

Appendix 6F

Dispersion Modelling Results – Ecology

Prepared for: Kronospan

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DNS5-4-027

1.0 RESULTS

1.1.1 As detailed in **Appendix 6C**, the following development scenarios have been considered:

- i) Baseline
- ii) Baseline + OSB
- iii) Proposed

1.1.2 This Appendix has focussed on the impact of normal operations as this is the intended long-term operating strategy for the Kronospan panel board manufacturing facility.

1.1.3 The following terms have been used in this Appendix:

- i) Critical Level – the air quality assessment level for the protection of ecology as set out in Chapter 6 of the ES – gaseous concentration of a pollutant in air;
- ii) Critical Load – the assessment level for the protection of ecology due to the deposition effects of pollutants – these are habitat and locational specific;
- iii) PC – the process contribution – i.e. the contribution from the Kronospan Facility; and
- iv) PEC – the predicted environmental concentration – i.e. the process contribution plus the background concentration.

1.1.4 The background concentration used is justified in **Appendix 6B**.

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- 1.1.5 The detailed results tables present the maximum impact using the five years of weather data. The results are presented for the maximum at each identified ecological receptor. In addition detailed results tables are provided at the end of this appendix which set out the predicted impact using each year of weather data and the calculated deposition rate and a comparison to the habitat specific Critical Loads.
- 1.1.6 The modelling assumes each item of plant operates at maximum capacity and emissions are at the relevant ELVs. As discussed in **Appendix 6C** although the Kronospan Facility operates on a 24-hour basis the operational loading of each process is well below 100%, and each source operates below the ELVs, and in some cases by a significant margin. Therefore, these results are considered to be extremely conservative.
- 1.1.7 A detailed interpretation of these results is provided in **Appendix 6H**.



Table 1.1 – Results – Normal Operations – Permitted Facility - Baseline

Site	Annual Mean			Weekly Mean	Daily Mean	
	Oxides of Nitrogen	Sulphur Dioxide	Ammonia	Hydrogen Fluoride	Oxides of Nitrogen	Hydrogen Fluoride
Critical Level	30	10	1	0.5	200	5
European and UK Designated Sites						
River Dee and Bala Lake SAC and SSSI	10.0%	0.9%	0.4%	1.1%	17.5%	0.3%
Johnstown Newt Site SAC	1.4%	0.1%	0.1%	0.1%	2.9%	0.0%
Berwyn and South Clwyd Mountains SAC	1.4%	0.1%	0.1%	0.1%	3.1%	0.0%
Berwyn SPA	0.8%	0.1%	0.0%	0.1%	1.9%	0.0%
Chirk Castle SSSI	12.3%	1.2%	1.0%	2.6%	31.8%	0.5%
Nant-y-Belan & Prynella Woods SSSI	5.5%	0.5%	0.2%	0.4%	6.6%	0.1%
Locally Designated Sites						
Barracks Field	9.0%	0.9%	0.5%	0.6%	10.4%	0.1%
Ceod-Y-Canal Wood	17.3%	1.6%	0.9%	1.6%	48.8%	0.4%
Pentre Wood	2.2%	0.2%	0.1%	0.6%	12.1%	0.2%
Various Ancient Woodlands	17.0%	1.6%	0.9%	2.5%	31.8%	0.5%

Table 1.2 – Results – Normal Operations – Baseline + OSB

Site	Annual Mean			Weekly Mean	Daily Mean	
	Oxides of Nitrogen	Sulphur Dioxide	Ammonia	Hydrogen Fluoride	Oxides of Nitrogen	Hydrogen Fluoride
Critical Level	30	10	1	0.5	200	5
European and UK designated sites						
River Dee and Bala Lake SAC and SSSI	11.7%	0.9%	0.4%	1.1%	22.3%	0.3%
Johnstown Newt Site SAC	1.7%	0.1%	0.1%	0.1%	3.6%	<0.1%
Berwyn and South Clwyd Mountains SAC	1.7%	0.1%	0.1%	0.1%	4.0%	<0.1%
Berwyn SPA	1.0%	0.1%	0.0%	0.1%	2.4%	<0.1%
Chirk Castle SSSI	15.0%	1.2%	1.0%	2.6%	42.2%	0.5%
Nant-y-Belan & Prynella Woods SSSI	6.7%	0.5%	0.2%	0.4%	8.1%	0.1%
Locally designated sites						
Barracks Field	11.0%	0.9%	0.5%	0.6%	13.2%	0.1%
Ceod-Y-Canal Wood	20.1%	1.6%	0.9%	1.6%	50.9%	0.4%
Pentre Wood	2.7%	0.2%	0.1%	0.6%	15.3%	0.2%
Various Ancient Woodlands	20.7%	1.6%	0.9%	2.5%	42.0%	0.5%

