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UPGRADE OF EXISTING PETROL FILLING STATION

WOODLANDS SERVICE STATION
FLEETWOOD ROAD NORTH, THORNTON - CLEVELEYS

FLOOD RISK ASSESSMENT

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1.0 INTRODUCTION AND DEVELOPMENT DESCRIPTION

1.1 Project Introduction and Objectives

Penny Petroleum Ltd. has commissioned NSugg Ltd. to undertake a Flood Risk Assessment (FRA) to support a planning application for the upgrade of the existing Woodlands Service Station, Fleetwood Road North, Thornton-Cleveleys. This document represents a site-specific FRA for the proposed development.

1.2 Planning Policy and Guidance

This FRA has been undertaken in accordance with the relevant planning policy and guidance outlined below.

1.2.1 National Planning Policy

The National Planning Policy Framework (NPPF)¹ and associated technical guidance for flood risk² aim to steer new development to areas with the lowest risk of flooding.

New development must also ensure that flood risk is not increased elsewhere, and where appropriate, planning applications should be supported by a site-specific Flood Risk Assessment.

The NPPF recommends that development should only be allowed in areas at risk of flooding where the FRA (and the sequential and exception tests, as applicable) can demonstrate that:

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- b) the development is appropriately flood resistant and resilient;
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- d) any residual risk can be safely managed; and
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

The guidance confirms that major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate.

1.2.2 Environment Agency Policy and Guidance

The Environment Agency's guidance for FRAs³ confirms that planning applications for the following development proposals must be supported by a FRA:

¹ Ministry of Housing, Communities & Local Government, March 2012 (last updated: September 2023), National Planning Policy Framework.

² Ministry of Housing, Communities & Local Government, March 2014 (last updated: August 2022), Guidance, Flood Risk and Coastal Change.

³ Environment Agency, March 2014 (last updated: February 2017), Guidance – Flood Risk Assessments if you're applying for planning permission.

- Development in Flood Zone 2 or 3 including minor development and change of use
- Development sites of more than 1 hectare (ha) in Flood Zone 1
- Development sites less than 1 ha in Flood Zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
- Development in an area within Flood Zone 1 which has critical drainage problems as notified by the Environment Agency

The Agency's guidance supports the NPPF and specifies the requirements for FRAs based on the level of flood risk and the vulnerability of the proposed development to flooding.

In addition, Environment Agency consent is required for any proposed works or structures, in, under, over or within eight metres of the top of the bank of the watercourse, designated a 'main river', (or sixteen metres in the case of a tidal watercourse).

1.2.3 Local Policy and Guidance

The following documents provide local flood risk policy and guidance for development within Thornton-Cleveleys:

- Wyre Borough Council's Level 1 Strategic Flood Risk Assessment (SFRA)⁴ presents a summary of the local hydrology, potential sources of flood risk across the region and flood risk information for planning. The Council's Level 2 SFRA⁵ focuses on key development areas across the Borough, including the Coastal Peninsula which includes Thornton-Cleveleys.
- Blackburn-with-Darwen Council, Blackpool Council and Lancashire County Council's Local Flood Risk Management Strategy for Lancashire (LFRMS)⁶ provides details of local flood risk sources (i.e. groundwater, ordinary watercourses, sewers, surface water flooding) and proposals for future management strategies.
- North West England & North Wales Coastal Group, Shoreline Management Plan Guide, Wyre⁷ provides an overview of the coastal management issues and flood risk management policy for this stretch of coastline.
- Wyre Council's Local Plan (2011-2031) (incorporating partial update of 2022) (adopted 26 January 2023) presents local planning policy up to 2031. **Policy CDMP2: Flood Risk and Surface Water Management** states:

Flooding

1. Development is required to have regard to the most up-to-date Wyre Strategic Flood Risk Assessment Level 2 including the SFRA Level 2 Flood Risk Sequential Test Paper and comply with the most up to date version of any relevant plans and strategies including:

- a) Surface Water Management Plan*
- b) Local Drainage Strategies*
- c) Land Drainage Strategy*

⁴ Wyre Council, July 2016, Wyre Borough Council, Strategic Flood Risk Assessment.

⁵ Jacobs, October 2016, Wyre Level 2 Strategic Flood Risk Assessment.

⁶ Blackburn-with-Darwen Council, Blackpool Council and Lancashire County Council, Local Flood Risk Management Strategy for Lancashire 2021-2027.

⁷ North West England & North Wales Coastal Group, February 2023, Shoreline Management Plan Guide, Wyre.

- d) *Catchment Flood Management Plans*
- e) *Shoreline Management Plan*
- f) *Coastal Defence Strategy*
- g) *Emergency Flood Plans*

2. *Development will be required to demonstrate that:*

- a) *It will not be at an unacceptable risk of flooding; and*
- b) *It would not lead to an increased risk of flooding elsewhere; and*
- c) *It would not adversely affect the integrity of tidal and fluvial defences or access for essential maintenance and emergency purposes.*

3. *Where development is proposed in areas at risk of flooding, unless specifically proposed in this Local Plan, it must be demonstrated that the Sequential Test has been applied and there are no reasonable available alternative sites at lower risk, considering the nature of flooding and the vulnerability of the development.*

4. *Subject to passing the Sequential and, where required, the Exception Test as set out in national policy and guidance, development will only be permitted in flood risk areas where appropriate mitigation and/or adaption measures are proposed to reduce the likelihood and / or impact of flooding.*

1.3 Site Location

The application site is located off Fleetwood Road North, Thornton-Cleveleys, Lancashire, FY5 4BL, as shown on the Site Location Plan within Appendix 1. The site is within a predominantly residential area of Thornton-Cleveleys, approximately 1km north-west of Thornton town centre and approximately 2.3km east of the coastline at Cleveleys. The application site currently comprises a petrol filling station and workshop.

The total area of the application site, as indicated on the Site Location Plan, is approximately 0.16 hectares. The Environment Agency's on-line flood map for planning indicates that the application site is located within Flood Zone 3, defined as land with a high probability of fluvial/tidal flooding.

The National Planning Policy Framework (NPPF) and associated technical guidance confirms that all applications for proposed new development within Flood Zone 2 or 3 and development proposals exceeding one hectare within Flood Zone 1 must be accompanied by a site-specific Flood Risk Assessment.

1.4 Topography and Existing Land Use

Review of Ordnance Survey mapping indicates that the application site lies within the Fylde coastal plan, with a flat-lying topography and a ground level of approximately 4mAOD within the application site.

A topographic survey of the application site was undertaken in June 2023 and a copy of the survey and existing site layout is included as Appendix 2. The survey confirms that ground levels are generally highest in the central and north-east areas of the site at 5.4mAOD to 5.6mAOD. Ground levels fall gently away to the western and southern site boundaries, where levels are typically 5.0mAOD to 5.2mAOD. The lowest site level is recorded in the south-east corner of the site, at 4.83mAOD,

The application site is accessed off, and bound to the west, by Fleetwood Road North, with predominantly residential development beyond. The site is bound to the north and south by mixed use residential and retail development and to the east by Hillylaid Pool (Main Dyke).

The application site currently comprises a petrol filling station and workshop and is all impermeable surfaces. An existing site layout plan is included within Appendix 1.

1.5 Geology

British Geological Survey mapping indicates that the local geology beneath the application site comprises interbedded mudstone and siltstone of the Kirkham Mudstone Member overlain by superficial Tidal Flat Deposits (silty clay, peat, sand and gravel)⁸.

Review of Cranfield University's soil maps⁹ indicates that the soils beneath the application site are defined as Soilscape 21: loamy and clayey coastal flats soils with naturally high groundwater.

Review of Natural England's MAGIC geographic information mapping confirms that the application site is not located within a Groundwater Source Protection Zone.

The topographic survey (Appendix 2) confirms that the application site currently comprises entirely impermeable surfaces, with incident rainfall forming surface water runoff discharging to the urban drainage network.

1.6 Hydrological Features

The application site lies within the surface water catchment of Hillylaid Pool (Main Dyke), which is classified as a main river and passes approximately 5m east of the site boundary.

Hillylaid Pool flows in a north-easterly and easterly direction and discharges into the tidal River Wyre approximately 2.5km east of the application site. The River Wyre discharges into Morecambe Bay at Fleetwood, approximately 5.5km to the north.

The local hydrological site setting is presented as Figure 1.

⁸ British Geological Survey, GeoIndex Onshore, accessed 3rd September 2023.

⁹ Cranfield University's Soilscape Map, accessed 11th September 2023.

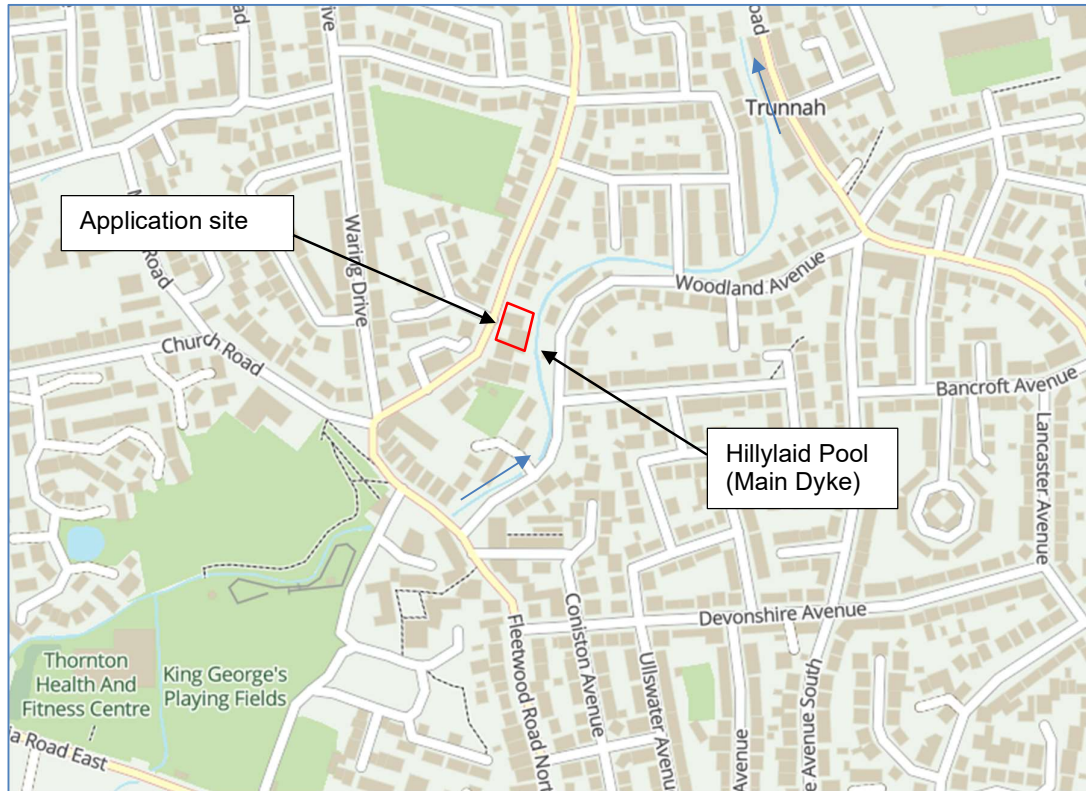


Figure 1. Hydrological Site Setting

1.7 Proposed Development and Flood Risk Vulnerability Classification

The proposed development comprises an upgrade of the existing petrol filling station, to comprise:

- demolition of the existing kiosk building,
- conversion of the existing workshop into the petrol filling station kiosk and an extension of this building, and
- other ancillary development including the creation of jet wash and car wash facilities, a new area of planting on the northern site boundary and new/replacement perimeter fencing.

A proposed development layout plan is included within Appendix 3 and the 8m easement from Hillylaid Pool is overlain on the development plan. No new development is proposed within the 8m easement other than conversion of the existing building, a limited area of planting in the north and replacement of the existing eastern boundary fence with a new timber post and rail fence.

In terms of flood risk vulnerability classification, general industry and buildings used for shops are classified as 'less vulnerable'. This is discussed further in Section 2.3.

2.0 FLOOD RISK ASSESSMENT

2.1 Sources of Information

In addition to the flood risk planning policy and guidance outlined in Section 1.2, the following sources of information have been consulted during the preparation of this FRA:

- Environment Agency website – for information regarding surface water, reservoir and fluvial/tidal flood risk and outline flood zone maps.
- Environment Agency consultation response (Product 4 & Product 8 data) which provides site-specific flood risk data including modelled flood water levels. A copy of the consultation response received from the Environment Agency on 30th August 2023 is included as Appendix 4.

2.2 Flood Hazard

All potential sources of flooding to the application site are considered within this section of the report.

2.2.1 Environment Agency Flood Zone Map and Fluvial/Tidal Flood Risk

The Environment Agency flood zone map presents information regarding the fluvial and tidal flood risk to the application site and is included as Figure 2 below. The flood zone map indicates that the entire application site and wider area lie within high probability Flood Zone 3. Flood Zone 3 is defined as land with $\geq 1\%$ annual probability of flooding from rivers and/or $\geq 0.5\%$ annual probability of flooding from the sea. The flood zone map ignores the presence of local flood defences.

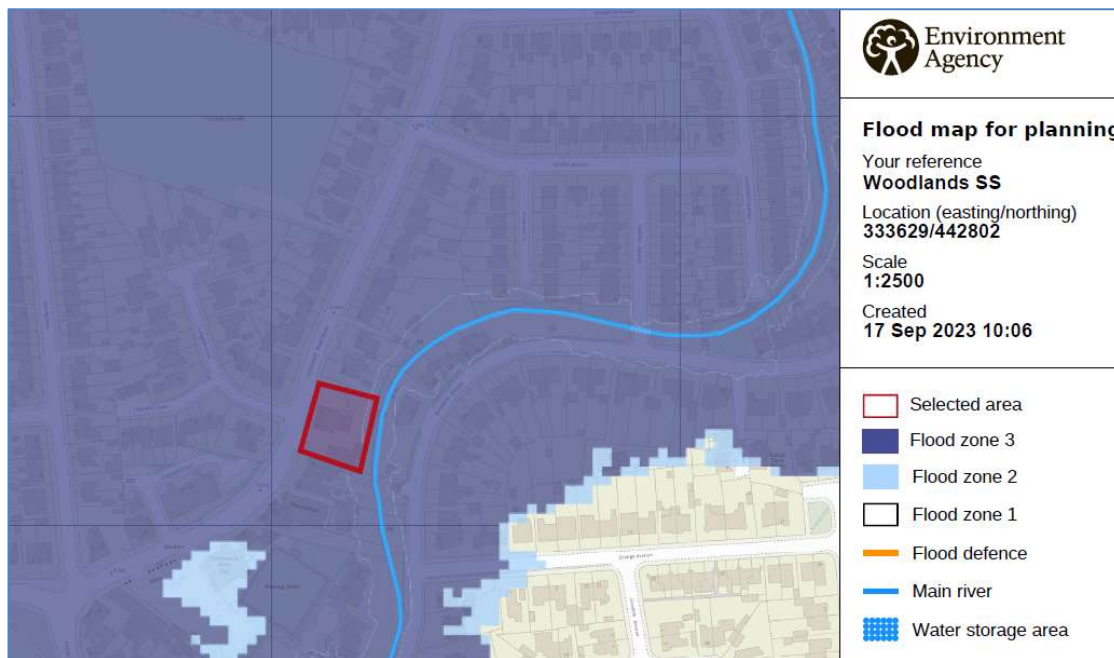


Figure 2. Environment Agency Flood Zone Map¹⁰

¹⁰ www.flood-map-for-planning.service.gov.uk accessed 17th September 2023.

Figure 3 presents the Environment Agency's flood map for rivers and the sea which takes into account the presence of flood defences. This confirms that the application site has a very low risk of flooding from rivers or the sea, defined as less than 0.1% annual probability, due to the presence of flood defences.



Figure 3. Environment Agency Flood Map for Rivers and the Sea

Figure 2-2 of the Level 1 SFRA confirms that the dominant source of flood risk in the area is tidal flooding. The north-south aligned coastline of Thornton-Cleveleys has historically been subject to extensive flooding with extensive areas of built development within Flood Zone 3. These areas, including the application site, are protected from tidal flooding by concrete coastal defences to the west and north and by earth embankments to the east.

The SFRA also confirms a long-term plan to provide continued protection; the residential areas of Thornton and Cleveleys will therefore continue to be defended.

The site-specific Product 4 response received from the Environment Agency is presented as Appendix 4 and includes predicted flood water level data from the Hillylaid Pool 2013 model and the Wyre Estuary Tidal 2014 model. The Hillylaid Pool modelling study assesses the fluvial flood risk to the application site and the Wyre Estuary modelling study assesses the tidal flood risk from the sea.

Fluvial Flood Risk – Hillylaid Pool 2013 Model

Predicted peak fluvial flood water levels are provided for the defended scenario, taking into account the presence of local flood defences, and for the undefended scenario which ignores the presence of flood defences. Model node 6 is adjacent to the application site and the following peak flood water levels are predicted:

Table 1: Predicted Peak Flood Water Levels, Hillylaid Pool

Hillylaid Pool 2013 Model Results – Predicted Peak Flood Water Level (mAOD)		
Model Scenario	Defended Scenario	Undefended Scenario
1.0% Annual Probability	4.15	4.35
0.1% Annual Probability	4.59	4.49
1.0% Annual Probability + 20% Climate Change	4.26	4.37

Section 2.2.4 of this report confirms that a 35% climate change allowance for peak river flows is appropriate for the development; therefore, the design fluvial flood event is represented by the 1% annual probability + 35% climate change. Whilst the design flood event has not been considered within the Hillylaid Pool model scenarios, the results presented in Table 1 confirm a peak predicted flood water level for the extreme, 0.1% annual probability flood event of 4.59mAOD. Review of the site topography (Appendix 2) confirms a minimum site level of 4.83mAOD along the eastern boundary, adjacent to Hillylaid Pool; this remains 0.24m above the peak predicted 0.1% annual probability flood water level. Therefore, it is inferred that the site would also remain dry during the design fluvial flood event, with the site located within fluvial Flood Zone 1.

Tidal Flood Risk – Wyre Estuary

The Environment Agency's Product 4 data (Appendix 4) includes results from the 2014 Wyre Estuary Tidal model. The application site is shown to have <0.1% annual probability of tidal flooding, due to the presence of flood defences.

Section 2.2.4 of this report confirms that local sea levels are predicted to rise by between 730mm (higher central allowance) and 1011.4mm (upper end allowance) due to climate change, over the lifetime of the development (from the 2014 modelled scenario). The Environment Agency's guidance confirms that both the higher central and upper end allowance should be considered within FRAs.

The 2014 tidal model predicts a peak flood water level within the application site of 4.91mAOD for the 0.5% annual probability tidal flood event + 970mm sea level rise, for the defended scenario. The worse-case, upper end climate change allowance for sea level rise is 1011.4mm, which is 41.4mm (0.04m) higher than that included within the modelling study. Therefore, a worse-case design flood tidal water level, assuming the existing flood defences and a 0.5% annual probability flood event with 1011.4mm sea level rise can be inferred as **4.95mAOD** (4.91 + 0.04). Review of the site topographic survey (Appendix 2) confirms that the majority of the application site would remain dry during this scenario, with limited flooding occurring in the extreme south-east of the site only (peak flood water depth: 0.12m).

It is reiterated that local flood risk management policy proposes to upgrade the existing flood defences as required by sea level rise, to ensure Thornton-Cleveleys remains defended.

Residual Flood Risk

The application site benefits from tidal flood defences and there is a residual risk of flooding in the unlikely event of a flood defence breach, or overtopping of defences during an extreme flood event. The Environment Agency's Product 4 data confirms that the application site would remain dry during the extreme, 0.1% annual probability flood event, due to the presence of flood defences; therefore, the defences are not predicted to overtop during this extreme flood event.

The Environment Agency has provided the results of a flood defence breach assessment; this presents the predicted peak flood water level and velocity in the event of a breach of the flood defences during the 0.5% annual probability tidal flood event (2014). The peak predicted flood water level within the application site during this scenario is 4.97mAOD. Review of the site topographic survey (Appendix 2) indicates that this would result in limited isolated flooding to depths of <150mm in the extreme south-east of the site and in the north-west, adjacent to Fleetwood Road North. The hazard rating within the application site is classified as 'low hazard', where caution should be applied. The hazard rating increases within the surrounding road network to 'moderate' (dangerous for some e.g. children) and occasionally to 'significant' (dangerous for most people), based on the predicted flood water depth and velocity.

Summary

In summary, the application site is located within Flood Zone 3 which extends across the wide, urban region of Thornton-Cleveleys and the entire area benefits from flood defences. The results of hydraulic modelling indicate that the site is at very low probability of fluvial flooding from the adjacent Hillylaid Pool, with <0.1% annual probability of flooding (for both the defended and undefended scenarios).

The primary source of flood risk is tidal flooding from the coast and tidal River Wyre. The application site benefits from flood defences and the results of hydraulic modelling confirm that the site is defended during the extreme, present-day 0.1% annual probability tidal flood event. However, limited flooding within the south-east corner of the site is predicted to occur during the design flood event, when long-term climate change is taken into account, with a peak predicted flood water level of **4.95mAOD**, equivalent to a peak flood water depth of **0.12m**. This is based on the present-day flood defences.

