CAS-03463-R2W9C2 - Kronospan Low Carbon CHP Facility

Environmental Statement

Vol2: Chapter 3.0 – Alternatives

Prepared for

December 2025
DNS5-2-003

Document Control

Revision	Date	Prepared By	Reviewed / Approved By
DNS5-2-003	December 2025	BC	AR
DNS5-2-003 Rev 1			
DNS5-2-003 Rev 2			

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3.0 ALTERNATIVES

3.1 Introduction

3.1.1 The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (the EIA Regulations) states at Regulation 17(3)(d) that an Environmental Statement (ES) must include *'a description of the reasonable alternatives studied by the applicant or appellant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the development on the environment'.*

3.1.2 The EIA Regulations sets out (at Schedule 4, Paragraph 4) information for inclusion in ES documents, including *'a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.*

3.1.3 The EIA Regulations place no specific obligation on a developer to study alternatives, but simply to describe them in the manner specified, where they have been considered.

3.1.4 A range of alternatives for the proposed Low Carbon CHP Facility have been considered. The subsequent sections provide a summary of each of the alternatives considered and design decisions taken under the following headings:

- Location
- Layout and Minimising Mass
- Colour
- Technology
- Feedstock
- The 'Do Nothing' Alternative

3.2 Location

Identification of Potential Sites

3.2.1 Given the purpose of the proposed Low Carbon Combined Heat and Power (CHP) Facility is to provide on-site electricity and heat for direct use in Kronospan's ongoing operations, the early site search exercise (undertaken in 2022) was restricted to locations within the existing Kronospan Facility.

3.2.2 The early site search exercise was based on a proposed Low Carbon CHP Facility that would be able to provide all power (electrical and thermal) needs for the existing Kronospan Facility; as such, for the purpose of this exercise a larger CHP Facility (with a thermal energy output of 245 megawatts (MW)) than the proposed Low Carbon CHP Facility (125 MW thermal energy output) was initially considered.

3.2.3 The key parameters considered when selecting and assessing potential site locations were as follows:

- 1. Due to a general lack of available space within the existing Kronospan Facility, the **ability to physically accommodate all components of the proposed Low Carbon CHP Facility** as close together as practicable, without an unacceptable knock-on effect for the continued operation of the existing Kronospan Facility (including reducing, splitting or relocating existing site processes/components).
- 2. **Proximity to residential receptors and consideration of amenity** (with respect to the potential for adverse noise, and landscape and visual effects).
- 3. **Proximity to components of comparable size and/or type** – the grouping together of similarly sized components/buildings, particularly the larger infrastructure at the southwestern extent of the existing Kronospan Facility, which would help to reduce amenity effects described above.
- 4. **Approximate length of piped infrastructure for efficient and effective transfer of waste heat** between the proposed Low Carbon CHP Facility and the existing Medium Density Fibreboard (MDF) 1 and 2 dryers.

3.2.4 Based on the above, four potential indicative locations were identified as follows:

- Site 1 – West of Kronospan Plus
- Site 2 – West of the Formalin Facility 1
- Site 3 – West of the Formalin Facility 2
- Site 4 – East of the Rail Offloading Area

3.2.5 Due to the size and scale of the CHP plant required to provide all power need for the existing Kronospan Facility, Sites 1 – 4 are all on land currently used for open wood storage where there would be sufficient space to accommodate the development; however, this would be at the expense of a large proportion of the open wood storage area, which is a critical aspect of day-to-day operations.

3.2.6 As such, two further potential indicative locations (Site 5 and Site 6) were identified away from the existing open wood storage areas. Due to space limitations (resulting from the nearby presence of other built infrastructure), Site 5 and Site 6 (in comparison to Sites 1 – 4) have a smaller footprint, would necessitate a smaller CHP plant, and would not be capable of providing all thermal energy needs for the existing Kronospan Facility (the latter meaning one of the existing biomass thermal energy generators (biomass plant) would remain in operation – see **Table 4.1, ES Chapter 4.0 (Description of the Proposed Development)** for further details of existing and proposed energy generation on the existing Kronospan Facility).

3.2.7 The two further potential indicative locations are summarised below

- Site 5 – On the Footprint of the Existing Gas Turbines 1 and 2 (the Proposed Development Site)
- Site 6 – West of the Proposed Engineering Stores (granted 07 November 2022 under planning reference P/2022/0615)

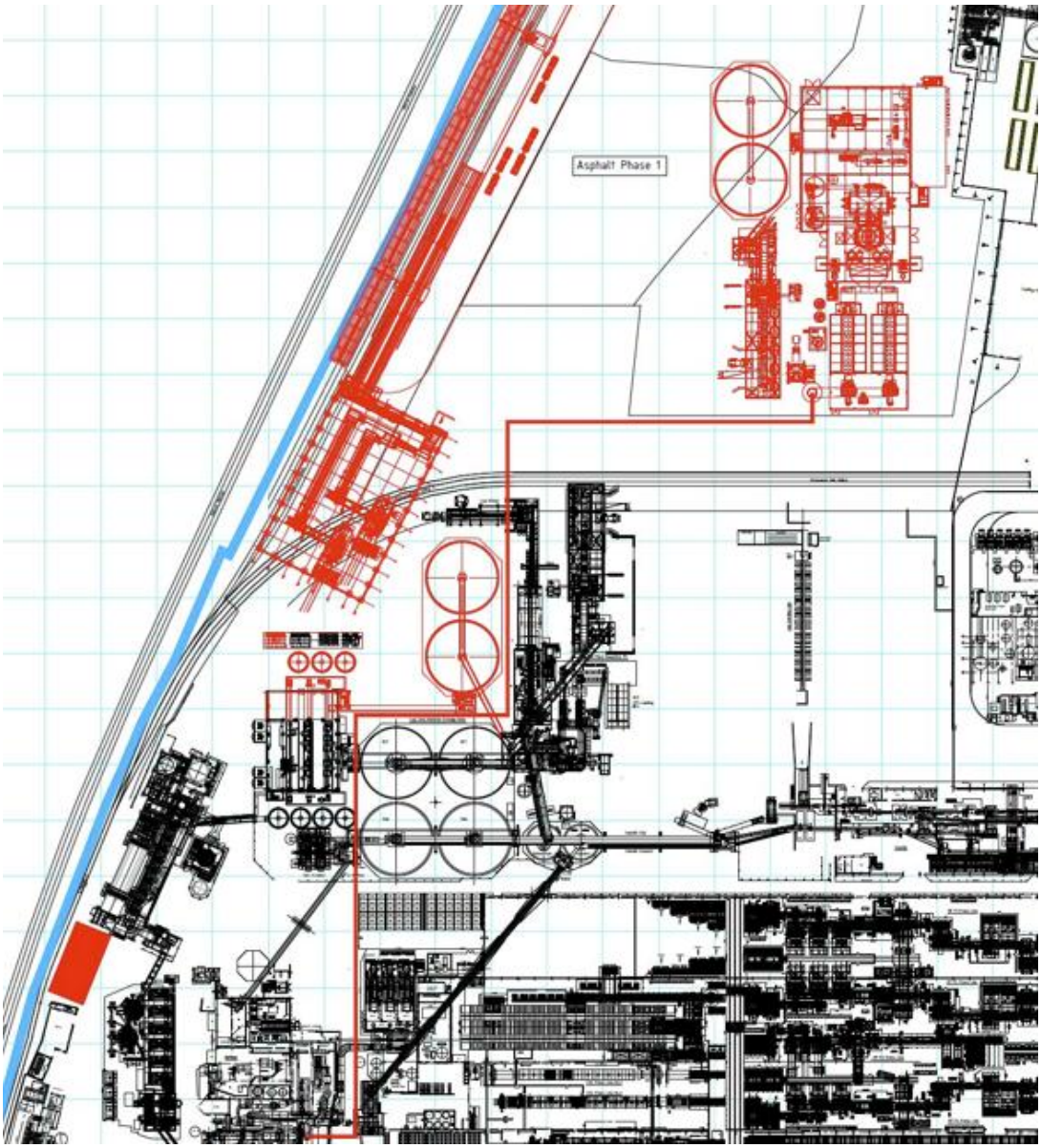
3.2.8 The subsequent appraisal of Sites 1 – 6 (set out below) does not factor in the differences in long-term energy generation implications (between Sites 1 – 4 and Sites 5 – 6 as set out above) as those differences are clear, all sites would still offer significant net carbon benefits whereby full reliance on the existing gas turbines and gas engines could be substantially reduced (see **ES Chapter 9.0 (Climate Change)** for further details), and the Applicant considered the four key parameters detailed above to carry greater weight to ensure the most appropriate location was selected.

3.2.9 The subsequent appraisal of Sites 1 – 4 (set out below) also considers both the initial larger CHP plant and the smaller plant (that Site 5 and Site 6 can only accommodate) to ensure a fair and balanced appraisal; this is relevant for Parameter 2 and Parameter 3.

