

Membury Flood Warning System

Summary of Proposed Membury Flood Warning System

A river level sensor will be located within the open culvert section of the Membury watercourse just to the north (and upstream) of the community at flood risk. If the rate of flow into Membury watercourse exceeds the capacity of the culvert, either through sheer volume of water or blockage of the trash screen, an alarm (set at 75% of the depth of the road ramp impounding structure) will be sent to a receiver located in Membury village carpark. The receiver will be connected to a 141dB siren (with the option of a 'soft start') which will sound for 5 minutes or until switched off by one of the Flood Wardens. On hearing the siren the Flood Wardens will activate their community flood plan. Other residents of the community will be able to take preventative measures, such as installing flood boards, laying sandbags, moving vehicles etc.

The siren is unlikely to be heard throughout the whole village and an auto-dialler co-located with the siren will be triggered at the same time. The auto-dialler will contact a pre-set number of suitable telephone numbers, such as flood wardens out of the audible range of the siren and residents in downstream communities also at risk from the Membury watercourse.

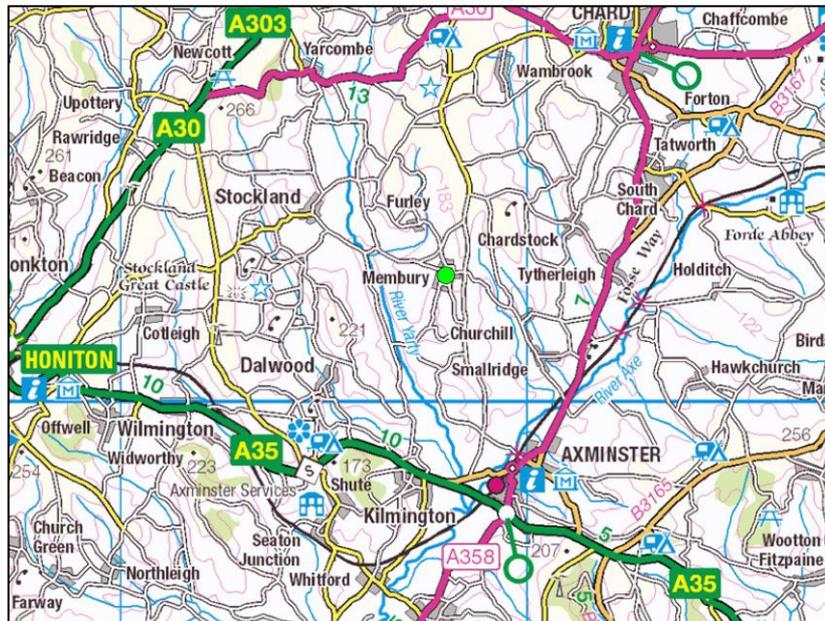
Where possible the siren will serve as a contingency to the Environment Agency's Floodline Warnings Direct system.

Background

Membury is located in East Devon approximately 3 miles north of Axminster. A small stream runs in a culvert through the centre of the village, the stream is unculverted further downstream as it passes through Rock. Membury watercourse joins the River Yarty just downstream of Beckford Bridge.

In response to repeated flooding of properties within Membury Village and Rock, Membury Parish Council developed an emergency flood plan to ensure residents could take preventative action in the event of a flood. Properties further downstream in Rock are also flooded from the Membury watercourse and were included as part of the local flood warning plan. The community bought and installed a low cost auto-dialler triggered by the water level in the road near the open culvert. The intention was for the auto-dialler to contact flood wardens prior to flooding who could then activate the flood plan.

Membury Parish Council approached the Environment Agency in 2010 requesting an audible alarm based on levels recorded near the upstream culvert. It was felt that an audible alarm would provide a more resilient/reliable trigger for their flood plan and could be used to communicate flood risk to all of the community at the same time. An additional request for an auto-dialler working in conjunction with the siren was also made.