There is a residual risk of flooding to the site, in the event of a breach of the flood defences. The results of hydraulic modelling indicate a peak present-day (2014) flood water level of **4.97mAOD** for the site, in the unlikely event of a flood defence breach during the 0.5% annual probability flood event. It is noted that the peak flood water level for the breach scenario is unlikely to increase significantly in the future, as a result of long-term climate change, due to the application site's significant distance from the coast and tidal River Wyre and local flood defence policy to ensure Thornton-Cleveleys remains defended.

The flood risk sequential test and recommendations for flood risk mitigation measures are discussed in Sections 2.3 and 2.4 below.

2.2.2 Other Potential Sources of Flooding

The local SFRA, LFRMS and online flood maps have been reviewed to identify any other potential sources of flood risk to the application site and evidence of historic flood events in the local area. This information is presented in Table 2 below.

Table 2: Woodlands Service Station – Potential Sources of Flooding

Potential Source	Significant Potential Risk at Application Site?	Reasoning
Fluvial Flooding	No	Hillylaid Pool (main river) passes within 5m to the east of the application site. The Environment Agency has provided results from the Hillylaid Pool 2013 model; these are reviewed in Section 2.2.1 and confirm that the application site would remain dry during the extreme 0.1% annual probability flood event. Therefore, the site is considered to have a very low risk of flooding from rivers.
Tidal Flooding	Yes	The application site is in the vicinity of the tidal River Wyre and is located within high probability Flood Zone 3 but benefits from flood defences. The risk of tidal flooding is assessed in Section 2.2.1.
Flooding from High Groundwater	No	The Environment Agency's online long-term flood risk service indicates that flooding from groundwater is 'unlikely' in the area of the site. Figure 9.3 of the SFRA indicates that the application site lies within a region with low susceptibility to groundwater flooding (less than 25% of the 1km grid square has hydrogeological conditions which indicate that groundwater may emerge). No below ground (basement) development is proposed, therefore the risk of flooding from groundwater is considered low and acceptable.
Surface Water Flooding	No	The Environment Agency's online mapping indicates that the application site is at very low risk of surface water flooding; this is discussed further below.
Flooding from Artificial Drainage Systems	No	The application site is located just outside the Thornton Critical Drainage Area identified within the SFRA. Whilst the SFRA indicates that sewer flooding incidents have been recorded in the local area, the majority of the application site is slightly elevated above the adjacent Fleetwood Road North, suggesting a low potential risk of on-site flooding.
Flooding due to Infrastructure Failure	No	The Environment Agency's online mapping confirms that the application site is not within the predicted maximum extent of flooding of local reservoir(s).

Table 2 confirms that the only significant potential source of flooding identified within the application site is tidal flooding. The fluvial and tidal flood risk are detailed above in Section 2.2.1, with appropriate mitigation measures for tidal flood risk presented in Section 2.4.

Figure 4 presents the Environment Agency's surface water flood map for the application site; this indicates that the risk of surface water flooding within the application site is very low (<0.1% annual probability).



Figure 4. Environment Agency Surface Water Flood Map

2.2.3 Historic Flooding

Review of the Environment Agency's online historic flood map confirms that the application site has no previously recorded flooding¹¹. The Environment Agency's consultation response (Appendix 4) confirms there are no recorded flood events. However, it is noted that the application site lies within the Environment Agency's flood warning area for the Wyre Estuary at Thornton (between A585 Stanah Road and School Road).

Figure 7-1 of the Level 1 SFRA presents details of historic flood events from all sources; no recent flood events are noted within Thornton-Cleveleys.

2.2.4 Climate Change

The Environment Agency's climate change allowances guidance¹² confirms that rainfall, sea levels and river flows are predicted to increase as a result of climate change, which must be considered throughout the lifetime of the proposed development. The application site lies within the Wyre Management Catchment, where peak river flows are predicted to increase by between 35% (central allowance) and 67% (upper end allowance) by the 2080s.

The Environment Agency's guidance confirms that the central climate change allowance (35%) is appropriate for less vulnerable development within Flood Zone 2 or 3a. This has been considered within the assessment of fluvial flood risk (Section 2.2.1).

¹¹<https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/HistoricFloodMap&Mode=spatial> accessed 11th September 2023.

¹² Environment Agency, February 2016 (last updated: May 2022), Guidance: Flood Risk Assessments: Climate Change Allowances.

The application site lies within the North West River Basin District where sea levels are predicted to rise between 730mm (higher central allowance) and 1011.4mm (upper end allowance) from 2014 (date of Environment Agency tidal model) and 2104 (assumed 2024-2104 lifetime of development, based on standard 80-year design life). This has been considered within the assessment of tidal flood risk (Section 2.2.1).

The Environment Agency's climate change allowances guidance also indicates that peak rainfall intensity for the 1% annual probability rainfall event within the Wyre Management Catchment is predicted to increase by between 35% (central allowance) and 50% (upper allowance) by the 2070's (2061 to 2125).

The Environment Agency's guidance confirms that drainage systems should be designed for new development to ensure there is no increase in the rate of runoff discharged from the site for the upper end climate change allowance appropriate to the lifetime of the development. A surface water drainage strategy has been developed for the site which includes appropriate allowance for long-term climate change (refer to Section 3).

2.3 Flood Risk Sequential Test

As set out in the NPPF, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding (Flood Zone 1).

The proposed development is limited to an upgrade of the existing petrol filling station only, with the footprint of new development limited to a minor extension of the petrol filling station kiosk (converted from the existing workshop building). Therefore, with regards flood risk, the proposed development would be classified as a minor extension (<250m²) and is exempt from the flood risk sequential test.

The proposed development is classified as 'less vulnerable' with regards flood risk and Table 2 of the NPPF guidance² confirms that less vulnerable development is considered appropriate within Flood Zones 1, 2 and 3a.

The application site benefits from flood defences, which will be maintained over the long-term, in response to climate change. However, it is recognised that a residual risk of flooding remains within the application site in the unlikely event of a breach of the flood defences. Therefore, appropriate flood risk mitigation measures are outlined in Section 2.4 below.

2.4 Flood Risk Mitigation Measures

Hillylaid Pool Easement

Hillylaid Pool flows immediately east of the application site and is classified as a main river; therefore, any works within 8m of the edge of the river bank are likely to require an Environment Agency Flood Risk Activity Permit. The proposed development layout (Appendix 3) has been prepared with due consideration of the 8m easement and no new buildings are proposed within this easement. Works within the easement are limited to the erection of a replacement perimeter fence, change of use of the existing building and potential changes/replacement to external surfaces. There will be no land raising within this easement and the perimeter fence has been designed as post and rail, to ensure it would not form a potential barrier to overland flood flows. Any requirement for a Flood Risk Activity Permit for these works should be confirmed with the Environment Agency post-planning.

Finished Floor Level and Flood Resistant/Resilient Design

The site topographic survey (Appendix 2) confirms an existing finished floor level of the building of 5.11mAOD; the floor level of the proposed extension will remain consistent with this existing level. This FRA has confirmed that the application site is at very low risk of tidal flooding, due to the presence of flood defences, with a worse-case peak flood water level of 4.97mAOD in the unlikely event of a flood defence breach during the 0.5% annual probability tidal event. Therefore, the finished floor level remains 0.14m above the breach flood water level and no additional flood resistant or flood resilient design measures are considered necessary or appropriate.

Flood Warning & Evacuation Plan

Due to the widespread risk of flooding in the unlikely event of a breach of the local flood defences, and the increased flood hazard predicted within the surrounding road network, it is recommended that a Flood Warning and Evacuation Plan be prepared for the development.

The application site is located within the Environment Agency's Flood Warning Area for Wyre Estuary at Thornton and the property manager would sign up to the Environment Agency's free Flood Warning Service. The Flood Warning and Evacuation Plan would set out appropriate actions to be taken in the event of a flood alert or flood warning being issued.

Surface Water Management

It is recognised that new development has the potential to increase the rate and volume of surface water runoff through the introduction of impermeable surfaces; this could result in an increased flood risk to others.

The proposed development is limited to an update of the existing petrol filling station; the existing surface coverings are entirely impermeable. Therefore, there will be no significant change in surface water runoff rates or volumes post-development. However, a sustainable surface water drainage strategy is proposed for the development, with details provided in Section 3.

The drainage strategy shall ensure the appropriate management of surface water runoff to minimise the risk of surface water flooding to the development and shall reduce the current peak off-site discharge rate by 74%, thereby reducing flood risk to others, as detailed in Section 3.

Site Access and Evacuation

The application site is located within the Environment Agency's flood warning area for the Wyre Estuary at Thornton (between A585 Stanah Road and School Road), and it is recommended that a Flood Warning and Evacuation Plan be prepared for the development. The property manager should sign up to the Environment Agency's free Flood Warning Service and the Flood Warning and Evacuation Plan would set out the appropriate actions to be taken in the event of a Flood Alert or Flood Warning being issued.

3.0 SURFACE WATER MANAGEMENT

In accordance with local and national planning policy, a surface water drainage strategy has been prepared for the development, to ensure it does not increase flood risk to others and to ensure the risk of surface water flooding to the development is appropriately managed.

A surface water drainage strategy has been prepared for the development by Goodson Associates¹³, and the proposed drainage layout plan is included as Appendix 5.

The potential to discharge surface water runoff to ground is limited by the low permeability ground conditions and historic use of the site as a petrol filling station. Therefore, in accordance with the SuDS hierarchy, surface water runoff from the development shall be discharged to Hillylaid Pool via the site's existing outfall.

Peak surface water runoff rates from the development shall be restricted to a maximum of 5l/s, representing a 74% reduction from the existing brownfield runoff rate, for all rainfall events up to and including the 100-year event with 50% allowance for long term climate change.

Attenuation shall be provided via a below-ground cellular storage tank, with a flow control device restricting the off-site discharge to the watercourse.

¹³ Goodson Associates, 22 September 2023, Proposed PFS Redevelopment, Woodland Service, Fleetwood Road North, Thornton-Cleveleys, Drainage Strategy Report. Project No. P15701.

4.0 SUMMARY AND CONCLUSIONS

This report represents a site-specific Flood Risk Assessment to support the proposed upgrade of the existing Woodlands Service Station off Fleetwood Road North, Thornton-Cleveleys, Lancashire, FY5 4BL.

The Environment Agency flood zone map for planning indicates that the application site lies entirely within Flood Zone 3; therefore, a detailed site-specific FRA is required.

A review of all potential sources of flooding to the application site has been undertaken and the Environment Agency has been consulted to obtain site-specific predicted flood risk information.

The FRA concludes that the only significant potential source of flooding to the application site is tidal flooding. The application site and wider Thornton-Cleveleys area benefit from flood defences, with a policy to maintain and upgrade the defences over the long term. Due to the presence of flood defences, the risk of tidal flooding to the site is very low (<0.1% annual probability). Therefore, the site would remain dry during the extreme 0.1% annual probability flood event.

In the unlikely event of a breach of the flood defences during the 0.5% annual probability tidal flood event, hydraulic modelling predicts a peak flood water level of 4.97mAOD within the site. This would result in very limited, low depth flooding within the south-east and north-west corners of the site only; no flooding of any buildings or infrastructure is predicted.

The proposed development is limited to an upgrade of the existing petrol filling station; the existing kiosk would be demolished, and the existing workshop converted and extended to provide a replacement kiosk building. The finished floor level of this building remains above the peak 0.1% annual probability (defended) flood water level and above the predicted breach flood water level.

Based on the findings of this FRA, the following site-specific mitigation measures are recommended:

- Works within the 8m main river easement of Hillylaid Pool are limited to the erection of a replacement perimeter fence, change of use of the existing building and potential changes/replacement to external surfaces. Any requirement for a Flood Risk Activity Permit for these works should be confirmed with the Environment Agency post-planning.
- The application site is located within an Environment Agency Flood Warning Area, and it is recommended that a Flood Warning and Evacuation Plan be prepared for the development. The property manager should sign up to the Environment Agency's free Flood Warning Service and the Flood Warning and Evacuation Plan would set out the appropriate actions to be taken in the event of a Flood Alert or Flood Warning being issued.
- A surface water drainage strategy has been prepared for the development to ensure the appropriate management of surface water runoff. The peak runoff rate would be attenuated to provide a 74% reduction from the existing brownfield rate via below ground attenuation with a controlled discharge to Hillylaid Pool via the site's existing outfall.

This FRA concludes that the proposed upgrade of the existing petrol filling station, classified as 'less vulnerable' development, off Fleetwood Road North, Thornton-Cleveleys is appropriate and sustainable with regards to flood risk.

5.0 CLOSURE

This report has been prepared by Nicola Sugg (trading style of NSugg Limited) with all reasonable skill and care, and in accordance with the services agreed with Penny Petroleum Ltd. Relevant information provided by ADS Design has been accepted in good faith as being accurate and valid. This report is based on the relevant guidance and legislation in force at the date of the report and should be reviewed if such guidance and legislation are amended or superseded.

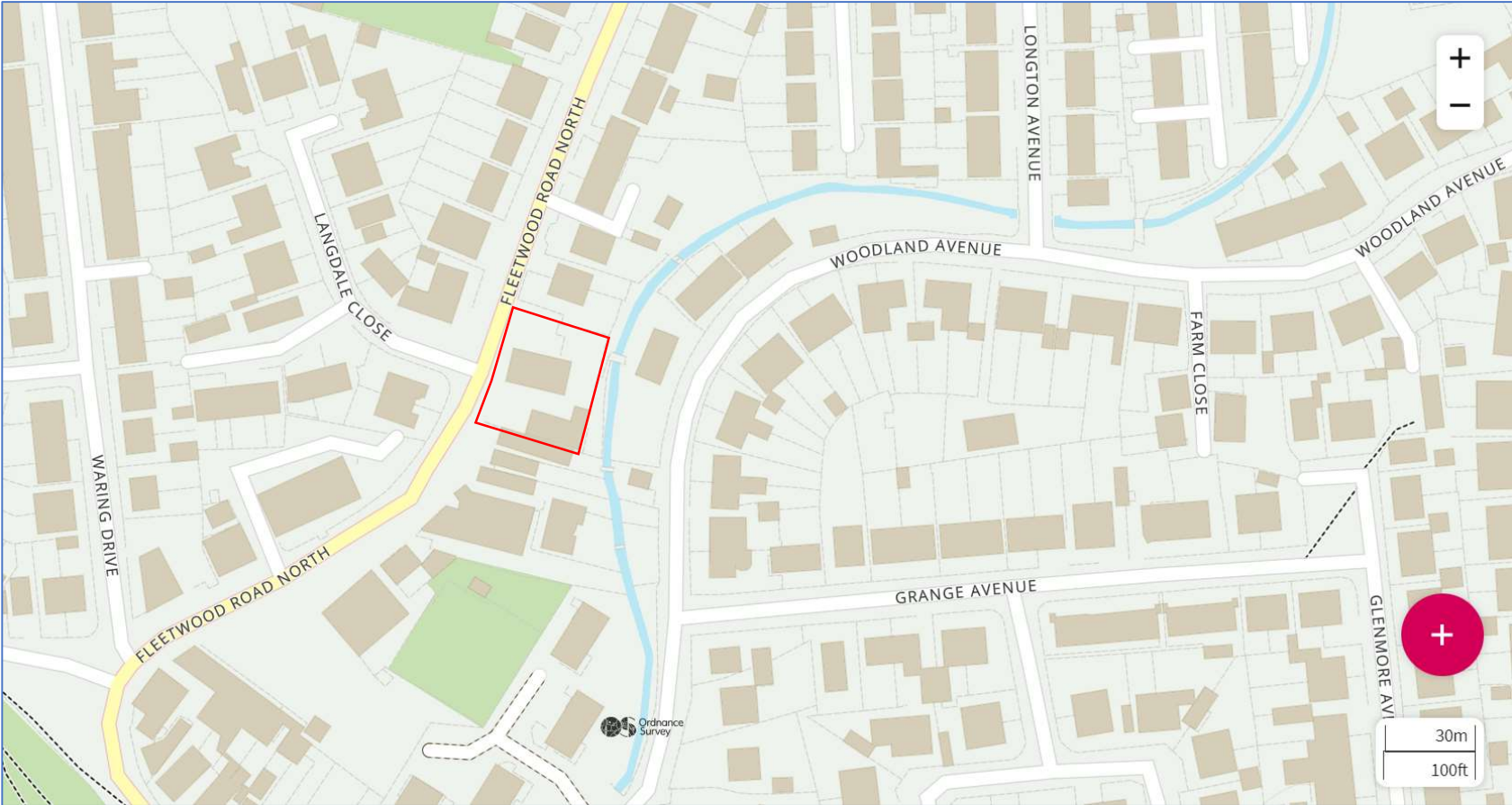
NSugg Ltd do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

It will be the owner's /occupier's responsibility to ensure the recommended flood risk mitigation measures outlined within this FRA are implemented and to maintain the site drainage system throughout the lifetime of the development.

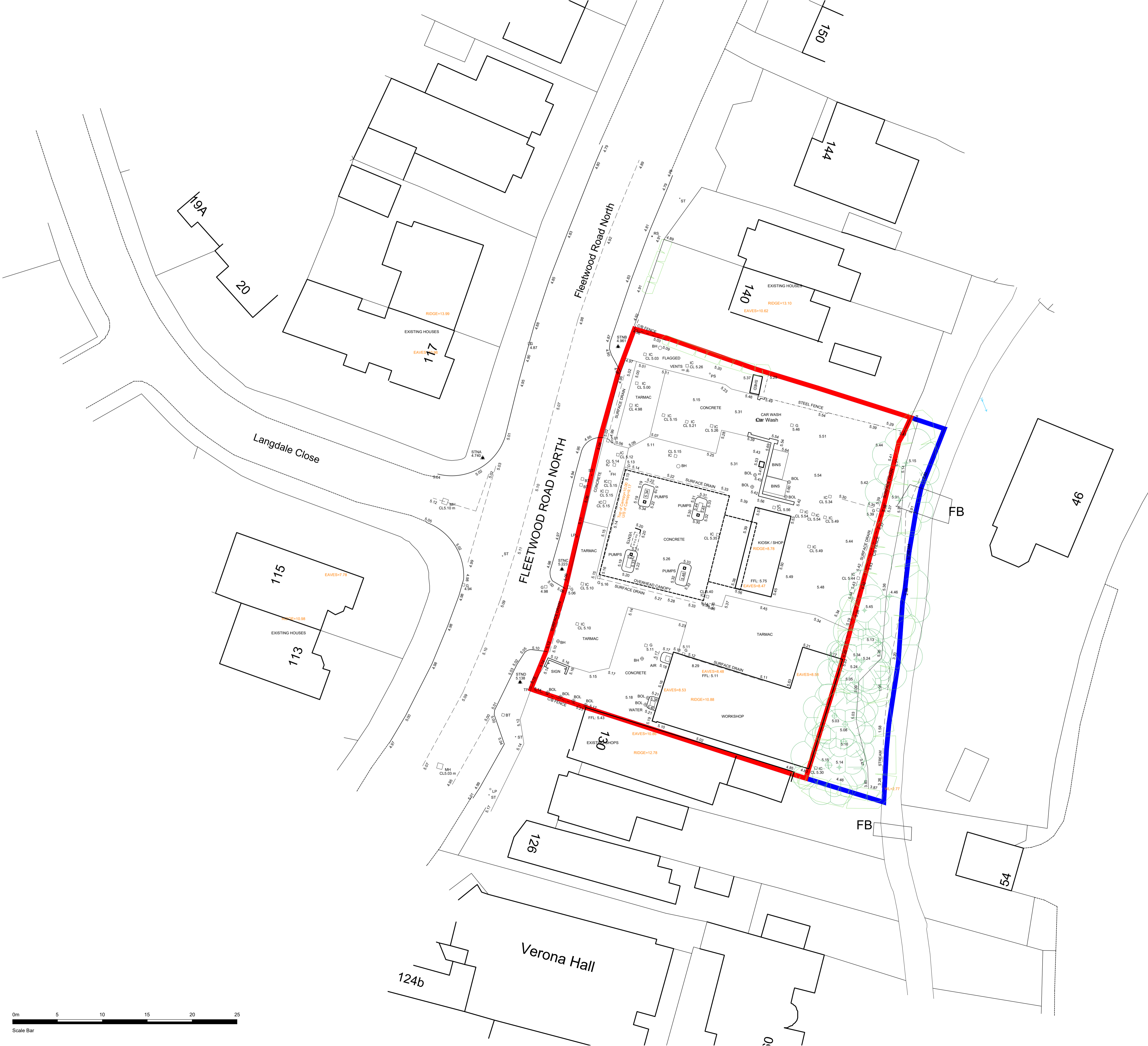
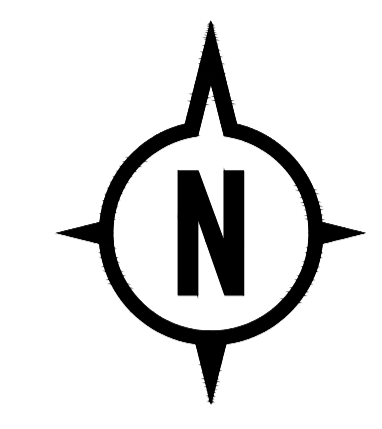
This report is for the exclusive use of ADS Design and Penny Petroleum Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Nicola Sugg.

