SIZEWELL C PLANNING EXAMINATION

SUBMITTED BY WAYNE JONES - RR 20026801

Deadline 8 Submission

Supporting Evidence In Relation To ISH 6 And Concerns Raised By EDF And CEFAS Evidence to ISH 11

I wish to draw the Inspectors attention to a study made in 2020 concerning the effects of storm surge and coastal flooding on a new nuclear power station site . The site in question was that housing the three stations at Hinkley in Somerset . The method is clearly displayed without recourse to information overload . The text is presented here , though the report itself has accompanying maps of the region and the predicted flooding . Secondly I present a synopsis from Irish Weather Online on the 2013 St Stephens Day Storm , and thirdly a thorough description of the same storm by Berlin Weather Map . I would also like to complain at the unwillingness of the proponents to put before the Inspectorate their revised evidence on storm effects and wave action , as mentioned in ISH 11 , by Deadline 9 , giving time for examination by Interested Parties and submissions on that evidence at Deadline 10 . I believe this is too important an issue to be left over as an unresolved safety issue , and should necessitate a further submission Deadline after 10 , if the proponents refuse to submit by Deadline 9 .

1 The following evidence is taken from ‘POTENTIAL FOR A SOMERSET FUKUSHIMA ?’ IMPACT OF FLOODING ON NATIONAL GRID INFRASTRUCTURE IN AND AROUND HINKLEY POINT …… CALLUM GUBB…. 8 JANUARY 2020

https://storymaps.arcgis.com/stories/a1c2475200ff4e77af4047f443dcd92e

Risks

Despite the advantages of building on the coast, the risk of flooding, tsunami and storm surge have to be considered. A large-scale flood event could have the potential to damage the grid surrounding the facility, causing brown or blackouts in surrounding regions. In a worst case scenario floodwaters could wash contaminated materials from the plants into the surrounding area, or disrupt coolant supply to an active reactor resulting in a Level 7 nuclear accident. The latter took place at the Fukushima Daiichi Nuclear Power Plant in 2011, and the resulting disaster and cleanup effort served to highlight the importance of planning and investigations into such scenarios (Funabashi & Kitazawa, 2012). Climate change has the potential to increase flood risks due to sea-level rise and increased storm and rainfall intensity (National Grid, 2014).

This investigation attempts to assess the risk and impacts to the grid of future flooding around the nuclear facility at Hinkley Point.

Historical Flooding

Past flood events in the UK are often caused by a combination of storm surges occurring during periods of high tide, such as the spring tide (Haigh et al., 2016). This was the case in 1981 when a storm surge in conjunction with the tide resulted in the highest water levels experienced in the Bristol Channel this century and severe flooding along the north Somerset coast (Proctor & Flather, 1989). The great flood of 1607 which reached 7.74m in height and destroyed large amounts of property and farmland across the southwest was potentially also caused by a surge event, although a Tsunami is another possibility (Bryant & Haslett, 2002). Storm surges of 1.5m-2.0m occurred during the 1981 event (Horsburgh & Horritt, 2006), while <1.0m surges are a common occurrences (NTSLF, 2020).

Rising Sea Level

Rising sea levels pose a significant threat to coastal communities and infrastructure. While IPCC reports detail that mean sea level will increase due to melting land-ice and the thermal expansion of oceans this is not a uniform process. Localised effects such as coastal topography and the shifting of the crust following the last ice age have significant effects on local sea-level changes (Grinsted et al., 2015). Sea level rise by 2100 under the RCP8.5 high emissions scenario was modelled by (Grinsted et al., 2015), taking into account localised effects. The median value for the Cardiff area was used in flooding scenarios 2 and 3 (0.77m). Tidal effects were taken into account using data from the National Tidal and Sea Level Facility.

Method

Scenarios

- Three water-level scenarios were chosen for investigation:
- Scenario 1 was 7.43m,

  This was calculated from the Mean high-water at spring tide (11.83m), plus a 1.5m storm surge, minus the Chart-ordinance datum conversion for the area (5.9m)
- Scenario 2 was 8.2m,

  This was identical to Scenario 1 but taking into account the predicted 0.77m sea level rise.
- Scenario 3 was 11.52m,

  This is a worse case scenario using the highest tide since 2008 (14.65m) plus a 2m storm surge and the 0.77m sea level rise, minus the 5.9m datum conversion.
- All tide and surge values are for Hinkley point and taken from the National Tidal and Sea Level Facility database.

