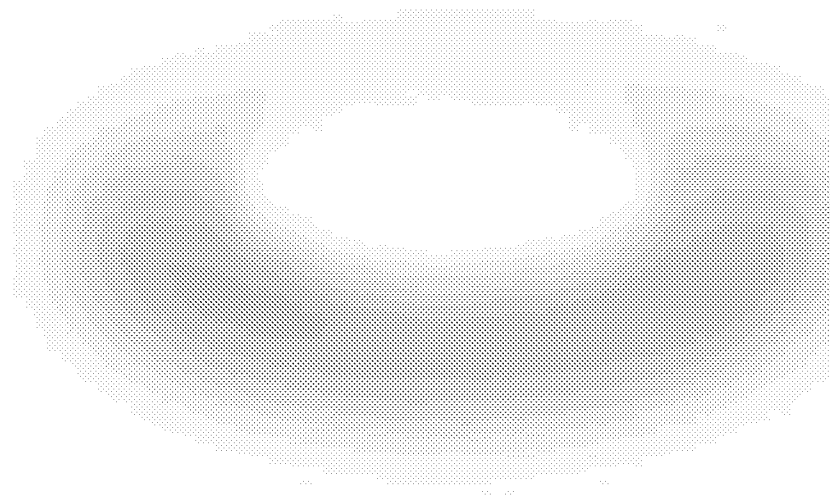




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Project: Former Maltravers Social Club, Maltravers Lane - Phase 1 FRA
Prepared for: Dowsett Mayhew Planning Partnership Ltd on behalf of Mr Jamie Bannon
Reference: 3570 FRA
Date: December 2017
Version: Final v1.0



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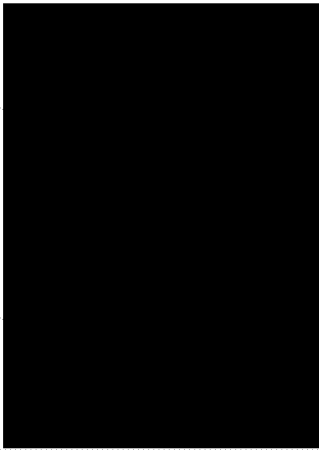
Project: Former Maltravers Social Club, Maltravers Lane - Phase 1 Flood Risk Assessment (FRA)

Prepared for: Dowsett Mayhew Planning Partnership Ltd on behalf of Mr Jamie Bannon

Reference: 3570 FRA

Site Location: Former Maltravers Social Club, Maltravers Lane, Littlehampton, West Sussex, BN17 5NA

Proposed Development: It is understood that the development is for the change of use of former united services club to 10 no. flats with associated landscaping, parking, bins and recycling storage.

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1. Summary

- 1.1 Ambiental Technical Solutions Limited has been appointed by Dowsett Mayhew Planning Partnership Ltd on behalf of Mr Jamie Bannon to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the development at the former Maltravers Social Club, Maltravers Lane, Littlehampton, West Sussex, BN17 5NA.
- 1.2 The proposed development is for the change of use of former united services club to 10 no. flats with associated landscaping, parking, bins and recycling storage.
- 1.3 With reference to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA, the proposed site is partly located within Flood Zone 3 (High Risk; having a 1 in 200 or greater annual probability of flooding from the sea) and is considered to be a “More Vulnerable” development under the NPPF.
- 1.4 With focus on the potential main flood risk, the proposed development lies at approximately 450m east of River Arun, which is considered a main watercourse by the EA. The EA and Arun SFRA confirm that the principal flood risk at the site is from tidal flooding.
- 1.5 The site-specific EA data validates that the site benefits from man-made flood defences protecting the wider area of the site up to the 1 in 300 (0.33%AEP) standard.
- 1.6 Topographic levels across site vary between approximately 3.61mAOD at the site’s frontage to 4.59mAOD towards the rear (Source: Topographical Survey). The threshold level of the existing building is approximately 4.85mAOD.
- 1.7 The EA site-specific data indicates that during a 1 in 200 year tidal flooding event (undefended) the flood level is 3.74mAOD. This flood level represents the outline of EA’s Flood Map for Planning - Flood Zone 3 within the site’s boundaries, and in comparison with the general site levels it results that most of the site would be unaffected by a 1 in 200 year tidal flooding event.
- 1.8 EA Product 4 flood data indicates that the flood level at the site during the 1 in 200 year event with an allowance for climate change up to year 2115 (0.5%AEP-2115) is 4.89mAOD - if the defences are breached or overtopped, and 4.94mAOD if the defences are removed (undefended scenario).
- 1.9 In terms of access/egress and the flood hazard to human life associated with a worst-case scenario breach, is ‘Danger for Some’. See Section 6, Residual Risks.
- 1.10 The client has stipulated that the ground floor finished level will be raised to 5.19mAOD, 300mm above the design flood event 0.5%AEP-2115 defended scenario level of 4.89mAOD.
- 1.11 Analysis of EA Risk of Flooding from Surface Water Map indicated that the site is at a ‘Very Low’ risk of surface water flooding. During the worst-case scenario flooding event, associated with a rainfall event less than 1 in 1000 probability of occurrence in any given year (Low Risk), the proposed site will experience no or negligible flooding depths.
- 1.12 As such, and given that:
 - the development is for the change of use with no post-development alterations to the exterior of the building which impact on the current flooding regime;
 - proposed residential units will be located 300mm above the defended 1 in 200 year tidal flooding event level and accounting for climate change to year 2115;
 - formalisation of an evacuation plan and signing up for the EA Flood Alert and Warning Service;

following the guidelines contained within the NPPF, the proposed development **meets all requirements set by the Exception Test and therefore considered to be suitable**, assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

Development Description	Existing	Proposed
Development Type:	Social Club	Residential Accommodation
EA Vulnerability Classification:	Less Vulnerable	More Vulnerable
External Ground Level:	3.61mAOD to 4.59mAOD (Source: Topographic Survey)	
Risk to Development	Summary	Comment
EA Flood Zone:	Partially in Flood Zone 3	EA Flood Map for Planning
Flood Source:	Tidal	Arun Strategic Flood Risk Assessment
Defended 1:200 + CC to year 2115	4.89mAOD	Product 4 Site-specific EA Data
Undefended 1:200 + CC to year 2115	4.94mAOD	
'Very Low' (<0.1% AEP) Pluvial Risk Flood Depth:	Negligible	EA Floor Risk from Surface Water Map
Recorded Flood Events in Area:	Yes	Historic Flooding Records Map (Arun SFRA, Appendix H, Sheet no.26/46)
Recorded Flood Events at Site:	No	
SFRA Documents:	Yes	Arun District Council Final Combined Level 1 and Level 2 SFRA – Final Report (v5 November 2016)
Management Measures	Summary	Comment
Ground floor/sleeping level above extreme flood levels:	Yes	Ground floor FFL set 300mm above design flood level (Defended-0.5%AEP-2115)
Flood Resilient Design:	Yes	
Flood Alert & Evacuation Plan:	Recommended	EA Flood Alert & Warning Service; Access & Egress Plan
Offsite Impacts	Summary	Comment
Displacement of floodwater:	No	The proposed development is for the change of use with no alterations to the external environment and with no impact on the existing flooding regime
Increase in surface run-off generation:	No	
Impact on hydraulic performance of channels:	None	

Table 1: Summary of flood risks, impacts and proposed flood mitigation measures.

N/A¹ not required for this assessment; N/A² data not available.

2. Development Description and Site Area

Proposed Development and Location

- 2.1 The site is located at the former Maltravers Social Club, Maltravers Lane, Littlehampton, West Sussex, BN17 5NA (Figure 1 and 2). The proposed development is for the change of use from a social club venue to provide 10no. residential units.



Figure 1: Wider Site Location Map (Source: OS).



Figure 2: Site location (Source: Google Earth).

- 2.2 The nearest watercourse to the site is the River Arun, located at approximately 450m towards the west from the site and is designated as an EA main river.
- 2.3 Analysis of topographic levels show the ground levels at the proposed development to vary between 3.61mAOD at the site's frontage to 4.59mAOD at the rear (Source: Topographic Survey).

