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## **Climate Change and Change in flood and erosion risk**

The village of Fairbourne has grown over the last century, developing over the low lying land within the estuary.

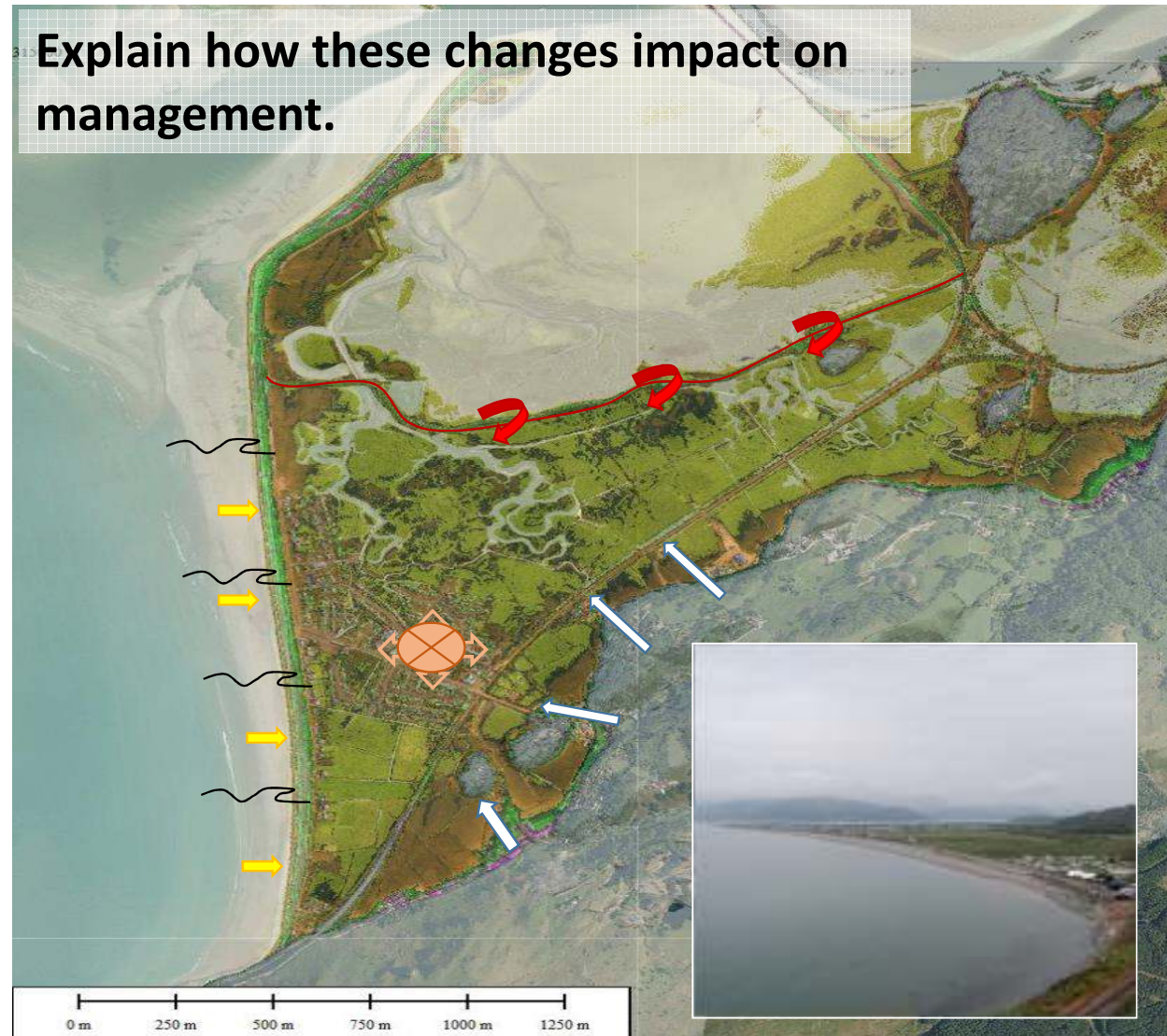
As development occurred so the need for defence grew.

