

Introduction

Our client's site in North Walsham receives condensate from Bacton Gas Reception Facility, for transfer to railway tankers and onward delivery. The site is located in the town centre, adjacent to the railway station and close to a nursing home and other amenities. Following the 2009 Hazardous Substances regulations, the site fell under COMAH, and new expressed consent had to be sought for continued operation. The local planning authority sought the advice of the HSE, who identified tank collapse as a "low frequency; high consequence" event and required analysis to determine the potential consequences.

Our client had been using MMI over a period of years to address safety considerations such as bund wall stability, fire impingement on the control building, and protection of firefighters in an accident scenario. We were therefore appointed to assist with this further challenge.

Our Approach

We initially used computational fluid dynamics (CFD) to analyse the potential effects of catastrophic primary tank failure. The results indicated that relatively large quantities of condensate could, under certain circumstances, overtop the bund, posing a threat to persons on and off-site. We were subsequently engaged to design a barrier that would prevent bund overtopping. The geometric requirements of this were determined using CFD, which was also used to determine the fluid-induced dynamic load transients which any such barrier would need to resist. Due to the highly energetic nature of the fluid wave resulting from very rapid tank failure, the loads obtained were significant, and not dissimilar from load transients caused by blast loading, albeit of longer duration.

We devised a candidate structural bund enhancement scheme and, using a combination of hand calculations and finite element analysis, proved the design fit for purpose. We gathered pre-interpreted point cloud data and used this to generate civil BIM models using REVIT. The structural model of the steel bund enhancements was created using TEKLA and this was integrated with the civils BIM model before supplying to the D&B Contractor for the addition of other BIM layers.

Value Added

MMI produced detailed drawings to a level approved for construction and maintained an involvement through the construction and project close out phases to enable timely responses to site queries as they arose.

TEKLA UK BIM Award

The North Walsham project won a 2016 Tekla UK BIM Industrial Projects Award, find out more by visiting: <http://www.tekla.com/uk/bim-awards/north-walsham-containment-enhancement>