Vulnerability Classification

- 2.4 According to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA the site is partly located in Flood Zone 3 (High Risk; 1 in 200 (>0.5%) or greater annual probability of flooding).
- 2.5 Under the NPPF guidance, the existing development is classified as a 'Less Vulnerable' development and the proposed change of use to residential as 'More Vulnerable'.



Figure 3: EA Flood Zone Map (Source: EA).

Geology

- 2.6 According to the British Geological Survey (BGS) the bedrock of the site is of the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated) - chalk. The superficial geology of the site is classified as River Terrace Deposits (undifferentiated) - sand, silt and clay.

3. Sequential Test/Exception Test

- 3.1 Under the NPPF, all new planning applications must undergo a *Sequential Test*. This test must be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain. The test refers to the EA Flood Zones described in Table 4. For reference, the NPPF *Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility'* table is reproduced below in Table 2.
- 3.2 The development is for the change of use from social club to residential accommodations. The proposed development will be classified as "More Vulnerable".

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b Functional Floodplain	Exception Test Required	✓	✗	✗	✗

Table 2: The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF. Shaded cells denote the proposed re-development. Please note: ✓ means development is appropriate; ✗ means the development should not be permitted.

- 3.3 Using the principles of the Sequential Test outlined above, the proposed development is 'More Vulnerable' and partially located within Flood Zone 3 (as defined by the EA online Flood Map, Figure 3) and as such, the development is required to implement the Exception Test.

For the Exception Test to be passed, the proposed development must meet the following criteria:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh the flood risk;
- a Flood Risk Assessment demonstrates that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

(Source: the NPPF)

- 3.4 As such, the proposed development is required to be accompanied by a FRA which shows that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area.

4. Site Flood Hazards

Sources of Flooding

- 4.1 Communication with the Environment Agency (EA) has identified the following potential sources of flooding to the site:

Source	Description
Fluvial	N/A
Tidal	Lower River Arun
Surface	Near the site
Groundwater	At the site
Sewer	N/A

Table 3: Summary of flood sources.

Mechanisms and History of Flooding

- 4.2 According to the low detail, national-scale flood mapping created on behalf of the EA the proposed development is partially located within Flood Zone 3, within the tidal flood plains of Lower River Arun.
- 4.3 Tidal flooding is generally caused by low pressure weather systems creating storm-surges (or storm tides), chiefly via high speed winds. These winds (and to a certain extent, the low pressure) create a 'bulge' of water which, if it coincides with high tide, can generate very high, stormy, water levels which are subsequently influencing the estuary's rivers. However, because this mechanism is well understood, it is very likely that an early warning will be issued before such an event strikes.
- 4.4 Surface water flooding occurs predominantly at topographic depressions where the runoff from the wider region accumulates and ponds. Along flow pathways, increased speeds of large volumes of water runoff augment the hazard of flooding to people and may cause severe damages to property.
- 4.5 Groundwater flooding is also predominantly caused by intense and unremitting rainfalls events, however the soil layer texture and standing water table of a region are the main catalysts determining the occurrence probability and intensity of this source of flooding.

Fluvial

- 4.6 The EA site-specific data and Arun SFRA indicate that the floodplains of River Arun in proximity to the sea are mainly tidally influenced.
- 4.7 As such, the risk of fluvial flooding at the site is deemed low.

Tidal

- 4.8 The EA site-specific data Product 4 indicates that the site is partly located in Flood Zone 3, at a risk of tidal flooding at greater than 1 in 200 annual exceedance probability (>0.5%AEP).
- 4.9 The EA has provided water levels and depths for different flood return periods at five node locations across the site. The data was extracted from the Arun to Adur Flood Model (2012).
- 4.10 The lowest site topography is found toward the north-western site boundary and according to the EA data (Node 2) it could be affected by the 1 in 200 year and 1 in 1000 year events, causing flood depths of up to 0.02m and 0.26m respectively. In addition, Node 1, which is located on Maltravers Road could experience up to 0.26m of flooding during the 1 in 1000 year event.
- 4.11 Across nodes 3, 4 and 5, no flooding would occur on site during any flood events when climate change is not accounted for. Analysis of the location of nodes, site topography and flood depths indicates that most of the site is currently at a risk of flooding of less than 1 in 1000 chance of occurrence (Flood Zone 1).
- 4.12 As such, the proposed site is only partially at a high risk of tidal flooding (>0.5%AEP), toward the north-western site region designated predominantly as refuse area and parking.
- 4.13 According to the Department for Communities and Local Government, the flood risk for residential developments should be considered over a 100 year timeframe due to the anticipated negative impact of climate change on coastal/tidal flooding. See Paragraph: 026 Reference ID: 7-026-20140306 in Flood Risk and Coastal Change Guidance.
- 4.14 As such, the tidal flooding events with an allowance for the effects of climate change must be analysed and the flooding risk and human hazard quantified by the worst-case scenario over the lifetime of the development of 100 years. Climate change effects have been analysed in Section 5, Probability of Flooding.

Surface Water (Pluvial)

- 4.15 The site has been identified as being located in an area of “Very Low” risk of surface water flooding by the EA’s Risk of Surface Water Flooding map (Figure 4). This means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%). Regions on Maltravers Road are located at a ‘Low’ risk of flooding, being a conveyance route for flows to a lower topography.
- 4.16 The EA Surface Water Depth Map – High Chance of Occurring (greater than 1 in 30 year rainfall event) shows that the site and surrounding area not to be affected by such an event (Figure 5).
- 4.17 The EA Surface Water Depth Map – Low Chance of Occurring (greater than 1 in 1000 year rainfall event) shows that the site not to be affected by such an event. On Maltravers Road the flooding can reach a depth of up to 300mm (Figure 6) and velocities of over 0.25m/s (Figure 7).

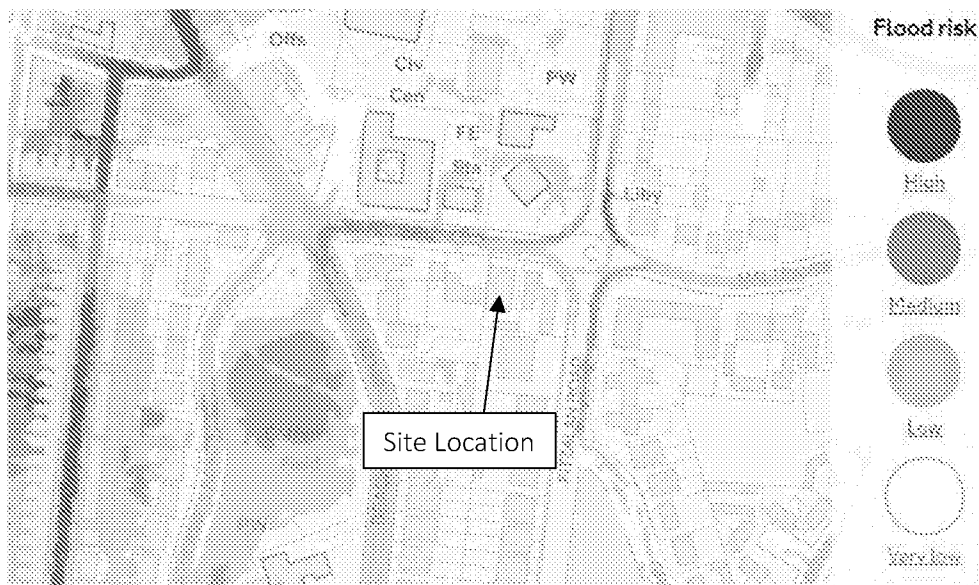


Figure 4: EA Surface Flood Risk Map (Source: EA Online)



Figure 5: Surface Water Depth – High Chance of Occurring (Source: EA Online).



Figure 6: Surface Water Depth – Low Chance of Occurring (Source: EA Online).



Figure 7: Surface Water Velocity and Direction – Low Chance of Occurring (Source: EA Online).

- 4.18 As such, the risk of flooding from this source could be considered to be **low**. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. Data can vary based on the accuracy of the level information on which the models are based and any runoff criteria.