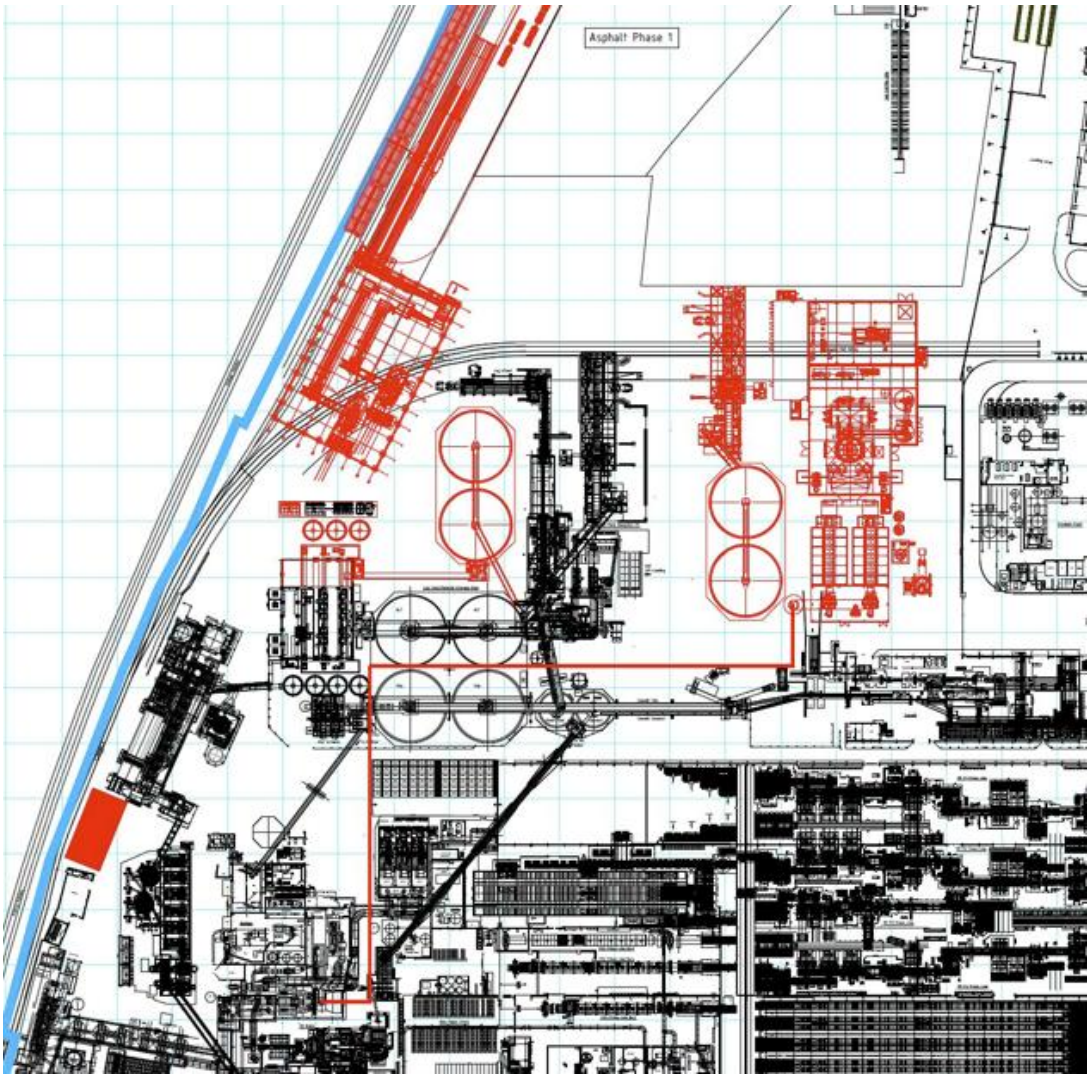
3.2.10 The location of Sites 1 - 6 can be viewed below at **Inset 3.1** and is also provided at **Figure 3.1**. High-level indicative layouts for Sites 1 – 4 are provided at **Insets 3.2 – 3.5** below (layouts for Site 5 and Site 6 not available at time of the early site search exercise).

Inset 3.1 – Potential Indicative Locations of Sites 1 - 6

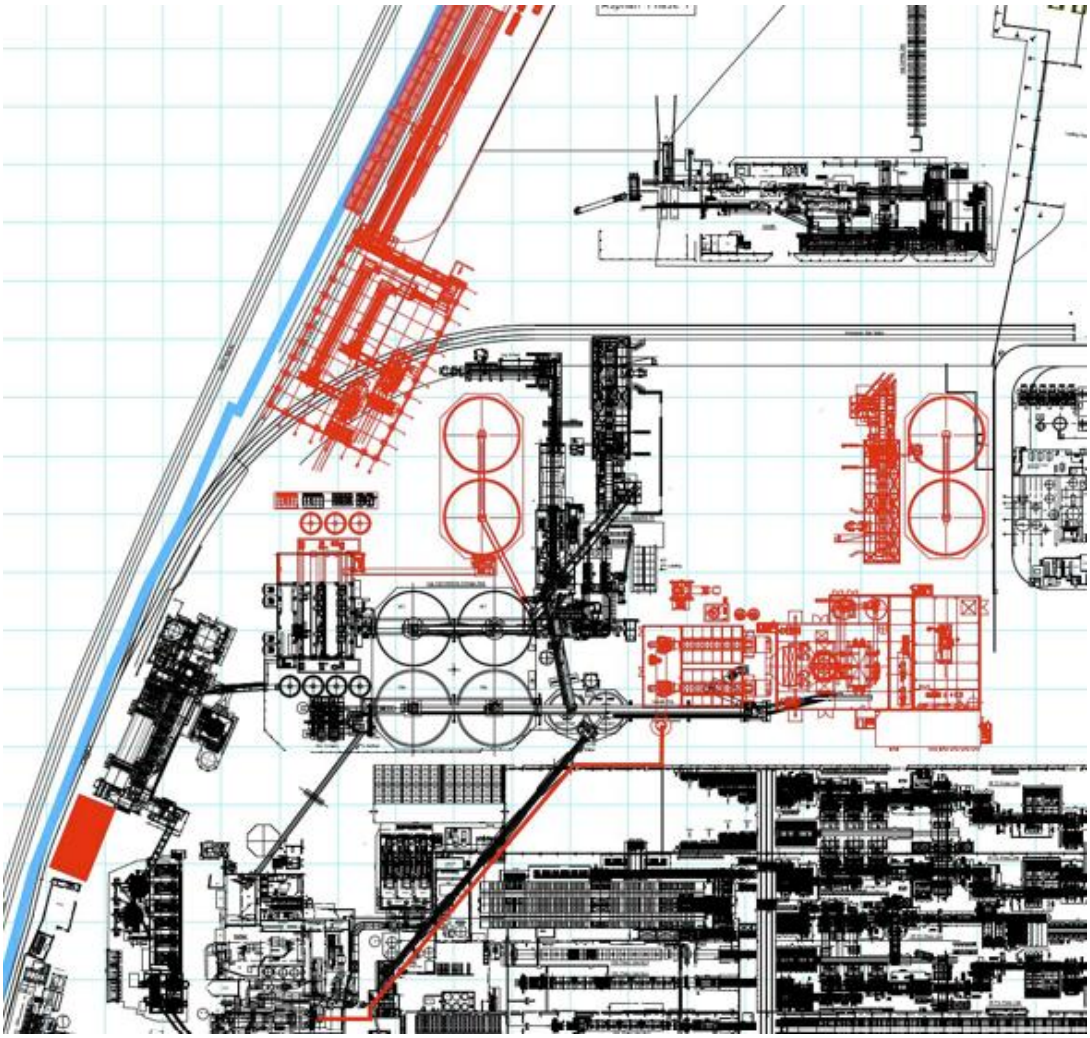
Inset 3.2 – Indicative Arrangement at Site 1



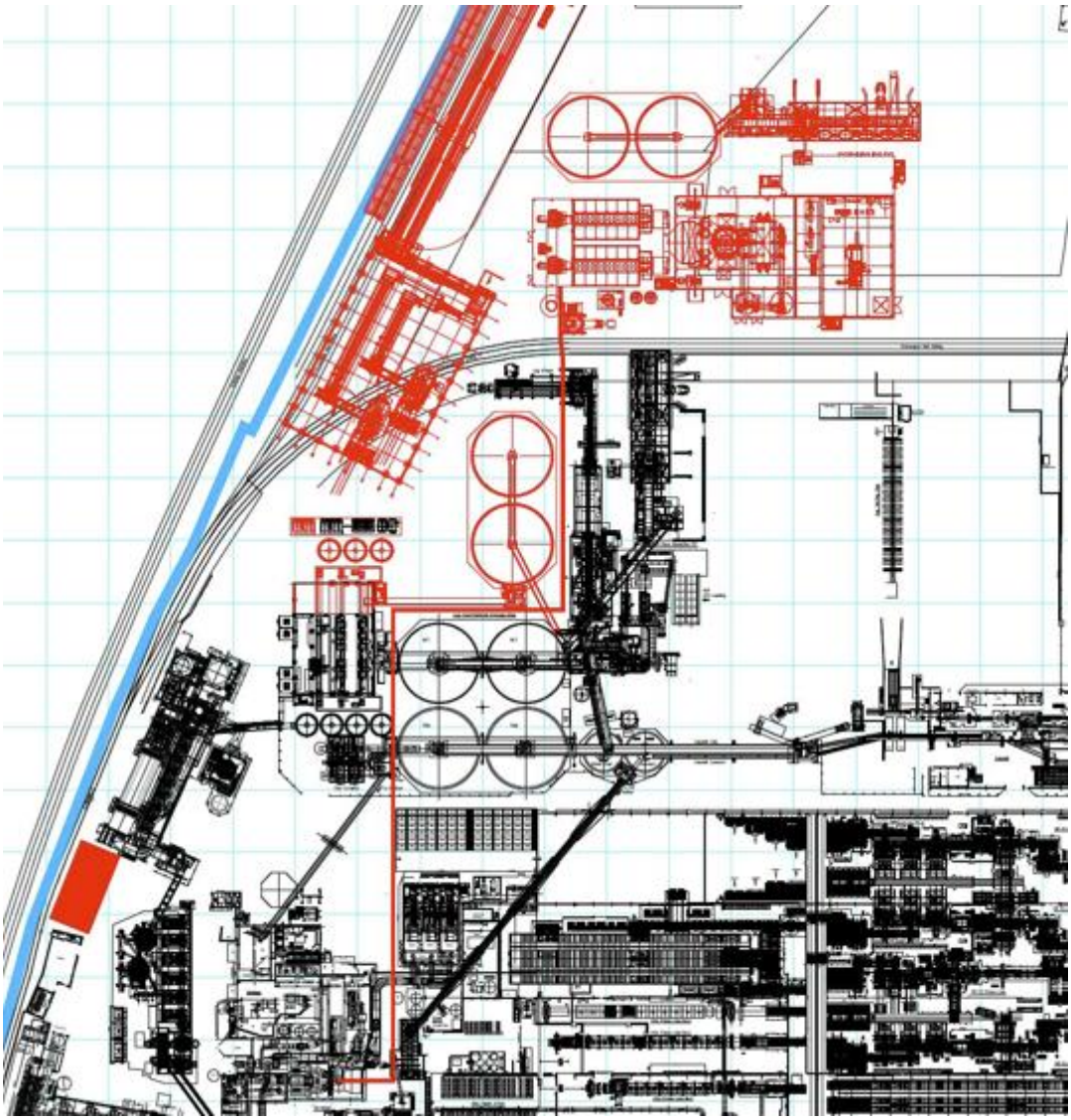
Inset 3.3 – Indicative Arrangement at Site 2



