Site Investigations Report

for Mechanical, Plumbing & Electrical Services

at

The Walled Garden

Wonham Lodge

Bampton Tiverton

EX16 9JZ

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Ref: P453

Date: 27/12/2021

Issue: 01

Contents

Document Control

Job Title	The Walled Garden, Wonham Lodge, Bampton Tiverton EX16 9JZ		
Job Number	P453		
Document Title	Site Investigations Report for mechanical, plumbing & electrical services		
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Dated:	27/12/21		
Version:	STATUS (Final)		
Revisions:	No.:	Date:	Approved:

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1.0 Introduction

En Masse Design Ltd is appointed by Laila El-Kayem and Sophie Mayer to undertake a site services investigation of the Walled garden, Wonham Lodge in Bampton, Devon.

En Masse Design attended site on 10th December 2021 to conduct the survey of the site, the existing buildings and adjoining and surrounding areas.

2.0 The Brief

I. Identify existing locations on site that have power and water and identify their source.
II. Locate nearest utility power, mains water and telecoms services to the site.
III. Discuss engineering proposals with clients.
IV. Discuss need for tests on site.

3.0 Glossary

- CIBSE: Chartered Institute of Building Services Engineers
- CWSC: Cold water storage cistern – not considered suitable for storage of wholesome water
- CWST: Cold water storage tank – closed container for water. Can store wholesome water subject to satisfying water regulation rules
- Direct hot water Cylinder: Heated by an electric immersion. Does not contain a primary heating coil for heating by hot water from a boiler.
- Direct mains fed systems: Where all hot and cold water fittings in the property are supplied from mains water pressure.
- L/min: Litres per minute
- MCWS: Mains cold water supply.
- MDPE: Medium density polyethylene. (Not UV resistant)
- OD: Outside diameter.
- Potable: Water fit for drinking
- UV: Ultra violet light
- Wholesome water: Mains cold water supplied from the incoming utility water supply that is suitable for human consumption.
- Water conditioning: Electromagnetic water conditioning used to prevent scale formation caused by hard water in plumbing systems.

4.0 Reservations

The inspection of the services and conclusions and recommendations made within the report are limited to visible building services. Services installations which are concealed within the building fabric such as sealed riser ducts, shafts, ceiling voids, etc. or buried below ground are unable to be considered.

Any design calculations on the existing services used in the report are for feasibility purposes only.

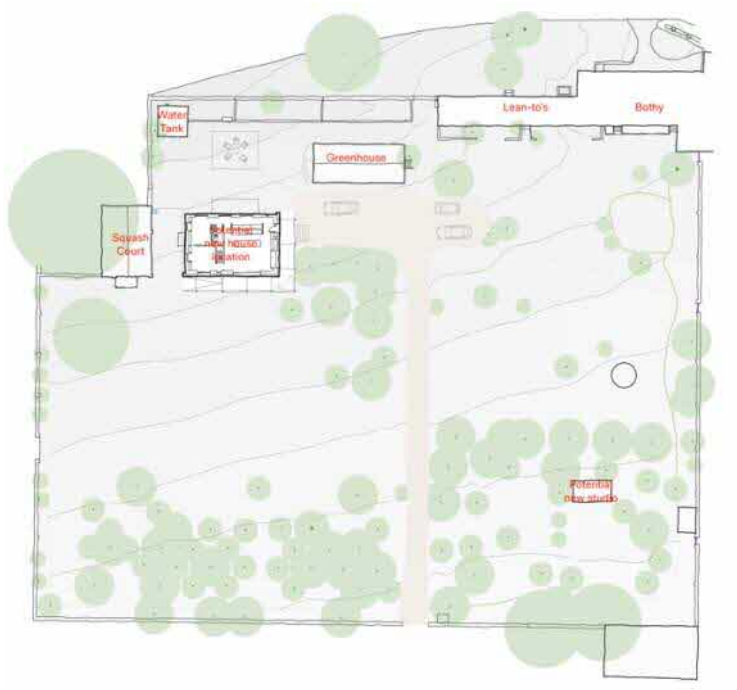
The report does not comment or give advice relating to any spore fungus or bacteria that may be contained within the building or any of its services.

