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STOCKLAND BRISTOL
St Mary Magdalene
Drainage Options Appraisal

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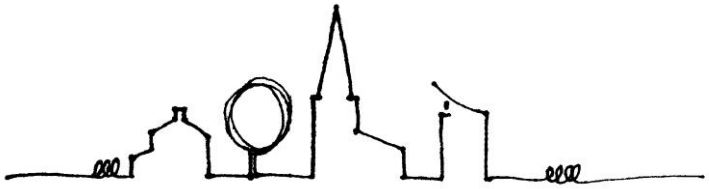


1.0 Introduction

1.1 This Options Appraisal was commissioned by the PCC to consider drainage options for a new WC and kitchenette inside the church. The purpose of this report is to help the PCC with its assessment and to start the process of consultation.

1.2 In considering the options for drainage, the impact of such a change needs to be considered in relation to all aspects of the building, costs and environmental implications.

2 Background Information

2.1 Stockland Bristol is a small village situated some 5 miles northwest of Bridgwater and close to the Steart Peninsula. The village is recorded in the Domesday Book meanwhile the 'Bristol' name was added in reference to its ownership by the Bristol Corporation from 1541 to 1839. During the 2nd World War, two wireless Direction-Finding stations, also known as 'Y-Stations' were located in the village.

2.2 The original medieval church was demolished in 1865 and the rebuilt church was designed for the Daniel family of Stockland Manor. The church is Grade II listed. The church is not within a Conservation Area but it is registered as being in poor condition on the Historic England 'at risk' register.

2.3 The church comprises a nave, chancel, north aisle, south chapel, vestry, south porch and west tower. The main body of the church may be partially built of brick and clad in Blue Lias with Bath Stone dressings all under plain clay tiled roofs.

2.4 The design has been attributed to Arthur of Plymouth but an article from the Somerset Free Press dated 1967 attributes to the design to T S Hack of Bristol and following his sudden death to Godwin and Crisp. This account states that the church and tower are built of Blue Lias stone with Bath dressing all backed by bricks. The masonry work was carried out by Hartree of Clevedon with other building works and carpentry etc carried out J & J Foster of Bristol. The roof tiles were Staffordshire Brown and inside, the floor tiles were made by Godwin of Hereford. The three stained glass windows are by Clayton and Bell. The church retains the font, two memorials and sections of the chancel screen from the original church.