Inset 3.4 – Indicative Arrangement at Site 3



Inset 3.5 - Indicative Arrangement at Site 4



Appraisal of Potential Sites

Parameter 1 - Availability of Space

Context

3.2.11 Feedstock would be unloaded into dedicated screening facilities which would remove materials unsuitable for combustion (such as metals). The screened feedstock would then be transported to storage facilities via overhead conveyor systems. The feedstock would then be transferred to the proposed boiler building via further overhead conveyer systems.

3.2.12 In all scenarios, the intention would be to use two of the new silos (granted planning permission under planning reference P/2022/0615) for the storage of the majority of the feedstock required for the proposed Low Carbon CHP Facility. The two new silos would be positioned immediately east of the existing chip preparation building and immediately north of the four existing log yard material silos. Additional (new) feedstock storage would also be required to complement the use of the two silos.

3.2.13 Therefore, and notwithstanding the piped infrastructure required for heat transfer between the proposed Low Carbon CHP Facility and the existing MDF 1 and 2 dryers (see Parameter 4 below), optimum solutions are those that would minimise the relocation of existing infrastructure whilst ensuring the proposed Low Carbon CHP Facility, proposed feedstock screening, proposed feedstock storage, and proposed feedstock transportation facilities (hereafter referred to as 'the proposed feedstock facilities') are as close to each other as practicable. This would minimise the physical spread of this infrastructure (particularly overhead conveyors) across the existing Kronospan Facility and minimise associated cost and historic environment/visual effects.

Appraisal: Sites 1 – 4

3.2.14 Sites 1 – 4 are in the northern half of the existing Kronospan Facility, predominately characterised by open wood storage at the western extent, and Kronospan Plus, the Formalin Facility, the sawmill, and the recently constructed northeast warehouse at the eastern extent.

3.2.15 For Sites 1, 2, and 4, there is no permanent, physical development on their footprint, and all have sufficient space to accommodate the proposed Low Carbon CHP Facility and proposed feedstock facilities.

3.2.16 The southern extent of Site 3 is on the footprint of the existing sawmill which would be required to be relocated (optimum relocation would be west of Kronospan Plus at Site 1). This would have significant cost and programme implications and would result in additional planning permission requirements (either included as part of the Development of National Significance (DNS) application or a separate planning application determined by Wrexham County Borough Council (WCBC)). Should the sawmill be relocated, Site 3 would have sufficient space to accommodate the proposed Low Carbon CHP Facility and the proposed feedstock facilities.

3.2.17 All four sites would result in the loss of a large area of land currently used for open wood storage. Given that land used for open wood storage has recently been lost to the recently constructed northeast warehouse (referred to above), further loss of such land would be detrimental to the core business operations, particularly stock holding. It should be noted that the recently consented North Access Road (planning reference P/2022/1080) would partly compensate for open wood storage lost to the northeast warehouse, but that further losses would be difficult to replace elsewhere.

Appraisal: Site 5

3.2.18 Site 5 is on the footprint of the existing Gas Turbines 1 and 2. However, if the Proposed Development is consented, the existing Gas Turbines 1 and 2 would be decommissioned and removed (as an inherent part of the Proposed Development and attaining the core objective of decarbonisation).

3.2.19 Site 5 has sufficient space to accommodate the proposed Low Carbon CHP Facility. However, the proposed feedstock facilities would be required to be positioned elsewhere on the existing Kronospan Facility; the optimum location for the proposed feedstock facilities would be the southern extent of Site 2 as there would be sufficient space, it is close to the recently consented silos that would house the majority of the feedstock, and it is relatively close to Site 5 which would minimise the length of the proposed feedstock transportation facilities (overhead conveyors).

Appraisal: Site 6

3.2.20 Site 6 is immediately east of the consented (but not fully constructed) engineering stores development and immediately north of a pond at the southwestern extent of the existing Kronospan Facility. The southern extent of Site 6 is currently occupied by established woodland, the central extent of Site 6 is currently occupied by open storage, and the northern extent of Site 6 is currently occupied by the existing Scottish Power Energy Networks (SPEN) 33kV substation.

3.2.21 Site 6 would only have sufficient space to accommodate the proposed Low Carbon CHP Facility if the existing SPEN 33kV substation was relocated. Such relocation would require agreement with SPEN and other third parties, considerable additional cost and programme implications, reliance on multiple third parties adding considerable risk to delivery and would result in additional planning permission requirements (either included as part of the DNS application or a separate planning application determined by WCBC).

3.2.22 Proposed feedstock facilities would be required to be positioned elsewhere on the existing Kronospan Facility. As for Site 5, the optimum location for the proposed feedstock facilities would be the southern extent of Site 2. However, this would result in considerable distance between the proposed feedstock facilities and the proposed Low Carbon CHP Facility, which would require extensive overhead conveyors systems.

3.2.23 Site 6 is partly owned by a third party (all other sites are on land owned by the Applicant); therefore, land agreements would be required to enable Site 6 to be developed.

3.2.24 The development of Site 6 would require the removal of a group of trees/woodland which has direct connectivity to a further linear woodland group that runs parallel to the railway.

Conclusion

3.2.25 Sites 1, 2, and 4 would provide sufficient space for all components of the proposed Low Carbon CHP Facility. However, they are not preferred due to the resulting loss of a large amount of space currently used for open wood storage which would be very difficult to replace elsewhere due to site-wide physical constraints.

3.2.26 Site 3 would provide sufficient space for all components of the proposed Low Carbon CHP Facility. However, it is not preferred as it would result in the loss of a large amount of space currently used for open wood storage which would be very difficult to replace elsewhere and would require the relocation of the existing sawmill which would have significant cost and programme implications.

3.2.27 Site 5 only has sufficient space to accommodate the proposed Low Carbon CHP Facility (with the proposed feedstock facilities to be positioned elsewhere on the existing Kronospan Facility (optimum position would be southern extent of Site 2)). However, it is preferred as Site 5 would recycle land which would be vacated by the existing Gas Turbines 1 and 2. Using the southern extent of Site 2 for proposed feedstock facilities is preferred as there would be sufficient space, it is close to the recently consented silos that would house the majority of the feedstock, and it is relatively close to Site 5 which would minimise the length of the proposed feedstock transportation facilities (overhead conveyors). Further, the loss of land currently used for open wood storage to accommodate the proposed feedstock facilities would be approximately 25-30% of Site 2. This has a much-reduced impact in comparison to the use of Sites 1 – 4 for the proposed Low Carbon CHP Facility as a whole and would (comparatively) ensure more land for open wood storage is retained.

3.2.28 Site 6 is not preferred as it would require the removal of existing and established woodland, the relocation of the existing SPEN 132kV substation, is partly on third party land (and would require suitable land agreements) and would have significant cost and programme implications. Site 6 would also require extensive lengths of overhead conveyor systems due to the need for the proposed feedstock facilities to be positioned elsewhere on the existing Kronospan Facility (optimum position would be southern extent of Site 2) which would result in extensive overhead conveyor systems due to the distance between Site 6 and Site 2.

Parameter 2 - Proximity to Residential Properties

3.2.29 At their closest point, Sites 1 – 4 are approximately 300m from residential properties to the east, compared to approximately 500m for Sites 5 and 6.

3.2.30 Sites 5 and 6 are the most suitable options as they offer greatest potential for reduced environmental (amenity) effects (particularly with respect to noise effects and landscape and visual effects) given they are further away from residential properties

than Sites 1 – 4; landscape and visual considerations are also discussed further below (under the heading 'Parameter 3 - Proximity to Components of Comparable Size and/or Type').

