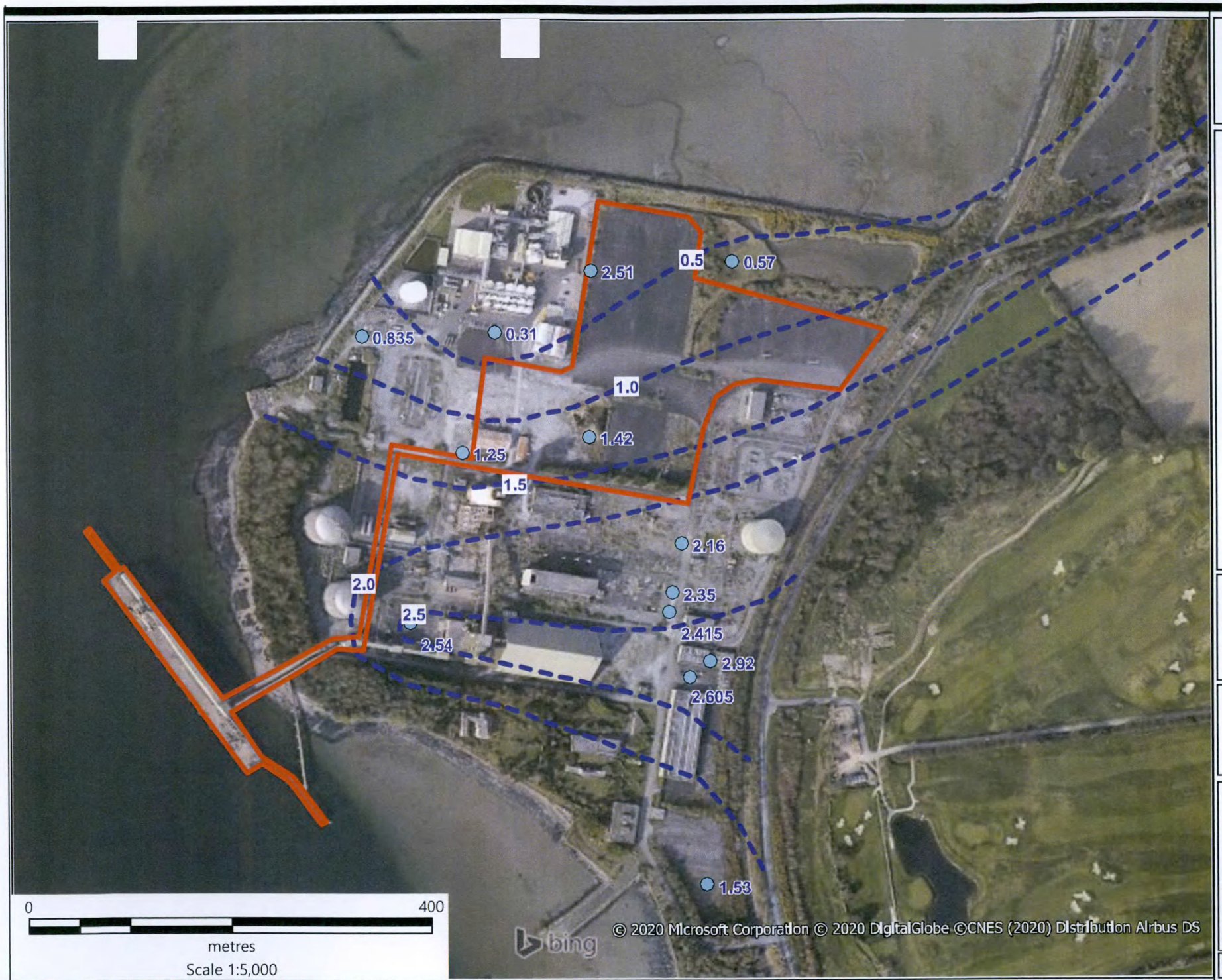
Appendix 8.1

Additional Hydrogeological Figures



NOTES

LEGEND

Goulding Site

Groundwater level (mAOD)

Groundwater contour (mAOD)

ERS
environmental risk solutions

Marino Point

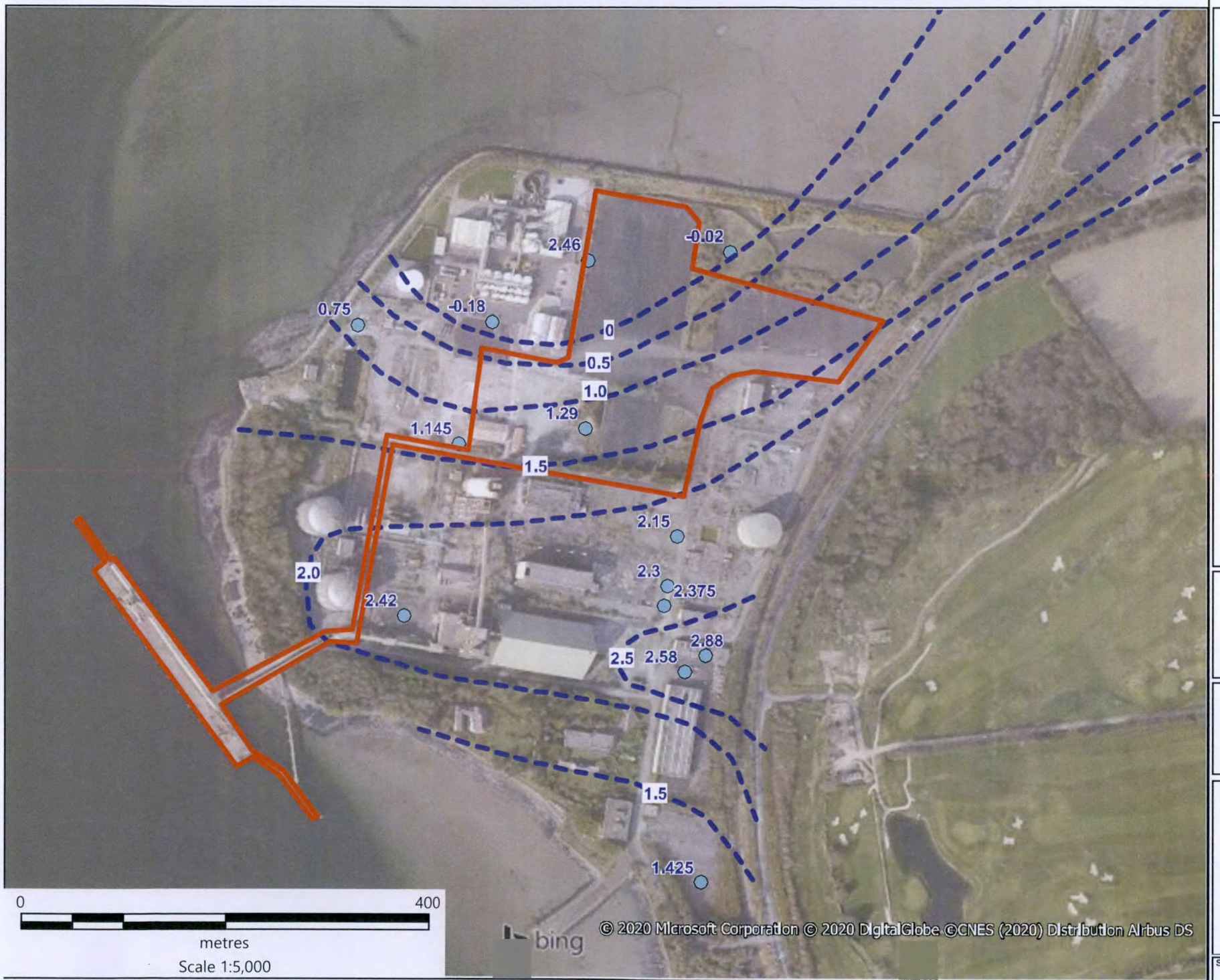
EIAR - Gouldings Development

Groundwater Flow
3 July 2019 (Low Tide)

Figure A.8.1

SCALE: As shown

DATE: Jan 2020



NOTES

LEGEND

Goulding Site

Groundwater level (mAOD)

Groundwater contour (mAOD)

ERS
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Marino Point

EIAR - Gouldings Development

Groundwater Flow
28 May 2019 (Mid Tide)

Figure A 8.2

SCALE: As shown

E: Jan 2020

Appendix 8.2

Laboratory Test Results

UKAS TESTING
2183

Chemtest
The right chemistry to deliver results
Chemtest
Depot
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-18181-1
Initial Date of Issue:	10-Jun-2019
Client	Environmental Risk Solutions
Client Address:	Unit 1 31 Dundela Park Sandycove County Dublin Ireland
Contact(s):	Shane Herlihy
Project	0007-009
Quotation No.:	Q18-14004
Order No.:	
No. of Samples:	18
Turnaround (Wkdays):	5
Date Approved:	10-Jun-2019
Approved By:	
Details:	Martin Dyer, Laboratory Manager

