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Trendlewood Park Wetland Area Pond Restoration





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2	August 2026	Section 2 updated to reflect first season outcomes. Section 6 wildfowl added. New Section 7 covering the scrape. Old Section 7 renumbered as Section 8 and duckweed control added.

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1. Introduction

This document outlines the background, design considerations, longer-term changes to the hydrology and biodiversity and the maintenance of the Wetland Area of Trendlewood Park in Nailsea.

Some of the topics investigated were produced as standalone reports that have been incorporated into this document as sections that can either be read in isolation or together as a whole. The restoration process is dynamic with no clear end point; as such this document will be updated with new material whenever it becomes available.

1.1. History

The pond is known to have existed prior to the development of the Trendlewood estate in Nailsea. Up until 1984 the pond was in fields used by East End Farm that had been in the ownership of the Smith family since 1945[1]. The Smith's farmed dairy cattle and the pond was a source of water for their cattle, possibly only a seasonal source of water. The Smith family later recounted how they had collected watercress from the pond to eat[2].

Historic maps show the cattle pond as a rectangular shape, strongly suggesting that it was either a man-made feature or that an existing feature had been adapted for farming purposes.

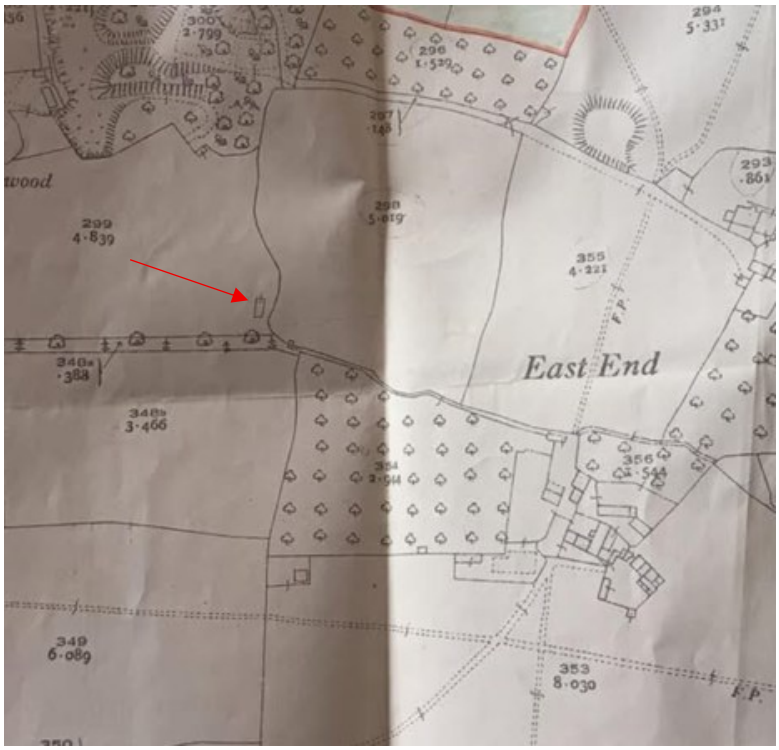


Figure 1 1973 Conveyancing Map[3]

[1] Nailsea History Group.
[2] Pat Gilbert, Chair of the Friends of Trendlewood Park (FoTP).
[3] Nailsea History Group.



Figure 2 1882 Ordnance Survey Six Inch Map

In Figure 1 and Figure 2 the pond is the rectangular shape pointed to by the red arrow. It is not obvious if a stream fed the pond, but the field boundaries by the pond in Figure 2 may well have been drawn along the route of streams or rhynes.

A stream could have fed the pond from the north prior to the quarry in Nowhere Wood being excavated from the 1850s onwards. Quarrying would have disrupted the local flow of surface water.

When work began on the restoration of the pond two roughly parallel structures were unearthed, these have been interpreted as the possible remains of the longer sides of the cattle pond. The edges of the pond may have been reinforced to prevent them being trampled down by cattle. The eastern edge consists of a line of thin rocks stacked side by side in a manner similar to that used on the top of drystone walls. The western edge is built of rocks cemented together. The remains of the edging have been left in place and can be seen when the water level is not high. The base of the deepest part of the pond between the parallel structures is clay, which may be natural or perhaps introduced to reduce water loss.

The pond lies in a shallow dip close to a spring. Water would have flowed here before the pond the was formed into a rectangular shape. There may have been a natural pond at this site before it was modified into a rectangular shape, or the rectangular pond may have been created at a place that was known to be damp and have a source of water.



Figure 3 East End Farm Cattle Close to the Site of the Pond

The East End district of Nailsea was built over between 1985 and 1989, mostly by Westbury Homes[4]. In December 2025 a resident, who said she had lived in the area for fifty years, which pre-dated the housing development, told the Friends of Trendlewood Park (FoTP) volunteers[5] that the pond had been filled in by householders dumping garden waste. When the pond site was excavated during 2025 it was found to contain builder's rubble, rocks, other rubbish such as street signs plus sediments.

By 2010 the area of the pond was just a shallow dip in the landscape covered by amenity grass that was regularly mown. The biodiversity was low, consisting of mown grass, two oak trees, an old crack willow and a few hardly plants that escaped the attention of the gang mowers and little else of note. The area was known to collect water but was usually dry. The image on the front cover of this document shows FoTP volunteers looking at the water that had collected there in the winter of 2010. The dampness of the area led North Somerset Council to write in 2015[6]:

> 'A5.10 Investigate Improving the condition of the Woodland pond for frogs, toads and newts.' This proposed 'making a small part of the pond permanent or finding a suitable alternative location.'

[4] Nailsea History Group Facebook Page 13/04/2018.
[5] Trendlewood Community Park Facebook Page 17/12/2025
[6] Trendlewood Community Park, Management Plan, 2016 – 2020, North Somerset Council.

'Appendix 10b Possible area for creation of a wetland or permanent pond.' This proposed 'the area in Compartment 2 that becomes water logged during wet periods.'

The Management Plan included an image of winter flooding in Compartment 2, see Figure 4 below.



Figure 4 Picture by Andrew Town of Winter Flooding in Compartment 2

The Woodland Pond referred to in the Management Plan is what FoTP refer to as the 'Seasonal Pond' in Nowhere Wood. That pond is in an old quarry working and is of an ephemeral nature flooding most winters but drying out in the summer. Species list from around the year 2000 shows that it had been more biodiverse in the past and must have retained water for longer periods. Unfortunately, it has attracted the dumping of timber and other rubbish. An attempt to excavate part of the pond, in line with the Management Plan, failed when the excavator became stuck in the mud and had to be pulled out by a second, larger, vehicle. No further attempt to improve the condition of the Seasonal Pond, beyond removing litter and extracting some of the smaller timber in the summer months, has been made. Sadly in 2025 the contractors felling trees with Ash Dieback diseased dumped some of the felled timber into the pond and in the only access route for machinery. This has significantly hampered any future attempts to improve that pond.

By 2020 the flooding of the Wetland Area in Compartment 2 was becoming a regular event with a large area being periodically in undated, but with the site always drying out in the spring. The ephemeral nature of the flooding meant that there was no standing water in the park long enough for amphibians to successfully breed. Creating an environment suitable for amphibians was the main driver of the Management Plan's suggestion for a pond,

In 2023 FoTP began considering how to create a pond in Compartment 2, the alternative location suggested by the Management Plan. Some early digging was undertaken which exposed one of the edges of the old pond, but a damp summer saw periods of flooding that prevented much work.

In 2024 FoTP raised the prospect with North Somerset Council for creating a pond that might hold water for long enough to allow amphibians breed. The council were in principle in favour of the idea. FoTP agreed to undertake a survey of the site and present a proposal to the council for their consideration.

2. Pond Restoration Planning

The first steps were to investigate if there were any physical reasons why the pond could not be excavated and to survey the immediate area. To survey the site if was necessary to wait until the Wetland Area had dried out which did not happen until July 2024.

2.1. Underground Services

There are no overhead powerlines or telegraph wires in the area of the pond which meant that only the presence of underground service had to be investigated. Inspection of the site strongly suggested that no underground services had passed under the site of pond since the long side edges were still in place. Furthermore, deep excavation was not envisaged; only shallow digging of about 1m would be carried out due to safety concerns for park users and because several large trees are nearby that would need to be protected.

Linesearch BeforeUDig was approached to identify if any services passed under the site. NGED (National Grid) refused to provide information on the grounds that park volunteers were private individuals and the park was not their property. Solicitors, Conveyancers, and Search Companies could ask for the information but this was a chargeable service. It was decided not to investigate further, but to make North Somerset Council aware of that decision.

Wales&West Utilites were more sensible and supplied a map showing local gas mains, see Figure 5. The pond area was defined as a circle which covered the pond and some of the surrounding area. While gas pipe 125 PE L/P cut through the circular area it did not go anywhere near where the planned excavation would take place.

Similarly Wessex Water provided a drainage map covering the area around the pond site. Again there was no underground infrastructure passing under the area of the pond, but some pipes passed close by, see Figure 6. Surface water sewer 375 runs under the tarmac footpath above and to the east of the pond with separate feed sewer crossing Compartment 3 to join sewer 375 near the park's flagpole. However, no information on water mains was provided, presumably because there are none near the pond. The situation of the site away from the main housing to the east and without any other buildings nearby would be consistent with that interpretation.

No information on telecommunication cables was provided, again it was assumed that these cables typically run under streets and would not need to cross the park at this location.

Inspection of the site and surrounding area did not reveal any other manhole covers or inspection hatches other than those in the information provided.

It was concluded that 1m deep excavation could be safely carried out, but that vigilance would be maintained in case any unexpected services were present.

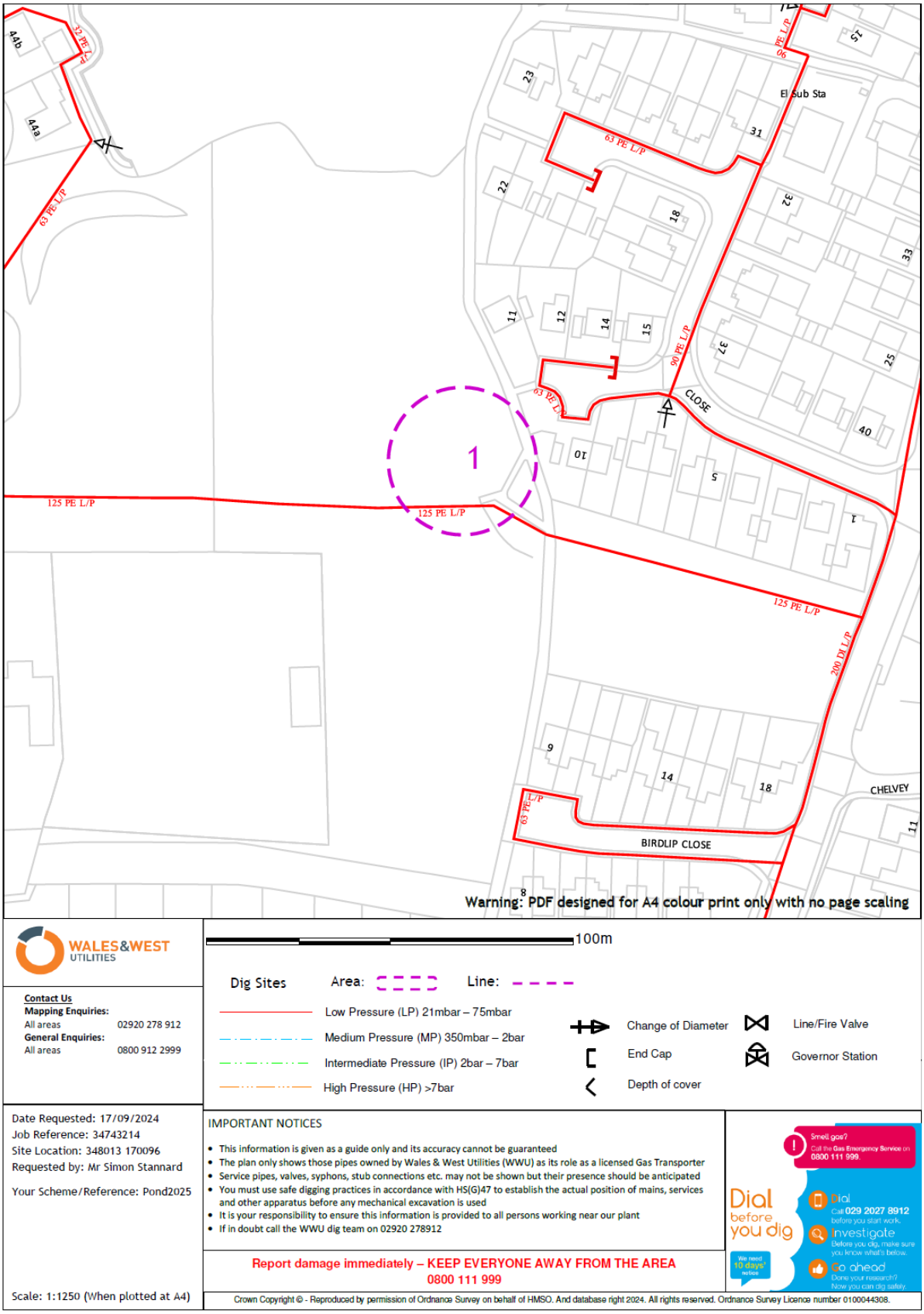
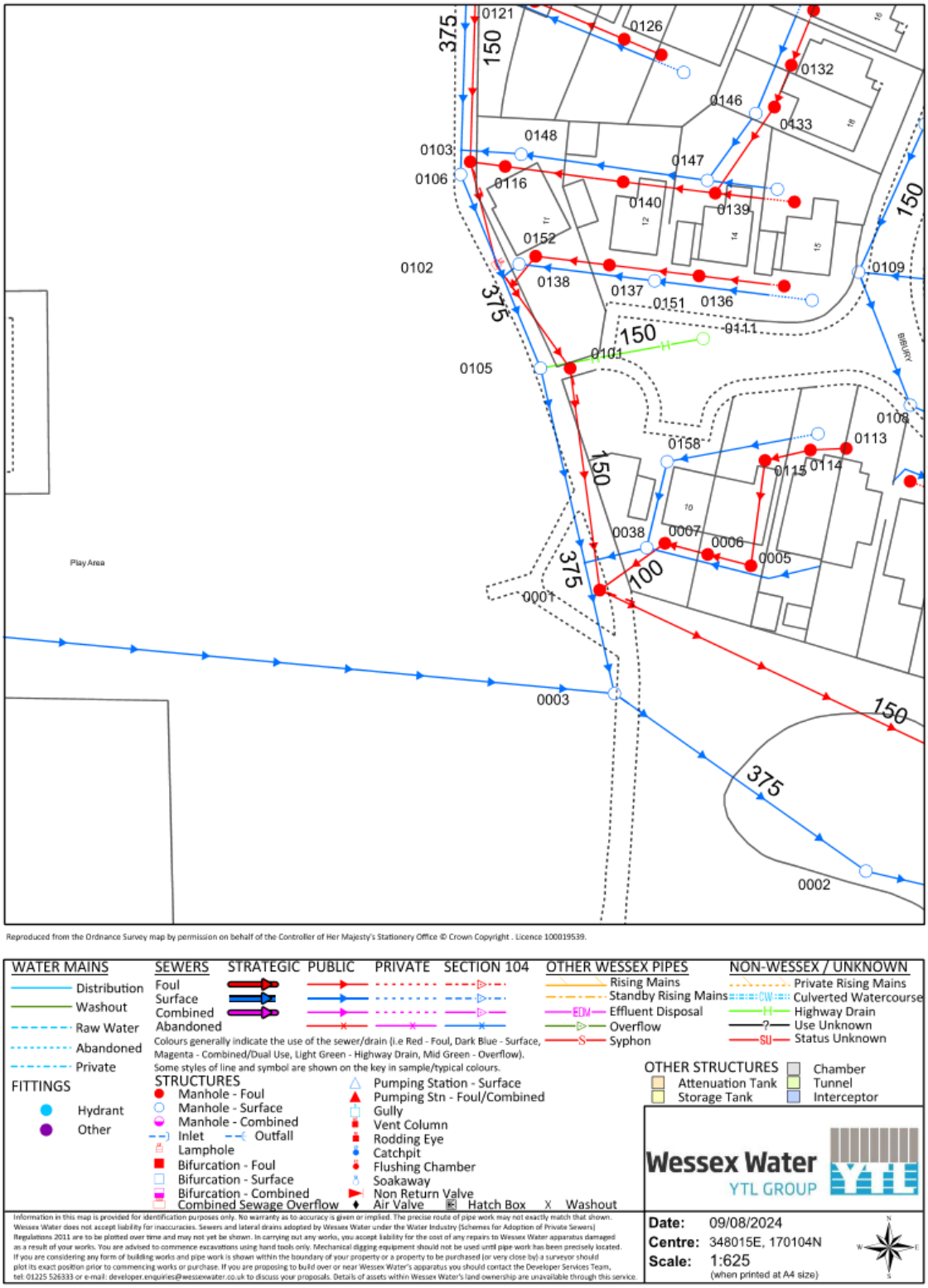


Figure 5 Gas Pipes Near the Pond

Wessex Water Network Map



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WATER MAINS
Distribution
Washout
Raw Water
Abandoned
Private

FITTINGS
Hydrant
Other

SEWERS
Foul
Surface
Combined
Abandoned

STRATEGIC PUBLIC PRIVATE SECTION 104

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
Manhole - Foul
Manhole - Surface
Manhole - Combined
Inlet
Outfall
Lamphole
Bifurcation - Foul
Bifurcation - Surface
Bifurcation - Combined
Combined Sewage Overflow
Pumping Station - Surface
Pumping Stn - Foul/Combined
Gully
Vent Column
Rodding Eye
Catchpit
Flushing Chamber
Soakaway
Non Return Valve
Air Valve
Hatch Box
Washout

OTHER WESSEX PIPES
Rising Mains
Standby Rising Mains
Effluent Disposal
Overflow
Syphon

NON-WESSEX / UNKNOWN
Private Rising Mains
Culverted Watercourse
Highway Drain
Use Unknown
Status Unknown

OTHER STRUCTURES
Attenuation Tank
Storage Tank
Chamber
Tunnel
Interceptor

Wessex Water
YTL GROUP

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 09/08/2024
Centre: 348015E, 170104N
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(when printed at A4 size)

Figure 6 Water drainage Pipes Near the Pond

2.2. Site Survey

In 2024 the pond site when dry consisted of two distinct levels, this was partly due to some earlier digging in 2023, but is also visible in the cover image from 2010. A Survey of the Lower-Level Wetland Area was carried out to establish surface levels and vertical profiles.

A datum point was established at the junction of a large Iris plant and the stone wall. The datum zero height was approximately aligned with the top of the stone edging, which is the same height as the upper level. From the datum point a grid at 1.5m intervals was set up covering the deepest area of the lower level. Heights from the ground surface to datum level were measured which were recorded as negative values as the ground surface was below the datum level chosen.



Figure 7 Survey Datum Point, the Wooden Stick and the Start of the Grid

The survey grid covered the deepest areas of the pond base, much of the other area subject to flooding was very shallow. Greatest depth with respect to the datum point was 0.39m. Consequently, once the flooding exceed that depth water would spill across the grass footpath into the feature known as the Gully. An event that was observed each winter.

