Technical Memorandum

To:	Chris Emery	**From:**	Martin Baines
Company:	Kronospan Ltd	**SLR Consulting Limited**	
cc:	Emily Owen, SLR	**Date:**	13 December 2023
		Project No.	410.V05415.00009

RE: Kronospan Lorry Park and Access Road
Floodplain Compensation Assessment

Introduction

Kronospan are proposing to develop a new access road, lorry park, weighbridge, wood storage area and substation on land to the north of their existing operations at Holyhead Road, Chirk, LL14 5NT.

Documentation was prepared and submitted to support a pre-app and detailed comments were received from stakeholders on this documentation. As a result of this consultation, agreement has been reached with regard to a reduction in scale of the proposed lorry parking area.

SLR Consulting (SLR) prepared a Flood Consequence Assessment (FCA) for the development proposals and a surface water drainage strategy to manage runoff from the development areas. The FCA report highlighted a number of locations along the Afon Bradley corridor where the bottom of embankments for the new development platform encroaches within the floodplain extent for the watercourse.

Natural Resources Wales (NRW) provided comment (NRW ref: CAS-201398-X4Y1) on this interaction with the floodplain and requested that the loss of flood storage be quantified and any loss of flood storage resulting from the development should be compensated for, calculated on a level for level basis.

This technical note details the areas where assessment has been undertaken and provides a commitment to create compensation storage and evidence that this storage will provide appropriate floodplain compensation on land within the ownership of Kronospan.

Floodplain Encroachment

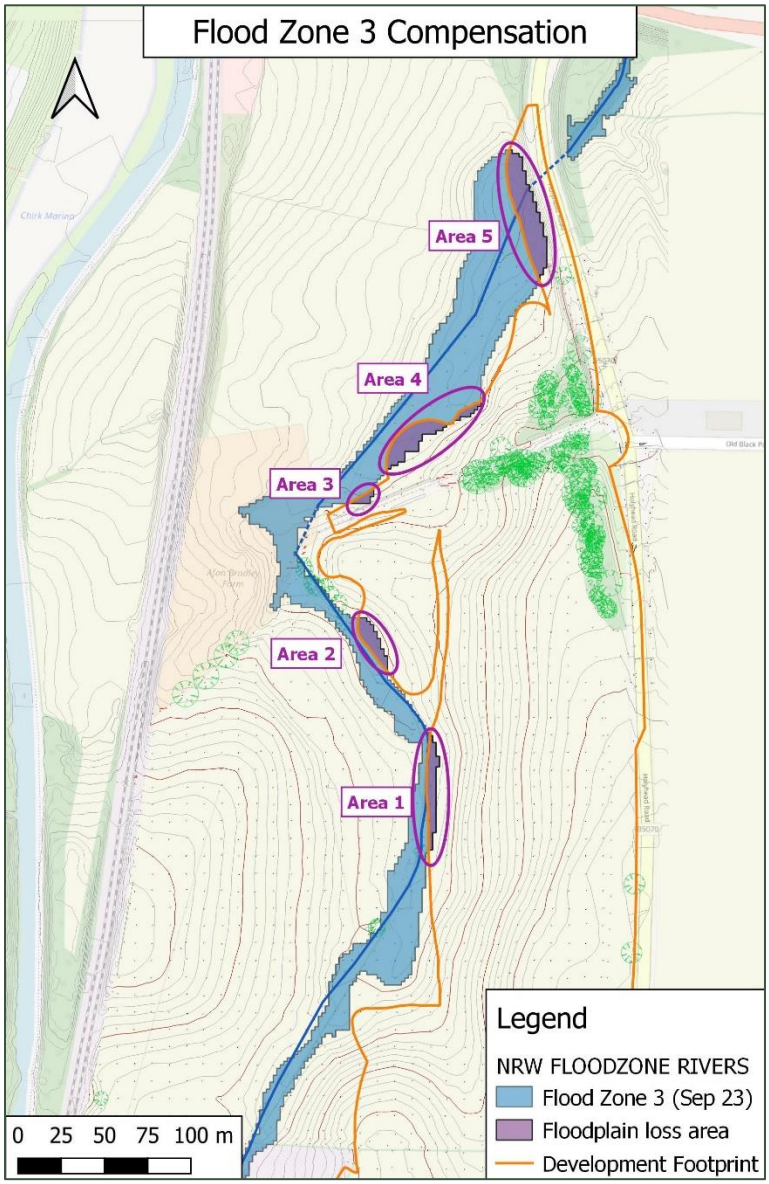
The proposed development does encroach onto the floodplain therefore compensatory floodplain storage has been proposed. The areas of encroachment are illustrated in Figure 1 below. For each area of encroachment, a peak water level has been estimated based on the maximum ground elevation covered by the flood extent mapping within each respective area. The elevation data is based on topographical survey information undertaken for the planning application and project design process.

