LOCH LOMOND & THE TROSSACHS NATIONAL PARK

SUPPLEMENTARY PLANNING GUIDANCE

Callander Development and Flood Risk

November 2012

NATIONAL PARK local plan SUPPLEMENTARY PLANNING GUIDANCE

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1.1 Purpose

This SPG provides guidance on the consideration of flood risk for new development proposals in Callander. As the largest settlement in the National Park with a population of over 3,000 residents a range of development opportunities have been identified in the National Park Local Plan, some of which may be at risk of flooding from a range of sources. This is due to Callander's location between the River Teith and steep land on the highland boundary fault line.

This guidance supports the implementation of proposals identified in the Local Plan (refer to **Appendix 3** for Local Plan development sites), as well as new development on gap or windfall sites, which may come forward in the future by providing information on the following:

- Different sources of flooding in Callander (Section 2)
- Management responsibilities (Section 3)
- Spatial guidance illustrating areas where flood risk assessments may be required to be submitted with planning applications (Section 4 and Appendix 2), and;
- Options for flood risk management and mitigation (Section 5 and Appendix 3)

The guidance, prepared in collaboration with SEPA and Stirling Council, also aims to ensure that as a result of new development that there is no increase to flood risk in Callander. In this regard it supports the implementation of the general responsibilities of the National Park as a planning authority under the Flood Risk Management (Scotland) Act 2009. By providing the information in this guidance, it is intended to increase the accessibility of information in relation to flooding and planning proposals. It should also result in a more prompt consideration of flood risk in the determination of planning applications in Callander, by clearly outlining the Authority's requirements.

The guidance is to be used by planning applicants and agents when considering a development proposal in Callander. It sets out when a flood risk should be considered, key information sources, and some of the potential mitigation measures. This guidance also provides information for the residents of Callander in outlining how the Park Authority will consider flood risk. It does not replace the need for site or proposal specific Flood Risk Assessments or the implementation of recommendations from such assessments.

To support this SPG the following documents are available on the National Park Authority's website:

- The Loch Lomond & The Trossachs National Park Local Plan
- Callander Strategic Flood Risk Assessment, MNV Consulting Ltd, 2010, commissioned by the National Park Authority.
- Callander Strategic Flood Risk Assessment, MNV Consulting Ltd, 2011 update, commissioned by the National Park Authority.
- Habitats Regulations Appraisal Screening Report, April 2012

Development Briefs for some development sites in Callander will be produced during 2012 and they will reflect this draft SPG.

2.0 Flooding in Callander

Callander has experienced significant flooding from both the River Teith and smaller water bodies for many years. The town is partially built on the natural flood plain of the River Teith, at the foot of a major escarpment (Callander Crags) and other surrounding hills all of which have small watercourses draining into the main river. These factors cause the location to be naturally high risk. The different sources of flooding are outlined below and identified on **Map 1**.

Flooding from the River Teith

The River Teith is a significant source of flood risk in Callander, and the most understood. Private properties along the length of the river through the town are well known to be at risk of flooding, as shown by observed and modelled flood incidents. Due to the way the settlement has developed, several important public amenities have also been located in the flood risk area, including major roads, the police station, the public library and the primary school. The major flooding problems occur when there is prolonged heavy rain, supplemented by snow melt and flood peaks from both rivers, Leny and Eas Gobhain, to form a single large flood peak through Callander. This can also be exacerbated by changes to loch levels as a result of the Loch Katrine reservoir system for drinking water.

Flooding from small watercourses

There are numerous small watercourses which drain off the surrounding hills and flow through the town and into the River Teith. Many have been altered in their upper reaches, for instance through canalisation or diversion related to forestry or agricultural developments. Most of the burns flow through woodland areas and result in significant amounts of tree debris falling into the channel and causing blockages. Some blockages can create temporary dams which can release a wave of floodwater downstream when suddenly breached. In the right conditions tree debris can be beneficial for flood management, breaking up high energy flows and trapping smaller material and other debris, but if near vulnerable structures, such as low bridges and culverts, it can become a flood hazard.

Stirling Council has used various sources of information to design a maintenance programme to keep culvert entrances clear and respond to emergency situations, such as a structural collapse or blockage in a watercourse. Copies of the maintenance programme are available from the Council.

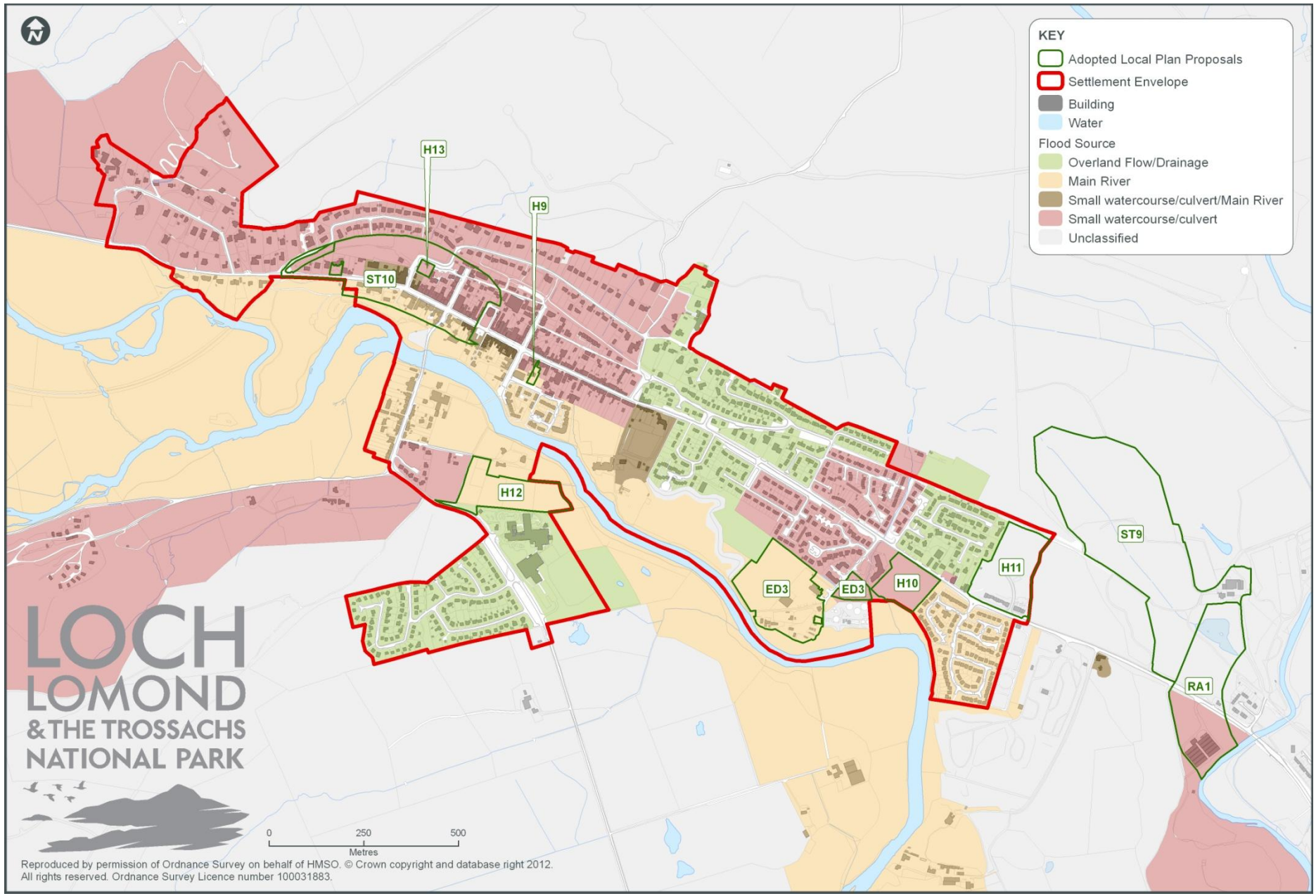
Flooding from storm water drainage including pluvial flooding

Storm water drains are designed to collect rainwater originating from urban areas including roofs, car parks and roads; and to discharge the water into surface water courses. In some areas of Callander the drainage system takes the form of a combined storm water and sewage system resulting in water discharged into the Callander wastewater treatment works. This part of the network was not designed to cope with major flood events and in these situations the combined flow can exceed the system's capacity and result in water surcharges flowing through residential areas. Floodwater from other sources, particularly when a burn spills out of its bank, can enter the storm water system, and potentially cause surcharging problems further along the system.

