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Flood Risk Assessment for the Proposed Development at Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent

April 2019

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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 the second element of the Exception Test (where applicable).

Herrington Consulting has been commissioned by Jade and Sam Payne to prepare a Flood Risk Assessment (FRA) for the proposed development at **Copperfield Stables**, **48 Eastbridge Road**, **Dymchurch**, **Kent**, **TN29 0PG.**

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2019) and the National Planning Practice Guidance Suite (March 2014) 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.

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 609455, 129988, off Eastbridge Road in Dymchurch, Kent. In total the site covers an area of approximately 84m^2 and currently comprises an outbuilding. The location of the site in relation to the surrounding area and the Marshland Sewer is shown in Figure 2.1.

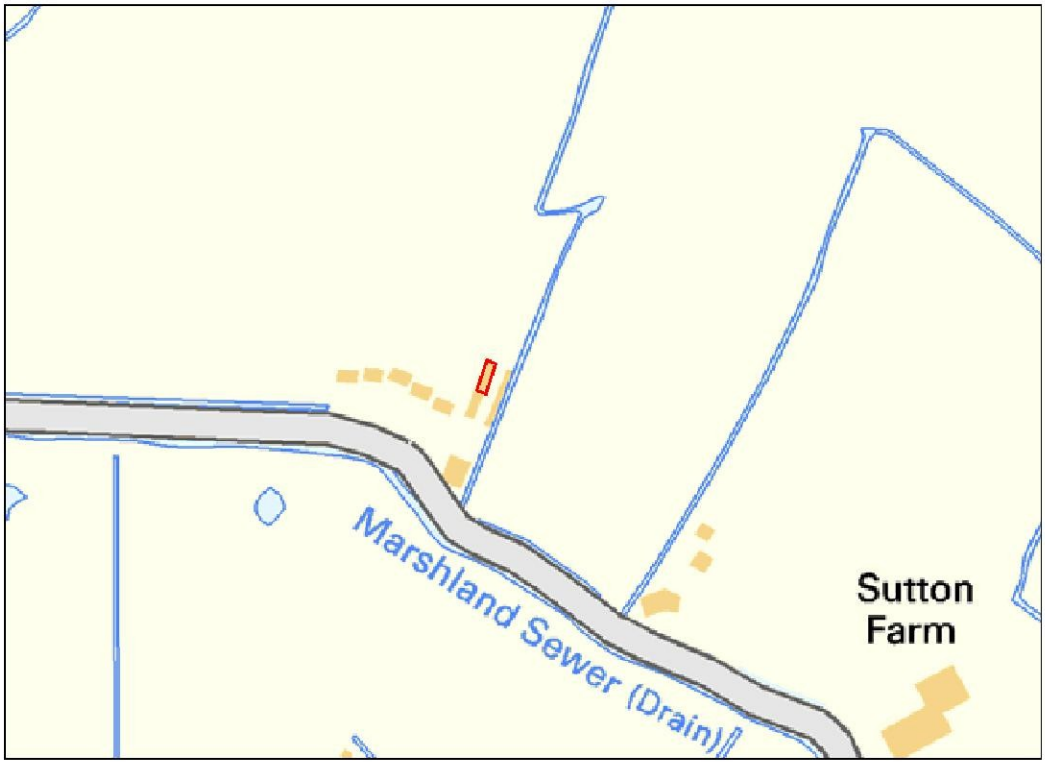


Figure 2.1 – Location map (Contains Ordnance Survey data © Crown copyright and database right 2019).

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

2.2 Proposed Development

The proposals for development comprise the change of use of the existing building to create a new holiday let accommodation.

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

2.3 The Sequential Test and Exception Test

Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for development in an area of flood risk 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 a lower risk of flooding. In addition to the Sequential Test, it is also necessary to consider the type and nature of the development and whether or not the Exception Test is applicable. The Technical Guidance to the NPPF defines the type and nature of different development classifications in the context of their flood risk vulnerability.

Whilst new holiday let development in Flood Zone 3 would normally require both the Sequential Test and the Exception Test to be applied, paragraph 164 of the NPPF states that change of use developments need not be subject to the Sequential Test and therefore, by default, the Exception Test is not required either. The development that is the subject of this Flood Risk Assessment (FRA) fits this category and therefore, *neither the Sequential Test nor the Exception Test is applicable in this circumstance.*

Notwithstanding this, the NPPF does require all development in Flood Zones 2 and 3 to be subject to a site-specific FRA and to meet the requirements for flood risk reduction. This is therefore the primary focus of this document and the risk of flooding from all key sources is considered in the following sections of this report.

3 Definition of Flood Hazard

3.1 Site Specific Information

In addition to the high level flood risk information shown in the Environment Agency (EA) flood zone maps, additional data from detailed studies, and other information sources is referenced. This section summarises the additional information collected as part of this FRA.

Site specific flood level data provided by the EA – The EA has been consulted as part of the development of this FRA and a copy of their response is included in Appendix A.2 of this report.

Information contained within the SFRA – The Folkestone & Hythe District Council SFRA (2015) contains detailed mapping showing the extent of flooding from 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. Their response is included in Appendix A.3.

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 of the site fall to the east and vary between 2.7m and 2.9m Above Ordnance Datum Newlyn (AODN).

Geology – Reference to the British Geological Survey map shows that the underlying solid geology in the location of the subject site is Tunbridge Wells Sand Formation (sandstone). Overlying this are superficial Tidal Flat Deposits (clay and silt).

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

3.2 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 particular development are discussed below. Table 3.1 at the end of this section summarises the risks associated with each of the sources of flooding.

Flooding from the Sea – The site lies within Flood Zone 3 (coastal source) as shown on the EA's flood map (Figure 3.1).

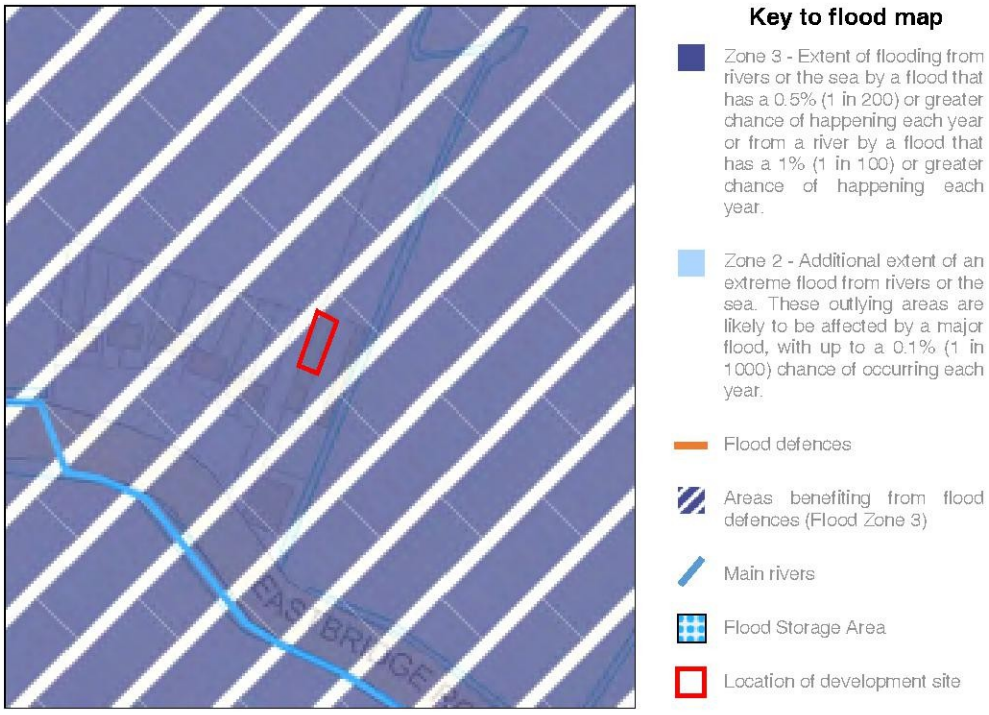


Figure 3.1 – Flood zone map showing the location of the development site (© Environment Agency)

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. The fact that the site lies within Flood Zone 3 means that the risk of flooding from this source is examined in more detail in this FRA.

