Martello Tower 66 Flood Risk Assessment

Flood Risk Assessment for Planning

Prepared for:
Martello 66 Limited

May 2024

Location:
Martello Tower 66
Anguilla Close
Eastbourne
BN23 5TS

Our reference:
89121-Lee-MartelloTw-v2.1

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Document Issue Record

Project:	Flood Risk Assessment for Planning
Client:	Martello 66 Limited
Location:	Martello Tower 66, Anguilla Close, Eastbourne, BN23 5TS
Application:	Change of use to a single residential dwelling (holiday home)
Our reference:	89121-Lee-MarterlloTw-v2.0
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Key Facts

Flood Risk Posed:

- The site is situated entirely within Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea).
- Modelled flood levels and flood extents have been requested from the EA.
- The EA has provided modelled flood levels and extents from the East Sussex Coastal Model, completed in Summer 2012 by JBA Consulting.
- The site is shown to be entirely within the defended and undefended 1:200 year and 1:1000 year extents at the present day, and in 2115.
- Comparison of the 1:200 year Higher Central and Upper End flood levels (5.93mAOD and 6.32mAOD respectively) with the topographic finished ground floor level of 5.36mAOD, shows that the ground floor level is 0.27m below the 1:200 year Higher Central and 0.96m below the 1:200 year Upper End flood levels.
- The EA Risk of Flooding from Surface Water Map suggests that the site lies in an area of "Very Low" risk of flooding from surface water.
- No records of flooding at the site previously have been provided.
- No further information has been provided to suggest that the site has flooded from groundwater or sewer surcharge flooding.

Flood Risk Management:

- The proposed plans include the removal of the existing modern entry point to the tower at ground floor level, with the reinstatement of the first floor level entrance. The entrance to the tower at 8.17mAOD is 1.69m above the modelled 1:1000 year Upper End flood level.
- In addition, uninterrupted internal access is provided from the ground floor to first and second floor level.
- Flood proofing of the development will be incorporated as appropriate.
- Safe escape will be provided by a formal flood warning and evacuation plan which will be prepared in liaison with the Council's Emergency Planners and tied in with the existing emergency plans for the area.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Introduction

Unda Consulting Limited have been appointed by Martello 66 Limited (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at the Martello Tower 66, Anguilla Close, Eastbourne, BN23 5TS (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance, as well as relevant Local Policies.

The site appears to be located within Flood Zones 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

Given that the proposed application site is located in Flood Zone 3 (High Risk of flooding from rivers or the sea), and includes building works, the applicant is required to submit a FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

Existing Situation

Site Usage:

The site is currently occupied by a Martello Tower.

Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of our full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 1.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

LiDAR remotely sensed digital elevation data suggests that the ground topography on site is approximately 6.20mAOD to 6.60mAOD.

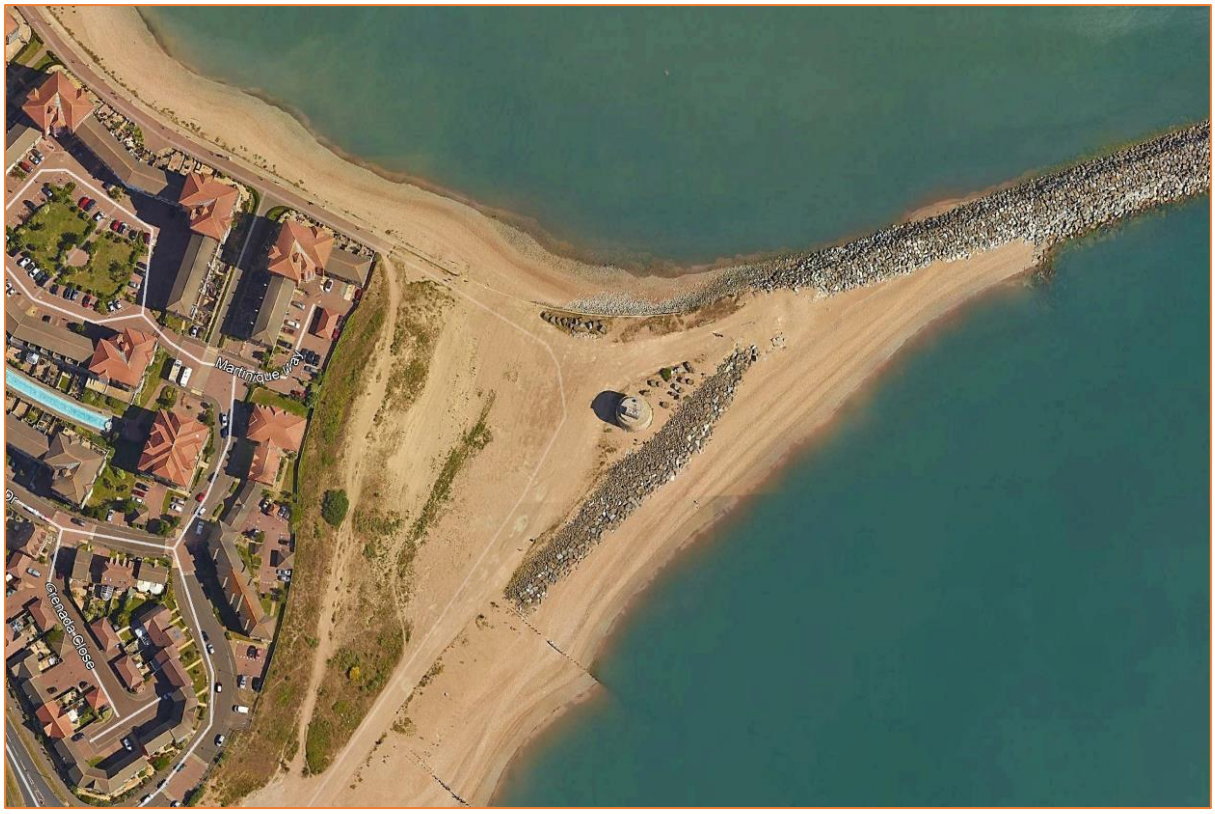

Figure 1: Aerial view of the site and immediate surrounding area (Source: Google Earth)