Table 1.3 – Results – Normal Operations – Proposed

Site	Annual Mean			Weekly Mean	Daily Mean	
	Oxides of Nitrogen	Sulphur Dioxide	Ammonia	Hydrogen Fluoride	Oxides of Nitrogen	Hydrogen Fluoride
Critical Level	30	10	1	0.5	200	5
European and UK Designated Sites						
River Dee and Bala Lake SAC and SSSI	11.7%	1.0%	1.0%	3.7%	22.3%	1.0%
Johnstown Newt Site SAC	1.7%	0.2%	0.2%	0.5%	3.7%	0.2%
Berwyn and South Clwyd Mountains SAC	1.7%	0.2%	0.3%	0.5%	4.0%	0.2%
Berwyn SPA	1.0%	0.1%	0.2%	0.4%	2.4%	0.1%
Chirk Castle SSSI	15.0%	1.5%	2.3%	9.6%	45.7%	1.9%
Nant-y-Belan & Prynella Woods SSSI	6.6%	0.6%	1.0%	1.4%	8.2%	0.4%
Locally Designated Sites						
Barracks Field	11.0%	1.1%	1.7%	2.4%	13.2%	0.6%
Ceod-Y-Canal Wood	20.1%	2.0%	3.0%	6.3%	52.3%	1.6%
Pentre Wood	2.8%	0.3%	0.4%	2.3%	15.4%	0.7%
Various Ancient Woodlands	20.7%	2.0%	3.0%	9.5%	44.8%	1.9%

Table 1.4 – Results – Normal Operations – Impact from Baseline

Site	Annual mean			Weekly mean	Daily Mean	
	Oxides of Nitrogen	Sulphur Dioxide	Ammonia	Hydrogen Fluoride	Oxides of Nitrogen	Hydrogen Fluoride
Critical Level	30	10	1	0.5	200	5
European and UK Designated Sites						
River Dee and Bala Lake SAC and SSSI	1.7%	0.2%	0.7%	2.6%	4.8%	0.8%
Johnstown Newt Site SAC	0.3%	0.0%	0.1%	0.4%	0.8%	0.1%
Berwyn and South Clwyd Mountains SAC	0.3%	0.0%	0.2%	0.4%	0.9%	0.1%
Berwyn SPA	0.2%	0.0%	0.1%	0.3%	0.5%	0.1%
Chirk Castle SSSI	2.7%	0.3%	1.2%	7.0%	13.9%	1.4%
Nant-y-Belan & Prynella Woods SSSI	1.1%	0.1%	0.8%	1.0%	1.5%	0.3%
Locally Designated Sites						
Barracks Field	2.1%	0.2%	1.2%	1.8%	2.7%	0.5%
Ceod-Y-Canal Wood	2.9%	0.4%	2.1%	4.8%	3.6%	1.2%
Pentre Wood	0.5%	0.1%	0.3%	1.7%	3.3%	0.5%
Various Ancient Woodlands	3.7%	0.4%	2.1%	7.0%	13.0%	1.4%

Table 1.5 – Results – Normal Operations – Impact from Permitted Proposed (i.e. from OSB)

Site	Annual Mean			Weekly Mean	Daily Mean	
	Oxides of Nitrogen	Sulphur Dioxide	Ammonia	Hydrogen Fluoride	Oxides of Nitrogen	Hydrogen Fluoride
Critical Level	30	10	1	0.5	200	5
European and UK Designated Sites						
River Dee and Bala Lake SAC and SSSI	<0.01%	0.19%	0.67%	2.64%	<0.01%	0.76%
Johnstown Newt Site SAC	0.02%	0.04%	0.13%	0.38%	0.04%	0.12%
Berwyn and South Clwyd Mountains SAC	<0.01%	0.04%	0.22%	0.38%	<0.01%	0.14%
Berwyn SPA	<0.01%	0.02%	0.14%	0.30%	-0.01%	0.08%
Chirk Castle SSSI	0.01%	0.30%	1.24%	7.00%	3.51%	1.39%
Nant-y-Belan & Prynella Woods SSSI	-0.01%	0.13%	0.78%	1.04%	0.02%	0.26%
Locally Designated Sites						
Barracks Field	<0.01%	0.23%	1.21%	1.78%	<0.01%	0.47%
Ceod-Y-Canal Wood	<0.01%	0.39%	2.10%	4.75%	1.45%	1.17%
Pentre Wood	0.11%	0.06%	0.30%	1.71%	0.09%	0.53%
Various Ancient Woodlands	-0.01%	0.41%	2.11%	6.96%	2.85%	1.40%

