

Our ref: JH 21-4494
Your ref:



Report for:
Nantwich Town Council

Regarding the Structural Inspection of:
Brookfield 1 & 2 Allotments
Brookfield House
Nantwich



Date of inspection: 16th February 2021

Date of report: 13th March 2021

1. Brief.

To undertake a visual inspection of the site to comment upon the recent flooding and advise accordingly.

2. Type of Report:

This report consists a visual inspection of the site with additional desk top study of available data.

3. Limitations.

This report is based upon a visual inspection of the site and information freely available which we consider to be relevant to the flooding issues encountered on site over the years.

Our observations are not meant to be a detailed report and only the relevant issues are addressed.

We have not inspected the below ground drainage nor seen any reports/surveys of previous inspections.

No investigations have been undertaken to determine soil conditions.

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4. General details:

The site is used as general allotments for local individuals for growing plants and vegetables.

The site covers approx. 14000m² and split into two sections, known as:

- Brookfield One (9000m²) to the south, &
- Brookfield Two (5000m²) to the north.

The site is located off Shrewbridge Road some 200m south from the main railway line that runs east to west.

The site is accessed from Brookfield House previously used by Nantwich Council Offices.

The surrounding levels tend to fall from east to west by 10m from Wellington Road across to Shrewbridge Road and from Park Road to the south up to the northern boundary by a similar degree.

Approximately 60m due west of the site the River Weaver winds its way from north to south.

The British Geological Maps show that the underlying soils are of River Terrace deposits of sands and gravels overlying Halite Stone and Mudstone.

According to the Environment Agency Flood Maps, the area is in an area of low to medium risk to flooding.

5. Observations:**Brookfield One**

We entered the site off the access road from Brookfield House to the Allotment Association Hut at the head of the site. To the north access is provided to Brookfield Two, whilst to the south the allotment gardens of Brookfield One are located.

A gravel path is provided around the site that gives access to all the allotments.

A manhole is located along the eastern boundary of Brookfield One – along the boundary with St Anne's Primary School – in Plots 66 & 67. This would appear to take surface water from the School building via a 150mm diameter drain that is seen to the eastern edge of the manhole. A corresponding manhole is located some 3-4m within the School playing field that would appear to connect into this manhole. Another drain at 45 degrees to the south enters the manhole but we understand that when this was investigated no advancement beyond 2m was possible. The main drain runs off through the allotments to the western boundary.

A further manhole is located to the west corner of the access path of the allotments - adjacent Plot 41. The surface water drain in this manhole is 150mm diameter and approx. 1m deep and runs from the manhole along the eastern boundary through the property downstream, presumably discharging into the River Weaver. However, a new structure has been built in the rear garden of this property - No 45 Shrewbridge Road – that would appear to extend over the line of the drain.

There are no Planning Applications available on line for this structure.

We understand that during periods of heavy rainfall the Plots to the southeastern corner tend to flood. In particular, during the recent Storm Christoph in January this year, excessive ground water was encountered in this corner of the allotments, resulting in flooding of the plots to this southern area.

Residual dampness is noted to the path around this area.

Brookfield Two

Access is gained from Brookfield One via a small path between Plots 115 & 116 although vehicle access can be gained through gates adjacent Brookfield Park.

Brookfield Two is situated between Brookfield Hall – a small timber framed building to the west and Tanners Way housing development to the east that has been built in the last 15-20 years.

The houses along the eastern boundary are set some 500mm higher than the allotment gardens.

We understand that during periods of heavy rainfall, the eastern side of the allotments flood.

6. Desk Top Study

British Geotechnical Maps

These maps show that the underlying soils should be of sands and gravels resulting from river terrace deposits. Beneath this Halite Stone and Mudstone would be encountered.

Logs of boreholes in the area show that to the north of the railway sands and gravels are encountered down to 2-3m overlying a stiff clay. To the eastern side of Wellington Road clay subsoils were encountered immediately after ground level. Similarly to the west, within the flood plains of the River Weaver, clay soils are encountered.