Groundwater

- 4.19 Groundwater flooding accounts for a small proportion of the number of properties at risk of flooding across England and Wales, when it does occur it usually lasts longer than flooding from rivers, the sea or surface water. It is most likely to occur in areas underlain by permeable rocks, areas known as aquifers. These can be extensive regional aquifers, such as chalk or sandstone, or more local sand or river gravels in valley bottoms underlain by less permeable rocks.
- 4.20 The EA has identified the site to be located in a Groundwater Vulnerability Zone, classified as a major aquifer with high activity.

- 4.21 Groundwater Flooding Susceptibility Map (See in Arun SFRA, Appendix H, Sheet no.26/46) indicates that the site is located within an area with chances of groundwater emergence of between 50% and up to 75%.
- 4.22 The EA and the Arun SFRA have no records of historical groundwater flooding at the site or in the wider area.
- 4.23 As such, the risk of flooding from this source can be considered to be **moderate**.



Figure 8: Areas Susceptible to Groundwater Flooding (Source: Leicester SFRA)

Sewer

- 4.24 Arun SFRA and EA has no records of historical sewer flooding records at the site. As such, the risk to the site from sewer flood sources can be considered **relatively low**.

Records of Historical Flooding

- 4.25 Historical Flooding Records Map (see in Arun SFRA, Appendix H, Sheet no.26/46) indicates a couple of flooding incidents reported in the wider area of the site however, the source of the flooding of these incidents is mostly unknown. No historical flooding records are illustrated at the proposed site.

5. Probability of Flooding

- 5.1 According to the low detail, national-scale flood mapping created on behalf of the EA the site is partially located in Flood Zone 3, the probability of tidal flooding at the site is greater than 0.5% chance of annual occurrence.
- 5.2 This information is supported by the EA Flood Map for Planning (Figure 3) which has been produced in part using JFLOW/HYDRO-F – a relatively coarse, national scale flood modelling strategy and in part using detailed flood models. It is important to note that only the *potential* floodplain is shown; **the mitigating effects of any flood defences currently in place are not considered**. For reference, the definition of the NPPF flood risk zones is included in Table 4.

Zone	Description
1	Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 4: Definition of the NPPF Flood Zones. Shaded cells denote the proposed development (Source: EA).

Climate Change on Site

- 5.3 Climate change is likely to increase sea levels and storm intensity.
- 5.4 The EA have provided flood data for the site to account for climate change up to years 2070 and 2115.
- 5.5 According to the Department for Communities and Local Government, the flood risk for residential developments should be considered over a 100 year timeframe due to the anticipated impact of climate change on coastal/tidal flooding. See Paragraph: 026 Reference ID: 7-026-20140306 in Flood Risk and Coastal Change Guidance.
- 5.6 As such, the tidal flooding events with an allowance for the effects of climate change must be analysed and the flooding risk and human hazard quantified by the worst-case scenario over the lifetime of the development of 100 years.

- 5.7 Therefore, flood risk at the proposed site should be primarily evaluated by the 2115 EA flood data.
- 5.8 Flood levels and depths for the site have been provided at five locations or nodes within the site's boundaries, extracted from the Arun to Adur Flood Model conducted in 2012.
- 5.9 The flood level for the defended 1 in 200 year event accounting for climate change to year 2115 across all nodes is 4.89mAOD. The flood depths at the nodes vary according to the site's topography. Given that the site's topography slopes downward from south to north the flood depths range from 0.58m to 1.1m.
- 5.10 The flood level for the undefended 1 in 200 year event accounting for climate change to year 2115 across the modelled nodes is 4.94mAOD. The flood depths vary from 0.7m at the rear of the site to 1.16m to the site's frontage on Maltravers Road.
- 5.11 The EA has confirmed that the site currently benefits from defences that protect the site up to the 1 in 300 year standard (0.33%AEP). As such, and given that the defences will not be removed in the future, the flood risk at the proposed site should be assessed by the defended flooding scenarios.
- 5.12 As such, the flood risk at the proposed site is mainly associated residual risks with overtopping or breaching of defences along Arun River and of coastal defences.

6. Residual Risks

- 6.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:
- the failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
 - failure of a reservoir, or;
 - a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

Defence Breach

- 6.2 Table 4.4 of DEFRA Report 'Flood Risk to People' FD2321/TR2 indicates the likely hazard to human life a defence breach might have relative to their distance from the breach.
- 6.3 The EA has indicated that the flood defences protecting the wider area of the site are in the form of Steel Sheet Pile with concrete cap and prom, and have a good structural condition. The crest levels of the defences are approximately between 4.76mAOD and 4.8mAOD. The distance from the site to the nearest defences on River Arun is approximately 450m.
- 6.4 Analysis of 2mLiDAR DTM topography between the site and the defences indicates that the site is roughly 2m above the immediate floodplain topography bounding the defences. Additionally, the natural earth banks of the river reach up to approximately 3.5mAOD. As such, and given that

the natural embankment of the river remains unaffected, the maximum water height during a breach scenario would be 1.3m.

- 6.5 Assuming the worst-case scenario of breaches failing at the nearest point to the site, and the breach failure occurs on the full height of the defences – i.e. water head 1.3m, according to Table 4.4 and Figure 4.1 in DEFRA Report FD2321/TR2 the flood hazard at the site is 'Danger for some' (children, the elderly and the infirm).

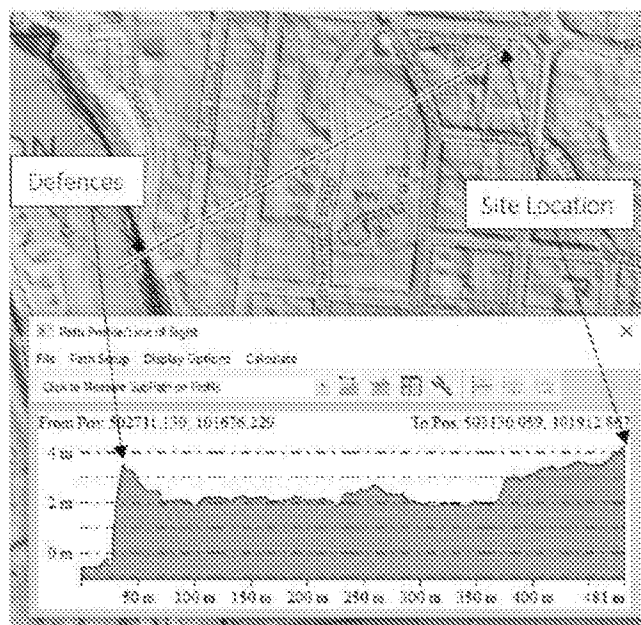


Figure 9: Wider Site Area Floodplain Topography (Source: 2mLIDAR)

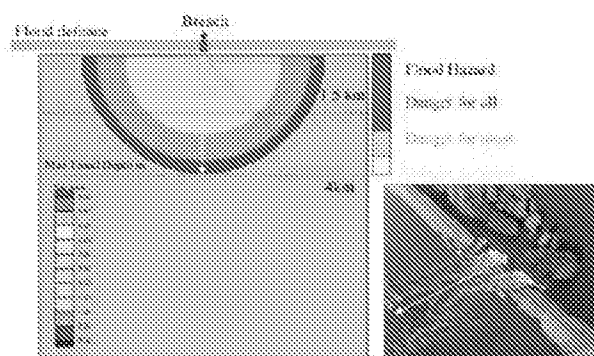


Figure 4.1 Flood hazard at a breach in a flood defence

Table 4.4 Danger to people from breaching relative to distance from defence

Distance from breach (m)	0.5	1	2	5	10	20
100						
200						
300						
400						
500						
600						
700						
800						
900						
1000						
1200						
1400						
1600						
1800						
2000						
2500						
3000						
3500						
4000						
4500						
5000						
6000						

Key:
 Danger for some
 Danger for most
 Danger for all

Figure 10: Flood Hazard to People relative to distance from defence (Source: DEFRA)

- 6.6 The controlling residual flood risk mechanism on site is tidal. However, because this mechanism is well understood, it is very likely that an early warning will be issued before a tidal flood event occurs. As such, it is very unlikely that the site would be subject to tidal flooding without several hours of early warning.
- 6.7 The client has stipulated that the ground floor finished level will be raised 300mm above the design flood event 0.5%AEP-2115 defended scenario level of 4.89mAOD.
- 6.8 As such, the risk to the site users in a worst-case defence breach scenario is deemed relatively low.