Loch or reservoir failure

A number of natural lochs and artificial reservoirs exist upstream of Callander and the collapse or breach of the retaining structure could cause flood damage. The risk of this occurrence is however extremely small. **Map 1** below identifies the sources of flooding.

MAP 1: SOURCES OF FLOODING



3.0 Management responsibilities

Responsibilities for flood risk management are now provided for in the Flood Risk Management (Scotland) Act 2009. Stirling Council is the Responsible Authority for flood risk prevention in Callander and has the following duties to:

- Assess relevant water bodies for flood risk
- Prepare and carry out a schedule of maintenance works to prevent flood risk
- Provide information to SEPA to assist their delivery of flood risk responsibilities

The Council has commissioned studies of the River Teith and small water courses surrounding Callander in recent years to help manage flood risk in the settlement. Regular inspections and maintenance is carried out on culverts and drains. In addition to these responsibilities, the Council is consulted in respect of flood risk issues on planning applications.

The National Park Authority has a duty to consider flood risk in the delivery of its function as a planning authority. To give effect to this responsibility the National Park Local Plan includes Policies ENV16 and 17 on Sustainable Flood Risk Management to guide its consideration of planning applications (refer to **Appendix 1** for Local Plan policies). The consideration of flood risk has also been incorporated into the Local Plan development and locational strategy, and the range of sites identified for development in Callander.

SEPA has responsibilities to develop National Flood Risk Maps and work with councils and planning authorities on the development of Flood Risk Management Plans. SEPA also provides guidance on requirements for Flood Risk Assessments. More information on responsibilities under the Flood Risk Management (Scotland) Act 2009 can be found on SEPA's website at http://www.sepa.org.uk/flooding/flood_risk.aspx. SEPA is also a statutory consultee in respect of flood risk.

4.0 Planning application procedure

Flood risk issues should be considered during the pre-application stage of the planning process and can be informed by the Local Plan and discussions with the National Park Development Management Team.

Map 2 below can assist with considering flood risk issues in Callander. It is designed as a trigger map to identify specific areas of Callander where flood risk needs to be considered as part of a development proposal. Consideration can involve a simple discussion with planning staff, gathering of existing information on flooding events in relation to a particular site from Stirling Council and SEPA, or a more detailed flood risk assessment.

Map 2 establishes four zones relating to the need for consideration of flood risk should a planning application be put forward regarding a site within that zone. The zones are as follows and are colour coded accordingly:

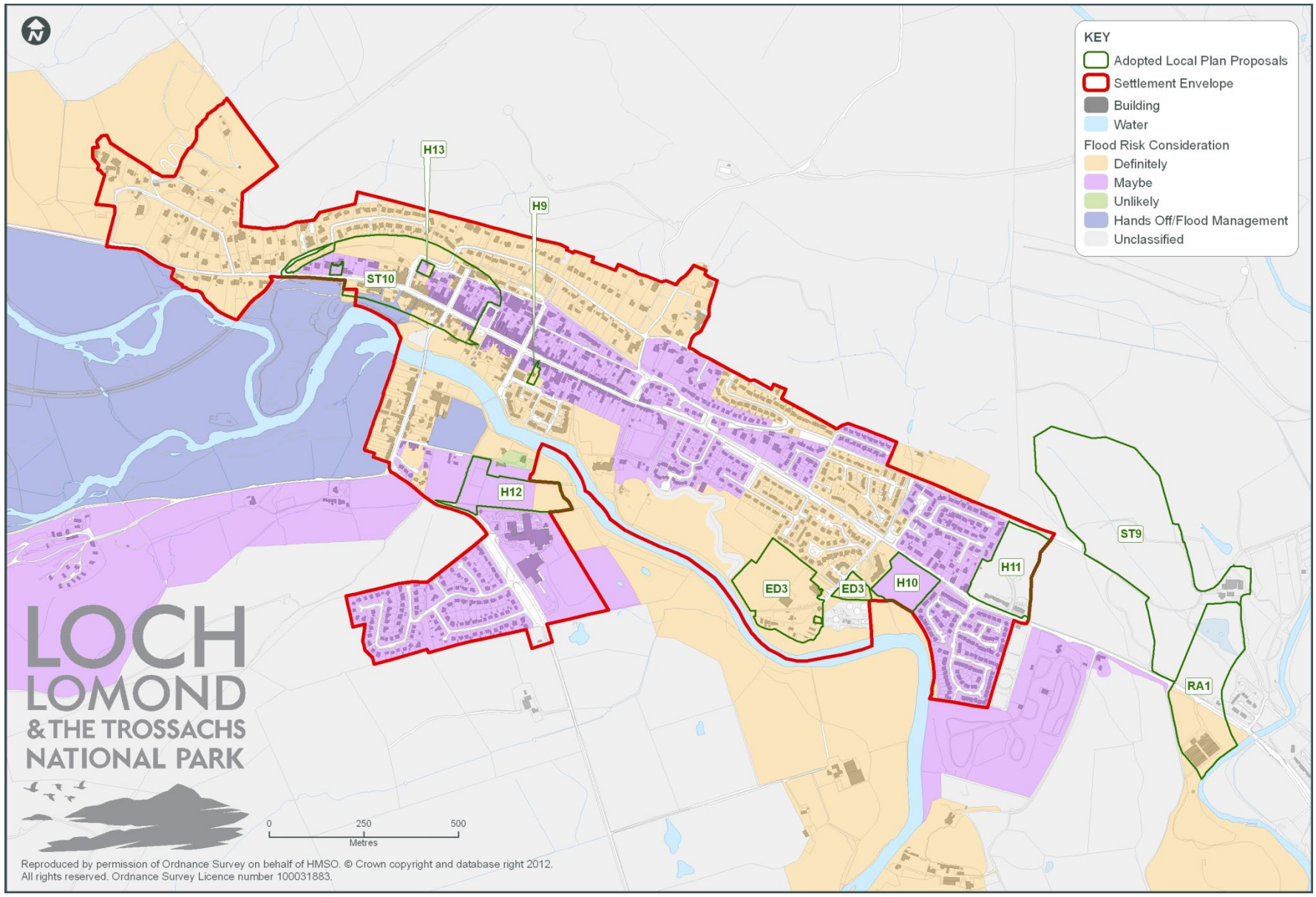
- Flood risk is definitely a consideration
- Flood risk may be a consideration
- Flood risk is unlikely to be a consideration
- Flood management zone

The zones are based on local information on flooding events held by the Callander Community Council, Stirling Council and SEPA, as well as specific studies of surface water and fluvial flooding undertaken by Stirling Council. The zones incorporate SEPA's medium to high risk flood areas outlined on the SEPA 1:200 year Indicative Flood Map, as well as areas known to flood frequently that are not included on the SEPA map, or at additional flood risk as a result of physical structures such as bridges and culverts obstructing water flow. A flood management zone is also outlined on **Map 2** which shows areas that should be left undeveloped due to their potential for retention of or restoration of the functional floodplain.

As a starting point the development sites for Callander allocated in the National Park Local Plan have been identified on **Map 2**. The location and type of future development sites in addition to those identified in the Local Plan can also be considered in this way.

Map 2 below identifies where flood risk is a consideration in Callander.

MAP 2: FLOOD RISK CONSIDERATION IN CALLANDER



Some developments will be more sensitive to flooding than others, for example residential developments and essential infrastructure such as schools and healthcare or medical facilities. The type and scale of development will influence the degree of information required to assess the level of flood risk. For example, a minor extension to a residential dwelling located within a location highlighted on **Map 2** as “definitely requiring consideration of flood risk” may not require a detailed flood risk assessment to be completed. It may be sufficient to demonstrate that flood risk has been considered in relation to current available information and that the development is not at any additional risk from future flooding events.