Process

- OS topography data for the study area (figure 1) around Hinkley was obtained from Digimap's Ordnance Survey Collection.
- Shape file assets detailing national grid towers, over head lines, and substations were obtained from the national grid website (network and assets).
- The OS topography data was set to a classified symbology, with scenario water levels as class 1 and remaining land as class 2
- By changing the max value of class 1, three water level scenarios are created and converted to a raster form.
- National grid shapefile assets are clipped for analysis based on floodwater extent.

Flood Scenario 1 results in the flooding of 92 transmission towers carrying 31.1km of over head lines and one transformer substation is submerged. However Hinkley point A, B and C remain above-water, due to their position on raised ground its probably that no nuclear material is released and an emergency shutdown could be performed using the backup generators if necessary.

Flood Scenario 2 results in the flooding of 97 transmission towers carrying 32.7km of over head lines and one transformer substation is submerged. However Hinkley point A, B and C remain above-water.

Flood Scenario 3 results in the flooding of 106 transmission towers carrying 35.7km of over head lines and two transformer substations are submerged, this includes one substation at Hinkley. The Hinkley site also is partly submerged, along with 325km of road, limiting logistics and transport in the area. It is possible in this scenario that floodwaters become contaminated with radioactive material, and there is potential for a Level 7 incident to occur, if a loss of cooling to the Hinkley C reactor were to take place (it is assumed that by this point Hinkley B is offline).

Conclusion

All three scenarios represent severe flooding events. Scenario 1 has a water level similar to that during the great flood of 1607 (Bryant & Haslett, 2002), while 2 and three are both more severe due to higher base sea-levels. In all scenarios the flooded area loses power due to the flooding of the local transformer substation, and multiple towers are likely to be damaged by the floodwaters. Pylon foundations can be washed away and over head lines bought down by falling towers, this can result in power cuts and brownouts for areas not affected by the flood, as well as a high cost in infrastructure damage (Troccoli, 2010).

However the likelihood of a level 7 nuclear incident is difficult to predict. The UK met office should be able to provide advanced warning of such a surge allowing Hinkley to take precautions (NTSLF, 2020). In addition feedback from Fukushima has further improved safety standards for reactors, resulting in Hinkley C housing multiple backup safety systems, including diesel generators in watertight compartments as well as emergency pumps (EDF, 2020). The flooding investigation undertaken also does not take into consideration fixed flood defences such as walls which are deployed throughout the region. The study also does not take into account the flow of water inland from the sea and around localised structures, soils, vegetation and topography as it only a basic assessment of land height. This is something to improve on in a future study.

Notes by Wayne Jones : The scenario used by Gubb differs from my own realistic scenario in that I believe a 2 metre expected rise in sea level by the year 2100 would more appropriately cover all future changes in scenario , instead of the 0.77 metres used in this study . I also add 0.5 metres for predicted tidal height increase over and above the highest tidal value given for any given site , in relation to the effect on the tide of the 2 metre sea level increase itself . I do not think the impact of a storm would result in anything like a level 7 accident , but I believe the ability of this power station to function in a normal event sequence as EDF's evidence suggests , will likely be continually compromised . Lessons here must be applied to Sizewell C and I refute the idea that EPR's have safety designs that would make a Fukushima type accident impossible **, except for waterproofing of emergency generators and pumping equipment , though generators require exhaust emission and high wind can be a hazzard as can clogging by debris such as seaweed . It is the general damage to ancillary site structures that will increase cost and make decommissioning more hazzardous . Again , site drainage would be compromised by heavy rainfall associated with storm activity , and the site could be semi-permanently flooded .**