Flooding from Rivers, Ordinary and Man-made Watercourses – The Marshland Sewer (main river) is located approximately 60m to the south of the site. Inspection of OS mapping also shows a small drainage ditch flows to the east of the site. The primary role of these artificial watercourses is to reduce the groundwater level within the surrounding land, with pumps or tidal sluices being used to discharge flows to the sea. Extreme rainfall, the failure of a pumping station or the tide-locking of the tidal outlet can prevent the system discharging, which may result in increased water levels in the network of drains and ditches.

However, due to the large and relatively flat nature of the land that is drained, the consequence of such an event is likely to be water logging of the ground and shallow flooding in the lower-lying areas. Reference to aerial height data shows that the development site is located on an area of elevated land which is situated ~0.5m above these drainage ditches. Furthermore, the land to the north, east and west of the site is lower-lying than the site itself, as such, in the event that water was to exit the drainage ditches in this location, flooding is more likely to occur away from the site in these low-lying areas. In addition, evidence contained within the SFRA shows that there are no records of flooding at, or near to the site from these watercourses in the past. Taking the above into consideration, the risk of flooding to the site from this source is considered to be *low*.

Flooding from Land (overland flow and surface water runoff) – 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 flooding mechanism 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.

Figure 3.2 below is an extract of the Environment Agency's 'Flood Risk from Surface Water' map which can be interrogated to identify whether the site is located in an area at risk of surface water flooding.

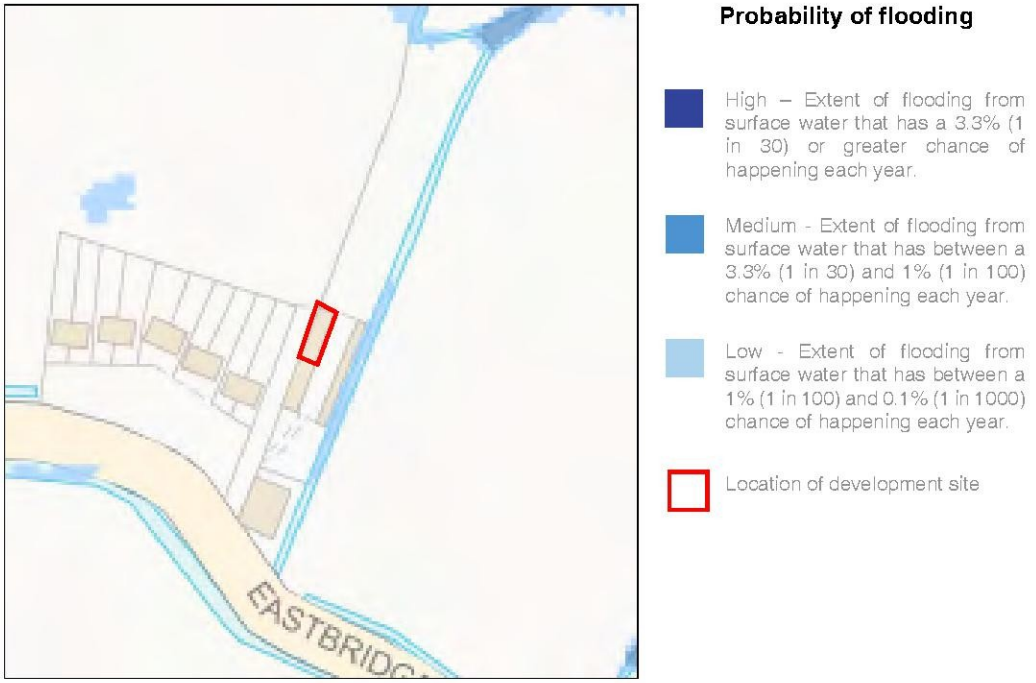


Figure 3.2 – Surface water flooding map showing the location of the development site (© Environment Agency)

The above mapping identifies that the site is located within an area at 'very low' risk of surface water flooding. Furthermore, there have been no recorded incidents of surface water flooding in this location in the past. Consequently, the risk of flooding to the site from this source is concluded 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 Tunbridge Wells Sand Formation overlain with superficial Tidal Flat Deposits. This geological make-up is characteristically permeable and therefore, in certain circumstances can be susceptible to groundwater emergence. However, the network of drainage ditches located to the east and south of the site act to drain the surrounding soils, helping to maintain lower groundwater levels in this area.

This is supported by detailed mapping on groundwater emergence provided as part of the Defra Groundwater Flood Scoping Study (May 2004), which shows that no groundwater flooding events were recorded at, or near to the site during the very wet periods of 2000/01 or 2002/03. The same study also shows that the site itself is not located within an area where groundwater emergence is predicted. In addition, the historic records contained within the SFRA identify that there is no evidence of past groundwater flooding in this location.

Notwithstanding the above, in the unlikely event that groundwater was to emerge in this area, floodwater is more likely to emerge away from the site in the lower-lying areas to the north, east and west. Consequently, the risk of flooding to the site from groundwater is considered to be *low*.

Flooding from Sewers – In urban areas, rainwater is frequently 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 is of inadequate capacity; this will continue until the water drains away.

Inspection of the Southern Water asset location mapping (Appendix A.3) identifies that there is a foul water sewer located ~25m to the south of the site which acts to drain foul effluent from the surrounding properties. As the site is located near to the top of the network for this sewer, the volume of water entering the sewer in this location will be limited. Consequently, this significantly reduces the risk of the sewer network surcharging at, or near to the site. Furthermore, reference to the SFRA identifies that there have been no recorded incidents of sewer flooding in this area in the past.

Notwithstanding this, in the unlikely event that water was to exit this sewer (i.e. as a result of a blockage), floodwater will be directed away from the site to the south, as it follows the sloping land levels. Taking the above into consideration, the risk of flooding to the site from sewers is concluded 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, sand and 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 additional artificial sources of flooding near to the site. In addition, the EA's 'Flood Risk from Reservoirs' mapping 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 3.1 below.

Source of flooding	Initial level of risk	Appraisal method applied at the initial flood risk assessment stage
Sea/Estuaries	Appraised further in Section 5	OS mapping and the EA's 'Flood Map for Planning'
Rivers, Ordinary and Man-made Watercourses	Low	OS mapping, the EA's 'Flood Map for Planning' and
Overland flow	Low	Environment Agency 'Flood Risk from Surface Water' map, and historic records contained within the SFRA
Groundwater	Low	Defra Groundwater Flood Scoping Study, BGS geological data, aerial height data, OS mapping and the historic records in the SFRA
Sewers	Low	Aerial height data, OS mapping, records in the SFRA and asset location data provided by Southern Water
Artificial sources	Low	OS mapping and Environment Agency 'Flood Risk from Reservoirs' flood map

Table 3.1 – Summary of flood sources and risks.

3.3 Existing Flood Risk Management Measures

The Folkestone & Hythe District shoreline is approximately 41km long and much of this is defended to protect the lower-lying, rich and fertile land that forms part of the Romney, Walland and Denge Marshes. The land levels in these marsh areas are generally below the mean high water springs level and consequently, without the protection of the existing sea defences much of this land would be permanently inundated.

As part of the Folkestone to Cliff End Strategy, there are planned improvements to defences on Romney Marsh to provide a consistent 1 in 200 year standard of protection along the entire coastline by the year 2022.

In 2001, the Folkestone to Rye Coastal Defence Strategy Plan recognised the relatively low standard of protection and state of deterioration of the seawalls that protect the Dymchurch, St Mary's Bay and Littlestone frontages and recommended a phased scheme of improvement works. The first scheme was at Littlestone-on-Sea, which is fronted by a concrete seawall backed by a strip of shingle backshore.

In April 2003, work on the Littlestone to St Mary's Bay sea defence scheme started. This involved improvement works to the seawall itself and the importation of 240,000 cubic metres of shingle. The scheme is now complete and the area benefits from a 1 in 200 year standard of protection, although this can be reduced at times when beach levels are drawn down.

In 2005, work started on the improvement works to the Dymchurch seawall between the Redoubt and Martello Tower number 23 and this included placing a rock armour revetment along the lower apron of the seawall, improvements to the concrete upper section and raising the seawall crest. These works are now complete and provide a standard of protection of 1 in 200 years. Following these works the scheme was extended to meet the St. Mary's Bay defences, and comprise a concrete revetment and rear wave return wall. These works were completed in 2012.