Table 1 below provides a guide to assessing the type of development and the level of flood risk information required to accompany planning applications. The categories of use are based on national planning guidance. The table should be considered when interpreting **Map 2**.

Table 1: Type of development and level of flood risk information required

Development type	Definition	Flood risk definitely a consideration	Flood risk may be a consideration	Flood risk unlikely to be a consideration	Flood management zone
Minor and change of use	Minor non-residential extensions Alterations that do not increase the size of buildings	Seek advice from NPA.	Seek advice from NPA.	No additional information required.	No development recommended.
Essential civil infrastructure	Hospitals, police stations, ambulance stations, fire stations Emergency depots and command centres Essential transport infrastructure Strategic utility infrastructure, including electricity generating power stations and grid and vital telecommunications installations	Flood risk assessment required.	Seek advice from NPA.	No additional information required.	No development recommended.
More vulnerable	Dwellings Residential institutions e.g. residential care homes, children's homes, prisons and hostels, student accommodation Hotels and licensed premises including night clubs Non residential health service buildings, nurseries, education establishments Caravans, mobile homes and park home, campsites (permanent residential/temporary leisure) (subject to a specific warning and evacuation plan) Sites used for waste management facilities for hazardous waste or installations requiring hazardous substances consent	Flood risk assessment required.	Seek advice from NPA.	No additional information required.	No development recommended.
Less vulnerable	Retail units Offices for financial/professional services Eating establishments General industry e.g. assembly, storage and distribution Leisure facilities Land and buildings used for agriculture and forestry Water treatment plants Waste treatment (except landfill and hazardous waste facilities) Sewage treatment plants (if adequate pollution	Flood risk assessment required.	Seek advice from NPA.	No additional information required.	No development recommended.

	control measures are in place) Minerals working and processing (except for sand and gravel working)				
Water compatible development	Flood control infrastructure Water transmission infrastructure and pumping stations Water-based/outdoor sports recreation facilities Lifeguard and coastguard stations Amenity open space, nature conservation and biodiversity Sand and gravel workings Fish farms	Flood risk assessment required.	Seek advice from NPA.	No additional information required.	No development recommended.
Major development	As defined in the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009, Reg 2 (1) and as included in the Schedule	Flood risk assessment required.	Flood risk assessment required.	Seek advice from NPA.	No development recommended.

Seeking advice from the National Park Authority

Contacting the National Park Authority (NPA) planning department at the pre-application stage of a development will help determine whether flood risk is an issue for a site, and the level of information required to accompany a planning application. At the pre-application stage the NPA will advise whether a site may be at risk and if so, advise that the applicant makes contact with SEPA to discuss the likely information requirements. The NPA may also suggest that the applicant contacts Stirling Council for further information on any flooding occurrences which have taken place on the site.

In determining whether a site is at risk the NPA will consider:

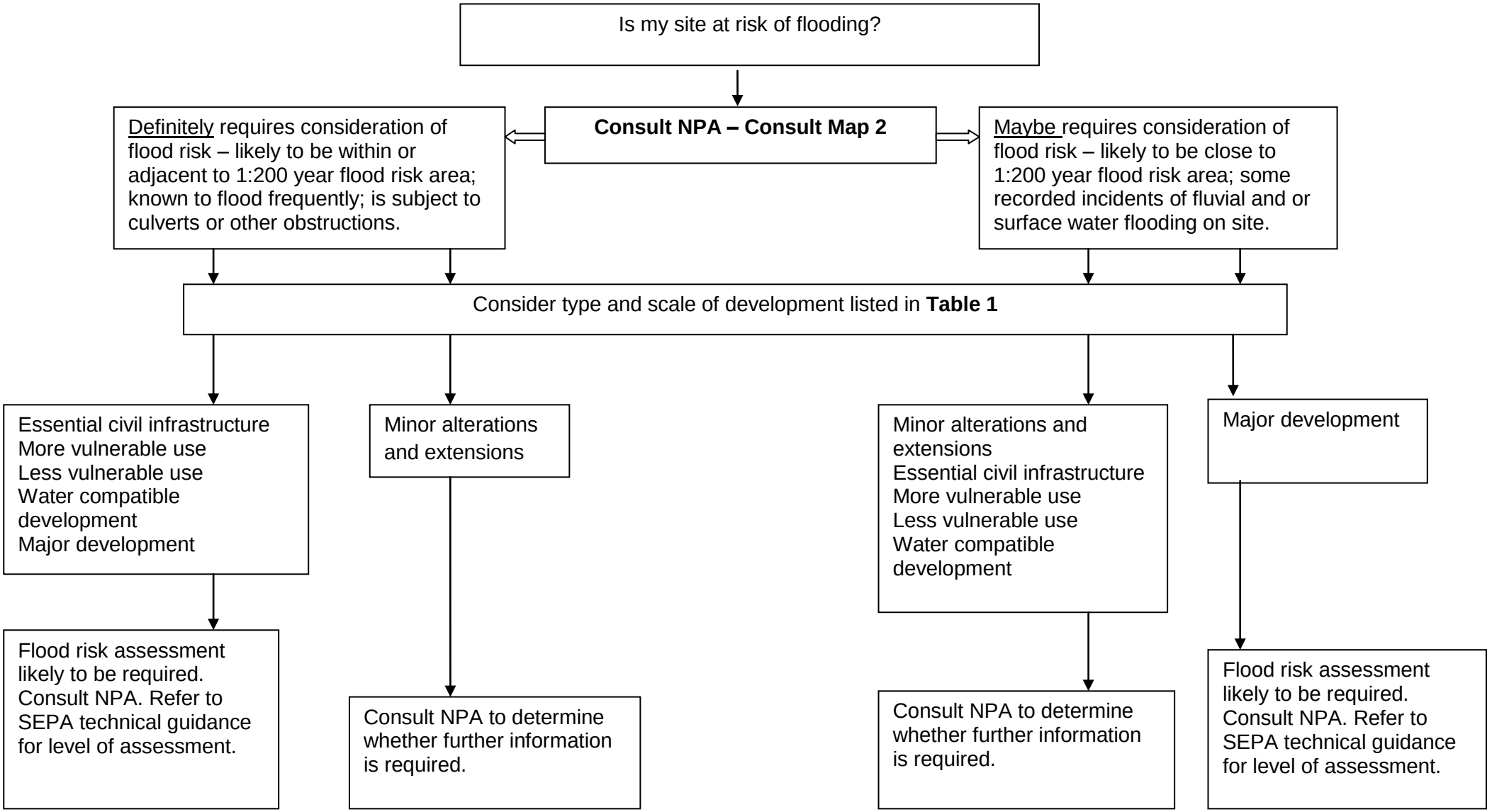
- The location of the site in relation to the 1:200 year flood risk area identified on SEPA's Indicative flood risk map
- Recorded incidents of fluvial and surface water flooding on the site
- The scale and type of development proposed

Flood risk assessments

If a site is considered to be at potential risk the NPA will advise the applicant to contact SEPA for further information. SEPA will determine the information required from the applicant. Simple or more detailed assessments may be required, depending on the specifics of the site. Information requirements are likely to include level information, and an assessment of design flows and hydraulic calculations, depending on the size of the development and perceived risk and complexity of the area. In some cases a more detailed report, including flood risk modelling may be required to quantify the risk to a site and to determine safe development levels. Further information on SEPA's technical requirements for flood risk assessments can be found in **Appendix 2 of** this guidance and on the following website: http://www.sepa.org.uk/flooding/planning flooding.aspx.

The flow chart in **Diagram 1** summarises the consideration of flood risk for development sites in Callander at the pre-application stage.

Diagram 1: Consideration of flood risk for development sites in Callander at the pre-application stage



5.0 Flood risk management and mitigation

The starting point for mitigating flood risk should always be to avoid new development in high flood risk areas. This position is stated in national planning guidance http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/newSPP, the Flood Risk Management (Scotland) Act 2009, and in SEPA guidance on planning and flood risk. The National Park Local Plan policies on sustainable flood management are also based on this principle. **Map 2** supports this precautionary approach by identifying zones where new development is unsuitable, classed as hands-off catchment management areas where enhancement of the natural heritage would help to protect against flooding.

