



**Client: Mr Jamie Hall**

Flood Risk Assessment for the  
Undertaken Development at MAH Steel,  
Imperial Business Park, Gravesend

**June 2025**

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# 1 Background and Scope of Appraisal

Flooding is a major issue in the United Kingdom. The impacts can be devastating in terms of the cost of repairs, replacement of damaged property and loss of business. The objectives of the Flood Risk Assessment (FRA) are therefore to establish the following:

- whether a proposed development is likely to be affected by current or future flooding from any source.
- whether the development will increase flood risk elsewhere within the floodplain.
- whether the measures proposed to address these effects and risks are appropriate.
- whether the site will pass Part B of the Exception Test (where applicable).

Herrington Consulting has been commissioned by **Mr Jamie Hall** to prepare a Flood Risk Assessment (FRA) for the undertaken development at **MAH Steel, G1-G2 West Mill, Imperial Business Park, Gravesend, Gravesham, DA11 0DL**.

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2024) and the National Planning Practice Guidance Suite (August 2022) that has been published by the Department for Communities and Local Government. The *Flood Risk and Coastal Change* planning practice guidance included within the Suite represents the most contemporary technical guidance on preparing FRAs. In addition, reference has also been made to Local Planning Policy.

This report has been prepared to accompany a retrospective planning application and has been prepared in accordance with the requirements of both national and local planning policy. To ensure that due account is taken of industry best practice, this FRA has been carried out in line with the CIRIA Report C624 'Development and flood risk - guidance for the construction industry'.

## 2 Development Description and Planning Context

### 2.1 Site Location and Existing Use

The site is located at OS coordinates 563842, 174387, off West Mill Road in Gravesend. The total site covers an area of approximately 0.375 hectares and currently comprises the existing MAH Steel commercial site. The spray booth, which is the subject of this report, covers an area of approximately 30m<sup>2</sup>. The location of the site in relation to the surrounding area and the River Thames is shown in Figure 2.1.



Figure 2.1 – Location map (contains Ordnance Survey data © Crown copyright and database right 2025).

The site plan included in Appendix A.1 of this report provides more detail in relation to the site location and layout.

### 2.2 Retrospective Development

The retrospective development comprised the construction of a vehicle spray booth adjacent to the commercial building (Figure 2.2).

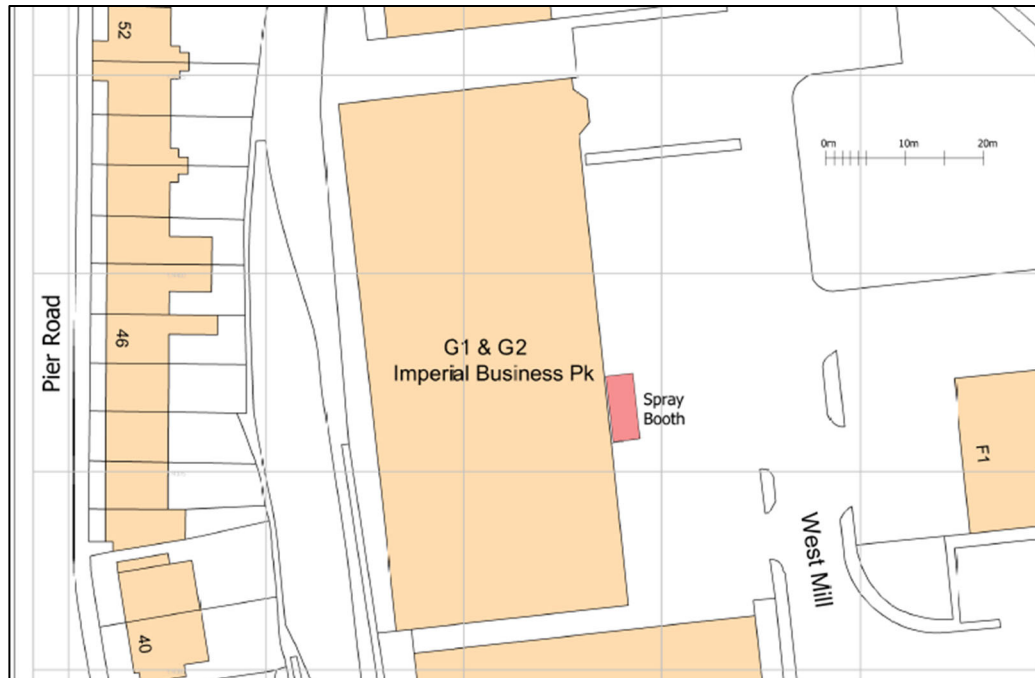


Figure 2.2 – Layout of the site, including the spray booth.

Drawings of the development scheme are included in Appendix A.1 of this report.

## 2.3 Flood Zone Classification

When assessing the risk of flooding to a These maps and the associated information are intended for guidance proposed development, generally the starting point is the Environment Agency's (EA) 'Flood Map for Planning' (Figure 2.3). and cannot provide details for individual properties. They do not take into account other considerations such as existing flood defences, alternative flooding mechanisms and detailed site-based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any particular area of the country. The Flood Zones are classified as follows:

**Zone 1 – Low probability of flooding** – This zone is assessed as having less than a 1 in 1000 annual probability of river or sea flooding in any one year.

**Zone 2 – Medium probability of flooding** – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between 1 in 200 and 1 in 1000 annual probability of sea flooding in any one year.

**Zone 3a – High probability of flooding** - This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding in any one year.

**Zone 3b – The Functional Floodplain** – This zone comprises land where water has to flow or be stored in times of flood and can be defined as land which would flood during an event having

an annual probability of 1 in 30 or greater. This zone can also represent areas that are designed to flood in an extreme event as part of a flood alleviation or flood storage scheme.

