

Gas House and Infrastructure - Mechanical and Electrical Planning Information

Project: **Raby Castle – Phase 1**

Job No.: **8065**
Doc Ref: **0002**
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M&E Strategy

Please review this document in conjunction with the following drawings and documentation:

- RE-RR-TGA-00-00-DR-M-50-0001
- RE-RR-TGA-00-00-DR-M-50-0002
- RE-RR-TGA-00-00-DR-M-50-0003
- RE-RR-TGA-00-00-DR-M-50-0004
- RE-RR-TGA-00-00-DR-M-40-0003
- Hydrogeo Bore Hole Prognosis report

GAS HOUSE

The building known as the “Gas House” is a former energy centre that delivered heating to the Castle.

It is proposed to return the building to its former use as a mechanical and electrical energy centre, delivering thermal energy to the needs of several buildings within the Raby estate.

One section of the building is currently used as a domestic vehicle garage. This space will also be allocated for new plant.

Thermal energy will be generated utilising a “Bivalent” approach namely Groundwater Source Heat Pumps, in an “open loop” configuration and supplemented by Gas Fired Boilers.

The building will accommodate all the necessary plant such as water to water GSHP’s, Gas Fired Boilers, Pressurisation equipment, Pumps, Thermal Stores, Controls, Electrical Incomer and associated ancillary components.

The GSHP’s will provide the majority of the thermal energy requirements of the development (COP 3.8 – 4.7), however, to provide the peak demand during periods of extreme low temperature, the GWSHPs will be supplemented by, and run together with, low NOx Gas Fired

[REDACTED]

Boilers (NOx Class 6, 41 mg/kwh) i.e., the “Bivalent” system. It must be noted that the Boilers will not operate during most of the year.

The GWSHP’s and Boilers will generate Low Temperature Hot Water which will be distributed throughout the site via below ground distribution pipework, with circulation pumps located in the Gas House.

A new natural gas supply will be provided with a Gas Meter located within an external Gas Meter structure adjacent to the Gas House.

The existing Gas House chimney will be extended in height and lined to provide adequate discharge for the Gas Fired Boilers exhaust gases.

Natural ventilation will be provided to the Gas House via louvred doors and windows within existing openings to cater for the Gas Fired Boilers.

Noise emanating from the Gas House will be attenuated where required, to satisfy the requirements of the local residential properties. An Acoustic Report has been compiled to determine the acceptable levels of noise in the vicinity.

Wastewater discharge from the Gas House to the foul system will be limited to condensate drainage from the Gas Fired Boilers and occasional discharge of water treatment chemicals utilised for dosing of the Low Temperature Hot Water circulation system.

INCOMING ELECTRICAL SUPPLIES

The existing electrical supply arrangements to the site will be rationalised as part of the project. A new 20kV Northern Power Grid (NPG) substation will be established in the heart of the North Site adjacent the Stable Block from which a 275kVA supply will be derived to feed the North Site. The new substation will be fed from existing 20kV NPG infrastructure which runs through the field immediately to the north of the Raby Castle site.

The new substation and associated incoming electrical supply will enable a series of existing NPG supplies to be progressively rationalised and removed, including a number of overhead services, which operate at 20kV and at low voltage, and a pole mounted transformer which is presently located adjacent the proposed Play Area.

The NPG substation will be located in a new building constructed for this purpose and to NPG standards. This building will also house a low voltage switchroom in which a new low voltage switchboard will be located from which the various buildings which are located on the North Site will be refed.

A new NPG incoming supply will be brought into the Gas House, at low voltage and rated at 250kVA. This supply will be served from NPG infrastructure located on the east side of the A688 and will enter the Gas House underground. The supply will be used to serve the Gas House and mechanical plant within it, principally new ground source heat pumps, boiler plant and ancillary components.



INCOMING GAS SUPPLY

A new natural gas supply will be provided with a Gas Meter located within an external Architectural Gas Meter housing adjacent to the Gas House.

The new supply will serve the Gas House only. The existing gas supply to the site will be retained to serve Raby Castle.

INCOMING WATER SUPPLIES

A new Mains Cold Water supply will be provided to serve the new development.