Mechanism of Flooding

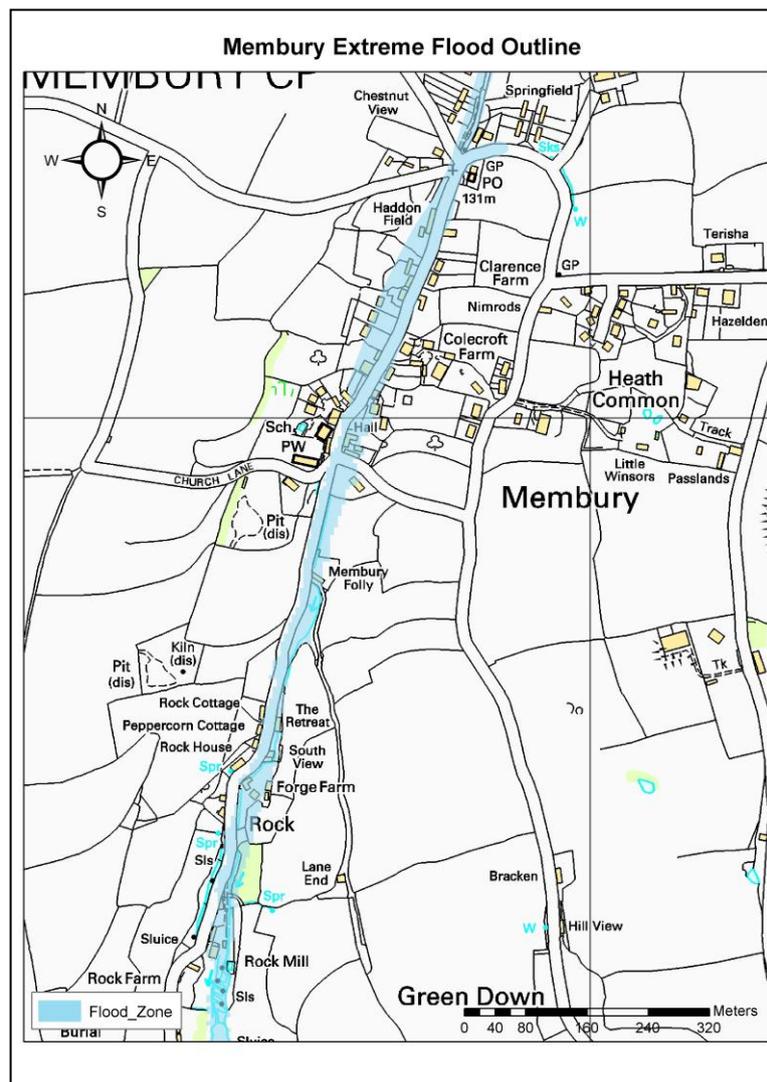
During periods of intense rainfall, high runoff from fields to the north of Membury are funnelled along a farm track with an embedded debris filter until the flow meets with the road system. From the road an open section of culvert covered by a trash screen provides a route for the water to enter Membury watercourse. High runoff volumes often carry high volumes of debris from the surrounding fields. The debris can cover or partially cover the trash screen, limiting the amount of water entering the culvert. As water backs up, a ramp in the road provides an impounding structure creating a small area of flood storage.

If runoff from the fields continues the depth of water exceeds the storage afforded by the ramp in the road and water discharges directly onto the main road through Membury. A series of drainage holes along the surface of the road provide a route for the water to join the Membury watercourse which at this point flows in an under road culvert. The drainage holes can become blocked by debris quite quickly leaving the water to flow freely along the road, flooding low lying properties.

Water will also flow down the roads to the east and west of Membury contributing further to the water flowing along Membury's main road. Properties to the east of the road can also be flooded directly from runoff from the surrounding fields.

Flood Risk

The Flood Map shows that up to around 15 properties are at risk of flooding from the Membury watercourse in some of the more extreme events, the number is likely to be lower in some of the more typical events. The volume and distribution of water is also likely to cause severe disruption to the village as the water will be at its most hazardous as it flows down a main access route into Membury and passes the local primary school.



Flood Warning and Audible Alarm

Floodline Warnings Direct

The members of Membury community at flood risk will be added to Floodline Warnings Direct. However due to the small size of the catchment contributing to flow in Membury stream, it is difficult for the Environment Agency to provide a traditional flood warning service for the Membury community via its Floodline Warnings Direct telephone warning system. The small catchment and associated short watercourse mean that any water level alarm triggered within the catchment would need very prompt acknowledgement and action by Flood Warning Duty staff. There is a risk that properties will begin to flood before the Environment Agency can respond to the alarm and send a telephone warning via its Floodline Warnings Direct system. A contingency of an audible alarm through the use of a siren/auto-dialler would ensure the maximum chance for triggering the community flood plan.

