Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-30645	22-30645	22-30645	22-30645
Quotation No.: Q21-23509			Chemtest Sample ID.:		1486009	1486010	1486011	1486012
			Sample Location:		TP07	TP07	TP07	TP07
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.7	1.5	2.5
			Date Sampled:		05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot R[redacted]
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-31068-1
Initial Date of Issue:	08-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-0403S DAA South Apron
Quotation No.:	Q21-23509
Order No.:	
No. of Samples:	3
Turnaround (Wkdays):	7
Date Approved:	08-Sep-2022
Approved By:	

Date Received:	15-Aug-2022
Date Instructed:	30-Aug-2022
Results Due:	07-Sep-2022

Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd				Chemtest Job No.:		22-31068	22-31068	22-31068
Quotation No.: Q21-23509				Chemtest Sample ID.:		1487819	1487820	1487821
				Sample Location:		TP06	TP06	TP06
				Sample Type:		SOIL	SOIL	SOIL
				Bottom Depth (m):		0.30	1.00	1.70
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH	U	1010	2:1		N/A	8.9	8.6	8.1
Ammonia (Free)	N	1220	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Nitrite	U	1220	2:1	mg/l	0.020	< 0.020	< 0.020	< 0.020
Nitrate	U	1220	2:1	mg/l	0.50	< 0.50	< 0.50	< 0.50
Sulphate	U	1220	2:1	mg/l	1.0	4.4	2.3	77
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15	33	54	360
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.40	< 0.20	< 0.20
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	15	11	< 10
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	0.57	0.53	1.3
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05	0.08
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	1.6
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	180
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	< 2.5	< 2.5	2.8
Cadmium (Total)	N	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	89	27	5.9
Chromium (Trivalent)	N	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0	14	17	13
Naphthalene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-31068	22-31068	22-31068
Quotation No.: Q21-23509			Chemtest Sample ID.:		1487819	1487820	1487821
			Sample Location:		TP06	TP06	TP06
			Sample Type:		SOIL	SOIL	SOIL
			Bottom Depth (m):		0.30	1.00	1.70
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	2.6	7.8	11
pH	U	2010		4.0	[A] 9.4	[A] 8.8	[A] 8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.82	[A] < 0.40	[A] < 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] < 0.010	[A] 0.015	[A] 0.24
Total Sulphur	U	2175	%	0.010	[A] 0.14	[A] 0.063	[A] 0.28
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 3.4	[A] 5.9
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 6.1	[A] 23	[A] 6.9
Sulphate (Total)	U	2430	%	0.010	[A] 0.19	[A] 0.079	[A] 0.58
Arsenic	U	2455	mg/kg	0.5	6.1	6.1	11
Cadmium	U	2455	mg/kg	0.10	0.64	0.18	1.8
Chromium	U	2455	mg/kg	0.5	6.8	13	13
Copper	U	2455	mg/kg	0.50	9.4	140	27
Mercury	U	2455	mg/kg	0.05	< 0.05	0.08	0.05
Nickel	U	2455	mg/kg	0.50	15	12	47
Lead	U	2455	mg/kg	0.50	8.0	64	22
Selenium	U	2455	mg/kg	0.25	0.78	0.58	4.2
Zinc	U	2455	mg/kg	0.50	30	56	73
Chromium (Trivalent)	N	2490	mg/kg	1.0	6.8	13	13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	[A] 0.41	[A] 1.3	[A] 1.7
Total TPH >C6-C40	U	2670	mg/kg	10	[A] < 10	[A] 17	[A] < 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic T[redacted]C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-31068	22-31068	22-31068
Quotation No.: Q21-23509			Chemtest Sample ID.:		1487819	1487820	1487821
			Sample Location:		TP06	TP06	TP06
			Sample Type:		SOIL	SOIL	SOIL
			Bottom Depth (m):		0.30	1.00	1.70
			Asbestos Lab:		DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] 3.5
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] 1.2
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

UKAS TESTING
2183

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot R[redacted]
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-31392-1
Initial Date of Issue:	08-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister
Project	21-0403S DAA South Apron
Quotation No.:	Q21-23509
Order No.:	
No. of Samples:	3
Turnaround (Wkdays):	7
Date Approved:	08-Sep-2022
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	17-Aug-2022
Date Instructed:	30-Aug-2022
Results Due:	07-Sep-2022

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd				Chemtest Job No.:		22-31392	22-31392	22-31392
Quotation No.: Q21-23509				Chemtest Sample ID.:		1489402	1489403	1489404
				Sample Location:		TP08	TP08	TP08
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.9	1.5
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH	U	1010	2:1		N/A	8.5	8.3	8.9
Ammonia (Free)	N	1220	2:1	mg/l	0.050	< 0.050	< 0.050	0.075
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.070	0.32	0.26
Nitrite	U	1220	2:1	mg/l	0.020	< 0.020	0.47	2.2
Nitrate	U	1220	2:1	mg/l	0.50	2.2	2.9	10
Sulphate	U	1220	2:1	mg/l	1.0	28	230	9.8
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15	80	410	85
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	2.0	2.8	0.47
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	18	98	23
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	2.9	4.3	1.8
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.1	5.4	1.2
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	0.54	0.65	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	2.4	2.8	0.82
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	3.0	3.8	< 2.5
Cadmium (Total)	N	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	180	38	7.7
Chromium (Trivalent)	N	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0	23	52	28
Naphthalene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-31392	22-31392	22-31392
Quotation No.: Q21-23509			Chemtest Sample ID.:		1489402	1489403	1489404
			Sample Location:		TP08	TP08	TP08
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.3	0.9	1.5
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	5.1	17	11
pH	U	2010		4.0	[A] 9.1	[A] 8.5	[A] 9.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] 2.1	[A] < 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.024	[A] 0.26	[A] 0.010
Total Sulphur	U	2175	%	0.010	[A] 0.18	[A] 0.098	[A] 0.021
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 3.6	[A] 290	[A] 11
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	0.015	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 12	[A] 13	[A] 4.0
Sulphate (Total)	U	2430	%	0.010	[A] 0.17	[A] 0.13	[A] 0.055
Arsenic	U	2455	mg/kg	0.5	13	6.3	5.2
Cadmium	U	2455	mg/kg	0.10	1.6	0.90	0.93
Chromium	U	2455	mg/kg	0.5	5.7	9.6	5.3
Copper	U	2455	mg/kg	0.50	18	14	12
Mercury	U	2455	mg/kg	0.05	0.15	0.06	< 0.05
Nickel	U	2455	mg/kg	0.50	17	22	18
Lead	U	2455	mg/kg	0.50	66	23	9.0
Selenium	U	2455	mg/kg	0.25	0.41	0.46	0.41
Zinc	U	2455	mg/kg	0.50	260	48	33
Chromium (Trivalent)	N	2490	mg/kg	1.0	5.7	9.6	5.3
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	[A] 28	[A] 0.97	[A] 2.8
Total TPH >C6-C40	U	2670	mg/kg	10	[A] 12	[A] < 10	[A] 14
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic T C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-31392	22-31392	22-31392
Quotation No.: Q21-23509			Chemtest Sample ID.:		1489402	1489403	1489404
			Sample Location:		TP08	TP08	TP08
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.3	0.9	1.5
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1489402			TP08		A	Amber Glass 250ml
1489402			TP08		A	Amber Glass 60ml
1489402			TP08		A	Plastic Tub 500g
1489403			TP08		A	Amber Glass 250ml
1489403			TP08		A	Amber Glass 60ml
1489403			TP08		A	Plastic Tub 500g
1489404			TP08		A	Amber Glass 250ml
1489404			TP08		A	Amber Glass 60ml
1489404			TP08		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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N	Unaccredited
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I/S	Insufficient Sample
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LOD	Limit of detection

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All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
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customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-31605-1
Initial Date of Issue:	08-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister Rachel White
Project	21-0403S DAA South Apron
Quotation No.:	Q21-23509
Date Received:	18-Aug-2022
Order No.:	
Date Instructed:	30-Aug-2022
No. of Samples:	3
Turnaround (Wkdays):	7
Results Due:	07-Sep-2022
Date Approved:	08-Sep-2022
Approved By:	

Details:	Stuart Henderson, Technical Manager

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd				Chemtest Job No.:		22-31605	22-31605	22-31605
Quotation No.: Q21-23509				Chemtest Sample ID.:		1490306	1490307	1490308
				Sample Location:		TP12	TP12	TP12
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		0.5	1	1.5
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH	U	1010	2:1		N/A	8.7	8.3	8.5
Ammonia (Free)	N	1220	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Nitrite	U	1220	2:1	mg/l	0.020	0.082	0.020	< 0.020
Nitrate	U	1220	2:1	mg/l	0.50	< 0.50	< 0.50	< 0.50
Sulphate	U	1220	2:1	mg/l	1.0	5.7	4.5	7.9
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15	78	87	74
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	2.0	1.1	0.71
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	14	13	15
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	2.2	2.2	2.9
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.1	1.8	1.8
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	0.59	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	2.3	1.9	2.0
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	< 2.5	4.0	< 2.5
Cadmium (Total)	N	1455	2:1	µg/l	0.11	< 0.11	0.13	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	270	870	78
Chromium (Trivalent)	N	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	[A] < 20	[A] < 20	[A] < 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0	22	30	18
Naphthalene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-31605	22-31605	22-31605
Quotation No.: Q21-23509			Chemtest Sample ID.:		1490306	1490307	1490308
			Sample Location:		TP12	TP12	TP12
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.5	1	1.5
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	7.9	13	11
pH	U	2010		4.0	[A] 8.8	[A] 8.7	[A] 8.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 1.0	[A] 0.76	[A] < 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.023	[A] 0.019	[A] 0.014
Total Sulphur	U	2175	%	0.010	[A] 0.072	[A] 0.043	[A] 0.021
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 2.1	[A] 2.3	[A] 2.3
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 2.5	[A] 4.6	[A] 6.8
Sulphate (Total)	U	2430	%	0.010	[A] 0.081	[A] 0.029	[A] 0.051
Arsenic	U	2455	mg/kg	0.5	9.8	4.4	7.6
Cadmium	U	2455	mg/kg	0.10	1.1	0.86	1.2
Chromium	U	2455	mg/kg	0.5	12	6.9	7.7
Copper	U	2455	mg/kg	0.50	19	9.1	18
Mercury	U	2455	mg/kg	0.05	0.07	< 0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	27	15	32
Lead	U	2455	mg/kg	0.50	32	11	14
Selenium	U	2455	mg/kg	0.25	0.89	0.26	0.73
Zinc	U	2455	mg/kg	0.50	62	31	50
Chromium (Trivalent)	N	2490	mg/kg	1.0	12	6.9	7.7
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	[A] 1.4	[A] 0.52	[A] 1.1
Total TPH >C6-C40	U	2670	mg/kg	10	[A] 21	[A] < 10	[A] < 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd		Chemtest Job No.:			22-31605	22-31605	22-31605
Quotation No.: Q21-23509		Chemtest Sample ID.:			1490306	1490307	1490308
		Sample Location:			TP12	TP12	TP12
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.5	1	1.5
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1490306			TP12		A	Amber Glass 250ml
1490306			TP12		A	Amber Glass 60ml
1490306			TP12		A	Plastic Tub 500g
1490307			TP12		A	Amber Glass 250ml
1490307			TP12		A	Amber Glass 60ml
1490307			TP12		A	Plastic Tub 500g
1490308			TP12		A	Amber Glass 250ml
1490308			TP12		A	Amber Glass 60ml
1490308			TP12		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-32836-1
Initial Date of Issue:	08-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Alistair McQuat Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister Ciaran Dohert
Project	21-0403S DAA South Apron

Quotation No.:	Q21-23509	**Date Received:**	26-Aug-2022
Order No.:		**Date Instructed:**	30-Aug-2022
No. of Samples:	7		
Turnaround (Wkdays):	7	**Results Due:**	07-Sep-2022
Date Approved:	08-Sep-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd						Chemtest Job No.:	22-32836	22-32836	22-32836	22-32836	22-32836	22-32836	22-32836
Quotation No.: Q21-23509						Chemtest Sample ID.:	1495687	1495688	1495689	1495690	1495691	1495692	1495693
Order No.:						Client Sample Ref.:	1	2	3	4	1	2	3
						Sample Location:	TP18	TP18	TP18	TP18	TP19	TP19	TP19
						Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
						Top Depth (m):	0.5	0.8	1.5	2.5	0.3	1.0	1.5
						Date Sampled:	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**								
pH	U	1010	2:1		N/A		8.6	8.4	8.3	8.3	8.6	8.4	8.4
Ammonia (Free)	N	1220	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050		0.086	0.093	0.39	0.093	0.12	0.10	0.093
Nitrite	U	1220	2:1	mg/l	0.020		0.040	< 0.020	2.0	< 0.020	< 0.020	0.30	< 0.020
Nitrate	U	1220	2:1	mg/l	0.50		4.7	3.9	6.8	< 0.50	< 0.50	3.0	< 0.50
Sulphate	U	1220	2:1	mg/l	1.0		4.8	20	18	77	10	21	5.4
Cyanide (Total)	U	1300	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15		60	92	120	130	45	88	63
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20		0.66	1.9	2.0	0.33	0.51	1.9	< 0.20
Boron (Dissolved)	U	1455	2:1	µg/l	10.0		< 10	22	48	14	18	28	14
Copper (Dissolved)	U	1455	2:1	µg/l	0.50		1.9	3.1	6.1	1.2	0.70	2.3	1.4
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50		0.63	2.4	4.1	0.71	< 0.50	1.5	0.93
Lead (Dissolved)	U	1455	2:1	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50		0.79	1.5	3.8	27	0.82	1.6	0.95
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5		< 2.5	3.3	6.4	2.5	< 2.5	4.4	4.4
Cadmium (Total)	N	1455	2:1	µg/l	0.11		< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0		93	36	130	62	10	80	32
Chromium (Trivalent)	N	1490	2:1	µg/l	20		< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20		< 20	< 20	< 20	< 20	< 20	< 20	< 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0		19	26	36	16	11	23	30
Naphthalene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-32836	22-32836	22-32836	22-32836	22-32836	22-32836	22-32836
Quotation No.: Q21-23509			Chemtest Sample ID.:		1495687	1495688	1495689	1495690	1495691	1495692	1495693
Order No.:			Client Sample Ref.:		1	2	3	4	1	2	3
			Sample Location:		TP18	TP18	TP18	TP18	TP19	TP19	TP19
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.8	1.5	2.5	0.3	1.0	1.5
			Date Sampled:		24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type	U	2192		N/A	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	2.2	6.2	15	7.5	0.19	8.9	9.6
pH	U	2010		4.0	9.1	8.9	8.5	8.9	9.1	9.0	8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	< 0.40	1.2	< 0.40	< 0.40	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	0.012	0.039	0.010	0.017	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.040	< 0.010	0.028	0.029	0.021	0.025	0.014
Sulphur (Elemental)	U	2180	mg/kg	1.0	2.1	4.9	11	3.3	5.6	5.1	2.8
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	5.5	2.2	6.9	7.0	6.7	3.5	6.8
Sulphate (Total)	U	2430	%	0.010	0.043	0.030	0.062	0.54	0.062	0.019	0.033
Arsenic	U	2455	mg/kg	0.5	8.9	9.7	5.7	5.6	5.6	6.3	5.7
Cadmium	U	2455	mg/kg	0.10	0.78	0.43	0.92	1.1	0.29	0.23	1.2
Chromium	U	2455	mg/kg	0.5	8.3	10	7.8	6.0	3.2	7.2	6.2
Copper	U	2455	mg/kg	0.50	15	15	14	14	7.5	9.7	15
Mercury	U	2455	mg/kg	0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	21	23	21	24	8.8	14	23
Lead	U	2455	mg/kg	0.50	17	11	18	9.8	11	5.4	11
Selenium	U	2455	mg/kg	0.25	0.46	0.56	0.76	1.3	< 0.25	< 0.25	0.42
Zinc	U	2455	mg/kg	0.50	69	36	40	39	44	20	38
Chromium (Trivalent)	N	2490	mg/kg	1.0	8.3	10	7.8	6.0	3.2	7.2	6.2
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	1.0	0.95	< 0.40	1.9	1.3	0.48	0.79
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10	< 10	< 10	110	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic T C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-32836	22-32836	22-32836	22-32836	22-32836	22-32836	22-32836
Quotation No.: Q21-23509			Chemtest Sample ID.:		1495687	1495688	1495689	1495690	1495691	1495692	1495693
Order No.:			Client Sample Ref.:		1	2	3	4	1	2	3
			Sample Location:		TP18	TP18	TP18	TP18	TP19	TP19	TP19
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.8	1.5	2.5	0.3	1.0	1.5
			Date Sampled:		24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.31	< 0.10	< 0.10	0.14
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.11
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.10	< 0.10	0.13	0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	0.20	< 0.10	0.12	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	0.14	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	0.13	0.20	0.21	< 0.10	0.11
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	0.12	< 0.10	0.11	< 0.10	0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	22-33017-1
Initial Date of Issue:	12-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Alistair McQuat Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister Ciaran Dohert
Project	21-0403S DAA South Apron

Quotation No.:	Q21-23509	**Date Received:**	30-Aug-2022
Order No.:		**Date Instructed:**	30-Aug-2022
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	07-Sep-2022
Date Approved:	12-Sep-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot R[redacted]
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd				Chemtest Job No.:		22-33017	22-33017
Quotation No.: Q21-23509				Chemtest Sample ID.:		1496526	1496527
Order No.:				Client Sample Ref.:		1	2
				Sample Location:		TP17	TP17
				Sample Type:		SOIL	SOIL
				Top Depth (m):		0.3	1.0
				Date Sampled:		25-Aug-2022	25-Aug-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	2:1		N/A	8.2	8.2
Ammonia (Free)	N	1220	2:1	mg/l	0.050	< 0.050	< 0.050
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.24	0.093
Nitrite	U	1220	2:1	mg/l	0.020	0.19	< 0.020
Nitrate	U	1220	2:1	mg/l	0.50	5.2	6.3
Sulphate	U	1220	2:1	mg/l	1.0	4.0	4.6
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15	87	88
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.69	0.71
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	19	26
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	22	20
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	0.06
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.8	1.8
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.7	1.4
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	5.2	4.4
Cadmium (Total)	N	1455	2:1	µg/l	0.11	< 0.11	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	250	320
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0	32	32
Naphthalene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-33017	22-33017
Quotation No.: Q21-23509			Chemtest Sample ID.:		1496526	1496527
Order No.:			Client Sample Ref.:		1	2
			Sample Location:		TP17	TP17
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.3	1.0
			Date Sampled:		25-Aug-2022	25-Aug-2022
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	8.1	13
pH	U	2010		4.0	8.8	8.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.60	0.86
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.011	0.017
Total Sulphur	U	2175	%	0.010	0.035	0.026
Sulphur (Elemental)	U	2180	mg/kg	1.0	2.6	2.8
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	1.1	1.1
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	4.9	3.7
Sulphate (Total)	U	2430	%	0.010	0.072	0.093
Arsenic	U	2455	mg/kg	0.5	7.6	7.6
Cadmium	U	2455	mg/kg	0.10	1.2	1.1
Chromium	U	2455	mg/kg	0.5	9.5	9.0
Copper	U	2455	mg/kg	0.50	20	19
Mercury	U	2455	mg/kg	0.05	0.08	0.11
Nickel	U	2455	mg/kg	0.50	25	23
Lead	U	2455	mg/kg	0.50	31	33
Selenium	U	2455	mg/kg	0.25	0.63	0.55
Zinc	U	2455	mg/kg	0.50	59	54
Chromium (Trivalent)	N	2490	mg/kg	1.0	9.5	9.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	1.9	2.7
Total TPH >C6-C40	U	2670	mg/kg	10	57	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic T C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-33017	22-33017
Quotation No.: Q21-23509			Chemtest Sample ID.:		1496526	1496527
Order No.:			Client Sample Ref.:		1	2
			Sample Location:		TP17	TP17
			Sample Type:		SOIL	SOIL
			Top Depth (m):		0.3	1.0
			Date Sampled:		25-Aug-2022	25-Aug-2022
			Asbestos Lab:		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	0.12
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	0.16
Anthracene	U	2800	mg/kg	0.10	< 0.10	0.17
Fluoranthene	U	2800	mg/kg	0.10	0.13	0.20
Pyrene	U	2800	mg/kg	0.10	< 0.10	0.20
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	0.16
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	0.18
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	0.11	0.11
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	0.17	0.15
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	22-33417-1
Initial Date of Issue:	08-Sep-2022
Client	Causeway Geotech Ltd
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL
Contact(s):	Alistair McQuat Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister Ciaran Dohert
Project	21-0403S DAA South Apron

Quotation No.:	Q21-23509	**Date Received:**	01-Sep-2022
Order No.:		**Date Instructed:**	01-Sep-2022
No. of Samples:	6		
Turnaround (Wkdays):	7	**Results Due:**	09-Sep-2022
Date Approved:	08-Sep-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Results - Leachate