Development sites however, can often be located across both high and medium flood risk areas, and adjacent to high flood risk areas, according to SEPA's Indicative Flood Risk Maps. The locations identified as "definitely requiring consideration of flood risk" on **Map 2** of this guidance are based on SEPA's maps as well as additional areas known to flood frequently. These additional areas can include catchments smaller than 3 square kilometres, or subject to the effect of culverts, blockages, bridges or buildings on water courses, which are not included on SEPA's maps. This position is consistent with National Park Local Plan Policy ENV16 for managing development in medium to high flood risk areas and areas known to flood frequently.

If there is an overriding reason to develop in or close to an area where flood risk is a consideration certain measures may be required in order to reduce the risk to an acceptable level for new development**.** Flood risk assessments may be required to determine the level of risk and appropriate mitigation measures, and to demonstrate that the development and accompanying mitigation measures will not impact on the risk of flooding elsewhere.

The following on-site mitigation options can be considered for proposals where a risk is identified:

Adjusting the scale and type of development such as reducing a site's boundaries, incorporating open space buffer areas between developments and watercourses, reducing the scale of development, limiting development to specific areas of a site, and providing for mixed use development which incorporates areas for recreation, open space and natural heritage enhancements.

Designing and constructing a development to incorporate flood mitigation and flood resilience measures depending on predicted flood levels such as:

- Constructing buildings with raised floor levels above flood levels.
- Fitting one-way valves to sewage pipes, and installing temporary bungs.
- Installing sump and pump systems to remove water from buildings.
- Using concrete rather than timber flooring.
- Locating boilers and electrical points above flood levels.
- Using plastic and metal alternative building materials instead of chipboard and MDF.
- Using lime plaster or cement render rather than conventional gypsum plaster for external and internal wall construction depending on the predicted flood level.

Additional mitigation measures are outlined in the CIRIA guidance manual 675 on development and flood risk for the construction industry.

Drainage design to manage surface water is an important part of flood risk management and will often require minimum drainage standards to be met. For larger developments Drainage Impact Assessments may be required which should consider the local conditions and appropriate methods of attenuation.

Sustainable Urban Drainage Systems (SUDs) are required for new developments of more than one dwelling and can be part of an effective drainage system. SUDs can help to drain excess surface water and can include porous surfaces, soak aways, infiltration trenches, filter drains and strips, swales, detention basins and purpose built ponds and wetlands. Importantly they minimise surface water drainage. SUDs should be developed in compliance with the CIRIA SUDs manual C697 and PAN 61 Planning and Sustainable Urban Drainage Systems, and Scottish Water's Sewers for Scotland 2nd Edition Manual. The National Park Local Plan Policy ENV12 Surface Water Drainage requires SUDs and drainage impact assessments for new developments.

Considering land raising which involves permanently elevating a site above the functional flood plain. This mitigation option is not generally encouraged as it involves loss of natural flood plain storage. Scottish Planning Policy states that proposals for land raising should:

- be linked to the provision and maintenance of compensatory flood water storage to replace the lost capacity of the functional flood plain,
- have a neutral or better effect on the probability of flooding elsewhere, including existing properties,
- not create a need for flood prevention measures elsewhere,
- not create islands of development but should adjoin developed areas outwith the functional flood plain, and
- be set back from the bank of the watercourse.

Land raising proposals may require authorisation from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011. For further information see SEPA's Practical Guide on The Controlled Activities Regulations under the following link: http://www.sepa.org.uk/water/water_regulation.aspx.

5.1 Protection of the River Teith SAC

The River Teith is a Special Area of Conservation (SAC) with qualifying interests of river lamprey, brook lamprey, sea lamprey and atlantic salmon. All development and flood risk measures in Callander will need to consider the impacts on the SAC, and ensure that any measures taken will not adversely affect the integrity of the site.

Flood mitigation measures identified for development sites such as drainage design, incorporation of open space, scale and design of development, and incorporation of habitat enhancements should aim to protect the receiving water environment, and habitat for the SAC's qualifying interests. It is likely that Habitat Regulations Appraisals will be required to accompany development proposals to ensure that adverse impacts on the SAC are avoided. Local Plan policies for protecting the natural heritage of the Park will also apply to all development applications, particularly ENV1: European Sites (SACs and SPAs) for requiring appropriate assessments under the Habitat Regulations Appraisal process. Advice can be sought from the National Park Authority on this. Further information on the protection of SACs and SPAs is available on the SNH website at:

http://www.snh.gov.uk/planning-and-development/environmental-assessment/habitat-regulations-appraisal/

5.2 Flood risk mitigation for Local Plan development sites

Initial site specific mitigation measures have been identified for each Callander development site included in the National Park Local Plan. Further detailed assessments may be required depending on the development and any updated incidents of flooding. Measures have been

identified as part of the Callander Strategic Flood Risk Assessment and provide initial guidance for development. Further detailed flood risk assessments may also be required for Local Plan sites where planning permission is not in place or has expired. (Refer to **Appendix 3** for initial Local Plan development site assessments).

5.3 Catchment-wide flood risk mitigation

A coordinated catchment management approach to flood risk management complementing individual site specific measures outlined above may assist other long term flood risk measures for Callander and the River Teith. A large rural catchment area is located above the settlement with mixed land uses providing opportunities for a variety of sustainable flood management measures, including leaky barriers and wetland restoration. A catchment approach requires coordination by agencies and landowners. For more information refer to the Callander Strategic Flood Risk Assessment, MNV Consulting Ltd, 2010.

6.0 Monitoring and update

The National Park Authority is required to monitor the outcomes of the National Park Local Plan over a five year period, by the end of which, a new Local Plan must be developed. In the NPA's case this will be a Local Development Plan. The SPG will be monitored in accordance with this process. **Map 2** included in this guidance will be maintained and updated with new flooding incidents recorded by the Stirling Council flood prevention team. Updated versions will be posted on the NPA's website. Community organisations will also be notified when updated versions are available.

7.0 Contacts

Loch Lomond and the Trossachs National Park Planning & Rural Development Service –

- Planning Support Officer for Development Management advice.
- Forward Planning Team for queries regarding the content of this guidance.

Ph: 01389722024
Email: planning@lochlomond-trossachs.org

Stirling Council Food Team
Stirling Council Contact Centre
Ph: 08452777000

SEPA Planning Service
East Kilbride Office
Ph: 01355574200

SEPA's Floodline Service
Ph:08459881188

Appendix A: National Park Local Plan sustainable flood management and environmental protection policies

Policy ENV16: Development in Medium to High Flood Risk Areas

New development on undeveloped or sparsely developed functional floodplain will not be supported, unless it is demonstrated that the proposed development complies with the Risk Framework as defined in *Scottish Planning Policy* or subsequent national planning guidance. Development in the National Park will not normally be permitted in areas that are:

(a) outwith existing settlements and that have been identified as medium to high flood risk on SEPA's flood map or in areas known to flood frequently that have not been identified by SEPA unless:

i. the location is essential for operational purposes such as navigation and water-based recreation uses, agriculture, transport or utilities infrastructure;

ii. an alternative lower risk location is not physically available; and

iii. a flood risk assessment in compliance with (b) i, ii, iii, and approved by the relevant flooding authority can demonstrate that the risk can be mitigated; and

(b) within existing settlements and that have been identified as medium to high risk on SEPA's flood map or in areas otherwise known to flood frequently unless a flood risk assessment is approved by the relevant flooding authority and can demonstrate that:

i. the assessment has been developed in consultation with SEPA and complies with SEPA's *Technical Flood Risk Guidance*;

ii. the site will not be at risk of flooding, and;

iii. the development will not increase the risk of flooding elsewhere and where land raising is proposed on functional floodplains new development will seek to provide compensatory flood storage to ensure that the lost storage volume is replaced in full. Provision of like-for-like replacement storage will be the preferred method.