Date Received:	30-May-2019
Date Instructed:	30-May-2019
Results Due:	05-Jun-2019

Chemtest
The chemistry to deliver results

Results - Water

Project: 00_ _ _9

Client: Environmental Risk Solutions		Chemtest Job No.:			19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004		Chemtest Sample ID.:			834446	834447	834448	834449	834450	834451	834452	834453
		Sample Location:			12-5	12-4	12-3	12-2	12-1	95-2	95-3	95-9
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Date Sampled:			27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Bromide	N	1215	mg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Salinity	N	1020	ppt	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3.8	< 2.0
Total Dissolved Solids	N	1020	mg/l	1.0	380	360	470	720	330	210	4000	560
Alkalinity (Total)	U	1220	mg/l	10	200	170	250	410	170	150	560	220
Chloride	U	1220	mg/l	1.0	42	62	110	73	22	15	1900	46
Fluoride	U	1220	mg/l	0.050	0.12	0.11	0.12	0.27	0.12	0.098	0.35	0.29
Ammonia (Free)	U	1220	mg/l	0.050	< 0.050	0.068	< 0.050	0.67	0.73	0.058	11	1.3
Ammonium	U	1220	mg/l	0.050	0.25	0.46	0.29	4.8	5.0	0.36	58	5.4
Nitrite	U	1220	mg/l	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Nitrate	U	1220	mg/l	0.50	1.2	4.0	1.5	3.2	2.2	< 0.50	1.3	< 0.50
Phosphate	U	1220	mg/l	0.200	< 0.20	< 0.20	< 0.20	1.8	< 0.20	< 0.20	0.41	< 0.20
Sulphate	U	1220	mg/l	1.0	32	34	21	100	58	3.7	9.0	< 1.0
Calcium	U	1415	mg/l	5.0	66	76	80	45	48	64	18	44
Potassium	U	1415	mg/l	0.50	3.7	0.81	5.9	110	4.1	< 0.50	72	5.1
Magnesium	U	1415	mg/l	0.50	23	24	30	25	14	3.9	96	21
Sodium	U	1415	mg/l	0.50	36	22	33	84	44	5.4	1100	56
Arsenic (Dissolved)	U	1450	µg/l	1.0	1.5	1.3	2.5	3.6	< 1.0	1.1	3.5	9.7
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080	< 0.080	0.16	< 0.080	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	6.4	6.5	3.5	5.3	4.9	6.4	16	2.8
Copper (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	4.6	< 1.0	< 1.0	6.6	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	6.5	< 1.0	< 1.0	1.4	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	18	< 1.0
Strontium (Dissolved)	N	1450	µg/l	1.0	< 1.0	70	140	130	64	31	190	95
Zinc (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	8.5	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C10	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C21-C40	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Chemtest
The right chemistry to deliver results

Results - Water

Project: 0007-009

Client: Environmental Risk Solutions					Chemtest Job No.:	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004					Chemtest Sample ID.:	834446	834447	834448	834449	834450	834451	834452	834453
					Sample Location:	12-5	12-4	12-3	12-2	12-1	95-2	95-3	95-9
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Date Sampled:	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[k]fluoranthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l			< 1.0	< 1.0	< 1.0	< 1.	< 1.0	< 1.0	< 1.0	< 1

Chemtest
The chemistry to deliver results

Results - Water

Project: 00[illegible]9

Client: Environmental Risk Solutions					Chemtest Job No.:	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004					Chemtest Sample ID.:	834446	834447	834448	834449	834450	834451	834452	834453
					Sample Location:	12-5	12-4	12-3	12-2	12-1	95-2	95-3	95-9
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Date Sampled:	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Tribromomethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
The right chemistry to deliver results

Results - Water

Project: 0007-009

Client: Environmental Risk Solutions					Chemtest Job No.:	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004					Chemtest Sample ID.:	834454	834455	834456	834457	834458	834459	834460	834461
					Sample Location:	95-8	95-6	95-61	95-7	95-5	95-4	Drain	Lagoon
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Date Sampled:	27-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Bromide	N	1215	mg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Salinity	N	1020	ppt	2.0		9.8	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	26
Total Dissolved Solids	N	1020	mg/l	1.0		9800	2100	1400	1200	260	980	620	24000
Alkalinity (Total)	U	1220	mg/l	10		< 10	470	500	920	140	730	350	89
Chloride	U	1220	mg/l	1.0		6300	380	380	71	14	110	170	16000
Fluoride	U	1220	mg/l	0.050		0.19	5.7	6.0	0.89	0.11	4.1	0.20	0.78
Ammonia (Free)	U	1220	mg/l	0.050		0.63	24	24	55	1.4	58	2.6	0.071
Ammonium	U	1220	mg/l	0.050		16	93	94	160	7.1	200	20	1.3
Nitrite	U	1220	mg/l	0.020		< 0.020	< 0.020	< 0.020	4.5	0.17	2.0	0.020	< 0.020
Nitrate	U	1220	mg/l	0.50		< 0.50	< 0.50	< 0.50	30	5.5	12	< 0.50	< 0.50
Phosphate	U	1220	mg/l	0.200		0.40	3.7	3.8	4.3	< 0.20	3.4	< 0.20	< 0.20
Sulphate	U	1220	mg/l	1.0		290	67	67	25	8.1	27	1.9	1900
Calcium	U	1415	mg/l	5.0		180	< 5.0	< 5.0	< 5.0	49	< 5.0	63	370
Potassium	U	1415	mg/l	0.50		93	29	31	13	3.5	16	6.1	340
Magnesium	U	1415	mg/l	0.50		410	3.4	3.4	2.0	5.7	0.65	6.6	1100
Sodium	U	1415	mg/l	0.50		2500	360	340	80	12	150	100	8000
Arsenic (Dissolved)	U	1450	µg/l	1.0		15	6.1	5.4	66	< 1.0	110	2.2	31
Cadmium (Dissolved)	U	1450	µg/l	0.080		< 0.080	0.22	0.34	< 0.080	< 0.080	0.12	0.088	0.50
Chromium (Dissolved)	U	1450	µg/l	1.0		58	11	9.3	8.0	5.7	2.2	7.2	160
Copper (Dissolved)	U	1450	µg/l	1.0		32	2.8	1.8	5.7	< 1.0	< 1.0	1.9	290
Mercury (Dissolved)	U	1450	µg/l	0.50		< 0.50	< 0.50	0.52	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0		1.6	< 1.0	< 1.0	8.6	< 1.0	4.0	5.2	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0		71	4.5	4.4	1.4	< 1.0	2.4	2.8	200
Strontium (Dissolved)	N	1450	µg/l	1.0		2900	34	22	12	55	77	150	700
Zinc (Dissolved)	U	1450	µg/l	1.0		6.2	< 1.0	< 1.0	< 1.0	3.8	< 1.0	10	9.7
TPH >C6-C10	N	1670	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C21-C40	N	1670	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total TPH >C6-C40	U	1670	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]flu ene	U	1700	µg/l			< 0.10	< 0.10	< 0.10	< 0.	< 0.10	< 0.10	< 0.10	< 0.

Results - Water

Project: 00[illegible]9

Client: Environmental Risk Solutions		Chemtest Job No.:			19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004		Chemtest Sample ID.:			834454	834455	834456	834457	834458	834459	834460	834461
		Sample Location:			95-8	95-6	95-61	95-7	95-5	95-4	Drain	Lagoon
		Sample Type:			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Date Sampled:			27-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
The right chemistry to deliver results

Results - Water

Project: 0007-009

Client: Environmental Risk Solutions					Chemtest Job No.:	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181	19-18181
Quotation No.: Q18-14004					Chemtest Sample ID.:	834454	834455	834456	834457	834458	834459	834460	834461
					Sample Location:	95-8	95-6	95-61	95-7	95-5	95-4	Drain	Lagoon
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Date Sampled:	27-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Tribromomethane	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
The chemistry to deliver results

Results - Water

Project: 0[illegible]9

Client: Environmental Risk Solutions		**Chemtest Job No.:**			19-18181	19-18181
Quotation No.: Q18-14004		**Chemtest Sample ID.:**			834462	834463
				Sample Location:	97-2	95-1
				Sample Type:	WATER	WATER
				Date Sampled:	28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Bromide	N	1215	mg/l	0.10	< 0.10	< 0.10
Salinity	N	1020	ppt	2.0	7.7	< 2.0
Total Dissolved Solids	N	1020	mg/l	1.0	7800	400
Alkalinity (Total)	U	1220	mg/l	10	330	180
Chloride	U	1220	mg/l	1.0	2800	24
Fluoride	U	1220	mg/l	0.050	0.52	0.11
Ammonia (Free)	U	1220	mg/l	0.050	< 0.050	< 0.050
Ammonium	U	1220	mg/l	0.050	0.30	0.16
Nitrite	U	1220	mg/l	0.020	< 0.020	< 0.020
Nitrate	U	1220	mg/l	0.50	< 0.50	9.6
Phosphate	U	1220	mg/l	0.200	< 0.20	< 0.20
Sulphate	U	1220	mg/l	1.0	410	34
Calcium	U	1415	mg/l	5.0	140	45
Potassium	U	1415	mg/l	0.50	63	1.0
Magnesium	U	1415	mg/l	0.50	210	35
Sodium	U	1415	mg/l	0.50	1400	27
Arsenic (Dissolved)	U	1450	µg/l	1.0	5.4	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	32	8.6
Copper (Dissolved)	U	1450	µg/l	1.0	4.9	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	2.4	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0	2.3
Selenium (Dissolved)	U	1450	µg/l	1.0	34	< 1.0
Strontium (Dissolved)	N	1450	µg/l	1.0	140	70
Zinc (Dissolved)	U	1450	µg/l	1.0	< 1.0	3.6
TPH >C6-C10	N	1670	µg/l	0.10	< 0.10	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	< 0.10	< 0.10
TPH >C21-C40	N	1670	µg/l	0.10	< 0.10	< 0.10
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10

Chemtest
The right chemistry to deliver results

Results - Water

Project: 0007-009

Client: Environmental Risk Solutions			Chemtest Job No.:		19-18181	19-18181
Quotation No.: Q18-14004			Chemtest Sample ID.:		834462	834463
			Sample Location:		97-2	95-1
			Sample Type:		WATER	WATER
			Date Sampled:		28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l		< 1.0	< 1.0

Results - Water

Project: 00[illegible]9

Client: Environmental Risk Solutions		Chemtest Job No.:			19-18181	19-18181
Quotation No.: Q18-14004		Chemtest Sample ID.:			834462	834463
		Sample Location:			97-2	95-1
		Sample Type:			WATER	WATER
		Date Sampled:			28-May-2019	28-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity 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.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	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).
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	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-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.