Table 1.6 – Results – Normal Operations – Nitrogen Deposition Rates

Site	Grassland Deposition PC – kgN/ha/yr			Woodland Deposition PC – kgN/ha/yr		
	Permitted Facility - Baseline	Baseline + OSB	Proposed	Permitted Facility - Baseline	Baseline + OSB	Proposed
River Dee and Bala Lake	0.33	0.38	0.43	0.65	0.75	0.83
Johnstown Newt Sites	0.05	0.05	0.07	0.09	0.11	0.12
Berwyn and South Clwyd Mountains	0.05	0.06	0.07	0.09	0.11	0.13
Berwyn	0.03	0.03	0.04	0.05	0.06	0.07
Chirk Castle	0.42	0.51	0.57	0.82	0.99	1.08
Nant-y-Belan & Prynella Woods	0.18	0.22	0.25	0.36	0.42	0.48
Barracks Field	0.30	0.36	0.42	0.58	0.70	0.80
Canal Wood	0.57	0.65	0.76	1.11	1.28	1.45
Pentre Wood	0.56	0.67	0.78	1.09	1.32	1.48
Various ancient woodlands	0.56	0.67	0.78	1.09	1.32	1.48

Table 1.7 – Results – Normal Operations – Acid Deposition Rates

Site	Grassland Deposition PC – KeqN + S /ha/yr			Woodland Deposition PC – KeqN + S /ha/yr		
	Permitted Facility - Baseline	Baseline + OSB	Proposed	Permitted Facility - Baseline	Baseline + OSB	Proposed
River Dee and Bala Lake	0.03	0.03	0.03	0.08	0.09	0.11
Johnstown Newt Sites	0.01	0.01	0.01	0.01	0.01	0.02
Berwyn and South Clwyd Mountains	0.01	0.01	0.01	0.01	0.01	0.02
Berwyn	0.00	0.01	0.01	0.01	0.01	0.01
Chirk Castle	0.05	0.05	0.06	0.11	0.12	0.14
Nant-y-belan & Prynella Woods	0.02	0.03	0.03	0.05	0.05	0.06
Barracks Field	0.04	0.04	0.05	0.08	0.09	0.11
Pentre Wood	0.07	0.08	0.10	0.15	0.16	0.20
Ceod-Y-Canal Wood	0.07	0.07	0.09	0.15	0.16	0.19
Various Ancient Woodlands	0.07	0.08	0.10	0.15	0.16	0.20

Table 1.6 – Results – Normal Operations – Nitrogen Deposition

Site	NCL Class	Lower Critical Load (kgN/ha/yr)	N Deposition - kgN/ha/yr				
			Permitted Facility - Baseline	Baseline + OSB	Proposed	Impact from Baseline	Impact from Permitted Proposed (i.e. from OSB)
River Dee and Bala Lake SAC, SSSI	Not Sensitive	-	-	-	-	-	
Berwyn and South Clwyd Mountains SAC	Raised and blanket bogs	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Dry heaths	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Semi-dry perennial calcareous grassland	10	0.47%	0.57%	0.67%	0.20%	
Berwyn and South Clwyd Mountains SAC	Valley mires, poor fens and transition mires	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Arctic, alpine and subalpine scrub habitats (no direct correspondence with EUNIS habitat)	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Arctic-alpine calcareous grassland (APIS advise no direct correspondence with EUNIS habitat)	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Arctic-alpine calcareous grassland (APIS advise no direct correspondence with EUNIS habitat)	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Northern wet heath	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Arctic, alpine and subalpine scrub habitats (no direct correspondence with EUNIS habitat)	5	0.93%	1.14%	1.34%	0.40%	
Berwyn and South Clwyd Mountains SAC	Non-Mediterranean dry acid and neutral closed grassland	6	0.78%	0.95%	1.12%	0.34%	