The current defence along the Dymchurch frontage comprises a high embankment, with a stepped concrete revetment. The crest is protected by an asphaltic concrete pavement and there is a rear return wall with a crest of approximately 7m AODN. The rear wall has a number of flood gates to enable access to the beach, and the landward face consists of a steep embankment.

As part of the Folkestone to Cliff End Strategy, future work is planned to improve the existing defence infrastructure at Hythe Ranges. Currently, this frontage comprises a 3km shingle beach, timber groynes and is partly protected by a rock revetment, all of which are currently in poor condition. The preferred strategy in this location is 'hold the line - improve' which is planned to be achieved by a combination of a new rock revetment along the line of the existing defences and beach renourishment at Fisherman's Beach. Although a business case is still currently being developed for this scheme, the EA's indicative funding programme shows that the construction is planned to start between 2018 and 2022. It should be recognised that, on completion of these improvements, the outputs of the SFRA modelling (used to inform this report) will significantly overestimate the risk of flooding in this location.

4 Climate Change

When the impact of climate change is considered it is generally accepted that the standard of protection provided by current defences will reduce with time. 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 of the type responsible for the recent UK flooding 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.

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. The development that is the subject of this FRA is a holiday let accommodation and consequently, a residential design life of 100 years has been appraised.

4.1 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. The accompanying Planning Practice Guidance Suite to the NPPF provides allowances for the regional rates of relative sea level rise and these are shown in Table 4.1.

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2026 to 2055	2056 to 2085	2086 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South West	3.5	8.0	11.5	14.5
NW England, NE England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Table 4.1 – Recommended contingency allowances for net sea level rise

From these values it can be seen that the extreme flood level at the site will change with time and that this change is not linear. The 1 in 200 year flood level at the site has therefore been calculated for a number of steps between the current day and the year 2115 and these values are shown in Table 4.2 below.

Year	1 in 200 year extreme water level (m AODN)
Current day (year 2008)	4.75
2025	4.82
2055	5.07
2075	5.31
2085	5.43
2115	5.88

Table 4.2 – Climate change impacts on extreme flood levels

Based on a design lifetime of 100 years, the extreme sea level for this development is taken as 5.88m AODN.

Peak Rainfall Intensity

The recommended allowances for increases in peak rainfall intensity are applicable nationally. There is a range of values provided which correspond with the central and upper end percentiles (the 50th and 90th percentile respectively) over three time epochs. The recommended allowances are shown in Table 4.3 below.

Allowance Category (applicable nationwide)	Total potential change anticipated for each epoch		
	2015 to 2039	2040 to 2069	2070 to 2115
Upper End	+10%	+20%	+40%
Central	+5%	+10%	+20%

Table 4.3 – Recommended peak rainfall intensity allowance for small and urban catchments (1961 to 1990 baseline)

For a development with a residential design life of 100 years an increase of 20% in peak rainfall intensity should be considered.

All of the above recommended allowances for climate change should be used as a guideline and can be superseded if local evidence supports the use of other data or allowances. Additionally, in the instance where flood mitigation measures are not considered necessary at present, but will be required in the future to account for changes in the climate, a "managed adaptive approach" can be adopted. This approach allows appropriate mitigation measures to be incorporated into the development in the future to combat the impacts of climate change.

5 Probability and Consequence of Flooding

When appraising the risk of flooding to new development it is necessary to assess the impact of the 'design flood event' to establish depths, velocities and the rate of rise of floodwater under such conditions. 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 4.1).

5.1 Risk of Flooding from the Sea

Site specific flood level data has been provided by the EA which has been extracted from the Romney Marsh Mapping Study 2017 (Appendix A.2). The results show two modelled scenarios; undefended and defended. It is recognised that the site is currently protected by flood defence infrastructure and as such, the undefended scenario does not present a realistic representation of the actual risk of flooding.

When the results of the defended scenario are considered, the site is shown to be protected from an extreme coastal event with a 1 in 200 year return period. However, the data provided for the defended scenario does not include an allowance for climate change. Consequently, in absence of this information the coastal modelling from the Folkestone & Hythe District Council SFRA has been interrogated.

In 2015, the whole Romney, Walland and Denge Marsh area was numerically modelled using TUFLOW hydrodynamic numerical modelling software as part of the revised SFRA commissioned by Folkestone & Hythe District Council. Within the SFRA, 12 scenarios were considered in order to ascertain the risks associated with coastal flooding, which included an allowance for climate change and the defence infrastructure currently in place.

Five of the scenarios modelled as part of the SFRA strategic modelling show the impact of waves overtopping the localised defences surrounding the Romney Marsh. This type of flood event is classified as *actual risk,* as there is no reliance on the failure of the sea defences for flooding to take place. Inspection of the model results for all scenarios shows that the site is located a significant distance outside the areas affected by wave overtopping, even when considering the impact of 100 years of climate change. Therefore, the actual risk of flooding to the site from the sea is concluded to be low.

5.2 Residual Risk of Flooding

When considering the residual risk of flooding, analysis of the 7 individual breach scenarios tested as part of the SFRA modelling identifies that a breach at the defence along the Hythe Ranges (B7) would have the greatest impact on the Dymchurch area.

A review of the model results for this breach scenario shows the flood level at the development site is 2.83m AODN. Figure 5.1 below shows the predicted extent of flooding in the location of the subject site under this breach scenario.



Figure 5.1 – Predicted flood extents from Breach Scenario 7 - 1 in 200 year event [2115] (Contains Ordnance Survey data © Crown copyright and database right 2019).

From Figure 5.1 above it can be seen that the predicted extents of flooding from a breach scenario in this location would be extensive. However, when the modelled breach flood level is compared with land levels at the site (based on aerial height data) it can be seen that flood depths are shallow, ranging from 0m to 0.13m.

5.3 Rate of Rise and Velocity of Floodwater

The site is situated ~5.5km from the Hythe Ranges, as such in the event of a breach there is expected to be a time lag between when the breach occurs to when floodwater reaches the site. A review of the raw model results from the SFRA identifies that it takes up to 7 hours from the start of the breach event for floodwater to reach the site.

Interrogation of the results of the SFRA modelling also reveal that flow velocities at the site are predicted to be less than 0.25m/s.

6 Offsite Impacts and Other Considerations

6.1 Displacement of Floodwater

The construction of a new building 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.

The development proposals simply comprise a change of use of an existing building and they do not include the construction of any additional structures. As such, the proposed development will not displace any additional floodwater.

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.

The proposed development has been shown to remain dry under an actual risk tidal flood event (i.e. wave overtopping). When a breach scenario (residual risk) is considered, it is evident that both the site and the access road could be affected by flooding. The maximum depth of flooding at the development is predicted to be 130mm, while the depth of flooding along the access road is shown to be up to 200mm. Consequently, given the shallow depth of flooding in this location, safe vehicular access/egress to/from the site will be available.

Notwithstanding the above, it is recommended that the owner of the proposed holiday let signs up to the EA's flood warning service in order to receive forewarnings in the anticipation of a flood event. This will enable the owner to provide the occupants of the holiday let warning that a flood event is likely, which will give them the opportunity to evacuate the site and return to their permanent residence, before the onset of flooding.

6.3 Proximity to Watercourse and Flood Defence Structures

Inspection of OS mapping identifies that the proposed holiday let accommodation is located over 8m from any watercourse and over 16m from any defence infrastructure. Consequently, the development will not compromise any of the EA's maintenance or access requirements.

7 Flood Mitigation Measures

The key objectives of flood risk mitigation are:

- to reduce the risk of the development being flooded.
- to ensure continued operation and safety during flood events
- to ensure that the flood risk downstream of the site is not increased by increased runoff
- to ensure that the development does not have an adverse impact on flood risk elsewhere

The following section of this report examines ways in which the risk of flooding at the development site can be mitigated.

Mitigation Measure	Appropriat	Comment
Careful location of development within site boundaries (i.e. Sequential Approach)	x	The proposals are for a change of use of an existing building and therefore, there is limited opportunity to apply the Sequential Approach in this instance.
Raising floor levels	✓	Refer to Section 7.1
Land raising	x	Not required
Compensatory floodplain storage	x	Not required
Flood resistance & resilience	✓	Refer to Section 7.2
Alterations/ improvements to channels and hydraulic structures	x	Not required
Flood defences	x	Not required
Flood warning	✓	Refer to Section 7.3
Surface water management	x	Refer to Section 7.4

Table 7.1 – Appropriateness of mitigation measures.