2.5 Post code: TA5 2PZ.

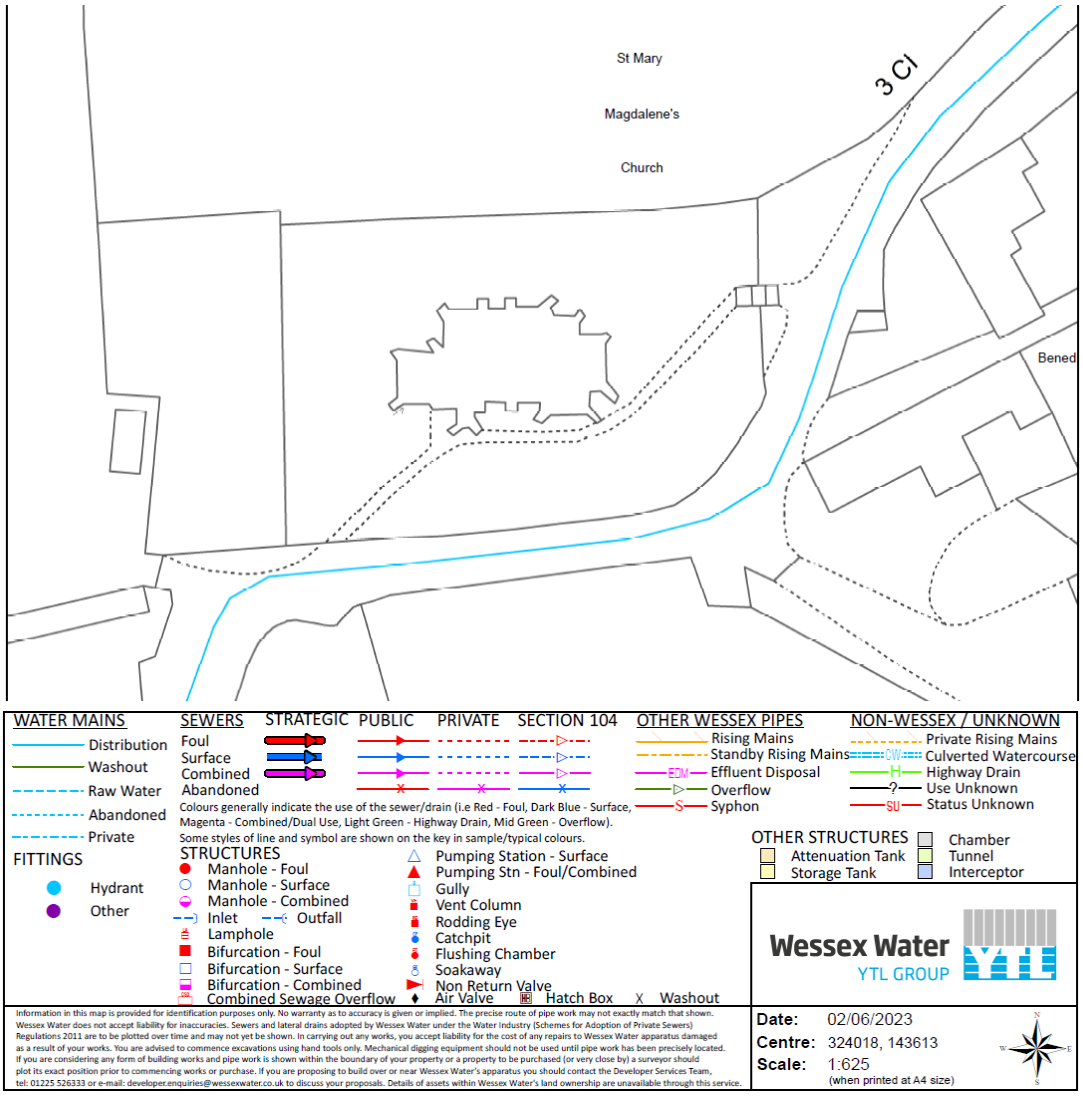
3. Site Context

3.1 The church is located centrally within the churchyard, on the same footprint as the previous medieval church. There are burial markers on all sides and it can be assumed that there are many more unmarked burials throughout.

3.2 The churchyard contains a number of mature trees, with a dense line of planting to the north, and a small mature woodland to the west referred to as 'The Spinney'.

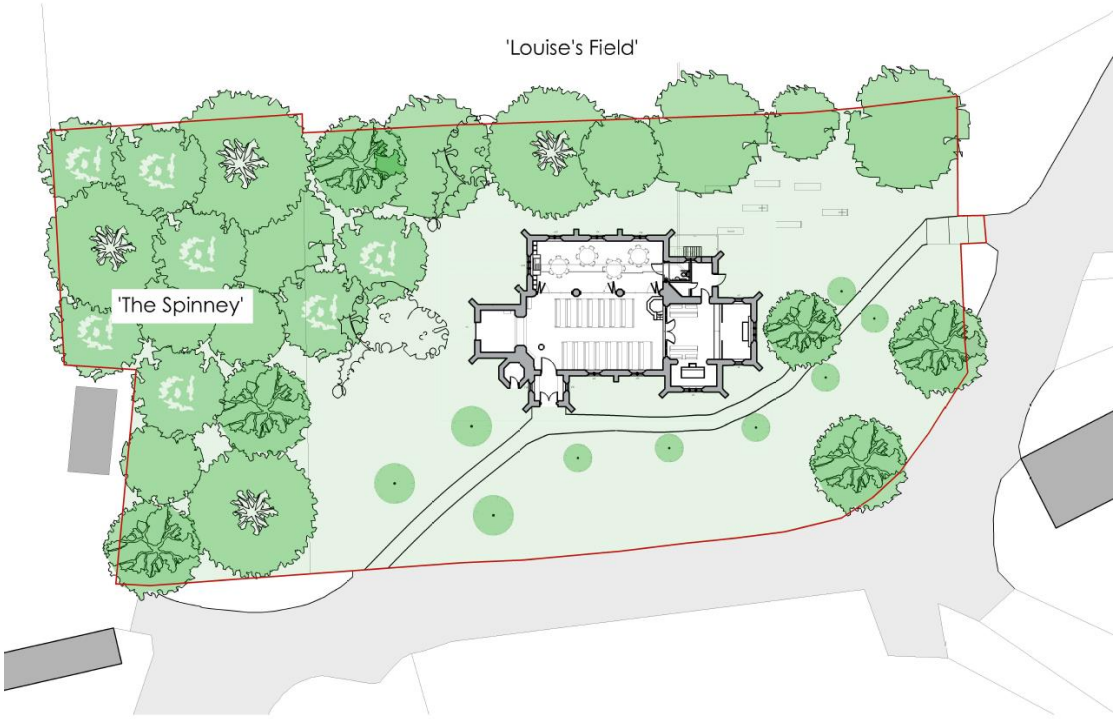
3.3 To the north, beyond the churchyard wall there is open farmland currently used for grazing, and locally referred to as 'Louise's Field'. The churchyard is bounded to the east and south by the village road, with an access point on both walls.

3.4 There is no mains drainage in the village. A Wessex Water water supply pipe is located beneath the roadway, providing connections to neighbouring houses.



Wessex Water network map.
Fig 1

3.5 Church site plan:



Site Plan.
Fig 2

3.6 Photographs:

Left: Churchyard entrance from south.
Right: Churchyard entrance from east.

2 The Options

2.1 Option A – Trench Arch System

A trench arch is a low-tech practical solution which is feasible for low-usage drainage systems where a mains drainage connection is not feasible. It is essentially a long hollow chamber, built underground, which allows effluent to be broken down aerobically. Trench arches can accommodate occasional 'peak' usage and can be installed on marginal soil types where percolation test results are sub-optimal. These are generally 400mm wide, 400mm deep and approximately 8 meters long, subject to percolation test results.