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd						Chemtest Job No.:	22-33417	22-33417	22-33417	22-33417	22-33417	22-33417
Quotation No.: Q21-23509						Chemtest Sample ID.:	1498434	1498435	1498436	1498437	1498438	1498439
Order No.:						Client Sample Ref.:	1	2	3	4	5	6
						Sample Location:	TP05	TP05	TP05	TP05	TP05	TP05
						Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
						Top Depth (m):	0.3	0.5	0.7	1	2	2.9
						Date Sampled:	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**							
pH	U	1010	2:1		N/A		8.5	8.4	8.2	8.1	8.2	8.1
Ammonia (Free)	N	1220	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	0.17	< 0.050
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050		0.19	0.086	0.26	0.26	2.3	0.72
Nitrite	U	1220	2:1	mg/l	0.020		< 0.020	< 0.020	3.5	0.27	< 0.020	0.073
Nitrate	U	1220	2:1	mg/l	0.50		0.68	< 0.50	2.0	< 0.50	< 0.50	< 0.50
Sulphate	U	1220	2:1	mg/l	1.0		28	47	6.9	7.9	58	130
Cyanide (Total)	U	1300	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	2:1	mg/l	15		60	86	97	110	180	230
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20		0.61	0.95	0.76	0.41	7.7	1.2
Boron (Dissolved)	U	1455	2:1	µg/l	10.0		150	31	29	35	88	25
Copper (Dissolved)	U	1455	2:1	µg/l	0.50		0.77	0.56	5.7	4.8	2.8	2.8
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50		1.7	0.72	1.6	1.3	11	2.1
Lead (Dissolved)	U	1455	2:1	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50		4.0	5.3	4.5	3.3	9.6	180
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5		< 2.5	< 2.5	3.3	4.7	4.7	3.2
Cadmium (Total)	N	1455	2:1	µg/l	0.11		< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Iron (Dissolved)	N	1455	2:1	µg/l	5.0		41	5.9	23	44	< 5.0	10
Chromium (Trivalent)	N	1490	2:1	µg/l	20		< 20	< 20	< 20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20		< 20	< 20	< 20	< 20	< 20	< 20
Total Organic Carbon	U	1610	2:1	mg/l	2.0		16	15	32	37	50	2.4
Naphthalene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 21-0403S DAA South Apron

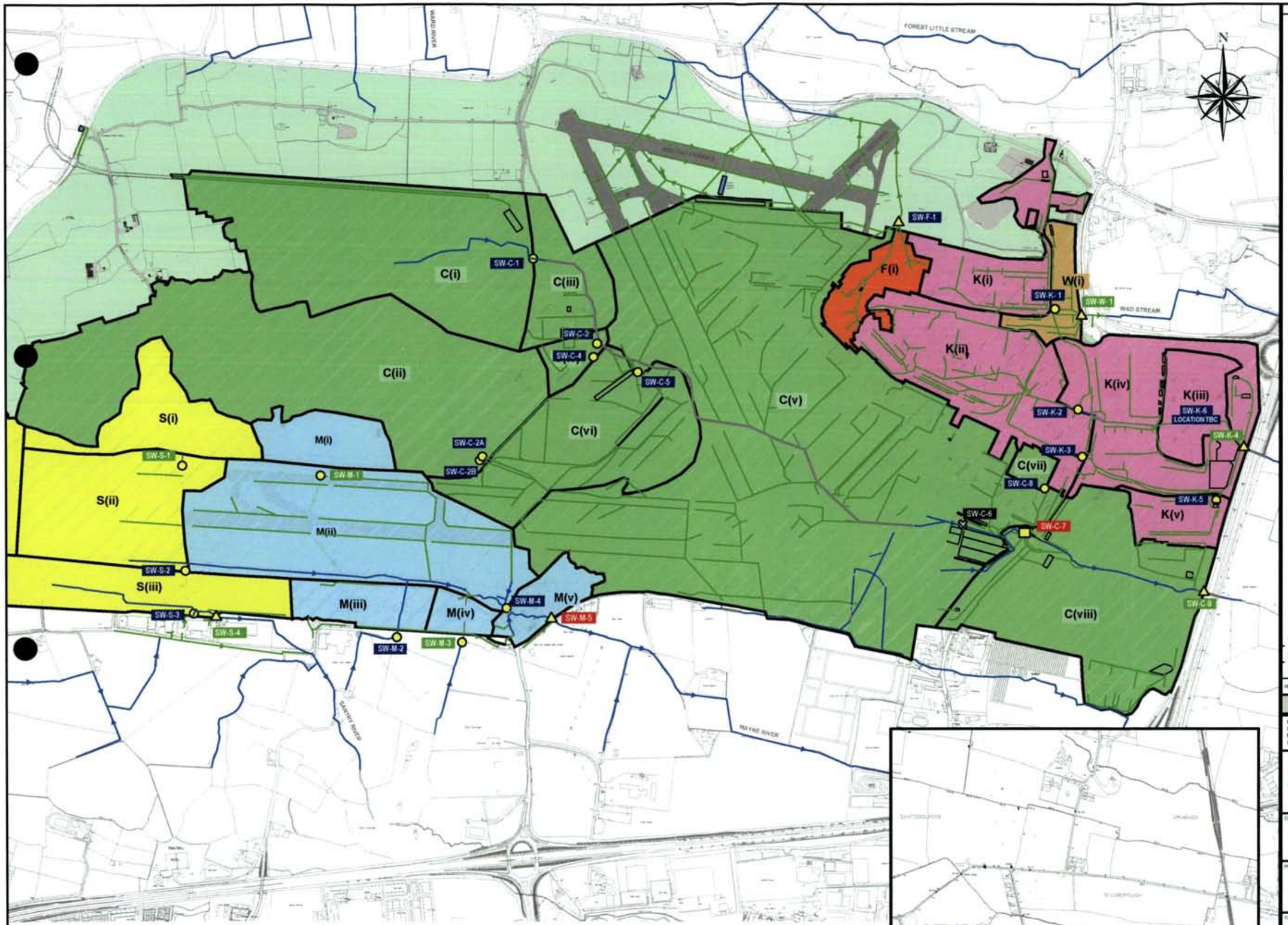
Client: Causeway Geotech Ltd				Chemtest Job No.:	22-33417	22-33417	22-33417	22-33417	22-33417	22-33417
Quotation No.: Q21-23509				Chemtest Sample ID.:	1498434	1498435	1498436	1498437	1498438	1498439
Order No.:				Client Sample Ref.:	1	2	3	4	5	6
				Sample Location:	TP05	TP05	TP05	TP05	TP05	TP05
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.3	0.5	0.7	1	2	2.9
				Date Sampled:	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.0	4.5	25	18	21	7.7
pH	U	2010		4.0	8.4	8.5	8.3	8.1	8.2	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.1	0.42	< 0.40	0.81	0.77	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.021	< 0.010	< 0.010	0.025	0.039	0.18
Total Sulphur	U	2175	%	0.010	0.070	0.060	0.069	0.53	0.17	0.80
Sulphur (Elemental)	U	2180	mg/kg	1.0	2.0	30	9.9	6.5	200	3.9
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	3.9	3.1	3.7	21	16	17
Sulphate (Total)	U	2430	%	0.010	0.12	0.078	0.097	0.19	0.59	0.18
Arsenic	U	2455	mg/kg	0.5	5.2	4.7	3.9	3.7	5.1	4.3
Cadmium	U	2455	mg/kg	0.10	0.76	1.1	0.85	0.68	1.0	0.64
Chromium	U	2455	mg/kg	0.5	6.1	11	8.5	8.2	7.2	5.1
Copper	U	2455	mg/kg	0.50	10	15	12	10	13	10
Mercury	U	2455	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	16	17	14	13	21	18
Lead	U	2455	mg/kg	0.50	9.3	11	9.0	8.6	11	8.8
Selenium	U	2455	mg/kg	0.25	0.88	0.73	0.54	0.46	1.3	1.4
Zinc	U	2455	mg/kg	0.50	25	54	44	41	48	31
Chromium (Trivalent)	N	2490	mg/kg	1.0	6.1	11	8.5	8.2	7.2	5.1
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	0.57	1.6	1.2	1.5	4.5	1.6
Total TPH >C6-C40	U	2670	mg/kg	10	14	86	71	42	32	36
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic T C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 21-0403S DAA South Apron

Client: Causeway Geotech Ltd			Chemtest Job No.:		22-33417	22-33417	22-33417	22-33417	22-33417	22-33417
Quotation No.: Q21-23509			Chemtest Sample ID.:		1498434	1498435	1498436	1498437	1498438	1498439
Order No.:			Client Sample Ref.:		1	2	3	4	5	6
			Sample Location:		TP05	TP05	TP05	TP05	TP05	TP05
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.3	0.5	0.7	1	2	2.9
			Date Sampled:		22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022	22-Aug-2022
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Appendix 12: Water



NOTES

LEGEND

- CATCHMENT BOUNDARY
- STREAMS / RIVERS
- STORM CULVERTS
- ATTENUATION AREAS (TANKS / PIPES BELOW GROUND)
- SURFACE WATER PIPELINES

SAMPLING

- COMPOSITE SAMPLING
- GRAB SAMPLING
- CONTINUOUS MONITORING
- COMPOSITE SAMPLING & CONTINUOUS MONITORING
- NO SAMPLING — SW-X-00
- WEEKLY SAMPLING — SW-X-00
- MONTHLY SAMPLING — SW-X-00
- QUARTERLY SAMPLING — SW-X-00

DRAFT

REV	DATE	DESCRIPTION	O	C	A
3	18.11.19	BOUNDARIES / SAMPLING LOCATIONS REV	AM	CD	NC
2	08.11.19	SAMPLING LOCATION REV	DS	CD	NC
1	08.11.19	BOUNDARIES / SAMPLING LOCATIONS REV	DH	CD	NC

PRELIMINARY

NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park, Nutgrove Avenue, Dublin 14
t +353 1 296 9000
f +353 1 296 9001
e dublin@nodwyer.com
w www.nodwyer.com

CLIENT: daa

PROJECT: DUBLIN AIRPORT DRAINAGE MASTERPLAN

TITLE: MONITORING PLANS SAMPLING LOCATIONS

SCALE	DRAWN	CHECKED	APPROVED
1:7500 @ A1	D. Smithers	C. Dennehy	S. Cosgrove
	DATE 15.08.19	DATE 15.08.19	DATE 15.08.19

DRAWING No: 20771-18-MP-17 — REV: 3

Project Ref: 5218354
Project Title: US Customs and Border Protection (CBP) - Proposed Reconfiguration & Expansion & South Apron Support Centre (SASC) - Partial Demolition, Refurbishment & Upgrade Project
Project Site: Dublin Airport
Client: Dublin Airport Authority

Table 1: Surface Water Analytical Results for Monitoring Station SW-C-5

Date	Sample Location	BOD (mg/L)	COD (mg/L)	Ammonia (mg/L)	pH (pH units)	Ortho-phosphate (mg/L)	Temperature (degrees C)	Dissolved Oxygen (%)	Dissolved Oxygen2 (mg/L)	Nitrate (mg/L)	Total N (mg/L)	TPH (ug/L)	Detergents (ug/L)	Benzene (ug/L)	Anthracene (ug/L)	Propylene Glycol (mg/L)	PAH (ug/L)	PCB (ug/L)	Benzo a pyrene (ug/L)	Zinc (ug/L)	Chromium VI (ug/L)	Arsenic (ug/L)	Copper (ug/L)	Chromium III (ug/L)	Chromium (ug/L)	Lead (ug/L)	Nickel (ug/L)	Coliforms Faecal (cfu/100ml)	Coliforms Total (cfu/100ml)	Phenols (ug/L)	Xylene (ug/L)	Potassium (mg/L)	Toluene (ug/L)	Turbidity (NTU)
Screening [illegible] as required by	Surface Water Regulations*	-	-	0.065	6.0<pH<9.0*	0.06	-	-	-	-	-	-	-	50	0.1	-	-	-	0.027	-	32	-	5	-	-	-	-	-	-	-	10	-	10	-
08-Jan-20	SW-MO-SW-C-5	<2	9	0.09	9.56	<0.014	9.2	79.2	7.41	<0.51	1					<2																		
14-Feb-20	SW-MO-SW-C-5	11	40	0.15	10.7	<0.014	9	93.7	10.12	<0.51	2.2					<5																		
11-Mar-20	SW-MO-SW-C-5	<2	139	0.21	8.19	<0.014	10.9	67	7.26	<0.51	2.4					<5																		
21-May-20	SW-MO-SW-C-5	<2	19	0.01	7.36	<0.014	24	39.8	3.34	<0.51	<1.0					<200																		
11-Jun-20	SW-MO-SW-C-5	<2	9	0.07	7.12	0.025	15.8	52.9	5.25	<0.51	0.4					<20																		
23-Jul-20	SW-MO-SW-C-5	<2	14	0.04	8.89	<0.014	17.3	77.3	6.53	<0.51	0.2					<2.00																		
24-Aug-20	SW-MO-SW-C-5	<2	10	0.18	9.56	0.05	17.8	54.8	5.1	<0.51	0.6	<1				<5																		
08-Sep-20	SW-MO-SW-C-5	<2	<5	0.07	9.12	0.01	17.5	60.3	5.61	<0.51	0.3					<5																		
07-Oct-20	SW-MO-SW-C-5	<2	5	0.04	8.7	0.01	12.6	65.1	6.8	<0.51	0.3					<5																		
11-Nov-20	SW-MO-SW-C-5	<2	<5	0.02	8.64	0.01	12.4	73.2	7.68	<0.51	0.1					<5																		
15-Dec-20	SW-MO-SW-C-5	2	<5	<0.01	8.19	<0.01	8.9	68.4	7.79	<0.51	0.1					<5.00																		
12-Jan-21	SW-MO-SW-C-5	22	43	<0.01	8.64	0.11	7.2	68.8	8.13	<0.51	0.2					<5																		
17-Feb-21	SW-MO-SW-C-5	106	197	0.13	9.35	0.03		79.7	7.93	<0.51	0.8					<5																95.7		
11-Mar-21	SW-MO-SW-C-5	<2	21	0.04	8.26	0.01			6.4	<0.51	0.3		148			<5														<1		20		
22-Apr-21	SW-MO-SW-C-5	6	20	0.48	7.62	0.02			4.6	<0.51	0.7	<1	133																			45.9		
26-May-21	SW-MO-SW-C-5	2	14	0.09	7.71	0.01			7.6	<0.51	0.3		205			<2.00																7.5		
14-Jun-21	SW-MO-SW-C-5	4	11	0.02	7.94	0.01			6.2	<0.51	0.2		124			<2.00																6.5		
05-Jul-21	SW-MO-SW-C-5	2	21	0.01	7.63	0.01			7.5	<0.51	0.2		359			<2.00																2.9		
10-Aug-21	SW-MO-SW-C-5	<2	18	0.04	8.71	0.01			6.7	<0.51	0.4		169			<5																3.2		<1
21-Sep-21	SW-MO-SW-C-5	1.2	12	0.55	9.57	0.01			8.1	<0.51	0.9		106			<5																		
12-Oct-21	SW-MO-SW-C-5	1	10	0.13	8.69	0.01			8	<0.51	0.4		53			<5																10.9		
23-Nov-21	SW-MO-SW-C-5	1.9	8	0.08	8.57	0.01			8.2	<0.51	0.6		<50			<2.00																12.5		
14-Dec-21	SW-MO-SW-C-5	0.1	12	0.08	8.29	0.49			5.7	<0.51	0.8		60																			11.8		
18-Jan-22	SW-MO-SW-C-5	157	347	0.26	9.07	<0.01			8.5	<0.51	1.1		193			138																17.1		
16-Feb-22	SW-MO-SW-C-5	3.6	21	<0.01	8.45	0.01			10.7	<0.51	0.1		50			<20.0																8		
08-Mar-22	SW-MO-SW-C-5	2	8	0.07	9.44	0.01			7.5	<0.51	0.6		<50			<2.00																14.5		
[illegible]-22	SW-MO-SW-C-5	3.6	22	0.1	8.97	<0.01			8.8	<0.51	0.6		186			<2.0																3.9		
[illegible]y-22	SW-MO-SW-C-5	2.3	12	0.09	8.97	0.02			8.8	<0.51	1		323			<2.0																5.8		

Notes:
* in the absence of CaCO3 / water hardness value, the most conservative pH limit has been used.
*Surface Water Regulations - S.I. No. 272 of 2009 as amended – S.I. No. 327 of 2012, S.I. No. 386 of 2015 and S.I. No. 77 of 2018

Relevant Surface Water Regulation Value (for MAC - EQS - Other Surface Waters) applied as generic assessment criteria.

Table 2: Surface Water Analytical Results for Monitoring Station SW-C-7

Date	Sample Location	BOD (mg/L)	COD (mg/L)	Ammonia (mg/L)	pH (pH units)	Ortho-phosphate (mg/L)	Temperature (degrees C)	Dissolved Oxygen (%)	Dissolved Oxygen2 (mg/L)	Nitrate (mg/L)	Total N (mg/L)	TPH (ug/L)	Detergents (ug/L)	Benzene (ug/L)	Anthracene (ug/L)	Propylene Glycol (mg/L)	PAH (ug/L)	PCB (ug/L)	Benzo a pyrene (ug/L)	zinc (ug/L)	Chromium VI (ug/L)	Arsenic (ug/L)	Copper (ug/L)	Chromium III (ug/L)	Chromium (ug/L)	Lead (ug/L)	Nickel (ug/L)	Coliforms Faecal (cfu/100ml)	Coliforms Total (cfu/100ml)	phenols (ug/L)	Xylene (ug/L)	Potassium (mg/L)	Toluene (ug/L)	Turbidity (NTU)
Screening Values as defined by	**Surface Water Regulations***	-	-	**0.065**	**6.0<pH<9.0***	**0.06**	-	-	-	-	-	-	-	**50**	**0.1**	-	-	-	**0.027**	-	**32**	-	**5**	-	-	-	-	-	-	-	**10**	-	**10**	-
11-Jun-20	SW-MO-SW-C-7	<2	36	0.36	7.16	0.064	15.6	72.1	7.01	<0.51	1.5	<1	466	<1	<0.01	<20	<0.01	<0.05	<0.01	59	<1	2	18	<10						<0.1	<1	12	<1	
23-Jul-20	SW-MO-SW-C-7	<2	22	0.08	8.49	<0.014	16.4	81.5	6.9	<0.51	0.7	<1	383	<1	<0.01		<0.01	<0.01	<0.01	50	<10	2	21	<10						<0.1	<1		<1	
24-Aug-20	SW-MO-SW-C-7	<2	23	0.12	7.89	0.01	17.5	50.2	4.7	0.79	1.3	<1	133	<1	<0.01		<0.01	<0.05	<0.01	46	<10	3	6	<10						<0.1	<1		<1	
[illegible]p-20	SW-MO-SW-C-7	<2	<5	0.13	8	0.04	17	61.1	5.77	0.77	1.5	-	80	<1	<0.01		<0.01	<0.05	<0.01	20	<10	3	5	<10						<0.1	<1		<1	
[illegible]-20	SW-MO-SW-C-7	<2	13	0.14	8.27	0.08	12.3	66.9	7.04	2.35	2.6	<1	<50	<1	<0.01		<0.01	<0.05	<0.01	16	<10	2	6	<10						<0.1	<1		<1	
11-Nov-20	SW-MO-SW-C-7	<2	29	0.01	8.01	0.01	12.5	60.3	6.35	0.83	0.8	<1	83	<1	<0.01		<0.01	<0.05	<0.01	73	<10	2	15	<10						<0.1	<1		<1	
15-Dec-20	SW-MO-SW-C-7	<2	8	0.01	7.94	0.01	8.5	68.7	7.87	3.2	3.4	<1	191	<1	<0.01		<0.01	<0.05	<0.01	29	<10	2	4	<10	1	<1	3			<0.1	<1		<1	<1
12-Jan-21	SW-MO-SW-C-7	35	183	<0.01	7.86	0.05	7.5	48.1	5.71	<0.51	0.7	<1	214	<1	<0.01		<0.01	<0.05	<0.01	80	<10	3	13	<10	2	2	3			<0.1	<1		<1	<1
25-Jan-21	SW-MO-SW-C-7	9	44	0.18	7.77	0.02	3.9	51.2	6.5	0.65	1.1	<1	75	<1	<0.01		<0.01	<0.05	<0.01	92	<10	3	2	<10	1	<1	4			<0.1	<1	17.8	<1	<1
17-Feb-21	SW-MO-SW-C-7	<2	16	0.19	7.64	0.07		71.3	7.33	<0.51	0.8	<1	99	<1	<0.01	<5		<0.05	<0.01	406	<10	2	2	<10	<1	<1	3			<0.1	<1	14.4		
26-May-21	SW-MO-SW-C-7	2	12	0.21	7.74	0.02		90.8	8.3	0.83	1.1	<1	117	<1	<0.01	<2.00		<0.05	<0.01	19	<10	3	3	<10	1	<1	3			<0.1	0	14	<1	
14-Jun-21	SW-MO-SW-C-7	<2	<5	0.06	7.43	0.01		85	7.5	1.28	1.4	<1	153	<1	<0.01	<2.00		<0.05	<0.01	21	<10	3	4	<10	2	1	4			<0.1	0	7.4	<1	
05-Jul-21	SW-MO-SW-C-7	<2	14	0.07	7.71	0.02			7.8	1.02	1.1	<1	104	<1	<0.01	<2.00		<0.05	<0.01	31	<10	2	5	<10	2	<1	3			<0.1	0	10.8	<1	
10-Aug-21	SW-M0-SW-C-7	<2	14	0.14	7.69	0.03			5.9	0.76	1.1	<1	129	<1	<0.01	<5		<0.05	<0.01	29	<10	2	4	<10	2	<1	4			<0.1	0	9.4	<1	
21-Sep-21	SW-MO-SW-C-7	1.7	7	0.13	7.87	0.03			10.4	0.98	1	<1	97			<5		<0.05	<0.01	24	<10	2	3	<10	1	<1	5			<0.1	0		<1	
12-Oct-21	SW-MO-SW-C-7	1.7	23	0.11	7.87	0.02			9	1.48	1.1	<1	<50	<1	<0.01	<5		<0.05	<0.01	49	<10	3	5	<10	2	1	3			<0.1	0	8.9	<1	
23-Nov-21	SW-MO-SW-C-7	2	20	0.11	7.82	0.02			8.4	<0.51	0.9	<1	106	<1	<0.01	<2.00		<0.05	<0.01	76	<10	3	5	<10	<10	2	1	4			0	20.4	<1	
14-Dec-21	SW-MO-SW-C-7	5	21	0.01	7.94	0.01			7.1	0.78	0.9	<1	53	<1	<0.01			<0.05	<0.01	146	<10	4	4	<10	<10	1	<1	4			0	25	<1	
18-Jan-22	SW-MO-SW-C-7	6	22	0.01	8.04	0.01			8.7	1.04	1.2	<1	136	<1	<0.01	<2		<0.05	<0.01	46	<10	4	4	<10	<1	<1	3			<0.1	0	14.2	<1	
08-Mar-22	SW-MO-SW-C-7	1.2	5	0.12	8.15	0.02			10.4	1.32	1.2	886	<50	<1	<0.01	<2.00		<0.05	<0.01	21	<10	2	2	<10	1	<1	4			<0.1	0	6	<1	
12-Apr-22	SW-MO-SW-C-7	9	70	5.26	7.89	0.33			7.9	1.02	7.2	<1	135	<1	<0.01	<2.0		<0.05	<0.01	199	<10	2	33	<10	3	7	1			<0.1	0	5.4	<1	
13-Sep-22	SW-MO-SW-C-7	2.6	18	0.03	7.71	0.03			7.5	1.3	1.1	<1	74	<1	<0.01		<0.01	<0.05	<0.01	32	<10	3	3	<10	<1	1	4			<0.1	<1	6.3	<1	