The key risks being managed are:

- Rainfall from the high ground flowing through the rivers through the area.
- Flood risk from water levels within the estuary.
- Pressure of erosion and overtopping from along the open coast.
- Ground water, the level of the natural water table.

These risk are being managed at present.

With Climate Change these pressures will change.

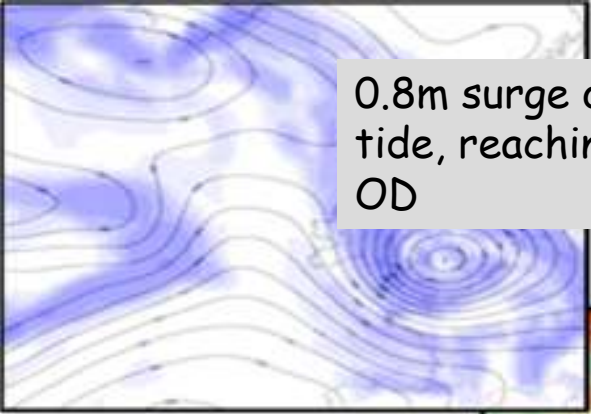
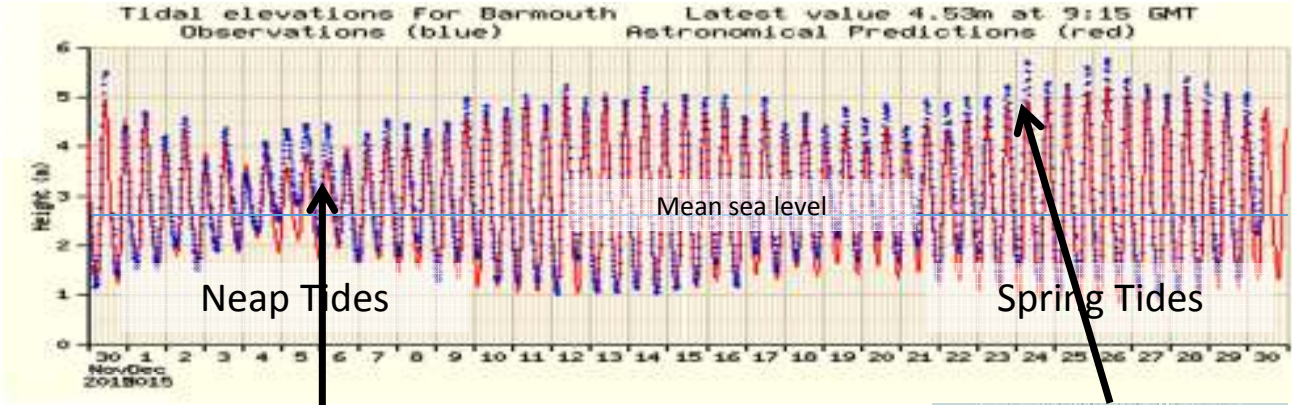


# What we mean by risk and what is climate change

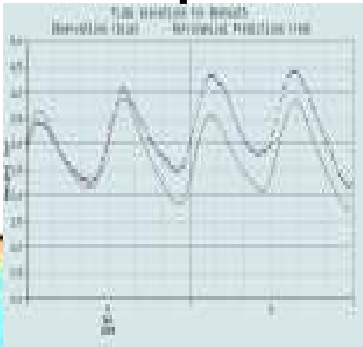
Natural every day variation in water levels and rainfall