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The right chemistry to deliver results

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"

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 45 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

Appendix 8.3

Photographs

Monitoring Well 95-6

Monitoring Well 95-9

Appendix 10.1
Chronological Account of the Archaeological and Cultural Heritage of the Study Area

Appendix 10.1
Chronological account of the archaeological and cultural heritage of the Study Area

The pace of landscape change in Ireland accelerated in the second half of the 20th century and many archaeological sites have been levelled by activities associated with modern development and progress such as agriculture, industry and infrastructural improvements. This has ensured that the present day archaeological landscape is not fully representative of the human occupation of this island, which has spanned some nine thousand years. While many archaeological sites survive today as partially upstanding structures, such as earthworks and stone monuments, many more survive only as subsurface remains, often forgotten and concealed from view. Subsurface archaeological remains are usually uncovered during archaeological investigations in advance of development. Much of the physical evidence for the existence of past societies has been altered by each successive community, all of which leave their mark on the landscape they have occupied. The following account of the archaeological and cultural heritage of the Study Area is assessed chronologically. The archaeological timescale can be divided into two major periods, each with a number of sub-sections:

The prehistoric period: Mesolithic - (*circa* 8000 to 4000 BC); Neolithic - (*circa* 4000 to 2400 BC); Bronze Age (*circa* 2400 to 500 BC) – Iron Age (*circa* 500 BC to AD 400)

The medieval period: Early medieval 5th – 12th century; high medieval 12th century – *circa* 1400; late medieval *circa* 1400 – 16th century.

Mesolithic and Neolithic

The earliest evidence for human colonisation and settlement in Ireland can be dated to 8000BC, the Mesolithic Period. The people of this era were hunter-gatherers, entirely dependent on what food could be obtained through hunting and gathering, amongst other things, edible plants and shellfish. They used flint and other hard stone to manufacture their tools, and their settlements can often be identified by locating scatters of these discarded stone tools in ploughed fields. The transition of these early settlers from hunter/gatherers to a farming way of life in the Neolithic Period brought about revolutionary change. This led to more permanent settlements and substantial houses and a more complex and structured social hierarchy. A steady food supply meant that people had more time to increase their toolkit and domestic equipment and develop specialised crafts. While much evidence for the Neolithic Period now remains below ground, the characteristic upstanding feature of this period is the Megalithic tomb.

There are no known archaeological sites dating to the Mesolithic or Neolithic Periods within the Study Area. The general lack of sites does not, however, mean that such early settlement and occupation were unknown to the region. Many archaeological sites from the early prehistoric period leave little or no surface evidence on the landscape. In many cases they only come to light during archaeological testing/monitoring in association with industrial, residential and infrastructural development. Prehistoric settlement sites are often concentrated along river valleys and along the coastline and the evidence for early prehistoric activity in Cork is likewise predominantly found in the estuarine and harbour areas. A polished stone axe almost 0.12m long was identified during monitoring of topsoil removal prior to the construction of the waste-water treatment plant at Carrigrenan, *c.* 700m across the harbour to the northwest of the proposed development site (Lane 2001). A large area surrounding the location of the axe head was inspected, but nothing of an archaeological nature was noted. Polished stone axe finds are very often isolated and this would seem to have been the case here (*ibid*). Including this find, a total of six Neolithic polished stone axes have now been recovered from the Cork Harbour area (*ibid*). The Files of the National Museum give details of a dugout canoe that was washed ashore in the townland of Pembroke, Passage West *c.* 600m across the harbour to the west of the proposed development site. The example at Pembroke consisted of a round-bottomed wooden dugout hewn from a single piece of wood, elm (*ulmus*). The bow and stern were pointed and the sides damaged and it had been hollowed out to a

depth of approximately 19cm. Although this boat wasn't dated, it is typical of the earliest boats known to have been made by humans.

Within the broader area of Cork harbour, there are a number of Neolithic sites, including a simple megalithic tomb in Rostellan (CO088-010) on the modern shoreline, approximately 10km to the southeast. Within the inner reaches of Cork Harbour, Neolithic settlement activity was discovered during development at Ballinure on the Mahon peninsula (CO074-130), approximately 5km to the northwest (Purcell, 2005) and at Foaty on Fota Island (CO075-077), approximately 2km to the northeast (Power *et al.* 1994, 365). Approximately 17.5km to the southeast of the proposed development site at the mouth of Cork harbour, a number of finds of flint scatters (some of which date to the later Mesolithic period), are spread across the townlands of Ballintra West (CO100-042), Inch (CO100-043), Lahard (CO100-016), and Ballybranagan (CO100-044).

Bronze Age and Iron Age

The Irish Bronze Age is characterised by the introduction of metallurgy, distinctive pottery styles, changes in burial traditions and an increase in population. The first metal used as a raw material in Ireland was unalloyed copper. Much evidence for primitive copper mining has been discovered in the south-west of the country and two areas, Ross Island, Co. Kerry (O'Brien, 2004) and Mountgabriel, Co. Cork (O'Brien, 1994) have been archaeologically investigated. Much of the archaeological evidence for this period comes from burial sites, which consist of cists and pit graves, much simpler than the previous Neolithic Period. The remains cremated or as inhumations, were placed in these stone cists and were often accompanied by grave goods. Some graves were marked with a cairn, a mound of stones while others were marked by a mound of earth known as a barrow. The earliest recorded archaeological sites in the study area date to the Bronze Age in the form of three fulachtai fia, two (CO075-091 and CO075-092) in Foaty and one (CO087-125) in Ballynoe. Fulachtai fia are the most common type of prehistoric site in the country. They comprise a trough or pit usually lined with stone, wattle or planks in which quantities of water could be boiled using fire-heated stones. They have been interpreted as cooking places, bathing places or steam baths. They are sometimes recognisable as horseshoe-shaped mounds of heat–shattered stones, often located near a stream or in waterlogged areas.

The two fulachtai fia in Foaty were identified during pre-development testing of a proposed extension to Fota Wildlife Park. One of the sites (CO075-091) measured 15.2m E-W x 8.9m and comprised of a low mound of black, charcoal-enriched burnt material with a lot of heat-shattered stone. Situated a short distance to the east of this, a second fulacht fia was identified (CO075-092). This site measured 9.4m E-W x 2.3m but was not fully exposed and was cut by a stone-filled land drain (Quinn, 2012). The fulacht fia in Ballynoe (CO087-125) consisted of a kidney-shaped mound (18m E-W; 15m N-S) of heat-shattered stones and charcoal-enriched soil. The site is located within a housing estate and there are no visible remains of it (Ronan *et al.* 2009).

Iron Age

The transition from bronze to iron working was a significant technological innovation that had a major impact on agriculture, making it more efficient and productive and thus having an effect on society as a whole. Iron, a much harder substance than bronze was used to make more efficient tools to clear large tracts of dense forest. It is around this time that we see the adoption of the La Tene style of art practiced by the Celtic peoples of Europe, a people who had been using iron as a far superior metal to bronze from around 1000 to 700BC. This La Tene culture is represented in metalwork and some stone sculpture, mainly in the north and west of the country. Burial practices included cremation and inhumation interred in pits or in pre-existing tumuli. Burial monuments associated with the period include ring barrows, ring-ditches and embanked enclosures. Cremation burial appears to have declined in the Iron Age, a trend that has been attributed to a Roman and Christian influence. There are no sites within the study area dating to the Iron Age and none within

the surrounding landscape. In the broader harbour area, an enclosure (CO087-155, which probably represents the remains of a Bronze Age or Iron Age settlement site, was identified during investigations in Barnahely (Rossaveare and Rossaveare, 2004 and Ronan *et al.* 2009, 123) approximately 5.5km south of the proposed development site. Two pits (CO087-132---) (O'Donovan, 2004 and Ronan *et al.* 2009, 57) (CO087-148) (Hanley, 2004 and Ronan *et al.* 2009, 357) of indeterminate date were exposed during separate archaeological investigations in Barnahely townland. A third site that revealed a pit and a stakehole (CO087-147) was located nearby also in Barnahely townland (Ronan *et al.* 2009, 357), all of which may be of prehistoric date

Early Medieval Period

This period in Ireland is characterised by the influx and influence of Christianity, which had become widely established by the 6th century AD such as the ecclesiastical site (CO087-065002) on Spike Island, situated *c.* 5km to the southeast of Marino Point. Hurley (1980) describes the ecclesiastical site on Spike Island as "identifiable with the early ecclesiastical site of Inispicht". A map of 1625 appears to show the remains of a ruined church on the island (1980 quoted in Power *et al.* 1994, 290). The earliest beginnings of Cork City, (*c.* 10km to the northwest of the development site) as an established settlement can be traced to the monastic foundation of St. Fin Barre, in the 6th/early 7th century (Gwynn and Hadcock 1970, 66) on the site of the present St. Finbarr's Cathedral and graveyard (CO074-038002 and CO074-038001).

Monasteries became a focal point for the lay communities of this period who were spread throughout the countryside in settlements such as ringforts/raths, crannogs and simple huts. Irish society in the Early Christian Period was divided into the free elite and the unfree cottiers, tenants-at-will and serfs/slaves. The elite and their families would have lived in ringforts, while the labourers and others of lower status in society lived outside the ringfort in small huts. Ringforts are the most widespread and characteristic field monument in Ireland, a single bank and ditch (univallate) being the most common form, with double rings (bivallate) and triple rings (trivallate) being more rare and thought to have been of higher status. Cattle dominated the farm economy of the period, with dairying being the primary pursuit. Tillage was secondary, the most important crops being wheat, oats, barley, rye and flax. In the absence of money (coinage did not become widespread until later in the medieval period), cattle were the indicator of one's status and were the currency for payment of fines, rent, tributes and gifts. Land was valued on the basis of the number of cows it could support (Feehan, 2003). Cattle raiding was widespread and the ringfort provided protection for the animals at night when they would have been kept within its defensive palisade (*ibid*, 62).