This option could be installed within the field to the north, or possibly within the churchyard along the north elevation of the church. Installing within the churchyard reduces the cost of excavation, and the necessity for a legal agreement to create a wayleave with the neighbouring landowner.

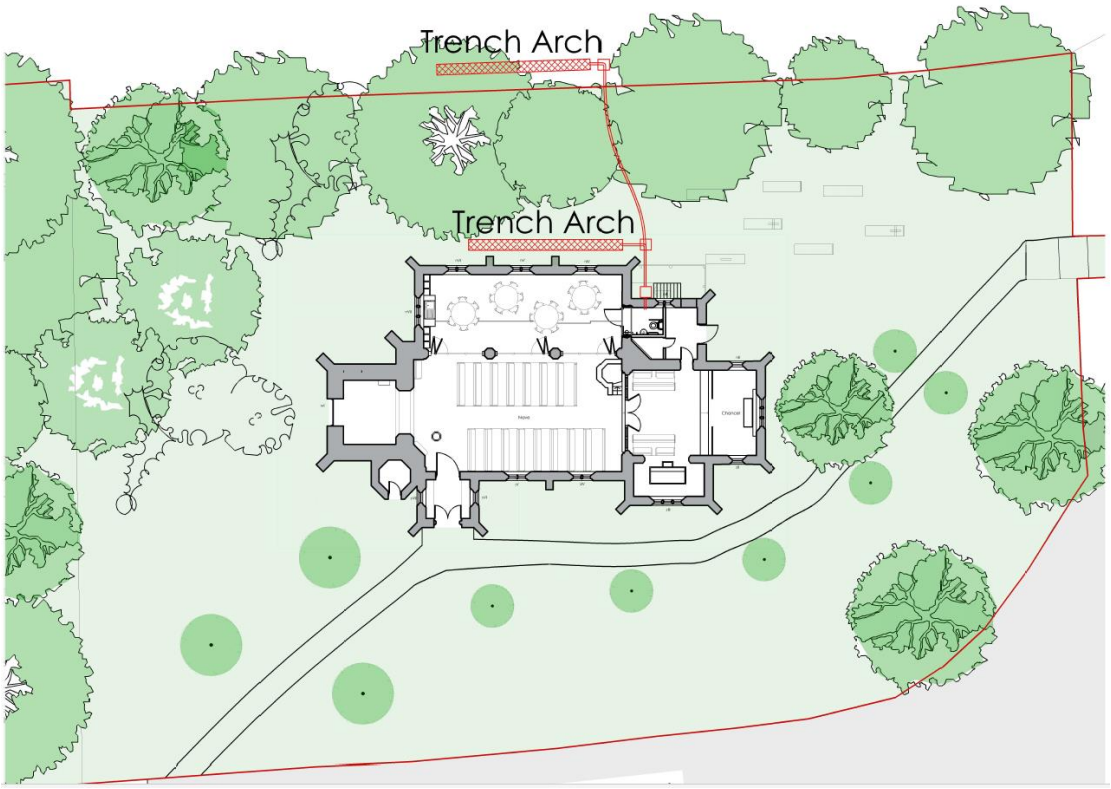
Risks to this installation are:

- An assessment of tree root protection areas is required. Significant excavation will not be permitted within a zone 12 times the diameter of the tree.
- Burials within the excavation area.

The trench arch could also be installed in the field to the north. In this instance, the drain could be 'moled' through the root protection zones to minimise disturbance of burials and tree roots. *'Moling' is a process whereby a drain is fed through the ground, between two pits, without the need for digging a trench.* The principal risk to this variant is the need for an neighbour to agree, and for a legal agreement to be put in place.

The land over a trench arch can be used for grazing, or as a lawn.

