PURPOSE OF REPORT
To advise on the key issues and risks associated with the utilisation of modular buildings for Comhairle Capital Projects

COMPETENCE
1.1 There are no legal, financial or other constraints to the recommendations being implemented.

SUMMARY
2.1 This report considers the key issues and risks associated with a complete modular construction solution in the procurement of new buildings. It is important to note the distinction between complete modular buildings and modular components; this distinction is covered in paragraphs 4.1-4.5 of the Report.

2.2 The development and current usage of complete modular building solutions is covered in paragraphs 5.1-5.5.

2.3 The key issues and risks associated with the utilisation of a complete modular construction solutions are described in paragraphs 6.1-6.8 and can be summarised as follows:

- Value for money
- The climatic conditions of the Western Isles
- Maintenance
- Flexibility and adaptability
- Environmental and sustainability issues
- Engagement with local construction firms
- Disposal

RECOMMENDATIONS
3.1 It is recommended that the Comhairle note the issues and risks identified in the Report.

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INTRODUCTION

4.1 There are many different types of modular construction, ranging from small-scale repeat elements, such as bathroom “pods” in large housing & hotel developments, and external cladding panel systems, to complete modular buildings, sometimes referred to as “portacabins”.

4.2 “Portakabin” is in fact the name of one of many manufacturers of such complete modular building solutions. Such buildings are generally comprised of several modular units connected together on site to form one building; the units themselves are manufactured entirely off-site, and only the foundations and associated infrastructure and external works can be procured locally. Modular buildings are also known as Volumetric Construction, Pre-Fabricated Buildings, or System Buildings.

4.3 Modular construction methods are often collectively referred to as Modern Methods of Construction (MMC) or Off-Site Manufacture (OSM). A commonly and successfully used type of MMC in the Western Isles is timber-frame “kit house” building.

4.4 The benefits of MMC for specific repeat elements of a building are well-documented and, when used in the right circumstances, can present significant benefits and economies of scale.

4.5 This report specifically seeks to identify the key issues and risks associated with using complete modular building solutions in the context of the Western Isles, as distinct from individual modular construction components.

BACKGROUND

5.1 Since the 1950s, a complete modular approach has often been used in building procurement; most notably in the Western Isles, the CLASP (Consortium of Local Authority Special Programme) system was utilised. An example of this particular type of building can still be seen at Balivanich Primary School, built in the early 1970s.

5.2 The design and construction detailing of complete modular buildings have undoubtedly moved forward since then and presently, as well as CLASP, suppliers such as Yorkon, a subsidiary of Portakabin, offer a complete modular approach for buildings, whereby the building is constructed in modules off-site and transported to the relevant site for speedy erection. In particular, systems such as these have been successfully adopted in recent years for meeting the demands of large-scale housing developments in England.

5.3 In Scotland, some recent school buildings have utilised a complete modular approach. An example of this is Our Lady of Lourdes Primary School in East Kilbride, which South Lanarkshire Council (SLC) recently built because it had an urgent need to construct a new school following severe storm damage to existing building stock. Subsequently, SLC has also utilised a modular approach at Rutherglen; however, it must be noted that this was solely as decant accommodation during construction of a new Primary School. A complete modular approach has also been adopted at other UK locations for schools projects; however, these have been primarily used as decant accommodation during construction of new school buildings using traditional construction methods. Yorkon, together with Cartwright Pickard Architects, has developed a modular prototype for Secondary schools under the English Building Schools for the Future (BSF) programme; however, this prototype system has not yet been utilised on any BSF project.

5.4 In order to meet specific educational accommodation requirements in a very tight timescale, the Comhairle has recently procured complete modular building solutions for Croileagans at Tong and Back Schools, and a Technological Classroom at the Nicolson Institute. These buildings were manufactured entirely off-island, with the exception of the foundations, infrastructure and external works, which were carried out by the Comhairle’s Commercial Operations Unit.

5.5 The advantages of a complete modular approach are undoubtedly attractive in the short term. Such buildings are quick to erect, relatively cheap to purchase, and can be particularly useful where there is an urgent need to build or a lack of construction skills available locally.

KEY ISSUES AND RISKS

6.1 Despite the relative attraction of a complete modular solution in the short-term, it is vital that the factors described in this part of the Report are taken into account when considering a complete modular approach to any new-build procurement.
6.2 **Value for Money:** whilst such solutions can be useful for fast-track construction, this can be at a considerable financial cost & risk. Although the units themselves can be relatively cheap, the need to then quickly procure foundation, infrastructure and external works locally in a very short timeframe can prove to be expensive, particularly when compared with procuring a “traditional” building from a local contractor over a slightly longer period of time. In the long-term, costs associated with maintenance and replacement of building components can be expensive for reasons such as the limited availability of parts compatible with a specific modular building type.