There are four ringforts in the study area in Lissanisky, (CO075-033, CO075-034, CO075-037 and CO075-042), situated between *c.* 1.4km and *c.* 1.7km to the southeast of the proposed development site. One of the sites (CO075-033) consists of a circular area (37m E-W) defined by an earthen bank (H 0.9m) ENE-NNW (Power *et al.* 1994). Approximately 200m to the southeast of this is another ringfort (CO075-034) which consists of a semi-circular arc formed by an earthen bank (int. H. 1m) E-W that is part of the townland boundary. There is a local tradition of a 'fort' and the interior of the site (28m E-E x 20m N-S) remains untilled (*ibid)*. There is no visible surface trace of a third ringfort (CO075-042), situated 200m to the east of these and a farm shed now stands on the site (Power *et al.* 1994). The fourth ringfort in Lissanisky (CO075-037) is situated in tillage on a west facing slope. It consists of a heavily overgrown circular area (31m E-W) which is enclosed by an earthen bank (H0.7m) (*ibid*).

There is a holy well (CO087-007) in Ballyleary, *c.* 700m to the south of the proposed development site. The tradition of visiting holy wells goes back to the very beginnings of Irish Christianity, but most wells probably have their origin in pre-Christian ritual activities. The majority of the 'wells' are springs or just depressions in rocks where rainwater collects; some have more recently constructed stone or concrete surrounds. Some wells are still maintained for holy use when at certain times of the year they would be visited in the form of a pilgrimage often referred to as a 'round' or 'pattern'. Other wells are known through tradition for their reputed curative properties. The well in Ballyleary, located on the hillside is enclosed by a rectangular stone wall and roofed with a slab. According to Power (1918) rounds were made at the well, particularly on Easter Sunday. The well is no longer in holy use (Power *et al.* 1994).

Pre-development testing of a proposed extension to Fota Wildlife Park in Foaty townland was undertaken in 2012 and an oval enclosure (CO075-093) was identified (Quinn, 2012). This possible enclosed settlement site contained three ditches, *c.* 3.5m in width, and associated linear trenches, a pit (CO075-090) measuring 0.94m E-W x 1.4m and charcoal spreads. Two fualchtai fia (CO075-091 and CO075-092), detailed above were also found within this area. A number of linear and pit-like features were identified but did not produce any datable finds. One sherd of pottery was found from the surface of a charcoal-enriched spread and was identified as being from a late Roman amphora dating to the 4th – 7th century (Quinn, 2012). A pit (CO075-089) was identified during an extension to a car park area at Fota Wildlife Park in 2009. Four possible hearths measuring 0.75m and 1.25m in diameter and up to 0.33m deep were identified along with sub-circular pits measuring 0.33-0.45m in diameter with a depth of 0.15m (Lane, 2010).

The Viking invasion of Ireland began in 795AD with an attack on Rathlin Island off the Antrim coast. From about 830AD raids intensified, with the Vikings navigating major rivers and plundering inland. Although, there is no evidence at present for Viking settlement around Cork Harbour, a number of place names such as Dunkettle and Foaty reflect Scandinavian influence.

High Medieval and Late Medieval Periods

The Anglo-Normans arrived in Ireland in 1169 at the request of Diarmait Mac Murchada, the deposed king of Leinster. With Diarmait reinstated to his lands, the Anglo-Normans set about seizing territory for themselves. By 1350 the Norman influence was evident on the rural landscape in the form of manorial villages with open field systems, occupied with colonists from England and Wales (Aalen, Whelan, Stout 1997, 55). The earth and timber fortresses constructed by the Anglo-Normans settlers in the late 13th/early 14th century functioned as defensive homesteads replacing the earlier ringfort. They were also a means of consolidating infiltration into Irish territory. Only the earthworks of these fortresses survive above ground in the form of mottes or ringworks. Moated sites are the earliest physical evidence for Anglo-Norman settlement in the country. There are no known moated sites in the study area or in the broader landscape surrounding the development area. In addition, there are no castles of Anglo-Norman date within the region. The well-drained soils of the southeastern quadrant of the country were especially Normanised. A network of towns was established throughout the country, with the exception of the west and north which remained largely under Gaelic control (*ibid*, 55). Following Anglo-Norman colonisation, the old Gaelic system of farming with its dominance on dairying was replaced. The Anglo-Norman system of agriculture was predominantly arable, based generally on the open field system used in England with crops such as wheat, rye, flax and corn. New crops such as peas, beans, celery and onions were introduced. Sheep were more important on the Anglo-Norman farm and improved breeds meant that wool and sheepskin exports rose.

Castles, whether of stone, or earth and timber, functioned as a well-defended fortress and a private residence, of someone of importance in medieval society. Castles, although fortresses, were the

centre of their owner's estate or manor, usually a functioning farm and centre of rural administration. The many castles dotted throughout the modern landscape were once residences and farm centres in much the same way as contemporary undefended manor houses and later country houses (*ibid*, 26). The majority of castles in Ireland can be broadly classified into two groups; the early castles of the late twelfth and thirteenth centuries and the tower houses of the fifteenth to seventeenth centuries. Tower houses consist of fortified residences in the form of a tower that was usually four to six storeys high and often partially enclosed by a bawn. Most tower houses date to the fifteenth/sixteenth centuries.

There is one Tower House in the Study Area, Belvelly Castle (CO075-030), situated *c.* 1.3km to the northeast of the proposed development site. This castle is located on the north shore of Great Island overlooking the ford which was the only access to the island before Belvelly Bridge was built in 1803. The four-storey tower (13.5m E-W; 10m N-S), built by the Hodnett family in 15th century was described as 'broken down' in 1581 but apparently occupied by Sir Peter Courthorpe (Healy 1988). A plaque bearing coat of arms over the ground floor door may belong to Courthorpe (*ibid*). The castle was restored in late 2018 and is currently in use as a private residence.

Historical evidence also suggests that a second castle (CO75-065) was present in Oldcourt townland which forms part of the southern end of the proposed development site. There is an account of Hugh O'Neill raiding two castles in the NW corner of Great Island named as 'Shanecourt' and 'Killhodeneigue' which were both probably Hodnett castles. The land was in the possession of the Ronaynes by 1614 and they intermarried with the Hodnetts in 1642 when a structure known as 'Ronaynes Court' existed (Healy 1988). The Downe Survey map of 1652 depicts three structures in the present day Marino townland. The name 'Ronaynes Court' was changed to 'Marino' in the late 18th century. The exact location of structures earlier than the current country house is not known (Power *et al.* 1994).

Post Medieval Period

In the Post Medieval Period, the Irish farming landscape began to take on its present appearance, with many of the current field systems and boundaries being laid out. The organised plantations of English and Scottish settlers into Ireland in the 17th century greatly altered the land ownership in the country. The old order of transhumance and open cattle breeding died out and was replaced by a structure of great landed estates, small tenant farmers (leasees) and a mass of landless labourers. The potato, initially introduced as a garden crop in the mid-17th century became the main food crop of the tenant and labouring classes. This system continued up to the end of the 19th century until the formation of the Land League began to bring about land reform. In this process of reform, the former tenants and labourers became land owners, with the great estates being broken up into small and medium sized farms and smallholdings. The process continued well into the 20th century with the work of the Irish Land Commission.

The eighteenth century was an era of relative peace and political stability in Ireland. This encouraged a growing sense of prosperity and order, which in turn created an environment favourable to industrial and agricultural innovation as well as intellectual and aesthetic pursuits. Perhaps the most notable cultural heritage site-type of this period and the ensuing century is the country house and its demesne. The term 'demesne' or 'demaine' is Norman French in origin and denotes that portion of the manorial estate not leased out to tenants but retained by the Lord for his own use and occupation' (Reeves-Smyth, 1997, 549). The estate system was finally dismantled in Ireland in the early twentieth century. Although demesnes were widespread in medieval Ireland, the foundation of those still evident on the modern landscape date to the middle of the eighteenth century when 'natural style' landscape parks were adopted by Irish landowners. The typical demesne consisting of the big house with associated buildings, ornamental grounds, landscaped gardens and woodlands, often enclosed by high walls and belts of trees still remains the dominant man-made feature of the post medieval landscape in Ireland. At one time demesnes occupied nearly 6% of the country (Aalen

et al., 2000, 197). This was the era of great landed estates, a period when landowners signalled the extent of their authority with the scale of their homes. Abandoned castles and fortified houses were often utilised, either to form the core of the new building or as an attractive focal point on the demesne along with ponds, decoys, bridges and follies. Designed landscapes became an essential part of country estates. Formal design elements dominated the early part of the century but were gradually replaced by more naturalistic compositions characterised by smooth, undulating lawns and casual arrangements of trees.

Many of the archaeological sites within the Study Area date to the Post Medieval Period. They include Marino Country House (CO075-013) and Orangery (CO075-076). Also associated with Marino House was a demesne landscape feature (CO075-027) and a farm building (CO075-074). The designed landscape feature is depicted on the OS 3rd edition map as a roughly square-shaped raised area and may have been a tennis court. The closest RMP sites to the proposed development site are Marino House (CO075-013) and Orangery (CO075-076), *c.* 250m and designed landscape feature (CO075-027), *c.* 180m to the south. The designed landscape feature, a possible tennis court/garden feature dating from the mid-20th century, was demolished when IFI was constructed in the 1970's while the farm building, situated across the Cork to Cobh road to the east was demolished by Cork County Council following a chemical spillage at the NET plant (National Monuments Service Archive).