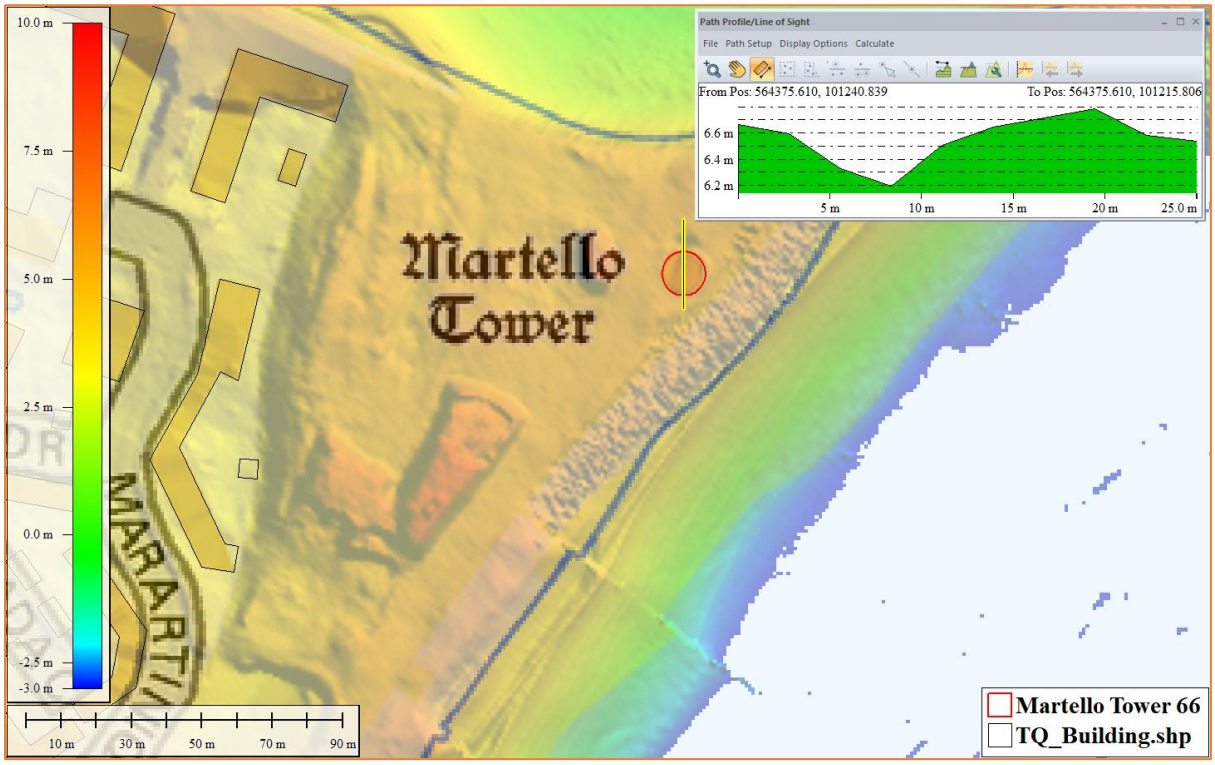

Figure 2: EA 1m LiDAR DTM showing topographic levels across the site and local area. Transect (inset) runs from north to south. OS Mapping overlain (Source: EA LiDAR, OS Mapping)

Topographic floor levels have also been provided by Koldo and Co.

	Proposed Floor Level
Basement	3.95mAOD
Ground	5.36mAOD
First	8.17mAOD
Second	13.76mAOD
Third	16.12mAOD
Roof	18.75mAOD

Table 1: Finished floor levels (Source: Koldo and Co)

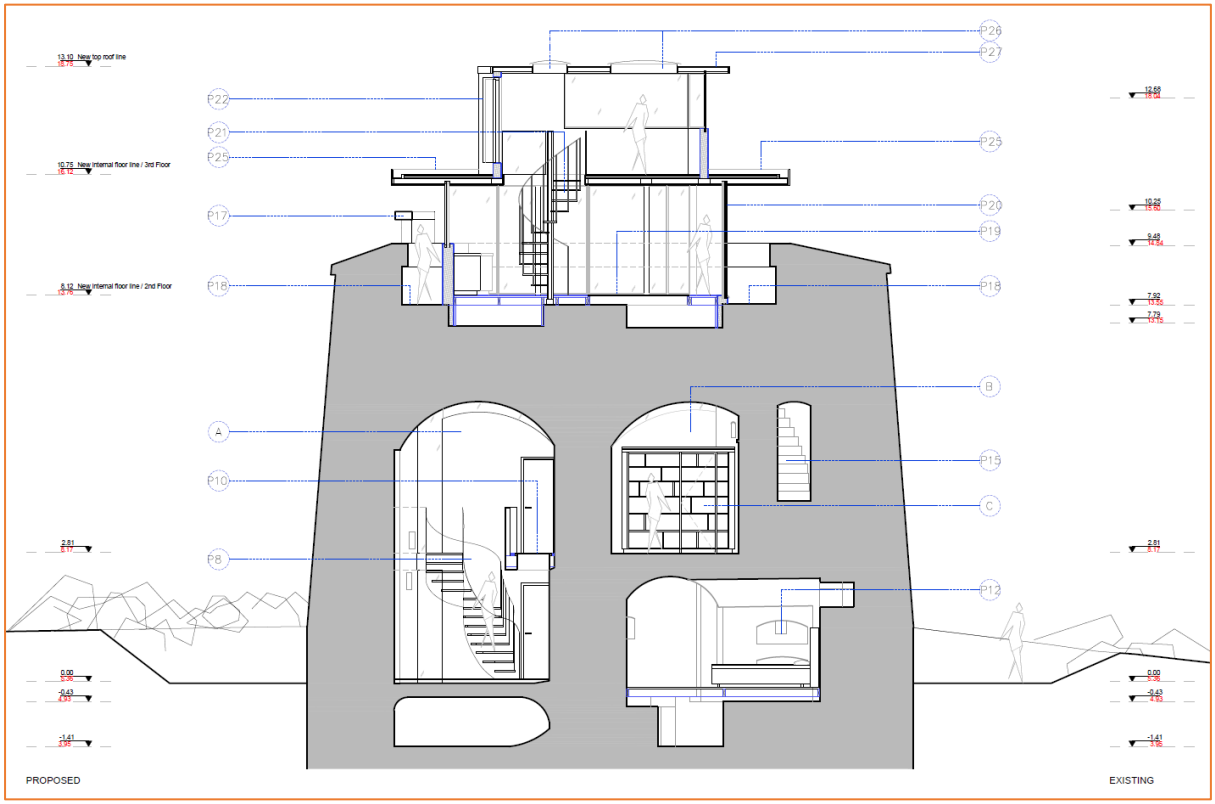

Figure 3: Proposed section showing finished floor levels (Source: Koldo and Co)

Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Gault Formation – Mudstone, with superficial deposits of Storm Beach Deposits - Gravel.