A trench arch being constructed.
Fig 3



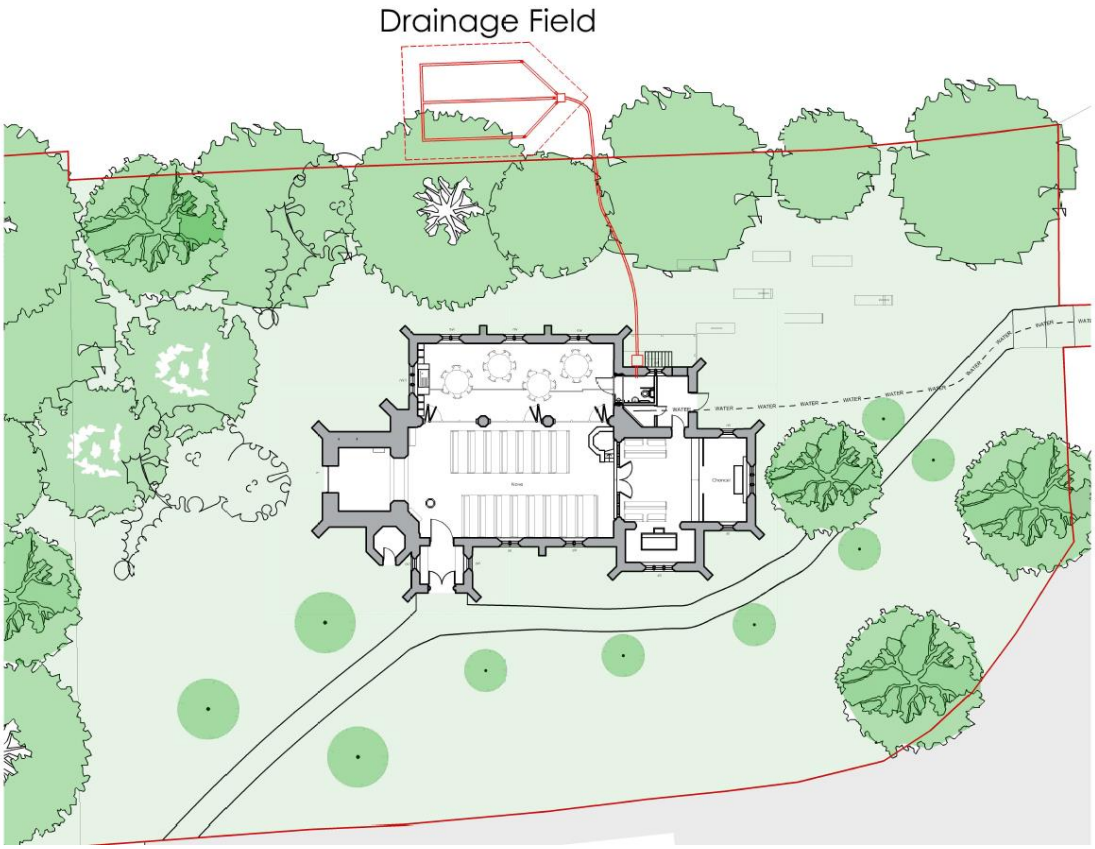
Trench Arch in churchyard, with alternative location in north field also shown.
Fig 4

2.2 Option B - Modular Wastewater Treatment Plant (WWTP) in cellar

This option reduces the risk and disturbance of excavation and makes use of the cellar. As access to the cellar is limited, the wwtp would have to be constructed from modular units to create two tanks. A blower unit is then installed within this tank, allow the effluent to be broken down aerobically. The treated effluent from wwtp's is clear and odourless and can often be discharged to a ditch, but in the absence of a suitable ditch, a drainage field would need to be constructed in the field to the north. This is a series of trenches, filled with gravel, with a perforated pipe in each, allow the treated effluent to percolate into the ground and for any remaining 'nutrients' to be broken down by bacteria in the soil.

This type of system requires a power supply, and periodic servicing to remove 'sludge'. Power usage is very low, similar to a lightbulb. De-sludging is recommended annually. The land over the drainage field can be used for grazing, and future access is not required to the drainage field once installed.

It may be possible to retain bat access to the cellar, if not, a compensatory bat roost may need to be constructed.



Drainage field in field to north with wwtp in cellar.
Fig 5

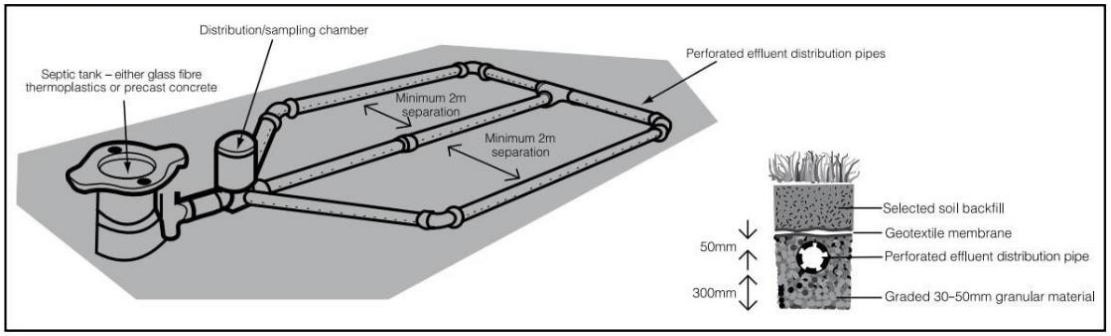


Diagram showing construction of small domestic drainage field.
Fig 6

2.3 Option C - 'Aquatron' in cellar

Again, this option reduces the risk and disturbance of excavation and makes use of the cellar. An 'Aquatron' is a device which separates solids effluent from liquids and breaks down solid waste into compost. It is slightly smaller than a wwtp, lighter and does not use electricity. It does however require emptying and dispersing once every six to twelve months.

This option would not affect bat usage of the cellar but would require a drainage field in the field to the north.