En Masse Design Ltd disclaims any responsibility in respect of incorrect information imparted to them for the actual performance of the installed building services.

5.0 General Description of the Site & Buildings

The rectangular site is on a north east by south west axis and circa 1.65 acres in area. It is enclosed by a tall brick wall with several openings for access. The site comprises the following existing buildings of approximate area:

- Squash court (72m2)
- Communal Water tank (18.7m2)
- Green house (71m2)
- Lean-to's (98m2)
- Bothy (154m2)



Site plan (not to scale) indicating site boundary

The squash court building is to be retained and requires structural repairs and Architectural improvements. This building is intended to be used as a studio space with scope to include a mezzanine. The building will require new services.

The communal water tank is c.3.5m high and 4.2m x 4.2m on plan and built of masonry. The structure is supported on nine 2.1m tall brick piers.

The correct term for this structure is cistern or reservoir which is filled by an electric pump from a spring or other fresh water source and drained by gravity. The cistern holds approximately 12,000 litres of water.

> According to Energy Saving Trust - average water consumption per person per day for domestic use is 142 litres.

The cistern supplies cold water to buildings in the walled garden and is known to serve neighbouring domestic properties. Neighbours connected to the water supply have legal rights of access and water.

The lean-to's have become dilapidated and are dangerous to enter. At the time of survey the incoming mains power and meter are noted as being located on the brick wall below the lean-to. The condition is considered very hazardous due to the partial collapse of the roof and wall which the meter box is fixed to. The client is notified of this and the meter is now safely relocated by the utility company.

The bothy is utilised for accommodation and has self-contained heating via a wood burning stove, power, electric lighting, domestic hot water (electrically heated), cold running water and drainage. The clients are in the process of adapting this space to serve as their temporary accommodation. The bothy will be a future studio and accommodation space.

The green house is dilapidated and not presently fit-for-purpose. A new building will take its place and will require services.

Future proposed buildings on the site comprise a new build 2 bed detached dwelling and a small studio building. These will each require service connections.

6.0 Existing Services - Description & Observations

6.1 Communal Water Supply

Water is stored and supplied from an elevated concrete cistern in one corner of the site. This provides gravity pressure water supply to neighbouring properties including the walled garden. The source of this water supply is understood to be from Wonham House.

The cistern structure is concrete and of unknown date of construction. The cistern has a visible single removable cast iron inspection cover on its roof. This allows inspection inside of the tank.

As previously stated, the assumed water storage volume is c.12,000 litres when full. Approximate measurements were taken during the survey.

External masonry water storage cistern c. 3.5m tall.

Water cistern removable cover. Lever tools were required to remove it.

Copper pipe (possibly pumped supply) covered in green patina, which will eventually corrode the pipe.

Cistern access cover. Cover will not fully protect against mud, insects and rain water entry. There is no seal or locking nuts.

Unknown open vessel below cistern. Possibly an overflow tank of some description for cistern above.

Immovable valve and pipes under cistern tangled with thick tree branches.

External water stand-pipe against outside of site wall. The tap was not working.

Observations

a) The inspection cover is not suitable to prevent entry of external contaminants into the water cistern. The lid has no seal and is not secured with screws.
b) Without sample testing it is not known if the water meets standards fit for human consumption.
c) The water overflow pipe is not screened to prevent entry of insects or rodents into the cistern.
d) The cistern has no float valve to regulate the inlet and rate of fill. It relies on filling by remote timer by a neighbour.
e) Access to inspect inside the cistern is located on the roof of the structure. This is considered hazardous. There is no fixed ladder or safety rail. The hatch is close to the edge of the cistern.

