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BRISTOL WATER PR09



WR3d – Gurney Slade Stand Alone Scheme Preliminary Design Report

January 2009



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WR3d – GURNEY SLADE STAND ALONE SCHEME

1. INTRODUCTION

Gurney Slade Well is currently out of service due to high turbidity of the water and the associated risk of cryptosporidium. It is proposed to bring the well back into service by constructing an 8ML/d capacity submerged membrane treatment plant on the site.

2. DRIVER FOR SCHEME

The scheme is driven by a need to increase water resources.

The driver included in the scheme database is:
SDB2 - Growth - treatment/production

3. OPTIONS CONSIDERED

3.1 Option Selected – Stand Alone Submerged Membrane Treatment Plant

Install a 8MLD capacity submerged membrane treatment plant together with replacement pumps and On Site Electro-Chlorination (OSEC).

3.2 Option A: Greater Mendip (Maesbury) Treatment Works

The option to pump all the Mendip sources to a single greater Mendip treatment works was investigated. Honeyhurst, Charterhouse, Holes Ash, Forum, Gurney Slade and Sherborne wells would be pumped to a single treatment works located at Maesbury.

A further option to pump only Forum, Gurney Slade and Sherborne wells to a single smaller treatment works at Maesbury was also investigated.

Both combined Mendip scheme options were rejected on cost: both capital and operational.

3.3 Gurney Slade and Sherborne

Scheme WR3x - Gurney Slade to Sherborne is an alternative to this Gurney Slade stand alone scheme. Sherborne water has high lead concentrations and under the Gurney Slade to Sherborne scheme water from Gurney Slade will be pumped to Sherborne for blending with Sherborne water. The water will then be treated with a 15ML/d capacity submerged membrane treatment plant.

4. INTERACTION WITH OTHER SCHEMES

No interaction with other schemes.

5. GEOTECHNICAL SUMMARY

5.1 Geotechnical Review

The site is located adjacent to the A37, midway between Shepton Mallet and Midsomer Norton. The following points assess the likely bearing conditions and options for disposal of backwash to soakaways. It is based on published geological mapping and fieldwork should be undertaken to confirm the assessments.

Geology: The BGS map¹ indicates Triassic Dolomitic conglomerate, overlying Carboniferous Hotwells Limestone. It may be noted that there has been quarrying of the limestone close to the proposed site.

Soils: The soil is shown as 313c, shallow well-drained loam over limestone.

Groundwater Protection: The site is on the edge of an inner groundwater protection zone, presumably associated with the well on the site or another one nearby. Further investigation of the local hydrogeological regime is recommended.

Bearing capacity: The soils should be thin and easily stripped to provide good bearing capacities on the underlying bedrock.

Soakaways: Infiltration into these porous bedrocks should be rapid, but note the presence of a groundwater protection zone.

Cost estimate should allow for encountering rock in excavations for pipes and building foundations.

6. ENVIRONMENTAL DESK STUDY

6.1 Scope

This high-level environmental assessment has used the GIS data provided within the Environmental Schedule in Appendix 3. It is important to note that data is not provided for all environmental receptors that may be considered in an EIA screening. For example, information on Sites of Interest for Nature Conservation would need to be gathered following the Preliminary Environmental Assessment.

6.2 Overall assessment

- Proposed installation of a new submerged membrane treatment plant within a new building at Gurney Slade Water Treatment Plant and installation of an on-site electro-chlorination kiosk. Works to include associated pipework replacement and small-scale works to upgrade other plant and machinery. The works do not fall within Schedule 1 and do not cover a sufficient area to exceed the indicative thresholds for Schedule 2 of the EIA Regs. '99. This would indicate that an EIA is unlikely to be required.
- The below ground works are not likely to require planning permission as they should fall within Bristol Water's permitted development rights. However, the provision of a new building to house treatment plant will require planning permission, and any separate temporary works compounds, may also require planning permission and consultation should be sought with the LPA.
- If a planning application is required, but an EIA is not required, then a supporting statement should be submitted to the LPA to outline the environmental constraints and actions taken (such as surveys).
- *It is important to note that should an EIA be required by the LPA then all permitted development rights will be lost and a planning application would need to be submitted alongside the Environment Statement (report generated by the EIA).*

6.3 Summary of environmental constraints

- The nearest 'sensitive area', as defined by the EIA Regs. '99, is the Emborough Quarries Site of Special Scientific Interest (SSSI) 1230m away. This SSSI is protected for its nationally important fossil remains.

