MOD Shoeburyness – ETC Area
Building 71 Extension
Flood Risk Assessment

Prepared for

QinetiQ

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SUPPLIED

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1.0 Introduction

1.1 Background

This flood risk assessment has been prepared in support of a planning application by QinetiQ on behalf of MOD in connection with the proposed extension of building number 71 at the Environmental Test Centre (ETC) on Foulness Island as part of the MOD's Shoeburyness Estate. The planning application is to allow the construction of additional facilities to support the ongoing activities within the ETC area of MOD Shoeburyness testing facilities.

This risk assessment investigates the main sources of flooding risk and assesses the impacts of the proposed additional development of the area.

2.0 Proposed Works

2.1 Proposed Development Description

The proposed development works consist of refurbishment of the existing structure and addition of an external plant structure / compound at Building 71 at the ETC facility on Foulness Island on the Ministry of Defence (MOD) Shoeburyness Estate which is managed and operated on behalf of the MOD by QinetiQ.

The external addition to the western elevation of Building 71 is approximately 200m^2 in plan area comprising a bunded concrete compound with ancillary building and new 4m wide access road (Refer to Figure 1). The building forms part of the existing ETC testing facilities that are located on Foulness Island. Exact details of the development are not known at this stage as the works will be procured using a Design and Build form of contract. The proposed development of Building 71 will broaden the scope of test delivery at ETC and provide an increase in the period for which it can be used and be of benefit to the MOD.

Surface water drainage from the proposed development will continue to discharge via the existing land drainage network (refer to section 5.0 below).