Overtopping

- 6.9 At the time of writing, the EA and Arun SFRA have no records relating to overtopping of defences with an impact in the area of the site.
- 6.10 As such, and taking into account the distance from development site to the River Arun the risk to the development from overtopping is deemed low.

7. Flood Risk Management Measures

- 7.1 The site is partially located in Flood Zone 3 (High risk of flooding as defined in the NPPF) according to the EA Flood Map, as such the proposed conversion would likely require flood mitigation measures. The client has stipulated that the ground floor finished level will be raised 300mm above the design flood event 0.5%AEP-2115, defended scenario level of 4.89mAOD, to 5.19mAOD. In addition, the following additional mitigation measures are recommended:
- bringing down electrical services from ceilings toward sockets, where possible;
 - all plumbing insulation to be of closed-cell design;
 - subscribe to the EA Flood Alert Service and EA Flood Warning Service and ensure that this service is made available to all site users, future owners and residents, and;
 - formulate an evacuation plan to be implemented in the event of severe flood or weather warnings.

Safe Access/Egress

- 7.2 The site resides partly within Flood Zone 3 and therefore it is recommended the site owner sign up to the EA Flood Alert Service and EA Flood Warning Service in order to provide betterment to the proposed development.
- 7.3 Safe refuge from flooding can be achieved by remaining within the premises of the proposed development, or by leaving the site and heading away from the source of flooding.
- 7.4 A flood evacuation plan should be prepared to indicate the closest safe location within Flood Zone 1, or at a higher topography and specifically to the east and head towards Maltravers Drive.

EA Flood Warning Service

- 7.5 The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.

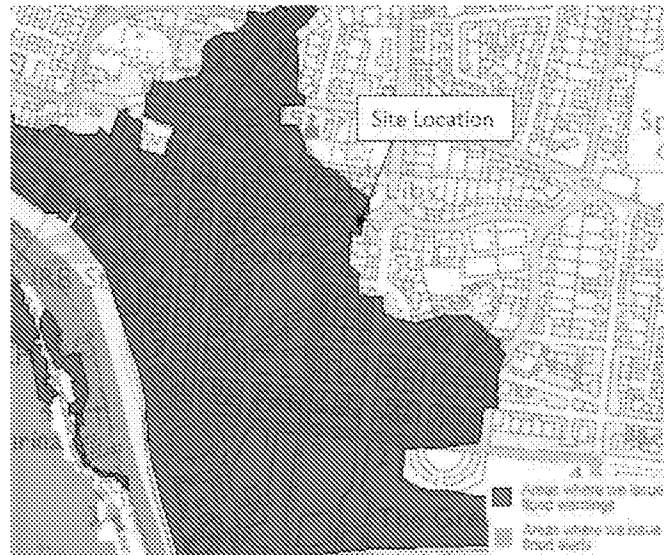


Figure 11: EA Flood Warning Areas Map (Source: EA)

- On receipt of a **FLOOD ALERT**, the owners/occupiers of the property should:
 - monitor the situation via local media;
 - make themselves aware of forecast local weather conditions;
 - alert others resident in the property of the situation;
 - prepare to evacuate if necessary.
 - On receipt of a **FLOOD WARNING**, the owners/occupiers of the property should:
 - follow advice to “go in, stay in, and tune in”;
 - be prepared to follow instruction from the Emergency Services.
 - On receipt of a **SEVERE FLOOD WARNING**, the owners/occupiers of the properties should:
 - follow advice to “go in, stay in, and tune in”;
 - remain attentive to local media forecasts and news bulletins;
 - do not evacuate unless instructed to do so by the Emergency Services;
 - only when instructed to evacuate by the Emergency Services, leave the property and follow the agreed evacuation route – detailed previously.
- 7.6 Safe egress from the site can be achieved by migrating away from the source of flooding on receipt of a severe flood warning.
- 7.7 If flooding has already occurred prior to evacuation, it is advised to access a higher elevation of the property (e.g. first floor) if possible and await instruction from the emergency services or until it is deemed safe to evacuate. No evacuation should be sought if flood depths exceed 25cm, evacuation should only be sought with the assistance of the emergency services in these circumstances.

8. Off Site Impacts

- 8.1 The proposed development is for the change of use of the existing social club to a residential building. No external alterations to the building or to the site have been identified to impact on any existing flooding regimes at the site or within the wider area.

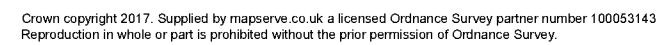
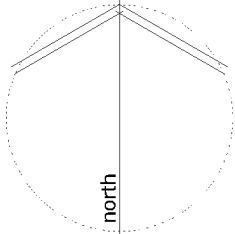
9. Conclusion

- 9.1 Ambiental Technical Solutions Limited has been appointed by Dowsett Mayhew Planning Partnership Ltd on behalf of Mr Jamie Bannon to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the development at the former Maltravers Social Club, Maltravers Lane, Littlehampton, West Sussex, BN17 5NA.
- 9.2 The proposed development is for the change of use of former united services club to 10 no. flats with associated landscaping, parking, bins and recycling storage.
- 9.3 With reference to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA, the proposed site is partly located within Flood Zone 3 (High Risk; having a 1 in 200 or greater annual probability of flooding from the sea) and is considered to be a “More Vulnerable” development under the NPPF.
- 9.4 With focus on the potential main flood risk, the proposed development lies at approximately 450m east of River Arun, considered a main watercourse by the EA. The EA and Arun SFRA confirm that the principal flood risk at the site is from tidal flooding.
- 9.5 The site-specific EA data validates that the site benefits from man-made flood defences protecting the wider area of the site up to the 1 in 300 (0.33%AEP) standard.
- 9.6 Topographic levels across site vary between approximately 3.61mAOD at the site’s frontage to 4.59mAOD towards the rear (Source: Topographical Survey). The threshold level of the existing building is approximately 4.85mAOD.
- 9.7 The EA site-specific data indicates that during a 1 in 200 year tidal flooding event (undefended) the flood level is 3.74mAOD. This flood level represents the outline of EA’s Flood Map for Planning - Flood Zone 3 within the site’s boundaries, and in comparison with the general site levels, it results that most of the site would be unaffected by a 1 in 200 year tidal flooding event.
- 9.8 EA Product 4 flood data indicates that the flood level at the site during the 1 in 200 year event with an allowance for climate change up to year 2115 (0.5%AEP-2115) is 4.89mAOD - if the defences are breached or overtopped, and 4.94mAOD if the defences are removed (undefended scenario).
- 9.9 In terms of access/egress and the flood hazard to human life associated with a worst-case scenario breach, is ‘Danger for Some’. See Section 6, Residual Risks.
- 9.10 The client has stipulated that the ground floor finished level will be raised to 5.19mAOD, 300mm above the design flood event 0.5%AEP-2115 defended scenario level of 4.89mAOD.
- 9.11 Analysis of EA Risk of Flooding from Surface Water Map indicated that the site is at a ‘Very Low’ risk of surface water flooding. During the worst-case scenario flooding event, associated with a rainfall event less than 1 in 1000 probability of occurrence in any given year (Low Risk), the proposed site will experience no or negligible flooding depths.
- 9.12 As such, and given that:
 - the development is for the change of use with no post-development alterations to the exterior of the building which impact on the current flooding regime;
 - proposed residential units will be located 300mm above the defended 1 in 200 year tidal flooding event level and accounting for climate change to year 2115;
 - formalisation of an evacuation plan and signing up for the EA Flood Alert and Warning Service;

following the guidelines contained within the NPPF, the proposed development **meets all requirements set by the Exception Test and therefore considered to be suitable**, assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