Table 3: Surface Water Analytical Results for Monitoring Station SW-C-9

Date	Sample Location	BOD (mg/L)	COD (mg/L)	Ammonia (mg/L)	pH (pH units)	Ortho-phosphate (mg/L)	Temperature (degrees C)	Dissolved Oxygen (%)	Dissolved Oxygen2 (mg/L)	Nitrate (mg/L)	Total N (mg/L)	TPH (ug/L)	Detergents (ug/L)	Benzene (ug/L)	Anthracene (ug/L)	Propylene Glycol (mg/L)	PAH (ug/L)	PCB (ug/L)	Benzo a pyrene (ug/L)	zinc (ug/L)	Chromium VI (ug/L)	Arsenic (ug/L)	Copper (ug/L)	Chromium III (ug/L)	Chromium (ug/L)	Lead (ug/L)	Nickel (ug/L)	Coliforms Faecal (cfu/100ml)	Coliforms Total (cfu/100ml)	phenols (ug/L)	Xylene (ug/L)	Potassium (mg/L)	Toluene (ug/L)	Turbidity (NTU)
Screening Values as defined by	**Surface Water Regulations***	-	-	**0.065**	**6.0<pH<9.0***	**0.06**	-	-	-	-	-	-	-	**50**	**0.1**	-	-	-	**0.027**	-	**32**	-	**5**	-	-	-	-	-	-	-	**10**	-	**10**	-
25-May-20	SW-QT-SW-C-9	<2	32	0.09	8.34	0.024	20.2	97.8	8.88	0.68	1.1		228	<1	<0.01		<0.01	<0.05	<0.01	35	<10	2	5.7	<10						<0.1	<1		<1	
[illegible]-20	SW-MO-SW-C-9	<2	21	0.04	8.21	0.021	17.3	68.3	6.36	<0.51	0.6	<1	409	<1	<0.01		<0.01	<0.01	<0.01	31	<10	2	17	<10						<0.1	<1		<1	
[illegible]g-20	SW-MO-SW-C-9	<2	<5	0.15	7.39	0.01	18	76.3	6.8	0.62	1.2	<1	112	<1	<0.01		<0.01	<0.05	<0.01	50	<10	2	11	<10						<0.1	<1		<1	
07-Sep-20	SW-MO-SW-C-9	<2	7	0.06	8.08	0.02	14.8	75.1	6.73	<0.51	0.7	<1	95	<1	<0.01		<0.01	<0.05	<0.01	32	<10	2	9	<10				<10	<10	<0.1	<1		<1	
06-Oct-20	SW-MO-SW-C-9	<2	9	0.11	7.79	0.06	13.1	70.7	7.27	1.72	2.3	<1	<50	<1	<0.01		<0.01	<0.05	<0.01	46	<10	2	6	<10						<0.1	<1		<1	
04-Nov-20	SW-MO-SW-C-9	<2	8	0.13	8.15	0.07	9.5	73.1	8.23	1.68	1.9	<1	86	<1	<0.01		<0.01	<0.05	<0.01	30	<10	2	4	<10						<0.1	<1		<1	
08-Dec-20	SW-MO-SW-C-9	<2	<5	0.01	8.04	0.02	5.7	74.7	9.02	<0.51	0.5	<1	70	<1	<0.01		<0.01	<0.05	<0.01	104	<10	1	4	<10	<1	<1	4			<0.1	<1		<1	<1
07-Jan-21	SW-MO-SW-C-9	12	25	0.01	7.96	0.02	5.5	67.5	8.76	1.42	2.1	<1	52	<1	<0.01		<0.01	<0.05	<0.01	46	<10	2	3	<10	<1	<1	3			<0.1	<1		<1	<1
03-Feb-21	SW-MO-SW-C-9	8	25	0.01	7.83	0.02			6.1	3.52	2.9	<1		<1	<0.01	<5	<0.01	<0.05	<0.01	86	<10	5	5	<10	1	1	4			7.1	<1	16.5		
01-Mar-21	SW-MO-SW-C-9	7	12	0.17	8.12	0.022			9.12	0.55	1.2	<1	163	<1	<0.01	<2.00		<0.05	<0.01	29	<10	4	<2	<10	<1	<1	3			<0.1		23.2	<1	
06-Apr-21	SW-MO-SW-C-9	3	9	0.01	8.07	0.04			9.9	0.63	0.9	<1	<50	<1	<0.01	<2.00		<0.05	<0.01	33	<10	3	3	<10	2	1	4			<0.1	0	20	<1	
11-May-21	SW-MO-SW-C-9	2	15	0.13	7.81	0.01			6.6	<0.51	0.6	<1		<1	<0.01	<5		<0.05	<0.01	235	1	1	11	<10	1	<1	3			<0.1	0	16.5	<1	
22-Jun-21	SW-MO-SW-C-9	2	14	0.02	8.6	0.01			8	<0.51	0.6	<1	166	<1	<0.01	<2.00		<0.05	<0.01	25	<10	2	4	<10	<1	<1	4			<0.1	0	26.6	<1	
13-Jul-21	SW-MO-SW-C-9	<2	23	0.03	8.07	0.05			5.9	0.67	0.7	<1	242	<1	<0.01	<5		<0.05	<0.01	82	<10	3	3	<10	<1	<1	3			<0.1	0	30.2	<1	

daa

CUSTOMS AND BORDER PROTECTION EXTENSION

Flood Risk Assessment

D18362-NOD-ZZZ-ZZ-ZZZ-RP-C-520-0001

APRIL 2023

NICHOLAS O'DWYER

DUBLIN AIRPORT AUTHORITY

CUSTOMS AND BORDER PROTECTION EXTENSION

D18362-02-NOD-ZZZ-ZZ-ZZZ-RP-C-520-0001

FLOOD RISK ASSESSMENT

Nicholas O'Dwyer Ltd

Consulting Engineers

Nutgrove Office Park

Nutgrove Avenue

Dublin 14

April 2023

Project No.						
Revision	**Suitability status**	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
-	S3	Draft for Review	AS	MA	GM	31/03/2023
A	CP	Updated per client review comments	AS	MA	GM	20/04/2023
B						
C						
D						

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1. INTRODUCTION

This Flood Risk Assessment (FRA) Report has been prepared by Nicholas O'Dwyer on behalf of Dublin Airport Authority (daa) as part of the planning application documentation for the proposed Customs and Border Protection (CBP) Extension.
This planned development involves the extension of CBP facility at the Pier 4 building through the construction of proposed CBP building, as well as associated drainage works. This FRA report discusses the impact of the proposed CBP Extension works with respect to flood risk.

1.1. Report Structure

The Report is structured in following sections,

- **Section 1: Introduction**
  This section describes the study area, existing developments and proposed developments within the Project Boundary for the CBP Extension.

- **Section 2: Flood Risk Management Guidelines**
  Provides a summary of the key guidance documents and development plans to be followed during the Flood Risk Assessment

- **Section 3: Flood Risk Assessment**
  This section provides the details and results of Flood Risk Assessment of the proposed CBP Extension.

- **Section 4: Conclusion**
  This section outlines the conclusion on the appropriateness of the proposed developments, based on the outcome of the Flood Risk Assessment.

1.2. Study Area

1.2.1. Location

The development site proposed for CBP extension works is within Dublin Airport, the primary international airport in Ireland. The airport is located 7km north of Dublin City (Refer Figure 1-1).

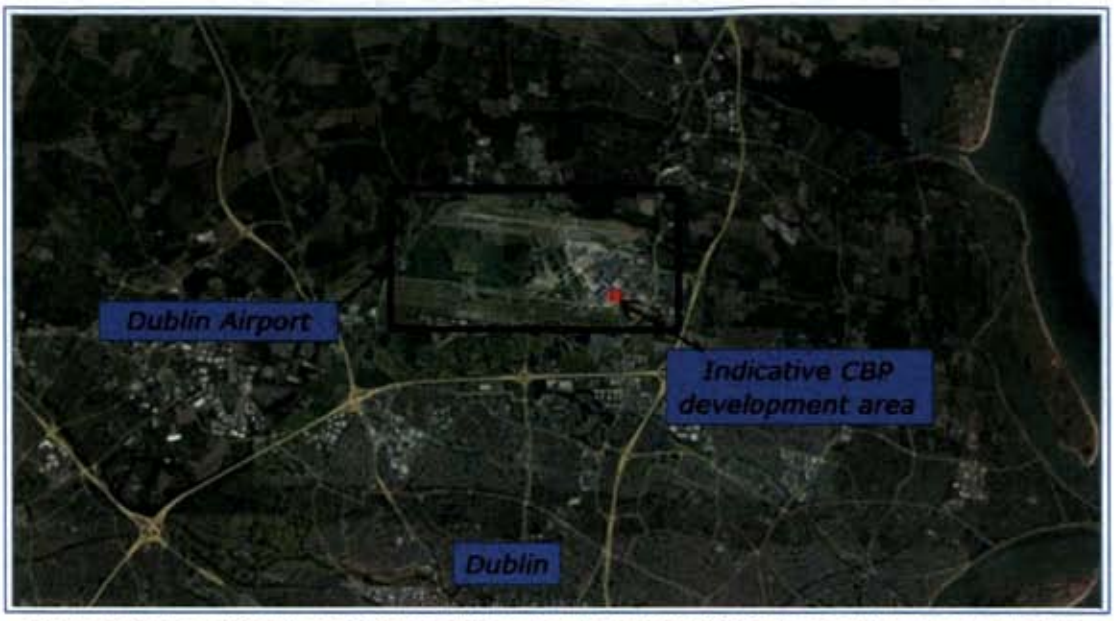

Figure 1-1: Location Map of Dublin Airport and Indicate CBP planned development site.

The proposed development will be within the "airside" areas of the airport campus. The term "airside" refers to the areas in the Dublin Airport campus which are within the Critical Part of the Security Restricted Area (CPSRA) boundary which surrounds the airfield. The proposed CBP Project Boundary is positioned to the south of Terminal 2 and will be constructed as an extension to the existing CBP facility in the Pier 4 building.

The CPRSA Boundary (orange) and the Project Boundary (red) for the CBP Extension are shown in Figure 1-2.

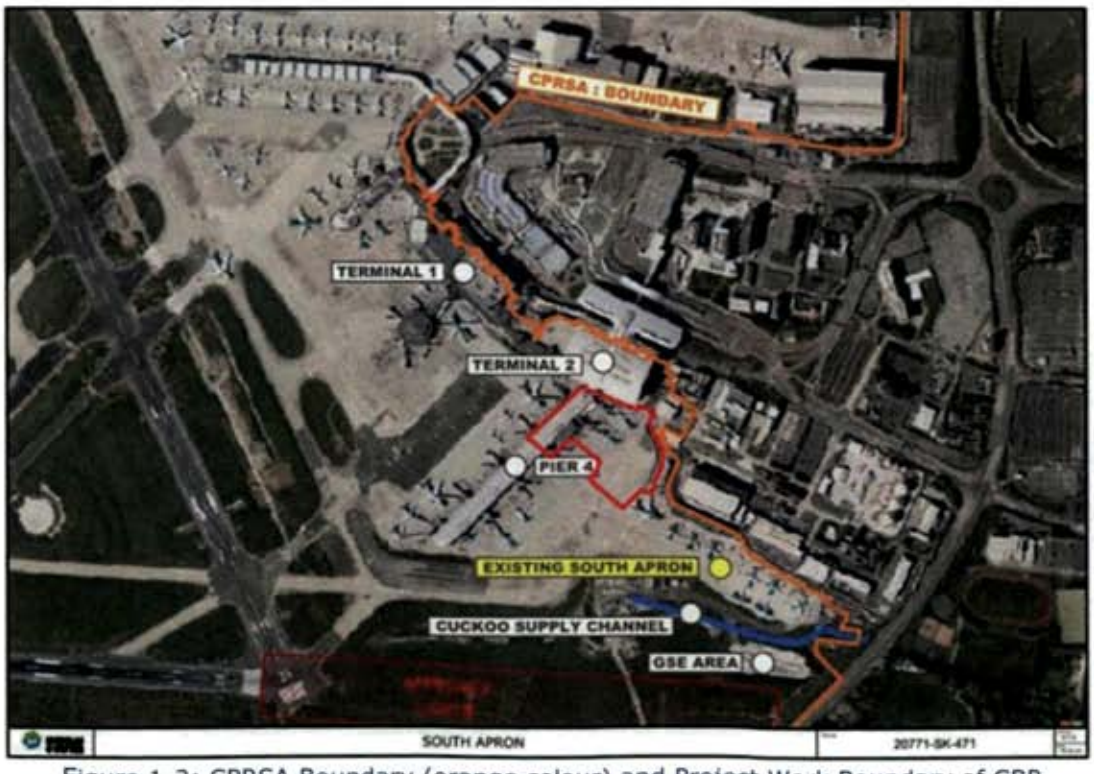

Figure 1-2: CPRSA Boundary (orange colour) and Project Work Boundary of CBP Extension Works (Red colour)

1.2.2. Watercourses Applicable to the Study Area

The surface water at Dublin Airport drains to four primary catchments, subdivided into a further seven sub catchments, as illustrated in Table 1-1 below.

Table 1-1: Waterbodies within Study Area

Catchment	Sub-catchment
Sluice	*Kealy Stream*
	Wad
	Forrest Little Stream
Ward	*Ward River*
Santry	*Santry*
Mayne	*Mayne*
	Cuckoo Stream

The Cuckoo Stream sub-catchment, which forms part of the overall Mayne catchment, is the largest sub-catchment at Dublin Airport and includes a large proportion of the operational airfield area at Dublin Airport. The Cuckoo Stream in this sub-catchment is a tributary of the Mayne River, that discharges to Portmarnock Estuary.

The proposed CBP Extension works, which are the subject of this flood risk assessment, are contained entirely within the Cuckoo Stream sub-catchment.

1.3. Existing drainage infrastructure at the proposed development site

The area within the CBP Extension project boundary is an existing paved area, consisting of hardstand areas, aircraft stands and "head-of-stand" vehicular access roads, as well as the northern section of the Pier 4 building.

These areas are currently served by the existing surface water drainage network shown in *Figure 1-3.* Further details of existing surface drainage works are provided in Drawing D18362-02-NOD-ZZZ-ZZ-ZZZ-DR-Y-520-2500 of the CBP Drainage Drawings package.

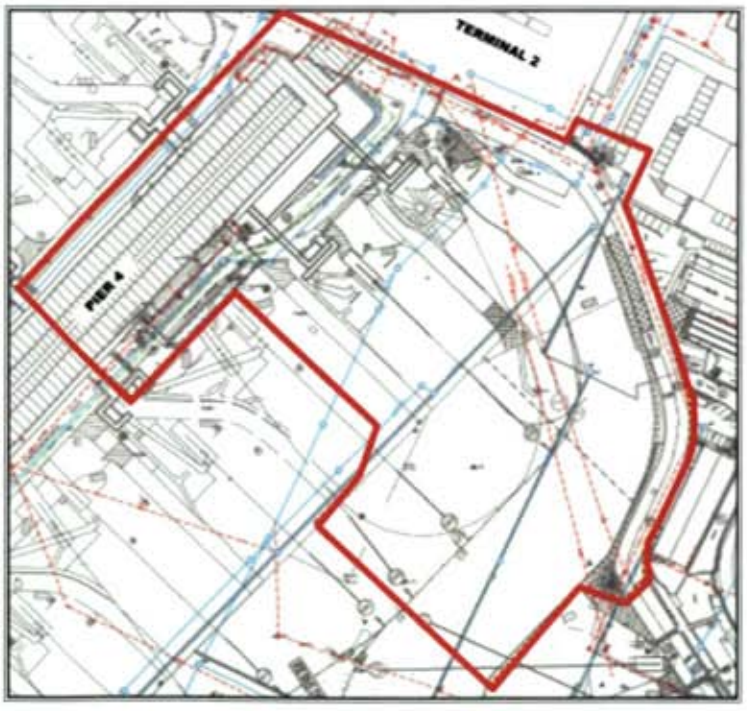

Figure 1-3: existing surface water drainage network at proposed development site.

1.4. Outline Scope of Proposed CBP Extension works

1.4.1. CBP building

The proposed extension to the existing CBP facility, located within the existing Pier 4 building, is proposed to be constructed at the north-east of Pier 4, to the south of Terminal 2. There would be no change in impermeable area on completion of CBP Extension works, as the location of the proposed construction is entirely within existing paved areas.

The proposed developments will have connections to existing surface water drainage and foul drainage networks, although some local reconfigurations and upgrades are proposed to the surface water network in order to facilitate the proposed CBP Extension, as discussed in the next sub-section.

1.4.2. Surface Water Drainage Reconfigurations

This section summarises the proposed surface water drainage network reconfigurations and upgrades necessary to facilitate the proposed CBP Extension works.

During the CBP Extension, the proposed upgrades in surface water drainage includes the diversion of an existing 750mm diameter surface water network pipeline which is currently located within the footprint of the proposed CBP building. The roof runoff from the proposed CBP building will be collected and conveyed by the diverted surface water network pipeline and it will be discharged to the existing 750mm pipeline at a location farther downstream. The drainage proposals include the construction of new slot drains to collect the excess runoff along the "head-of-stand" road, which runs inside the northern and eastern perimeter of the CBP Project Boundary. Once constructed, this slot drain will discharge to the existing downstream drainage network.

The CBP drainage proposals also include the construction of a new section of 600mm clean-only surface water drainage pipeline (CW402- CW001), as a future-proofing measure. It is designed to future-proof for the potential future diversion of clean roof runoff to the Cuckoo Supply Channel, in a separate clean-only pipeline. This future-proofing measure will be an inert pipeline initially, which will form part of the future drainage network at Dublin Airport. This is designed to avoid re-construction work at the CBP building in the future. The overall future drainage network, of which the clean-only surface water drainage pipeline will form part, is the subject of a pending planning application. Until permission on planning application is received, the future-proof pipeline will, if permitted, serve no function.

Refer to Figure 1-4 for details and locations of the proposed drainage upgrades.

All drainage proposals associated with the CBP Extension have been designed in accordance with the Dublin Airport Drainage Policy. Dublin Airport Drainage Policy was developed in accordance with local, national, and international policy, legislation, and design standards. It provides an overarching guidance on the design of drainage infrastructure projects at Dublin Airport.