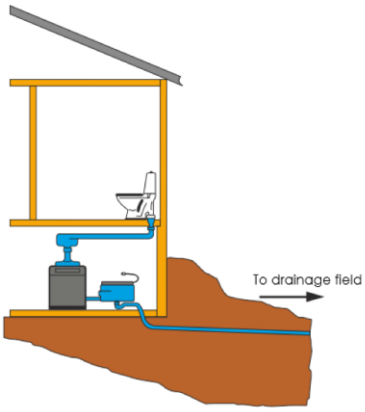
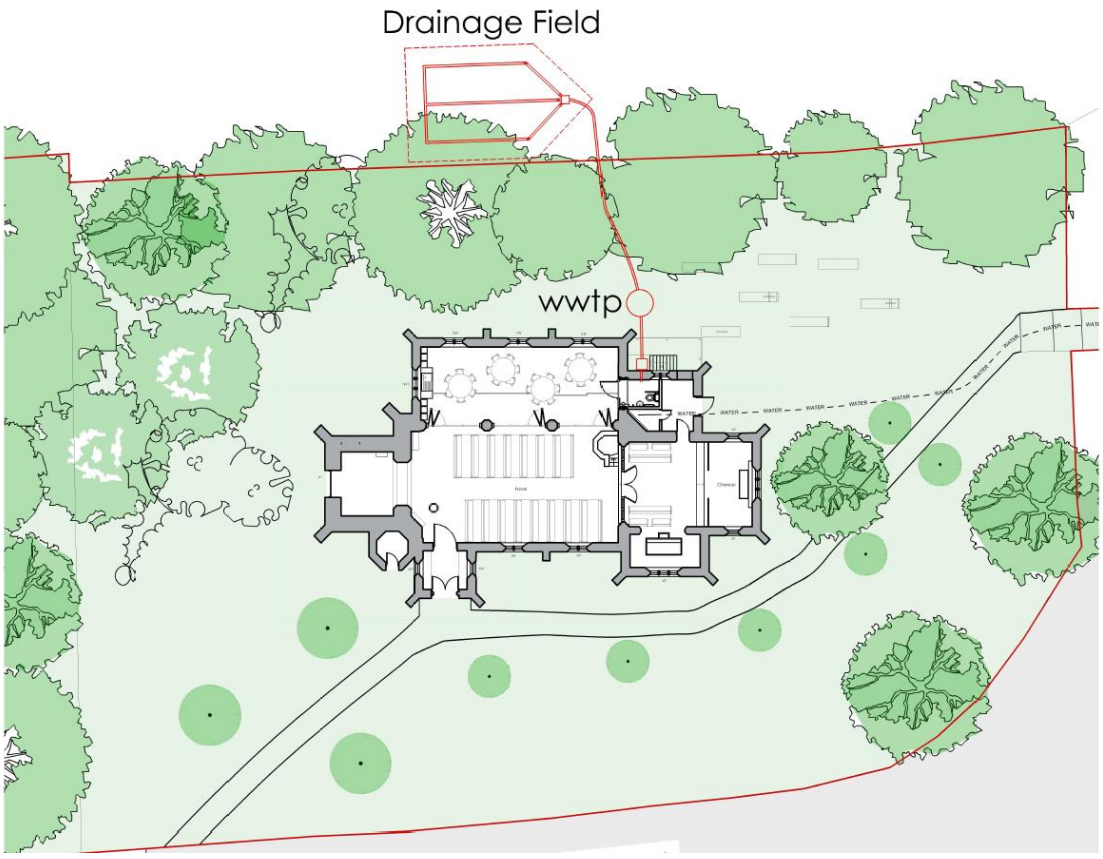


