Notice of Review – Statement

I am requesting a review of Moray Council's decision to refuse this Planning Permission in Principle application as I believe that my presentation satisfied all the principles of the policy constraints it was scrutinised against. All the boxes were able to be ticked with acceptable answers bar one which was however addressed by a scientifically proven logically appropriate design solution. An innovative proposal for an increasingly frequent environmental challenge – living with flooding.

This solution is so obvious that it's a bit like the elephant in the room that everybody knows and realises but can't accept as there are no protocols for it. There are no predetermined pigeon holes for the approval of amphibious buildings and this is a big legislative void which requires Council and Government support. This missed connection is causing major anxiety for SEPA officials who can appreciate the benefits of amphibious structures but feel vulnerable if they step beyond the comfort zones of the prescribed embargos on flood plain developments.

The easy way is to just say no to any development on all or any flood susceptible locations but that would knock out many village/town and city centres and their conservation areas without mega-expensive flood prevention schemes. These schemes rely upon river containment by bank heightening and overspill space provision which sterilises huge areas of settlements from development and housing renewal; placing people further away from civic centres, encouraging out of town centre growth and furthering the demise of our traditional High Streets.

It does not have to be this way as amphibious buildings offer a responsive and responsible solution. The ever increasing flooding problems could be addressed incrementally, building by building, with private funds rather than committing public funds for hugely intrusive flood protection schemes. These public schemes also have finite limitations and many couldn't cope with a contemporary Muckle Spate. Amphibious buildings however have infinite flood clearance characteristics.

In the 2008 Local Plan Garmouth was assured the preparation of a flood management scheme which has not yet materialised and as a result this has provided a problem for SEPA. They feel unable to approve any development applications in terms of their baseline constraints which were drafted by legislators who were not then aware of amphibious buildings. However the amphibious option can be realised by elected members supporting the concept, enabling formal referral to the Scottish Government for official clearance. This link between logicality and legislation is all that prevents this project proceeding. All other technical issues (roads, drainage etc.) have been resolved.

Considerable pre-application dialogue with the various statutory consultees took place resulting in potential issues being appropriately resolved. Safety considerations have been paramount and agreement has been secured with Roads/Transportation for an enhanced vehicular access and a separate flood free pedestrian route via the adjacent public lane ascending to upper parts of the village.

All 6 refusal reasons are over-burdened by inaccurate perceptions about local fluvial flooding and contemporary mitigation solutions. Reasons 1 & 2 are founded upon inaccurate SEPA mapping whilst reasons 3,4,5,& 6 are erroneous. The following critique is integral to my reasons for a review.

1&2

Policies recommend (rather than stipulate) that new development should (rather than cannot) be located away from (rather than within) functional flood plains. Part of the adjacent inclusive land owned by the applicant, but not the actual proposed house location, appears to fall within the indicative functional fluvial flood plain as designated by SEPA. The local community association confirm this in correspondence to the Council of 28/12/2011 by stating "*The actual site of the proposed dwelling, whether on stilts or not, does not actually flood.*" However, appreciating that there is potential for passive flood water seepage (as opposed to active flood water conveyance) on site, the proposed amphibious house design can circumvent all inundation scenarios without impacting on its neighbouring environment. There would be no need for an expensive and traumatic evacuation by the emergency services and no drying out or alternative accommodation costs after the event.

The concept of floating homes is nothing new, dating back to the earliest of civilisations, however more recently the Netherlands has taken the lead with whole amphibious settlements being constructed to withstand unpredictable fluvial and tidal inundations. The proposed Garmouth amphibious house has had input from Treat-Mentor Hydrology, Fairhurst Engineering and reference to Dura Vermeer acknowledged specialists in amphibious structures.

The basic principles are similar to the floating pontoons in marinas allowing a buoyant structure to rise and fall responsively to prevailing surface water conditions within the constraints of columns and slip collars maintaining a fixed horizontal location. Mains services and pedestrian access will be maintained at all times via flexible connections and hinging gangways.