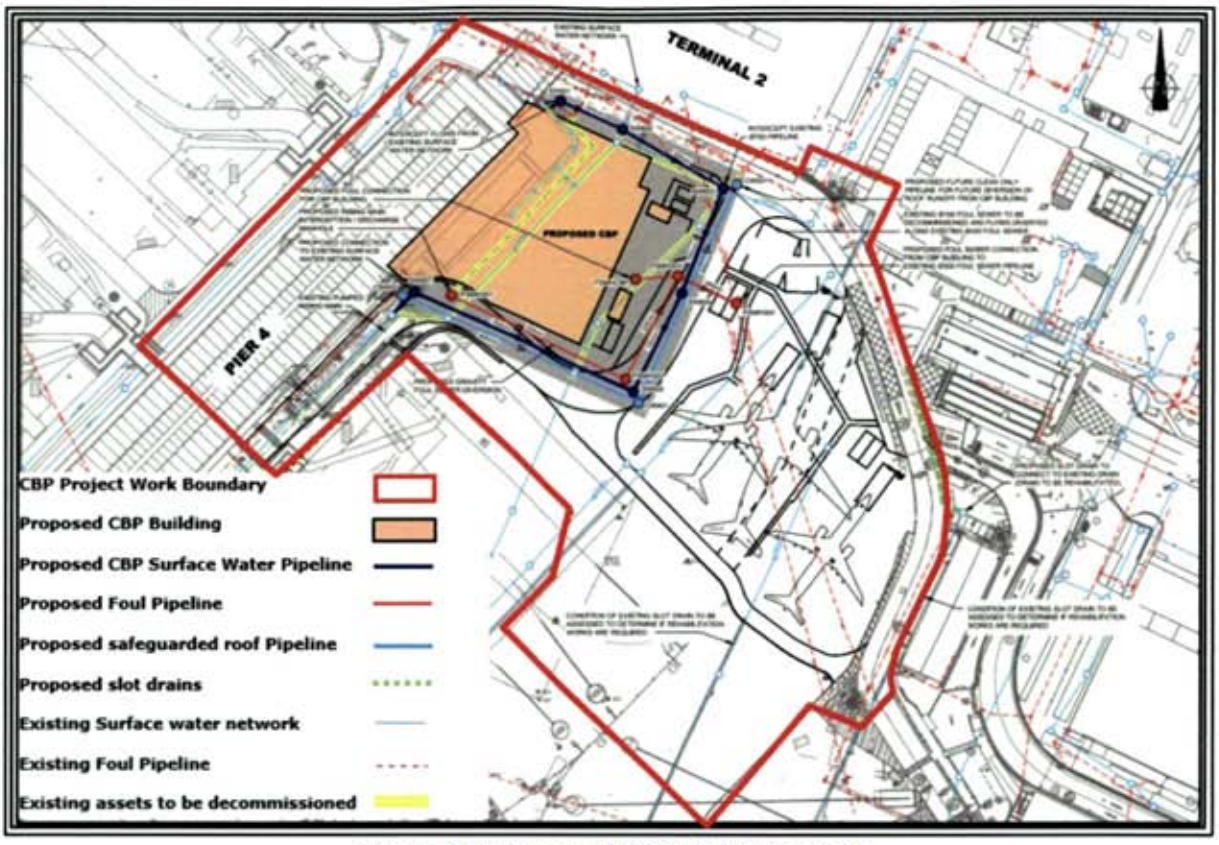

Figure 1-4: Proposed CBP Drainage works

2. FLOOD RISK MANAGEMENT GUIDELINES

2.1. Introduction

This FRA was prepared in consideration to the following documents, that provides objectives and approach on Flood Risk Assessment for planned developments:

- *The Planning System and Flood Risk Management (PSFRM) Guidelines for Planning Authorities, November 2009*
- *Flood Risk Management Climate Change Sectoral Adaptation Plan, OPW, 2019-2024*
- *Fingal County Development Plan*
- *Dublin Airport Local Area Plan (LAP), Appendix 6 - SFRA & SWMP, January 2020*

2.2. The Planning System and Flood Risk Management Guidelines

The latest PSFRM Guidelines were published in 2009 by the Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW). These guidelines aim to ensure that, where relevant, flood risk is a key consideration in development proposals and in the assessment of planning applications. The guidelines outline methodologies to be adopted to integrate flood risk into the planning process, address its impacts and manage it (Refer Figure 1.1 of PSFRM for details).

2.2.1. Risk Assessment

The PSFRM Guidelines recommend a staged approach for Flood Risk Assessment.

- Stage 1 Flood Risk Identification – Identification of any flooding sources: fluvial or pluvial, at proposed development site that may warrant further investigation. If any such flood sources, are identified, the assessment should proceed to Stage 2. If not, the assessment can be concluded at Stage 1.
- Stage 2 Initial Flood Risk Assessment – It involve appraisal of the adequacy of existing data and identified flooding risk, and further confirming the extent (specific infrastructures) within the Project Boundary that are susceptible to flooding and which need further assessment.
- Stage 3 Detailed Flood Risk Assessment - Quantitative appraisal of flood risk issues in sufficient detail for scoped area, followed by effectiveness of any proposed mitigation measures.

The assessment involves mapping of the Project location, to establish the specific flood zone which applies, and classifying the types of development, based on its vulnerability to flooding, both of which are explained in subsequent paragraphs.

The PSFRM Guidelines discuss flood risk in terms of three flood zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. These flood zones are determined based on Annual Exceedance Probability (AEP) of flooding events, Refer to Table 2-1 for the definition of flood zones. It is also important to note that the Flood Zones indicate flooding from fluvial (river) and coastal sources and do not take other sources: groundwater or pluvial, into account. Thus, an assessment of risk arising from groundwater and pluvial sources should also be made, to supplement the fluvial assessment.

Likewise, PSFRM Guidelines classifies different types of development into three vulnerability classes based on their sensitivity to flooding – highly vulnerable, less

vulnerable and water-compatible development. Refer to Table 3.1 of PSFRM Guidelines to find the classification of vulnerability of different types of development.

On identification and confirmation of potential flooding risk in Stage 1 and Stage 2 respectively, the risk is to be further assessed and managed in stage 3. The approach to risk management throughout this assessment is discussed in section 2.2.2.

2.2.2. Risk Management

The PSFRM guidelines define the key principles of a risk management for identified flood risks. In this sequential approach, the preferred outcome is to avoid development in Flood Zone A and B, is possible. Primarily, floodplains are found in Flood Zones A and B, which have a valuable function both in attenuating or storing floodwater and through their ability to convey floodwater in a relatively controlled and safe way. If it is not possible to avoid development in Zone A and B , consider substituting a land use that is less vulnerable to flooding. Only when both avoidance and substitution is not possible, the proposed development in flood risk areas is to undergo a Justification Test, which must demonstrate the planning need and outline measures for the sustainable management of flood risk. The Justification Test is used to assess the appropriateness of developments in flood risk areas. Box 5.1 of the "Planning System and Flood Risk Management Guidelines" (PSFRM Guidelines) outlines the criteria required to complete the "Justification Test". Further, the Justification Test is required to detail the flood risk mitigation and management plan at the proposed development site, and to demonstrate that the proposed development will not increase the flood risk in nearby areas. Figure 2-1 illustrates the philosophy underpinning the sequential approach. Refer Figure 3.2 of PSFRM Guidelines to find the mechanism flow chart of sequential approach for use in the planning process.

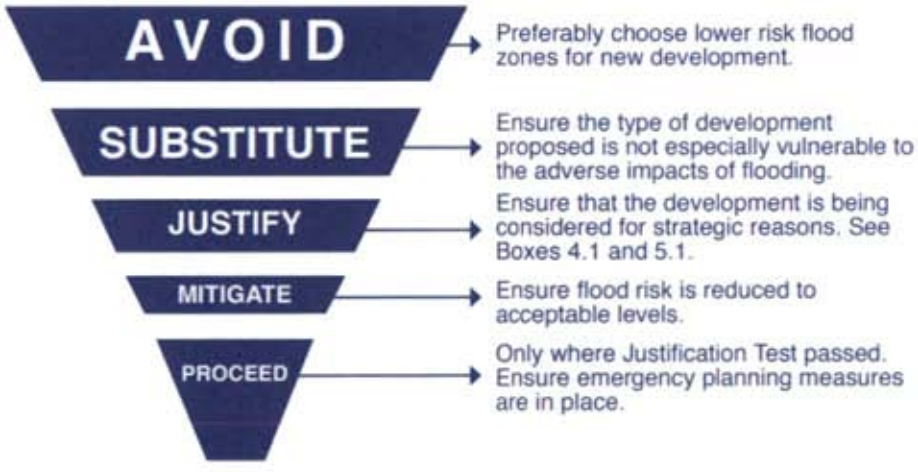

Figure 2-1: Sequential approach principles in flood risk management (Source: Figure 3.1 of PSFRM,2009)

Table *2-1* shows probability of flooding of each flood zone, and tabulates a matrix to illustrate the appropriateness of different types of development for each flood zone i.e. is the development in question confirmed as appropriate or would it require the Justification Test. The annual exceedance probabilities used to define each flood zone are also provided.

In accordance with PSFRM, the CBP extension works can be considered high vulnerability as it is an essential infrastructure, being part of primary transport. Therefore, this type of development would be required to satisfy the Justification Test if it were to be located within Flood Zone A or Flood Zone B, but it would not be required if located in Flood Zone C.

Table 2-1: Decision Matrix for determining the appropriateness of a development in each flood zone (Source: Table 3.2 of PSFRM,2009; Table 3.1 of LAP,2020)

Flood Zone	Probability of Flooding (Return Period)	Development Appropriateness		
		Highly Vulnerable (Including Essential Infrastructure)	Less Vulnerable	Water Compatible
A	High Probability River flooding (more frequent than 1 in 100-yr) Coastal flooding (more frequent than 1 in 200-yr)	Justification Test	Justification Test	Appropriate land uses and types of development
B	Moderate Probability River flooding (1 in 100-yr to 1 in 1000-yr) Coastal flooding (1 in 200-yr to 1 in 1000-yr)	Justification Test	Appropriate land uses and types of development	Appropriate land uses and types of development
C	Low Probability River & Coastal flooding (less frequent than 1 in 1000-yr)	Appropriate land uses and types of development	Appropriate land uses and types of development	Appropriate land uses and types of development

2.3. Flood Risk Management Climate Change Sectoral Adaptation Plan

The first version of Flood Risk Management Climate Change Sectoral Adaptation Plan was produced by Office of Public Works (OPW) in 2015, followed by next updated plan in 2019. The 2019 plan was prepared under the National Adaptation Framework 2018, and it has updated the previous 2015 Plan by considering new information available on potential climate change impacts and developments in flood risk management since 2015.

This plan outlines the OPW's long-term strategy to promote sustainable communities and support environment through the effective management of the potential effects of climate change on flooding and flood risk management. This approach is based on a current understanding of potential impacts on flood risk in Ireland due to anticipated rising sea levels and an increase in extreme weather events, due to climate change.

The OPW have adopted two indicative future flood risk scenarios when assessing flood risk - Mid-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS). Table 2-2 indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

Table 2-2: Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios (Source: Table 5-2, FRM,2019)

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year[1]	- 0.5 mm / year[1]
Urbanisation	*No General Allowance – Review on Case-by-Case Basis*	*No General Allowance – Review on Case-by-Case Basis*
Forestation	- 1/6 Tp^2	- 1/3 Tp^2 + 10% SPR^3

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For this flood risk assessment, the proposed development has been assessed against the High-End Future Scenario for short and long duration rainfall events. The HEFS represents the critical future design scenario (Refer Section 3.1.3).

2.4. The Fingal County Development Plan

The current County Development Plan (CDP) applicable to Dublin Airport is the Fingal 2023-2029 CDP. It was adopted on 22nd February 2023, and came into effect on 5th April 2023. This FRA has prepared in accordance with the requirements of the CDP 2023-2029.

The existing Fingal County Development Plan (CDP) sets out Council's policy and objectives related to development over plan period in a sustainable manner. One of the strategic policies contains provisions dealing with climate change mitigation and adaptation in flood risk management for each of the local areas. The CDP refers to the Fingal East Meath Flood Risk Assessment and Management Study (FEM-FRAM) that includes identification of flood risks areas and shows the extent of flooding impact, through the provision of flood maps for the existing and potential hazard prone area. The FEM-FRAM also involved the development of a long-term strategy for flood risk management in the study area. The FEM-FRAM started as a pilot study for the Eastern Catchment Flood Risk Assessment and Management (ECFRAM) programme was published in 2014.

Section 3.1.2 of this Report illustrates the flood maps derived from FEM-FRAM study and ECFRM programme for Dublin Airport, including the location of the proposed CBP Extension.

2.5. The Dublin Airport Local Area Plan 2020

The development site for the CBP Extension works that is the subject of the planning application (Refer Figure 1-2) is contained entirely in the area zoned "DA" Dublin Airport in the Fingal CDP. The Fingal CDP, referenced in Section 2.4, will be the key document for setting out a vision for the development of the Dublin Airport during the plan period.

The Dublin Airport LAP 2020 provides planning framework to facilitate the capacity enhancements and operational improvements that are required within Dublin Airport, and

outlines measures necessary to support airport's growth, consistent with the sustainable development principles and appropriate environmental measures. In this regard, it defines policy objectives related to Flood Risk Management, Sustainable Urban Drainage to mention a few. Appendix 6 of the LAP contains the Strategic Flood Risk Assessment (SFRA) of Dublin Airport described in subsequent section 2.5.2.

2.5.1. Flood Risk Management Objectives (LAP Section 9.2)

Development proposals at the Airport will be required to demonstrate compliance with the following FRM objectives.

- **FRM01**: Have regard to The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DoHELG/ OPW 2009) and Circular PL2/2014, through the use of the sequential approach and application of the Justification Tests for Development Plans and Development Management.
- **FRM02**: Protect existing flood risk management infrastructure and safeguard planned future infrastructure.
- **FRM03**: Implement and comply fully with the recommendations of the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan.
- **FRM04**: Ensure that a Flood Risk Assessment is carried out for any development proposal, in accordance with The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DoEHLG/OPW 2009) and the recommendations of the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan. This Assessment should be appropriate to the scale and nature of risk to the potential development.

2.5.2. Appendix 6: Dublin Airport SFRA & SWMP

This document has been prepared alongside this LAP, in order to delineate the current flood extents across the LAP study area and it includes recommendations for the future development of these lands. Future development should comply with the associated FRM objectives, mentioned in LAP section 9.2, to ensure sustainable development in so far as it should avoid any increased flood risk.

SFRAs enable a sequential approach, including the Justification Test where necessary, to allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process, on the lines of PSFRM guidelines described in section 2.2.

Appendix 6 Section 7.2 of the Dublin Airport SFRA states that "in order to determine the appropriate design standards for a development, it may be necessary to undertake a site-specific flood risk assessment. This will typically rely on the predictive flood mapping presented within this report but should include a quantitative appraisal of the risk from the drainage design".

Appendix 6 Section 7.2.1 of the Dublin Airport SFRA sets out the Requirements for a Flood Risk Assessment. It is recommended that an assessment of flood risk is required in support of any planning application where flood risk may be an issue. The level of detail required will vary depending on the risks which have been identified and the proposed land use. Flood risk from sources other than fluvial should also be reviewed.

Any proposal that is considered acceptable in principle is required to demonstrate the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test (where required), the proposal is required to demonstrate that appropriate mitigation and management measures are put in place.

Development of highly or less highly vulnerable uses within Flood Zones A and B will be predominantly limited to existing sites, i.e.: change of use, extensions and re-development works to a very limited area impacted by flooding from the Cuckoo Stream.

3. FLOOD RISK ASSESSMENT

This section assesses the proposed CBP Extension works within Dublin Airport against potential sources of both fluvial and pluvial flooding. A staged assessment of flood risk is undertaken in accordance with the PSFRM guidelines (described in Section 2.2). The assessment consists of a maximum of three steps. If any source of flooding is identified at Stage 1 from available information, then Stage 2 assessment shall be required. Further, if flooding source is confirmed in Stage 2 and required further investigation, it proceeds for detailed assessment in Stage 3.

3.1. Stage 1 Flood Risk Identification

Stage 1 of the flood risk assessment identifies whether there are any flooding sources at the location of the proposed CBP Extension that may warrant further investigation. It is primarily based on findings of available sources of flood mapping for the Dublin Airport Area - the Eastern Catchment Flood Risk Management Study (ECFRAM), Fingal East Meath Flood Risk Management Study (FEM FRAM), OPW's Preliminary Flood Risk Assessment, Dublin Airport Strategic Flood Risk Assessment (SFRA).

3.1.1. OPW Preliminary Flood Risk Assessment

The Preliminary Flood Risk Assessment (PFRA) is a national screening exercise completed by the OPW in 2012 based on available and readily derivable information. The PFRA aimed to identify areas where there may be a significant risk associated with flooding. As per Dublin Airport SFRA (Section 4.2.1), the PFRA fluvial flood map has been superseded by the detailed FEM-FRAM and ECFRAM mapping studies, described in section 3.1.2.

The PFRA mapping remains a useful screening source for pluvial and groundwater flood sources and is displayed below in Figure 3-1. It is evident that there is no indication of pluvial and groundwater flooding within the CBP Project Boundary, shown with red line in Figure 3-1. It is to be noted that the flood map shown below does not consider effects of climate change.

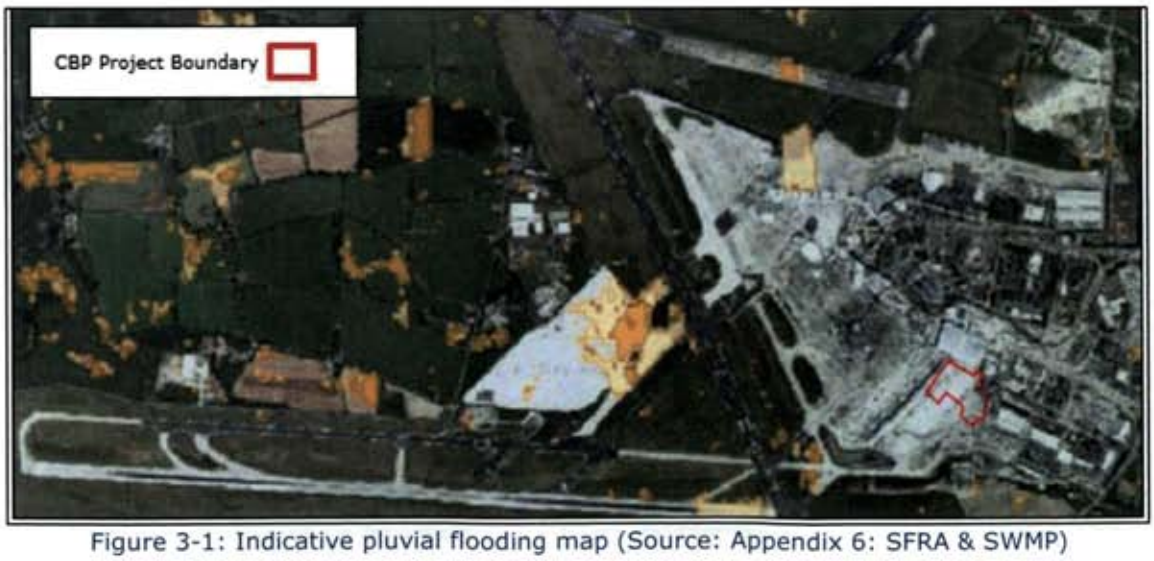

Figure 3-1: Indicative pluvial flooding map (Source: Appendix 6: SFRA & SWMP)

3.1.2. Fingal East Meath Flood Risk Assessment and Management Study

The daa ownership land, that includes CBP Project Boundary, falls within the Fingal East Meath Flood Risk Assessment Management (FEM-FRAM) study (2011). The outputs of the study included flood zone mapping, flood risk management proposals and flood risk

management plans. Mapping produced as part of the FEM-FRAM study for the Dublin Airport Lands were later incorporated into the ECFRAM Programme.

The study outlines for zone A and zone B indicate the areas at risk of fluvial flooding zones, in the absence of any mitigation measures (Refer Figure 3-2). These flood risk areas relate to the risk of the Cuckoo stream overtopping its banks. However, subsequent upgrade works have been carried out at this location to alleviate flood risk at these locations, including attenuation upgrades and the construction of bypass culverts and flood embankments. Based on the results of the FEMFRAM study, the CBP Project Boundary (shown with red line) is not susceptible to flooding during the 1% AEP and the 0.1% AEP. It is to be noted that the flood map shown in Figure 3-2 does not consider effects of climate change.

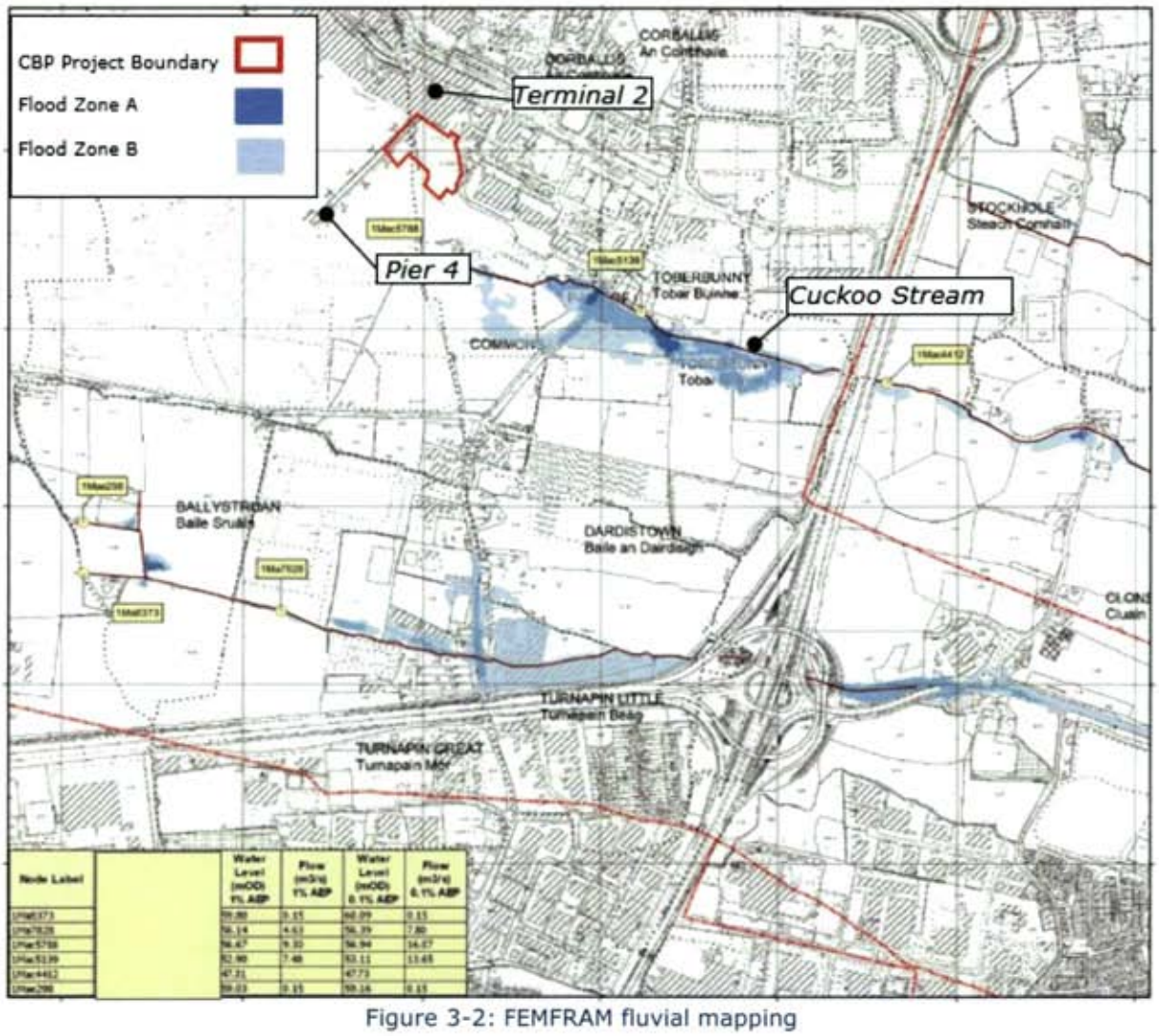

Figure 3-2: FEMFRAM fluvial mapping

3.1.3. Dublin Airport SFRA&SWMP (Appendix 6 of Dublin Airport LAP)

The Dublin Airport SFRA and SWMP provide the most recent flood risk output of the sources assessed. This study also includes consideration of the anticipated future effects of climate change. The consideration of climate change effects is based on two scenarios - MRFS and HEFS, details of which are described in Table 2-2. For this study, the results have been shown in High-End Future Scenario (HEFS) for short duration rainfall events as it represents the critical scenario. The combined output of indicative fluvial and pluvial flood mapping at Dublin Airport LAP is illustrated in Figure 3-3. The varying intensities of fluvial

and pluvial flooding are shown with different gradients of blue colour and orange colour in Figure 3-3, respectively.