APPENDIX 1

Woodlands Service Station, Fleetwood Road North, Thornton-Cleveleys – Site Location Plan

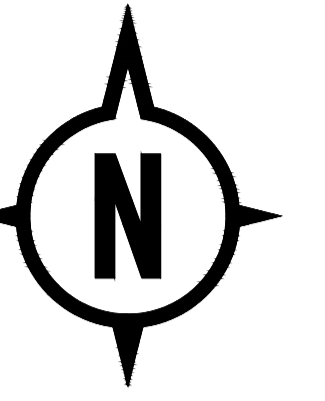


APPENDIX 2



REVISIONS	
CLIENT	PENNY PETROLEUM
PROJECT	WOODLAND S/STN FLEETWOOD ROAD FY5 4BL
TITLE	EXISTING SITE LAYOUT
DATE	10.08.23
SCALE	1:200 @ A1
JOB ID	2067
DWG	5

APPENDIX 3



REVISIONS	
E	11.09.23 PARKING SPACE ADDED
D	07.09.23 BUILDING ENTRANCE MOVED
C	07.09.23 BUILDING EXTENDED PARKING REVISED
B	17.08.23 VENTS AS EXISTING ATM REMOVED, LAUNDRY ROTATED
A	16.08.23 EV, AW AND LAUNDRY POSITIONS REVISED, CAR WASH AND WASH BAYS POSITION REVISED

CLIENT	PENNY PETROLEUM
PROJECT	WOODLAND S/STN FLEETWOOD ROAD FY5 4BL
TITLE	PROPOSED SITE LAYOUT
DATE	14.08.23
SCALE	1:200 @ A1
JOB ID	2067
DWG	6e

APPENDIX 4

Nicola Sugg

From: CMBLNC Info Requests <Inforequests.cmblnc@environment-agency.gov.uk>
Sent: 30 August 2023 11:17
To: Nicola Sugg
Subject: CL322458RC- Woodlands Service Station, Thornton-Cleveleys - Flood Risk Assessment Data Request (Product 4)- RESPONSE

Dear Nicola,

Enquiry regarding product data.

Thank you for your enquiry received on 17th August 2023.

We respond under the Freedom of Information Act 2000 and Environment Information Regulations 2004. Please find further information attached and below:

- The Tidal data provided has been taken from the Wyre Estuary Tidal ABD study produced in 2014. Fluvial data was taken from the Hillylaid Pool 2013 Study. For information on the latest climate change allowances, please visit: www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.
- The data shows the site to be unaffected by the 0.5% AEP, 0.5% AEP + Climate Change (370mm and 670mm) and 0.1% AEP defended scenarios from the 2014 Wyre Estuary Tidal study, and therefore no outline maps have been provided.
- Please also find attached a Tidal Product 8. No breach analysis data is available from the Hillylaid Pool 2013 study for this location and therefore no fluvial breach hazard map can be provided.
- The Environment Agency holds no records of flooding for the site of interest. Please be aware, however, that this does not necessarily mean that flooding has not occurred here in the past as our records are not comprehensive.
- For all queries relating to flooding from surface water, ordinary watercourses and groundwater flooding, please contact the Lead Local Flood Authority Lancashire County Council.
- Surface Water Maps can be viewed online at <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>.

Please refer to [Open Government Licence](#) which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards.

Rosie Cumella
Customer Engagement officer
Cumbria and Lancashire

From: CMBLNC Info Requests
Sent: 17 August 2023 10:40
To: Nicola Sugg <nicola@nsugg.co.uk>
Subject: CL322458RC- Woodlands Service Station, Thornton-Cleveleys - Flood Risk Assessment Data Request (Product 4)

Flood risk assessment data

Location of site: 333630 / 442804 (shown as easting and northing coordinates)

Document created on: 29 August 2023

This information was previously known as a product 4.

Customer reference number: 8FATKE5DYKMW

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- flood defences and attributes
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Not included in this document

This document does not include a Flood Defence Breach Hazard Map.

If your location has a reduced flood risk from rivers and sea because of defences, you need to request a Flood Defence Breach Hazard Map and information about the level of flood protection offered at your location from the Cumbria and Lancashire Environment Agency team at inforequests.cmlnc@environment-agency.gov.uk. This information will only be available if modelling has been carried out for breach scenarios.

Include a site location map in your request.

Information that's unavailable

This document **does not** contain:

- historic flooding

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to flooding from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they

have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Hillylaid Pool 2013

Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial

Date: 1 February 2012

Model name: Wyre Estuary_Tidal 2014

Scenario(s): Defended tidal, defences removed tidal, defended climate change tidal, defences removed climate change tidal

Date: 30 July 2014

These models contain the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.







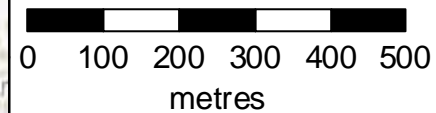
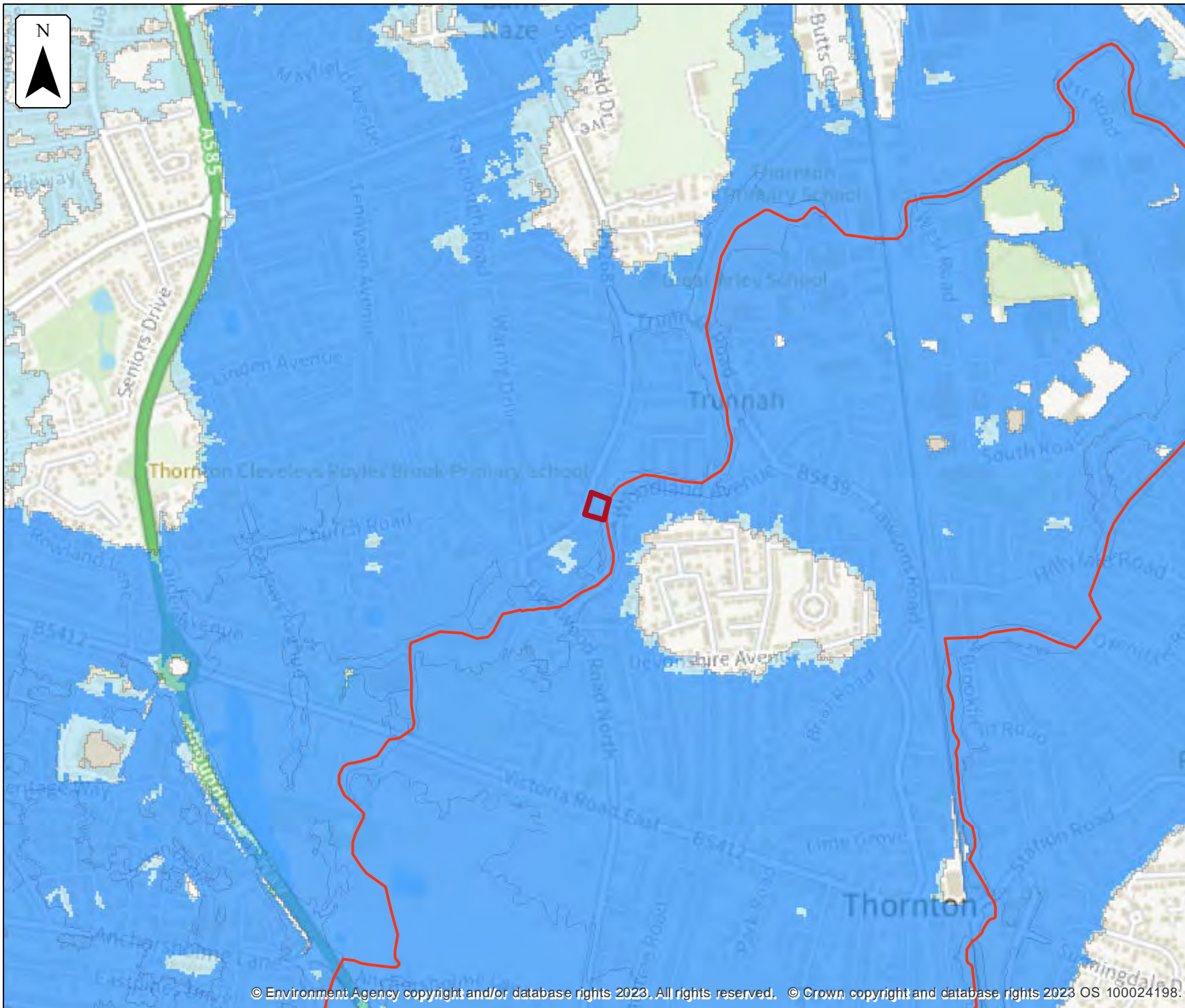
Flood map for planning

Location (easting/northing)
333630/442804

Scale
1:10,000

Created
29 Aug 2023

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is in mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.






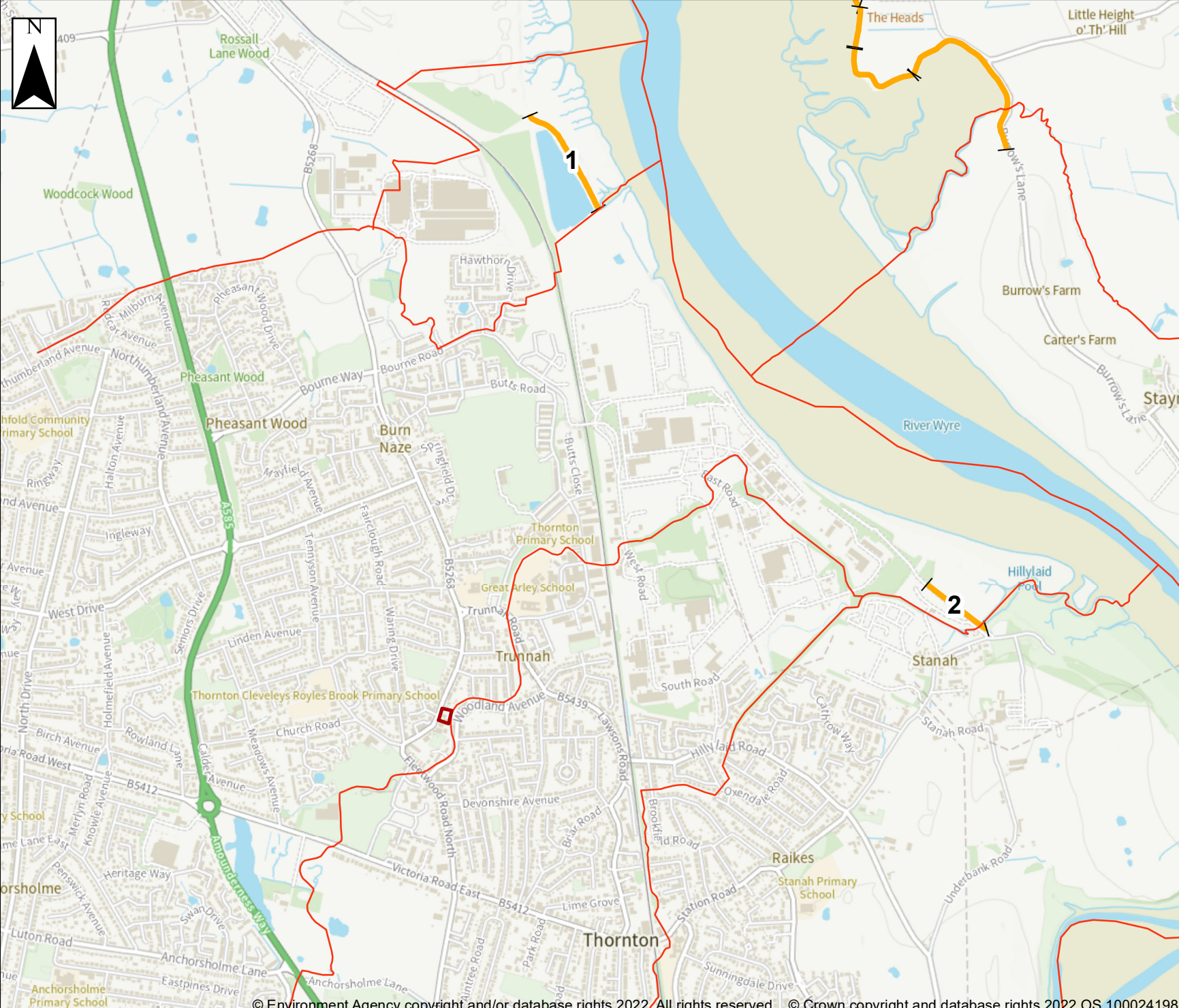
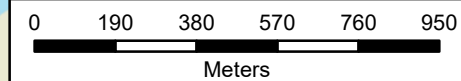
Flood Defences

Location (easting/northing)
333630 / 442804

Scale
1:17,746

Created
29 Aug 2023

-  Selected area
-  Main river
-  Flood defence



Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	105371	Embankment	200	3 - Fair	6.95	7.06	6.95
2	106606	Embankment	25	3 - Fair	8.15	7.63	7.63

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- Defended modelled tidal: risk of flooding from the sea where there are flood defences
- Defences removed modelled tidal: risk of flooding from the sea where flood defences have been removed
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change
- Defended climate change modelled tidal: risk of flooding from the sea where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled tidal: risk of flooding from the sea where flood defences have been removed, including estimated impact of climate change



Defended modelled fluvial extent

Location (easting/northing)
333630/442804


Scale Created
1:10,000 29 Aug 2023


Model name
Hillylaid Pool 2013


 Selected area


 Main river


Modelled flood extent


 5% AEP

 2% AEP

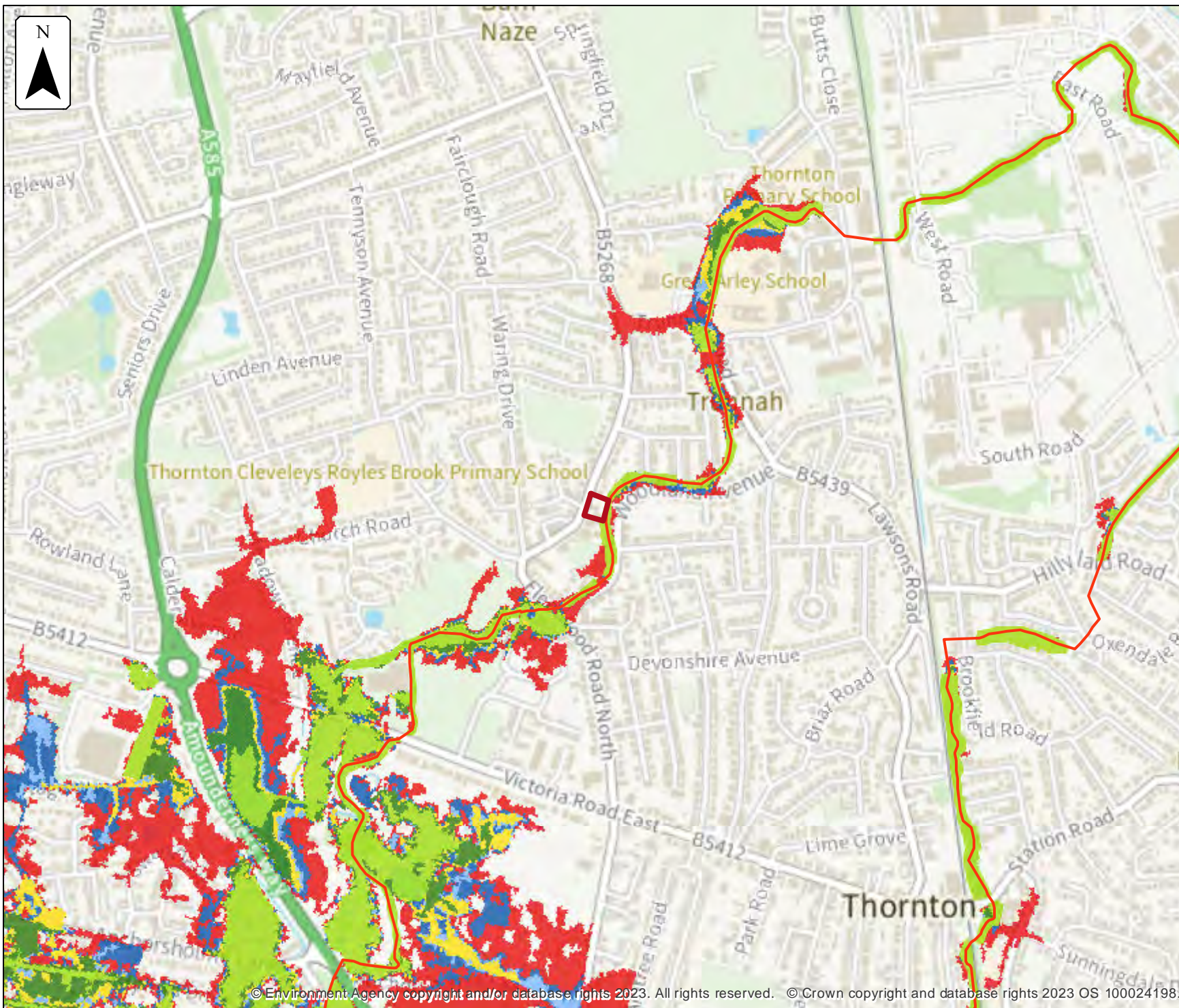
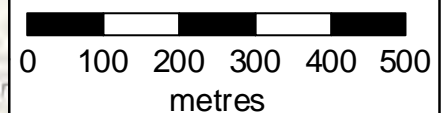
 1.33% AEP

 1% AEP

 0.5% AEP

 0.1% AEP

Flood extents may not be visible where they overlap other return periods








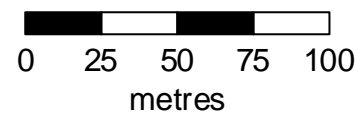
Defended modelled fluvial node locations

Location (easting/northing)
333630/442804

Scale Created
1:2,500 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	992960	333483	442602	4.30	2.02	4.38	2.08	4.42	2.08	4.43	2.08	4.47	2.10	4.55	2.12
2	992798	333564	442614	3.96	2.02	4.06	2.08	4.15	2.08	4.17	2.08	4.31	2.10	4.58	2.12
3	992838	333604	442640	3.96	2.03	4.06	2.08	4.15	2.08	4.17	2.08	4.31	2.10	4.58	2.12
4	992970	333633	442653	3.95	2.05	4.06	2.10	4.15	2.10	4.17	2.11	4.30	2.12	4.58	2.14
5	992885	333651	442667	3.94	2.05	4.05	2.10	4.14	2.10	4.16	2.11	4.30	2.12	4.58	2.14
6	992961	333651	442801	3.91	2.10	4.04	2.15	4.13	2.15	4.15	2.16	4.30	2.18	4.59	2.21
7	992786	333663	442706	3.94	2.08	4.05	2.12	4.14	2.13	4.16	2.13	4.30	2.15	4.58	2.17
8	992787	333761	442861	3.91	2.14	4.03	2.22	4.12	2.20	4.15	2.21	4.29	2.22	4.59	2.25
9	992959	333781	442856	3.90	2.16	4.02	2.22	4.11	2.23	4.14	2.25	4.29	2.26	4.59	2.29
10	992828	333797	442852	3.87	2.16	4.0	2.22	4.09	2.23	4.12	2.25	4.29	2.26	4.63	2.29

Data in this table comes from the Hillylaid Pool 2013 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.