7.1 Raising Floor Levels & Land Raising

It has been demonstrated that the proposed development site is located outside the flood extents predicted under an actual risk tidal flood event. It is only in the extremely unlikely scenario whereby a breach to the coastal defences should occur (residual risk) that the site could be affected by shallow flooding. However, the anticipated depth of flooding at the site under this scenario is not expected to exceed 130mm.

The proposals simply comprise a change of use to the existing outbuilding, which has no previous history of flooding. Therefore, it is recommended that the finished floor levels are raised as high as other constraints allow, but preferably a minimum of 150mm above the existing ground level. It is also recommended that a raised threshold is included within the design of the building to ensure that shallow floodwater is prevented from entering the property.

7.2 Flood Resistance and Resilience

During a flood event, floodwater can find its way into properties through a variety of routes including:

- Ingress around closed doorways.
- Ingress through airbricks and up through the ground floor.
- Backflow through overloaded sewers discharging inside the property through ground floor toilets and sinks.
- Seepage through the external walls.
- Seepage through the ground and up through the ground floor.
- Ingress around cable services through external walls.

Since flood management measures only manage the risk of flooding rather than eliminate it completely, flood resilience and resistance measures may need to be incorporated into the design of the buildings. The two possible alternatives are:

Flood Resistance or 'dry proofing', where flood water is prevented from entering the building. For example using flood barriers across doorways and airbricks, or raising floor levels. These measures are considered appropriate for 'more vulnerable' development where recovery from internal flooding is not considered to be practical.

Flood Resilience or 'wet proofing', accepts that flood water will enter the building and allows for this situation through careful internal design for example raising electrical sockets and fitting tiled floors. The finishes and services are such that the building can quickly be returned to use after the flood. Such measures are generally only considered appropriate for some 'less vulnerable' uses and where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable.

In this instance, it is recognised that the risk of flooding to the site from an 'actual risk' event is low. However, as the site has been shown to be affected by flooding under a residual risk breach scenario, it is recommended that flood resistance and resilience measures are considered for incorporation into the design of the building, where practicable.

To retrofit flood resistance and resilience measures into an existing building requires a survey of the flood performance of the building to identify potential locations where floodwater could ingress. Details of an appropriately qualified surveyor can be found at the Blue Pages, hosted on the National Flood Forum website:

http://bluepages.org.uk/

The National Flood Forum provides advice to property owners on flood resistance and resilience measures which can be retrofitted into an existing building. Advice can be found on their website at:

https://nationalfloodforum.org.uk/

7.3 Flood Warning

The risk of tidal flooding to the development site is associated with an extreme tidal surge in the English Channel resulting in a breach of the defences. A surge in tide levels is dependent on meteorological conditions that can be monitored reliably and therefore it is likely that a minimum of 12 hours warning could be given. 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 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.

Therefore, it is recommended that the owner of the proposed holiday let accommodation signs up to the EA's Flood Warning Service. This forewarning will allow the site owner to keep occupants of the holiday let informed and aware of an upcoming storm surge which could potentially cause the defences to breach. In addition, were a breach to occur, these forewarnings will also give the occupants the opportunity to evacuate the site and return to their permanent residence, before the onset of flooding. The owner of the site can sign up to the EA's Flood Warning Service either by calling 0345 988 1188, or by visiting;

https://www.gov.uk/sign-up-for-flood-warnings

7.4 Surface Water Management

The general requirement for all new development is to ensure that surface water runoff is managed sustainably, and that the development does not increase the risk of flooding at the site, or within the surrounding area.

The development proposals are for a change of use to an existing building and therefore, no alterations are proposed to be made to the size of the building or the impermeable area. As such,

the development will not result in an increase in surface water runoff from the site. It is therefore concluded that the development will not increase the risk of flooding offsite.

8 Conclusions

The key aims and objectives for a development that is to be sustainable in terms of flood risk are summarised in the following bullet points:

- the development should not be at a significant risk of flooding, and should not be susceptible to damage due to flooding.
- the development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, is threatened
- normal operation of the development should not be susceptible to disruption as a result of flooding and safe access to and from the development should be possible during flood events
- the development should not increase flood risk elsewhere
- the development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences by the EA
- the development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk; the responsibility for any operation and maintenance required should be clearly defined
- the development should not lead to degradation of the environment
- the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change

In determining whether the proposals for development at Eastbridge Road are sustainable in terms of flood risk and are compliant with the NPPF and its Planning Practice Guidance, all of the above have been taken into consideration as part of this FRA.

The development proposals are simply for the change of use of an existing building to holiday let accommodation, therefore, both the Sequential and Exception Test are not applicable in this instance. Nevertheless, the NPPF does require a flood risk assessment to be undertaken for all development located within Flood Zone 2 and 3 and as such, the risk of flooding to the development site has been appraised for a wide range of sources.

The analysis shows that it is only the risk of coastal flooding that has any bearing on the development. However, when the risk of flooding from the coast is examined in detail, it has been demonstrated that the site remains dry under an actual risk tidal flood event (i.e. wave overtopping), even when considering the impact of 100 years of climate change. The flood model results from

the SFRA do identify that the site could be subject to shallow flooding from a breach event, nevertheless, this would require a failure of the sea defence infrastructure to coincide with the design flood event. The likelihood of such an event is considered to be very low and the depths of flooding predicted on site are shallow (less than 130mm). Consequently, a number of mitigation measures, which are deemed appropriate for the level of risk and type of development, have been proposed to be incorporated into the proposed holiday let to minimise the impact of such an event.

With regard to the offsite risk of flooding, the proposed development simply comprises a change of use to an existing building, with no changes to the external fabric of the building. As such, there will be no increase in impermeable area and the surface water runoff from the building will not increase as a result of the proposals. Therefore, the offsite risk of flooding will not increase as a result of the proposed development.

In conclusion, following the recommendations of this report, the occupants of the development will be safe, and the development will not increase the risk of flooding elsewhere. Consequently, it has been demonstrated that the development will meet the requirements of the NPPF in terms of flood risk.

9 Recommendations

The findings of this report conclude that the development will not increase the risk of flooding at the site, or elsewhere. There are, however, a number of mitigation measures and recommendations that could further reduce the risk to the development and other areas within the floodplain.

- The finished floor levels of the proposed holiday let should be raised as high as other constraints allow, but preferably a minimum of 150mm above the existing ground level. It is also recommended that a raised threshold is included within the design of the building to ensure that shallow floodwater is prevented from entering the property.

- Flood resistance and resilience measures are recommended to be incorporated into the design of the building where practicable.

- The owner of the proposed holiday let accommodation should sign up to the EA's Flood Warning Service. These flood warnings will enable the occupants to evacuate the site and return to their permanent residence, before the onset of flooding which may occur in the unlikely scenario of a breach.

With the above mitigation measures incorporated into the design of the development, the proposals will meet the requirements of the NPPF and its Planning Practice Guidance and will therefore be acceptable and sustainable in terms of flood risk.