Reason for Policy:

Policy ENV16 directs new development away from medium to high flood risk areas but recognises that many existing settlements in the Park are located in or close to such locations. Future development in settlements will need to take place cautiously and reflect the findings of specific flood risk assessments for each development proposal. The Park Authority will prepare Supplementary Planning Guidance on flood risk to supplement Policy ENV 16. Medium to high flood risk areas include floodplains, other land along water courses, land with drainage constraints and low lying coastal land. Medium to high flood risk areas are based on SEPA's flood map which identifies locations at greater than 0.5% (1 in 200 year) probability of flooding in a year and areas identified in a future Strategic Flood Risk Assessment undertaken for the Park. SEPA's flood map can be viewed on the SEPA website at www.sepa.org.uk. Areas which are known to flood but have not been included on SEPA's maps, such as catchments smaller than 3 square kilometres, or subject to the effect of culverts, blockages, bridges or buildings on water courses, are also regarded as

medium to high risk. The four local authorities covering the National Park area are responsible authorities under the Flood Risk Management (Scotland) Act 2009.

Policy ENV17 Natural Flood Management

Flood prevention schemes will be expected to adopt a natural flood management approach which involves the restoration of riparian areas of water bodies, wetlands, floodplains and woodlands to slow water flow. Traditional hard engineering approaches for flood prevention will only be supported where it can be demonstrated that a natural flood management approach is not feasible and where there will be minimal adverse effects on the natural, cultural and historic environment.

Reason for Policy:

Policy ENV17 seeks to ensure that flood management solutions are sustainable and enhance the natural environment. It recognises that in order to allow land allocations in built-up areas of medium to high flood risk there needs to be either flood prevention measures in place or planned as part of long-term development strategies such as future Flood Risk Management Plans developed under new legislation on sustainable flood management. The Park Authority is supportive of future flood prevention measures that aim to take a long-term natural flood management approach.

Local Plan Environmental Protection Policies

ENV1: European Sites (SACs and SPAs)

ENV2: Sites of Special Scientific Interest, National Nature Reserves and RAMSAR Sites

ENV3: Local Nature Conservation Sites

ENV4: Legally Protected Species

ENV5: Species and Habitats Identified in National Action Plans

ENV6: Enhancing Biodiversity in New Developments

ENV7: Protection Geological Conservation Review Sites

ENV8: Ancient, Long-Established and Semi-Natural Woodlands

ENV9: Development Impacts on Trees and Woodlands

ENV10: Protecting the Water Environment

ENV11: Connection to Sewerage and Water Supply

ENV12: Surface Water Drainage

ENV13: River Engineering Works and Culverts

ENV18: Protecting Air Quality

ENV19: Historic Land Contamination

Appendix B: SEPA requirements for Flood Risk Assessments

Flood Risk Assessments (FRA) may be required to accompany planning applications and should be prepared by a suitably qualified consultant or company. FRAs should demonstrate that the proposed development is in accordance with Scottish Planning Policy and should be prepared in consultation with SEPA's Technical Flood Risk Guidance for Stakeholders, or any subsequent replacement guidance.

SEPA's guidance outlines information and methodology requirements for FRAs, including background data, generic guidance for undertaking hydrological and hydraulic modelling. In some cases provision of other information may be appropriate and might include the following:

- pre and post development site and finished floor levels related to nearby watercourses
- flood relief levels of any hydraulic structures in proximity to the site
- appropriate photographs of any nearby historical flood events

A full copy of the guidance can be found at: http://www.sepa.org.uk/flooding/planning flooding.aspx

SEPA has also produced FRA checklist (outlined below in **Box 1**) to ensure key aspects have been considered and included in the report.

Box 1: SEPA Flood Risk Assessment Checklist

- Identification of the source/type of potential flooding (e.g. riverine, coastal, pluvial, etc or combination of more than one type).
- An assessment of the appropriate design flows and levels at the site. This should provide sufficient information on the derivation of the design flows and hydraulic modelling for auditing purposes.
- The plan extent, depth and any flood flow pathways should be indicated on a scale map of the site for appropriate return periods. Cross-sections of the site showing finished floor levels, access routes or other relevant levels, relative to the source of flooding and anticipated water levels for associated probabilities.
- An assessment of the likely rate or speed with which inundation might occur, the order in which various parts of the location or site might flood and the likely duration of flood events. If appropriate, the identification of routes of safe access/egress during the design event should also be made including the depth of flood water which may be encountered on these routes. Confirmation that access/egress will be maintained in the event of a flood should also be provided.
- Plans and description of any structures (culverts, screens, embankments or walls, overgrown or collapsing channels etc) which may influence local hydraulics, and a summary of the findings of any hydraulic modelling and how they impact on water levels at the site in question.
- Where culverts provide a significant flow restriction, levels and discharge rates at which flow would overtop the structure should be identified. Likely impacts of blocked culverts should also be identified.
- An assessment of the hydraulics of all watercourses, drains or sewers, existing or proposed, on the site during flood events to assess the risks of secondary flooding.
- Best estimates, based on the most up-to-date findings, should also be made of climate change impacts on probabilities, flood depths and extents for both fluvial and coastal situations. Current fluvial guidance (published by DEFRA) recommends that the 0.5% (200 year) peak flow estimate should be increased by +20%. Reporting to the Scottish Executive in 2003, Price & McKenna provide a picture of how climate change could affect runoff regionally across Scotland. For projected increases in sea-level rise, refer to UKCIP02 but note that the POL 112 method has a function for making allowances for climate change for future time horizons.
- Details of flood mitigation measures/strategies employed. In the case of proposed ground raising, estimates should be made of the volumes of water which would be displaced from the site for various flood levels following development of the site, and details provided of how compensatory flood storage would be implemented.
- An assessment of the likely impact of any displaced water (whether or not full compensatory storage has been provided) on neighbouring or other locations which might be affected subsequent to development. This requirement also applies to coastal locations.
- A brief assessment of the potential impact of any development on fluvial or coastal ecology, habitat or morphology and the likely longer term stability and sustainability. The assessment should indicate the requirement for additional separate detailed investigation into these issues, which may be required to address the requirements of the WEWS Act (Controlled Activities Regulations).

Appendix C: Local Plan development sites and initial flood risk considerations

Pearl Street Housing Site (H9)

Disused plot of land located at the rear of Callander Kirk building and extending from the Main Street to Pearl Street. Site area is approximately 0.09ha. The site has been allocated in the Local Plan as a potential development site for 5 houses. There is no recorded history of flooding at this site however, it lies in a vulnerable area of the town. A FRA will therefore be required to accompany any planning application for this site.

Flooding from the River Teith has occurred at properties on South Church Street. There is also a small burn to the east of the site which could have the potential to cause flooding. There is a documented history of flooding at properties on Main Street as a result of insufficient drainage systems to cope with peak flood events. This problem has been corrected and appears to be working effectively at the time of developing this guidance.

Map 3: Pearl Street

Potential flood mitigation measures:

To reduce the likelihood of flooding at the site, sufficient drainage should be installed to reduce the impact of any overland flow from flooding of the River Teith or the burn or from insufficient drainage network capacity. Care should be taken not to increase the risk of flooding elsewhere as a result.

The historical issue of flooding from poor drainage capacity on the Main Street is likely to have been resolved, however maintenance is ongoing and should be continued with future assessments.

