Some notes on Arreton Flooding 17 August 2022

Introduction

These are the writer's observations and thoughts; they are not a detailed and accurate analysis and my conclusions are obviously open to challenge. Thank you for taking the time to provide Island Roads (IR) with your observations and analysis.

Around 17:10 on Wednesday 17th June 2022 the village of Arreton suffered a short intense period of rainfall lasting around 20 to 30 minutes. It seems likely that there was well over 25mm of rain - up to 40mm based on reports in the *County Press*. The rain fell on land that, although there had been some recent rain, was very dry. The result was severe flooding of: farmland, the main road through the village, and internal and external flooding of properties, with tonnes of silt deposited in the village. Police did attend and advised drivers that the road was closed due to flooding but this was late in the flooding and some drivers ignored the advice.

This was the second severe rainfall event causing flooding; there was a similar though far less damaging event in 2021 which derived mainly from flows off the land leading up to Arreton Down.

Impact

The major impact of the storm was due to silt bearing surface water run-off from the agricultural land either side of the main road through Arreton. Agreed, the volume of water and quantity of silt was exceptional.

This resulted in a torrent of water flowing through the entire length of the village, with the highest flows between the area of the school and the area of Rose Cottage. Within this length gardens and houses were flooded and tonnes of silt were deposited. Agreed. The highway suffered the same, having been used as a conduit for this water and silt. Approximately 20t of silt was removed from the highway alone.

There was some flooding to the north of the village caused by run-off from the agricultural land running up to Arreton Down but this was far less significant than the flooding from waters running off the agricultural land to the south of the main road. All of these issues of course ultimately compound the risk of flooding and IR will therefore look to have dialogue with the respective landowners in the first instance, with recommendations for the Isle of Wight Council to consider enforcement action where deemed necessary. IR compiles case files under the Land Drainage Act 1991 or in line with other legislation and guidance where required and as appropriate, documenting the issue in detail for further enforcement consideration.

The pictures below show the sources of the flooding from the fields and flooding along the main road:

Picture 1 Agricultural run-off at the drainage chamber near to Primrose Dell

There is a collection chamber and a pipe under the road near to this. This looks dramatic but it was probably the lesser of the flows coming off fields, with the larger flow being at the Community Centre. The location of the flows coming off the fields at the Community Centre is shown below.

Picture 2 The flood water came down the access to the Community Centre and over a 10metre length of bank between the Community Centre and the traffic lights.

Flooding through the village was extreme with a torrent through much of the village, as shown in the photo below, although this does not fully capture the rate of flow.

Picture 3 Flooding and traffic in the village

One compounding factor for some properties was the speed at which some vehicles drove through the flood causing waves which pushed water and silt into properties that otherwise would have been minimally affected. However, for the seriously affected properties this was not significant.

There were three main sources of the water that flowed along the main road through the village.

- Rain falling onto the road and pavement from the northern end of the village, including some from the roads that run from Arreton Cross up to the Downs and towards Newport. A picture in the County Press on 19th August shows this to be a significant flow. Agreed. IR included this within the case file compiled.
- Water flowing off the agricultural land behind the community centre. This appears to have been a very significant flow and probably was the main source of the floodwater. Agreed. IR included this within the case file compiled.
- Water flowing off the agricultural land at the collection chamber and pipe under the road at Primrose Dell. Agreed. IR included this within the case file compiled.

These flows may not have all peaked at the same time, depending on the movement of the storm and the travel time to Arreton main road.

Between approximately the community centre and Cherrywood View the bulk of the water flowed along the main road but with some flows leaving the main road through gardens and into some properties, where the fall of the land allowed it. These flows ran down towards the tributary of the River Yar that runs parallel with and to the north of the A3056. It seems that the location where there was the greatest flow from the main road was in the location of Rose Cottage, where a video shows an incredible volume of silt laden water entering the property. Any water remaining on the road after the Rose Cottage area flowed down to the Yar at Horringford; this last length of road is cambered such that there was minimal impact on properties, with the flow staying on the road. Again, what is key here is the management of the water on the agricultural land. Once this water has run onto the highway and the highway becomes the conduit, especially at such volumes, the highway drainage infrastructure simply cannot cope, nor was it ever intended to. Further, the profile of the highway / carriageway is not designed or intended to cater for water from third party land. The LDA case file compiled by IR reiterates this.

The water was silt laden and also conveyed gravel sized stones. The heavier particles were mainly deposited in the road but silt was deposited wherever there was flow, with literally tonnes of silt being deposited in some gardens. I have not investigated damage but it is likely that some outhouses were damaged. Noted.

Discussion

The rain was intense and very localised and Arreton was unlucky to have been on the direct track of the storm.