2.3. Geology

The site of the pond is near to a Pennant Sandstone quarry. There was a question of the depth of the soil under the pond and the nature of the rock beneath it. The plan was to use a mechanical digger for the excavation and it was necessary to know what lay below the visible surface.

A test hole approximately 0.95m deep was dug using a spade at position approximately X = 0.0m, Y = 2.0m with respect to the datum point. It found an upper layer of soil several cm deep, probably washed in from surface water runoff plus sediment due to flowing water from the spring. Some old wood, a bit of broken concrete and a small rock. Below the upper layer of soil some clay was encountered. The thickness of the clay layer was not discovered. No tree roots were encountered.

It was concluded that the geology was suitable for excavation by a mechanical digger and that the under lying clay would help with water retention.

2.4. Design Concept

The aim of the pond was to allow standing water to be retained within the park for a period long enough to support the successful breeding of amphibians. This requires some water to be present until June or July.

The site has a spring that rises on the upper level alongside the oak tree. The spring typically flows between October and April/May each year. The spring fills the lower level which is also augmented by surface water runoff in wet weather. In very wet conditions both the lower and upper levels are completely flooded together with the adjacent Gully. In extreme conditions the water over tops the tarmac path flowing into Compartment 4 towards Trendlewood Way.

When the spring stops flowing, if the weather is dry, the entire Wetland Area can dry out within a week. This typically occurs in the late spring which is too early for amphibians and many other semi-aquatic species to mature. This results in a lower biodiversity than would be the case if the water was retained for longer.

Placing a waterproof lining under part of the area would mean that the primary loss of water after the spring stops flowing would be through evaporation.

Typical evaporation losses in standing water in southern England during the summer are 2cm to 5cm in depth per week. If a depth of 90cm could be prevented from draining away then at the highest evaporation rate it should be possible to retain some water for a further 18 weeks i.e. until August, perhaps September. This would be more than long enough for amphibians to mature out of the tadpole stage.

It was recognised that dogs and children would be a risk to any pond liner. To prevent punctures or tears a concept of laying a rubber water proof liner between two layers of underlay and then burying the whole lot under some stone free soil, see Figure 8. This would require the initial excavation to be deeper than the final planned depth of the pond. Also the steepness of the sides of the pond were a consideration, with the slope gradient

into the excavated region being between 30° and 45°, ideally with no sudden changes in depth.

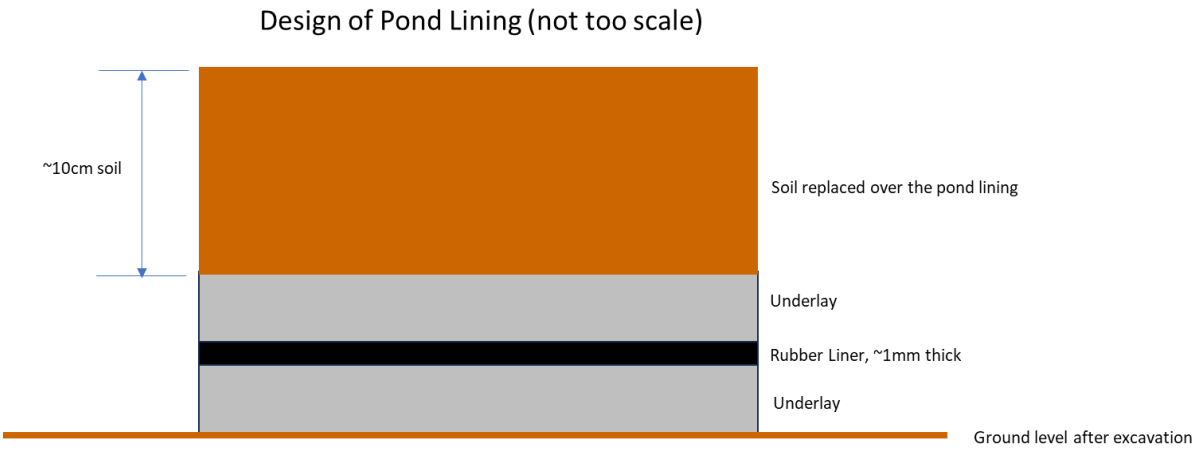


Figure 8 Pond Lining Concept

Three schemes using this concept were drawn up and debated by the FoTP committee. The smallest and cheapest of the three schemes, number three, was selected. **Table *1* Pond Scheme Projected Cost**Table 1 summarises the findings.

	Digger Cost Opt	Liner Costs	Total Cost Range	~Volume	Issues
Scheme 1	£300.00	£1,020.63 to £1,098.61	£1,020.63 to £1,398.61 + fencing	8m^3	Very heavy materials to move. Leakage by small stone edge negates some of this work. Man power. Digger operator. Fencing. New plants.
Scheme 2	£300.00	£451.37 to £526.87	£751.37 to £826.87 + fencing	6m^3	Heavy materials to move. Man power. Digger operator. Fencing.
Scheme 3	£300.00	£397.39 to £469.39	£697.39 to £769.39 + fencing	4.5m^3	Lighter but still heavy materials to move. Man power. Digger operator. Fencing.

Table 1 Pond Scheme Projected Cost

There were unknown costs, particularly for fencing and a digger which had been offered for free by North Somerset Council, but only in the early autumn when the risk of flooding was growing. A local contractor offered to do the work at short notice but only at a weekend, this seemed ideal given the uncertainty of the site being dry.

Scheme 3 involved excavating a trench 3m long, 1.5m wide and 1.0m deep but backfilled to 0.9m deep. Slope the sides at the desired gradient and line an area about 7m by 3.6m wide, see Figure 9.

A key feature of the site was the supply of water from the spring. In order to understand the water supply and the broader suitability of the site for holding water the hydrology of the area was investigated, see Section **Error! Reference source not found.**.

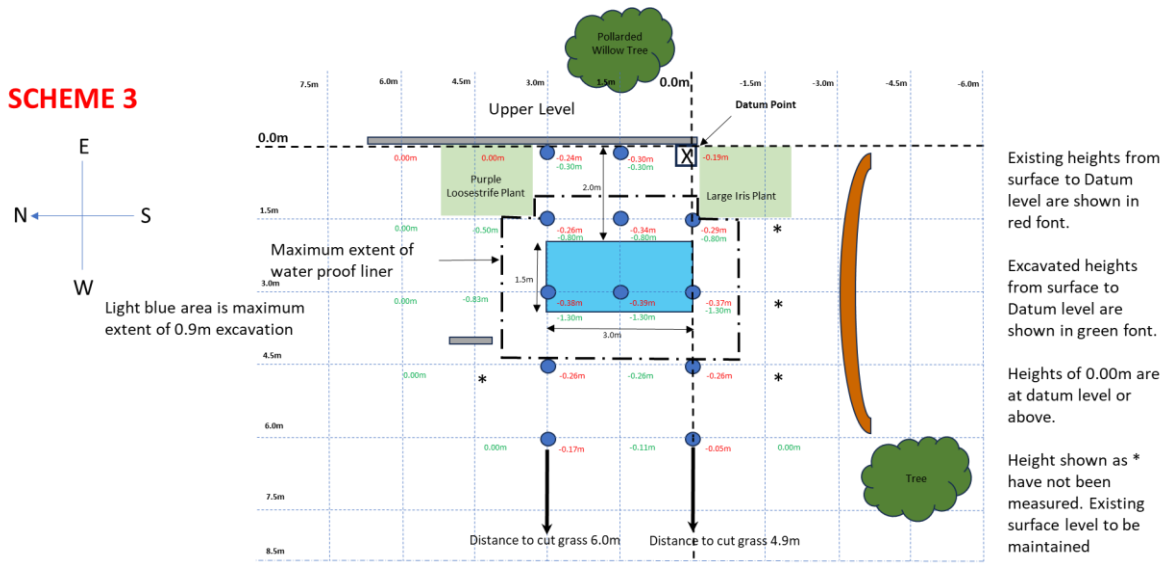


Figure 9 Scheme Concept

2.5. Design Outcome

The scheme in Figure 9 was accepted by North Somerset Council who offered offcuts of pond liner from another pond project and unused pond lining material. However, before construction began the North Somerset Council Park Officer contacted the North Somerset Council Tree Officer who came and met us on site. The site of the pond lay entirely within the Root Protection Area of the oaks and the crack willow tree. Due to concerns about tree roots the Tree Officer banned the use of mechanical diggers and of pond liners. We were allowed to dig by hand, leaving any tree roots in place, but a one metre excavation was forbidden, however a shallower, unspecified, depth of digging was permitted.

The loss of using an artificial pond liner and having a shallower excavation were a significant issue as the depth of the lined area had been calculated on evaporation rates. Without pond lining, water would also be lost through ground absorption which risked the pond drying out too early in the summer to support breeding amphibians.

In an attempted to compensate for less depth the volume of the pond was increased. The hope was that the increased volume might lead to the ground remaining saturated for a longer period slowing the water loss. The design was modified to be three rectangular excavations, each level being about a spade's depth resulting in the deepest and smallest part being about 0.6m below the surface, which was about 60% of the original planned depth and of a smaller area.

Excavation took place during the long dry periods that characterised 2025 and began in April 2025. By late May the revised plan had been dug out, see Figure 10. Some of the rocks extracted were used as stone edging to extend the line of what was thought to be the original cattle pond side. Surprisingly, only two small tree roots were encountered during the dig. On the positive side the deepest part of the excavation encountered the clay layer found in the test hole. The clay was left intact and it was hoped that this would seal the bottom of the pond, potentially reducing ground absorption.



Figure 10 Initial Excavation May 2025

Almost as soon as the clay layer was exposed water began to collect in the deepest part of the excavation, which is referred to as the 'sump'. This was very encouraging as the weather had been extremely dry at the time. After a few days the sump was filled and following some rain the level above the sump also filled.

Unfortunately, this attracted the attention of vandals, probably bored children, who repeatedly ripped up the stone edging we had built and threw it into the water together with other rubbish. When the pond finally dried out the sump had been filled with debris and mud.

The sump, which would be critical to having a long duration of standing water, was too small and too vulnerable. To counter this the stone edging was disposed off and the area of the pond enlarged with the sump being extended, the sides were also sloped rather than being stepped. While this was going on the vegetation in and around the excavation was growing, see Figure 11.

The extended dig found the foundations of the cattle pond side. It was underneath the line of the stone edging that we had created and then disposed of. The foundations were left in place, but they did restrict the area of the sump.



Figure 11 Final Excavation of the Pond July 2025

The soil from the excavation was used to construct an earthen dam wall at the southern end of the pond site. This is the brown feature shown in Figure 9. The dam used the oak tree as one end of the wall and the upward slope of the park towards the notice board as the other end.

2.6. Overflow Pipe

In addition to the original design concept it was realised that a continuous inflow of water from the spring would result in the dam wall being over topped. A steady flow of water over the dam wall would cause erosion inevitably resulting in the collapse of the dam and subsequent reduction in the water level of the pond which in turn would lead to the pond drying out earlier in the year.

To minimise this risk an overflow pipe was installed between the dam wall and the Gully, see Section 5.7 for details. The overflow pipe is not big enough to cope with the maximum flow from the spring but should be able to manage the typical flow rates. During period of exceptionally high flow rate the entire Wetland Area, including the Gully, are expected to be flooded completely submerging the dam and lessen the risk of erosion.

2.7. The First Season 2025/2026

The summer of 2025 had been dry and warm which had maximised the time available to excavate the pond. Rain began to fall in the first week of September 2025 and by the 12th September 2025 there was 31cm of water in the pond. This increased to 35cm by 17th September 2025, but a spell of dry weather caused the water level drop to 12cm by 1st October 2025.

Throughout October 2025 the water level fluctuated, increasing when there was rainfall and gradually reducing during dry spells. This pattern continued until the spring began to flow on 14th November 2025. Initially the flow from the spring was low and intermittent, but it was soon providing a strong and continuous flow. The water level in the pond steadily increased until it got to the level of the overflow pipe intake. Unfortunately, the dam wall was not long enough and the water was able to bypass the dam. Due to the overflow pipe and the deficient dam wall the pond water level remained between 92cm and 105cm until 17th March 2026 when the spring flow rate reduced. The water level began dropping with the trend accelerating after the 1st April 2026 when the spring stopped flowing.

During the drying period heavy rainfall caused short term water level increases follow by further reductions of the water level. A noticeable event of this occurred in early June 2026 when the water level increased from 35cm to 69cm over 12 days before falling back to 30cm by the end of the month. A long dry and very hot period followed with the pond drying out by 20th July 2026. See the plot below, Figure 12, for the first season's flooding behaviour; to read the details expand the image on your screen.

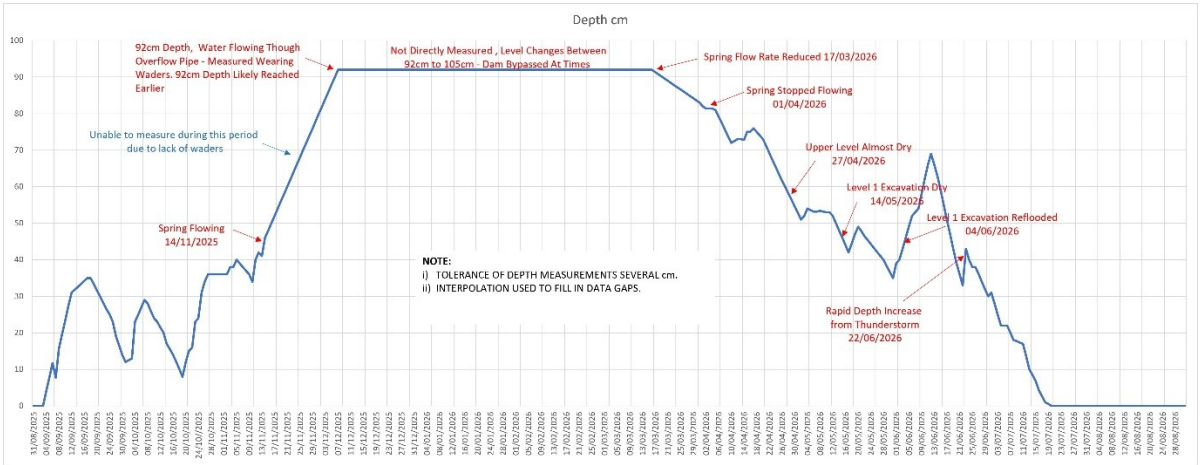


Figure 12 Pond Depths Season 2025 - 2026

Due to the reflooding event in early June 2026 the pond was looking very nice on 12th June 2026, see Figure 13. The green weed on the right-hand side is duckweed introduced by a member of the public who placed frog spawn covered in duckweed in the pond. Despite attempts to manage the duckweed it spread rapidly.



Figure 13 The Pond 12th June 2026

2.8. Maintenance Summer 2026

The summer of 2026 was exceptional hot and dry enabling work on the pond to be carried out in August. A surprising amount of sediment had collected in the sump of the pond which needed to be removed to maintain the depth of water. There were also many rocks thrown in by children, this together with strong vegetation growth made it difficult to identify and recreate the original pond profile. The resulting excavations created a narrow, but likely deeper, sump in the pond, see Figure 14.

During the excavation work any areas of soil found with duckweed stuck to it were removed and buried away from the pond. It is unlikely that all the duckweed has been extracted and further out breaks are anticipated next season. These will have to be managed, see Section 8.2.



Figure 14 2026 Pond Profile

A water depth gauge was installed to assist with depth monitoring and to warn the public of potentially deep water (deep being about 1m when the water level reaches the top of the dam wall), see Figure 15. Unfortunately, the base of the depth gauge could not be set on the bottom of the pond due to rocks below the pond base. Consequently, the depth gauge under reads by about 15cm (1.5dm). Not being able to set the depth gauge as deeply into the ground as planned is a concern due to the level of vandalism at the pond site, a shallower set gauge is more at risk of being push over despite being set in concrete.

Further work included extending the dam wall to cover the area where the water bypassed the dam during the winter of 2025/2026.

Additional works necessary include levelling the top of the dam wall and adding some clay to the dam to improve its water retention. This work was been scheduled for October 2026 to avoid the summer school holiday period as the work will trample down some of the vegetation around the dam. The vegetation growth around the pond has been very vigorous in 2026 which had made it difficult to see and access many areas of the pond site. This had a positive benefit as it resulted in a reduction of vandalism. Activity that exposes the pond's infrastructure attracts unwanted and often destructive attention.



Figure 15 Water Depth Gauge

3. Hydrology of the Wetland Area

Section **Error! Reference source not found.** is taken from a document written in 2025.

Trendlewood Community Park in Nailsea is divided into a series of 'Compartments', these divisions are used to support the management of the park. The map in Figure 16, below, shows the compartments of the park that are mentioned in this document.

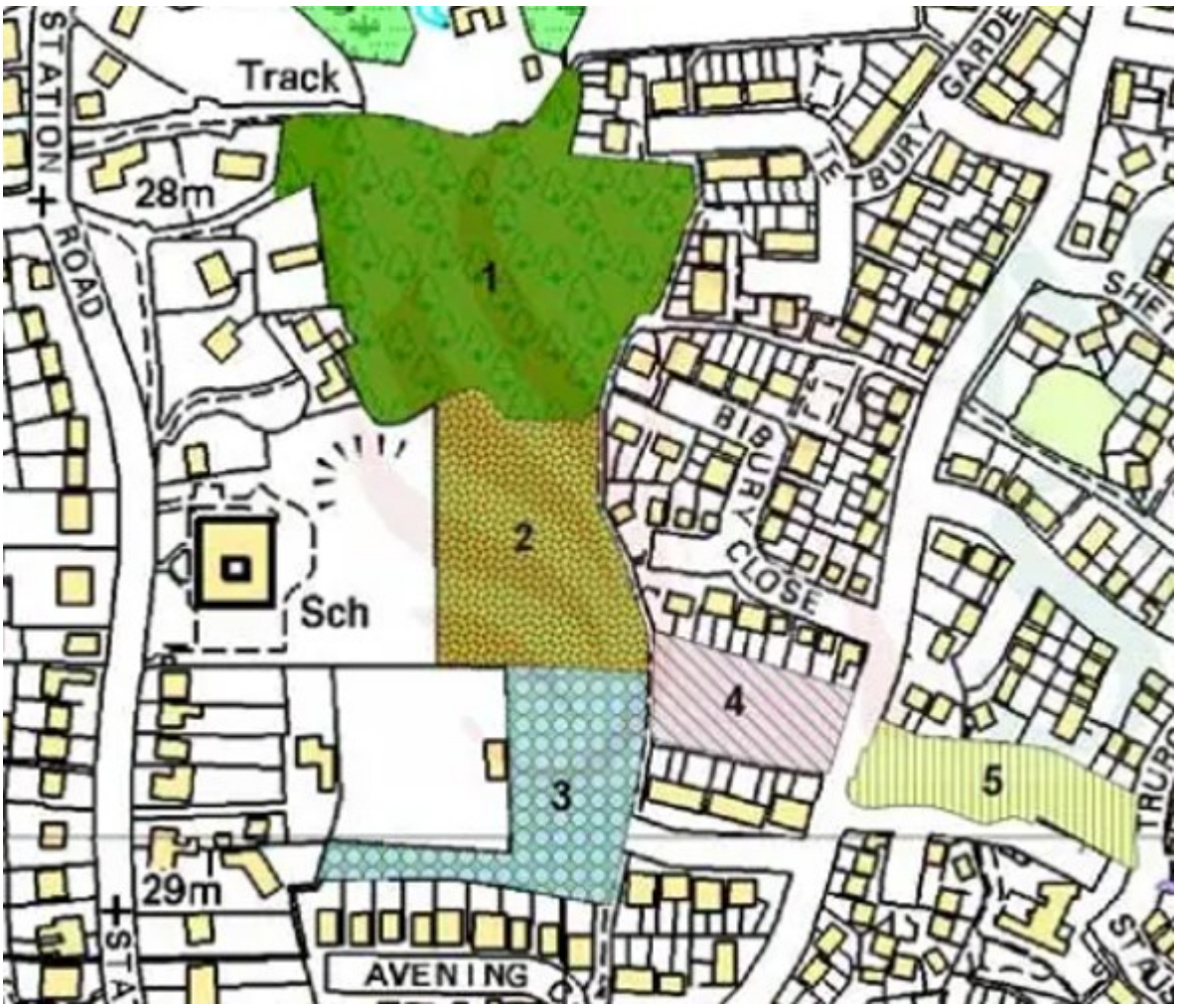


Figure 16 Trendlewood Community Park Compartments

Trendlewood Community Park in Nailsea does not have any standing water, but Compartment 1, Nowhere Wood, has a seasonal pond and Compartment 2 has a wetland area in which spring water comes to the surface for part of the year.

