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FLOOD RISK ASSESSMENT

Langstone Lodge,
1 High Street, Langstone,
Havant.

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Report Ref:

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ABBREVIATIONS

AEP	Annual Exceedance Probability
EA	Environment Agency
FEH	Flood Estimation Handbook
FFL	Finished Floor Level
FRA	Flood Risk Assessment
m AOD	Metres Above Ordnance Datum

1 SUMMARY

1.1 Purpose

This report provides a flood risk assessment for a proposal for the demolition of the existing house and a rebuild at Langstone Lodge, 1 High Street, Langstone, Havant, PO9 1RY.

1.2 Overview

Site characteristics					
Location	Langstone Lodge, 1 High Street, Langstone, Havant, PO9 1RY				
NGR	SU 71768 04991 471768 , 104991	Approx. Site area (Ha)		Existing land use status	Residential
Development proposal	Demolish the existing house and rebuild				

Flooding issues						
Source of flooding	Flood risk				Comments	Further investigation required?
	Very Low	Low	Medium	High		
Rivers	✓				The site is in flood zone 1 and not mapped as being at risk of fluvial flooding.	No
Sea	✓				The site is not currently affected by tidal flooding, but may become at risk within the new building's lifetime.	No
Surface water	✓				The site is at low risk of surface water flooding.	No
Groundwater		✓			Groundwater is unlikely to affect the site	No
Artificial sources		✓			The site is not at risk of flooding from reservoir failure. No other water sources have been identified	No

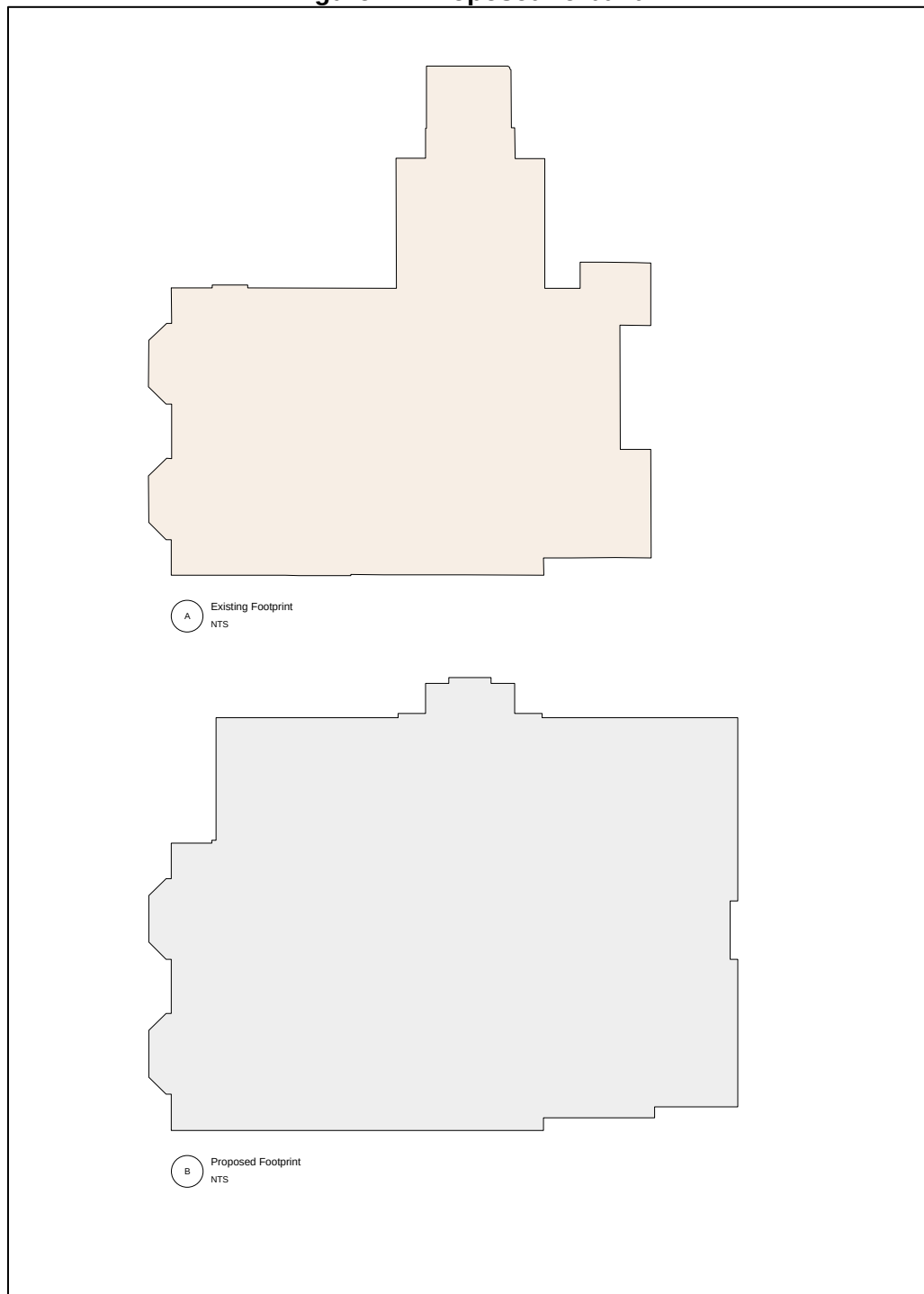
Other Issues	
Drainage	The site is assumed to be formally drained and reuse may be possible but discharge rates should not increase. Use of infiltration systems may be possible subject to the results of infiltration testing. Permeable paving is likely to be feasible for hardstanding areas.
Mitigation	It is recommended that either the finished floor level of the proposed development is above 4.62 m AOD or the property is protected from the increasing risk of tidal flooding to an equivalent level.
Safe Access	The access route may be affected for short periods by tidal or surface water flooding. An alternative access route may be feasible.