3.2.31 For the reasons set out above, Sites 1 – 4 are the least suitable options.

Parameter 3 - Proximity to Components of Comparable Size and/or Type

Context

3.2.32 Sites 1 – 4 are in the northern half of the existing Kronospan Facility, predominately characterised by open wood storage at the western extent, and Kronospan Plus, the Formalin Facility, the sawmill, and the recently constructed northeast warehouse at the eastern extent.

3.2.33 Sites 5 and 6 are in the southern half of the existing Kronospan Facility, which is predominately characterised by substantial built development (significantly more so than the northern extent). Of this substantial built development, those of a greater overall mass are predominately contained to the southwestern extent of the existing Kronospan Facility and include (but are not limited to) the MDF Facility (height of cyclones 57m), Gas Engines 1 – 3, Gas Turbines 1 and 2, K7 and K8 Biomass Plants (including biomass plant stack height of 70m), SEKA wet electrostatic precipitator (WESP) filter (stack height of 65.5m), and the WESP chip dryer (stack height of 50m).

3.2.34 A covered loading yard and storage area (granted 04 July 2022 under planning reference P/2022/0336) and a new building to form engineering stores and a dedicated apprentice workshop (granted 07 November 2022 under planning reference P/2022/0615) will be constructed at the southeastern and southwestern extents of the southern half of the existing Kronospan Facility respectively.

3.2.35 The height of the proposed boiler building would be 41.7m) and the height of the proposed stack would be 75m. As such sites that are closer to the generally larger infrastructure in the southern half of the existing Kronospan Facility, and particularly the existing, taller stacks in the southwestern extent, would be favoured. This approach would result in a smaller degree of change in respect of landscape and visual impact from nearby receptors, and impact on the Essential Setting of the Pontcysyllte Aqueduct and Canal World Heritage Site (WHS).

Appraisal: Sites 1 – 4

3.2.36 Sites 1 – 4 are in the northern half of the existing Kronospan Facility. As described above, there is significantly less built development in the northern half of the existing Kronospan Facility (compared to the southern half). The warehouse buildings in both the northern and southern halves of the existing Kronospan Facility are of a similar height (between approximately 10-12m in height); approximately half of the land in the northern half is occupied by open wood storage with greater spacing between the existing warehouse buildings (compared to those in the southern half which largely run back-to-back across much of the full length of the site).

3.2.37 As such, for Sites 1 - 4, there is no opportunity to position the proposed Low Carbon CHP Facility close to existing infrastructure of a similar type, size and scale described in paragraph 3.2.33 above (notably the existing stacks) which would otherwise help to minimise landscape and visual effects and associated historic environment effects.

Appraisal: Site 5

3.2.38 Site 5 is on the footprint of the existing Gas Turbines 1 and 2, which would be decommissioned and removed from site (as an inherent part of the Proposed Development and attaining the core objective of decarbonisation). The existing Gas Engines 1 – 3, the biomass plant stack, SEKA WESP filter and the dryer exhaust stack at the WESP Chip Dryer are adjacent or very close to Site 5. The existing MDF cyclones are approximately 150m to the south of Site 5.

3.2.39 As such, Site 5 would enable the proposed Low Carbon CHP Facility to be positioned close to existing infrastructure of a similar type, size and scale (including the existing stacks described in paragraph 3.2.33) which would help to minimise landscape and visual effects and associated historic environment effects.

Appraisal: Site 6

3.2.40 In comparison to Site 5, Site 6 is further away (between 100m and 200m) from the existing infrastructure of a similar type, size and scale (including being close to the existing stacks described in paragraph 3.2.33)

3.2.41 However, Site 6 is immediately adjacent the existing MDF cyclones (57m high) which would help to minimise landscape and visual effects and associated historic environment effects, but not as effectively as Site 5.

Conclusion

3.2.42 Sites 1 – 4 are the least suitable options due to being in the northern half of the existing Kronospan Facility and, as such, being further away from infrastructure of a similar type, size and scale (including the existing stacks).

3.2.43 Site 5 is the most suitable option, followed by Site 6, due to being in the southern half of the existing Kronospan Facility and, as such, its closer proximity to existing infrastructure of a similar type, size and scale (including the existing stacks).

Parameter 4 – Approximate Length of Piped Infrastructure

Context

3.2.44 The Proposed Development would result in the decommissioning and removal of existing Gas Turbines 1 and 2, which currently provide waste heat for the direct drying of product from the primary manufacturing process via the MDF 1 and 2 dryers. Waste heat from the proposed Low Carbon CHP Facility would replace the waste heat from Gas Turbines 1 and 2.

3.2.45 Waste heat transfer infrastructure is already in place between the MDF 1 and 2 dryers and the existing Gas Turbines 1 and 2, Gas Engines 1 – 3, and the K7 and K8 Biomass Plants at the southwestern extent of the existing Kronospan Facility. As such, new waste heat transfer infrastructure would be required from the proposed Low Carbon CHP Facility.

Appraisal: Sites 1 - 6

3.2.46 The sites would require the following lengths of piped infrastructure to enable the transfer of waste heat from the proposed Low Carbon CHP Facility to existing MDF 1 and 2 dryers. Given the existing physical constraints on the wider Kronospan Facility, the likely practicable distances are shown (rather than as the crow flies):

- Site 1: 450m
- Site 2: 300m
- Site 3: 200m
- Site 4: 300m
- Site 5: 0 - 50m
- Site 6: 100m

Conclusion

3.2.47 Site 5 is the most suitable option, followed by Site 6 given they are close to the existing waste heat transfer infrastructure, allowing a short connection to be made.

3.2.48 Sites 1 – 4 are the least suitable options given they require between 200m and 450m of new waste heat transfer infrastructure, with Site 1 requiring the longest length.

Summary and Conclusion

3.2.49 On balance, Site 5 is the preferred location for the proposed Low Carbon CHP Facility as it is the most suitable option for Parameters 1, 3, and 4 and the joint most suitable (together with Site 6) for Parameter 2. The recycling of the land (which would be vacated by the existing Gas Turbines 1 and 2) is a more efficient and sustainable use of land than other site options.

3.2.50 It is acknowledged that Site 5 only has sufficient space to accommodate the proposed Low Carbon CHP Facility and that the proposed feedstock facilities would be required to be positioned on the southern extent of Site 2. Whilst Site 2 is not a preferred site for the proposed Low Carbon CHP Facility in its entirety for any of the four parameters, the use of the southern extent of the site to accommodate the proposed feedstock facilities is considered suitable for the following reasons:

- There would be sufficient space, it is close to the recently consented silos that would house the majority of the feedstock, and it is relatively close to Site 5 which would minimise the length of the proposed feedstock transportation facilities (overhead conveyors).
- The loss of land currently used for open wood storage to accommodate the proposed feedstock facilities would be approximately 25-30% of Site 2; this has a much-reduced impact in comparison to the use of Sites 1 – 4 for the proposed Low Carbon CHP Facility as a whole and would (comparatively) ensure more land for open wood storage is retained.
- Although closer to residential properties than Site 5, the proposed feedstock facilities are generally smaller in mass and height than the more prominent proposed Low Carbon CHP Facility components (being the proposed boiler building and proposed stack), would visually integrate more effectively with the existing infrastructure of a similar mass and height (notably the sawmill, the existing and recently consented silos, and the existing overhead conveyor

systems) and are less likely to result in significant environmental and amenity effects. As such, it is less important for the proposed feedstock facilities to be positioned close to the larger existing infrastructure described at paragraph 3.2.33 (see Parameter 3).

