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FLOOD RISK ASSESSMENT SJA3472_St Andrews Arts Centre

1. Introduction and Scope of Work

This is a flood risk assessment (FRA) for proposed works to the Grade II Listed, St Andrews Arts Centre, Royal Pier Road, Gravesend, DA12 2BD.

Figure 1: Google Image of Site and Surrounding Area



Further to pre-application number PRE20260017, this FRA report has been produced in support of a Listed Building Consent application for proposed internal works to the Arts Centre and should be read in conjunction with the accompanying Heritage, Design & Access Statement and the Existing & Proposed Architectural

Drawings. In brief, the proposal is for internal renovations to improve accessibility for the public building, with improved WC provision, catering provision, and internal finishes.

The overall site covers approximately 157m² and is located on the sea wall associated with the adjacent Thames Estuary as illustrated in **Figure 2**.

Figure 2: Site Red Line Boundary



The purpose of this FRA is to establish the flood risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime (in this case assumed to be 75 years) taking account of the vulnerability of its users, without increasing flood risk elsewhere. This report has been written in accordance with the National Planning Policy Framework (NPPF).

In the context of this FRA, it is important to stress that the application will involve internal alterations only. Due to the position of the site on the waterfront, and the Grade II listed status of the building, the FRA serves to quantify the flood risk to the site (both now and considering climate change) from these changes; however, the degree of site-specific mitigation that can be included in the scheme is likely to be limited.

The site location plan in **Figure 2** showing the red line boundary to the proposed development is submitted with this planning application together with a full set of existing site plans and proposed development plans and elevations (**Appendix A**).

2. Site Topography

A site-specific topographic survey is not currently available for the site, however, ground levels on Royal Pier Road have been referenced from 1:1250-scale mapping and indicate that levels range from 4.6mAOD (spot height located 50m to the east of the site) to 5.0mAOD (spot height located 90m to the east of the site).

These levels, and reference to Google Streetview and on-site observations, indicate that the road level in the vicinity of the southern road frontage of the building is approximately 4.5mAOD. The step up into the building is approximately 100mm from the back edge of the pavement, which is conservatively estimated at an additional 50-100mm, indicating an approximate existing internal finished floor level of 4.65 – 4.75mAOD.

3. Sources of Flooding

3.1 Fluvial and Tidal Flooding

Reference to Ordnance Survey mapping indicates that the nearest watercourse is the River Thames Estuary, which forms the western, northern and eastern boundaries to the site. The Thames Estuary is classified by the EA as a Main River in this area and the primary flood risk to the site is associated with tidal Inundation.

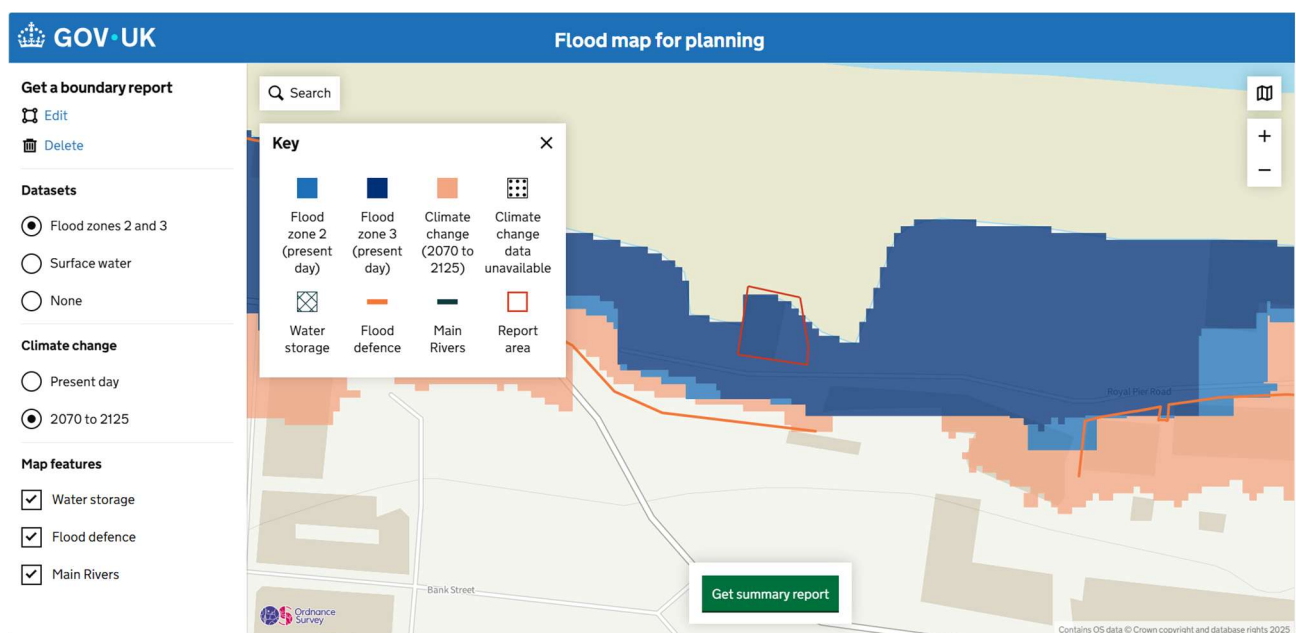
The current published EA Flood Zone map is shown in **Figure 3** and indicates that the site lies within Flood Zone 3, with a 1% (1 in 100 year) of greater annual probability of river flooding or a 0.5% (1 in 200 year) or greater annual probability of sea flooding in any year.

