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BRISTOL WATER PR09



WR3c - Honeyhurst to Cheddar Pipeline Preliminary Design Report

January 2009



HONEYHURST TO CHEDDAR PIPELINE

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WR3c - HONEYHURST TO CHEDDAR PIPELINE

1. INTRODUCTION

Honeyhurst Well is currently out of service due to high turbidity and associated risk of cryptosporidium. To bring this well back into service it is proposed to pump water from Honeyhurst to Cheddar treatment works with a new 4.2km 300mm diameter pipeline. The proposed yield is 6MI/d.

1.1 OS references

Start:	Honeyhurst Well	347700,150250	ST7750
Finish:	Cheddar TW	345200,153250	ST4553

2. DRIVER FOR SCHEME

The driver for this scheme is water resources. The scheme is dependent on the construction of Cheddar UV to control the crypto risk associated with Honeyhurst.

The driver included in the scheme database is:

- SDB3 - Growth - distribution/transfers.

3. OPTIONS CONSIDERED

3.1 Option Selected – Honeyhurst to Cheddar Pipeline

The option selected is a 4.2km long 300mm diameter pipeline and replacement pumps at Honeyhurst which will enable raw water to be transferred from Honeyhurst for treatment at Cheddar works.

3.2 Option A: Stand Alone Treatment Plant at Honeyhurst

The option to install a submerged membrane plant at Honeyhurst was investigated. This was rejected on the basis of capital cost.

3.3 Option B: 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 sources to a single smaller treatment works at Maesbury was also investigated.

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

4. INTERACTION WITH OTHER SCHEMES

4.1 Q3b - Cheddar UV Scheme

To remove the risk of cryptosporidium associated with the Cheddar spring a UV plant will be installed at Cheddar with a capacity of 60MI/d.

The Honeyhurst to Cheddar pipeline will introduce into Cheddar treatment works raw water with potentially higher turbidity than the Cheddar raw water. This may lower the transmissivity of the water which may have a significant cost implication for the Cheddar UV plant. This interaction needs to be examined in more detail.

Note: Transmittance values have been assumed for feasibility costing purposes for the Cheddar UV scheme. For the final specification, this value should be determined by the process contractor.

4.2 Honeyhurst Drought Contingency Scheme

A drought contingency scheme has been designed which will enable Honeyhurst Well to be brought back into service in approximately 6 months should a drought situation arise. The contingency scheme is a containerised submerged membrane plant, replacement low and high lift pumps and new on site electrochlorination (OSEC) plant.

4.3 WR1 – Cheddar Reservoir

A second raw water reservoir is proposed alongside the existing Cheddar reservoir. Details of the interaction between the proposed Cheddar reservoir and Honeyhurst to Cheddar pipeline are yet to be considered.

5. GEOTECHNICAL SUMMARY

5.1 Route

From Honeyhurst Well, to the south of Draycott, the route runs in a north–westerly direction along the east side of the River Yeo flood plain. After crossing Moor Lane it runs along Dolemead Lane. Approx 0.3km beyond Latches Lane the route crosses the Oldbury Yeo and Cheddar Moor Drove. The route then runs along the west side of Cheddar Moor Drove traversing numerous drainage ditches in Cheddar Moor and crossing Long Cuts Drove and Labourham Drove. Beyond Labourham Drove the route crosses the Cheddar Yeo river by means of a 150m long directional drill. North of the directional drill crossing the route crosses Wedmore Road and existing Cheddar treatment works to connect into the existing micro-strainer channel at the works.

5.2 Geology

Between Moor Lane and Wedmore Road the whole route is effectively on Alluvium (Tidal Flat Deposits). To the north of Wedmore Road the route is on Head. The Alluvium is expected to comprise soft clay, silt, sand and peat beneath a firmer clay crust. The depth of the Alluvium is expected to be approximately 4m.

5.3 Constructional Issues

Excavation through the Alluvium will require trench support. The pipeline itself is also likely to require adequate bedding and surround support. The groundwater level can be expected to be close to ground level.

5.4 Site Investigation

A walkover survey should be carried out to check the anticipated ground conditions and features, particularly drainage ditch crossings, along and adjacent to the route before scoping any ground investigation.

A 10m deep borehole is recommended at each end of the directional drill.

Elsewhere a number of trial pits are recommended to establish:

- the depth of soft ground at road and watercourse crossings
- recover soil samples for contamination testing to enable the excavated spoil to be classified for waste management purposes.

5.5 References

BGS 1:63,360 Sheet 280 'Wells'

BGS Memoir 'Geology of the Bristol district' 1993.

Digital geology mapping.