The 2016 Management Plan for Trendlewood Community Park, written by North Somerset Council, contained the following statement about the park's history:

'Compartments 4, 5 and 6 were originally the course of a stream that ran down off farmland and into the River Kenn. Developers largely infilled the valley cut by the stream, and culverted the water. The course of the stream is still visible today, and a line of mature trees grows along it.'

The stream referred to would have been fed from the spring in Compartment 2 as the spring and wetland areas are immediately next to Compartment 4 at the head of its valley.

The spring is curious in that it is a known historical feature associated with a cattle pond that had disappeared. For many years the spring did not flow and the area around the spring became dry. Modern mapping does not show the pond. However, in the 2010's the spring became a regular feature once more, flowing most years between October and May. The flow of spring water leads to the flooding of the Wetland Area close to the spring; it creates an ephemeral pond on the site of the old cattle pond. Why the behaviour of the spring changed is not certain. The following notes examine the location of the spring and the hydrology that supplies it.

3.1. The Geology of Trendlewood Park

Compartment 1 is mostly a disused Pennant Sandstone quarry. Pennant Sandstone is part of the Downend Formation (Dn), a sandstone with mudstone formation and some coal especially at lower levels. In our case the sandstone is the Pennant Sandstone that was previously extracted from the quarry.

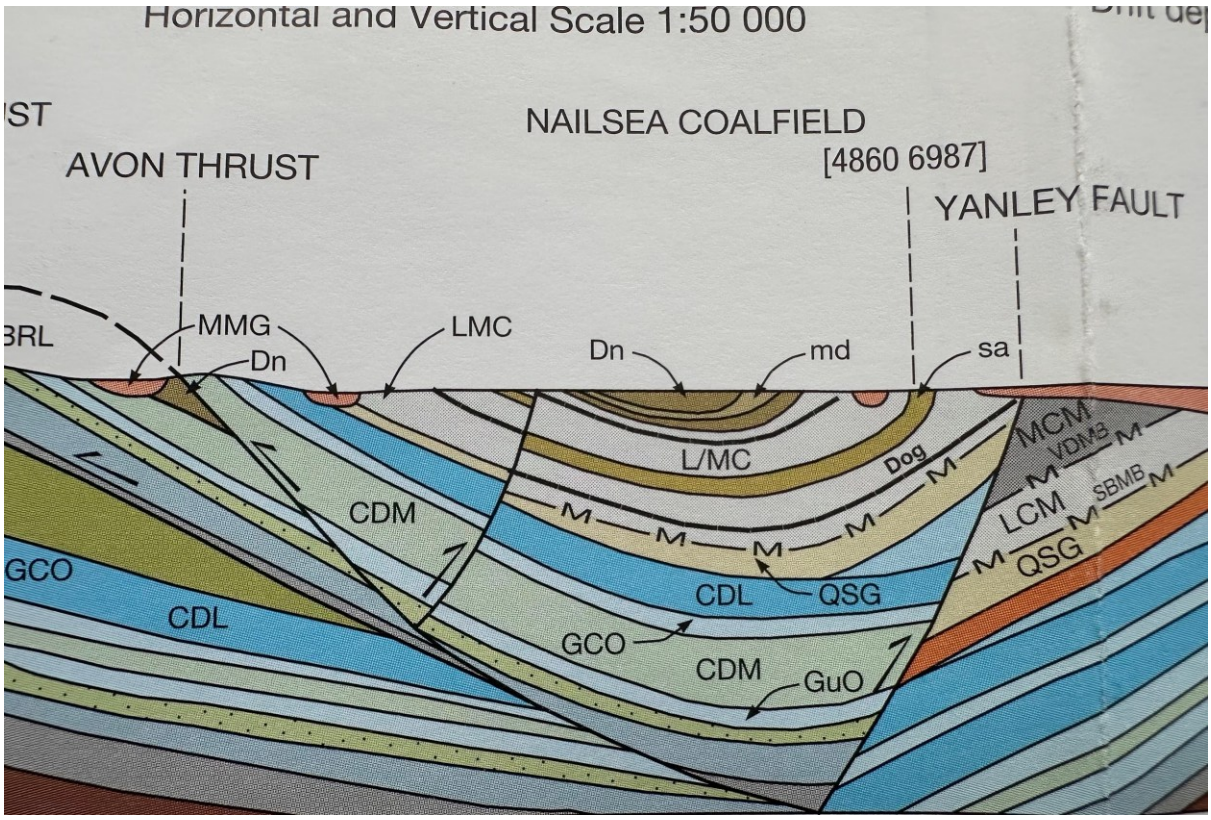


Figure 17 Nailsea Coalfield Vertical Cross Section

Figure 17, above, is a vertical cross section of the rock strata running north west to south east under the Trendlewood area of Nailsea and the surrounding districts. The Trendlewood area sits on the Downend Formation (Dn) and mudstone (md) in the centre of the image. The rock strata under Nailsea bends downwards in what is known as a syncline.

The surface geology is shown in Figure 18 below. The straight black line which bends at Backwell Common is part of the section used in Figure 17.

The thickest black lines in Figure 18 are where coal seams reach the surface and the thick black dashed line is a concealed coal seam. There are very thin coal seams within the sandstones, one of one can be seen in the quarry face in Compartment 1, but these are not shown in Figure 18 due to their thinness.

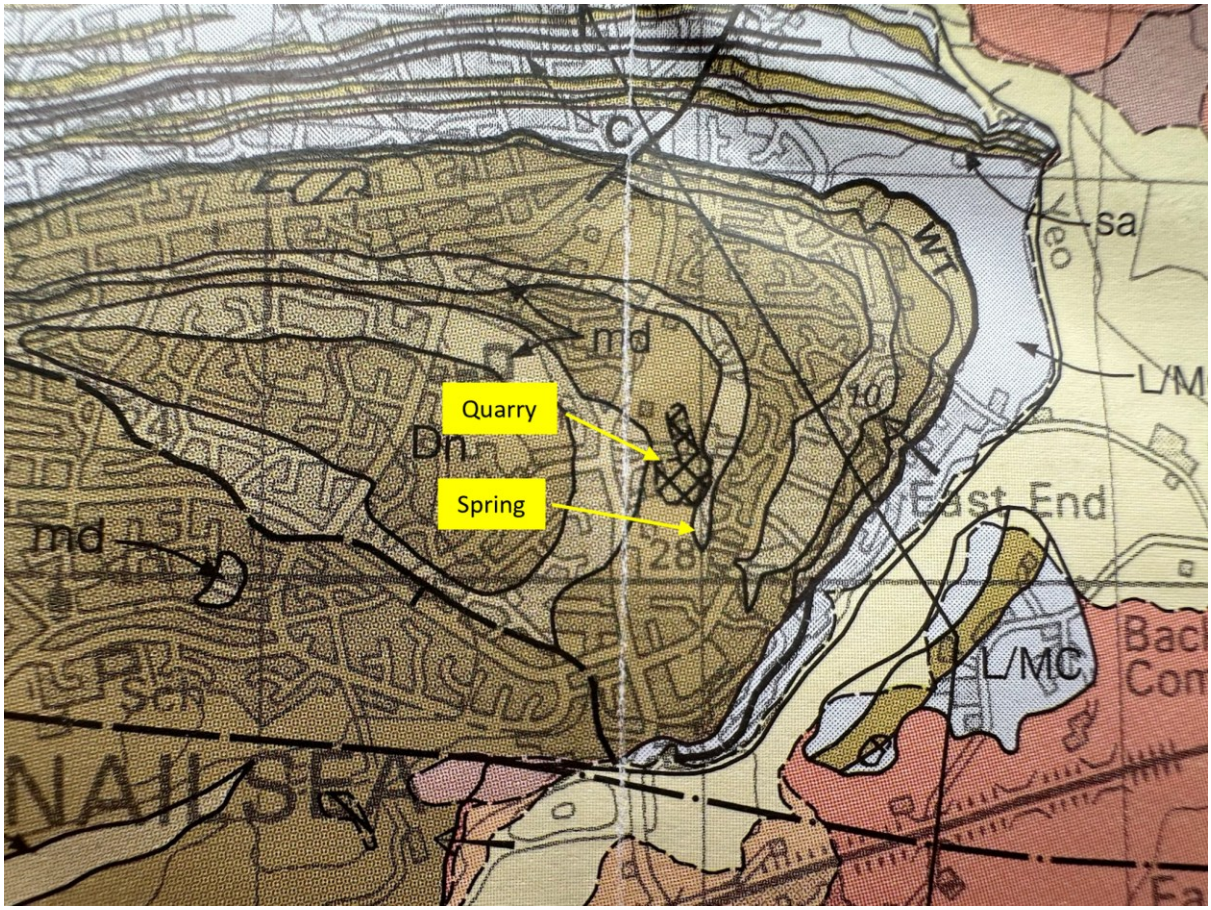


Figure 18 Surface Geology

The hatched area in Figure 18 is the quarry workings. The spring lies to the south of the quarry workings with the Wetland Area being joined to and southwards of the spring. The spring appears to lie on, or very close to, the surface boundary between the Downend Formation sandstone and mudstone. The mudstone is shown as the paler shade of brown in Figure 18.

Pennant Sandstone is a porous rock. The porosity of Pennant Sandstone is around 9% which is not particularly high, being less than the porosity of the Limestone rocks in the hills either side of Nailsea. Critically, Pennant Sandstone is more porous than mudstone. This will result in water being held within the sandstone above the mudstone. Where the boundary between the rock layers comes to the surface springs may occur. Figure 19 is an idealised sketch illustrating this process.

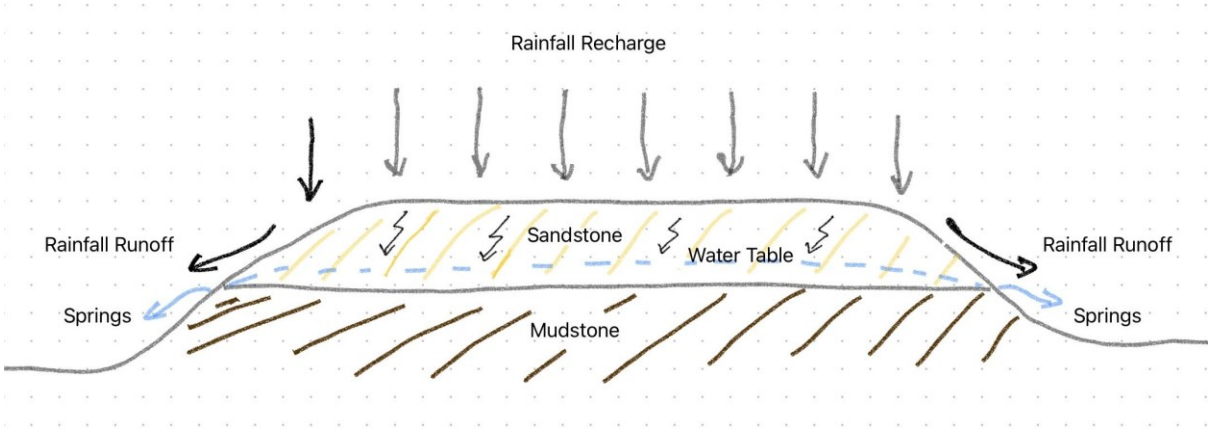


Figure 19 Idealised Sketch of the Water Table Under Trendlewood Park

The bedding of the Nailsea syncline in the quarry dips downwards in a north-westerly direction (in Figure 18 the arrow above the word 'East' is the generalised dip of inclined strata in degrees - in this case it is 10 degrees). The rocks in this area are part of the 660m deep Downend Formation. The upper beds are highly fractured, yielding the 'Nailsea Flats'. A combination of a porous rock and fracturing allows rainwater to seep into the ground and replenish the water table. The water is stored within the pores of the sandstone, like a sponge and will migrate downwards until it reaches a barrier to the downward flow. The water will then pool within the sandstone until it finds a way to escape. The top of the pooling is the height of the water table of the underground aquifer.

Nailsea is a relatively flat town situated on a geologically small area. Nailsea is higher in elevation than the countryside that surrounds it. Consequently, the aquifers under Nailsea have both a limited catchment area and a restricted reservoir capacity. The water table heights are likely to fluctuate as a function of rainfall more quickly than many other areas due to the small catchment area and limited volume of the reservoir. This is supported by stories that wells within Nailsea were often unreliable with a tendency to dry out after periods without rain.

The mudstone outcrop at the spring terminates nearby. The mudstone has either been eroded away to the south of the spring, or never existed, leaving sandstone at the surface. It may be that two strata of sandstone meet here with perhaps a thin layer of less permeable material at the interface between the strata, but there is no evidence to support this concept.

Excavation of the wetland area at the site of the old cattle pond revealed a layer of blue-grey clay about 70cm below the surface. This area of Nailsea is not part of the wider alluvial clay deposits found at lower elevations around the edge of Nailsea. At the time of writing in 2025 there was no information on the extent or depth of this clay layer. Consequently, it was not clear if this clay layer was a natural deposit or perhaps introduced manually to line the cattle pond. When the Scrape was excavated in 2026 orange-brown coloured clay was encountered, see Section 6.2.1. Orange-brown clay is formed from eroded mudstone, the outcrop of which is close to the site of Scrape. The orange-brown clay layer is at least 30cm deep and appears to be natural in origin.

3.2. Topography of Trendlewood Park

LiDAR imaging allows us to look at the relative surface elevations in the park and the surrounding district.

In Figure 20 green areas are at a higher elevation than the grey areas. Examination of Figure 20 shows that the quarry floor is at a higher elevation than the spring. This implies that the quarry floor is above the typical water table height. This is probably the reason that the floor of the quarry is usually dry. The seasonal pond is at a similar elevation as the spring (the grey colouring in the LiDAR images) and may, therefore, partly respond to the water table level as well as to rainfall runoff.

We know the Gully in Compartment 2 is slightly lower than the spring, as the water flows from the pond into the Gully. However, when the flow of the spring water slows the Gully quickly dries out. Clearly the Gully depends on the spring for its water and not the water table level directly. Also, Compartment 4 is lower than Compartment 2 and slopes downhill to Trendlewood Way but it does not have a spring or hold any water, except in periods of very high rainfall.

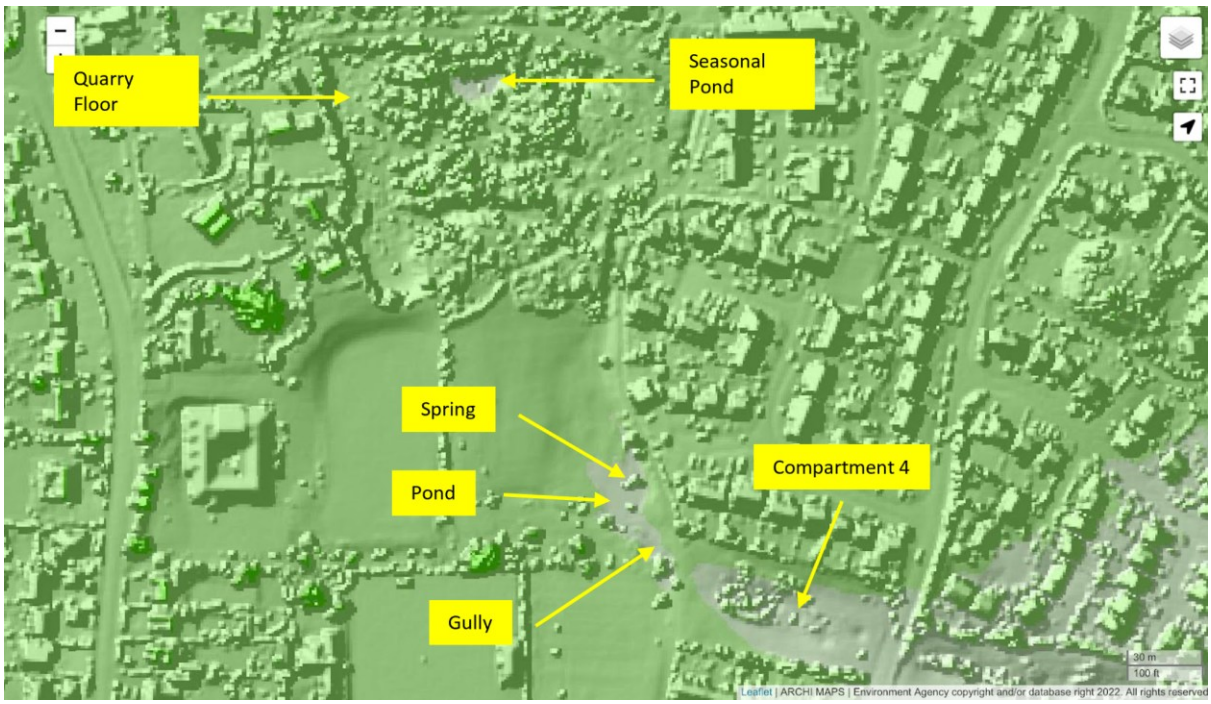


Figure 20 Compartments 1, 2, 3 & 4 Elevations

A possible reason for the Gully drying out and Compartment 4 being dry is that they lie over sandstone, not the mudstone. Looking at Figure 18 it can be seen that the mudstone outcrop finishes near the spring, being replaced by sandstone which continues down to Trendlewood Way. A further outcrop of mudstone then occurs in Compartment 5.

During work to enhance the biodiversity of Gully it was reported that a rock was lifted from the base of the Gully and remaining water in the Gully at the time then quickly drained away. It is likely that lifting the rock unblocked access to the culvert that diverts the stream away

from its original course. Alternatively, it may have disturbed sediments that were overlying the sandstone rock beneath the Gully.