The EA mapping also indicates that the site is located on the Estuary side of the formal flood defences in the area, which comprise higher natural ground to the south of the site, indicating that the site is not afforded any artificial protection in the event of a tidal flood event occurring.

The EA was formally consulted as part of this assessment in July 2025, with request for flood related information (including flood levels) included in the consultation. The relevant information from the EA was received on 1st August 2025 and is included in **Appendix B**.

Figure 3: Environment Agency Flood Map

Site



Reference to the detailed modelling supplied by the EA, suggests that the site (and specifically the building) is at risk of flooding from various tidal flood events. Extracted from the full EA dataset is the pertinent flood level and inferred flood depth information included in **Table 1** below. It should be noted that an inferred building threshold level of 4.70mAOD has been used, based on the available topographic level information summarized in **Section 2**. A detailed site topographic survey would be required to accurately corroborate this data.

Table 1: Relevant EA Tidal Flood Level Information and Inferred Depths

	Flood Return Period (years) Annual Exceedance Probability (%)					
	20% (5 yr)	5% (20 yr)	2% (50 yr)	0.5% (200 yr)	0.5% (200 yr) climate change (+50mm)	0.5% (200 yr) climate change (+95mm)
Flood Level (mAOD)	4.51	4.77	5.00	5.35	5.71	6.32
Inferred Internal Depth (m)	N/A	0.07	0.30	0.65	1.01	1.52

Reference to the detailed modelling supplied by the EA shows that the building will not be flooded in the 20% AEP (5 year) tidal flood event, however, the building will be flooded internally to varying depths of between 0.07m in the 5% AEP (20 year) tidal flood event, up to 1.52m in the most extreme 0.5% AEP (200 year climate change + 95mm) flood event.

Taking this information into account, the overall **tidal flood risk** to the site itself is classified as **medium to high**.

As the Thames Estuary at this point is dominated by tidal flood risk, the **fluvial flood risk** to the site is classified as **low**.

3.2 Pluvial (Surface Water) Flooding

Intense rainfall can create conditions where the local infiltration and drainage capacity is insufficient to cope with the volume of water and so water flows overland. Surface water flooding can also occur due to a reduction in the capacity of a drainage system due to some form of blockage.

3.2.1 On site Surface Water Runoff

Currently the site is entirely covered with hardstanding the building itself and is known to drain directly to the surrounding land, which is effectively directly into the Thames Estuary.