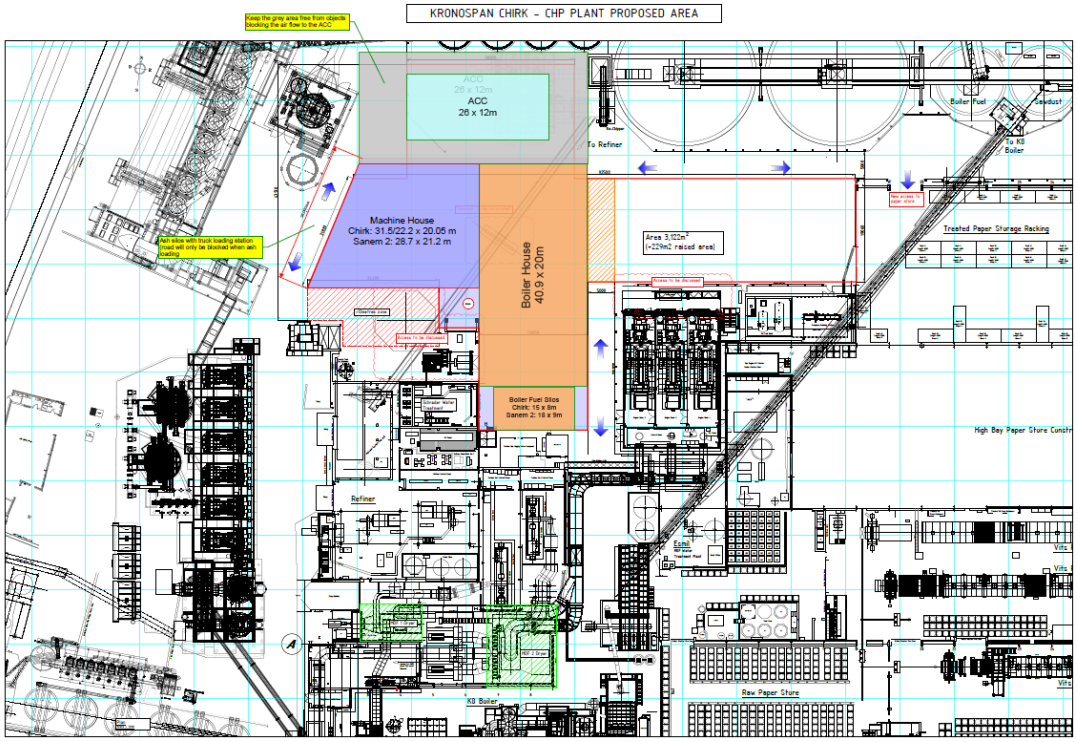
3.3 Layout and Minimising Mass

Alternative Layout Arrangements for the Proposed Low Carbon CHP Facility

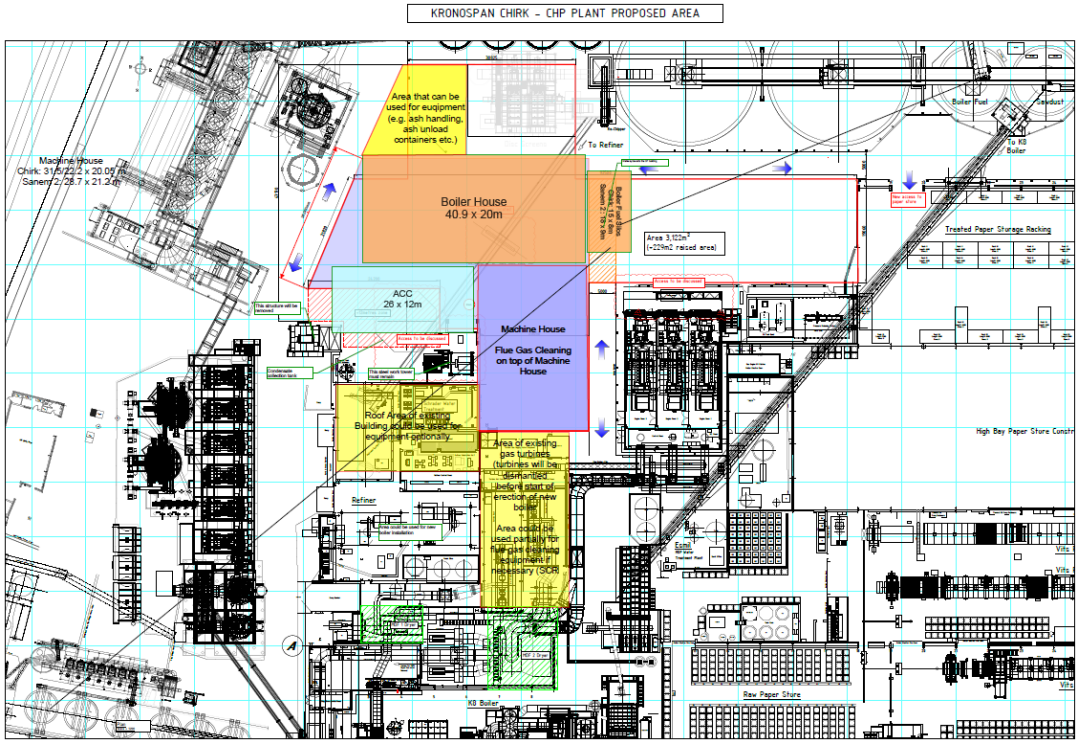
3.3.1 As set out in **Section 3.2** above, Site 5 was selected as the preferred location for the proposed Low Carbon CHP Facility. The Applicant then approached three specialist CHP/biomass service providers (Dieffenbacher, Dalmat, and Aalborg Energie Technik (AET)) for CHP solutions on Site 5 capable of achieving the core objective of generating up to 40 MW of electricity and 125 MW of thermal energy for use in the existing manufacturing processes at the existing Kronospan Facility (via a maximum feedstock throughput capacity of 293,000 tonnes per annum).

3.3.2 Due to the relatively small and constrained footprint of Site 5, the feasibility brief agreed with the three service providers excluded the provision of proposed feedstock storage and handling facilities i.e. the feasibility brief was restricted to the proposed Low Carbon CHP Facility with the design of the proposed feedstock storage and handling facilities (including their physical connection to the proposed Low Carbon CHP Facility) to be managed by the Applicant. As expected, (due to its constrained footprint), all three service providers provided similar CHP solutions for Site 5 (resulting in two core layout options) to the extent that they offered no measurable/notable advantages or disadvantages from one another with respect the four key parameters identified above or any other environmental considerations. An overview of the two core layout options is provided at **Inset 3.6** and **Inset 3.7** below, noting that the placement of components was not considered to be rigid/fixed to the extent that there would be no flexibility for alternative positioning (for example, to enable physical connections to be made to proposed feedstock storage and handling facilities).

Insert 3.6 – Core Layout 1



Inset 3.7 – Core Layout 2



3.3.3 The CHP layouts have three core operative areas: the machine house (which includes the stack), the boiler house, and the Air Cooled Condenser (ACC) (detailed descriptions of these components are provided in **ES Chapter 4.0 (Description of the Proposed Development)**). Following a review of the two core layout options, the following Site 5 objectives were identified as paramount to the Site 5 layout to minimise environmental effects (discussed in **Section 3.2**) whilst maximising operational effectiveness and efficiency:

- Minimise the removal and/or replacement/relocation of existing infrastructure as far as practicable.
- When considering residential receptors, prioritise minimising visual impact over minimising noise impact (particularly for taller components) as the former can only effectively be mitigated through site placement, whilst the latter can effectively be mitigated by site placement and/or the implementation of noise abatement mitigation measures.
- The machine house area should be positioned as far south as practicable to ensure that the stack (approximate height of 90 – 95 m at early design stage) could be positioned as close as practicable to the existing stacks.
- The boiler house (with an approximate height of 40-45m) should be positioned as far west as practicable, away from residential receptors to the east. The area immediately south of the existing chip preparation building was preferred as it is of a similar height and mass to the proposed boiler house.
- The ACC (as the lowest component with an approximate height of 20 – 25m) could feasibly be positioned anywhere within Site 5 (but with priority given to the positioning of the machine house area and boiler house given they are taller components). The ACC is typically the CHP component that generates the greatest noise and would therefore typically be positioned furthest away from residential receptors; however, if positioned towards the eastern extent of Site 5, this would ensure that it would be adjacent the existing enclosed warehouses (which are of a similar height) and would not be so far east as to be likely to generate a notable increase in noise at residential receptor locations (approximate 75m distance between eastern and western extents of Site 5 resulting in distance from residential receptors of between approximately 475m – 550m respectively).

3.3.4 Subsequently, the layout provided at **Inset 3.7** was selected as preferred and formed the basis of the design. The main deviation from that core design is to accommodate the preference to site the ACC at the eastern extent of Site 5 (as described in the final bullet point above); this also ensures that the far northern extent of Site 5 could remain available to accommodate proposed connections (via overhead conveyors) between the proposed Low Carbon CHP Facility and the proposed feedstock storage and handling facilities (the latter designed by the Applicant) using the southern extent of Site 2. All three service providers were able to provide a technical layout and supporting drawings and documentation compliant with **Inset 3.7**. Following a formal commercial tendering exercise with all three service providers, AET was subsequently selected by Kronospan as the preferred service provider.

3.3.5 An assessment of noise and vibration likely to result from the proposed Low Carbon CHP Facility, including the identification of noise mitigation measures to ensure no significant noise effects would arise, is set out at **ES Chapter 5.0 (Noise and Vibration)**. No significant noise and vibration effects are anticipated; this supports the assumptions described above with respect prioritising visual impact over noise impact, in particular the proposed positioning of the ACC.

Alternatives for the Proposed Feedstock Storage and Handling Facilities

3.3.6 The Applicant obtained planning permission in January 2023 (planning reference P/2022/0765) for the erection of two raw material silos, an extension to the existing chip preparation building, and erection of three silos and associated works. Those works have not yet commenced.

3.3.7 The Applicant has taken the decision to repurpose the two raw material silos granted (but not constructed) under planning permission P/2022/0765 to provide feedstock storage capability as part of the proposed Low Carbon CHP Facility; this is possible due to the proposed relocation of the existing chip screening facility (see drawings provided at **DNS3-002** and **DNS3-003**) which will screen chips prior to their onward transportation and storage in the existing chip silos (which currently hold unscreened chips prior to onward transportation and screening). Further details of the above are provided at **Section 4.14, ES Chapter 4.0 (Description of the Proposed Development)** (Component ID 5 – Chip Screening Facility).

3.3.8 As the silos consented under planning reference P/2022/0765 are in a slightly different position than the silos proposed as part of the proposed Low Carbon CHP Facility, an amendment to planning permission P/2022/0765 will be sought (should this DNS application be consented) to formalise the arrangement in planning terms.