The structure of the legislation through which SEPA filter and vet planning applications has little flexibility and there is a tendency to opt for the "No" default in situations which don't readily dovetail into standard prescribed pigeon holes. Unfortunately, there is no current tick box for amphibious houses, however discussions with the Scottish Government has confirmed that there is a route to approval available for innovative design solutions via an appropriate risk assessment. This has been provided but despite its detail and supportive conclusions it appears to have been largely ignored. Pressures of time and resources no doubt make cognisance of innovation somewhat of an inconvenience resulting in compromised processing performance statistics.

National guidance at Senior Planning Officer level regarding elevated buildings was obtained on 21/7/2014 which stated:-

"Please note that para 263 states that generally elevated building etc are unlikely to be acceptable. This does not necessarily mean therefore that stilted construction would be unacceptable in every circumstance. The inclusion of the reference to stilts comes from a concern over the ability of such construction to withstand flood events. There is a recognition however that within the general reference there may be construction techniques that a planning authority may find acceptable.

Para 266 of the SPP states that a Flood Risk Assessment should be required for development in the medium to high category of flood risk. A FRA would, we hope, assess the effectiveness of construction and engineering techniques to withstand flood events. This could include the consideration of stilted construction, upon which planning decisions would be made."

The flood risk assessment submitted in support of the planning application provided documented information from the statistical account of the 1829 Muckle Spate and data that SEPA didn't know existed from Messrs Baptie Shaw & Morton for Grampian Regional Council reporting on River Spey flooding at Garmouth and from the Scottish Agricultural College on River Spey flooding (immediately adjacent the application site) at Queenshaugh, Garmouth. Both these reports contain the information on water depths, flows and erosion which SEPA had asked for but chose to ignore after having been embarrassed at not being aware of their existence. It seems as if SEPA had hoped their demands would halt the application in its tracks however their belligerence has prompted the sourcing of data which supports the suitability of the amphibious house concept for this site. The hydrology and structural engineering consultants see no difficulty in realising the design proposals to withstand the constraints identified in the flood risk assessment thereby fulfilling the requirements of the Scottish Government's 21/7/2014 guidance. The applicant therefore contends that the innovative proving process has been successfully completed and Planning Approval should have been forthcoming.

3.

The Council state that the fact that "*as there are no flood alleviation measures in place, under consideration, or planned, the application is contrary to the requirements of policy*" yet it is Moray Council who are in default here as there is a commitment in their 2008 local plan for the preparation of a *"Flood Scheme for Garmouth*" within the currency of that local plan.(2008-2013), yet nothing has been done in this regard. This application should not have been refused as a result of the Council's non-compliance with its own regulatory statement.

4.

The Council state that "*Insufficient information has been submitted to demonstrate that the development will not materially increase the possibility of flooding elsewhere*" yet SEPA state in correspondence to the Council of 28/10/2014 that "*We note that no landraising and loss of flood plain capacity is now proposed."* Actually, the creation of the two surface water swales (ponds) on the applicants land will provide an additional 600m^3 of available flood storage to the assistance of all surrounding properties.

5.

The Council state that "*The site is presently undeveloped*" whereas it was developed and is obviously awaiting permission for this single house "development" before it can be redeveloped. The site is located within the village settlement boundary and its nearest neighbours are two and three storey dwellings. The applicants property has been cleared of previous buildings which included a two storey Corff House used for commercial and domestic purposes, a store and cottage plus a stack yard where the proposed amphibious house is to be located. All these former buildings can be confirmed by reference to Ordinance Survey maps of 1870, 1905 and 1958.

6.

