

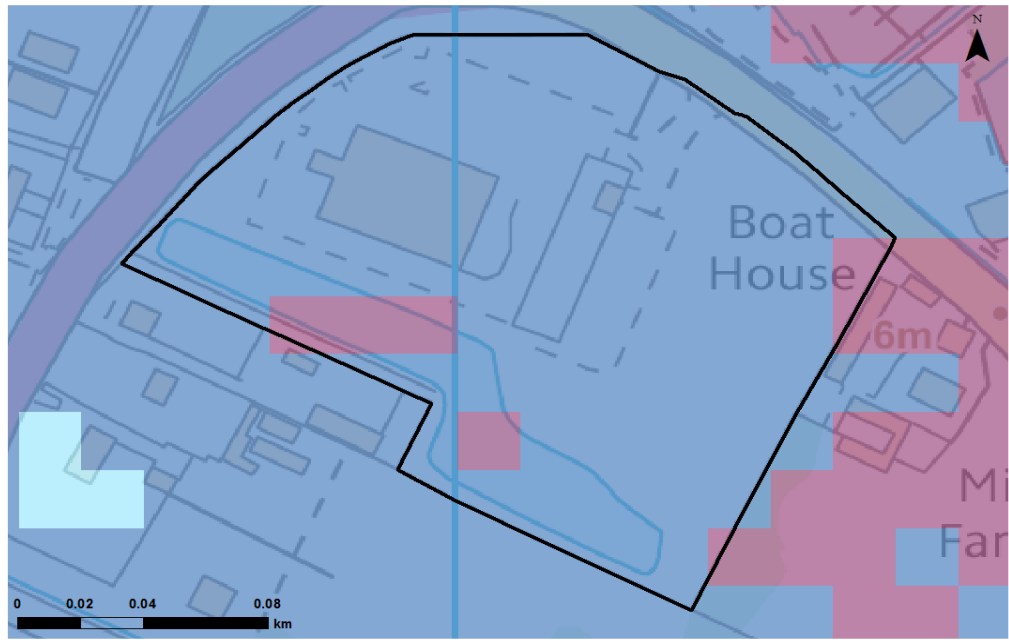
Vindis Car Show Room, St Ives

OSNGR: 531028,270414	Area: 2.77ha		Brownfield / greenfield	
Flood Zone Coverage:	FZ3b 7%	FZ3a 93%	FZ2 0%	FZ1 0%

Sources of flood risk:
 The whole of the site is at risk of flooding from the River Great Ouse. There is also an unnamed drain that flows north of the site that may pose a risk, but the risk is predominantly from the River Great Ouse. Mapping shows surface water also poses a risk to the south of the site; however, this appears to correspond to the location of a pond/lake within the site.

Exception Test Required?
 Yes, if More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2.
 Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b.
 More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.
 Essential Infrastructure in Flood Zone 3b will require the Exception Test.