6. ENVIRONMENTAL DESK STUDY

This high-level environmental assessment has used the GIS data provided within the table attached as 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 local (built) Conservation Areas, Public Rights of Way and Sites of Interest for Nature Conservation would need to be gathered following the Preliminary Environmental Assessment.

6.1 Overall assessment

- Proposed pipeline, 4232m long with associated replacement pumps. Proposed works fall within Schedule 2, section 10 (1) of EIA Regs. '99
- The works for the laying of the proposed new pipeline are not likely to require planning permission outright as they should fall within Bristol Water's permitted development rights.
- However, any permanent above ground structures (such as pumping stations), or separate temporary works compounds, will require consultation regarding planning permission.
- The proposed pipeline route is 449m away from an Area of Outstanding Natural Beauty (Mendip Hills).
- The proposed route is 930m from a Special Area of Conservation (SAC) (Mendip Woodlands). This is a 254ha SAC which is primarily designated for its Annex I habitat of Tilio-Acerion forests on limestone. There is also a large population of common dormouse present. The site is also less than 2km from the North Somerset & Mendip Bats SAC. It is not considered likely that an Appropriate Assessment would be required given the distance of the SACs from the proposed works.
- The proposed route of the pipeline is 605m away from the closest Site of Special Scientific Interest (Cheddar Reservoir) which is a 105ha site notified for the wildfowl which it supports. The proposed pipeline also falls within 2km of 4 other SSSIs (The Perch, Draycott Sleights, The Cheddar Complex and Rodney Stoke).
- There is a National Nature Reserve 885m away from the proposed pipeline route.
- Whilst the majority of the above sites are over 500m away from the proposed pipeline, any potential effects will be taken into account by the LPA in their screening decision for an EIA and further consultation may be required with Natural England.

- The proposed pipeline may also require an Environmental Impact Assessment (EIA) as the area of works is over the 1 hectare threshold¹. A screening opinion should be submitted to the LPA who will consider this threshold in parallel with the sensitivity of the receiving environment.
- *It is important to note that should an EIA be required by the LPA then permitted development rights will be lost and a planning application would need to be submitted alongside the Environment Statement (report generated by the EIA).*

6.2 Summary of environmental constraints

- In addition to the constraints outlined above, the route of the pipeline also falls 244m away from of a scheduled monument. This site contains a Roman Settlement, Anglo-Saxon and Norman Royal Palace and St Columbanus' Chapel. It is not considered likely that the development would impact upon this site. However, consultation should be held with the county council to confirm this.
- There are 14 buildings within 50m of the pipeline. This would be taken into account by the LPA in determining whether the works will require an EIA.
- The proposed pipeline does not cross any railways, but it does cross 5 roads and runs alongside minor roads for 363m. It is likely to be necessary to fell trees and hedgerows in order to make these crossings and route sections. In which case, protected species surveys such as bats, nesting birds, dormice, badgers and hedgerow surveys would be required. These ecological constraints will be covered by an initial Phase One walkover survey.
- The majority of the proposed pipeline (3408m) runs within agricultural land classified as 1, 2 or 3 which indicates that it is likely to be seen as the 'best or most versatile land'. This would be taken into consideration by the LPA during their EIA screening. Hedgerow Removal Notices are also likely to be required.
- The proposed pipeline does not cross any ancient woodland. However, it runs through 223m of other woodland. Protected species surveys as described above would be required and consultation will be required with the local council. The presence of the woodland would be taken into account during the EIA screening.
- 2547m of the proposed pipeline passes through a flood zone 3, indicating that the area would be at a 1% risk of annual flooding. The subsurface nature of the pipeline will not result in any loss of flood storage capacity.
- There are 20 watercourses of less than 10m width that will require crossing by the proposed pipeline route. Land drainage consents and surveys may be required for these crossings (see recommendations below).
- Great crested newt surveys will be required as there are 24 ponds within 500m of the proposed pipeline.
- There are 2 groundwater abstractions identified within 50m of the proposed route. This would be taken into account in EIA screening and special construction measures may be required to reduce the risk of transmitting polluting materials to groundwater used for abstraction.

6.3 Recommendations for future surveys/investigations

- An EIA screening opinion will be required from the LPA
- The LPA will also need to be consulted regarding planning permission for any above ground structures.
- Consultation will be required with Natural England regarding the proximity of the proposed pipeline to the SSSIs.

¹ Assuming a 15m working width. An EIA is likely to be required under Schedule 2 (sec 10) (1) if the work area exceeds 1 hectare which is the equivalent of a 700m pipeline in length and 15m working width.