The peak water levels estimated for each encroachment area are detailed in Table 1.

Table 1 Peak Water Level Estimates

Encroachment Area	Peak Water Level (m AOD)
Area 1	88.25m
Area 2	87.45m
Area 4	84.50m
Area 5	84.05m

Figure 1 Floodplain Encroachment Areas



Area 3

The small area of floodplain encroachment detailed at Area 3 as not been included in the assessment as the floodplain at this location does not appear realistic. The existing landform at this location is dominated by an embankment to the existing farm track which would confine any out of bank flooding. This is evident in the topographic survey for the site. The proposed development at this location includes upgrade to the existing track.

Given the improbable nature of the floodplain extent at this location and the conservative nature of the assessment and application of compensatory storage at other locations, no further assessment has been undertaken for Area 3.

Loss in Floodplain Capacity

An assessment was undertaken in AutoCAD on the Digital Elevation Model (DEM) generated from topographic survey data (existing condition) over the extent of the predicted loss in floodplain capacity for a 1% AEP event (represented by the shaded areas in Figure

1). This assessment calculated the elevation / volume relationship for each area assessed in 100mm elevation intervals. Results are provided in Table 2 to Table 5 below.

Table 2 Loss in Floodplain Volume – Area 1

Elevation (m AOD)	Cumulative Loss in Floodplain Volume (m^3)	Floodplain Loss per 100mm Level Interval (m^3)
87.50	0.000	0.000
87.60	0.003	0.003
87.70	0.297	0.294
87.80	1.656	1.359
87.90	5.287	3.631
88.00	12.333	7.046
88.10	23.967	11.634
88.20	40.977	17.010
88.25	51.675	10.698

Table 3 Loss in Floodplain Volume – Area 2

Elevation (m AOD)	Cumulative Loss in Floodplain Volume (m^3)	Floodplain Loss per 100mm Level Interval (m^3)
86.70	0.033	0.033
86.80	0.496	0.463
86.90	2.546	2.050
87.00	7.783	5.237
87.10	17.184	9.401
87.20	30.625	13.441
87.30	48.736	18.111
87.40	72.333	23.597
87.45	86.432	14.099

Table 4 Loss in Floodplain Volume – Area 4

Elevation (m AOD)	Cumulative Loss in Floodplain Volume (m^3)	Floodplain Loss per 100mm Level Interval (m^3)
83.70	0.370	0.370
83.80	0.955	0.585
83.90	3.707	2.752
84.00	13.153	9.446
84.10	37.884	24.731
84.20	71.054	33.170
84.30	112.768	41.714
84.40	162.493	49.725
84.50	220.107	57.614

Table 5 Loss in Floodplain Volume – Area 5

Elevation (m AOD)	Cumulative Loss in Floodplain Volume (m^3)	Floodplain Loss per 100mm Level Interval (m^3)
82.00	0.000	0.000
82.10	1.244	1.244
82.20	3.305	2.061
82.30	6.280	2.975
82.40	10.256	3.976
82.50	15.438	5.182
82.60	22.875	7.437
82.70	32.397	9.522
82.80	44.916	12.519
82.90	61.601	16.685
83.00	83.982	22.381
83.10	112.671	28.689
83.20	145.617	32.946
83.30	183.157	37.540
83.40	225.640	42.483
83.50	273.407	47.767
83.60	326.199	52.792
83.70	383.425	57.226
83.80	445.412	61.987
83.90	512.531	67.119
84.00	585.168	72.637
84.05	623.530	38.362

Floodplain Compensatory Storage Areas

NRW requirements state that no floodplain storage can be removed from fluvial catchments; therefore the storage volume removed by construction on the development site must be accommodated elsewhere on a level for level basis. The location where storage is created should ideally be immediately adjacent and hydraulically connected to the area where flood storage is being lost and will typically involve land that is out of the floodplain being brought into the floodplain.