Old Ordnance Survey Maps

The Old OS Maps date back to the 1870's that show Brookfield House to the north east corner of the site. Fields are noted to the east and south of the property with the River Weaver running north to south to the east of Shrewbridge Road. The River runs parallel to the road at this time. An orchard is noted to the east of Brookfield House. We suspect a ditch is located running north to south along the east boundary of the southern two fields (which now would run part way through the school playing fields). Benchmarks are shown on Wellington Road as 132ft, Park Road to the south of 136ft and on Shrewbridge Road to the west of 124ft.

Shrewbridge Road was built up generally in the 1960's

St Anne's Catholic Primary School was built in the 1970's

The River Weaver was re-routed in the 1980's away from Shrewbridge Road.

Environment Agency Flood Maps

The EA provide maps of the UK to show the risk of flooding from Rivers and Seas, Surface Water and Reservoirs. According to the maps, the site is not susceptible to flooding from the River Weaver as it is located downstream of the site at a lower level. There are no reservoirs in the locality to cause issues, however the maps show that Brookfield Two has a low to medium risk of flooding along the eastern boundary by upto 900mm with a velocity downstream of upto 0.25m/s

7. Discussions.

The allotment gardens would appear to be around 20-30 years old and set over two sites.

Flooding has occurred to both site over the years, however during the recent prolonged rainfall of Storm Christoph in January, significant flooding has occurred to the site – particularly to the eastern boundary of Brookfield Two (Plots 106 to 114) and the southern part of Brookfield One (Plots 69 to 81 & 40 to 45).

We have been provided with video footage of the surface water flooding to these plots during this time which shows the water level to be around 100-150mm high with the manhole to the eastern corner fully flowing with water seeping in through the joints in the precast concrete rings.

The surface water had dissipated by the time of our visit however, the path and gardens to the southern part of the site were damp to wet still. The northern part of Brookfield One was drier under foot. The dampness seems to stop along the line of the drain across Brookfield One.

Similarly, Brookfield Two remains damp underfoot around the eastern part of the site.

The EA maps show that this part of Brookfield Two is known for flooding from surface water and is to be expected. The new development adjacent this part of the site has been built up higher than the allotment level due probably to this problem to prevent flooding of the new houses.

We understand from the British Geological Maps that the underlying soils of the two sites are of a granular nature, which we would expect to be free draining. From borehole information available from investigations around the site, we note that stiff clays are encountered either beneath the granular soils or directly beneath the surface to the east and west. From the Old OS Maps, the surrounding ground levels seem to slope down from east to west and from the south into the allotments.

We consider that a drainage ditch was located along the eastern side of the previous fields (between Brookfield One and St Anne's Primary School that appears to have run down to the north. The EA Maps show a patch of ground within the current 'wooded' area to the north of the school that has a medium to high risk from flooding. Therefore, we consider that this ditch could be running below ground naturally.

Any ground water runoff from the east will permeate the surface but run off along the impermeable clayey soils down towards the site. The levels along the southern boundary are also higher than site so ground water will tend to run into the site from this side.

Along the west boundary, houses have been built over the years that will tend to form 'barriers' to the flow of ground water off site into the River Weaver.

Also, over the years, St Anne's Primary School has been extended creating greater impermeable areas which we suspect has been collected to discharge into the drain that runs through the allotment site. From Google Maps, the potential impermeable area of the school is 3200m², which under average rainfall with no climate uplift could equate to 160m³/hour or approx. 5l/s. This value is normally the maximum runoff allowed by United Utilities into a surface water sewer.

We consider the site is generally low lying compared to the surrounding higher levels upstream therefore are of the opinion that the natural ground water and construction developments over the years have caused greater ingress of water to the site but preventing the natural flow of this water from the site downstream into the River Weaver.

The construction of the drain across the lower part of the site has effectively created a 'french' drain that directs the ground water along this line and downstream. This can be seen from the video footage that shows ground water pouring into the manhole through joints in the precast concrete rings.

Recommendations

At this time, no physical investigations have been carried out to determine the ground conditions beneath the site and whether impermeable layers are present at shallow level. Therefore, we would request several trial holes are excavated to at least 2m in depth over the extent of the two sites to determine the depth of any impermeable layers present that prevent ground water freely draining.