## The tide

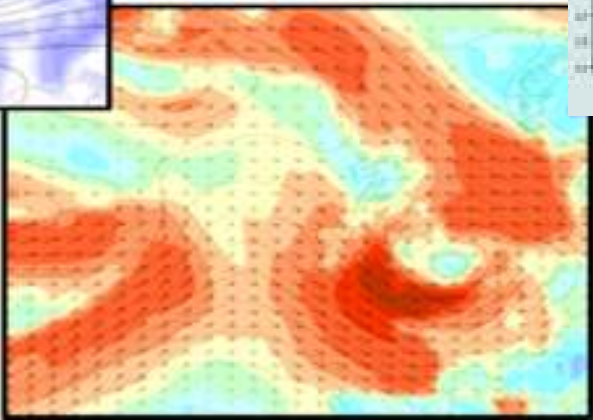
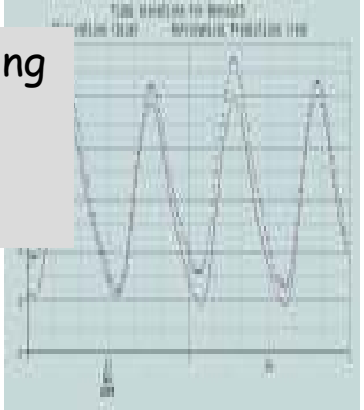
Each day, variation every 14 days between springs and neaps



0.8m surge occurring on a neap tide, reaching a level of 1.96m OD



0.75m surge occurring on a spring tide, reaching a level of 3.31m OD



**Statistical analysis.  
On average.  
But can occur at any time.**

Recent extreme water levels since 1992						
return period	T1	T2	T5	T20	T100	T500
water level OD	3.5	3.6	3.7	3.9	4.1	4.3
Years when levels were exceeded	1992	1993	2000	1997		
