Cory Decarbonisation Project

Written Representation on behalf of Landsul Limited and Munster Joinery (U.K.) Limited

Introduction

1. This relevant representation ("WR") is prepared on behalf of Landsul Limited ("Landsul") and Munster Joinery (U.K.) Limited ("Munster Joinery"). Landsul is the owner, developer and manager of land at Norman Road Belvedere which is partially developed for industrial and warehousing purposes ("the Munster Joinery land"). Part of the land is occupied by Munster Joinery, from where it operates a major distribution function for its UK operations.

2. The development consent order application seeks authority for the compulsory acquisition of the Munster Joinery land. If authorised and implemented, this will result in the loss of Munster Joinery's business from Belvedere.

3. This WR summarises Landsul and Munster Joinery's case and also stands as a summary of the submissions made in outline at ISH1 and CAH1. It should be read together with the attached reports.

Compulsory acquisition principles

4. Section 122 Planning Act 2008 provides that land may only be compulsorily acquired pursuant to a development consent order when two conditions are met. First, it must be shown that the land:

    a. is required for the development to which the development consent relates,
    b. is required to facilitate or is incidental to that development, or
    c. is replacement land which is to be given in exchange for the order land under section 131 or 132.

5. Second, it must be demonstrated that there is a compelling case in the public interest for the land to be acquired compulsorily.

6. The "Planning Act 2008: Guidance related to procedures for the compulsory acquisition of land" further explains that applicants must have a clear idea of how they intend to use the land which it is proposed to acquire (paragraph 9). The Secretary of State will need to be

satisfied that the land to be acquired is no more than is reasonably required for the purposes of the development (paragraph 11).

7. Case law makes clear that any need for the development identified in an NPS does not, in itself, mean that a compelling case for the acquisition of land is made out. Thus even if there is an urgent need for the development in question, the land proposed to be acquired compulsorily may, on proper analysis, be found to be excessive because the development proposals can be constructed without needing that land to be acquired. In *R (FCC Environment (UK) Ltd) v Secretary Of State For Energy & Climate Change* [2015] Env LR 22, the Court of Appeal found that there may not be a compelling case for compulsory acquisition even if there was an urgent need for the development in question if (see [11]):

> ""(1) The land proposed to be acquired compulsorily may, on proper analysis, be found to be excessive because the development proposals can be constructed without needing that land to be acquired (in which case, the section 122(2) test would also not be met); [or]
> (2) The acquisition of a right over the land, rather than its acquisition, might suffice."

The Munster Joinery land is not required to construct the scheme

8. The Munster Joinery land is not required to construct the scheme and accordingly there is no compelling case for compulsory acquisition. It is for the Applicant to demonstrate that the objectives of the project cannot be achieved without the compulsory acquisition of Munster Joinery land.

9. The detailed technical case in support of Landsul and Munster Joinery's case is set out in the Expert Report of Dr Craig Edgar, together with the accompanying Plant Layout Study ("PLS"). Dr Edgar's report sets out his extensive expertise in the matter, and confirms that it is prepared in the manner which would be expected of a court appointed expert. The report explains that Dr Edgar's instructions were to primarily focus on whether the Munster Joinery Land is needed for the scheme and secondly to focus on whether it is possible to avoid both the Munster Joinery Land and all or as much of the Crossness Local Nature Reserve as is possible.

10. Regrettably despite a written request for information relating to the design basis for the scheme being made in August 2024, the Applicant refused to provide that information until

after CAH1. On 14 November 2024 some of the requested information was provided, and this has informed Dr Edgar's report. The conclusions of the report are:

a. There are a number of concerns with the Applicant's layout that have increased the footprint of the site;
b. There are a number of design decisions which have resulted in a larger footprint;
c. There are a number of arguments put forward by the Applicant which lack robustness or potentially lead to incorrect conclusions.

11. Dr Edgar has carried out his own assessment and developed two alternative layouts in the PLS. The Alternative Site Layout avoids the compulsory acquisition of the Munster Joinery land by occupying a smaller area than the Applicant's scheme but still achieves the same design intent and is likely to do so whilst achieving a better financial outcome for the Applicant.

12. A further alternative would minimise the requirement to use land currently designated as part of the Crossness Nature Reserve and avoid the compulsory acquisition of the Munster Joinery land. Whilst this layout does have some disadvantages compared to the Alternative Site Layout it is still feasible. For the avoidance of doubt Landsul and Munster Joinery does not express a view on whether development in the Nature Reserve should be avoided, but it demonstrates that it can be avoided.

13. Accordingly, since it has been demonstrated that the scheme can be delivered without the acquisition of the Munster Joinery land, the case for compulsory acquisition is not made out. The DCO can, however, be amended to exclude the Munster Joinery land from the proposed compulsory acquisition.

<u>Alternative locations</u>

14. Dr Edgar's report demonstrates that the Applicant has sought an excessive amount of land for the scheme. Accordingly, it has wrongly rejected alternatives on the basis that they would not provide a sufficient amount of land and/or that they would interfere excessively with other land uses. In particular, as explained by Dr Edgar, only part of the land identified as the "East Zone" in the Terrestrial Site Alternatives Report would be required for the scheme. Notably, this would exclude the Lidl distribution centre. The freehold of the Iron Mountain facility was recently sold and is understood to be leased to Iron Mountain only until 2031. It is therefore potentially available for the scheme. The Applicant indicated at CAH1 that it would provide

further information on the use of this land, together with the existing wharf, as an alternative option.

Inadequate socio-economic assessment

15. The Environmental Statement does not contain a proper and comprehensive assessment of the impacts of the loss of the business from the Munster Joinery land. The ES has been reviewed by socio-economic development experts at Lichfields whose detailed report is attached, who have carried out their own assessment based on industry best practice methodologies and information on the public domain, which was also available to the Applicant. Lichfields conclude that the following significant adverse effects would occur:

    a. Long-term, permanent, moderate adverse (significant) effect on the labour market within the Local Study Area.
    b. Long-term, permanent, substantial adverse (significant) on businesses and commercial activity within the site boundary.
    c. Long-term, permanent, moderate adverse (significant) effect on businesses and commercial activity within the Local Study Area.
    d. Long-term, permanent, moderate adverse (significant) effect on businesses and commercial activity within the Regional Study Area.

16. In addition, ES Chapter 14 [APP-063] provides an inadequate assessment of the effect of the loss of employment from the Munster Joinery site on human health.

17. These significant adverse effects should be mitigated and could be mitigated by changes to the design and footprint of the scheme, as explained in Dr Edgar's report. Further the Applicant's inadequate assessment means that the effects of the proposal have been understated, and the impacts including on the wider supply chain provide a clear reason for withholding development consent.

Conclusion

18. Landsul and Munster Joinery is firmly opposed to the acquisition of its land. Ongoing expert review indicates that the Project can be delivered without this land. Neither the compulsory acquisition, nor the consequent significant socio-economic effects of that acquisition, is justified. Accordingly either the land should be excluded from the application and the compulsory acquisition request withdrawn or development consent should be refused. In light

of the serious prejudice to their interests and the technical complexity of the issues raised, Landsul and Munster Joinery seek the right to be heard on this objection at a future compulsory acquisition hearing.

For and on behalf of Landsul and Munster Joinery

26 November 2024

Annex A

Expert Report of Dr Craig Edgar

Expert Report

Cory Decarbonisation Project

Landsul Ltd and Munster Joinery (U.K.) Ltd

Report Details

Client	Landsul Ltd and Munster Joinery (U.K.) Ltd
Project	Cory CCS
Project Number	2409
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Document History

Revision	Date	Prepared By	Notes
0	10/10/24	Craig Edgar	First Draft
1	22/11/24	Craig Edgar	First Issue

Notice

Abbreviations, Acronyms and Definitions

ACC	Air Cooled Condenser
Applicant	Cory Environmental Holdings Ltd
BOP	Balance Of Plant
CEMS	Continuous Emissions Monitoring System
EfW	Energy from Waste
DCC	Direct Contact Cooler
DCO	Development Consent Order
HP	High Pressure
ISH	Issue Specific Hearing
LP	Low Pressure
PINS	Planning Inspectorate for England
Proposed Development	The carbon capture, liquefaction and storage project

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1. INTRODUCTION

A. Background

1.1 Cory Environmental Holdings Limited ("Cory") ("the Applicant") has made an application for a development consent order (DCO) for a decarbonisation project associated with its Riverside 1 and Riverside 2 facilities in Belvedere, London. The Proposed Order relates to the construction, operation, maintenance and decommissioning of the decarbonisation project, incorporating:

(a) A Carbon Capture Facility, comprising up to two carbon capture plants,

(b) A proposed new Jetty, extending into the River Thames to facilitate the onward transfer of captured carbon dioxide,

(c) A mitigation and enhancement area (to both enhance biodiversity and to improve public access to outdoor space),

(d) Three temporary construction compounds, connections to utilities and provision of site access works.

1.2 As part of the Proposed Scheme, Cory are seeking powers to compulsorily purchase land owned by Landsul, part of which is currently used for facilities belonging to Munster Joinery (the "Munster Joinery Land").

1.3 Landsul Limited & Munster Joinery (U.K.) Limited have submitted an objection to the Planning Inspectorate (PINS) as part of their relevant representation.

B. Instructions

1.4 I have been instructed to prepare an Expert Report that:

(a) provides a critique of the Proposed Scheme with a particular focus as to why and how the Proposed Scheme could be implemented without requiring the Munster Joinery Land; and

(b) includes an alternative design of the Proposed Scheme which avoids the Munster Joinery Land.

1.5 The primary focus of the Expert Report should be on whether the Munster Joinery Land is needed for the Proposed Scheme. Following that, there should be secondary focus on whether it is possible to avoid both the Munster Joinery Land and all or as much of the Crossness Local Nature Reserve as is possible.

C. Approach

1.6 My approach has been to first understand the Applicant's proposals for the development. To this end, I have relied principally upon the information provided on the PINS National Infrastructure Planning website as part of the DCO application.

1.7 The public domain information is somewhat high level and, following an initial review, I had requested (through Landsul's legal representatives Tozers LLP) additional information and technical engagement with relevant parties involved in developing the Applicant's proposals. Unfortunately, this did not initially result in meaningful additional information prior to the Issue Specific Hearing (ISH) on November 6th 2024.

1.8 Therefore, in addition to an independent review of the Applicant's Scheme I have also developed an Alternative Scheme by making a number of assumptions based on my understanding of the Riverside 1 and 2 facilities and information in the public domain including that provided in the DCO. I have discussed these assumptions in detail in a separate document.

1.9 Following the ISH, the Applicant has provided useful responses in terms of design basis information. I have been able to check these responses against the assumptions I had made. There was generally good alignment but where there were differences I have discussed the impact of these.

1.10 I have set out this Expert Report as follows:

(a) An introduction (section 1);

(b) My analysis following a review of the Applicant's proposed layout (section 2);

(c) A summary of the Alternative layout that I have developed (section 3);

(d) A discussion of the key differences between the Alternative layout and the Applicant's layout as well as consideration of some more general site selection points (section 4);

(e) Conclusions (section 5).

D. Expert Declaration

1.11 I am a chartered engineer and member of the Institute of Chemical Engineers with a first class engineering degree and a doctorate from the University of Strathclyde in chemical engineering. I have more than 20 years' experience in process engineering and project development – primarily within the power generation sector. This includes experience in the development of carbon capture facilities. A copy of my CV can be found in Appendix A.

1.12 I, Craig Robert Edgar, declare that:

(a) I confirm that I have not entered into any arrangement where the amount or payment of my fees is in any way dependent on the outcome of the case.

(b) I know of no conflict of interest of any kind, other than any which I have disclosed in my report.

(c) I do not consider that any interest which I have disclosed affects my suitability as an expert witness on any issues on which I have given evidence.

(d) I will advise the party by whom I am instructed if there is any change in circumstances which affect my answers to points b and c above.

(e) I have shown the sources of key information I have used.

(f) I have exercised reasonable care and skill in order to be accurate and complete in preparing this report.

(g) I have endeavoured to include in my report those matters, of which I have knowledge or of which I have been made aware, that might adversely affect the validity of my opinion. I have clearly stated any qualifications to my opinion.

(h) I have not, without forming an independent view, included or excluded anything which has been suggested to me by others including my instructing lawyers.

(i) I will notify those instructing me immediately and confirm in writing if for any reason my existing report requires any correction or qualification.

1.13 I confirm that the contents of this report are true to the best of my knowledge and belief.

2. CORY DCO PROPOSED SCHEME

A. Overview

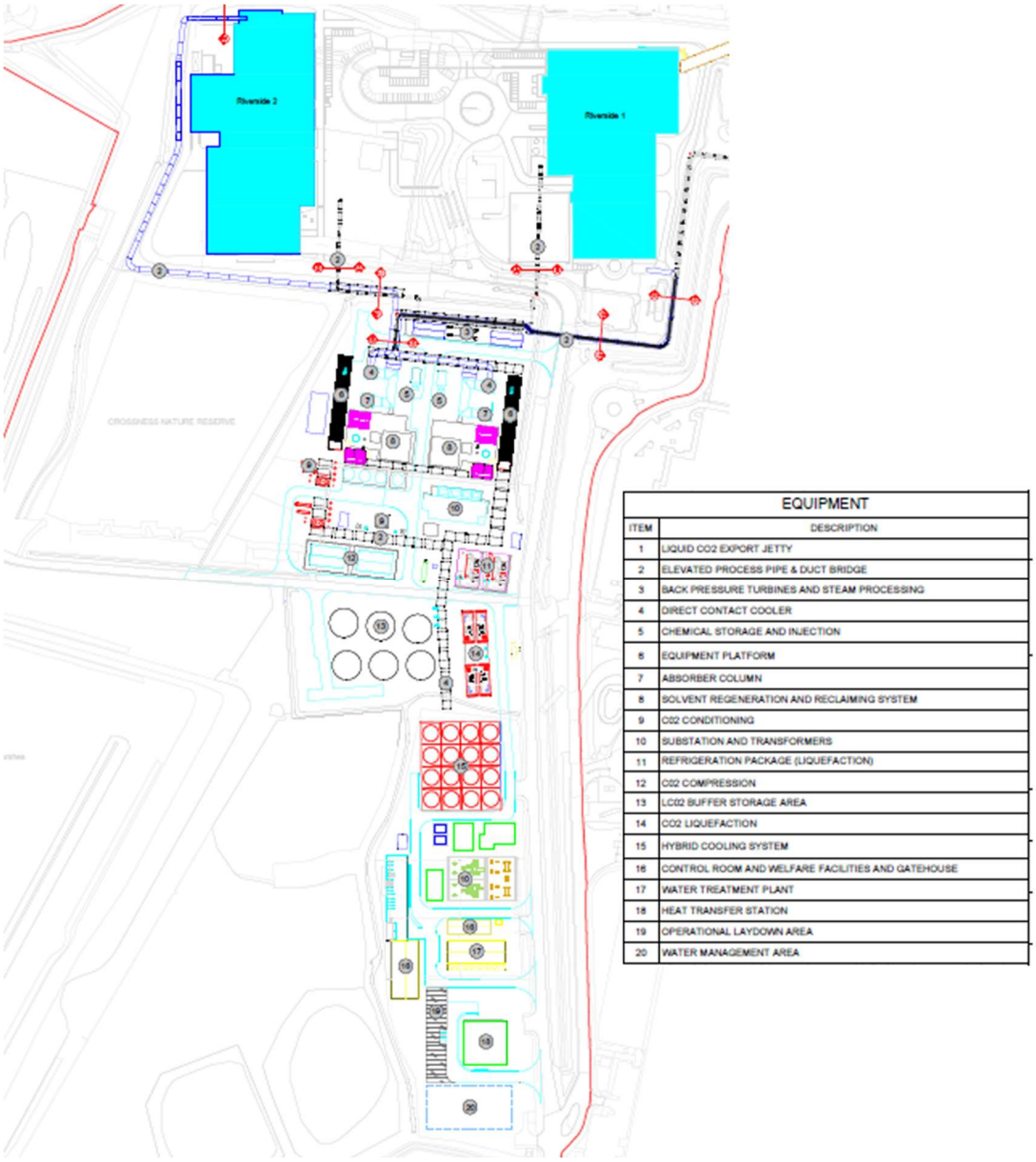
2.1 The Cory Decarbonisation scheme is intended to capture 95% of the carbon dioxide (CO_2) emissions from the Riverside 1 and Riverside 2 Energy from Waste (EfW) facilities. These EfW facilities are both located on the south bank of the River Thames in Belvedere, London.

2.2 The Applicant has described the intended scheme in documentation provided to support the Development Consent Order (DCO). This information is provided on-line on the Planning Inspectorate website. I have relied upon this information to develop my understanding of the proposed scheme.

2.3 The Proposed Development consists of process plant that will separate CO_2 from the flue gas of the Riverside 1 and Riverside 2 EfW facilities, purify that CO_2, liquify the CO_2 and then store the liquid CO_2 prior to exporting it via ship on the River Thames.

2.4 The Applicant suggests that the carbon capture, liquefaction and storage facilities will require a footprint of approximately 8 hectares[1] (80,000 m^2). For context, the Munster Joinery facility is approximately 0.8 hectares (8,000 m^2) and thus represents about 10% of the total suggested footprint.

2.5 The Applicant has presented a high level description of the technologies that will comprise the Proposed Development. The Applicant has also provided an indicative equipment layout from which Figure 1 is taken.



EQUIPMENT	
ITEM	DESCRIPTION
1	LIQUID CO2 EXPORT JETTY
2	ELEVATED PROCESS PIPE & DUCT BRIDGE
3	BACK PRESSURE TURBINES AND STEAM PROCESSING
4	DIRECT CONTACT COOLER
5	CHEMICAL STORAGE AND INJECTION
6	EQUIPMENT PLATFORM
7	ABSORBER COLUMN
8	SOLVENT REGENERATION AND RECLAIMING SYSTEM
9	CO2 CONDITIONING
10	SUBSTATION AND TRANSFORMERS
11	REFRIGERATION PACKAGE (LIQUEFACTION)
12	CO2 COMPRESSION
13	LCO2 BUFFER STORAGE AREA
14	CO2 LIQUEFACTION
15	HYBRID COOLING SYSTEM
16	CONTROL ROOM AND WELFARE FACILITIES AND GATEHOUSE
17	WATER TREATMENT PLANT
18	HEAT TRANSFER STATION
19	OPERATIONAL LAYDOWN AREA
20	WATER MANAGEMENT AREA

Figure 1 – Indicative Equipment Layout from DCO

2.6 The equipment selected is generally typical of what would be expected for a facility to capture, liquefy and store CO_2. However, as I will explain in the following sections, there are some items of equipment that appear unnecessary and this, combined with some of the design assumptions, has led to a site footprint that is considerably larger than required.

B. Liquid CO_2 Export

2.7 Given that the export arrangements do not impact the required footprint for the capture and storage facilities I have not reviewed this aspect of the Proposed Development.

C. Interfaces With EfW Facilities

2.8 I have limited detail available on the Riverside 1 and Riverside 2 facilities but my understanding is that the interfaces include:

(a) A high pressure steam off-take between the boiler and the steam turbine in both EfW facilities;

(b) A tie-in to the existing flue gas system to enable flue gas to be directed to the carbon capture facility rather than to the existing EfW stacks;

(c) An electrical feed from the existing EfW switchyards.

2.9 The steam, flue gas and electrical connections are brought to the Carbon Capture plant on elevated pipebridges. I have not reviewed this aspect of the Proposed Development in detail and have assumed the same routing when developing the Alternative Scheme Layout (see section 3).

D. Two-line vs Single line Approach

2.10 Before I go on to discuss the individual items of equipment, it is worth highlighting that the Applicant has chosen a two-line approach. Basically, this means that the plant consists of two distinct trains, each capable of capturing and liquefying 50% of the total carbon dioxide capture capacity for the development.

2.11 It is stated by the Applicant[2] that:

"Whilst the amount of each type of equipment might change the remaining equipment will need to be sized to meet that capacity i.e. you would require one larger (in length and width, but not height) version of each type of equipment to meet the same capacity if only one carbon capture plant is brought forward. As such the eight hectare size requirement for the Carbon Capture Facility remains the same."

2.12 However, this is not correct. Firstly, not all process equipment scales linearly with increased capacity. For instance, a pump with double the capacity will not be twice as big in terms of footprint.

2.13 Secondly, for process equipment such as the absorber column where capacity is dependent on surface area of the packing, the packing area could be increased by using a taller column rather than just increasing the cross sectional area.

2.14 Finally, and most significantly, the overall site footprint is dictated not just by the process equipment itself but the need to provide access for operation and maintenance. Therefore, doubling the quantity of equipment also significantly increases the space that is required to permit operation and maintenance. This is illustrated by the simple sketch below which shows a 2 line plant utilising 2 x 6m diameter columns and the equivalent 1 line plant which would require a 8.5m diameter column to maintain the same column cross sectional area. For the sake of illustration, I have kept the height the same although (as per paragraph 2.13) this is not a hard constraint. For both, a 5m buffer around the units has been provided for maintenance. It can be seen that the footprint for the 1 line plant is 342 m^2 whilst the footprint for the 2 line plant is 432 m^2 (26% more).

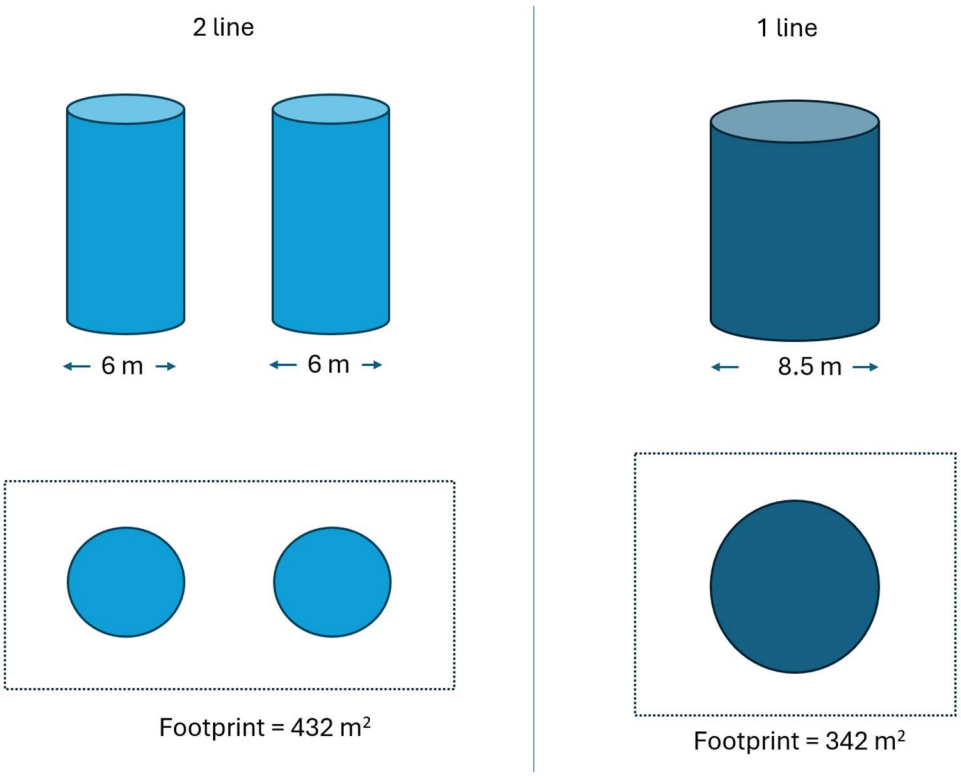


Figure 2 - Footprint comparison (2 line vs 1 line)

2.15 It can be seen that the decision to adopt a two-line approach is not neutral in terms of footprint as the Applicant suggests. Rather, selecting a two-line approach will significantly increase the required footprint.

E. Electricity and steam

2.16 Carbon capture and liquefaction requires significant quantities of electricity and steam. The steam required is Low Pressure (LP) which is not currently available at either the Riverside 1 or Riverside 2 facilities.

2.17 High Pressure (HP) steam is available as this is produced in the EfW boiler plant and then fed to Steam Turbines to produce electricity. The Applicant proposes to take some of that HP steam and feed it into new back pressure steam turbines. The steam will expand through the turbines which will produce both electricity and the LP steam required by the carbon capture plant.

2.18 It is noted by the Applicant[3] that the steam turbine generator does not produce sufficient electricity to fully meet the needs of the carbon capture and liquefaction plant and therefore an additional electrical supply is taken from the existing Riverside 1 and Riverside 2 power stations.

2.19 However, despite these arrangements the Applicant has also included a separate switchyard (item 10). This is shown in the diagram along with the approximate location on a satellite image from Google Earth.

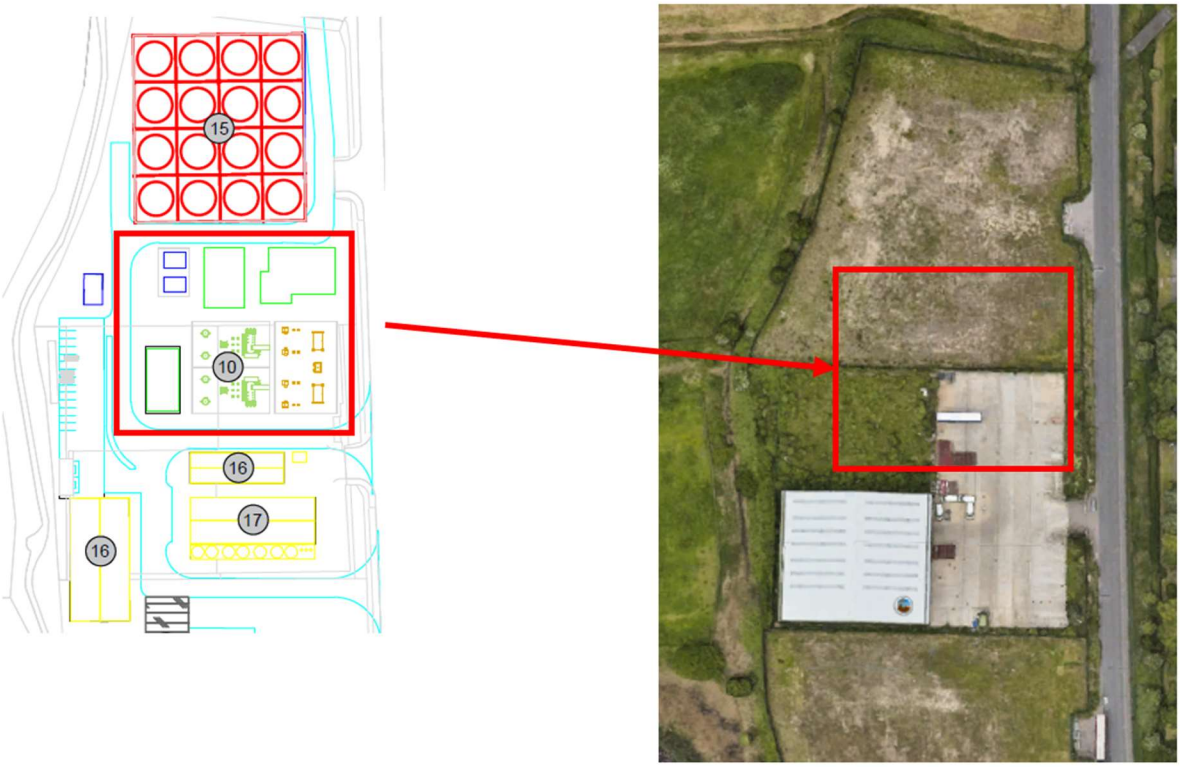


Figure 3 - "Substation and Transformers" equipment item from DCO application

2.20 Substation and transformer plant is used to provide appropriate isolations, metering and voltage step-up / step-down to connect facilities to electricity supplies on distribution and transmission electrical networks. In short, they enable electricity to be either imported or exported from a site. However, given that the Applicant proposes to serve the electrical needs of the development through a connection to the existing Riverside 1 and 2 facilities plus self-generation through a back-pressure steam turbine generator unit the need for this substation and transformer plant is not apparent.