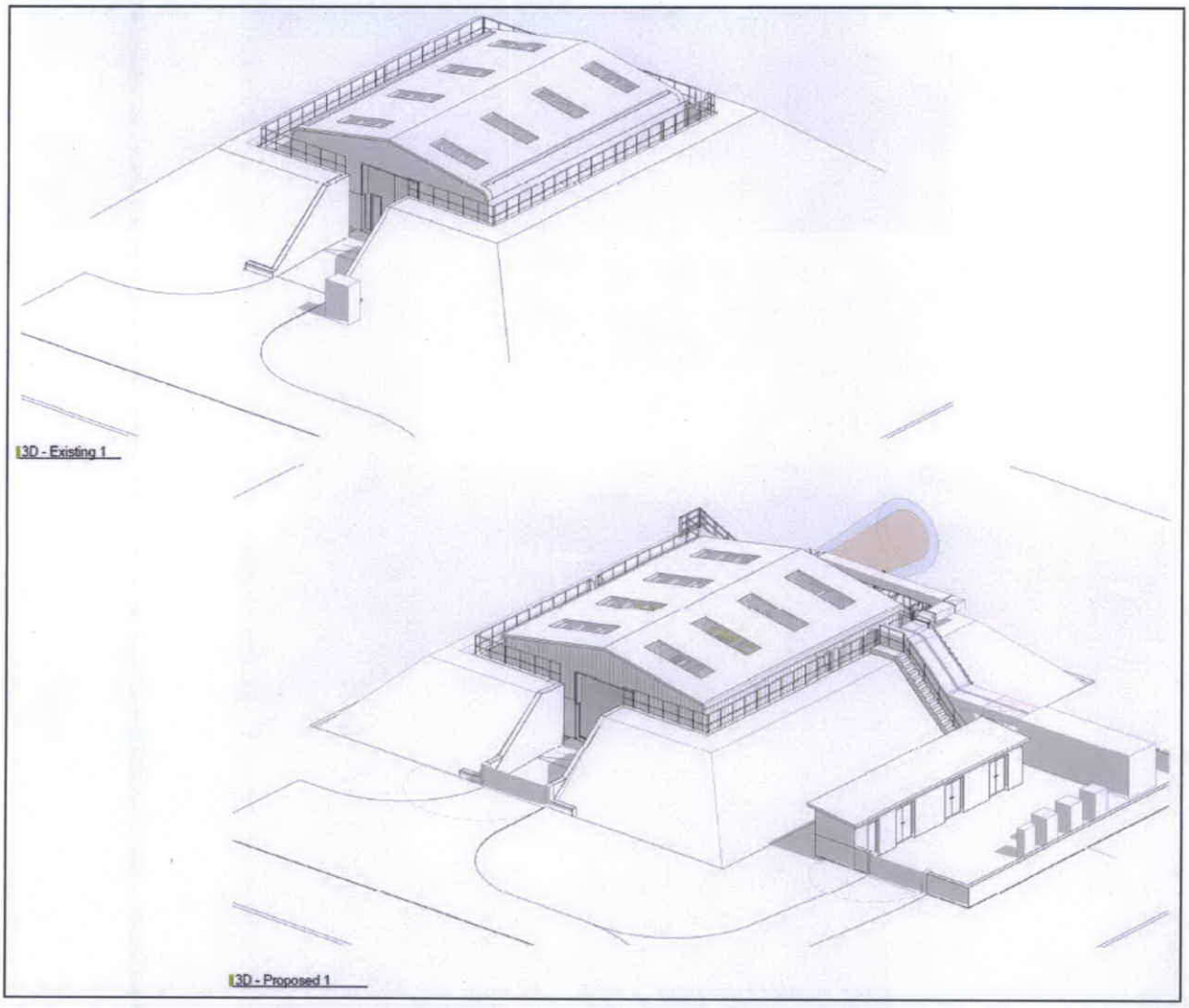

Figure 1. Existing and proposed views of Building 71 (*extract from drawing IDA-5000*)

2.2 Site Location and Description

The works are located on Foulness Island, approximately 10km north east of Shoeburyness within the site of the MOD Shoeburyness Estate. MOD Shoeburyness provides defence Test and Evaluation (T & E), and training support services which help ensure the safety and effectiveness of munitions and skills used by the UK Armed Services.

The ETC area where Building 71 is located is situated in the north western corner of the island approximately 450m inland from the coastal defences along the River Crouch (Refer to Figures 2 & 3). The building is located to the eastern side of the existing ETC complex.

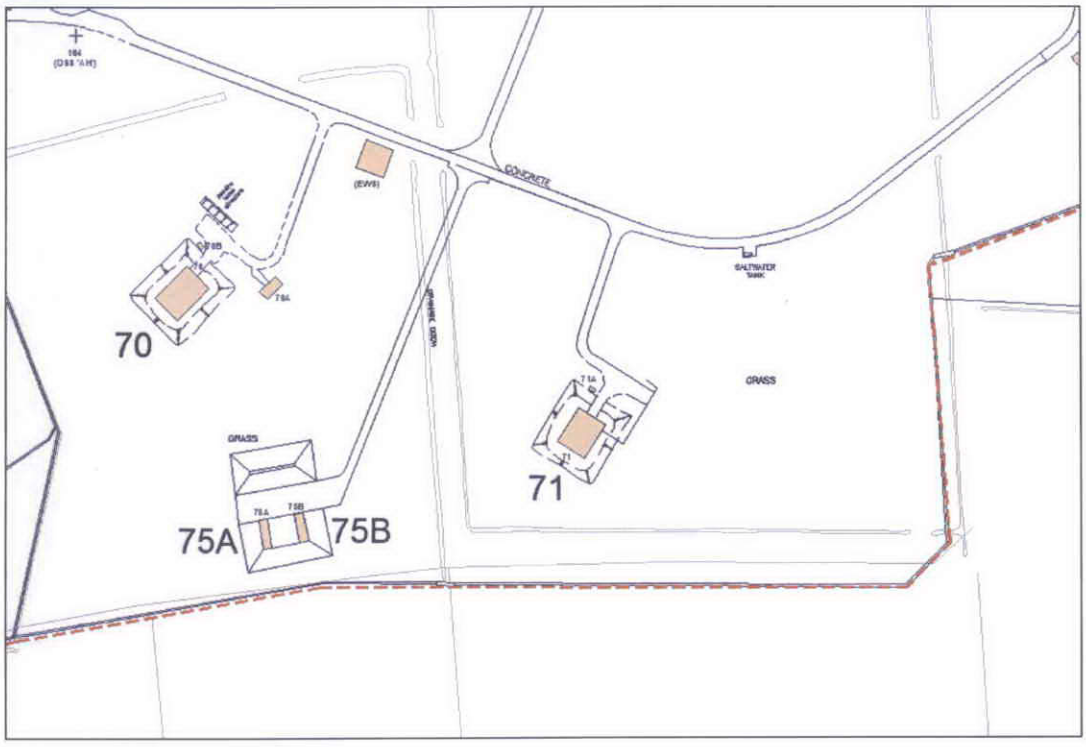

Figure 2. Location of proposed works, Building 71 (*extract from drawing SHB-STE-PLAN-ETC-PROP-BOREHOLES*)

Figure 3. Site Location

Foulness Island is owned by the MOD and is utilized for MOD testing facilities and agriculture (farmed by tenant farmers). The island is low lying and relatively flat in topography and is drained by a network of land drains that cross the island and drain into soak dykes around the perimeter of the island which then discharge into the surrounding estuary via a number of outfalls through the existing sea defences.

