WITNESS STATEMENT

1 Introduction

My name is Ria Lyden. I am an Associate Director of Arup Consulting Engineers.

I have a Bachelor of Engineering Degree in Civil Engineering and a Master of Business Administration Degree. Both degrees are from University College Cork. I am a Chartered Engineer. I am a fellow of the Institution of Engineers of Ireland and a member of the Institution of Structural Engineers. I have worked as a civil and environmental engineer for 25 years.

My evidence will cover the flood of 27th October 2004.

1.1 Current levels

1.1.1 Site

The existing ground levels of the waste to energy plant site vary from approximately 2.7mOD (metres above Ordnance Datum Malin Head) at the edge of the road to more than 32mOD. The existing ground levels on the waste transfer station site vary from about 2mOD just in from the edge of the road to approximately 4mOD at the boundary with Hammond Lane. The Community Recycling park levels vary from about 2.5mOD, close to the road, to 8mOD, at the foot of the escarpment. The highest point of the site, at the southern fence line, is approximately 41mOD.

1.1.2 Road

The levels along the road, at the northern boundary of Indaver's land, vary from approximately 2.6mOD near the County Council car park, to the north-east of the site, to 2.87mOD west of the Hammond Lane entrance.

The road levels are 600mm to 800mm higher than the current ground levels in the adjacent part of the transfer station site and ponding occurs occasionally in this area following heavy rainfall.

1.1.3 Beach

There is a path from the County Council car park to the beach. The ground at the back of the beach is at a level of around 3.1mOD.

1.2 27th on October 2004

On 27th of October 2004 37.8mm of rainfall in the 24 hour period was recorded at Cork Airport. This coincided with a storm depression of 953hPa, centred close to the south coast of Ireland. The resulting combination of storm surge, south-easterly gales and a very high tide caused flooding on the southern and south eastern coasts of Ireland.

The road in front of the waste to energy site and the low-lying part of the transfer station site flooded on 27th October 2004. We did not measure the maximum flood level at the site. In her written objection to the granting of the proposed determination, and in her evidence on Wednesday 16th February, Ms O'Leary of CHASE indicated the level was 2.85mOD. Our data would support this level.

The storm surge of 27th October 2004 raised the sea level in Cobh to 2.66mOD, which was 1.04m higher than the predicted high tide level for Cobh given in the Tide Tables[1]. The sea level information is from the Port of Cork.

Cobh is a primary tidal height reference port and Ringaskiddy is a secondary port. According to the Nautical Almanac[2], 0.1m should be added to the predicted tide level in Cobh to obtain the tide height for Ringaskiddy. On this basis, we estimate that the maximum tide level in Ringaskiddy on 27th October 2004 was 2.76mOD.

The maximum flood level at Carrigaline on 27th October 2004 was 2.72mOD. The level was surveyed for Arup Consulting Engineers. The maximum level in the centre of Cork City was 3.0mOD. Arup Consulting Engineers obtained this information from Cork City Council. Using the Nautical Almanac conversion factor, a tide level of 3mOD in the City suggests a tide level of 2.7mOD at Ringaskiddy.

1.3 Proposed ground levels

The floor level of the buildings in the waste to energy plant will be 5.777mOD. This will be almost 3m above the flood level of 27th October 2004. The waste to energy plant would not have flooded on 27th October 2004. For the waste to energy plant to flood, the centres of Cork and Carrigaline would be under more than 3m (that is 10 feet) of water.

In the waste transfer station, the level of the floor of the warehouse and the yard will be 2.6mOD. However the storm water and fire water retention system for the yard includes a kerb which will be 300mm above the yard level, i.e. the kerb will have a top level of 2.9mOD, which will act as a flood barrier. Thus if the waste transfer station had been built, it would not have flooded on 27th October 2004.

The transfer station has been designed to retain 300mm of water. The drums of waste will be on racks above the water.

1.4 Return period for Weather Conditions of 27th October 2004

The storm surge on 27th October 2004 was caused by the depression of 953hPa central pressure. This was described as 'exceptionally deep' in the Met Éireann Monthly Weather Bulletin for October 2004[3].

We asked Met Éireann to calculate the return period for depressions with this pressure coinciding with winds from a south-easterly direction of gale force or higher. They reviewed data from the Cork Airport met station from 1962 to 2004 and data from the Roches Point met station from1956 to 1990. Since 1956 they had no record at these stations of a pressure of 960hPa or lower, coinciding with winds from a south-easterly direction of gale force or higher. The conditions of 27th October 2004 were very unusual.

1.5 Normal Engineering Practice

In her evidence on Wednesday 16th February, Ms O'Leary of CHASE said she had been given advice that it would be 'prudent engineering practice' 'to have all working areas, especially those liable to flood at least a half metre above the 1/100th year flood level.' Arup Consulting Engineers would not give such advice. The circumstances and requirements of projects are different. Advice in relation to flooding would have to be specific to each project.

1 Tide Tables for 2004 published by Union Chandlery, Cork

2 Reeds OKI Nautical Almanac 2005 Atlantic Europe from the Tip of Denmark to Gibraltar, Adlard Coles Nautical, London.

3 Met Éireann Monthly Weather Bulletin for October 2004, Met Éireann, Dublin.