¹ British Geological Survey Ten Mile Map, 3rd Edition South Sheet, 1979.

- The nearest scheduled monument identified is Blackers' Hill Fort 698m away. This is unlikely to be impacted upon by the Gurney Slade works.
- The proposed works are located within a groundwater Source Protection Zone 1.
- There is one landform, such as a quarry or gravel pit, within 500m of the proposed works. Further consultation with the local council may be required to identify the nature of this landform.

6.4 Recommendations for future surveys/investigations

- The LPA will need to be consulted regarding planning permission for the new building and a supporting environment statement should accompany the application.
- Preliminary Environmental Assessment (PEA) will be required to identify specific environmental issues.
- A phase one habitat assessment / walkover survey will be required to identify potential protected species, invasive species and protected habitats.
- Once identified in the Phase One survey, protected species surveys will be required.
- It may be necessary to gather information on Local Sites of Interest for Nature Conservation before receiving a screening opinion. This information is held by Bristol Regional Environmental Records Centre (BRERC) who makes a minimum charge of £90 per enquiry.
- As the site is located within a Source Protection Zone 1, special construction measures will be required to reduce the risk of transmitting polluting materials to groundwater used for abstraction.

7. HYDRAULIC REVIEW

Not required.

8. TECHNICAL DETAILS

A new submerged membrane plant is to be installed to remove turbidity and *Cryptosporidium*. To install this proposed plant a new building will be constructed as shown on the Drg. No. WR3d-001. A new micro strainer will be installed to protect the membranes from damage by gross solids. Refer to Drg. WR3d-001. The existing chlorination system will be supplanted with a new on site chlorination system (OSEC).

8.1 Process plant

The proposed submerged membrane plant will have a foot print of some 15 x 10m. The membrane plant will be installed inside a new building to be constructed in the car parking area adjacent to the existing contact tank building at Gurney Slade.

To protect the membrane fibres from damage by gross solids, a basket strainer system will be installed.

Submerged membranes are a DWI recognised barrier against cryptosporidium and there is therefore no requirement for DWI approved cryptosporidium monitoring. The membrane can also be used as a primary disinfectant meaning water requires marginal chlorination only. This is to be provided using new OSEC plant. The existing Braithwaite Contact Tank is no longer required and is to be decommissioned and removed from site.

The membranes are backwashed with air and water on a regular interval (e.g. 30 to 45 minutes) to dislodge solids build-up on the membranes, and chemically cleaned with hypochlorite or acid on a less frequent basis (e.g. every 28 days). Chemical waste coming

from cleaning by acidic, alkaline or chlorinated cleaning agents will be neutralised in a neutralisation tank before being pumped to the neutralized waste holding tank.

Backwash waste water (up to 250m³/d) is produced by the membrane plant and it has been assumed that it will be directed to a water course. No chemicals will be added to the water before discharge so the discharge is unlikely to be harmful to the environment. Infrastructure to store and discharge the backwash waste water has not been included at this stage so waste discharge remains a risk item that needs to be addressed in more detail. Investigations may include liaison with the EA and surrounding landholders. A water quality sampler and flow meter is to be included to monitor the discharge to the stream.

Following removal of the existing Braithwaite tank (as described above) it may be necessary to provide a buffer tank as a control volume before the high lift pumps.

The following process plant is proposed:

Equipment from Membrane supplier:

- Membrane cells
- Filtrate pumps
- Cleaning in place chemical tank
- Backwash water tank
- Air blower, compressor, air receiver
- CIP chemical storage (carboys) and dosing sets
- Media neutralisation unit

Additional equipment included with membrane plant

- CIP waste tank (holds untreated waste prior to treatment by the waste neutralisation unit).