Appendix A – Site Information

- Existing and Proposed Site Plans

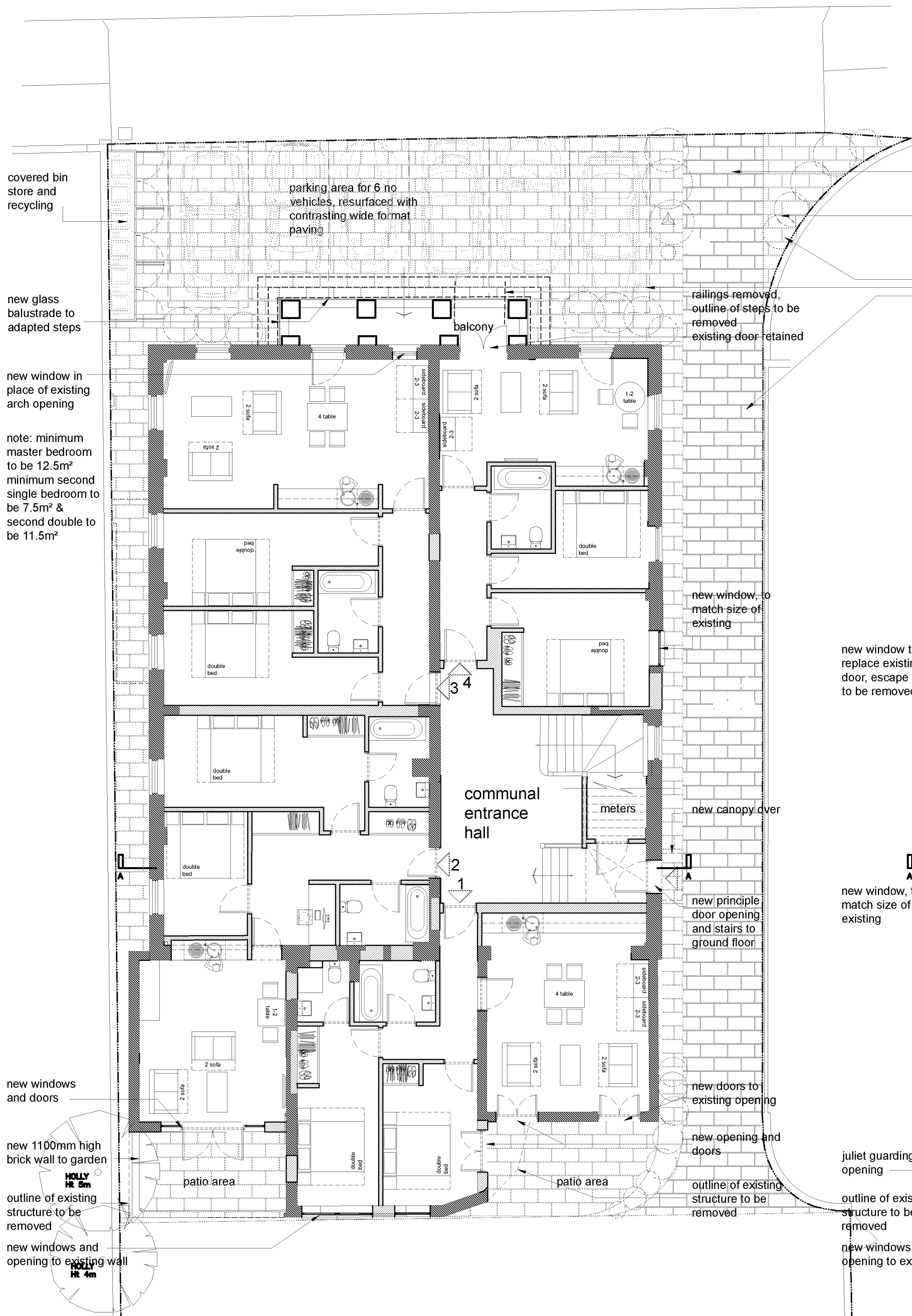


All dimensions to be confirmed on site prior to work commencing. Goods, materials and work to be in accordance with current regulations and standards. Refer to approved drawings and conditions.
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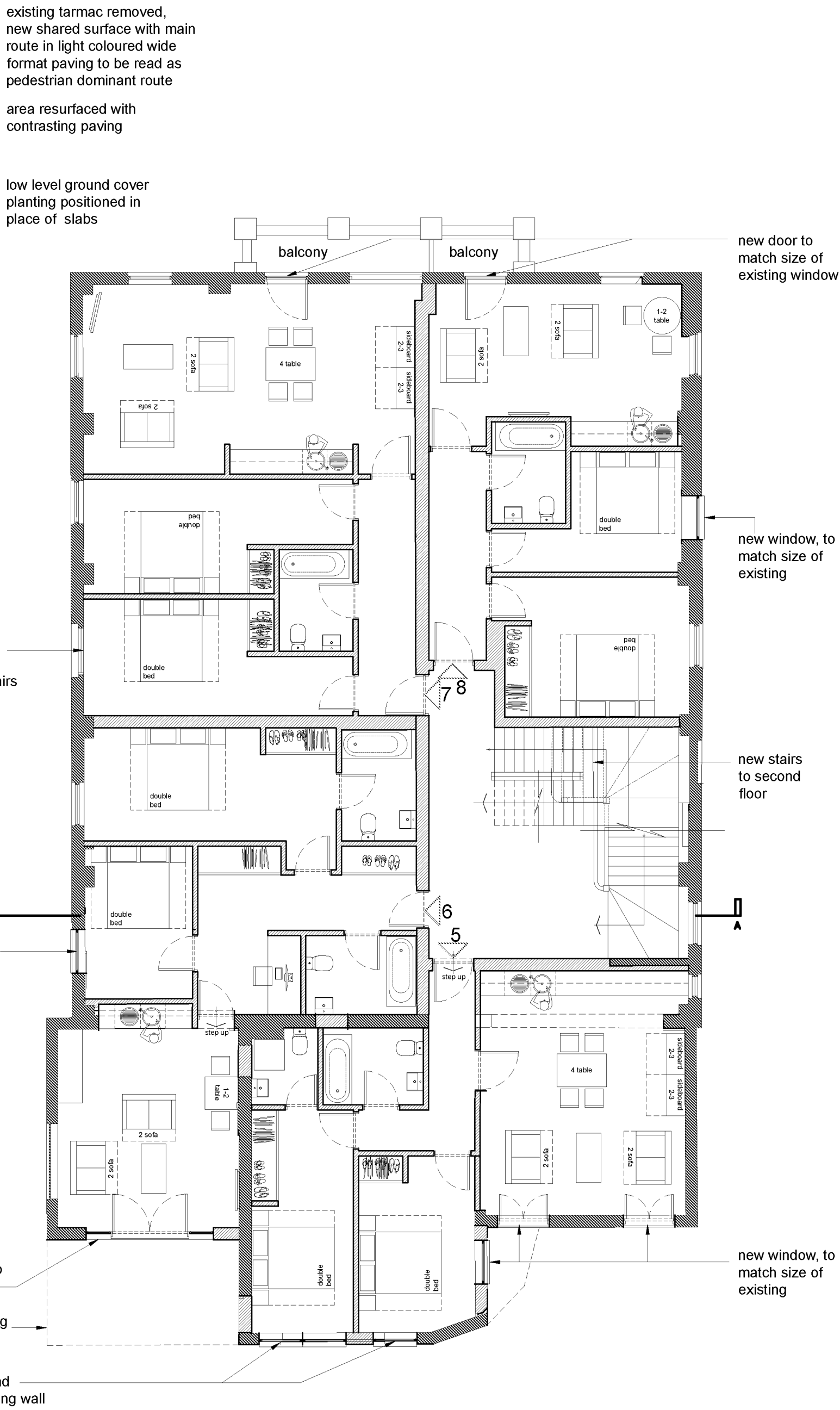
Simon
Atkins RIBA