A previous event in 2021 caused extensive flooding with water running off the agricultural land running up to Arreton Down, particularly affecting properties in Carpenters Yard. This time inspection of the site of the 2021 flooding showed that some silt had been deposited on the A9 bridle path at its junction with footpath A13. However, of the two fields from which the flow came, one was planted with maize and the other had been planted with a cereal crop which had been harvested, leaving stubble. The reason for there being less flooding in this area could have been due to the fields having vegetation in, and/or possibly having had less intense rainfall. The picture below shows the stubble (with a trench dug subsequent to the flooding). Whether due to the crops or due to less intense rainfall on the fields the flooding in this area was much less severe than in 2021. Noted and agreed

Picture 4 Stubble in a field north of the village

With respect to the flooding in Arreton the fields south of the main road were the source of much of the flow and essentially all of the silt and gravel. Going along the A3056 south-eastwards from Arreton Cross there are:

- Two very large fields either side of the track by the Community Centre, both of which are bare earth at present, at least one of which was reportedly planted with potatoes which have been harvested. There is a slope of around 400 to 500m long running down to both the locations where there was significant flow onto the road, at the Community Centre and the pipe under the main road near to Primrose Dell.
- A large field of maize, still to be harvested
- A smallish field of grass, earmarked for housing
  The management of water on this agricultural land is the key focus of the LDA case file

There are then houses for the next quarter of mile or so.

Once water has got onto the road the only ways the road drains are:

- Into road gullies
- Through properties on the north side of the road where levels permit; and
- Down the main road to the Yar at Horringford

In this instance the road gullies had nothing like the capacity needed so the bulk of the water flowed from the road northwards through properties towards the stream running into the Yar, with the residual flow running down the hill to the Yar at Horringford. Again, what is key here is the management of the water on the agricultural land. Once this water has run onto the highway and the highway becomes the conduit, especially at such volumes, the highway drainage infrastructure simply cannot cope, nor was it

ever intended to. Further, the profile of the highway / carriageway is not designed or intended to cater for water from third party land. The LDA case file compiled by IR reiterates this.

What Happened?

There was a very intense rainfall event lasting no more than 30 minutes during which around 40mm of rain fell. The two large fields behind the Community Centre were bare earth and very dry after several weeks of dry conditions and some very hot weather. The intense rainfall was way beyond the absorptive capacity of the soil and a significant proportion of the rain ran overground to the two low points, picking up silt and gravel en-route. These low points were:- the area around the Community Centre and an existing chamber and drainage pipe located around 200m west of the Community Centre near to Primrose Dell, with the greater flow at the Community Centre.

These two points appear to have been the only significant points of discharge from the agricultural land to the south of the Main Road. After the event there was no sign of discharges from the field of maize or from the pasture to the east of these bare fields.

The flows from the agricultural land were combined with water running down into the village from Arreton Cross. The intensity of the storm was such that there would have been high flows derived from the road and pavement evidenced by a photo in the *County Press*: it is certain that the road gullies could handle this flow. However, the greater part of the flood was derived from flow off the fields. Agreed.

What could be done in the future to prevent this.

The likelihood of an event of similar consequences occurring is low as such intense rainfall is very rare, and the flooding was caused in part by the fields being bare. However, with two significant flooding events in in Arreton in the past two years there should be measures taken to reduce the consequences.

There are two issues:- how to stop run-off from fields reaching the road and how to ensure water running down the road does not flood properties.

The flooding appears to have been made worse because some fields were bare earth. It is inevitable that fields used for arable crops are bare earth at times. One option would be to use the lower areas of the fields as pasture which would slow the flow of water and trap silt. However, after a drought there would probably be little infiltration of water, although silt would be trapped. Another action that could ameliorate flooding would be to carve large level furrows after harvesting prior to planting. These would slow run-off and allow more infiltration – but in practice unless a field was out of use for an extended period this would be unlikely be an effective approach. The landowner has employed a contractor to excavate a ditch in the field which has exposed a 200mm culvert that passes beneath the carriageway. The excavation has extended to include a bunding bank and ditch. It is unclear at this stage, whether or not the works will be extended to include other parcels of land. Prior to the flooding, the landowner had harvested crops and ploughed the field. When viewed from the highway the field had furrows running towards the highway whereas the landowner had previously ploughed the field the opposite way. Had the field been ploughed in the opposite direction the furrows would have afforded some attenuation and may have reduced the flooding.

Existing Pipe under A3056 near Primrose Dell

Superficially the easiest improvement would be to increase the size of the pipe under the road near to Primrose Dell. This is a 300mm diameter pipe, and increasing this to, say, 450mm diameter would more than double its capacity. There would also need to be some earthworks in the field and possibly an increase in the size of the chamber. However, the effect of this would be to discharge into a watercourse upstream of Carpenters Yard; properties there are currently at risk of flooding, and this would almost certainly increase the probability of them flooding. Thus, unless work was done to

significantly increase the capacity of the downstream watercourse this appears unacceptable as it would increase the risk of Carpenters Yard properties flooding.