- 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 make a minimum charge of £90 per enquiry.
- Information on Public Rights of Way and (built) Conservation Areas will need to be gathered following the PEA.
- Following consultation with the LPA archaeologist a desktop study will be needed to identify the need for further archaeological mitigation.
- The LPA may require further field studies to be undertaken for the class 1-3 agricultural land.
- Consultation with county councils will be needed to establish if there is likely to be any impact upon the scheduled monuments identified and any further survey requirements.
- Consultation with local councils and wildlife trust may be needed to establish the nature of the woodland and any species present.
- Great crested newt surveys will be required.
- The pipeline crosses agricultural land, therefore it is very likely that Hedgerow Removal Notices will be required.
- The Environment Agency (EA) would need to be contacted to determine which of the rivers being crossed are categorised as main rivers. Flood defence consents would be required from the EA for the crossing and working within 8m of a main watercourse. If it is not a main river then consent would be required from the local council or Internal Drainage Board.
- Dependent on the PEA and further ecological information, the watercourse crossings may also necessitate a wolver survey, otter survey and/or a white clawed crayfish survey.
- A flood risk assessment may be required if any above ground construction is required within flood zones 3 or 2 and special construction methods may be required to reduce the impact of any potential flooding during construction.

7. HYDRAULIC REVIEW

7.1 Review

A surge analysis is required to determine whether a surge vessel is required. The pipeline diameter has been determined by Black & Veatch.

8. TECHNICAL DETAILS

The chosen option is a pipeline from Honeyhurst to Cheddar treatment works. The pipeline is to connect to the inlet channel of the existing microstrainers at Cheddar. The microstrainers are not pressurised so the pipeline will discharge into the microstrainer inlet channel without any further pumping.

The Honeyhurst water suffers from high turbidity and an associated risk of cryptosporidium. To combat the cryptosporidium this project must be constructed alongside scheme Q3b- Cheddar UV. This Honeyhurst to Cheddar pipeline cannot be put into service until the UV plant at Cheddar has been commissioned.

8.1 Process plant

The pipeline is to connect to the inlet channel of the existing microstrainers at Cheddar treatment works as shown on the attached drawing in Appendix 1.

8.2 Pipeline size/ material data

The pipeline is 4232m long and is to be either 300mm internal diameter ductile iron or 355mm outside diameter polyethylene PE100 SDR 17. The pipeline is to be laid on imported granular bed and surround.

Of the above length, 150m is to be installed by directional drilling under the Cheddar Yeo River.

A 19 pair control cable is to be laid with the pipeline to enable control between Cheddar treatment works and Honeyhurst. Where the pipeline is installed using directional drill a duct will be strapped to the directional drill pipe and the cable pulled through this duct.

8.3 Pumping plant

Replacement high lift pumps with duty of 6Ml/d at 30m head with associated variable speed drives and switch gear. The existing electrical panels are to be replaced.

8.4 Other

A cross connection is to be installed from the proposed 300mm diameter pipeline to the existing 33" cast iron raw water pipeline at Cheddar. This will allow raw water from Honeyhurst to be transferred directly to Cheddar reservoir if required.

A flow meter and turbidity meter are to be installed at the Honeyhurst end of the proposed pipeline.

9. BUILDABILITY

The most significant buildability issues are as follows:

- 1) Crossing some 21 rhynes. It may be required to cross these using no-dig methods;
- 2) The alluvium is soft and the water table will be high. It is assumed that trench support will be required along the entire length of the pipeline;

10. RISKS AND OPPORTUNITIES

10.1 Crossing of Rhynes

The route includes crossing of numerous rhynes and ditches and it is assumed that these can be crossed by open cut methods. If these crossings require no-dig methods then this will have a significant cost effect.

10.2 Directional Drilling

It is proposed to cross the Cheddar Yeo river using directional drilling. It must be confirmed with a directional drilling contractor whether the directional drilling is feasible in alluvium. If this is not feasible then an alternative but more expensive no-dig method such as microtunnelling will be used.

11. COST INFORMATION

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

Summary of Netts	£1,610,329
Summary of Contractors overheads & prelims	£614,901
Summary of design costs	£104,671
Summary of BW costs (excluding BW supervision)	£335,316
Contingency - to cover change of scope (5% of scheme total)	£133,261
BW costs	£ 83,954
Scheme CAPEX Total (excl. OPEX costs)	£2,882,433
Scheme OPEX Total (pa)	£89,000

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

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 new 4.2km 300mm diameter pipeline from Honeyhurst Well to Cheddar together with modifications to the pumping plant at Honeyhurst Well. A proposed UV plant at Cheddar, to be constructed under a separate scheme, will inactivate cryptosporidium oocysts in the water.

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