UK Registered Architect

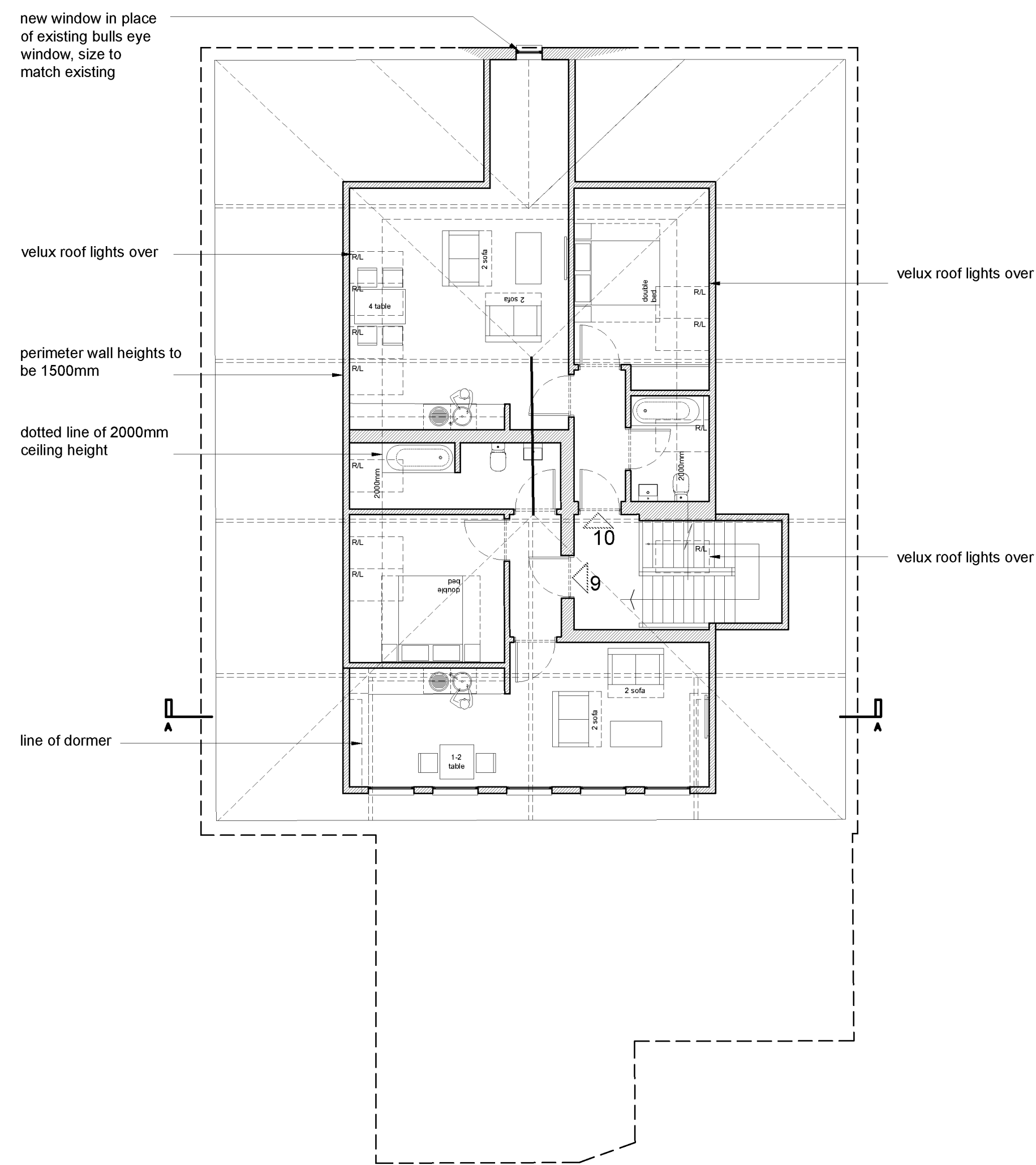
07500 601
939simon@simonatkings.com.au
simonatkings.com.au



Ground Floor Plan

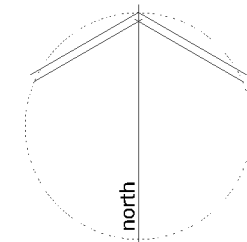
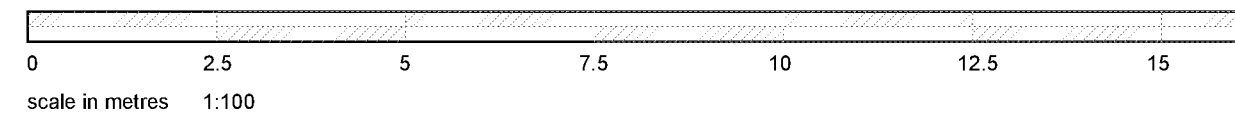


First Floor Plan

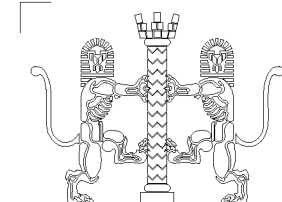


Loft Level Plan

KEY
existing wall
proposed wall
dwelling entrance



170923	ISSUED FOR PLANNING	SA
rev.	date	comment
amendments		
client	James Bannon	contract 0041
project	The Maltravers Social Club	reference PL.002
	Maltravers Lane, Littlehampton	revision
	WEST SUSSEX BN17 5NA	title Proposed Building Plans
		PLANNING
work stage	drawn	date
	SA	170909
	file	scale 1:100
		paper size A1