The surface water drain from the school would be retained but investigations into the condition of the drain downstream of the site should be carried out by means of CCTV survey to identify any defects and clarify necessary repairs to aid free flow.

We would also recommend clarification of the foundations to the new building to the rear of No 45 Shrewbridge Road is obtained as this could have affected the flow of the drain.

From the information available and taking into consideration the surrounding geology, we consider that the wooded area between Tannery Way and St Anne's School is a natural water course and holds water. Therefore, to relieve the build up of surface water to the two allotment sites, a drainage ditch could be excavated along the boundary of the allotments and the school playing field to discharge into this area. Similarly, a further ditch could be formed along the boundary of Brookfield Two and the new houses to Tannery Way discharging into this area.

Provision for discharging excess water from this area into the existing drain and off to the River Weaver may be required.

These proposals would obviously require approval from relevant authorities and environmental bodies.

Alternatively, Plot 56 could be taken over and used as a surface water swale (approx. 200m²) with the two ditches being directed into this. This should be capable of storing sufficient surface water during a period of heavy rainfall, with the water infiltrating the subsoils under natural measures although a runoff into the existing drain to the rear of Plot 67 could be installed to prevent flooding of the site.

In addition, the current 150mm diameter drain from the school isn't sufficient to accept the potential flow of water from the site under heavy rainfall, which is leading to the flooding of the site along this line. We would therefore suggest that a more thorough assessment is carried out to determine the amount of discharge this drain is expected to accept and where necessary measures introduced to either increase its capacity or restrict the flow of water from the school.

8. Conclusions.

The site is spread over two areas, Brookfield One to south and Brookfield Two to the north. These are currently used as allotment gardens and cover a total area of approx. 1.4hectares. The overall site is generally level but lying lower than the surrounding areas to north, east and south. The natural ground levels across the site tend to run off to the west – where the River Weaver runs north to south.

The underlying soils should be of River Terrace sands and gravels with the surrounding areas underlain with less permeable clayey soils causing ground water to run down towards the site.

The southern end of Brookfield One and eastern edge of Brookfield Two are subject to flooding during periods of heavy rainfall, which culminated in severe flooding in January during Storm Christoph.

We consider that the surface water runoff from these surrounding higher levels is causing flooding to the site in two separate locations, both along the eastern boundary however, and that suitable flood alleviation measures could be undertaken to prevent further flooding of the Allotment Gardens.

The most natural measure would be to create two drainage ditches along the eastern boundary to discharge into the wooded area between the houses on Tannery Way and the playing field of St Anne's School. There would appear to be a natural 'pond' in this location which the ground water could be directed to via these ditches. However, as we know the area can flood, we would recommend that allowance be made for discharging excessive ground water into the River Weaver via the existing drain across the southern part of the site.

As this could affect the habitat of the wooded area along with the stability of the ground, it may not be practical to direct the surface water to this area. Therefore, an alternative approach would be create a new pond/swale on the allotment site – we suggest Plot 56 – which would accept the runoff from the two ditches, provide temporary storage and allow natural infiltration into the subsoils to run off downstream without affecting the neighbouring area.

We would also recommend allowance for discharging excess ground water from this area into the existing drainage be made as above.

For this, we recommend trial holes are excavated over the site and in particular to this plot to ascertain the soil conditions to determine suitability and identify the permeability of the soils overall.

In addition, suitable inspection of the drain running through the site should be carried out to confirm its condition from the boundary with the school through to its run into the River Weaver, as we suspect there could be defects along the later part that is reducing its flow potential. Repairs will need to be carried out as necessary.

However, we do consider that the school should be accountable for volume of water being discharged from their site as this drain only seems service their building. Installation of suitable flow restrictors and attenuation measures may be required on their side of the boundary to reduce the flow of water through this drain and thus reduce the risk of flooding on the allotment site.

We trust that this is all sufficient for your purposes, however, should you have any queries then please do not hesitate to contact us.

Yours sincerely



Jonathan Hayes

BEng(Hons) CEng MIStructE

For [STL Projects Ltd](#)