

**Subject:** Fairbourne Technical Group

**Author:** Steffan Williams

**Date:** 21.02.17

**Location:** Ship Inn, Dolgellau

**Present:** Lisa Marshall (YGC)  
 Huw Williams (YGC)  
 Alun Osbourne (YGC)  
 Greg Guthrie (RHDHV)  
 Mike Phillips (UWTSD)  
 Tony Thomas (UWTSD)  
 Kerry Keirle (WG)  
 Louise Pennington (NRW)  
 Stephen Buss (H-G)  
 Rob Low (RIGARE)  
 Philip Bennet-Lloyd (JBA)  
 Mark Wiles (FFC/ACC)  
 Steffan Williams (YGC)

**Apologies:** Gareth Evens (NRW)  
 Keith Ivens (NRW)  
 Rob Williams (YGC)  
 Gareth Wright (YGC)

Item No	Action	By who	Date
1	<b>Welcome, introductions and apologies</b> Everyone introduced themselves to the group.		
2	<p><b>Fairbourne: Moving Forward – Technical Group Context</b></p> <p>Lisa Marshall (LM) gave an introduction and a background to the whole project and the purpose of the Technical Group as there were new members who weren't present at the previous meeting (Tony Thomas (TT), Stephen Buss (SB), Rob Low (RL), Philip Bennet-Lloyd (PBL), Alun Osbourne (AO), Mark Wiles (MW)).</p> <p>Greg Guthrie (GG), as one of the authors of the policy explained to the group the true context of the SMP2 policy on Fairbourne, and its uniqueness. There is no blueprint or a standardized way of carrying out the recommendations the SMP2 highlights – i.e to be in a position where there is no need to manage risks in a defined period of time (37 years from now as the policy suggests). So many uncertainties plague the smooth running of the masterplan that the tech group was formed to try and cast a clearer light of the processes involved and the ultimate dangers resulting from those processes, by bringing in expertise from different backgrounds together. Huw Williams (HW) explained that as the local authority, its purpose in this project is to bring all this expertise together, and join the dots to see collectively where we currently are against assumptions.</p> <p>LM set out the aim today was to collectively agree on how to get about creating a timeline of managing the risks going forward to try and reassure the community's present and immediate concerns.</p>		
3	<b>Groundwater Monitoring &amp; Modelling Presentation</b> RL gave a comprehensive update of the hydrometric monitoring RIGARE have been conducting over the past couple of years, and the interpretation of the initial data which has been collated. 10 dipwells and 4 stilling wells have been		

	<p>installed around the village attempting to give maximum spatial coverage within the constraints of site availability. The collected data then is analysed against rainfall which is measured using a gauge installed at dipwell 3 (Stanley Rd), barometric loggers from Fairbourne and Dolgellau, and against sea level data from the tidal tracker at Barmouth Bridge.</p> <p>RL went on to show some interpretation of the currently collected data. Groundwater levels are very reactive to periods of wet weather which is as expected – it’s also possible to see strong correlation between ditch water levels and tidal activity. Tidal influence on ditch levels also visibly shows the activity of the tidal gate in effective operation, reducing the ditch water levels as the tide recedes. The tidal effect on groundwater was less obvious, possibly down to the ditch system absorbing most of the pressure apart from at dipwell 4,5 and 7, which RL suggested could be because of their relative distance from ditches in comparison to other dipwell locations.</p> <p>RL was pretty pleased with shallow water drainage which keeps groundwater in the winter roughly 20-30cm below local ground level, AO suggested it could be because of Fairbourne’s permeable sewer system although SB suggested that pumping data from Dŵr Cymru was needed to analyse this further. Concerns were expressed about the system during periods of heavy rain, RL referred to 19<sup>th</sup> December 2015 as an example where ditch water levels came to within 20cm of groundwater levels which decreases the hydraulic gradient from which groundwater would flow into the ditches. Once the ditch water level rises to equal level with groundwater then additional precipitation/flow from the Afon Henddol would flood the village.</p> <p>There is not enough data currently to ascertain whether any rise in the sea level influences the hydrology system. But RL suggested that immediate concerns should focus on the groundwater level and hydraulic gradient during particularly wet weather events, especially if climate change is to exacerbate / cause more frequent storm events.</p> <p>MW declared interest in producing a simplified and graspable information package of what RL had presented in order to show to the community. This would open minds within the community of other forms of risk to the village rather than the obsession that has currently been with sea level rise since publishing of the SMP2.</p> <p><b>Stephen Buss – Hydrological Model</b></p> <p>There is currently very useful transient data available which RL has shown i.e. the data collated from the dipwells, stilling wells, rain gauge and tidal tracker. So it is proposed that a more process based model is formed to analyse the transfer of water between different elements. The big question is how to extract information from the model into answers for the community’s questions. Once there is a suitable description of the current situation from continued analysis of this transient data, then the input parameters can be adjusted to represent future climate change scenarios.</p>		
4	<p><b>Predicting Future Flood Risk</b></p> <p>A limitation of the appraisal is that the SMP2 has been used as a definitive guideline. Rising of the embankment has been rejected because of the SMP2 predictions despite universally agreed uncertainty regarding the rate of sea level rise. GG showed lidar data of embankment and sea defence versus</p>		