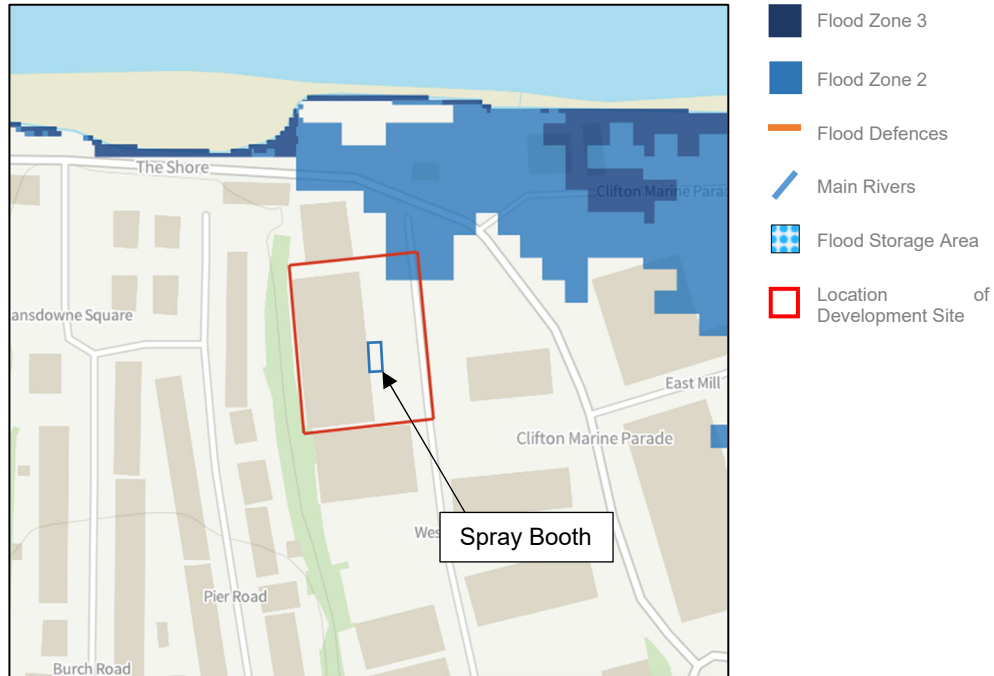


Figure 2.3 – EA's 'Flood Map for Planning' (© Environment Agency, mapping contains Ordnance Survey Data © Crown copyright and database right 2025).

Figure 2.3 shows the spray booth is located within Flood Zone 1, however, the wider site red line boundary development site is located within Flood Zone 2. Consequently, a Flood Risk Assessment (FRA) is required to support the application.

## 2.4 Site Specific Information

Information from a wide range of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

**Site specific flood level data provided by the EA** – The EA has provided detailed flood level data as part of the Thames Tidal Upriver Breach Inundation Assessment (completed in 2017) and Maximum Likely Water Levels (MLWLs) as part of the Thames Upstream Inundation Modelling Study (2015). These studies have been referenced as part of this assessment. The publicly available 'Risk of Flooding from Surface Water' (RoFSW) GIS dataset has also been studied to provide additional information regarding this source of flooding.

**Information contained within the Strategic Flood Risk Assessment (SFRA)** – The 2005 Kent Thameside SFRA contains detailed mapping showing historic flood records for a wide range of sources. This document has been referenced as part of this site-specific FRA.

**Information provided by Southern Water** – Southern Water has provided the results of an asset location search for the site. The response is included in Appendix A.2.

**Site specific topographic surveys** – A site-specific topographic survey has not been undertaken at this stage; however, inspection of aerial height data (LiDAR) records show that the land levels on the site itself are flat to support the large commercial building and associated car park. Aerial height data suggests the land levels vary between 5.80m to 6.10m Above Ordnance Datum Newlyn (AODN). The topography of the wider area slopes significantly from the west down to the east before reaching the Thames.

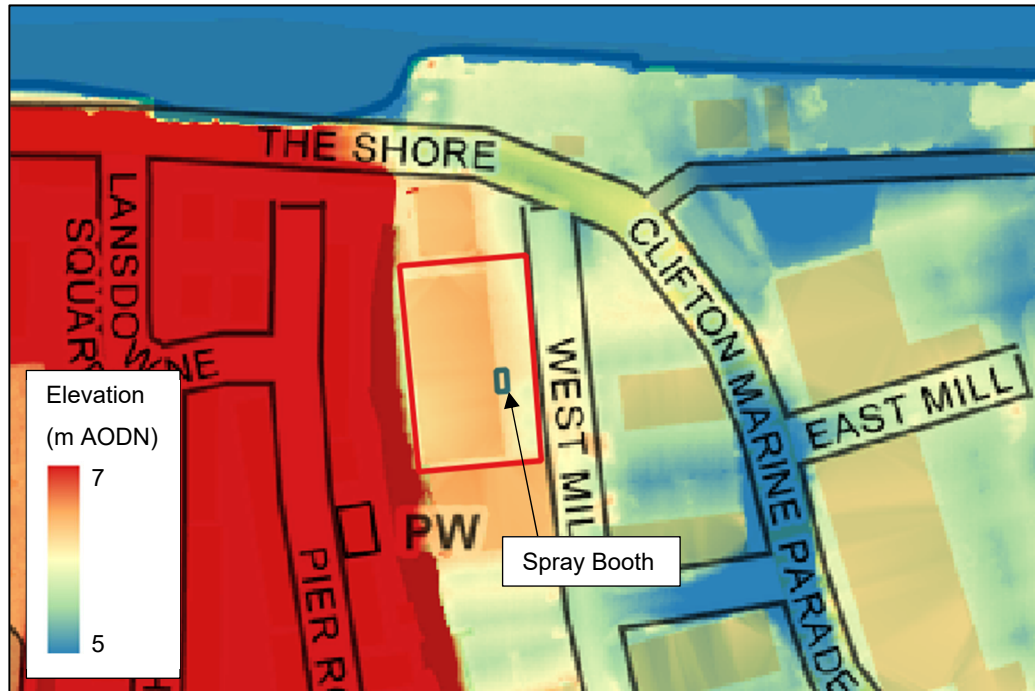


Figure 2.4 – EA's 1m resolution LiDAR data presented over OS Mapping, site boundary in red, spray booth in blue (© Environment Agency - contains Ordnance Survey data © Crown copyright and database right 2025).