The Council state that "*Insufficient information has been submitted to demonstrate that the dwellinghouse can be adequately served in terms of foul and surface water drainage.*" This seems strange since correspondence of 11/7/2011 from Scottish Water to the applicants consultants (JIG Environemntal Ltd) has been forwarded which states clearly that there is "*sufficient capacity in the Garmouth Septic Tank to service the demands of the development.*"

Storm roof water has been stated as being initially harvested and stored within the proposed house roof space for "grey water use" and the excess would be attenuated in two SUDS swales (ponds) totalling 600m^3. Both foul and storm water drainage can function gravitationally and there would be flexible connections to the amphibious house ensuring continuous service and no contamination. SEPA have no issues in this regard and the whole drainage system will have to be approved by the Council in detail as part of the Building Warrant approval process in due course.

Proposed single storey dwelling, formation of access driveway and associated landscaping works on a site to the south and east of Orchard House, Mill Lane, Garmouth

Supporting Statement

The application 14/00747/APP was withdrawn to allow time to resolve flood risk issues and since then extensive discussions and correspondence have taken place with both SEPA and MFRM bottoming out to the undernoted design challenges.

1. No changes to the topography of the site can take place which would deflect flood waters to the detriment of any adjoining proprietors.
2. No diminishment of existing flood water storage capacity on site can take place without compensatory storage capacity being provided.
3. The finished floor level of any building has to take account of a 1 in 200 year flood event without compromising on site flood storage capability and the safety of its occupants.

The resolution of these constraints has taken us to a research of local flooding history and contact with Dutch civil engineers.

There is a well documented local flooding event of 1829, which is as close to 200 years ago as you can get, which records the levels of the "Muckle Spate" in relation to local physical features which still exist.

At the Garmouth saw-mill, the level of the water is reported by Sir Thomas Dick Lauder to have risen by "10 feet 2 inches above the ordinary level" of the Black Burn. This translates to the 4.900 AOD level which was adopted for the finished floor level of the preceding design and remains the case with the current re-submission. At the 1793 Tugnet Ice Houses there is a commemorative masons mark carved on the original archway which records the highest level of the flood water described in "The Great Moray Floods of 1829" and this equates to a level of 5.876 AOD. The conclusion from this factual research, as opposed to theoretical conjecture, is that a 1 in 200 year flooding event has produced overspill water depths of between 0.5 and 1.5 metres.

With the aforementioned parameters in mind we have deferred to a Dutch civil engineering company's experience in engineering solutions to fluvial flood risks. Dura Vermeer have many years experience in floatation design and more recently about 10 years back came up with a policy called "Room for Rivers" which led to their construction of 46 amphibious houses at Maasbommel in 2006. The design principles are delightfully simple in that normally the dwellings are "at rest" on terra firma but should their site be inundated by flooding, they float

to accord with whatever over wash depths (up to 4 metres) prevail and return to rest levels as and when the flooding subsides. They are two storey timber frame structured houses built on buoyant precast concrete and polystyrene egg crate boxes measuring just under 20x10x1.2 metres. The structures are held in place by piles with vertical slip collars and have flexible services connections. There have been various modifications since the first prototype and the Dutch government have designated fifteen other locations for similar developments. (See attached Dura Vermeer brochure for more information)

With SEPA and MFRM agreeing to the proposed new access driveway not being heightened in view of there being a safe dry alternative pedestrian access westwards up the ascending Mill Lane, the amphibious house concept would seem to offer the undernoted design advantages.

1. There would be no deflection of flood water on to other properties with a floating structure.
2. There would be no diminishment of existing flood water storage capacity on site with a floating structure. Indeed the swales proposed would offer more capacity and a route for water flowing in the lower areas of Mill Lane to escape to.
3. The rise and fall capability of a floating structure would work automatically giving a safe method of addressing any flood event, as much as twice the known 1 in 200 year event, without the "at rest" height of the structure exceeding 6 metres.

The decision therefore has been to adopt a slightly smaller footprint design than previously submitted as an amphibious house with a non raised driveway but still retaining the swales for SUDS and extra flood storage capacity.

Flood proof architecture

Concepts and constructive solutions to adapt to rising water levels

Johan van der Pol *(Dura Vermeer, the Netherlands)*

Introduction

Soil compaction and subsidence, urbanisation and climate change increase the vulnerability of (urban) areas to floods. The government is going to invest heavily in the necessary knowledge development, to be able to face climate change.