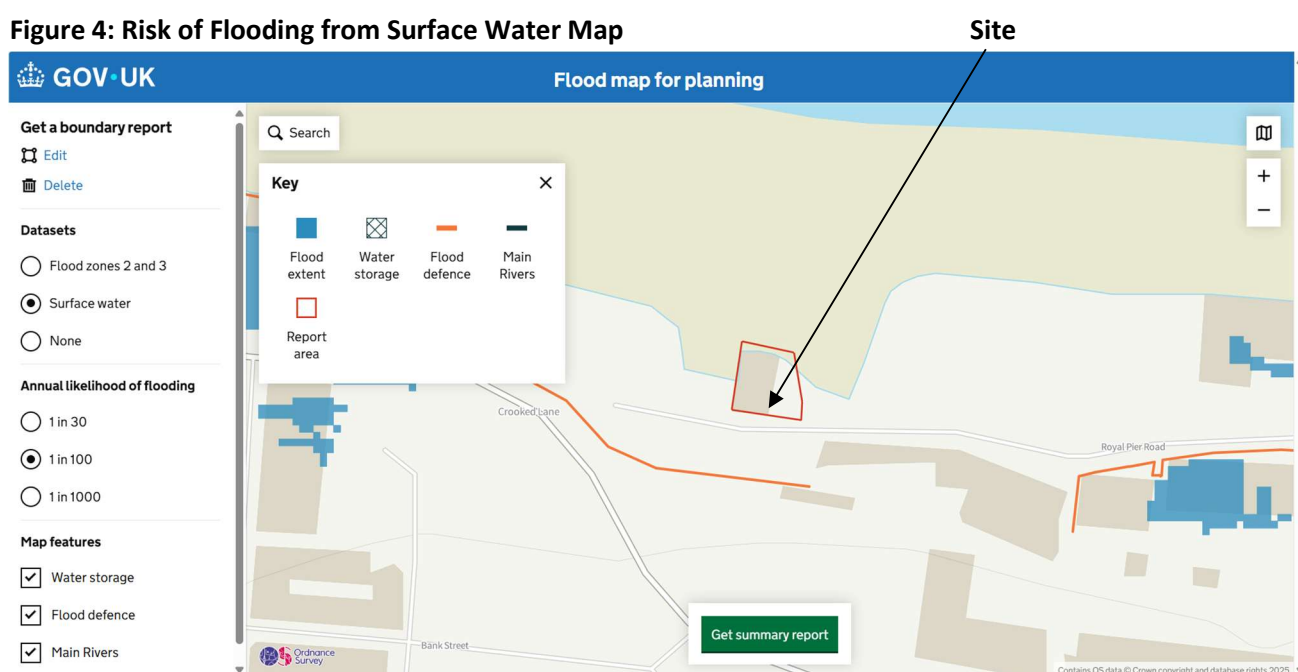
As the proposed changes to the site are limited to the internal reconfiguration and remodelling, the sites surface water drainage regime will not be materially altered by the proposals.

3.2.2 Off site Surface Water Runoff

The EA's online map 'Risk of Flooding from Surface Water' reproduced as **Figure 4**, indicates that the site itself and the immediate surrounding area is at a 'very low' risk from this source of flooding. Any surface water flow along Royal Pier Road to the south will likely be discharged directly into the Thames Estuary to the north. Given the relatively small area of the road, any flows are likely to be relatively insignificant and would be confined to road gullies within the road network.

The overall risk of pluvial (surface water) flooding affecting the site is therefore assessed as **low**.

Figure 4: Risk of Flooding from Surface Water Map



3.3 Groundwater Flooding

British Geological Survey (BGS) online records indicate that the site is likely to be underlain directly by the Solid Geology of the Lewes Nodular Chalk Formation. There are no Superficial Deposits recorded by the BGS in this location.

The underlying Chalk is classified as a Principal Aquifer. The EA internet groundwater map shows that the site does not lie within a Groundwater Source Protection Zone (SPZ), although there is a Zone 1 Inner Protection Zone located 600m to the south of the site.

As the site development will not involve the construction of a basement level works, there is a low risk of groundwater flooding. However, there may be a possibility of encountering shallow groundwater during any shallow service excavation works required for the scheme.

The risk of groundwater flooding to the site is assessed as **low**.

3.4 Sewer Flooding

Flood events occur when the capacity of a sewer is exceeded either due to a blockage in the sewer system or excess surface water runoff entering the system.

Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption, one of the design parameters of which is that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30-year rainfall event. By definition, a 1 in 100-year event could exceed the capacity of the surrounding sewer network as well as any proposed drainage system. When exceeded, the surcharged pipe work will lead to flooding from backed up manholes and gully connections. This will likely lead to flooding within highways surrounding the site.