3.3.9 The main benefits of the above approach are:

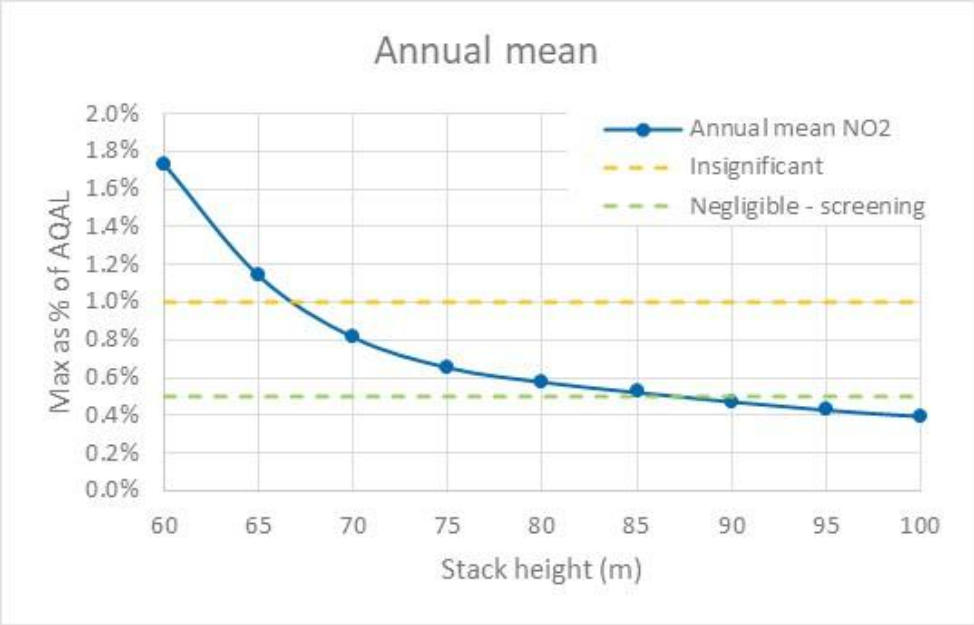
- The existing chip silos would be used more efficiently and able to store a significantly greater quantity of usable chips for subsequent manufacturing.
- The above would allow the proposed (two) larger silos granted under planning permission reference P/2022/0765 to be repurposed for the proposed Low Carbon CHP Facility.
- Subsequently, only one 'new' feedstock storage facility (using the premise that the two larger silos already have planning permission) would be required to provide sufficient feedstock storage for the proposed Low Carbon CHP Facility; this would be smaller in height than, and positioned east of, the existing chip silos.
- The above would have benefits with respect to reduced landscape and visual impact, and the use of raw materials and associated carbon footprint.

Stack Height

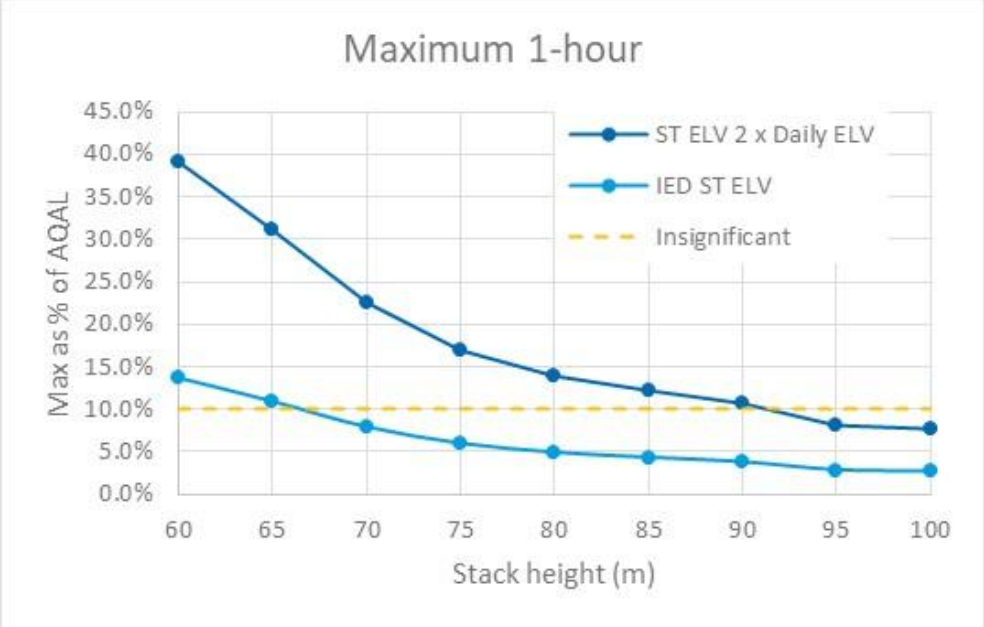
3.3.10 The stack height was set at a precautionary height of 95m at the outset of the design (to inform the EIA Scoping Report (**Appendix 1C**)).

3.3.11 Under normal operations, the exhaust gases from the proposed Low Carbon CHP Facility would be used in the direct drying of product from the primary manufacturing process via the MDF dryers. However, if the dryers are offline and the proposed Low Carbon CHP Facility was online, these emissions would need to vent to atmosphere via a dedicated stack. The height of this stack has been determined by running the air quality dispersion model (see **Appendix 6C** and **Appendix 6D**) for a range of stack heights and identifying the point at which there is a diminished reduction in ground level concentration with increased stack height. The maximum annual mean and 1-hour concentrations of nitrogen dioxide are presented at **Inset 3.8** and **Inset 3.9** respectively.

Inset 3.8 – Stack Height Analysis (Annual Mean)



Inset 3.9 – Stack Height Analysis (Maximum 1-Hour)



3.3.12 As shown at **Inset 3.8**, there is a notable change in the angle of the slope for annual mean impacts at 75m stack height.

3.3.13 When considering the maximum 1-hour impact (**Inset 3.9**), there is a change in angle of the slope at 75m and at 90m. However, with a 75m stack height, the impact can be described as insignificant if it is assumed that the half-hourly emission limit value

(ELV) is double the daily mean ELV in line with the ratio between the daily and half-hourly ELV for oxides of nitrogen as set out in the Industrial Emissions Directive (IED) (Directive 2010/75/EU).

3.3.14 A stack height of 75m is the point at which increasing the height of the stack further has a diminished reduction in ground level concentration; as such, a height of 75m is concluded to be the appropriate stack height for the proposed Low Carbon CHP Facility.

3.3.15 Further information regarding the air quality dispersion model and the stack height analysis (summarised above) is provided at **ES Chapter 6.0 (Air Quality and Odour)** and its accompanying **Appendix 6C** and **Appendix 6D**.

3.4 Colour

Introduction

3.4.1 To examine the potential implications of different cladding colours on the proposed CHP Building, a Colour Study (see **Appendix 3A**) has been undertaken.

Approach

3.4.2 The baseline for the study is the pale Goosewing Grey coloured cladding (RAL 080 70 05) utilised across the majority of existing structures at the existing Kronospan Facility.

3.4.3 The Colour Study examines the potential for a reduction in the visual effects of the proposed Low Carbon CHP Facility that might be achieved by substituting the Goosewing Grey cladding with alternate colours as follows:

- Quartz Grey (RAL 080 50 20).
- Camouflage Green (RAL 110 50 10).
- Olive Green (RAL 100 30 20).
- Colour banding, running from a dark green at the bottom of the building to Goosewing Grey at the top of the building (the approach taken reflects similar cladding on the existing Encirc Glass building at Ince, Cheshire).
- Light Grey (RAL 7035).

3.4.4 The colour options were applied to the CHP building from four of the LVIA Viewpoints (refer to **ES Chapter 7.0 Landscape and Visual Impact Assessment** for further details regarding viewpoints). The viewpoints were selected to reflect views from more sensitive locations at different directions from the Kronospan site, and are as follows:

- Viewpoint A, located at Chirk Recreation Ground in the centre of town.
- Viewpoint B, located along the Offa's Dyke Path National Trail, and within the Clwydian Range and Dee Valley National Landscape.
- Viewpoint C, located along the B5070 at the northern edge of Chirk.
- Viewpoint M, located along the towpath of the Llangollen Canal.

3.4.5 The appearance of the proposed Low Carbon CHP Facility from each Viewpoint, based upon Goosewing Grey cladding and each of the five alternative cladding options set out above, is shown on the illustrative photomontages presented on **Figures 1-4** of **Appendix 3A**.

Conclusion

3.4.6 Following an examination of potential alternative cladding colour options, it is considered that the baseline Goosewing Grey cladding remains the most appropriate colour for the proposed CHP building. Goosewing Grey would provide the least contrast with existing structures at Kronospan, and thus the proposed CHP Building would look the least distinct if this colour cladding is utilised. Whilst use of Camouflage Green cladding may result in the proposed CHP Building appearing more recessive from Chirk Recreation Ground due to it being backgrounded by the hills behind, in reality this would vary depending upon light conditions and could also result in increased adverse visual effects at some times.

3.5 Technology

Overview of Proposed CHP Technology

3.5.1 The installation of a proposed Low Carbon CHP Facility (using a combination of existing K7 Biomass Plant feedstock, existing on-site process wood residues, imported Grade C waste wood*, imported forestry brash, and future on-site process residues (by increasing on-site production)) is the most sustainable, efficient and

economically effective method of producing electrical energy for use in the existing manufacturing processes at the existing Kronospan Facility.

3.5.2 *Grade C wood is a mix of waste wood, including panel products and wood treated with preservatives. Whilst not suitable for traditional recycling, it can be used in biomass fuel applications.

3.5.3 Additionally, the fact that the proposed Low Carbon CHP Facility would also generate thermal energy (which would also be used in the existing manufacturing processes at the existing Kronospan Facility) is a significant benefit when compared to alternative forms of technology such as solar, wind, and hydro, detailed below.