The removable hatch is heavy to lift and requires tools to lever it out from its frame. There are no lifting handles.

f) Neighbours have advised that the water storage capacity runs out. When this happens a remote pump has to be manually enabled to replenish the stored water. The cistern is filled daily from a pump which runs for a number of timed hours in the day.

g) There is no labelling on pipes and valves to help identify their purpose.

h) On inspection inside, the cistern has a build-up of sediment. There are no records of when it was last cleaned out and checked for bacteria.

i) Adding new pipework connections to the cistern would be considered difficult due to its masonry construction.

j) There is no evidence of water seepage/ leaks from the concrete cistern.

k) Exposed pipes under the cistern have no protection from frost or impact damage. The pipework is showing some signs of corrosion but has clearly remained like this for a long period.

l) It is not known what material the cistern is lined with. Very old cisterns used lead and sometimes fiberglass.

m) When the storage is at maximum the fresh water overflows and discharges across the garden making it water logged as the pump has no way of knowing that the cistern is full. This was evident on the day of the survey.

n) In accordance with standard practice the storage volume of c.12,000 litres is considered sufficient to serve an equivalent of 84 people per day for domestic use. The loss of supply could be a factor of the pump running infrequently and on occasion only partially filling the cistern. Alternatively the supply pipe crossing the site to serve properties is undersized to meet the demand of peak simultaneous usage. Some neighbours connected to this supply may be using the water for non-domestic as well as domestic use which could mean they consume more than the average 142 litres per day.

o) It is not known how tank and pump maintenance/ running costs are apportioned between neighbours.

p) Neighbours have advised that they use the cistern water for drinking and have their own water filters to remove any particles.

q) Buried water supplies crossing the site connected with neighbouring properties are shown indicatively on the Bishop Longbotham & Bagnall plan. The actual route taken is unknown without a full survey scan or exploratory dig used for locating the pipe(s).

r) A neighbour advised that they do drink the water from the cistern after it has been filtered. They have no concerns about its quality and advise that the taste is fine.

6.2 Domestic Hot & Cold Water Services

The supply of water to buildings on site is via modern blue MDPE pipework. The pipework is assumed to be fed from the concrete cistern on site. The pressure of water supplied will depend on the level of water in the cistern. At best this would be circa 2.5 to 3m head of water (0.3bar).

> As a comparison, average town mains water to a property is c.2 to 3bar pressure.

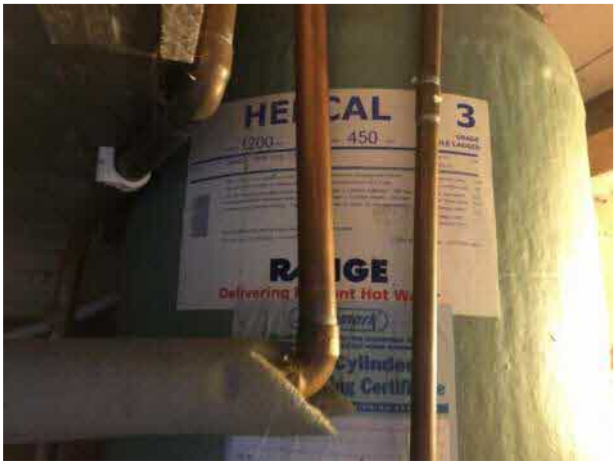
The bothy is plumbed in for hot and cold water and has a pre-insulated hot water cylinder and cold storage supported on a timber platform. The cylinder appears to be heated only by an electric immersion heater. Hot and cold water serve sinks and bathroom appliances.

Earthenware sink with MDPE water supply in bothy

Exposed blue water pipe in bothy

Exposed blue water pipe in lean-to

Exposed blue water pipe in lean-to



Direct heated hot water cylinder serving bothy


Insulated domestic water tanks serving bothy

Observations

a) Water supply to the bothy and lean-to is installed in a random way and difficult to follow its route through the buildings.
b) Where blue MDPE water pipe is exposed above ground, this is not resistant to damage by UV light. The pipes are also uninsulated and at risk from frost and impact damage.
c) The installed depth of water piping is unknown. The depth of buried water pipes must be a minimum of 750mm below ground to comply with the Water Regulations.
d) There is no filter in use for water that is being consumed from the cistern.
e) There is no water meter fitted to record consumption.
f) There appear to be no devices installed on the supply to prevent backflow contamination.