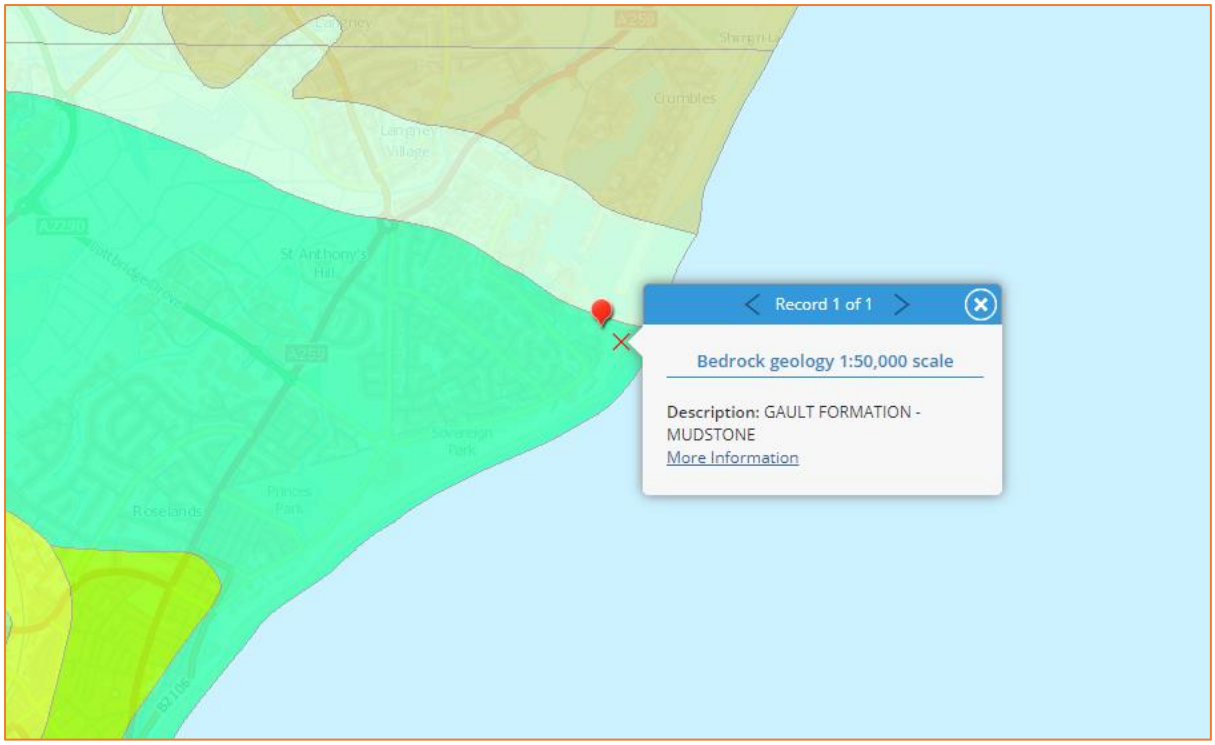

Figure 4: Local bedrock geology (Source: BGS)

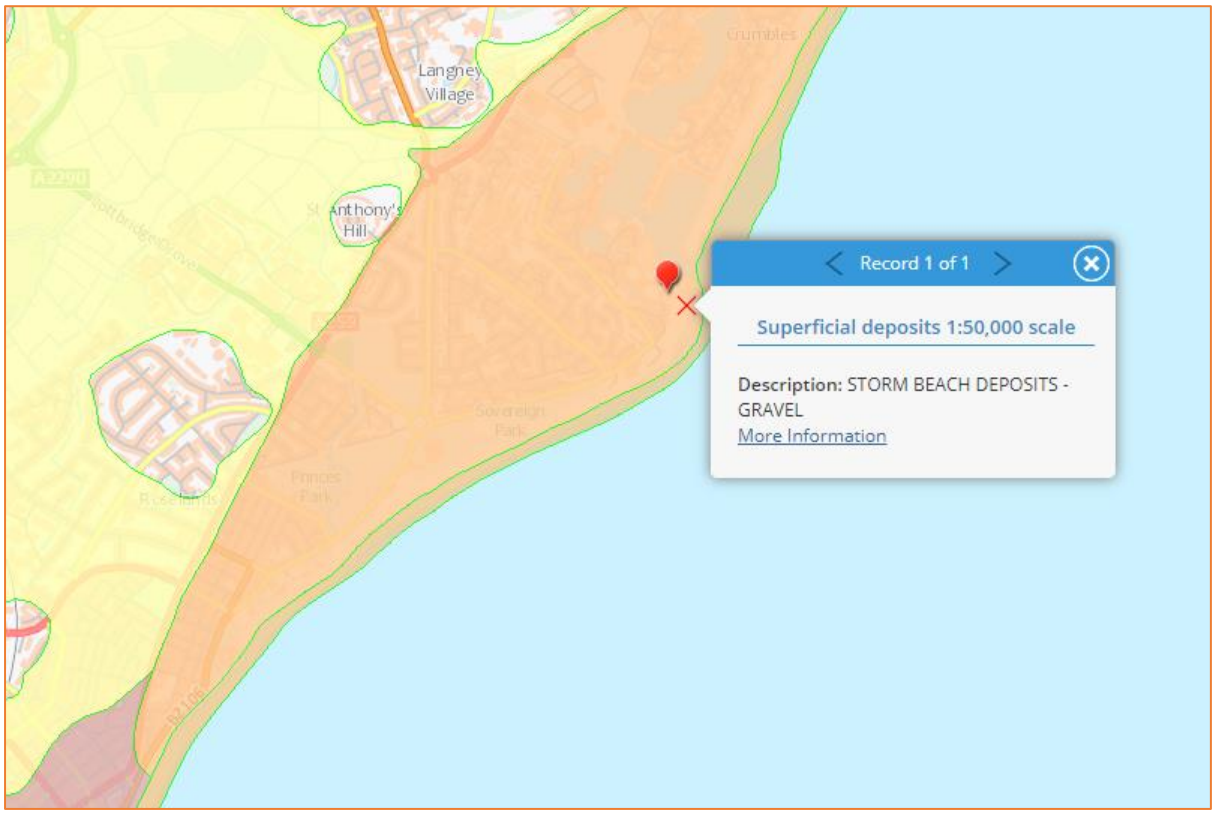

Figure 5: Local superficial geology (Source: BGS)

The soil type in the area taken from the UKSO data is relatively deep soils from Quaternary Marine / Estuarine Sand with a sandy loam soil texture.