2 DEVELOPMENT DESCRIPTION AND LOCATION

2.1 Proposed development

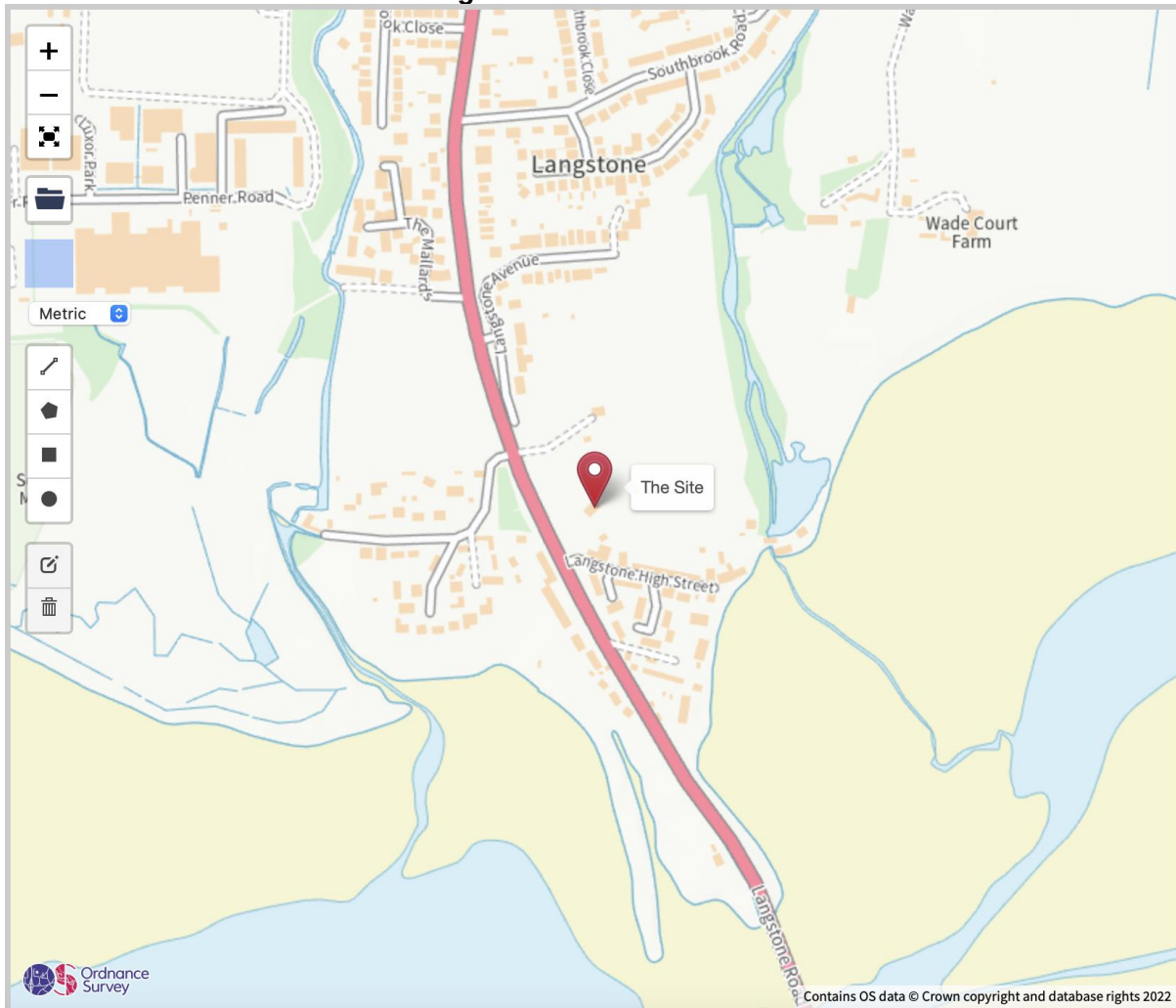
It is proposed to demolish the existing Langstone Lodge and replace it with a new, larger residential property as outlined in Figure 2.1.