Philip Ronayne built a house at Marino Point in the early 18th century. The house, known as 'Ronayne's Grove' and later 'Marino' was described by Smith (1750) as a 'good house and handsome improvements'. Philip Ronayne died in 1755 and was succeeded by his eldest son J. Thomas Ronayne who leased the 354 acres of the Marino estate to Mr Savage French Esquire at an annual rent of £381. Marino House then became home to Pascoe Stuart who inherited the estate from his uncle Thomas French, a descendant of the Mr. Savage French. A condition of his inheritance was that Pascoe Stuart would have to assume the additional surname of French (Blake, www.abandonedireland.com). This earlier house was burnt down in *c.* 1860 and was replaced by the current building a 2-storey house with 3-sided bows (Power *et al.* 1994). The 1911 Census records nineteen rooms in the Marino House which was then occupied by Pascoe William Gampell Stuart (aged 42), his wife Elizabeth Julia Stuart (aged 42), their two children and five servants. Pascoe Stuart died at Marino House on the 5th of February 1954 aged 85 years (Blake, www.abandonedireland.com)

Marino House is described in the NIAH as follows;

Detached L-plan seven-bay two-storey country house, built c. 1870, with single-bay single-storey porch to front (south) elevation, canted bays to east and west elevations and wings to rear (north). Incorporating fabric of earlier dwelling. Now disused. Hipped slate roofs with rendered chimneystacks and cast-iron rainwater goods. Hipped slate roof to porch. Rendered walls with render stringcourse. Render corner pilasters to porch. Square-headed window openings to front elevation, round-headed window openings to porch and ground floor of canted bays, having cut limestone sills and margined one-over-one pane timber sliding sash windows, those to west canted bay having timber Y-tracery. Triple round-headed window openings to rear (north) elevation of main block having cut limestone sills and six-over-six pane timber sliding sash windows. Square-headed door opening to east elevation of porch having timber panelled door. Five-bay double-height bow-fronted orangery, built c. 1790, to east of site. Red brick construction having round-headed openings. Flanking lean-to glass houses to east and west'.

An orangery (CO075-076) of red brick construction, built *c.* 1790 is located a short distance to the east of the house within a walled garden. It has lean-to glass houses to its east and west. The walled garden has been breached at the northern end by the construction of a structure associated with the former IFI plant. The orangery was restored by IFI in the late 1970's when the land was purchased by the company. In an article in the Cork Examiner, Mary Leland (1999) described the renovation of the orangery, much of which was overseen by Professor Oliver Roberts of UCC, as follows; *...it was almost derelict by the time it came into IFI hands. Roofless and windowless, the windows and doors*

were without their keystones and the entire south wall was dangerously unstable. That was rebuilt in the local redbrick, everyone stamped with Belvelly, from the brickworks beyond the bridge – and the cut limestone of windowsills, keystones, capstones and doorstep was all restored. The four tall arched windows…were almost entirely gone but enough of one frame remained to provide accurate copies. There was no available record of the original flooring and glossy ceramic tiles have been installed, their deep reds and purples catching the terracotta detail of the décor. The bow-fronted south wall, which is so charming to look at, was something less than charming for the builders, its complex curvature meaning that individual roof trusses had to be built, actually on the site. The old stables had already been demolished and the slates from these were used for the roof. Professor Roberts claimed that the nearest 18th century orangery using its original heating system was at the Schonbrunn Palace in Vienna. The restoration was completed in 1978 (ibid). The orangery today appears to be in good condition with its roof intact.

Within the study area there are three additional designed landscape features at Foaty (CO075-046), Carrigrenan (CO075-024002) and Belvelly (CO075-028). The folly in the townland of Foaty, *c.* 1.7km to the north on Fota Island, consists of a two storey structure built in *c.* 1824 within the demesne of Fota House (CO075-047). The folly consists of a two-storey round tower with mock battlements with a third storey at its western side and another slender round tower attached to and behind the first (NIAH). The folly is a prominent feature on the harbour and is clearly visible to the north of the proposed development site. Carrigrenan House, situated 1.4km across the harbour to the northwest of the proposed development site has now been demolished. The Late Georgian house, built in the early 1800's consisted of two storeys over a basement. The ruins of an ornamental tower are all that remain of Carrigrenan House and demesne which once stood on the southeastern side of the Carrigrenan peninsula situated 1.4km across the harbour to the northwest. The tower is described in the National Monuments Archive as a single storey tower over basement of cut limestone that is now missing its gabled roof which adjoins a five-bay circular two-storey over basement tower. All wall tops are castellated to give it a castle look (National Monuments Archive after Healy 1959). The tower is most probably a folly, similar to that at Foaty, associated with the now demolished Carrigrenan House. There is no information available on the demesne landscape feature at Belvelly. There are four pointed brick arched bee boles in the north wall of a walled garden attached to Ballynoe country house, *c.* 2.5km to the south.

Other sites dating to the post medieval period include a country house in Ardmore (CO075-079), *c.* 1.8km across the harbour to the west and a brickworks (CO075-031) in Belvelly, *c.* 1.5km to the east. The country house at Ardmore is a five-bay, three-storey house built in c. 1780 and was once the home to Captain Richard Roberts who captained the steamship Sirius, the first such craft to cross the Atlantic to America in 1838 (NIAH).

The site of the former Belvelly Brickworks (CO075-031) is situated *c.* 1.5km to the east of the proposed development site. The brickworks were established in late 1850s; closed *c.* 1863 but reopened in 1873 before finally closing in *c.* 1914 (Power *et al.* 1994). This was the site of operations for the Cork Clayworks Company, which began brick manufacturing here in 1858. Most of the 19th century brick manufacturers in Cork were based around the harbour area as this location had suitable clay materials and was convenient for water transport. There was also a 1778 ban on setting up brickworks within 2 miles of Cork City due to smoke pollution (Rynne 1999, 33). The pond at Belvelly brickwork was, as was the case at other contemporary brickworks, created by the extraction of clay raw materials. This was carried out on a seasonal basis and involved pumping out the pits with wooden manually operated double-acting pumps and then heaping the extracted clay on specially prepared ground where it was then prepared for working (ibid). The bricks produced at Belvelly were of high quality and were used in the extension to the Cork School of Design (now part of the Crawford Art Gallery) and the Union Quay Constabulary Barracks (Rynne 1993, 79). Very little remains of this late 19th century complex.

There are five Martello towers in Cork Harbour, two of which are in the study area guarding the north side of Great Island. One tower (CO075-026) is situated in the townland of Belvelly, just outside the development site to the north on a narrow low-lying spit of land and is known as Monning Tower. It consists of a circular tower (diameter 15.5m) of coursed limestone ashlar construction, with flattened profile to the E and W. The second tower (CO075-029) also in Belvelly is located to the immediate south of Belvelly Bridge, its location dominating the approach over the bridge from the mainland. It consists of a circular tower (diameter 14.2m), again of coursed limestone ashlar construction and external flattened profile to the E and W. It was converted to a dwelling house in the early 21st century. Martello towers were once part of an extensive network of similar towers erected on the English and Irish coasts as a defensive measure against a French invasion. They were built in Ireland by the military authorities under the 'National Defence Act' of 1804. The first Irish Martello towers were built in Dublin bay in 1804 but those in Cork harbour are later (1813 – 1815) (Rynne 1993, 74). In 1975 Enoch found 39 Martello towers still standing in Ireland. Martello towers are roughly of uniform design. They are generally two storeys high and are circular or oval in plan consisting of living quarters on the first floor and a magazine below. The circular design of these towers meant that there were no exterior corners that might be breached or undermined at a time of siege (Mulcahy 1999). The mortar used in the construction of the towers was of the highest grade to enable it to withstand attack, inclusions such as ground granite, lime, ash, hot wax and ox blood being added (Enoch 1975).The roofs of the towers are flat with a surrounding parapet, from which the towers' chimneys and ventilation shafts emerged. On the roof there was one, or two, 32-pounder muzzle-loading gun(s) mounted on traversing carriage(s) (Power et al. 1994). The magazines of the towers would have contained about a half ton of gunpowder, 100 round shot, 20 case and grape shot and c.280 varied types of shell (Rynne 1993). The entrance to the tower was usually by a door on the first floor, access to which was obtained by a moveable ladder. In total there were five towers built in Cork Harbour, three of which are on the Great Island of Cobh (Belvelly, Monning and Rosslague), one at Ringaskiddy and one on Haulblowline Island. All of the towers in Cork Harbour were completed and ready to be fitted with their guns by 1814 (McCarthy, C. 2019). The process of removing the guns from the towers commenced in 1868 after the Monning tower (CO075-026) was successfully raided by the Fenians in December 1867 (*ibid*).