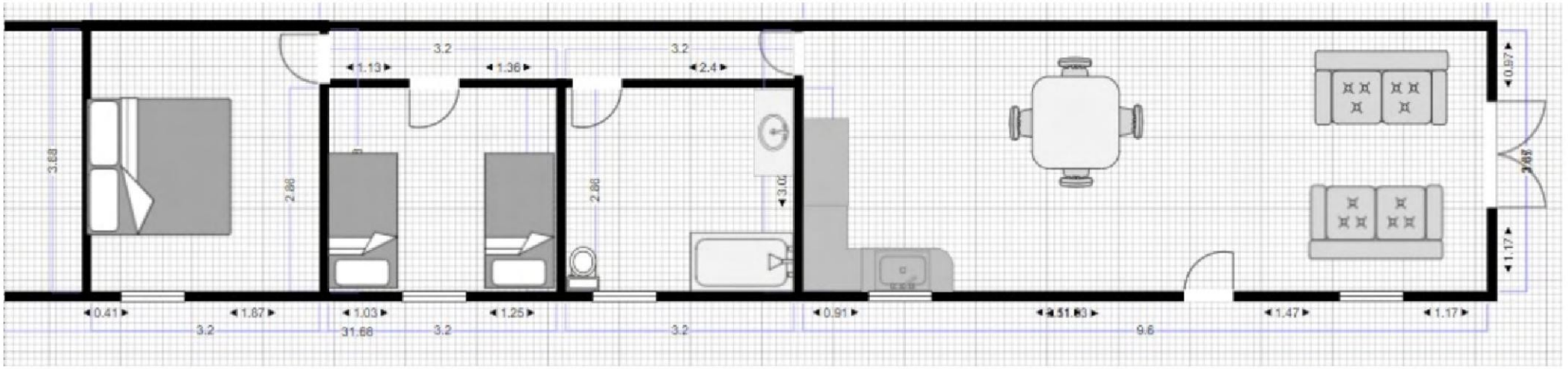
10 Appendices

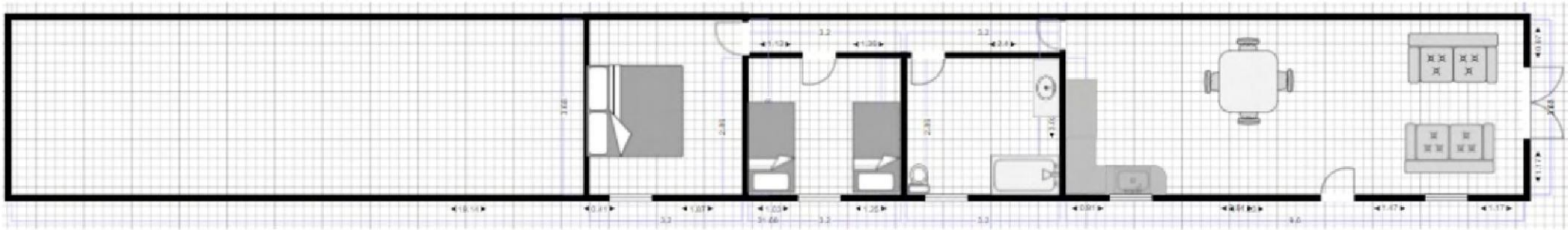
Appendix A.1 – Drawings

Appendix A.2 – Environment Agency Flood Report

Appendix A.3 – Southern Water Asset Location Data

Appendix A.1 – Drawings


3.2
1.19
1.36
3.2
2.4
3.68
2.86
2.86
3.0
0.97
1.17
0.41
1.87
1.03
1.25
0.91
1.47
1.17
3.2
31.68
3.2
3.2
9.6



Appendix A.2 – Environment Agency Flood Report

Product 4 (Detailed Flood Risk) for: Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent, TN29 0PG
Requested by: Sean Robinson of Herrington Consulting
Reference: KSL 119358 CM
Date: 3 April 2019

Contents

- Flood Map Confirmation
- Flood Map Extract
- Model Output Data
- Data Point Location Map
- Modelled Flood Outlines Map
- Defence Details
- Historic Flood Data
- Use of information for Flood Risk Assessment

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made to the data for this location. Should you contact us again, after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the Open Government Licence which explains the permitted use of this information.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Flood Map Confirmation

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from fluvial and tidal flooding. The floodplain is specifically mapped ignoring the presence and effects of flood defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be overtopped or breached during a flood event.

The Flood Map shows the probability of a flood of a particular magnitude, or greater, occurring in any given year. This is known as the Annual Exceedance Probability (AEP). Flood Zone 3 indicates areas of land having a 1 in 100 or greater annual probability (1% AEP) of flooding from rivers, or a 1 in 200 or greater annual probability (0.5% AEP) of flooding from the sea. Flood Zone 2 indicates areas of land having up to a 1 in 1000 annual probability (0.1% AEP) of flooding from rivers or the sea. The Flood Map also shows the location of some flood defences and the areas that benefit from them.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time of completion, taking into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at https://flood-map-for-planning.service.gov.uk/.

At this Site:

The Flood Map shows that this site lies within the outline of the 0.5% (Flood Zone 3) chance of flooding from the sea in any given year.

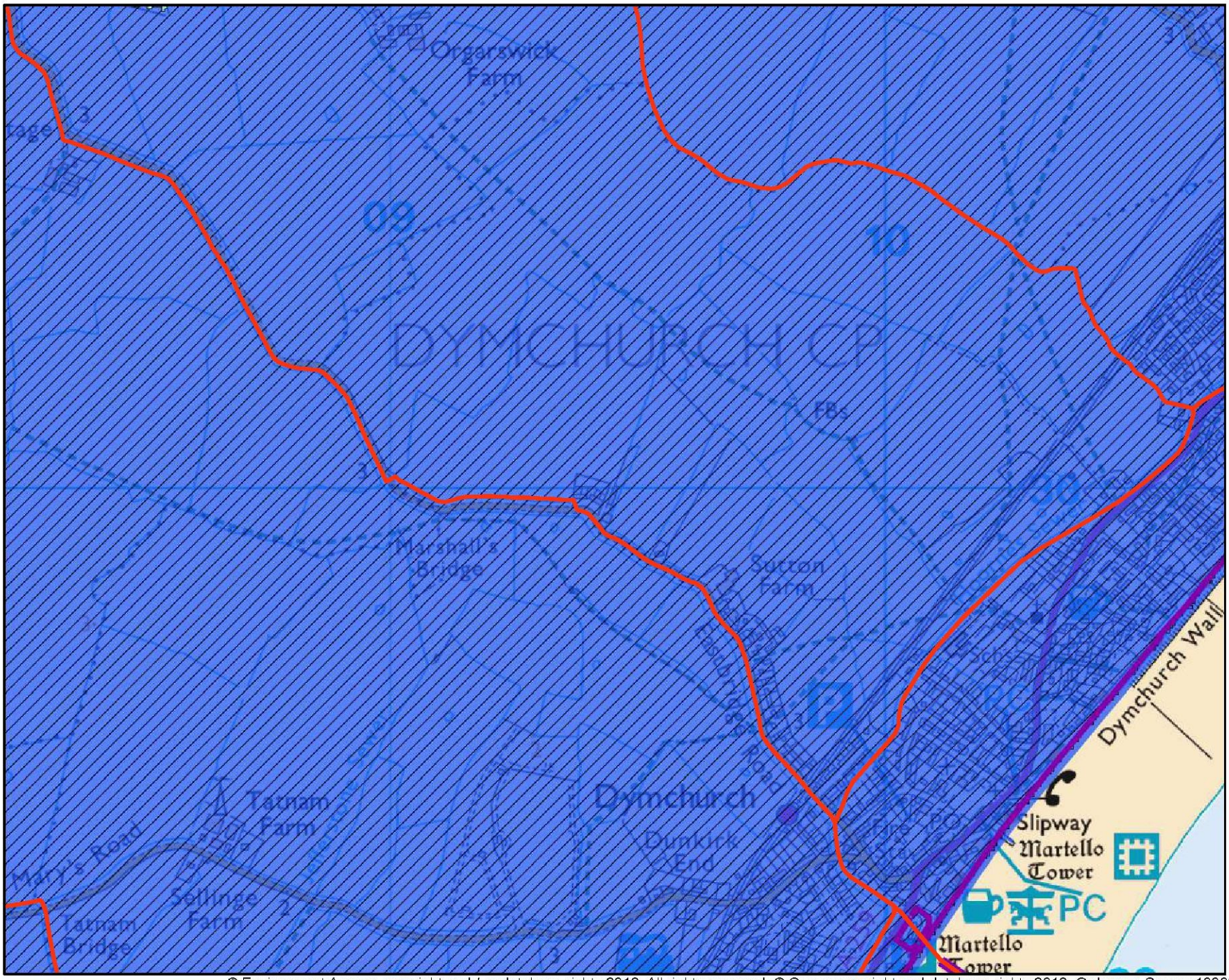
Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed tidal modelling of Romney Marsh, completed by JBA Consulting in 2017.

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Email: kslenquiries@environment-agency.gov.uk

Flood map centred on Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent, TN29 0PG
Created 3 April 2019 [Ref: KSL 119358 CM]



Environment Agency

N

Legend

- Main River
- Flood Defences
- Flood Storage Areas
- Areas Benefiting from Flood Defences
- 0.5% AEP Flooding
- 0.1% AEP Flooding

Annual Exceedance Probability (AEP). The probability of a flood of a particular magnitude, or greater, occurring in any given year.