2.21 The area of the red box in figure 3 is approximately 0.4 hectares (4,000 m^2). This is equivalent to about half of the Munster Joinery Land.

F. Carbon Capture

2.22 The carbon capture plant comprises columns, heat exchangers, pumps, tanks and supporting equipment that separates out the CO_2 from the other chemical components in the flue gas to produce a relatively pure feed of CO_2 which can then be compressed and liquefied.

2.23 In terms of the footprint occupied by this plant (items 3 to 8 in Figure 1) it is broadly in-line with what I would expect for a 2-line plant of this capacity.

G. Liquefaction and storage

2.24 The proposed export route for the CO_2 is to transport it as a liquid by ship. Therefore, the CO_2 produced by the carbon capture stage requires to be compressed, dried, conditioned

and liquefied to meet both the purity and physical conditions (temperature, pressure) for onward transportation.

2.25 The technologies selected by the applicant appear to be appropriate. Much of the plant and equipment for this part of the process will be procured as vendor packages. One vendor with an offering in this market is Linde [redacted] from where Figure 4 is taken. In this diagram, the compression equipment is housed in the building labelled 1 whilst the drying, conditioning and liquefaction is carried out in the equipment labelled 2, 3 and 4.

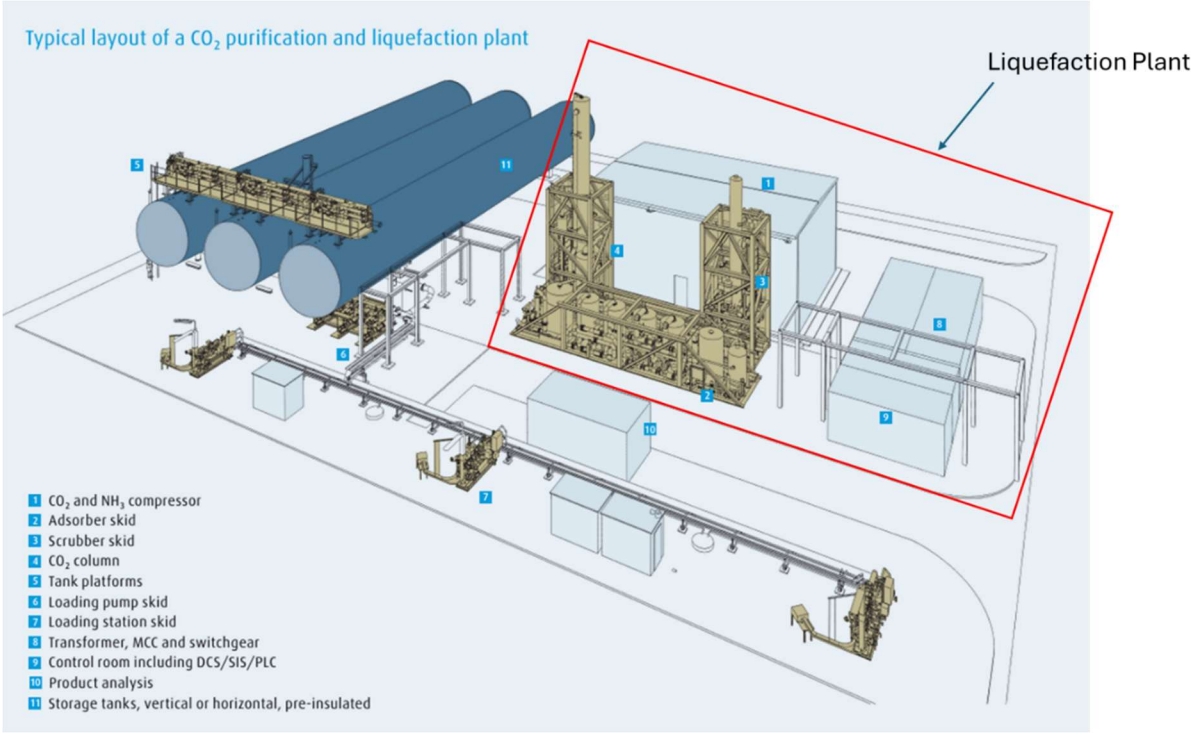


Figure 4 - Typical liquefaction plant layout

2.26 In terms of the main process equipment associated with the compression and liquefaction the footprint suggested by the Applicant appears generally reasonable.

2.27 However, the site footprint though is not just driven by the equipment itself, it is necessary to provide adequate space to permit access for operations and maintenance and it is a general feature of the Applicant's site layout that the space around equipment / areas of unused / wasted space are excessive. This can be clearly seen when considering the liquefaction and storage as illustrated in Figure 5.

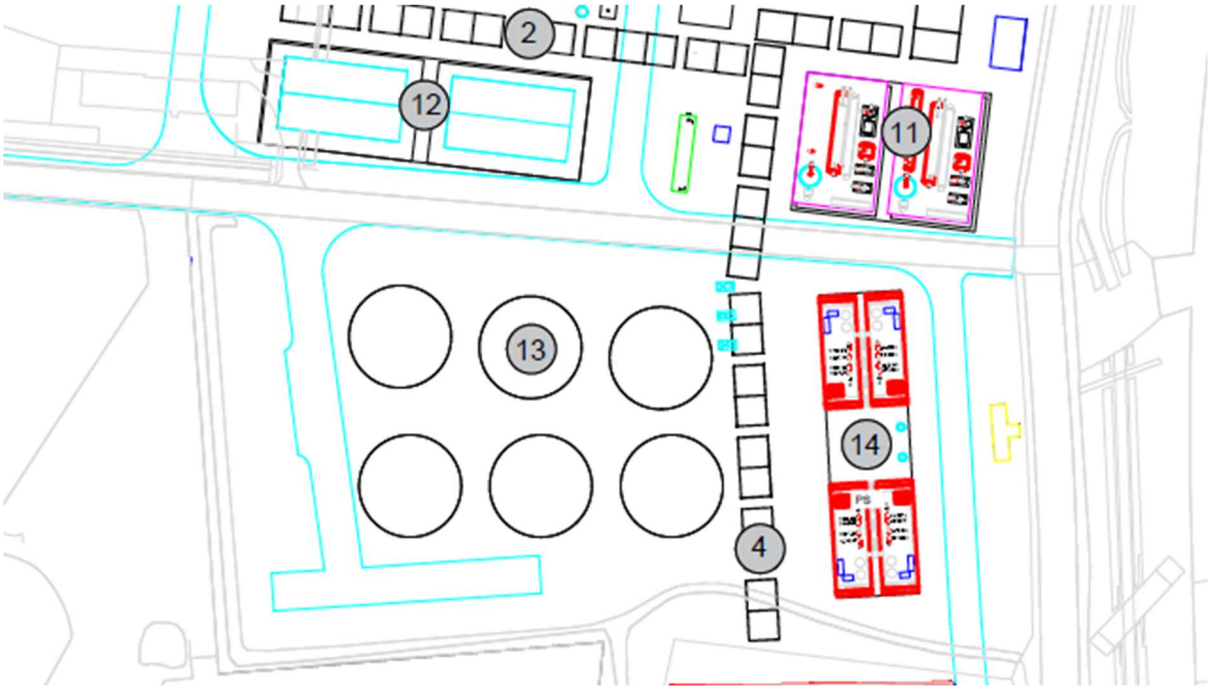


Figure 5 - Liquefaction and Storage (items 11, 13 and 14)

2.28 The area of land occupied by the liquefaction and storage is approximately 11,250 m^2. However, it can be seen from Figure 5 that the actual process equipment occupies less than half of this. As I discuss in 3.8 to 3.9 it is possible to accommodate liquefaction and storage equipment that will achieve the required duty in a much reduced space without compromising operability and maintainability.

2.29 Temporary storage for the liquid CO_2 is required on-site as there will not always be a ship sitting at the jetty to receive the CO_2 being produced. For economic reasons, it is desirable to have the CO_2 loading rate to the ship as high as possible to minimise the time the ship spends docked. This means that on-site buffer storage is required to improve the economics of the scheme.

2.30 There is a potential alternative to select floating storage rather than on-land storage. This is briefly discussed and discounted by the Applicant in the consideration of alternatives[6]. The reasons given were that it would have an adverse impact on the marine environment, present navigation risks as well as increase operational costs due to maintenance of the floating storage and dredging to remove silt that might build up around the floating storage unit.

2.31 The storage capacity is driven by the capacity of the vessels used to transport the CO_2. A minimum storage requirement would be the time between one vessel being filled and the next vessel being ready to be filled. However, given that the filling rate for the vessel will be quick in comparison to the CO_2 production rate, it would be more common to base the buffer storage to the capacity of the vessel.

2.32 The design basis for the development[4] (as per the DCO) was to accommodate vessels between 7,500 m^3 (basis of assessment in the Environmental Statement) and 15,000 m^3 vessels (maximum design basis for the Jetty). As such, the on-site storage would be sized at the larger of these two capacities – that is, 15,000 m^3.

2.33 Subsequent to the DCO application, the Applicant has had an amendment approved by the Planning Inspectorate to accommodate vessels of up to 20,000 m^3. Logically, it would be thought that this would increase the required on-site storage but in the letter that sets out this proposed amendment[5] it is stated that "*the Applicant confirms that the change to provision for vessels of approximately 20,000 m^3 would not require any changes in the size of the LCO_2 Buffer Storage Area*".

2.34 The Applicant has subsequently confirmed[7] that 24,000 m^3 of storage is provided. This is more than would have been required for the original design basis but is appropriate for the amended design basis to accommodate the larger vessels.

2.35 My own assessment of the storage requirements is that the same volume of storage can be provided in less space than the Applicant has allowed. In particular, the Applicant's layout shows 6 storage spheres but I consider that only 3 storage spheres are required to provide approximately 24,000 m^3 of CO_2 storage.

H. Cooling

2.36 The separation of CO_2 from the flue gas and the subsequent liquefaction of that CO_2 involves numerous process stages that require both heating and cooling. The process design will look to optimise the heating and cooling to minimise overall energy consumption but overall there will be a significant residual cooling load for the plant which the Applicant has estimated to be 362MW[7]. This cooling load is considerably higher than that which I had calculated prior to the provision of new information from the Applicant, and may warrant further investigation.

2.37 The Applicant provides a review of cooling options[8] which acknowledges three feasible options based on cooling towers – wet, dry and hybrid. There are advantages and disadvantages to each. The wet and hybrid options require water and can potentially create visible plume which (whilst harmless) is often subject to negative public perception. However, as noted above, the dry option requires a significantly greater footprint.

2.38 The Applicant adopts dry cooling as a potential option and then carries out a comparison between wet cooling and hybrid cooling. Hybrid cooling is ultimately preferred by the applicant for the following reasons:

- *it has a lower water consumption due to reduced evaporation losses and blowdown in the system, therefore limiting the required make up water amount;*
- *it provides plume abatement as the wet air mixes with, and is heated by, the dry air prior to exiting the cooling towers, therefore negating plume visibility; and*
- *it provides better operational flexibility in varied environmental conditions, with the potential to use the wet section in isolation, if required.*

2.39 These reasons are valid but the Applicant fails to acknowledge the difference in footprint between a wet cooling and hybrid cooling option. As a rough guide, a wet cooling tower might require just 60% of the footprint of a hybrid cooling tower. Given that the Applicant has allowed a footprint of slightly over 3 ha (3,000 m^2) for cooling this is a significant difference in terms of overall site footprint.

2.40 The Applicant's main reason for discounting wet cooling is said to be that there is insufficient water supply. I have not seen the detailed calculations / justification but I would observe that whilst hybrid cooling significantly reduces the annual water

consumption, the saving in terms of peak water requirements is far lower. Therefore, depending on the detailed design basis, hybrid cooling may not significantly reduce the sizing of the peak water demand for the plant. The Applicant states that 175 m^3/h water supply has been applied for from Thames Water. The cooling water circulation flow used by the Applicant is 31,200 t/h which is based on a 10C rise in water temperature. A rule of thumb for cooling water tower make-up is that it will be about 2% of the circulation flow. In this case that would be 624 t/h.

2.41 In terms of water, it is important to note that there is a significant quantity of water in the flue gas from the EfW facilities. This is condensed out of the gas in the Direct Contact Cooler (DCC) which is part of the carbon capture facility. The Applicant does not state the amount of water in the flue gas but based on my experience of other EfW plants it is likely to be in the region of 20% v/v. If this were the case then there would be more than 624 t/h of water in the flue gas and there may be no need for any make-up from the Thames Water supply.

2.42 In order to fully understand this issue I would need further detail on the Applicant's design, but, as should be apparent from the above, I am not convinced that a wet cooling tower option would not be possible.

2.43 Notwithstanding my concerns over whether the Applicant has been sufficiently rigorous in the selection of cooling technology, my own assessment suggests that the Applicant's footprint is approximately 30% larger than I would expect for a hybrid cooling system of the cooling load anticipated by the Applicant.

2.44 For this particular development, there is also an additional opportunity to capture waste heat and feed it to the Riverside Heat Network. The Applicant estimates that up to 100MWt of heat can be supplied to the heat network[9].

2.45 The Applicant includes a significant footprint for the heat transfer station that would include heat exchangers and pumps to capture the waste heat from the carbon capture and liquefaction processes and transfer it to the heat network. However, if this was implemented then the cooling load would be decreased accordingly. This would lead to a corresponding decrease in the footprint required for the cooling plant. Given that it would appear that the cooling requirement could be reduced by >25% then the footprint saving could be over 800 m^2.

I. Balance Of Plant (BOP)

2.46 In addition to the plant and equipment discussed above, the carbon capture, liquefaction and storage will require additional BOP including:

(a) Chemical storage for solvents and reagents

(b) Storage tank for degraded amine prior to off-site disposal

(c) Water tank

(d) Water Treatment Plant and Waste-Water Treatment Plant

(e) Heat transfer station

2.47 Water treatment is required to produce demineralised water for the carbon capture process (to replenish losses from the amine solution in the absorber and stripper).

However, the quantity of demineralised water is relatively small and will not require a large plant for this purpose. The water recovered from the flue gas and potable water from the Thames Water supply will be suitable for use in a wet / hybrid cooling tower without significant further processing. There will be a need to treat recovered water from the cooling tower to prevent impurities building up and reduce the requirement for make-up water.

2.48 A feature of the Applicant's layout is the significant space that is allowed around items of equipment and a failure to best optimise the footprint available. The heat transfer station is an example of this as can be seen from Figure 6 below. The heat transfer station is designated 18 whilst area 19 is designated for operational laydown. It can be seen that the heat transfer station is surrounded by roads and hardstanding meaning that the building itself occupies only about 25% of the available area to the east of the operational laydown area. Access to the operational laydown area is achieved from a road running between that area and the heat transfer station ignoring the potential to use the area to the west of the operational laydown area for access which means that area is effectively unused.

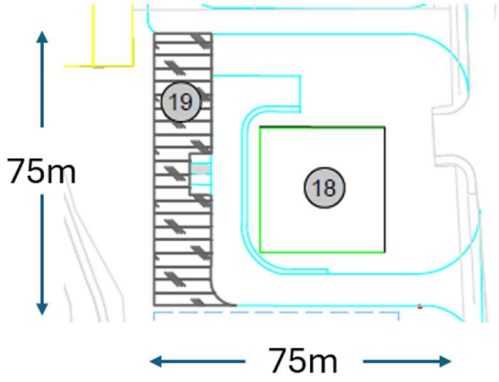


Figure 6- Heat transfer station and operational laydown area

J. Operational laydown area

2.49 As shown in Figure 6 the Applicant has configured the site such that there is an area allocated for operational laydown. Operational laydown, in relatively close proximity to the plant is certainly beneficial – particularly during outages. However, there is no absolute requirement that this be on the carbon capture site itself – it could be located within the wider Riverside campus. It would appear that there is plenty of other alternative land available to the Applicant for temporary laydown on the existing EfW facilities as shown in the image from Google Earth below.

Figure 7- Apparently unutilised space on Riverside 1 EfW

2.50 The areas designated by the red boxes in Figure 7 would appear to be available and potentially suitable for operational laydown. Indeed, it can be seen that parts of the western red box appear to already be being used for temporary storage – potentially as part of the construction of the Riverside 2 facility.

2.51 For context, a more efficient layout for the heat transfer station and utilising existing unused land for operational laydown would be able to save at least 0.4 hectares (4000 m^2) which is 50% of the Munster Joinery Land.

K. Administration and Welfare Facilities

2.52 The Applicant has included two buildings designated as "Control Room And Welfare Facilities And Gatehouse". It is assumed that the western of these buildings is the control room and welfare facilities whilst the eastern is the gatehouse.

2.53 It is common on industrial facilities to have a gatehouse to monitor deliveries in and out of site. However, on a carbon capture facility it is not common to have a dedicated gatehouse due to the very low number of deliveries to site. This is acknowledged by the Applicant in the Environmental Statement[10]:

"the Proposed Scheme will generate a small number of vehicle movements during the operation phase which, in agreement with the Planning Inspectorate and LBB19, have been scoped out of the landside transport assessment. The vehicle movements will be from the following:

- *operation staff travelling to/from the Proposed Scheme;*
- *additional Contractor(s) for maintenance activities not undertaken by the operational workforce;*

- *delivery of diesel for the backup power generators;*
- *delivery of chemicals and proprietary amine-based solvent; and*
- *emergency services."*

2.54 There is no necessity for a dedicated gatehouse to accommodate these vehicle movements. They could be managed by the control room operators.

2.55 The Applicant has allowed for a large control and welfare block with dimensions of approximately 40m x 20m and a footprint of 800 m^2. The Applicant states[11] that this is because the carbon capture facility will be operated as a "*separate facility to Riverside 1 and Riverside 2*".

2.56 In my own experience, this is unusual. Normally, a post combustion carbon capture facility is designed to be closely integrated with the host power station. The key reason for this is that the process interactions are relatively complex and the operation of the host power plant and carbon capture facility are very much intertwined.

2.57 To give an example, the booster fan supplied as part of the carbon capture facility will require to follow the operation of the Induced Draft fan in the ERF plants in order to ensure stable gas flow to the carbon capture facility and avoid disruption to the operation of the ERF plant. This is likely to require signals such as the speed of the Induced Draft fan and a pressure measurement in the flue gas duct.

2.58 Accordingly, in my experience, it would be normal practice for a post combustion carbon capture plant to be operated from the control room of the combustion plant to which it is attached.

2.59 The Applicant further states[11] that there is no space in the existing control rooms to accommodate the facilities or personnel for the carbon capture plant. I have not got information on the size of the existing control rooms so I am unable to robustly confirm or deny this statement but I would observe that the necessary facilities are likely to comprise an operator station, a station for the Continuous Emissions Monitoring System (CEMS) as well as space for servers and switches. This is a relatively small amount of equipment which would not take up a significant amount of space.

2.60 The Applicant also advances the argument[11] that the control room / welfare facilities *"support the requirement for a single contiguous plot of land for the construction, operation and maintenance of the Proposed Scheme, and the need for fast response times in the unlikely event of an operational incident*". There is no detail on what an operational incident is considered to be but I would observe that good industrial practice is that the plant should be designed to fail into a safe condition rather than requiring operator intervention and, especially, it would generally be unacceptable to require operatives to be in the vicinity of any operational incident – especially when one considers the hazards involved in the proposed facility including chemicals such as carbon dioxide and amines as well as fire and electricity. Normally, if there is an operational incident then trained first responders (for instance the fire brigade) are called, the plant is shut-down / put into a safe state and personnel are evacuated. It is not acceptable health and safety practice for operators / maintenance personnel to put themselves in harm's way by moving towards the source of an operational incident. As such, I do not agree with what the Applicant appears to be arguing in this section.

2.61 An additional consequence of the Applicant's decision to consider the carbon capture facility separate from EfW plants is that there will be a requirement for parking within the carbon capture facility which would not otherwise be required if the carbon capture facility and the EfW plants were operated as one facility.

L. Water Management Area

2.62 The Applicant has made allowance for a "Water Management Area" with a footprint in the region of 2000 m^2. The need for this or what it entails is not explained in the Site and Proposed Scheme Description. However, in the Applicant's response to a question on what this area entailed[12] it is stated that this is to be "*finalised through the detailed design and include Water Supply Storage Tank(s)*". The Applicant has stated that 8,400 m^3 of water storage will be provided. As I discuss in 2.40 to 2.42, I consider that it may be possible to reduce the water abstracted from Thames Water which would reduce the required storage. The Applicant states that the storage is sized to achieve 2 days of capacity. This is quite a significant amount of storage. If the EfW facilities do not benefit from similar levels of back-up storage then in the event of a failure of the Thames Water supply the carbon capture plant will still require to shut-down.

2.63 Regardless of the above, as an example, a tank with capacity 8,354 m^3 from Superior Tank Company Inc[13] has a diameter of 38m and height of 7.4m. The footprint of that tank would be 1,134 m^2. This is far less than the circa. 2,000 m^2 allowed for in the Applicant's footprint.

M. Contiguous Site

2.64 In its consideration of alternatives, the Applicant dismisses any potential to retain Munster Joinery within a development that extends both north and south of the Munster Joinery Land using the following justification[14]

"an arrangement that retains Munster Joinery (0.8 hectares) would lead to a fractured development whereby much of the Supporting Plant is separated from the rest of the Carbon Capture Facility. Severance would compromise operational efficiency, site security and safety and reduce the potential for enhancement within/at the edges of the Carbon Capture Facility. For example, lack of visibility from the Control Room to the Carbon Capture Facility and also a lack of safe and secure access from the Gatehouse to the Carbon Capture Facility."

2.65 This is a very weak argument to dismiss what is an entirely achievable option. I do not agree that "severance" of the type contemplated would compromise operational efficiency, site security and safety. Contrary to what the Applicant seems to suggest, a modern industrial facility such as a Carbon Capture plant is not operated by looking out of the window of the control room. Even were this true, the Applicant has situated the control room at the southern end of the site, a significant distance from, and out of sight of, the main process plant.

2.66 I would also observe that this seems rather contradictory to the decision to separate the carbon capture facility from the EfW facilities. The Applicant has not explicitly stated which facilities / plant items would be located to the South of the Munster Joinery Land in their option 3 (see Figure 11) but it would be logical to assume that these might comprise the heat transfer station, the water treatment plant and the water storage tank plus the operational laydown area. The level of process interaction / complexity of these items of

plant is very much less than the complexity of interaction between the EfW facilities and the carbon capture plant. It seems inconsistent to argue that a contiguous site is necessary for these facilities but not for the more complex interactions with the EfW facilities.

2.67 A further inconsistency in terms of the contiguous site argument can be seen from the Applicant's plans for accommodating the Thames Water access road[15]. As can be seen from Figure 8 the Applicant has included gates to isolate the Thames Water access road from the carbon capture facility. In effect, this means that the Thames Water access road bifurcates the site.

Figure 8- Carbon Capture Facility Circulation Plan

2.68 A concern with a bifurcated / non-contiguous site is the need to maintain safe and secure access. However, there is no reason why this could not be achieved even with two completely separate site areas. It would require separate access control and would be less convenient, but it is entirely achievable.

2.69 There is no technical challenge to bringing services such as water and electricity between a development located North and South of the Munster Joinery Land. The services that require to be taken across the Thames Water Access Road are far more significant as they include the liquid carbon dioxide which will be a relatively large pipe.

3. ALTERNATIVE SITE LAYOUT

A. General

3.1 In order to better understand the footprint required for the carbon capture, liquefaction and buffer storage facilities, I have prepared an alternative site layout. This has been done by defining the key equipment required, estimating the sizing for that equipment and locating the equipment within the site.

3.2 In developing this alternative site layout, the following key principles have been followed:

(a) The alternative site layout will aim to achieve the same carbon capture performance as the scheme proposed by Cory in the DCO;

(b) The alternative site layout will enable the construction and operation of a carbon capture plant that achieves reliability and availability in line with what is typical for similar schemes, and can operate safely and securely;

(c) The alternative site layout will enable the construction and operation of a carbon capture plant at a similar cost to the scheme proposed by Cory.

3.3 A key assumption that I have made is to provide 2x50% trains for the carbon capture and liquefaction equipment. This has been done to enable a direct comparison with the Cory DCO scheme which has been designed on this basis. As I discuss above (2.10 to 2.15) selecting a single 100% train would enable a plant with a smaller footprint to be designed.

3.4 Notwithstanding my reservations that I discuss in 2.56 to 2.58 I have also adopted the Applicant's assumption that the carbon capture development will be separate from the EfW plants without shared access.

3.5 A layout drawing for my alternative scheme is provided in Appendix B. It will be immediately evident the footprint for the alternative scheme is significantly smaller than the one proposed by the Applicant, would not require the use of the Munster Joinery Land and would provide a contiguous site for the carbon capture development.

3.6 In terms of the main process equipment (including the carbon capture plant such as absorbers, strippers and reboilers as well as the drying and liquefaction) the size of this equipment is generally similar to that suggested by the Applicant. However, there are a number of significant differences that drive the reduction in footprint which I will discuss below.

B. No requirement for a large switchyard

3.7 As I discuss in 2.19 to 2.21, the Applicant has included for an allocation of approximately 4,000 m^2 for "substation and transformers" which is not necessary. The alternative scheme provides electricity using a back-pressure steam turbine driven by high pressure steam from the EfW stations supplemented by an electrical fed from the EfW stations. This is the same methodology as proposed by the Applicant and can be achieved without the need for the large switchyard specified by the Applicant.

C. CO_2 Buffer Storage

3.8 I have used spherical storage tanks to provide the required buffer storage for the liquid CO_2. This was one of the options proposed by the Applicant[16]. The Applicant suggests that

spherical storage tanks or multiple vertical tanks would both be acceptable and have a minimal difference in footprint. However, I would suggest that using spherical tanks of the size that I have employed will provide a more efficient use of space.

3.9 I have specified 3 x 25m diameter spherical tanks which provides almost 24,000 m^3 of storage. This is sufficient even for the increased vessel size proposed by the Applicant in the recent change request.

D. Cooling and Heat Transfer Station

3.10 I have selected hybrid cooling towers as the technology. This is one of the options for cooling technologies that the Applicant proposes to be taken forward to the next stage of the project[17].

3.11 Also, as I explain in 2.44 to 2.45, if waste heat is supplied to the local district heating network then the cooling load and hence the footprint of the cooling towers can be reduced accordingly.

3.12 The alternative scheme includes a footprint that would be sufficient to provide the necessary cooling in the event that waste heat recovery to the district heating network was not included. However, in the event that this is included, then the alternative scheme locates the heat transfer station within the footprint of the cooling towers using the space that would become available due to the reduced cooling load.

3.13 An additional option for cooling if it were required to further reduce the footprint would be to install V-shaped air coolers on top of the buildings. For the roof space available in the alternative layout it should be possible to accommodate in the region of 50MW of cooling capacity. This would not only offer an opportunity to further reduce the footprint occupied by the cooling towers but would also mitigate against visible plume concerns. For clarity, this is not currently included in the Alternative Layout.

E. Operational Laydown

3.14 I have noted in 2.49 to 2.51, there appears to be alternative locations on the existing EfW sites that could be used for operational laydown and therefore I am not satisfied that an additional area within the carbon capture development is required for this purpose. However, given the assumption that the carbon capture development will be separate from the rest of the Riverside Campus I have included for operational laydown of the same size (1000 m^2) as the Applicant.

F. Control Room, Welfare Facilities and Gatehouse

3.15 Notwithstanding my concerns over the need for these facilities which are driven by the assumed separation of the carbon capture development from the rest of the Riverside Campus,, I have provided a control room, welfare facilities, gatehouse and parking. On the Alternative Layout this is provided in the North East of the site. A single building (with appropriate internal divisions) is provided with the control room and welfare facilities at the northern end and the process equipment that requires to be indoors (including heat exchangers and compressors) to the south of the control room.