The results indicate that the proposed CBP Project Boundary is mapped in Zone C, which is classified as a "low-probability flood risk zones". Flood Zone C covers all areas of the plan which are not in Zones A or B. Thus, the proposed CBP Project Boundary lies in Zone C where the probability of fluvial flooding less than 0.1%.

However, as per PSFRM Guidelines,
"The definition of these zones does not, however, take account of the potential for flooding from other sources, such as ground water or pluvial. Flooding from these sources could occur in any of the zones and as such should always be considered, regardless of zone."

As per Appendix 6: SFRA & SWMP (7.2.1.2),
" Risk from pluvial/surface water must also be addressed for all development in Flood Zone C and this should provide the details of how surface water will be managed."

Therefore, the area within the proposed CBP Project Boundary was also be checked for pluvial flooding as per the current Guidelines.

The pluvial assessment indicated that there is minor, localised pluvial flooding predicted within the proposed CBP Project Boundary, in current scenarios that do not include climate change effects and future scenarios with climate change effects. The most critical scenario is the High-End Future Scenario that considers extreme effects of climate change, results of which are shown in Figure 3-3. In particular, the predicted pluvial flooding risk within the CBP Project Boundary is minor in terms of low flood depth and less spatial footprint.

It is noted that there are areas nearby the location of the proposed CBP Extension, but outside of the CBP Project Boundary, which also show a risk of pluvial flooding. These areas at risk of pluvial flooding include an area towards the north of Terminal 2, to the south of Pier 4, and to the east of the CBP Project Boundary, at the "head-of-stand" roads.

The decision on requirement of stage 2 assessment for identified pluvial flooding risk within CBP Project Boundary and around it will be discussed in section 3.1.4.

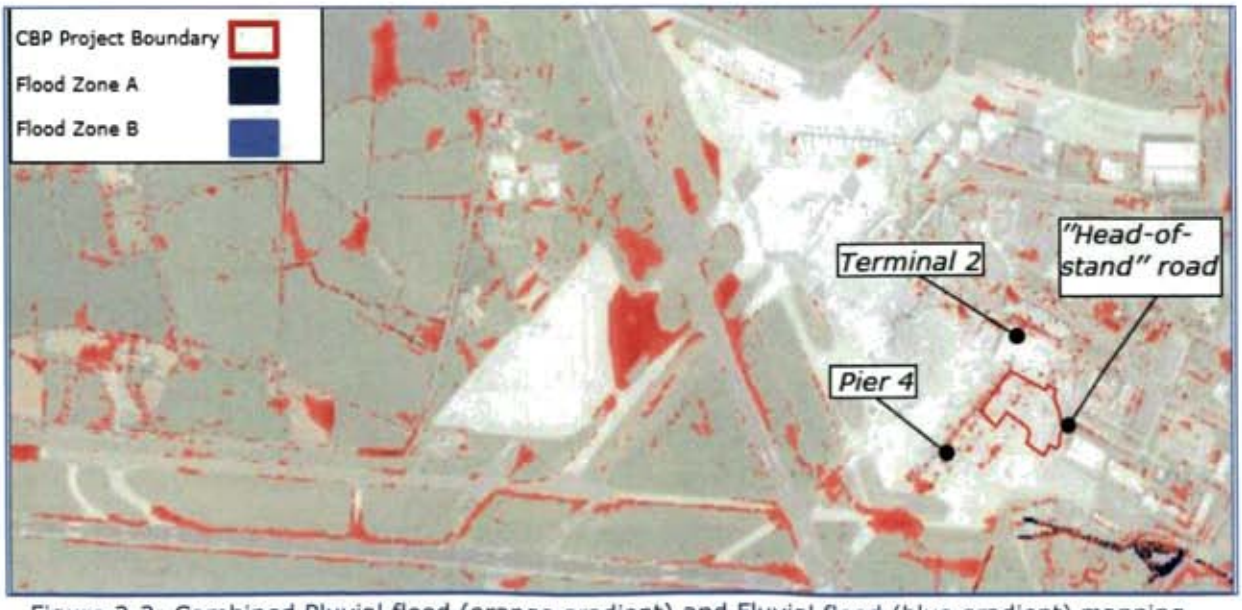

Figure 3-3: Combined Pluvial flood (orange gradient) and Fluvial flood (blue gradient) mapping within Dublin Airport LAP

3.1.4. Results of Stage 1 Flood Risk Identification

The proposed CBP Project Boundary has been assessed to determine its susceptibility to fluvial and pluvial flooding, using available predictive data from available studies. This included assessment of scenarios with and without consideration of climate change effects.

The results show no signs of fluvial flooding within proposed CBP Project Boundary for any scenario, with or without consideration of extreme climate change effects. The proposed CBP Project Boundary is mapped in Flood Zone C where probability of fluvial flooding less than 0.1%.

The area within the proposed CBP Project Boundary was also checked for pluvial flooding as per the current Guidelines. The results of the OPW PFRA show no signs of pluvial flooding, albeit the scenarios assessed did not consider the effects of climate change. The results of the Dublin Airport SFRA show minor pluvial flooding within the CBP Project Boundary.

The pluvial mapping also shows pluvial flooding in nearby areas, albeit outside of the CBP Project Boundary, including along Terminal 2, the southern part of Pier 4, and "head-of-stand" roads. While flood risk at these areas is not expected to increase as a result of the proposed CBP Extension, these areas will be considered at Stage 2 for the avoidance of doubt.

The identified flooding sources are to be further assessment at Stage 2.

3.2. Stage 2 Initial Flood Risk Assessment

The Stage 2 initial flood risk assessment consists of following tasks:

- Appraisal of the adequacy of existing data that identifies flooding risk,
- Clarification and confirmation of the flooding risk associated with the identified flooding source.
- Establishing the extent of flood risk by identifying specific infrastructures which are susceptible to flooding and which areas, if any, require detailed assessment at Stage 3.

3.2.1. Appraisal of existing data

The available flood maps shown in Figure 3-3, that indicates the possible pluvial flooding risk, was obtained from the Dublin Airport LAP Appendix 6: SFRA & SWMP, as explained in section 2.5.2. The Dublin Airport LAP - SFRA&SWMP presents the critical scenario as it includes for the future effects of climate change. Thus, the result obtained from Dublin Airport LAP: SFRA & SWMP were used as the critical basis for assessment during Stage 2.

3.2.2. Appraisal of identified sources causing flooding risk

Th results of the Stage 1 assessment identified minor, localised pluvial flooding risk within the Project Boundary. This pluvial flooding risk is considered minor due to the relatively low flood depth and the small footprint of the affected area. The pluvial flood mapping also identified potential flood risk in nearby areas, outside of the CBP Project Boundary. While the primary area of concern for this assessment is the area within the CBP Project Boundary, these nearby flood risk areas were also considered. This conservative approach was taken in order to establish whether the planned development has any knock-on effects to adjoining areas.

Refer to Figure 3-4, which provides a zoomed in version of Figure 3-3, and which illustrates the area within and outside the Project Boundary which are potentially susceptible to pluvial flooding, if no mitigation measures were to be implemented.

The overall impermeable area will be same after the completion of CBP extension, with the result that there will be no change in the overall runoff from the proposed CBP Project Boundary. Therefore, the proposed development would not present an increased flooding risk, even without consideration of the proposed drainage upgrades.

The following text outlines the proposed upgrades and re-configurations in proposed surface drainage network, which will help to address the potential flooding risk within Project Boundary and the aforementioned adjoining areas.

a. Proposed upgrades and re-configuration in surface network

The predicted pluvial flooding, within the Project Boundary and in its vicinity, is the result of surface water accumulation along the existing paved area. The proposed CBP building is planned to be constructed on this part of the existing paved area. The planned CBP footprint will therefore replace this paved area where the potential pluvial flood risk was noted. The clean roof runoff from this building will be conveyed directly through the 750mm diameter pipeline to the downstream network i.e. it will not reach the pavement and will not need to be collected by slot drains. Consequently, the pluvial flooding risk will be removed at this location. Furthermore, the paved area served by existing slot drains in the areas adjacent to the proposed CBP building will reduce. Hydraulic analysis has verified that the 750mm pipeline has sufficient hydraulic capacity to convey the roof runoff. The above upgrades and re-configurations will eliminate the predicted minor flooding issue within Project Boundary.
The new slot drains are proposed along the "head-of-stand" road in the east of proposed CBP building. It will improve the collection of hardstand runoff from the remaining paved area within CBP Project boundary. This means that, not only will the paved area to be served by slot drains reduce, but there will be an increase in the collection capacity for the remaining area. As well as reducing flood risk within the CBP Project Boundary, this will also reduce flood risk in the area labelled 'I' in Figure 3-4.

b. Account for climate change in hydraulic design

The hydraulic design of the proposed drainage works includes an uplift factor of 30% to account for climate change effects. This will enhance the resilience of drainage infrastructure against the future effects of climate change.

To summarise, it is evident that there would be no increase in flood risk even without the above-mentioned upgrades and re-configuration in the surface water network. When the proposed upgrades and reconfigurations are considered, the potential pluvial flooding shown in the LAP SFRA flood mapping would be fully addressed. Furthermore, since there will be no increase in flows to the existing downstream network pipelines, the proposed development will not have any knock-on negative impact to the flood risk of adjoining areas outside of the CBP Project Boundary.

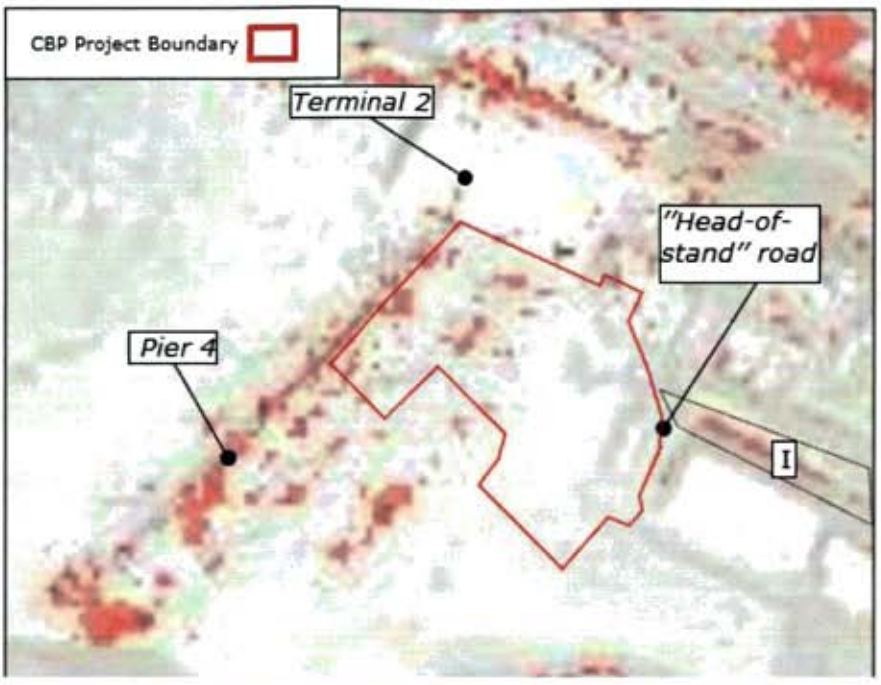

Figure 3-4: Pluvial Flooding in the vicinity of CBP Project Boundary

3.2.3. Results of Stage 2 Flood Risk Identification

The identified sources of pluvial flooding at the Project location in Stage 1 were further assessed and it was established that the affected paved areas would be replaced by the CBP building which will be served by an upgraded system which is designed with consideration for the future effects of climate change.

It has been established that the proposed development would alleviate flooding risk within the Project Boundary, and it would not present any knock-on increase of the pluvial flooding risk in areas outside of the Project Boundary.

Since it is substantiated that there is no fluvial flooding risk and the pluvial flooding identified in stage 1 will be removed by the proposed development, it was not necessary to proceed to further assessment at Stage 3.

4. CONCLUSION

This Flood Risk Assessment was carried out for the proposed CBP Extension at Dublin Airport, in accordance with the PSFRM guidelines.

In Stage 1 of this assessment, the development site was mapped in the "low-probability flood risk zone" – Flood Zone C. This indicated that the development site is suitable from a fluvial flood risk perspective. No fluvial flooding risk was identified in any of the information sources reviewed.

In accordance PSFRM Guidelines, the pluvial flooding risk was also assessed for planned development. The available data identified a potential minor pluvial flooding risk within the Project Boundary, for the extreme scenario which considers the future effects of climate change. This resulted in the recommendation for further assessment at Stage 2.

On further appraisal at stage 2, it was demonstrated that the paved area, where the potential pluvial flooding risk was identified, will be replaced by the proposed CBP building. Roof runoff from the CBP building will be conveyed directly to an underground pipeline, thereby avoiding the identified risk of pluvial flooding. Additionally, the proposed new slot drains will offer improved collection in the remaining paved area adjacent to the building. The combination of upgrades to the slot drain collection capacity and a reduced paved area to be served by slot drains will serve to further alleviate any residual risk of pluvial flooding within the CBP Project Boundary.

Based on these results, it is concluded that no flooding risks have been identified which require further investigation at Stage 3. The proposed developments will not result in an increased flood risk, in fact, they will alleviate existing flood risk within the CBP Project Boundary. This assessment is therefore concluded at Stage 2.

AECOM

South Apron Support Centre (SASC)

Stage 2 Flood Risk Assessment

Dublin Airport Authority

Project number: 60592409
D18362-05-ACM-XXX-XX-XXX-RA-C-XXX-0001

May 2023

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	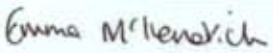		
Aileen Prendergast Principal Engineer	Emma McKendrick Associate Director	Retha Esterhuizen Associate Director	

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Prepared for:

Dublin Airport Authority

Prepared by:

Aileen Prendergast
Principal Engineer

AECOM Ireland Limited
1st floor, Montrose House
Carrigaline Road
Douglas, Cork T12 P088
Ireland

T: +353 21 436 5006
F: +353 21 436 5156
aecom.com

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1. Introduction

AECOM Ireland was appointed by the Dublin Airport Authority (DAA) to undertake the infrastructure design in support of a planning application to Fingal County Council (FCC) for the South Apron Support Centre (SASC) building at Dublin Airport.

1.1 Existing Site

It is proposed to repurpose the existing Flight Catering Building (FCB) for use initially as a temporary construction compound for the proposed works to the US Customs and Border Protection (CBP) pre-clearance facility at Pier 4 and then for continued use as an Airport Operational Building for airside support/operations. Works include partial demolition and upgrade the external envelope and reconfiguration of internal areas. The existing building is a two-storey building located in a landside area between the Terminal 2 Energy Centre and Shamrock House buildings as shown in Figure 1. The Gate Gourmet building is located to the south and there is an existing service yard between FCB and Shamrock House. This yard is accessed by a road off Corballis Park. There is a link bridge at first floor level connecting the FCB and Shamrock House. There is also a service yard between FCB and the Terminal 2 Energy Centre building, which is accessed from a road adjacent to Gatepost 4 (security post).

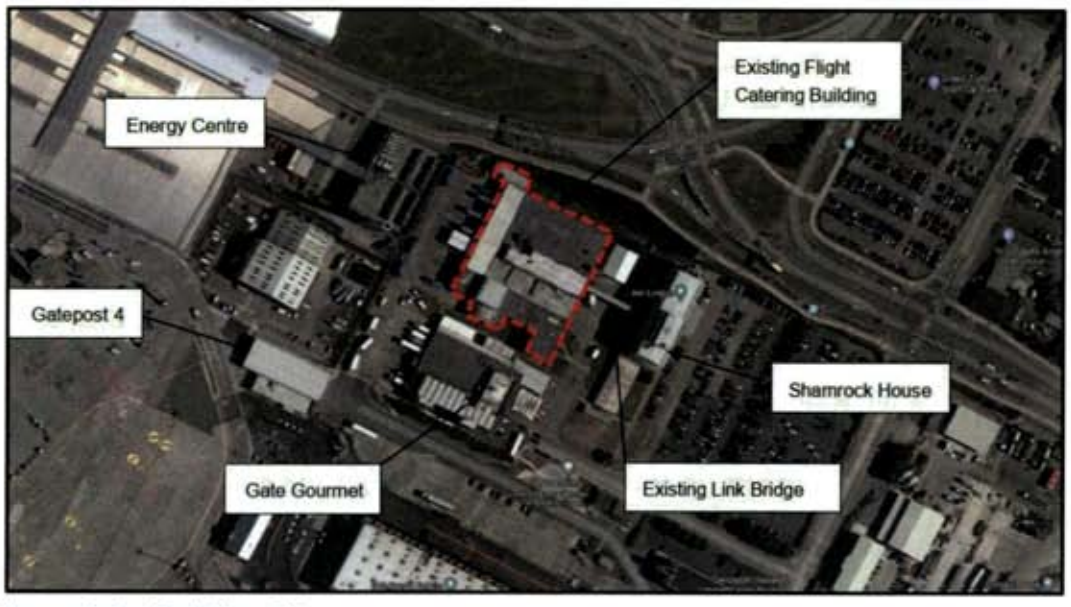

Figure 1-1 – Existing Site

1.2 Proposed Development

The proposed development will comprise:

1) the reconfiguration and expansion of the existing 2-storey US Customs and Border Protection (CBP) pre-clearance facility at Pier 4, Terminal 2, Dublin Airport, and

2) the partial demolition, refurbishment and upgrade of the existing 2-storey Flight Catering Building (FCB) to the southeast of the Terminal 2 building at Dublin Airport, to be used initially as a temporary construction compound for the proposed works to the CBP facility, and then for continued use as an Airport Operational Building for airside support/operations.

Specifically, the proposed development will include:

1) CBP:

a) demolition of 2no. existing Pier 4 link bridges, 2no. external vertical circulation cores (VCC), part of the north, east and south elevations of the existing CBP facility, and part of the existing apron pavement;

b) reconfiguration of part of Pier 4 and the existing CBP facility and the construction of an expanded 2-storey, part 3-storey CBP facility to the east of the existing CBP facility, to include:

   i. pre-clearance passenger processing facilities at Level 10 (ground floor), including 5no. entry E-gates, queuing areas, 8no. screening lanes (1no. for training/contingency and 1no. for staff access), 22no. booths, transit lounge area, welfare facilities, and ancillary staff facilities;

   ii. lounge, retail/food and beverage area, swing gateroom, welfare facilities, airline lounge, staff facilities, including ancillary offices at Level 15 (first floor);

   iii. construction of 2no. external vertical circulation cores (VCC);

   iv. construction of a new link bridge at Level 20 to the Terminal 2 building;

   v. fallow space at Level 10 to allow for future CBP security facilities, and at Level 20 (second floor) and a lift core extending to Level 30 to safeguard for future expansion, to merge with the remaining parts of the existing facility at Pier 4;

   vi. reconfiguration of the existing airside road on site with pedestrian walkways and zebra crossings; and

   vii. 15no. airside operations car parking spaces, 2no, PRM airside operations car parking spaces, and 2no. platinum parking spaces.

c) decommissioning of an existing aircraft stand 409 L/C/R, and the provision of temporary MARS aircraft stand 409T accommodating 2no. Code C or 1no Code E aircraft.