Simon Atkins
RIBA

UK Registered Architect

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North Elevation



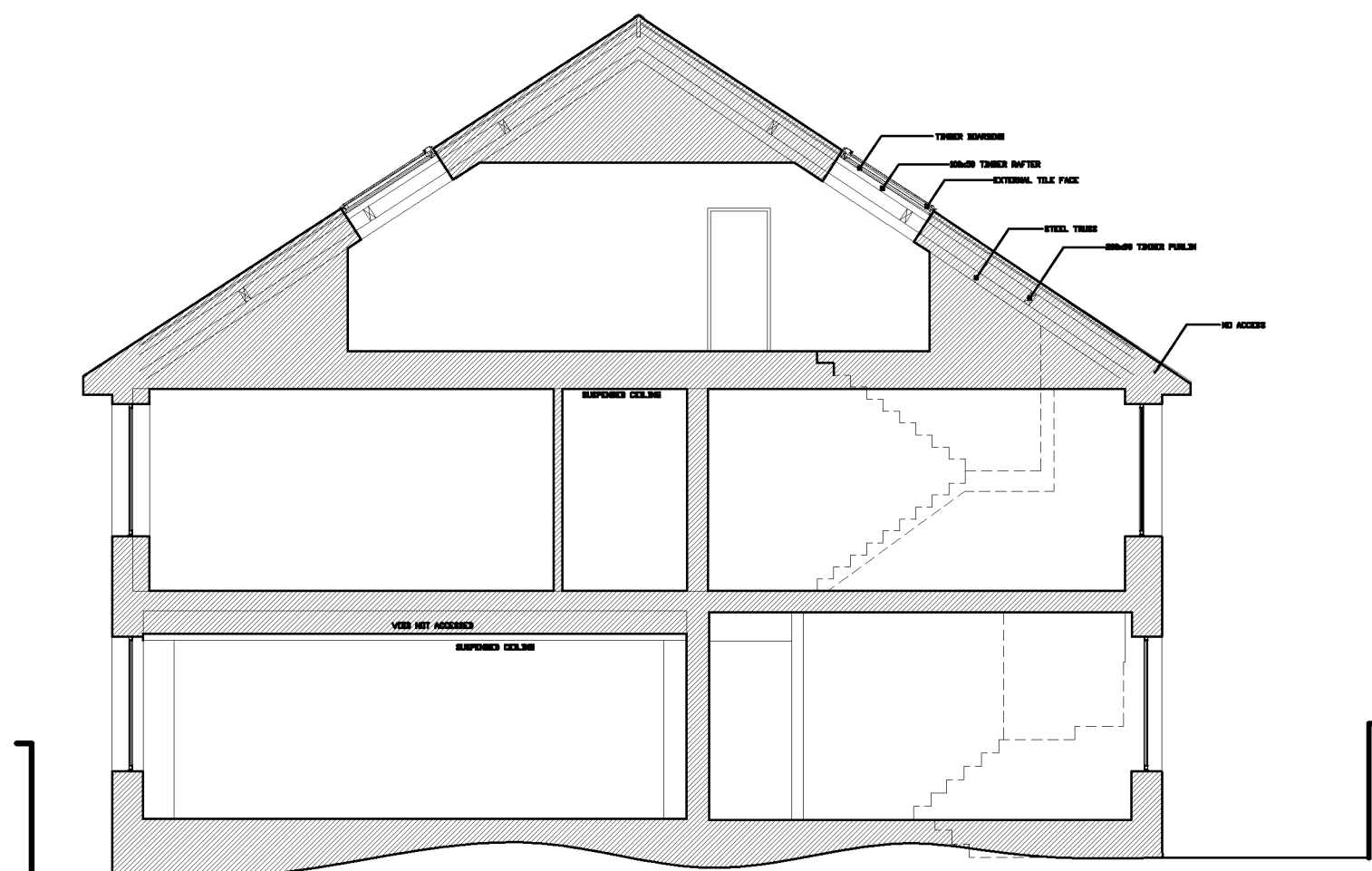
East Elevation



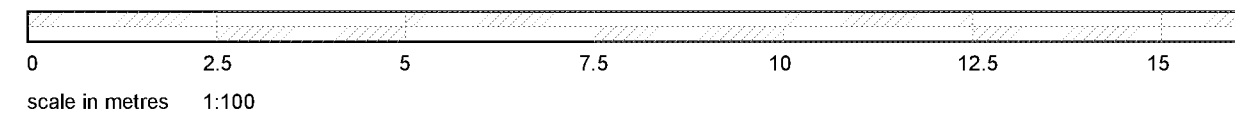
South Elevation



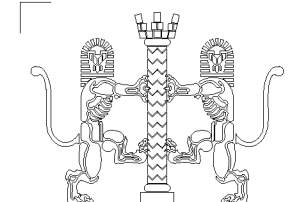
West Elevation



Section A-A



170923		ISSUED FOR PLANNING		SA
rev.	date	comment		auth.
amendments				
client	contract	reference	revision	
James Bannon	0041	PL.003		
project	title			
The Maltravers Social Club		Proposed Building Elevations		
Maltravers Lane, Littlehampton				
WEST SUSSEX BN17 5NA		PLANNING		
work stage	drawn	file	date	scale
-	SA		170909	1:100
				A1



Simon
Atkins

RIBA

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07590 601
saton@simonathins.com.au
simonathins.com.au

Appendix B - EA Flood Data

Thea Powell
Ambiental
Science Park Square
Brighton
BN1 9SB

Our ref: SSD66418
Your ref: 3570
Date: 28/11/17

Dear Thea

Enquiry regarding Product 4 for Floods Risk Assessment (FRA).

Thank you for your enquiry which was received on 13/11/17.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The property is in an area located partially within Flood Zones 2 and 3 as shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences

There are flood defences in the form of a Steel Sheet Pile (SSP) with concrete cap and prom. The Asset ID is 483074. The downstream crest level is 4.76, and the upstream is 4.8. The estimated standard of protection is 1 in 300 (0.33% AEP). The estimated condition grade is good.

Model Information

The model used was the Arun to Adur Flood Model which was completed in 2012 by JBA consulting.

Flood History

We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flooding Authority, West Sussex County or the Local Authority, Arun District Council for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for ...
Licence	<u>Open Government Licence</u>
Information Warnings	<i>No information warnings.</i>
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

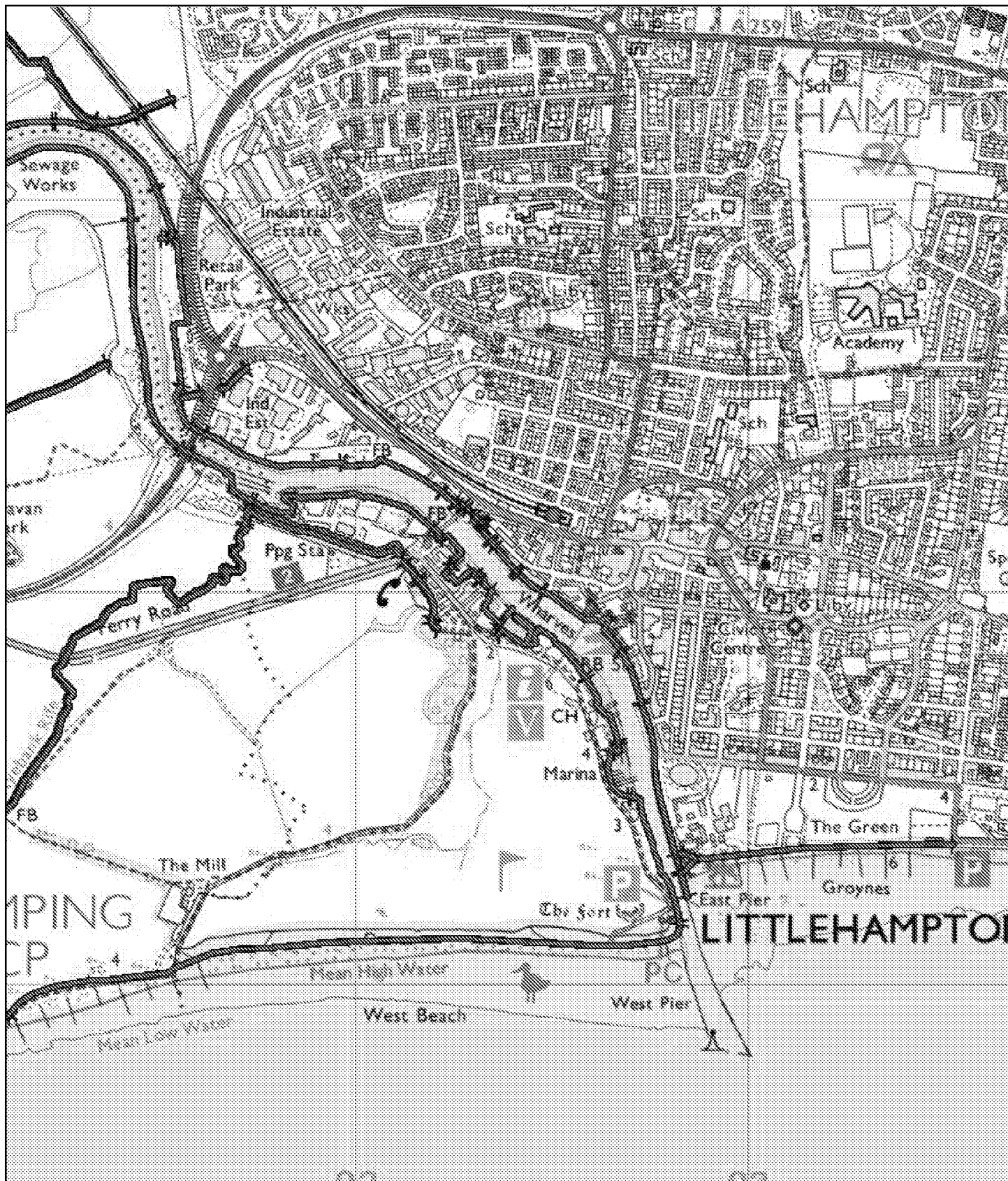
- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

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.