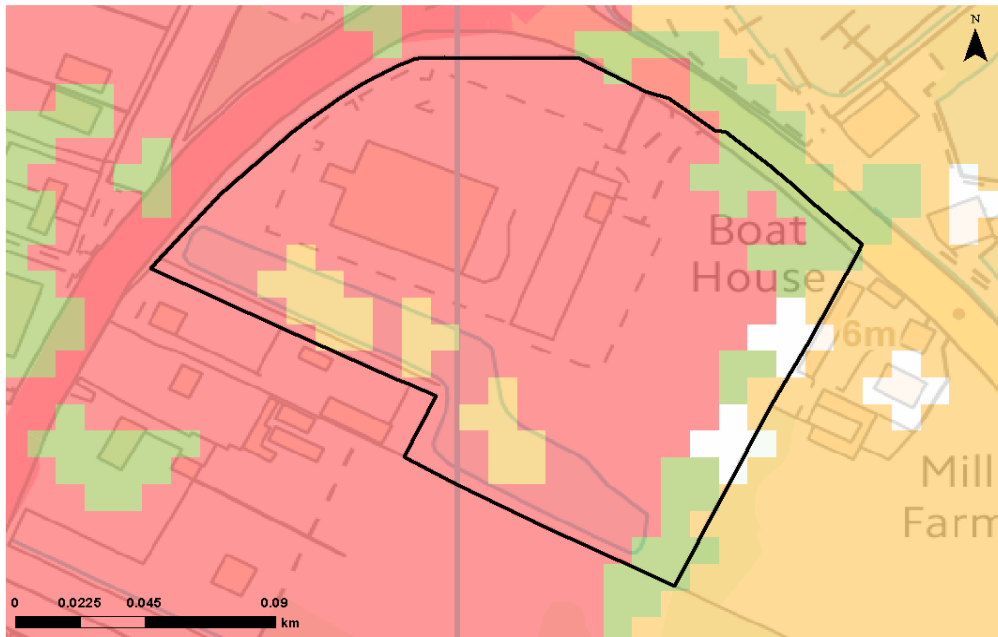
Flood Zone Map



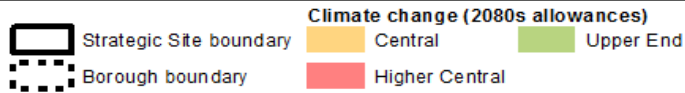
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Potential development location	Flood Zone 3b	Flood Zone 3a
Council boundary	Indicative Extent of Flood Zone 3b	Flood Zone 2