6.3 Power Supply

Power to the walled garden is fed from the utility overhead cable network distribution on timber poles crossing and surrounding the site and neighbouring properties. These poles are also shared by telecoms distributions.

The distribution network is fed from a remote transformer or substation. The location of this was not determined during the survey.

Power enters the site on the North side via an overhead cable crossing the neighbours driveway (Wonham Firs). The cable terminates in a meter box mounted on the boundary brick wall. At the time of survey the wall is noted as being dilapidated and the meter box is considered to be in a hazardous state. The clients have contacted the utility company and the box is now relocated to a safe position away from the lean-to.

The relocated power supply is a single phase 100amp service currently feeding the bothy.

Existing incoming power supply and meter located under dilapidated lean-to. The supply has a 415v fuse cut-out indicating that the incoming supply is 3 phase.

North East - Power and telecoms pole outside site boundary, supplies power to walled garden site.

Bothy single phase power and lighting electrical consumer unit

Observations

a) The power supply available on the site is suitable for a single dwelling. When all other buildings are connected, the supply will need to be changed to a 415 volt 3 phase 100amps service to cater for the additional load.
b) A single utility power distribution pole is located in the garden on east side of the site with overhead cables crossing from north to south.
c) The existing power supplies to other buildings on site are dilapidated.
d) There appear to be no safety devices fitted to the LV power installation in use with the bothy.
e) There is a risk of loss of power supply due to trees falling onto overhead power cables during storms.

6.4 Fuel Oil

The walled garden site comprises two existing oil tanks. The tank by the main entrance to the site is a disused steel tank and not suitable for re-use.

The second domestic oil tank is a modern Kingspan Titan GRP single skin unit of approx. capacity 1200 Litre and ideal for applications where bunding isn't a legal requirement. This horizontal oil tank is equipped with a sonic alarm to help reduce the chance of ever running out of oil. The tank is suitable for storage of Kerosene (C1/C2), Fuel Oil (A2) and Gas Oil/Diesel (D) as defined in BS2869 and BS EN590.

Oil storage tank behind bothy

Disused steel oil tank at entrance. Clients wish to retain as a feature

Observations

a) It is advised by the client that the plastic oil tank is located on land not belonging to the wall garden site. The clients would like to relocate the oil tank to within the boundaries of the site.
b) The plastic tank appears to be fit for purpose and should be reused subject to its capacity and future intended use.
c) No oil appears to be in use on site. The tank is connected to an oil line which runs into the bothy but is not evident as to what it serves.

6.5 Above & Below Ground Drainage

The site has gravity soil and waste drainage which runs from the bothy and is assumed to connect to a cesspit or septic tank on the site. There is indication of drainage alongside/outside of the squash court. It is assumed this is rainwater drainage. There is no mains drainage to discharge too.

Rainwater runoff is collected in gutters from roofs and is assumed to discharge to ground via a soakaway or combination of perforated French drains.

The capacity and condition of the foul water collection system is unknown.

Observations

a) No foul water performance issues have been advised by the clients.
b) There are no plans of the existing drain routes.

6.6 Telecoms & Broadband

Telecoms service is available around the site. The walled garden is understood not to be connected to a hardwired telecoms service. Mobile reception around the site was noted as good.

Telecoms service is available locally to the walled garden from a post on the North East side of the site and a post on site with cables crossing.

Observations

a) There is a risk of loss of telecoms supply due to trees falling onto overhead cables during storms.

7.0 Environmental Aspects

Solar

The site offers good winter and summer solar exposure with little obstruction from tall trees and buildings.

The site is considered good for potential harvest of solar energy with PV and/or solar thermal panels.