G. Water Management Area

3.16 The alternative scheme does not include for water management such as Sustainable Urban Drainage within the site boundary. However, it is my understanding that the main purpose of the area entitled Water Management Area by the Applicant is to locate the water storage tank.

3.17 The Alternative Layout provides a water storage tank, sized at 4,600 m^3 with diameter 24.5m and height 9.8m. As I discuss in 2.40 to 2.42 I consider that there may be opportunity to reduce the water demand assumed by the Applicant. However, even on the Applicant's assumed water demand this tank provides 24 hours of back-up storage which I consider to be sufficient.

H. Thames Water Access Road

3.18 There is currently a Thames Water Access Road through the middle of the proposed development as shown in Figure 9.

Figure 9- Thames Water Access Road

3.19 There is a requirement in the DCO[25] to retain emergency access to their facilities for Thames Water through this route but there is flexibility in terms of moving the existing road. In the Alternative Layout I have made provision for a new access road for Thames Water that runs to the south of the carbon capture site. This avoids the Lagoon Field and has the advantage over the Applicant's scheme that Thames Water personnel do not have to travel through the Carbon Capture site itself.

I. Construction Laydown

3.20 The Alternative Layout will permit a similar approach in terms of construction compound / construction laydown as proposed by the Applicant. Figure 10 shows the areas designated as construction compounds by the Applicant[26]. It is readily apparent that in comparison to the size of the site this is a generous area for construction laydown.

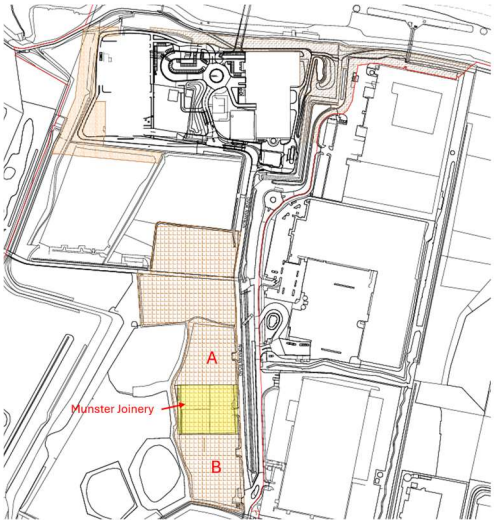


Figure 10 – Construction Laydown

3.21 Whilst I have not performed a detailed constructability study, in principle I would foresee the construction generally proceeding from the north of the site towards the south of the site. Similarly to the methodology proposed by the Applicant, as the construction proceeds some of the areas designated as laydown will be absorbed within the site footprint.

3.22 The Alternative Layout will provide a slightly lower maximum construction laydown space than that available in the Applicant's scheme due to the fact that the Munster Joinery Land will not be available. However, a positive benefit will be that whilst the Applicant's proposal ultimately requires to use all of the areas designated towards the south of the site (based on the equipment layout shown in Figure 1), my layout does not require areas A and B in Figure 10 to be used for the final facility. Therefore, these will continue to be available for laydown for the full duration of the construction phase of the project.In any regard, I consider that there is adequate laydown space available to permit the safe and efficient construction of the facility.

4. COMPARISON OF LAYOUT OPTIONS

A. General

4.1 As outlined in the previous section, I have developed the Alternative Layout to achieve the same design outcomes as the Applicant's layout. However, this is achieved with a smaller footprint. In this section, I will highlight the key drivers for this reduction.

B. Overall Footprints

4.2 The Applicant states the required footprint to be approximately 8 hectares (80,000 m^2)[16]. As shown in Figure 11 the Applicant provides a footprint[19] for three different potential layouts.

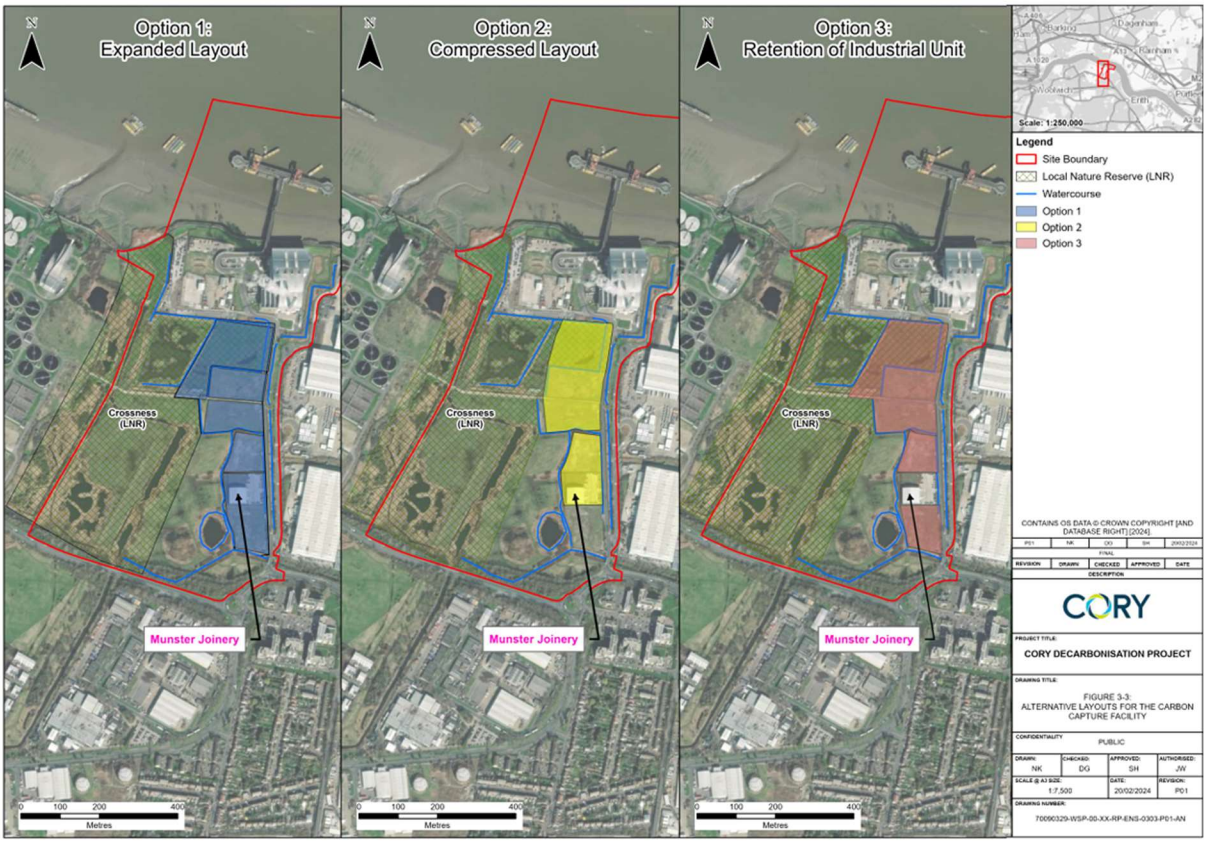


Figure 11 - Options considered by the Applicant

4.3 As a comparison, I have measured the total footprints of the Applicant's options and my alternative layout using Google Earth. The comparative approximate footprints are:

(a) Applicant's Option 1 (Expanded) = 74,000 m^2

(b) Applicant's Option 2 (Compressed) = 55,000 m^2

(c) Applicant's Option 3 (Retention of Industrial Unit) = 66,000 m^2

(d) Alternative Site Layout = 46,000 m^2

4.4 However, at the Issue Specific Hearing on 6th November 2024, the Applicant presented an amended version of the above plot plans and clarified that the shading on option 2 was incorrect in the original footprint which I have replicated as Figure 11 above. The amended footprint for option 2 is replicated below in Figure 12. My measurement using Google Earth for this footprint was approximately 61,000 m^2.

Figure 12 – Amended footprint for Applicant's option 2

4.5 The Applicant briefly discusses the three options[20] and concludes that Option 2 which is referred to as the "Compressed" layout is selected. Therefore, I will use this layout as the basis for comparison.

4.6 Figure 13 below shows a waterfall chart that summarises the reasons why I consider that the carbon capture development can be delivered with a smaller footprint than suggested by the Applicant.

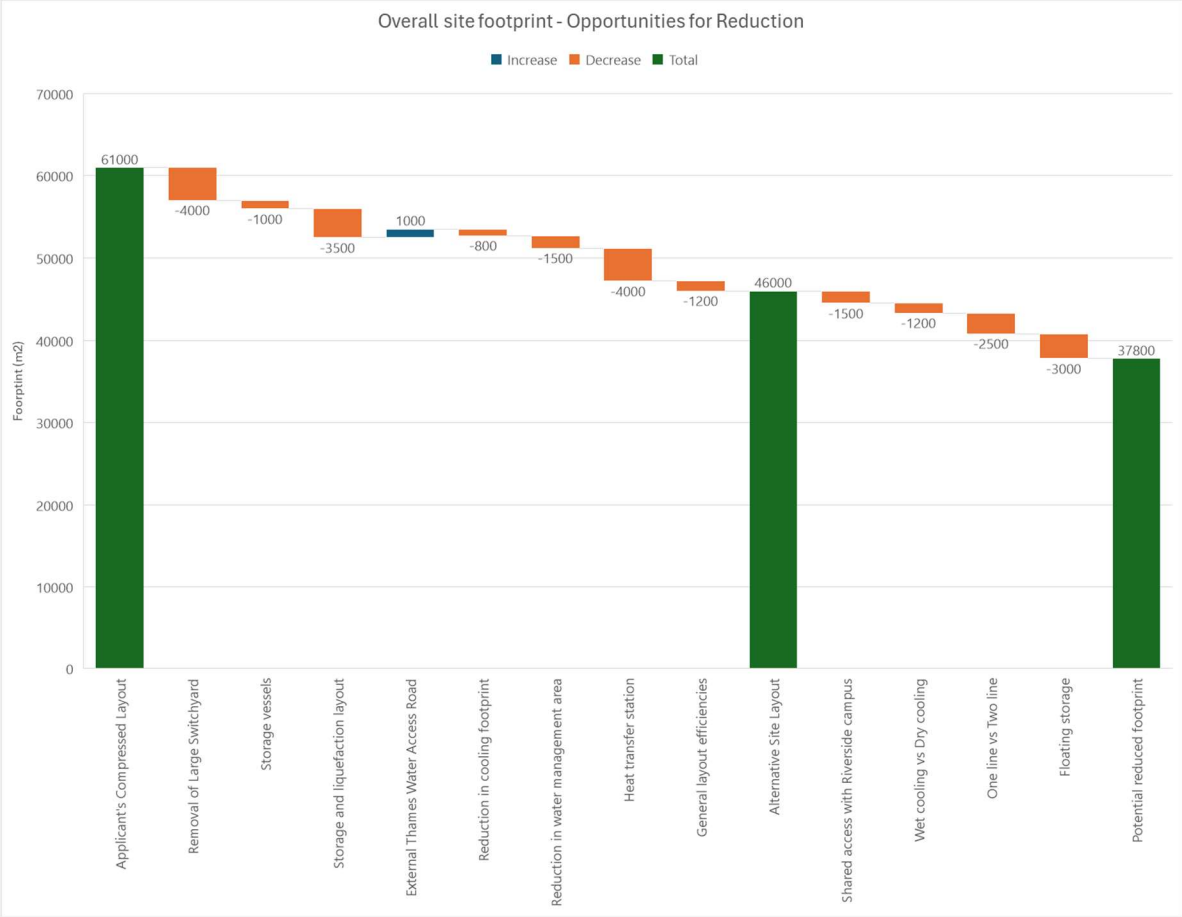


Figure 13- Footprint reduction opportunities

4.7 In addition to the savings identified in the Alternative Layout, the waterfall chart also makes some estimates on additional savings that might be attainable if different design assumptions / decisions were taken.

4.8 As can be seen from Figure 13, one area of footprint saving is simply being more efficient with the specific location / position of plant items and supporting infrastructure (in particular for the liquefaction and storage plant). This is partly due to the shape of the land for the development. For the southern part especially, it is not a rectangle / square which makes it harder to fully utilise the land available in that part of the site. Further, given that provision of access around plant and equipment is a significant driver of required footprint, reduction in equipment sizing (for instance the CO_2 storage vessels) also enables a reduction in footprint for access.

4.9 In the Applicant's Response to Relevant Representations[24] it is stated that "*in practical terms, the specific location and position of these elements is immaterial in the context of the Proposed Scheme's land requirements*" arguing that the exact position of the individual items of plant and supporting infrastructure doesn't impact the overall footprint. The footprint difference between the Applicant's own "Expanded" and "Compressed" layouts contradicts this argument and as further demonstrated by my Alternative Layout, even with (in general) relatively similar sizing for the process plant, it is possible to reduce the footprint by careful positioning of the process equipment and infrastructure.

C. Site Location

4.10 I have also reviewed a document prepared by the Applicant that discusses alternatives in terms of terrestrial development zones. In that document, it is noted[21] that the area required by the development is approximately 8 ha for the carbon capture facility. This is despite the fact that the Applicant acknowledges that a layout requiring only approximately 6.1 ha is feasible (and, indeed, even preferred as noted in 4.4 above). The Applicant appears to have used the 8 ha as the basis for the optioneering assessment on the proposed development zones. One option the applicant considered was entitled "South Zone 2" and is shown below[22].

Figure 14 – Potential development zone "South Zone 2" considered by the Applicant

4.11 In the options comparison performed by the Applicant[23] this option performed well both in terms of engineering complexity and minimising impact to third-party landowners. However, it performed comparatively poorly on loss of land in Crossness Local Nature Reserve and Erith Marshes. The Applicant ultimately notes that these disadvantages led to South Zone 2 being dismissed in favour of what is termed South Zone 1 which is the area shown in Figure 11 for the "Expanded" layout.

4.12 It might be that had the 6.1 ha Compressed Layout been used as a basis this would have changed the outcome of that assessment as this would have allowed an equivalent option to South Zone 2 to have been developed with a significantly lesser impact on the Crossness Local Nature Reserve.

4.13 I also note that the Alternative Layout that I have developed fits within the boundaries of South Zone 2 (but with a significantly reduced uptake of land in the Crossness Local Nature

Reserve). The Alternative Layout will be no more expensive to construct or operate than the Applicant's proposal. Indeed, given the reduced land take and reduced length of process piping and electrical connections it would be expected that the Alternative Layout would deliver a better financial outcome for the Applicant.

4.14 In addition to sites located to the South of the Riverside 1 and 2 EfW facilities, the Applicant also considered sites to the west, east and north as shown in Figure 15 below.

Figure 15 – Alternative Sites Considered by the Applicant

4.15 In the Issue Specific Hearing (ISH) on 6th November 2024, there was some discussion around the area to the east of the Riverside 1 facility. Confusingly, the zone designation appears to have changed from the Terrestrial Site Alternatives assessment[27] where the East zone was designated as shown in Figure 16 below.

Figure 16- East Zone from Terrestrial Site Alternatives Report

4.16 The East Zone (North 1 Zone) would have the benefit of avoiding any impact on the Crossness Local Nature Reserve. It would also be technically superior to the south zone given its closer proximity to both the EfW facilities and the jetty. This would mean lower capital costs and operating costs for the Applicant were this zone selected. However, it was discounted by the Applicant due to impact on local businesses as well as concerns that "*it would not form a single homogenous area with the Riverside Campus*".

4.17 This second reason seems very strange given that the Applicant's plans for the development using the Southern Zone also do not form a single homogenous area with the Riverside Campus (see discussion in 2.55 to 2.58).

4.18 I would also note that in terms of business impact, the area that is actually required for the development is very much smaller than the East zone considered. As shown in Figure 17 below, the terrestrial part of the area now designated as North 1 by the Applicant is sufficiently large to accommodate the full carbon capture development even using the 61,000 m^2 footprint of the Applicant's own proposed scheme. The result of this is that there would be no impact on the Lidl operation as assumed in the assessment of the East Zone in the Terrestrial Site Alternatives Report.

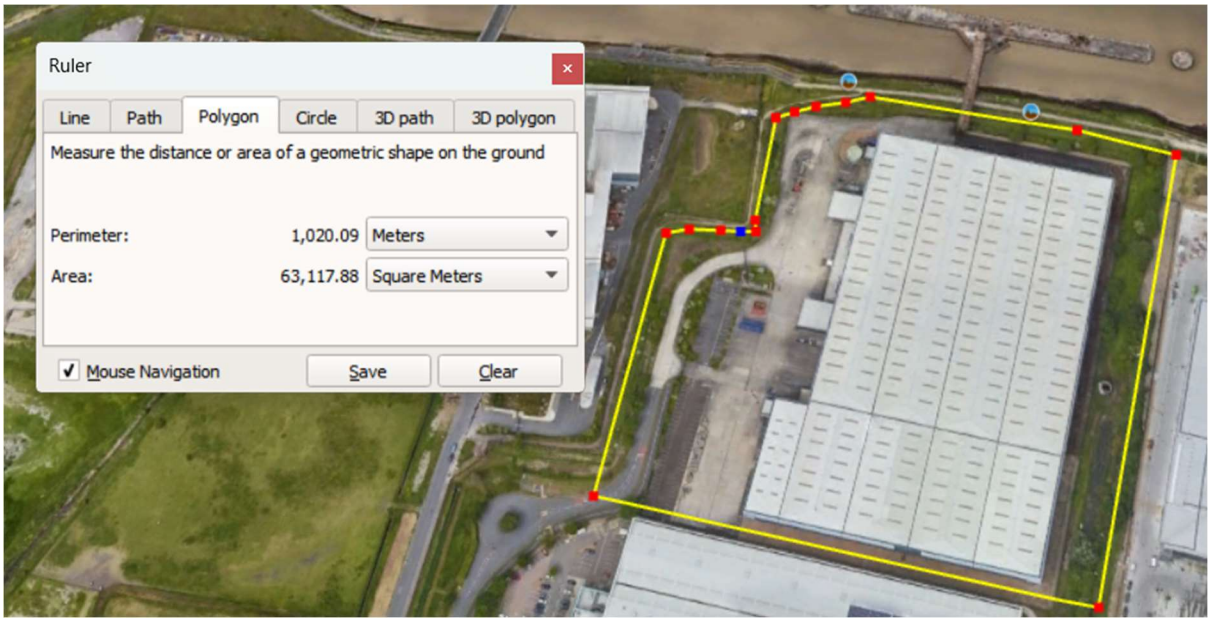


Figure 17- North 1 Zone available footprint

D. Nature Reserve

4.19 As well as the Munster Joinery Land, the proposed carbon capture development will also impact the Crossness Nature Reserve. The extent of this is shown in Figure 18 below[28].

Figure 18 – Crossness Nature Reserve

4.20 I have been instructed to consider a layout that would seek to minimise the impact on the nature reserve whilst maintaining the assumption that the Southern Zone remains the preferred option in terms of site location. This "LNR Preservation Layout" is presented in Appendix C.

4.21 It can be seen that it is possible to accommodate the carbon capture, liquefaction and storage facility with a minimal impact on the area designated as nature reserve. It is not possible to completely avoid the nature reserve due to the need for a service corridor to bring steam, electricity and flue gas to the carbon capture development and take liquid CO_2 from the buffer storage to the River Thames for onward transport.

4.22 Further, this layout also requires some elements of the carbon capture development (the water storage tank, water treatment plant and operational laydown) to be located to the south of the Munster Joinery Land.

4.23 In addition, it is no longer possible to provide a new access route for Thames Water external to the carbon capture site. Rather, Thames Water would require to achieve access by passing through the carbon capture facility.

4.24 By effectively moving the entire development south, the runs of pipework from the EfW facilities to the carbon capture plant and the pipes to transfer the liquid CO_2 to the jetty for onward transportation will be longer. This will increase both the capital and operating costs.

4.25 I have not sought in my analysis to compare the relative impact of these increased costs to the Applicant against the wider benefits / value of retaining significantly more of the Local Nature Reserve. Rather, I simply look to highlight that such an arrangement appears to be feasible. It is of course the case that selection of the North Zone 1 (as discussed in 4.16) would be the best option in terms of minimising impact on the Crossness Local Nature Reserve.

5. CONCLUSIONS

5.1 I have reviewed the Applicant's proposal for the carbon capture, liquefaction and buffer storage facilities. That review has highlighted a number concerns with the Applicant's layout that will increase the required footprint of the site. In particular:

(a) The inclusion of a large electrical switchyard which is not necessary for the supply of electricity to the carbon capture development.

(b) A larger than necessary footprint for the storage and liquefaction elements of the process.

(c) An apparent failure to recognise that provision of heat to a district heating network will reduce the cooling demand and hence the footprint required.

(d) A larger than required Water Management Area

(e) The apparent selection of 'worst-case' footprints on an individual plant basis leading to an over-prediction of the overall site footprint

(f) An equipment layout that makes inefficient use of the space available.

5.2 In addition, I have also noted a number of optional decisions that result in a larger footprint

(a) The decision to select a plant configuration of 2x50% trains rather than a 1x100% train.

(b) The discounting of wet cooling towers as a viable option.

(c) The decision to have the carbon capture facility separate from the EfW facilities with no common access.

5.3 In addition, I consider a number of the arguments put forward by the Applicant to lack robustness / potentially lead to incorrect conclusions including:

(a) The very weak justification put forward for why the Munster Joinery facility could not be accommodated within a carbon capture development that extended to the south of the Munster Joinery Land.

(b) Inconsistencies in key assumptions (in particular the required footprint) between the Applicant's proposed scheme and the footprint used in the options assessment for preferred development zones.

5.4 I have carried out my own assessment to develop an Alternative Site Layout that occupies a smaller area than the Applicant's scheme but still achieves the same design intent and is likely to do so whilst achieving a better financial outcome for the Applicant.

5.5 I have also put forward a potential layout that would minimise the requirement to use land currently designated as part of the Crossness Nature Reserve. Whilst this layout does have some disadvantages compared to my Alternative Site Layout it does nonetheless appear feasible.

5.6 In conclusion, I feel that it would be possible for the Applicant to develop a carbon capture, liquefaction and storage scheme that would meet their requirements whilst also reducing or minimising the impact on other parties.

5.7 In particular, it is my view that it is not necessary to acquire the Munster Joinery Land in order to construct and operate a carbon capture scheme for the Riverside 1 and 2 EfW facilities.

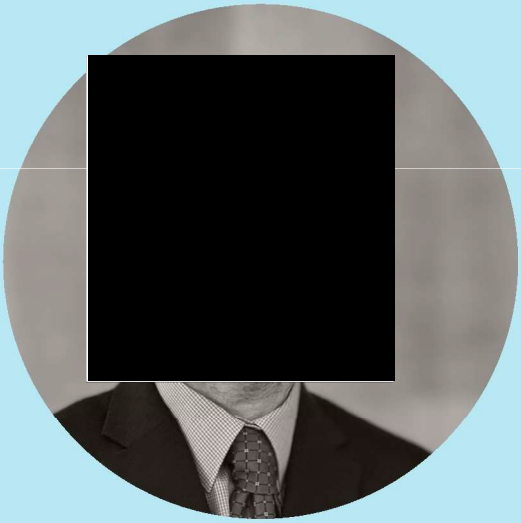
6. REFERENCES / CITATIONS

[1]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.3.3
[2]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.4.8
[3]	Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraph 2.2.27
[4]	Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraphs 2.6.11 and 2.6.12
[5]	EN010128 Cory Decarbonisation Project – Project Update And Notification Of Intention To Submit A Change Request
[6]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.5.36
[7]	E-mail : RE: Cory / Landsul next steps Ref Tozers:MA:L03102-0002 [PM-AC.FID5236074] from Matthew Fox (Pinsent Masons) to Kelly Burns (Tozers) on 14th November 2024.
[8]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.5.14 to 3.5.21
[9]	Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraph 2.2.107
[10]	Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraph 2.6.8
[11]	Response to Relevant Representations Document Number: 9.2, paragraph 4.2.28
[12]	Technical Note: Response To Landsul Limited, Q9
[13]	https://superiortank.com/downloads/STCI-Capacities.pdf
[14]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.4.3
[15]	Design Approach Document, Application Document Number 5.6, Rev A Part 2 of 3 p97
[16]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.5.33 to 3.5.39
[17]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.5.21
[18]	Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraph 2.1.7
[19]	Environmental Statement: 6.2 Figures: Part 1, P7
[20]	Environmental Statement - Chapter 3: Consideration of Alternatives, paragraph 3.4.3 to 3.4.4
[21]	Terrestrial Site Alternatives Report, paragraph 2.6.5
[22]	Terrestrial Site Alternatives Report, figure 3-5
[23]	Terrestrial Site Alternatives Report, paragraph 2.6.5
[24]	Response to Relevant Representations Document Number: 9.2, paragraph 4.2.32
[25]	Development Consent Order, Schedule 6
[26]	Works Plans, Sheet 29 of 47
[27]	Terrestrial Site Alternatives Report, figure 3-2
[28]	Information from DEFRA : https://magic.defra.gov.uk/magicmap.aspx

Appendix A

Curriculum Vitae

CRE | FUTURE ENERGIES



Dr Craig R Edgar

Consultant Engineer

An experienced and commercially aware consultant engineer providing expert advice to help my Clients make informed decisions, reduce risk and generate value from their projects and assets

Core Skills

Power project development
Renewable energy
Energy from Waste and biomass
Emerging technologies
Technical Due Diligence
Expert Witness

Qualifications

BEng (Hons) Chemical Engineering
University of Strathclyde, UK (1995)
PhD Chemical Engineering University of Strathclyde, UK (1999)

Professional Associations

Chartered Engineer (CEng)
Member, Institute of Chemical Engineers (MIChemE)

PEN PORTRAIT

Craig is a chartered chemical engineer with over 20 years experience developing projects and working with operational assets in the power, heat and energy from waste sectors. He has held senior commercial and business roles as well as leading significant projects from a technical perspective.

Craig combines technical knowledge with commercial acumen and a strong strategic understanding of the power, renewables and waste sectors to provide technical advice and consultancy services to developers, owner operators, investors and the public sector.

Craig has significant experience in performing Technical Due Diligence conventional power, district heating, energy from waste and renewable energy assets. He is passionate about emerging technologies and can help with bankability assessments and project development.

Craig is also an experienced Expert Witness. He is able to quickly decipher complex technical data and information and clearly communicate in both written evidence and oral evidence under cross-examination in court.