2) Existing FCB, now SASC:

The former Flight Catering Building (FCB) is to be repurposed to become the South Apron Support Centre (SASC). The works include:

a) upgrade of the façade of the existing FCB building, to include partial demolition of the later attritions/extensions to the south and west flanks of the building; demolition of the existing pedestrian link bridge to Shamrock House to the east (making good the elevation of Shamrock House to match the existing), and demolition of an existing substation internal to the building;

b) the refurbishment of the remaining FCB structure to provide offices, meeting rooms, staff welfare facilities, storage and plant rooms on the ground and first floors, including an external dining courtyard at ground floor; and refurbished rooftop plant enclosure and new rooftop balustrades;

c) initial use as office storage and a pre-screening/ logistics/ staff welfare facility, as well as 10no. parking spaces, 2no. PRM car parking spaces and 80no. cycle storage racks;

d) revised external pedestrian and vehicular circulation arrangements; and

e) separate external smoking shelter and separate external bin storage.

The proposed development at the existing CBP and FCB buildings will also require the diversion and extension of the existing watermain on site, and a new foul and surface water drainage system, as well as all associated site development and landscaping works.

The proposed development will also require the diversion and extension of the existing watermain on site, and a new foul and surface water drainage system, as well as all associated site development and landscaping works.

Under planning reference F19A/0084, permission was granted for a new Thermal Storage Tank to the south of the Terminal 2 Energy Centre and all associated site works. The horizontal tank will measure

16m by 4.8m and have a capacity of 250m³ for the storage of hot water. The purpose of the tank is to store excess heat and improve energy efficiency of the existing Combined Heat and Power Plant serving Terminal 2.

As part of a subsequent granted planning application (Planning Ref: F22A/0316) to Finglas County Council, it was proposed to relocate the Thermal Storage Tank to the east of the Terminal 2 Energy Center, adjacent to the existing Flight Catering Building site. The submission notes that '*the tanks dimensions (16m x 4.8 m) and capacity (250m3) will remain unchanged. It will, as previously permitted, be used to store excess heat and improve the energy efficiency of the existing combined Heat and Power Plant serving Terminal 2.*' This Thermal Storage Tank has now been installed.

2. The Planning System and Flood Risk Management Guidelines

In September 2008 "The Planning System and Flood Risk Management Guidelines for Planning Authorities" (Guidelines) were published by the Department of the Environment, Heritage, and Local Government in Draft format. In November 2009, the adopted version of the document was published.

The Guidelines provide guidance on flood risk and development. A precautionary approach is recommended when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding.

The objective of a Site-Specific Flood Risk Assessment (FRA) is to assess all types of flood risk to a development. The assessment should investigate potential sources of flood risk and include for the effects of climate change. The assessment is required to examine the impact of the development and the effectiveness of flood mitigation and management measures proposed. It should also present the residual risks that remain after those measures are put in place.

This approach is based on the identification of flood zones for river and coastal flooding. "Flood Zones" are geographical areas used to identify areas at various levels of flood risk. It should be noted that these do not consider the presence of flood defences, as the risks remain of overtopping and breach of the defences. There are three flood zones defined (refer to Figure 2-1):

Flood Zone A (high probability of flooding) is for lands where the probability of flooding is greatest (greater than 1% or 1 in 100 for river flooding and 0.5% or 1 in 200 for coastal flooding).

Flood Zone B (moderate probability of flooding) refers to lands where the probability of flooding is moderate (between 0.1% or 1 in 1,000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1,000 and 0.5% or 1 in 200 for coastal flooding).

Flood Zone C (low probability of flooding) refers to lands where the probability of flooding is low (less than 0.1% or 1 in 1,000 for both river and coastal flooding).

Figure 2-1 – Indicative Flood Zone Map (Extract from the Guidelines, Figure 2.3)

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three-staged approach to undertaking an FRA is recommended:

Flood Risk Identification (Stage 1) - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment.

Initial Flood Risk Assessment (Stage 2) - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures.

Detailed Flood Risk Assessment (Stage 3) - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements of a Stage 1 and 2 Flood Risk Assessment for the SASC element of the proposals as a quantitative appraisal of potential flood risk is not considered to be required. A separate Flood Risk Assessment for the CBP element of the proposals has been prepared by Nicholas O'Dwyer.

3. Flood Risk Identification (Stage 1)

The existing building is a two-storey building located in a landside location in Dublin Airport between the Energy Centre and Shamrock House buildings. The existing site levels range from approximately 61 m OD Malin to 63.90 m OD Malin. Figure 3-1illustrates the location of the subject site relative to the nearby water body, the Cuckoo Stream.

Figure 3-1 – Location of existing building relative to Cuckoo Stream

3.1 History of Flooding

As part of the planning stage design of the proposed development, AECOM undertook at review of available sources of information regarding flood risk in the area surrounding the proposed development site. The following sources were consulted as part of the review:

- OPW Flood Records,
- Historic Flood Records.

3.1.1 OPW Flood Hazard Mapping

The Office of Public Works (OPW) collates available reports of flooding from all sources (e.g. fluvial, pluvial, coastal, etc.) on a nationwide basis. The OPW's website (www.floodmaps.ie) was consulted to obtain reports of recorded flooding within and surrounding the site. Figure 3-2 is an extract of the information available for the area surrounding the site. There are no records of flooding within or surrounding the development site.

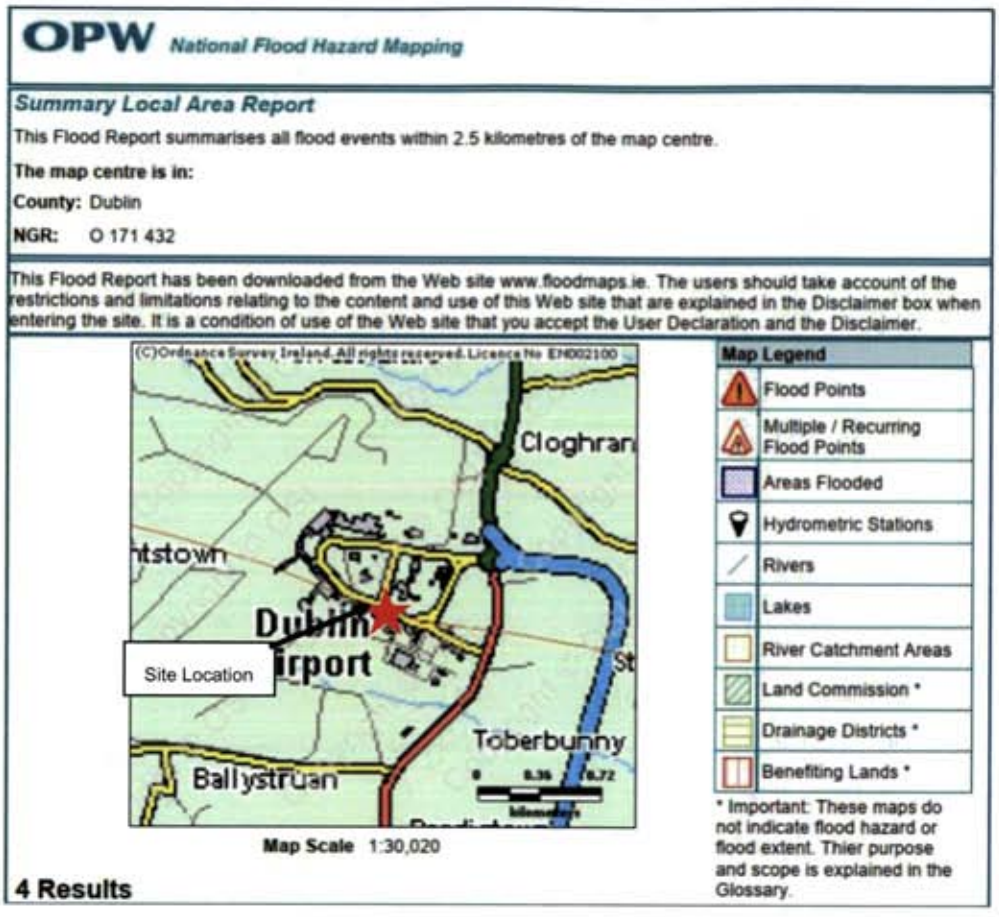

Figure 3-2 – OPW Flood Hazard Mapping

3.1.2 OSi Historical Flood Maps

The 6" (1837 – 1842) and the 25" (1888 – 1913) historical maps available on OSi have been reviewed. These maps do not indicate flooding in the area of the proposed development.

3.2 Fingal County Development Plan (2023 – 2029) Strategic Flood Risk Assessment (SFRA)

The Strategic Flood Risk Assessment (SFRA) published as part of the Final County Development Plan includes predictive flood risk mapping. Figure 3-3 is an extract from the SFRA flood risk mapping and illustrates the extent of Flood Zone A (1 in 100 year return period event/ 1% AEP) in dark blue and the extent of Flood Zone B (1 in 1000 year return period event/ 0.1% AEP) in light blue. The flood extents shown are associated with the Cuckoo Stream. There are no areas within or surrounding the subject site that have been identified as being at risk of flooding. The full map is included in Appendix A.

Figure 3-3 – Extract from SFRA Flood Risk Mapping

4. Initial Flood Risk Assessment (Stage 2)

4.1 Potential Sources of Flooding

The potential risk to the proposed development associated with each of the following sources of flooding is presented in this section.

- Fluvial Flooding,
- Coastal/ Tidal Flooding,
- Pluvial Flooding,
- Groundwater Flooding.

4.1.1 Fluvial Flooding

Fluvial flooding refers to flooding from rivers and streams. Fluvial flooding is the result of a river/stream exceeding its channel capacity and excess water spilling out onto the adjacent floodplain. Given the proximity of the development to the Cuckoo Stream/ River Mayne, fluvial flood risk from this watercourse has been considered.

Figure 4-1 is an extract from the Fingal East Meath FRAM study carried out by the OPW. Please see Appendix B for the full map. The site is approximately 320 m north of the Cuckoo Stream and is located outside the predicted flood extents, therefore the risk of flooding is considered to be low.

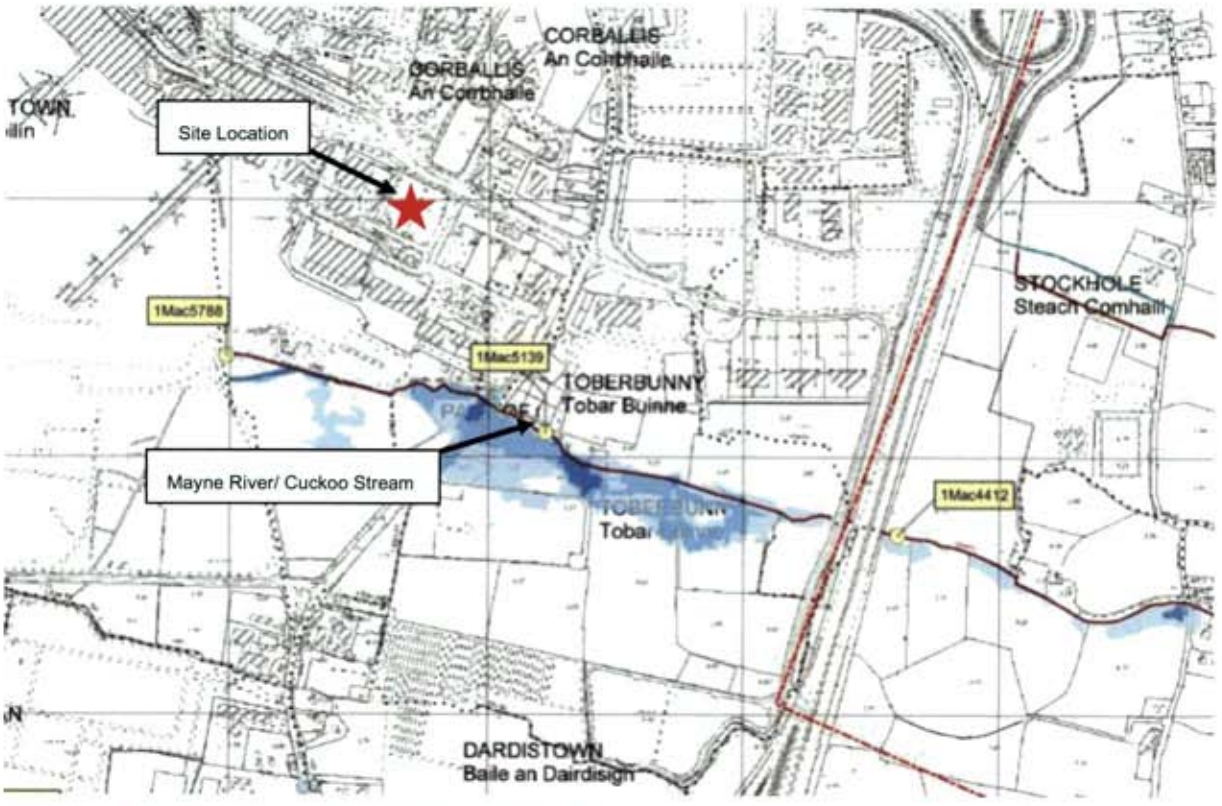

Figure 4-1 - River Mayne Fluvial Flood Extent Map

4.1.2 Pluvial Flooding

Pluvial flooding relates to flooding as a direct result of extreme rainfall. Pluvial flooding can occur during a rainfall event of extreme intensity. If the rate at which water falls on the ground is faster than the rate at which the water can make its way to the drainage network, then flooding will occur. Figure 4-2 is an extract from myplan.ie and illustrates areas that may be at risk of pluvial flooding.

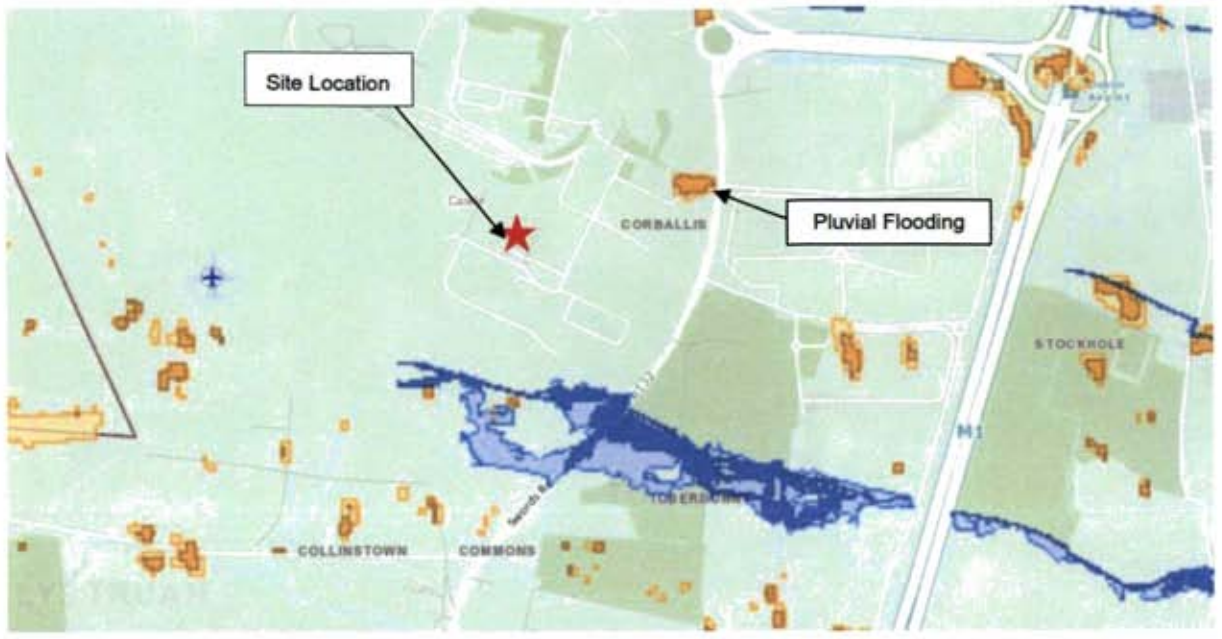

Figure 4-2 - PFRA Predicted Pluvial Flood Extents

The site of the proposed development is not identified as being affected by the threat of pluvial flooding. The existing FCB site is impermeable and unattenuated run-off is collected by the existing drainage networks serving the wider area. In accordance with the Policy Objectives set out in Section 9.3 (Sustainable Urban Drainage) of the Dublin Airport Local Area Plan (LAP), the proposed development will be carefully managed in terms of surface water run-off and provision has been made for the incorporation of SUDS measures. To provide an at source reduction in the rate of surface water discharged from the site, an attenuation tank has been incorporated in the surface water drainage network. The surface water drainage network will be designed to cater for run-off from the building and the surrounding hardscaped areas in accordance with the policy objectives set out in the LAP and the Greater Dublin Strategic Drainage Study (GDSDS) and will contain the 1 in 100-year event plus 20% climate change allowance.

4.1.3 Coastal/ Tidal Flooding

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination, high tide level, storm surges and wave action. The subject site is approximately 6km from the coast. Due to the inland nature of the site, the risk of coastal flooding is considered low.

4.2 Estimate of Flood Levels and Flood Zone

Following a review of the predictive flood risk mapping available, it is concluded that the subject site is located within Flood Zone C for coastal and fluvial flood risk and the risk of pluvial and groundwater flooding to the development is low.

5. Flood Risk Management

Chapter 3 of the Planning System and Flood Risk Management Guidelines (DEHLG/ OPW, 2009) describes the key principles of a risk based sequential approach to managing flood risk. The sequential approach is aimed at directing development toward land that is at low risk of flooding. Figure 5-1 is extracted from the Guidelines and illustrates the sequence in which a site must be assessed from a flood risk standpoint. Specifically, the order in which the planning authority must be satisfied from a flood risk perspective is to Avoid (locate in an area that is not flood prone), then Substitute (if in a flood prone zone, then substitute the type of development), Justify (if substitution does not reduce flood risk sufficiently, then perform Justification Test) and Mitigate. This section discusses the sequential approach recommended in the Guidelines with regard to the proposed development.

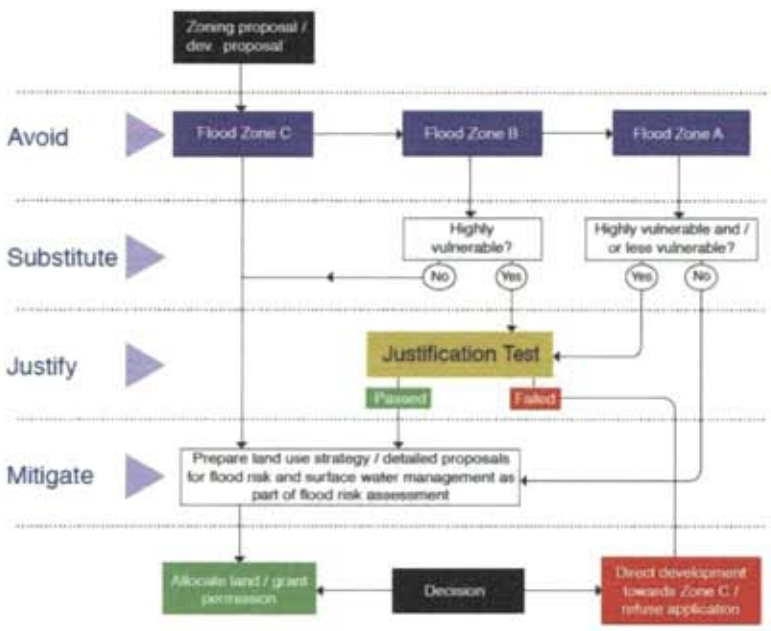

Figure 5-1 – Sequential Approach Mechanism in the Planning Process

5.1 Vulnerability

Table 3.1 of the Planning System and Flood Risk Management Guidelines for Planning Authorities gives a detailed classification of vulnerability of different types of development. As the project involves the reconfiguration of an existing commercial building, it is classed as a 'less vulnerable development', and these are considered a suitable land use for Flood Zone C (please see Table 5.1) which negates the requirement for a Justification Test.

Table 5-1– Vulnerability and Appropriate Flood Zones – Table 3.2 of the PSFRM

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

5.2 Flood Risk Management

Flood risk management under the EU Floods Directive aims to minimise the risks arising from flooding to people, property, and the environment. Minimising risk can be achieved through structural measures that block or restrict the pathways of floodwaters, such as river defences or non-structural measures that are often aimed at reducing the vulnerability of people and communities such as flood warning, effective flood emergency response, or resilience measures for communities or individual properties.

6. Conclusion

AECOM has prepared this Stage 1 & 2 Flood Risk Assessment report in support of the proposed works to the existing Flight Catering Building at Dublin Airport.

Following a review of historic information and predictive coastal and fluvial flood risk mapping, it has been concluded that the site is located within Flood Zone C with respect to both coastal and fluvial flood risk.

Commercial/ office buildings are classified as Less Vulnerable development and are considered a suitable land use for the subject site and negated the need for a Justification Test. It is also noted that the proposed development will not increase flood risk elsewhere.

In accordance with the Policy Objectives set out in Section 9.3 (Sustainable Urban Drainage) of the Dublin Airport Local Area Plan (LAP), the proposed development will be carefully managed in terms of surface water run-off and provision has been made for the incorporation of SUDS measures. To provide an at source reduction in the rate of surface water discharged from the site, an attenuation tank has been incorporated in the surface water drainage network. The surface water drainage network will be designed to cater for run-off from the building and the surrounding hardscaped areas in accordance with the policy objectives set out in the LAP and the Greater Dublin Strategic Drainage Study (GDSDS) and will contain the 1 in 100-year event plus 20% climate change allowance.

We note that in case of emergency there is vehicular access for Fire and Ambulance services to the site from all roads surrounding the proposed development.

AECOM recommends that any residual flood risk be managed through appropriate maintenance of the proposed drainage network and structures (attenuation tanks, manholes, gullies, channel drains, etc.).

