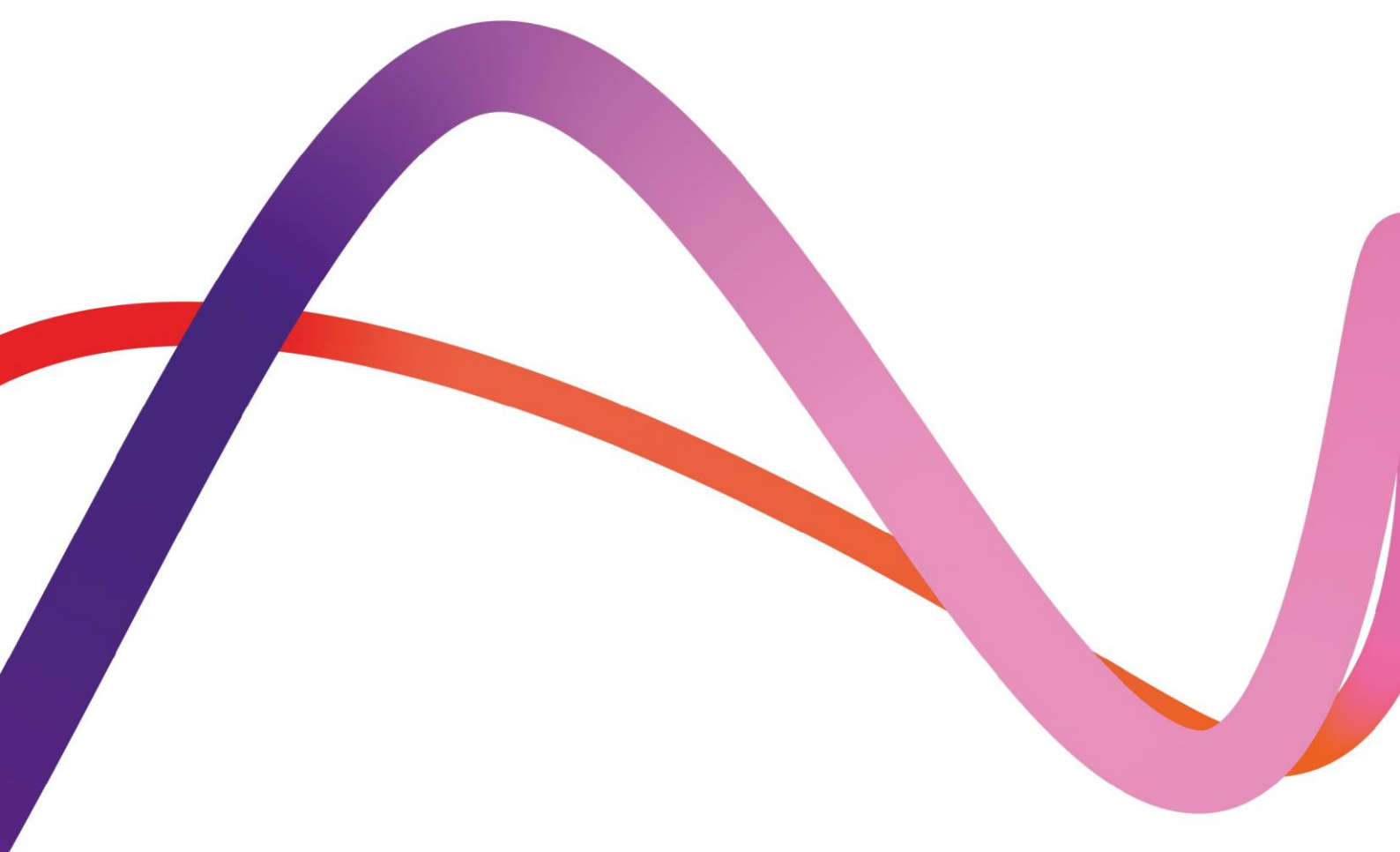


Medworth Energy from Waste Combined Heat and Power Facility

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Applicant's Response to ISH4 Action Point 6