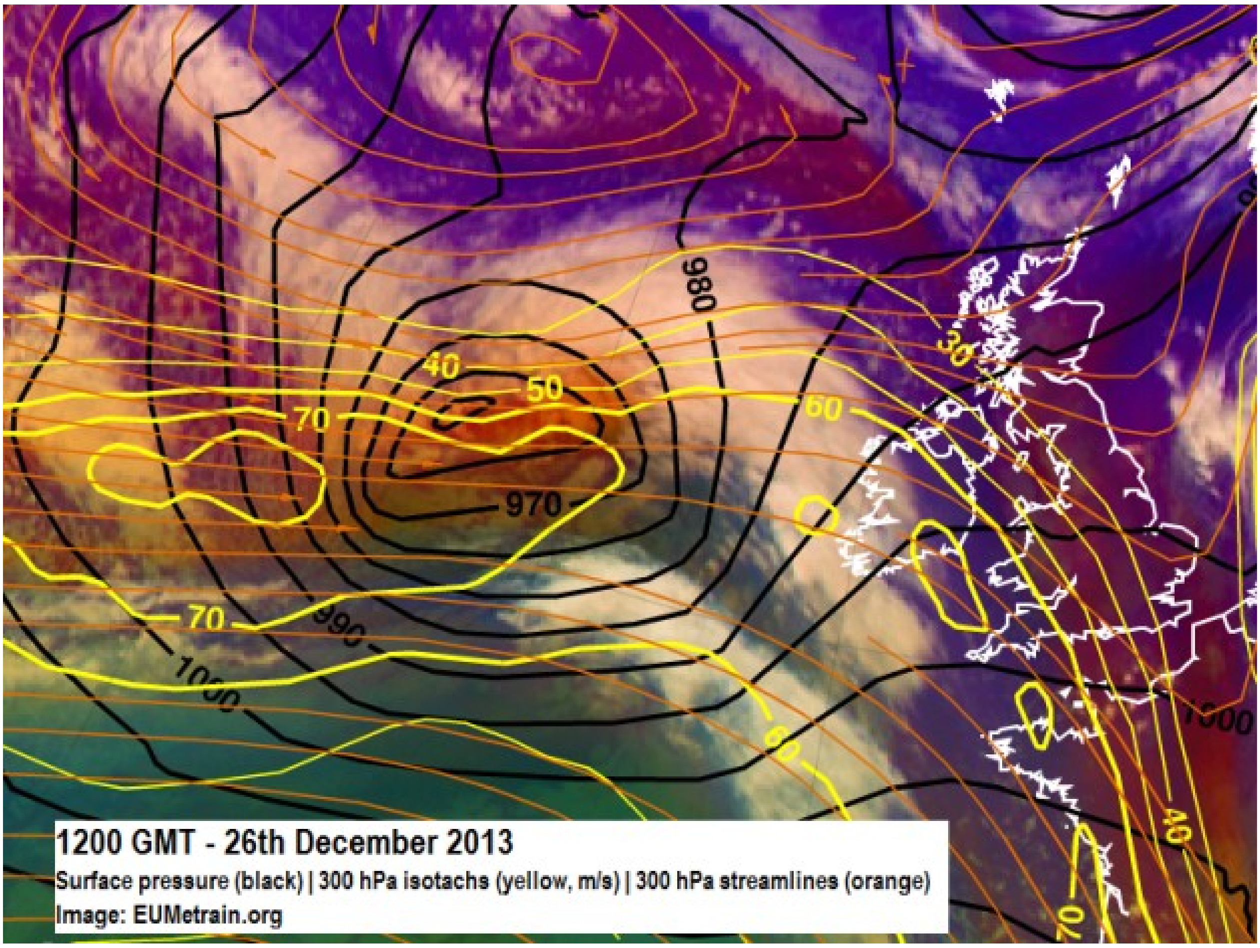
2 St. Stephen's Day 2013 Storm Erich

https://irishweatheronline.wordpress.com/2013/12/26/st-stephens-day-2013-storm-erich/

December 26, 2013 fergalt Climate of Ireland, How weather works, NewsAtlantic, cyclone, Erich, St. Stephen's Day 2013, storm

The turkey's now no more than a sorry carcass, while the recycling bin's full to the brim with waste packaging. We're all in lazy mode as we wake up to a bright, crisp St. Stephen's morning, vowing to walk off yesterday's spuds when you get a chance later on this evening. Well go right now, as there's one hell of a storm on the way tonight and tomorrow!

This is a serious system, stronger than those storms of late, and one to possibly challenge that of St. Stephen's Day 1998. Erich, as named by the German Wetterpate group, is rapidly developing and racing towards Ireland, to arrive later this evening. The first rain bands are already affecting western fringes, and will spread eastwards to remaining parts after sunset. Sizeable rainfall and sodden ground could lead to localised flooding overnight, but the real headline looks to be the wind. And lots of it. South to southwesterly winds could top 150 km/h in exposed western and southern coastal districts, with 100-130 km/h gusts elsewhere. Met Éireann have issued a Red Warning for counties in the south, and and an Orange Warning for the rest of the country.



Storm Erich at 1200 GMT, 26 December 2013.

The Airmass RGB satellite image above shows Erich as it was at 1200 GMT today. Overlaid are the ECMWF model surface pressure and 300 hPa wind-fields. This one image shows why Erich is rapidly deepening and heading our way. The surface low (black) is located just under the Left Front Quadrant of the 80 m/s+ (155 knots/288 km/hr+) jet streak (yellow contours). This setup leads to mass upward motion of the air, leading to a lowering of the surface pressure (a bit like holding a vacuum-cleaner nozzle a few centimetres above the floor). As long as this forcing from above is there the pressure will continue to fall at the surface, tightening those isobars and increasing the wind-speeds. Upper dynamics mean that gusts will be stronger with this system than with those of the past two weeks, so take no chances.