Appendix 10.2
Cultural Heritage Maps

Appendix 10.2

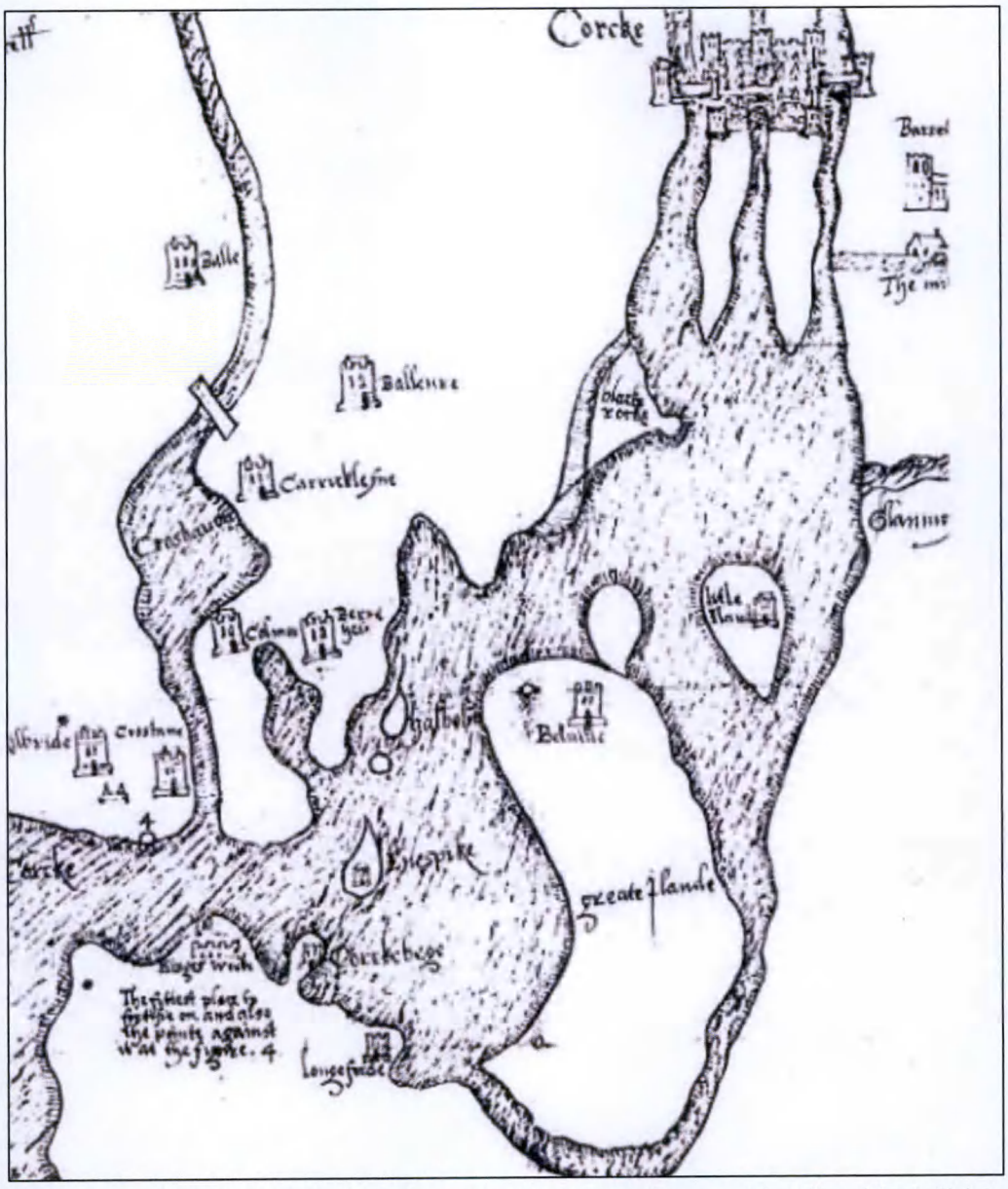

Figure 10.1: Candells map of Cork Harbour (1587) showing '*Greate Island*' and '*Belville*' Castle

Figure 10.2: The parish of Clonmel on Downe Survey map 1652, showing three houses in the vicinity of Marino and Oldcourt townlands www.downsurvey.tcd.ie

Figure 10.3: Marino Point depicted on Grand Jury Map of Cork (1811) showing houses in the townlands of Marino and Old Court www.corkpastandpresent.ie

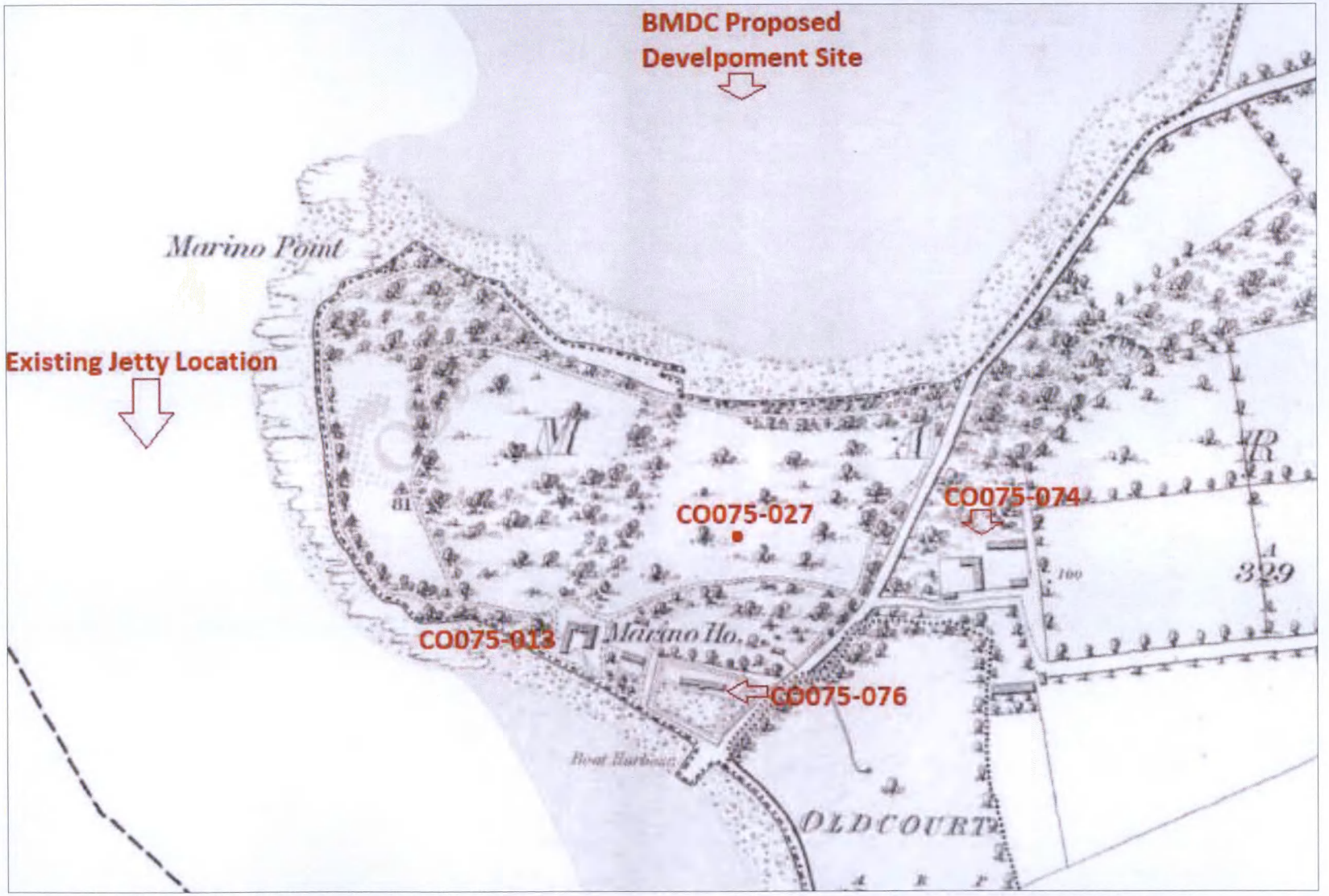

Figure 10.4: OS 6-inch map (1841-42) with location of proposed development site arrowed prior to reclamation to the north of demesne lands associated with Marino House shaded in grey www.geohivemapviewer.ie

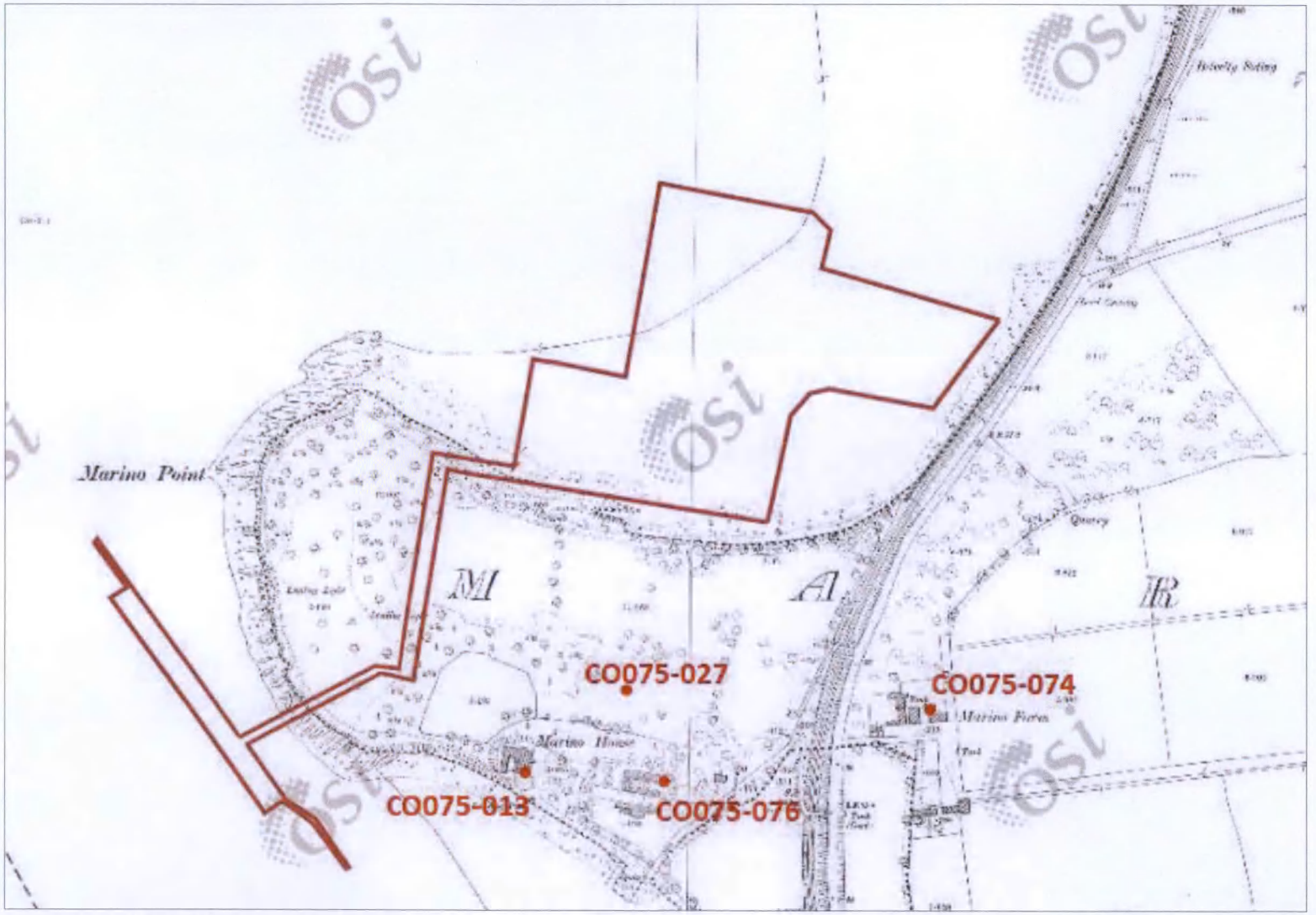

Figure 10.5: OS 25-inch map (1897-1904) depicting the proposed development site outlined in red prior to reclamation to the north of Marino Peninsula and demesne lands associated with Marino House (CO075-013) www.archaeology.ie

Figure 10.6: OS 6-inch map (1935) depicting the depicting the proposed development site outlined in red prior to reclamation, to the north of Marino Peninsula and demesne lands associated with Marino House (CO075-013) www.archaeology.ie

Appendix 11.1
Definitions Used

Appendix 11.1

Definitions used in chapter.