Other equipment not included with membrane plant:

- 2mm pre-filter (manual basket filter on inlet pipe – type similar to Airpel model single or dual perforated basket filter)
- OSEC plant
- Modifications to pipework
- Neutralisation tank feed pumps to Neutralisation Media Unit
- Neutralised waste storage tank for tanker pickup
- Backwash wastewater storage tank and disposal infrastructure (if required)
- Flow and quality meters, other instrumentation

8.2 Modifications to pumping plant

It was assumed that the local supply booster pump system would not be affected by proposed works and would continue to operate as it currently does.

To accommodate a submerged membrane plant the existing well pumps are to be replaced with a lower head duty (estimated head $H = 15\text{m}$) well pump to lift 333m³/h (8MI/d) into the membrane tank. An additional set of high lift pumps are to be provided to lift the treated water to the Maesbury Zone. It is proposed that 2No. variable speed drive high-lift pumps are provided, each with estimated design duty $Q = 333.3\text{m}^3/\text{h}$ (8 MI/d) at approximate head (H) = 92 m.

New pump discharge pipe work is to be provided within the well. New pipework and well-head chamber modifications are required to connect into the re-useable sections of existing buried pipe work.

8.3 Modifications to electrical plant

Power: The site power supply (currently a 200kVA pole mounted transformer) will need to be upgraded to accommodate the additional power requirements of approximately 320kVA. This is likely to require a ground mounted sub-station of approximately 550kVA to 800kVA capacity depending on WPD preferred sizes. It should be noted that this transformer also feeds some local housing. The standby generator will also need to be upgraded to a similar capacity.

The capacity of the 11kV supply to the site would need to be confirmed by Western Power to confirm that it is adequate for the additional loading.

MCC: A new MCC will be required to accommodate the additional loads and the increased main and generator incomers. A feeder for the existing site distribution system will need to be included in the MCC.

ICA: Modifications to the ICA system will be required to accommodate the new plant

It is noted that the existing electrical installation on site is generally old and contains a large quantity of asbestos insulated equipment. It is recommended that all existing MCC's be replaced.

8.4 Phosphoric Acid Dosing

To control plumbosolvency there may be a need to include phosphoric acid dosing plant in the works. An allowance for this is to be made in the risk register.

9. BUILDABILITY

The most significant buildability issues relate to construction of a existing works on a small, narrow site.

10. RISKS AND OPPORTUNITIES

The primary risks are associated with construction of the proposed plant on a small and narrow existing site. Coupled with this is the risk that there may be insufficient space for the proposed membrane plant building. In this case the membrane plant would need to be split into two and housed in two separate buildings.

Planning is likely to be issue and it may be necessary to provide architectural enhancements to the building to help it blend in with other buildings in the village.

11. COST INFORMATION

Costs are summarised in the table below (price base 2007/08):

Summary of Netts	£2,485,364
Summary of Contractors overheads & prelims	£952,626
Summary of design costs	£161,549
Summary of BW costs (excluding BW supervision)	£360,268
Contingency - to cover change of scope (10% of scheme total)	£395,981
BW costs	£ 130,674
Scheme CAPEX Total (excl. OPEX costs)	£4,486,461
Scheme OPEX Total (pa)	£42,000

More detailed cost information is included in the Cost schedule attached in Appendix 6.

Gurney Slade stand alone treatment works will lift water to Maesbury reservoir and will offset water currently pumped from Stowey to Maesbury. As such there will be a saving in pumping costs to Bristol Water but additional costs in running the new treatment works. The annual additional operational cost to Bristol Water is estimated at £42,000 per annum.

12. PROGRAMME

Details of the programme are attached in Appendix 7.

13. CONCLUSIONS

The Water Resources Plan identifies the need to bring this source back into operation. This will require the construction of a submerged membrane plant to remove cryptosporidium oocysts from the water and deal with high turbidity. Modifications to pumping plant and the installation of an OSEC plant are also required.

APPENDICES

Appendix 1 – General Arrangement Drawing

Appendix 2 – Environmental Constraints Map

Appendix 3 – Environmental Constraints Summary Table

Appendix 4 – Geological Map

Appendix 5 – Risk Register

Appendix 6 – Cost Schedule

Appendix 7 – Outline construction programme