	2014	1998	2002	2014		
		1999	2006			
		2006				
		2008				
frequency of exceedance	12+	10	5	2	0	0

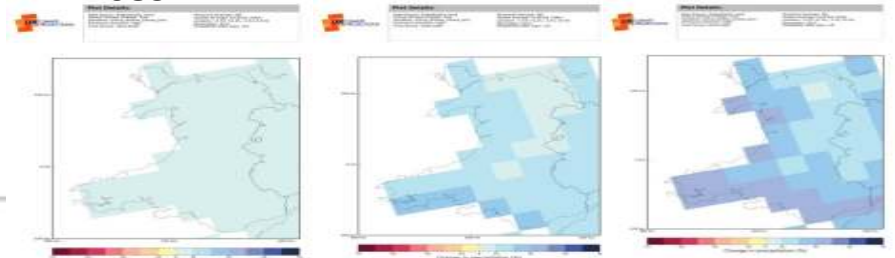
## What we mean by risk and what is climate change

Climate change is happening. Over the last several decades changes have been accelerating. Sea level has risen at 1.8 mm per year since 1955 and around 3 mm per year since 1992.

## Not just sea level

Higher water levels – larger waves

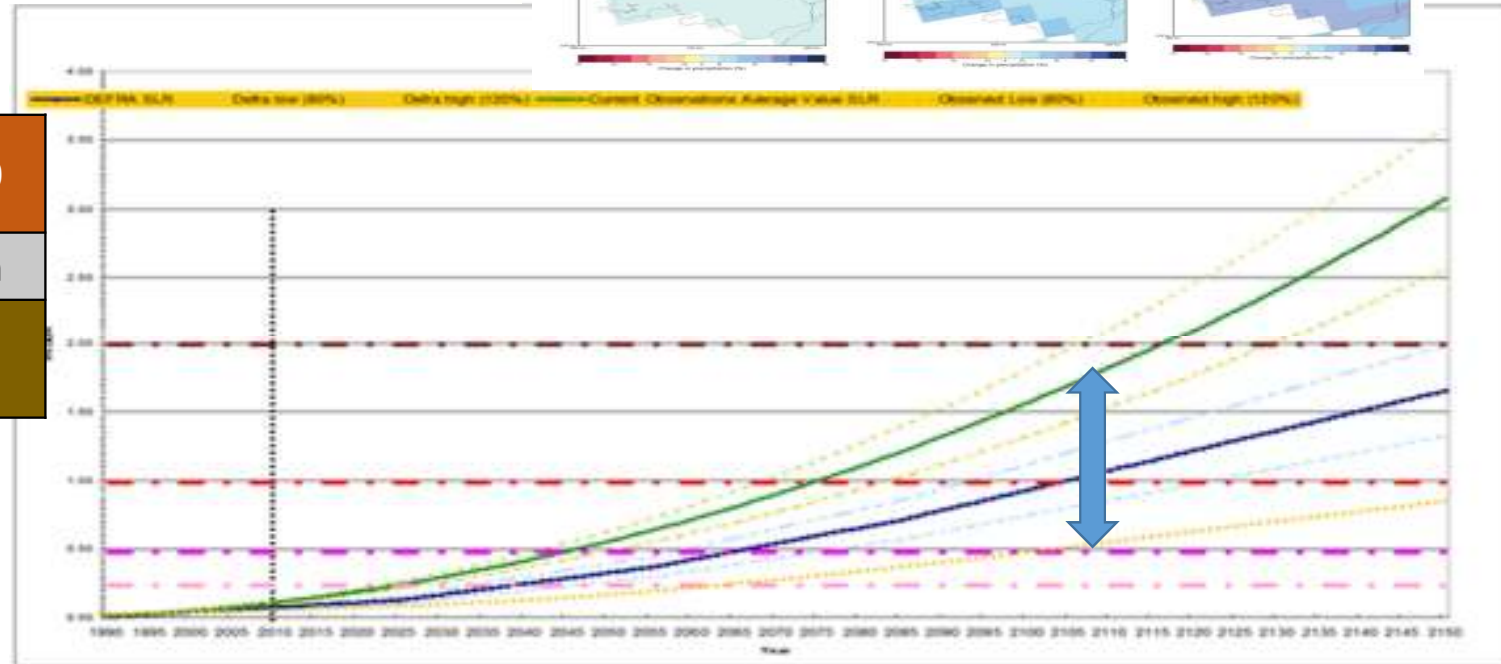
30% to 40% increased rainfall by 2070 to 2089