Figure 2.1 Proposed re-build



The location of the site is shown in Figure 2.2 and a site plan is in Appendix 1.

Figure 2.2 Site Location



2.2 The Site

The site is south of Langstone and north of Hayling Island. It is accessed from Langstone High Street via a private driveway.

The existing building has a finished floor level of 4.1 m AOD and the site is at an elevation of approximately 3.8 m AOD. A site survey is provided in Appendix 1 and shows that in the immediate area surrounding the site the ground to the west and south fall away to around 3.5 m AOD whilst to the east and north the land declines more slowly to around 3.7 m AOD.

2.2.1 Hydrological Setting

The site is on the south coast approximately 200 metres north of the Solent which forms a tidally inundated marshland between the mainland and Hayling Island. The site is on an area of slightly higher ground between two small inlets to the west and east formed by small watercourses that enter the Solent near the property, approximately 300 metres to either side.

There are no other watercourses in the vicinity.

2.2.2 Geology

The site is underlain by the Lewes Nodular Chalk Formation with superficial deposits of River Terrace Deposits recorded at this location¹.

¹ BGS Geology of Britain viewer, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

The bedrock is described as a Principal aquifer that could contain significant amounts of groundwater of regional significance. The superficial deposits are classified as a secondary A aquifer (permeable layers that can support local water supplies, and may form an important source of base flow to rivers).

The site is not in a source protection zone.

The geology suggests use of permeable surfaces may be feasible but this requires on-site infiltration testing for confirmation. Use of soakaways for roof drainage may also be feasible subject to an assessment of infiltration rate and winter groundwater table elevation. On site testing is required to assess infiltration rates.

2.2.3 Greenfield Runoff

Runoff from developments should emulate Greenfield runoff where feasible.

Greenfield runoff is an estimate of the likely runoff from the site before development occurred and is calculated using equations derived from natural river catchments. Available data from such catchments is limited and restricted to much larger areas than individual development sites, so Greenfield runoff is therefore a guide rather than a precise runoff calculation.

Greenfield runoff has been estimated using the standard IoH report 124 for a notional 50 Ha site, with an areal reduction to allow for the small size of the development area.

This methodology uses information on the site area, annual rainfall and soil type to calculate the Greenfield peak runoff rate, Q_{bar} , as follows:

$$Q_{bar_{rural}} = 0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}, m^3/s$$

where:

$Q_{bar_{rural}}$ is the mean annual flood flow from a rural catchment (approximately 2.3 year return period).

AREA is the area of the catchment in Ha.

SAAR is the standard average annual rainfall for the period 1941 to 1970 in mm (SAAR 41-70).

SPR is Standard Percentage Runoff coefficient for the SOIL category.

Using the information for the site, the HR Wallingford online Suds site² has been used to provide an estimate of annual average peak flow of 2.9 l/s/ha. The annual average peak flow has a probability of 1 in 2.3, and other probabilities can be derived from it as (Table 2.1).

Table 2.1 Calculated Greenfield Runoff Rates (l/s/ha)

Return Period (years)	Peak Greenfield Rate (l/s/ha)
1	2.5
30	6.7
100	9.3
200	10.9

Further details of greenfield runoff calculations are provided in Appendix 2.

² UK Sustainable Drainage Guidance and Tools. HR Wallingford.
http://geoservergisweb2.hrwallingford.co.uk/uksd/surfacewaterstorage_js.htm#Top

3 PLANNING POLICY

3.1 National Flood Policy

National policy on planning and flood risk is provided by the National Planning Policy Framework (NPPF) and supplementary guidance.