3.5.4 As Kronospan is the world's leading manufacturer of wood-based panels and associated products, it is well placed and well-versed in using Grade B and Grade C waste-wood in its manufacturing processes. As such, the proposed Low Carbon CHP Facility provides a unique opportunity for wood to be more sustainably used in a cradle to grave manner. The proposed Low Carbon CHP Facility would use low quality Grade C waste wood (part generated on-site, part imported) that is not suitable for use in the manufacture of wood products or other forms of recycling and use it to provide electrical and heat energy for direct use on-site in the subsequent manufacture of high-quality wood products. Therefore, the proposed Low Carbon CHP Facility would represent a unique embodiment of the circular economy principles promoted by the Welsh government circular economy strategy, Beyond Recycling, and other policy and guidance documents (further detail of the policy appraisal is provided in the Planning Statement (**DNS4-001**).

Alternative Technologies

3.5.5 Notwithstanding the above, provided below is an appraisal of alternative renewable energy technologies to the proposed Low Carbon CHP Facility.

Solar

3.5.6 Whilst solar energy is often cited as a low-impact renewable option, a 40MWp solar PV installation would require approximately 39 hectares of land and would only generate around 39 GWh of electricity annually due to limited sunlight hours and its intermittent generation profile, producing peak output only during daytime hours. In contrast, the proposed Low Carbon CHP Facility would deliver a continuous, steady-

state power output 24 hours a day, seven days a week, required for the production at Chirk. To match the annual output of the proposed Low Carbon CHP Facility of 210GWh, a solar installation would need to span approximately 208 hectares, highlighting the significant spatial inefficiency of solar in this context. This comparison demonstrates the practicality and land-use efficiency of the proposed Low Carbon CHP Facility in delivering reliable, baseload renewable energy.

3.5.7 Unlike the proposed Low Carbon CHP Facility, solar power does not generate waste steam or heat that is able to subsequently be used in the existing on-site manufacturing operations, namely, the MDF manufacturing process (waste steam), and the drying of product via the MDF1 and MDF2 dryers (waste heat). Kronospan would therefore have a continued reliance on fossil fuels to deliver this heat demand. As such, the proposed Low Carbon CHP Facility has a significant advantage when compared to solar power in this regard.

Wind

3.5.8 When evaluating wind energy as an alternative to the proposed Low Carbon CHP Facility, it is important to consider the scale and generation characteristics of modern onshore wind turbines in the UK. A typical onshore wind turbine has a capacity of around 2.5 to 3.5 MW and stands approximately 125 to 150 metres tall (to blade tip). To achieve a peak capacity of 40 MW, approximately 12 to 16 turbines would be required. However, to match the proposed Low Carbon CHP Facility's annual electricity generation of 210 GWh, a larger installed capacity is needed due to the variable and intermittent nature of wind. Assuming a UK average capacity factor of around 30%, approximately 80 MW of installed wind capacity would be required, equating to roughly 23 to 32 turbines, depending on their individual ratings and site-specific wind conditions. These turbines would need to be distributed across a substantial land area, potentially several hundred hectares, to allow for adequate spacing and optimal performance. While wind power is an important renewable source, it is less suited for providing the steady, reliable baseload energy output that the proposed Low Carbon CHP Facility offers.

3.5.9 Unlike the proposed Low Carbon CHP Facility, wind power does not generate waste steam or heat that is able to subsequently be used in the existing on-site manufacturing operations, namely, the MDF manufacturing process (waste steam), and the drying of product via the MDF1 and MDF2 dryers (waste heat). Kronospan

would therefore have a continued reliance on fossil fuels to deliver this heat demand. As such, the proposed Low Carbon CHP Facility has a significant advantage when compared to wind power in this regard.

Nuclear

3.5.10 Another alternative is nuclear via a Small Modular Reactor (SMR), which would offer the advantage of providing consistent, high-capacity baseload power similar to the proposed Low Carbon CHP Facility. SMRs are designed to generate electricity reliably 24 hours a day, seven days a week, with a typical unit capable of producing up to 300 MWe, depending on the design. To match the proposed Low Carbon CHP Facility's annual output of 210 GWh, a single SMR operating at around 30–50 MW capacity with a high-capacity factor (over 90%) would be sufficient. SMRs require significantly less land than solar or wind installations and offer strong carbon reduction benefits, aligning with long-term decarbonisation goals. However, despite their technical and environmental advantages, SMRs face considerable public concern around nuclear safety, waste management, and long-term health risks. Additionally, they require robust physical security infrastructure, specialised regulatory oversight, and typically involve longer planning and construction timelines. While SMRs present a viable and efficient alternative from a purely technical perspective, these social, regulatory, and security factors may present significant barriers to deployment in comparison to the proposed Low Carbon CHP Facility.

3.5.11 Similar to the proposed Low Carbon CHP Facility, nuclear power does generate waste steam or heat that is able to subsequently be used in the existing on-site manufacturing operations, namely, the MDF manufacturing process (waste steam), and the drying of product via the MDF1 and MDF2 dryers (waste heat). However, this would be the first project of its kind in the world. Therefore, the proposed Low Carbon CHP Facility has a significant advantage when compared to nuclear power in this regard.

Geothermal

3.5.12 Geothermal energy, such as the deep geothermal system trialled at the Eden Project in Cornwall, is another renewable alternative capable of providing steady baseload power comparable to the proposed Low Carbon CHP Facility. Deep geothermal systems can operate continuously, unaffected by weather or daylight, and have a

minimal surface footprint once operational. In theory, a geothermal installation with a capacity of around 40 MW could generate approximately 210 GWh per year, matching the proposed Low Carbon CHP Facility's output. However, geothermal energy in the UK is still at an early stage of development, with no commercially operational large-scale plants currently in place. Significant technical and geological challenges remain, including the need for deep drilling, often several kilometres, which carries the risk of inducing seismic activity or ground tremors, as observed in other European projects. Furthermore, suitable geothermal resources are geographically limited, reducing the feasibility of deployment across much of the UK. While geothermal energy holds long-term potential as a low-carbon, reliable source of heat and power, its current lack of commercial viability and public concern over drilling impacts make it a less practical alternative at this time compared to the proposed Low Carbon CHP Facility.

3.5.13 Similar to the proposed Low Carbon CHP Facility, geothermal power does generate waste steam or heat that is able to subsequently be used in the existing on-site manufacturing operations, namely, the MDF manufacturing process (waste steam), and the drying of product via the MDF1 and MDF2 dryers (waste heat). However, this would be the first project of its kind in the world. Therefore, the proposed Low Carbon CHP Facility has a significant advantage when compared to geothermal power in this regard.

Hydro

3.5.14 There are no watercourses in the vicinity of the existing Kronospan Facility with sufficient flow rate to generate anywhere close to sufficient electrical energy that would enable the Applicant to reduce its current reliance on the gas turbines and gas engines.

3.5.15 Unlike the proposed Low Carbon CHP Facility, hydro energy does not generate waste steam or heat that is able to subsequently be used in the existing on-site manufacturing operations, namely, the MDF manufacturing process (waste steam), and the drying of product via the MDF1 and MDF2 dryers (waste heat). Therefore, the proposed Low Carbon CHP Facility has a significant advantage when compared to hydro energy in this regard.

3.6 Feedstock

Overview of Changes to Proposed Low Carbon CHP Facility Feedstock Configuration/Sources

3.6.1 The original Proposed Development design was for the existing K7 Biomass Plant to remain in full operation. This was set out in the EIA Scoping Report (**Appendix 1C**) submitted to Planning and Environment Decisions Wales (PEDW) on 30 May 2024 under Regulation 14 of the EIA Regulations. This would result in less onsite derived feedstock for the proposed Low Carbon CHP Facility (since the existing K7 Biomass Plant feedstock would not be 'available'). On this basis the Applicant, at that point in the project design, was considering using Refuse Derived Fuel (RDF) as a feedstock for the facility.

3.6.2 Following receipt of the Scoping Direction (**Appendix 1D**), formal pre-application advice from PEDW (received 19 June 2024), further informal discussions with PEDW and informal pre-application discussions with WCBC, the Applicant issued (on 15 October 2024) a document to PEDW entitled 'EIA Scoping Direction Clarification and Update to the Proposed Development Design' (**Appendix 1E**). This document provided details of the proposed changes to the Proposed Development which arose since the initial pre-application advice was sought, as well as setting out broad areas of agreement and disagreement/clarification with the EIA Scoping Direction. A summary of the main Proposed Development design changes made at this point is provided below:

- The status of the existing K7 Biomass Plant would change from 'remaining in operation' to 'remain in situ but be used as a back-up biomass plant only' – as a result, the existing K7 Biomass Plant feedstock would be re-directed for use in the proposed Low Carbon CHP Facility.
- A detailed review of CHP Facility feedstock generated on-site was undertaken to understand the maximum wood residue feedstock that would be generated from existing and planned manufacturing operations.
- The proposed use of RDF was removed.

3.6.3 The proposed change to the Proposed Development design also confirmed that the proposed electrical generating capacity of the proposed Low Carbon CHP Facility would increase from 30 megawatts (MW) to 40MW.

3.6.4 An EIA Scoping Direction Addendum (see **Appendix 1F**) was issued by PEDW on 14 January 2025 and provides PEDW's updated opinion regarding the proposed EIA scope of the Proposed Development. Further details of the EIA Scoping Direction (and the Addendum) are provided at **ES Chapter 1.0 (Introduction)** and **ES Chapter 2.0 (EIA Methodology)**.