		Year by which level of rise might occur					
		0.3m	0.5m	0.75m	1m	1.5m	2m
Sea level rise scenario over the next 100 years	0.5m	2076	2106	2143			
	1m	2048	2066	2090	2106	2140	
	2m	2032	2047	2064	2076	2098	2116

Present day return periods	T20	T100
Level m OD	3.9m	4.1m
Future (+0.5m) return period	T1	T2

Over the next 100 yrs, the rise is likely to be between 0.5m and 2m.



What does this mean for the village?

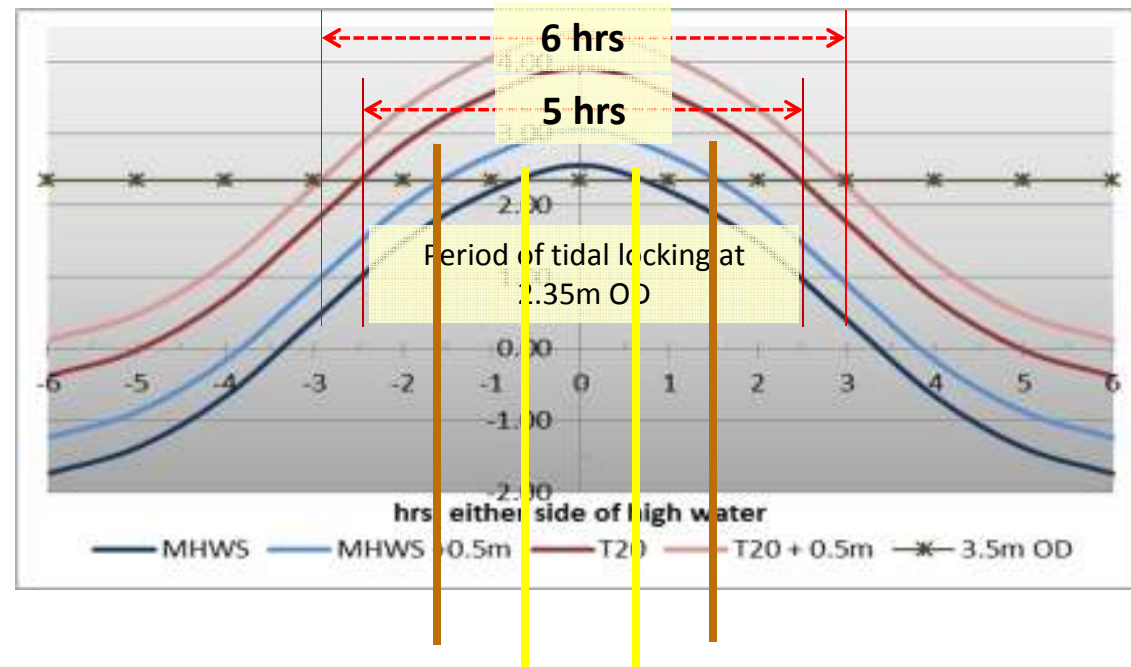


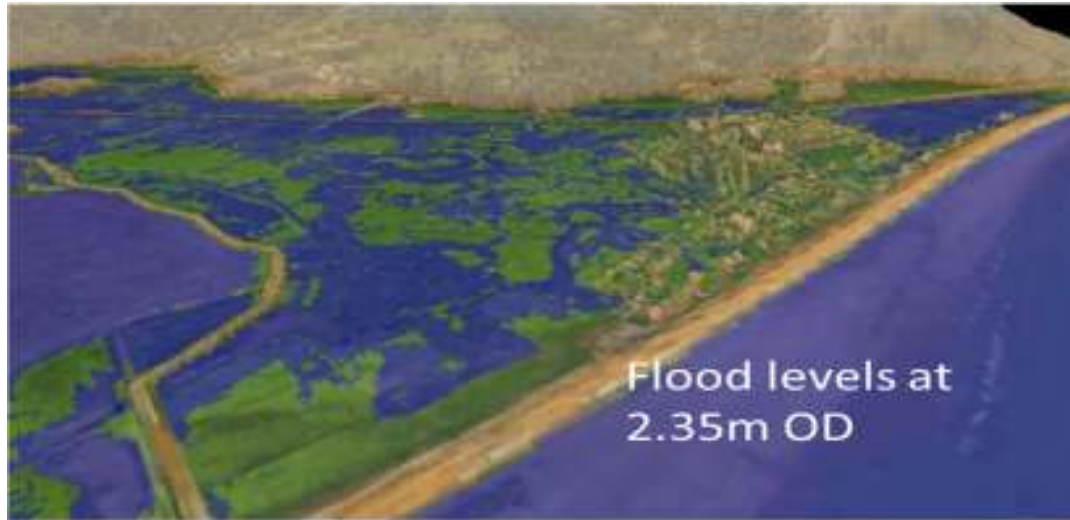
With increased rainfall and increased tidal locking, there is increased risk of flooding.

*With 1m sea level rise*

ground levels below MHW + 1 m  
(2.81m OD)