SELECTED TECHNICAL EXPERIENCE

- Feasibility study for waste to sustainable aviation fuel project in Dubai, UAE. Responsible for waste characterisation, specification of materials recycling facility, gasification process and CORSIA carbon intensity calculations (confidential client)
- Lead Technical Advisor for potential carbon capture project on Energy Recovery Facility. Review of FEED documentation, confirmation of heat and mass balances and equipment selection. (confidential client)
- Buy-side Technical Due Diligence for industrial decarbonisation business with assets including biomass boilers, hybrid electric boilers and hydrogen electrolysers (confidential client)
- Vendors Technical Due Diligence on biogas facility utilising food waste to produce gas for injection into grid and renewable electricity (confidential client)
- Expert advice on DCO for carbon capture on Energy from Waste facility (confidential client)
- Technical due diligence on 3 biomass power stations in the Philippines burning a mixture of sugar cane trash and wood chip (confidential client)
- Feasibility study for installation of carbon capture plant at sugar refinery (confidential client)
- Technical due diligence for a portfolio of UK energy from waste (both operational and in-construction) and biogas assets as part of a debt financing exercise (confidential client)
- Buy-side Technical Due Diligence on a portfolio of waste recovery and recycling assets (confidential client)
- Buy-side Technical Due Diligence on portfolio of UK biogas plants – anaerobic digestion of a wide range of food and waste feed stocks including both gas-to-grid and electricity generation facilities (confidential client)
- Technical Advisor (TA) support to Energy from Waste plant struggling with slagging issues. Working with Client to identify and implement solutions (confidential client)
- Technical due diligence and subsequent OE support on pyrolysis plant for biochar production (confidential client)
- Technical due diligence for re-financing of a portfolio of OCGT, CCGT and co-generation assets (confidential client)
- Expert witness for waste gasification project providing technical advice on RDF preparation, gasification and combustion and balance of plant aspects (confidential client)
- Feasibility study on hydrogen production across a portfolio of Energy from Waste sites (enfinium)
- Technical consultancy support on feasibility assessment, initial development and tendering of 10MW solar PV project for UK airport (London Luton Airport)
- Technical support to consortia bidding 120,000 tpa new build Energy from Waste facility in Malta (confidential client)
- Technical support to retrofit project replacing APCr ash storage and unloading plant at Energy from Waste facility (Government of Jersey)
- Expert witness for balance of plant aspects of energy from waste project including giving evidence at the Technology and Construction Court (confidential client)
- Expert witness for biomass power generation facility facing HSE prosecution (confidential client)
- Technical Due Diligence on innovative microturbine generator (confidential client)
- Technical Due Diligence on vertical axis wind turbine generator (confidential client)

- Technical Due Diligence on acquisition of new build biomass station (confidential client)
- Technical Due Diligence for acquisition of multi-asset power company Contour Global. Responsible for review of thermal assets in North America, Eastern Europe and Africa (KKR)
- Decarbonisation and energy security study for healthcare product manufacturing site (Reckitt, Germany)
- Analysis and review of net zero hub projects for the Midlands and North East and Yorkshire Hubs as part of wider BEIS monitoring of the net zero hub programme (Steer Group)
- Assisting a biomass gasification facility with operational difficulties related to fuel supply quality Issues (confidential client)
- Technical consultancy support to Internal Carbon Price determination for Icelandic Power Generator (Landsvirkjun)
- Appointed as expert engineer for a waste-to-energy gasification plant in commissioning but not meeting performance requirements. Working closely with legal advisors and client to identify issues, determine rectification measures and prepare for arbitration (confidential client)
- Project Director for technical due diligence of potential acquisition of 3 gas fired power stations in the UK (confidential client)
- Technical due diligence on district heating assets in Finland, Sweden and Estonia (confidential client)
- Technical lead on due diligence looking at separation of power and water assets from Aluminium production facilities in the UAE (TAQA)
- Project Director for technical due diligence of potential acquisition of a tidal energy company (confidential client).
- Buy-side technical due diligence for district heating and industrial services provider in Scandinavia and the Baltics (confidential client).
- Power generation lead for cost benchmarking exercise for Hong Kong power system (EMSD – Hong Kong government)
- Technical lead for energy aspects in the development of a biosolids strategy for NEOM city development in Saudi Arabia (NEOM)
- Project development for 50MWe floating offshore wind farm (KOWL)
- Black start project development study (EDF)
- Technical support to FCO China to prepare technical advisor specifications for engagement in the power generation sector (FCO China)
- Technical reviewer for Oman Power 2022 providing technical input and assurance on the procurement process for new contracted power capacity for the Sultanate of Oman in 2022. (Oman Power and Water Corporation)
- Technical due diligence for acquisition of a portfolio of power generation assets in Italy including CCGTs and hydro as well as new build gas and renewable projects (confidential client)
- Technical due diligence for acquisition of a CCGT in Ireland (confidential client)
- Technical lead for decentralised energy market review focussing on developing a UK market entry strategy for a major European district heating operator (confidential client)
- Lender's Technical Advisor for new-build waste-to-energy gasification plant in the UK (confidential client)
- Developing technical competency framework for Centrica's Distributed Energy and Power business (Centrica)

- Technology development support on conventional cycle elements of a Small Modular Reactor design (confidential client)
- Technical due diligence on potential acquisition of portfolio of UK generation assets including hydro, gas storage and CCGT (confidential client)
- Study on hydrogen production from constrained wind in Shetland (Shetland Islands Council)
- Lead advisor for a Technical Due Diligence on a Canadian CCGT working with a joint UK / Canadian team to support a Chinese investor on the potential acquisition (confidential client)
- Technical lead on assignment for a UK big six utility to develop their offering for the Energy from Waste market (confidential client)
- Leading Atkins delivery of the Local Heat and Energy Efficiency Strategy pilot programme delivery. (Scottish Government)
- Bankability assessment for wood gasification to electricity plant. (Confidential Client)
- Lead advisor for Technical Due Diligence on district heating and electrical distribution assets in France (confidential client)
- Technical due diligence on capacity expansion of mass-burn WtE plant in Singapore (Keppel Infrastructure Trust)
- Technical due diligence on acquisition of gas fired and coal fired generation assets in Spain (Confidential Client)
- New build solar PV development in Sub-Saharan Africa (Confidential Client)
- Technical due diligence on portfolio of waste to energy, heat boilers, CHP and heat network assets in Finland, Estonia and Sweden (Confidential Client)
- Project Director for new build Waste to Energy plant (Reform Energy)
- Technical due diligence on portfolio of district heating and decentralised energy assets in France comprising gas, biomass, WtE and geothermal assets (First State Investments)
- Engineering Manager for new build 150,000 t/a Waste to Energy plant based on gasification technology. (Glasgow Recycling and Renewable Energy Centre)
- Lead for OE team for Markinch Biomass CHP plant. Technical responsibility for all Process Engineering aspects. (RWE Innogy)
- Project Director for OE team supporting biomass conversion of coal fired station (Confidential client)
- Power plant lead for Atkins support to the development of a 50MWe waste to energy facility in Haiti (International Electric Power)
- Lead for Technical and Environmental Due Diligence for the acquisition of CHP and heat distribution assets in Poland. Assets included approximately 5GW thermal, 1GW electrical output and over 1500km of heat distribution network. Work also included evaluation of potential new-build projects. (Confidential client)
- Technical due diligence / bankability assessment for conversion / enhanced co-firing for 4 x 500 MW PF power station (Confidential client).
- Technical due diligence for the acquisition of CHP, heat generation and heat distribution assets in Finland. Assets included gas and biomass generation of approximately 0.5GWt as well district heating networks. (Confidential client)
- Technical lead for feasibility study on introducing biomass co-firing at Muja Power Station, Western Australia. (Vinalco)
- Technical advisor to the development of a new build Bagasse station including determination of a staffing model and a fully costed maintenance programme for the plant. (Tongaat Hullett, South Africa)

- Technical Director for Lender's Engineer team advising on the proposed open cycle to combined cycle conversion of two power stations in Abu Dhabi. (Confidential client)
- Process engineering support in specification of biomass CHP plant and thereafter process engineering input to OE team overseeing the delivery of the plant. (RWE Innogy)
- FEED for lime dosing process plant as part of installation of seawater FGD to a coal fired station (Scottish Power)
- Design review on mill inertion system on coal fired station (Scottish Power)
- Assessment of BOP requirements for replanting of frame 9E CCGT station (Confidential client)
- Feasibility study for auxiliary steam supply system on coal fired station (Eggborough Power)
- OE for engineering, construction and commissioning of replacement oil sump management system across Galloway Hydros scheme (ScottishPower)
- Lead for feasibility study and specification preparation for addition of new OCGT and gas conditioning facilities to Paraburdoo power station, WA (Rio Tinto Iron Ore).
- Lead for feasibility study into new generation and transmission capacity in the Pilbara Region of Western Australia (Rio Tinto Iron Ore).
- Lead for feasibility study into the installation of a tri-generation facility to supply steam, electricity and cooling to various users in an industrial estate near Jakarta, Indonesia (PT Tatajabar Sejahtera).
- Process flowsheeting and process engineering FEED for feasibility assessment of cogeneration plant at Alcoa Alumina Refinery, Kwinana (Alinta).
- Lead for Owner's Engineer team for new OCGT power station near Darwin, NT (Power and Water Corporation).
- Project audit on EPC contractor engineering onshore reception facilities for Gulf of Suez oil field development. (BP)
- Secondment (3 months) as process engineer into EPCM team based in Perth, WA to co-ordinate P&ID and FEED specifications for OCGT (2 x Alstom 13E2) development in Wagerup, WA (Alinta).
- Review of contractor open book estimate for the Kurisaniyah gas plant facility (Saudi Aramco).
- Thermal modelling / water balance for OCGT plant in Togo (Confidential Client).
- Technical due diligence on proposed process to convert land fill gas into liquefied natural gas for use as vehicle fuel (confidential client).
- Plant availability and reliability assessment and modelling for combined power and water plant (confidential client).
- Preparation of Best Available Techniques assessment reviewing potential technologies for improving odour emissions from Waste Derived Fuel plant (SMW).
- Project manager / Technical Lead for SKM design team within AMRR Alliance at Dounreay. Scope of supply covered project lifecycle from inception through process development, FEED, detailed design and support during construction, commissioning and operation. (UKAEA)
- Project lead on Cartridge Cooling Pond (CCP) skip disposal project at Hunterston 'A'. In this project a complete solution, from support in initial option selection to eventual supply of a detailed design was provided to the client. The design was for a transfer and storage facility for ILW nitric acid and also required the supply of a complete suite of safety and environmental documentation. (British Nuclear Group)

EMPLOYMENT HISTORY

CRE Future Energies [2023 to current] : Director

- Founding Director of independent consultancy providing technical advice and consultancy services to developers, owner operators, investors and the public sector within the energy sector.

Padd Energy (Anthesis Group) [2021 to 2023] : Technical Director

- Responsible for PADD Energy Ltd Advisory Services business stream. Delivering technical due diligence, expert witness and feasibility study assignments for the power, renewable and waste sectors.

Atkins (SNC Lavalin Group) [2011 to 2021] : Chief Engineer / Associate Director

- In addition to strategy & business management responsibilities, provided technical leadership of Atkins Power's service provision on new-build, or major retrofit, Power Generation projects. These services include technical due diligence, Owner's / Client's Engineer, Lender's Engineer, feasibility studies, engineering design and project delivery.

RWE Npower [2008 to 2011] : Group Head, Process Engineering

- Group Head, Process Engineering: (2008 – 2011): Led a team of process and mechanical engineers providing support to operating stations, major retrofits and new-build projects for RWE internal activities and to the external market. Led the nPower Owner's Engineer team supporting the construction of a new build 49.9MW biomass CHP plant at the Tullis Russell Papermill site in Glenrothes, Fife.

Sinclair Knight Merz [2002 to 2008]

Engineering Study Manager [2007 to 2008]

- Engineering study manager for a circa A$900m (circa £450m) project to upgrade the power generation and transmission systems owned by Rio Tinto Iron Ore in the Pilbara Region of Western Australia.

Senior Process Engineer [2006 to 2007]

- Senior Process Engineer within the Thermal Generation section of the Western Australia Power and Industry business unit.

Process Group Leader [2005 to 2006]

- Leadership of a group of process and mechanical engineers providing consultancy and design services to the power and energy sectors.

Process Engineer [2002 to 2004]

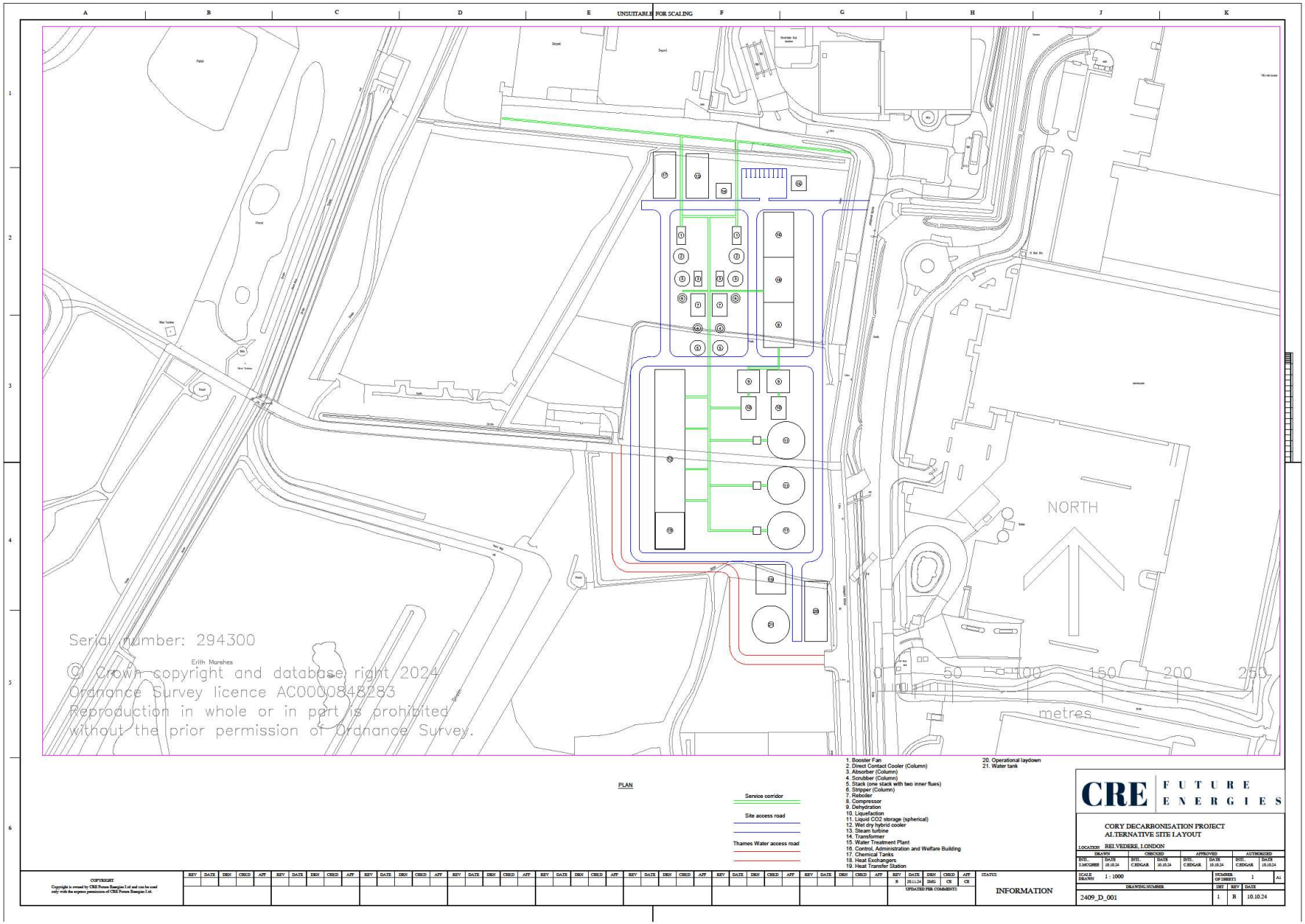
- Providing Process Engineering input to consultancy projects in the thermal generation and nuclear decommissioning sectors.

Scottish Power Technology / Ingenco [1999 to 2002] : Process Engineer

- Providing Process Engineering input to consultancy projects in the thermal generation and nuclear decommissioning sectors

Appendix B

Alternative Site Layout


UNSUITABLE FOR SCALING
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200
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metres
Serial number: 294300
Erith Marshes
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PLAN
Service corridor
Site access road
Thames Water access road
1. Booster Fan
2. Direct Contact Cooler (Column)
3. Absorber (Column)
4. Scrubber (Column)
5. Stack (one stack with two inner flues)
6. Stripper (Column)
7. Reboiler
8. Compressor
9. Dehydration
10. Liquefaction
11. Liquid CO2 storage (spherical)
12. Wet dry hybrid cooler
13. Steam turbine
14. Transformer
15. Water Treatment Plant
16. Control, Administration and Welfare Building
17. Chemical Tanks
18. Heat Exchangers
19. Heat Transfer Station
20. Operational laydown
21. Water tank
CRE FUTURE ENERGIES
CORY DECARBONISATION PROJECT
ALTERNATIVE SITE LAYOUT
LOCATION BELVEDERE, LONDON
DRAWN INTL. DATE 10.10.24
CHECKED INTL. CHDGAR DATE 10.10.24
APPROVED INTL. CHDGAR DATE 10.10.24
AUTHORISED INTL. CHDGAR DATE 10.10.24
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NUMBER OF SHEETS 1
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DRAWING NUMBER
2409_D_001
REV 1
REV B
DATE 10.10.24
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INFORMATION
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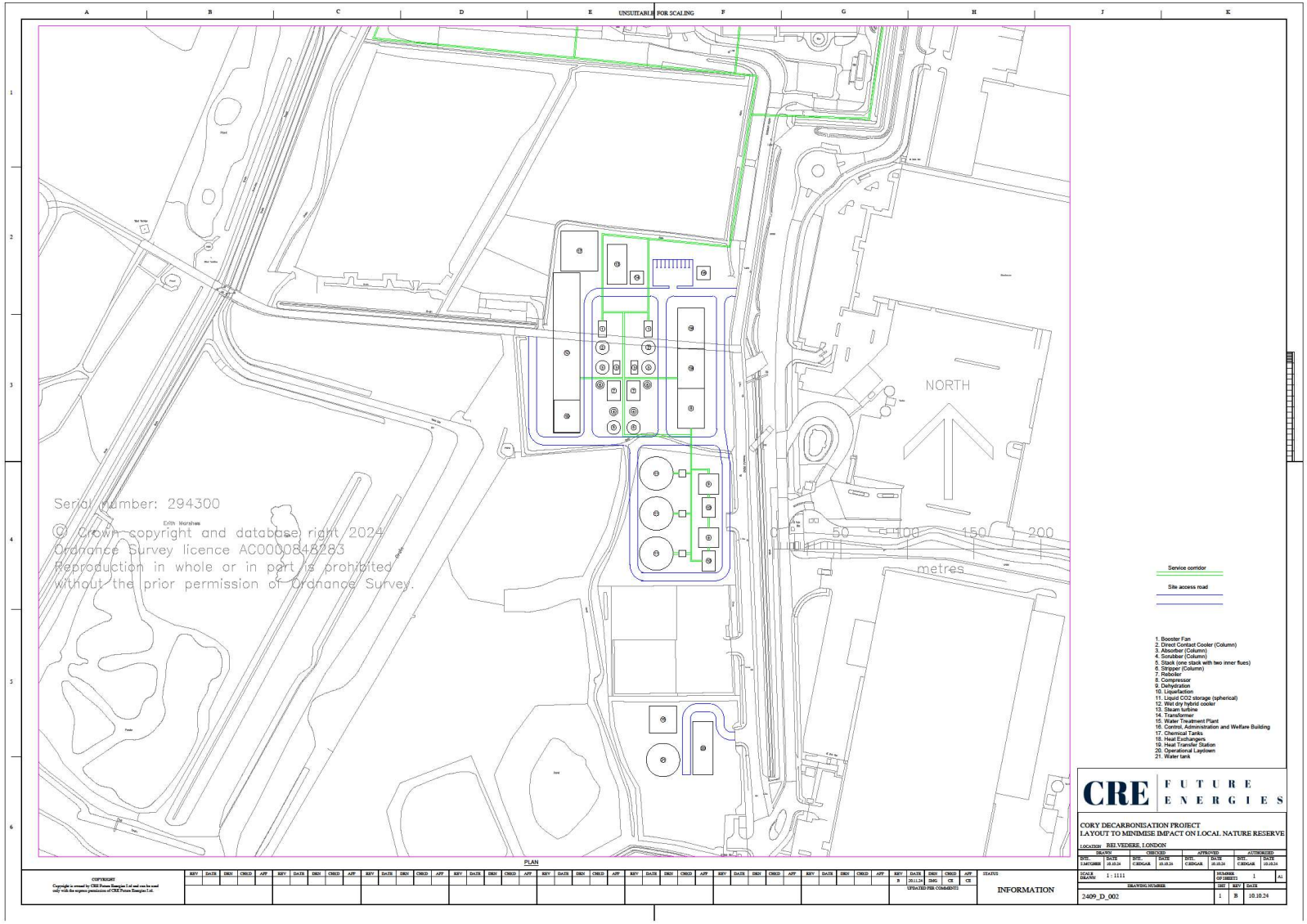
Appendix C

Local Nature Reserve Preservation Layout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metres
Service corridor
Site access road
1. Booster Fan
2. Direct Contact Cooler (Column)
3. Absorber (Column)
4. Scrubber (Column)
5. Stack (one stack with two inner flues)
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7. Reboiler
8. Compressor
9. Dehydration
10. Liquefaction
11. Liquid CO2 storage (spherical)
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14. Transformer
15. Water Treatment Plant
16. Control, Administration and Welfare Building
17. Chemical Tanks
18. Heat Exchangers
19. Heat Transfer Station
20. Operational Laydown
21. Water tank
Serial number: 294300
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CRE FUTURE ENERGIES
CORY DECARBONISATION PROJECT
LAYOUT TO MINIMISE IMPACT ON LOCAL NATURE RESERVE
LOCATION BELVEDERE, LONDON
DRAWN S.MUGHER 10.10.24
CHECKED C.RIDGAR 10.10.24
APPROVED C.RIDGAR 10.10.24
AUTHORISED C.RIDGAR 10.10.24
SCALE DRAWN 1 : 1111
NUMBER OF SHEETS 1
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DRAWING NUMBER 2409_D_002
ISS 1
REV B
DATE 10.10.24
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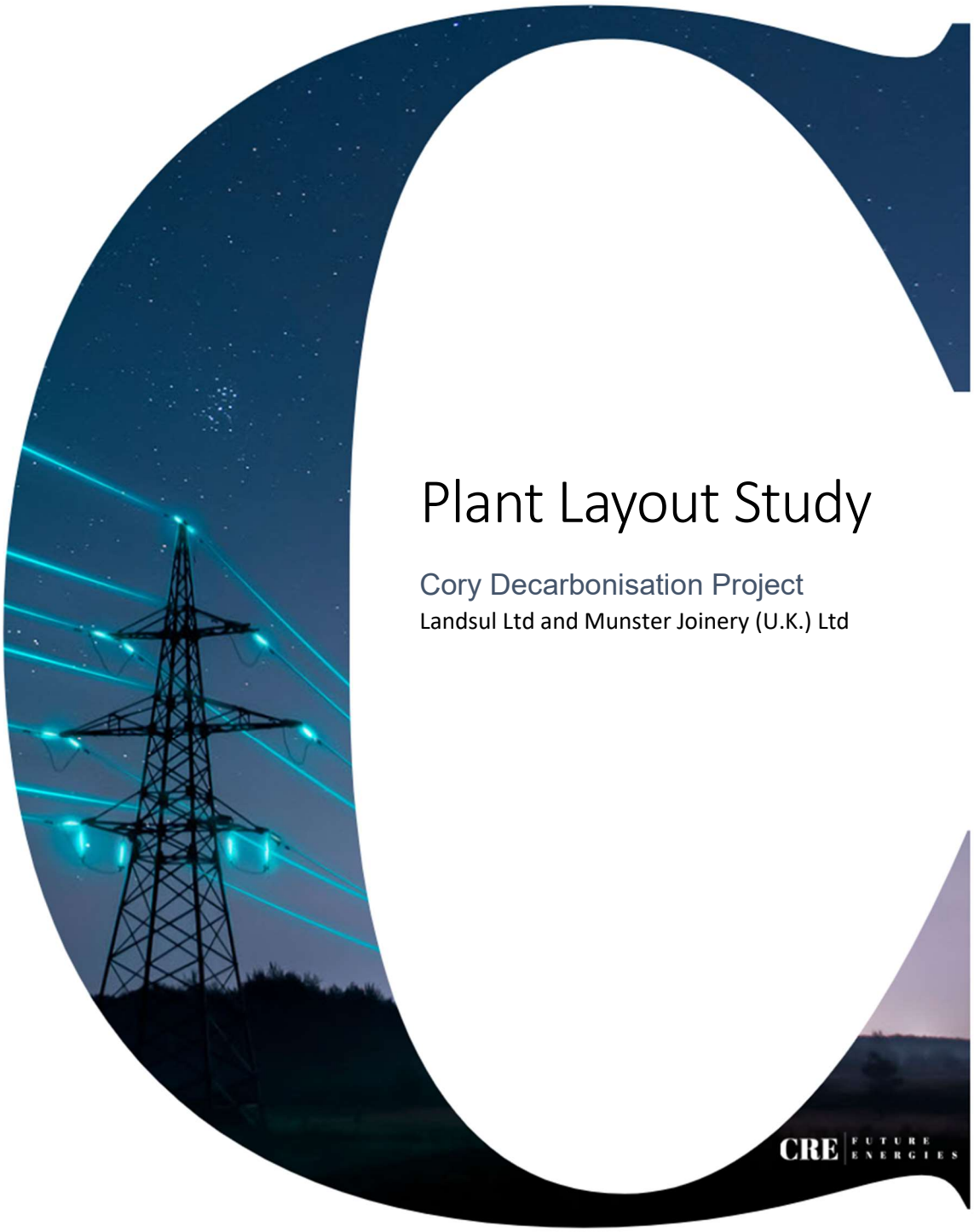
Web : [redacted]

Annex B

Plant Layout Study



Plant Layout Study

Cory Decarbonisation Project

Landsul Ltd and Munster Joinery (U.K.) Ltd

Report Details

Client	Landsul Ltd and Munster Joinery (U.K.) Ltd
Project	Cory CCS
Project Number	2409
Report Number	2409_R_002

Document History

Revision	Date	Prepared By	Notes
0	10/10/24	Craig Edgar	Draft
1	22/11/24	Craig Edgar	First Issue

Notice

Contents

1. Introduction

Dr Craig Edgar (of CRE Future Energies Ltd) has been appointed by Landsul Ltd and Munster Joinery (U.K.) Ltd to provide expert engineering advice in relation to the proposed carbon capture development at the Cory Energy from Waste (EfW) facility.

Cory Energy is proposing to construct up to two carbon capture plants to reduce the carbon dioxide emissions from the Riverside 1 and Riverside 2 EfW facilities. A Development Consent Order (DCO) application has been prepared for the proposed scheme. The DCO sets out a proposed plot plan for the carbon capture development which necessitates the use of land currently owned by Landsul Ltd and occupied by Munster Joinery (U.K.) Ltd (the "Munster Joinery Land").

2. Scope of report

This report presents supporting information for the development of an alternative site layout. In particular, it describes the most important items of equipment and outlines the design basis and other assumptions that have been made.

The intent of developing the alternative site layout has been to check the proposed footprint for the proposed Cory DCO scheme. This has been done by defining the key equipment required, estimating the sizing for that equipment and locating the equipment within the site.

It would have been of considerable assistance in developing the alternative site layout to have had the same design basis information as was made available for the Cory DCO scheme. However, as this was not provided during the initial work, it was necessary to make a number of assumptions based on information contained within the DCO and in the public domain. These assumptions are clearly set out in the following sections. References are given for assumptions based on documents produced by Cory or from the open literature.

Given that the scope of this exercise has been to check the Cory DCO scheme, equipment sizing has not been done using first principles modelling. Rather, the key equipment has been sized by factoring from known references supported by a number of assumptions which are clearly detailed in the following sections.

On 14th November 2024, information on a number of key design basis assumptions was received. These have been checked against the assumptions made in this document and, in general, there is good alignment with the exception of the cooling load. Given the short time available between receipt of the information and submission of this report, the cooling load has been updated to match the Cory design basis assumption, but the other parameters have not given the small differences do not materially impact the site layout.

3. Basis of design

3.1. Key Principles

In developing this alternative proposal for the site layout, the following key principles have been followed:

- The alternative site layout will aim to achieve the same carbon capture performance as the scheme proposed by Cory in the DCO;

- The alternative site layout will enable the construction and operation of a carbon capture plant that achieves reliability and availability in line with what is typical for similar schemes, and can operate safely and securely;
- The alternative site layout will enable the construction and operation of a carbon capture plant at a similar cost to the scheme proposed by Cory.

3.2. Assumptions

3.2.1. Overall requirements / constraints

The carbon capture facility will receive flue gas from the Riverside 1 and Riverside 2 facilities. It will separate carbon dioxide from that flue gas. The treated flue gas will be emitted to atmosphere through new stacks supplied as part of the carbon capture facility. The carbon dioxide captured will be compressed and then liquified before being transported off-site by boat on the River Thames.