**Geology** – Reference to the British Geological Survey (BGS) map shows that the underlying solid geology in the location of the subject site is Chalk (Newhaven, Seaford and Lewes Nodular) formation, with are no overlying superficial deposits.

**Historic flooding** – No information on historic flooding in this area has been provided or revealed through desktop searches.

## 2.5 Existing Flood Risk Management Measures

The flood defences in this area of the River Thames provide a 1 in 1000 year standard of protection and are all raised, man-made and privately owned. The EA inspects them twice a year to ensure that they remain fit for purpose, although they must be maintained by their owners to a crest level of 6.87m to 6.95m AODN (the Statutory Flood Defence Level in this reach of the Thames). The current defences have a crest height of 6.76m to 6.77m AODN and the condition grade for defences in this area is 2 (good), on a scale of 1 (very good) to 5 (very poor).

The Thames Barrier is a significant feature of the Thames Tidal Defences and is located between Newham and Greenwich. It became operational in October 1982 and was closed for the first time in February 1983. The Barrier is part of a system of tidal defences that currently protect London to extremely high standards. However, this level of protection is expected to decline in the future.

The Thames Estuary 2100 (TE2100) project sets out the strategic direction for managing flood risk in the Thames Estuary up to the year 2100. The TE2100 plan is now live and forms the overarching flood management strategy for the Thames Estuary. The TE2100 takes into account operation of the Thames Barrier when considering future levels. The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels for which the barrier would normally be shut, will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upstream of the barrier will increase and the tidal walls will need to be heightened to match (Table 2.1).

|                        | Present Day | 2065 to 2100 | 2100 |
|------------------------|-------------|--------------|------|
| Defence Level (m AODN) | 6.87        | 6.90         | 7.40 |

*Table 2.1 – Future defence levels for the River Thames tidal defences.*

The 'Thames Estuary 2100' document can be found on the EA's website for the short, medium and long term Flood Risk Management strategy for London:

<http://www.environment-agency.gov.uk/homeandleisure/floods/125045.aspx>

## 3 Climate Change

The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present, and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall could be expected.

These effects will tend to increase the size of Flood Zones associated with rivers, and the amount of flooding experienced from other inland sources. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels. It will also increase the extent of the area at risk should sea defences fail. Changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events are also predicted.

### 3.1 Planning Horizon

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on the extreme flood level that is commensurate with the planning horizon for the proposed development. The NPPF and supporting Planning Practice Guidance Suite state that residential development should be considered for a minimum of 100 years, but that the lifetime of a non-residential development depends on the characteristics of the development. For commercial development, a 75 year design life is typically assumed. The development that is the subject of this FRA is classified as commercial therefore a design life of 75 years has been assumed.

### 3.2 Potential Changes in Climate

#### ***Extreme Sea Level***

Global sea levels will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west.

Reference to guidance published by the EA specifies allowances for different epochs and regions across England. The predicted rates of relative sea level rise for the 'South East' region, relevant to the subject site, are shown in Table 3.1. These values which correspond with the Higher Central and Upper End percentiles (the 70<sup>th</sup> and 90<sup>th</sup> percentile respectively).

| Administrative Region | Allowance Category | Net Sea Level Rise (mm/yr) (Relative to 2000) |              |              |              |
|-----------------------|--------------------|-----------------------------------------------|--------------|--------------|--------------|
|                       |                    | 2000 to 2035                                  | 2036 to 2065 | 2066 to 2095 | 2096 to 2125 |
| South East            | Higher Central     | 5.7                                           | 8.7          | 11.6         | 13.1         |
|                       | Upper End          | 6.9                                           | 11.3         | 15.8         | 18.2         |

Table 3.1 – Recommended contingency allowances for net sea level rise.

The development site is not subject to coastal flooding, however, the River Thames is a tidal river and therefore the figures above are still applicable. Although the River Thames is tidal and would have an increase in water level over time, due to climate change, the maximum likely water level (MLWL) within the Thames will be dependent on the operation of the Thames Barrier. The MLWLs are discussed further in Section 5 of this report.

It is recognised that both the MLWLs provided as part of the Thames Tidal Breach Modelling Study (2015) and the Thames Tidal Upriver Breach Inundation Assessment (2017) are based on data which was produced before the latest guidance on climate change was published. The models are therefore based on previous estimates of sea level rise as opposed to the values stated in Table 4.1. Nevertheless, in the absence of detailed modelling which references the latest guidance, this modelling has been referenced in Section 5 of this report in order to quantify the risk of flooding at the site.

### Peak Rainfall Intensity

Recognising that the impact of climate change will vary across the UK, the allowances were updated in May 2022 to show the anticipated changes to peak rainfall across a series of management catchments. The development site is located in the **Medway Management Catchment**, as defined by the 'Peak Rainfall Allowance' maps, hosted by the Department for Environment, Food and Rural Affairs. Guidance provided by the EA states that this mapping should be used for site-scale applications (i.e. drainage design), for surface water flood mapping in small catchments (less than 5km<sup>2</sup>), and urbanised drainage catchments.

The development site lies within an urbanised drainage catchment and therefore, the Peak Rainfall Allowances for the Medway Management Catchment should be applied.

For each Management Catchment, a range of climate change allowances are provided for two time epochs and for each epoch, there are two climate change allowances defined. These represent different levels of statistical confidence in the possible scenarios on which they are calculated. The two levels are as follows:

- Central: based on the 50<sup>th</sup> percentile
- Upper End: based on the 90<sup>th</sup> percentile

The EA has provided guidance regarding the application of the climate change allowances and how they should be applied in the planning process. The range of allowances for the Management Catchment in which the development site is located are shown in Table 3.2 below.

| Management Catchment Name | Annual exceedance probability | Allowance Category | 2050s | 2070s |
|---------------------------|-------------------------------|--------------------|-------|-------|
| Medway                    | 3.3 %                         | Central            | 20%   | 20%   |
|                           |                               | Upper End          | 35%   | 35%   |
|                           | 1 %                           | Central            | 20%   | 20%   |
|                           |                               | Upper End          | 45%   | 40%   |

*Table 3.2 – Recommended peak rainfall intensity allowances for each epoch for the Medway Management Catchment.*

For a development with a design life of 100 years the Upper End climate change allowance is recommended to assesses whether there is no increase in flood risk elsewhere, and the development will be safe from surface water flooding.