Technical Note: Combined Heat and Power and Carbon
Capture Delivery Readiness

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1. Introduction

1.1 Overview of the Proposed Development

- 1.1.1 Medworth CHP Limited (the Applicant) is applying to the Secretary of State (SoS) for a Development Consent Order (DCO) to construct operate and maintain an Energy from Waste (EfW) Combined Heat and Power (CHP) Facility on the industrial estate, Algores Way, Wisbech, Cambridgeshire. Together with associated Grid Connection, CHP Connection, Access Improvements, Water Connections, and Temporary Construction Compound (TCC), these works are the Proposed Development.
- 1.1.2 The Proposed Development will recover useful energy in the form of electricity and steam from 625,600 tonnes of non-recyclable (residual), non-hazardous Municipal and Commercial and Industrial waste each year. Generating over 50 megawatts, the electricity will be exported to the grid. The EfW CHP Facility will have the capability to export steam and electricity to users on the surrounding industrial estate.
- 1.1.3 The Proposed Development is a Nationally Significant Infrastructure Project (NSIP) under Part 3 Section 14 of the Planning Act 2008 (hereafter referred to as the '2008 Act') by virtue of the fact that the generating station is located in England and has a generating capacity of over 50 megawatts (see section 15(2) of the 2008 Act). It, therefore, requires an application to be submitted for a DCO.

1.2 The Applicant

Background

- 1.2.1 The Applicant is a wholly owned subsidiary of MVV Environment Limited (MVV). MVV is part of the MVV Energie AG group of companies. MVV Energie AG is one of Germany's leading energy companies, employing approx. 6,500 people with assets of around €5 billion and annual sales of around €4.1 billion. The Proposed Development represents an investment of approximately £450m.
- 1.2.2 The company has over 50-years' experience in constructing, operating, and maintaining EfW CHP facilities in Germany and the UK. MVV Energie's portfolio includes a 700,000 tonnes per annum residual EfW CHP facility in Mannheim, Germany.
- 1.2.3 MVV Energie has a growth strategy to be carbon neutral by 2040 and thereafter carbon negative, i.e., climate positive. Specifically, MVV Energie intends to:
- reduce its direct carbon dioxide (CO₂) emissions by over 80% by 2030 compared to 2018;
 - reduce its indirect CO₂ emissions by 82% compared to 2018;
 - be climate neutral by 2040; and



- be climate positive from 2040.

1.2.4 MVV's UK business retains the overall group ethos of 'belonging' to the communities it serves whilst benefitting from over 50 years' experience gained by its German sister companies.

UK Facilities

1.2.5 MVV's largest project in the UK is the Devonport EfW CHP Facility in Plymouth. Since 2015, this modern and efficient facility has been using around 265,000 tonnes of municipal, commercial and industrial residual waste per year to generate electricity and heat, notably for Her Majesty's Naval Base Devonport in Plymouth, and exporting electricity to the grid.

1.2.6 In Dundee, MVV has taken over the existing Baldovie EfW Facility and has developed a new, modern facility alongside the existing facility. Operating from 2021, it uses up to 220,000 tonnes of municipal, commercial and industrial waste each year as fuel for the generation of usable energy.

1.2.7 Biomass is another key focus of MVV's activities in the UK market. The biomass power plant at Ridham Dock, Kent, uses up to 195,000 tonnes of waste and non-recyclable wood per year to generate green electricity and is capable of exporting heat.

1.3 Purpose of this document

1.3.1 Since submitting the DCO application, the Applicant has engaged with potential EPC Contractors and technology suppliers, and further developed the technical specification for the Proposed Development. As a result, more detail in relation to delivery of the Combined Heat and Power (CHP) and Carbon Capture (CC) elements of the Proposed Development is available.

1.3.2 This document presents information to demonstrate that the CHP and CC elements of the Proposed Development have been appropriately considered for this stage in the process and are capable of being delivered, including a list of embedded design measures that must be implemented prior to Final Commissioning of the EfW CHP Facility.

1.3.3 The Applicant considers that the Proposed Development is compliant with applicable national policies relating to CHP and CC (as set out in the National Policy Statement Tracker **[REP3-031]**) and positive weight in the planning balance can therefore be attributed to the ability of the Proposed Development to deliver CHP and CC.

