon, and Carbon Dioxide entering the building.

Once the slab and foundations were in place the build has progressed to schedule. Firstly the timber frame that had been pre-fabricated in workshops nearby was erected. The frame is constructed from Douglas Fir that had recently been cut from local well-managed woodland, minimising the need for expensive, energy-consuming processing and transport.

The frame was then infilled with boxes constructed with boarding made from waste wood products to take the straw bale walls, and the outside clad with the same material.

The final finish on the outside is mostly locally grown Western Red Cedar cladding that will weather naturally and require no treatment as Cedar contains its own natural preservatives. Areas not clad with Cedar will be coated with a Lime render on natural wood wool boards. The walls, and the rest of the building, will be a 'breathing structure', that is a structure that allows water vapour to migrate through the fabric creating a healthy environment and eliminating problems associated with condensation.

The pre-fabricated studwork panel sections are filled with straw bales, and will be clad internally with a compressed Flax Board manufactured from a waste product from the linen industry.

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Straw bales are being used as the main component in the walls for many reasons:

- **High insulation properties**
- **Good acoustic properties**
- **Negative carbon footprint, - straw locks up carbon dioxide when growing.**
- **Speed of construction**
- **Inexpensive and plentiful**

The windows and doors have been sourced from a major manufacturer for economy, and they are constructed from timber sourced from sustainable supplies under the Forest Stewardship Council Certification Scheme, with high efficiency triple glazing.

The floor is a suspended timber floor with Natural Wool Insulation to achieve high thermal efficiency, coupled with under-floor heating run from an Air Source Heat Pump to achieve very high efficiency and independence from fossil fuels.

The roof covering is a one-piece integrated roofing panel that provides a highly durable colour-coated outer skin with very high levels of insulation and a high level of finish on the interior. This roofing system is installed very quickly, allowing the build to progress to schedule.

Natural light will be provided in abundance inside the building with the use of "Light Tubes" mounted in the roof panels that give a diffused light, eliminating sharp shadows and shafts of sunlight that can cause overheating and visual discomfort, reducing the need for artificial lighting.

All decorating will be carried out using natural, toxin-free materials to create a healthy environment from the outset

The building will need very low levels of heating to achieve a comfortable environment, and equally will not require cooling in hot weather, benefiting from a u-value in the region of .15 - .2 for the whole structure, compared to a figure of .3 required by Building Regulations at present. (The lower the value of the U-value, the higher the insulation levels of the building)

Cherry Tree's overall Carbon Footprint with the new buildings, taking into account the nature of a project growing a large quantity of plants and trees and already using rainwater harvesting and electric vehicles, will be near zero, or probably negative. This would mean Cherry Tree would be a net absorber of carbon dioxide, and a shining example to other organizations.

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