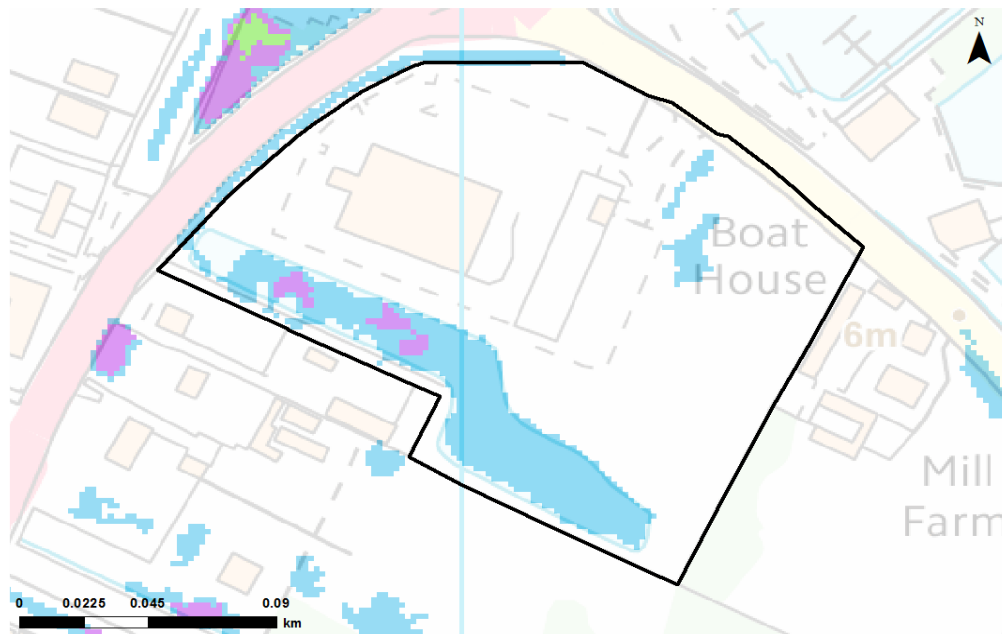
Climate Change Map



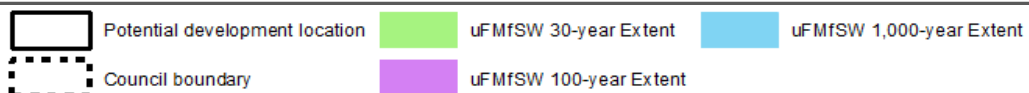
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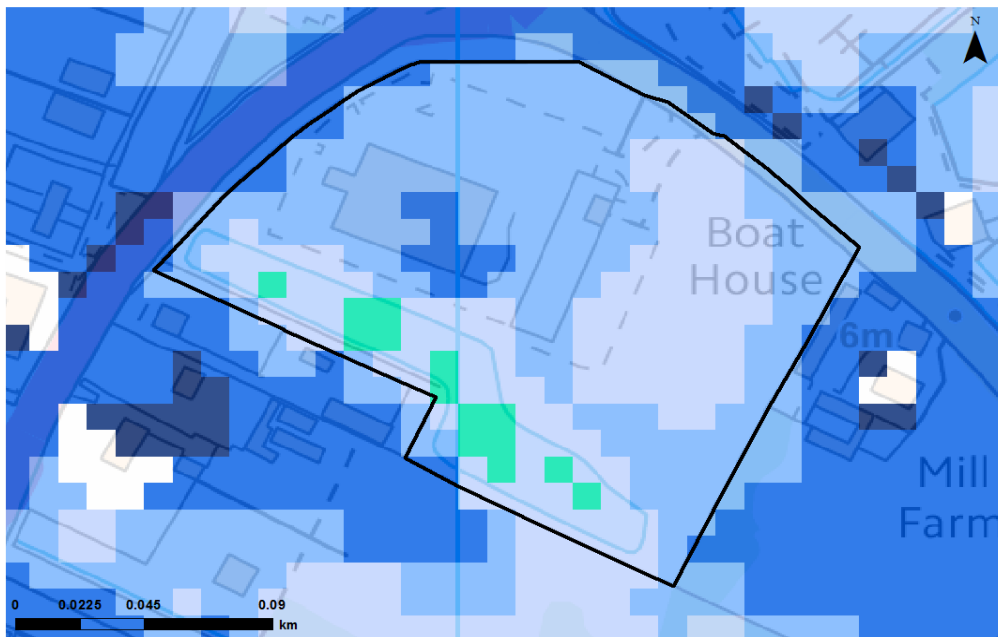
Surface Water Map



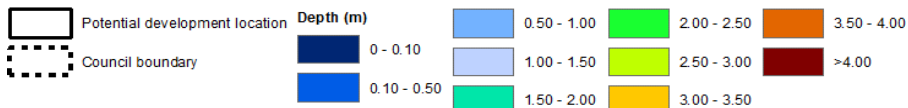
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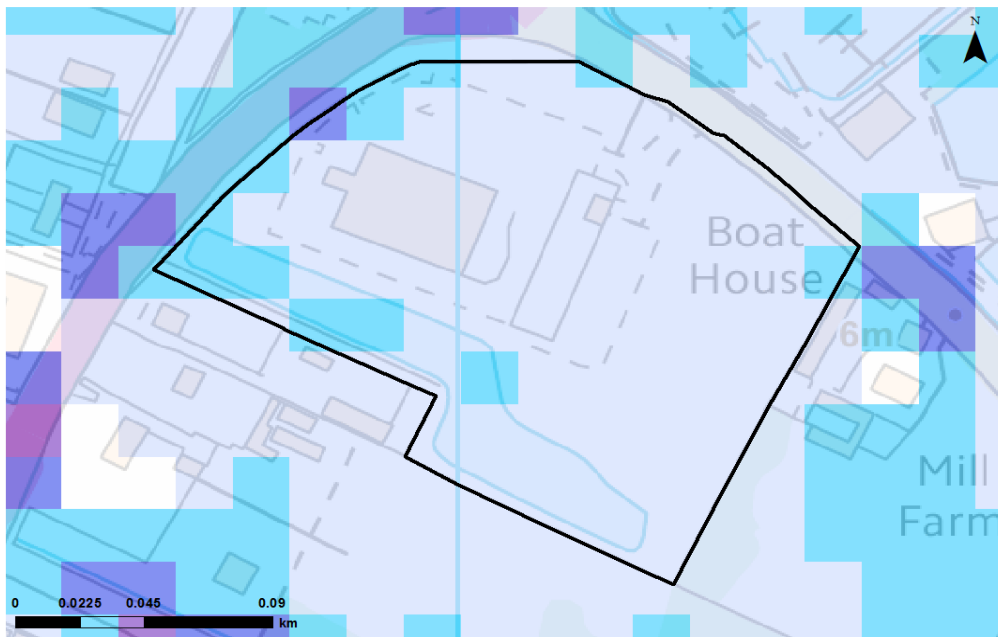
Depth Map - fluvial flooding (1% Annual exceedance probability)