1.3.4 This document is submitted further to Issue Specific Hearing 4 (ISH4) Action Point 6, published by the Examining Authority on 22 May 2023, which requires the Applicant to provide at Deadline 5, 'information on the design features of the equipment to show that the plant is being designed and specified to allow carbon capture'.



4 Applicant's Response to ISH4 Action Point 6: Technical Note: Combined Heat and Power and Carbon Capture Delivery Readiness

1.4 Structure of this document

- Section 2.0 – CHP Connection.
- Section 3.0 – Carbon Capture.
- Section 3.0 – Conclusion.



2. CHP Connection

2.1 Introduction

2.1.1 There are three stages to deliver the plant, equipment and space required to implement the Applicant's CHP proposals. These are:

- Embedded design measures;
- DCO Requirements; and
- Customer supply requirements.

2.2 Embedded design measures

2.2.1 The embedded design measures form part of Work No.1 and Work No. 2 and will be implemented by the Applicant during the construction of the EfW CHP Facility and be completed prior to the date of Final Commissioning (as defined in the draft DCO). **Appendix A** lists the CHP embedded design measures.

2.3 DCO Requirements

2.3.1 To secure the Applicant's commitments to CHP, a DCO Requirement was included in the submitted draft DCO and developed during the Examination, see Requirement 25 (combined heat and power) of Schedule 2 to the draft DCO **[REP3-006]**:

2.3.2 The draft Requirement secures:

- Production of a CHP assessment within 18-months of the date of Final Commissioning;
- To consider the opportunities to deliver CHP secured under Works No. 3, 3A and 3B;
- List actions to reasonably increase the potential to deliver CHP;
- Consult relevant organisations, such as the Environment Agency; and
- Commitment to 5-year reviews.

2.3.3 In order to give the Secretary of State comfort that the embedded design measures necessary to facilitate CHP will be delivered, Requirement 25 has been updated in the version of the draft DCO submitted at Deadline 5 to require the Applicant to provide evidence to the relevant planning authority that the embedded design measures have been constructed.



2.4 Customer supply requirements

2.4.1 Once a CHP customer(s) is secured, the CHP Connection works forming Work No. 3 will be implemented and depending on the customer(s) location, all or part of Works No. 3A and 3B may be implemented. In summary the Works are:

- **Work No. 3** – All necessary work at the EfW CHP Facility Site including the installation of steam supply and condensate return pipes up to the EfW CHP Facility Site boundary.
- **Work No. 3A** – All necessary off site work including extension of the steam supply and condensate pipes up to Weasenham Lane, and installation of private wire cables as required.
- **Work No. 3B** – All necessary of site work including installation of a pipe bridge over Weasenham Lane and extension of the steam supply and condensate return pipes to the northern end of the CHP Connection Corridor, and installation of further private wire cables as required.

2.5 Summary

2.5.1 At the date of Final Commissioning, the Applicant must have implemented the embedded design measures necessary to ensure the EfW CHP Facility CHP is enabled to deliver CHP and is ready to carry out Works No 3, 3A and 3B as soon as a CHP customer(s) is secured.

2.5.2 The Applicant will report on the opportunities that exist to export heat to customers and the actions taken to increase the potential to export heat in accordance with Requirement 25 of Schedule 2 to the draft DCO.



3. Carbon Capture

3.1 Introduction

3.1.1 A summary of the Applicant's commitments to Carbon Capture (CC) are summarised in **Section 3.4.80 ES Chapter 3: Description of the Proposed Development (Volume 6.2) [APP-030]**.

