**Bolsover District Council**

**Meeting of the Executive on 9th September 2024**

# Mine Water Demonstrator and Heat Network Project

**Report of the Portfolio Holder for Growth**

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| **Classification** | This report is Open |
| **Report By** | Chris Fridlington<br>Director: Devolution and Development |

## PURPOSE OF REPORT

To provide members with an update on (i) the mine water demonstrator project at Creswell and (ii) a related feasibility study funded by the Heat Network Distribution Unit.

The report seeks approval for the novation of a contract originally entered into with D2N2 for the funding for the mine water energy project to a contract with the East Midlands Combined Authority for the same project to allow the demonstrator project to go ahead.

The report also seeks delegated authority to procure a contractor to construct and operate the demonstrator and small heat network in Creswell, serving the Creswell Heritage and Wellbeing Centre in the first instance.

In addition, this report seeks to notify Executive of the acceptance of the funding for the feasibility study from the Heat Network Distribution Unit.

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## REPORT DETAILS

### 1. Background

1.1 Bolsover District Council has secured funding for two projects: (i) construction of a heat network utilising mine water energy in Creswell and (ii) a feasibility study into the viability of heat distribution networks in Creswell and Whitwell utilising mine water energy where practicable.

1.2 The two projects are linked because one is a capital works programme that is designed to provide 'proof of concept' that utilising mine water energy to reduce consumption of fossil fuels and energy costs is viable in the first instance. This will be achieved through a demonstrator unit and a small heat network serving Creswell Heritage and Wellbeing Centre.

1.3 The second project is a revenue funded feasibility study that is intended to evaluate this capital works programme and the feasibility of using mine water energy to provide heat to a larger number of residential and commercial properties within the context of a wider study on the feasibility of constructing larger heat networks providing energy to new and existing developments in Whitwell and Creswell.

## 2. Details of Proposal or Information

Heat Network Distribution Project

2.1 Heat networks distribute heat or cooling from a central source or sources and deliver it to a variety of different customers such as public buildings, shops, offices, hospitals, universities, and homes. By supplying multiple buildings, they avoid the need for individual boilers or electric heaters in every building.

2.2 Heat networks are also uniquely able to use local sources of low carbon heat which would otherwise go to waste. This could be from factories, the ground or even from rivers. In this case, there is the potential to use mine water that is underground and is heated 'in situ' by the surrounding rocks.

2.3 In particular, there are 'open' shafts in Whitwell and Creswell close to proposed residential developments that have planning consent, which provide an opportunity to create a heat network 'powered' by mine water for the new homes.

2.4 In this context, and in view of the Council's own ambitions around climate action, a successful application was made to the Heat Work Distribution Unit (a government department, which is part of BEIS) for funding for a feasibility study. The decision to accept the funding and procurement of the feasibility study were made under the Chief Executive Officer's delegated powers following appropriate consultation with the portfolio holder and the statutory officers.

2.5 The funding has since been received by the Council and a feasibility study has been procured (subject to contract) and this study will be completed early next year (January 2025). On completion, the study will show whether it is feasible to use mine water to power heat networks for the proposed developments in Whitwell and Creswell and lead to further consideration as to whether mine water could be used to create a larger heat network serving existing properties in the local areas.

2.6 The study will also consider whether heat networks would be viable for either of the proposed developments and the two villages without utilisation of mine water energy. So, the work will not be abortive even if it is not feasible to use mine water in ether location.

Mine Water Demonstrator Project

2.7 The Council was originally awarded £900,000 from D2N2 following a successful application to the Green Growth Fund in 2022 for a small heat network utilising mine water energy from the open shaft in Creswell.

2.8 The proposal remains innovative insofar as it will utilise a closed loop system in a single shaft to draw out heat from the mine water and transfer that energy into a heat network. This will be first done through a small network taking heat transfer

fluid through underground pipework from the shaft to a heat exchanger to provide energy to the Heritage and Wellbeing Centre in the first instance.

2.9 If this approach is successful it will show how a closed loop system could significantly reduce costs and risks typically associated with mine water energy where drilling to access the underground water is involved or where there is a requirement to run highly saline and often contaminated mine water directly through pipe work and heat exchangers, for example.

2.10 In addition, a feasibility study carried out by the University of Derby building on a Coal Authority scoping report indicated the closed loop system proposed at Creswell could provide sufficient energy to provide heat through a heat network to 100 domestic properties. These findings will be tested and built on by the larger feasibility study funded by the Heat Network Distribution Unit.