3.0 Planning and Flood Risk

Planning Practice Guidance (PPG) requires that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is necessary in such areas, the guidance aims to make it safe without increasing flood risk elsewhere and where possible reducing flood risk overall. PPG classifies land into three Flood Zones, depending on the probability of flooding (Refer to Table 1). The Flood Zones refer specifically to flooding from rivers and the sea, however all sources of flooding including groundwater and surface water should be considered when assessing flood risk.

The PPG Sequential Test states that the overall aim of decision makers should be to steer new development to Flood Zone 1 – areas with the lowest probability of flooding. Where there are no reasonably available sites in Flood Zone 1, sites in Flood Zone 2 may be considered. Only where there are no reasonably available sites in Flood Zones 1 or 2 should sites in Flood Zone 3 be considered, taking into account the vulnerability of land uses.

For some land uses, the PPG Exception Test must be passed before development can be permitted in a particular Flood Zone. The Exception Test requires that:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Flood Zone	Definition
Zone 1: Low Probability	Land having a less than a 1 in 1,000 annual probability of river or sea flooding
Zone 2: Medium Probability	Land with between a 1 in 100 and 1 in 1,000 annual probability of river flooding or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding
Zone 3a: High Probability	Land with a 1 in 100 or greater annual probability of river flooding, or a 1 in 200 or greater annual probability of sea flooding
Zone 3b: The Functional Floodplain	**Land where water has to flow or be stored in times of flood.** Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplains and its boundaries accordingly in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1. Flood Zones, referring to the probability of river and sea flooding, ignoring the presence of defences. (Taken from PPG Table 1).

4.0 Flood Hazard

4.1 Flood Risk

The site of Building 71 is located within Flood Zone 3 (land benefitting from flood defence) in the Environment Agency Flood Map for Planning, as shown in Figure 4 below.

Flood Zone 3 is defined as "an area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded from the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year or from a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year".

Areas "benefiting from flood defences" are areas that benefit from the flood defences shown, in the event of a river flood with a 1 per cent (1 in 100) chance of happening each year, or a flood from the sea with a 0.5 per cent (1 in 200) chance of happening each year. If the defences were not there, these areas would be flooded.