Appropriate consultation with Thames Water should ensure that any increase in foul water flows from the site post development (which is anticipated to be negligible) can be accommodated within the surrounding network. The surrounding topography is fairly level, therefore if sewers were to surcharge, it is likely that flood flows will most likely follow through road gullies into the highway drainage system. Thames Water sewer records have not been obtained as part of this assessment, but any adjacent network within Royal Peir Road are considered to pose a low risk to the site, due to the slight rise in building threshold level from the road, and given any surcharging foul, surface water or potable water pipes would likely discharge directly into the adjacent Thames Estuary.

Given the site levels in relation to the surrounding road levels and the unlikely event of a surcharging sewer spilling water onto the surrounding area, the risk of sewer flooding affecting the site is assessed as **low**.

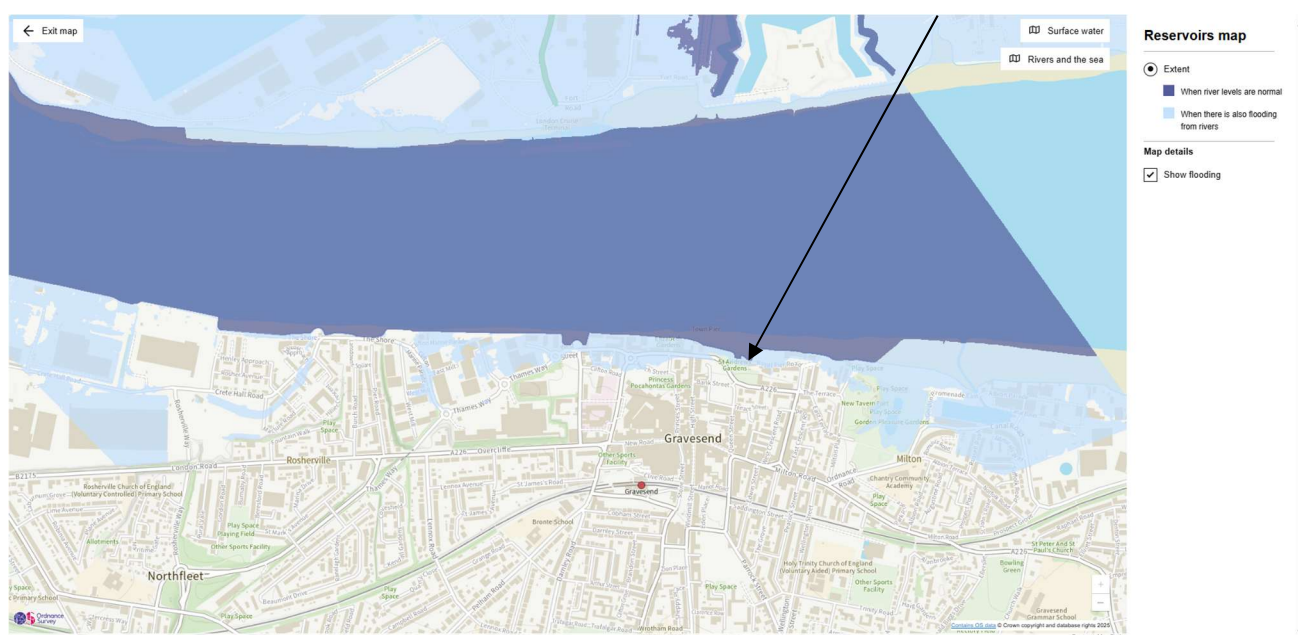
3.5 Other Sources of Flooding: Artificial Sources, Reservoirs, Canals etc.

There are no reservoirs within the vicinity of the site. The EA's internet reservoir flooding map as reproduced in **Figure 5**, and although this mapping indicates that the site borders an area of risk associated with flooding from reservoirs (to the north), this risk is considered residual.

There are no canals within the vicinity of the site. There are no other artificial water bodies in the vicinity of the site which could constitute a flood risk to the site. The risk of flooding from artificial sources is therefore assessed as **low**.

Figure 5: Risk of Flooding from Reservoirs for London: DA12 2BD

Site (approx.)



4. Development proposals and Proposed Mitigation

The proposal will comprise the internal reconfiguration of the site only and will not involve any significant external alterations. The relevant existing and proposed plans are included as **Appendix A**.

In terms of flood risk to the building, the FRA has concluded that all flood risks, with the exception of tidal flood risk are considered low. Tidal flood risk would only be expected to inundate the building in an event close to or in excess of the 1 in 20-year (5% AEP) flood event. Whilst flood depths would be relatively shallow in lower return period events, there is a risk of significant flood depths occurring in the higher 1 in 50-year to 1 in 200-year flood return periods as indicated in **Table 1**.