Diagram of aquatron in cellar within domestic setting.
Fig 7

2.4 Option D - WWTP in churchyard

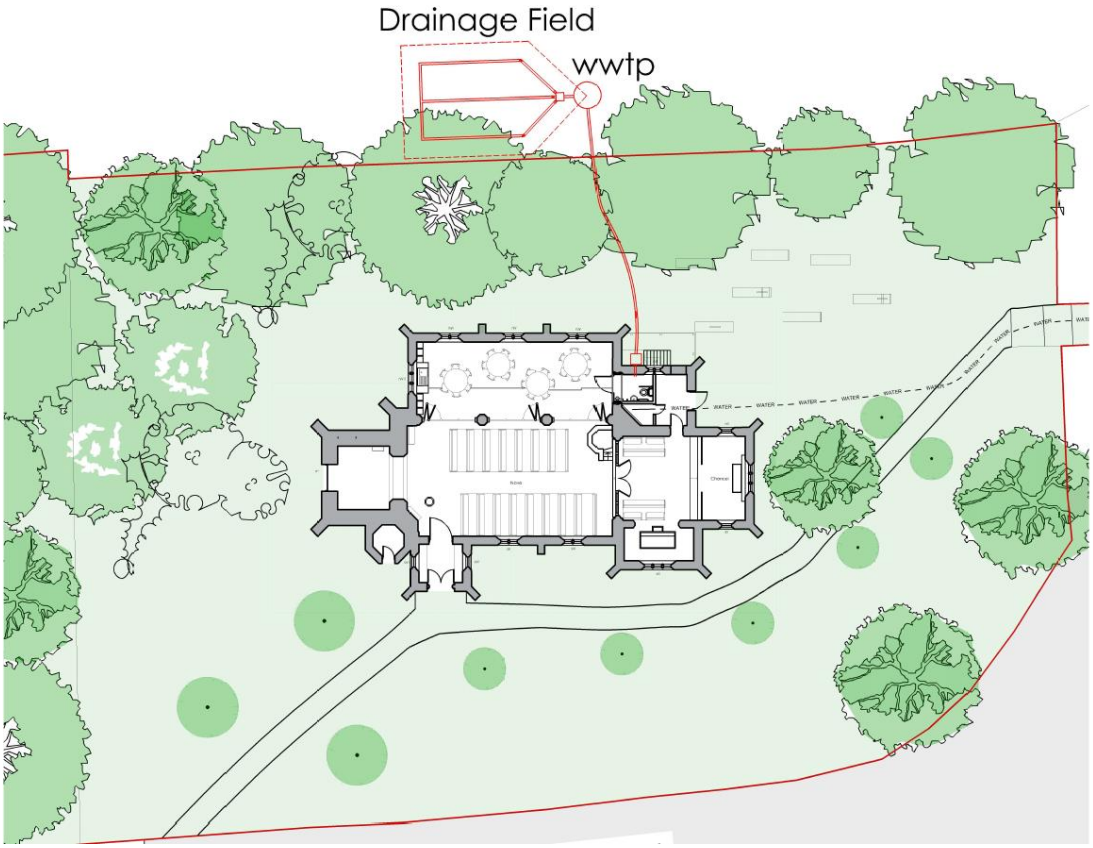
It may be possible to excavate an area to the north of the church to install a wwtp. The smallest wwtp's can be installed in a pit measuring 1.5m x 1.5m. There is a high possibility of encountering archaeological material, including articulated burials but by allowing some flexibility in locating the wwtp, the excavation may be feasible. Archaeology is a considerable risk; if an articulated skeleton is uncovered during excavation, it would be more cost effective and more appropriate to re-commence digging nearby rather than seek consent to re-inter the burial elsewhere. The cost of excavation cannot therefor be accurately forecasted for excavation within the churchyard.



WWTP in churchyard with drainage field to north.
Fig 8

2.5 <u>Option E</u> – WWTP in field to north

Subject to agreement from the neighbour, the archaeology risk can largely be mitigated by locating the wwtp and drainage field both in the neighbouring field. A gravity drain would deliver effluent to the wwtp. A power source is required for the blower in the wwtp, but this can be located within the churchyard. It may also be feasible to locate a standpipe within the church, as a connection point for the annual de-sludging of the wwtp. This would potentially negate the need for access onto the adjoining land in future.



WWTP in field to north
Fig 9

2.6 <u>Option F</u> - Connection to Cesspit to west

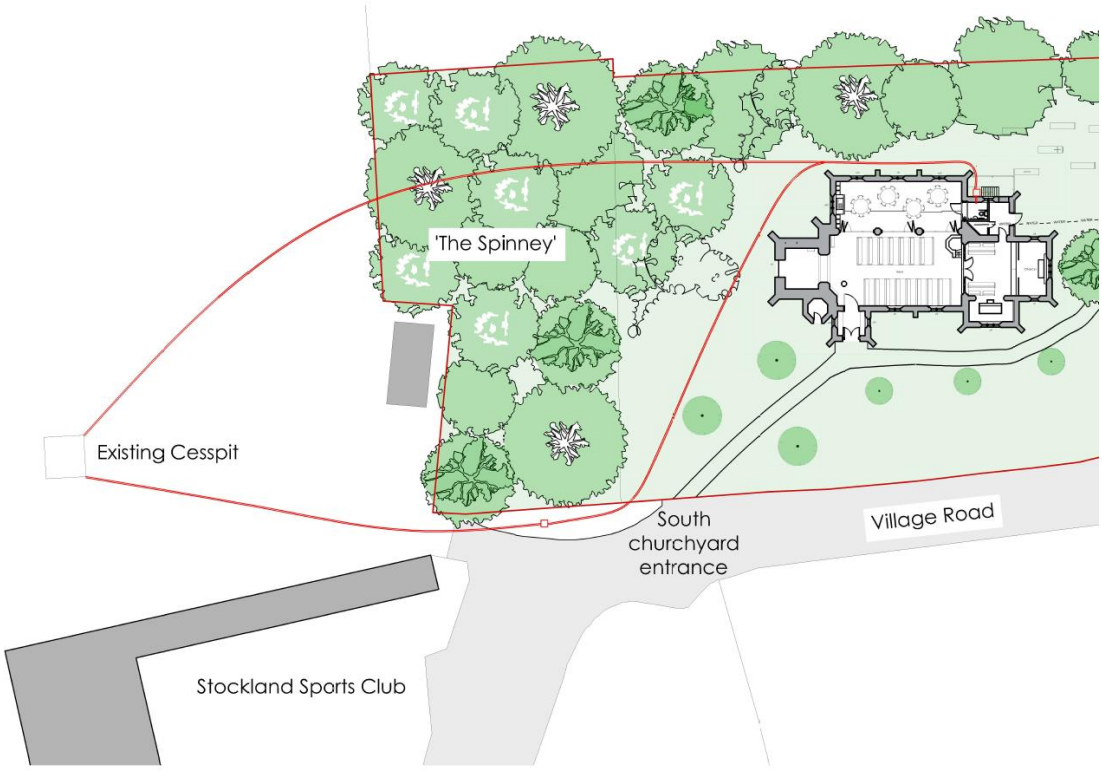
The drainage run from the WC location to the cesspit in the field to the west is approximately 90m. In theory, this drainage run, can be moled, using a 50mm diameter pipe and there are sewage macerator pumps which can pump this distance. There are considerable risks associated with the longevity of this installation as it is likely the drain would be subject to soil heave around tree roots and the likelihood of the drain being distorted in future is high, which would lead to blockages.