3.6.5 A summary of the changes to the configuration/sources of the feedstock required for the proposed Low Carbon CHP Facility is provided in **Table 3.1** below.

Table 3.1 – Changes to the Proposed Low Carbon CHP Feedstock Configuration

Type/Source (as described in the Pre-Application Request/Scoping Report)	Initial Approach (now superseded)	Proposed (Revised) Approach
Source A - Existing On-Site Process Residues Currently Sold Off-Site On-site process residues currently sold off-site (to be diverted to the proposed Low Carbon CHP Facility). • Bark from the MDF chipper and sawmill debarking process. • MDF process residues	**65,000 tonnes per annum (TPA)**	2021 – 83,577 TPA 2022 – 77,495 TPA 2023 – 69,990 TPA **2021-2023 Average – 76,991 TPA**

Type/Source (as described in the Pre-Application Request/Scoping Report)	Initial Approach (now superseded)	Proposed (Revised) Approach
Source B – Operational Status of Existing K7 Biomass Plant Currently processes approximately 70,000 TPA of virgin and exempt biomass - sourced via unsuitable material arising from the core on-site business of board production (roundwood logs, wood chip, sawmill off-cuts, sawmill bark, and sawmill sawdust) that is not suitable for board production.	K7 to remain in full operational **0 TPA**	K7 Biomass Plant would remain in situ but be used as a back-up (for when the proposed Low Carbon CHP Facility and the existing K8 Biomass Plant have their annual shutdowns) – fuel currently used in the K7 Biomass Plant would be diverted to the proposed Low Carbon CHP Facility and exhaust gases used for drying purposes in the MDF2 dryer. 2021 – 78,500 TPA 2022 – 74,000 TPA 2023 – 71,500 TPA **2021-2023 Average – 74,667 TPA**
Source C - Other On-Site Process Residues Extraction of smaller fractions of recycled timber or fines from the existing Particleboard (PB) process. This fraction often contains the most impurities and gives the PB no structural properties. Removing it adds significant quality improvements to the PB.	**75,000 TPA**	Based on the 2021 - 2023 processing data, the following wood residue would have been created from the enhanced PB manufacturing process: 2021 – 118,184 TPA 2022 – 104,853 TPA 2023 – 102,328 TPA

Type/Source (as described in the Pre-Application Request/Scoping Report)	Initial Approach (now superseded)	Proposed (Revised) Approach
		2021-2023 Average – 108,455 TPA
Source D - Importing Grade C Waste Wood to Site for Direct Use in Proposed Low Carbon CHP Facility	**153,000 TPA**	**0 TPA** See text below Table 3.1 for further details of proposed approach to import of Grade C waste wood as part of 'off-site' feedstock source.
Source E – Importing up to 30,000 TPA of RDF and/or Forestry Residues for Direct Use in Proposed Low Carbon CHP Facility This would be considered as part of the overall 153,000 TPA associated with Source D. In other words, if 30,000 TPA of RDF and/or forestry residues was imported, 123,000 TPA of Grade C waste wood would be imported.	**30,000 TPA** (considered as part of the 153,000 TPA associated with Source D)	**0 TPA** See text below Table 3.1 for further details of proposed approach to import of forestry residues as part of 'off-site' feedstock source.
TOTAL	293,000 TPA	260,113 TPA (based on 2021-2023 average)

Type/Source (as described in the Pre-Application Request/Scoping Report)	Initial Approach (now superseded)	Proposed (Revised) Approach
Other Sources	N/A	There would be a 'remainder' of 32,887 TPA of feedstock required for the proposed Low Carbon CHP Facility Further details as to how this would be met is provided below.

3.6.6 As set out in **Table 3.1** above, it is proposed that 260,113 TPA of the 293,000 TPA throughput capacity would be generated by existing on-site process residues. This is a proposed increase from 48% (original design) to 88.8% (proposed design), meaning that the vast majority of the feedstock would now be sourced from on-site processes.

How the 'Remainder' would be Met

Overview

3.6.7 Based on the likely availability of feedstock that can be generated on-site (based on an average taken from the calendar years 2021, 2022, and 2023 – see **Table 3.1**), there would be a 'remainder' of 32,887 TPA of biomass feedstock required; this is based on attaining the maximum throughput of the proposed Low Carbon CHP Facility of 293,000 TPA.

3.6.8 The feedstock 'remainder' would be made up by:

- 50% (16,444 TPA) - **The import of forestry brash** for direct use in the proposed Low Carbon CHP Facility.
- 25% (8,222 TPA) - **The import of Grade C waste wood** for direct use in the proposed Low Carbon CHP Facility.
- 25% (8,222 TPA) - **Increased on-site production** that would generate further on-site process residues for direct use in the proposed Low Carbon CHP Facility.

3.6.9 The feedstock 'remainder' scenario set out above is considered feasible and reasonable and forms the basis of the feedstock assumptions considered as part of the ES. However, the Applicant would retain the flexibility to apply different percentages to the above depending on the actual feedstock 'remainder' in any given year and the availability/market conditions of the different types of feedstock. Increasing on-site production (to generate further on-site process residues) would likely be the Applicant's priority given this would be more sustainable, more cost effective, and could occur under their existing manufacturing conditions and existing Environmental Permit restrictions.

3.6.10 The feedstock 'remainder' scenario set out above would increase the feedstock that could be generated on-site from 88.8% (260,113 TPA) to 91.6% (268,335 TPA). As stated above, depending on market factors and material available on site, there is the potential for 100% of the feedstock to be generated on-site.

Increased On-Site Production

3.6.11 Kronospan, as all other UK businesses, is seeking economic growth whilst keeping up with technological advances that will naturally drive on-site efficiency and effectiveness. The policy aims and objectives of the new UK Labour Government seek to do the same i.e. stimulate economic growth, with particular focus on the development sector. With economic growth comes an increase in housebuilding (including an increase in more energy efficient homes) and growth in other general industrial and development sectors, which are Kronospan's key markets. It is on this basis that Kronospan is expecting manufacturing capacity at the Site to increase residue production set out in bullet point 3 above.

3.6.12 To deliver the increased level of board production, there would be a requirement for an increased import of Grade B and Grade C waste wood to the existing Kronospan Facility. The quantity of increased Grade B and Grade C waste wood required would be 41,109 TPA (based on the 2021-2023 average); the consequential increase in process residues is based on a percentage rate of 20% arisings from the raw material/primary process.

Alternative Approaches to CHP Facility Feedstock Configuration/Sources

3.6.13 The proposed changes to the CHP Facility feedstock configuration/sources have been extensively considered by the Applicant with the sole objective of maximising the amount of feedstock that could be generated on-site (to subsequently minimise the quantity of feedstock to be imported to site, and waste residue exported offsite). Therefore, it is considered that there are no viable alternatives that would see a further increase (from 88.8%) in the quantity of feedstock that could be generated on-site.

3.7 The 'Do Nothing' Alternative

3.7.1 The do-nothing alternative would mean that the benefits of the proposed Low Carbon CHP Facility as described at **Section 3.0** of the Planning Statement **(DNS4-001)** and **Section 4.3, ES Chapter 4.0 (Description of the Proposed Development)** would not be able to be realised.

3.7.2 Notably, the existing Kronospan Facility consumes:

- 7.7% and 3.2% of the non-domestic gas consumption and total gas consumption (respectively) in Wales, and
- 48.4% and 35.7% of the non-domestic gas consumption and total gas consumption (respectively) in the County of Wrexham.

3.7.3 The proposed Low Carbon CHP Facility would generate more heat and power than the existing K7 and K8 Biomass Plants and would enable Kronospan to significantly reduce its reliance on the on-site gas engines that are currently used to provide additional heat and power to the existing Kronospan Facility. As such, the proposed energy shift would provide significant environmental benefits due to the significant reduction in the burning of fossil fuels (gas) and an increase in the use of renewable biomass material. This would help to significantly decarbonise Kronospan's wood product manufacturing processes and make a valuable contribution to meeting the Welsh Government's Net Zero commitments.

3.7.4 From a greenhouse gas (GHG) emissions perspective, **ES Chapter 9.0 (Climate Change)** concludes that the proposed Low Carbon CHP Facility would have a net carbon benefit of 3,024,740 tCO_2e (tonnes of carbon dioxide equivalent) over its estimated 40-year lifespan and would provide carbon benefits throughout each carbon budget period considered.

3.7.5 The significant reduction in the burning of fossil fuels and the net carbon benefit summarised above would not be achieved in a do-nothing scenario.

3.7.6 Kronospan's products are all Environmental Product Declaration (EPD) certified. An EPD is a transparent, independently verified report that provides quantified information on a product's environmental impact throughout its entire lifecycle from raw material extraction to disposal; this includes environmental impacts such as carbon emissions, water usage, and waste generation. A do-nothing approach would mean that Kronospan would not be able to maximise its EPD certification (by missing opportunities to further reduce the carbon footprint of the products); this is increasingly demanded by the construction industry, and subsequently the existing Kronospan Facility could be less competitive as a result, impacting its long-term sustainability. Kronospan's long-term environmental and sustainable objectives (including its EPD certification) is set out in its Sustainability Report 2022-2023[1],

[1] *https://viewer.ipaper.io/in-link/sustainable-reports-kronospan/uk/?page=1*

Appendix 3A – CHP Colour Study