To compensate for the loss in floodplain volumes, indicative areas for excavation to provide compensation are included in the drawing at Appendix A. The compensations areas and supporting calculations demonstrate that the principal of floodplain compensation can be achieved on land that is under the control of the applicant. The final detail for regrading of floodplain compensation areas will be defined post consent.

Assessment undertaken in AutoCAD has been used to determine an appropriate completed ground surface that creates additional flood volumes at each level for the respective areas. This will ensure that the compensatory storage provided back to the floodplain exceeds the floodplain lost due to the development.

The floodplain storage gains for the indicative areas are detailed in Table 6 to Table 9.

Table 6 Gain in Floodplain Volume – Area 1

Elevation (m AOD)	Cumulative Gain in Floodplain Volume (m^3)	Floodplain Gain per 100mm Level Interval (m^3)
87.50	0.000	0.000
87.60	0.441	0.441
87.70	22.107	21.666
87.80	47.250	25.143
87.90	73.904	26.654
88.00	101.140	27.236
88.10	127.552	26.412
88.20	152.669	25.117
88.25	164.609	11.940

Table 7 Gain in Floodplain Volume – Area 2

Elevation (m AOD)	Cumulative Gain in Floodplain Volume (m^3)	Floodplain Gain per 100mm Level Interval (m^3)
86.70	1.393	1.393
86.80	11.481	10.088
86.90	29.851	18.370
87.00	54.197	24.346
87.10	75.127	20.930
87.20	96.913	21.786
87.30	120.052	23.139
87.40	146.510	26.458
87.45	160.720	14.210

Table 8 Gain in Floodplain Volume – Area 4

Elevation (m AOD)	Cumulative Gain in Floodplain Volume (m^3)	Floodplain Gain per 100mm Level Interval (m^3)
83.70	4.402	4.402
83.80	34.309	29.907
83.90	70.629	36.320
84.00	111.936	41.307
84.10	156.700	44.764
84.20	204.596	47.896
84.30	255.259	50.663
84.40	309.235	53.976
84.50	367.316	58.081

Table 9 Gain in Floodplain Volume – Area 5

Elevation (m AOD)	Cumulative Gain in Floodplain Volume (m^3)	Floodplain Gain per 100mm Level Interval (m^3)
82.00	0.000	0.000
82.10	7.470	7.470
82.20	84.922	77.452
82.30	168.816	83.894
82.40	256.685	87.869
82.50	349.740	93.055
82.60	447.086	97.346
82.70	546.289	99.203
82.80	645.449	99.160
82.90	744.433	98.984
83.00	843.284	98.851
83.10	942.188	98.904
83.20	1043.212	101.024
83.30	1146.723	103.511
83.40	1252.851	106.128
83.50	1361.750	108.899
83.60	1473.739	111.989
83.70	1589.603	115.864
83.80	1709.480	119.877
83.90	1833.447	123.967
84.00	1961.591	128.144
84.05	2026.330	64.739