A gravity drain to the cess pit would need to be laid at a gradient of 1:80, meaning a fall of approximately 1m, from the invert of the pipe at the church. This means a total level change of approximately 2m from the WC. From a visual assessment, the cesspit appears to be situated too far up the slope to accommodate this fall. The drain run would also be subject to heave from tree roots in the spinney.

Neither of these connection options to the existing cesspit are recommended.

An alternative route, avoiding the majority of trees by diverting to the south churchyard entrance, increases the drainage run to 105m. In this option, the first 60m of drain to the south churchyard gate would be pumped. A manhole would then be built near the gate, and from here a gravity drain could be dug to the cesspit. The length of gravity drain would be 40m from the manhole, to avoid the need for an additional manhole within the field.

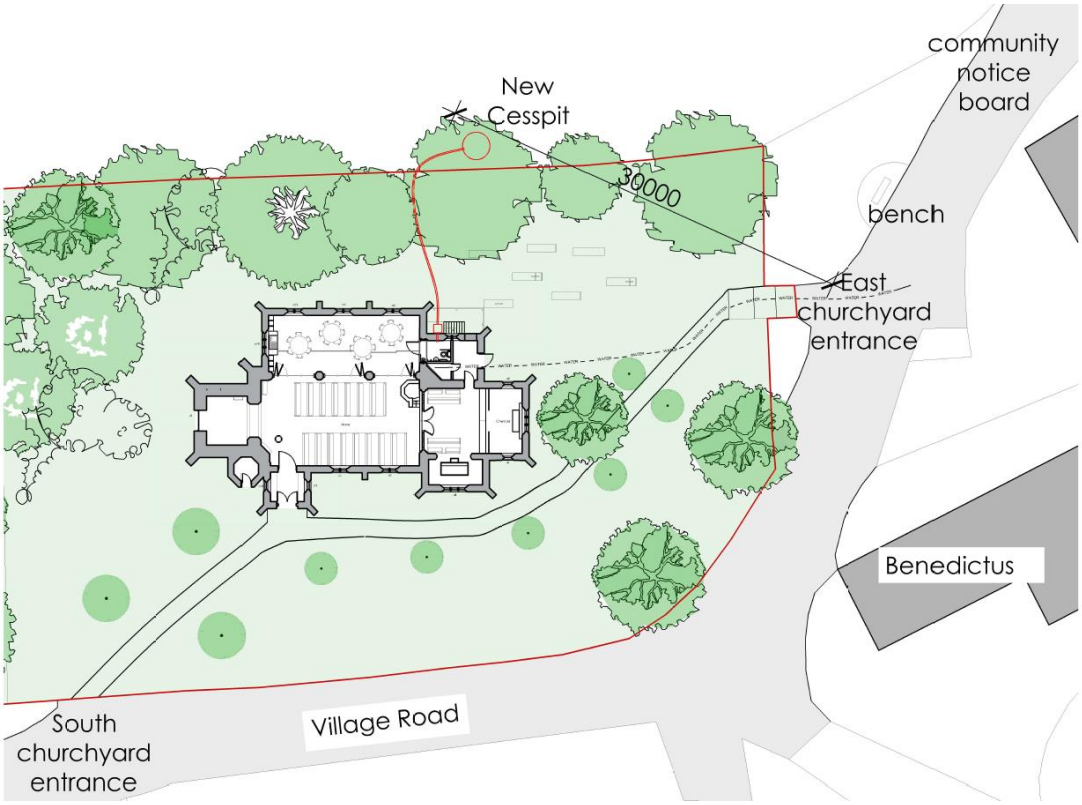
The risks associated with this are 1-The need for a wayleave agreement with the neighbour and also Somerset Highways. 2-Ecology impact of installing the sump pump in the cellar. There is a low chance of this being considered as harming the roost. To mitigate this, it may be possible to locate the pump to the north of the vestry. 3-The risk of mechanical or electrical failure for the pump. To mitigate this risk, a twin-pump system can be installed, or a tank with higher storage capacity can be specified.