Table 11.14 Landscape Sensitivity to Change Criteria

Landscape Sensitivity	Classification Criteria
High	• Landscape characteristics or features with little or no capacity to absorb change without fundamentally altering their present character • Landscape designated for its international or national landscape value or with highly valued features • Outstanding example in the area of well cared for landscape or set of features that combine to give a particularly distinctive sense of place • Few detracting or incongruous elements
Medium-high	• Landscape characteristics or features with a low capacity to absorb change without fundamentally altering their present character • Landscape designated for regional or county-wide landscape value where the characteristics or qualities that provided the basis for their designation are apparent or a landscape with highly valued features locally • Good example in the area of a well-cared for landscape or set of features that combine to give a clearly defined sense of place
Medium	• Landscape characteristics or features with moderate capacity to absorb change without fundamentally altering their present character • Landscape designated for its local landscape value or a regional designated landscape where the characteristics and qualities that led to the designation of the area are less apparent or are partially eroded or an undesignated landscape which may be valued locally – for example an important open space • An example of a landscape or a set of features which is relatively coherent, with a good but not exceptional sense of place - occasional buildings and spaces may lack quality and cohesion
Medium-Low	• Landscape characteristics or features which are reasonably tolerant of change without detriment to their present character • No designation present or of little local value • An example of an un-stimulating landscape or set of features; with some areas lacking a sense of place and identity
Low	• Landscape characteristics or features which are tolerant of change without determent to their present character • An area with a weak sense of place and/or poorly defined character /identity • No designation present or of low local value or in poor condition • An example of monotonous unattractive visually conflicting or degraded landscape or set of features

Table 11.15 Visual Sensitivity to Change Criteria

Visual Sensitivity	Classification Criteria
High	• Users of outdoor recreational facilities, on recognised national cycling or walking routes or in nationally designated landscapes
Medium-high	• Users of outdoor recreational facilities, in highly valued landscapes or locally designated landscapes or on local recreational routes that are well publicised in guidebooks • Road and rail users in nationally designated landscapes or on recognised scenic routes, likely to be travelling to enjoy the view • Residential buildings
Medium	• Users of outdoor recreational facilities including public open space in moderately valued Landscapes • Users of primary transport road network, orientated towards the Proposed development, likely to be travelling for other purposes than just the view
Medium-low	• People engaged in active outdoor sports or recreation and less likely to focus on the view • Primary transport road network and rail users likely to be travelling to work with oblique views of the project or users of minor road network
Low	• People engaged in work activities indoors, with limited opportunity for views of the Proposed development

Table 11.16 Magnitude of Landscape Change Criteria

Magnitude	Classification Criteria
None	No change
Negligible	Little perceptible change
Low	Minor change, affecting some characteristics and the experience of the landscape to an extent; Introduction of elements that are not uncharacteristic
Moderate	Noticeable change, affecting some key characteristics and the experience of the landscape; Introduction of some uncharacteristic elements.
High	Noticeable change, affecting many key characteristics and the experience of the landscape; Introduction of many incongruous developments
Very High	Highly noticeable change, affecting most key characteristics and dominating the experience of the landscape; Introduction of highly incongruous development

Table 11.17 Magnitude of Visual Change Criteria

Magnitude	Classification Criteria
None	No change in the existing view
Negligible	The development will cause a barely discernible change in the existing view
Low	The development will cause very minor changes to the view over a wide area or minor

Magnitude	Classification Criteria
	changes over a limited area
Moderate	The development will cause modest changes to the existing view over a wide area or noticeable change over a limited area
High	The development will cause a considerable change in the existing view over a wide area or a significant change over a limited area
Very High	The development will cause significant changes in the existing view over a wide area or a change which will dominate over a limited area

Table 11.18 Definition of Duration of Effects

Duration	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short Term	Effects lasting one to seven years
Medium Term	Effects lasting seven to fifteen years
Long Term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Table 11.19 Significance of effect based on analysis of magnitude and sensitivity of receptor

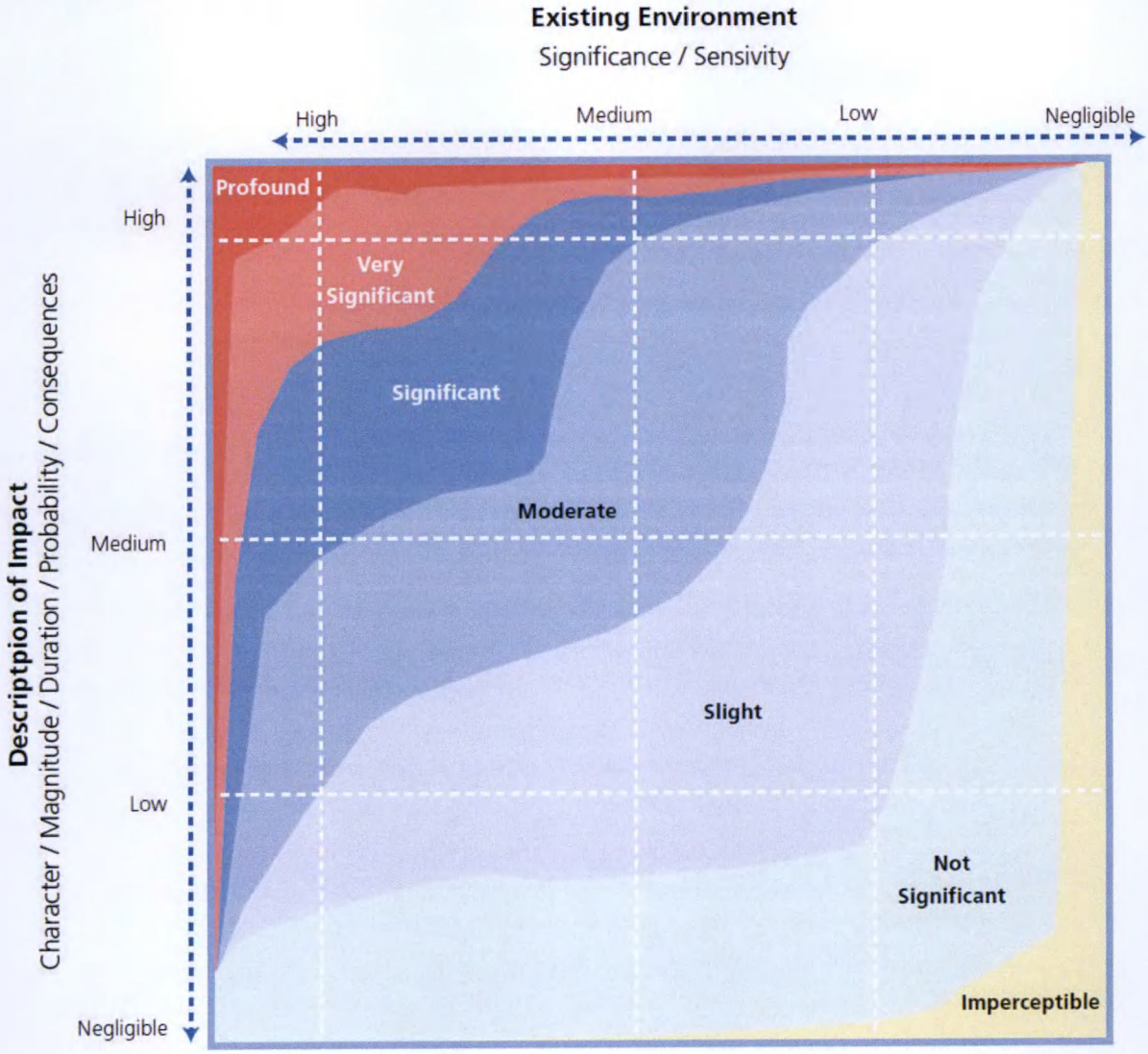

Table 11.20 Significance Categories

Significance Category	Description of Effect
Very Significant Positive Effect	The project would: • have an effect which, by its character, magnitude, duration or intensity significantly and positively alters most of a sensitive aspect of the environment; • greatly enhance the character (including quality and value) of the landscape; • enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development; • enable a sense of place to be created or greatly enhanced; • cause a very noticeable improvement in the existing view; and • open up a new view of local landscape dominate the future view.
Significant Positive	The project would:

Significance Category	Description of Effect
Effect	• by its character, magnitude, duration or intensity, positively alter a sensitive aspect of the environment
Moderate Positive Effect	The project would: • enhance the character (including quality and value) of the landscape; • enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development; • enable a sense of place to be restored; and • cause a noticeable improvement in the existing view.
Slight Positive Effect	The project would: • complement the character (including quality and value) of the landscape; • maintain or enhance characteristic features and elements; • enable some sense of place to be restored; and • cause a barely perceptible improvement in the existing view. This will typically occur where the viewer is at some distance from the development and the development newly appears in the view, but not as a point of principal focus. It will also occur where the development is closely located to the viewpoint but is seen at an acute angle and at the extremity of the overall view.
Not Significant Effect	The project would: • cause noticeable changes in the character of the environment but without significant consequences • maintain the character (including quality and value) of the landscape; • blend in with characteristic features and elements; • enable a sense of place to be retained; and • not result in a discernible improvement in the existing view.
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant Effect	The project would: • cause noticeable changes in the character of the environment but without significant consequences • maintain the character (including quality and value) of the landscape; • blend in with characteristic features and elements; • enable a sense of place to be retained; and • not result in a discernible deterioration in the existing view.
Slight Adverse Effect	The project would: • not quite fit the character (including quality and value) of the landscape; • be at variance with characteristic features and elements;