6.3 **The climatic conditions of the Western Isles:** complete modular building solutions are not typically built to withstand the particularly severe weather conditions frequently experienced in the Western Isles. Whilst such buildings may stand up to one or two severe weather incidences, their long-term durability would, as with any building, be dependent on an adequate maintenance programme. Major repairs to complete modular buildings, which could be required after severe weather conditions, could prove very difficult due to the limited local availability of compatible building components.

6.4 **Maintenance:** the practicalities of maintaining complete modular buildings are extremely challenging, particularly as they are not as robust and durable as traditional construction methods. The cost of construction of a building in proportion to its maintenance over its lifespan is in the region of 1 to 5. As current MMC are unproven in the long-term, a complete modular approach could prove to be significantly more costly over a building’s lifetime than traditional, proven construction methods. It is also important to note that such increased cost is unlikely to be reflected in the Capital Value of the built asset, as modular buildings tend to depreciate in Capital value, whereas traditional buildings tend to offer an appreciation of the original investment, albeit with some lifecycle costs. The Comhairle’s experience of the CLASP building at Balivanich reflects the difficulties typically encountered in maintaining complete modular buildings:

(a) Many years ago, the roof covering on Balivanich Primary School was replaced. Because such complete modular buildings are designed to very fine load tolerances, the Comhairle had to engage CLASP engineers to enable the Comhairle to provide a roof with slightly enhanced insulation properties. The level of reinforcement to the existing structure which would have been required to provide a reasonably good level of insulation would have been completely uneconomic; it is also worth noting that, in order to undertake such reinforcement works, a decant of the school would have been necessary.

(b) In more recent years, it was necessary to replace the windows at Balivanich Primary School. This work could only be done by CLASP-approved contractors because the window sections and structural fixings were non-standard. Since the CLASP centre of operations is Nottingham, it is not surprising that the specialist contractors were from the same area.

6.5 **Flexibility and adaptability:** as the needs of building users can change over time, it is important that buildings are flexible and suitable for future adaptation. A pertinent example of the requirement for flexibility and adaptability would be the wide-ranging and still-developing requirements of “A Curriculum for Excellence” in school buildings. A complete modular building approach can also be restrictive in terms of extension in the future; extensions and replacement components need to be compatible with the existing modular fabric of the building. Suppliers of such components / extensions will be limited and, therefore, are unlikely to be cost competitive and may have lengthy lead-in times in terms of supply.

6.6 **Compatibility with the Comhairle's policies and aspirations in terms of sustainability, renewable energy and “environmental friendliness”:** modular units are invariably manufactured some considerable distance from the Western Isles, typically in the north of England. This clearly presents significant transportation costs and logistics difficulties, as the modules are of a large physical size; coupled with this is the pollution resulting from transportation over such long distances. The palette of materials used in complete modular building solutions is limited and is not typically of the range that could be considered to be “green” or of low-embodied energy. The options for utilisation of renewable and alternative energy sources may be more restricted than those for traditional buildings.

6.7 **Engagement with local construction firms:** the use of complete modular building solutions offers very limited opportunities to engage with the local construction market during initial construction, as the units and all their internal finishes and components are factory-manufactured,
installed and finished. The opportunities for using local construction or consultancy firms for maintenance are even more limited, as demonstrated in paragraphs 6.4.1 and 6.4.2 above.

6.8 **Disposal:** when constructing any new building, as well as considering the requirements for a planned maintenance regime to make the most of the building during its lifecycle, it is important to take into account how the building will be disposed of at the end of its useful life. As noted in the preceding paragraphs, due to their very nature, complete modular buildings can prove challenging to maintain, extend and repair. By contrast, traditional construction methods, when combined with the financial investment of an adequate maintenance programme, can endure for many decades or longer and prove more suitable for adaptation for alternative uses to those they were originally designed for. The lifespan of complete modular buildings using current MMC are unproven; the fact that at least two complete modular buildings have been erected and demolished within living memory in Stornoway (Elizabeth Haldane and Macrae Hostels, both of which were CLASP buildings) gives an indication of the limited useful life expectancy of this building type. Whilst it is acknowledged that some individual components of complete modular buildings could be reclaimed and reused at the end of the building’s life, the overall “shell” of each module will most likely prove very difficult to dispose of, particularly given the geographical context of the Western Isles and the increasing statutory complexities of waste disposal generally.