potential sea level rise that he had brought along to the meeting. Predicted sea levels during 1 in 100 year event in present day levels, 0.5m sea level rise and 1 metre sea level rise was put against present embankment and sea defence height. When considering 0.6m added height in still water sea level due to wave activity the current embankment would be breached in a 1 in 100 year event with a 0.5m rise in sea level. This would bring the threshold of breaching the embankment down to a 1 in 20 year event. With this in mind, there is a need to consider the cost implication of making sure the embankment cannot be breached for the duration the policy sets out, with regard to rising sea level.

MP asked whether a smaller rise in sea level had been considered such as 0.25m. GG explained that it is possible to go back and analyse different potential situations, but that a breach of only 0.15m would be enough to flood the lowland because of back soil erosion of the embankment. The cost of maintaining the embankment and sea defence would therefore increase as the frequency of storm events increases.

KK suggested that establishing a greater understanding of future sea level rise is needed and asked whether there was a realistic way of achieving this? GG stated that ultimate defending of the village is impossible, and that there is a need to be in a situation where there isn't a need to maintain defences in a period of time which is safe. There is a fine balance between managing the current situation and immediate future without overreacting, but that simply relying on sea level rise not happening at the rate the SMP2 suggests is not an option. In a theoretical sense, the SMP2 sets a hypothesis which needs to be challenged constantly, hence the formation of the tech group.

MP stated that it is a careful PR exercise of showing the community what different scenarios would mean for the village. HW agreed and from the point of view of the local authority which is responsible for the community, this would answer the community's rejection of the SMP2. PBL explained that everyone within the community will have different reactions and these different layers will need to be managed accordingly. LM agreed and supported the development of the model as a tool which will allow members of the community to make up their own minds after digesting the findings.

The lidar data showing the profile of the sea defence showed the process of shingle being transferred northwards between the three noticeable storm events in 2003, 2013 and 2014. There's noticeable accretion of sediment at m2 lidar point to N2, and pretty considerable erosion in the 11 year period further south especially in Friog Corner. NRW's reprofiling work in September 2016 will have replenished tonnes of shingle back into the corner and isn't visible on the cross sections.

MP and TT will be able to analyse profile data from AO of the beach since 1992 and work out the coastal processes involved, along with analysis of aerial photographs. By calculating the volumes involved it will be possible to predict future changes with different values of sea level rise.

TT gave a presentation explaining the process of going about achieving this using a similar project for the Swansea Bay Lagoon project. Historical and primary data collection measuring (x,y) coordinates along the beach profile to create mean beach processes over time called an 'envelope'. This envelope is used as a reference for future storm events where the profile

	would be compared to historical profiles. If the profile exceeds the envelopes boundary a traffic light system would be triggered to indicate a period of excessive erosion / deposition of material.		
6	<p><b>Way Forward</b></p> <p>MP stated the beach profile modelling could be worked on immediately and suggested meeting again towards early May. LM would seek clarification from SB for a realistic time to develop the hydrological model sufficiently before confirming on the date of the next meeting.</p>	LM	ASAP
7	<b>Any other business</b>		
8	<p><b>Date of next meeting</b></p> <p>4<sup>th</sup> May, 11am at the Ship Inn Dolgellau.</p>		