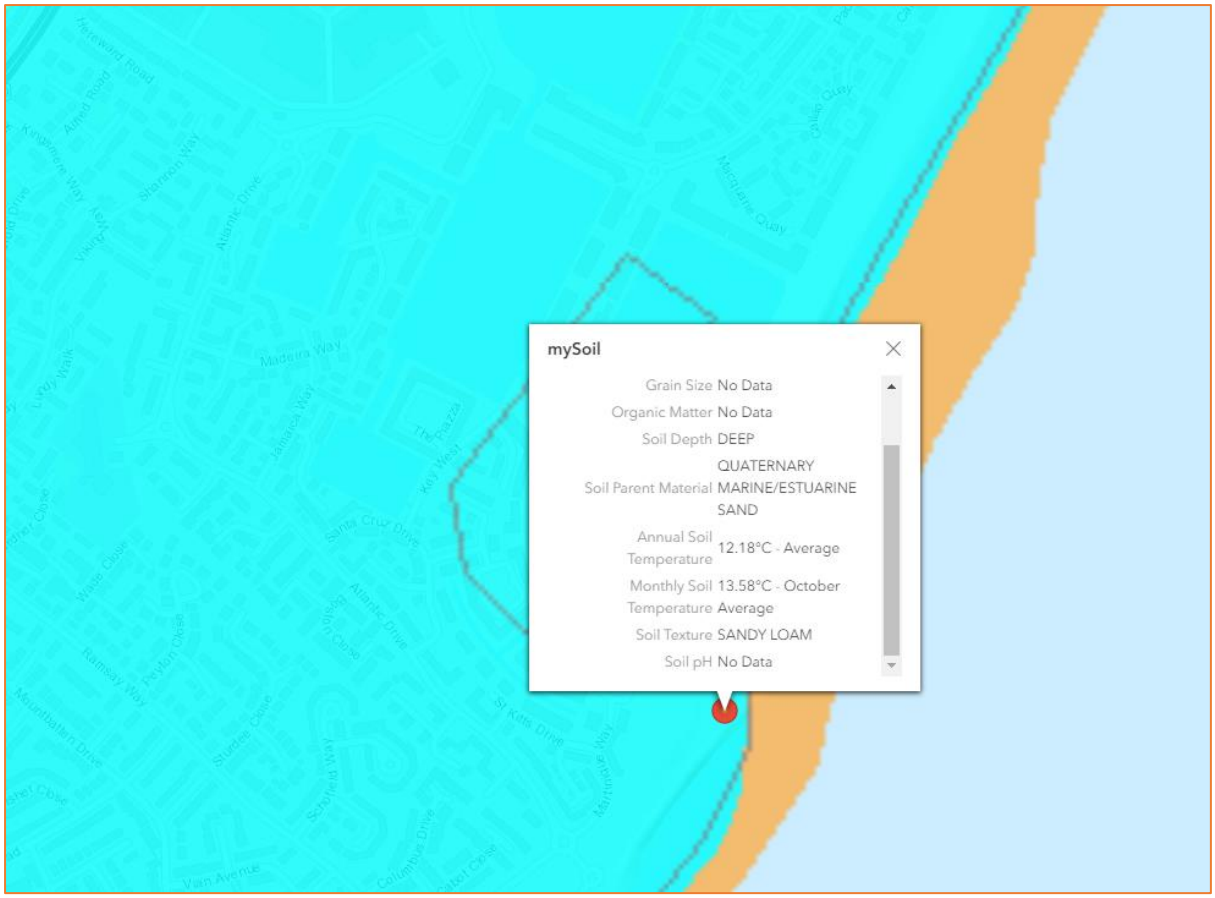

Figure 6: Local Soil Types (Source: UKSO)

Proposed Development

Proposed Application:

The proposed planning application is for the change of use of the existing Martello Tower to a single residential dwelling (holiday home).

Proposed plans can be found in the report Appendix.

Figure 7: Existing Martello Tower (Source: https://www.castles.nl/martello-66)

Assessment of Flood Risk

Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Flood Zone	Definition
Zone 1 **Low Probability**	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 **Medium Probability**	Land having 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. (Land shown in light blue on the Flood Map)
Zone 3a **High Probability**	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b **The Functional Floodplain**	This zone comprises 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 floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 2: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

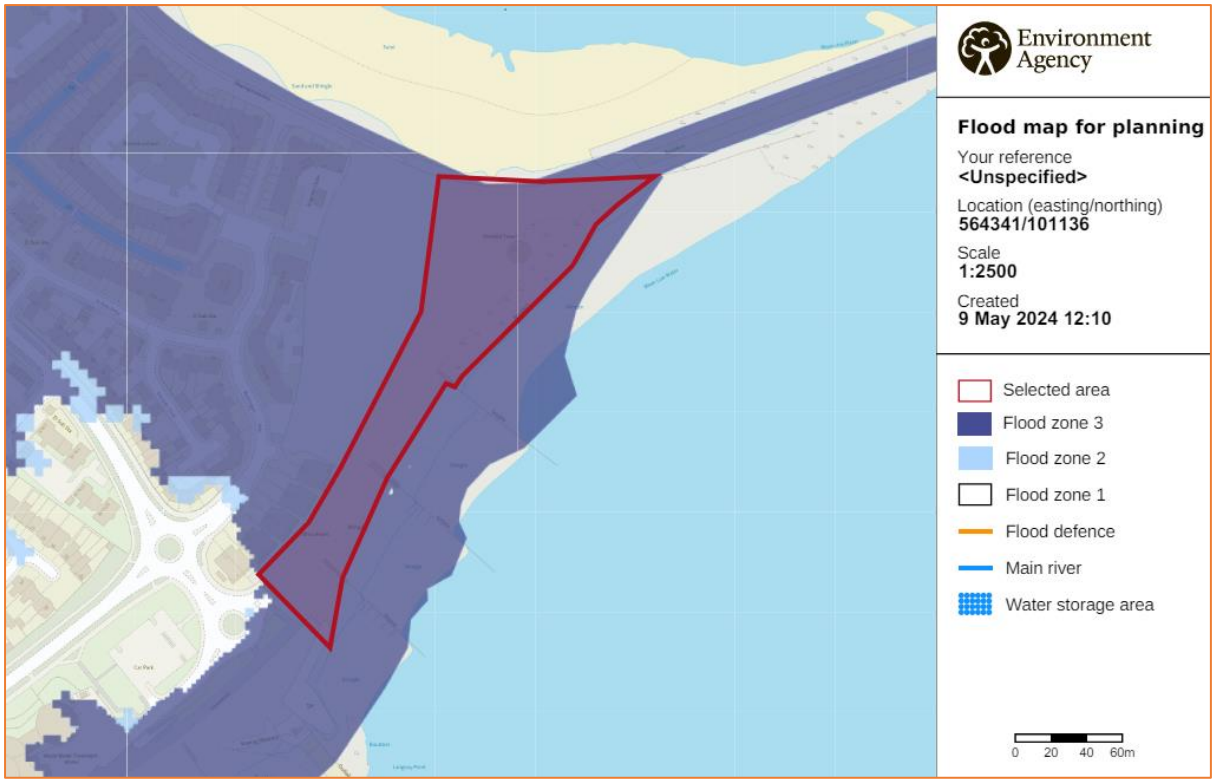

Figure 8: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zones 3 (High Probability), which means it is defined as land having a 1:200 or greater annual probability of tidal flooding.

The risk would appear to be predominantly tidal, and originate from the English Channel approximately 20m from the Martello Tower at its closest proximity.

Tidal (English Channel):

The English Channel is the body of water that separates southern England from northern France, and joins the southern part of the North Sea to the Atlantic Ocean. It is about 560km long and varies in width from 240km at its widest to 33.1km in the Strait of Dover. It is the smallest of the shallow seas around the continental shelf of Europe, covering an area of some 75,000km^2.

Uniquely, The Channel acts as a funnel that amplifies the tidal range from less than a metre as observed at sea to more than 6m as observed in the Channel Islands, the west coast of the Cotentin Peninsula and the north cost of Britany. The time difference of about 6 hours between high water at the eastern and western limits of the Channel are indicative of the tidal range being amplified further by resonance. Some areas along the south coast are particularly vulnerable to severe storms moving from the Atlantic eastwards along the English Channel.