Scale 1:10,000

0 250 500

Metres

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Model Output Data

You have requested flood levels and/or depths for various return periods at this location.

A 2D TuFLOW model has been used to represent the floodplain as a grid. The flood water levels and/or depths have been calculated for each grid cell. The modelled flood levels / depths presented here are for the closest most appropriate model grid cells. Any additional information you may need to know about the modelling from which they are derived and/or any specific use or health warnings for their use are set out below.

A map showing the location of the points from which the data is taken is enclosed. Please refer to the Open Government Licence which explains the permitted use of this information.

Table 1: Modelled tidal flood levels for Annual Exceedance Probability (AEP) events shown (mAOD)

Point ID	National Grid Reference		Modelled Tidal Flood Levels for Annual Exceedance Probability (AEP) events shown (metres AOD)										
			Undefended						Defended				
	Easting	Northing	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.1% AEP + CC (2070)	0.5% AEP + CC (2115)	0.1% AEP + CC (2115)	20% AEP	5% AEP	1.33% AEP	0.5% AEP	0.1% AEP
1	609457	130002	4.42	4.57	4.80	4.97	5.22	5.38	0.00	0.00	0.00	0.00	0.00
2	609458	129997	4.42	4.58	4.80	4.97	5.22	5.38	0.00	0.00	0.00	0.00	0.00
3	609454	129995	4.42	4.57	4.80	4.96	5.22	5.38	0.00	0.00	0.00	0.00	0.00
4	609455	129991	4.42	4.57	4.80	4.97	5.22	5.38	0.00	0.00	0.00	0.00	0.00
5	609452	129989	4.42	4.57	4.80	4.97	5.22	5.38	0.00	0.00	0.00	0.00	0.00
6	609451	129971	4.43	4.58	4.81	4.97	5.22	5.39	0.00	0.00	0.00	0.00	0.00
7	609437	129960	4.42	4.57	4.80	4.96	5.22	5.38	0.00	0.00	0.00	0.00	0.00
8	609430	129944	4.42	4.57	4.80	4.96	5.22	5.38	0.00	0.00	0.00	0.00	0.00
9	609444	129915	4.43	4.59	4.81	4.98	5.23	5.39	0.00	0.00	0.00	0.00	0.00
10	609369	129968	4.39	4.54	4.77	4.94	5.19	5.36	0.00	0.00	0.00	0.00	0.00

Data taken from Romney Marsh Mapping Study, completed by JBA Consulting in 2019.

Climate change (CC) data represents modelled levels and depths based on estimates of sea-level rise published by UKCP09. Using this guidance, climate change scenarios were run for the years 2070 and 2115 to investigate the impact of future sea-level rise on coastal flood risk across the area; this was based on the 95 percentile medium emissions data.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

There are no health warnings or additional information for these levels, or the model from which they were produced.

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Table 2: Modelled tidal flood depths for Annual Exceedance Probability (AEP) events shown (m)

Point ID	National Grid Reference		Modelled Tidal Flood Depths for Annual Exceedance Probability (AEP) events shown (metres)										
			Undefended						Defended				
	Easting	Northing	0.5% AEP	0.1% AEP	0.5% AEP + CC (2070)	0.1% AEP + CC (2070)	0.5% AEP + CC (2115)	0.1% AEP + CC (2115)	20% AEP	5% AEP	1.33% AEP	0.5% AEP	0.1% AEP
1	609457	130002	1.68	1.84	2.07	2.23	2.48	2.65	0.00	0.00	0.00	0.00	0.00
2	609458	129997	1.76	1.91	2.14	2.30	2.56	2.72	0.00	0.00	0.00	0.00	0.00
3	609454	129995	1.68	1.83	2.06	2.22	2.48	2.64	0.00	0.00	0.00	0.00	0.00
4	609455	129991	1.71	1.87	2.10	2.26	2.51	2.68	0.00	0.00	0.00	0.00	0.00
5	609452	129989	1.71	1.87	2.10	2.26	2.51	2.68	0.00	0.00	0.00	0.00	0.00
6	609451	129971	1.76	1.92	2.15	2.31	2.56	2.72	0.00	0.00	0.00	0.00	0.00
7	609437	129960	1.71	1.86	2.09	2.25	2.51	2.67	0.00	0.00	0.00	0.00	0.00
8	609430	129944	1.75	1.90	2.13	2.29	2.55	2.71	0.00	0.00	0.00	0.00	0.00
9	609444	129915	1.62	1.77	2.00	2.16	2.41	2.58	0.00	0.00	0.00	0.00	0.00
10	609369	129968	1.59	1.74	1.97	2.14	2.39	2.56	0.00	0.00	0.00	0.00	0.00

Data taken from Romney Marsh Mapping Study, completed by JBA Consulting in 2017.

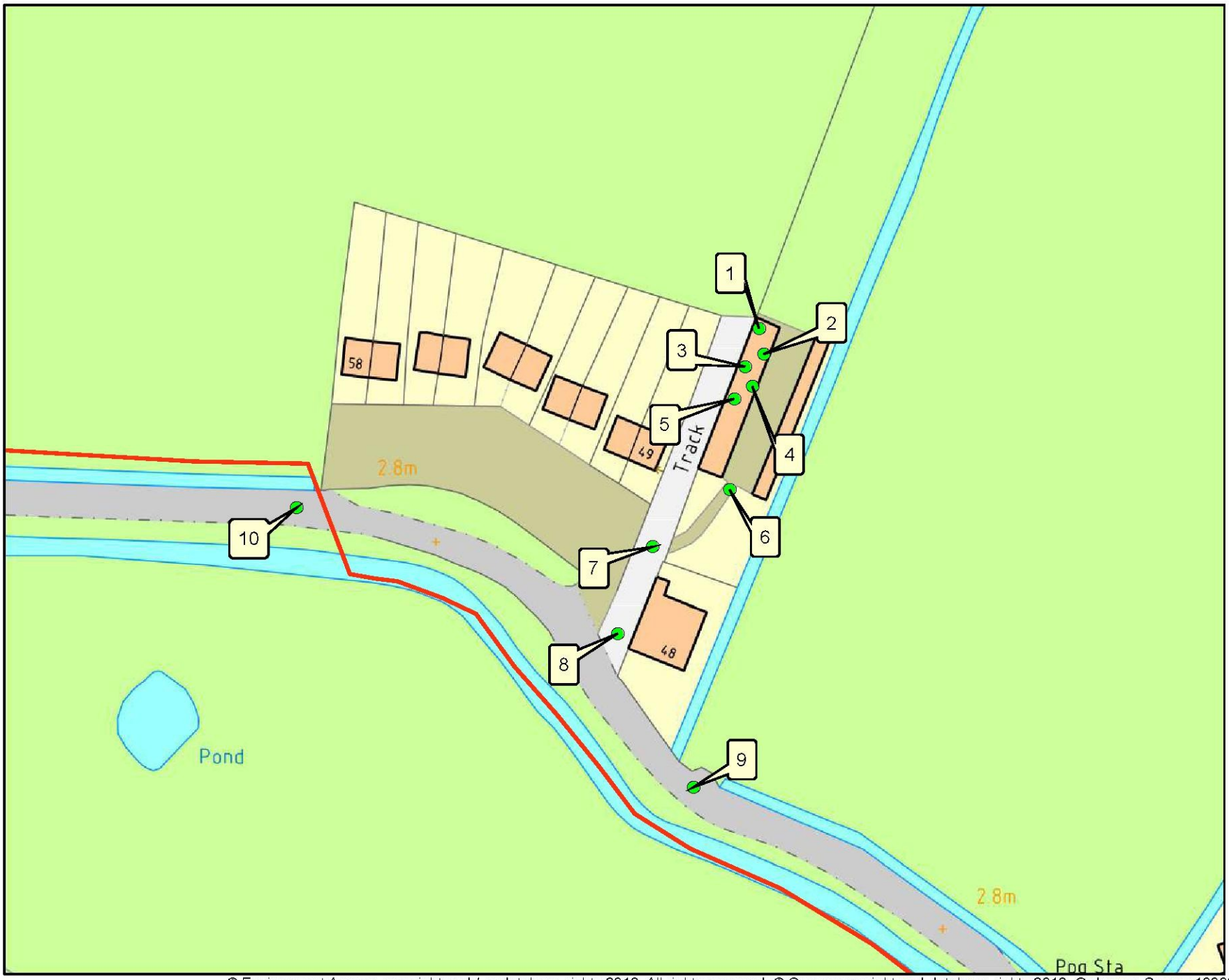
Climate change (CC) data represents modelled levels and depths based on estimates of sea-level rise published by UKCP09. Using this guidance, climate change scenarios were run for the years 2070 and 2115 to investigate the impact of future sea-level rise on coastal flood risk across the area; this was based on the 95 percentile medium emissions data.