The sandstone under the Gully is at a lower elevation than the spring and Compartment 4 is lower than the Gully, but neither area appear to be affected by the water table that feeds the spring nearby. It is surmised that the water table flows along the top of the mudstone strata after which it sinks into the sandstone to a lower depth until it encounters a less permeable layer.

The catchment area for the spring water is likely to involve some of the green coloured areas in Figure 21 and possibly beyond. In the Figure 21 LiDAR image, below, all of the ground to the west and north of the spring is at the higher green elevation. However, it can be seen from Figure 17 and Figure 18 that bands of less permeable mudstone lay between the sandstone layers. This may result in different water tables being present in each of the sandstone layers.



Figure 21 Wider View of the Surrounding Catchment Area

The view in Figure 22, below, shows the ground in Compartment 2 sloping downwards in a southerly direction to the wetland area and the spring. The grass is mostly over sandstone resulting in rainfall both seeping down to the water table and on occasions running off along the surface to collect in the pond.



Figure 22 A View Across Compartment 2 to the Wetland Area

3.3. Nailsea Hydrology

Water catchment in Nailsea is from rainfall. Historically there were streams in Nailsea but these have been buried in culverts and are no longer visible or able to interact with the surrounding geology.

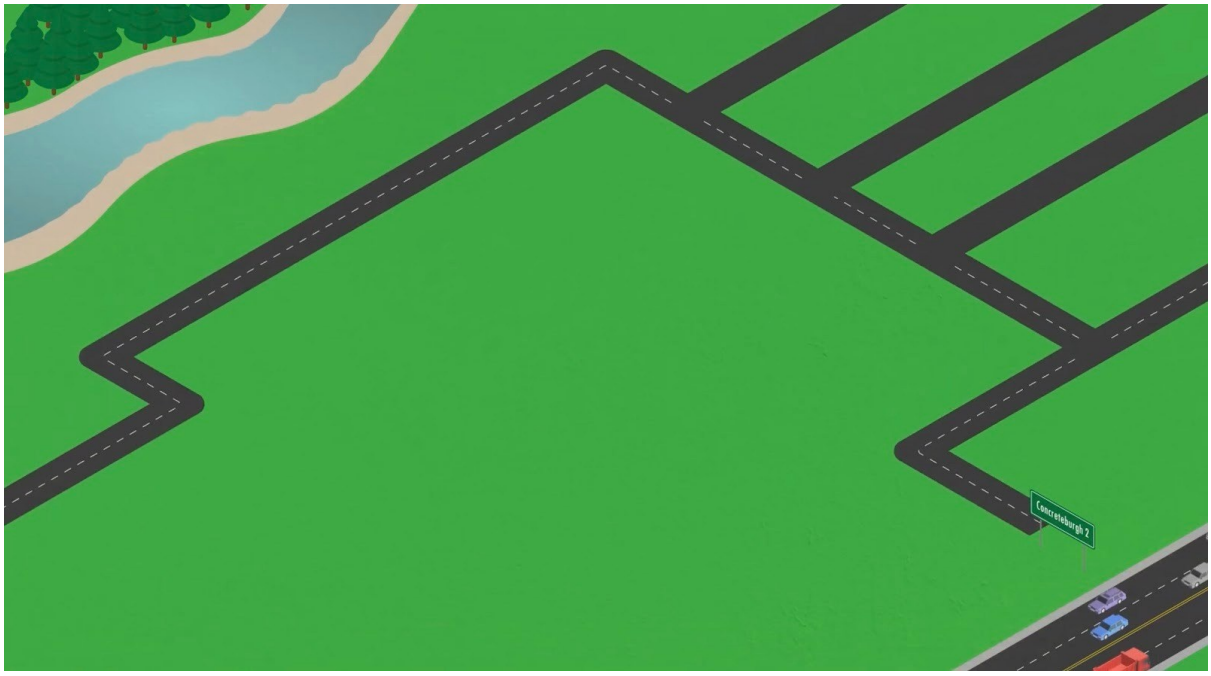
When Nailsea was developed much of the surface area became impervious to water with drains being installed to quickly move the water away. Backwell Lake is an artificial Balancing Pond built to absorb sudden water out flows from Nailsea and release them at a slower rate into the River Kenn. These changes cut off some of the flow of water into the underground aquifers. This is likely to have affected the water table heights under Nailsea due to a reduction in the volume of water held by the aquifers which in turn starved springs and streams of their water supply. This may have been compensated to some extent by the decline in water extraction due to the spread of mains water usage and the demise of water intensive industries such as cider production.

The following schematics in Figure 23 taken from ‘Practical Engineering’ illustrate how urban development reduces rainwater access to the underground aquifers. A similar process has occurred in Nailsea.

Figure 23 Schematics of Urban Development Reducing Area for Surface Water Absorption



The area to be developed. It is fields and woodlands. Rainwater can soak into the ground and feed the aquifers below ground.



Tarmac or concrete access routes are built together with surface water drainage system to quickly remove water from the area to prevent flooding.



Infrastructure is added. These are all impervious structures reducing the collecting area available for rainwater to soak into the ground.



Development continues, further reducing the land area that can absorb rainfall.



Finally the town is complete. Large areas of ground are covered over with impervious materials and the drainage system quickly removes much of the rainfall from the area. This greatly reduces the supply of water to the underground aquifers.

Some wells still exist in Nailsea but data for any wells close to the park was not available to the author. The car wash at the Touts service station in Wraxall takes its water from a well 50m deep and apparently has never run dry. While a well at Heath Cottage is 20m deep and reported to usually have a water level that is about 10m down the well shaft.

The seasonal pond in Compartment 1 is ephemeral, being dry for many months each year. The pond in the garden of the nearby number 56, 'The Old Quarry' does not dry out, but is probably in a deeper excavation that intersects with the water table.

East End Farm, now The Old Farmhouse public house, had four wells in its grounds. As the farm is at a lower elevation than the central part of the park it is likely that the water table in that area was more accessible.

Modern water extraction for drinking is taken from Clevedon and is not thought to be extracted from under Nailsea. Consequently, the reason for the spring drying up is unlikely to have been directly related to water extraction, more likely is the reduced catchment area. However, that does not explain why the spring has re-emerged.

3.4. Rainfall Data

Table 2 below is based on rainfall measured at the Meteorological Office station in Yeovilton and regional averages. Yeovilton is close enough to Nailsea to identify trends but not precise rainfall amounts due to locational differences and spatial separation of the two locations. To understand regional trends, data for South West England and South Wales and also for Southern England are included in the table below.

Periods (Rolling 29 year periods)	Yeovilton Average Annual Rainfall mm	England SW & Wales S Average Annual Rainfall mm	England S Average Annual Rainfall mm
1961 to 1990	718.2	1,198.13	761.17
1971 to 2000	742.52	1,237.11	776.07
1981 to 2010	708.54	1,255.26	791.42
1991 to 2020	729.73	1,277.37	807.99

Table 2 Rolling 29 Year Rainfall Averages

Nailsea being closer to the Severn Estuary and South Wales is unlikely to reflect the totals recorded at Yeovilton and Southern England. The England South West and Wales South data includes areas that are further westwards and often higher in elevation than Nailsea, these factors are likely to lead to higher precipitation rates to those experienced in Nailsea.

Overall, the rolling 29-year trend data in Figure 24 shows increasing rainfall since 1961, although Yeovilton has a slight decrease in the period 1981 to 2010. To establish if Nailsea had a similar trend, data recorded at Wrington between 1990 and 2017 was examined, this is shown in Figure 25.

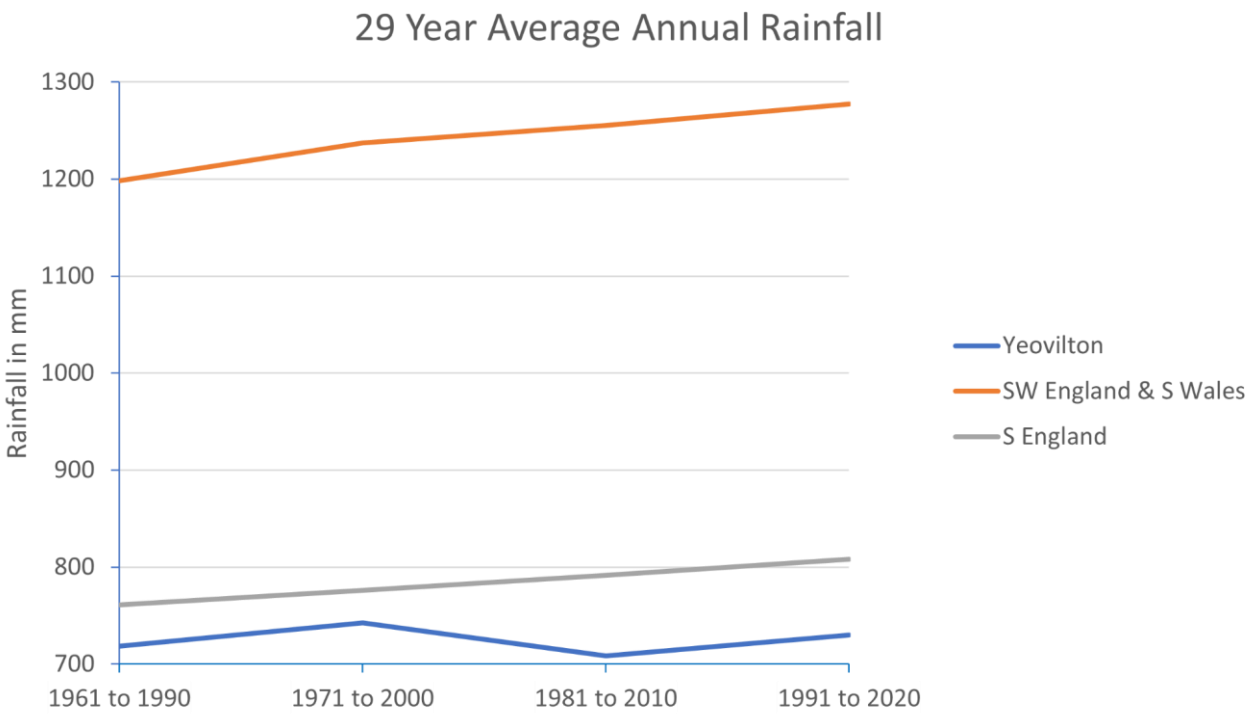


Figure 24 29 Year Rainfall Averages Trend Lines

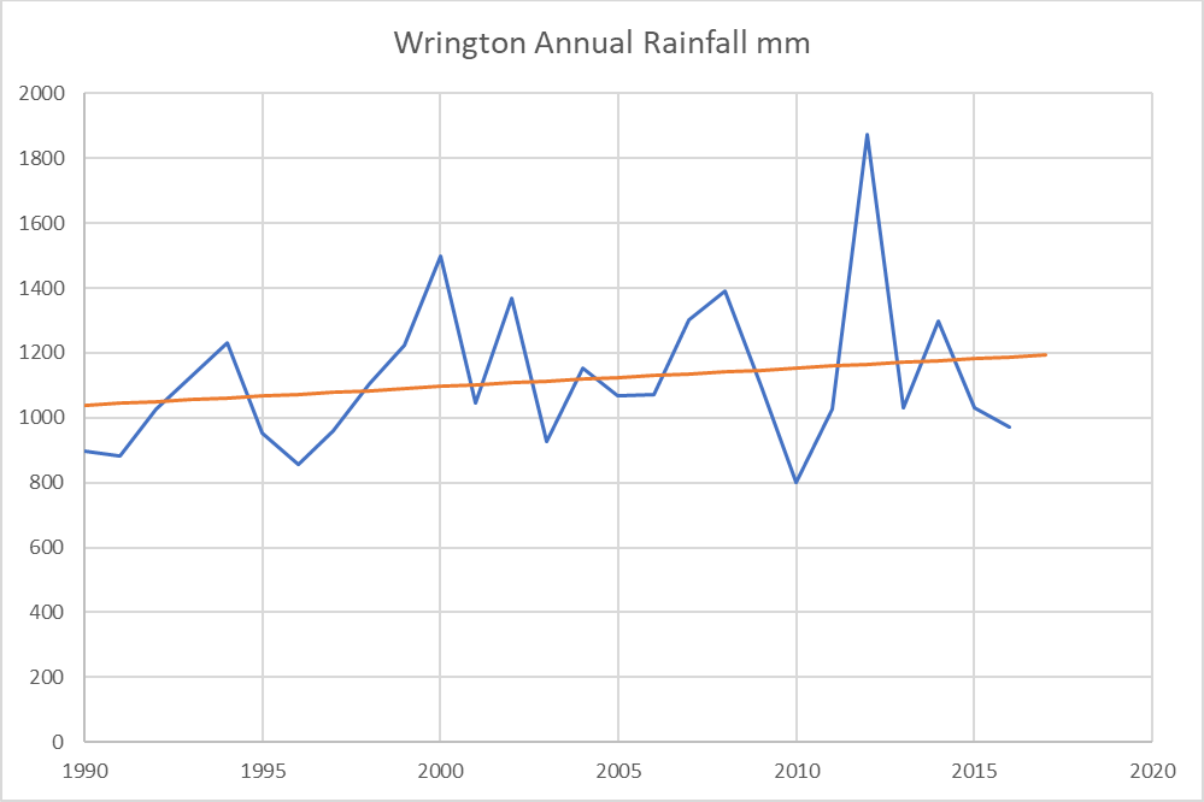


Figure 25 Wrington Annual Rainfall

The Wrington data shows higher precipitation rates than Yeovilton or the Southern England average, being closer to South West England and South Wales data. The trend lines for all the data shows a general increase in annual rainfall totals.

While yearly fluctuations (the blue line in Figure 25) occur overall the amount of rain falling is increasing over time. When Nailsea was developed in the 1980's some of the catchment area was paved over and drainage installed. This would have reduced the flow of water into the underground aquifers which would have lowered the water tables. The trend at Yeovilton has a slight dip around the period that Nailsea was being developed, it is not known if a similar trend was seen at Nailsea, but if it was it would have exacerbated the lowering of the water table. Subsequent increase in precipitation may have been enough, over time, to raise the water table to the point where spring once again flowed.

3.5 Flood Risk and Drainage

Figure 26, below, is the surface flood water prediction covering Trendlewood Park Compartments 1, 2, 3, 4 and 5. This data reflects the surface topography and shows where surface water would go once the ground is saturated and no longer able to absorb the water. As such it does not inform us about the water table or the spring. However, under such conditions the spring flow rate is likely to be high causing the Gully to flow over the footpath into Compartment 4.



Figure 26 Surface Flood Water 2025 Prediction

Figure 27, below, shows the surface water drains near the Wetland Area and spring in Compartment 2 and their route into Compartment 4. Surface water sewer 375 (shown as a blue line in Figure 27) passes alongside the spring and pond locations before it is joined by another drain running next to the location of the Gully. There is a manhole cover at the point of their intersection, identified by a small circle in Figure 27 below. The experience during the enhancement the biodiversity of the Gully suggests that a drain access to this surface water sewer was unblocked. If correct sewer 375 is the culvert referred to in the North Somerset

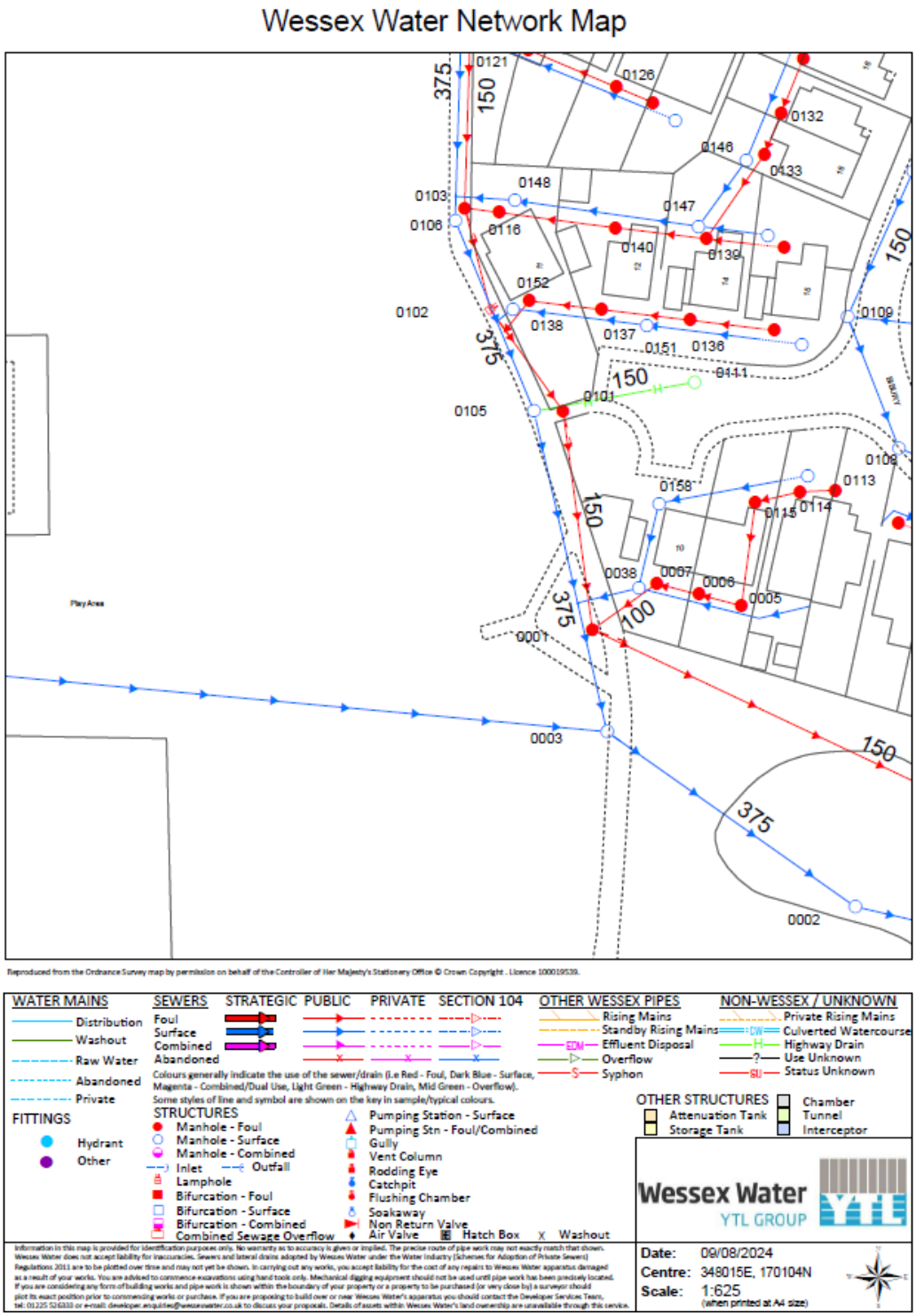


Figure 27 Surface Water Drainage Map

Council's Park Management Plan and, if not blocked by debris, excess water from the spring is channelled away through sewer 375, thus keeping compartments 4 and 5 free from flood water. Richard Ivens of Backwell Common, a retired drainage engineer, reported that surface water drains some times used pipes with holes to collect surrounding ground water, this might apply to the pipe passing close to the Gully.