3.1.2 As stated in APP-030, there is currently no legal or policy requirement for the EfW CHP Facility to include Carbon Capture and Storage (CCS) apparatus or for Decarbonisation Readiness (DR). Further details on the existing and potential future policy position and how the Proposed Development complies are stated in the Applicant's comments on Deadline 2 Submissions at ID CC20, page 36 to 39 **[REP3-042]**. The Proposed Development does not therefore include the construction and operation of carbon capture technology, instead and to comply with MVV's own corporate objectives (see **Section 1.2.3**) it has been designed to be decarbonisation ready in accordance with existing and emerging national policy by reserving the space required for and to connect future CC equipment to the EfW CHP Facility. This approach requires the Applicant to include some items of plant and apparatus, that could be too difficult or expensive to retrofit later. Consequently, during construction of the EfW CHP Facility the Applicant will include space, plant and equipment to accommodate a future CC facility. These embedded design measures will be implemented prior to the commencement of Final Commissioning.

3.1.3 To summarise, the Applicant's commitment to CC can be divided into 3 stages:

- Embedded design measures;
- DCO Requirements; and
- Delivery of a future CC facility and export apparatus.

3.2 Embedded design measures

3.2.1 The embedded design measures form part of Work No.1 and Work No. 2 and will be implemented during the construction of the EfW CHP Facility and be completed prior to the date of Final Commissioning (as defined in the draft DCO). The EfW CHP Facility will be CC ready to capture 95% of CO₂ flue gas emissions. **Appendix B** lists the CHP embedded design measures.

3.3 DCO Requirements

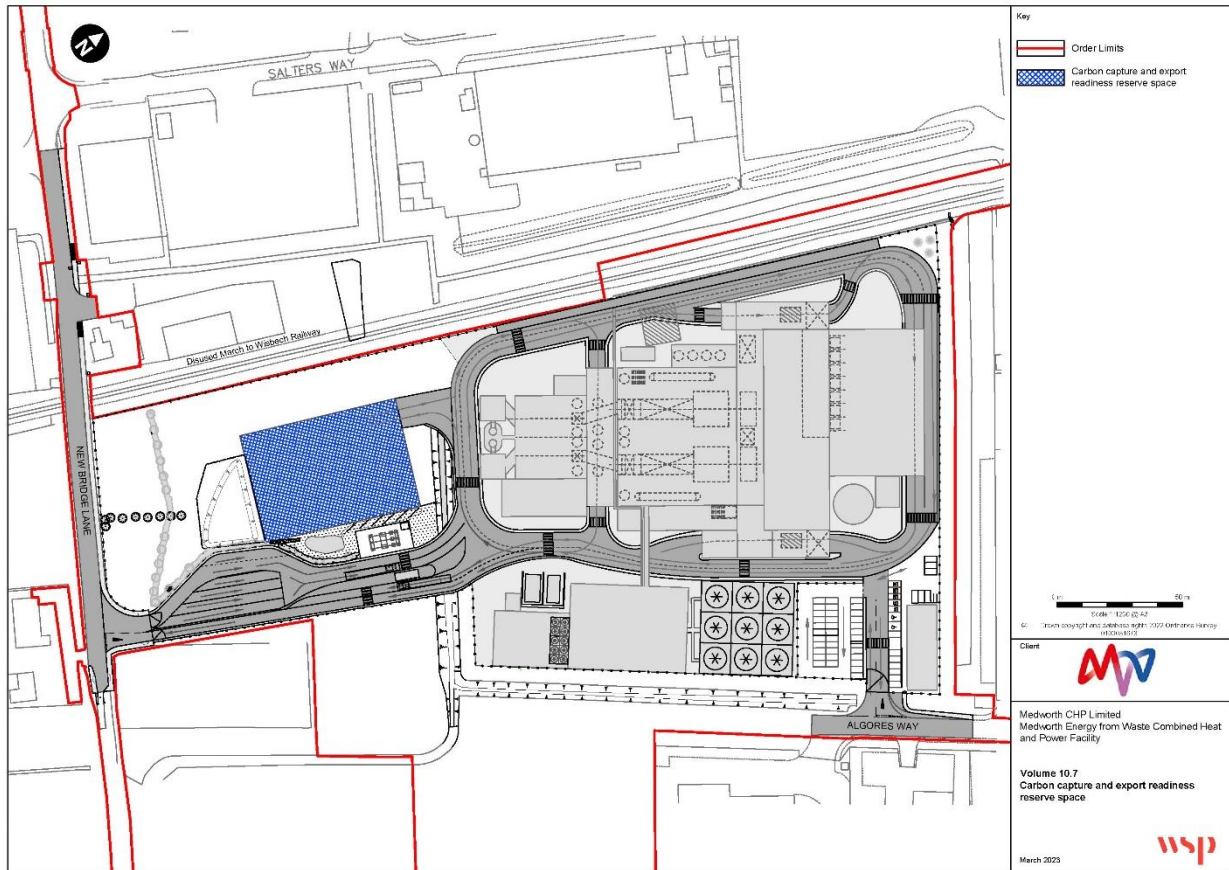
3.3.1 To secure the Applicant's commitments to CC, two DCO Requirements were introduced during the Examination:

- Requirement 22, **draft DCO (Volume 3.1) [REP1-007]** secures the carbon capture and export readiness reserve space required for the installation and operation of carbon capture and export equipment in the future. The land subject



to Requirement 22, the Carbon Capture and Export Readiness Reserve Space Plan [REP2-024] is presented in **Figure 3.1**.

Figure 3.1: Carbon Capture and Export Readiness Reserve Space Plan



- Requirement 23, **draft DCO (Volume 3.1) [REP1-007]** secures the production of a carbon capture readiness monitoring report which will set out how the Applicant is monitoring the ongoing feasibility of carbon capture and export technology.

3.3.2 The Applicant has commissioned an established technology provider to conduct a CC pre-feasibility study, based on standard amine technology and a 95% carbon capture rate. The results demonstrate that the area reserved (see **Figure 3.1**) is sufficient to accommodate such a facility. It is widely considered that standard amine based CC facilities are the largest amongst the available techniques. Therefore, the Applicant is confident that the area reserved is sufficient in size, regardless of the eventual CC technology deployed.

3.3.3 In order to give the Secretary of State comfort that the embedded design measures necessary to facilitate CC will be delivered, Requirement 22 has been updated in the version of the draft DCO submitted at Deadline 5 to require the Applicant to provide evidence to the relevant planning authority that the embedded design measures have been constructed.



3.3.4 The Applicant's parent company has become a participant in the Bacton Thames Net Zero consortium¹, which is developing a project to sequester carbon dioxide in expired gas and oil fields linked to the Bacton gas terminal in Norfolk. This includes new pipelines from a variety of carbon emitters to the existing terminal at Bacton. As this project is at the early design stage any apparatus associated with it is outside the scope of this DCO Application. Decisions on how and when this project will be consented will not be made until sometime after the DCO Application for the Proposed Development has been determined. However, the Applicant considers that the identification of a possible method of exporting and sequestering carbon dioxide emitted by the Proposed Development to be relevant.

3.4 Future Carbon Capture facility

3.4.1 In the future, should a CC facility be constructed at the EfW CHP Facility Site, utilising the land reserved by DCO Requirement 22, the Applicant would apply for the necessary consents to build and operate it at that point in time. Based on the existing regulatory processes, planning permission from the relevant planning authority under the Town and Country Planning Act 1990 and an Environmental Permit from the Environment Agency would be required.

3.5 Summary

3.5.1 At the date of Final Commissioning, the Applicant must have implemented the embedded design measures and reserved the space necessary to ensure the EfW CHP Facility CHP is decarbonisation ready.

3.5.2 The Applicant will report on the feasibility of retrofitting carbon capture and export technology and any regulatory clearances in accordance with Requirement 23 of Schedule 2 to the draft DCO.

¹ <https://www.eni.com/static/bactonthamesnetzero/> last accessed 10/06/2023



4. Conclusion

- 4.1.1 This document demonstrates that the CHP and CC elements of the Proposed Development have been appropriately considered for this stage in the process and are capable of being delivered, including a list of embedded design measures that must be implemented prior to Final Commissioning of the EfW CHP Facility.
- 4.1.2 The Applicant considers that the Proposed Development is not only compliant with applicable national policies relating to CHP and CC (as set out in the **National Policy Statement Tracker [REP3-031]**) but exceeds the current legal and policy requirements for this type of facility. The Applicant therefore considers that positive weight in the planning balance can be attributed to the ability of the Proposed Development to deliver CHP and CC in the future.