Flood defences:

The EA has stated that the site is protected by the Pevensey Bay sea defence to a standard of protection of a 1 in 400 year flood event. Pevensey's residents and environment are guaranteed

this consistent standard of protection until at least 2025. This means that in any given year, there will be a 0.25% chance that this area will experience flooding from the sea.

However flood defences can fail or be overtopped.

The Pevensey Bay's Sea Defences, built in 2000 extends for 9km between Eastbourne and Bexhill in East Sussex. The defence consists of a naturally formed shingle bank. These beach defences are managed to remain at a 1 in 400 year standard of protection, with an annual shingle replenishment scheme and shingle replenishment after storm events.

Modelled flood levels and events:

Modelled flood levels and extents have been requested from the EA for use within this report. The EA has provided modelled flood levels and extents from the East Sussex Coastal Model, completed in Summer 2012 by JBA Consulting. The model is a 1D-2D ESTRY TUFLOW model.

Site specific flood levels have been extracted for a range of return periods at the location of the Martello Tower:

	1:200 year	**1:200 year 2115**	**1:1000 year**	**1:1000 year 2115**
Undefended	4.79mAOD	5.89mAOD	4.95mAOD	6.05mAOD
Defended	Outside	Outside	Outside	Outside

Table 3: Undefended and defended modelled flood levels (Source: EA)

The site is shown to be entirely within the defended and undefended 1:200 year and 1:1000 year extents at the present day, and in 2115.

Comparison of these modelled flood levels with topographic site levels (of approximately 6.20mAOD to 6.60mAOD) shows that the site is situated above all modelled flood levels, including the 1:1000 year level and the 1:200 year flood level in 2115.

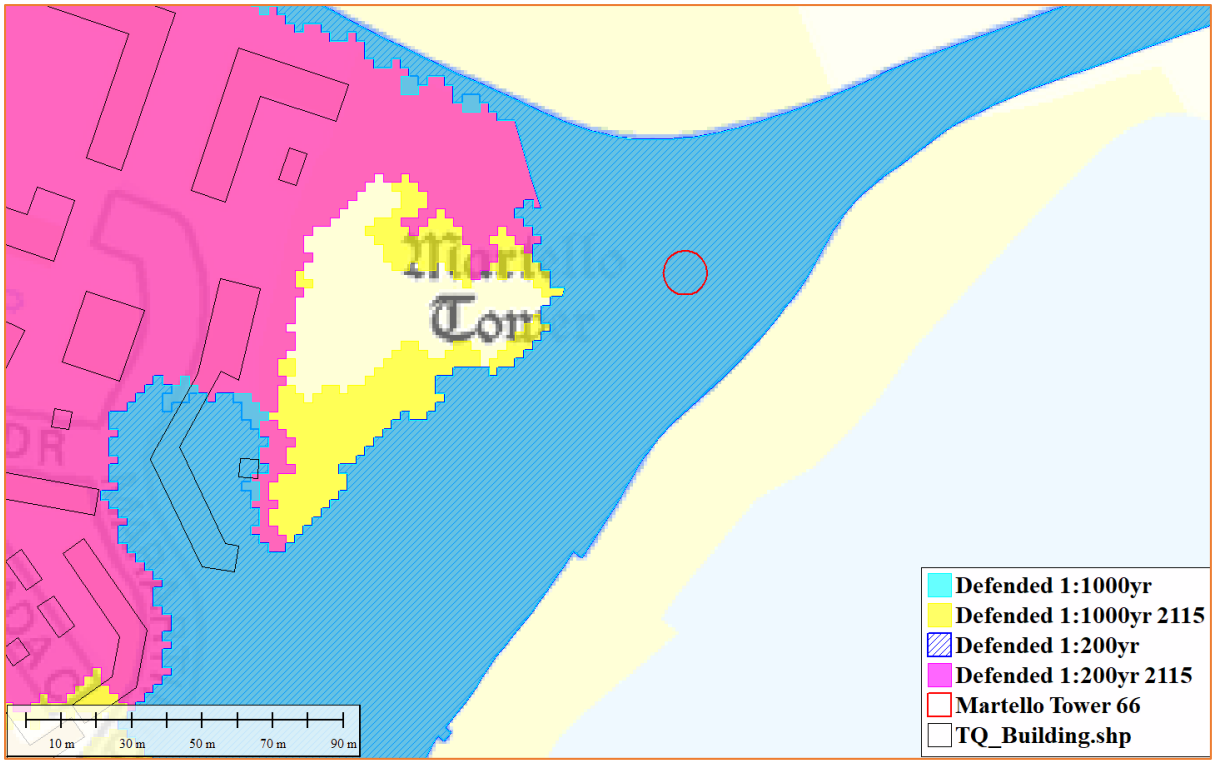

Figure 9: Modelled defended flood extents (Source: EA)

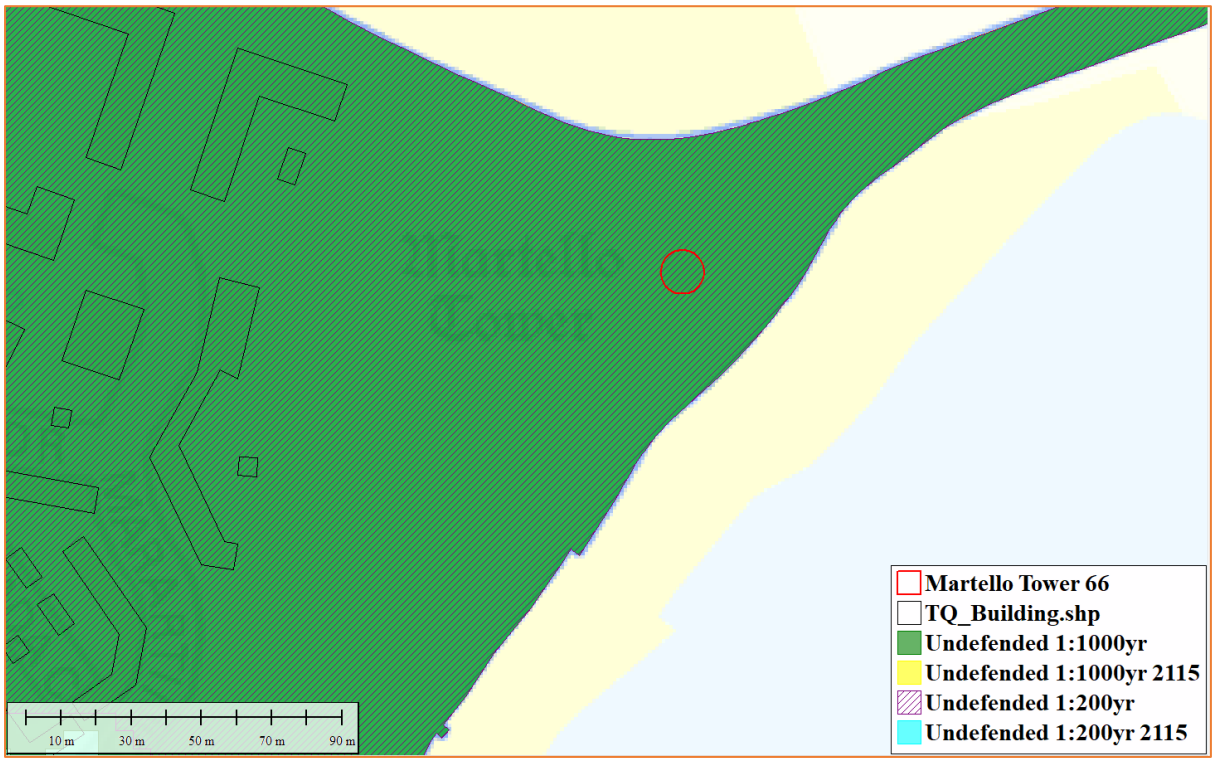

Figure 10: Modelled undefended flood extents (Source: EA)