## 4 Definition of Flood Hazard

### 4.1 Potential Sources of Flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table 4.1 at the end of this section summarises the risks associated with each of the sources of flooding.

***Flooding from Rivers (Tidal)*** – The site lies within Flood Zone 2 of the tidal reaches of the River Thames (main river) as shown on the EA's 'Flood Map for Planning'. The flood zone maps are used as a consultation tool by planners to highlight areas where more detailed investigation into the risk of flooding is required. Consequently, the risk of flooding from this source has been examined in more detail in Section 5 of this FRA.

***Flooding from Ordinary or Man-Made Watercourses*** – Natural watercourses that have not been enmained and man-made drainage systems such as irrigation drains, sewers or ditches could potentially cause flooding.

Inspection of the site and surrounding area reveals that there are no non-main rivers or artificial watercourses within close proximity of the site and therefore the risk of flooding from this source is considered to be *low*.

***Flooding from the Sea*** – The site is a significant distance inland and whilst the River Thames is still tidally influenced at this location, the risk of flooding from the sea is considered to be *low*.

***Flooding from Surface Water*** – Surface water, or overland flooding, typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This mechanism of flooding can occur almost anywhere but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions.

The EA's 'Flood Risk from Surface Water' map (Figure 4.1) shows the development site is located in an area classified as having a 'very low' to 'high' risk of surface water flooding. Inspection of the site and its surrounding area shows that land levels fall gradually across the site towards the east and south. In addition, a small topographical low point is located within the southeast corner of the site, which could encourage flood water to pond. However, the area where the spray booth has been positioned is at very low risk of flooding from surface water.

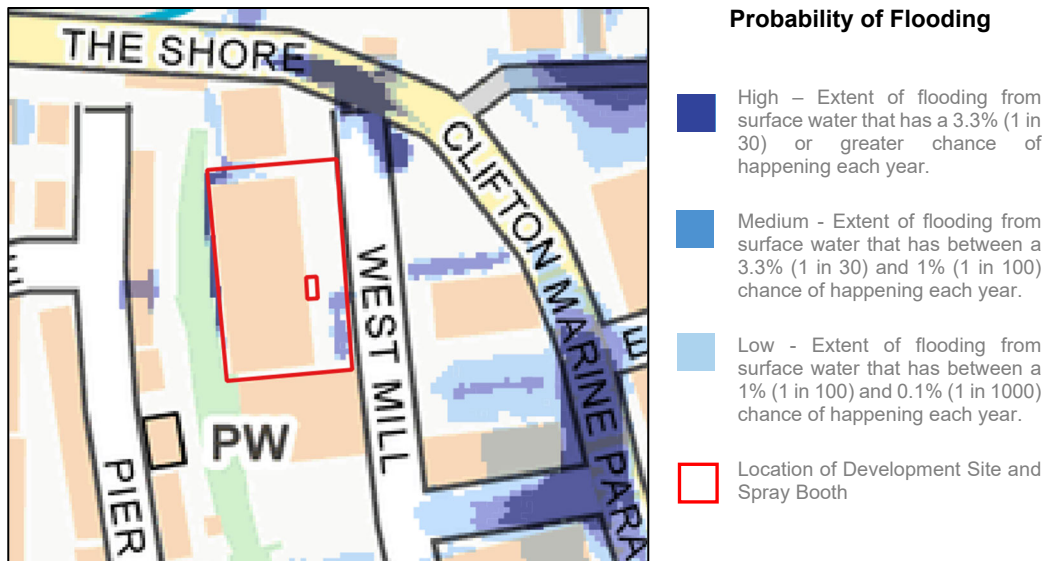


Figure 4.1 – EA's 'Flood Risk from Surface Water' map (© Environment Agency).

When the impact of climate change is considered, the spray booth remains outside the extent of surface water flooding, including both the design pluvial event and the precautionary 1 in 1000-year+CC extent. The modelled accumulation of surface water remains within the localised areas in Figure 4.1. Access to and from the spray booth on site is available. The large build up of surface water to the north of the site along The Shore may prohibit access to the north, however users of the site can safely travel south during an extreme pluvial event.

The extent of surface water flooding does not cover the spray booth area, and safe access and egress can be achieved from the commercial area, both now and in future scenarios. Subsequently, the overall risk of flooding from this source is considered to be *low*.

**Flooding from Groundwater** – Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year).

Groundwater flooding is most likely to occur in low-lying areas that are underlain by permeable rock (aquifers). The underlying geology in this area is chalk, which is typically permeable, and can be associated with groundwater flooding.

However, given the proximity of the River Thames to the site, groundwater levels in this area are likely to be hydraulically linked to water levels within the river itself. As the tidal defences prevent river water from flooding the site under extreme conditions, the water level in the river can rise higher than land levels at the site, and this can result in elevated groundwater levels inland of the defences. However, the extreme conditions in the River Thames are only expected to remain for a period less than 12 hours, and therefore it is considered unlikely that groundwater levels will respond quickly enough to result groundwater emergence at the surface. This is supported by the

absence of historic records from groundwater flooding in this location in the SFRA and Defra Groundwater Scoping Study. It is therefore concluded that the risk of above ground flooding from this source is *low*.

**Flooding from Sewers** – In urban areas, rainwater is typically drained into surface water sewers or sewers containing both surface and wastewater known as “combined sewers”. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

Inspection of the asset location mapping provided by Southern Water (Figure 4.2) identifies that the sewers in this area are both foul and surface water sewers.