3.6 Conclusions

The spring exists at the point where less permeable mudstone outcrops at the surface. The overlying sandstone is more porous and acts like a sponge holding water that has permeated through the ground from rainfall.

It is likely that the spring and its associated pond dried up because the development of Nailsea reduced the catchment capability that fed the water table. Some surface water previously able to soak into the ground was instead quickly removed by drainage which prevented it from entering the water table.

Less water has been extracted from the water table over time due to the introduction of mains water supply replacing wells and the demise of water intensive industries. The reduction in water extraction together with the long-term increase in rainfall is likely to have caused the water table level to rise, leading to the spring flowing once again.

The geology under Nailsea limits the volume of the underground aquifer which means that it is particularly sensitive to periods of low rainfall and also sensitive to the loss of catchment area.

The Gully and Compartment 4 are situated over sandstone, consequently, the ground is porous and water there quickly soaks away. However, there is a clay layer beneath site of the old cattle pond, but the extent of the clay layer is not understood. If the clay layer extends beyond the cattle pond site that would prevent water loss into the sandstone in the areas where the clay is present. The Gully may also be at the entrance of the culvert, this is most likely to be Sewer 375. If correct Sewer 375 takes excess spring water that gathers in the Gully and drains it into the surface water drainage system.

The pond is fed by the spring and may partially lie over sandstone, if so its ability to hold water would be poor. However, there is a layer of clay under at least part of the pond site which has low permeability. The pond was once a cattle pond and the clay may have been introduced historically to line the pond.

The Seasonal Pond in Nowhere Wood is likely to interact with the same underground aquifer that feeds the spring. It is at a similar elevation as the spring and is within the same rock sequence. Visual observations have noted that the depth of water in the Season Pond appears to correlate well with the flow rate of the spring, although these parameters have not been precisely measured it suggests that a common water table height is involved.

3.7 References

BGS England and Wales sheet 264. Solid and Drift Geology Map. 1:50000 Series.

The Hydrology of Nailsea by Terry Smith 6th July 2013.
https://www.newtnailsea.org.uk/gallery/Hydrology%20of%20Nailsea%2016.pdf

Meteorological Office.

https://wringtonsomerset.org.uk/topical/metreport2014.html

Images

North Somerset Council Trendlewood Community Park Management Plan 2016 - 2020.

Simon Stannard.

ARCHI Maps Environment Agency.

YouTube - Practical Engineering

North Somerset Council Definitive Map.

Wessex Water Network Map.

4. Movement of the Wetland Spring Location

This section is taken from a document written in February 2026.

The Wetland Area in Trendlewood Park has a natural spring that flows during wet periods. The spring rises beside an oak tree at the end of an outcrop of mudstone, see Section 3 above. In the winter of 2025 / 2026 the spring's main location appears to have moved northwards, up the valley away from the oak tree. This section investigates why that may have occurred.

The spring typically rises to the left of the oak tree surrounded by water in Figure 28 below. The image in Figure 28 was taken in February 2026 and shows the pond and its dam wall, which is being bypassed causing flooding of the footpath close to the stone gate posts. The bypassing is because there was insufficient soil from the 2025 excavation for the dam wall to extend to the length required.



Figure 28 Wetland Area Pond in Flood

4.1. Reasons Why a Spring May Move

Movement of a spring's location is a common event and there is plenty of material on the internet explaining why such movements may occur. As well as moving springs can dry up, or re-emerge elsewhere.

There are a number of factors that can explain alterations in spring behaviour, such as changes in the underground aquifer's water table level, alterations in the surrounding geology, or shifts in water pressure. Springs are not static, but rather dynamic exit points for groundwater, making them sensitive to both natural and human-induced environmental changes.

The likely driving forces behind each of the possible reasons are as follows:

4.1.1. Changes in the Water Table (Seasonal Fluctuations)

Dry Weather or Drought: During dry periods, the height of the water table drops. A spring that relies on a shallow aquifer might dry up, only to re-emerge elsewhere or at a lower elevation when rain returns and refills the aquifer.

Wet Weather or High Water: In times of heavy rain, the water table rises, which can cause new "wet weather" springs to appear or existing ones to flow from a higher point on a hill.

4.1.2. Geological and Physical Changes

Erosion and Sedimentation: Over time, water flowing through cracks and fissures (especially in limestone or karst landscapes) can dissolve rock, creating new, easier paths for water to travel, or block old ones with debris, forcing the spring to shift location.

Landslides or Earthquakes: A landslide or seismic activity can instantly change the terrain, blocking a fissure or opening a new fissure, causing a spring to disappear or move.

Collapse of Underground Cavities: In karst topography, the collapse of underground caverns can redirect the path of groundwater.

4.1.3. Human Intervention and Land Usage

Construction and Mining: Excavation, digging, or mining can damage the impermeable layers that hold an aquifer in place, causing the water to find a new, often lower, path to the surface.

Diverting or Capping: Installing a "spring box" or a pipe to capture the water can sometimes alter the pressure, forcing water to seep out elsewhere on a slope if not properly contained.

Deforestation and Vegetation Changes: Removal of deep-rooted trees can alter the soil's ability to hold water, causing changes in how the ground absorbs rain, which impacts the local water table.

4.1.4. Characteristics of Moving Springs

Preferential Pathways: Ground water often flows through underground "highways" (cracks, caves, or porous rock layers). If a slightly different, more direct path to the surface is opened, the spring will shift to that location.

"Wet Weather" vs. "Perennial" Springs: Some springs are temporary (wet weather), shifting based on seasons, while others are permanent but may "move" slightly along a slope as they erode their exit point.

In summary, a spring's location is determined by a delicate balance between topographical, geological, and hydraulic pressures. When that balance shifts, the spring will follow the path of least resistance to a new, lower-elevation, or different location.

4.2. Details of the Wetland Area Spring

The spring in the park's Wetland Area is seasonal, it typically flows through the winter months between September / October until April / May, drying up during most summers or in periods of drought.

The wetland spring aquifer flows over a layer of mudstone that lies beneath the permeable Pennant Sandstone. The spring is situated close to the end of an outcrop of mudstone, see Figure 29.

The spring is in a slight valley that follows the mudstone outcrop up into Nowhere Wood, see the Lidar image in Figure 30. In Figure 30 the grey areas are at lower elevations than the green areas. The spring is next to the tree, an oak, near the northern end of the grey area. The valley that supports the spring can be seen going northwards, next to the footpath, into Nowhere Wood.

The spring typically rises beside the oak tree which is situated close to the pond and in winter is often surrounded by the pond water as seen in Figure 28. The pond covers much of the wide grey shaded area in Figure 30 before the grey valley turns eastwards

The spring is affected by the water table in the area. The aquifer is within the sandstone that lies above the mudstone. The mudstone dips downwards at 10° in a north-westwards direction, see the arrow in Figure 29.

Nailsea is situated on the Downend formation of rocks whose strata lies in a syncline under Nailsea, see Figure 17. The Downend formation syncline under Nailsea has been uplifted causing faults through Yanley to the east and along the hills from Clevedon to Bristol to the north. This has resulted in Nailsea being higher than the surrounding countryside but lower than the limestone hills to the north and east. The syncline and change in rock type cuts Nailsea off from any aquifers in the limestone hills, limiting the source of the local aquifers to the catchment area of the higher ground in Nailsea itself.

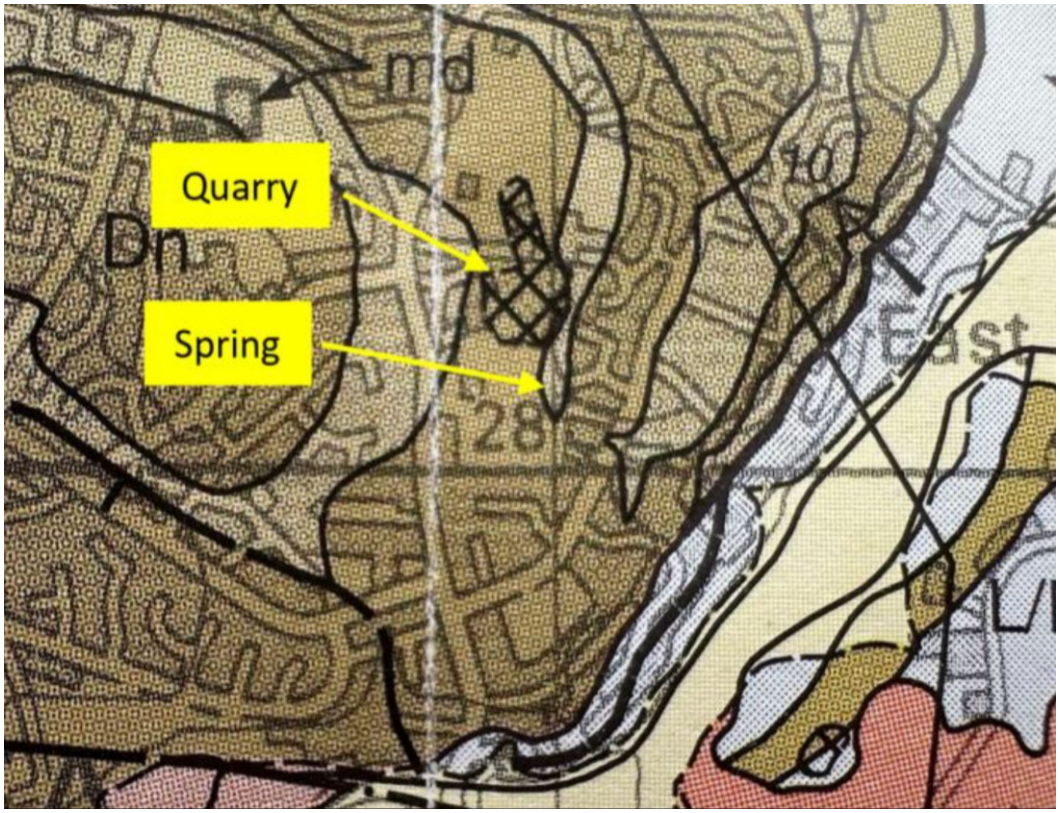


Figure 29 Geological Surface Rocks

Due to the limited surface area of the higher ground in Nailsea the catchment area is small and volume held in the aquifer is, therefore, limited. Wells in Nailsea were said to be unreliable in dry weather, which would be expected given the local geology. Due to their being several layers of sandstone and mudstone under Nailsea there may be several aquifers at different depths beneath Nailsea.

The ground under the adjacent housing to the east and the tarmac footpath near the spring sits over the mudstone outcrop. The edge of valley alongside the footpath to the north of the spring (Figure 30) aligns with the mudstone - sandstone interface, however, the side of the valley appears to have been partially landscaped, modifying the steepness of the eastern slope. This is unlikely to have significantly affected the spring since it comes to the surface further down the valley.

Restoration of the Wetland Area pond did not breach any mudstone or clay layers. It did remove sediment, lowering the previous surface by up to 0.6m.

The construction of the dam wall to heighten the pond water level has led to water being retained for longer periods with a maximum depth of around 0.9m. Some increase in the ground water pressure is a likely consequence of this.



Figure 30 Lidar Image

4.3. What Can Be Ruled Out

Addressing the factors raised above the following can be discounted as not applicable to the spring in Trendlewood Park for the reasons given below.

4.3.1. Geological and Physical Changes

- There has been no known seismic activity in the area during 2025.
- There is no sign of any underground collapse up stream of the spring.
- Construction activity at the pond did not disturb the impermeable layers. The work was below the spring line.
- Pennant Sandstone does not dissolve in water. The aquifer has a low flow rate and volume, consequently, erosion and sedimentation effects are limited.

4.3.2. Human Intervention and Land Usage

- In 2025 sediment from the pond was excavated. This lowered the ground level but only downhill of the spring's location. It did not breach clay or mudstone layers.
- Ash tree felling took place in 2025 including on the edge of the shallow valley the spring lies in. This work was uphill from the spring's location, did not involve much of the catchment area and does not appear to have affected the flow of the spring.

4.3.3. Characteristics of Moving Springs:

- A spring will follow a more direct route to the surface if available. 2025 had a very dry winter, spring and summer. The oak tree and the bushes uphill of the oak may have caused the ground to become particularly dry which, in turn, could have created new routes to the surface slightly uphill of the normal location.

- The spring is a wet weather spring, however, the movement is not erosion as the spring's location has moved uphill.

4.4. What Cannot Be Ruled Out

4.4.1. Changes in the Water Table (Seasonal Fluctuations)

- The spring is seasonal and does respond to changes in the water table.
- The pond is holding water at a greater depth than before. An increase in the ground water pressure may have forced the spring water to the surface slightly further uphill than previously.
- The late autumn and winter of 2025 / 2026 were particularly wet with rainfall rates at in excess of 170% of the normal amounts. While the water table was very low following the drought earlier in 2025, it may well have risen above the typical winter levels causing the spring line to move further up hill.

4.5. Conclusions

The location of the main outflow from the spring in February 2026 was under the bushes, up hill of its usual location by the oak tree. The spring water surfaces under the bushes and flows down the gentle gradient into the pond. It is possible that there may still be some outflow from the usual location of the spring, by the oak tree, but visual inspection of the pond in this area was not conclusive. If there was some flow of spring water then the rate was very low and may not have been visible.

The most likely explanation of the movement of the spring is that the water table has risen due to the heavy rainfall and the ground water pressure has increased due to the deeper standing water in the pond. These two factors would lead to the spring preferring to find an outflow higher up the valley.

4.6. References

BGS England and Wales sheet 264. Solid and Drift Geology Map. 1:50000 Series.

Images

ARCHI Maps Environment Agency.

Peter Speight.

Simon Stannard.

5. Gully Drainage

This section is taken from a document written in February 2026.

The Wetland Area of Trendlewood Park is within Compartment 2 close to the boundary with Compartment 1, see Figure 16. Part of the Wetland Area includes a small depression near the boundaries with Compartments 3 and 4, which is known as the 'Gully'. In wet winter weather the Gully fills with water coming from the spring that rises by the adjacent Wetland Area pond. In severe conditions the Gully fills completely flooding the amenity grass out to the Zip Wire and overflowing the tarmac footpath to spill down Compartment 4 towards Trendlewood Way.

Much of 2025 was a particularly dry year with long periods of no rainfall, however, the late autumn 2025 and early winter of 2026 were exceptionally wet with rainfall amounts running in excess of 170% of the long-term average. However, while there was a continuous and fast flow of water from the pond to the Gully from the autumn through the winter months the Gully struggled to fill and did not reached anywhere near the levels typically seen in previous winters. This section investigates why that might have happened.

5.1. Features of the Gully

The following is a list of factors that may have some bearing on why the drainage pattern has changed.

- The Gully is near the head of a shallow valley, see Figure 31, that runs from the River Kenn up into Trendlewood Park where the valley then turns northwards ending in Nowhere Wood (Compartment 1) buried under quarrying spoil heaps. The Gully is about 20m long and 5m wide.

- The shallow valley appears to be natural, initially following an outcrop of mudstone, see Figure 32 and lower down the valley probably the result of water erosion from the spring that rises near the pond.

- The edge of the shallow valley north of the Gully is mudstone rock (Figure 32). Mudstone is not permeable and acts as a barrier to water. The mudstone out crop dips downwards at about 10° to the north west. The tarmac footpath and the houses of Bibury Close are built over this layer of mudstone rock.

- The Gully lies over Pennant Sandstone rocks which are permeable.

- The tarmac footpath running northwards past the Gully, while dipping where it crosses the Gully, partially fills the shallow valley. This appears to be the result of landscaping.

- The Gully was part of a farm and next to a cattle pond.



Figure 31 Lidar Imaging of the Shallow Valley

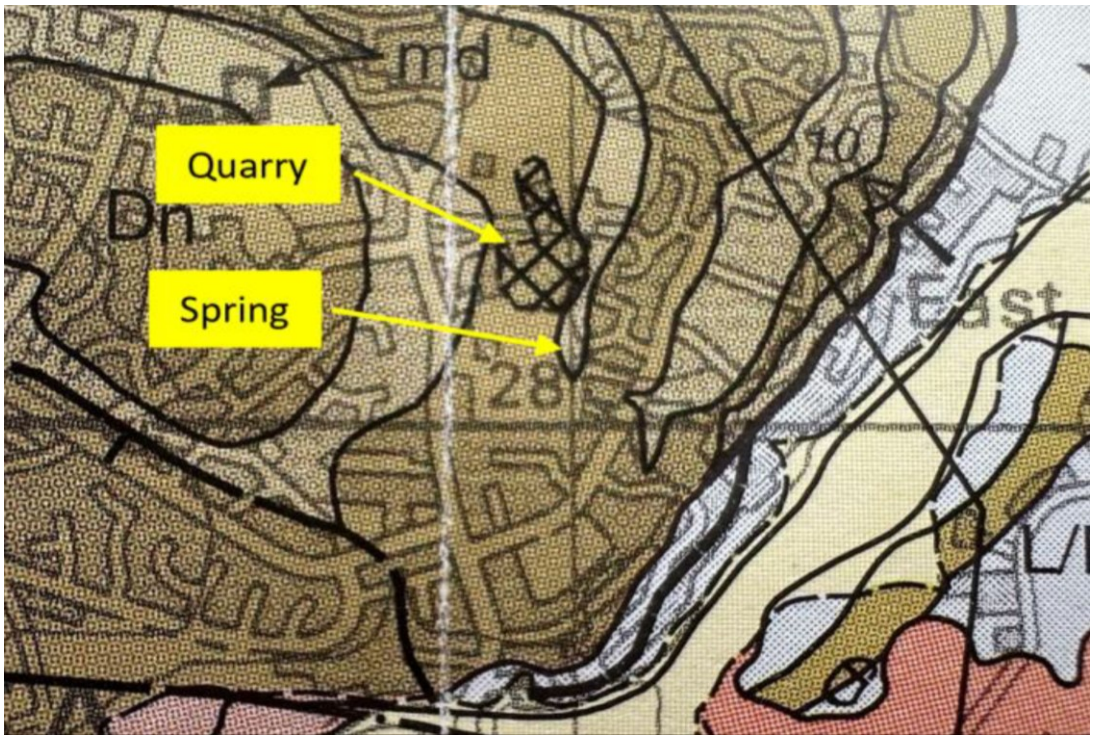


Figure 32 Geological Surface Rocks -The Gully is near '28'

- There is no known evidence of mining activity at the Gully. However, there were deep shaft mines nearby at Bucklands Batch, Farlers and East End, see Figure 33. Nailsea also has many unmapped bell pits. Richard Ivens, a long-term resident of Backwell Common who worked on the design of Backwell Lake, recalled that large voids occurred when Avening Close was being built with several properties there having to be underpinned as a result.

- Collieries often had drainage problems and adits (nearly horizontal tunnels used for mine access, drainage or ventilation) were dug to remove water.