Connections to existing cesspit to the west.
Fig 10

2.7 Option G - New Cesspit in field to north

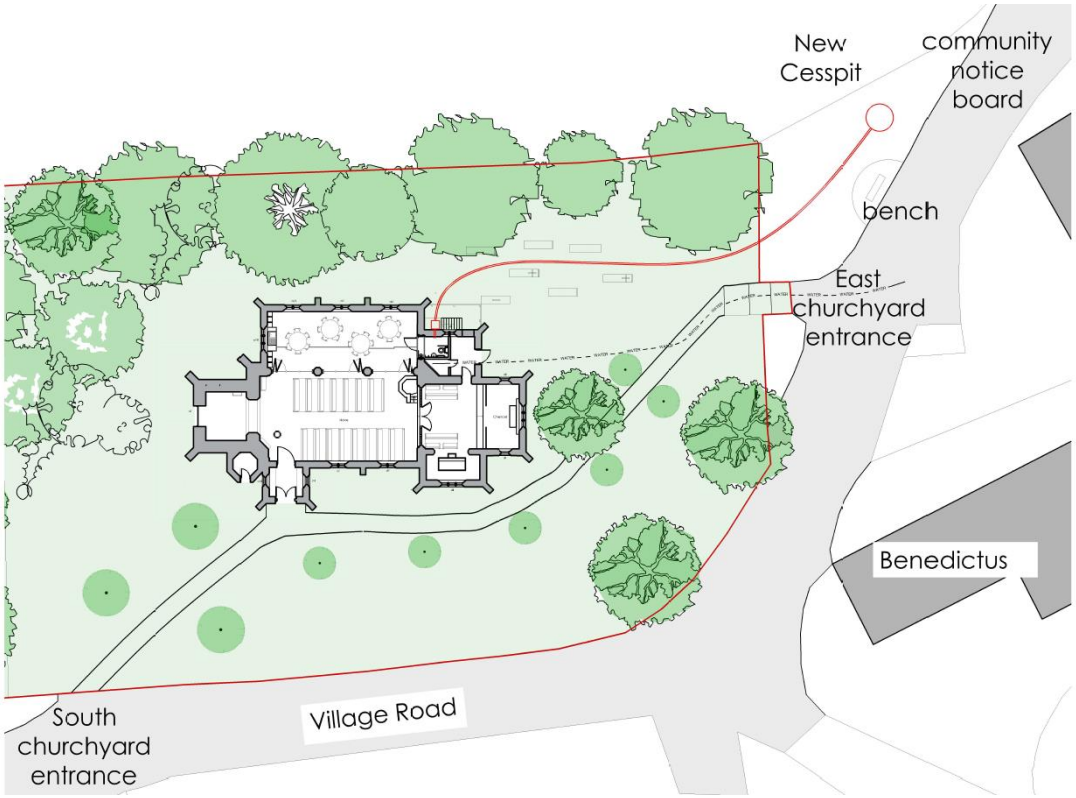
A new cesspit could be constructed within the field to the north. This should ideally be situated within 30m of road access for emptying. A gravity drain could be moled to this location. A power supply would also be required to the cesspit to monitor the level. The principal risk with this installation is if taps are used excessively, or water left running, the cesspit can fill up very quickly, leading to more regular emptying. It may be possible to install a pipe within the churchyard for emptying so that the emptying contractor would not need to access the cesspit when emptying.



New cesspit in field to north.
Fig 11

2.8 **<u>Option H</u> – New cesspit to east of churchyard.**

A new cesspit could also be constructed in the grassed area to the northeast of the east churchyard steps. Land ownership of this area would need to be confirmed and this will affect the cost of legal agreements. A gravity drain could also be moled to this area and access for emptying is much easier, with no impact on neighbouring land use or livestock.



New cesspit in grassed area to east of churchyard.
Fig 12

3 Next Steps/Conclusions

3.1 The next stage is to fine tune the Options Appraisal, include any additional missing information and to prepare a preferred option. With a preferred option and a developing brief early informal consultation with the DAC is to be encouraged and a site visit is likely to follow.

3.2 Consultation with neighbours is a further very important community aspect of the scheme.

3.3 All options except cesspits are subject to slight variation of cost following the result of a percolation test to ascertain the porosity of the soil. The soil porosity affects the sizing of drainage fields and trench arch systems.

3.4 There are a number of mature trees within the area where excavation and moling is being considered. It is likely the Local Authority will require advice from a qualified arboriculturist in relation to the potential for the proposals to cause harm to tree roots. This tree advice may inform the choice regarding the above options.

3.5 A written scheme of investigation (WSI) will be required for the consent processes and an archaeological watching brief will be required for all excavation within the churchyard. A budget of £250 should be expected per day of archaeological supervision with a further allowance of £250 for the archaeologist's report.

3.6 Options which rely on future access to the cellar for maintenance may encounter additional expense in future if access or certain works are prohibited due to the presence of bats.