

# **Friends of Queens Wood**

## **Report of Impact of Rain Event of 12 July 2021 on Queens Wood**

On Monday 12 July 2021 there was an exceptionally heavy rainstorm, which seriously affected the wood, damaging both the ecology and the path network. The overflow from the wood also led to flooding of properties in Wood Vale. This report considers the event in the area of the wood that drains into the valleys leading down the Wood Vale entrance an area of about 17 hectares. Rain falling in the remaining part of the wood between Priory Gardens and Queens Wood Road led to damage on the Capital Ring and considerable scouring of topsoil, but left the wood in the drainage pipes.

### The report

- Details the existing drainage system
- Describes what happened in the wood on that day, and considers the functioning of the existing drainage system.
- Outlines events in Wood Vale and on the footpaths outside the wood.
- Suggests action to be taken in present circumstances. That is, without a major flood relief scheme in the wood.

### Annex

Photos taken the same evening and the following day illustrate the type and extent of the effects of the water.

### Existing Drainage System

Above and to the west of the wood is Muswell Hill Road. The surface water from here and several adjacent roads and their properties is fed into a Thames Water sewer running through the wood along the line of the southern stream and leaving at the Wood Vale entrance. Water from these roads should enter the sewer and pass under the wood without problem, but there are repeated reports that with heavy rainfall the section of Muswell Hill Road next to the wood floods and water enters the wood on the surface.

The wood typically has a thin layer of soil over a clay subsoil. Some of the wood has significant understorey, but in large areas the soil is exposed. With moderate rainfall some water is absorbed and retained, and some runs off. In heavy rain nearly all water runs off, though both quantity and speed is reduced in areas with understorey. The wood is steeply sloped so the runoff is fast.

Two streams start on the high ground to the west of this area, and run to the east. The topography of this area is such that any surplus rainfall will descend rapidly to the two valleys. The two streams merge about 200m from Wood Vale entrance, and the combined stream continues to the entrance.

The northern stream starts behind houses in Muswell Hill Road.

The southern stream starts alongside the BuildBase depot and runs down the main valley. In the southern valley there is a large pool known as the Frogpool, created in 2010 as a pool for wildlife. It was previously a concrete based children's paddling pool built in the 1930s. As such it was refilled daily in summer and fed by a mains water pipe inlet. There was then an outlet connected to the Thames Water sewer. To create the Frogpool the concrete was removed together with the drain and connection. Now the water from the valley stream is fed through a grating into a short pipe and into the Frogpool. The pool level varies, but always contains some water. Any overflow is directed back to the valley. The pool is relatively shallow. It

is not designed to store surplus water and cannot be assumed to always have any spare capacity. On this occasion it was already full.

Further down the valley the two streams meet, before continuing towards the Wood Vale entrance. In the confluence area there is a small shallow pool known as the dogpool. Records are sparse but it is understood to be an ornamental pool, and there are indications it was fed by a continuation of the mains pipe. It is very shallow, with a concrete base, and has negligible storage capacity. The nearby streams are not designed to feed into it, although with decades of neglect and silting in the area, they sometimes do so now. There is an outlet from the dogpool that is understood to feed into the Thames Water sewer, but is designed as an overflow for the pool, with low capacity and not as a drain for the wood itself.

Immediately before the Wood Vale entrance there is a brick wall across the valley, which is understood to have been constructed in the 1930s as a holding dam to alleviate flooding further down. There is a grating on the wood side of the wall leading to the Surface water sewer. As such it appears to be the only planned provision in this entire area of the wood for the drainage of surplus water.

#### Event of 12 July 2021

Very heavy rain fell for at least two hours in the late afternoon. There was extensive flooding in many parts of London. The nearest weather recording station to the wood that we have found is in NW3 near Hampstead. This station has been going for 11 years. The rainfall for 12 July was recorded as 42mm, and appears to be the highest ever recorded here (4594 readings in total).

On this date most of the water in the wood became runoff with fast and heavy flows. It scoured many areas and removed quantities of soil and organic woodland debris, both of which are serious losses. The topography is sloping, often steeply, so there is little pooling or holding. The valleys rapidly became fast flowing along the existing streams. In many places the stream capacity rapidly became inadequate and flooding started.

The northern stream has a smaller catchment area, much of it runs through understorey, and in some places dead branches and other material act as small leaky dams. By the junction with the southern stream it ran fast and full and over spilled onto adjacent areas.

The southern stream showed far more damage. By the crossing of the Capital Ring it was already flowing strongly and the pipe under the path was partially blocked. Water flowing on to the path here was a nuisance, but did no damage.

Between the Capital Ring and the Frogpool there were major problems and considerable damage of all kinds. Runoff from the sides was considerable, and the stream itself here has very limited capacity as it runs close to mature trees and their roots. The path has been severely damaged and there is scouring along the stream.

The gully leading into the Frogpool was blocked. This has always been a problem, and it is likely that the flow was restricted before the event. The storm water runoff diverted onto the path to the south of the frog pond with sufficient force to carry a large section of asphalt paving into the gully below the Frogpool.

The overflow pipe to the Frogpool appeared to be blocked and the water overflowed over the path to the east of the pond.

The stream between the Frogpool and the 'Dog Pond' and a wide area to either side was scoured clean of silt and soil exposing the bedrock clay. There was a visible 'tide mark' indicating the depth and width of the storm water runoff, and some of the dead hedge timbers nearby were swept away.

The two streams met in the area of the Dogpool. Both were full and flowing fast. In the junction area they overflowed creating a large pond, and there are now quantities of deposited silt and aggregate. Plants were flattened.