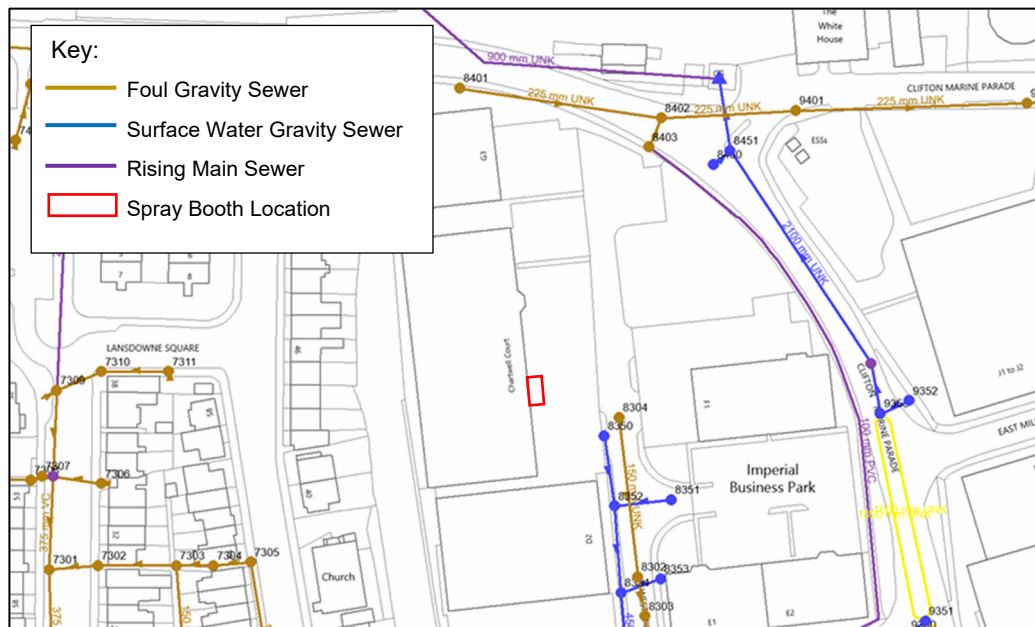


Figure 4.2 - Asset location mapping provided by Southern Water (a full scale copy can be found in Appendix A.2).

Inspection of the above mapping identifies the spray booth is located north of the nearest sewer networks. The land levels of the wider area slope to the east and the south, reducing the risk of surcharged water reaching the spray booth. Furthermore, the nearest manholes are at the start of the sewer networks, meaning a predicted, relatively low, volume of flood water would exit the manholes in the result of a failure in the wider system.

Taking the above into consideration, the overall risk of flooding from sewers to the spray booth and its users is considered to be *low*.

**Flooding from Reservoirs, Canals and Other Artificial Sources** – Non-natural or artificial sources of flooding can include reservoirs, canals, and lakes, where water is retained above natural ground level. In addition, operational and redundant industrial processes including mining,

quarrying, and sand or gravel extraction, may also increase the depth of floodwater in areas adjacent to these features.

The potential effects of flood risk management infrastructure and other structures also needs to be considered. For example, reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

Inspection of the OS mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the EA's 'Flood Risk from Reservoirs' map shows that the site is not within an area considered to be at risk of flooding from reservoirs. Therefore, the risk of flooding from this source is considered to be *low*.

A summary of the overall risk of flooding from each source is provided in Table 4.1 below.

| Source of Flooding                 | Initial Level of Risk          | Appraisal method applied at the initial flood risk assessment stage                                                         |
|------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Rivers (tidal)                     | Appraised further in Section 5 | OS mapping and the EA's 'Flood Map for Planning'                                                                            |
| Ordinary and Man-Made Watercourses | Low                            | OS mapping and aerial height data                                                                                           |
| Surface Water                      | Low                            | EA's 'Flood Risk from Surface Water' map, and historic records contained within the SFRA, aerial height data and OS mapping |
| Groundwater                        | Low                            | BGS groundwater flood hazard maps, Defra Groundwater Flood Scoping Study, aerial height data and OS Mapping                 |
| Sewers                             | Low                            | Aerial height data, OS mapping, and asset location data provided by Southern Water                                          |
| Artificial Sources                 | Low                            | OS mapping and EA's 'Flood Risk from Reservoirs' map                                                                        |

*Table 4.1 – Summary of flood sources and risks.*

## 5 Probability and Consequence of Flooding

### 5.1 The Likelihood of Flooding

When appraising the risk of flooding to new development it is necessary to assess the impact of the 'design flood event'. Flood conditions can be predicted for a range of return periods, and these are expressed in either years or as a probability, i.e., the probability that the event will occur in any given year, or Annual Exceedance Probability (AEP). The design flood event is taken as the 1 in 200 year (0.5% AEP) event for sea or tidal flooding, including an appropriate allowance for climate change (refer to Section 3.2).

### 5.2 Risk of Flooding from the River Thames

As identified in Section 2.5 development within the Thames basin area is protected by the Thames Barrier. Water levels upstream of the Barrier are controlled by closure rules depicted in the Thames Estuary 2100 (TE2100) plan, rather than being dictated by extreme weather events with a certain return period. In the absence of flood return period data, Maximum Likely Water Levels (MLWL) have been calculated (by others) for a number of time epochs, chosen to represent the impact of climate change on the water levels in the River Thames for the years 2014, 2065, and 2100. These time epochs are commensurate with the planning horizons defined by the NPPF for each type of development, e.g., residential development (2100) and commercial development (2065).