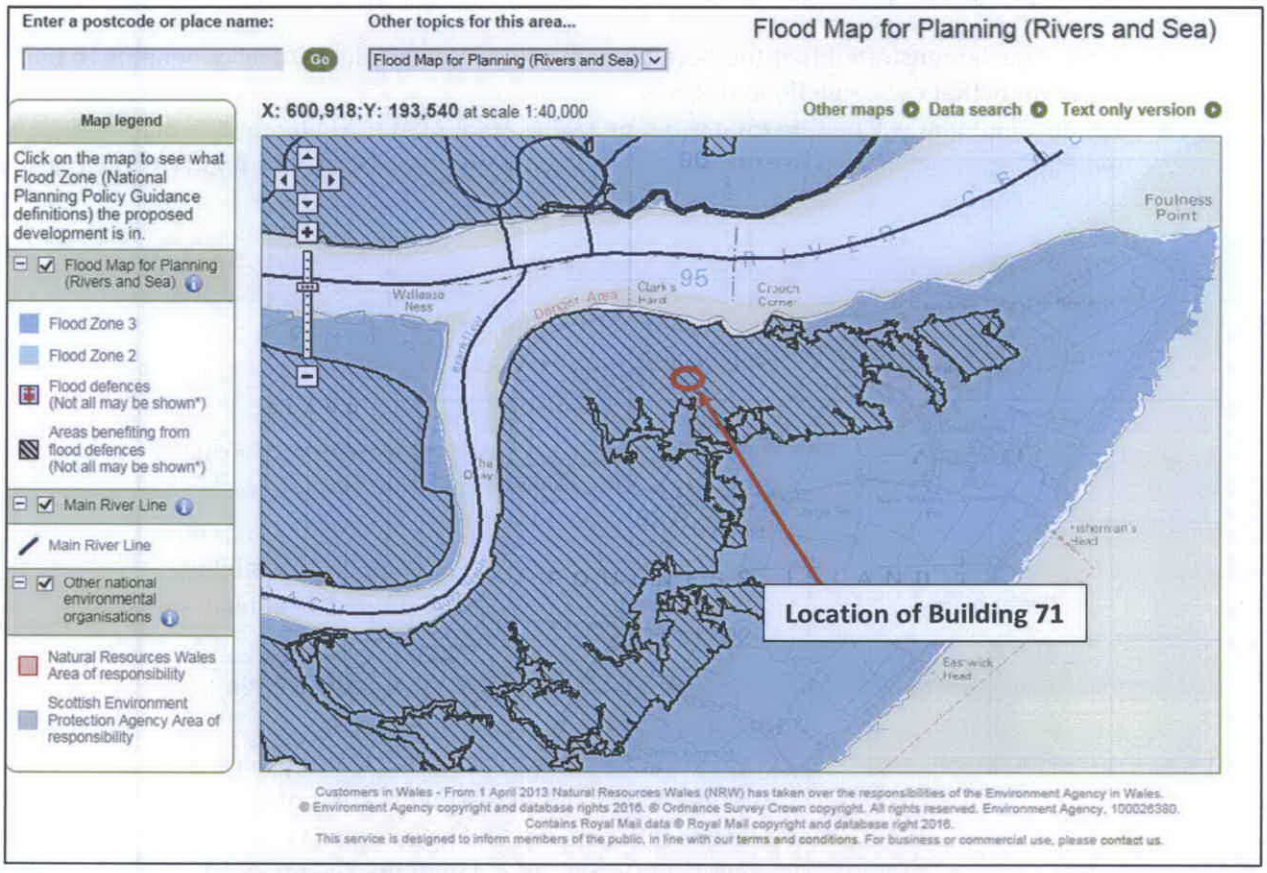

Figure 4. Extract from Environment Agency Flood Map for Planning - Site is categorized as Flood Zone 3

4.2 Applying the Sequential and Exception Tests

The site is located in Flood Zone 3 (refer to section 4.1 above) and hence the sequential test applies whereby development should be restricted to lower classed flood zones. As the proposed

development is to support the ongoing MOD facilities on Foulness Island, and those specifically at the existing ETC complex, no other suitable locations exist for the development.

PPG categorizes MOD defence installations as "water compatible" and therefore the PPG Exception Test is not required for the proposed development (refer to Table 2).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	x	Exception Test required	✓	✓
Zone 3b	Exception Test required	x	x	x	✓

Key:

✓ Development is appropriate

X Development should not be permitted

Table 2. Extract from PPG (Table 3: 'Flood Risk Vulnerability and Flood Zone Compatibility')

5.0 Existing Coastal Defences and Surface Water Drainage

5.1 Existing Conditions

Foulness Island is bounded by an existing flood defence wall. Previous studies (Halcrow, 2014) have shown that, in the event of a breach in the flood wall, the whole of Foulness Island may be vulnerable to flooding. This is due to the fact that the island is relatively low-lying and there are very few natural barriers. Furthermore, the existing network of drainage ditches and soak dykes that cross the island and run around the perimeter, adjacent to the flood banks, would transport flood waters to all parts of the island, as shown in Figure 5 below.