Audible Alarm

A river level sensor will be installed within the open section of culvert at the bottom of the track leading up to the playing fields, just to the north of the road ramp. Levels recorded in this part of the watercourse will then be sent via a radio signal to a receiver in Membury carpark. The information received in the carpark will be transmitted back to the Environment Agency offices via the telephone line. This will allow the Environment Agency to monitor the depth within the Membury watercourse. At pre-set thresholds the information received will be used to trigger a Flood Warning siren and auto-dialler located in the carpark.

Alarm trigger levels

There is uncertainty as to the most appropriate level to set the alarms triggered from the river level sensor at the open culvert. It has been proposed that the level being used by the Membury Parish Council to trigger the existing auto-dialler is adopted as the trigger for the siren and new auto-dialler. This is set at **approximately 75%** of the depth in the impounding section of the road upstream of the ramp. On hearing the siren the Flood Wardens and community will activate their community flood plan

An alarm threshold will also be set at 50% of the depth in the impounding section of the road. This will raise an alarm within the Environment Agency. The Flood Warning Duty Officer will make every attempt to issue a Flood Warning via the Environment Agency's preferred warning communication route (Floodline Warnings Direct) to the Membury community. As this alarm will be set at a relatively low level there will be false alarms.

Identifying the most appropriate alarm thresholds is likely to be an iterative process with reviews after each event or false alarm.

Work to date

- A siren manufacturer has made two site visits to Membury to provide advice on a cost effective siren specification to warn as many of the properties at flood risk as possible.
- A siren demonstration took place in May which was attended by members of the Parish Council, the Membury community, the Environment Agency and Environmental Health. This allowed Environmental Health to measure the level of decibels in the carpark and inside nearby buildings to ensure the volume of the siren was within health and safety guidelines.
- The siren demonstration also allowed a consultation on a unique, favoured siren tone and allowed residents to observe the visual impact of the siren.
- A BT line connection has been made in the corner of Membury carpark housed in a temporary, secure, waterproof box.
- Western Power Distribution have made site visits and provided quotes for power options in Membury carpark.

- Environment Agency engineers have made site visits and have provided the initial design drawings for the siren site and the culvert level sensor. Detailed design drawings are in development with Environment Agency engineers.

Description of equipment;

River level sensor: A pressure transducer will be installed within a steel tube and secured to the side of the upstream culvert. The transducer will be connected by cable to a small cabinet located next to the culvert in a secure compound. A solar panel will be fixed within the compound to power the transducer.

Siren: The 141dB siren will be located on a 6m demountable pole mounted on a square plinth in the south east corner of the carpark. A metal cabinet housing the siren electronics, batteries, auto-dialler and BT connection will share the plinth. The batteries to power the siren and auto dialler will be trickle-fed with electricity from a power cable running under the carpark and up a new power pole. The new pole will be installed next to the existing BT pole which will in due course be decommissioned and removed where upon all BT connections will be migrated to the new pole. Three bollards will be installed in front of the plinth to ensure vehicles cannot hit the equipment. The siren will have the option of a soft start to provide the public with a pre-warning that the main siren is going to sound. This will ensure the 'alarming' effect of the siren doesn't cause unnecessary startling to those in the near vicinity (e.g. in the carpark itself).

Auto-dialler: The autodialler will have the capacity to phone between 5 – 15 different numbers. It will phone each number one after the other. If a number doesn't answer then the auto-dialler will skip that one and starting dialling the next number, it will then re – dial the skipped numbers at the end. The autodialler will automatically stop once all numbers have been contacted, however it can be manually stopped by ringing it and entering a short code.

Note: The auto-dialler can only be installed if there remains enough telephone line capacity on the BT system in the village. At the time of writing this is still to be confirmed.

Drawings and details

The full design drawings and corresponding details can be seen in the appendix attached to this document.