Defended climate change modelled fluvial extent

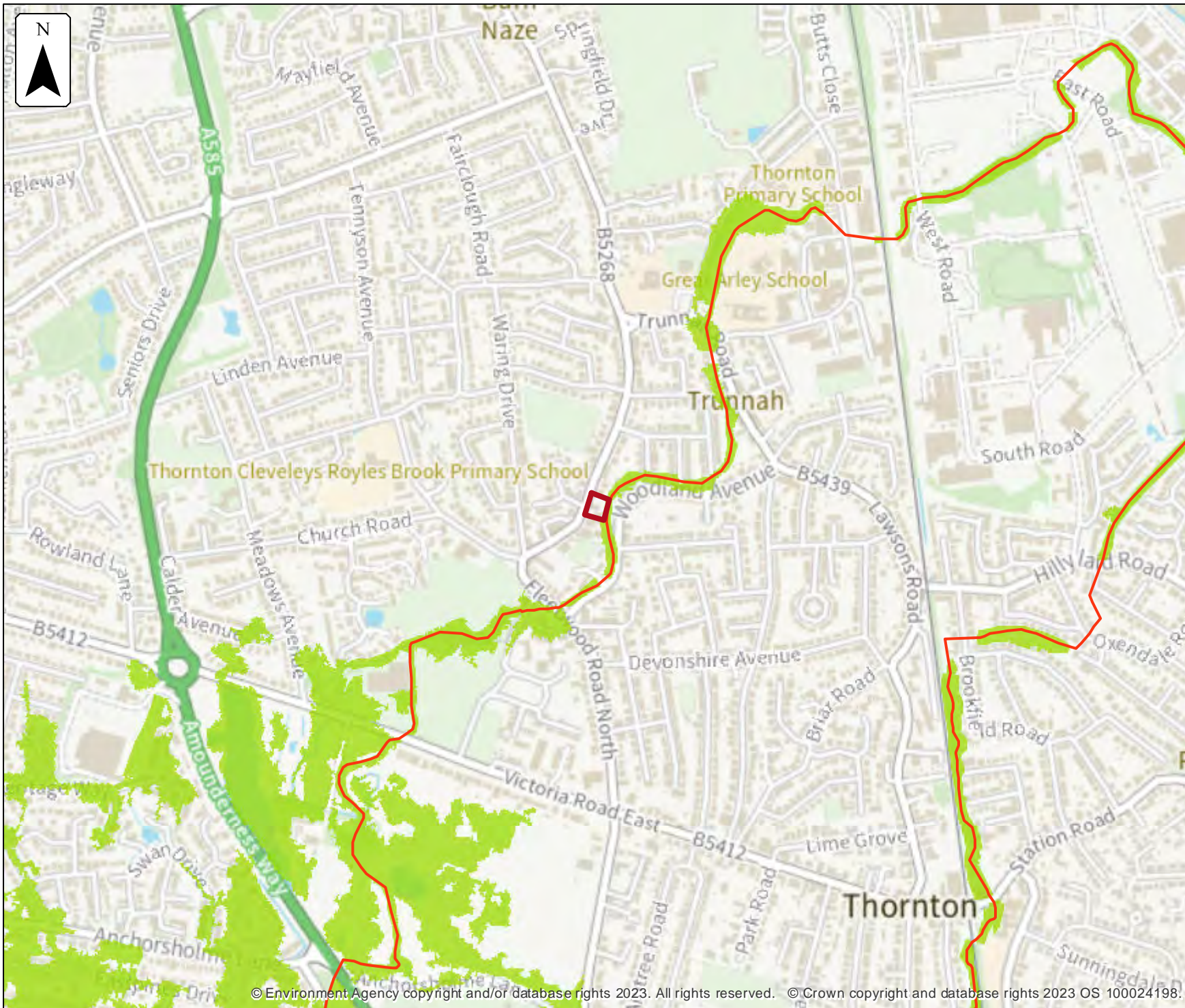
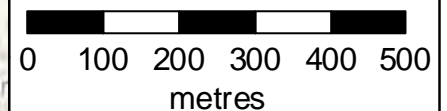
Location (easting/northing)
333630/442804

Scale Created
1:10,000 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Main river
- Modelled flood extent
 -  1.0% AEP (+20%)

Flood extents may not be visible where they overlap other return periods








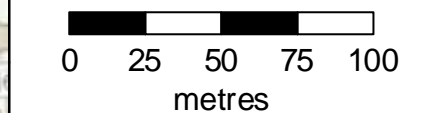
Defended climate change modelled fluvial node locations

Location (easting/northing)
333630/442804

Scale Created
1:2,500 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)	
				Level	Flow
1	992960	333483	442602	4.47	2.08
2	992798	333564	442614	4.28	2.08
3	992838	333604	442640	4.28	2.09
4	992970	333633	442653	4.28	2.11
5	992885	333651	442667	4.27	2.11
6	992961	333651	442801	4.26	2.18
7	992786	333663	442706	4.27	2.14
8	992787	333761	442861	4.26	2.23
9	992959	333781	442856	4.26	2.28
10	992828	333797	442852	4.25	2.28

Data in this table comes from the Hillylaid Pool 2013 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.



Defences removed modelled fluvial extent

Location (easting/northing)
333630/442804

Scale Created
1:10,000 29 Aug 2023

Model name
Hillylaid Pool 2013

Selected area

Main river

Modelled flood extent

5% AEP

2% AEP

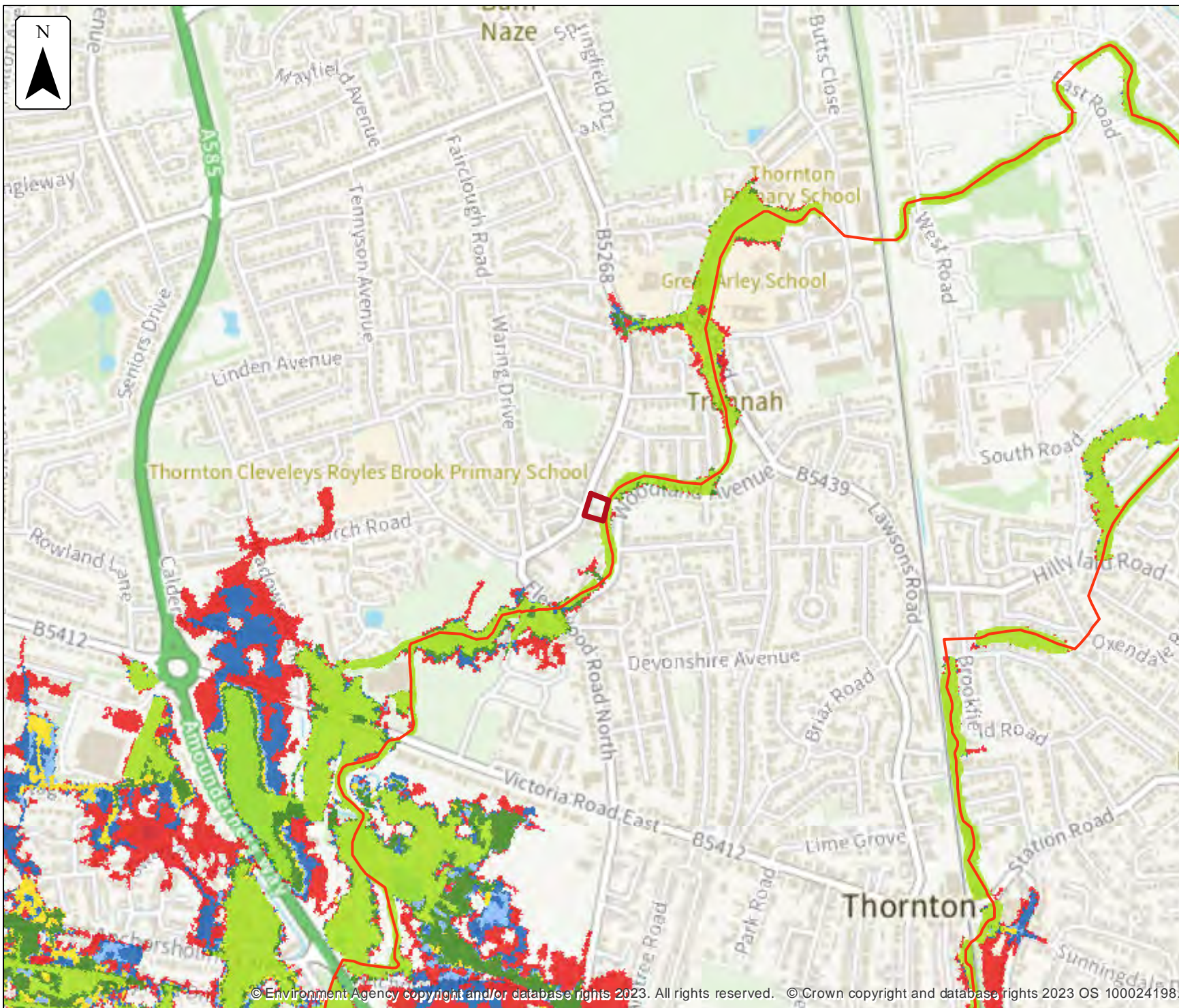
1.33% AEP

1% AEP

0.5% AEP

0.1% AEP

Flood extents may not be visible where they overlap other return periods








Defences removed modelled fluvial node locations

Location (easting/northing)
333630/442804

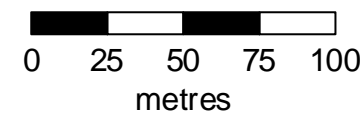
Scale Created
1:2,500 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	992960	333483	442602	4.40	1.99	4.46	2.03	4.46	2.03	4.47	2.03	4.49	2.06	4.53	2.06
2	992798	333564	442614	4.35	1.99	4.42	2.03	4.35	2.03	4.36	2.03	4.38	2.06	4.49	2.06
3	992838	333604	442640	4.35	2.0	4.42	2.03	4.35	2.03	4.36	2.04	4.38	2.07	4.49	2.06
4	992970	333633	442653	4.35	2.02	4.42	2.05	4.35	2.06	4.36	2.06	4.38	2.09	4.49	2.10
5	992885	333651	442667	4.35	2.02	4.42	2.05	4.34	2.06	4.35	2.06	4.38	2.09	4.49	2.10
6	992961	333651	442801	4.35	2.07	4.42	2.11	4.34	2.12	4.35	2.12	4.37	2.16	4.49	2.18
7	992786	333663	442706	4.35	2.04	4.42	2.08	4.34	2.08	4.35	2.09	4.37	2.12	4.49	2.14
8	992787	333761	442861	4.35	2.12	4.42	2.16	4.34	2.16	4.34	2.17	4.37	2.20	4.49	2.27
9	992959	333781	442856	4.35	2.15	4.42	2.18	4.34	2.19	4.35	2.19	4.37	2.24	4.49	2.31
10	992828	333797	442852	4.36	2.15	4.46	2.18	4.36	2.19	4.36	2.19	4.37	2.24	4.49	2.31

Data in this table comes from the Hillylaid Pool 2013 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.






Defences removed climate change modelled fluvial extent

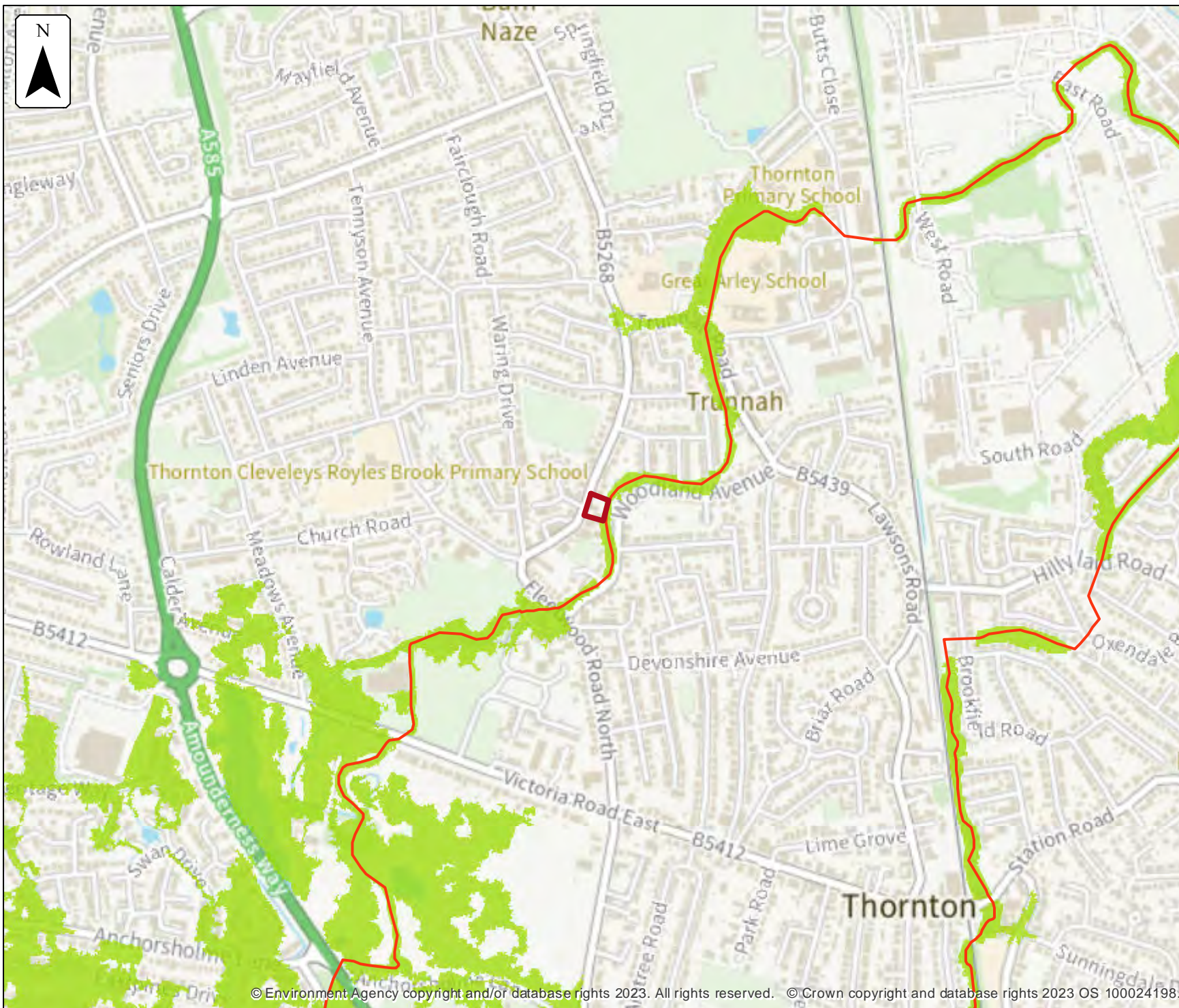
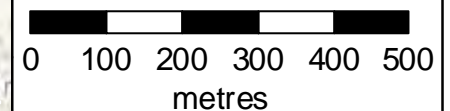
Location (easting/northing)
333630/442804

Scale Created
1:10,000 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Main river
- Modelled flood extent
-  1.0% AEP (+20%)

Flood extents may not be visible where they overlap other return periods








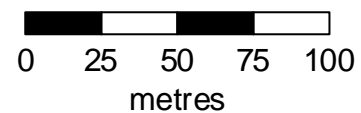
Defences removed climate change modelled fluvial node locations

Location (easting/northing)
333630/442804

Scale Created
1:2,500 29 Aug 2023

Model name
Hillylaid Pool 2013

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)	
				Level	Flow
1	992960	333483	442602	4.49	2.05
2	992798	333564	442614	4.38	2.05
3	992838	333604	442640	4.38	2.05
4	992970	333633	442653	4.38	2.08
5	992885	333651	442667	4.38	2.08
6	992961	333651	442801	4.37	2.14
7	992786	333663	442706	4.38	2.11
8	992787	333761	442861	4.37	2.19
9	992959	333781	442856	4.37	2.22
10	992828	333797	442852	4.39	2.22

Data in this table comes from the Hillyaid Pool 2013 model.

Level values are shown in mAOD, and flow values are shown in cubic metres per second.

Any blank cells show where a particular scenario has not been modelled for this location.

**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

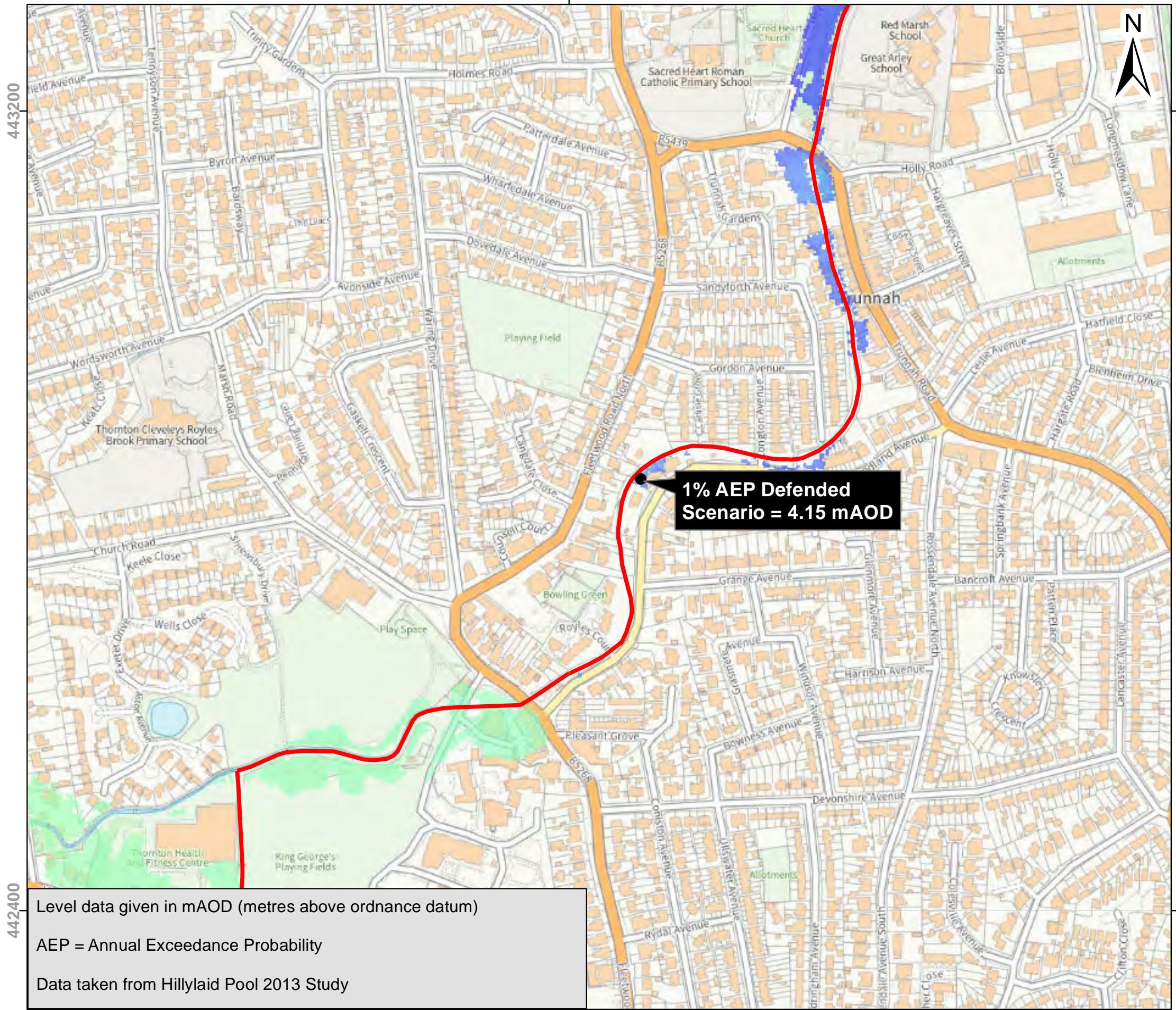
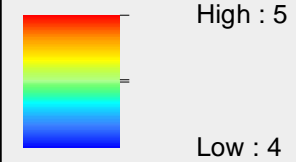
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

Key

 Statutory Main Rivers

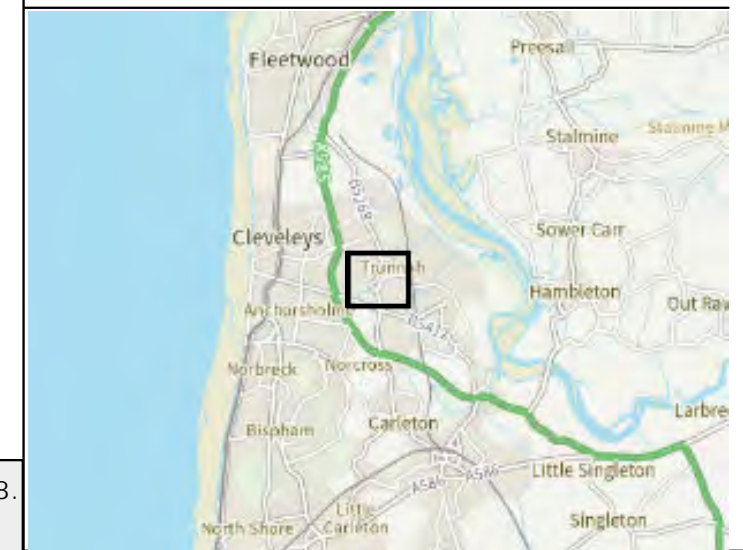
**1% Annual Exceedance Probability
Defended Scenario**

mAOD



**1% AEP Defended
Scenario = 4.15 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study



**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

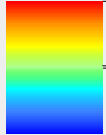
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