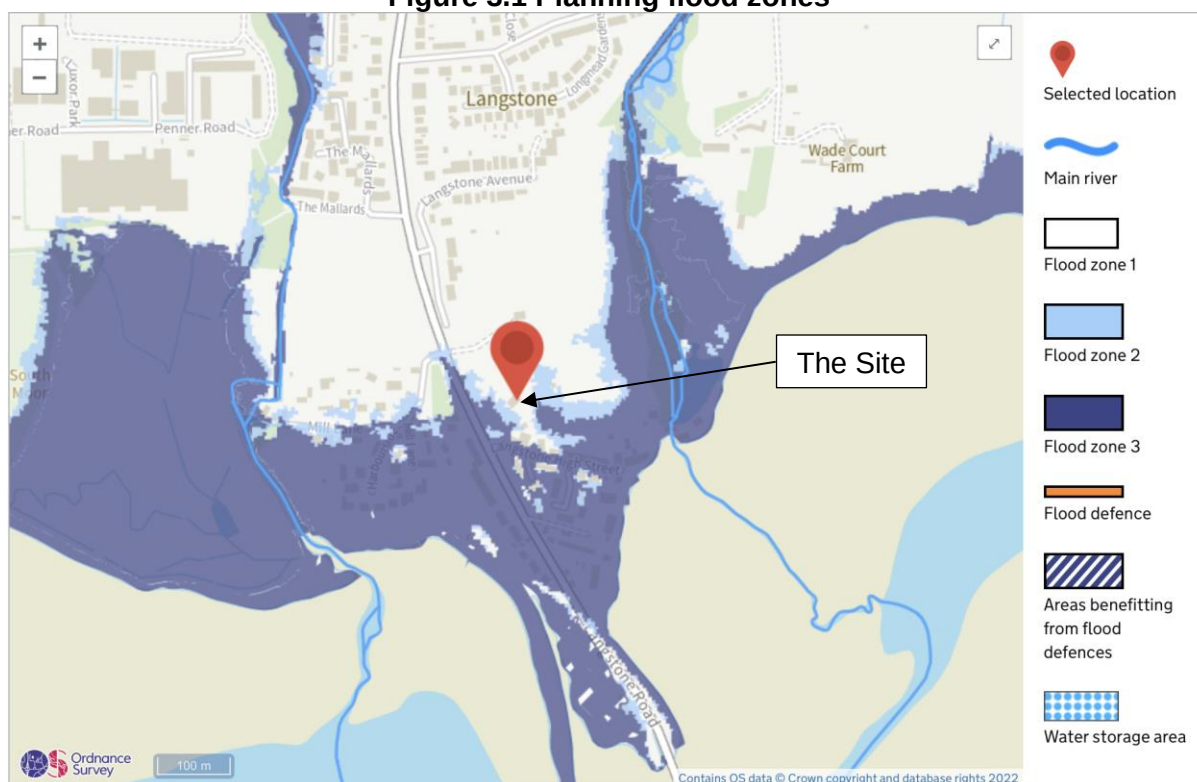
Residential development is classified in technical guidance to the NPPF as “more vulnerable”, whilst the utility block is commercial development and classed as “less vulnerable”.

Flood risk has been mapped nationally by the Environment Agency to show the flood zones used in the NPPF. Figure 3.1 shows the planning flood zones in the vicinity of the site, and indicates the site is in Flood Zone 1, which has an annual exceedance probability³ (AEP) of less than 0.1% for river or tidal flooding.

However, nearby areas are in flood zones 2 and 3 with a higher risk of flooding, including the access driveway.

These estimated flood risks cover only flooding from main rivers and the sea, not from other flood sources. These other sources are considered in subsequent sections of this report.

Figure 3.1 Planning flood zones



More vulnerable development, such as is proposed at the site, are considered by the NPPF as acceptable in flood zone 1 and is not subject to the sequential and exception tests.

3.2 Sequential and Exception test

The sequential test seeks to guide development to areas of lowest flood risk. The site is already in the zone of lowest flood risk and so the sequential test does not need to be applied.

³ The annual exceedance probability is the risk of flooding within any one year. An AEP of 1% indicates an annual risk of flooding of 1%, or more loosely a 100 year return period.

3.3 SFRA

The updated Strategic Flood Risk Assessment (SFRA)⁴ provides the background information on flood risk and flood risk policy in the area, along with requirements and guidance on assessing flood risk for site-specific development proposals. Information in the has been used during the production of this FRA.

The SFRA does not mention Langstone specifically, but does state:

Flooding from the sea, due to extreme tides, is the predominant source of flood risk to the sub-region's most populated areas on low lying coastlines in Portsmouth, Southampton, Isle of Wight, Gosport, Havant, Fareham, Eastleigh and the New Forest. In addition, the coastal frontages of Portsea, Hayling Island and Southern and Eastern coasts of the Isle of Wight have experienced flooding caused by wave overtopping;

⁴ Partnership for Urban South Hampshire Strategic Flood Risk Assessment (PUSH, 2016)

4 DEFINITION OF FLOOD HAZARD

4.1 Historical records

The Environment Agency has records of flooding in the Langstone High Street on 10th March 2008, as shown in Figure 4.1.

Figure 4.1 Recorded flood outline



This flood event may relate to a surface water flood event or an exceptional high tide or tidal surge. It did not affect the proposed site and the site is not within the EA recorded flood outlines dataset. It would have affected the current site access from Langstone High Street, however.