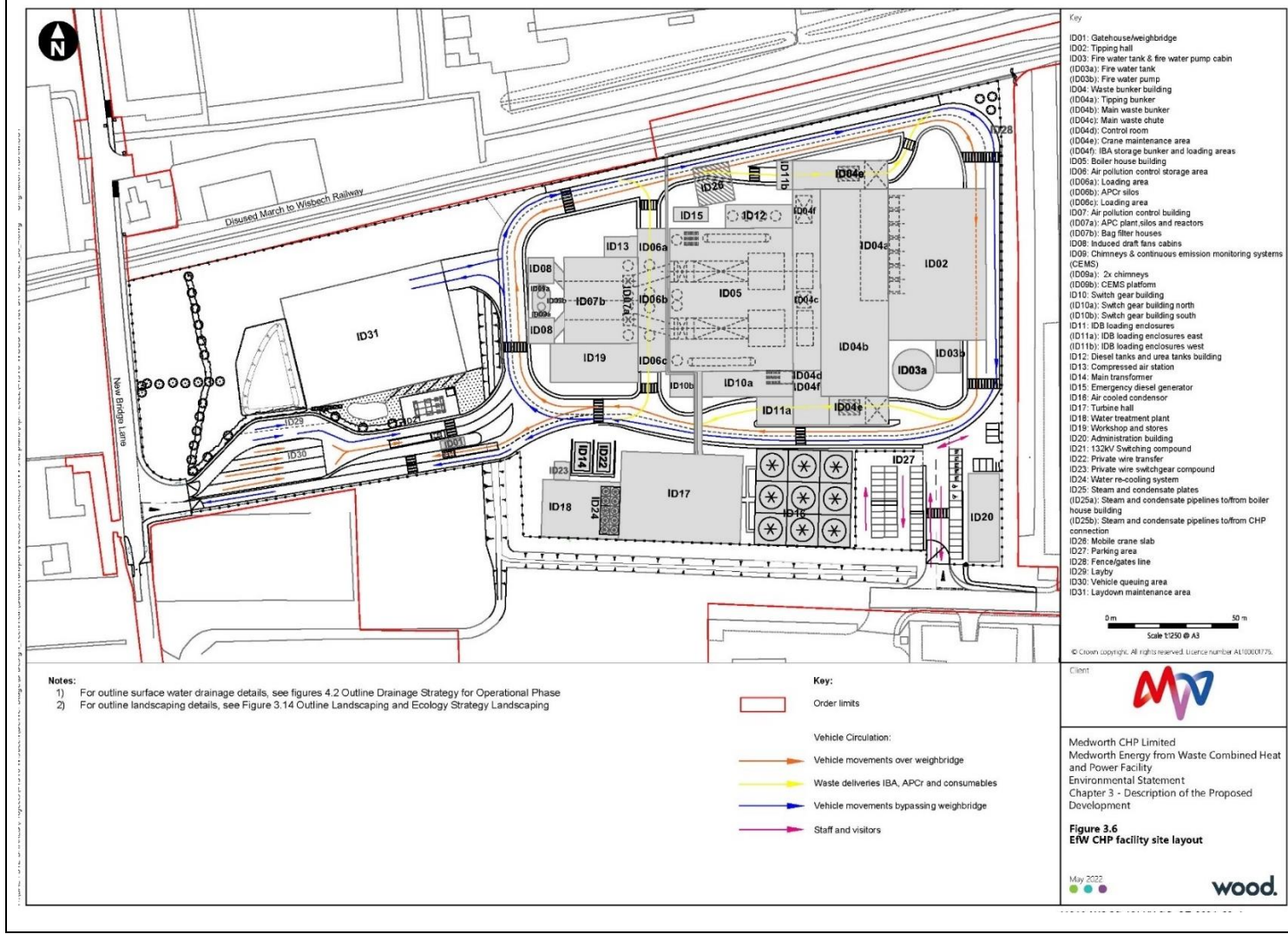
Appendix A Combined Heat and Power (CHP): Embedded Design Measures