Key

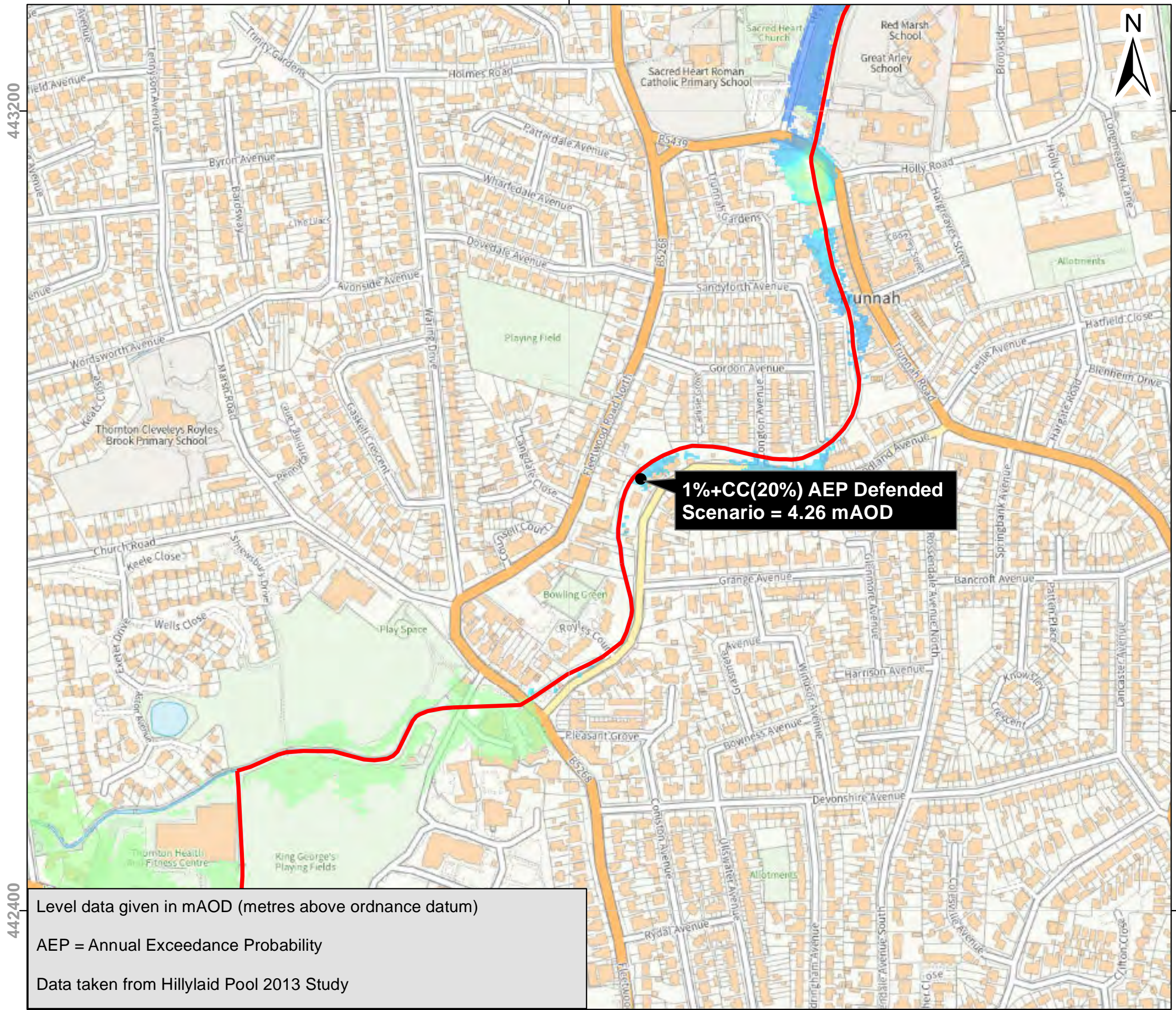
 Statutory Main Rivers

**1% Annual Exceedance Probability
Defended Scenario + Climate Change
(20%)**

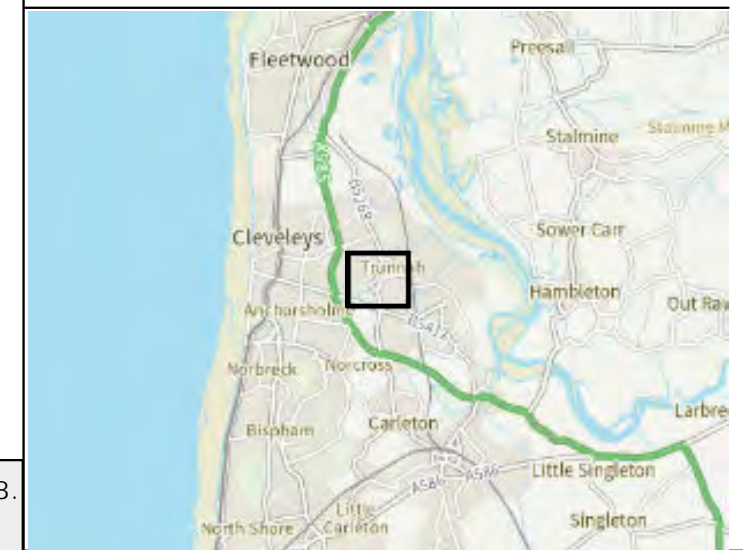
mAOD



High : 5
Low : 4



Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study



**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

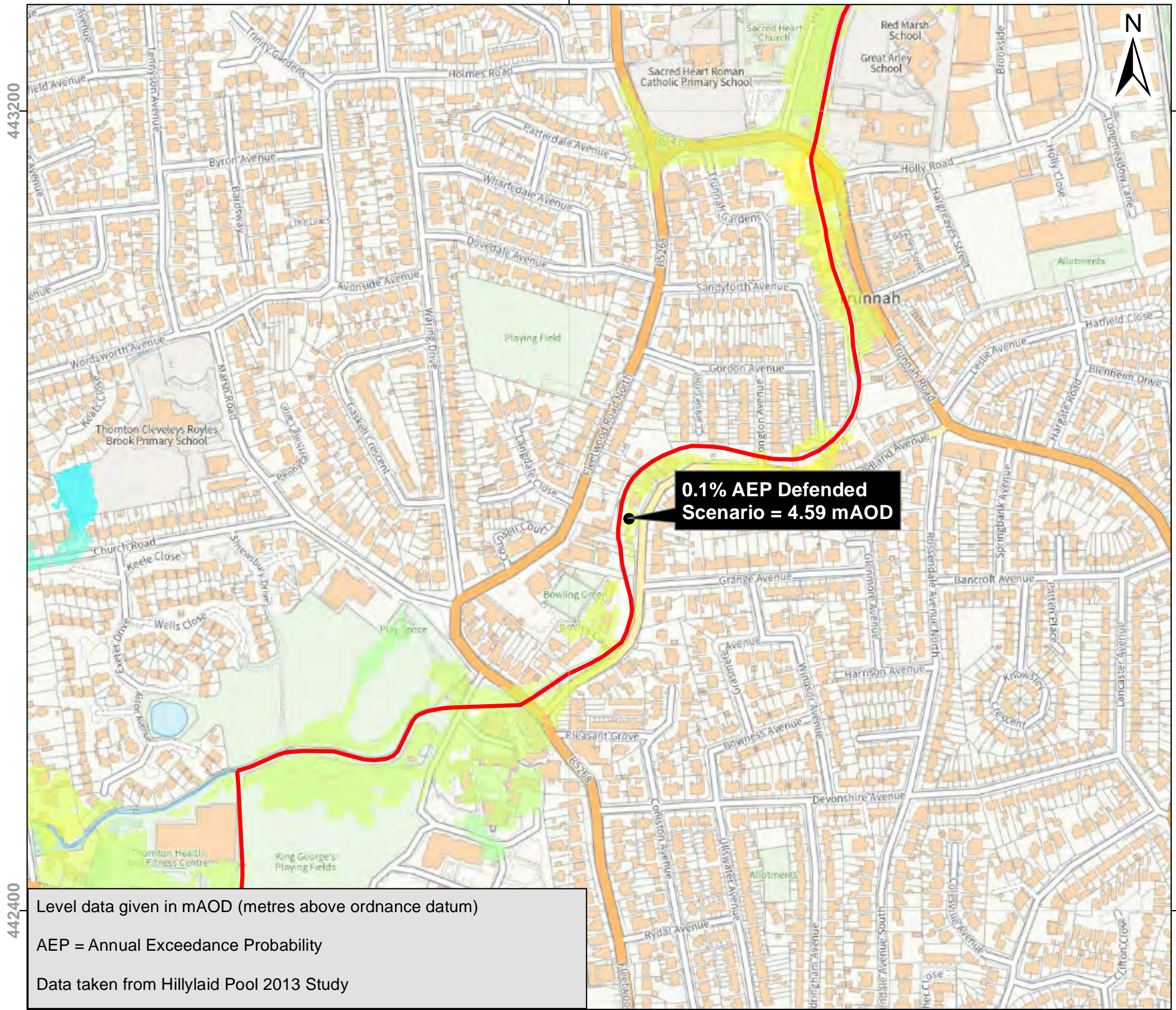
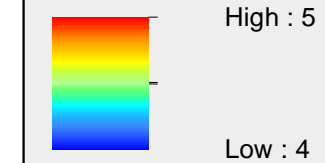
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

Key

 Statutory Main Rivers

**0.1% Annual Exceedance Probability
Defended Scenario**

mAOD

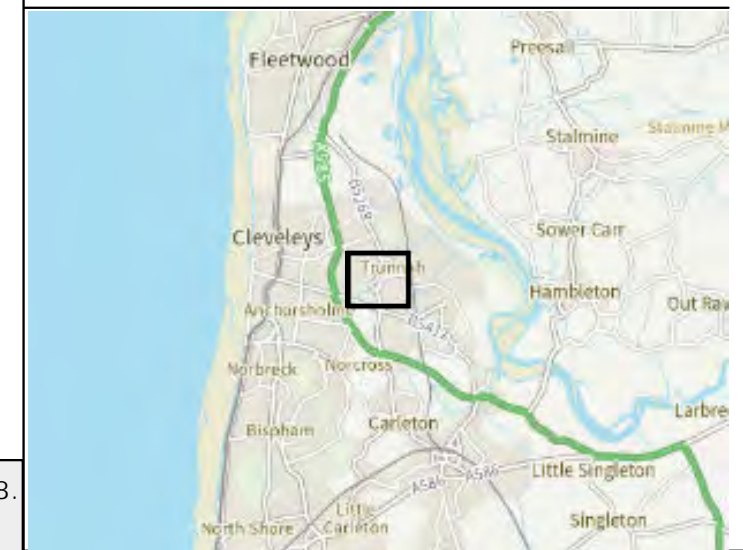


443200

442400

333600

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study



**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

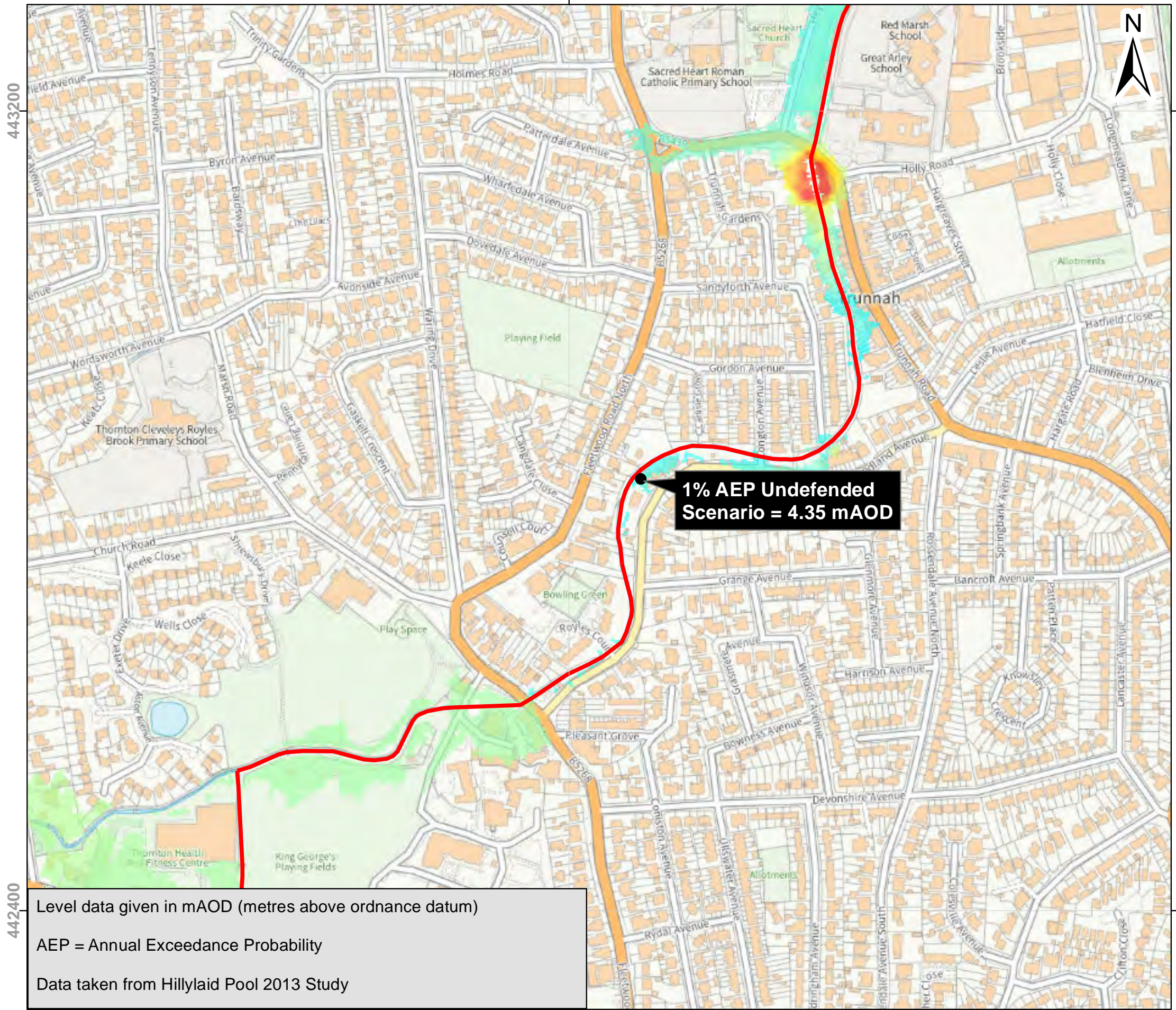
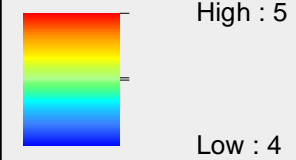
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

Key

 Statutory Main Rivers

**1% Annual Exceedance Probability
Undefended Scenario**

mAOD

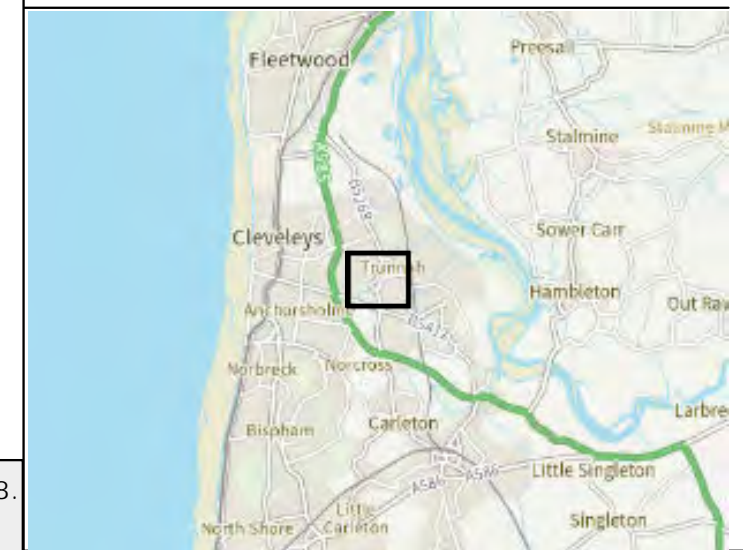


443200

442400

333600


Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study



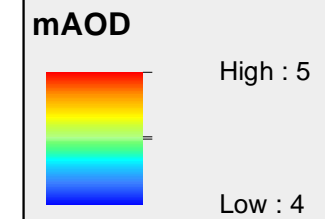
**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

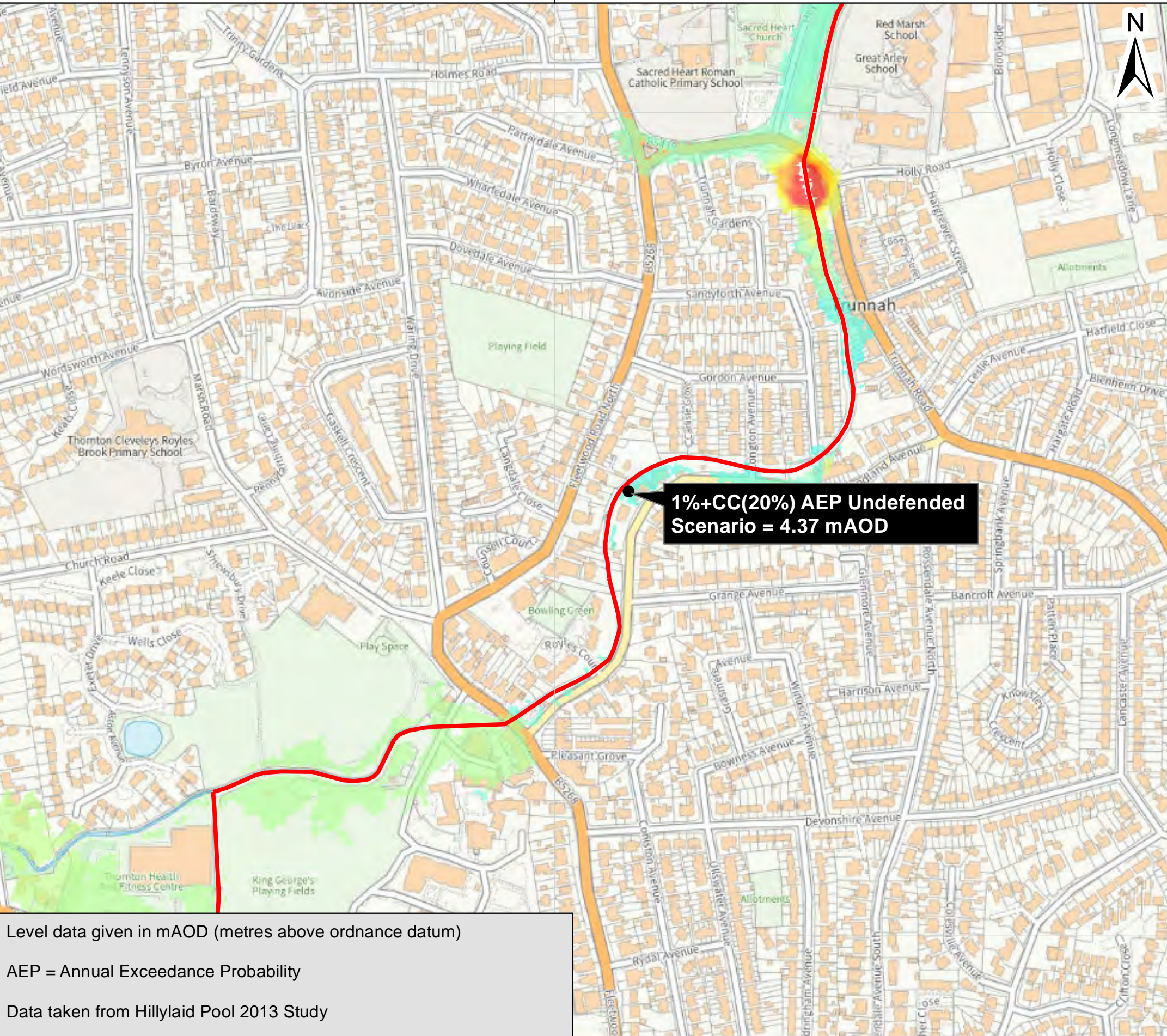
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

 Statutory Main Rivers

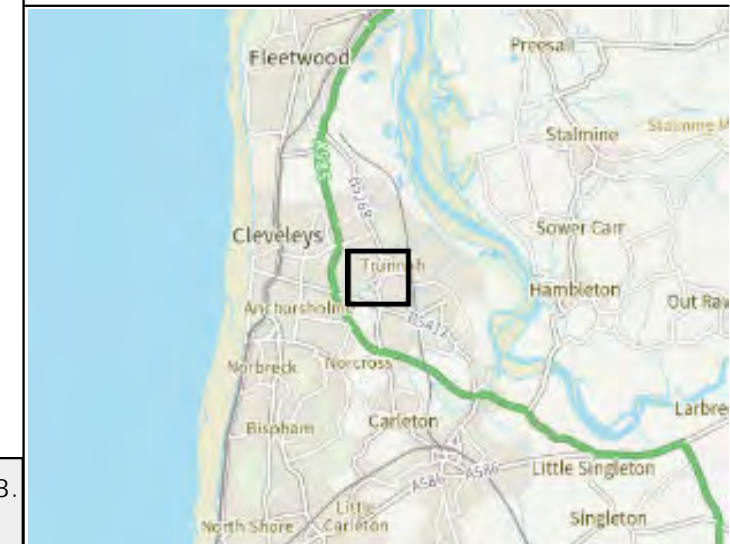
**1% Annual Exceedance Probability
Undefended Scenario + Climate
Change (20%)**



**1%+CC(20%) AEP Undefended
Scenario = 4.37 mAOD**



Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study



**Fluvial Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

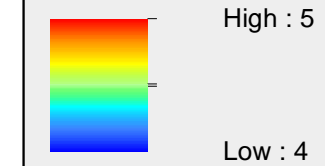
**Model Name
Hillylaid Pool 2013
Created: 29/08/2023**

