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BRISTOL WATER PR09



WR3f – Forum Stand Alone Treatment Scheme Preliminary Design Report

January 2009



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4.2 G1a(iv) Forum Reservoir

To meet an anticipated growth in demand in the Shepton Mallet region it is proposed to construct a 4.1MI covered storage reservoir at Forum.

4.3 G5b South East Trunk Mains

To meet anticipated growth in demand in the Shepton Mallet region new trunk mains will be constructed from Sperrings Green to Maesbury and from Maesbury to Forum.

5. GEOTECHNICAL SUMMARY

5.1 Geology

Forum Treatment Works is located on a gentle south-facing slope to the west of Downside, approx. 1km north of Shepton Mallet. It is proposed to construct a submerged membrane treatment plant at the site.

The site lies on beds of the Langport Member/Blue Lias Formation Limestone. These limestone, mudstone and clay beds dip to the south at about 65°. Some weathering can be expected near the ground surface.

5.2 Constructional aspects

The existing membrane plant building will be extended on its southern side to accommodate the new plant. It is anticipated that this extension will entail some excavation. Trenching for replacement pipework is expected to be in weathered ground and should be capable of being excavated without undue difficulty.

5.3 Recommendations for site investigation

No further ground investigation is envisaged.

6. ENVIRONMENTAL DESK STUDY

6.1 Scope

This high-level environmental assessment has used the GIS data provided within the attached table. It is important to note that data is not provided for all environmental receptors that may be considered by a local planning authority (LPA). 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 extension of existing building to accommodate installation of a new submerged membrane treatment plant at Forum WTW. Works to include decommissioning of existing plant, associated pipework replacement and small-scale works to upgrade 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 extension of the

- building to house the new plant, and any separate temporary works compounds, may require planning permission and consultation should be sought with the LPA.
- If a planning application is required, but the LPA do not require an EIA, then a supporting statement should be submitted 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 proposed works are 243m away from the Hobbs Quarry Site of Special Scientific Interest (SSSI). The area is protected due to a sequence of early Jurassic rocks and it is unlikely that the proposed works would impact upon them. However, as it is a designated 'sensitive area' under the EIA Regs, consultation should be held with Natural England.
- The proposed works are also within 2km of four other SSSIs. One of these is a protected marsh and consideration should be given to any potential impacts of water use or discharge on this feature.

6.4 Recommendations for future surveys/investigations

- The project does not exceed the indicative thresholds for an EIA under Schedule 2. However, as it is less than 250m away from a SSSI, consultation should be held with Natural England and the LPA to confirm that it will not require an EIA.
- The LPA will also need to be consulted regarding planning permission for the building extension.
- 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.

7. HYDRAULIC REVIEW

No hydraulic review has been undertaken at this stage. The existing site pipework will need to be checked to ensure that it has the capacity to convey the increased flow rate of 4 MI/d.

8. TECHNICAL DETAILS

8.1 Proposed pipeline/ pumping station/ plant

The existing pressurised membrane plant will be decommissioned and removed from the building. A new submerged membrane plant will be installed to remove turbidity and *Cryptosporidium*. To install this proposed plant the existing membrane plant building will be extended as shown on the Drg. No. WR3f-001. A new micro strainer will be installed to protect membrane from damage by gross solids. Refer to Drg WR3f-001. The existing chlorination system has recently been replaced with new gas chlorination system. As such, there will be no on site chlorination system (OSEC) in Forum WTW.

A portion of the existing 12 inch AC raw water pipe will be replaced with 300 DN DI pipe as shown on the Drg. No. WR3f-001.

The existing low lift pumps are to be replaced with duty/ standby pumps with a duty of 4 MI/d at 10m head.

Further details of plant including supplier costs for the membranes plant and micro strainer are included in the cost schedule attached in Appendix 6.

8.2 Process plant

The proposed submerged membrane plant will have a foot print of 23m x 10m. It will contain four cells and thirty six modules per cell.

Marginal chlorine (1mg/l) will be applied to treated water. A manually cleaned microstrainer with 2mm screens 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 by the existing, newly installed gas chlorination system.

The membranes are backwashed with air and water at regular intervals (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 neutralised waste holding tank.

Backwash waste water (up to 120m³/d) produced by the membrane plant will be discharged to a storage tank and then pumped through the existing 63mm diameter PE discharge pipe to the Wessex sewer pipe along A37 highway. The existing 63mm diameter PE pipe has sufficient capacity for the expected flow rate. It has also been confirmed with Wessex Water that their sewer has sufficient capacity.

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 - single or dual perforated basket filter)
- Modifications to pipework
- Neutralisation tank feed pumps to Neutralisation Media Unit

- Neutralised waste storage tank for tanker pickup
- Backwash wastewater storage tank
- Flow and quality meters, other instrumentation.

9. BUILDABILITY

The most significant buildability issues identified are as follows:

- 1) Working around existing plant;
- 2) Working in a congested site.

10. RISKS AND OPPORTUNITIES

- 1) If the backwash waste volume increases the capacity of the existing 63 mm PE pipe may not be sufficient to convey the increased backwash wastewater to the sewer in the A37. As such, a bigger PE pipe may need to be installed. This would increase the cost of disposal of backwash wastewater into the existing sewer pipe. There may be an opportunity to dispose the wastewater into the existing soakaway. A percolation test will need to be done on the site to make sure the existing soakaway has the sufficient capacity for percolation.

11. COST INFORMATION

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

Summary of Netts	£1,577,102
Summary of Contractors overheads & prelims	£603,460
Summary of design costs	£102,512
Summary of BW costs (excluding BW supervision)	£270,655
Contingency - to cover change of scope (10% of scheme total)	£255,373
BW costs	£ 84,273
Scheme CAPEX Total (excl. OPEX costs)	£2,893,375
Scheme OPEX Total (pa) (see below)	-£14,000

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

Forum stand alone treatment works will feed Forum reservoir and supply water primarily to Shepton Mallet. This will offset water currently pumped from Stowey to Forum. As such there will be a saving in pumping costs to Bristol Water but additional costs in running and maintaining the new treatment works. The net effect is a saving in operational cost estimated at £14,000 per annum.

12. PROGRAMME

Details of programme are to be provided.

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. Installation of replacement low lift pumps is also required.

APPENDICES

Appendix 1 – General Arrangement Drawing

Appendix 2 – Environmental Constraints Map

Appendix 3 – Environmental Schedule

Appendix 4 – Geological Map

Appendix 5 – Risk Register

Appendix 6 – Cost Schedule

Appendix 7 – Outline construction programme