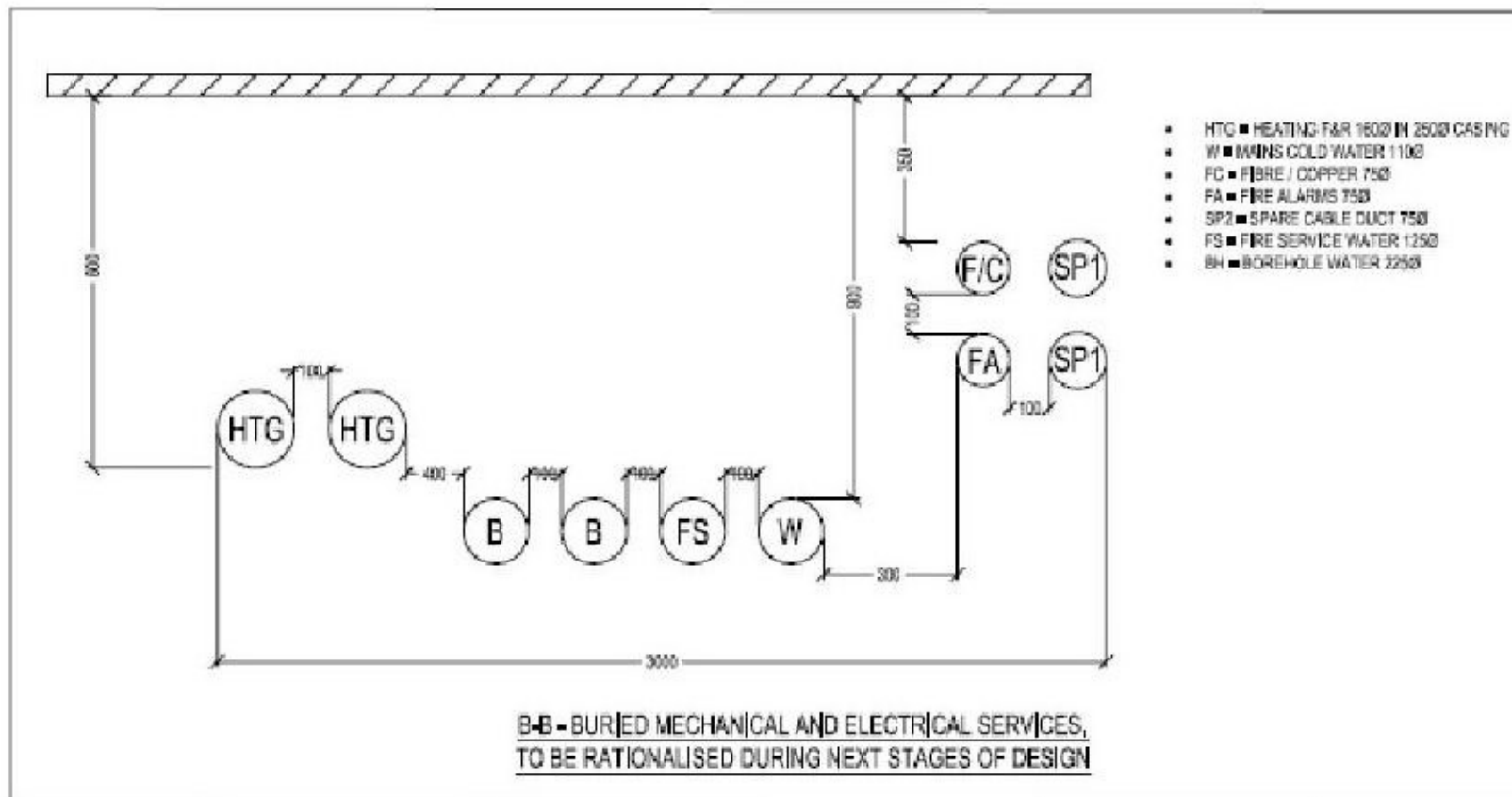
A new Fire Service supply will be provided to serve Fire Hydrants.