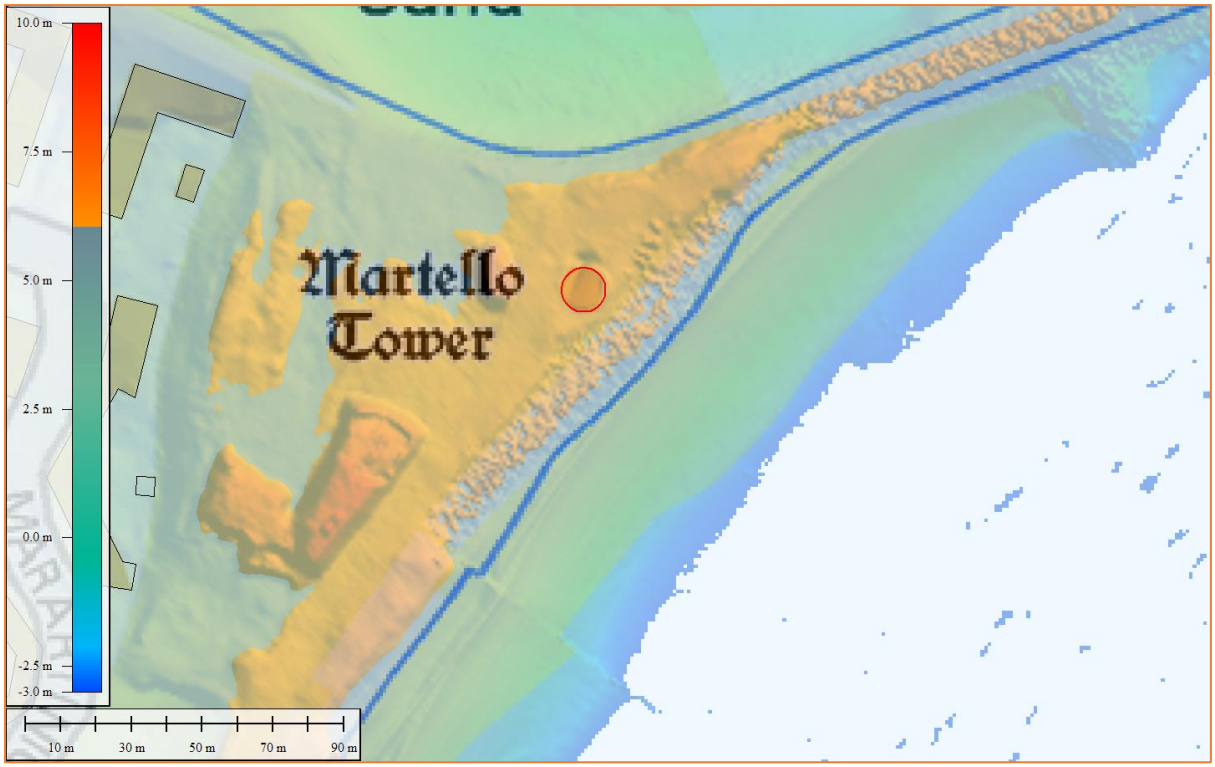

Figure 11: Environment Agency 1m LiDAR DTM with OS mapping overlain. Land below the modelled 1:1000 year flood level in 2115 (6.05mAOD) shaded blue (Source: EA)

The site is located within Flood Zone 3, and is classified as “more vulnerable”. The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states for flood risk assessments both the higher central and upper end allowances should be assessed.

The 'Flood risk assessments: climate change allowances' guidance for the South East area of England provides the following sea level allowances:

Area of England		2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 / metres (m)
South East	**Higher Central**	5.7	8.7	11.6	13.1	1.2
South East	**Upper End**	6.9	11.3	15.8	18.2	1.6

Table 4: Sea Level Allowances for the South East River Basin District for each epoch in mm per year (Source: 'Flood risk assessments: climate change allowances)

Area of England		2011 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2011 to 2125 / metres (m)
Site	**Higher Central**	143	261	348	393	1.14
Site	**Upper End**	173	339	474	546	1.52

Table 5: Sea Level Allowances for the site for each epoch in mm per year (Source: 'Flood risk assessments: climate change allowances)

The design flood levels for planning are the 1:200 year with Higher Central, and Upper End climate change. The undefended 1:200 year and 1:1000 year flood levels at the present day are 4.79mAOD and 4.95mAOD respectively from the East Sussex Coastal Modelling (2012).

	2125 Higher Central	**2125 Upper End**
1:200 year	5.93mAOD	6.32mAOD
1:1000 year	6.09mAOD	6.48mAOD

Table 6: Modelled climate change flood levels

Comparison of the 1:200 year Higher Central and Upper End flood levels (5.93mAOD and 6.32mAOD respectively) with the topographic finished ground floor level of 5.36mAOD, shows that the ground floor level is 0.27m below the 1:200 year Higher Central and 0.96m below the 1:200 year Upper End flood levels.

The ground floor is only accessible internally from first floor level. The entrance to the Martello tower will be at first floor level only – at 8.17mAOD.

Based on the plans provided, sleeping accommodation will be located at ground and first floor level.

The proposed plans include the removal of the existing modern entry point to the tower at ground floor level, with the reinstatement of the first floor level entrance. The entrance to the tower at 8.17mAOD is 1.69m above the modelled 1:1000 year Upper End flood level.

In addition, uninterrupted internal access is provided from the ground floor to first and second floor level, with the basement a storage area only.

Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance

of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

The site is situated on raised land immediately behind a maintained flood defence wall / beach. It is considered that whilst the site is situated on land above the maximum modelled flood level, it may still be susceptible to inundation via wave overtopping action.

Historical flood events:

According to the EA they do not hold records of historic flood events from rivers and/or the sea affecting the area immediately local to this site.