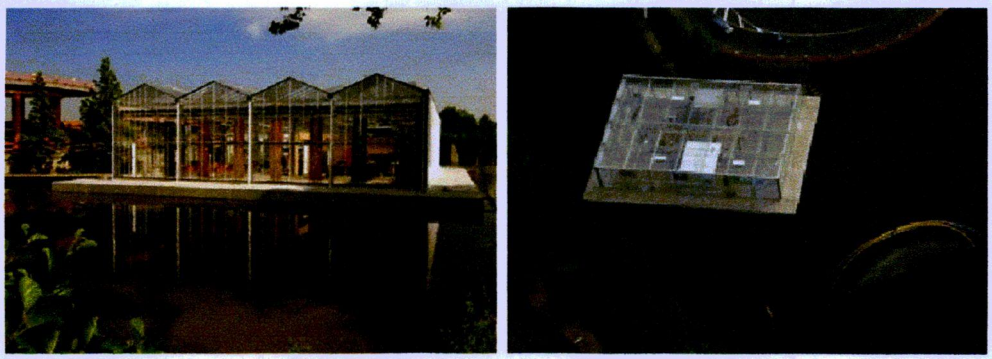
For this task, the building trade can and should make a crucial contribution with new concepts of "building with water'. Especially in highly populated areas, living with water may be a sustainable adaptive solution for future challenges. More and more Dutch designers are getting into 'flood proof' architecture. This has already led to a whole range of concepts and constructive and non-constructive solutions. Noticeable examples of building methods are: floating construction, amphibious construction, construction on piles, elevated construction, dry- and wet proof construction. Practical examples are floating- and amphibious houses, platform houses, artificial islands or reefs, floating offices and floating greenhouses. These items are the specialism of Dura Vermeer, a construction and development company in the building industry. This article illustrates some of their concepts.

Floating greenhouses

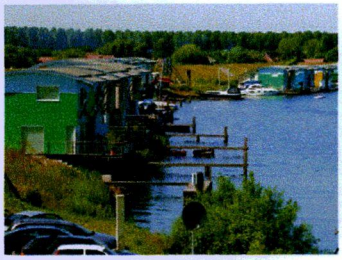
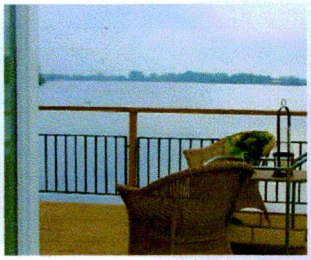
Floating greenhouses offer the opportunity to combine two functions on the same square metre: greenhouse horticulture and water storage. There is an increasing demand for this multiple use of space, because space in The Netherlands is restricted, while the demand for living-, working- and recreational locations is increasing. In the years to come many tens of thousands of hectares will be used for water storage, taking up valuable space. Creating space for water storage is not simple in a densely populated country as the Netherlands. Combining water storage with an economic function may more easily create the necessary space.

The concept of floating greenhouses has been developed from the idea that it contributes to the solution of spatial limitations that arise from the redevelopment of greenhouses and will create space/ room for water storage.

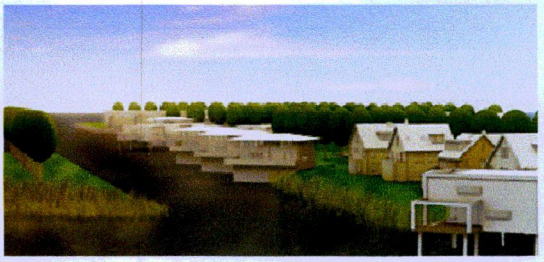
A pilot project for a floating greenhouse is to be realised in the province of South-Holland. The lowest point of The Netherlands is situated in this area: 6,76 metre below NAP (NAP = about average sea level). The idea is to plan an area where a pilot project floating greenhouse can be realised on a commercial basis. The pilot will be an example of a sustainable development of glasshouses combined with water storage. Apart from the development of a floating greenhouse, the business case also comprises a research programme covering the environmental effects. A public-private partnership has been working on the business case for two greenhouse growers since 2005. In 2012 we hope to finally celebrate the opening of the five hectares floating Greenhouse: the Floating Roses.