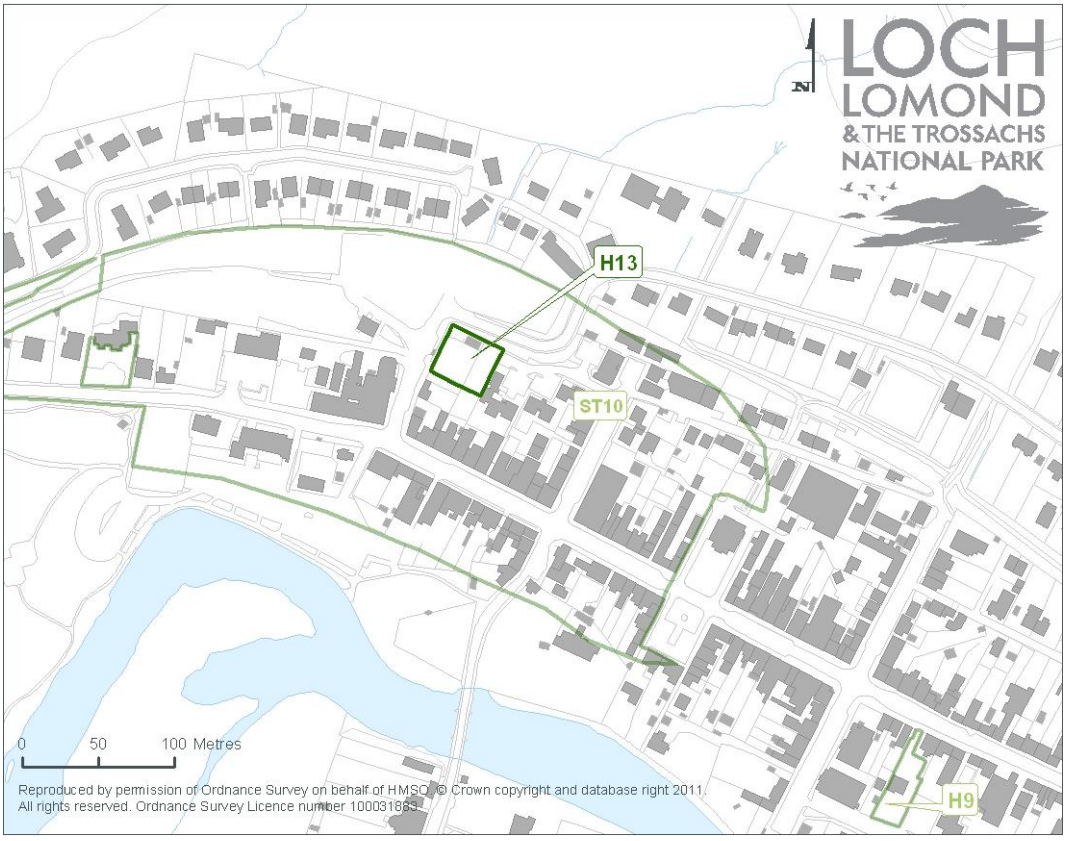
Figure 1: Flooding in Callander in 2006 showing the location of the Pearl St development site

Old Telephone Exchange Housing Site (H13)

The Old Telephone Exchange building is located adjacent to the current Post Office on the corner of Station Road, below the car park. The site covers an area of 0.13ha. The existing building is disused and planning permission has been granted for redevelopment into 10 residential units and 1 commercial unit. The site has now been enlarged and an application for 17 flats and one commercial unit was granted planning permission.

Potential flood risk at the site is principally from drainage issues and overland flow. There is a known problem with the burn flowing into a culvert at the north eastern side of the Station Road car park. The culvert could potentially affect the development site as it lies below the current road and car park elevation. Stirling Council's longer term plan is to upgrade the pipe and modify the inlet structure to minimise flood risk.

Map 4: Old Telephone Exchange



Potential flood mitigation measures:

Regular monitoring and maintenance of the culvert is currently in place and this should continue. Future assessment of the drainage capacity for the road and car park should ensure that any surcharge or overland flow is redirected away from buildings including the development site, and that the flooding problem is resolved through upgrading of the drainage network, including the culvert.

Figure 2: Culvert at Station Road car park

Callander Town Centre Tourism Site (ST10)

The Callander Town Centre tourism proposal incorporates much of the Main Street business area of Callander from the western side of Ancaster Square to Leny Road at the end of Tulipan Cresent. The zone includes the Station Road car park and part of the Meadows area. Buildings excluded from this zone are the Episcopal Church and the end of the Station Road car park below the Main Road. Land use within the zone is principally commercial with some residential properties. The proposed development site covers an area of approximately 8ha.

The proposed development would include a mix of tourism, recreation and community uses; including shops, restaurants, accommodation and office space within gap or vacant sites. Services such as extended car parking, community space and visitor facilities would also be improved. The development includes plans to integrate Main Street and the Meadows car park area through the use of double facade buildings.

The culvert at the Station Road car park has historically affected infrastructure and a number of buildings in the vicinity. The River Teith regularly floods the Meadows car park, adjacent buildings and the Main Street.

Map 6: Callander Town Centre

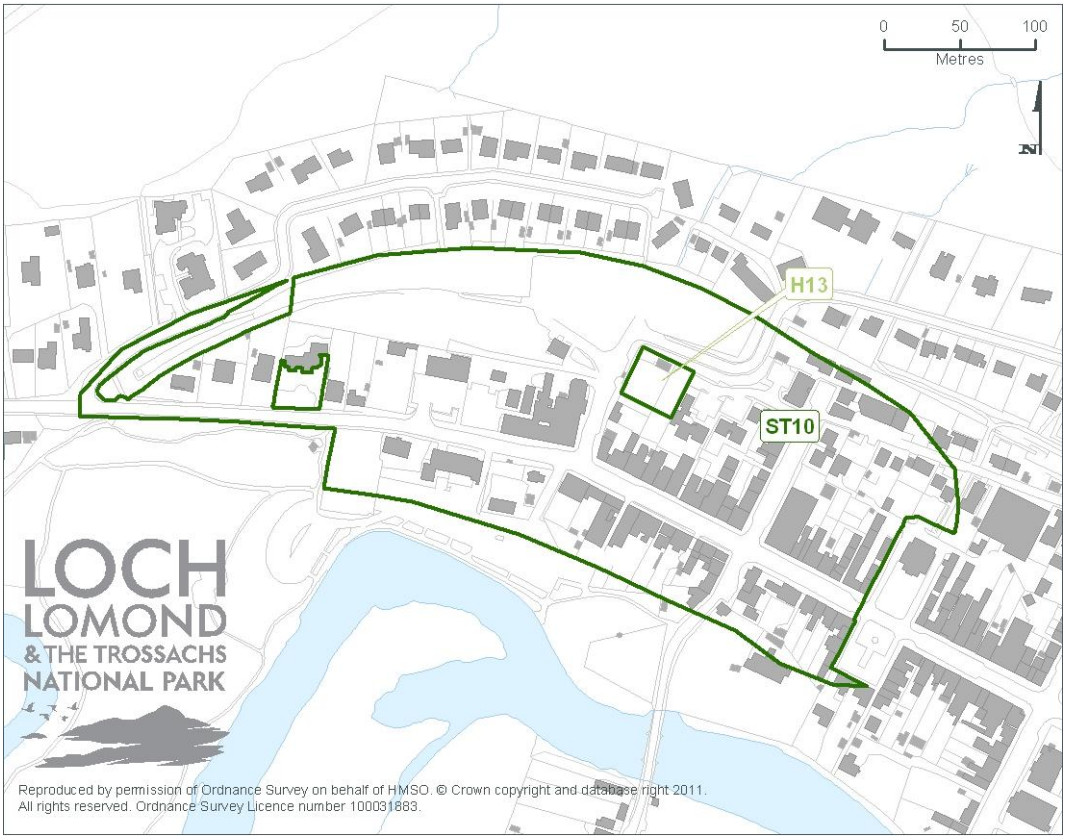


Figure 3: Flooding at Callander Meadows car park and Main St in 2005 and 2006

Potential flood mitigation measures:

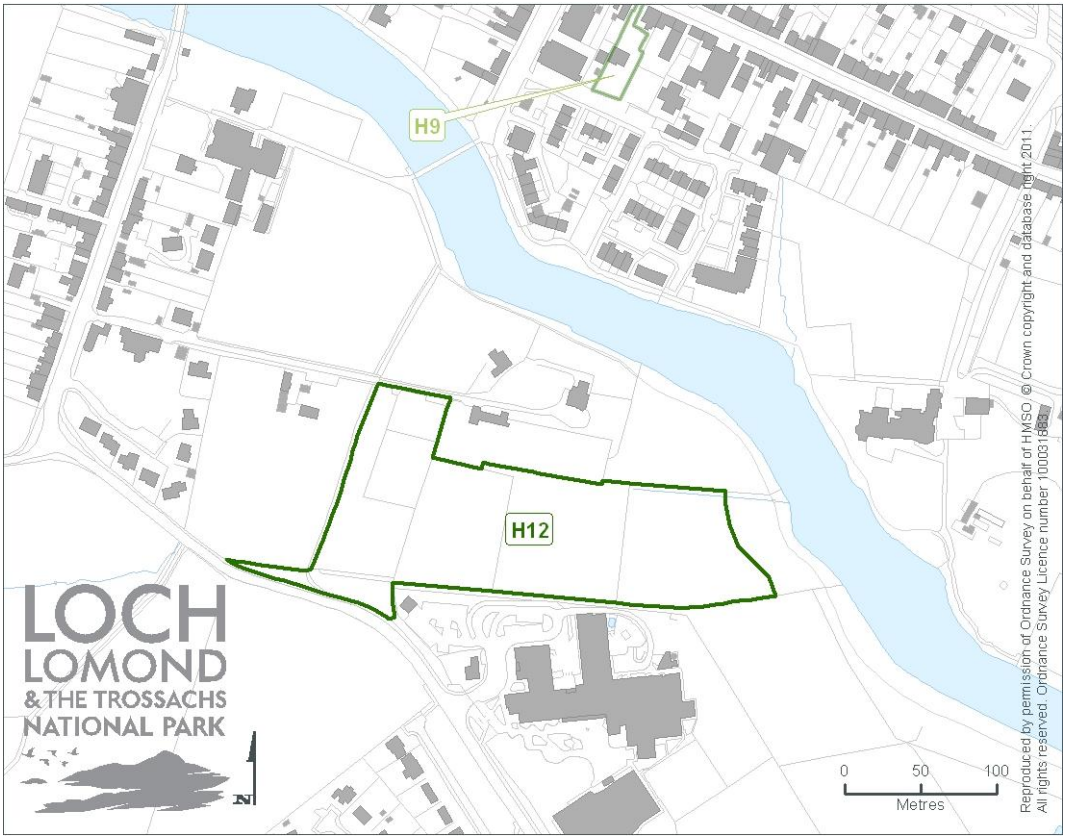
Flood proofing for individual buildings must be maintained and enhanced for existing structures and new development must be designed in such a way that it will be resistant to flood damage. Careful consideration will need to be given for developments involving more sensitive uses. Any existing problematic culverts and pipelines should continue to be monitored and maintained, with reassessment of their suitability in the future.

Churchfields Housing Site (H12)

The proposed site is located immediately to the north of McLaren High School on the south side of the River Teith. The site is currently utilised as grazing land and has an area of 2.54ha.

The site has been identified as the potential location for up to 28 residential properties. Planning Permission in Principle was granted for 28 residential dwellings in 2010. The majority of the site area is not regarded to be at risk of flooding from the River Teith. Drainage issues cause saturation and occasional standing water over the site. Existing road drainage problems have resulted in excess water being discharged onto the fields. Flooding related to a problem culvert at Castle Grove to the west is unlikely to affect the development site.

Map 6: Churchfields



Potential flood mitigation measures:

Ensuring that sufficient drainage of surface water is included in future construction plans will be essential for managing flood risk on this site. Existing drainage problems should be assessed and solutions agreed to by all relevant parties. As an additional precautionary measure, designs for construction should include placing houses away from flood prone areas, using flood proof materials and placing floor levels at an elevation that would prevent inundation of properties if flooding was to occur.

Figure 4: Churchfields site showing standing water

Tannochbrae Housing Site (H11)

Partially constructed, this site is located at the entrance to Callander from the east, on the northern side of the A84. The site was previously used as a chalet park. The site occupies an area of around 3.05ha. Planning permission has been granted for this site and development has commenced.

Map 7: Tannochbrae

Potential flood mitigation measures:

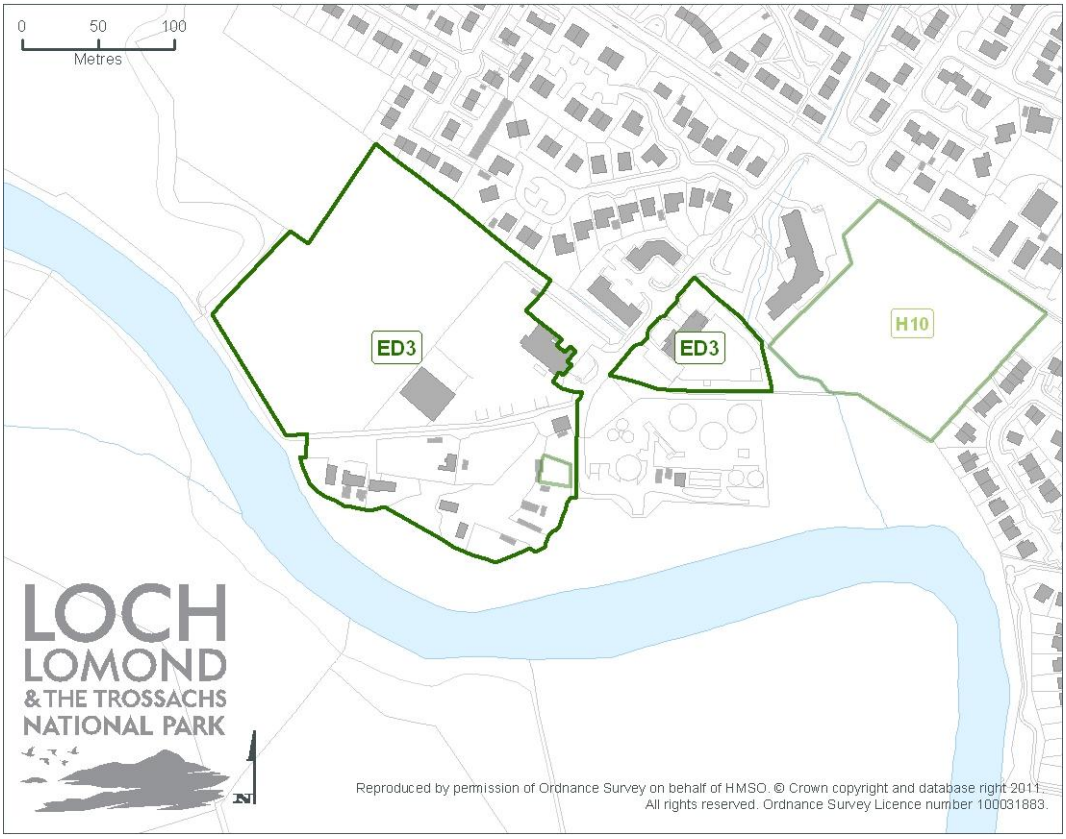
Adequate drainage including SuDs is a requirement for this site. Cooperation with neighbouring land owners could potentially lead to a reassessment of the existing drainage network. Redirection of existing drains, management of wet areas and ponds and upgrading of structures may, in the future, present opportunities for more effectively managing drainage.

Lagrannoch Economic Development Site (ED3)

Further development is proposed for the existing Lagrannoch industrial estate to the south of Gullipen View. The proposed site has an area of approximately 4.08ha. The proposed development consists of plans for Class 4 and 5 (office and industrial) uses.

The development site is adjacent to the River Teith and could therefore be at risk of flooding. The SEPA indicative flood map shows that part of the site is likely to be inundated in a 0.5% AEP, or 1 in 200 year flood event. Further areas of the site may also be at risk which are outwith the SEPA indicate map. Previous problems have been recorded at Gullipen View to the northeast of the site and are related to flooding of the Mellis Burn. This recurring problem could potentially impact on new development in this area. A piped watercourse beneath part of this site will need to be investigated for flood risk.

Map 8: Lagrannoch development site



Potential flood mitigation measures:

Local scale mitigation of floods in the Mellis Burn could include upgrading and maintaining existing structures and pipeline capacity. Development on the site should be located outside of the 0.5% AEP flood outline and any structures or buildings should be built using flood-proof and resilient materials.

Figure 6: 2006 Flood at the Lagrannoch industrial site

Figure 7: Mellis Burn at the A84 during flood in 2004 (photograph taken at the junction of the A84 and the road to leading to the Medical Centre, Gullipen View and the industrial estate).

Stirling Road Housing Site (H10)

This site is a 1.48ha open area of grassland. It lies to the south west of the A84, immediately to the east of the Health Centre. Refer to Map 8 for the site's location. Outline planning permission for the construction of 30 housing units expired in 2011. Planning Permission in Principle was granted for a supermarket in 2012. Flooding of the Mellis Burn onto the A84 is common and has the potential to impact on the Stirling Road site although this has not previously been documented.