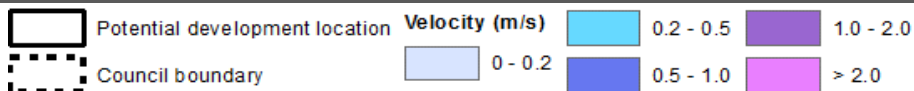
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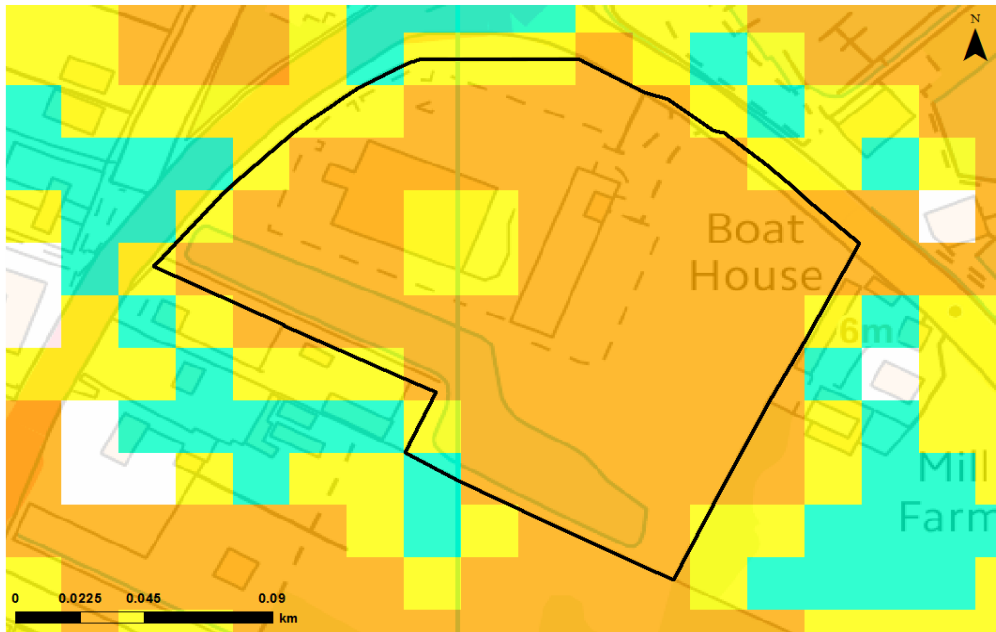
Velocity Map - fluvial flooding (1% Annual exceedance probability)



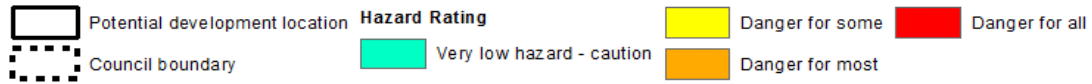
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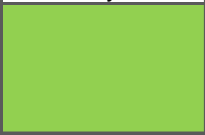
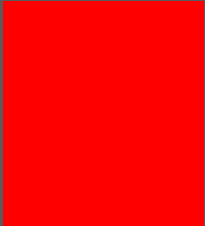



Hazard Map - fluvial flooding (1% Annual exceedance probability)



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SuDS & the development site:

SuDS Type	Suitability	Comments
Source Control		Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk both to and from groundwater.
Infiltration		Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is possible infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. If possible, proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints given that the site is located with a Source Protection Zone.
Detention		This option may be feasible provided site slopes are < 5% at the location of the detention feature. A liner may be required to prevent the egress of groundwater and if there are any contamination issues.
Filtration		This feature is probably suitable provided site slopes are <5% and the depth to the water table is >1m. A liner may be required to prevent the egress of groundwater and if there are any contamination issues.
Conveyance		All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner may be required to prevent the egress of groundwater and if there are any contamination issues.

Drainage strategies should demonstrate that an appropriate number of treatment stages have been delivered. This depends on the factors such as the type of development, primary source of runoff and likelihood of contamination. Guidance should be sought from the LLFA and other guidance documents such as the CIRIA SuDS Manual (C753).