Key

 Statutory Main Rivers

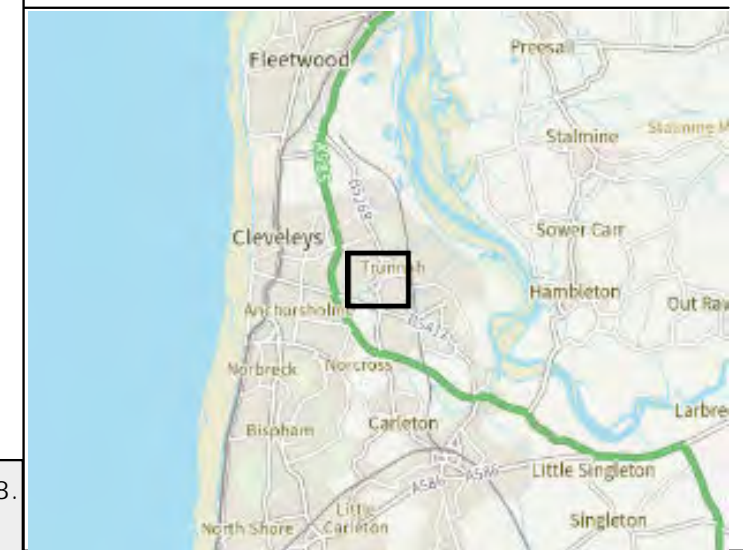
**0.1% Annual Exceedance Probability
Undefended Scenario**

mAOD



**0.1% AEP Undefended
Scenario = 4.49 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Hillylaid Pool 2013 Study





Defended modelled tidal extent

Location (easting/northing)
333630/442804

Scale Created
1:10,000 29 Aug 2023

Model name
Wyre Estuary Tidal 2014

Selected area

Main river

Modelled flood extent

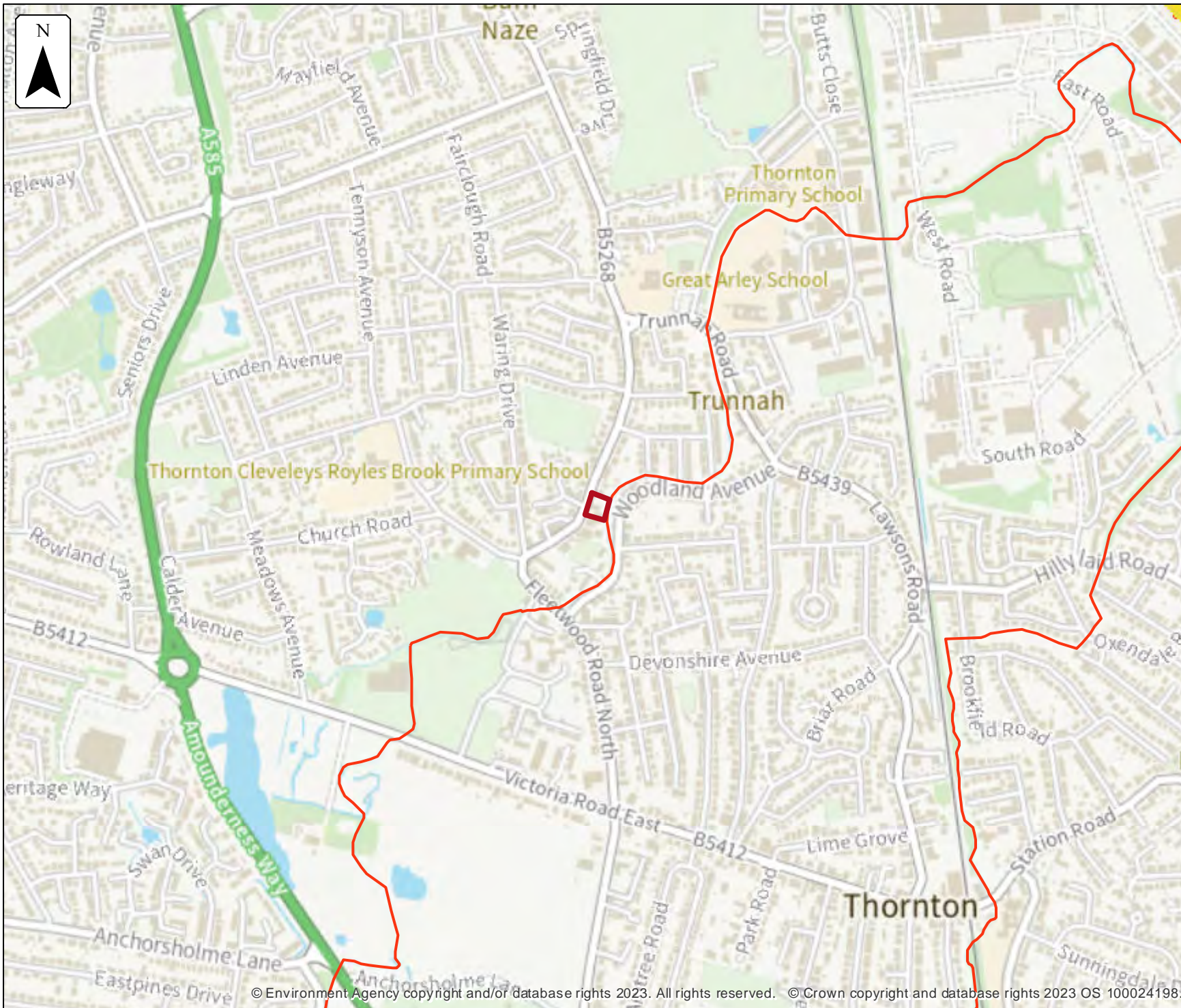
1.33% AEP

1% AEP

0.5% AEP

0.1% AEP

Flood extents may not be visible where they overlap other return periods





Defences removed modelled tidal extent

Location (easting/northing)
333630/442804


Scale Created
1:10,000 29 Aug 2023


Model name
Wyre Estuary Tidal 2014


 Selected area


 Main river

Modelled flood extent

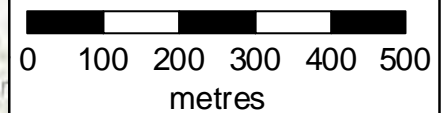
 1.33% AEP

 1% AEP

 0.5% AEP

 0.1% AEP

Flood extents may not be visible where they overlap other return periods





Defences removed climate change modelled tidal extent

Location (easting/northing)
333630/442804

Scale Created
1:10,000 29 Aug 2023

Model name
**Wyre Estuary Tidal
2014**

 Selected area

 Main river

Modelled flood extent

 0.5% AEP (+370mm)

 0.5% AEP (+670mm)

 0.5% AEP (+970mm)

Flood extents may not be
visible where they overlap
other return periods



**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

Location (easting/northing)
333630/442804

Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023

Key

 Statutory Main Rivers

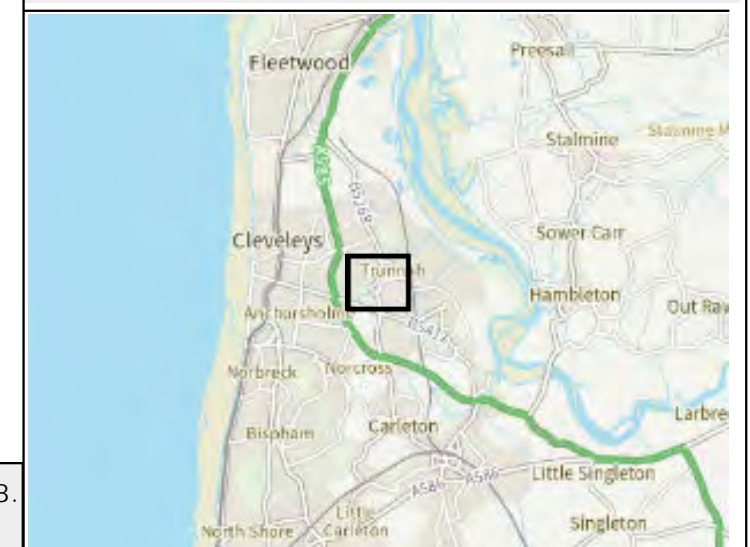
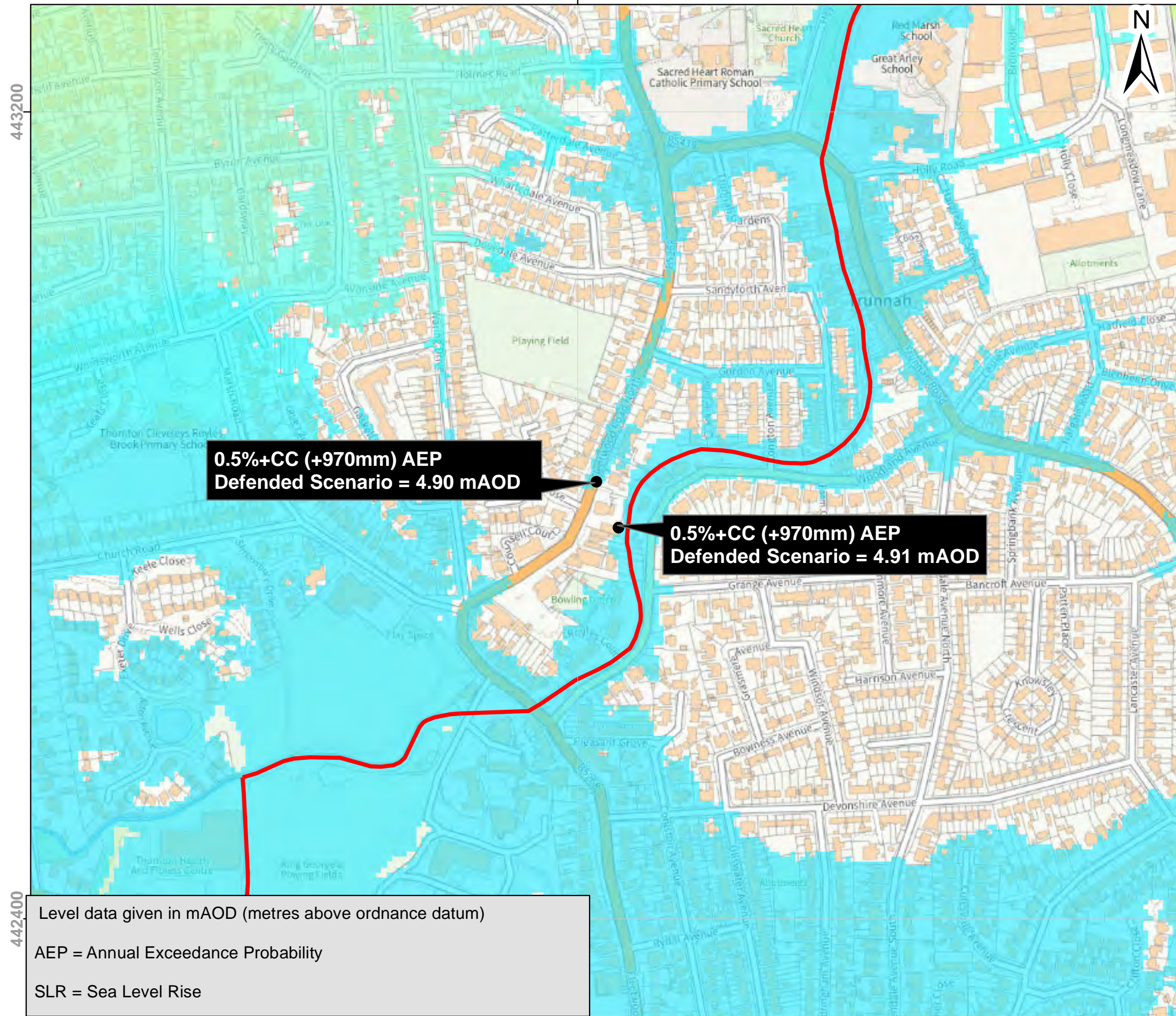
**0.5%+Climate Change (970mm SLR)
Annual Exceedance Probability
Defended Scenario**

mAOD



High : 7

Low : 4

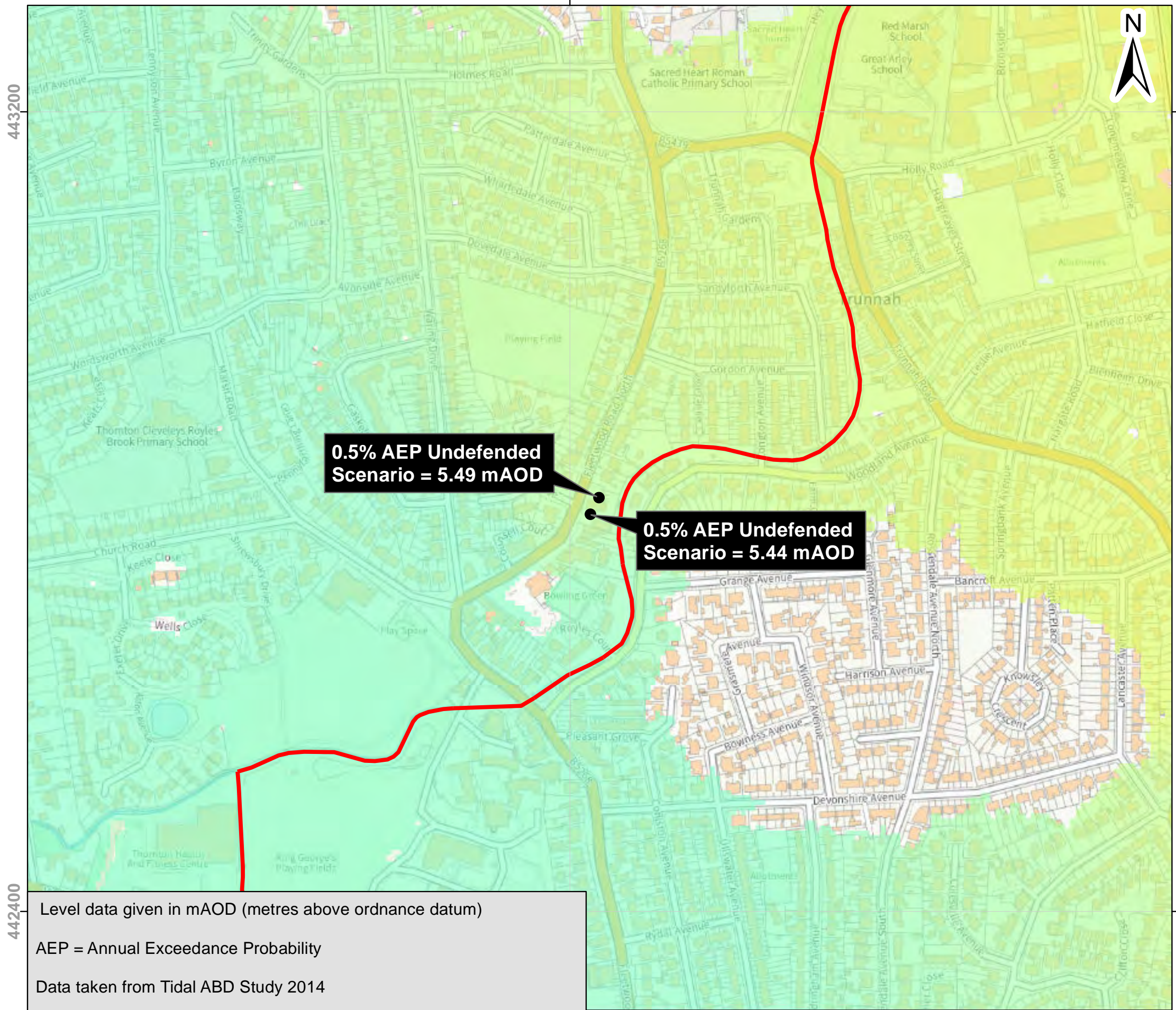
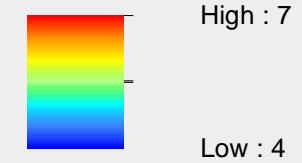


Key

 Statutory Main Rivers

**0.5% Annual Exceedance Probability
Undefended Scenario**

mAOD



**0.5% AEP Undefended
Scenario = 5.49 mAOD**

**0.5% AEP Undefended
Scenario = 5.44 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Tidal ABD Study 2014



442400

443200

333600

**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

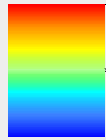
**Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023**

Key

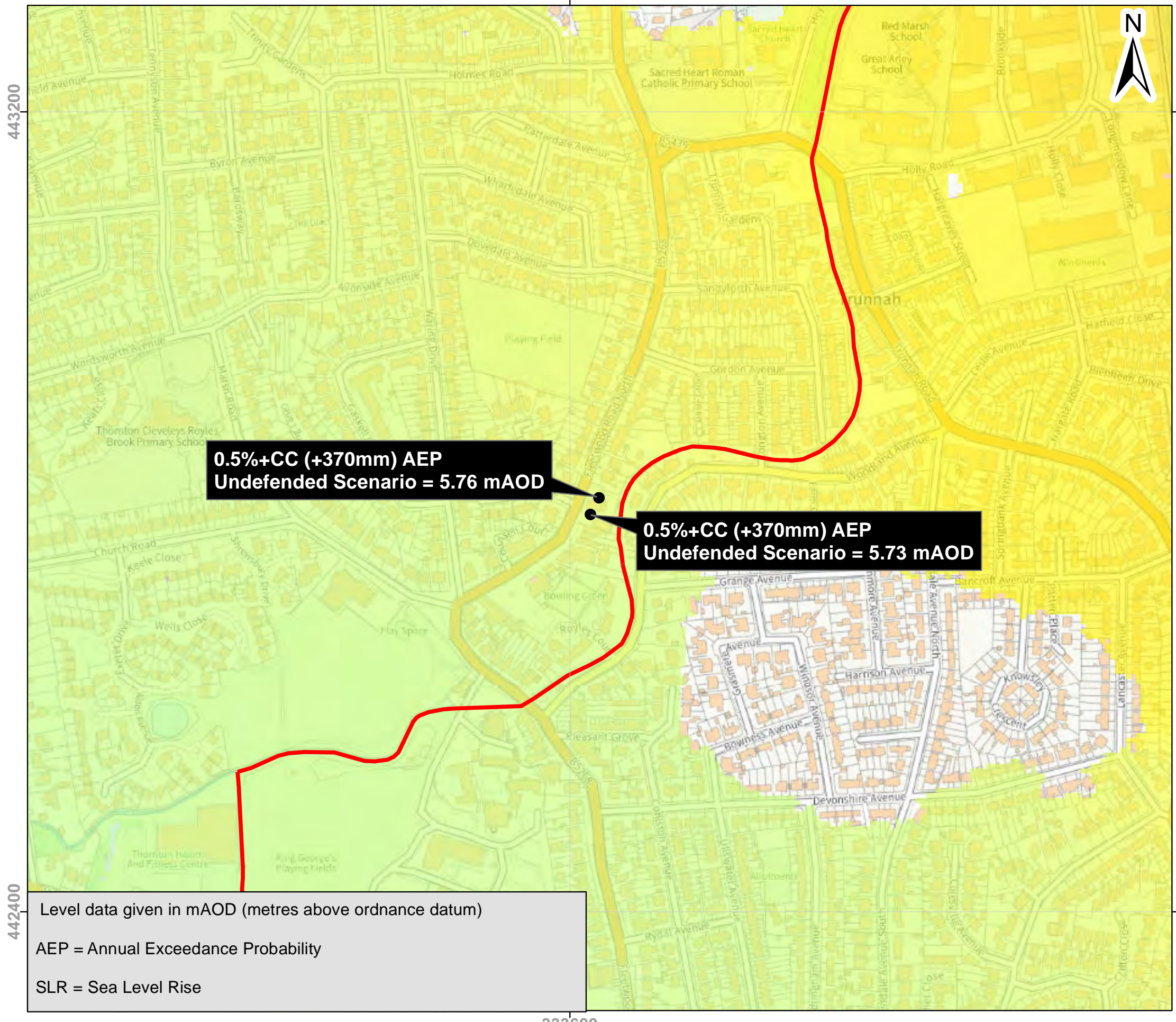
 Statutory Main Rivers

**0.5%+Climate Change (370mm SLR)
Annual Exceedance Probability
Undefended Scenario**

mAOD



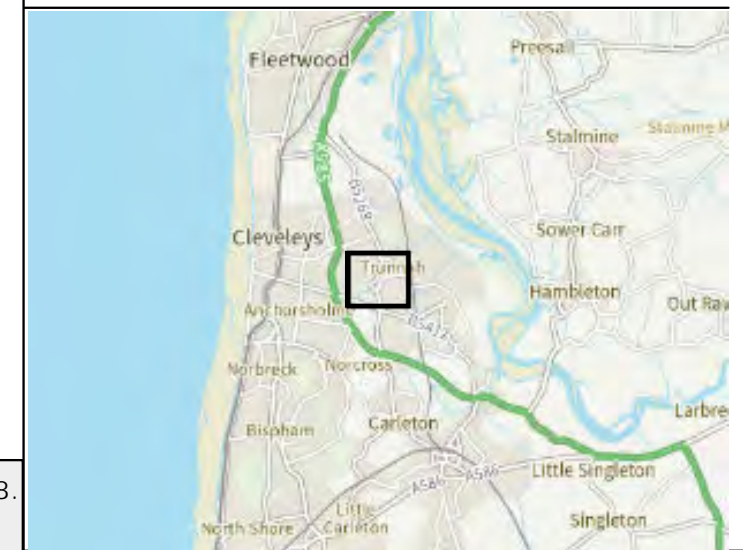
High : 7
Low : 4



**0.5%+CC (+370mm) AEP
Undefended Scenario = 5.76 mAOD**

**0.5%+CC (+370mm) AEP
Undefended Scenario = 5.73 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
SLR = Sea Level Rise