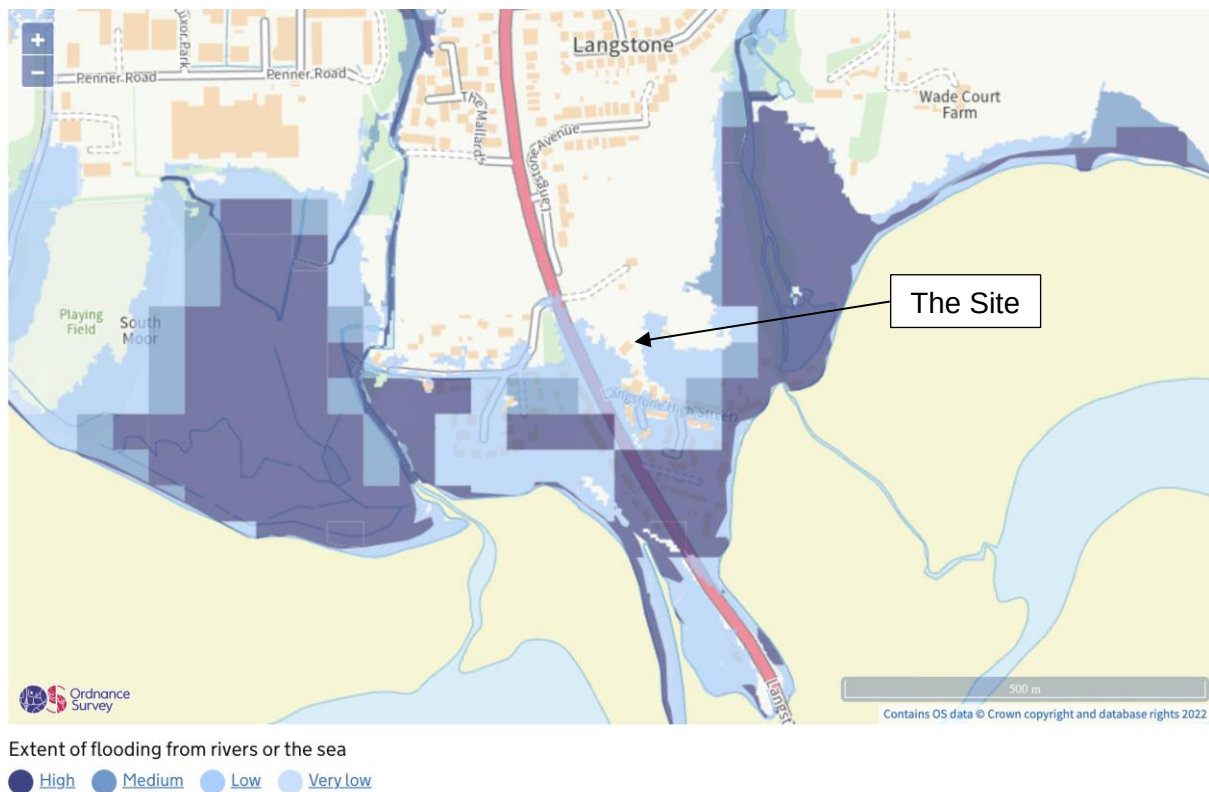
This does not mean that the site has not flooded in the past or that the site would not flood if similar flood events recurred.

4.2 Sources of flooding

4.2.1 Flooding from Rivers and the Sea

The flood risk arising from rivers and the sea is mapped nationally by the Environment Agency (EA), and their online flood map is shown in Figure 4.2. This shows the site is in an area at very low risk of river or tidal flooding (AEP less than 0.1%), but that areas of low flood risk (AEP between 1% and 0.1%) lie to the west, east and south of the site.

Figure 4.2 Flood Risk from Rivers and Sea



Due to the proximity of higher flood risk areas modelled flood levels have been obtained from the Environment Agency. The nearest modelled location to the site is 40 metres west of the existing building where a flood elevation of 3.59 m AOD has been provided for the 0.1% tidal event.

Comparison with site survey in Appendix 1 suggests this would approach the site to the west and south of the existing building but would not reach the site as the ground level at the building is approximately 3.8 m AOD.

The flood levels are estimated for the present day, and need to be increased to account for rising sea levels due to climate change. The EA have provided modelled tidal flood levels for the site for 2165 and for 2115, representing 50 and 100 years beyond the modelling which was done in 2015. Flood elevations for the 0.5% and 0.1% flood events are included and shown in Table 4.1.

Table 4.1 Modelled flood levels with climate change allowance

Modelled Flood Year	0.5% tidal flood (m AOD)	0.1% tidal flood (m AOD)	
2065	3.74	3.90	
2115	4.15	4.31	
2122 Higher Central	4.24	-	
2122 Upper End	4.28	-	

The modelled flood levels are estimated up to 2115, i.e. 100 years from the date of the modelling. As sea level rise is expected to accelerate significantly in later years they need to be increased to account for rising sea levels between 2115 and 2124.

Climate change scenarios for sea level rise are now based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. The higher central allowance is based on the 70th percentile (exceeded by 30% of the projections in the

range) and the upper end allowance is based on the 95th percentile (exceeded by 5% of the projections in the range).