The site is located within a Source Protection Zone. As such, infiltration techniques should only be used where there are suitable levels of treatment, although it is possible that infiltration may not be permitted. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints

Flood Defences:

The site is protected primarily by an Environment Agency owned embankment. There is also a smaller section of Local Authority owned embankment. These defences protect against a flood of 1% AEP magnitude. The majority of the defence is considered to be in good condition.

Emergency Planning:

This site is covered by the St Ives Flood Warning Area.

Access & Egress:

Both main access and egress routes for the site (London Road and Low Road) are affected during a flood. During a 1% AEP event depths on these roads reach 0.5 metres.

The access and egress routes are shown to be unaffected by surface water flooding.

Climate Change:

Modelling suggests that defences will protect the site from a 1% AEP event with the 2080s Central climate change allowance applied. However, when the Higher Central and Upper End allowances are applied, the site defences are overtopped and the majority of the site will be flooded.

Climate change may increase the extent and depth of surface water flooding in the future.

Implications for Development:

The whole of the site is located in Flood Zone 3; therefore the amount and type of development may be limited. This is particularly important due to the lack of safe access and egress when the River Great Ouse is in flood.

Given the whole of the site is within flood zone 3 flood compensation will be required on a level for level volume for volume basis for any proposed loss of floodplain. Therefore land within the vicinity and outside the proposed site may be required for flood compensation, see section 8.3.4 of the SFRA main report. Prospects for effective mitigation would need to be established before taking the site forward.

The site is, to some extent, afforded some protection from flood defences. These defences have a standard of protection of 1% AEP and therefore it is unlikely the site will flood until events of a magnitude higher than the 1% AEP flood. However, there is still a residual risk of flooding should the defence fail (breach) due to the potential for rapid inundation of water to the site. Climate change modelling also suggests that the defences may be overtopped in the future. Therefore, it is important that the defences in this area continue to be maintained in line with catchment policy and that any development accounts for the potential residual risk.

There is limited ability to apply the Sequential Approach within the site. Climate change may result in parts of the site becoming Functional Floodplain in the future.

Broadscale assessment of suitable SuDS has indicated a number of different types may be possible; however, given the whole of the site at risk from flooding, the type of SuDS system used may be influenced by amount of land available; depending on the system used there may be an impact on the amount of land available for development and the cost of development. Currently there is no surface water risk in the site therefore development will need to ensure that the level of surface water does not increase and that there is no impact on land elsewhere or on levels in the receiving watercourse (either the unnamed drain or the River Great Ouse).

The site is partially covered by the Environment Agency's Flood Warning Service. Should development take place, it should be signed up to the Flood Warning Service; however, it should be noted that warnings can not be provided in the event of failure of a defence. Given the risk to access and egress, development should consider provision of safe refuge in the event that evacuation is not possible.

Guidance for Developers:

Mapping in this table is based on results from the Environment Agency's Downstream Ouse 1D-2D model.

At the planning application stage, a site-specific flood risk assessment will be required if any development is located within Flood Zones 3a or 3b. Where a site specific FRA has produced modelling outlines which differ from the Flood Map for Planning then a full evidence based review would be required; where this is acceptable to the EA then amendments to the Flood Map for Planning may take place.

Resilience measures will be required if buildings are situated in the flood risk area.

The peak flows on the River Great Ouse and unnamed drain should be considered when considering drainage.

Assessment for runoff should include allowance for climate change effects.

New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff.

Onsite attenuation schemes would need to be tested against the hydrographs of the River Great Ouse and unnamed drain to ensure flows are not exacerbated downstream within the catchment.

Safe access and egress will need to be demonstrated particularly in the event of failure of flood defences; currently access and egress is affected by fluvial flooding from a 1% AEP event (undefended).

New development must seek opportunities to reduce overall level of flood risk at the site, for example by:

- o Reducing volume and rate of runoff
- o Relocating development to zones with lower flood risk
- o Creating space for flooding.
- o Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using Flood Zones 2 and 3 as public open space.

Consultation with the Local Authority and the Environment Agency should be undertaken at an early stage.