2.11 However, whereas geothermal energy and therefore, the heat in underground mine water (and other water stored underground) is often considered to be 'inexhaustible', the Coal Authority raised concerns that the heat in the mine water, which is stored in a relatively static environment within a contained shaft would not 'recharge' quickly enough to maintain a consistent output of heat energy required for a viable heat network.

2.12 In addition, the Coal Authority were concerned about the potential impact of taking mine water energy from the shaft on the physical integrity of the shaft itself as well as the impact of the project on the wider and interconnected underground mine systems within that local area including a potential impact on the chemical composition of various contaminants that might be in the water and rising water levels through changes in the heat of the water.

2.13 Therefore, £200,000 was earmarked and approved by D2N2 for use on the demonstrator project that will allow a closed loop system to be constructed and monitored to pin down exactly how the system and a small network will work and whether the energy could be used to power a larger heat network.

2.14 The demonstrator will also provide evidence on what impacts - if any, utilising the heat in the mine water from the open shaft in Creswell will have on any Coal Authority assets including the shaft and associated mine systems.

2.15 In the meantime, D2N2 is now in the process of being dissolved because its functions and its staff have been taken into the East Midlands Combined County Authority (EMMCCA) and there is a requirement to novate the original contract with D2N2 to EMMCCA. Therefore, this report seeks an endorsement from the Executive to sign the new contract to retain the funding originally awarded by D2N2.

2.16 This report also seeks approval from the Executive to allow officers to proceed with the procurement of goods and services with a value in excess of £150,000 by way on an exemption to the Contract Procedure Rules set out in the Council's constitution.

## 3. Reasons for Recommendation

3.1 Extensive coalfields exist across Great Britain, and it is estimated that 25% of homes and businesses in the UK are located above former coal mines and more so in Bolsover District, and larger parts of North Derbyshire and North Nottinghamshire.

3.2 Water within the mines is warmed by natural processes and can, if sustainably managed, provide a continuous supply of heat. Mine water temperatures are not affected by seasonal variations and, subject to the right support, mine water can provide renewable, secure, low carbon heating for buildings in coalfield areas.

3.3 With heating accounting for 40% of energy use in the UK, mine water heat connected to an appropriate heat distribution network could also play a large part in the District's efforts to tackle climate change and support its net zero future alongside providing cheaper energy to its residents.

3.4 Therefore, there are good reasons to endorse the application for - and acceptance of the funding for the feasibility study that will help determine whether mine water energy could be utilised in Whitwell and Creswell where there is relatively easy access to the underground mine water and determine the feasibility of heat networks more generally in both locations.

3.5 For similar reasons, it is considered appropriate to recommend endorsement of novation of the original contract made with D2N2 to ensure retention of the funding for the mine water demonstrator and the construction of a larger network if the demonstrator proves to be successful.

3.6 In particular, if the demonstrator is successful it will offer 'proof of concept' of a novel system that will significantly reduce the costs and risks associated with mine water energy and potentially unlock this resource, which would be of local, regional, and national significance primarily because of the size and scale of the resource and the difficulties experienced in utilising this resource.

3.7 This is also because a heat network using mine water and ground source heat pump technology will have substantially better co-efficiency of performance compared to air source heat pump technology and would be cheaper to operate in the longer term despite higher initial costs because of the higher input temperature (c.17º - 22º) from a mine water system compared to the ambient winter temperatures (<5º) utilised by an air source heat pump in the UK.

3.8 However, because the system is novel and because it involves the use of mine water there is demonstrably an insufficient market to tender for the supply of goods, services or works required to carry out the project that is funded by an external grant on a 'not for profit' basis.

3.9 In this case, ENER-G Renewable Solutions Ltd are the only company that officers have been able to identify through extensive market engagement that not only have the relevant skills, knowledge and experience to carry out the project, and the trust and support of the Coal Authority, but are also willing and able to do so within an acceptable time frame and cost envelope.

3.8 Therefore, it is also considered appropriate to recommend approval of an exemption to the Council's Contract Procurement Rules and to make a direct award of the contract for construction and operation of the demonstrator to ENER-G Renewable Solutions Ltd.

3.9 The relevant exemption is part 4.8.4 (e) of the Contract Procurement Rules which allows for a direct award of a contract where it relates to commissioning of projects funded by external grant where there is no or insufficient marketplace. The Procurement team have been consulted and they are satisfied that there are grounds to award a contract to ENER-G Renewable Solutions Ltd without undertaking a wider procurement exercise.