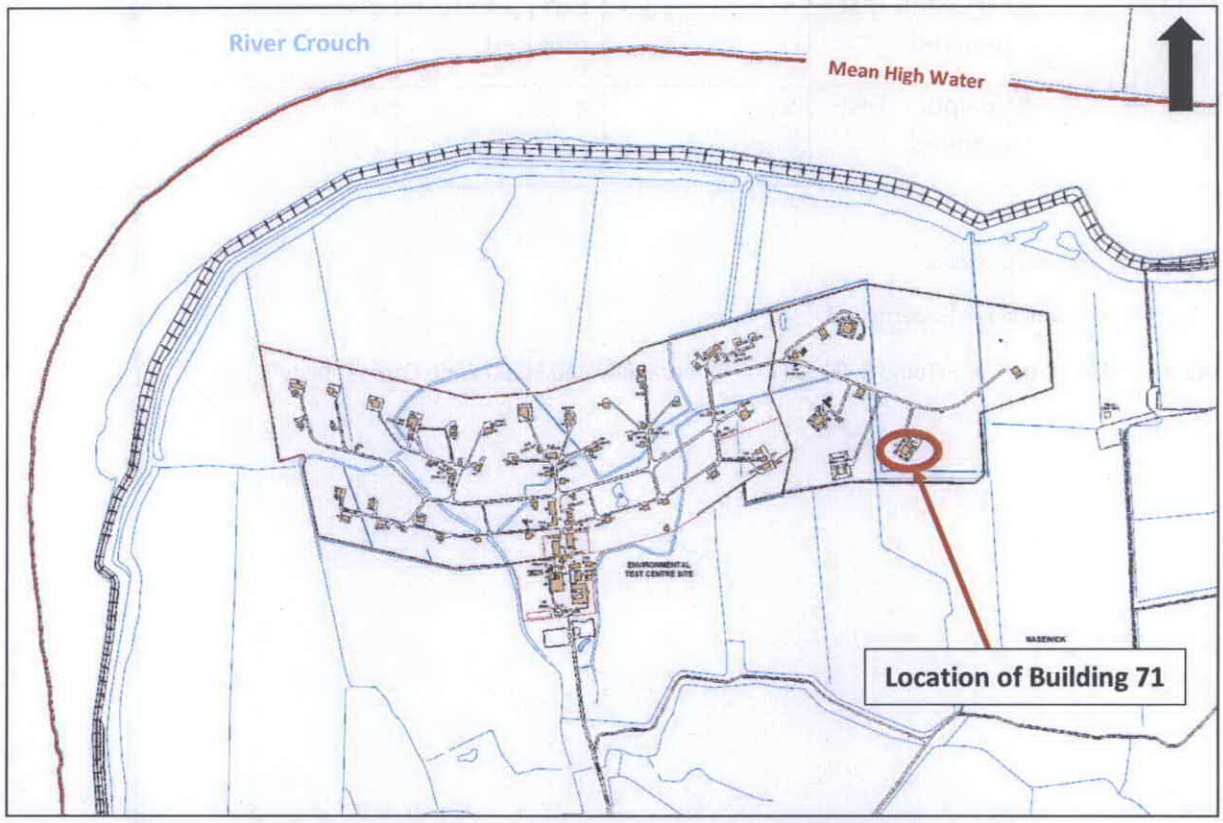

Figure 5. Existing Surface Water Drainage Network (*extract from drawing SHB/OSSITE/SP/9100/001*)

Funded by the MOD, QinetiQ is in the process of carrying out works to improve the condition and standard of the flood defences around the island. This is a multi-phase project of which Phases 1 & 2 have been completed and Phases 3 and 4 are planned. The works seek to improve the standard of the flood defences around the island such that they will provide a minimum of 1 in 100 year standard in year 2064 (hence account for predicted sea level rise as a result of climate change). Works seeking to improve the existing sluice structures and land drainage around the island is also ongoing.

5.2 PPG Requirements

PPG requires that there is no detrimental impact of the development on flood risk elsewhere, and if possible, there is an improvement in flood risk to other properties. Development can increase surface water flood risk elsewhere through reduced permeability of the site leading to increased volume and rate of runoff. This effect should be mitigated through the use of Sustainable Drainage Systems (SUDS) to mimic the flows from the site prior to development.

5.3 Development Impacts on Surface Water

As noted in section 5.1 above, all surface water is drained from the island via a network of surface water drains. No information is currently available on the existing surface water discharge rates from the Island and any impact from additional surface water resulting from climate change is not known.

The flood defence improvement works to the Island include improvements to the condition of the surface water outfalls which, although not increasing their capacity, will help improve their efficiency. The clearance of silt from the soak dykes adjacent to the sluices is also undertaken periodically.

Due to the small plan area of the proposed development in relation to the area of the Island, and there being no alteration to the existing surface water runoff regime, impacts on surface water are deemed negligible.

6.0 Flood Risk Management Measures

6.1 Flood Warning and Alerts

QinetiQ is currently on the Environment Agency's flood alert system for the area and also operate their own emergency flood response plan: Emergency Management Plan - SHB_CTP LGL/FRM/0567/1.0 (08/06/2017).

7.0 Conclusion

QinetiQ is proposing the construction of an external addition to Building 71 (a bunded concrete compound with ancillary building, new road access and flood gate) which will ensure the continued use of the existing MOD Shoeburyness ETC facility on Foulness Island. The plan area of the development is approximately 200m^2.

The development is situated in Flood Zone 3, however the existing flood defences are currently being improved by the MOD to provide an improved standard of protection of 1 in 100 years in year 2064. Works are also ongoing that seek to improve the existing sluice structures around the island.

The surface water drainage of the island consists of a number of land drains, soak dykes and sluices. No change in surface water drainage is proposed.

MOD Shoeburyness is currently on the Environment Agency's flood alert system for the area and they also operate their own emergency response plan.

Due to the small plan area of the proposed development and there being no alteration to the existing surface water runoff regime, impacts on surface water are deemed negligible.

References

- Halcrow 2014, Shoeburyness Sea Defence Appraisal and Flood Risk Assessment