Yours sincerely,

Maurice Ntege
PSO West Sussex

Flood Defences Map

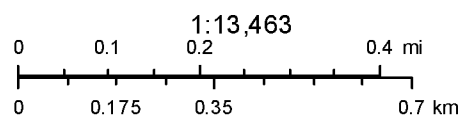


November 28, 2017

 Aids to Navigation

 Defences

OS Traditional Maps

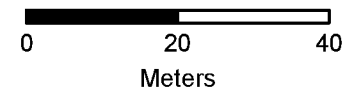




Legend

- Site Nodes
-  Site Boundary

Scale: 1:1,000



Product 4 Flood Risk Data Requested by: Ambiental

Site: Littlehampton, BN17 5NA

Table 1: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	1.3%	0.5%	0.5% (2115)	0.1%
1	503127	101931	-	-	-	4.94	4.05
2	503119	101931	-	-	3.74	4.94	4.05
3	503122	101904	-	-	-	4.94	-
4	503127	101886	-	-	-	4.94	-
5	503115	101890	-	-	-	4.94	-

Table 2: Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres							
	Eastings	Northings	Defended Annual Exceedance Probability							
			20%	5%	1.3%	1%	0.5%	0.5% (2115)	0.1%	0.1% (2115)
1	503127	101931	-	-	-	-	-	4.89	-	5.09
2	503119	101931	-	-	-	-	-	4.89	-	5.09
3	503122	101904	-	-	-	-	-	4.89	-	5.09
4	503127	101886	-	-	-	-	-	4.89	-	5.09
5	503115	101890	-	-	-	-	-	4.89	-	5.09

Table 3: Water Depth: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	1.3%	0.5%	0.5% (2115)	0.1%
1	503127	101931	-	-	-	1.16	0.26
2	503119	101931	-	-	0.02	1.15	0.26
3	503122	101904	-	-	-	1.00	-
4	503127	101886	-	-	-	0.55	-
5	503115	101890	-	-	-	0.70	-

Table 4: Water Depth: Tidal Defended

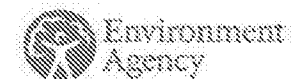
Node Ref	NGR		Modelled Flood Depths in Metres Undefended Annual Exceedance Probability							
	Eastings	Northings	20%	5%	1.3%	1%	0.5%	0.5% (2115)	0.1%	0.1% (2115)
1	503127	101931	-	-	-	-	-	1.1	-	1.30
2	503119	101931	-	-	-	-	-	1.10	-	1.30
3	503122	101904	-	-	-	-	-	0.97	-	1.17
4	503127	101886	-	-	-	-	-	0.49	-	0.69
5	503115	101890	-	-	-	-	-	0.58	-	0.78

All levels taken from: Arun to Adur Flood Model

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Produced on: 28/11/2017

Flood Map for Planning (Rivers and Sea). Centred BN17 5NA. Created 28/11/2017



Scale 1: 10,000



Flood Map for Planning (Rivers & Sea)

- Sealed Main Rivers
- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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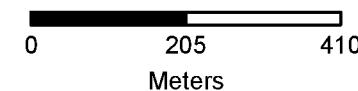
Legend

- Site Nodes
- Site Boundary
- 0.1% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)
- 0.5% AEP (2115) (Undefended)
- Main River

Climate Change (CC) extent based on an increase of 20% in river flows.

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

Scale: 1:10,000



LITTLEHAMPTON



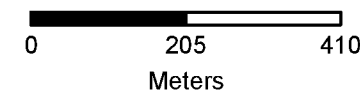
Legend

- Site Nodes
- Site Boundary
- 20% AEP (2012) (Defended)
- 5% AEP (2012) (Defended)
- 1.3% AEP (2012) (Defended)
- 1% AEP (2012) (Defended)
- 0.5% AEP (2012) (Defended)
- 0.5% AEP (2070) (Defended)

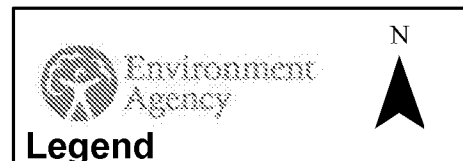
Climate Change (CC) extent based on an increase of 20% in river flows.

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

Scale: 1:10,000



LITTLEHAMPTON

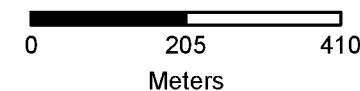


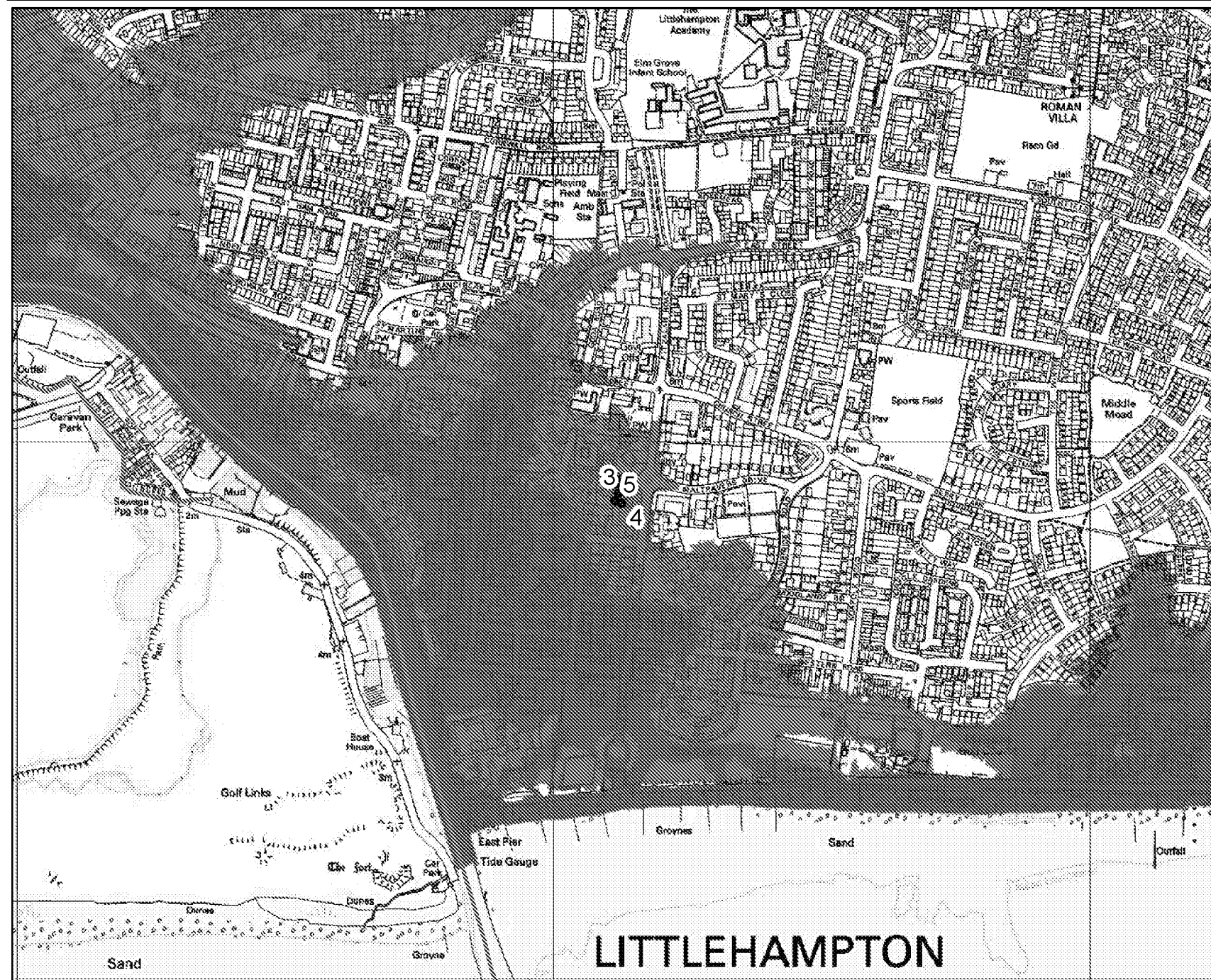
- Legend**
- Site Nodes
 - Site Boundary
 - 0.5% AEP (2070) (Undefended)
 - 0.5% AEP (2012) (Undefended)
 - 1.3% AEP (2012) (Undefended)
 - 5% AEP (2012) (Undefended)
 - Main River

Climate Change (CC) extent based on an increase of 20% in river flows.

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

Scale: 1:10,000





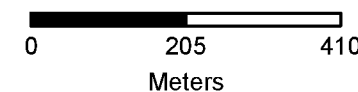
Legend

- Site Nodes
- Site Boundary
- 0.1% AEP (2115) (Defended)
- 0.1% AEP (2012) (Defended)
- 0.5% AEP (2115) (Defended)

Climate Change (CC) extent based on an increase of 20% in river flows.

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

Scale: 1:10,000



LITTLEHAMPTON