3.10 Finally, the fee proposal received by officers from ENER-G Renewable Solutions Ltd also includes full costings that are reasonable and competitive within this context but exceed £150,000. However the full value of the contract is yet to be determined Therefore, it is recommended that the Executive delegate authority to the Chief Executive Officer to agree the contract price subject to this not exceeding £200,000.

## 4 Alternative Options and Reasons for Rejection

4.1 The option to return the funding rather than novate the original D2N2 contract to EMMCCA was rejected because significant progress has now been made on the demonstrator project and the funding is required to carry the project out and build a larger heat network if the demonstrator is successful.

4.2 The option to discontinue the demonstrator project was rejected because of the significance of this scheme in relation to the Council's own aims and objectives, and its wider significance in terms of decarbonisation of housing stock and commercial property.

4.3 The option to go out to tender was rejected because only one company was identified through thorough market testing that could carry out the project to the satisfaction of the Coal Authority, meet the requirements of the funding body, and complete the works in an appropriate time frame and cost envelope.

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## RECOMMENDATION(S)

1. Executive notes the acceptance of funding from the Heat Network Distribution Unit.

2. Executive agrees to the novation of the contract for the Mine Water Energy project from D2N2 to EMMCCA with the effect of accepting the £900,000 funding originally awarded by D2N2.

3. Executive approves the procurement of ENER-G Renewable Solution Ltd to construct and operate the demonstrator and small heat network in Creswell serving the Creswell Heritage and Wellbeing Centre in the first instance.

4. Executive delegates to the Chief Executive Officer the decision to agree the contract price with ENER-G Renewable Solutions Ltd subject to this not exceeding £200,000.

Approved by Councillor John Ritchie, Portfolio Holder for Growth

**IMPLICATIONS;**

**Finance and Risk:** **Yes☐** **No ☒**

**Details:** The expenditure will all be covered by external grant, there should be no cost to the Council from this project.

On behalf of the Section 151 Officer

**Legal (including Data Protection):** **Yes☒** **No ☐**

**Details:** The contract is to be awarded using the exemption at part 4.8.4 of the Contract Procurement Rules.

On behalf of the Solicitor to the Council

**Environment:** **Yes☒** **No ☐**

Please identify (if applicable) how this proposal/report will help the Authority meet its carbon neutral target or enhance the environment.

**Details:** The two projects will support our environmental and Net Zero objectives.

- The demonstrator project will provide a low-carbon heating solution to the Creswell Heritage and Wellbeing centre reducing its carbon emissions.
- The Heat Network Distribution Project will show the viability and economic case for Heat Networks utilising mine water. This could then provide a low carbon heating and hot water source for properties close to former mines.

In addition, the co-benefits include; development of green skills; health benefits from reduction in local pollution from burning of fossil fuels; energy security benefit with less reliance on fossil fuels.

**Staffing:** **Yes☐** **No ☒**

**Details:** No staff issues arise from this report.

On behalf of the Head of Paid Service

**DECISION INFORMATION**

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| **Is the decision a Key Decision?**<br>A Key Decision is an executive decision which has a significant impact on two or more District wards, or which results in income or expenditure to the Council above the following thresholds:<br><br>**Revenue - £75,000 ☐ Capital - £150,000 ☐**<br>☒ *Please indicate which threshold applies* | Yes |
| **Is the decision subject to Call-In?**<br>(*Only Key Decisions are subject to Call-In*) | Yes |

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| **District Wards Significantly Affected** | Elmton with Creswell<br>Whitwell |
| **Consultation:**<br>**Leader / Deputy Leader ☐ Executive ☐**<br>**SLT ☐ Relevant Service Manager ☐**<br>**Members ☐ Public ☐ Other ☐** | Details: |

| **Links to Council Ambition: Customers, Economy, and Environment.** |
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| This project supports our environmental aims by<br>(1) reducing carbon emissions and potentially producing a business case for rolling this solution out to more sites.<br>(2) helps reduce local pollution by switching from fossil fuels to a low carbon alternative.<br>It supports our economy ambitions via supporting green skills and, should the business case prove economic, has the potential to create new jobs. |

| **DOCUMENT INFORMATION** | |
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| **Appendix No** | **Title** |
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| **Background Papers** |
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| (*These are unpublished works which have been relied on to a material extent when preparing the report. They must be listed in the section below. If the report is going to Executive you must provide copies of the background papers).* |
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