The development site for which this FRA has been prepared is classified as commercial, and therefore the development has been appraised for a lifetime of 75 years (refer to Section 3.1). The site has therefore been appraised to the 2100 epoch MLWLs, and this is henceforth termed the 'design event'. The MLWLs have been calculated (by others) as part of the Thames Upstream Inundation Modelling Study (2015) for a number of time epochs, chosen to represent the impact of climate change. The MLWLs have been taken from the for the closest node point to the development site (3.25) (Table 5.1).

| Epoch       | Maximum Likely Water Levels (2115)<br>(m AODN) |
|-------------|------------------------------------------------|
| Present Day | 5.81                                           |
| 2100        | 6.47                                           |

*Table 5.1 – Maximum likely water levels (at Node 3.25) showing the highest levels permitted by the Thames Barrier for the year 2115.*

As outlined in Section 2.5 of this report, the development site benefits from existing defence infrastructure along the River Thames, which provides a 1 in 1000 year standard of protection and have a crest height of 6.87m AODN in this area. Consequently, as shown in Table 5.1, the water level under current day conditions would remain below the crest height of the defences and the site would remain dry.

When taking into account future climate change scenarios, the MLWLs will increase to 6.47 AODN by the year 2100 (refer to Table 5.1). As part of the TE2100 Plan, the tidal defences are to be raised and adapted where required to keep the barrier closures within operational constraints. It is anticipated that by 2100, the tidal walls along both banks of the river will be raised to a minimum of 7.40m AODN in this area of the River Thames. As a consequence, the crest height of the defences will remain above the MLWL permitted by the barrier and therefore, the site would be protected by the defences and would continue to remain dry in the future. The actual risk of flooding to the site is concluded to be low.

### **Residual Risk of Flooding**

Whilst the Thames tidal defences do provide a very high standard of protection, and are also maintained to a safe and serviceable standard, there is always the risk that a small section of this infrastructure could fail; either as a result of structural failure, or through less predictable mechanism such as ship impact or an act of terrorism. This is known as the *residual risk* of flooding.

The only way that the impact of such a scenario can be quantified is through the use of detailed numerical breach modelling. This type of modelling has been undertaken as part of the Thames Upriver Breach Inundation Modelling study completed in May 2017. The model simulates 5679 continuous tidal breaches along the River Thames from Teddington to the Thames Barrier.

Inspection of the model results provided by the EA shows that the maximum predicted flood level on site during a breach event is **6.17m AODN**. In this scenario, it is predicted that the eastern section of the wider site could be flooded. Nonetheless, during this breach, floodwater is predicted to reach a maximum depth of **0.45m** within the red line boundary, and a depth of **0.07m** within the spray booth location itself (Figure 5.1).

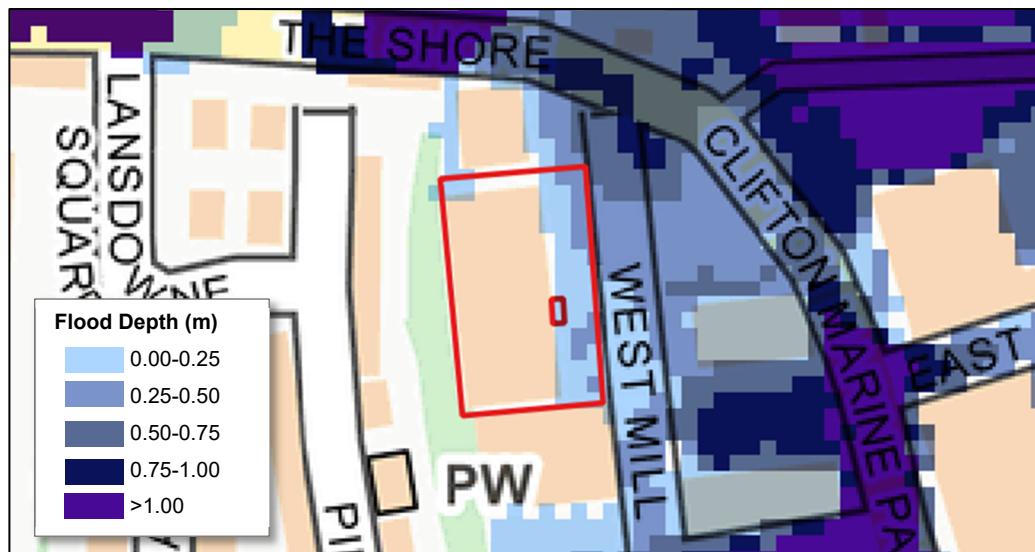


Figure 5.1 – Extract from the Thames Tidal Upriver Breach Inundation Modelling Study delineating the maximum flood depth and extent for the year 2100. (contains Ordnance Survey data © Crown copyright and database right 2025 - © Environment Agency).

## 6 Offsite Impacts and Other Considerations

### 6.1 Displacement of Floodwater

Development within the floodplain has the potential to displace water and to increase the risk elsewhere by raising flood levels. A compensatory flood storage scheme can be used to mitigate this impact, ensuring the volume of water displaced is minimised.

However, where development is located in tidal floodplains such as is the case here, it is generally accepted by the EA that raising the ground or building on the floodplain is unlikely to impact on maximum tidal levels.

### 6.2 Public Safety and Access

The NPPF states that safe access and escape should be available to/from new developments located within areas at risk of flooding. The Practice Guide goes on to state that access routes should enable occupants to safely access and exit their dwellings during design flood conditions and that vehicular access should be available to allow the emergency services to safely reach the development.

Section 5 has demonstrated that safe access to and from site can be achieved during the design flood event. However, the site is shown to be impacted by flood water during a breach of the Thames flood defences. Therefore, it is recommended that the users of the building sign up to the EA's Early Flood Warning System (Refer to Section 7 below).

The commercial classification of the development allows for restricted access to the site during times of potential heightened flood risk, and also means it is highly unlikely for users to be on site overnight.

### 6.3 Proximity to Watercourse

Under the Water Resources Act 1991 and Land Drainage Byelaws, any proposals for development in close proximity to a 'main river' would need to take into account the EA's requirement for an 8m buffer zone between the river bank and any permanent construction such as buildings or car parking etc. This buffer zone increases to 16m for tidal waterbodies and sea defence infrastructure.

The development site is located more than 16m from the tidal River Thames and as such will not compromise any of the EA's maintenance or access requirements.

## 7 Flood Mitigation Measures

The sequential approach to flood risk management can also be adopted on a site-based scale and this can often be the most effective form of mitigation. For example, on a large scheme this would mean locating the more vulnerable dwellings on the higher parts of the site and placing parking, recreational land or commercial buildings in the lower lying and higher risk areas.