**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

**Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023**

Key

 Statutory Main Rivers

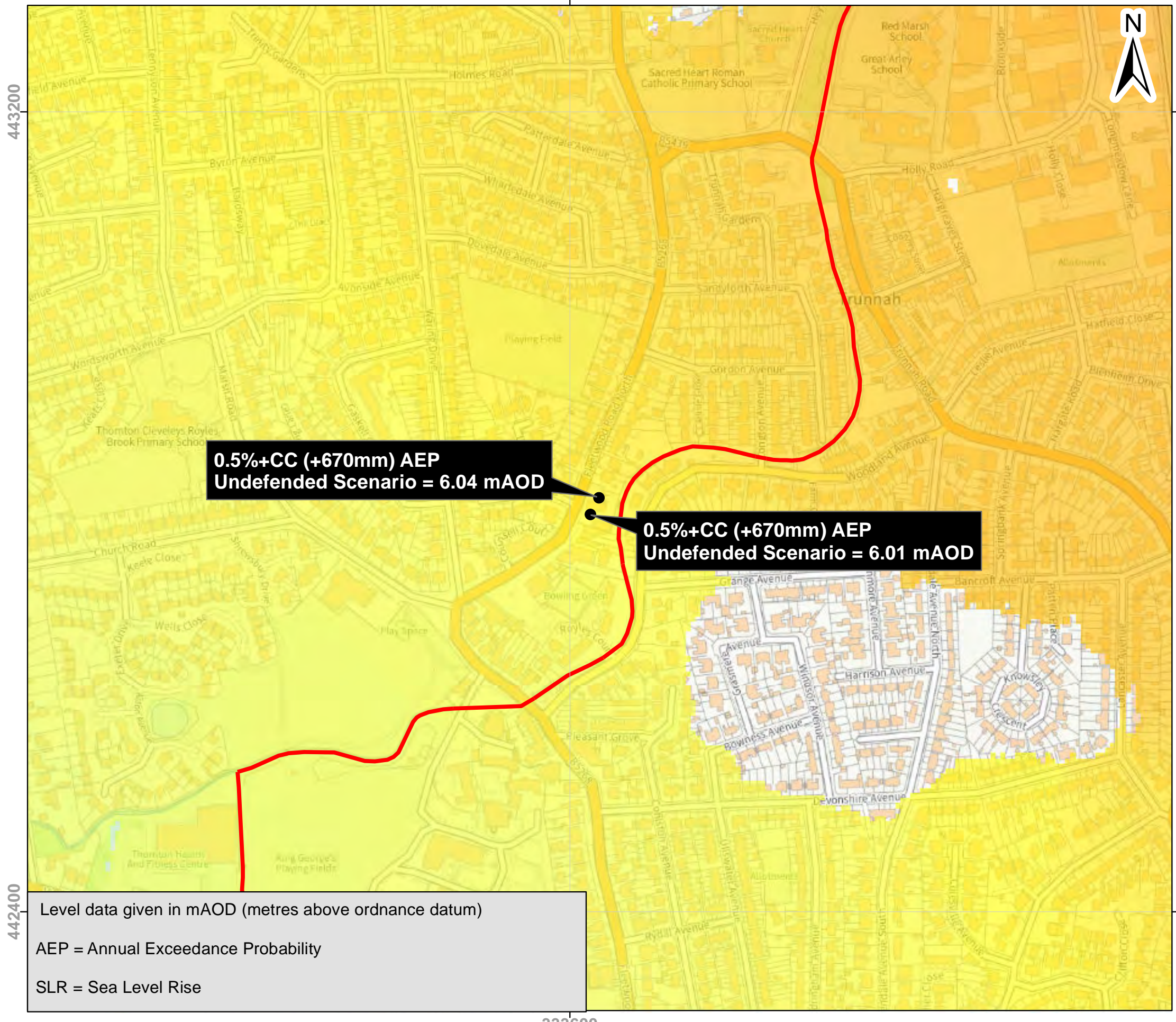
**0.5%+Climate Change (670mm SLR)
Annual Exceedance Probability
Undefended Scenario**

mAOD



High : 7

Low : 4



**0.5%+CC (+670mm) AEP
Undefended Scenario = 6.04 mAOD**

**0.5%+CC (+670mm) AEP
Undefended Scenario = 6.01 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
SLR = Sea Level Rise



**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

**Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023**

Key

 Statutory Main Rivers

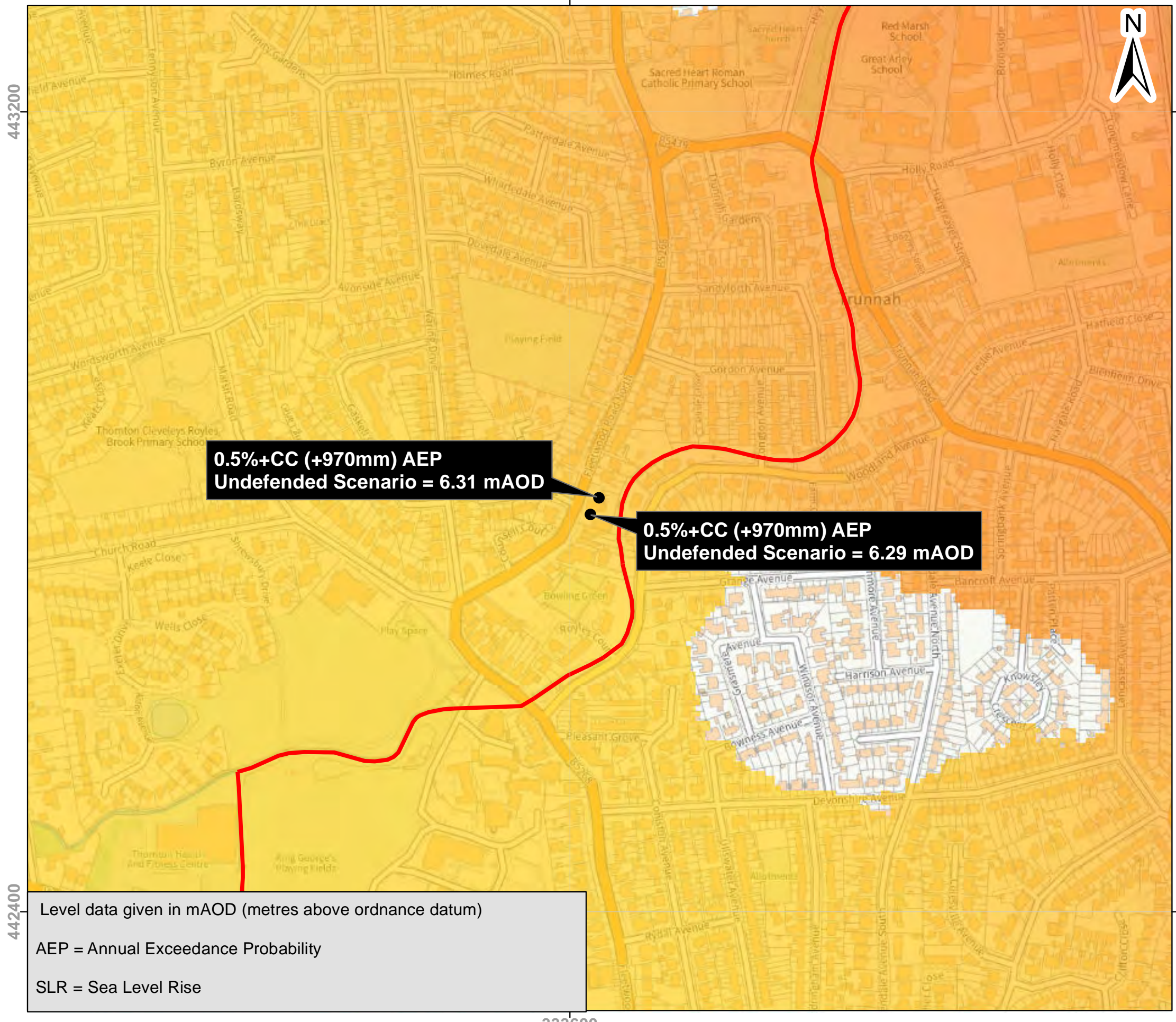
**0.5%+Climate Change (970mm SLR)
Annual Exceedance Probability
Undefended Scenario**

mAOD



High : 7

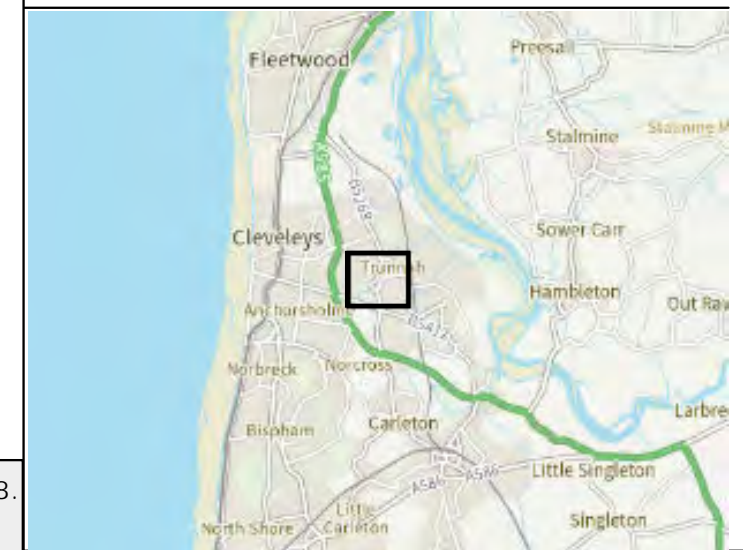
Low : 4



**0.5%+CC (+970mm) AEP
Undefended Scenario = 6.31 mAOD**

**0.5%+CC (+970mm) AEP
Undefended Scenario = 6.29 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
SLR = Sea Level Rise



**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**

**Location (easting/northing)
333630/442804**

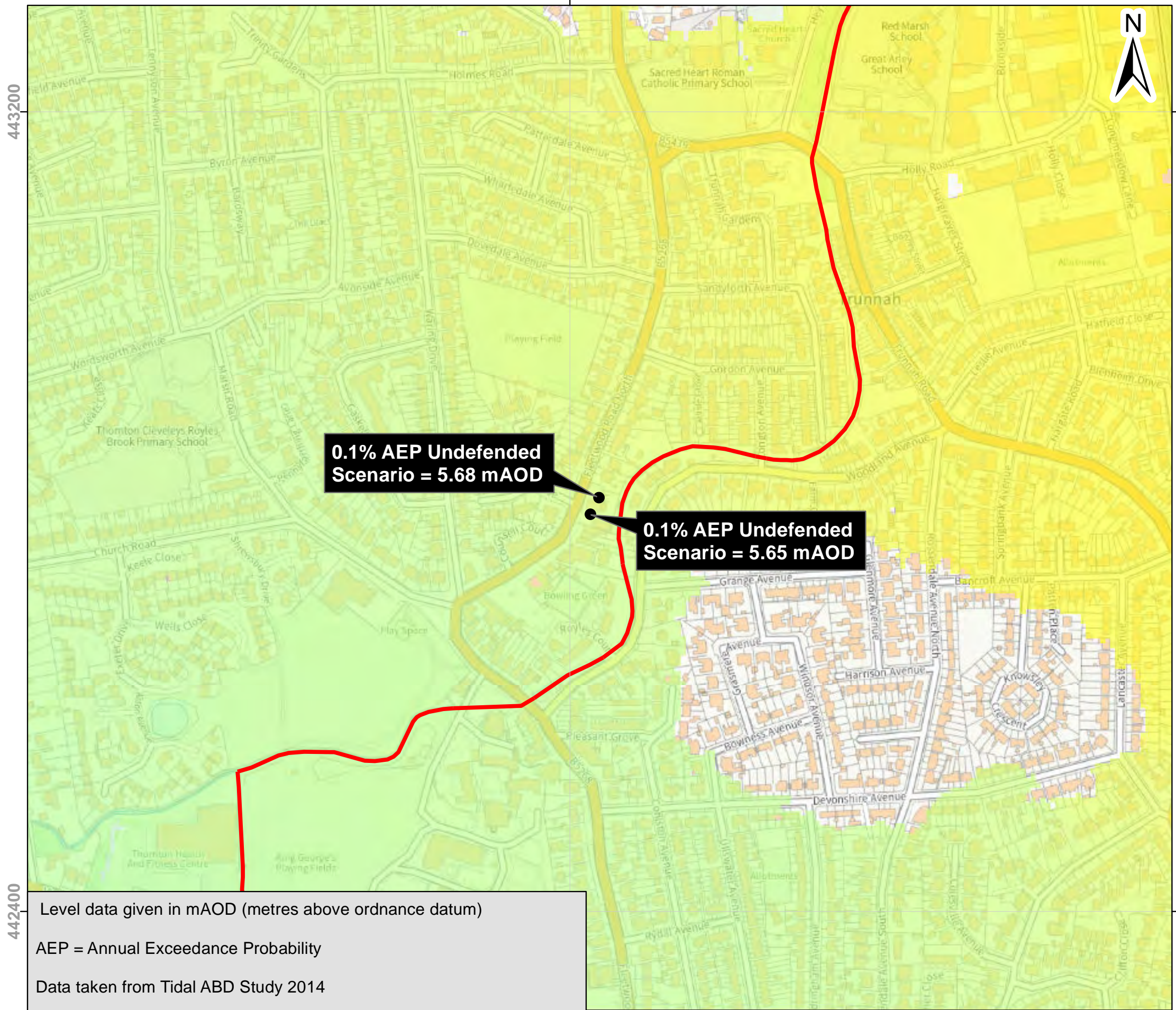
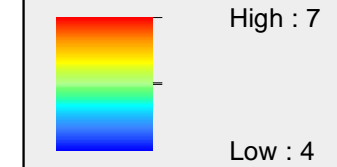
**Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023**

Key

 Statutory Main Rivers

**0.1% Annual Exceedance Probability
Undefended Scenario**

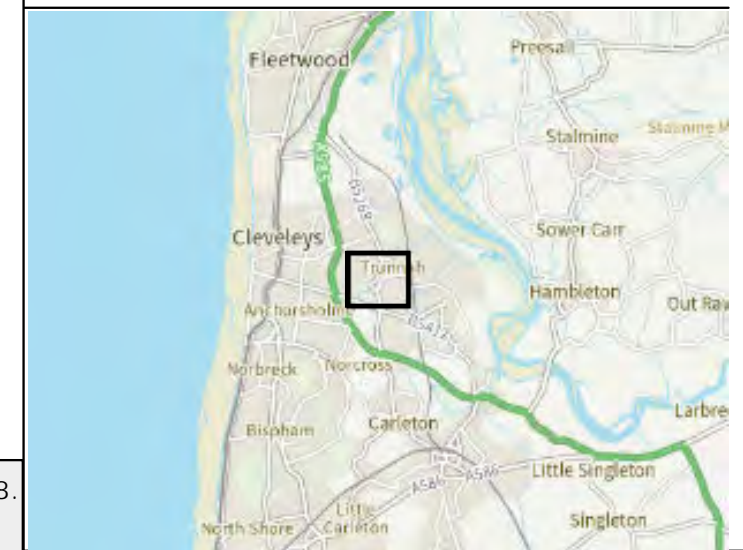
mAOD



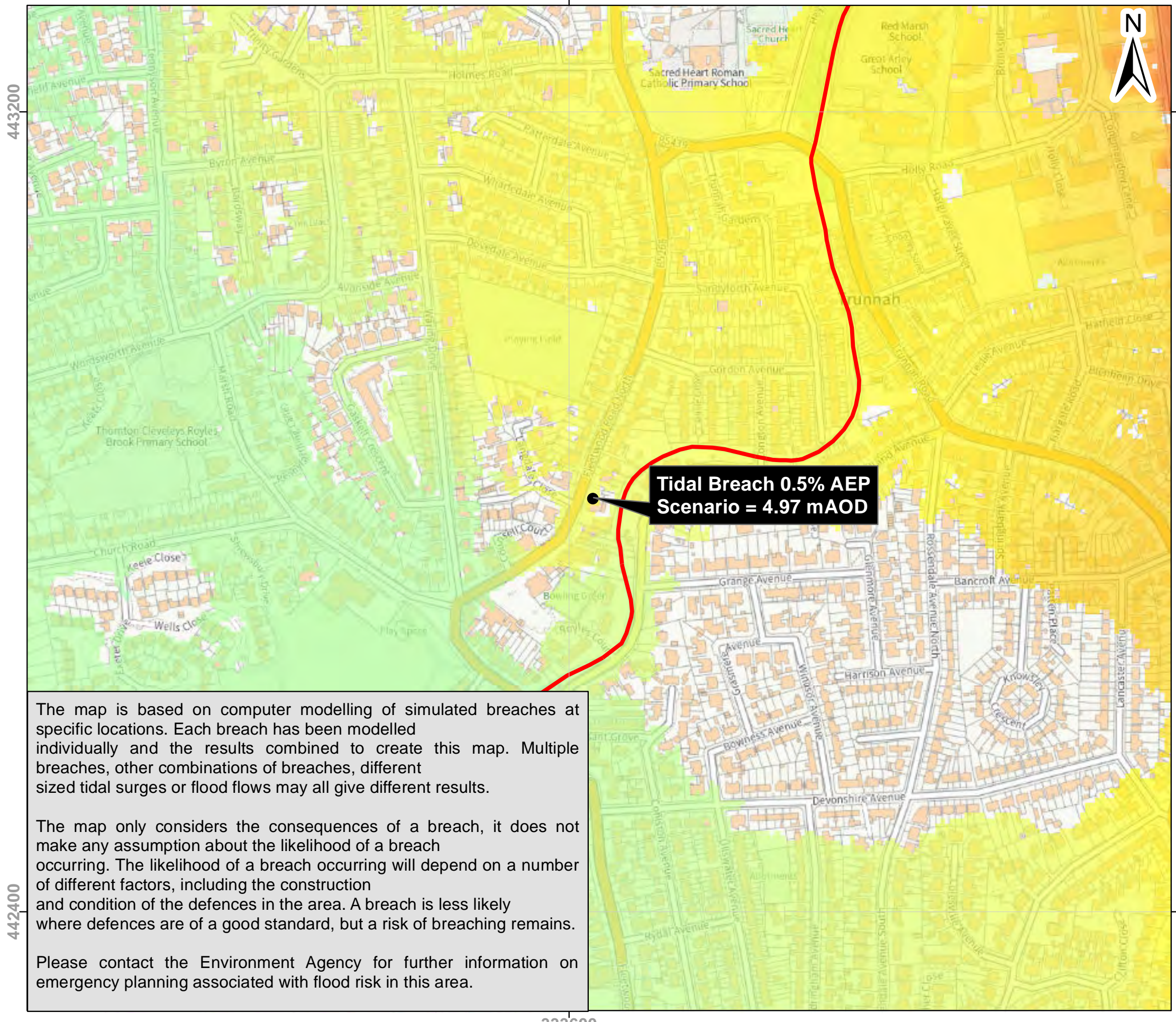
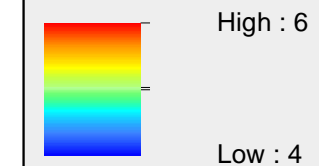
**0.1% AEP Undefended
Scenario = 5.68 mAOD**

**0.1% AEP Undefended
Scenario = 5.65 mAOD**

Level data given in mAOD (metres above ordnance datum)
AEP = Annual Exceedance Probability
Data taken from Tidal ABD Study 2014



**Tidal Flood Levels Map:
Fleetwood Road, Thornton-Cleveleys**
**Location (easting/northing)
333630/442804**
**Model Name
Lancashire Tidal ABD 2014
Produced: 25/08/2023**
Key
 Statutory Main Rivers

**0.5% Annual Exceedance Probability
Tidal Breach Scenario 2**
mAOD


The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.