Appendix A – Fingal County Development Plan – SFRA Mapping

713000 714000 715000 716000 717000 718000

745000 744000 743000 742000 741000 740000

N

St. Margaret's

Dublin Airport

Dardistown

Poppintree

Santry

R122 R108 R132 M50 M1 R104 R139 R135

0 0.5 1 km

KEY PLAN

LEGEND

- Fingal County Administrative Boundary
- Watercourses
- LAP & Masterplan Boundaries
- Flood Zone A
- Flood Zone B
- Defended Areas
- Area for Further Consideration

REV:	NOTE:	DATE:
03	DRAFT ISSUE	22/02/2022

Comhairle Contae Fhine Gall
Fingal County Council

McCloy Consulting
Unit 12, The Beat Centre, Stephenstown Industrial Estate, Balbriggan, Co. Dublin
T: +353 (0)1 5138963
E: info@mccloyconsulting.ie
W: www.mccloyconsulting.ie

MAP:	FLOOD ZONE MAP	
FLOOD PROBABILITY:		
FLUVIAL: 1% / 0.1%	COASTAL: 0.5% / 0.1%	
SOURCE CRS:		ITM EPSG:2157
DRAWN BY:	DL	DATE: 22/02/2022
CHECKED BY:	PS	DATE: 22/02/2022
APPROVED BY:	DKS	DATE: 22/02/2022
DRAWING NUMBER:	M02127-06_FIG_FL120	
MAP SERIES:		PAGE 20 OF 26
DRAWING SCALE:		1:20000 @ A3

Appendix B – CFRAM Mapping

316000 316500 317000 317500 318000 318500 319000

243000 242500 242000 241500 241000

COLLINSTOWN
Baile Choilín

CORBALLIS
An Corrbhaile

CORBALLIS
An Corrbhaile

STOCKHOLE
Steach Comhaill

1Mac5788

1Mac5139

TOBERBUNNY
Tobar Buinne

COMMONS

TOBERBUNNY
Tobar Buinne

1Mac4412

1Mae298

BALLYSTRUAN
Baile Sruáin

DARDISTOWN
Baile an Dairdisigh

1Ma7828

1Ma8373

CLONS
Cluain

TURNAPIN LITTLE
Turnapain Beag

TURNAPIN GREAT
Turnapain Mor

Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
1Ma8373	59.53	0.15	59.80	0.15	60.09	0.15
[illegible]828	55.87	2.65	56.14	4.63	56.39	7.80
1Mac5788	56.26	5.06	56.67	9.30	56.94	16.07
1Mac5139	52.78	3.81	52.90	7.48	53.11	13.65
1Mac4412	46.87		47.31		47.73	
1Mae298	58.90	0.15	59.03	0.15	59.16	0.15

316000 316500 317000 317500 318000 318500 319000

250 0 250 500 750 1000 Meters

Location Plan:

LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- Standard of Protection of Flood Defence

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

OPW

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
FINGAL EAST MEATH FRAM STUDY

Map: **Mayne Model**
FLUVIAL FLOOD EXTENT MAP

Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn by:	IH	Date: Dec - 2017
Checked by:	JM	Date: Dec - 2017
Approved by:	JM	Date: Dec - 2017

Map No.:
MAY/HPW/EXT/CURS/001

Revision: F1

Map Scale: 1:10,000 Plot Scale: 1:1 @ A3

aecom.com

Appendix 13: Cultural Heritage

Figure 1 - Site location.

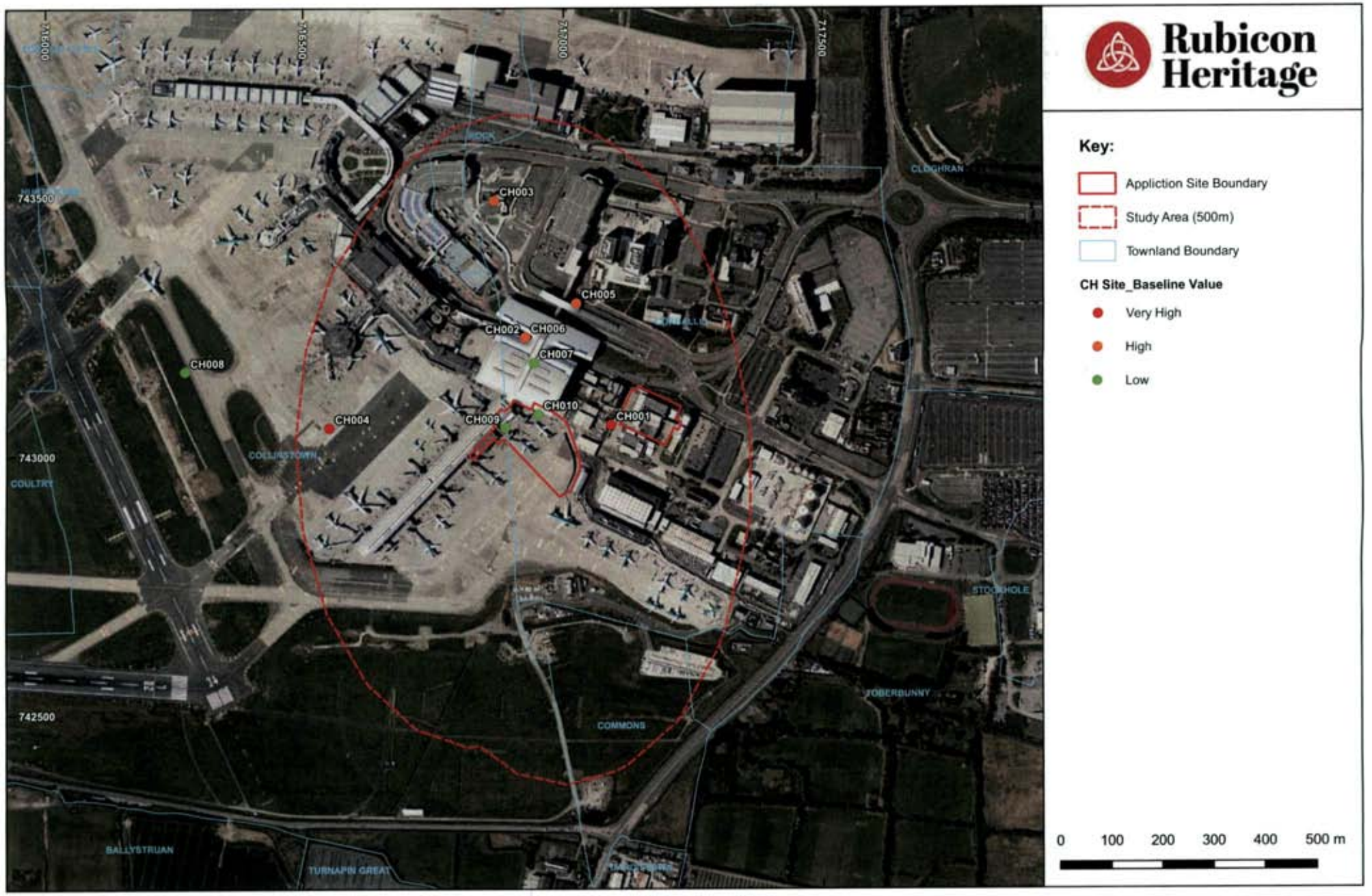

Figure 2 - Cultural Heritage (CH) sites within study area of proposed development site.

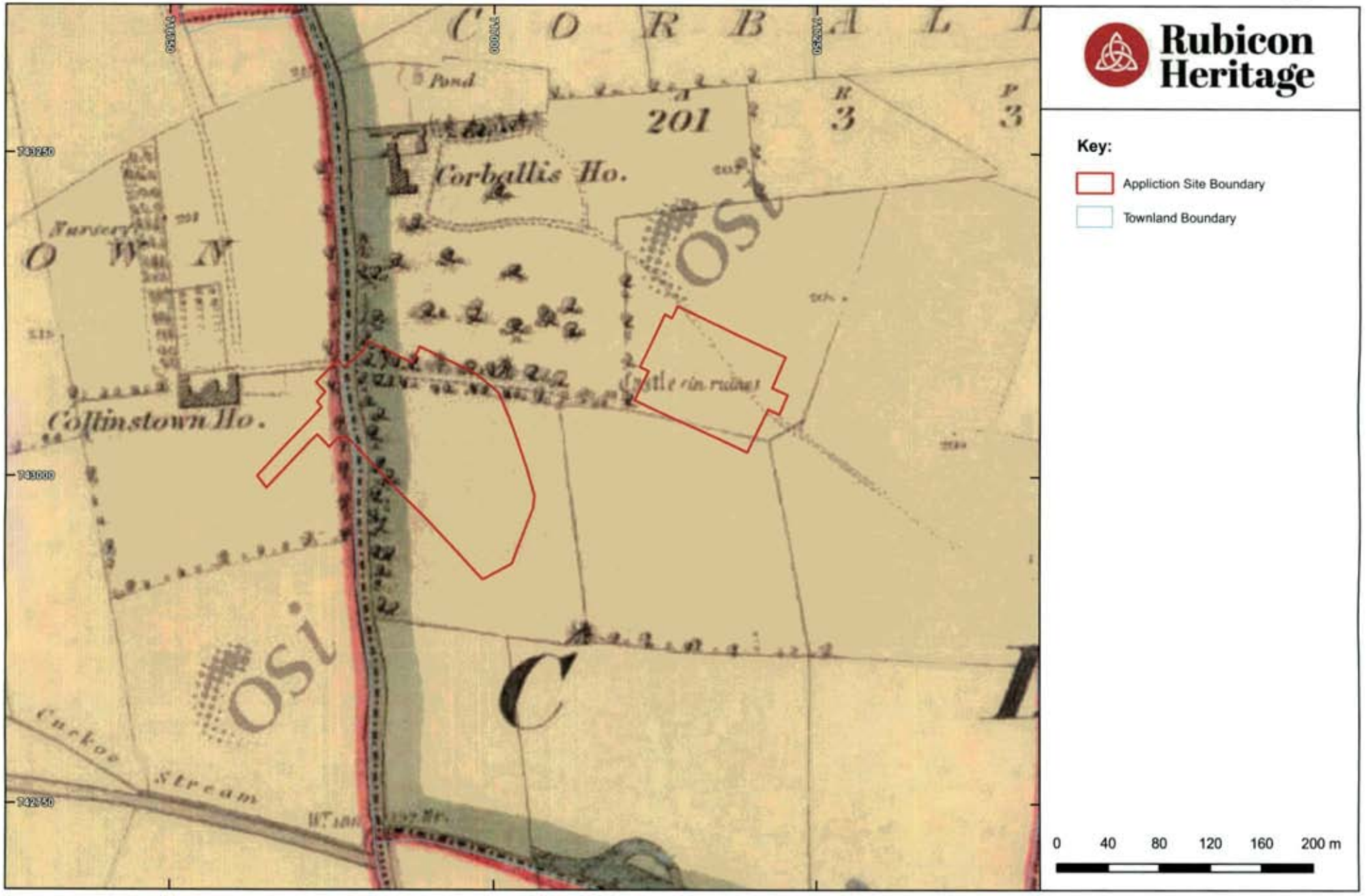

Figure 3 - First edition 6-inch Ordnance Survey map with proposed development site.

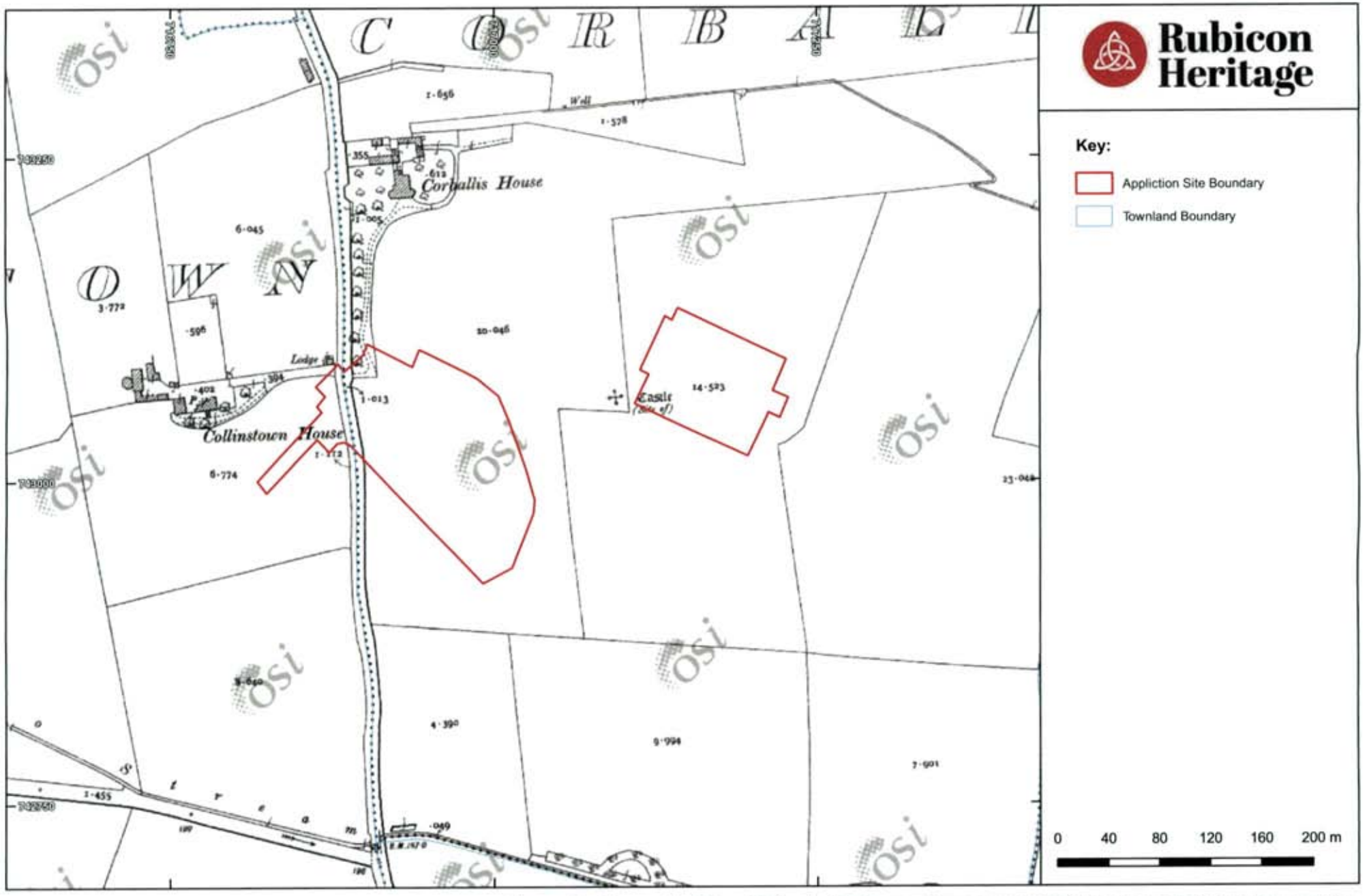

Figure 4 - Second edition 25-inch Ordnance Survey map with proposed development site.

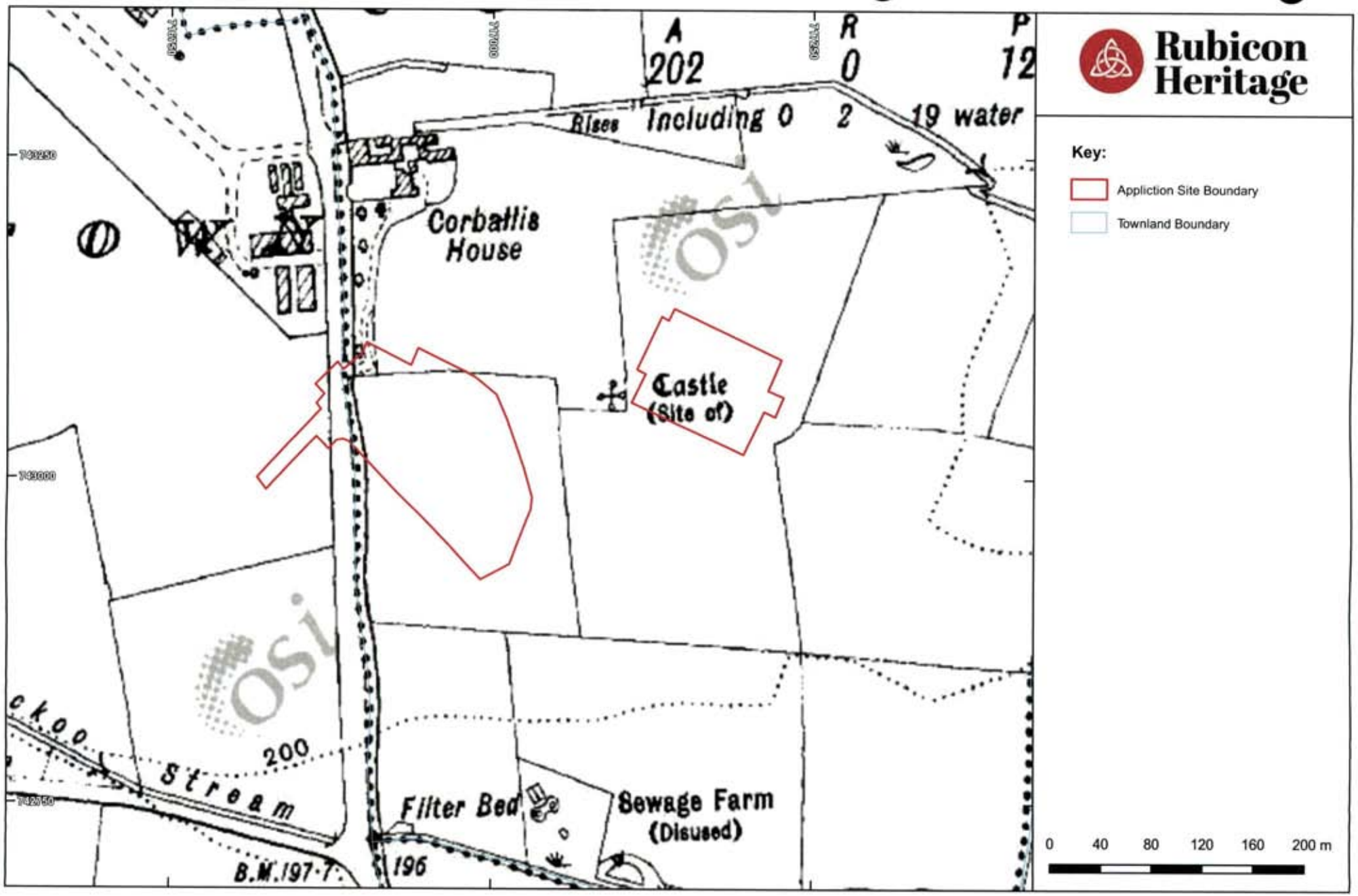

Figure 5 - Cassini OS Edition with proposed development site.