The sequential approach has been applied within the undertaken development. The spray booth is located within the lowest category of risk of flooding from the Thames possible on site (i.e., Flood Zone 1). The development is also within an area modelled to be at very low risk of flooding from surface water.

The EA operate a flood forecasting and warning service in areas at risk of flooding from rivers or the sea, which relies on direct measurements of rainfall, river levels, tide levels, in-house predictive models, rainfall radar data and information from the Met Office. This service operates 24 hours a day, 365 days a year.

Whilst the probability of an event of sufficient magnitude to cause floodwaters to reach the levels discussed in this report is very low, the risk of such an occurrence is always present. With the sophisticated techniques now employed by the EA to predict the onset of flood events the opportunity now exists for all residents within the flood risk area to receive early flood warnings.

This forewarning could be sufficient to either allow users of the spray booth to evacuate the area or prepare themselves for a flood event. It is therefore recommended that the occupants of the site sign up to the EA's Flood Warning Service either by calling 0345 988 1188, or by visiting; [www.gov.uk/sign-up-for-flood-warnings](http://www.gov.uk/sign-up-for-flood-warnings)

Inspection of the EA's 'Flood Risk from Surface Water' map suggests that the wider areas of the MAH Steel site could also experience surface water flooding following an extreme weather event. Users of the site are therefore recommended to monitor the Met Office's Weather Warnings to provide forewarning of weather conditions which could result in surface water flooding in the wider area: [www.metoffice.gov.uk/weather/uk/uk\\_forecast\\_warnings.html](http://www.metoffice.gov.uk/weather/uk/uk_forecast_warnings.html)

Finally, due to the nature of the development there is limited opportunity to include SuDS within the scheme. However, as the spray booth has increased the built footprint of the larger MAH Steel building slightly, it is recommended that the opportunity to include water butts, or planters is explored where possible. The primary aim of specifying SuDS would be to reduce the rate of discharge from the site where possible and ensure there is no increase in risk of flooding offsite as a result of the development in accordance with the principles promoted by the NPPF.

## 8 The Sequential and Exception Test

Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for development in or affecting flood risk areas through the application of the Sequential Test. The objectives of this test are to steer new development away from high risk areas towards those areas at lower risk of flooding. However, in some locations where developable land is in short supply there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that the lower risk sites are developed before the higher risk ones.

In this case, the spray booth itself is considered to be subservient of the MAH Steel building. The spray booth development itself has been located in an area at very low risk of surface water flooding and within Flood Zone 1. It is therefore not possible to re-locate the development within an area at lower risk, whilst also serving the required purpose to the existing MAH Steel building.

As the site is in Flood Zone 2 and is for commercial use, the development falls into a classification that does not require the Exception Test to be applied. Notwithstanding this, Paragraph 181 of the NPPF requires all development in Flood Zones 2 and 3 to be subject to an FRA and to meet the requirements for flood risk reduction. This has therefore been the primary focus of this document.

## 9 Conclusions and Recommendations

The overarching objective of this report is to appraise the risk of flooding at MAH Steel, Gravesend to ensure that the proposals for development are acceptable and that any risk of flooding to the users of the developed commercial spray booth is appropriately mitigated. In addition, the NPPF also requires the risk of flooding offsite to be managed, to prevent any increase in flood risk as a result of the development proposals. This report has therefore been prepared to appraise the risk of flooding from all sources in accordance with the NPPF and local planning policy.

The retrospective development comprised the construction of a vehicle spray booth adjacent to the existing commercial building. Whilst the spray booth is located within Flood Zone 1, the wider site red line boundary is located within Flood Zone 2. Therefore, a Flood Risk Assessment has been prepared to appraise the risk of flooding onsite.

The risk of flooding has therefore been considered across a wide range of sources, and it is only the risk of tidal flooding from the River Thames that has been shown to have any bearing on the development. However, when this risk is examined in detail, it has been demonstrated that the risk of flooding from this source is limited to the failure of the defence infrastructure (i.e. the residual risk event).