Pluvial (Surface Water):

Pluvial flooding is the term used to describe flooding which occurs when intense, often short duration rainfall is unable to soak into the ground or to enter drainage systems and therefore runs over the land surface causing flooding. It is most likely to occur when soils are saturated (or baked hard) so that they cannot infiltrate any additional water or in urban areas where buildings tarmac and concrete prevent water soaking into the ground. The excess water can pond (collect) in low points and result in the development of flow pathways often along roads but also through built up areas and open spaces. This type of flooding is usually short lived and associated with heavy downpours of rain.

The potential volume of surface runoff in catchments is directly related to the size and shape of the catchment to that point. The amount of runoff is also a function of geology, slope, climate, rainfall, saturation, soil type, urbanisation and vegetation.

Pluvial flooding can occur in rural and urban areas, but usually causes more damage and disruption in the latter. Flood pathways include the land and water features over which floodwater flows. These pathways can include drainage channels, rail and road cuttings. Developments that include significant impermeable surfaces, such as roads and car parks may increase the volume and rate of surface water runoff.

Urban areas which are close to artificial drainage systems, or located at the bottom of hill slopes, or in valley bottoms and hollows, may be more prone to pluvial flooding. This may be the case in areas that are down slope of land that has a high runoff potential including impermeable areas and compacted ground.

Pluvial flooding can affect all forms of the built environment, including:

- Residential, commercial and industrial properties;
- Amenity and recreation facilities; and
- Infrastructure, such as roads and railways, electrical infrastructure, telecommunication systems and sewer systems.

This type of flooding is usually short-lived and may only last as long as the rainfall event. However occasionally flooding may persist in low-lying areas where ponding occurs. Due to the typically short duration, this type of flooding tends not to have consequences as serious as other forms of

flooding, such as flooding from rivers; however it can still cause significant damage and disruption on a local scale.

The EA Surface Water Flood Map suggests that the site lies in an area of "Very Low" risk of flooding from surface water.

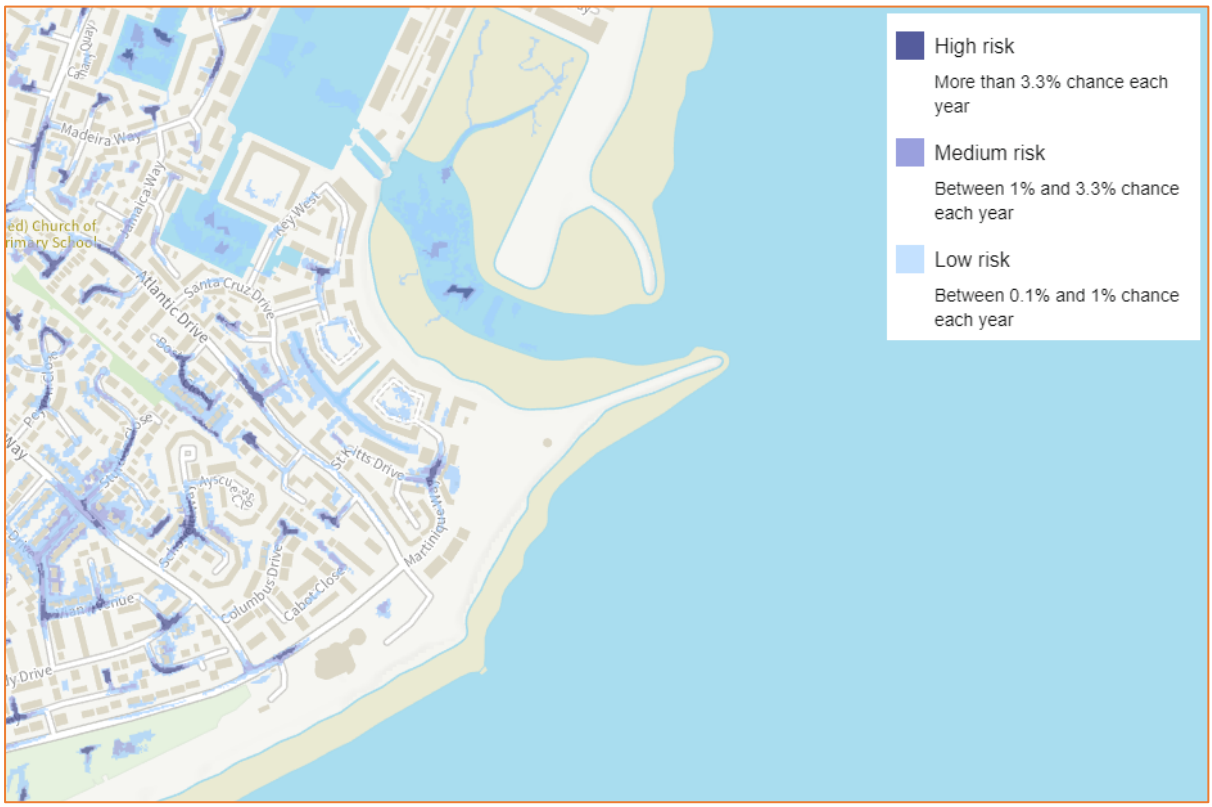

Figure 12: Risk of flooding from surface water mapping (Source: EA)

Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

No information has been provided to suggest that the site is particularly susceptible to groundwater flooding, or has experienced groundwater flooding previously.

Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

For a sewer to remain adoptable, any storage capacity above the 1.3% AEP (1 in 30 year) storm volume must be incorporated as an offline storage feature outside the online sewer network.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site is lies outside of the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

There do not appear to be any further artificial (man-made) sources of flood risk (such as raised canals) in the vicinity of the site.

The EA Risk of Flooding from Reservoirs Map suggests that the site lies outside of the “Maximum extent of flooding” from reservoir failure.

It is not possible to effectively quantify the risk of flooding from these sources, however it is considered to be very low.

Flood Risk Management

Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

Post development, the residential property will be classified as “more vulnerable”. Accordingly, it is considered that the vulnerability of the site as a whole will increase post development.

Physical Design Measures:

The application is for the change of use of the existing building.

The NPPF requires new residential floor levels to be set at least 300mm above suitable modelled flood levels.

Comparison of the 1:200 year Higher Central and Upper End flood levels (5.93mAOD and 6.32mAOD respectively) with the topographic finished ground floor level of 5.36mAOD, shows that the ground floor level is 0.27m below the 1:200 year Higher Central and 0.96m below the 1:200 year Upper End flood levels.

The ground floor is only accessible internally from first floor level. The entrance to the Martello tower will be at first floor level only – at 8.17mAOD.

The proposed plans include the removal of the existing modern entry point to the tower at ground floor level, with the reinstatement of the first floor level entrance. The entrance to the tower at 8.17mAOD is 1.69m above the modelled 1:1000 year Upper End flood level.

In addition, uninterrupted internal access is provided from the ground floor to first and second floor level, with the basement a storage area only.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the proposal, in consultation with the Local Authority building control department.