The proposed development is classed as residential and will therefore need to consider both the “higher central” and “upper end” scenarios for its assumed lifetime of 100 years. Extrapolating the 0.5% flood event to 2124 using the upper end predicted sea level rise provides a design tidal flood level of 4.32 m AOD for the site.

4.2.2 Surface water flooding

A map of modelled surface water flooding is also available online and is reproduced in

Figure 4.3. The risk of flooding from surface water is very low (annual flood risk less than 0.1%). However, the map indicates Langstone High Street may be regularly affected by surface water flooding.

Figure 4.3 Flood Risk from Surface Water



4.2.3 Groundwater flooding

The site is on an aquifer which may hold significant volumes of groundwater. However, the site is elevated above adjacent land and any groundwater drainage is likely to be away from the site.

The risk of groundwater flooding is therefore considered to be Low.

4.2.4 Catastrophic flooding

This source includes release of large volumes of stored water, such as in reservoirs and canals, due to catastrophic failure.

The site is not mapped as being at risk of flooding from reservoir failure and there are no canals or other sources of stored water in the vicinity.

The risk of flooding from catastrophic sources is therefore Low.

4.3 Flood Hazard at the Site

The above review has indicated that the site is at low or very low risk of flooding from all sources at the present time, but that the access from Langstone High Street may be affected by both surface and tidal flooding.

Climate change will lead to an increase in sea level with time and the site may be at risk of tidal flooding within its expected 100 year lifetime.

Flood risk from all other sources considered is likely to remain low or very low.

5 FLOOD RISK MANAGEMENT MEASURES

5.1 Flood Mitigation

Due to the increasing risk of tidal flooding during the lifetime of the property it is recommended that the finished floor level is at least 300 mm above the 2124 design flood level of 4.32 m AOD to allow for modelling error. A finished floor level of 4.62 m AOD is therefore recommended.

As the existing house is to be demolished and re-built it should be possible to raise the finished floor level as recommended however, should that be not feasible alternative flood protection measures for the property may be required to protect the property to an equivalent level and are discussed below.

5.2 Flood Resistance Measures

These measures aim to prevent flood water gaining access into the property, and are also referred to as property level flood protection. The main measures are provision of flood gates and boards across doorways and other openings such as air bricks. Valves are required on all drainage runs (foul and surface water) to avoid backing up into the property.

Commercially available devices can withstand up to 600 mm head of floodwater if installed correctly in a structurally sound building. In some locations it is possible to instal internal pumps within a sump to remove any water that evades the resistance measures.

There are many commercial suppliers of flood resistance measures and they can provide detailed designs for their products to meet the requirements of the property. Further information and independent assessment of these products is also widely available^{5, 6}.

As the property sits within extensive grounds an alternative of providing landscaped flood bunds could also be considered.

5.3 Safe Access and Egress

Dry access and exit may not always be available via the access driveway due to a high risk of tidal and surface water flooding along the Langstone High Street. Both tidal and surface water flooding are fairly ephemeral and access is likely to be by vehicle so access should not be significantly hindered.

Nevertheless, a new access to the northern boundary of the site onto the lane leading to 63 Langstone Road could be considered as this would be flood-free in all modelled scenarios. Provision of this access would be subject to obtaining planning permission or landowner consent if this lane is privately owned.

5.4 Off-site Flood Impacts

The proposed development will only cause displacement of tidal flood water which is not considered to increase flood levels elsewhere or affect flood flow paths.

Surface water drainage should use SuDS⁷ principles to attenuate runoff such as source control, surface storage a raingarden or a soakaway. Discharge off site, if required should be made at the current greenfield rates indicated in Table 2.1. Despite an increase in footprint size, the off-site discharge rate from the new property should therefore be reduced compared to the existing.

As the proposed development will not raise nearby flood levels or increase runoff it is therefore unlikely to have any adverse flood impacts off site.

⁵ <https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/review-of-property-level-flood-protection-measures>.

⁶ [https://www.bre.co.uk/filelibrary/pdf/projects/flooding/Property_owners_booklet_v2_web_\(2\).pdf](https://www.bre.co.uk/filelibrary/pdf/projects/flooding/Property_owners_booklet_v2_web_(2).pdf)

⁷ The SuDS Manual. CIRIA Report C753, 2015.

6 CONCLUSIONS

- Works comprising demolition of Langstone Lodge and construction of a new building is proposed.
- The proposed development will increase the building footprint but can be drained using SuDS principles including infiltration.
- The site is in Flood Zone 1 and not currently at risk of flooding from any of the sources considered.
- Climate change is expected to increase sea level and the property would then be at risk from the 0.5% tidal event during its lifetime.
- Recommended mitigation includes raising the finished floor level to 4.62 m AOD. As the proposed development is a new-build it is likely that the existing finished floor level can be raised above the existing level of 4.10 m AOD but an alternative of using flood resistance measures or flood bunding could be adopted to provide an equivalent level of protection.
- Access during flood conditions may be hindered by tidal or surface water flooding on Langstone High Street. An alternative access to the north could be considered to provide a dry access route.
- With SuDS drainage provision the proposed development should be safe and not cause an increase in flood risk elsewhere.

