High tides during 2015

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| Update of high tide periods this year.  | August 2015  |

High astronomic tides (also known as "spring tides") will be at their greatest over the next 3 months. This is because September 2015 is the point in a natural 19 year cycle when the sun, moon and earth align to exert the greatest force on the tides in the UK.

The increase in the size and number of high natural tides this coming year means that there is a small, but elevated, increase in risk of coastal flooding this spring and during the winter of 2015/16 compared to "normal" years.

However, the weather conditions that generate a tidal surge, or extreme waves on the east, west and south coasts, will continue to be the dominant factors influencing coastal flood risk. These conditions cannot be predicted more than 6-7 days ahead.

This note provides an update to the briefing about the risk which was provided in September 2014.

High astronomic tides of 2015

Some notably high astronomic (spring) tides occurred over the 20th-23rd March. These tides passed without any significant flood impacts due to favourable weather conditions at the time which prevented any tidal surge or large waves from being generated to combine with the high tidal levels

Adverse weather conditions are more common over the winter months, this means that the increased risk of coastal flooding will return toward the end of 2015.

When are the tides notably high during 2015?

Over the course of the year notable high natural tides will occur along all parts of the UK coastline. The dates of particular note are;

* August 30th - 3rd September
* September 27th - 30th

The peak of the astronomic cycle occurs in September 2015. Highest tides will then be on a downward trend but winter 2015/16 will also see periods of increased flood risk.

* October 27th - 30th
* December 25th - 27th
* January 11th -14th

What can we say about the likelihood of coastal flooding?

For significant widespread coastal flooding to occur, three things need to happen

1. High astronomic tides
2. Large storm generated coastal surge or waves arrive at the same time as high tide
3. The combination of high tide plus surge and waves creates sea levels greater than the height of flood defences.

Significant flooding will not result if

* There are high astronomic tides without a large surge or waves
* There is a large surge but this occurs at low tide.

So to determine if and where coastal flooding is likely to occur we need to know three factors

* The severity of the storm and the size of surge generated from it
* The timing of the storm surge in relation to high tide around the coastline
* The height of the astronomic tide at the time of the storm surge

We know what the astronomic tide will be years in advance. This is controlled by well known and predictable astronomic cycles and is published in tide tables. It is not possible to determine the severity and timing of a storm surge more than 6-7 days in advance of this occurring as this is controlled by the weather.

The number of notably high spring tides is above normal this year and therefore the likelihood of a storm coinciding with a spring tide and having a flood impact is higher this year than a normal year. Should there be an indication from Met Office seasonal forecasts that this year may see more storms than an average year, then this further increases the potential for a storm to coincide with a spring tide.

Seasonal long range forecasts provide some forward look as to the potential for increased storminess over the coming months but they cannot provide the necessary details of the timing and severity of storms.

Update on our response and readiness

In preparation for the high tide cycle we have updated our internal incident management procedures to build in learning from the previous winter floods of 2013 and 2014. We have ensured that our incident management rosters are robust around the high tide periods this year. Additional training has been provided to our flood incident management duty officers within the Environment Agency and Flood Forecasting Centre and a series of winter readiness activities have been undertaken. An internal desk top exercise took place in October 2014 to test revised procedures and communications. Lessons have been identified and measures put in place to address them to improve our response to the elevated flood risk posed by the notably high spring tides.

We have also been able to take advantage of improvements in the Met Office weather forecasts to update our surge model so that it provides improved forecast accuracy in the day 3-6 forecast period.

Our local Flood Resilience teams have briefed all Local Resilience Forums on the risk and dates of notable tides to ensure our partners are well briefed and prepared.

Annex 1

Comparison of actual December 2013 levels with expected astronomic tides on high spring tides

The table below shows the astronomic high tide levels and peak water levels for the surge of 5th December 2013 for key locations along the east and north-west coast of England. These levels are compared to the predicted astronomic high tides that will occur during 2015.

The astronomic tide heights expected this year are significantly higher than those of the 5th December 2013. This therefore means that the level of surge required is lower than that generated on the 5th December to give the same overall peak high water level.

The level of surge at the time of each of the high spring tides required to reach the same total peak water level at each location as the 5th December flooding is the value given in brackets below the astronomic tide value.

These strategic locations are used as indicator sites of the flood risk to stretches of coastline when using long range forecasts. The indicative levels of the onset of flooding are shown in the table to provide an understanding of the level of additional weather generated surge that would be required during each spring tide period for flooding to occur. It should be noted that these levels are the point at which flooding starts, reaching these levels does not necessarily mean that widespread flooding will occur, but some flooding could be expected. There are many other factors which will influence the actual onset of flooding along with coastal surge, such as wave height and wind direction at the time of the high tide.

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|  | **Astronomic tide height**  | **Peak high water level (surge)**  | Indicative Level at which flooding starts | **Maximum astronomic spring tide height over the risk period (and difference, in brackets, from total peak tidal level of December 2015)** |
| **Site**  | 5th December 2013 |  | 20 -23 March 2015 | 19- 21 April 2015 | Aug 30- Sept 22015 | 27- 30Sept2015 | 27-30Oct 2015 | 25-27Dec 2015 |
| North Shields  | 2.79 | 3.79(1.0)  | 3.4  | 3.01(0.78) | 2.88(0.91)  | 3.11(0.68) | 3.16(0.63) | 3.06(0.73) | 2.67(1.12) |
| Immingham | 3.61 | 5.22(1.61) | 4.5 | 3.97(1.25) | 3.78(1.44) | 4.04(1.18) | 4.09(1.13) | 3.94(1.28) | 3.42(1.80) |
| Lowestoft | 1.19 | 3.26(2.07) | 2.1 | 1.29(1.97) | 1.20(2.06) | 1.41(1.85) | 1.42(1.84) | 1.35(1.91) | 1.16(2.10) |
| Dover | 3.25 | 4.76(1.51) | 4.1 | 3.50(1.26) | 3.35(1.41) | 3.57(1.19) | 3.63(1.13) | 3.56(1.20) | 3.12(1.62) |
| Liverpool  | 4.97 | 6.22(1.25) | 5.6 | 5.35(0.87) | 5.10(1.12) | 5.39(0.83) | 5.47(0.75) | 5.31(0.91) | 4.66(1.56) |