Environment Agency Advice states that the design should be appropriately flood resistant and resilient by:

- using flood resistant materials that have low permeability to at least 600mm above ground level;
- making sure any doors, windows or other openings are flood resistant to at least 600mm above ground level;
- using flood resilient materials (for example lime plaster) to at least 600mm above ground level;
- by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above ground level;
- making it easy for water to drain away after flooding such as installing a sump and a pump;
- making sure there is access to all spaces to enable drying and cleaning;
- ensuring that soil pipes are protected from back-flow such as by using non-return valves.

As such, the following measures are recommended:

- Solid concrete ground floor slab, with waterproof membrane;
- Waterproof screed used on floors;
- Closed-cell foam used in wall cavities;
- Waterproof ground floor internal render;
- External walls rendered resistant to flooding to first floor level;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor;
- Electrical incomer and meter situated at first floor level or above;
- Boilers, control and water storage / immersion installed at first floor level or above;
- Gas meter installed at first floor level or above;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Kitchen units of solid, water resistant material;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid hardwood construction with wood faces treated to resist water penetration.

Owing to its proximity to the foreshore with its associated risk from wind/wave borne spray and debris; toughened glass/shutters should be installed on the seaward site of the property.

The ground floor window should be replaced with a flood proof window.

Safe Escape:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being though slow moving flood water no deeper than 25cm.

The flood depths along the adjacent roads and across the site are too deep to provide safe escape during the climate change 1:200 year event as per the definitions within the NPPF.

As such, safe escape will therefore be provided by a formal flood warning and evacuation plan, which will be prepared in liaison with the Emergency Planners and tied in with the existing Emergency Plans for the area.

Residents should follow the warning and evacuation procedure detailed in the following section. A point of safe refuge is provided within the upper floors of the property. During an extreme and imminent flood event, residents should seek refuge within the upper floors of the property.

Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

To further conform to the EA Standing Advice, the applicant has agreed to implement a flood warning and evacuation plan post development, and subscribe to the EA's flood warning service.

The site lies in an Environment Agency Flood Warning Area (the Eastbourne Seafront Warning Area). The EA issue flood warnings to specific areas when flooding is expected. The applicant has agreed to register online with the free Environment Agency Floodline Warnings Direct service at https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.

The flood warning service has three types of warnings that will help users prepare for flooding and take action:

Flood Warning	**Flood Alert**	**Flood Warning**	**Severe Flood Warning**
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.

When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 7: Flood Warnings

Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as electrical equipment.
- Know how to turn off gas, electricity and water supplies .
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Switch off water, gas and electricity at mains. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

Off-Site Impacts:

Fluvial floodplain storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). The proposed development is a conversion of an existing building, therefore post development there will be no loss of fluvial floodplain storage. In addition, the application site is situated within an area of tidal flood risk.

Surface Water Drainage Statement:

The proposal is for the conversion of the existing building, and therefore, there will be no increase in impermeable surfacing post development. In light of this, there will be no need for additional surface water drainage features.

The proposed development will utilise the existing drainage arrangements on site.

Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

The Sequential Test is applied to developments in areas identified as being at risk of any source of flooding now or in the future. The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account.

The sequential approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk

The site is situated partially within Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea), and within an area with a 'Very Low' risk of flooding from surface water.

Post development, the site will become residential, which is classified as "more vulnerable".

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	✗	Exception Test required	✓	✓
Zone 3b	Exception Test required	✗	✗	✗	✓

Table 8: Flood risk vulnerability and flood zone 'compatibility'

Using the table above, the proposed application is considered to be suitable within Flood Zone 3,. The Sequential and Exception Tests do not need to be applied to minor developments and changes of use. The proposed application is considered to be a change of use.

Conclusion

Unda Consulting Limited have been appointed by Martello 66 Limited to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at the Martello Tower 66, Anguilla Close, Eastbourne, BN23 5TS. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance, as well as relevant Local Policies.

The proposed planning application is for the change of use of the existing Martello Tower to a single residential dwelling (holiday home).

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having a 1:200 or greater annual probability of tidal flooding. The risk would appear to be predominantly tidal, and originate from the English Channel approximately 20m from the Martello Tower at its closest proximity.

The EA has stated that the site is protected by the Pevensey Bay sea defence to a standard of protection of a 1 in 400 year flood event. Pevensey's residents and environment are guaranteed this consistent standard of protection until at least 2025. This means that in any given year, there will be a 0.25% chance that this area will experience flooding from the sea.

However flood defences can fail or be overtopped.

The Pevensey Bay's Sea Defences, built in 2000 extends for 9km between Eastbourne and Bexhill in East Sussex. The defence consists of a naturally formed shingle bank. These beach defences are managed to remain at a 1 in 400 year standard of protection, with an annual shingle replenishment scheme and shingle replenishment after storm events.

Modelled flood levels and extents have been requested from the EA for use within this report. The EA has provided modelled flood levels and extents from the East Sussex Coastal Model, completed in Summer 2012 by JBA Consulting. The model is a 1D-2D ESTRY TUFLOW model.

Comparison of these modelled flood levels with topographic site levels (of approximately 6.20mAOD to 6.60mAOD) shows that the site is situated above all modelled flood levels, including the 1:1000 year level and the 1:200 year flood level in 2115.

The site is shown to be entirely within the defended and undefended 1:200 year and 1:1000 year extents at the present day, and in 2115.

The site is located within Flood Zone 3, and is classified as "more vulnerable". The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states for flood risk assessments both the higher central and upper end allowances should be assessed.

Comparison of the 1:200 year Higher Central and Upper End flood levels (5.93mAOD and 6.32mAOD respectively) with the topographic finished ground floor level of 5.36mAOD, shows that the ground floor level is 0.27m below the 1:200 year Higher Central and 0.96m below the 1:200 year Upper End flood levels.

The ground floor is only accessible internally from first floor level. The entrance to the Martello tower will be at first floor level only – at 8.17mAOD.

Based on the plans provided, sleeping accommodation will be located at ground and first floor level.

The proposed plans include the removal of the existing modern entry point to the tower at ground floor level, with the reinstatement of the first floor level entrance. The entrance to the tower at 8.17mAOD is 1.69m above the modelled 1:1000 year Upper End flood level.

In addition, uninterrupted internal access is provided from the ground floor to first and second floor level, with the basement a storage area only.

The site is situated on raised land immediately behind a maintained flood defence wall / beach. It is considered that whilst the site is situated on land above the maximum modelled flood level, it may still be susceptible to inundation via wave overtopping action.

The risk of flooding posed to the site by groundwater and sewer surcharge flooding would appear to be low. Additionally, the risk to pluvial flooding would appear to be very low.

The applicant has confirmed that:

- The proposed plans include the removal of the existing modern entry point to the tower at ground floor level, with the reinstatement of the first floor level entrance. The entrance to the tower at 8.17mAOD is 1.69m above the modelled 1:1000 year Upper End flood level.
- In addition, uninterrupted internal access is provided from the ground floor to first and second floor level.
- Flood proofing of the development will be incorporated as appropriate.
- Safe escape will be provided by a formal flood warning and evacuation plan which will be prepared in liaison with the Council's Emergency Planners and tied in with the existing emergency plans for the area.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.