The proposed scheme would therefore be resistant to flooding up to the 1 in 5 year (20% AEP) return period, but at risk of flooding in higher return period events.

In terms of the internal redevelopment of the building, it is recommended that electrical connections and plug sockets are raised as high as is reasonably practicable, to ensure some resilience in the event of a higher flood return period occurring.

Where feasible and not detrimental to the historic building fabric, consideration has been given to property level protection (PLP) measures, such as demountable barriers across the main entrance and non-return valves fitted to all drainage connections. A degree of flood proofing to internal finishes to minimise damage in the event of floodwater entering the building may be considered at a time when work to the internal finishes and external walls is proposed.

In addition to considering PLP measures, the operators of the building should sign up to the EA's Flood Warning Service, to ensure that, in the event that a high tide, or tidal surge is forecast, adequate time is available to ensure that the building is not occupied, which would ensure no users are at risk from floodwater.

5. Sequential and Exception Test

Planning Practice Guidance includes a list of appropriate land uses in each flood zone dependent on vulnerability to flooding. As this proposal is not altering the vulnerability classification of the building, it is not considered necessary to apply either the Sequential or Exception Test.

6. Summary

Based on the available information, the site lies within Flood Zone 3 and is therefore assessed as being at a medium to high risk from tidal flooding, but at a low risk of flooding from all other sources.

Tidal flood risk would only be expected to inundate the building in an event close to or in excess of the 1 in 20-year (5% AEP) flood event. Whilst flood depths would be relatively shallow in lower return period events, there is a risk of significant flood depths occurring in the higher flood return periods. With these risks in mind, certain flood risk mitigation has been recommended, however, it is acknowledged that certain mitigation may be precluded due to the building's status as a Grade II listed structure.

It is also recommended that the future owner/operators sign up to the EA's Flood Warning Service, to ensure that, in the event that a high tide, or tidal surge is forecast, adequate time is available to ensure that the building is not occupied, which would ensure no users are at risk from floodwater.

This assessment concludes that whilst the tidal flood risk is potentially significant, the redevelopment should not be precluded on flood risk grounds, particularly as the vulnerability classification of the building is not changing as a result of the proposals.

Appendix A - Architectural Drawings (Copies Submitted with this planning application.)

SJA3478/PL01	Location plan & context photographs
SJA3478/PL02	Existing site plan
SJA3478/PL03	Existing ground floor plan
SJA3478/PL04	Existing roof plan
SJA3478/PL05	Existing front elevation
SJA3478/PL06	Existing rear elevation
SJA3478/PL07	Existing side (east) elevation
SJA3478/PL08	Existing side (west) elevation
SJA3478/PL09	Existing Section A
SJA3478/PL10	Proposed ground floor plan
SJA3478/PL11a	Proposed ground floor plan – front
SJA3478/PL11b	Proposed ground floor plan - rear
SJA3478/PL12	Proposed roof plan
SJA3478/PL13	Proposed front elevation
SJA3478/PL14	Proposed rear elevation
SJA3478/PL15	Proposed side (east) elevation
SJA3478/PL16	Proposed side (west) elevation
SJA3478/PL17	Proposed Section A
SJA3478/PL41	Existing door schedule
SJA3478/PL42	Existing window schedule
SJA3478/PL43	Proposed door schedule
SJA3478/PL51	Demolition plan
SJA3478/PL71	Existing reflected ceiling plan
SJA3478/PL72	Proposed reflected ceiling plan
SJA3478/PL101	Existing internal elevations 1 and 3
SJA3478/PL102	Existing internal elevation 2
SJA3478/PL103	Existing internal elevation 4
SJA3478/PL104	Existing internal elevations 5 to 12
SJA3478/PL105	Existing internal elevations 13 to 16
SJA3478/PL106	Proposed internal elevation 1
SJA3478/PL107	Proposed internal elevation 2
SJA3478/PL108	Proposed internal elevation 3
SJA3478/PL109	Proposed internal elevation 4
SJA3478/PL110	Proposed internal elevations 5 to 12
SJA3478/PL4111	Proposed internal elevations 13 to 16

Appendix B – Environment Agency Data