Conclusion

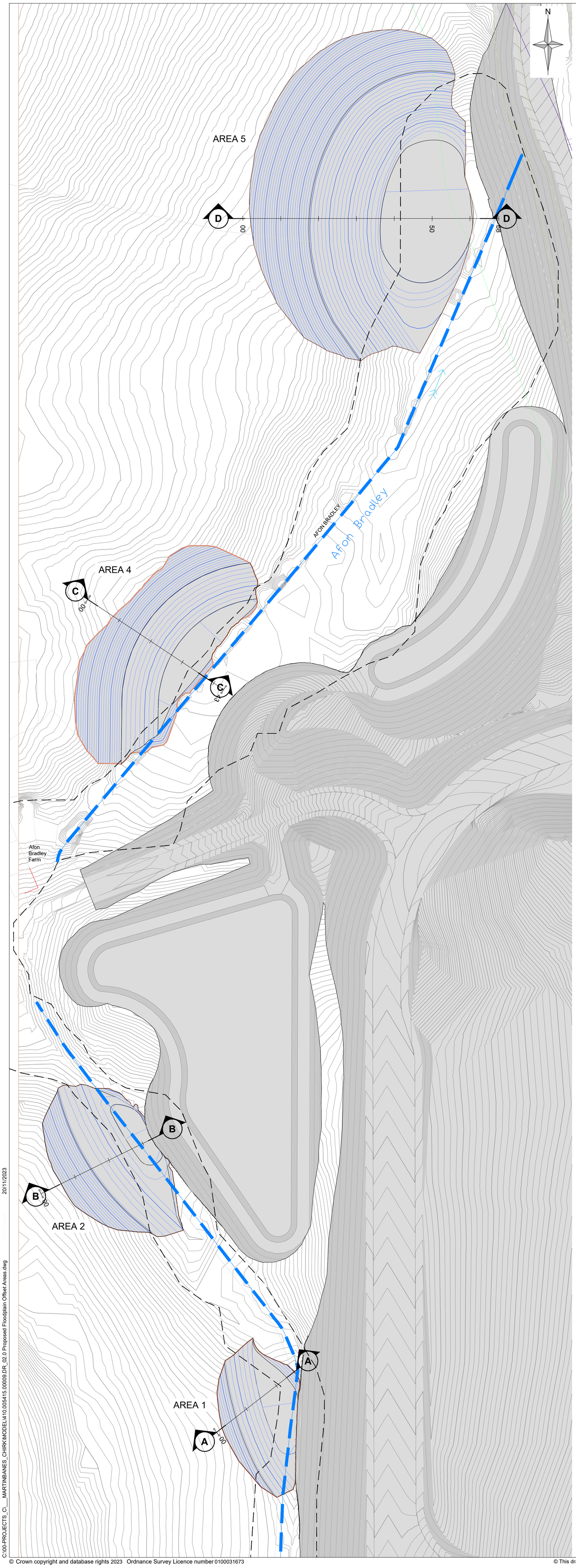
A summary of the loss and gain in floodplain storage volumes for the 1% AEP event is provided in Table 10.

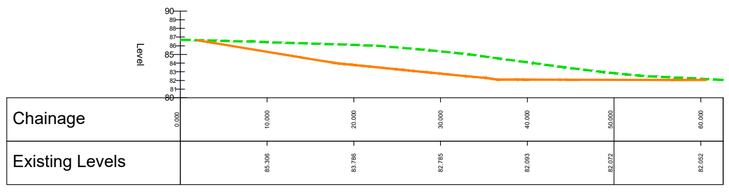
Table 10 Loss vs. Gain in Floodplain Capacity

Encroachment Area	Cumulative Total Loss (m^3)	Cumulative Total Gain (m^3)	Storage Added to Floodplain (m^3)
Area 1	51.675	164.609	112.934
Area 2	86.432	160.720	74.288
Area 4	220.107	367.316	147.209
Area 5	623.530	2026.330	1402.800

Table 10 shows that the proposed floodplain compensation scheme has identified land that would be available to fully compensate for the loss in the 1% AEP floodplain volume at all elevations between 82.0m AOD and 88.25m AOD. The scheme would also provide significant betterment to the catchment by providing an increase in storage to the floodplain. This will contribute to reducing risk to downstream areas during more extreme events.