3.2.2. CO_2 capture requirements

The carbon capture facility is required to capture 95% of the CO_2 from both the Riverside 1 and Riverside 2 facilities[1]

3.2.3. Flue gas

The flue gas from the two EfW facilities is a key input for the carbon capture facility. In the Environmental Statement there is information provided (see table 13-7, chapter 13)[2] on the annual anticipated unabated CO_2 from fossil sources:

- Riverside 1 annual emissions = 440,360 tCO_2e
- Riverside 2 annual emissions = 417,523 tCO_2e

Further information is provided in that same document (paragraph 13.8.14) whereby it is stated that 51% of the emissions are from biogenic sources. This means that the total CO_2 in the flue gas can be calculated as:

Total CO_2 = (Riverside 1 CO_2 non-biogenic + Riverside 2 CO_2 non-biogenic) / non-biogenic fraction

= (440,360 tCO_2e + 417,523 tCO_2e) / 0.49

= 1,750,782 tCO_2e per annum

The decision document for the Environmental Permit for the Riverside 2 station[3] lists the flue gas volumetric flowrate as 160 Nm^3/s which is equivalent to 576,000 Nm^3/h.

HZI (who are the equipment supplier for both Riverside stations) has published information on the Riverside 1 facility[4]. In that information, the flue gas volumetric flow is given as 170,000 Nm^3/h per train. There are 3 trains so the total flue gas volumetric flow is 3 x 170,000 Nm^3/h = 510,000 Nm^3/h.

It is assumed that the flows will be combined prior to feeding to the carbon capture facility – this gives a combined flow of 1,086,000 Nm^3/h.

The carbon dioxide concentration in the flue gas can thus be estimated as follows:

Assumed annual hours operation = 89% availability x 8,760 hrs = 7,796.4 hrs

Hourly carbon emissions = 1,750,782 / 7,796.4 = 224.6 t/h

Convert to kmols = 224.6 t/h x 1000 kg/ t / 44 kmols/kg = 5,102 kmols/h

Convert to Nm3	*= 5,102 kmols/h x (22.4 Nm3/kmol) = 114,285 Nm3/h*
CO_2 concentration	*= 114,285 / 108,600,000 = 10.5% by volume*

This is within the normal range of what would be expected for the CO_2 concentration in the flue gas for a UK EfW facility. This gives confidence that the flue gas assumptions are representative.

Therefore, the key design basis assumptions for the flue gas will be:

- Flue gas volumetric flow = 1,086,000 Nm^3/h
- CO_2 concentration in flue gas = 10.5% by volume.

3.2.4. Number of carbon capture trains

Like many industrial and power generation facilities, a fundamental consideration in the design is how many trains (or lines) the plant will comprise. This is often a balance between minimising capital cost and footprint (the less trains the better) and maximising operational flexibility.

In the DCO application, Cory has elected to adopt a 2x50% arrangement in terms of the carbon capture facility for both Riverside 1 and Riverside 2. This provides additional reliability and flexibility in operations and construction compared to a 1x100% arrangement but it will lead to a larger site footprint.

Notwithstanding, a key principle for this study is to provide a scheme that will achieve similar benefits to Cory as the DCO scheme. Therefore, even though it will result in a larger footprint, the design basis will be to design for 2x50% trains for the key process equipment.

This philosophy will be extended to the plant and equipment necessary to compress and liquefy the CO_2.

3.2.5. Technology selection

There are many different technologies available for post combustion carbon capture. It is beyond the scope of this site layout study to assess which might be optimal. However, the existing Cory DCO scheme assumes an amine-based absorption process which is in-line with other similar CO_2 capture developments that are currently being considered in the UK. Therefore, for the purpose of this study, it will be assumed that the CO_2 capture technology will use an amine solvent.

There are a wide range of potential amine solvents and this is a subject of significant research and development. However, 30% aqueous monoethanolamine (MEA) is a recognised benchmark solvent[5] and as such will be chosen for the purposes of this study.

3.2.6. Key interfaces and battery limits

In addition to the flue gas received from the EfW facilities, there are a number of other key interfaces / battery limits.

Firstly, the carbon capture plant requires steam as part of its operation. Typically, carbon capture plants require relatively low pressure steam (circa. 3 to 5 Barg). Steam at this pressure is not available within the current EfW. However, high pressure steam will be available from the EfW boiler. Based on the HZI publication[4] this is at 72 bar and 427C for Riverside 1. For the purposes of this plant layout study this is considered sufficiently representative of the Riverside 2 conditions also.

In addition to steam, there are significant electricity requirements for a carbon capture facility and, especially, for the liquefaction of the carbon dioxide. Therefore, a solution that provides both the required electricity and the required steam is to install a back pressure steam turbine as part of the carbon capture installation. This lets down the high pressure steam to the conditions required for the carbon capture plant whilst also producing electricity.

Another key interface is the depleted flue gas produced by the carbon capture facility. In theory, this could be returned to the stacks in the original EfW. However, it is explained in the DCO documentation[6] that the existing EfW plant arrangement would make this complicated and expensive. Therefore, it is assumed that the depleted flue gas will be emitted from new stacks installed as part of the carbon capture facility.

4. Process

4.1. Overall

The carbon capture facility can be considered to comprise of five distinct stages:

1. Flue gas receipt – transfer of flue gas from EfW facilities to carbon capture plant
2. Carbon capture – where the CO_2 is separated from the EfW flue gas and compressed
3. Liquefaction – where the CO_2 is dehydrated and liquefied
4. Storage – where the liquid CO_2 is stored
5. Offloading – transfer of CO_2 to ship for onward transportation

As discussed above (section 3.2.4) the design basis is to have two identical trains for capture, liquefaction and storage.

This is illustrated by the diagram below.

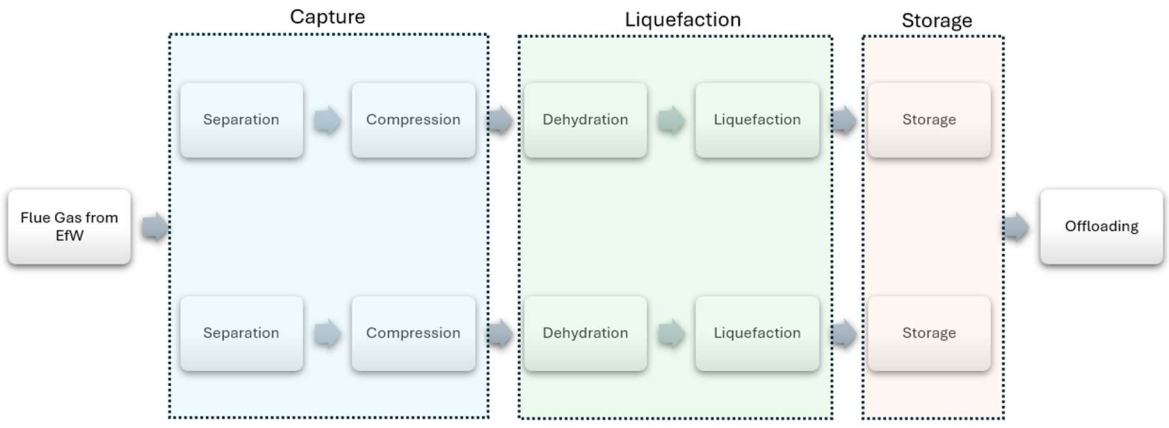


Figure 1 - Key Process Stages

In terms of the design presented in this study, for the transfer of flue gas from the EfW facilities and the transfer and offloading of liquid CO_2 to ship, the design from the Cory DCO has been reviewed and it is decided to simply replicate that design given that it does not materially impact the discussion on whether or not the Munster Joinery Land is required for the carbon capture development.

Given that the flue gas receipt and offloading stages are identical to the DCO scheme, these will not be discussed further in this section with the focus being on the capture, liquefaction and storage stages.

4.2. Carbon capture

4.2.1. Block diagram

Figure 2 below shows the key elements in the carbon capture stage of the process.

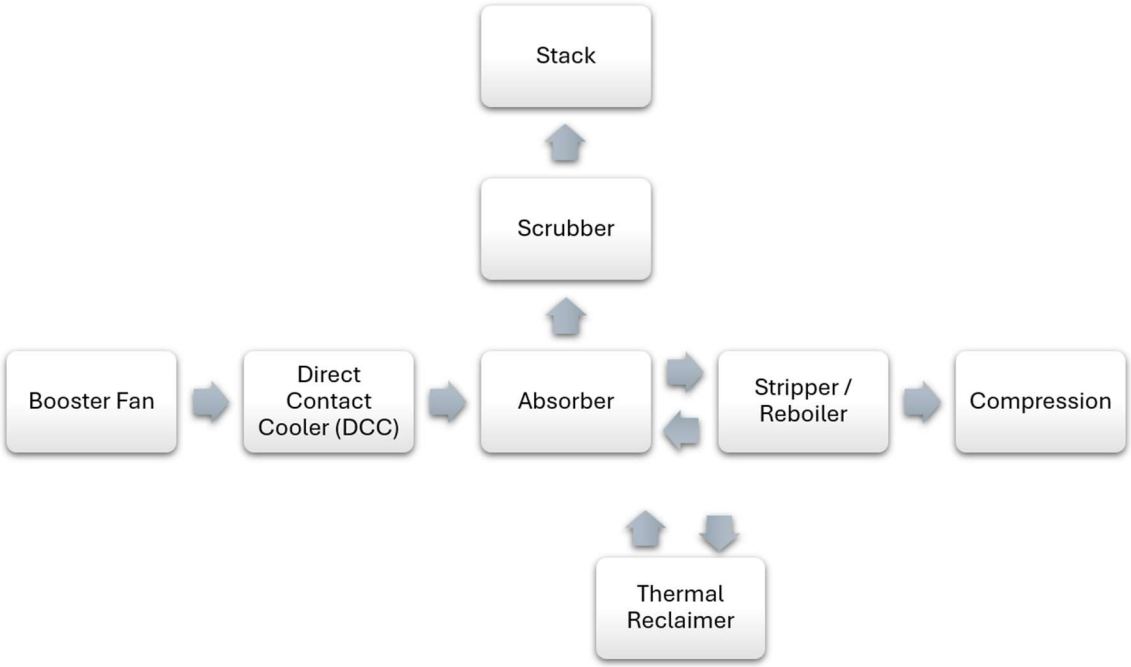


Figure 2- Block Diagram for Carbon Capture Stage

4.2.2. Booster Fan

The EfW facilities will each already have an Induced Draft (ID) fan that pulls the combustion gases from the boilers and propels them out of the EfW facility stacks. However, the pressure drop across the carbon capture plant is significantly more than the existing route to atmosphere. Therefore, a new booster fan is required to take the flue gas through the system.

4.2.3. Direct Contact Cooler (DCC)

The flue gas from the EfW facilities will be at a higher temperature than the absorber column can accommodate. Therefore, it requires to be cooled before being passed to the absorption stage. This is accomplished using a DCC. A typical DCC is shown diagrammatically in Figure 3 below.

The flue gas is first quenched using a water spray before passing into the DCC column. As the flue gas flows up through the column, water droplets are removed using the demister. It is then scrubbed using water as it passes up through the packed bed. Once the flue gas has passed through the packed bed it is then sent to the absorber.

The DCC both cools the flue gas and also removes contaminants including particulate and acid gases.

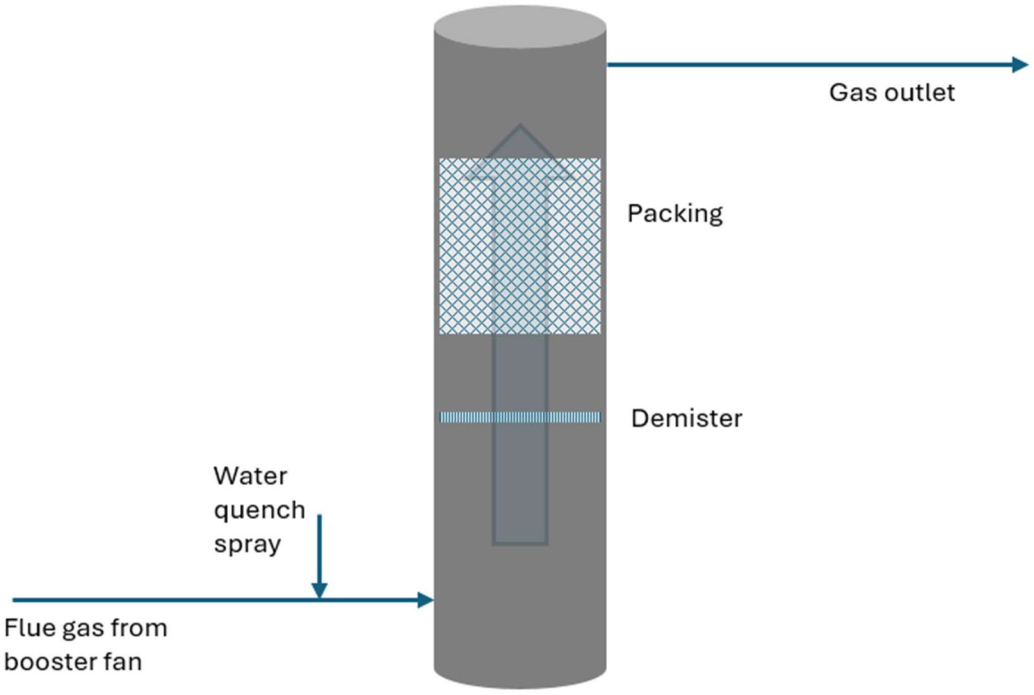


Figure 3 – Diagrammatic representation of DCC

4.2.4. Absorber

The cooled gas from the DCC will be passed to the absorber. The absorber is shown diagrammatically in Figure 4 below. The absorber is another column, again containing packing although in this instance there will be a number of distinct stages. Lean (low concentration of CO_2) solvent is introduced at the top of the column and flows down contacting the gas which flows up. The CO_2 in the gas is absorbed by the amine solvent. The rich (high concentration of CO_2) solvent is removed from the bottom of the column. The rich solvent is pumped to the stripper column. The exhaust gas, with most of the CO_2 now removed, is sent to the scrubber.

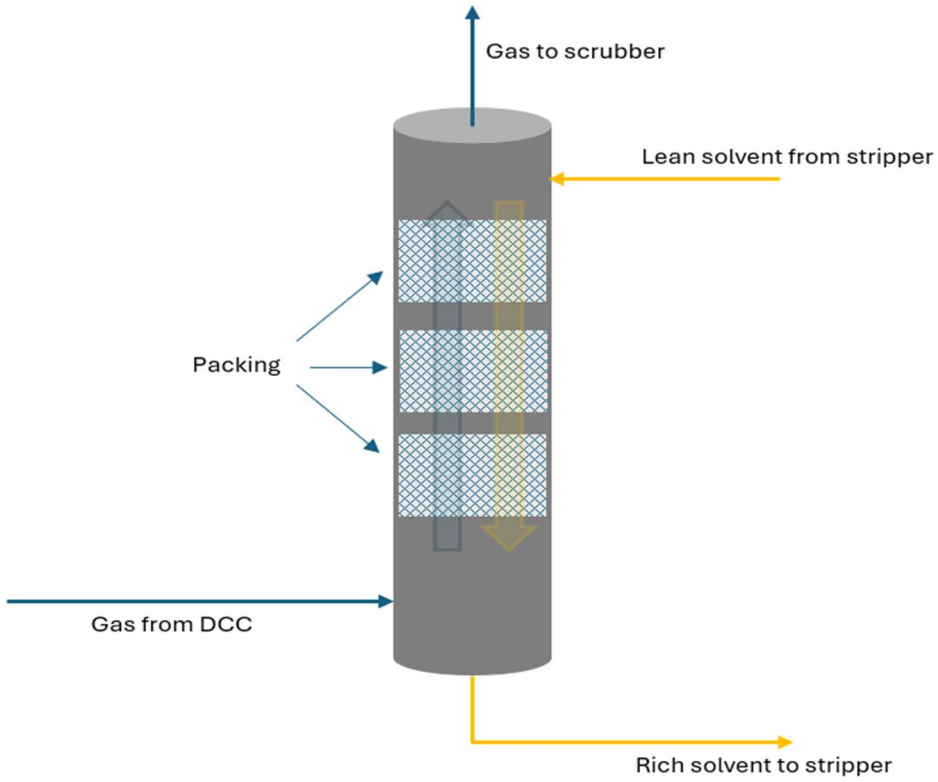


Figure 4 - Diagrammatic representation of Absorber

4.2.5. Scrubber

The gas exiting the absorber is likely to have picked up some of the amine solvent. This needs to be removed prior to the gas being released to atmosphere. This is done in the scrubber where the exhaust gas from the absorber is scrubbed using water. The scrubber is shown diagrammatically in Figure 5 below. The scrubbed gas is vented through a new dedicated stack which is fitted to the top of the absorber column. Prior to release to atmosphere, the exhaust gas will be heated to avoid liquid drop-out / visible plume issues.

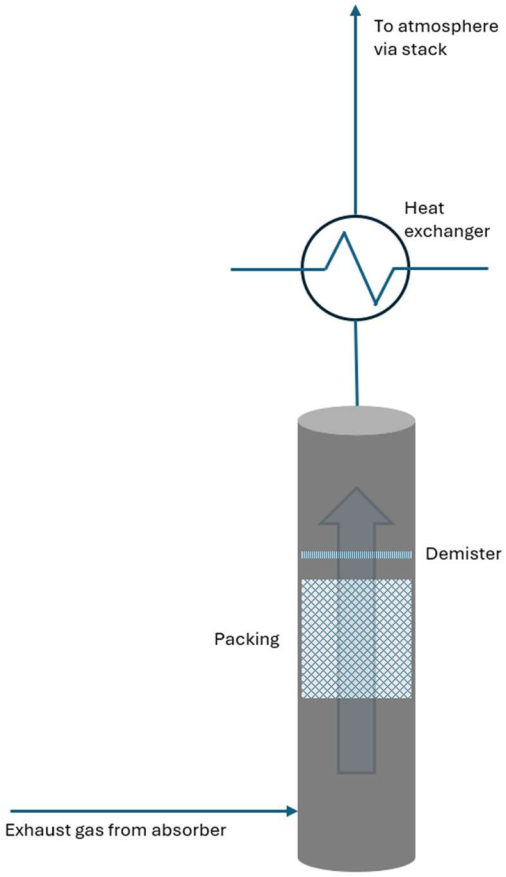


Figure 5- Diagrammatic representation of scrubber

4.2.6. Stripper / Reboiler

The amine solvent that is used to remove the CO_2 from the EfW flue gas requires to be regenerated in order that it can be reused. This is important both to avoid unnecessary environmental discharges and for financial reasons.

The regeneration of the amine takes place in the stripper / reboiler. This equipment is shown diagrammatically in Figure 6 below. The CO_2 rich solvent from the absorber is introduced above the lower packing and trickles down through the packing. It is then heated in the reboiler to partially vapourise the liquid and produce a CO_2 gaseous vapour and amine water solution which is reintroduced to the stripper column. The CO_2 / vapour component flows upwards through the packing which removes the amine leaving relatively pure CO_2 gas exiting the top of the column. Any residual liquid in that gas is then knocked out in a liquid separator and returned to the column. The CO_2 gas liberated is fed to the compression stage.

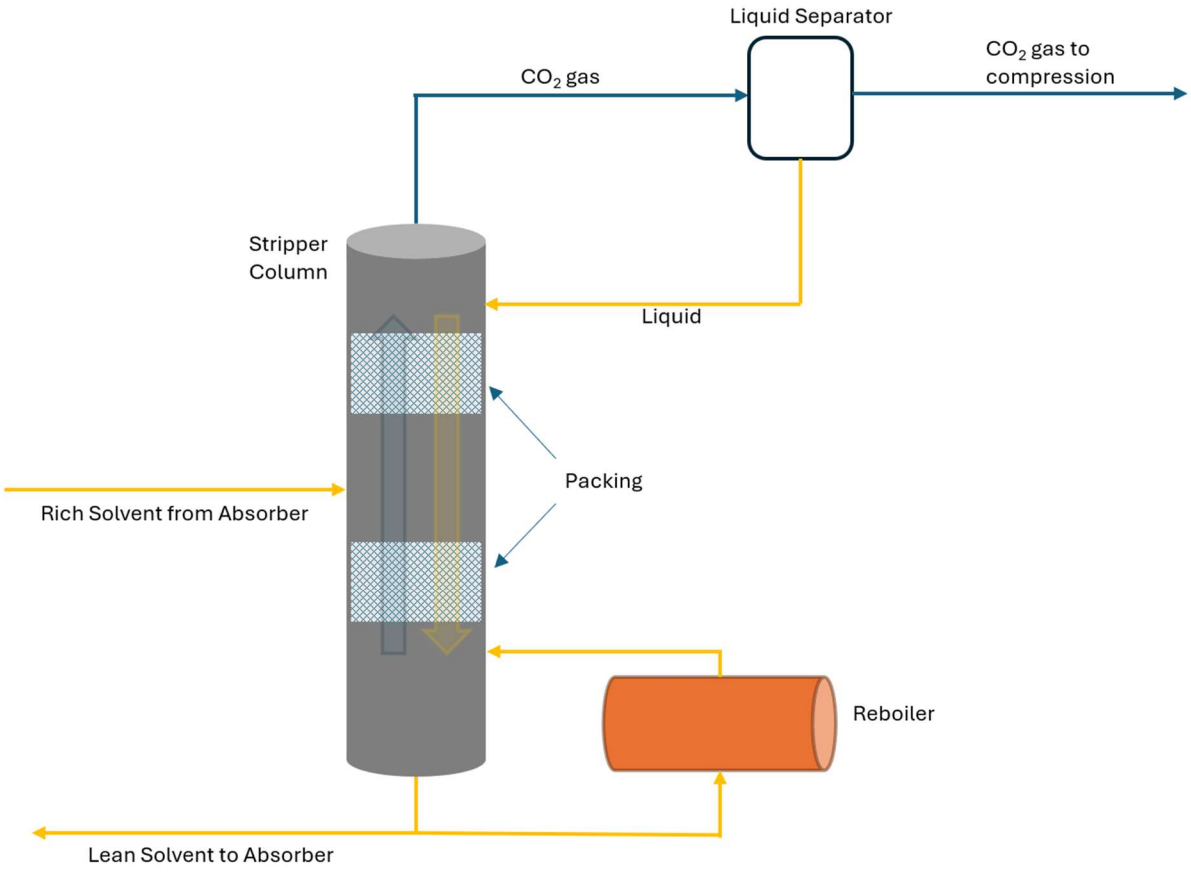


Figure 6 – Diagrammatic representation of stripper / reboiler

4.2.7. Compression

Before being fed to the liquefaction stage, the CO_2 is compressed. For this study, the compression will be to 2 Barg. After exiting the compressor, the CO_2 is heated by circa 20C before the gas is passed through an activated carbon adsorber. This removes any trace quantities of hydrocarbons that may be in the CO_2. A small amount of hydrogen is then injected which reacts exothermically with any oxygen present to form water. The gas is cooled before being passed to the dehydration stage with any condensed water being separated out.

4.3. Liquefaction

4.3.1. Dehydration

The CO_2 gas that is produced by the stripper column (see section 4.2.6) will still contain a significant quantity of water. The water would freeze if the wet gas was liquefied and therefore to avoid plant damage / operational issues the water must be removed prior to liquefaction. The dehydration step is shown diagrammatically in Figure 7 below. The dehydration relies on passing the wet gas through a desiccant. The water in the gas is retained on the surface of the desiccant. Over time, the ability of the desiccant to collect water decreases as more and more water is collected. Therefore, two columns are used, termed column A and B in the diagram below. At any point in time, the gas passing through one column is being dried whilst the desiccant in the other column is being regenerated (where the water is driven off by passing hot dry gas through the column). The dry CO_2 from the adsorption process is passed to the liquefaction step.

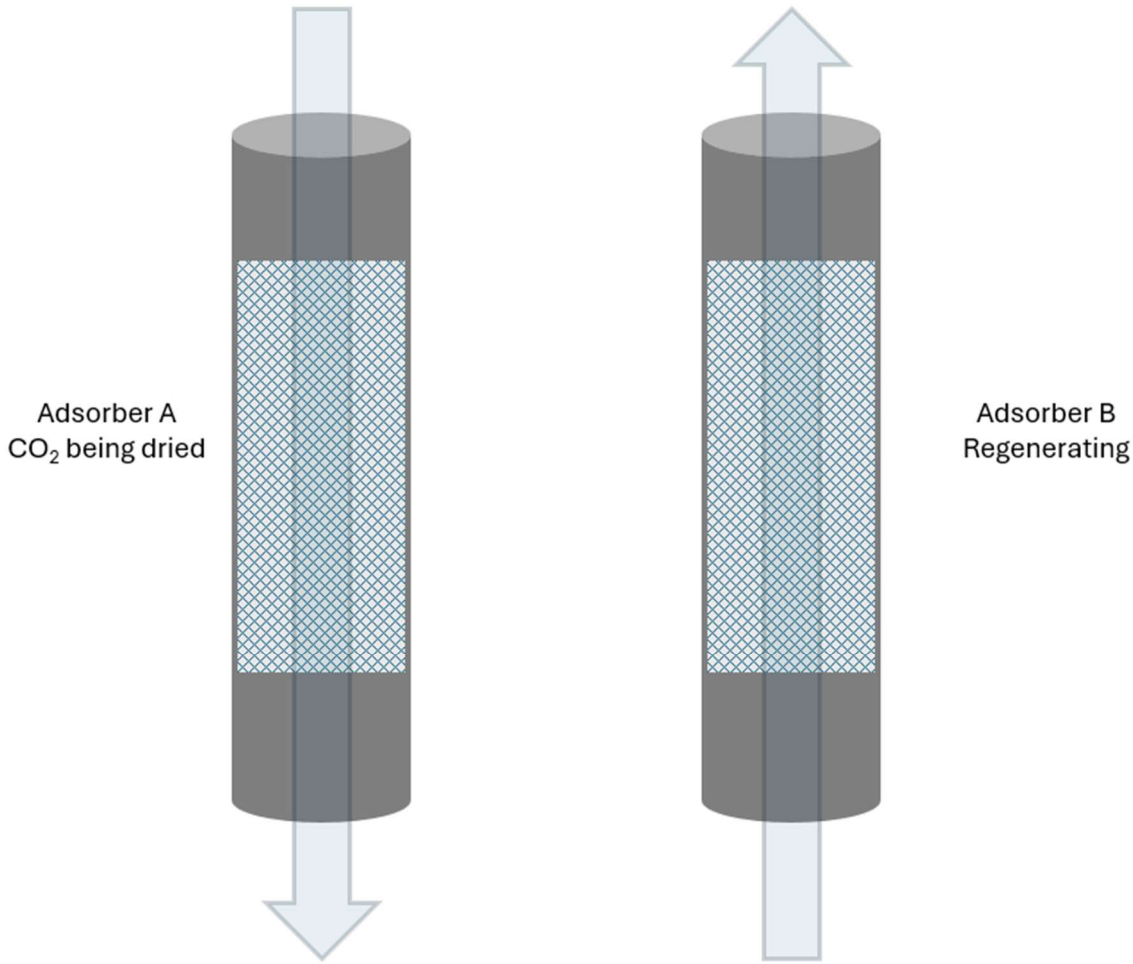


Figure 7 – Diagrammatic representation of dehydration stage

4.3.2. Liquefaction

For the purposes of this study, it is assumed that closed cycle liquefaction will be used as this is more energy efficient than open cycle liquefaction. This involves cooling the CO_2 using an external refrigerant such as ammonia.

There are a number of different technology providers for the liquefaction step, one of which is Linde. The following diagram[9] shows a Linde liquefaction plant for CO_2. The elements of the plant that correspond to the liquefaction stage for this study are those in the red box.