From here to the Wood Vale entrance the engorged stream ran through the undergrowth in the coppiced area. On reaching the flood wall it was initially fed into the grille and into the sewer. Before long this became inadequate and the water began to be retained by the wall. The level of retention increased and a large pond was formed. Eyewitnesses have confirmed the area filled completely before overtopping the wall and flowing round the end wall. There is no sign of any damage or possible failure of the wall. The flood water then left the wood towards Wood Vale.

The runoff down the slopes crossed a number of paths, and also ran along them. The water can cause problems for walkers, debris can be deposited, and the paths can be damaged. Along the southern valley there are at least two pipes crossing under the paths designed to direct these flows off the paths, but the inlets have filled up and disappeared.

Most of the path network has an asphalt surface -although often in poor condition. The good sections suffered no damage, but in places poor condition asphalt was damaged. However, in recent years a number of paths have been repaired using a graded aggregate surface. Normally this is reasonably self-binding, but with high water flows it can be washed away. Several sections of path were damaged on this occasion, some seriously. In addition the swept away aggregate either is left on the adjacent soil surface – undesirable in a nature reserve – or enters the streams. Here it fills and blocks the streams causing local flooding, or is swept along until it reaches an inlet to the Frogpool, pipes under paths or the main Wood Vale outlet.

### Sewer System

The surface water sewer from Muswell Hill Road is 381mm diameter. There is no evidence that this pipe is unable to cope with the required flows, but rather that any overflow into the wood occurred because the gullies did not allow the water entry.

At the Wood Vale entrance, where there is the main inlet to the sewer from the wood, there is a further increase to 610mm, a capacity increase of 160%. This is similar to the expected flow increase estimated in the 2018 NFM Feasibility Study, so should have been able to cope.

### Beyond the wood in Wood Vale

The excess flood water from the wood left through the Wood Vale entrance area. Some of it then flooded the gardens of a few houses on the west (wood) side of the road, but most of the water swept down the 60m path from the wood and into the road. This path is the responsibility of the Highways Department. There is no apparent drainage along it, so no water entered the surface water sewer, but had to continue along the path on the surface.

The path reaches Wood Vale near to, but not at, the lowest point in the road. The road has a normal distribution of drains, and even if not blocked could not cope with the extra flow. There are reports that the drainage system in Wood Vale itself from either direction was also overloaded and became part of the flood water. Much of the water then entered the gardens of houses on the opposite side of the road, which are at a lower level. There are no apparent features to prevent this in either the road or the gardens. Much of this water went past the houses, but there are reports of it entering and causing significant damage.

Some of the flood water from the wood had continued across the and onto the footpath leading from there to Park Road. Again this is the responsibility of Highways Department, and again there appears to be no drains anywhere along its considerable length.

### Immediate Actions

Of particular concern is that it seems the existing drainage infrastructure is both poorly designed and maintained. This applies not only in the wood, but in the surrounding roads.

This was an extreme event, but not a unique one. It is important to remember that none of the specific problems were new. Flooding and damage had occurred in many previous heavy rain events.

For an ancient woodland the extensive scouring of areas of woodland that has removed topsoil and natural debris such as leaves is a serious ecological degradation. It would be extremely difficult - or even impossible - to reverse, and steps need to be taken to prevent or at least reduce it in the future, possibly by increasing the vegetation cover on the ground. This should take place on the slopes well before entering the streams. Even if soil settled lower down, it would not be practicable to replace it higher up the slopes.

The basic design of the present system to drain surplus water from the wood needs checking. It has repeatedly failed over the years. Just what sort of failure occurred to cause the flooding? Was the ability for water to enter the sewer inadequate? With just one main entry point this seems possible. Or was the sewer itself of inadequate capacity?

Consideration of ways of alleviating these deficiencies should then be undertaken.

All of the pipe inlets along the streams were blocked, many before the event. They should be unblocked and regular maintenance carried out.

The gullies on all highways in the catchment area have been reported as blocked. They should be inspected and cleared as necessary, and then regularly maintained.

Debris of all kinds has always been swept into the Thames Water sewers, both in the wood and under the roads. These should also be surveyed now and on a regular basis and cleared as necessary.

David Warren

Photos by Michael Johns and Michael Hacker

7 August 2021

## ANNEX

Not surprisingly no photos were taken during the event itself.

The first 4 photos were taken in poor light between 8 and 9 pm the same day. By then most water had left the wood, and although the streams were flowing strongly, it was obvious the height of the event was far more serious with widespread flooding.

The following 5 photos were taken the following morning. By then there was very little water flow.



1. 8 pm. At the Frogpool the water flowed onto the path. The earlier wide flood area is apparent.





2. 8 pm. Between the Frogpool and the Dogpool the stream was flowing. The widespread flooding and erosion are apparent.



3. 8 pm. Flooding approaching the Wood Vale entrance. The wall is visible in the distance below the notice board. When the wall was overtopped earlier, the water level in the entire area would have been more than a metre deeper. This is shown by the effects on the adjacent vegetation.





4 8 pm. Another view of the Wood Vale entrance flooded area looking away from the wall.





5. Next morning. This shows the Wood Vale entrance wall and inlet grating. The wall is undamaged. Vegetation has been flattened, and has silt on it. There was silt and debris in and around the grating.





6 Next morning. The Southern branch of Moselle stream between the Frogpool and the Dogpool has little flow. As well as widespread flooding the exposure of the underlying clay can be seen.





7. Next morning. The grating forming the inlet of the stream into the Frogpool was blocked had completely disappeared under piles of soil and aggregate.





8. Next morning. The stream below the Frogpool towards the Dogpool was the scene of devastation. The area had been flooded with fast-flowing water that removed topsoil and is expected to have destroyed many plants. The protective deadhedge was partially swept away. By the tree a large piece of asphalt can see – taken off the path and moved.



9 Next morning. The aggregate surface of the path above the Frogpool had been washed away into the stream and its gullies.