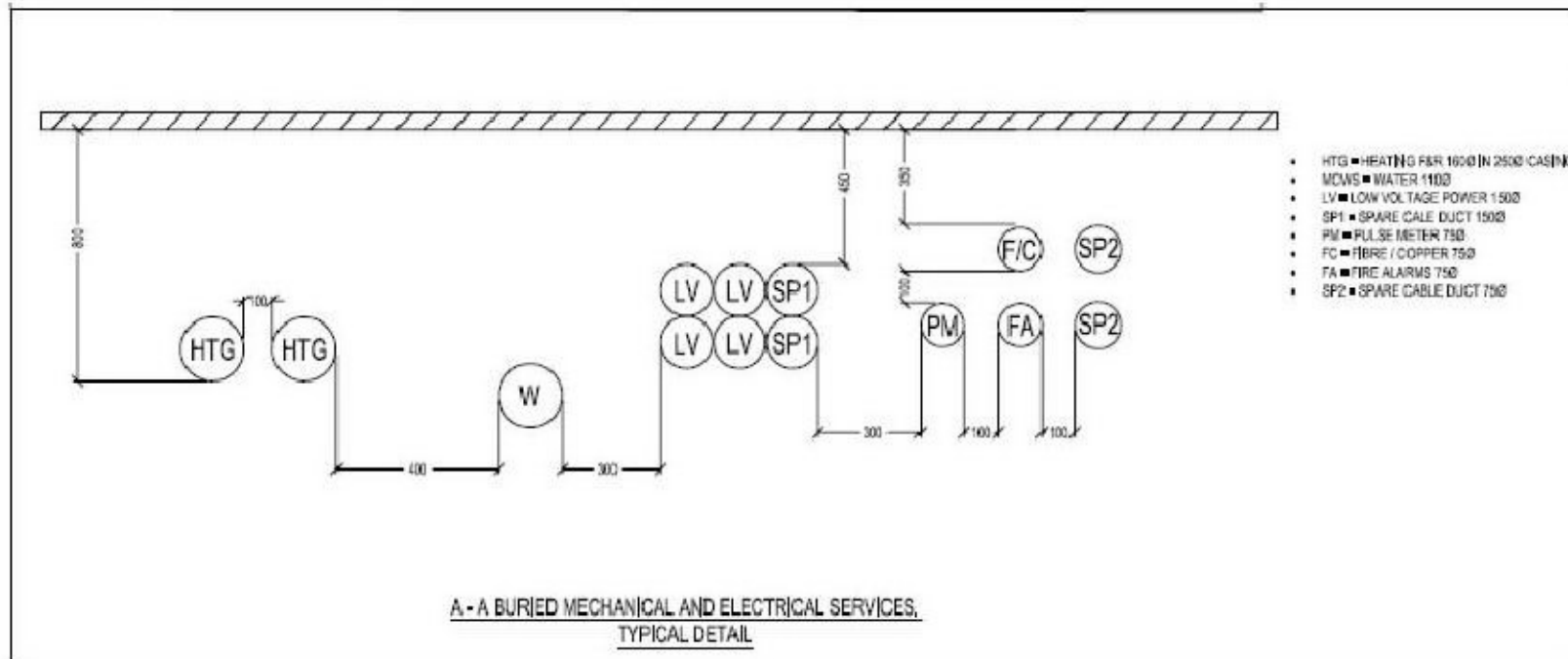
A new MCWS will enter the Gas House below ground and will serve the proposed heating plant. Backflow prevention will be

INFRASTRUCTURE

The Gas House, which will provide the thermal energy to the development, is located remotely for the individual buildings which it will serve. The Low Temperature Hot Water distribution system will be routed below ground utilising “flexible” pre-insulated pipework. Due to the requirement to distribute other services i.e., Mains Cold Water Service, Fire Service water, Power, IT and Controls along similar routes, they will be routed together within combined service trenches below ground.

Please see services trenching detail as below:





The route of the trenches has been carefully considered in relation to tree root protection and potential Archaeology. Trench excavations will typically be to the dimensions as required by the NJUGS guidelines and local utility providers.

Draw pits and valve access chambers will be provided to allow access to the below ground services at designated locations, typically main intersections and building isolation points. Draw pits will be typically 600 x 600 or 1200 x 1200 with lift off covers, valve access chambers typically 150 Dia to individual valves.

The new sitewide services infrastructure network will also include a series of cable ducts running parallel with the piped services and used to carry electrical infrastructure services to each building. These ducts will carry power cables, fire alarm cables and data cables etc, to each building via a series of draw pits as described above.

OPEN LOOP BOREHOLES

The Groundwater required for the GWSHP's will be extracted via an abstraction borehole(s) in the parkland to the west of the Gas House, routed to the Gas House via below ground pipework, then utilised by the GWSHP's, and returned to the ground via discharge borehole(s) to the southwest of the Gas House. The boreholes will need to be adequately separated to avoid the groundwater flows interacting.