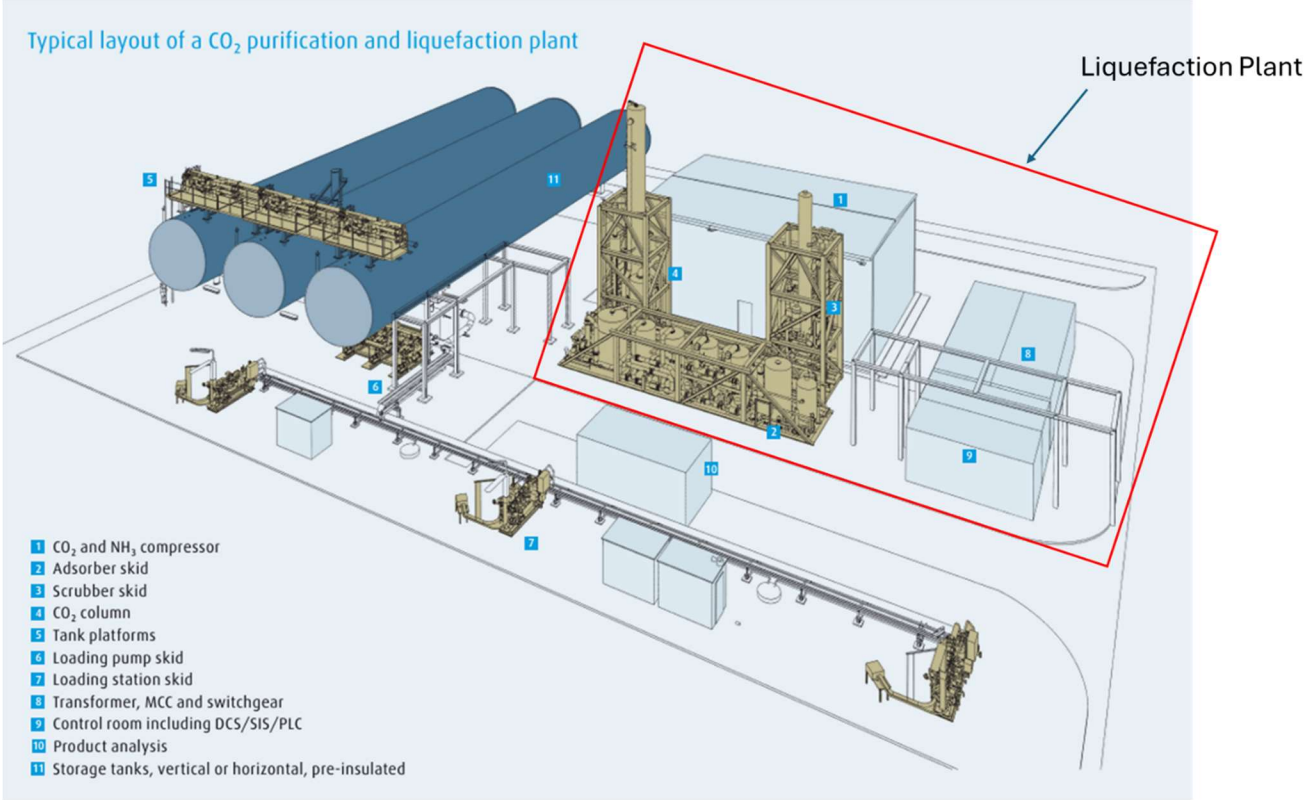


Figure 8 - Typical liquefaction plant layout

4.4. Storage

The CO_2 will be transported as a liquid by ship. An amendment to the planning permission has been approved by the Inspector to increase the capacity of the ship to 20,000 m^3 from the 15,000 m^3 that was originally sought.

The production rate of CO_2 can be estimated as follows:

Hourly carbon emissions	*= 224.6 t/h [see section 3.2.3]*
Capture efficiency	*= 95% [see section 3.2.2]*
CO_2 captured per hour	*= 0.95 x 224.6 = 213.4 t/h*

It is assumed that the CO_2 transportation will be at 7 Bara[7]. The following table provides properties for liquid CO_2 at different temperatures.

Carbon Dioxide - Liquid Properties

Temperature - T - (^oC)	Density - ρ - (kg/m^3)	Specific Heat - c_p - (10^3 J/kg K)	Thermal Conductivity - k - (W/m K)	Kinematic Viscosity - ν - (10^{-6} m^2/s)	Prandtl's No. - Pr -
-50	1156	1.84	0.086	0.119	2.96
-40	1118	1.88	0.101	0.118	2.46
-30	1077	1.97	0.112	0.117	2.22
-20	1032	2.05	0.115	0.115	2.12
-10	983	2.18	0.110	0.113	2.20
0	927	2.47	0.105	0.108	2.38
10	860	3.14	0.097	0.101	2.80
20	773	5.0	0.087	0.091	4.10
30	598	36.4	0.070	0.080	28.7

[redacted]

Table 1 – Physical properties of liquid CO_2

The P-T diagram for CO_2 is given in Figure 9below.

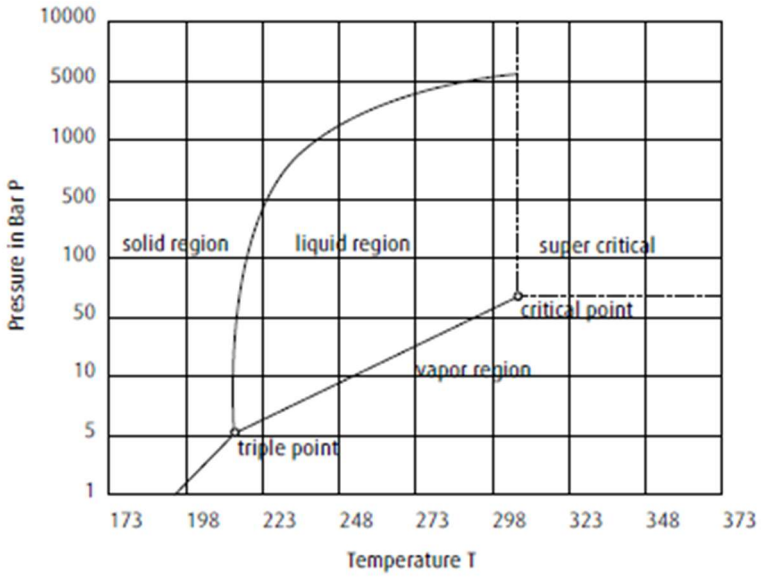


Figure 9 – P-T diagram for CO_2

The CO_2 will be stored at temperatures slightly above the triple point (216K (-57C), 5.2 Bara (6.2 Barg)). As a design assumption, conditions of -50C / 8 Barg have been selected. This gives some margin from the triple point without raising the pressure too high.

Therefore, in volumetric terms:

CO_2 captured per hour = 213.4 t/h / 1156 kg/m^3 = 184.6 m^3/h

Time to capture 20,000 m^3 = 20,000 m^3 / 184.6 m^3/h = 108.4 hours

From an economic perspective, it will be optimal to avoid the ship being docked for longer than necessary. As such, it is assumed that CO_2 loading will take place at a high rate of 2,500 m^3/h[7]. This would mean that it would take 8 hours to fill the 20,000 m^3 vessel.

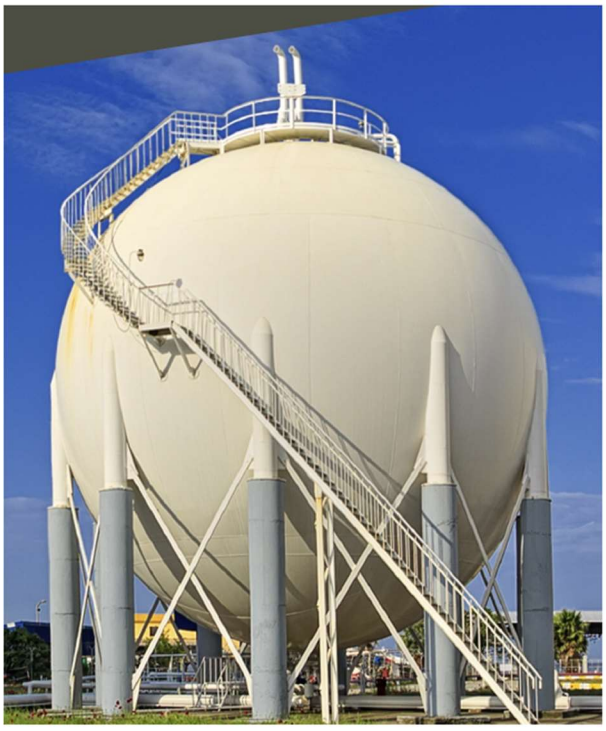
It can be seen that the ship loading time is small compared to the time taken to produce sufficient CO_2 to completely fill the ship. Strictly speaking, the minimum storage capacity would be found by subtracting the ship fill time from the time taken to generate 20,000 m^3. This would mean that the storage capacity could be reduced to

Storage capacity *= 20,000 –(8 x 184.6) = 18,532.2 m3*

However, it will be assumed that the required storage capacity is at least 20,000 m^3 to align with what is understood to be the Cory assumption on storage capacity.

There are a range of options for storage including multiple bullet type cylinders or a smaller number of spherical storage tanks. For the purposes of this design, it will be assumed that spherical storage tanks will be used. Given the relatively large volume of storage capacity, it would require a very large number of bullet type cylinders. The spherical tanks are likely to have advantages in terms of visual impact (they will be lower) and maintenance access will be better for an equivalent overall footprint.

There are multiple potential suppliers of these tanks but a typical example[10] is given below.



ASME SPHERES

Typical larger sized sphere sizes:

Diameter Ø Feet and Inches	Number Size Of Columns	Capacity / Barrels
54'-9"	9 @ 32"	15,000
60'-6"	10 @ 34"	20,000
65'-0"	11 @ 36"	25,000
69'-0"	11 @ 40"	30,000
73'-0"	11 @ 42"	36,000
76'-0"	12 @ 42"	40,000
81'-10"	13 @ 42"	50,000

Figure 10 – Spherical storage tank

The largest tank has a capacity of 50,000 barrels (equivalent to 7,949 m^3) and a nominal diameter of 81'10" (equivalent to 25m). Three of these tanks would provide a storage capacity of 23,848 m^3. This is sufficient to provide the required buffer storage.

The above makes a simplifying assumption in that it assumes 100% liquid for both the on-ship storage and the buffer storage. In reality, the tank will not be completely filled with liquid to avoid

hydraulic lock. The 23,848 m^3 of volume provides for 20,000 m^3 of liquid plus 3,848 m^3 of vapour (16% vapour space allowance) which is considered reasonable.

5. Utilities

5.1. Steam and electricity

The carbon capture, liquefaction and storage of CO_2 will require significant amounts of steam and electricity.

The following figure[11] shows benchmark values for steam and heat inputs as well as heat outputs for a CCS process.

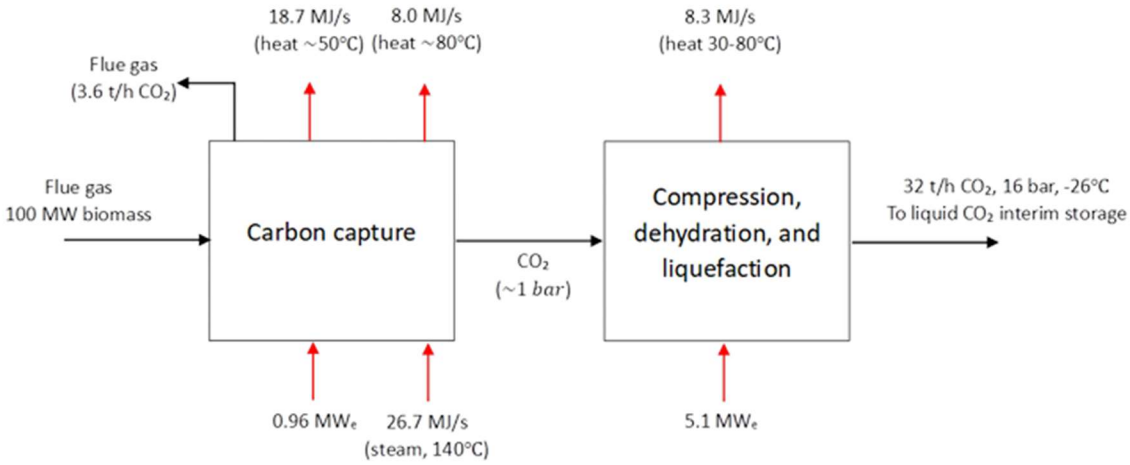


Figure 11 - Heat inputs and outputs

The above is for a CO_2 production of 32 t/h. The CO_2 interim storage conditions are slightly higher pressure / higher temperature than what is proposed for Cory but the overall heat loads will still remain representative in terms of rule of thumb analysis. In section 4.4, the CO_2 production for Cory is estimated at 213.4 t/h.

Therefore, scaling proportionally based on the CO_2 production, the steam and electricity demand is calculated as:

- Electricity requirement = 40.4MWe
- Steam requirement = 178.1 MW

It is noted in the Cory DCO that LP steam is not available from the Riverside power stations. Therefore, as is assumed in the Cory DCO, high pressure steam will be taken from the power stations and a back-pressure steam turbine will be used to let-down the steam to the required conditions and generate electricity.

From steam tables, the enthalpy of steam at 160C, 4.5 Barg is 2762.7 kJ/kg. Therefore, the steam flow can be estimated at 178.1 x 1000 / 2762.7 = 64.4 kg/s

5.2. Cooling

Both the carbon capture process and the liquefaction process have various elements that require both heat addition and heat removal. However, overall the carbon capture and liquefaction will result in a significant quantity of low grade heat that requires to be dissipated.

There are various means by which this could be done including Air Cooled Condensers (ACC), direct cooling (using water from the Thames) or cooling towers. In the Cory DCO, hybrid towers are selected as the base option and this will be the assumption for this study. It is noted that this requires a significantly greater footprint than a wet cooling tower solution.

Referring to Figure 11, and scaling proportionally on CO_2 production gives an estimated heat output of 233 MW. However, it was clarified by Cory[12] that the design basis cooling load is 362MW. The reason for this significant difference is not known at this time and may be the subject of further evidence.

It is noted that this cooling demand could be reduced if heat is provided to the local district heating network. For this particular development, there is an opportunity to capture waste heat and feed it to the Riverside Heat Network. The Applicant estimates that up to 100MWt of heat can be supplied to the heat network[13].

Notwithstanding the above, as a conservative assumption, the cooling tower requirement for this study is predicated on a demand of 362MW.

5.3. Water

Water will be required both for process use in the carbon capture plant (for instance for the direct contact cooler) and for the hybrid cooling towers. It is assumed that this water supply will be taken from the Thames Water network.

There will be a small amount of waste water produced from the water treatment plant and the cooling towers which it is assumed can be discharged to sewer.

5.4. Tanks and chemical storage

There will be a requirement for a number of different tanks to store liquids and chemicals. These will include:

- A tank to store fresh amine.
- A tank to store ammonia (used for the liquefaction plant).
- A tank to store degraded amine which will need to be taken off-site by tanker for appropriate disposal.

Allowance has also been made for a water storage tank as the Cory DCO notes that this will be required to reduce impact on the Thames Water system.

6. Site layout

Based on the above, a site layout drawing (2409_D_001) has been created. On this drawing, the key equipment shown in Table 2 below is indicated along with roads and corridors for services (piping, electrical connections etc).

Number	Plant / Equipment
1	Booster Fan
2	Direct Contact Cooler
3	Absorber and associated pumps
4	Scrubber
5	Stack
6	Stripper
7	Reboiler
8	Compressors
9	Dehydration
10	Liquefaction
11	Liquid CO_2 storage
12	Wet dry hybrid cooling towers
13	Steam turbine
14	Transformers / Switchgear
15	Water Treatment Plant
16	Control, Administration and Welfare Building
17	Chemical Tanks
18	Heat Exchangers and other process plant
19	Heat Transfer Station
20	Operational laydown
21	Water tank

Table 2 – Key plant and equipment for site layout

The outline footprint requirements are shown for each individual item of equipment. Within each of those allocations there will be various items of plant including pumps, valves and connecting pipework in addition to the main item of equipment.

Space has been provided around all items of equipment to allow for maintenance access. In addition, roads have been provided to allow vehicular access to all areas of the site.

Service corridors are indicated on the drawings which will be used, where possible, to collect and route pipework and utilities. For instance, the liquid CO_2 piping for export of the CO_2 will use this corridor.

A second site layout (2409_D_002) has also been produced. This layout uses the same equipment sizing but repositions equipment to minimise the amount of land required to be taken from the Local Nature Reserve.

7. References

[1] Environmental Statement: 6.1 Chapter 2: Site And Proposed Scheme Description Cory Decarbonisation Project PINS Reference: EN010128 March 2024 Revision A

[2] Environmental Statement: 6.1 Chapter 13: Greenhouse Gases Cory Decarbonisation Project PINS Reference: EN010128 March 2024 Revision A

[3] https://assets.publishing.service.gov.uk/media/632d5b428fa8f51d257aa705/Decision_Document_BK0825IU-V009.pdf

[4] [redacted]

[5] IEAGHG Technical Report 2022-03 February 2022 Prime Solvent candidates for next generation of PCC plants

[6] Environmental Statement: 6.1 Chapter 3: Consideration Of Alternatives Cory Decarbonisation Project PINS Reference: EN0101

[7] Knowledge Sharing Report – CO2 Liquid Logistics Shipping Concept (LLSC) Overall Supply Chain Optimization

[8] [redacted]

[9] [redacted]

[10] [redacted]

[11] Carbon capture transport and storage, Technology descriptions and projections for long-term energy system planning. Danish Energy Authority.

[12] E-mail : RE: Cory / Landsul next steps Ref Tozers:MA:L03102-0002 [PM-AC.FID5236074] from Matthew Fox (Pinsent Masons) to Kelly Burns (Tozers) on 14th November 2024.

[13] Environmental Statement - Chapter 2: Site and Proposed Scheme Description, paragraph 2.2.107

CRE | FUTURE ENERGIES

49 Callaghan Crescent, East Kilbride, South Lanarkshire, Scotland, UK

E-mail : info@crefutureenergies.com

Web : [redacted]

Annex C

August 2024 letter to Cory’s agent

TOZERS

Broadwalk House Southernhay West Exeter EX1 1UA
Tel: 01392 207020 Fax: 01392 207019

[redacted]

28 August 2024
Our ref: KSB/TAB/L03102-0002

Direct: [redacted]

By Email Only: [redacted]

Dear Mr Cooper

My client: Landsul Limited and Munster Joinery (UK) Limited
Re: Cory decarbonisation, Belvedere

We write further to our previous requests for our client's consultant engineer, Dr Craig Edgar of CRE Future Energies, to speak with an engineer at Cory in relation to the technical responses provided in Cory's letter (May 2024) which you sent to us on 23 May 2024.

We are disappointed that, to date, Cory has not been willing to facilitate such a discussion especially since it could narrow the issues that need to be considered by the Examining Authority during the examination process.

We understand that Cory's reasoning in refusing to facilitate such a meeting is because it considers the need for our client's land to be clear and that there is no reasonable alternative to the taking of all of our client's land for the purposes of Cory's decarbonisation project. We therefore do not understand Cory's reluctance for Dr Edgar to speak with one of its engineers if the discussion would demonstrate the clear need for all of our client's land.

Cory will need to demonstrate this during the Examination Hearing and so it would be sensible for this to be demonstrated now so that the issues can potentially be narrowed ahead of the Preliminary Meeting expected to take place at the beginning of November.

With this in mind, we are writing this letter to further request a meeting between Dr Edgar and Cory's engineers to discuss the technical response provided in May 2024.

To assist with this, we have set out the points that Dr Edgar would like to discuss with Cory's engineers below. Whilst Cory provided a technical note addressing these questions, the responses provided were merely a high level overview and restatement of the position and provided no further detail than that which was already set out in the application. The response failed to provide the necessary detail to evidence how such

an overview or conclusion has been reached and it is this which Dr Edgar would like to discuss with Cory's engineers. As we have stated above, Cory will need to be able to demonstrate this overview and conclusions during any Examination Hearing and so it would be sensible for such detail to be discussed now in order to try and narrow the issues.

In addition to this we have also set out below a list of questions from our client's consultant engineer, Dr Anna Ferguson of Blake Clough Consulting, and we would be grateful if you could pass these questions to Cory's engineers to provide the answers as soon as possible.

If Cory is unwilling to facilitate the meeting requested or supply answers to the questions raised by Dr Ferguson, then our client will have no option but to raise Cory's lack of cooperation with the Examining Authority at the Preliminary Meeting as part of its reasoning in requesting an Issue Specific Hearing to discuss the need for our client's land.

Please note that, Kelly Burns, has taken over conduct of this matter from Amy Cater. We would ask that all future correspondence is sent to Ms Burns whose contact details are at the bottom and the start of this letter.

We look forward to hearing from you at your earliest convenience.

Yours sincerely

[redacted]

Tozers
Email: [redacted]

List of Questions from Dr Craig Edgar

1. Design basis for the carbon capture project. In particular, total flue gas flows and composition and targeted carbon dioxide quantity.

2. Design basis / specification for the electrical switchyard (item 10 Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01)

3. Design basis / specification for the liquid CO2 buffer storage area (item 13 Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01)

4. Design basis / specification for the hybrid cooling system (item 15 Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01)

5. Design basis / specification for the water treatment plant (item 16 Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01)

6. Design rationale for the control room, welfare facilities and gatehouse. In particular, I'm keen to understand the scope of these facilities and whether they are intended purely for the carbon capture plant or have a more general purpose to serve the Riverside 1 / Riverside 2 EfW facilities also.

7. Design rationale / design basis for the heat transfer station. Please quantify how much waste heat will be generated / available for export from the carbon capture plant. Also, please clarify whether it is intended purely to export waste heat from the carbon capture plant or as a more general heat transfer station for waste heat from the Riverside 1 / Riverside 2 facilities also.

8. Please confirm that area 19 on Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01 is for Operational Laydown. Please clarify basis for sizing of this area.

9. Details on what is proposed for the Water Management Area (area 20 on Indicative Equipment Layout drawing number EN010128-01-XX-DG-PL-0005-P01).

List of Questions from Anna Ferguson

1. Please can you supply the Single Line Diagram (SLD) for the electrical connections, showing how the new CCS plant is to be supplied from the new substations?

2. Please can you supply the electrical basis of design document?

3. Please can you supply the substation layouts showing key HV equipment?

4. Please can you supply the cable routing drawing showing how the cables are proposed to be routed through the site?

Annex D

Iron Mountain Acquisition

ACQUISITION OF IRON MOUNTAIN

INDUSTRIAL & LOGISTICS

REALTY INCOME

THIS PROJECT WAS WORKED ON BY **JOHN HULME**, AND **TOM PATON-SMITH** WORKING IN

KEY INFORMATION

Montagu Evans advised Realty Income on the acquisition of Iron Mountain's last mile distribution facility in Belvedere, London. The unit was specifically designed for the tenant and operates as their largest facility in Europe.

The modern high quality distribution warehouse totalling 345,794 sq ft GIA is let in its entirety to Iron Mountain (UK) Ltd on two separate co-terminus FRI leases expiring 24th December 2031, guaranteed by Iron Mountain Europe Limited and Iron Mountain Inc. The total passing rent of £3,690,467 per annum reflects a low reversionary rent of £10.67 per sq ft. The five yearly rent reviews are subject to 3% annual fixed increases.

Montagu Evans also advised Realty Income on the acquisition of TK Maxx's prime distribution centre in Walsall. The unit was specifically designed for TK Maxx's operations in 2005.

The modern high quality distribution warehouse totalling 270,065 sq ft GIA is let in its entirety to TJX UK on an FRI lease expiring 24th February 2025, guaranteed by TJX Europe Ltd. The total passing rent of £1,406,125 per annum reflects a low reversionary rent of £5.20 per sq ft.

Realty Income purchased both units for £120,000,000 in April 2021 which reflects a blended net initial yield of 3.98% and capital value of £195 psf.

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Planning – Commercial
Planning – Historic Environment & Townscape
Planning – Housing
Planning – Scotland
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Advisory – Asset & Investment
Advisory – Development
Advisory – Rating
Advisory – Residential Valuation
Advisory – Strategic Advisory
Advisory – Valuation
Commercial & Agency
Commercial & Agency – Industrial & Logistics
Commercial & Agency – Land & Living
Commercial & Agency – Offices
Commercial & Agency – Retail & Leisure
Central Management

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Modern Slavery Act
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Annex E

Socio-economic Impact Assessment

Socio-economic Impact Assessment for Munster Joinery

Responding to the Cory Decarbonisation Project DCO

Final Report

Landsul Limited and Munster Joinery (U.K.) Limited

25 November 2024

LICHFIELDS

68581/01/CGJ/SS
33195165v2

Executive Summary

Lichfields, on behalf of Landsul Limited and Munster Joinery (U.K.) Limited, has conducted a review and reappraisal of the socio-economic impact of the proposals of the Cory Decarbonisation Project Development Consent Order ('DCO'), with respect to the Munster Joinery site at Norman Road, Belvedere, owned by Landsul Limited, which would be subject to compulsory purchase under the Proposed Scheme.

It is considered that the assessment of the socio-economic impact of the Proposed Scheme on Munster Joinery, within **Environmental Statement Chapter 15: Socio-economics** [APP-064], has not been accurately assessed, owing to multiple inaccuracies, inconsistencies, and deficiencies within the approach.

The issues identified in Section 2.0 of this report include, but are not limited to:

1 Failing to adequately address the matters raised by Landsul Limited and Munster Joinery (U.K.) Limited within the consultation responses.

2 Assessing the loss of Munster Joinery as an operational phase impact when the loss of the site would occur during the construction phase leading to an underestimation of potential significant adverse effects.

3 Combining the operational employment at the carbon capture and storage facility with the loss of employment at Munster Joinery to estimate the 'net' employment impact of the Proposed Scheme, incorrectly assuming that substitution between employment across the two uses is possible.

4 Presenting an imprecise definition of receptors within the scoping report and at the Preliminary Environmental Information Report ('PEIR'), which did not make explicit the Applicant's intention to combine the working age population and businesses into a single 'economic receptor'. This has led to the Applicant failing to assess the effect of business disruption on Munster Joinery resulting from the Proposed Scheme.

5 Not acknowledging the planned expansion of Munster Joinery at the Norman Road site in the future baseline and therefore underestimating the potential effects of displacement on employment.

6 Providing an inaccurate estimation of existing employment levels at the Munster Joinery facility and incorrectly adjusting existing on-site employment for displacement.

7 Failing to estimate impacts at a Local Study Area level and, despite this, proceeding to determine the significance of effect at this geography.

8 Identification of inconsistencies between assessments in Chapter 14 and Chapter 15 within the Environmental Statement.

To address these matters, a reassessment of the socio-economic analysis has been conducted by Lichfields following industry best practice. The reassessment focuses on the impacts related to Munster Joinery only. While the original assessment within **Chapter 15** [APP-064] did not identify any significant effects, the reappraisal within Section 3.0 of this report has identified the following effects as adverse and significant:

- **long-term, permanent, moderate adverse (significant)** effect on the labour market within the Local Study Area.

- **long-term, permanent, substantial adverse (significant)** on businesses and commercial activity within the site boundary.
- **long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Local Study Area.
- **long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Regional Study Area.

On this basis, the Applicant must revisit the assessment of socio-economic effects to ensure an appropriate range of impacts from the Proposed Scheme on socio-economic receptors are properly considered, and to provide accurate, precise and justified evaluation.

Consequently, as mitigation for the significant adverse effects identified within this reassessment, the design and footprint of the Proposed Scheme should be reconsidered to avoid the compulsory purchase of the Munster Joinery site on Norman Road, and the resulting disruption to local labour markets and wider business stability.