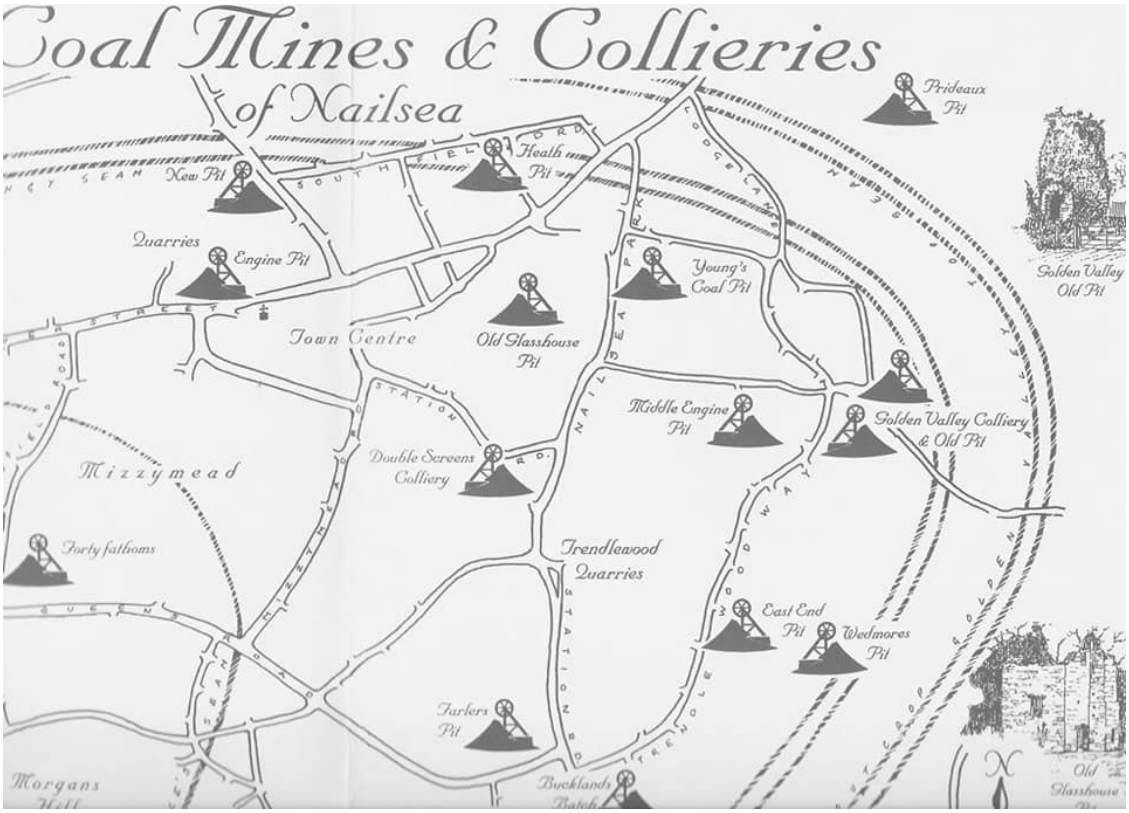


Figure 33 Deep Shaft Collieries in Nailsea

- A gas main and a surface water sewer run underground close to the Gully, see Figure 34.

- Pennant Sandstone lies under the Gully and has a permeability of about 9%. This far lower than limestone or chalk, both of which are more permeable and can be dissolved by water, especially if it is slightly acidic. While Pennant Sandstone is not dissolved by water it can be eroded by water. Under some circumstances this might lead to sinkhole development.

The features mentioned above are investigated below to understand if they might explain the change in drainage.

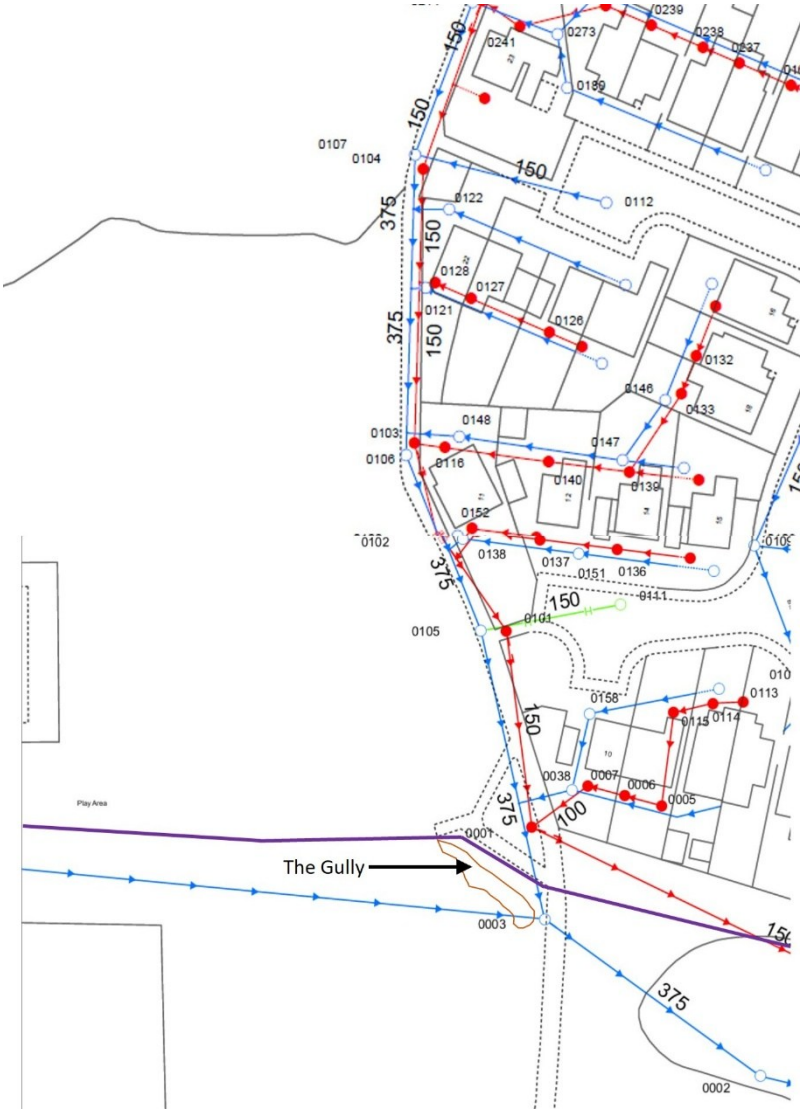


Figure 34 Water and Gas Services near the Gully

5.2. Geology

As noted above the shallow valley appears to be largely natural in its formation. Water rises near the outcrop of mudstone, which is more resistant to erosion than sandstone. Overtime this led to the shallow valley north of the Gully (Figure 31) as the sandstone was eroded faster than the mudstone. Housing development, which sits over the mudstone, may have landscaped the edge of the tarmac footpath in Compartment 2 increasing the steepness of the eastern side of the valley closest to the housing. However, the overall trend of the surface contours was likely similar before the houses were built.

At the Gully the direction of the shallow valley changes. The Gully has north-west, south-east alignment and the shallow valley turns downhill of the Gully into a more easterly direction going to the River Kenn. The shallow valley downhill of the Gully is likely the result of water erosion from the spring.

At the Gully the shallow valley is joined by minor feature, Figure 35, coming from the west, which channels surface water off the park from the children's play area. A long-term resident claimed that another spring further up the fields used to feed the feature. There is no sign of any other spring in the area and the accuracy of this claim is uncertain. It is possible that before Nailsea was developed the ground where St Francis School and the croquet club now stand was slightly higher in elevation and may have fed a small seasonal spring.



Figure 35 Minor Feature Running down to the Gully

At the Gully the shallow valley turns through almost 90°. The change of direction lies over sandstone as the mudstone outcrop ends in this area. Consequently, the change in orientation of the shallow valley appears to be due to the more easily eroded sandstone allowing the water to take a direct route downhill.

The land to the south to the Gully (Compartment 3) appears to have been landscaped at some point. Careful examination of Compartment 3 in Figure 31 shows straight parallel lines running across the amenity grass. These lines are just visible when the grass is short and viewed from Avening Close. These undulations are unlikely to be natural and may either be the remains of medieval farming strips, or a less than perfect attempt to smooth the ground surface when the park was created; possibly both reasons apply? It is interesting to compare this area with St Francis School playing field and the croquet club's ground, both of which appear to be completely flat. An attempt to level the ground may have steepened the south-west edge of the Gully.

The Friends of Trendlewood Park improved the biodiversity of the Gully during 2021 and 2022. This involved clearing out debris, mostly building rubble and rocks, plus some soil movement

to create planting areas for semi-aquatic plants. This did modify, slightly, the sides of the Gully but the main alignment and overall shape were not affected.

The Gully is cut off from the shallow valley heading down towards Trendlewood Way by the main tarmac footpath. The footpath is a manmade feature whose gradient has been lessened by the partial filling of the valley. The footpath is crossed by the foul water sewer, the surface water sewer and the low-pressure gas main in this area (Figure 34). The spoil from excavation of the trenches for these services may have been used to reduce the gradient of the path as it crossed the shallow valley.

Opinion – the Gully appears to be a natural feature with some modifications to its south-western edge and at the end by the main footpath.

5.3. Farming

The pond next to the Gully was at one time a cattle pond. Old maps do not record the presence of the Gully, from which we can conclude that it was not an area that normally retained water. This is to be expected as, before the footpath blocked the end of the Gully, any overflow from the cattle pond would have fed a stream that flowed down the shallow valley past East End Farm.

The cattle pond was fed by the spring that still rises nearby, consequently, there must have been an outlet for the water and this would have used the Gully and shallow valley downhill of the Gully.

While not conclusive on its own that fact that the area was farmed implies that there was no mining taking place at the Gully.

Opinion – the Gully was just part of the shallow valley running down to the River Kenn past the East End Farm. It was part of the route of a small stream that took overflow water from the cattle pond when the spring was flowing.

5.4. Mining

The Nailsea coal field was mined from at least the fourteenth century, initially using shallow bell pits and later deep shaft mines. As a result Nailsea has numerous mine shafts and there were many older bell pits (Figure 36) most of whose locations are now lost.

Bell pits, by their nature, exploited coal seams that were close to the surface

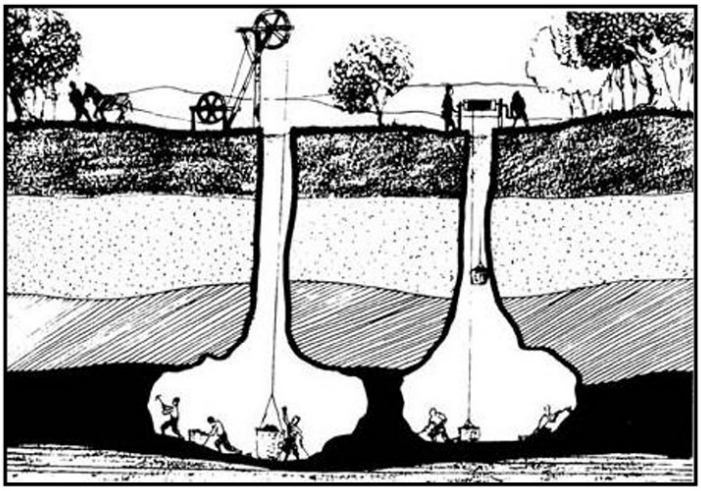


Figure 36 Schematic of a Bell Pit

When old mine shafts collapse the ground above them subsides (Figure 37) and this could be a potential explanation for the existence of the Gully.

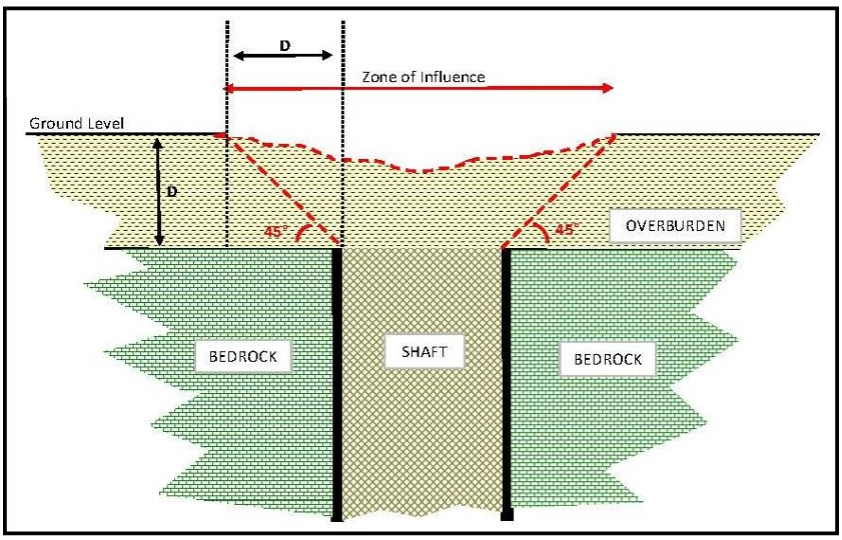


Figure 37 Diagram showing how the ground level subsidence risk from a mine shaft

However, the map of mine entrances (Figure 38) shows that the Gully is not in the area of past shallow coal workings. Furthermore, the presence of water from the spring makes the location unsuitable for a mineshaft.

Had a deep colliery existed at the Gully a large spoil heap would be present similar to those elsewhere in the Trendlewood area.

Richard Ivens recalled that mining issues were encountered when Avening Close was being built and the mining map below shows two mine entrances close to Avening Close, with overlapping influence zones, they would explain the subsidence and voids the builder had to

deal with. The type and depth of these mines is not known, but no spoil heap is present. If there was a spoil heap it may have been used to fill the holes that were discovered.

Avening Close is the nearest known site of mining activity to the Gully. While mine tunnels could easily run under the Gully from Avening Close the depth of the coal seams in this area is likely to be more than 60m down. At that depth a collapsed coal seam would not be close enough to the surface to have created such a prominent but small feature as the Gully. Figure 37 implies that if the Gully was the result of mine subsidence, the tunnels would have to be between 5m and 20m below ground. This is too shallow for coal extraction. Also it would require the overburden to be of similar depth which is unlikely as sandstone bedrocks are usually close to the surface in this area.

More plausible are adits closer to the surface, designed to divert water from the mines and out into the shallow valley of what was Compartment 4. Such an adit, if collapsing, could create the Gully and if partially collapsed may have voids into which water might be heard entering.



Figure 38 Map Showing Mine Entrances (X), areas of influence (O), past shallow coal mines working (hatched), coal outcrops (purple)

Against this argument is the north-west, south-east alignment of the Gully which does not point towards Avening Close. Adits running from the mines would mostly likely have had a general north-east, south-west alignment which is 90° out from the gully alignment.

The map in Figure 41 shows a stream running from where Avening Close to the Gully. This stream could have been fed by water coming from the mines. It follows the route that an adit

would have used. If that was the case there would have been no need to construct adits as natural surface drainage was available.

Opinion – there is no evidence that the Gully is over a mine shaft and the presence of a stream from the cattle pond would make the Gully an unsuitable location for sinking a mine shaft.

The Gully could be over an old adit that is collapsing, but the alignment of the Gully is not consistent with the expected route of an adit.

5.5. Underground Services

Both surface water sewers and a gas main pass by or under the Gully (Figure 34).

Surface water sewer 375 joins another surface water sewer under the footpath at the end of the Gully. There is a manhole cover, 0003, in the path at this point. Given that Gully was likely the route of a stream and that the raising of the ground level for the footpath blocked the outlet of the stream it is possible that a drain into sewer 375 was installed at the Gully.

If that happened, which would be a sensible flood management scheme, then it would explain North Somerset Council's statement in their Park Management Plan that the stream was diverted into a culvert and buried. The culvert being part of what became sewer 375.

It was reported by Andrew Town that when Friends of Trendlewood Park volunteers cleared out the Gully in 2021 and 2022 a rock was lifted and quote 'it was like pulling a plug out of the bath' with all the water draining away.

In the early winter of 2026 when standing by the side of Gully the sound of water cascading could be heard. The water in the Gully was clearly flowing into a lower cavity, but no entrance point could be seen. Furthermore, this phenomenon had not been encountered in previous years. The sound of running water ceased after the water level in the Gully increased. This implied that either whatever the water was draining into had filled up, or that the depth of the water covering the entrance to the cavity prevented the sound of running water from escaping.

There is a manhole cover opposite the north end of the Gully close to the pond which is assumed to be part of the low-pressure gas main. The manhole cover is over the route of the gas pipe shown in Figure 34. Manhole covers for gas pipes are often placed where there are joints in the pipework or valves. Figure 34 shows a sharp bend in the gas pipe by the north end of the Gully and this appears to coincide with the location of the manhole cover. While there may be a cavity large enough for a man to work in under the manhole there is no indication on the map provided by the gas authority for 'safe digging' of a cavity spreading under the Gully.

Opinion – it is very reasonable to think that a drain was installed to divert the spring water into sewer 375, however, when this document was written there was no documentary evidence that such a drain exists. Furthermore, if a drain exists why has it been blocked in recent years and suddenly become unblocked?

The gas manhole cover might give access to an underground chamber but it is unlikely that such a void would stretch over 20m to where the sound of running water was heard.

5.6. Sinkholes

Sandstone lies under the Gully and sandstone can be eroded by water but not readily dissolved. For a sinkhole to form water in the sandstone would need to have an easy underground exit into which the eroded sandstone could be washed away. The flow of the spring is seasonal and not particularly vigorous, assuming this is the only aquifer in the area it appears unlikely that it would create a large sinkhole on its own. Some other factor would be needed, like a collapsing adit, into which water could flow.

There are no accurate measurements of the Gully or the shape of its floor. However, visual inspection has revealed features that were not previously noticeable. Firstly there is a pronounced step near where water flows into the wider part of the Gully, see Figure 39. This step may have been present previously but either submerged or hidden by vegetation. The step may have been created by the biodiversity improvement work carried out in 2021 and



Figure 39 10 Gully Step

2022. For whatever reason the step seemed much more prominent in 2026 than previously. The step is also inconsistent with the water eroded shallow valley theory, unless there was band of more resilient rock out cropping at this point; Figure 32 does not show a change in rock type at this location.

Similarly parts of the eastern side of the Gully look a bit steeper than previously. Again this might just be changes in vegetation cover making the Gully side more obvious than before.

Finally the blackthorn bush at the southern end of the Gully has collapsed into the wider part of the Gully.

Opinion – sinkhole formation is likely to require some other factor, not just water flow through sandstone. A collapsing adit with the water washing away some sandstone is a possibility. However, the alignment of the Gully is inconsistent with any adits if they exist.

Water access to the surface water drainage system may have enhanced erosion within the Gully.

The collapse of the blackthorn and the apparent changes to the edges of the Gully suggest that the Gully may have, or is, subsiding. However, lack of any actual measurements of the Gully floor leaves this observation as just conjecture.

5.7. Pond Restoration

During the spring and summer of 2025 Friends of Trendlewood Park volunteers dug out, by hand, much of the sediment and rubbish that had accumulated at the site of the old cattle pond. The excavated soil was used to build a low dam wall between the pond and the Gully.

The aim of the pond restoration is for the pond to hold standing water for a longer period each year to enhance the biodiversity of the park. Since the pond is fed by a spring any dam wall is at risk of being overtopped and washed away. To reduce that risk and the regular flooding of the path between the pond and the Gully an overflow pipe was installed through the dam wall to the Gully. Figure 40 is a schematic (not to scale) of the dam wall and overflow pipe.