Appendix A
Proposed Floodplain Compensation Technical Drawing

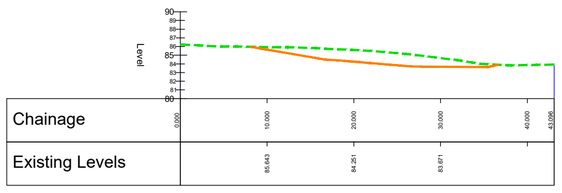




SECTION D - D

LEVEL m AOD	TOTAL VOL FOR BAND REQUIRED	PROPOSED BAND VOLUME m3
82.00	0.000	0.000
82.10	1.244	7.470
82.20	2.061	77.452
82.30	2.975	83.894
82.40	3.976	87.869
82.50	5.182	93.055
82.60	7.437	97.346
82.70	9.522	99.203
82.80	12.519	99.160
82.90	16.685	98.984
83.00	22.381	98.851
83.10	28.689	98.904
83.20	32.946	101.024
83.30	37.540	103.511
83.40	42.483	106.128
83.50	47.767	108.899
83.60	52.792	111.989
83.70	57.226	115.864
83.80	61.987	119.877
83.90	67.119	123.967
84.00	72.637	128.144
84.05	38.362	64.739

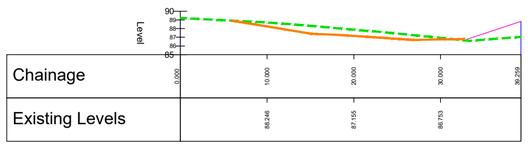
AREA 5 LEVELS 82.0m TO 84.050m



SECTION C - C

LEVEL AOD m	TOTAL VOLUME FOR BAND REQUIRED	PROPOSED BAND VOLUME m3
83.70	0.370	4.402
83.80	0.585	29.907
83.90	2.752	36.320
84.00	9.446	41.307
84.10	24.731	44.764
84.20	33.170	47.896
84.30	41.714	50.663
84.40	49.725	53.976
84.50	57.614	58.081

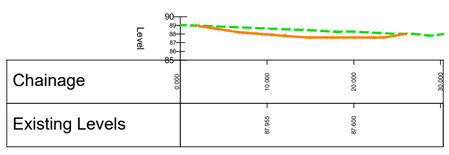
AREA 4 LEVELS 83.7m TO 84.5m



SECTION B - B

LEVEL AOD m	TOTAL VOL FOR BAND REQUIRED	PROPOSED BAND VOLUME m3
86.70	0.033	1.393
86.80	0.463	10.088
86.90	2.050	18.370
87.00	5.237	24.346
87.10	9.401	20.930
87.20	13.441	21.786
87.30	18.111	23.139
87.40	23.597	26.458
87.45	14.099	14.210

AREA 2 LEVELS 86.7m TO 87.45m



SECTION A - A

LEVEL AOD m	TOTAL VOL FOR BAND REQUIRED	PROPOSED BAND VOLUME m3
87.50	0.000	0.000
87.60	0.003	0.441
87.70	0.294	21.666
87.80	1.359	25.143
87.90	3.631	26.654
88.00	7.046	27.236
88.10	11.634	26.412
88.20	17.010	25.117
88.25	10.698	11.940

AREA 1 LEVELS 87.5m TO 88.25m

0 5 10 15 20 25 30 35 40 45 50m

Scale 1:500

Notes:

1.

Legend:

- EXISTING GROUND PROFILE
- PROPOSED GROUND PROFILE
- EXISTING LINE OF RIVER
- PROPOSED MAJOR CONTOURS AT 500mm INTERVALS
- PROPOSED MINOR CONTOURS AT 100mm INTERVALS
- EXISTING CONTOURS AT 100mm INTERVALS
- APPROXIMATE LINE OF FLOODPLAIN

Rev	Amendments	Date	By	Chk	Auth
0	OS Data included , river shown.	11/23	PS	MB	MB

SLR

www.slrconsulting.com

Drawing Status & Suitability Code: **PRELIMINARY**

Client: KRONOSPAN LTD.

Project: CHIRK FLOOD RISK AND DRAINAGE ASSESSMENT

Drawing Title: PROPOSED FLOODPLAIN COMPENSATION

Scale	SLR Project No.
1:500 @ A1	410.05415.00009

Designed	Drawn	Checked	Authorised
PS/IMR	PS	IMR/MB	MB
Date 10/23	Date 10/23	Date 10/23	Date 10/23

Drawing Number: **02** Rev.: **0**

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