Another potential intervention, the practicality of which would need to be investigated, would be to construct a balancing lagoon immediately adjacent to the pipe under the road. This would be an earth lagoon with a low-level small diameter pipe outlet and a high level overflow. The effect of this would be to dampen peak flows and hopefully prevent extremely high discharges. This appears possible and if implemented should in the event of another reduce the overflow discharging onto the Main Road. This appears practical but would not have made much difference in a storm of the intensity experienced last week. There are several recommendations that would go some way to reducing the risk of flooding. Land management by the landowners to ensure that they retain and manage the surface water from their land before it affects the highway. This would be the excavation of ditches along the hedge line which would accept surface water run-off and incorporate some means of filtration prior to it entering the culvert as this would prevent silting. This naturally leads on to the requirement for an improved culvert system to facilitate the effective removal of water from the ditches. The current culverts pass beneath the highway and then deposit into an unnamed watercourse behind the residential properties. The culvert system varies in diameter and a new system would increase capacity therefore improving the transfer of surface water from the agricultural areas to the watercourse. This would require a suitable engineering project that had a reduced impact on the property owners, i.e., not excavating gardens and driveways.

Community Centre

With respect to the flooding derived from the fields behind the Community Centre it is difficult to see an engineering solution to prevent flow onto the road in the event of a repeat of last weeks events.

Photograph shows an excavation by a landowner to form a ditch adjacent to the community centre.

Options to deal with flow in the Main Road

Once floodwater has reached the road the issue becomes how to prevent it entering properties. Options, some of which may be impractical to mitigate the problem appear to be:-

- Provide a route for water to flow to the stream to the north of the main road. Approximately 30m south east of Carpenters Yard there is an undeveloped strip of land (which appears to contain a septic tank) which could possibly be used to site a ditch to convey water to the stream. To get the flow off the road would require some form of 'speed bump' to divert the water off the road. There would be a number of issues with this; speed bumps on a bus route are not normally permitted; the amount of water that could be diverted off the road would be limited; and there could be an impact on downstream sheds and outbuildings adjacent to the stream. It might also be practical to construct a concrete culvert in Carpenters Yard to convey flow to the stream: again, works would be needed to divert flow from the road into the culvert.
- Re-camber the road and increase kerb heights to keep more of the flow within the road boundaries.
- Alternatively provide a barrier of pasture or woodland adjacent to the community centre to reduce the amount of water reaching the road.

Since the flood there has been work in the field to construct a crude lagoon by excavating a bank of earth. This would provide some storage of flood waters but it would not have prevented all run-off.

Please see my previous comments above. The conclusion here really has to be a focus on managing this this third-party surface water run off before it gets onto the highway, for reasons already set out. The key point is the landowner managing their water as this is the cause, as opposed to the Local Authority making alterations to the public highway as a result of the cause not being managed accordingly.

Conclusions

The event was due to exceptional rainfall combined with the high runoff resulting from an extended dry period and bare fields. There was a severe impact on many properties in terms of internal and external flooding, with tonnes of silt deposited.

There are no easy or obvious solutions to guarantee a similar future event would not result in flooding of properties. Agreed but many actions can and should be considered, as this will greatly mitigate any risk and will effectively lessen the likelihood of future episodes being so destructive.

To reduce the flooding derived from the fields adjacent to the Community Centre, the only realistic option appears to be either to use the fields as pasture rather than for arable crops. Alternatively, a strip of pasture or shrub or woodland might reduce flow and would intercept silt.

To reduce the flooding derived from the low point near to Primrose Dell, it does appear practical to construct a balancing lagoon. This would reduce flow and significantly dampen peak flow off the fields. Simply increasing the capacity of the existing drain pipe under the road would reduce flow reaching the road but would increase the risk of Carpenters Yard properties flooding.

Options for draining flood flows from the road are limited. Two potential options have been identified but both would involve speed bumps in the road and some re-cambering of the road. Increasing kerb height where there are properties at risk of flooding should be considered; this would keep more flow on the road allowing it to flow to the Yar at Horringford. My previous comments explain our stance on this matter. However, IR will offer to meet with Cllr. Suzie Ellis and others on site as a follow up to this, where these points can be considered further.

Some action has been taken in the field by the Community Centre to provide a lagoon to intercept agricultural flows; in a future similar event this may reduce flow onto the road a little but there is also a danger that if over-topped it could fail dramatically, significantly increasing flow whilst it emptied.

There was less impact to the north of the Main Road compared to 2021 but it is unclear whether this was a result of there being crops in the catchment or because the rainfall was less intense there.

I would suggest that historically there was little chance of such an intense storm occurring, and even with the impact of climate change it seems unlikely to occur for a long time. Nevertheless, it had a disastrous impact and serious thought needs to be given as to how to mitigate the impacts of future storms.

Martin Kimber

21st August 2022