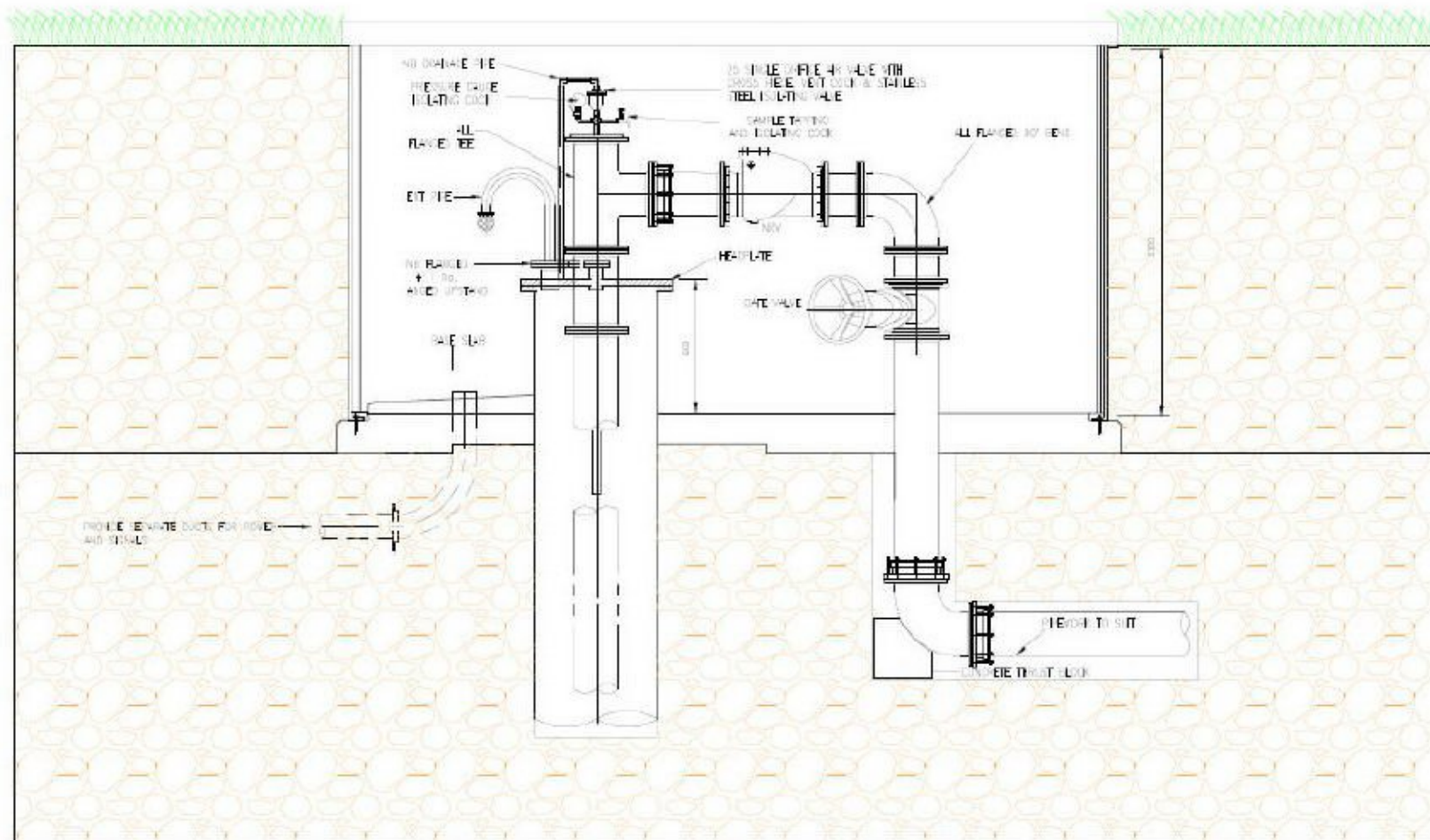
For the indicative positioning of the boreholes, please see TGA drawing RE-RR-TGA-00-00-DR-M-50-0004. Testing of the ground will be required to fully determine the exact spacing, however,

The Groundwater Source Heat Pump Abstraction and Discharge boreholes require the provision of an accessible services RC chamber at the top of each borehole (below ground) to house Isolation Valves and Control equipment. So as to be discreet as possible, the chambers will be

constructed to be installed below ground with manhole access lid fitted flush to existing ground level/landscape.

The access lids will be sensitively chosen (colour/finish) so as to blend in with the surrounding/landscaping. The approximate dimensions of the below ground chamber will be 3m X 3m and 2.3m deep.

Please see working detail below.



Proposed GSHP Well Head Chamber detail

We are currently liaising with the Environment Agency to adopt all necessary performance requirements associated with the GWSHP Borehole/well chamber's intended function and protection of the well head, equipment and potential backflow contamination of the aquifer.

Test drilling will be undertaken to ascertain viability of the energy source and will be carefully implemented under the strict guidance of the local Environmental Agency.