

# June floods of 2013 along the Austrian Danube

In the year 2013, most of central Europe suffered a very wet spring season and in some regions, the month of May generated the highest levels of rainfall since weather records began. At the end of May / start of June, a complex low pressure weather system over the Adriatic Sea, coupled with a Mediterranean low over North Africa produced an exceptionally high level of rainfall intensity, followed by levels of flooding which were to be classified as the extreme events of the century. The hydrography of Austria recorded, in Vienna, the highest run off values ever taken since records began in 1830 at approximately 11,000 m<sup>3</sup>/s of run off, overtaking the previous record value of 10,500m<sup>3</sup>/s from the year 1899.

In fourteen market towns (or municipalities) including Linz, through the Machland via the power plant stage at Ybbs, and through the Wachau to Kloster Neuburg, shortly before the gates of Vienna, demountable IBS flood protection walls were deployed as protection against the oncoming Danube floods across a total length of over 11km. In Linz in the year 2007, IBS handed over the first major system to the operators, the State City of Linz. At a length of almost one kilometre, the flood protection wall measuring approximately 2,250m<sup>2</sup> was erected with approx. 3,160 dam beams and approx. 310 posts; once erected, the Danube flooding level of up to 3.50m above road level could be resisted. The largest demountable flood protection system in Austria in terms of surface area was handed over in April 2010 in Weißenkirchen in the Wachau region. At a length of almost



**Grein Machland dam - 4th June 2013**



**Ybbs power station stage - 4th June 2013**

3 kilometres, approx. 8,800 dam beams and associated posts are utilised, giving a total wall area of 6,350m<sup>2</sup>.

The highest and most spectacular demountable wall was completed in December 2010 in Grein. With a total barrier height of 3.60m on a 1.0m-high base wall, the

system protects the land behind it to a flood level of 4.60m at the upstream end of the site - a height which is equal to the upper storeys of the adjacent properties. The flood protection measures in the municipality of Grein were erected within the scope of the Machland dam project in the name of Machland Damm GmbH as one of a total of 6 demountable wall sections. On 25 August 2012, the main protection measures for the Machland dam were declared as completed.

Less than a year later in June 2013, it was proven that the locations of Linz, Mauthausen, Naarn, Mitterkirchen, Baumgartenberg, Saxen, Grein, Ybbs, Persenbeug, Spitz, Oberarnsdorf, Rührsdorf, Weißenkirchen and Kloster Neuburg were able to successfully defend against the flood of the century through the deployment of a total of approximately 25,000m<sup>2</sup> of IBS demountable flood protection walls. In Grein, the flood level peaked at around 5cm below the top of the barrier, just before it would have overflowed the 4.60m-high protection wall. All of these systems were constructed in good time to their full heights and continued to remain entirely reliable whilst the peak river levels continued, as the flood run off and lowering of levels was extremely slow. Due to the superb performance of the IBS systems, it was clear to the affected communities and onlookers that they could place maximum trust in their local defences.



**Oberarnsdorf Wachau - 4th June 2013**

The drama of this event can only be realised in retrospect; the demountable flood protection systems, which had only just been completed, were immediately subjected to the maximum assumed extremes. Rescue forces were required to conduct the largest possible logistics and construction management procedures, and residents were subjected to constant positive and negative prognosis, uncertain whether the protection heights would prove sufficient or would overflow. Superb teamwork from rescue forces, residents, authorities, politicians and the associated project engineers allowed each community to return to everyday life within the shortest possible time; businesses resumed operation, holidaymakers and visitors utilised the river promenades once again, and the property and belongings of many thousands of people remained undamaged.

IBS-Clients located along the Austrian Danube	Completion	Length	max. height	Wall area	Design Defence height	flood level 2013
State capital Linz	Aug. 2007	940 m	3,30 m	2.250 m <sup>2</sup>	10,15 m	9,30 m
Market town of Mauthausen	Jun. 2010	1.630 m	2,60 m	3.300 m <sup>2</sup>	9,60 m	8,60 m
Market town of Naarn	Dec. 2011	7,5 m	2,8 m	20 m <sup>2</sup>	2,80 m	2,20 m
Market town of Mitterkirchen	Dec. 2011	36 m	4,60 m	140 m <sup>2</sup>	4,60 m	4,20 m
Market town of Baumgartenberg	Dec. 2011	125 m	3,60 m	190 m <sup>2</sup>	3,60 m	3,40 m
Market town of Saxen	Oct. 2012	160 m	4,60 m	390 m <sup>2</sup>	4,60 m	4,40 m
Municipality of Grein	Dec. 2011	765 m	4,60 m	2.450 m <sup>2</sup>	15,00 m	14,95 m
Municipality of Ybbs / Donau	Jun. 2011	920 m	3,25 m	1.850 m <sup>2</sup>	9,70 m	9,40 m
Market town of Persenbeug	Nov. 2009	865 m	2,40 m	1.275 m <sup>2</sup>	9,75 m	9,45 m
Market town of Spitz	Dec. 2011	1.980 m	4,25 m	5.130 m <sup>2</sup>	11,10 m	10,80 m
Cadastral comm. Oberarnsdorf	Sept 2012	550 m	3,60 m	1.240 m <sup>2</sup>	11,10 m	10,80 m
Cadastral community Rührsdorf	Oct. 2012	205 m	2,40 m	270 m <sup>2</sup>	11,10 m	10,65 m
Market town of Weißenkirchen	April 2010	2.920 m	3,50 m	6.350 m <sup>2</sup>	11,10 m	10,65 m
Municipality of Kloster Neuburg	Oct. 2008	110 m	2,30 m	130 m <sup>2</sup>	8,10 m	7,90 m