Contents

1.0 Introduction

1.1 Lichfields has been appointed by Landsul Limited and Munster Joinery (U.K.) Limited to:

a review the application documents submitted as part of the Cory Decarbonisation Project Development Consent Order ('DCO') application, specifically with regard to the proposed displacement of Munster Joinery's operations at Norman Road, Belvedere, in the London Borough of Bexley ('LBB'); and

b subject to the findings of a), prepare a socio-economic impact assessment to understand the direct and indirect impact in relation to the potential displacement of Munster Joinery's operations resulting from the DCO.

1.2 The DCO application pertains to the development of a Carbon Capture and Storage ('CCS') facility, in connection to Cory Environmental Holdings Limited's ('the Applicant') Energy from Waste ('EfW') facilities at Riverside Energy Park ('the Proposed Scheme').

Background

1.3 Munster Joinery (U.K.) Limited is a manufacturer of the highest standard of energy efficient windows and doors, with its primary manufacturing facility based in Wellesbourne, Warwickshire and its major distribution centre is located within the Belvedere Industrial Estate on Norman Road. The site on Norman Road serves as the sole major distribution centre for the company's energy efficient windows across London and the South East, which represents a major part of Munster Joinery's total customer base.

1.4 In August 2014 Landsul Limited was granted planning permission by Bexley Council for the erection of a building comprising a mix of Class B1 (business), Class B2 (general industrial) and B8 (storage/distribution) uses and associated ancillary works (ref. 13/00918/FULM) at the Former Electricity Generating Station, Norman Road, Belvedere.

1.5 The first phase of the development (50% of the scheme) was completed in 2016 and it is understood that the foundations have been laid for the remainder of the development. The total site is occupied by Munster Joinery (U.K.) Limited for use as a distribution hub, office, and showroom serving its customer base in London and the South East. Munster Joinery began operations at the site in 2016, using generators and water tanks in the absence of mains electricity and water supply connections.

1.6 This socio-economic impact assessment is required to support objections to the Cory Decarbonisation Project DCO application, which, if approved in its current form, would result in the compulsory purchase and demolition of Munster Joinery's site on Norman Road and displacement of its current operations.

1.7 The project is currently at Examination stage, which commenced on 5 November 2024 and is set to conclude on 5 May 2025. Tozers LPP, on behalf of, jointly, Landsul Limited and Munster Joinery (U.K.) Limited, submitted a formal response to the consultation through a **Relevant Representation** [RR-101] in June 2024. As outlined within the Relevant Representation, it is considered that the Applicant has undertaken an inadequate assessment of the socio-economic impacts resulting from the displacement of the Munster Joinery facility and has not provided sufficient justification for the compulsory purchase of

the land. Further submissions to this effect were made at Procedural Deadline A [see PDA-016 and PDA-018].

1.8 This report will be used as an evidence base for Landsul and Munster Joinery's objection to the DCO application and has been prepared for submission for Deadline 1. It reviews the chapters of the Environmental Statement ('ES') pertaining to socio-economics: **Chapter 14: Population, Health and Land Use** [APP-063] and **Chapter 15: Socio-economics** [APP-064]. It considers the assumptions, methodology and assessment within these chapters and, where deficiencies are identified, provides a high-level alternative assessment of socio-economic impacts pertaining to the loss of the Norman Road site.

1.9 This reassessment uses publicly available information that would have been available to the Applicant when preparing the Environmental Statement; no additional information has been provided to Lichfields by Landsul Limited or Munster Joinery (U.K.) Limited.

1.10 This assessment has been prepared by Emma Taylor, Senior Economics Consultant, MA (Cantab) MPhil MIED and Sakhi Sumaria, Associate Director, BA (Hons) MIED, and reviewed by Ciaran Gunne-Jones, BA (Hons) MSc FRGS MIED. Lichfields has an extensive track record of preparing socio-economic assessments for ES chapters, having written more than 50 such assessments over the past decade. Lichfields is a Corporate Member of the Institute of Economic Development (IED) and has over 20 registered members.

1.11 This report is structured as follows:

- **Section 2.0** provides a review of the relevant application documents.
- **Section 3.0** presents the alternative socio-economic impact assessment prepared by Lichfields.
- **Section 4.0** sets out implications based on the review and reassessment.

2.0 Review of Application and Supplementary Documents

2.1 This section comprises of a detailed review of the socio-economic assessment within the Scoping Report and Preliminary Environmental Impact Report ('PEIR') as well as Chapter 14 Population, Health and Land Use assessment and Chapter 15 Socio-economic assessment within the Environmental Statement (March 2024), including the associated appendices. In particular, it highlights inconsistencies and omissions within the assessment of effects of the Cory Decarbonisation Project on Munster Joinery's operations.

Scoping Report and Preliminary Environmental Impact Report [APP-026]

2.2 The Applicant's **Environmental Impact Assessment Scoping Report**, submitted in April 2023 set out the Applicant's approach to assessing the socio-economic impacts of the Proposed Scheme. The Scoping Report acknowledges that Munster Joinery falls within the site boundary stating that it is a "*manufacturing company with over 1,700 employees of which 700 are based in the U.K.*". The Scoping Report states that the relocation of Munster Joinery would be a required mitigation measure during the construction phase – an assumption which has not been accurately or consistently applied in subsequent stages of developing the final Environmental Statement.

2.3 Despite acknowledging that the displacement of Munster Joinery would require mitigation during construction, the Scoping Report scopes in the loss of Munster Joinery (as a worst-case scenario) including the loss of employment opportunities as an operational effect, establishing an inaccurate approach to the assessment from the outset and failing to identify that the loss of Munster Joinery would occur during the construction phase.

2.4 Based on the methodology set out within the Scoping Report, the **PEIR** [APP-026] was developed in March 2024. The PEIR assumes that the potential job losses resulting from the demolition of Munster joinery are deadweight, defined as *"a loss of or disruption to existing economic activity currently taking place onsite"* (paragraph 15.4.19), which is not defined within the reference provided by the Applicant[1]. The definition and application of the deadweight assumption by the Applicant is inaccurate and is not aligned with industry best practice nor the latest guidance[2] that was applicable at the time.

2.5 According to guidance, deadweight is defined as an output/outcome that would occur in the future without any intervention. Deadweight should only be applied to the potential employment that would be created as a result of the Proposed Scheme, to provide an understanding of the additional benefit that could be attained over and above the level of employment that would be achieved without the Proposed Scheme.

2.6 The application of deadweight to Munster Joinery is therefore inaccurate. The employment at Munster Joinery, in line with the definition provided in paragraph 2.5, is not considered deadweight. The employment is already in existence and should be included as part of the

[1] The reference provided in the PEIR (footnote 10) is to the 2015 HCA Employment Density Guide, which does not provide a definition of deadweight.

[2] Ministry of Housing, Communities and Local Government (2023), Appraisal Guide. Available at: https://www.gov.uk/government/publications/dluhc-appraisal-guide [Accessed October 2024].

existing baseline. Any employment associated with planned expansion at the Munster Joinery site, should be considered within the future baseline, as this employment would not be substituted by additional employment generated from the Proposed Scheme.

2.7 Employment (both current and future) at Munster Joinery would subsequently be lost as a result of the construction of the Proposed Scheme and therefore in environmental impact assessment terms, the effects of the Proposed Scheme should be assessed against a baseline position meaning that any job loss occurring at Munster Joinery, would be an adverse effect due to the reduction in employment opportunities within the local economy compared to the baseline position.

2.8 The Applicant has incorrectly assumed the loss of employment at Munster Joinery as deadweight, therefore undermining the approach adopted.

2.9 The **PEIR** [APP-026] has calculated the loss of employment at Munster Joinery using floorspace and employment density assumptions from Homes and Communities Agency guidance. Based on the assumptions outlined above, the employment loss was then deducted from operational employment generated from the Proposed Scheme. The PEIR therefore established an inaccurate methodology, which was subsequently implemented within the Environmental Statement and led to the underestimation of the adverse effects that would result from the demolition of Munster Joinery.

Environmental Statement Chapter 14: Population, Health and Land Use [APP-063]

2.10 **Environmental Statement Chapter 14: Population, Health and Land Use** [APP-063] considers the potential significant effects on a range of receptors during the construction and operational phase: effects on terrestrial businesses are assessed at the construction phase only. It should be noted that this assessment, in line with industry best practice, is a receptor-based assessment and therefore purely considers the loss of the receptor as an asset.

2.11 The assessment considers land use and accessibility impacts on businesses in terms of accessibility restrictions or severance and the potential loss or relocation of businesses (paragraph 14.4.11). Employment opportunities are also identified as a determinant of effects on human health (paragraph 14.4.20). Sensitivity and magnitude criteria are applied to each receptor asset to identify a final assessment of effects.

2.12 Table 14-4 of Chapter 14 outlines the sensitivity criteria for land use and accessibility, identifying *"commercial or industrial buildings or land/waterways key to the operation of a business"* as being of high sensitivity and on this basis assesses the Munster Joinery site as a receptor of **high sensitivity**.

2.13 The criteria defining magnitude of impact (Table 14-5) identifies the *direct acquisition and demolition of buildings and direct development of land to accommodate the Proposed Scheme"* as a **high magnitude impact**; this is applicable to the Munster Joinery site.

2.14 Taken together, the Population and Land Use elements of Chapter 14 conclude a direct, permanent, long term, **major adverse (significant)** effect on Munster Joinery in terms of land use and accessibility during the construction phase. This is inconsistent with the

assessment on human health and the assessment presented in Chapter 15 of the Environmental Statement.

2.15 The methodology for the assessment of effects on health within Chapter 14 identifies employment opportunities as a determinant of human health (paragraph 14.4.20). The health assessment, outlined in Table 14-14, states that *"employment improves health and wellbeing not only from an economic standpoint but also in terms of quality of life. This could therefore result in potential short term, indirect, temporary, beneficial effects on human health"*.

2.16 However, the assessment of effects fails to consider the impact of the permanent loss of employment opportunities that would arise from the displacement of the Munster Joinery site. The assessment concludes a potential short term, indirect, temporary, beneficial effect on human health from employment opportunities generated through construction activity, with the overall effect of the Proposed Scheme on human health during the construction phase assessed to be **minor adverse (not significant)**.

2.17 While Landsul Limited and Munster Joinery (U.K.) Limited agree with the assessment of a direct, permanent, long term, **major adverse (significant)** effect on Munster Joinery in terms of land use and accessibility during the construction phase, they maintain concerns that the impact of the loss of employment opportunities – given the highly specialised nature of Munster Joinery's operations– have not been fully accounted for within the assessment particularly in relation to adequate assessment of job losses on human health.

Environmental Statement Chapter 15: Socio-economics [APP-064]

2.18 **Environmental Statement Chapter 15: Socio-economics** [APP-064] assesses the likely significant effects of the Proposed Scheme on socio-economic receptors during construction and operational phases.

2.19 The assessment of socio-economic impacts considers effects on receptors including businesses and the labour market, arising from both the construction and operation of the Proposed Scheme. While there is no legislation or guidance that specifies the detailed content required to prepare socio-economic assessments, or that provides defined standards or thresholds for the significance of socio-economic effects, industry best-practice is well established.

2.20 The assessment should seek to establish the existing and future baseline position – including, in this instance, labour market and business indicators – at pre-defined levels of geography. It should present an assessment of the significance of effect of the Proposed Scheme on identified socio-economic receptors, defining both sensitivity and magnitude of impact as well as highlighting where any mitigation or monitoring actions are required to minimise, reduce or offset possible environmental effects identified within the assessment.

Consultation and Engagement

2.21 Table 15-3 within Chapter 15 details comments from statutory consultation in relation to socio-economics. This includes responses to concerns raised by Landsul Limited and

Munster Joinery (U.K.) Limited relating to the employment density assumptions applied at the operational stage within the **PEIR** [APP-026].

2.22 The response from the Applicant states that the employment density assumptions for the CCS facility were *"based on experience of the operation and maintenance of Riverside 1"* and "*other administrative functions"*. However, the Applicant fails to respond to the appropriateness of its density assumptions for the calculation of jobs at Munster Joinery. As such, Landsul Limited and Munster Joinery (U.K.) Limited consider that the Applicant's response to this matter is not sufficient nor does it adequately respond to the concerns that were raised.

2.23 Landsul Limited and Munster Joinery (U.K.) Limited further highlighted that the socio-economic assessment within the **PEIR** [APP-026] failed to consider the business disruption to Munster Joinery's wider supply chain and distribution networks that would result from the compulsory purchase. The response from the Applicant states *"the indirect and induced employment generation associated with Munster Joinery U.K. Limited, located within the Site Boundary, has been calculated."* However, this assessment uses simple ready-reckoner multipliers for indirect and induced employment effects from the (since withdrawn) Homes and Communities Agency ('HCA') Additionality Guide (4th Edition, 2014)[3], rather than considering the strategic importance of the distribution centre to Munster Joinery's U.K. business operations and the wider impacts of business disruption on both its horizontal and vertical supply chain linkages.

2.24 It should be noted that within the Applicant's later submission, accepted at the discretion of the Examining Authority in October 2024, a further **Response to Relevant Representations** [AS-043] made by or on behalf of landowners is provided. However, the Applicant fails to acknowledge or respond to the socio-economic matters within the **Relevant Representations made by Tozers LLP on behalf of, jointly, Landsul Limited and Munster Joinery (U.K.) Limited** [RR-101].

Study Area and Sensitive Receptors

2.25 The Local Study Area for the socio-economic assessment is defined as LBB, while the Regional Study Area is Greater London. While this is sufficient for the purpose of this assessment, the assessment of employment is only considered at a Greater London level. This results in an incomplete assessment of the effects of the Proposed Scheme on local employment; when considering the potential loss of jobs at the Munster Joinery site, this is significant.

2.26 Due to the nature of activity undertaken at the Munster Joinery site, i.e., working patterns with early starts, and its proximity to public transport (walking distance to major bus stops and Belvedere train station), it is reasonable to assume that the majority of the workforce reside in the local area proximate to the site. Therefore, the effects of the Proposed Development on the local workforce are not adequately appraised based on the broad study areas adopted within the Applicant's assessment. However, the assessment draws conclusions on the significance of effect at the Local Study Area level despite not estimating the assessment of GVA and employment at this spatial level.

[3] Homes and Communities Agency ('HCA') (2014) Additionality Guide, Fourth Edition. Available at: https://assets.publishing.service.gov.uk/media/5a7ec4b9e5274a2e87db1c92/additionality_guide_2014_full.pdf [Accessed October 2024]

2.27 The sensitive economic receptors are identified as including *"working age individuals within the local and regional level Study Area, local businesses within the Study Area including those that may provide services or accommodation, either through supply chain linkages or accommodation to construction employees"* (paragraph 15.5.4). However, the assessment does not assess the effect on each of the economic receptors individually, instead the assessment considers the overall impact of the Proposed Scheme across the totality of the identified receptors, treating them as a singular group. This understates the potential adverse effects resulting from the Proposed Scheme.

2.28 At the Environmental Statement stage, a more granular assessment would be expected and in line with industry best practice, an assessment for each sensitive economic receptor should be provided. The Applicant's assessment neither identifies specific sensitive economic receptors within the criteria they have established, nor does it consider potential effects for each receptor at the relevant spatial scales.

Sensitivity, Magnitude and Significance Criteria

2.29 The Applicant fails to explicitly establish the sensitivity and magnitude of individual receptors and does not clearly define the criteria used. Paragraph 15.4.27 states that the sensitivity of receptors *"has been identified on a case-by-case basis with reference to relevant guidance where applicable and/or by employing professional judgement; determination of sensitivity varies depending on the type of receptor"*. However, while the Applicant states that the assessment of sensitivity is qualitative, reflecting the receptor's ability to respond to change, no qualitative definition of the scale of sensitivity is provided within the methodology nor is justified within the assessment of effects.

2.30 Regarding the magnitude of impact, the Applicant states at paragraph 15.4.30 that the magnitude *"considers the size of the impact on people or business in the context of the area in which the effect would be experienced."* However, as for sensitivity, the definition of the scale of magnitude of impacts is not explicitly stated nor justified within the assessment of effects.

2.31 In the absence of assessment of sensitivity and magnitude for individual receptors and impacts, the overall assessment methodology for classifying effects states that *"expert judgement has been used to assess the scale of the effects of the Proposed Scheme against the baseline conditions"* (paragraph 15.4.28). The definition of significance of effect is established within **Chapter 4: EIA Methodology** [APP-053], which sets out a matrix for determining significant effects within Table 4-2; this matrix is based on both the magnitude of change (impact) and the sensitivity of receptor.

2.32 As such, the assessment of significance implicitly relies upon an understanding of the sensitivity of the receptor and magnitude of impact; this should be presented explicitly within the assessment methodology and justified when conducting the assessment of effects. **However, the socio-economic assessment does not establish what the sensitivity of each receptor, or magnitude of each impact, is assessed to be and, in the absence of this, does not provide sufficient justification for the overall assessment of the significance of effects.**

Baseline Conditions and Future Baseline

2.33 The assessment of baseline conditions (Section 15.6) identifies Munster Joinery (U.K.) Limited as a *"commercial business"* and states that the businesses is *"a window and door manufacturing company; its premises on Norman Road are part of its distribution operations dealing with products manufactured at its facility in Warwickshire"* (paragraph 16.6.11).

2.34 The baseline assessment therefore acknowledges the role of the Munster Joinery site at Norman Road as part of a wider business supply chain, yet it does not account for the potential business disruption that would result from its displacement within the assessment of significant effects. This results in a fundamental omission in the assessment and therefore an underestimation of the adverse effects that would result from the compulsory purchase of the site.

2.35 The baseline assessment further acknowledges that Munster Joinery has planning permission to develop the entirety of its site, of which only 50% of the permitted floorspace is currently developed and operational. Counter to industry best practice, the Applicant has failed to recognise the potential uplift in employment that would occur from an expansion to Munster Joinery's existing operations within their future baseline assessment. Accordingly, the assessment does not consider the potential future economic value of the site and therefore underestimates the significant adverse effects that would result from its displacement.

Assessment of Existing Employment

2.36 Landsul Limited and Munster Joinery (U.K.) Limited consider that the estimation of existing employment at the Munster Joinery site is not satisfactory nor robust. The Applicant has estimated existing on-site employment through a combination of satellite imagery and a survey of vehicle movements conducted during January and February 2024.

2.37 **ES Appendix 15-1: Munster Joinery** [APP-112] sets out how the Applicant has assessed the likely number of jobs supported by Munster Joinery's Belvedere site. This includes a review of the planning application for the site (13/00918/FULM), a 'site usage appraisal' based on satellite imagery and Google Street View, and observations of vehicle movements at the site between 5th January and 26th February 2024.

2.38 Imagery from Google was utilised to understand the level of cars parked within the site for each year from 2015 to 2022. However, no consideration is given to the time of day, nor day of the week, that these images were taken. Nor does it consider that the site was only completed in 2016, and subsequent to this an injunction taken out on the land (by Cory Environmental Holdings Limited) prevented utilities, including power and water supply, from reaching the site for a further three years. Based on this assessment, the Applicant estimates on-site employment to be approximately 54 workers.

2.39 The observations of vehicle movements, while covering a period of nine days across two months, primarily covered Fridays (visits 1-4 and 6-8) with two conducted on Mondays (visits 5 and 9). These visits, therefore, do not account for variation in peak traffic across the week; by not observing mid-week vehicle movements, the assessment does not consider the likely busiest days of the week. Additionally, the period between January and February

is generally the lowest point of business activity within the construction industry due to adverse weather conditions. Therefore, the observations utilised by the Applicant do not provide an accurate representation of the peak level of activity that would normally occur at the Munster Joinery site. The Applicant has established a lower estimate of 37 workers based on these observations.

2.40 The method described above does not provide a robust assessment of on-site employment as it does not account for the specific traffic movements of a distribution centre, where it is typical for many workers to be off-site during the day. Further, the approach undertaken by the Applicant does not account for shift patterns (early starts or late finishes) nor those arriving to the site on foot or by alternative transport modes. Due to its strategic location, the Munster Joinery site is highly accessible by public transport. The site is within a five-minute walk to bus stops providing connections to Bexleyheath, Hillside, Thamesmead and North Greenwich. Additionally, Belvedere train station is approximately a 15-minute walk from the site, providing connections to central London via Woolwich and Lewisham and to Bexleyheath via Slade Green.

2.41 Despite the extensive work undertaken to ascertain the existing employment at Munster Joinery through the Site Usage Appraisal and survey of vehicle movements, the results of this analysis are not applied to the assessment of significant effects. Instead, paragraph 15.4.24 states that *"the Homes and Communities Agency … Employment Density Guide has been applied to the employment generating floorspace to provide an estimate of the total gross jobs on-site."* This method results in an estimate of 50 workers on site by applying an employment density of 70 sq.m per worker – the benchmark for 'final mile' distribution centres – to a total floorspace of 3,510 sq.m.

2.42 At paragraph 15.6.12, the Applicant notes that parts of the Munster Joinery site have not been constructed to date. At paragraph 15.8.16, it is stated that the assessment considers *"the demolition of the building on the site it part occupies"*, rather than the full future scale of the site. However, the source of the floorspace of 3,510 sq.m reported within the assessment is not known; the total floorspace permitted within the planning permission (13/00918/FULM) for the totality of the site is 3,859 sq.m, while the area already developed covers circa 2,235 sq.m[4].

2.43 As the Site Usage Appraisal estimated a maximum of 54 employees within the currently developed area of the Munster Joinery site, which totals 2,235 sq.m, it follows that the employment density of the facility would be in the region of 41 sq.m, rather than the assumed 70 sq.m per worker. As such, one would expect the employment generated across the totality of the site once the second phase is constructed and operational to be substantially higher (potentially in the region of 94 workers based on an employment density of 41 sq.m per worker). This demonstrates that the employment figures used within the assessment of effects do not fully encompass the total loss of employment at the Munster Joinery Site and fail to consider the future baseline of employment.

2.44 The methodology goes on to state that the on-site employment estimate is then adjusted for leakage and displacement, with a multiplier of 1.7 applied to estimate indirect and induced

[4] Gross Internal Floorspace as recorded by the Valuation Office Agency's current rateable value for the property. Available at: Summary valuation - Valuation Office Agency - GOV.UK, [Date accessed: October 2024]

employment generation. HCA Additionality Guidance[5,6] defines leakage as the *"proportion of outputs that benefit those outside of the intervention's target area or group"* while displacement is defined as *"the proportion of intervention outputs/outcomes accounted for by reduced outputs/outcomes elsewhere in the target area."* It therefore follows that it would be incorrect to adjust for displacement in this case as the facility is already in existence – any displacement effect would have already taken place and hence is implicitly accounted for within the existing baseline conditions. While the planned expansion of Munster Joinery may result in displacement, as highlighted at paragraph 2.35 of this report, the Applicant has not assumed any growth in employment at Munster Joinery within the future baseline, and as such should not be applying any allowance for displacement.

2.45 Conversely, while there may be some leakage of 'output' (employment at Munster Joinery) outside the 'target area' (employees of Munster Joinery living outside the Local Study Area), the Applicant does not make an assumption of leakage of employment between the Local and Regional Study Areas. An assumption of a 'medium' level of leakage (25%) is applied at the Regional Study Area level, as such, the assessment assumes 25% of Munster Joinery's employees live outside Greater London.

2.46 However, the assessment does not estimate the proportion of existing, or future operational, employment within the Local Study Area, rather only providing estimates of employees living within the Regional Study Area (Greater London) and outside this area. As such, the Applicant should not be able to assess the significance of effect at the Local Study Area level but, despite this, an assessment at this level is nevertheless conducted without sufficient evidence or justification.

2.47 In addition to the above, the Applicant has failed to establish an understanding of the type of activity undertaken at Munster Joinery and therefore, the associated employment requirements. It is common for sites such as Munster Joinery to have a flexible workforce[7], with employment increasing in periods of peak business activity to support the increase in demand for products. The Applicant's assessment does not take this into consideration and assumes that employment would remain static. The omission of this assumption in the Applicant's assessment has meant that they have failed to assess the 'worst case scenario' of the demolition of Munster Joinery.

Assessment of Likely Impacts and Effects

2.48 Chapter 15 assesses the displacement of Munster Joinery as an impact occurring within the operational phase. However, the potential disruption to the site would occur as a result of the construction of the Proposed Scheme and should be assessed as a construction phase impact. The operational effects within an Environmental Statement should only consider the impacts that arise once the CCS facility is fully functional. The approach within Chapter

[5] HCA (2014) Additionality Guide, Fourth Edition. Available at: https://assets.publishing.service.gov.uk/media/5a7ec4b9e5274a2e87db1c92/additionality_guide_2014_full.pdf [Accessed October 2024]

[6] It should be noted that the guidance within this document pertains to economic appraisal, rather than socio-economic impact assessment.

[7] Assumptions based on the index of construction job vacancies for Greater London published by the Construction Industry Training Board. Available at: [redacted] [Accessed October 2024]

15 is inconsistent with the approach taken across the wider Environmental Statement, particularly when compared to **Chapter 14** [APP-063]. **This is a fundamental flaw in the approach to the socio-economic assessment; it does not adequately or robustly assess the full impact and implications of the loss of the Munster Joinery facility resulting from construction of the Proposed Scheme.**

Employment Generation

2.49 The assessment considers the net impact of the Proposed Scheme as the employment lost at Munster Joinery deducted from operational employment generated from the Proposed Scheme. This does not consider that the employment loss associated with the loss of the Munster Joinery site is an impact occurring during the construction phase, rather than an operational impact, and incorrectly assumes that substitution between the two uses is possible. In other words, the assessment assumes that individuals whose employment is lost at Munster Joinery can be directly replaced and are equivalent to positions created from the Proposed Scheme. However, employment at Munster Joinery requires a highly specialist skillset due to the nature of its operations and is therefore not interchangeable with the employment opportunities generated from the Proposed Scheme, which are specialist in their own right.

2.50 Instead, the jobs lost at Munster Joinery should be considered as a total deadweight loss within the Study Areas, separate from any operational or construction jobs supported by the Proposed Scheme.

2.51 The sensitivity of the economic receptors within the Local Study Area and Regional Study Area are assessed to be low *"due to the high rates of economic activity and high levels of employment in the area"* (paragraph 15.8.22). However, unemployment in Greater London was reported to be 4.6% within the baseline assessment, higher than the Great Britain national level of 3.8% (Table 15-5). While the Local Study Area (LBB) does demonstrate a higher employment rate compared to the Regional Study Area (Greater London), the assessment of effects was not conducted at this level (see paragraph 2.45). As such, the assessment of the sensitivity of receptor as low is therefore not adequately justified.

2.52 The magnitude of impact is considered to be negligible *"when considering the potential employment generation from the operational scheme in combination with the potential job losses from Munster Joinery U.K. Limited"* (paragraph 15.8.22, emphasis added). As the job losses from Munster Joinery are a construction phase effect and, in any case, not substitutable with the operational jobs at the Proposed Scheme, they should not be considered in combination with the operational employment generated. This would likely alter the assessment of magnitude.

2.53 The assessment concludes that the effect of operational employment impacts on the generic 'economic receptors' is **negligible (not significant)**. However, for the reasons stated above it is considered that the assessment of significance of effect from operational employment is therefore invalid.

Gross Value Added

2.54 The assessment of GVA is based on the direct, indirect and induced employment estimated to be associated with Munster Joinery, deducted from the direct, indirect and induced

employment arising from the Proposed Scheme. As highlighted previously, it is incorrect to deduct the impact of (the loss of) Munster Joinery from the impact of the Proposed Scheme, as the loss of Munster Joinery occurs during the construction phase and the nature of its activities means labour is not interchangeable between the two uses.

2.55 Further, this methodology does not allow for a separate assessment of direct, indirect and induced GVA effects of displacing Munster Joinery; the assessment only provides the aggregate figure. Using a benchmark of GVA per job for Greater London – not representative of the productivity of the respective industries – the Applicant estimates there to be a net loss of £1.33 million of GVA within Greater London, and £433,000 in the wider economy; it should be noted that this would be in addition to the loss in Greater London, leading to an overall loss of £1.77 million to the UK economy.