Appendix 13 CH Sites

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
CH001	RMP	DU014-011----	This site is marked 'Corballis castle, in ruins' on the 1837 OS 6-inch map. There are no remains of the castle. The site is under buildings within Dublin Airport. Not visible at ground level.	CORBALLIS (Coolock By.)	Very High	717091	743058
CH002	NIAH	11349002	Detached seven-bay two-storey house, c.1835, on an irregular plan, with three canted bays to left side and two-storey return to rear. Two-storey extensions to rear. ROOF: Hipped; slate; terracotta ridge tiles; cast-iron rainwater goods; plaster corbels to eaves; rendered chimney stacks with cornices. WALLS: Rough cast render; nap rendered plinth. OPENINGS: Square headed; patent reveals; painted stone cills; 9/6 pane timber sashes; rooundheaded door opening; moulded plaster surround; semi-circular radial fanlight; stone Ionic columns; original raised and fielded panelled door.	CORBALLIS (Coolock By.)	High	716925	743226
CH003	NIAH	11349001	Detached multiple-bay Roman Catholic church, built 1964, with a concrete bell tower and landscaped entrance courtyard to the west. One of the first modernist churches in Dublin. ROOF: Flat roof; roof to nave raised above that of side aisles; chancel and vestibule; copper clapping. WALLS: Reinforced concrete; concrete brick cladding. OPENINGS: Clerestory windows with timber frames; tongue and groove timber doors. INTERIOR: Single cell; rectilinear plan; timber panelled ceiling; stained glass clerestory lighting; concrete brick walls; square stained glass Stations of the Cross set into wall.	CORBALLIS (Coolock By.)	High	716866	743491
CH004	NIAH/PS	11349006/RPS No.612	Detached multiple-bay four-storey airport terminal building, built 1937, in the International Modern style on a curved plan with repeated bands of horizontal glazing, cantilevered terraces and promenades on western façade overlooking airfield. Designed by Desmond Fitzgerlad, Dermot O'Toole, Daithi Hanley, Charles Aliaga Kelly, Kevin Barry, Harry Robson. 'H': on of the first buildings in Ireland an an international modernist style.	COLLINSTOWN	Very High	716550	743053
CH005	Excavation	06E0440 ext.	Excavations at Corballis House, Dublin Airport, were undertaken in February–April 2007 in response to a joint request from the National Monuments Service and the Heritage Policy and Architectural Protection Unit, DoEHLG, to gather data on aspects of Corballis House, particularly its origins and pre-1700 history. The investigations were restricted by the necessity of leaving the building intact and restorable until a planning	CORBALLIS (Coolock By.)	High	717024	743293

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			decision could be made about its future. They built upon substantial previous archaeological work at the house, including an EIS (by E. O'Donovan and P. Clancy) that detailed the results of previous testing by Edmond O'Donovan (Excavations 2006, No. 586, 06E0440) and a building survey (by T. Murphy). The investigations involved the excavation of six 'keyhole' trenches inside Corballis House (over 16m2 in total), a large open excavation to the west of the building, a slot-trench along the south of the building (restricted by the proximity of numerous, active, modern underground services), a trench to the north of the building and an open area excavation to the east (for a total outside excavated area of over 975m2). The investigations also involved analysis of the surviving, upstanding building fabric, both a re-examination of fabric examined previously for the earlier building survey and scrutiny of new fabric (including 60m2 of interior wall, from which plaster was removed, and more than a third of the exterior walls, from which render was removed). Once a picture began to emerge of the dimensions and appearance of the earlier phases of Corballis House, a survey of comparative vernacular structures in the surround area was undertaken by Tim Murphy and the writer to provide a context for understanding the building at that time. Following the granting of planning permission for Terminal 2, additional investigations were carried out at Corballis House in October–November. These included further analysis of the standing building and the removal of much larger areas of wall plaster/render, as well as the excavation of exterior areas that were not previously accessible (totalling an additional 168m2). The further standing building analysis was undertaken in coordination with the conservation architect and specialist contractors involved in salvaging and removing the building's architectural features (window surrounds; plaster niches; doors, door surrounds and fanlights; stairway balusters, newel posts and rails; Victorian encaustic tiles). Once all this work was complete, the building was demolished in a phased manner to allow further archaeological analysis of its remains during the process. Finally, following demolition and the removal of the standing				

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			structure, excavation of the remaining interior area not previously accessible (some 313m2) was undertaken. What has emerged from the investigations is a social history of the building that details its main building phases and highlights the remnants of the early structure that survived. The findings of the investigations, according to the main building phases that have been established as a result of the work, are quite complex and will be published in detail elsewhere. Overall the story is one of a 17th-century vernacular dwelling (for an occupant of middling station) undergoing renovation and rebuilding according to the fortunes and concerns of sequential generations of owners, and of its elevation from a relatively modest stone cottage to an (imperfect, eccentric) example of 'polite architecture' for a family of wealthier gentry concerned – like their social peers of the day – to demonstrate their taste and standing through the architecture and grounds of their home. The earliest phase of Corballis is likely to have been built shortly after 1641/2. It incorporated reused medieval stone ope surrounds, probably from the nearby castle (see below), into its shallow foundations and wall fabric. At that time the building consisted of a single-storey, west-facing, 3-bay stone cottage with a thatched, gabled roof and a single chimney. Later in the 17th century, a south extension that included a second fireplace was added to one end of the cottage, doubling its length. The building was still thatched with longstraw at this time, and the few small windows were probably glazed. The next phase of renovation was probably initiated by Thomas Wilkinson after he acquired Corballis in 1706. It saw the raising of the walls of the existing building and the lowering of interior floors to accommodate the addition of an upper storey. Windows were enlarged as part of the refurbishment and a new roof of red tile and slate was added. Green-glazed ridge tiles from North Devon were used to decorate the roof peak and fashionable blue-and-white tin-glazed 'Delft' tiles (depicting various rural				

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			scenes) were added to either side of the enlarged downstairs fireplaces, just below the mantelpieces. Cobblestone paths threaded through a well-drained front garden to the central west entrance of Corballis House, flanked by decorative garden parterres – probably of box wood – that were considered especially pleasing when viewed from upper-storey windows. In the 1720s, the now two-storey residence was again lengthened at its other end and a small cellar was built beneath this new north extension, nearest to the farmyard. The cellar may first have been used as a dairy pantry; it subsequently came to serve as a wine cellar and, later still, was used for coal storage. A huge eastern addition that enlarged the house beyond its previous single-pile width and nearly doubled its size was begun around 1760 under the guidance of James Wilkinson. The opportunity was used to raise the height of the new slate roof in order to lift both ground-floor and first-floor ceilings inside the older part of the house. The front of the building was moved from the old east side entrance to the new Georgian-proportioned west façade, and a terraced cobblestone patio was laid before it. The south façade was also significantly renovated to provide a fitting prospect from the newly landscaped avenue approach. It resembled the new west front of the building, with large sash windows arranged symmetrically around a central arched doorway and fanlight. Towards the end of the 18th century, under the direction of Sir Henry and Lady Elizabeth Wilkinson, half-octagon bows were added to each side of the south façade. Windows were systematically repositioned and enlarged, in proportion to the revised building dimensions. The central arched doorway in the southern façade was also replaced with a large window. In addition, the roof and first-storey ceilings were raised over the eastern and southern parts of the building. Shortly thereafter, the interior plasterwork of Corballis House was renewed and new decorative plaster niches were built inside one of the upper-storey bay rooms. The musical theme of these niches is a clue that this room may once have been the venue for the				

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			fashionable recitals and parties that Susannah Liddiard Wilkinson hosted around the turn of the 19th century. Although many individual architectural features of the building were added over the remaining two centuries of its life, the basic floor plan of Corballis at the time of its removal in 2007 was that which was already in existence in the early 19th century. DU014–011 ('castle, site of') Early historical maps depict the location of a ruinous castle (tower-house) in the corner of a field, some 220m south-east of Corballis House. A variety of historical and cartographic evidence combine to suggest that the building may have been razed in 1641/2 by the forces of the Earl of Ormond. The castle's occupant at that time was involved in the provisioning of Confederate troops besieging Drogheda late in 1641, and Ormond repaid such participation, in Fingal and parts of County Meath particularly, with targeted violence. The demise of the structure in the early 1640s is also implied by the discovery of reused dressed medieval stones in the original, mid-17th-century, vernacular cottage at Corballis House. While groundworks across the Terminal 2 site are being archaeologically monitored/inspected, work in the vicinity of the former castle site – beneath tarmac, and modern concrete block and corrugated steel buildings – was overseen with particular scrutiny in December 2007 and early 2008. The very bottom of a former late post-medieval boundary ditch was identified, but the ground across the area had been heavily truncated by airport works over the past 60-odd years, not least by the countless trenches for services feeding the terminal, the control tower and various neighbouring buildings. No archaeology was identified in the vicinity of the RMP site.				
CH006	Excavation	06E0440	Monitoring of groundworks on the South Apron at Dublin Airport Terminal II was undertaken from April to July 2008, with the assistance of Carina	CORBALLIS (Coolock By.)	High	716926	743228

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			Eriksson. Particular attention was paid to the former location of Collinstown House. No archaeology was identified. Notably, no demolition rubble or building debris of any type was identified, suggesting that Collinstown House may have been quite thoroughly removed during the initial levelling of the area (by hand, by a large team of workmen) in the 1930s or during subsequent construction phases of airport tarmac and the underground access tunnel in the vicinity. Editor's note: This entry did not arrive in time for inclusion in the bulletin for 2008.				
CH007	Excavation	06E0440 ext.	Monitoring of groundworks on the South Apron at Dublin Airport Terminal II was undertaken from April to July 2008, with the assistance of Carina Eriksson. Particular attention was paid to the former location of Collinstown House. No archaeology was identified. Notably, no demolition rubble or building debris of any type was identified, suggesting that Collinstown House may have been quite thoroughly removed during the initial levelling of the area (by hand, by a large team of workmen) in the 1930s or during subsequent construction phases of airport tarmac and the underground access tunnel in the vicinity. Editor's note: This entry did not arrive in time for inclusion in the bulletin for 2008.	CORBALLIS (Coolock By.)	Low	716942	743178
CH008	Excavation	06E0545	Between May 2006 and August 2007 intermittent monitoring of groundworks associated with the proposed extension of the airport terminal building were undertaken. In conjunction with the Department of the Environment, and based on health and safety considerations, an investigative testing excavation was considered unsuitable and potentially hazardous, thus a programme of intensive monitoring of groundworks was implemented in its stead.	COLLINSTOWN	Low	716271	743162

CH Number	Type	ID	Long Description/Details	Townland	Baseline Value	ITM East	ITM North
			An area comprising 7838m2 was monitored and the results were determined to be not of archaeological significance, as no remains of cultural or heritage value were recovered. The stratigraphic matrix consisted of 0.6m of reinforced concrete where the aircraft runways exist, which was underlain by up to 0.4m of hardcore. The underlying natural subsoil was a very compacted silty clay, with a high volume of decayed and undecayed limestone present. The majority of the construction had little or no effect on to the subsoils, but the laying of service lines and utility plants did have deeper effects, ranging from 1.4 to 4m. In places, depths of up to 6m were recorded as having been achieved. Fragments of early 20th-century clay drainage pipes associated with the previous use of the area by the Royal Air Force (pre-1920) and one piece of oyster shell were recovered.				
CH009	UCH	TB01	Collinstown/Corballis townland boundary - shown as a roadway on the 1st ED OS sheet	COLLINSTOWN/CORBALLIS (Coolock By.)	CORBALLIS (Coolock By.)	716887	743053
CH010	UCH	UCH01	A straight laneway marked on the 1st Ed 6-inch OS sheet approaching the site of a castle (unclassified) from the west. It forms part of the Corballis House Demsne at this time	CORBALLIS (Coolock By.)	CORBALLIS (Coolock By.)	716951	743079

Appendix 14: Material Assets

0 5 10 15 20 25 30 35 40 45 50m
SCALE 1:500

Legend

G00-1012-001 Watermain
- Potable Water As-Built
- Potable Water Surveyed
- Potable Water Historical
- Dedicated Fire As-Built
- Dedicated Fire Surveyed
- Fingal CC Water Network
- Redundant Water Network

G00-1012-002 Surface Water
- Surface Water As-Built
- Surface Water Surveyed
- Surface Water Historical
- Surface Water Redundant

G00-1012-003 Foul
- Foul As-Built
- Foul Surveyed
- Foul Historical
- Foul Pumped
- Foul Redundant

G00-1012-004 Comms
- Comms As-Built
- Comms Surveyed
- Comms Historical
- Comms Redundant

G00-1012-005 Gas
- Gas As-Built
- Gas Surveyed
- Gas Historical
- Gas Redundant
- Flow Heat & Ret
- Flow Heat & Ret Redundant

G00-1012-006 MV
- ESB 110KV
- ESB 110KV
- ESB 38KV
- Daa 10KV
- ESB 10KV
- ESB 2/10KV Unsurveyed
- ESB Overhead 38KV
- ESB Overhead MV
- ESB Overhead LV
- MV Redundant

G00-1012-007 LV
- LV As-Built
- LV Surveyed
- LV Historical
- LV Unverified

G00-1012-008 Road Lighting
- Road lighting As-Built
- Road lighting Surveyed
- Road lighting Historical
- Road lighting Redundant

G00-1012-009 Traffic
- Traffic As-Built
- Traffic Surveyed
- Traffic Historical
- Traffic Redundant

G00-1012-010 Fuel
- Fuelmain As-Built
- Fuelmain Surveyed
- Fuelmain Historical
- Fuelmain Redundant

G00-1012-011 Unidentified/Gpr Anomaly
- Unidentified
- GPR Anomaly
- Existing Attenuation Tanks
- Pollution Control Tank
- Extent of works

AECOM

PROJECT

Dublin Airport South Apron

CLIENT

daa plc
Old Central Terminal Building
Dublin Airport
Co. Dublin, Ireland
+ 353 1 814 11 11
info@daa.ie

CONSULTANT

AECOM Infrastructure & Environment UK Ltd
4th Floor, Bridgewater House
Whitworth Street
Manchester
M1 6LT
United Kingdom
Fax +44(0)161 907 3559
Tel +44(0)161 907 3500
www.aecom.com

NOTES

1. THIS DRAWING IS BASED ON EXISTING SERVICES INFORMATION RECIEVED FROM daa
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ANY RELEVANT STRUCTURAL, ARCHITECTURAL AND CONSULTANTS INFORMATION AND DRAWINGS.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SERVICES SCHEMATICS AND SPECIFICATIONS.
4. DO NOT SCALE FROM THIS DRAWING.
5. ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED.
6. THE DRAWING DOES NOT INDICATE THE PRECISE SIZES, QUANTITIES AND POSITIONS OF SERVICES HOWEVER OUTLINES THE INTENDED LOCATIONS OF BUILDING SERVICES ITEMS AND SERVICE ROUTES IN SUCH DETAIL AS TO INDICATE THE DESIGN CO-ORDINATION STRATEGY. THE DRAWING DOES NOT SHOW ALL COMPONENTS THAT MAY BE NECESSARY TO LOCATE SERVICES IN A FULLY COORDINATED MANNER.
7. THE POSITIONS OF ALL CONNECTION POINTS, ACCESSORIES, EQUIPMENT AND OTHER BUILDING SERVICES ITEMS AS SHOWN ON THE DRAWING ARE APPROXIMATE AND FOR GUIDANCE IN THE PREPARATION OF THE TENDER.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THE INSTALLATION AND SHALL TAKE ACCOUNT OF ALL OTHER WORKS AND TRADES EITHER DURING OR PRIOR TO THEIR INCORPORATION INTO THE WORKS.
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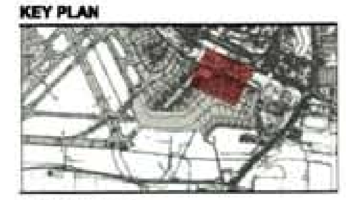
ISSUE/REVISION

I/R	DATE	DESCRIPTION
C	03-03-2023	Issued to daa for Tender
B	03-02-2023	Issued to daa for Tender
A	16-01-2023	Issued to daa for Tender

KEY PLAN



Suitability Status

A5 Suitable For Technical Design/Procurement

PROJECT NUMBER

60592409

SHEET TITLE

South Apron CBP Extension
Existing Below Ground Services
Combined

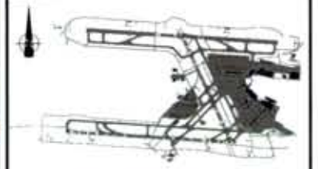
SHEET NUMBER

60592409-ACM-00-XX-DR-BS-020023

Scale 1:500 @A1 Rev C

02-06-23..F23A/0301
FINGAL CO CO PL DEPT

KEYPLAN



LEGEND

- WATERMAIN INFRASTRUCTURE
- SURFACE WATER INFRASTRUCTURE
- FOUL SEWER INFRASTRUCTURE
- GAS MAIN INFRASTRUCTURE
- FUEL MAIN INFRASTRUCTURE
- MV INFRASTRUCTURE
- LV INFRASTRUCTURE
- PUBLIC LIGHTING INFRASTRUCTURE
- TRAFFIC INFRASTRUCTURE
- ICT INFRASTRUCTURE
- UNIDENTIFIED SERVICES
- AS-BUILT LINETYPE PER SERVICE TYPE
- SURVEYED LINETYPE PER SERVICE TYPE
- HISTORICAL LINETYPE PER SERVICE TYPE
- REDUNDANT LINETYPE PER SERVICE TYPE
- UNVERIFIED STATUS LINETYPE PER SERVICE TYPE
- UNIDENTIFIED LINETYPE

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STATUS:

REV	DESCRIPTION	ISS. BY	DATE
100	ISSUED FOR INFORMATION	PEMM	N/A

DublinAirport

INFRASTRUCTURE

Cloghran House, Dublin Airport, Ireland
Email: infrastructureadmin@dublinairport.com
Website: www.dublinairport.com

PROJECT
DUBLIN AIRPORT
MASTER UTILITY DRAWING
ING COORDINATE SYSTEM

TITLE
COMBINED PIPED & DUCTED
INFRASTRUCTURE NETWORKS

DRAWN BY:		CHECKED BY:		APPROVED:	
CAD	DESIGNER	DIS LEAD	DES LEAD	DESIGN MANAGER	
PE	N/A	PE	N/A	N/A	
STATUS		PAPER SIZE	SCALE	DATE	
INFORMATION		A1	1:500	02/2023	
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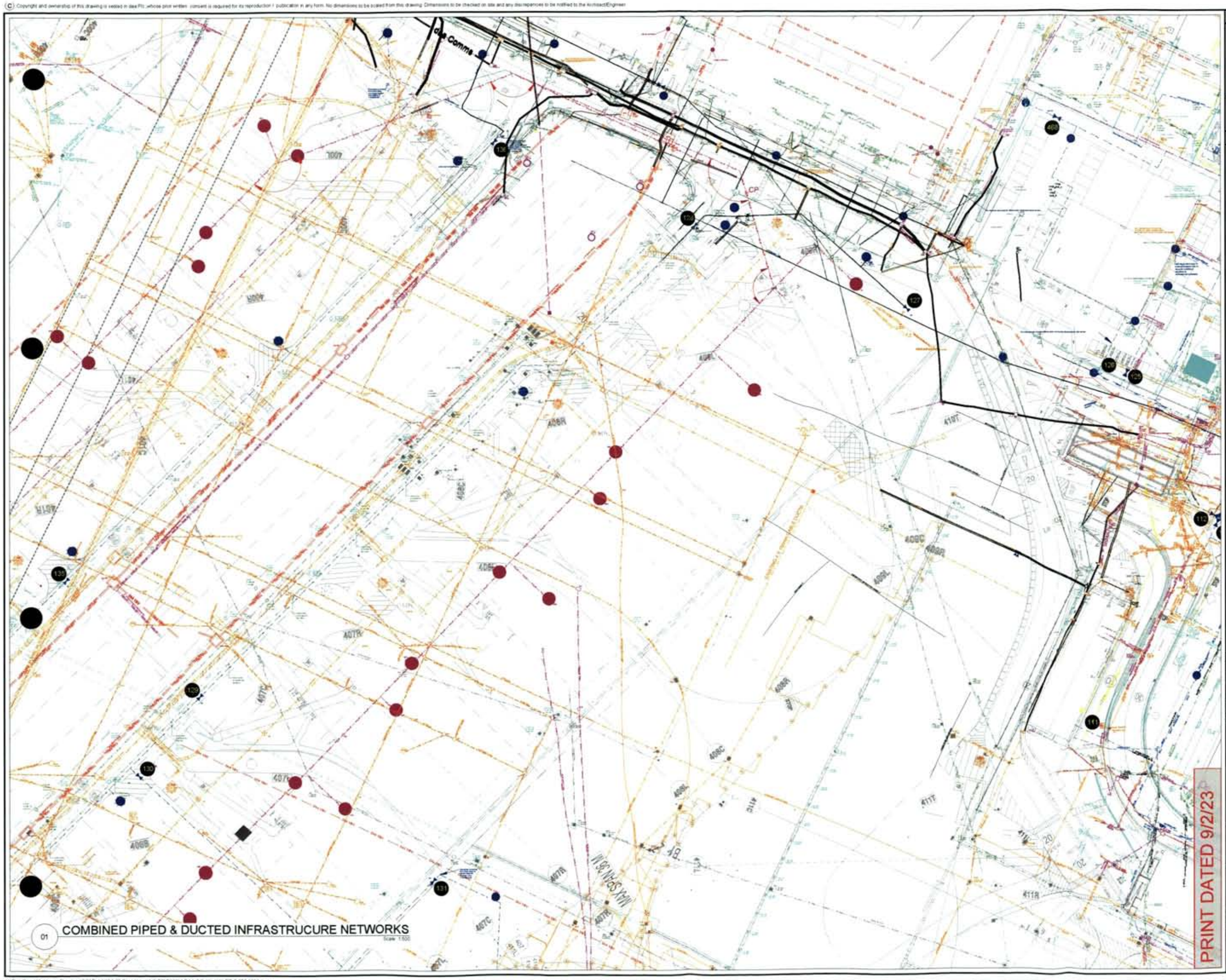
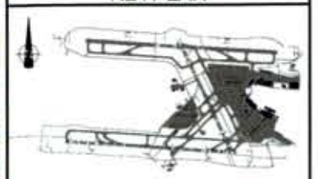
PRINT DATED 9/2/23



PRINT DATED 9/2/23

KEYPLAN



LEGEND

- WATERMAIN INFRASTRUCTURE
- SURFACE WATER INFRASTRUCTURE
- FOUL SEWER INFRASTRUCTURE
- GAS MAIN INFRASTRUCTURE
- FUEL MAIN INFRASTRUCTURE
- MV INFRASTRUCTURE
- LV INFRASTRUCTURE
- PUBLIC LIGHTING INFRASTRUCTURE
- TRAFFIC INFRASTRUCTURE
- ICT INFRASTRUCTURE
- UNIDENTIFIED SERVICES
- AS-BUILT LINETYPE PER SERVICE TYPE
- SURVEYED LINETYPE PER SERVICE TYPE
- HISTORICAL LINETYPE PER SERVICE TYPE
- REDUNDANT LINETYPE PER SERVICE TYPE
- UNVERIFIED STATUS LINETYPE PER SERVICE TYPE
- UNIDENTIFIED LINETYPE

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DublinAirport

INFRASTRUCTURE

Cloghran House, Dublin Airport, Ireland
Email: infrastructureadmin@dublinairport.com
Website: www.dublinairport.com

PROJECT:
DUBLIN AIRPORT
MASTER UTILITY DRAWING
ING COORDINATE SYSTEM

TITLE:
COMBINED PIPED & DUCTED
INFRASTRUCTURE NETWORKS

DRAWN BY:		CHECKED BY:		APPROVED:	
CAD	DESIGNER	DIS. LEAD	DES. LEAD	DESIGN MANGER	
PE	N/A	PE	N/A	N/A	
STAGE		SHEET	SCALE	DATE	
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ATKINS
Member of the SNC-Lavalin Group

WS Atkins Ireland Limited
Atkins House
150 Airside Business Park
Swords
Co. Dublin
K67 K5W4

Tel: +353 1 810 8000