7 REPORT LIMITATIONS

This report has been prepared with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources.

The opinions given in this report have been dictated by the finite data on which are they based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and has accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, the right to review such information and, if warranted, to alter the opinions accordingly is reserved.

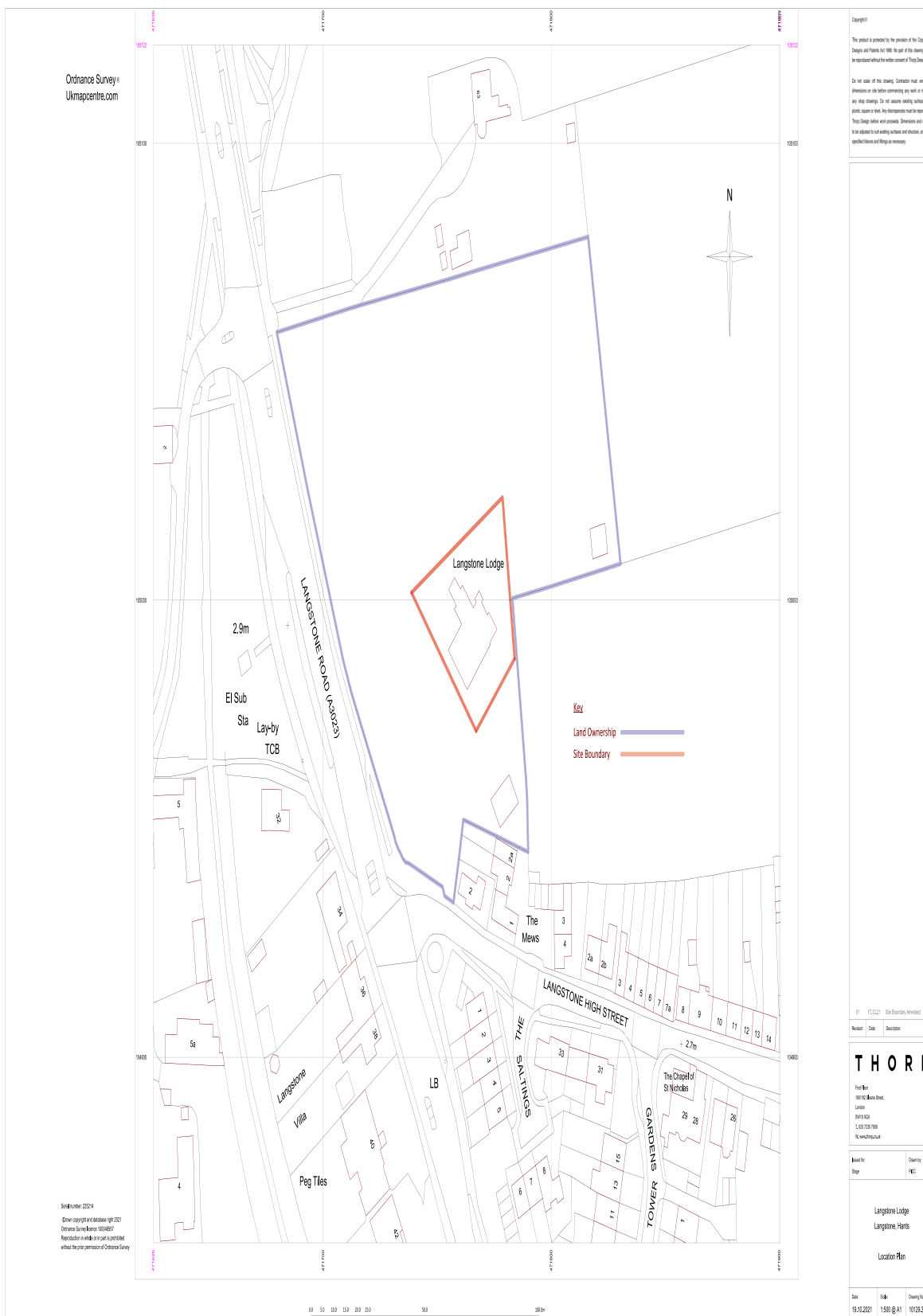
It should be noted that any risks identified in this report are perceived risks based on the information reviewed.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such are not guarantee that the sites are free of hazardous conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent.