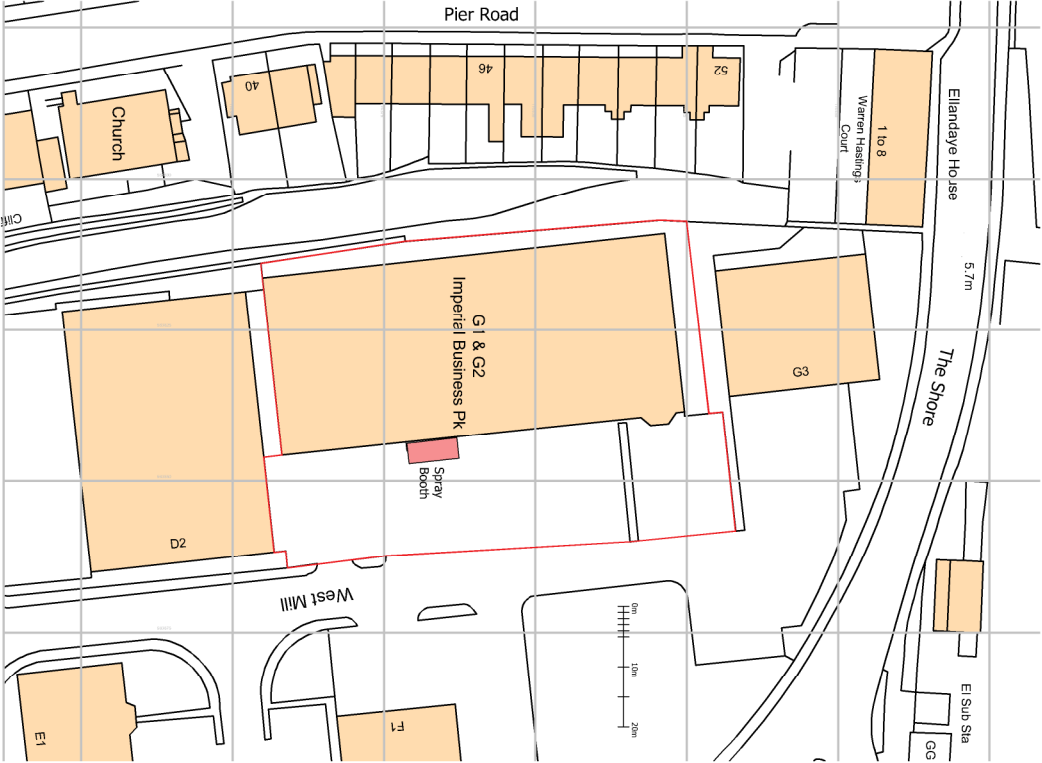
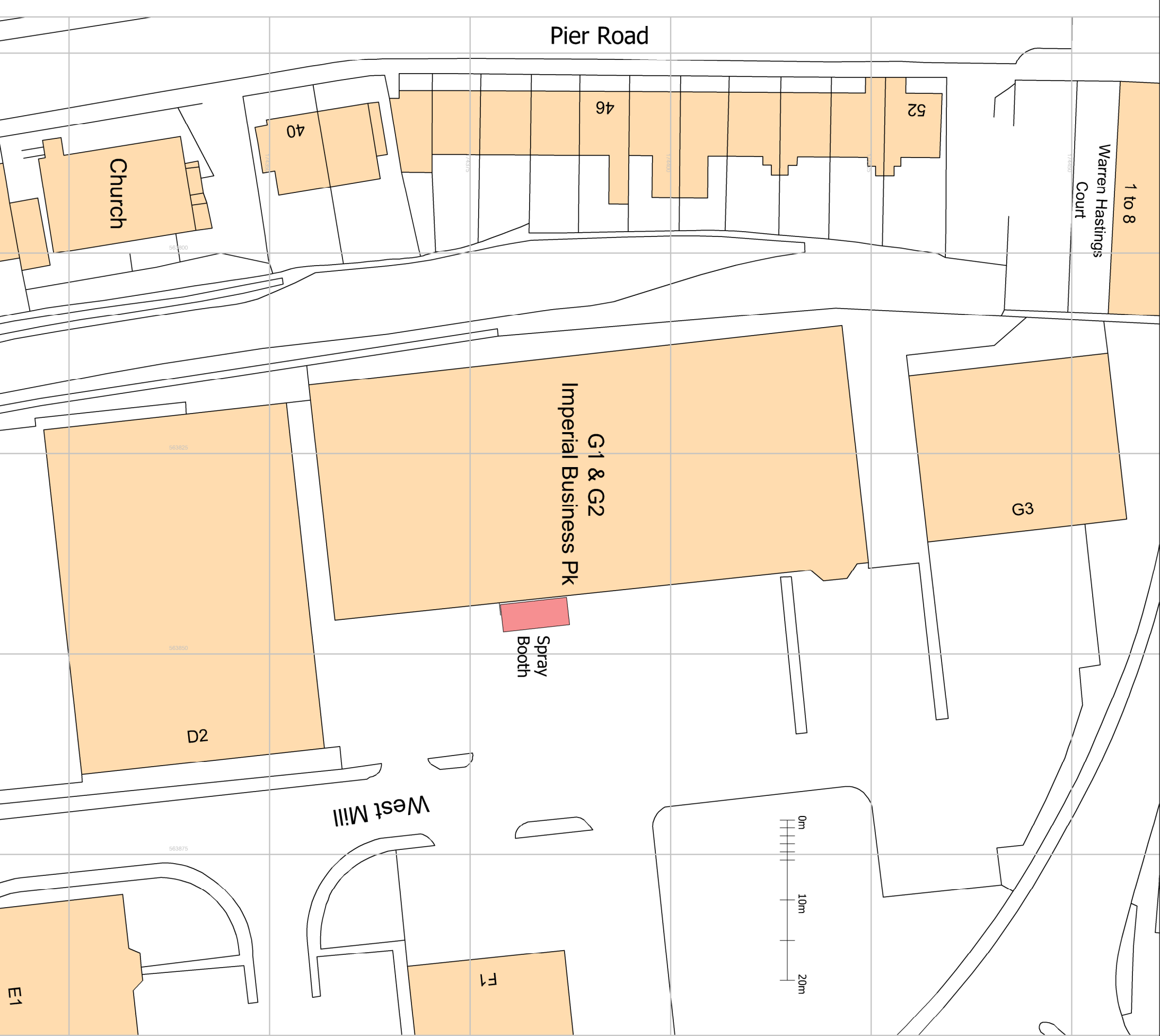
Considering the high standard of protection provided by defences, the good condition they are maintained to, and the low probability of their failure, it is considered that the likelihood of these defences failing over the lifetime of the development is very low. Nevertheless, it is recommended that in anticipation of a breach event, the occupants of the building should sign up to the EA's early flood warning system to enable the users of the site be on high alert and to evacuate the building before the shallow floodwater reaches the site. Consequently, it has been demonstrated that the development will meet the requirements of the NPPF.

## 10 Appendices

**Appendix A.1 – Drawings**

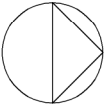
**Appendix A.2 – Southern Water Asset Location Data**

## **Appendix A.1 – Drawings**



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Location Plan 1:1250(A3)



27 Castle Street, Dover, Kent, CT16 1PT  
Tel: 01304 242702 Email: cad@cad.co.uk

CLIENT  
MAH Steel  
G1 & G2 Imperial Business Park  
Gravesend  
Kent  
DA11 0DL

PROJECT  
Parking and Spray Booth

DRAWING

Block Plan and Location Plan

| SCALE        | DRAWN BY | DATE     |
|--------------|----------|----------|
| as shown @A3 | MW       | 06.02.25 |
| DRAWING No.  | REV      |          |
| 250206-B-001 |          |          |



Block Plan 1:500(A3)

## Appendix A.2 – Southern Water Asset Location Data