The dam wall used sediment dug out from the pond site with a small quantity of clay mixed in along the side facing the pond. This was done to improve the water retaining properties of the dam. The dam was built on top of the natural ground surface without any additional measures to resist water loss.

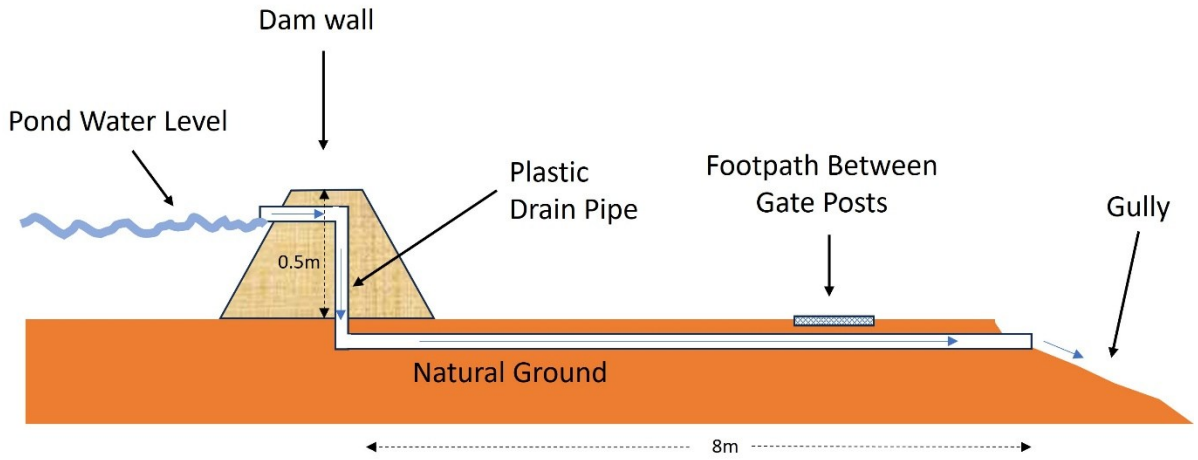


Figure 40 Schematic of Dam Wall and Overflow Pipe

A short length of trench was dug from the rear of the dam wall towards the path before the line of the overflow pipe was changed and that trench filled in. This left a slight depression in the ground.

Where the overflow pipe actually crossed the path a trench about 0.5m deep was dug and the pipe buried below the path. In excavating the trench many rocks were removed which led to a shortage of material to restore the original ground surface level. At the end of the trench closest to the Gully this shortfall was resolved by backfilling the trench with a mix of shingle and sand.

Both the short disused trench section and the trench for the overflow pipe have resulted in shallow depressions at the rear of the dam wall. These quickly filled with water as there is water seepage, either through the ground or between the base of the dam wall and the natural ground surface. This does not appear to affect the Gully in anyway as water often flowed across the path when the spring was flowing.

The section of trench which was backfilled with shingle and sand created an area of ground surface that is more porous than the previous surface. In the late autumn of 2025 water escaping from the pond was seen to be soaking into the ground at this point. Originally, it was suspected that water soaking away into the ground at that point was the reason that the Gully was not filling. However, as the winter progressed, with particularly heavy rainfall, it became clear that this could not be the only cause.

Opinion – some water is soaking into the ground at the northern end of the Gully. The soil dug out from the trench was not a clay and it is probable that water running over the path was always subject to some loss from absorption by the ground.

The strong flow through the overflow pipe has resulted in more water reaching the Gully when the spring flow rate is low. High spring flow rates resulted in the dam wall being bypassed further increasing the water flow to the Gully. For water flowing around the dam wall the loss rate has been augmented by the increased porosity of the backfill in part of the trench. However, this aspect on its own cannot explain the failure of the Gully to fill up, since due to the overflow pipe more water reached the Gully over a longer period than in previous winters.

5.8. Other Information

Bristol Avon Rivers Trust (BART) produced a map of the River Kenn catchment that included the area of the Gully, the pond, the minor feature and the shallow valley, see Figure 41 below. The map was produced using information from the Environment Agency based on Lidar and data modelling. It is not a map of actual known water courses but indicates where they might be found. The modelling used has produced some anomalies in the details. In places the flows shown do not align with ground features or historic maps.

The Gully is shown as two parallel flows joining at the southern end of the Gully. The surface level around the Gully does not support this as a route for multiple streams, only a single stream. The minor feature appears to be fed from spring in the croquet club. This would support the statement from the long-term resident who said that the minor feature was fed from a spring further up the park. The shallow valley is shown as a water course running down to the River Kenn which is consistent with the interpretation in this document. Of interest is a flow from Avening Close to the Gully which mirrors the route suggested for an adit. However, there may once have been a stream taking this route. If that was the case an adit would not have been necessary.



Figure 41 BART Potential Surface Flow Map

5.9. Assessment

The geology of the area supports the concept that the Gully is a natural feature. It is likely the remnant of a shallow valley that once supported a stream which flowed down to the River Kenn. The shallow valley changed direction at the Gully due to the outcrop of mudstone ending nearby and the sandstone that replaces it being more readily eroded allowing a direct downhill flow of water.

The land around the Gully has undergone some landscaping, most notably at the southern end of the Gully where the footpath crosses the valley floor. Compartment 3 appears to have been landscaped at some point. Also, the land where St Francis School and croquet club now stand has been levelled with lowering of the surface for the school playing field. This may have affected some water flows.

It is known that the Wetland Area was farmland with a cattle pond and spring. These factors together with the lack of mining spoil heaps rules out mining at the site of the Gully.

The Gully is beyond the area of Nailsea where shallow depth mining took place as the coal seams are too far down at this point, probably more than 60m. There were deep shaft collieries close by, particularly in what is now Avening Close, but the depth of those mines cannot explain the Gully. If mining is a factor with the Gully then it is related to mine drainage, rather than to the extraction of the coal.

The effect of the pond restoration has been to both increase the water reaching the Gully when the spring flow rate is low and also to increased water losses through ground absorption

when the spring flow rate is high. While there is no measured data, visual inspection shows that there is a strong flow of water into the Gully from both the overflow pipe and surface water, even though some surface water must be lost to ground absorption. The combined flow sources fill a channel into the Gully which is both wider and deeper than the channel from previous winters. This implies that the excessive rainfall during the winter of 2025 / 2026 delivered more water into the Gully even with the increased water loses.

Both water drainage and gas pipes pass by the Gully. There is a manhole cover very close to the Gully which is assumed to be associated with the gas main. This may have a working space below ground but would probably be very small and not stretch away from the gas pipe under the Gully.

Builders of surface water sewer 375 should have been aware that were cutting off a natural drainage channel. The obvious step would have been to include an access route for surface water in the Gully to get into sewer 375 by means of a drain. If that happened it would explain North Somersets Council's statement that the stream was diverted into a culvert.

2025 had low rainfall until late in the autumn. Vegetation in the park suffered as a consequence as the ground was very dry. The Wetland Area as a whole, did remain moist with lush green plant growth. That said it is likely that ground of the Wetland Area, while moist, was probably drier than in previous years. The Gully is further away from the spring and is likely to have dried out more than the rest of the Wetland Area.

Ground shrinkage may have created new routes for water to find access to the drain for sewer 375, if a drain exists. If there is no drain then there has to be another explanation for where the water goes. The most probable being an adit. If an adit exists it would have discharged into Compartment 4, but there is no sign of that. It is also likely that had an adit been present it would have been found when sewer 375 was built. An adit at this location would have either been blocked off or incorporated into the surface water drainage. There is no surface evidence of an adit exit and an adit drainage route is not shown in the drainage map.

The Gully may be subsiding slightly but this cannot be proved due to lack of measurements. The apparent subsidence might be either ground shrinkage or just loss of vegetation coverage, both resulting from the drought conditions in 2025.

5.10. Conclusions

During the winter of 2025 / 2026 the Gully found an unknown drainage route. The Gully did not fill to its usual levels, despite the rainfall being over 170% of the long-term average.

There are signs that the Gully floor has subsided slightly but this cannot be proved and may just be minor erosion of the banks created by soil excavations during 2021 and 2022.

Sound of running water early in the winter clearly indicated an outflow of water into an underground cavity.

The most probable explanation is that the water has found route into sewer 375. The prolonged flow of water into the sewer may have eroded the bed of the Gully leading, amongst other things, to the blackthorn collapsing.

The presence of a collapsing adit cannot be ruled out, but seems unlikely. However, great caution should be taken when working on the Gully floor.



Figure 42 Gully and Restore Pond Site February 2026

5.11. References

BGS England and Wales sheet 264. Solid and Drift Geology Map. 1:50000 Series.

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Wales & West Utilities.

Wessex Water Network Map.

6. Wetland Area Biodiversity

This section of the document is intended to remain 'live' and will be continually updated as new information becomes available.

6.1. History

The Wetland Area is situated in Compartment 2 of Trendlewood Park (see Figure 16) and covers the area occupied by the Gully and the pond restoration project.

Prior to 1984 the Wetland Area had been part of East End Farm's dairy pastures since 1945. East End Farm has a long history, with the farmhouse dating back to at least 1665.

Nineteenth and mid twentieth century maps show a cattle pond in the Wetland Area and it is known that the last occupants of East End Farm took Water Cress from the cattle pond to eat.

During the 1980s the Trendlewood area was developed for housing and the pond was lost. Section 3 of this document discusses why that may have occurred.

When the parkland was created Compartment 2 become an area mostly covered by amenity grass with no pond and Gully partially filled with rubble. Some pooling of water did occur in wet weather and excess water did flow into the Gully.

In 2020 the area had a low biodiversity consisting largely of parkland amenity grass, which was regularly mown in the summer months and areas that had been used to dump builder's rubble. There were and still were in 2026 several mature trees, notably two large oaks and an aging crack willow that had been pollarded. Some scrub, mostly blackthorn and hazel were also present. The site of the restored pond was prone to be damp in the winter with occasional pooling of water during wet conditions.

In 2021 the Friends of Trendlewood Park began a project to improve the biodiversity of the Gully. Unfortunately, a baseline biodiversity survey was not carried out but from the description above and photographic evidence the range of plants was limited and there was no aquatic life.

Work carried out in 2021 took advantage of the late summer months to clear seemingly endless amounts of builder's debris and rubbish from the Gully, as well as clearing invasive vegetation. A lot of rubbish was taken to the tip. Having revealed the ground level, Friends of Trendlewood Park volunteers then dug down into the channel to increase the capacity of the Gully to hold overflow from the pond area. Also the banks were made along the edges of the Gully to hold the water back. Before embarking on the work the Friends of Trendlewood Park took advice from Simon Bunn, the North Somerset Council Flood Officer, who visited the site. He did advise on pipework near the site etc. but did not mention the gas pipe running close to the area.

Having excavated the Gully, and created banks suitable for planting, the Friends of Trendlewood Park collected forty native marginal and aquatic plants from the Water Garden Nursery in Wiltshire and planted them on 21st April 2022 putting up a sign asking the public to respect the area. On 1st May 2022 a seed bed was prepared on the cleared Gully sides and banks and sowed a Wet Meadow seed mix. Some plants were also donated by members. The net effect until the summer of 2025 has been an explosion of vegetation in the Gully. Some of

the more aggressive plants have taken over, suppressing the less vigorous plants in the process.

6.2. Plants

6.2.1. Record of Plant Species

Date				
11/03/2022	**Plants Already Present**			
		Plant Common Name	**Scientfic Name**	**Comments**
	Lower Gully			
		Brooklime		
		Watercress		
	Upper Gully			
		Greater burdock		
		Figwort		
		Water figwort		
		Common valerian		
	Plants Purchased			
	Damp Loving [8 x 2]			
		Meadowsweet	Filipendule ulmaria	
		Water avens	Geum rivale	
		Cuckoo flower	Cardamine pratensis	
		Ragged robin	Lychnis flos-cuculi	
		Primroses	Primula vulgaris	
		Chives	Allium schoenoprasum	
		Bog pimpernel	Anagallis tenella	
		Common cotton grass	Scirpus angustifolium	
	Boggy / Pond Margins [12 x 2]			
		Marsh marigold	Caltha palustris	Richard & Sue Ivens
		Purple loosestrife	Lythrum salicaria	
		Yellow flag iris	Iris pseudacorus	Richard & Sue Ivens
		Creeping jenny	Lysimachia nummularia	
		Marsh woundwort	Stachys palustris	
		Soft rush	Juncus effusus	NB tall and can be invasive
		Flowering rush	Butomus umbellatus	
		Water mint	Mentha aquatica	Richard & Sue Ivens
		Water forget-me-not	Myosotis scorpiodies	Richard & Sue Ivens
		Bog bean	Menyanthes trifoliata	
		Marsh cinquefoil	Potentilla palustris	
		Lesser spearwort	Ranunculus flammula	

Table 3 List of Plant Species

6.3. Fungi

6.3.1. Record of Fungi Species

No data available.

6.4. Insects

6.4.1. Record of Insect Species

Occasional aquatic insects have been seen, but the species have not been identified.

6.5. Amphibians

6.5.1. Record of Amphibian Species

In May 2020 tadpoles were rescued from the area after a prolonged period of flooding. Which species of tadpole was not known.

6.6. Waterfowl

6.6.1. Record of Waterfowl Species

A pair of mallard ducks were present in the pond for several days in early April 2026. Unfortunately, they were frightened off by children building rafts and throwing logs into the water. Some years previously a mallard nest was built in the top of the pollarded crack willow tree.

7. Wetland Area Scrape

7.1. What is a Scrape?

A Wetland Scrape's purpose to is help wildlife and increase biodiversity. They are typically built in damp areas much larger than ours. In larger settings they can:

- Improve invertebrate richness by providing shallow, muddy edges which support an abundance of aquatic insects, beetles, and crane flies.
- Provide safe breeding spots for frogs, toads, and newts, alongside specialized wetland plants.
- Present feeding grounds for wading birds like lapwings, redshanks, and snipe to find food for their chick.
- Help to store excess surface water and reduce local flood risks, thereby providing flood management.

Trendlewood Park's Wetland Area is very small and cannot provide all of these benefits. We are unlikely to attract to wading birds and being next to a spring a small scrape is not going to have much impact on the flood risk in the park.

7.2. Why Build a Scrape?

The Wetland Area's restored pond is fed by a spring that rises at the north end of the Wetland Area. At the southern end the pond is confined by an earthen dam wall. When the spring is flowing there is a constant source of water entering the pond which has to be managed to prevent the dam wall from being overtopped and eroded away; this is achieved by an overflow pipe. The presence of the overflow pipe leads to a surprisingly strong current of water flowing through the pond from the spring to the overflow pipe. Amphibians prefer still water and do not like strong water flows which can sweep away their tadpoles.

To encourage amphibians to breed in the park we needed an area of water that is protected from the main flow between the spring and the overflow pipe. To achieve this an Amphibian Scrape was constructed during the summer of 2026 in a corner of the Wetland Area away from the main flow of water in the pond. Due to the limited space available the scrape is small and its overall effectiveness remains to be determined.

7.3. Design

The design of the scrape was limited by the space available. It is roughly oval in outline and has a cross-section that approximates to Figure 43. The sides of the Wetland Area scrape are steeper than desired in order to maximise the volume of the deep core. Figure 44 shows the newly constructed scrape after a rainfall, resulting in a shallow puddle in the deep core. At that time there were no other puddles in the Wetland Area, showing promise that the scrape will retain water for long periods.

The water is an orangey-brown colour due to runoff from the layer of orange-brown clay in the deep core discovered while excavating the scrape. It is the clay that is preventing the

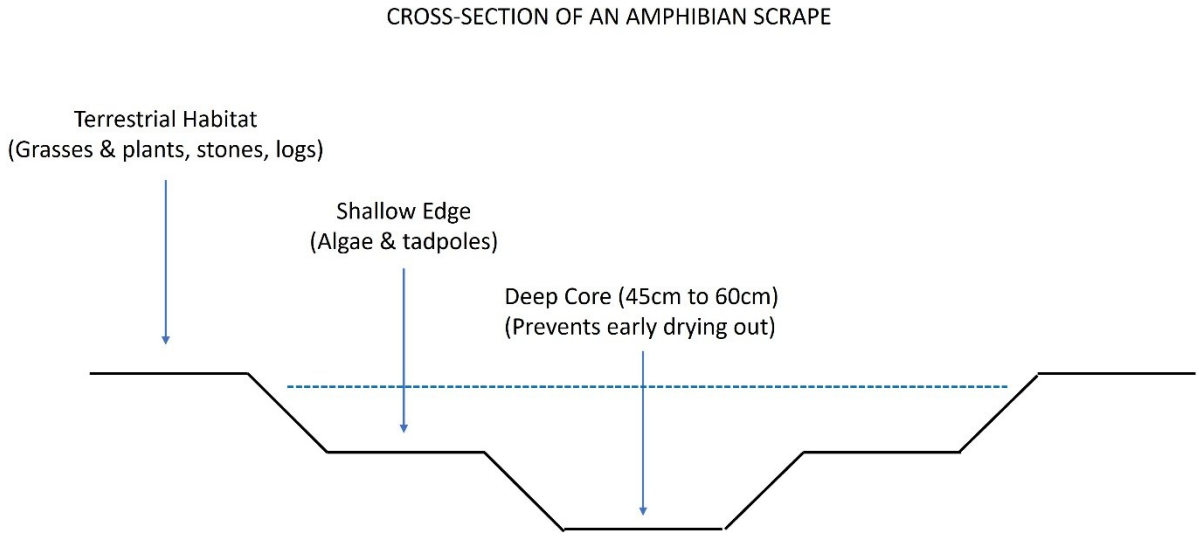


Figure 43 Amphibian Scrape Cross Section



Figure 44 Amphibian Scrape in August 2026 After a Rainfall

rainwater from draining away. Orange-brown clay is the result of eroded mudstone. As can be seen in Figure 29 the spring rises at the edge of an out crop of mudstone. The presence of orange-brown clay at this location is consistent with the geology of the area. The UK Soil Observatory subsoil description given in Figure 45 places the scrape near the boundary of Sandstone and Claystone/Mudstone, which is consistent with Figure 29. It is assumed that the orange-brown clay sediment in the water will settle out leaving clear water for plants to grow in and amphibians to forage.