The centre of the low will track just off the Donegal coast overnight and continue on over Scotland tomorrow. As it does so winds will veer to a more westerly direction but will continue strong throughout much of the daylight hours Friday, dragging in showers of rain, hail and sleet/snow in off the Atlantic.

Travel should not be undertaken unless completely necessary. Expect delays to flights from the main airports. Stay in touch with our Facebook page for updates by Peter through the night.

Fergal – IWO

3

ERICH low pressure area

(baptized on December 25, 2013)

On December 24, 2013, a low pressure area was created southwest of Newfoundland. This shifted to the east and began to deepen. Since the low was supposed to influence the weather in Central Europe, it was christened ERICH the following day. On the day of the christening, the low ERICH was with a core pressure of about 1004 hPa south of Newfoundland. The warm front of the deep ERICH ran a few hundred kilometers in a northeasterly direction, whereas the cold front west of the deep center was also a few hundred kilometers long.
By the next day at 01:00 CET, the ERICH cyclone had shifted about 1500 km further to the northeast and was now located centrally between North America and Europe on the North Atlantic at a little below 980 hPa. Due to the still existing strong temperature contrast, the low ERICH intensified to the storm and shifted quickly in an easterly direction controlled by the current at a height of about 5.5 km. Since the cold front is always faster than the warm front, the area between the aforementioned fronts - the so-called warm air sector - became increasingly narrow. The very long warm front of the eddy reached in a south-easterly direction off the coast of Morocco and the cold front ran in a south-westerly direction to the east of the Bermuda Islands.
On December 27th the vortex ERICH, which has now grown into a hurricane, reached the British Isles. The core pressure had deepened again very strongly and had its lowest value of just under 950 hPa at 01:00 CET. The occlusion , a mixed front of warm and cold fronts, ran north around the low center, which can be found a few hundred kilometers northwest of Ireland was. At the point of occlusion , the mixed front split into the warm front extending across the Strait of Gibraltar and the cold front extending far to the southwest across the Azores. Due to the strong contrasts in air pressure near the center, the wind on the British Isles was particularly strong in the

mountains, as the ground friction decreases sharply in the higher layers of the air. On the ScottishCairngorm Mountains at 1245 m above sea level, a hurricane gust of 183 km / h was measured. At 3 a.m. CET, the hurricane force was finally reached there even in the mean wind. But strong hurricane gusts were also reported from the west coasts of Great Britain and Ireland. Wind speeds of 133 km / h were recorded at the Irish stations at Mace Head and in Sherkin Island. On the Welsh coast, it was 165 km / h in Aberdaron and 152 km / h in Capel Curigalso reached the hurricane strength. In the inland, the wind reached storm strengths of around 70 to 100 km / h in many places, and precipitation was recorded at the same time. Up to 07:00 CET, precipitation sums of 22 mm in the southwest of Ireland, mainly caused by deep ERICH, were measured in Valentia, and in Bournemouth , on the English Channel, it was 11 mm. Widespread rain fell about 5 to 10 mm in the British Isles. The temperature in Spain reached maximum temperatures of up to 20.9 ° C in Bilbao and 21.1 ° C in Santander due to the approach of warm air masses from the southwest before the arrival of the cold front.
By the following day, the ERICH hurricane began to fill up slowly. At 01:00 CET it was over the Shetland Islands with a core pressure of around 956 hPa. The elongated occlusion ran circularly from the core to over southeast Sweden, where it was divided into a short warm front extending to northern Poland and a cold front extending over northern Germany. The wind dropped significantly over the British Isles compared to the previous day. So only the top stations Cairngorm Mountains and Cairnwell recordedHurricane gusts of up to 150 km / h or 128 km / h. In the lower altitudes, even directly on the coast, often only maximum peak gusts of 50 to 80 km / h were registered during the day. In Norway, however, the wind increased significantly. In Krakenes , a lighthouse located directly on the coast, gusts of up to 137 km / h were reported. Elsewhere the wind only blew at gale force, for example in the city of Bergen at 83 km / h. Due to a flat wave over Western Europe, the ERICH vortex caused high amounts of precipitation in some cases. In northern France, for example, more than 30 mm of rain was registered in 24 hours up to 7 a.m., including in Santiano, Spainfell over 30 mm of precipitation. In Germany, the traffic jam in the Black Forest recorded 23 mm in Freudenstadt and 27 mm in Emmendingen in 12 hours until 7 p.m. At the same time, a temperature of 10 ° C to 12 ° C was measured in front of the cold front, which meant a temperature increase of around 2 to 3 degrees compared to the previous day, especially in eastern Germany. Behind the front it cooled down to about 7 ° C.
On December 29th At 01:00 am, the low pressure area ERICH with a center pressure of around 974 hPa was a few kilometers off the coast of central Norway. The vertebra had one occlusion reaching as far as Scotland and another that extended to the point of occlusion over northern Norway. From there, a warm front lay over the Russian