442400

443200

333600

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

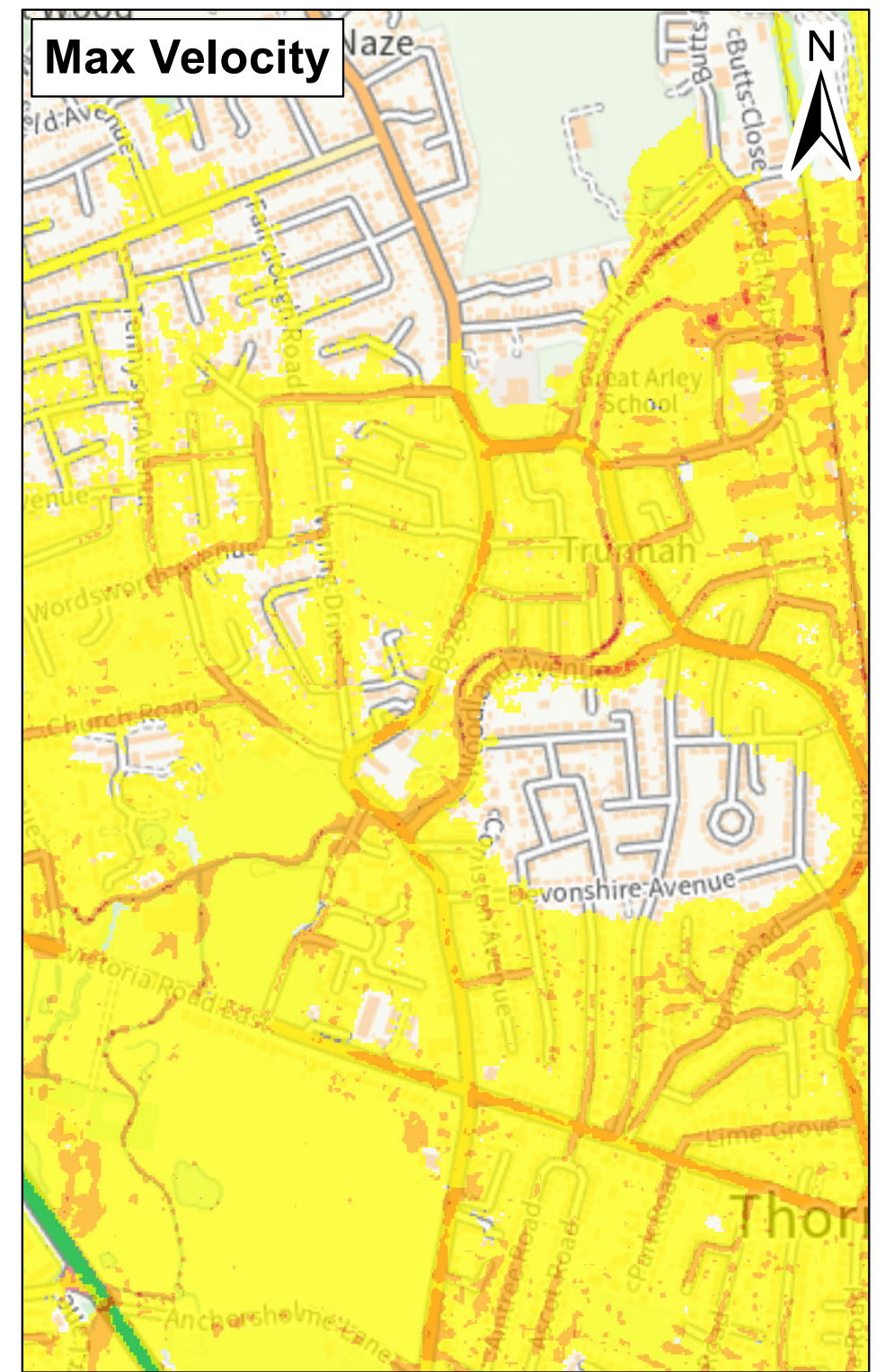
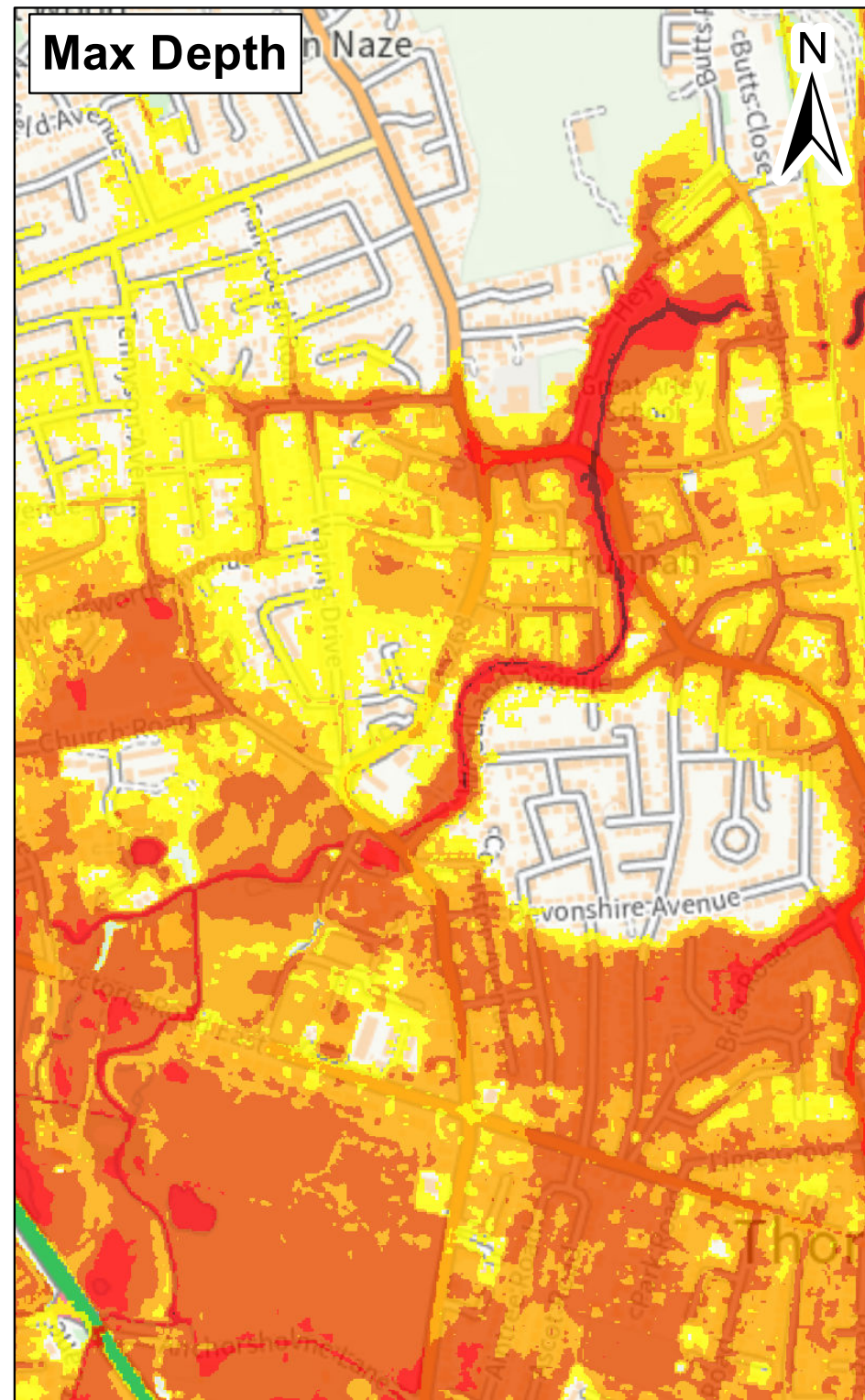
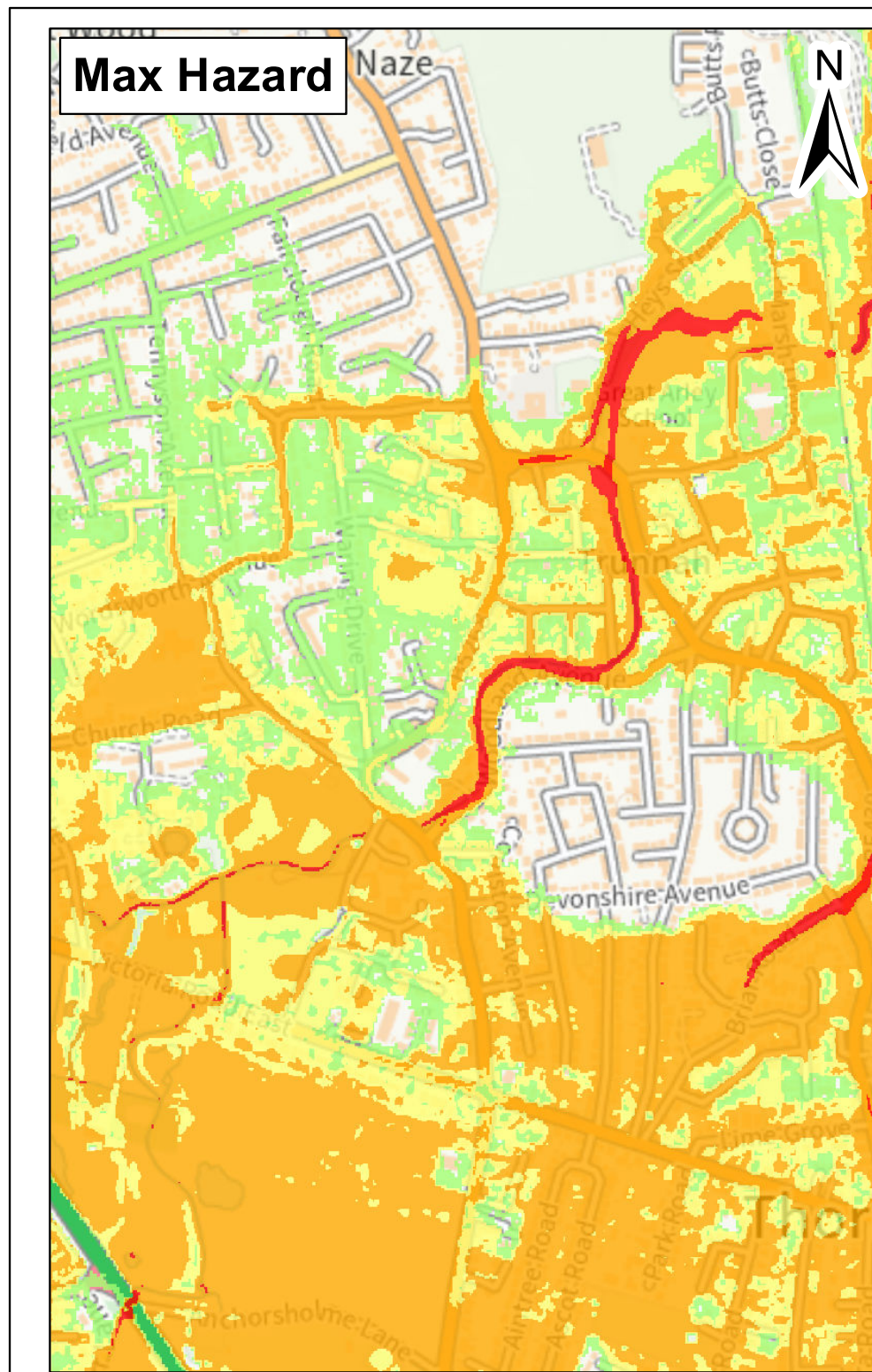
Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Cumbria and Lancashire Environment Agency team at inforequests.cmblnc@environment-agency.gov.uk for:

- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for



Modelled Breach Location


Max Hazard (Flood Risk to People : FD2320)	Max Depth (m)	Max Velocity (m/s)
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.3
Between 0.75 and 1.25 (Danger for Some)	0.25 - 0.50	0.3 - 1.0
Between 1.25 and 2.0 (Danger for Most)	1.0 - 2.0	1.0 - 1.5
Greater than 2.0 (Danger for All)	2.0 +	1.5 - 2.5
		2.5 +

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

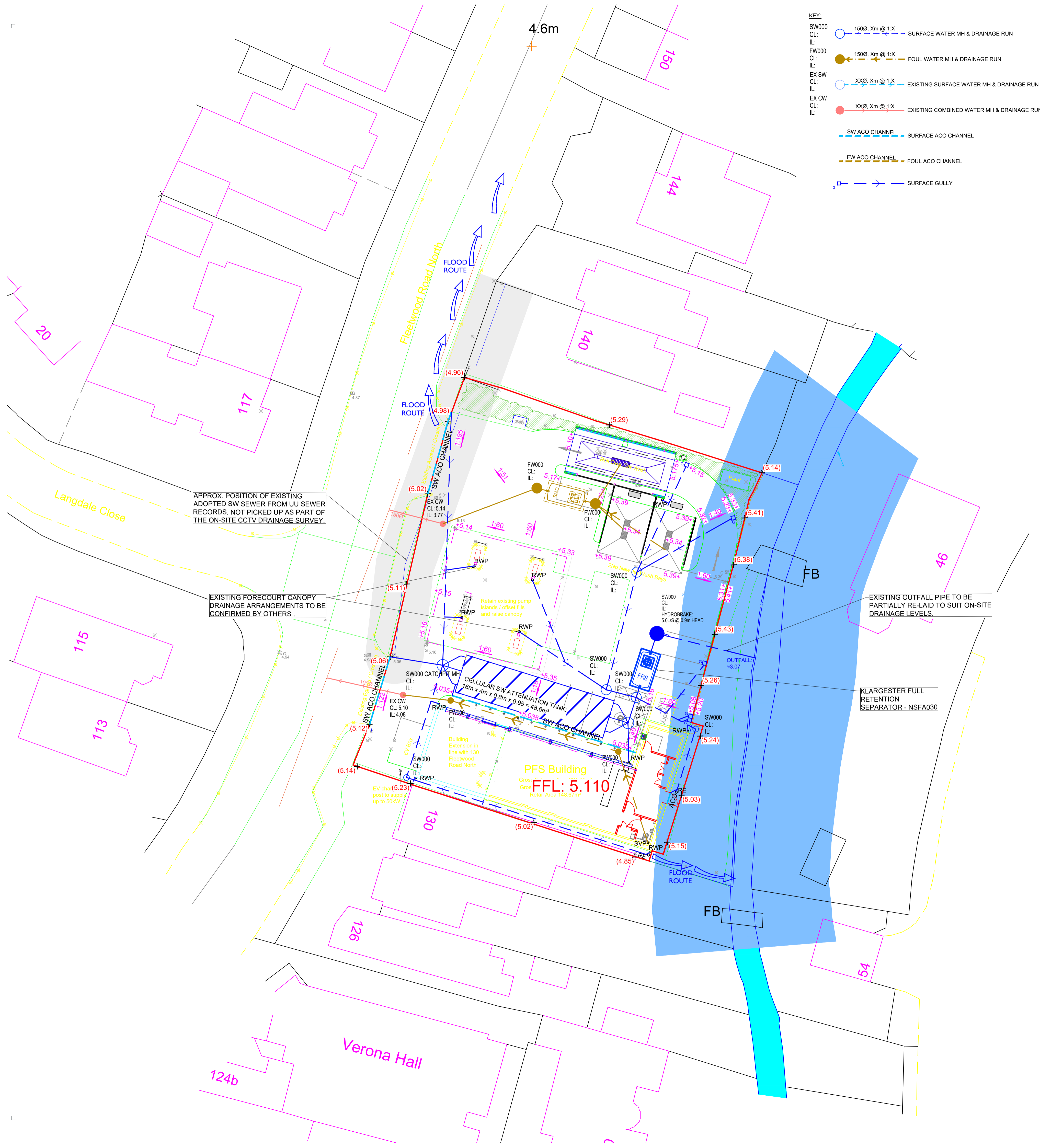
Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area



**Tidal Hazard Mapping:
Fleetwood Road
Thornton-Cleveleys
Our Ref: CL322458
Date 29/08/2023
Grid Ref: 333630/442804**

Date Printed	29/08/2023	Scenario year	2014	Scenario Annual Chance	0.5% (1 in 200)
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APPENDIX 5



- KEY:**
- SW000 CL: 1500, Xm @ 1:X SURFACE WATER MH & DRAINAGE RUN
 - IL: 1500, Xm @ 1:X FOUL WATER MH & DRAINAGE RUN
 - FW000 CL: 1500, Xm @ 1:X SURFACE WATER MH & DRAINAGE RUN
 - IL: 1500, Xm @ 1:X FOUL WATER MH & DRAINAGE RUN
 - EX SW CL: 1500, Xm @ 1:X EXISTING SURFACE WATER MH & DRAINAGE RUN
 - IL: 1500, Xm @ 1:X EXISTING SURFACE WATER MH & DRAINAGE RUN
 - EX CW CL: 1500, Xm @ 1:X EXISTING COMBINED WATER MH & DRAINAGE RUN
 - IL: 1500, Xm @ 1:X EXISTING COMBINED WATER MH & DRAINAGE RUN
 - SW ACO CHANNEL SURFACE ACO CHANNEL
 - FW ACO CHANNEL FOUL ACO CHANNEL
 - SURFACE GULLY

- RE SURFACE RODDING EYE 1.3
- RWP RAINWATER PIPE +3.20
- SVP SOIL VENT PIPE 1.60
- PROPOSED CARJET WASH SEPARATOR +2.59
- FLOOD ROUTE FLOOD ROUTE FOR STORM EVENTS IN EXCESS OF 1 IN 100 YEARS + 50% CLIMATE CHANGE
- FRS PROPOSED FULL RETENTION SEPARATOR KLARGESTER NSFA030

DO NOT SCALE. IF IN DOUBT ASK. DO NOT INTERROGATE CAD BASE

- DRAINAGE NOTES:**
- THIS DRAWING HAS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATIONS.
 - FOR DRAINAGE DETAILS REFER TO DRAWING PXXXXX.
 - FOR LOCATION OF ALL R.W.P.'s & INTERNAL POP-UPS REFER TO ARCHITECTS DRAWING. ALL DOWN PIPES TO BE FITTED WITH ACCESS HANDHOLES ABOVE F.F.L. OR GROUND LEVEL.
 - ALL GULLY CONNECTIONS TO BE 1500 U.N.O. ALL S.V.P. CONNECTIONS TO BE MINIMUM 1000 OR TO MATCH S.V.P. DOWNPIPE IF GREATER. ALL R.W.P. CONNECTIONS TO BE 1500 OR TO MATCH R.W.P. DOWNPIPE.
 - ALL PIPES UP TO 4500 TO BE UPVC PIPES. PIPES GREATER THAN 4500 TO BE CONCRETE.
 - PIPES UNDER ROADS HAVING 1200mm OR LESS COVER ARE TO BE ENCASED IN CONCRETE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. MANHOLE COVER LEVELS ARE INDICATIVE AND SHOULD BE SET TO SUIT FINISHED ROAD LEVEL AND CAMBER.
 - ALL EXTERNAL MANHOLES WITHIN ROADS TO BE FITTED WITH LOADCLASS D400 COVERS U.N.O. ALL EXTERNAL MANHOLES WITHIN SOFT LANDSCAPING TO BE FITTED WITH LOADCLASS B125 COVERS U.N.O. ALL IN ACCORDANCE WITH BS EN 124:2015 (ALL PARTS).
 - INVERT LEVELS OF EXISTING DRAINS AND MANHOLES TO BE CONFIRMED ON SITE PRIOR TO COMMENCING OPERATIONS. NO EXISTING SEWER MANHOLE TO BE OPENED OR ENTERED WITHOUT THE PERMISSION OF THE LOCAL AUTHORITY DRAINAGE DEPARTMENT AND THE ATTENDANCE OF SEWER PERSON AS REQUIRED.
 - DRAINAGE DESIGN AND INSTALLATION TO BE TO THE SATISFACTION OF THE LOCAL BUILDING CONTROL DEPARTMENT AND TO COMPLY WITH BS EN 752:2017, BS EN 1810:2015, BS EN 12056-1:2000, BS EN 12056-2:2000 and BS EN 12056-3:2000.
 - ADOPTABLE DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE LATEST EDITION OF 'SEWERS FOR ADOPTION'.
 - ALL SUDS COMPONENTS TO BE MAINTAINED IN ACCORDANCE WITH CIRIA C 768.
 - SURFACE WATER ATTENUATION CRATES TO BE WAVIN AQUACELL PLUS OR SIMILAR APPROVED. TO BE INSTALLED IN LINE WITH MANUFACTURES SPECIFICATION.

SURFACE WATER ATTENUATION

PROPOSED IMPERMEABLE AREA: 1280m² (0.128Ha)
 EXISTING IMPERMEABLE AREA: 1360m² (0.136 Ha)
 SITE AREA: 1360m² (0.136 Ha)
 EXISTING SW RUN-OFF: 2.78 x 0.136 x 50 = 18.9 L/S
 DISCHARGE RATE: 18.9 L/S - 74% = 5.0 L/S
 CELLULAR TANK DIMENSIONS: 16m x 4.0m x 0.95m = 48.6m³
 STORM EVENT: 1 IN 100YR + 50% CLIMATE CHANGE

- CDM NOTES**
- ACCESS AND EGRESS TO THE SITE FROM BUSY ROAD.
 - POTENTIAL GROUND INSTABILITY IN DEEP EXCAVATIONS
 - NO HEAVY PLANT OR STOCK PILES PERMITTED OVER OR WITHIN 3m OF THE CONSTRUCTED TANK
 - TANK TO BE FULLY PROTECTED FROM SILT AND DEBRIS INGRESS DURING CONSTRUCTION, AND TO BE INSPECTED AND MAINTAINED DURING OPERATION AS DETAILED ABOVE
 - TANKS NOT DESIGNED TO RESIST UPLIFT UNTIL FULLY BACKFILLED
 - EXISTING SERVICES IDENTIFIED ON SITE
 - ADEQUATE SEGREGATION HOARDING REQUIRED TO SEPARATE PUBLIC FROM THE CONSTRUCTION SITE.
 - ADEQUATE MEASURES REQUIRED TO CONTROL NOISE, DUST, FUMES & VIBRATION.

REV.	DATE	REVISION	BY	CHK
-	-	FIRST ISSUE	PH	NB

Penny Petroleum
 Proposed Petrol Filling Station at Woodland S/Strn
 Fleetwood Road N, Thornton-Cleveleys

Drainage Layout Plan

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OPERATION AND MAINTENANCE REQUIREMENTS FOR ATTENUATION STORAGE TANKS

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	INSPECT & IDENTIFY ANY AREAS THAT ARE NOT OPERATING CORRECTLY. IF REQUIRED, TAKE REMEDIAL ACTION	MONTHLY FOR 3 MONTHS THEN ANNUALLY
	REMOVE DEBRIS FROM THE CATCHMENT SURFACE (WHERE IT MAY CAUSE RISK TO PERFORMANCE)	MONTHLY
	REMOVE SEDIMENT FROM PRE-TREATMENT ROAD GULLIES & SILT TRAP MANHOLE	MONTHLY FOR 3 MONTHS THEN ANNUALLY OR AS REQUIRED
REMEDIAL ACTIONS	REPAIR/REHABILITATE INLETS, OUTLETS, OVERFLOWS & VENTS	AS REQUIRED
MONITORING	INSPECT/CHECK ALL INLETS, OUTLETS, VENTS & OVERFLOWS TO ENSURE THAT THEY ARE IN GOOD CONDITION & OPERATING AS DESIGNED	ANNUALLY
	CCTV SURVEY INSIDE OF TANK FOR SEDIMENT BUILD-UP & REMOVE IF NECESSARY	AFTER CONSTRUCTION, 1 YEAR, & THEN EVERY 5 YEARS OR AS REQUIRED

PLANNING

DATE CREATED: Sept. '23' SCALE: 1:200 @ A1

CONTRACT No: P15701 DRAWING No: 500 REV: -



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