Wind

The walled garden may have potential to produce wind energy subject to environmental factors and wild life protection agency recommendations.

A full wind and environmental study should be undertaken to determine its feasibility. Planning requirements must be satisfied.

Geothermal

The ground stores both thermal and solar energy. This can be extracted with use of ground source heat pumps from vertical indirect loops at depths of 50 to 150m subject to ground thermal conductivity. Alternatively, shallow trench loops can be installed across a wide area of site.

Water extracted from an aquifer can be used with a special heat pump.

Rainwater

Rainwater which is generally soft quality can be collected from roofs and stored for use with irrigation systems, flushing WC's, and as a water supply for washing machines. It is highly encouraged to employ water conservation measures.

Aquifer

Water suitable for consumption may be extracted by a borehole and a pump from a natural aquifer. The site is known to exist over an aquifer which other neighbours have tapped into. Advice should be obtained from the Environment Agency and/or local borehole specialist to determine its suitability and cost to utilise.

Local Renewable Fuel Source

Wood pellet suppliers will be available in the area to provide a source of renewable energy for use with biomass boilers. Secondary heating fuels such as seasoned and kiln dried logs will be available for use with wood burning stoves.

Carbon Fuel Supplies

Kerosene (C1/C2), Fuel Oil (A2) and Gas Oil/Diesel (D) supplies will be available in the area for use with an oil tank to supply a boiler and/or standby generator. These generally require annual contracts with a supplier.

8.0 Conclusions & Recommendations

Water

a) An internal inspection of the communal water cistern to look for signs of possible contamination and debris should be carried out every 6 months for drinking water and every 12 months for potable/non-potable water.
b) Given the known communal water supply issues it is recommended that the clients consider the viability of a borehole for their own independent water supply.
c) Consultation with a borehole specialist is required to determine preferred location and equipment required.
d) There must be adequate separation of 50 metres minimum between a borehole and a sewage treatment tank. This must be considered at the earliest planning stage.
e) Whether water is supplied from a borehole or communal cistern, water filtration and possibly UV filtering will be required.
f) During construction works it would be advisable to not use the water from the cistern as this could cause supply issues for neighbours. A temporary water bowser would be recommended.

Power

a) The power supply currently installed will be suitable for supply to the bothy and as a contractors supply for the site. Separate metering will be needed for the building works.
b) The supply will require upgrading to 3 phase 100amps to serve the whole site and new build dwelling.
c) Investigations will be needed with the utility suppliers if it is required to remove/relocate the post in the garden. The utilities will have rights of way for these services crossing the site overhead or below ground.
d) The habitable buildings (bothy) must have smoke detection in accordance with Building Regulations.

e) It should be possible to arrange for the entry point for ducted power cabling to cross from the neighbours drive (Wonham Firs) below ground. A wayleave will be required for this.

Oil

a) The plastic oil tank shall be moved to a location within the site. The tank may serve an oil/ dual fuel boiler(s) and/ or a standby generator for power to kilns and heavy machinery.
b) The oil tank enclosure may require bunding.
c) Liaise with the oil fuel suppliers to determine the ideal location to install the tank and for ease of filling.

Above & Below Ground Drainage

a) Clients to consult with the drainage engineer on these requirements.

Telecoms & Broadband

a) Client to initially liaise with telecoms provider for phone line(s), Broadband, TV availability and quote etc.
f) It should be possible to arrange for the entry point for ducted comms cabling to cross from the neighbours drive (Wonham Firs) below ground. A wayleave will be required for this.

9.0 Further Work

Prepare a full site services strategy on plans to illustrate service routes to retained and proposed buildings.

Undertake technical liaison with borehole specialist to agree plant requirements and location.

Ascertain requirements for relocation of utility pole on site subject to clients requirements.

Prepare electrical load schedule for application for a new 3ph 100amp power supply.

Technical liaison with drainage specialist for sewage treatment plant power requirements and plant location.

Undertake a site energy statement for submission to planners (subject to their requirements).