Site	NCL Class	Lower Critical Load (kgN/ha/yr)	N Deposition - kgN/ha/yr				
			Permitted Facility - Baseline	Baseline + OSB	Proposed	Impact from Baseline	Impact from Permitted Proposed (i.e. from OSB)
Berwyn and South Clwyd Mountains SAC	Acidophilous Quercus forest	10	0.91%	1.11%	1.27%	0.35%	
Berwyn and South Clwyd Mountains SAC	Carpinus and Quercus mesic deciduous forest	15	0.61%	0.74%	0.84%	0.24%	
Berwyn and South Clwyd Mountains SAC	Rich fens	15	0.31%	0.38%	0.45%	0.13%	
Berwyn SPA	Northern wet heath: Calluna-dominated wet heath (upland moorland)	5	0.53%	0.65%	0.78%	0.25%	
Berwyn SPA	Northern wet heath: Calluna-dominated wet heath (upland moorland)	5	0.53%	0.65%	0.78%	0.25%	
Berwyn SPA	Northern wet heath: Calluna-dominated wet heath (upland moorland)	5	0.53%	0.65%	0.78%	0.25%	
Berwyn SPA	Broadleaved deciduous woodland	10	0.52%	0.64%	0.73%	0.22%	
Chirk Castle SSSI	Broadleaved deciduous woodland	15	5.49%	6.59%	7.23%	1.75%	
Chirk Castle SSSI	Grassland	10	4.25%	5.08%	5.72%	1.47%	
Nant-y-Belan & Prynella Woods SSSI	Carpinus and Quercus mesic deciduous forest	15	2.37%	2.83%	3.18%	0.81%	
Nant-y-Belan & Prynella Woods SSSI	Carpinus and Quercus mesic deciduous forest	15	2.37%	2.83%	3.18%	0.81%	
Nant-y-Belan & Prynella Woods SSSI	Acidophilous Quercus forest	10	3.55%	4.24%	4.77%	1.22%	
Nant-y-Belan & Prynella Woods SSSI	Broadleaved deciduous woodland	10	3.55%	4.24%	4.77%	1.22%	
Barracks Field LWS	Low and medium altitude hay meadows	10	2.95%	3.58%	4.21%	1.25%	
Canal Wood LWS	Carpinus and Quercus mesic deciduous forest	15	7.41%	8.56%	9.65%	2.24%	
Pentre Wood LWS	Broadleaved deciduous woodland	10	10.90%	13.15%	14.85%	3.95%	

Site	NCL Class	Lower Critical Load (kgN/ha/yr)	N Deposition - kgN/ha/yr				
			Permitted Facility - Baseline	Baseline + OSB	Proposed	Impact from Baseline	Impact from Permitted Proposed (i.e. from OSB)
Various ancient woodlands	Broadleaved deciduous woodland	10	10.90%	13.15%	14.85%	3.95%	

Table 1.6 – Results – Normal Operations – Acid Deposition

Site	NCL Class	Lower Critical Load (CLMaxN keqN/ha/yr)	N Deposition - kgN/ha/yr				
			Permitted Facility - Baseline	Baseline + OSB	Proposed	Impact from Baseline	Impact from Permitted Proposed (i.e. from OSB)
River Dee and Bala Lake SAC, SSSI	Not Sensitive	-	-	-	-	-	-
Johnstown Newt Sites SAC	Not Sensitive	-	-	-	-	-	-
Berwyn and South Clwyd Mountains SAC	Montane	0.551	1.14%	1.27%	1.56%	0.42%	0.29%
Berwyn and South Clwyd Mountains SAC	Bogs	0.66	0.95%	1.06%	1.30%	0.35%	0.24%
Berwyn and South Clwyd Mountains SAC	Calcareous grassland (using base cation)	4.856	0.13%	0.14%	0.18%	0.05%	0.03%
Berwyn and South Clwyd Mountains SAC	Dwarf shrub heath	0.882	0.71%	0.79%	0.97%	0.26%	0.18%
Berwyn and South Clwyd Mountains SAC	Unmanaged broadleaved / coniferous woodland	0.748	1.72%	1.92%	2.31%	0.59%	0.40%
Berwyn SPA	Dwarf shrub heath	1.142	0.42%	0.45%	0.59%	0.17%	0.14%
Berwyn SPA	Unmanaged broadleaved / coniferous woodland	0.89	0.85%	0.94%	1.16%	0.31%	0.21%
Chirk Castle SSSI	Unmanaged broadleaved / coniferous woodland	1.864	5.95%	6.58%	7.77%	1.82%	1.19%
Chirk Castle SSSI	Calcareous grassland (using base cation)	4.856	0.96%	1.06%	1.25%	0.30%	0.20%
Nant-y-belan & Prynella Woods SSSI	Unmanaged broadleaved / coniferous woodland	1.879	2.52%	2.79%	3.35%	0.83%	0.56%
Barracks Field	Calcareous grassland (using base cation)	5.071	0.76%	0.85%	1.04%	0.28%	0.19%
Barracks Field	Acid grassland	2.088	1.85%	2.07%	2.54%	0.68%	0.47%
Pentre Wood	Unmanaged broadleaved / coniferous woodland	1.873	7.79%	8.65%	10.41%	2.62%	1.76%
Ceod-Y-Canal Wood	Unmanaged broadleaved / coniferous woodland	1.864	7.90%	8.56%	10.27%	2.37%	1.71%

Site	NCL Class	Lower Critical Load (CLMaxN keqN/ha/yr)	N Deposition - kgN/ha/yr				
			Permitted Facility - Baseline	Baseline + OSB	Proposed	Impact from Baseline	Impact from Permitted Proposed (i.e. from OSB)
Various Ancient Woodlands	Unmanaged broadleaved / coniferous woodland	1.876	7.78%	8.64%	10.40%	2.62%	1.76%