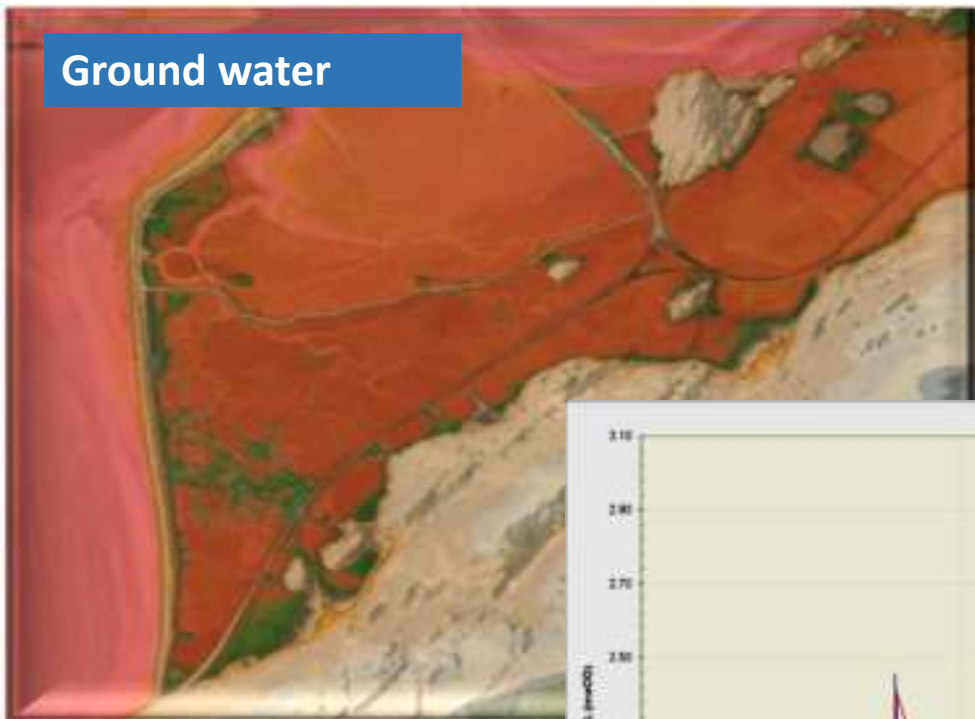
Flood risk from rivers





Flood levels at  
2.35m OD

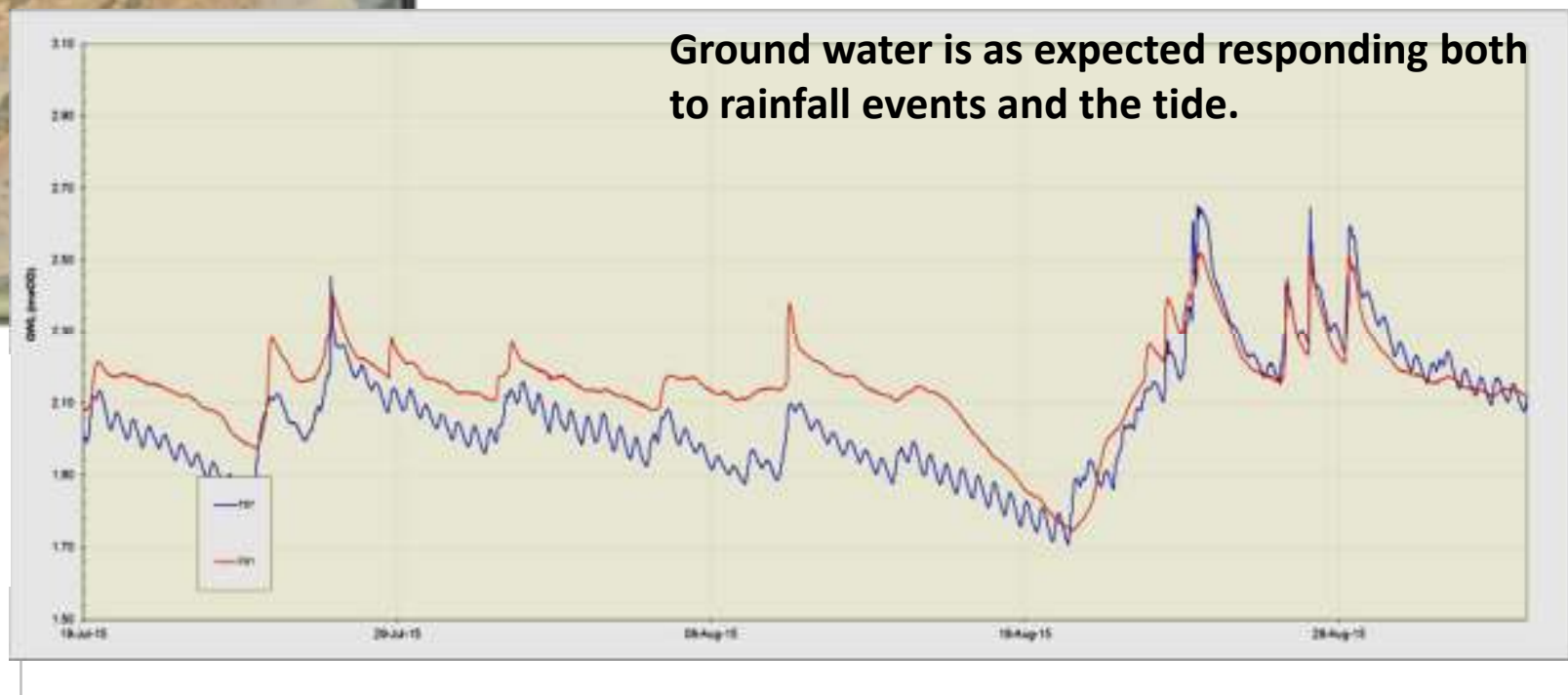
Ground water



Flood risk from the estuary

The recent work to the embankment have significantly improved the defence > 1:100

Ground water is being monitored.