Map 9: Stirling Road

Potential flood mitigation measures:

Local scale mitigation of floods in the Mellis Burn could be achieved by upgrading and maintaining existing structures and pipeline capacity. Adequate drainage capacity, including SUDs should be integrated into the final design for the site and should be capable of removing overland flow to prevent any build up of floodwater on the site.

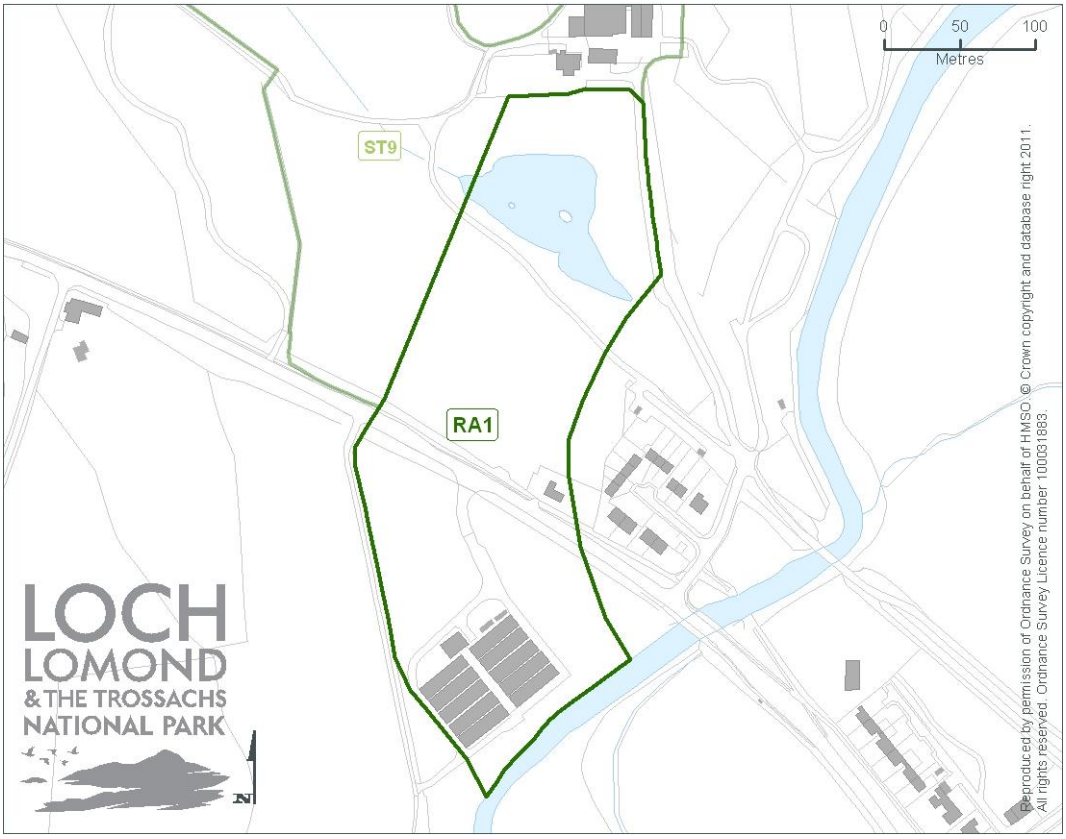
Callander East Rural Development Site (RA1)

The site lies on the outskirts of Callander, on the western side of the Keltie Water and on either side of the A84 immediately to the west of the existing caravan park and including the existing mushroom factory. The area of the site covers 5.59ha. See Map 10 for site location.

The proposed development consists of horticultural, small scale wood processing, food processing and other business/industry. The east of the site would be primarily commercial land potentially including horticultural land, a small-scale processing plant and food processing factories. This site also falls adjacent to a Special Area of Conservation linked to the River Teith and therefore any development would be subject to restrictions related to this.

The Keltie Water can be a source of flooding in the area. Overland flow from farmland and the golf course is a potential issue for this site.

Map 10: Callander East Rural Development



Potential flood mitigation measures:

Structures should be placed outwith any areas that are known to flood, including buffer areas, and at an elevation at which they will be protected from floodwaters. Sufficient drainage must be in place on the site to prevent accumulation of overland flow.

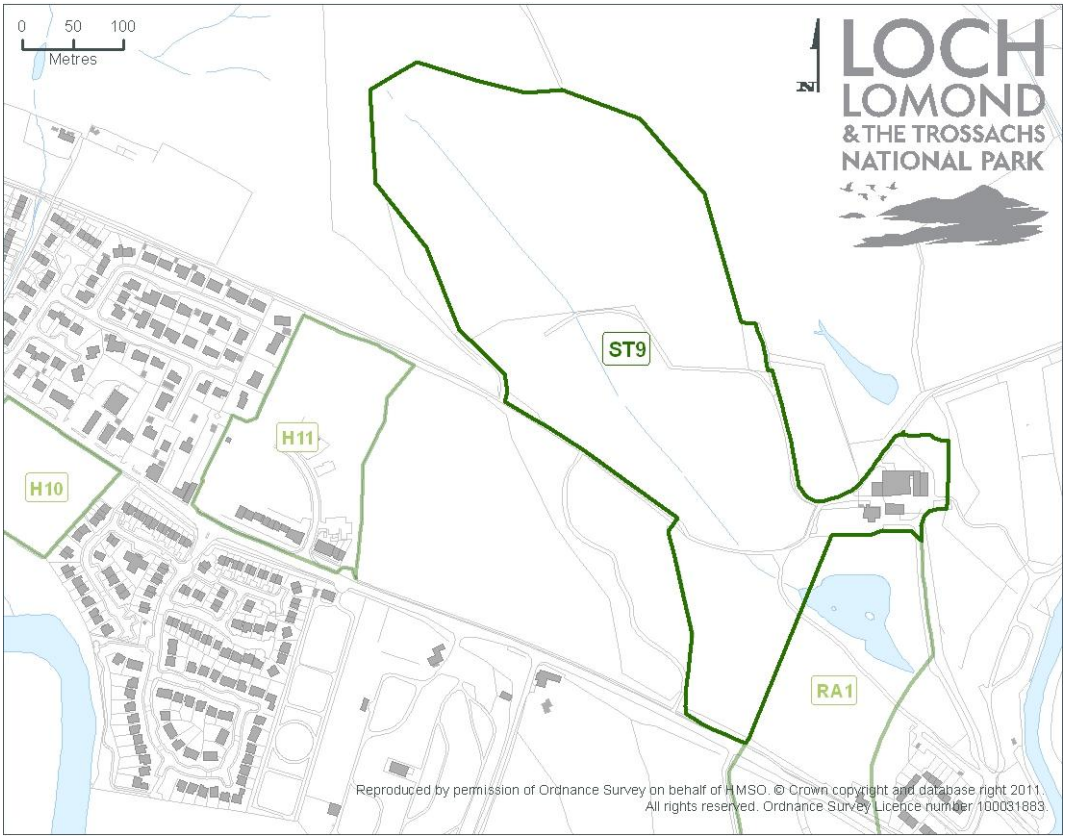
Callander East Auchenlaich Development Site (ST9)

The site lies on the outskirts of Callander to the west of the Keltie Water and to the north of the A84. The development area is currently used predominately for grazing, the majority of which has been reclaimed from quarry workings.

The proposed development incorporates a hotel on the western part of the site to the west of a farmhouse and buildings, some scope for self catering accommodation. The site also falls within a Special Area of Conservation linked to the River Teith and therefore any development would be subject to restrictions related to this. Site access including pedestrian and cycle routes should be preserved and improved.

The Keltie Water can be a source of flooding in the area and other burns and ponds should also be considered when assessing flood risk. Overland flow from farmland and the golf course is a potential issue for this site.

Map 11: Callander East Auchenlaich



Potential flood mitigation measures:

Structures should be placed outside any areas that are known to flood and at an elevation at which they will be protected from floodwaters. Sufficient drainage must be in place on the site to prevent accumulation of overland flow.

November 2012

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