Values of 0.00 indicate locations at which the selected points lie outside of a particular modelled flood extent.

There are no health warnings or additional information for these depths, or the model from which they were produced.

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Data points map centred on Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent, TN29 0PG
Created 3 April 2019 [Ref: KSL 119358 CM]



Environment Agency

N

Legend

- Data points
- Main River

Scale 1:1,000

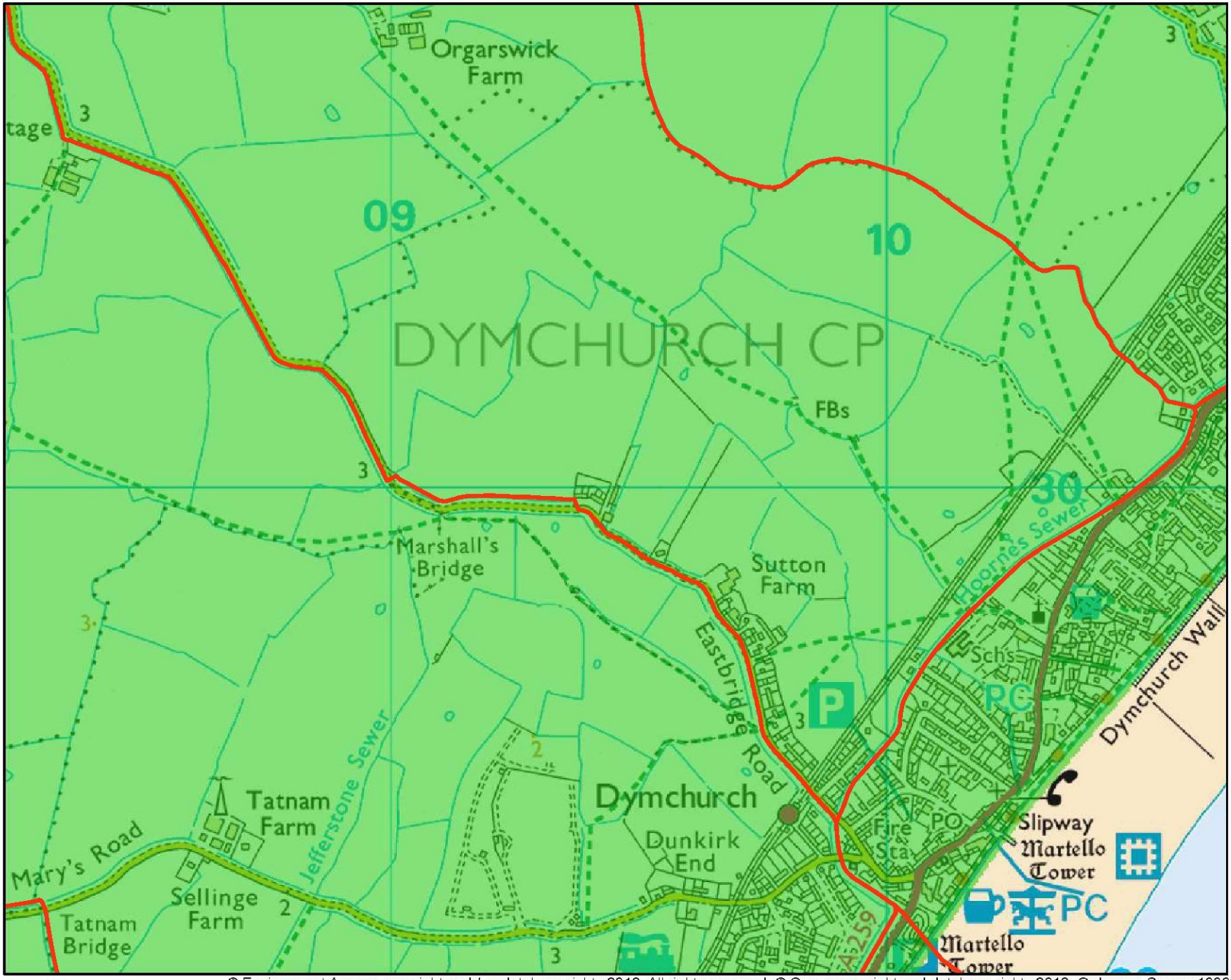
0 25 50

Metres

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Undefended tidal flood extents map centred on Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent, TN29 0PG. Created 3 April 2019 [Ref: KSL 119358 CM]



Environment Agency

N

Legend

Main River

Undefended Tidal Flood Extents

- 0.5% AEP
- 0.1% AEP
- 0.5% AEP + CC (2070)
- 0.1% AEP + CC (2070)
- 0.5% AEP + CC (2115)
- 0.1% AEP + CC (2115)

Annual Exceedance Probability (AEP). The probability of a flood of a particular magnitude, or greater, occurring in any given year.

Climate Change (CC) extents based on modelled flood extents with an allowance for sea level rise, for the years specified.

Scale 1:10,000

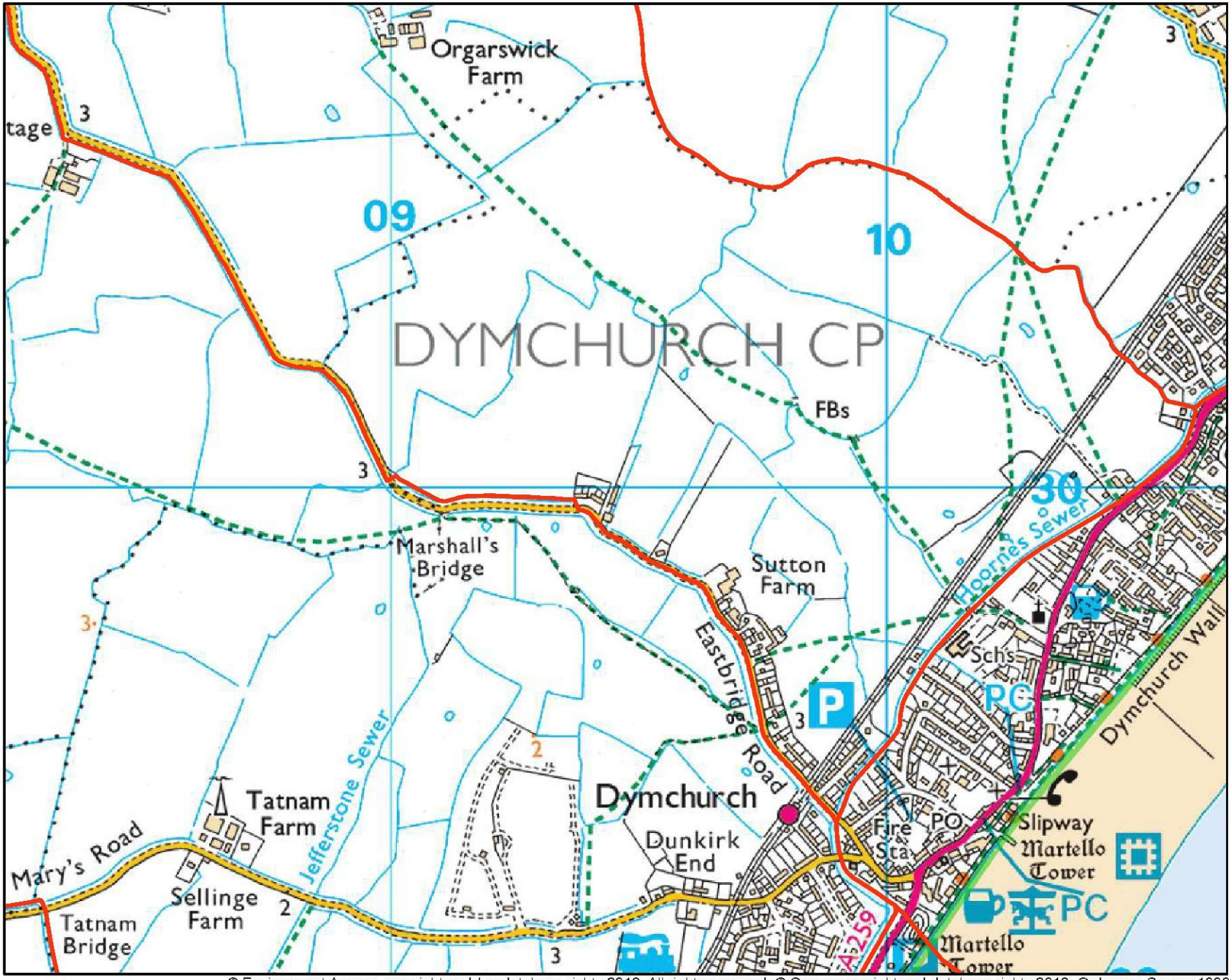
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Metres