2.56 The Applicant does not quantify the GVA impact to the Local Study Area (LBB). Despite this, it concludes that *"the generation of GVA during the operational phase of the Proposed Scheme is likely to have a direct, permanent, long term* ***negligible (not significant)*** *effect on LBB and Greater London economy"* (Paragraph 15.8.25). Without an assessment of the quantified magnitude of the GVA impact within LBB this conclusion is not sufficiently supported by evidence.

Response to Relevant Representations: 9.2 [AS-043]

2.57 Accepted into the Examination as an Additional Submission at the discretion of the Examining Authority, the **Response to Relevant Representations: 9.2** [AS-043] seeks to respond to the Relevant Representations submitted by Interested Parties.

2.58 At paragraph 2.3.10, the Applicant states that *"the most recent [planning consent for the development of Landsul's plot on Norman Road] has been partially implemented, delivering just one of the three permitted industrial units".* This fails to recognise that the foundations for the second phase of development, have been laid and that Munster Joinery anticipates taking occupation of the remaining consented development in 2027 to meet the growth needs of the business.

2.59 The Applicant further states:

"The Landsul land plot, and Munster Joinery premises, is substantially smaller than that of Iron Mountain, Lidl or ASDA and of much simpler construction and function, operating as a secondary facility, that focusses on product distribution to Munster's much larger, manufacturing, premises in Warwickshire and Cork. There are no unique features of the Landsul land plot for the operations undertaken by Munster Joinery, they could be relocated elsewhere and the Applicant has offered to help with the relocation." (Paragraph 2.3.11)

2.60 The Applicant's position fails to recognise the strategic importance of the Norman Road site to Munster Joinery's operations in the UK. The Norman Road site enables the firm to reach their customer base in London and the South East, a growing segment of the business as Munster Joinery ramps up its UK operations.

2.61 It also fails to acknowledge the significant financial investment Landsul Limited and Munster Joinery have committed to the Norman Road site. After submitting the original planning application in June 2013 and receiving permission in August 2014, the first phase

was completed in 2016. However, whilst operations at the site could commence in 2016, a subsequent injunction on the land (by Cory Environmental Holdings Limited) prevented Munster Joinery from establishing utility connections to their site until 2020.

2.62 On this basis, it is likely that the compulsory purchase of the plot would significantly hinder Munster Joinery's operations for the next three to six years – this could result in displacement of employment, not just at the Norman Road site but across the UK business. It would also disrupt the supply chain of energy efficient (and Passivhaus compliant) window systems of the highest standard, to UK housebuilders and given the concentration of the industry to a few suppliers, could substantially increase prices in the wider market.

2.63 Finally, while it is acknowledged that the Munster Joinery premises is significantly smaller than that of Iron Mountain, it is estimated by the Applicant that 55 workers are employed at the Iron Mountain facility – comparable to the Applicant's estimate of existing employment at the Munster Joinery facility. However, demolition of this site and relocation of the business was ruled-out by the Applicant, as *"relocation of this operating business would incur large costs and delay to delivery of the Proposed Scheme, not least through the extensive demolition works that would be required within a busy industrial area and the prior reconstruction of a similar facility elsewhere"* (paragraph 2.3.4). Landsul Limited and Munster Joinery (U.K.) Limited consider that the Iron Mountain site – as a final-mile distribution facility, rather than a storage facility as claimed by the Applicant[8] – is of comparable strategic importance to Iron Mountain's wider business as the Norman Road site is to Munster Joinery's wider business.

2.64 Further, while the Applicant has provided responses to Relevant Representations from landowners[9], **the comments made within the Relevant Representations [RR-101] submitted by Tozers LLP on behalf of, jointly, Landsul Limited and Munster Joinery (U.K.) Limited have not been addressed.**

Summary

2.65 Multiple inaccuracies, inconsistencies and failings in the approach adopted by the Applicant to assess the effects of the Proposed Scheme on Munster Joinery have been identified within **ES Chapter 14** [APP-063] and **Chapter 15** [APP-064].

ES Chapter 14: Population, Health and Land Use [APP-063]

a Failing to assess the effect of employment losses during the construction phase resulting from the compulsory purchase and demolition of the Munster Joinery site on human health, only considering the employment generated by construction activity.

ES Chapter 15: Socio-economics [APP-064]

a Failing to adequately address the matters raised by Landsul Limited and Munster Joinery (U.K.) Limited within the consultation responses.

[8] See Montagu Evans (n.d.) Acquisition of Iron Mountain. Available at: [redacted] [Accessed October 2024]

[9] Not all of whom, it should be noted, are landowners.

b Presenting an imprecise definition of receptors within the scoping report and at PEIR stage, which did not make explicit the Applicant's intention to combine the working age population and businesses into a single 'economic receptor'. This has led to the Applicant failing to assess the effect of business disruption on Munster Joinery resulting from the Proposed Scheme.

c Not explicitly defining and justifying the sensitivity of receptors, magnitude of impacts, or significance of effects within the assessment, in conflict with the overall EIA methodology presented within **ES Chapter 4: EIA Methodology** [APP-053].

d Failing to acknowledge the planned expansion of Munster Joinery at the Norman Road site as part of the future baseline.

e Flaws within the estimation of existing employment at the Munster Joinery facility, including reviewing satellite imagery from before the site was fully functional, only conducting site visits on Fridays and Mondays, and finally not applying this research to the assessment of effects and instead applying an inappropriate employment density across the site, using an incorrect existing floorspace figure.

f Incorrectly adjusting existing on-site employment for displacement – this should only be applied when considering a future baseline position, as any displacement from existing employment would have already taken place.

g Failing to estimate impacts at a Local Study Area level and, despite this, proceeding to determine the significance of effect at this geography.

h Assessing the loss of Munster Joinery as an operational phase impact when the loss of the company's Norman Road site would occur during the construction phase, underestimating the adverse effects.

i Combining the operational employment at the CCS facility with the loss of employment at Munster Joinery to estimate the net employment impact of the Proposed Scheme. This incorrectly assumes that (a) the loss of employment at Munster Joinery and the generation of jobs at the CCS would occur during the same phase and (b) there is labour substitutability between the functions of a joinery company and a carbon capture facility, both of which represent highly specialised activities requiring a specific set of skills respective to each industry.

3.0 Updated Socio-economic Impact Assessment

3.1 This section presents an alternative assessment of socio-economic impacts, in order to address the issues raised in Section 2.0, and thereby providing a more robust evidence base for the assessment of likely socio-economic effects. This reassessment focuses on establishing the socio-economic impact of the Proposed Scheme's compulsory purchase and demolition of Munster Joinery's Norman Road premises only. Wider construction and operational phase impacts of the CCS facility are therefore not included within this assessment.

Assessment Methodology and Significance Criteria

3.2 As highlighted previously, there is no U.K. legislation or guidance that specifies the detailed content required to prepare socio-economic assessments, or that provides defined standards or thresholds for the significance of socio-economic effects. However, it is considered that the Applicant's assessment requires a stronger methodological framework, with established magnitude and sensitivity definitions.

3.3 At present, the methodology within **ES Chapter 15: Socio-economics** [APP-064] for classifying effects within the socio-economic assessment does not define sensitivity and magnitude criteria. This is contrary to the approach established within **ES Chapter 4: EIA Methodology** [APP-053] which applies a significance matrix based on an assessment of the sensitivity of receptor and magnitude of change (impact). Likewise, it is also counter to the approach applied in comparable DCO applications such as for Riverside Energy Park (also known as Riverside 2)[10].

3.4 Suggested sensitivity definitions for socio-economic assessment are provided in Table 3.1.

Table 3.1 Sensitivity criteria

Sensitivity	Definition
Very High	Where a receptor has very limited ability to respond to change and therefore very limited potential for substitution.
High	Where a receptor has limited ability to respond to change and therefore limited potential for substitution.
Medium	Where a receptor has some ability to respond to change and therefore some potential for substitution.
Low	Where a receptor is particularly responsive to change with potential for substitution without substantial effects on existing status.
Negligible	Where a receptor is dynamic to the extent that the existing status is characterised by continuous change and ongoing substitution.

3.5 Impact magnitude criteria are shown in Table 3.2, potential impacts can be adverse (negative) or beneficial (positive).

[10] Riverside Energy Park (2018) Environmental Statement Chapter 14: Socio-Economics [APP-051]. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000229-6.1%20ES%20Chapter%2014%20Socio-economics.pdf [Accessed October 2024]

Table 3.2 Impact maginitude criteria

Magnitude of Impact	Definition
High	An impact that is expected to have considerable adverse or beneficial socio-economic effects. Such impacts will typically affect large numbers of businesses, workers or residents.
Medium	An impact that will typically have a noticeable effect on a moderate number of businesses, workers or residents, and will lead to a small change to the study area's baseline socio-economic conditions.
Low	An impact that is expected to affect a small number of businesses, workers or residents or an impact that may affect a larger number of receptors but does not materially alter the study area's baseline socio-economic conditions.
Very low	An impact which has very little change from baseline conditions where the change is barely distinguishable, approximating to a "no change" situation.

3.6 Based on the receptor sensitivity and the magnitude of impact, the significance of effect can be established, as shown in the assessment matrix in Table 3.3.

Table 3.3 Assessment matrix

		Magnitude of Impact			
		Very Low	**Low**	**Medium**	**High**
Receptor Sensitivity	**Negligible**	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Moderate
	High	Minor	Moderate	Moderate	Major
	Very High	Moderate	Moderate	Major	Substantial

3.7 The definitions of each significance level are as follows:

- **Substantial:** Only adverse effects are normally assigned this level of significance. These effects are generally, but not exclusively, associated features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change of local importance may also enter this category.
- **Major:** These beneficial or adverse effects are deemed to be very important considerations.
- **Moderate:** These beneficial or adverse effects may be important factors. The cumulative effects of such factors may lead to an increase in the overall beneficial or adverse effect on a particular resource or receptor.
- **Minor:** These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical factors but may be important in enhancing the subsequent design of the Project.
- **Negligible:** No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

3.8 The identified receptors for this assessment are the labour market and individual businesses and commercial activity (which, for the purposes of this report, is limited to the effects on Munster Joinery and its employees).

Baseline and Future Baseline

3.9 While the existing baseline assessment within Chapter 15 identifies Munster Joinery as a commercial business and estimates the number of employees on-site, the future baseline fails to account for the planned expansion of Munster Joinery's premises, for which the foundations have already been laid. The expansion is expected to be operational by 2027, increasing the size of the Munster Joinery facility. The future baseline should consider this expansion as the likely scenario. The area schedule for the existing and future baseline scenarios is provided in Table 3.4.

Table 3.4 Area schedule of Munster Joinery premises under existing and future baseline scenarios

Land use	Existing baseline (sq.m GIA)	Future baseline (sq.m GIA)
Distribution (B8)	1,187	2,049
Showroom (B2)	524	905
Office (B1)	524	905
Total	**2,235**	**3,859**

Source: Valuation Office Agency and LB Bexley Planning – Application Ref. 13/00918/FULM[11]

Sensitivity of Receptors

3.10 The sensitivity of receptors should be assessed at the different spatial scales considered within the assessment; this is shown in Table 3.5. The assessment of sensitivity is based on the existing baseline assessment within **Chapter 15** [APP-064], professional judgement and industry best-practice. The updated assessment retains the Study Areas defined by the Applicant.

Table 3.5 Sensitivity of receptors

Receptor	Impact	Geography	Sensitivity
Labour market	Employment changes	Local Study Area (LBB)	Medium
		Regional Study Area (Greater London)	Low
Businesses and commercial activity	Business disruption	Site boundary	Very High
		Local Study Area (LBB)	Medium
		Regional Study Area (Greater London)	Medium
Economy	GVA	Local Study Area (LBB)	Low
		Regional Study Area (Greater London)	Negligible

[11] The split between land uses has been based on the split recorded by the VOA, this assumption has been maintained for the future baseline position.

Assessment of Likely Impacts and Effects

Construction Phase: Employment at Munster Joinery

3.11 As discussed in Section 2.0, the Applicant has underestimated the existing direct employment at the Munster Joinery site due to a series of inaccuracies within the estimation methodology. This includes applying a blanket employment density assumption across the totality of the floorspace at Munster Joinery's site, and using a floorspace figure that has not been possible to reconcile with either the current and future potential floorspace on the site as per the extant planning permission (13/00918/FULM).

3.12 Furthermore, the employment impact resulting from the loss of the Munster Joinery facility is a construction phase impact, as the demolition of the facility would occur during construction of the Proposed Scheme. The Applicant's assessment considers this as an operational impact, resulting in a flawed assessment of the potential adverse effects from the loss of the Munster Joinery site.

3.13 Table 3.6 presents revised estimates of the direct employment at Munster Joinery in both the existing baseline and future baseline scenarios. Areas are aligned to the original planning application for the site (13/00918/FULM) and the latest floorspace recorded by the Valuation Office Agency ('VOA').

Table 3.6 Estimation of existing on-site employment at Munster Joinery

	Employment density[12] (sq.m/job)	Existing baseline		Future baseline	
		Floorspace (sq.m GIA)	Employment	Floorspace (sq.m GIA)	Employment
Distribution	70	1,187	17	2,811	40
Showroom	36	524	15	524	15
Office	14	524	37	524	37
Total		**2,235**	**69**	**3,859**	**92**

Source: Lichfields analysis

3.14 While the existing baseline employment on-site is likely to be marginally higher than the estimates within **Chapter 15** [APP-064], at approximately 69 employees, the floorspace of the facility anticipated within the future baseline scenario could support approximately 92 jobs. Both figures do not account for additional employment linked to the site from ancillary services.

3.15 It should be noted that, due to the nature of activities undertaken at Munster Joinery, employment at the site is not static: the volume of employment will be dependent on the amount of demand for the product being distributed and therefore is likely to increase during busy periods. The fluctuation in employment levels has not been accounted for within the employment estimates but are reflected in the range provided by Munster Joinery.

3.16 As discussed in Section 2.0, it is incorrect to adjust existing employment for displacement. Further, due to the specialist nature of the activities carried out by Munster Joinery it is not

[12] Based on HCA (2015) Employment Densities Guide 3rd Edition. Distribution uses the 'Regional Distribution Centre' assumption of 77 sq.m (GEA) per job, assumed to be approximately 70 sq.m (GIA). Offices applies the Professional Services density of 12 sq.m (NIA) uprated to 14 sq.m (GIA), while B2 employment density of 36 sq.m (GIA) is applied for showrooms.

considered that the expansion of the premises would displace activity elsewhere in the local area and should therefore not be applied to future employment estimates. As such, the direct employment that should be considered when assessing the impact of the potential loss of the Munster Joinery facility is at least 92 jobs.

Indirect and induced effects

3.17 The jobs at the Munster Joinery site on Norman Road not only support employment opportunities within the wider business but also more broadly within the Local and Regional Study Areas. This occurs through the 'multiplier effect'. The indirect effect occurs through supply chain spending by businesses while induced effects are attributable to spending triggered by increased household incomes resulting from direct and indirect effects.

3.18 Based on the 2019 ONS U.K. Input-Output Analytical Tables ('IOAT')[13], the Type II (indirect and induced) employment multiplier[14] for the construction industry[15] in the U.K. is 2.55 – this implies that for each job created directly by construction activity (which includes joinery), a further 1.55 roles are supported in the wider economy.

3.19 The indirect and induced employment impacts attributable to Munster Joinery are shown in Table 3.7. As addressed within Section 2.0 (paragraphs 2.44 to 2.45 inclusive), while leakage is considered for existing employment, displacement is not. Reflecting the highly specialised activities undertaken at Munster Joinery, an allowance for a low level of displacement of 5% is applied to the *future* direct employment resulting from the expansion of the Munster Joinery site.

3.20 Munster Joinery (U.K.) Limited has stated that the majority of its employees at the Norman Road site reside in the local study area (LBB); on this basis, a low level of leakage of 10% is applied. The resulting estimate of total direct, indirect and induced employment attributable to Munster Joinery's Norman Road facility is 232 jobs, of which in the region of 209 are estimated to be filled by residents of the Local Study Area (LBB).

[13] ONS (2020) 2019 Input-Output Analytical Tables. The ONS advises that users requiring a more "typical" IOAT reflecting the UK economy should use the 2019 tables, rather than the most recent 2020 tables, due to the effect of the Covid-19 pandemic on the 2020 tables.

[14] The ONS provides Full Time Equivalent (FTE) employment Type I effect and multiplier by sector. These are the latest available multipliers on the public domain and have been applied to the gross direct employment estimates by assuming the FTE ratio of the direct jobs is comparable to the FTE ratio of the indirect and induced jobs and remain constant. It is possible to derive the Type II effect and multiplier from the Type I effect and multiplier using the UK IOAT without any other data inputs.

[15] As per its registration with Companies House, Munster Joinery's 2-digit SIC code is 43, falling within the construction industry (SIC 41-43).

Table 3.7 Direct, indirect and induced employment under the future baseline scenario

	Local Study Area	Regional Study Area	Total
Existing direct employment	62	7	69
Future direct employment	21	2	23
Total direct employment *Adjusted for future displacement*	82	9	91
Indirect employment	99	11	110
Induced employment	28	3	31
Total	**209**	**23**	**232**

Source: Lichfields analysis
N.B. Figures may not sum due to rounding.

3.21 The relevant receptor for employment impacts is the labour market within the Local and Regional Study Areas. The sensitivity of this receptor is assessed to be medium within the Local Study Area, reflecting the ability of the local labour force to respond to change while accounting for the specialist nature of activity – and hence labour skills – considered within this assessment. Given the significantly broader geographical scope of the Regional Study Area, the sensitivity of the labour market at this scale is assessed to be low.

3.22 The loss of 209 jobs within the Local Study Area is assessed to be medium in magnitude, as it would have a noticeable effect on a moderate number of residents within the area. Given approximately 181 of these jobs would be directly at Munster Joinery or within the company's supply chain, it is considered that the loss of these jobs would affect baseline conditions in terms of employment in skilled trade occupations.

3.23 Within the Regional Study Area, a total of 232 jobs would be lost (209 within LBB and 23 within the rest of Greater London) if the compulsory purchase and demolition of Munster Joinery were to proceed. This impact is assessed to be low in magnitude at this scale as it would not materially alter the study area's baseline socio-economic conditions but would not approximate to a 'no change' situation (as per the definition of a very low magnitude of impact).

3.24 On this basis, the following effects on the labour market are assessed:

- **Long-term, permanent, moderate adverse (significant)** within the Local Study Area.
- **Long-term, permanent, minor adverse (not significant)** within the Regional Study Area.

Wider business disruption

3.25 Munster Joinery is one of the largest producers of energy efficient bespoke doors and windows in the UK, supplying several of the country's major housebuilders. The site on Norman Road forms a critical part of the company's overall operations in the UK. The site serves as the sole major distribution centre for their energy efficient windows across London and the South East, representing a significant proportion of their total customer base. The site has a strategic location, with easy access to the M25 allowing efficiency in their distribution and has high public transport accessibility for its employees.

3.26 The distribution site at Norman Road is supplied from Munster Joinery's main manufacturing centre located in Wellesbourne, Warwickshire, and employs over 900 staff. The site in Wellesbourne has been recently expanded to accommodate increased demand in the products developed by Munster Joinery. The compulsory purchase would not only affect the site at Norman Road but would have significant knock-on effects for the wider business.

3.27 The loss of the site would severely restrict the company's ability to reach its key customer base in London and the South East putting the viability of the business at risk. Without a distribution centre at this location, products from the Wellesbourne site would have to be directly transported to construction locations. The efficient operation of the industry relies upon 'just-in-time' delivery, to manage material wastage, avoid delay and reduce costs. To enable just-in-time delivery, warehouses and distribution centres form a critical role in acting as localised supply base accessible to construction sites. Without the site at Norman Road, just-in-time delivery services would be severely compromised, restricting the ability of Munster Joinery to supply to its customers, leading to the potential loss of customers and associated revenue.

3.28 This would, consequentially, reduce the required production volumes at the Wellesbourne manufacturing facility and would result in redundancies across the wider businesses in addition to the loss of employment at the Norman Road site resulting from the compulsory purchase sought by the Applicant.

3.29 As noted above, Munster Joinery intend to expand their operations on the site; this expansion has extant permission under 13/00918/FULM and the foundations have been laid. The compulsory purchase and loss of Munster Joinery from the site would not only mean that the potential employment and business output growth opportunity would be lost, but also that the sunk cost of investment in the expansion would become redundant.

3.30 In addition, reflecting the specialist nature of Munster Joinery's products, the existing market is characterised by a small number of specialist firms. As such, if Munster Joinery's ability to supply its customers was reduced through the demolition of the existing premises, it is likely that prices within this market would rise, impacting its customers, who include major housebuilders. This could have knock-on effects on the energy efficiency of new homes, limiting the sector's progress in achieving national building efficiency and sustainability objectives.

3.31 The sensitivity of existing businesses within the site boundary, i.e. Munster Joinery, is therefore assessed to be **very high**. This reflects their limited ability to respond to change, as the site would be lost in its entirety, with limited potential for substitution given the highly specialised activities of the company.

3.32 The sensitivity of businesses and commercial activity as a receptor within the Local and Regional Study Areas is assessed to be **medium**. This reflects the range and extent of economic activity among businesses in these areas which enhances their ability to respond to change and the potential for substitution, while still considering the highly specialised activities supported by Munster Joinery in these areas and the strategic importance of the housebuilding sector in particular.

3.33 The magnitude of impact upon businesses and commercial activity within the site boundary is assessed to be **high**, as the Proposed Scheme would result in the total deadweight loss of activity on-site and result in significant disruption to the wider business.

3.34 The magnitude of impact on businesses and commercial activity within the Local and Regional Study Areas from the compulsory purchase and demolition of the Munster Joinery site is assessed to be **medium** given the nature of Munster Joinery's product and the impact of its loss on its forward and backward linkages within its supply chain; the loss of the facility would impact both its suppliers and the housebuilders it supplies and may have knock-on effects to energy efficiency within new homes in London and the South East.

3.35 On this basis, the significance of effect on businesses and commercial activity is assessed to be as follows:

- **Long-term, permanent, substantial adverse (significant)** within the site boundary.
- **Long-term, permanent, moderate adverse (significant)** within the Local Study Area.
- **Long-term, permanent, moderate adverse (significant)** within the Regional Study Area.

Construction Phase: Sectoral (GVA) Impact of Munster Joinery

3.36 As per the ONS definition, Gross Value Added (GVA) is the value generated by any unit engaged in the production of goods and services – this includes labour. As such, estimates of GVA are based on an assumption of GVA per operational job.

3.37 According to the ONS, in 2023 GVA per job in the construction sector was £69,509[16], while the Type II GVA multiplier for the construction industry is 2.79[17]. Based on this, the resulting estimate of the GVA generated in the future baseline scenario of on-site employment is shown in Table 3.8. The Munster Joinery site generates an estimated £17.6 million in direct, indirect and induced GVA per annum under the future baseline scenario.

Table 3.8 Direct, indirect and induced GVA (p.a.) under the future baseline scenario

	Local Study Area	Regional Study Area	Total
Employment	82	9	91
Direct GVA	£5,691,615	£632,402	£6,324,017
Indirect GVA	£7,229,427	£803,270	£8,032,697
Induced GVA	£2,961,667	£329,074	£3,290,741
Total GVA	**£15,882,709**	**£1,764,745**	**£17,647,455**

Source: Lichfields analysis

3.38 Therefore, £15.9 million of GVA generation per year for the Local Study Area economy would be lost were the Munster Joinery facility to be demolished under the Proposed Scheme.

[16] Office for National Statistics ('ONS') (2024) Output per job, UK

[17] ONS (2023) UK input-output analytical tables, industry by industry: 2019

3.39 The sensitivity of the economy of the Local Study Area (LBB) is assessed to be **low**, as prevailing conditions suggest it is highly responsive to change. Given the size of the economy within the Regional Study Area (Greater London) the sensitivity of this receptor is deemed to be **negligible**.

3.40 The loss of Munster Joinery's Norman Road site would reduce GVA per annum in the Local Study Area by £15.9 million. The baseline assessment as presented does not provide any measure of GVA at either the national, regional or local level. However, estimates from Experian suggest that GVA within LBB (the Local Study Area) in 2023 was £5.67 billion, while across Greater London (the Regional Study Area) this figure was £469 billion. As such, the magnitude of impact of the loss of Munster Joinery in GVA terms on the overall economy is assessed to be **very low** in both study areas.

3.41 This results in the following significance of effects on the economy:

- **Long-term, permanent, negligible (not significant)** effect within the Local Study Area.
- **Long-term, permanent, negligible (not significant)** effect within the Regional Study Area.

Summary

3.42 The significant effects identified within this assessment are as follows:

- **Long-term, permanent, moderate adverse (significant)** effect on the labour market within the Local Study Area.
- **Long-term, permanent, substantial adverse (significant)** on businesses and commercial activity within the site boundary.
- **Long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Local Study Area.
- **Long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Regional Study Area.

3.43 These findings contrast with the findings of **Chapter 15** [APP-064] which failed to determine any significant effects. This can be attributed to:

a Not identifying business disruption as an impact of the Proposed Scheme, despite identifying *"local businesses within the Study Area"* as a sensitive receptor. While GVA is scoped-in to the assessment as an impact, this is only relevant to the economy as a whole rather than individual businesses.

b Assessing the loss of Munster Joinery as an operational impact, when the compulsory purchase and demolition of the site would take place during the construction phase.

c Incorrectly accounting for displacement effects when considering existing on-site employment.

d Considering the net impact of operational employment by combining the employment generated by the Proposed Scheme with the loss of employment at Munster Joinery. This does not reflect the lack of substitutability of labour between

the Proposed Scheme and Munster Joinery, nor does it reflect that the loss of jobs at Munster Joinery occurs at the construction phase rather than during operation.

4.0 Implications

4.1 Landsul Limited and Munster Joinery (U.K.) Limited raised concerns relating to the employment density assumptions and lack of consideration of wider business disruption at the **Preliminary Environmental Impact Report ('PEIR')** [APP-026] stage. However, the Applicant's assessment in the Environmental Statement did not adequately address these concerns or provide a satisfactory response.

4.2 The review of **ES Chapter 14: Population, Health and Land Use** [APP-063] and **Chapter 15: Socio-economics** [APP-064] has established that the Applicant has not given due consideration to the significant adverse effects resulting from the compulsory purchase of the Munster Joinery site. These assessments, particularly the socio-economic assessment, are fundamentally flawed, failing to fully capture the extent of the potential adverse significant effects and associated mitigation measures, including reasonable alternatives to the compulsory purchase.

4.3 Following the reassessment of the potential socio-economic effects of Munster Joinery's displacement resulting from compulsory purchase, the following significant adverse effects have been identified using industry best practice methodologies and information on the public domain, which was also available to the Applicant:

- **Long-term, permanent, moderate adverse (significant)** effect on the labour market within the Local Study Area.
- **Long-term, permanent, substantial adverse (significant)** on businesses and commercial activity within the site boundary.
- **Long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Local Study Area.
- **Long-term, permanent, moderate adverse (significant)** effect on businesses and commercial activity within the Regional Study Area.

4.4 In addition, it is considered that **Chapter 14** [APP-063] provides an inadequate assessment of the effect of the loss of employment from the Munster Joinery site on human health.

4.5 Landsul Limited and Munster Joinery (U.K.) Limited are therefore strongly of the view that the Applicant must revisit the assessment of socio-economic effects to ensure an appropriate range of impacts from the Proposed Scheme on Munster Joinery is considered, and to provide accurate, precise and justified evaluation.

4.6 Consequently, as mitigation for the significant adverse effects identified within the reassessment outlined within this report, the design and footprint of the Proposed Scheme should be reconsidered to avoid the compulsory purchase of the Munster Joinery site on Norman Road, and the resulting disruption to local labour markets and wider business stability.