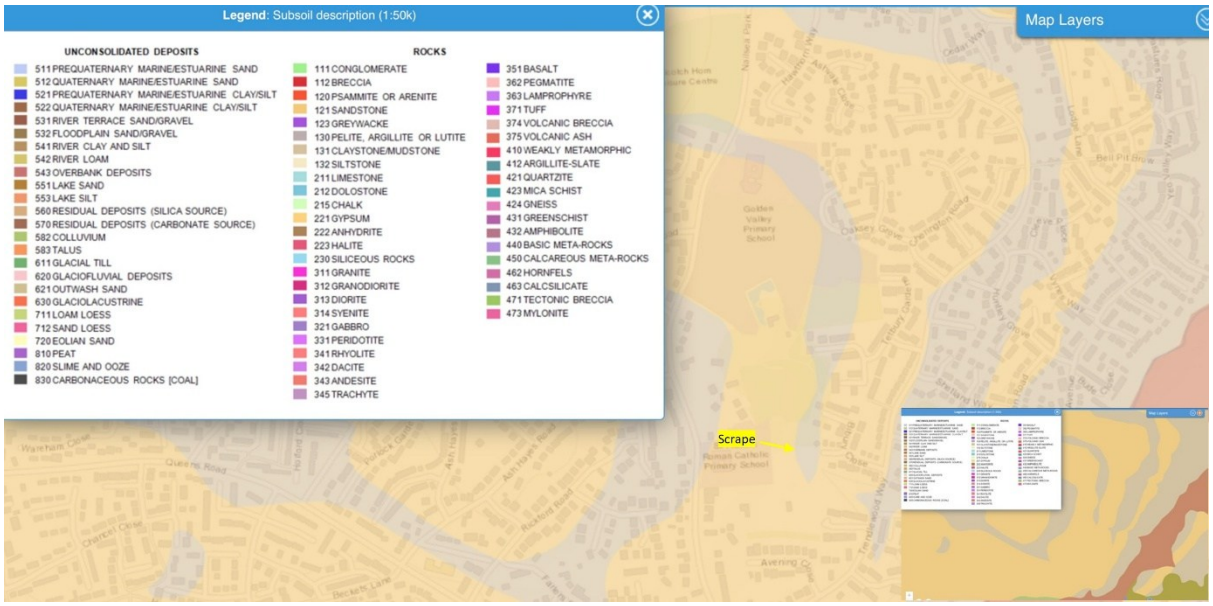


Figure 45 UK Soil Observatory Subsoil Types at the Scrape

The site of the scrape has a slight slope running downwards toward the pond. While hard to see in Figure 44 a low earth bank was placed around the lower side of the site to enable retention of slightly deeper water.

Another feature also present in Figure 44 is a man-made structure consisting of a line of rocks cemented together in a near vertical orientation. The length of this feature was not explored and its original purpose in a farming landscape is not known.

7.4. Location of the Scrape in the Landscape

The scrape is not directly connected to the restored pond. It is at a slightly higher elevation than the pond within the Wetland Area. When the water level is high and the whole Wetland Area is flooded the scrape will be within the same body of water, but as the water level drops the scrape will become isolated from the pond and the flow from the spring. Figure 46 shows the Wetland Area in flood with the approximate location of the scrape. The area labelled ‘Pond’ is over the deeper excavations that become the pond as the water level drops. For many months there is a flow of water from the area of spring to the pond, this flow does not go via the area of the location of the scrape.

The scrape is close to the Dead Hedge and some willows planted alongside to form a future hedge row.

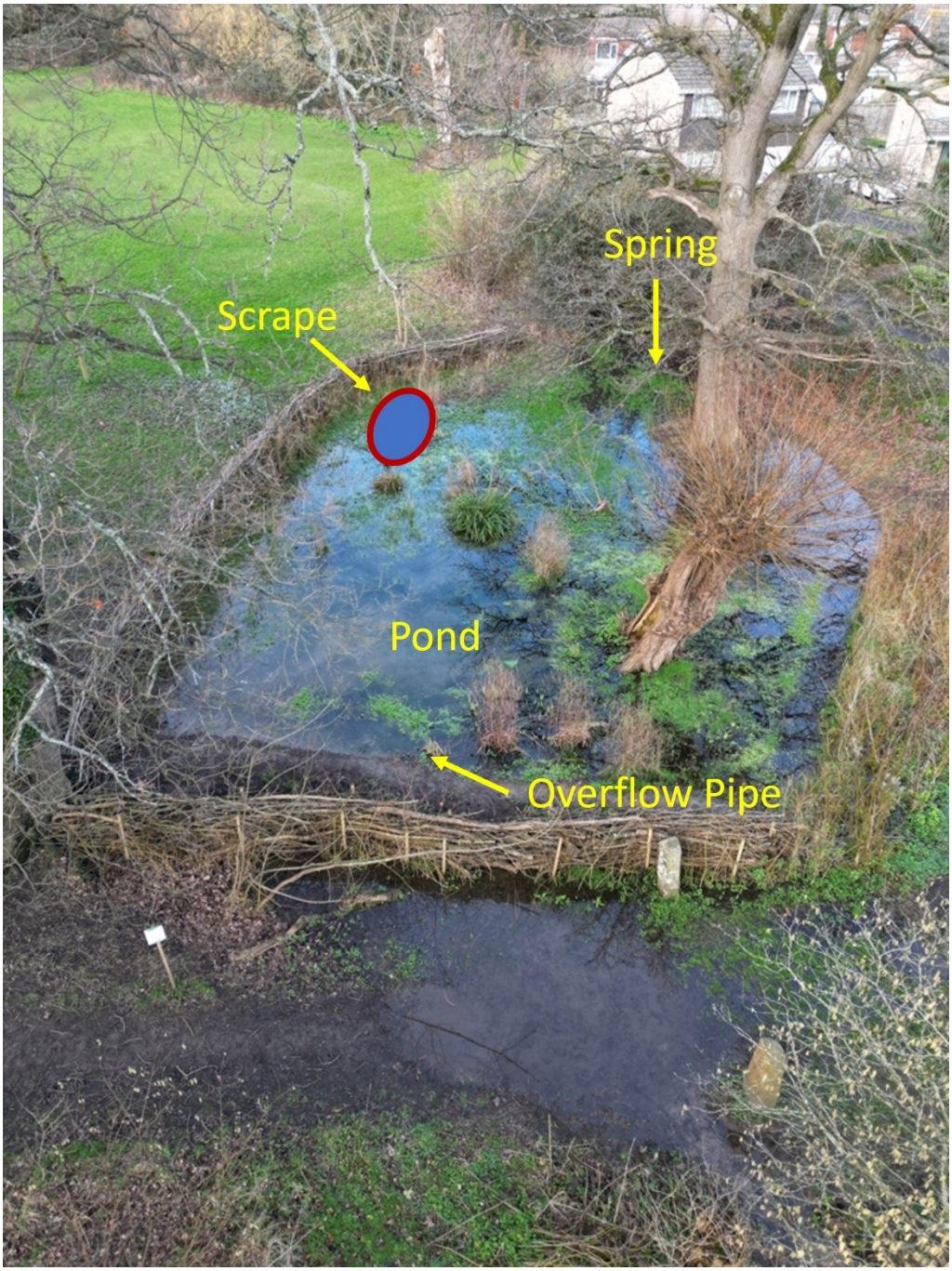


Figure 46 Location of the Scrape

8. Management of the Wetland Area

This section of the document records what management steps have been taken, or are required, to maintain the water quality and enhance the biodiversity of the area. In 2025 / 2026 the pond restoration was undergoing its first season of flooding, it was expected that a few yearly cycles would be needed for the pond to settle into an established state. The Gully had been cleared out and replanted in 2021 and 2022 which led had to a rapid spread of some damp loving plants in the area, see Section 6.2.

8.1. Blanket Weed

8.1.1. Problem

During the first winter season of the pond, in late February 2026, patches of blanket weed began to appear on the surface of the pond. The area covered by the weed quickly expanded becoming unsightly. Investigating how to manage blanket weed resulted in the advice reproduced below. However, much of the advice is not appropriate to a natural ephemeral pond; comments in red font interpret the information provided. This Section concludes with a seasonal table of proposed actions aimed at reducing the amount of blanket weed in the pond.

Blanket weed forms in ponds primarily due to an imbalance in the ecosystem, fuelled by excess nutrients (nitrates and phosphates), high sunlight exposure, and warmer water temperatures, especially during spring and summer. Decaying organic matter, overfeeding fish, and tap water use contribute to the buildup.

Key Drivers of Blanket Weed Growth:

- **Excess Nutrients:** Decaying leaves, sludge, fish waste, and uneaten food break down into nitrates and phosphates, which act as fertilizer for the algae.
- **Sunlight & Warmth:** Increased sun exposure in spring/summer provides the energy for rapid photosynthesis.
- **Water Quality & Chemistry:** High pH levels, often caused by tap water, promote growth. A lack of competing aquatic plants also allows it to thrive.
- **New Ponds:** Newly built ponds often experience outbreaks before a natural biological balance is established.

How to Prevent and Manage It:

- **Remove Debris:** Use a net to remove leaves and debris regularly.
- **Increase Shade:** Add water lilies or floating plants to cover the surface and reduce sunlight penetration.
- **Reduce Nutrients:** Use pond bacteria/treatments to break down sludge and reduce nitrates.
- **Use Rainwater:** Use collected rainwater instead of tap water to prevent adding minerals.

8.1.2. Control of Blanket Weed- General

Managing water quality in a natural pond near trees requires a combination of proactive debris removal, nutrient control, and natural, biological solutions to manage shade and organic decomposition. Key strategies include using autumn nets to catch falling leaves, introducing oxygenating plants, and utilizing beneficial bacteria to break down sludge, rather than relying solely on harsh chemical treatments.

Potential actions that could be taken for managing pond water quality are listed below, however, many of these are not practical for the Wetland Area pond.

1. Proactive Debris and Leaf Management

Trees are a major source of nutrients, which, when they decay, increase acidity, reduce oxygen, and turn the water brown.

- **Autumn Netting:** Install pond netting in autumn to catch leaves before they sink and settle. NOT PRACTICAL AND DANGEROUS TO WILDLIFE
- **Skimming:** Use a hand-held skimmer or a pond vacuum regularly to remove leaves and twigs, as they decompose into sludge at the bottom. NOT PRACTICAL FOR A PARKLAND POND
- **Create a "Beach":** Create an intake bay or a shallow, stone-lined area to collect and easily remove debris.
- **Pruning:** Trim overhanging branches to minimize the amount of debris entering the water. LIMITED PRACTICALITY – THE WILLOW CAN BE POLLARDED

2. Controlling Algae and Nutrients

Trees can cause excessive nutrients to enter the pond, fuelling algae and blanket weed.

- **Beneficial Bacteria:** Add specialized bacteria to break down organic matter and sludge. UNDESIREABLE IN A NATURAL POND
- **Barley Straw:** Use submerged barley straw to naturally inhibit algae growth as it decomposes, particularly in spring and autumn.
- **Aquatic Plants:** Introduce plants like lilies, water hyacinths, and hornwort to compete with algae for nutrients and provide shade. LIMIT TO NATIVE SPECIES BUT HAVE TO SURVIVE THE DRY MONTHS
- **Water Dye:** Use non-toxic pond dye (e.g., black or blue) to block UV rays and limit algae photosynthesis. UNDESIREABLE IN A NATURAL POND

3. Promoting Oxygenation

- **Aeration:** Install a, fountain or submersed aerator to increase oxygen levels, which helps beneficial bacteria break down organic waste. NOT PRACTICAL FOR A PARKLAND POND
- **Submerged Plants:** Use oxygenating plants like Water Crowfoot, which help maintain water quality and provide shade. LIMIT TO NATIVE SPECIES ONLY, BUT HAVE TO SURVIVE THE DRY MONTHS

4. Pond Structural & Environmental Care

- **Buffer Strip:** Establish a buffer strip of grasses and wildflowers around the edge to intercept nutrient-heavy runoff.
- **Silt Removal:** If the pond is very old, remove sludge from the bottom, ideally during winter when wildlife is less active. FOR EPHEMORIAL POND REMOVE SILT WHEN DRY
- **Water Level Management:** Top up with rain water rather than tap water, as tap water can contain nutrients that encourage algae. NOT APPLICABLE WE RELY ON SPRING AND RAIN WATER

5. Managing Shading

While too much shade can restrict aquatic plant growth, some shade is necessary to control temperature.

- **Balance:** Aim for a mix of full shade, dappled shade, and open areas, rather than removing all trees. NOT APPLICABLE
- **Tree Removal:** If necessary, only remove a small percentage of surrounding trees (e.g., no more than 1/4 over a 3-year period) to avoid drastic changes to the ecosystem. NOT APPLICABLE

8.1.3. Control of Blanket Weed in Natural Ephemeral Ponds

Managing blanket weed (filamentous algae) in a natural ephemeral pond near trees requires a focus on nutrient management and physical removal, as these ponds are highly sensitive ecosystems. Since they are temporary, they often lack the permanent biological filters found in garden ponds, making manual and preventative methods the most effective natural options.

1. Reduce Nutrient Input from Trees

Trees are a major source of organic matter, which decomposes into the nitrates and phosphates that fuel blanket weed.

- **Remove Fallen Leaves**: Regularly skim the surface or use a pond vacuum to remove leaves and plant debris before they sink and rot. MANUALLY REMOVE LEAVES WITH A FISHING NET
- **Autumn Netting**: Cover the pond with a fine mesh net during autumn to catch falling leaves. MANUALLY REMOVE LEAVES WITH A FISHING NET
- **Trim Overhanging Branches**: If appropriate for the local habitat, thinning branches can reduce the volume of leaf litter entering the water. NOT APPLICABLE

2. Manual Removal

Physical removal is the most direct way to "export" nutrients from the pond system.

- **Twirl with a Cane or Rake**: Use a bamboo cane or a spring rake to twirl the weed out like candyfloss. USE LARGE FISH NET TO REMOVE BLANKET WEED

- **Protect Wildlife**: Always leave removed weed on the bank for **24 hours** before composting. This allows small invertebrates like dragonfly larvae or snails to crawl back into the water.
- **Frequent Skimming**: Regular small-scale removal during warm weather prevents the weed from forming thick, suffocating mats. USE LARGE FISH NET TO REMOVE BLANKET WEED

3**.** Natural Preventative Treatments

If manual removal isn't enough, consider these eco-friendly additives:

- **Barley Straw**: Floating a mesh bag of loose barley straw is a traditional remedy. As it decomposes, it releases low levels of hydrogen peroxide that inhibit new algae growth.
    - *Dosage*: Use roughly 50g per square metre of surface area.
    - *Timing*: Add it in early spring before growth peaks; it can take 6–8 weeks to become active in cool water.
- **Beneficial Bacteria & Enzymes**: Products containing natural bacteria help digest the "sludge" (decaying organic matter) at the bottom, starving the blanket weed of its food source. NOT APPLICABLE
- **Ramshorn Snails**: These native aquatic snails are voracious algae eaters and help maintain a natural balance by grazing on fine growth. NOT APPLICABLE

4. Long-Term Ecological Balance

- **Increase Plant Cover**: Fast-growing native plants, such as water lilies or oxygenators like hornwort, compete with algae for nutrients and provide shade to cool the water. Aim for **one-third to one-half** surface coverage. EPHEMORIAL PONDS LIMIT THE PLANT CHOICE
- **Avoid Tap Water**: If you must top up the pond during dry spells, use rainwater. Tap water often contains high levels of phosphates and nitrates that act as fertilizer for blanket weed. NOT APPLICABLE
- **Create a Buffer Zone**: If the pond is near a lawn, maintain a strip of long grass or marginal plants around the edge to intercept nutrient-rich runoff from fertilizers.

8.1.4. Practical Management of the Wetland Area Pond

1. Reduce Nutrient Input from Trees

Leaf fall from the trees is probably the major source of organic matter. The leaves decompose generating the nitrates and phosphates that can fuel blanket weed. We cannot remove or trim the trees. Nor is it practical, or desirable, to net a natural pond meant to support wildlife. Therefore, it is advised that volunteers (in waders if necessary) use the large fishing net on a long pole to sweep fallen leaves off the surface of the pond during the autumn leaf fall season.

2. Manual Removal of Excessive Blanket Weed

Physical removal is the most direct way to "export" nutrients from the pond system.

When mats of blanket weed form, it is advised that volunteers (in waders if necessary) use the large fishing net on a long pole to collect and remove the weed from the pond. Mats of blanket weed should be dumped on the ground near the side of the pond to allow any small aquatic creatures to escape back to the water.

Removal of blanket weed should happen whenever it is seen to be spreading. In the spring care should be taken to avoid disturbing amphibians and spawn.

3. Create Buffer Zones

Least important step is to have a strip of tall grass or marginal plants around the edge to intercept any nutrient-rich runoff from the park. This is largely achieved by the ‘fedge’ on the eastern side and the hedging on the western side.

4. Other Potential Actions

4.1 Use of barley straw in mesh bags as a natural suppressant for blanket weed. Add it in early spring before growth peaks; it can take 6–8 weeks to become active in cool water.

4.2 Add products containing natural bacteria help digest the "sludge" (decaying organic matter) at the bottom, starving the blanket weed of its food source. This is not good for a natural pond; it will not survive the dry period and when the spring is flowing would be washed away.

Season	Practical Actions
Spring	Remove excess blanket weed using the fishing net on the long pole. Perhaps apply barley straw in mesh bags at 50g per square metre of surface area.
Summer	Monitor for blanket weed, remove with fishing net if excessive. When the pond is dry remove sludge from the pond sump.
Autumn	Regularly remove fallen leaves using a fishing net on a long pole.
Winter	Continue to remove leaves and extract blanket weed if excessive.

Table 4 Practical Actions to Control Blanket Weed

8.2. Duckweed

8.2.1. Problem

Duckweeds are small, free-floating aquatic perennials that combine to form a green 'carpet' on the surface of the water. Each plant consists of a single, rounded, leaf-like body (frond) usually not exceeding 5mm (⅛in) in diameter. This floats on the water's surface and typically has one or more slender, submerged roots, around 15mm (½in) long.

There are five native and two non-native species of duckweed in the UK. The most common species are Lemna minor, L. gibba and L. minuta. Duckweed grows and multiply rapidly in warm, nutrient-rich, still or slowly-moving water. Duckweed provides food and shelter for aquatic wildlife, however, large mats of duckweed can shade and outcompete other aquatic plants and reduce pond biodiversity.

It is difficult and unnecessary to completely eradicate duckweed, and there are ways to stop it becoming a problem.

8.2.2. Control of Duckweed

Duckweed is often unknowingly introduced to ponds. It may also be brought in on the feet of visiting water birds or arrive in watercourses. Duckweed spreads by vegetative propagation (cloning), where two daughter plants bud off from an adult one. This takes place every two to three days in warm summer conditions, meaning a single duckweed plant can very quickly become a large mat that completely covers the surface of a pond.

Duckweed should be regularly controlled to stop it smothering and outcompeting native plants in the pond. However, as it is also a valuable wildlife plant, providing food and shelter, the aim should be to reduce its numbers down to an acceptable level rather than trying to eradicate it completely.

For the Wetland pond the most practical method of control is to use the fishing net on a long pole to scoop fronds from the water when they are present. This is mostly during warm spells in the spring and the summer before the pond dries out. In summer months duckweed numbers can double every few days.

During the autumn and winter remove debris, leaves and other rotting vegetation from the pond. These increase the nutrient content of pond water, encouraging duckweed growth. Remove leaves as they fall in autumn using the fishing net on a long pole.

When removing silt from the pond in the summer check the sides of the pond for duckweed. If duckweed is present scrape off the soil with the duckweed and bury it away from the site of the pond excavation.

Note that many of the control measures for duckweed are the same ones used to control blanket weed.

Season	Practical Actions
Spring	Monitor for duckweed, remove excess duckweed using the fishing net on the long pole.
Summer	Monitor for duckweed , remove with fishing net if excessive. When the pond is dry scrape off any soil with duckweed and bury away from the pond.
Autumn	Regularly remove fallen leaves using a fishing net on a long pole.
Winter	Continue to remove leaves.

Table 5 Practical Actions to Control Duckweed