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Defended tidal flood extents map centred on Copperfield Stables, 48 Eastbridge Road, Dymchurch, Kent, TN29 0PG. Created 3 April 2019 [Ref: KSL 119358 CM]



Environment Agency

N

Legend

Main River

Defended Tidal Flood Extents

- 20% AEP
- 5% AEP
- 1.33% AEP
- 0.5% AEP
- 0.1% AEP

Annual Exceedance Probability (AEP). The probability of a flood of a particular magnitude, or greater, occurring in any given year.

Scale 1:10,000

0 250 500

Metres

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Defence Details

Sea defences between High Knocke and Martello Tower number 23 comprise of a sea wall which includes a concrete wave return wall and stepped revetment. Timber groynes act to retain sand on the frontage. The defences are designed to provide a standard of protection of 0.5% (1 in 200) chance of flooding from the sea in any given year. The scheme was completed in 2011 and is owned and maintained by the Environment Agency.

Between Martello Tower number 23 and Dymchurch Redoubt, the sea defences comprise of a sea wall with a rock armour revetment. The defences are designed to provide a standard of protection of 0.5% (1 in 200) chance of flooding from the sea in any given year. The scheme was completed in 2008 and is also owned and maintained by the Environment Agency.

Due to the flat nature of Romney Marsh, much of which is below present day high tide level, flooding could regularly occur from many other areas along the coast without properly maintained sea defences. At present the defences around Romney Marsh provide a varying standard of protection from 5% (1 in 20) at Lydd Ranges, to in excess of 0.5% (1 in 200) at Greatstone dunes.
As part of the Folkestone to Cliff End Strategy, we have significant investment planned to improve the remaining sea defences on Romney Marsh to provide a 0.5% (1 in 200) standard of protection from a flood event occurring at any point along the coast by 2022.

Areas Benefiting from Flood Defences

This site is within an area benefiting from flood defences, as shown on the enclosed extract of our Flood Map. Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year, or flooding from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

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Historic Flood Data

We do not hold records of historic flood events from rivers and/or the sea affecting the area local to this property. However, please be aware that this does not necessarily mean that flooding has not occurred here in the past, as our records are not comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

Please be aware that flooding can come from different sources. Examples of these are:
- from rivers or the sea
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system)
- overflowing or backing up of sewer or drainage systems which have been overwhelmed
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding or drainage systems that have been overwhelmed.

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Email: kslenquiries@environment-agency.gov.uk

Additional Information

Information Warning - OS background mapping

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Planning advice and guidance

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Complete the form in the link and email back to kslplanning@environment-agency.gov.uk.

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Flood Risk Assessments Guidance

Flood risk standing advice for applicants

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice

http://planningguidance.planningportal.gov.uk/

https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

https://www.gov.uk/guidance/flood-risk-and-coastal-change

You should also consult the Strategic Flood Risk Assessment and flood risk local plan policies produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. You should discuss surface water management with your Lead Local Flood Authority.
3. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection due to insufficient information

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Email: kslenquiries@environment-agency.gov.uk

Surface Water

We have provided two national Surface Water maps, under our Strategic Overview for flooding, to your Lead Local Flood Authority who are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse), which alongside their existing local information will help them in determining what best represents surface water flood risk in your area.

Your Lead Local Flood Authority have reviewed these and determined what it believes best represents surface water flood risk. You should therefore contact this authority so they can provide you with the most up to date information about surface water flood risk in your area.

You may also wish to consider contacting the appropriate relevant Local Planning Authority and/or water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources. We are working with these organisations to improve knowledge and understanding of surface water flooding.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Email: kslenquiries@environment-agency.gov.uk

Appendix A.3 – Southern Water Asset Location Data

Herrington Consulting Ltd
Unit 6, Barham Business Park
Elham Valley
Canterbury
Kent
CT4 6DQ

Your ref SR/2323
Our ref 332341
Date 21 March 2019
Contact searches@southernwater.co.uk
Tel 0845 272 0845
0330 303 0276
Fax 01634 844514

Attention: Herrington Consulting

Dear Customer

Re: **Provision of public sewer record extract**

Location: **Copperfield Stables 48, Eastbridge Road, Dymchurch, Romney Marsh, Kent, TN29 0PG**

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £[redacted] and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

SEWER RECORDS PAGE 1 OF 2

130102



129814

609209

609680

O.S. REF. TR0929NW	Drawn by: rohandas	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
	Scale: 1:1250	
Title: 332341_Copperfield Stables 48,	Date: 21/03/2019	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

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Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
3001X			UNK	VC	CIRC																		
300DX			UNK	VC	CIRC																		
3901X	2.57	1.53	150	UNK	UNK																		
4901X	2.66	0.55	UNK	UNK	UNK																		
4902X	2.83	0.27	150	UNK	UNK																		
4903X	2.81	−0.19	150	VC	CIRC																		
5801X	2.74	−0.61	150	VC	CIRC																		
580PY	2.87		100	CI	CIRC																		

LINE STYLES / COLOURS

Brown — Foul
Foul Syphon Sewer
Foul Vacuum Main
Foul Rising Main
Red — Combined
Combined Syphon Sewer
Combined Rising Main
Lateral Drain
Orange — Building Over Agreement Area
Dark Blue — Treated Effluent
Purple — Sludge
Sewer Catchment
Section 104 Area
Light Blue — Surface Water
Surface Water Rising Main
Yellow — Private
Green — Access Shaft
Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRO	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

Manhole (SW)
Manhole (F&C)
Lamp hole (SW)
Lamp hole (F&C)
Pumping Station (SW)
Pumping Station (F&C)
Side entry manhole (SW)
Side entry Manhole (F&C)
Blind shaft (SW)
Blind shaft (F&C)
Ejector station (SW)
Ejector station (F&C)
Watertight door (SW)
Watertight door (F&C)
Flushing ch. M>e (SW)
Flushing ch. M>e (F&C)
Flushing ch. No-e (SW)
Flushing ch. No-e (F&C)
Demarcation Chamber

Washout (SW)
Washout (F&C)
Rodding Eye (SW)
Rodding Eye (F&C)
Gauging point (SW)
Gauging point (F&C)
Intercept chamber (SW)
Intercept chamber (F&C)
Storm Tank (SW)
Storm Tank (F&C)
Vortex chamber (SW)
Vortex chamber (F&C)
Label ellipse
Dummy/624 manhole
Outfall
Penstock chamber
Dambounds
Storm Overflow
Backdrop manhole

Other (s)
Other
Change in sewer (s)
Change in sewer
Reflux valve
Flap valve
Cascade
Anode
Valve
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (F&C)
Direction arrow
Emptying valve
Catchpit
Spillaway
Inlet
Balancing Pond

Wastewater treatment works
Marine treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Blank end
Head of Public Sewer
Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
sewer type identifier
3rd digit: 0-4 = Foul/Combined
5-9 = Surface Water
4th digit: next sequential node

Drawn by:	rohandas
Title:	332341_Copperfield Stables 48,
Date:	21/03/2019

Southern Water