***First - built floating greenhouse in the world** - Demonstration version, municipality of Westland (photos: Dura Vermeer).*

Amphibious homes (photos: Dura Vermeer)



Impression of a residential district on water (source: Knowledge Project Bouwen met Water)

Amphibious and floating homes

Unlike the houseboats that line many Dutch canals or the floating villages of Asia, these amphibious homes are being built on solid ground — but they also are designed to float on flood water. They look much like regular houses; the only difference is that when the water rises, they rise.
Each house is made of lightweight wood, and the concrete base is hollow, giving it ship-like buoyancy. With no foundations anchored in the earth, the structure rests on the ground and is fastened to 15-foot-long mooring posts with sliding rings, allowing it to float upwards in times of flood. All the electrical cables, water and sewage flow through flexible pipes inside the mooring piles.

Realisation in Maasbommel

The desire to integrate water management issues in the Netherlands in sustainable spatial planning, has led Dura Vermeer to translate this aim into the development and realisation of 32 amphibious and 14 floating houses in Maasbommel in the Province of Gelderland. The houses are the solution to the demands for living-, working- and recreational space and the need for a sound and sustainable water storage. The location in Maasbommel is just outside the dyke ring in a water recreational area, connected with the river Maas. Recent flood events and the subsequent strengthening of the dykes in the river basin have led to the development of houses by an entirely new concept: houses that will float at high water. In order to enable the houses to move with the fluctuating water level, the houses are fixed on concrete floating platforms with a suspension mechanism. At a low water level, the houses rest upon a foundation of concrete. To keep the houses as light as possible the framework consists of timber. To prevent the houses from floating away at high water they are fixed to flexible moorings, with which tugs can be absorbed. It is expected that once every five years the water level will rise so much (over 70 centimetres) that the houses will indeed float. The houses can cope with a water level difference of up to 5,5 metres. That is above the height of the top of the levee.

Residential district on water

In the framework of expertise development, Dura Vermeer made a design for a residential district on water, applied to a pilot location in the low-lying polder Haarlemmermeer, south west of Amsterdam. In this concept, urban functions are integrated with water retention and storage. The result is an environment that not only respects the water system level, but moreover, creates a high-quality living environment and a net saving on space. To answer questions about the feasibility of a pilot residential district on water, a study is to be carried out. This study will show under what circumstances a residential district on water in the Haarlemmermeer is likely to be successful. Based on this, the parties involved can decide whether they want a pilot residential district on water. The developed expertise on the possibilities to combine water storage and construction will first be applied to the Haarlemmermeer. However, since this expertise is also applicable elsewhere, ideas for other locations can also be submitted.

Conclusions

In recent years, the knowledge and experience in the field of flood proof construction has increased strongly. It is an issue, which is not only relevant to the Netherlands, but has also been taken up by other countries. Some remarkable examples of practical applications have been realised, from which learning points are being shared. These experiences are subsequently used in developing the expertise and concepts further and its translation into daily construction practice. This means that expertise is now available for modelling damage because of flooding, construction concepts have also been elaborated, which are based on a sound financial footing, situation-specific and solutions offered and cost-benefit analyses made.
The concepts of flood proof architecture can be an efficient method for adapting to the potential impacts of climate change.

Websites

www.duravermeerbusinessdevelopment.nl
www.bouwenmetwater.nl
www.drijvendekas.nl
www.floatingroses.nl

English language websites

Flexbase: www.flexbase.eu
Floodprobe-Project: www.floodprobe.eu
Urban flood management, Dordrecht city:
www.ufmdordrecht.nl