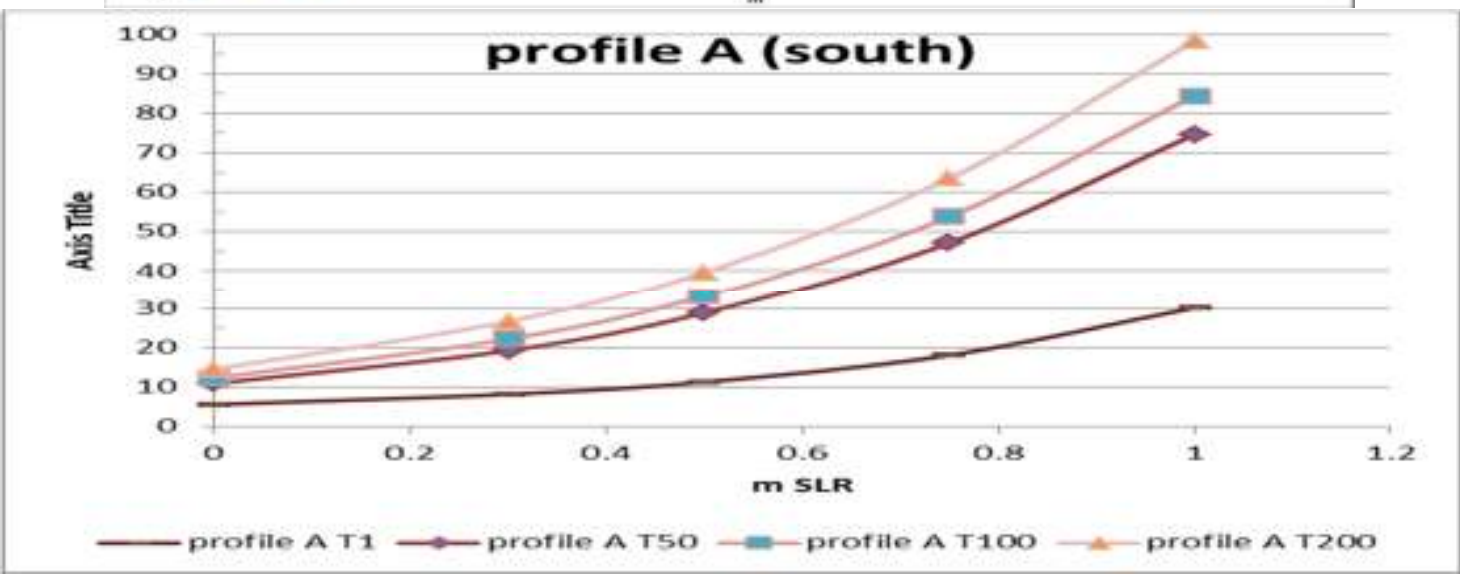
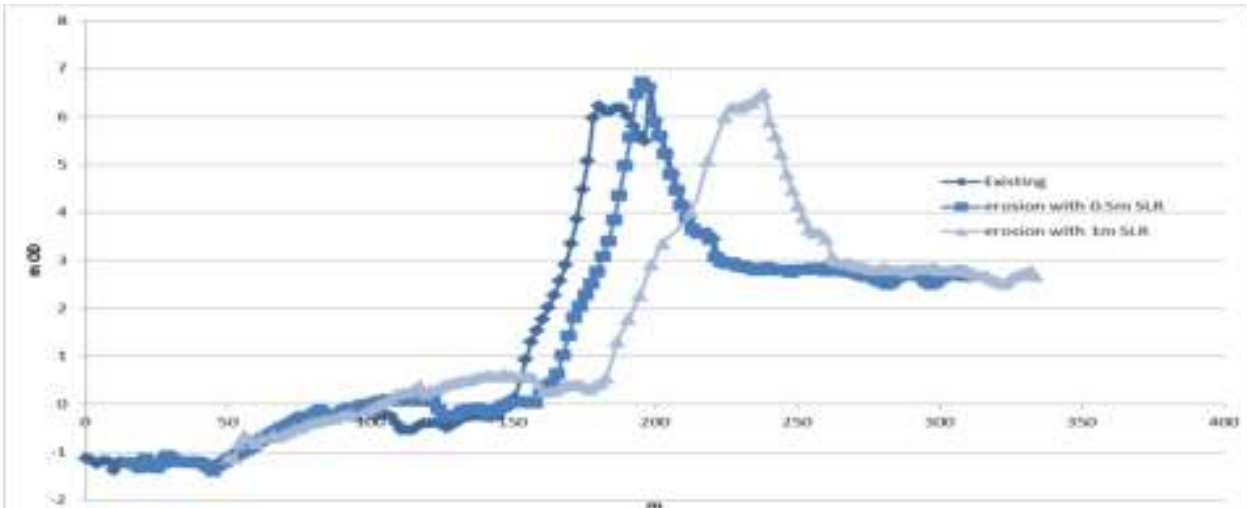
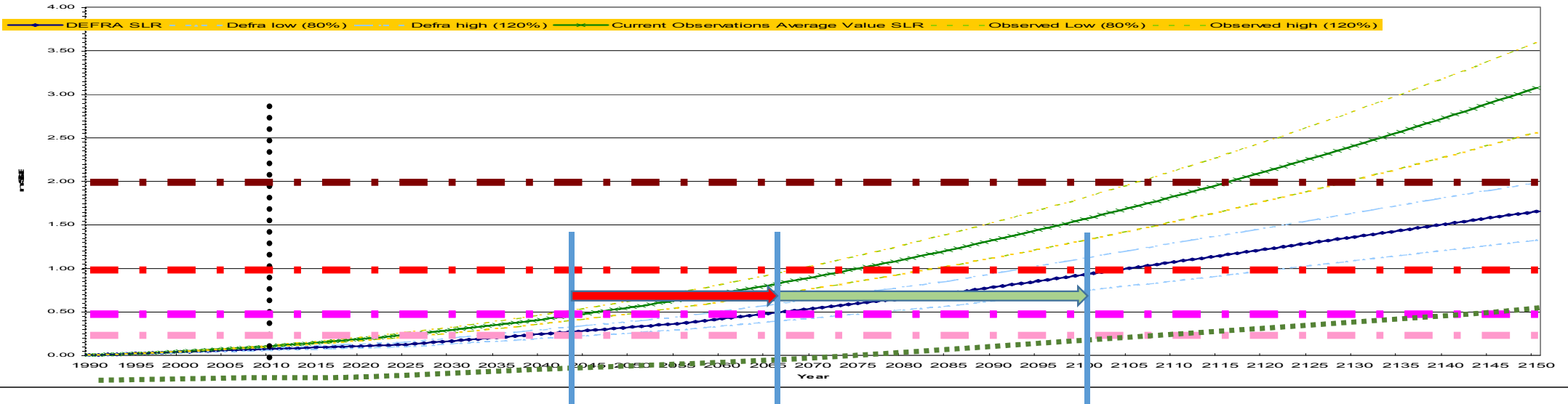




Figure 2. Sea Level Rise scenarios



Htt scenario					
time/slr line	present	0.36m	0.5m	1m	2m
defences	manageable	minor improvement	step change	step change	step change
erosion	manageable	some strengthening	significant strengthen	harden coast	harden coast
overtopping	manageable	minor improvement	raise defence	new sea wall	raise sea wall
.direct flooding	manageable	minor improvement	increase embankment	raise defence	new embankment?
fluvial	manageable	maintain	maintain	maintain	maintain
ground water	manageable	pumping?	pumping	continuous pumping	continuous pumping
risk	medium residual risk	high residual risk	high residual risk	unacceptable residual risk	unacceptable residual risk