Kola Peninsula, which extended over the Ural Mountains. The hardly shifting cold front had a north-south orientation, it was over Finland and the Baltic States and ended over Poland. In Suomussalmi Pesio , Finland, a total of 8 mm of precipitation was recorded in 24 hours up to 07:00 CET, as was the case in Pärnu, Estonia. With a few exceptions, the 24-hour rain sums were mostly less than
5 mm. The wind also decreased significantly in Norway, so that gusts of up to 86 km / h as measured in Lindesnes , the southernmost town in Norway, occurred. On the back of the cold front, warmed maritime polar air flowed in over Germany, which ensured mild daily highs of around 6 ° C to 8 ° C. As usual for this air mass, permafrost prevailed in the highest low mountain ranges. At times sunshine prevailed and provided up to 5 hours of sunshine, especially in Saxony and Thuringia.
The ERICH vortex shifted further to the northeast until the following day at 01:00 CET, weakening, so that it could now be found over northern Norway at a little below 990 hPa. The occlusion extended from the deep core to a little south of the Norwegian island of Jan Mayen . The day before, a partial depression had formed at the occlusion point, which was south of Novaya Zemlya. The two cyclones were with a second occlusion connected with each other. The still young marginal depression caused rain and sometimes also snowfall in the northern Ural Mountains. However, behind the fronts of the partial low, the strong westerly current caused warming, so that in large parts of western Russia there was no snow cover at the end of December. In Kandalaksa, Russia4 mm of rain were reported in 24 hours up to 7 a.m., in Saint Petersburg 10 mm of rain in the same period. In the area of the partial low, the total precipitation seldom exceeded 2 mm. The mild temperatures were also noticeable at night. In Saint Petersburg, for example, it did not cool below 4 ° C at 01:00 CET. In front of the front system of the partial low, however, air masses with temperatures of -17 ° C to -33 ° C were brought in with an easterly to southeastern current, but behind the front the temperature rose in many places in the positive range. That means a large temperature difference over a few hundred kilometers.
On the last day of 2013 at 01:00 CET, the low pressure area ERICH was at around 998 hPa just east of the Urals above the West Siberian lowlands. The vertebra, meanwhile reconnected to its marginal depth, had two occlusions . The western of the two mixed fronts reached across the White Sea as far as Lapland. The other occlusion ran to the east outside the display area of the Berlin weather map. At the top, a warm front extending from the center to the south-east and a cold front extending from the core to the south-west also belonged to the front system of the low. In the warm sector at high altitude, temperatures reached 850 hPa, which corresponds to about 1500 m altitude, up to 0 ° C, which is not common at this time of the year in Western Siberia. Significantly negative 850 hPa temperatures were again brought up behind the high altitude cold front. In the warm sector of the low, at

01:00 CET due to the poor exchange of low-level and high-lyingIn milder air masses, however, significantly negative temperatures down to -7 ° C were measured, accompanied by local light snowdrifts and light snowfall. Behind the cold front, the colder air mixed up to the ground, but it warmed up so much that positive temperatures of up to 2 ° C and rain were reported from northwestern Russia in many places. In the area of the floor occlusionsSnowfall or partly freezing drizzle was reported in many places at 01:00 CET. This was created by the warm layer of air above, which melted the falling snowflakes so that they froze on the still cold ground. North of the mixed fronts it remained frosty cold with an easterly ground current, so that a few hundred kilometers north of the center the temperature was only -34 ° C. Up to 07:00 CET, 5 mm of precipitation was measured in Teriberka , located on the Russian Kola Peninsula, in 24 hours . In 12 hours to atAt 7 p.m., 2 mm of precipitation was recorded at the Pjalica station on the White Sea.
By New Year's Day 2014, the ERICH low pressure vortex continued to weaken and moved outside the display area of the Berlin weather map, so that it could no longer be analyzed there on that day.

Written on 03/03/2014 by Dustin Böttcher
Berlin weather map: December 27, 2013
Godfather: Erich Jungmann