| COMBINED HEAT AND POWER (CHP): EMBEDDED DESIGN MEASURES | | MEDWORTH CHP LIMITED | | | |
|---|--|----------------------|--------------------------------------|----------------|------|
| ID | Plant and equipment list and approximate location within the EfW CHP Facility Site | Summary of evidence | Document/ photograph reference | Approved by | Date |
| CHP01 | Dedicated 11kV Private Wire Supply switchboards incl. switchgear building, one infeed panel and 5 metered outgoing feeder panels (for private wire customers), 1 metering and earthing panel, incl. spare ducts for private wires from switchgear to CHP corridor (terminating within EfW CHP Facility site boundary) – ID23 (private wire switchgear compound), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP02 | Dedicated 25MVA 15/11kV private wire supply transformer – ID22 (private wire transformer) Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP03 | Steam turbine-controlled medium pressure steam extraction – within ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP04 | CHP steam extraction to provide up to 63 Mg/h CHP steam at 20 - 24 bar. Capable of supplying the full steam load with only 1 boiler in 90% load operation – within ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP05 | Reducing station for full CHP supply in turbine bypass mode – within ID17 [APP-049] CHP steam cooler to provide saturated CHP steam – within ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP06 | Ultra sonic high grade steam flow meters (CHPQA compliant) provided for CHP steam – within ID17 (turbine hall) or on pipe bridge between ID17 (turbine hall) and ID05 (boiler house building), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| CHP07 | Water treatment plant capacity sufficient to replace CHP condensate losses up to 63 Mg/h – ID18 (water treatment plant), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |




COMBINED HEAT AND POWER (CHP): EMBEDDED DESIGN MEASURES – BUILDING/EQUIPMENT ID REFERENCE

MEDWORTH CHP LIMITED





Appendix B Decarbonisation Readiness: Embedded Design Measures

| DECARBONISATION READINESS (DR): EMBEDDED DESIGN MEASURES | | MEDWORTH CHP LIMITED  | | | |
|--|--|--|--------------------------------------|----------------|------|
| ID | Plant and equipment list and approximate location within the EfW CHP Facility Site | Summary of evidence | Document/ photograph reference | Approved by | Date |
| DR01 | Allowance for space at the EfW CHP Facility Site and close to the chimneys for future installation of the CCS facility – the carbon capture and export readiness reserve space identified in (Volume 10.7) [REP2-024]. | | | | |
| DR02 | Proven steam turbine design concept for the future installation of controlled low pressure steam extraction to provide the necessary heat load to a Carbon Capture facility – ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR03 | The concept for turbine conversion must be demonstrated and technically feasible – within ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR04 | Turbine efficiency must be optimised for operation without Carbon Capture however, high efficiency must be maintained following turbine conversion and with Carbon Capture operation – within ID17 (turbine hall), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR05 | Allowance for future installation of condensate return into main condensate system – within ID05 (boiler house building), ID17 (turbine hall) or ID18 (water treatment plant), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR06 | Option for delivery of all parts necessary to upgrade the turbine for Carbon Capture and Storage operation. It is the Applicant's intention to purchase these parts to ensure that Carbon Capture is deliverable – parts to be stored within ID19 (workshop and stores), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR07 | Allowance for sufficient space for later diversion of the flue gas between ID fan and chimney silencer through a CCS facility – between ID08 (induced draft fans cabins) and ID09 (chimneys and continuous emission monitoring systems), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR08 | Allowance of space at the 11kV switchboard for future installation of one additional 11kV circuit breaker for a future CCS facility – within ID10a (switch gear building north) or ID10b (switch gear building south), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR09 | Allowance for additional parasitic load for a future CCS facility – within ID10a (switch gear building north) or ID10b (switch gear building south), Figure 3.6, (Volume 6.3) [APP-049]. | | | | |
| DR10 | Trench with one 225mm duct and one 110mm duct from MV switch room to future CCS area – within ID10a (switch gear building north) or ID10b (switch gear building south) Figure 3.6, (Volume 6.3) [APP-049], to the carbon capture and export readiness reserve space identified in (Volume 10.7) [REP2-024]. | | | | |