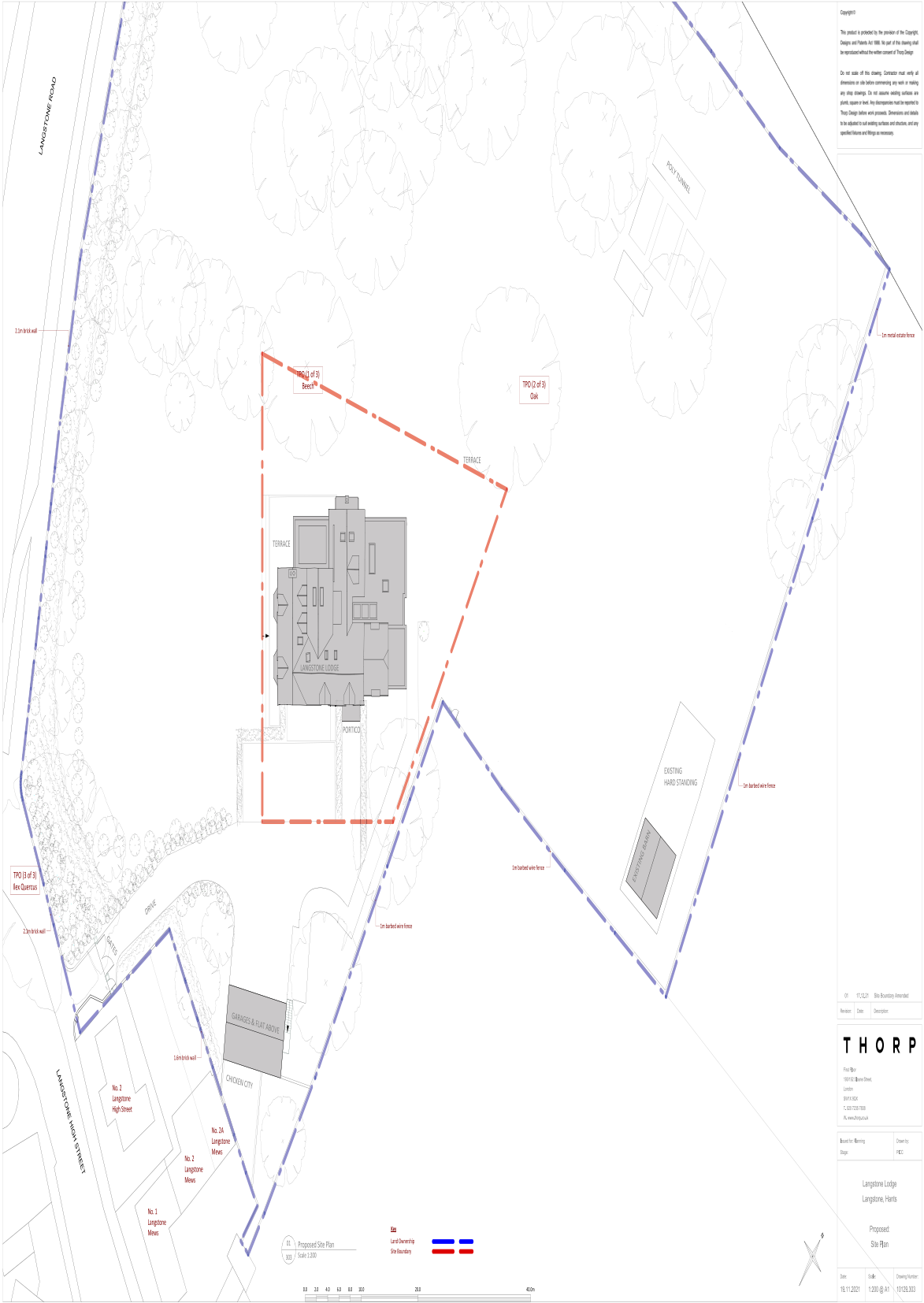
8 APPENDICES

APPENDIX 1 – SITE AND LOCATION PLANS









APPENDIX 2 – GREENFIELD RUNOFF RATES

Greenfield runoff rate estimation - members | UK SuDS

31/10/2022, 15:31



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Bob Sargent

Site name: Langstone Lodge

Site location: Havant

Site Details

Latitude: 50.84001° N

Longitude: 0.9821° W

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 2093908849

Date: Oct 31 2022 15:31

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 1

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

SPR estimation method: Calculate from SOIL type

(2) Are flow rates < 5.0 l/s?

Soil characteristics: Default Edited

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

SOIL type: 3 3

HOST class: N/A N/A

SPR/SPRHOST: 0.37 0.37

(3) Is $SPR/SPRHOST \leq 0.3$?

Hydrological characteristics: Default Edited

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

SAAR (mm): 711 711

Hydrological region: 7 7

Growth curve factor 1 year: 0.85 0.85

Growth curve factor 30 years: 2.3 2.3

Growth curve factor 100 years: 3.19 3.19

Growth curve factor 200 years:

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	2.93	2.93
1 in 1 year (l/s):	2.49	2.49
1 in 30 years (l/s):	6.73	6.73
1 in 100 year (l/s):	9.33	9.33
1 in 200 years (l/s):	10.94	10.94

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.