Significance Category	Description of Effect
	• detract from a sense of place; and • cause a barely perceptible deterioration in the existing view. This will typically occur where the viewer is at some distance from the development and the development newly appears in the view, but not as a point of principal focus. It will also occur where the development is closely located to the viewpoint but is seen at an acute angle and at the extremity of the overall view.
Moderate Adverse Effect	The project would: • alter the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant Adverse Effect	The project would: • by its character, magnitude, duration or intensity adversely alter a sensitive aspect of the environment
Very Significant Adverse Effect	The project would: • have an effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment; • be at complete variance with the character (including quality and value) of the landscape; • degrade or diminish the integrity of a range of characteristic features and elements; • damage a sense of place or cause a sense of place to be lost; • cause the integrity of characteristic features and elements to be lost; • cause a very noticeable deterioration in the existing view; and • obstruct an existing view of local landscape and the development will dominate the future view.
Profound Adverse Effect	A project would: • obliterate sensitive characteristics

Table 11.21 Quality of effects

Quality of Effects	Description
Neutral	This will neither enhance nor detract from the landscape character or view
Positive	This will improve or enhance the landscape character or view
Negative (adverse)	This will reduce the quality of the existing landscape character or view

Appendix 14.1
2019 Survey Details

Appendix 14.1: 2019 survey details

Station	N1
Survey date	28.06.19-01.07.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying throughout
Precipitation	0 mm
Temperature	Warm throughout
Wind direction	SW throughout, veering NW at survey end
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl3') IEC 61672-1:2013 Class 1
SLM serial	A2A-15392-E0
Microphone serial	A16340 + pre-amp 7956
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 1537 @ 43.2 mV/Pa
Post survey drift check	93.8 dB

Station	N2
Survey date	28.06.19-01.07.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying throughout
Precipitation	0 mm
Temperature	Warm throughout
Wind direction	SW throughout, veering NW at survey end
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl4') IEC 61672-1:2013 Class 1
SLM serial	A2A-15429-E0
Microphone serial	A16329 + pre-amp 7945
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 1449 @ 41.3 mV/Pa
Post survey drift check	93.9 dB

Station	N3
Survey date	28.06.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying 80-100 %
Precipitation	0 mm
Temperature	16 C
Wind direction	S veering SW
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl2') IEC 61672-1:2013 Class 1
SLM serial	A2A-14337-E0
Microphone serial	A14972 + pre-amp 7266
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 1517 @ 42.7 mV/Pa
Post survey drift check	93.8 dB

Station	N4
Survey date	01.07.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying 50-80 %
Precipitation	0 mm
Temperature	19 °C
Wind direction	NW
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl1') IEC 61672-1:2013 Class 1
SLM serial	A2A-13658-E0
Microphone serial	A14735 + pre-amp 7066
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	01.07.19 1313 @ 38.9 mV/Pa
Post survey drift check	93.9 dB

Station	N5 day 1
Survey date	28.06.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	16 °C
Wind direction	S veering SW
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl1') IEC 61672-1:2013 Class 1
SLM serial	A2A-13658-E0
Microphone serial	A14735 + pre-amp 7066
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 1617 @ 39.2 mV/Pa
Post survey drift check	93.9 dB

Station	N5 day 2
Survey date	01.07.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying 50-80 %
Precipitation	0 mm
Temperature	19 °C
Wind direction	NW
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl2') IEC 61672-1:2013 Class 1
SLM serial	A2A-14337-E0
Microphone serial	A14972 + pre-amp 7266
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	01.07.19 0856 @ 42.8 mV/Pa
Post survey drift check	93.9 dB

Station	N6
Survey date	03.07.19-05.07.19
Microphone position	1.5 m above balcony floor, 1 m from façade
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	Varying 0-60 %
Precipitation	0 mm
Temperature	Warm throughout
Wind direction	W & SW throughout
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl4') IEC 61672-1:2013 Class 1
SLM serial	A2A-15429-E0
Microphone serial	A16329 + pre-amp 7945
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	03.07.19 1702 @ 41.2 mV/Pa
Post survey drift check	93.8 dB

Station	N7
Survey date	28.06.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	16 C
Wind direction	S
Wind speed	Initially 1-4 m/s, gradually reducing to 0-1 m/s
Instrument	NTi XL2 ('xl4') IEC 61672-1:2013 Class 1
SLM serial	A2A-15429-E0
Microphone serial	A16329 + pre-amp 7945
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 0854 @ 41.4 mV/Pa
Post survey drift check	93.9 dB

Station	N8
Survey date	01.07.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	60 %
Precipitation	0 mm
Temperature	16 rising to 19 °C
Wind direction	NW
Wind speed	0-2 m/s
Instrument	NTi XL2 ('xl2') IEC 61672-1:2013 Class 1
SLM serial	A2A-14337-E0
Microphone serial	A14972 + pre-amp 7266

Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	01.07.19 0856 @ 42.8 mV/Pa
Post survey drift check	93.9 dB

Station	N9
Survey date	28.06.19
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	16 °C
Wind direction	S
Wind speed	Initially 1-4 m/s, gradually reducing to 0-1 m/s
Instrument	NTi XL2 ('xl3') IEC 61672-1:2013 Class 1
SLM serial	A2A-15392-E0
Microphone serial	A16340 + pre-amp 7956
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	28.06.19 0932 @ 43.4 mV/Pa
Post survey drift check	93.9 dB

Appendix 14.2
2019 Baseline Noise Data

Appendix 14.2: 2019 baseline noise data

Station	Start Date & Time	$L_{Aeq\ 15min}$	$L_{AF1015min}$	$L_{AF9015min}$		Station	Start Date & Time	$L_{Aeq\ 15min}$	$L_{AF1015min}$	$L_{AF9015min}$
N1	28/06/2019 16:00	48	50	44		N2	30/06/2019 02:30	42	46	35
N1	28/06/2019 16:15	50	52	45		N2	30/06/2019 02:45	40	44	35
N1	28/06/2019 16:30	47	49	42		N2	30/06/2019 03:00	40	45	33
N1	28/06/2019 16:45	46	48	43		N2	30/06/2019 03:15	38	43	30
N1	28/06/2019 17:00	45	46	42		N2	30/06/2019 03:30	41	46	32
N1	28/06/2019 17:15	44	46	41		N2	30/06/2019 03:45	39	44	32
N1	28/06/2019 17:30	45	46	42		N2	30/06/2019 04:00	40	44	33
N1	28/06/2019 17:45	44	46	41		N2	30/06/2019 04:15	40	45	34
N1	28/06/2019 18:00	46	48	41		N2	30/06/2019 04:30	53	55	36
N1	28/06/2019 18:15	46	49	41		N2	30/06/2019 04:45	50	52	38
N1	28/06/2019 18:30	44	46	41		N2	30/06/2019 05:00	45	48	38
N1	28/06/2019 18:45	44	45	40		N2	30/06/2019 05:15	44	49	35
N1	28/06/2019 19:00	47	52	42		N2	30/06/2019 05:30	46	49	38
N1	28/06/2019 19:15	43	45	41		N2	30/06/2019 05:45	43	47	37
N1	28/06/2019 19:30	43	44	40		N2	30/06/2019 06:00	43	46	36
N1	28/06/2019 19:45	43	45	40		N2	30/06/2019 06:15	46	49	38
N1	28/06/2019 20:00	43	44	40		N2	30/06/2019 06:30	47	50	38
N1	28/06/2019 20:15	43	45	40		N2	30/06/2019 06:45	44	48	35
N1	28/06/2019 20:30	42	44	40		N2	30/06/2019 07:00	45	49	36
N1	28/06/2019 20:45	42	44	40		N2	30/06/2019 07:15	45	49	37
N1	28/06/2019 21:00	53	48	41		N2	30/06/2019 07:30	50	49	37
N1	28/06/2019 21:15	44	46	41		N2	30/06/2019 07:45	46	48	35
N1	28/06/2019 21:30	43	45	41		N2	30/06/2019 08:00	46	49	35
N1	28/06/2019 21:45	45	49	41		N2	30/06/2019 08:15	47	51	40
N1	28/06/2019 22:00	48	47	41		N2	30/06/2019 08:30	49	51	38
N1	28/06/2019 22:15	42	44	41		N2	30/06/2019 08:45	48	50	39
N1	28/06/2019 22:30	42	44	41		N2	30/06/2019 09:00	46	49	38
N1	28/06/2019 22:45	43	44	41		N2	30/06/2019 09:15	47	50	40
N1	28/06/2019 23:00	43	45	41		N2	30/06/2019 09:30	48	50	40
N1	28/06/2019 23:15	42	43	41		N2	30/06/2019 09:45	47	50	40
N1	28/06/2019 23:30	42	43	41		N2	30/06/2019 10:00	47	50	41
N1	28/06/2019 23:45	41	43	40		N2	30/06/2019 10:15	49	52	43
N1	29/06/2019 00:00	42	43	40		N2	30/06/2019 10:30	48	51	43
N1	29/06/2019 00:15	41	42	40		N2	30/06/2019 10:45	49	51	45
N1	29/06/2019 00:30	42	43	40		N2	30/06/2019 11:00	49	51	42
N1	29/06/2019 00:45	41	43	40		N2	30/06/2019 11:15	49	51	44
N1	29/06/2019 01:00	40	42	39		N2	30/06/2019 11:30	49	52	44
N1	29/06/2019 01:15	40	42	40		N2	30/06/2019 11:45	48	50	45
N1	29/06/2019 01:30	40	41	39		N2	30/06/2019 12:00	50	52	46
N1	29/06/2019 01:45	40	41	39		N2	30/06/2019 12:15	49	51	45
N1	29/06/2019 02:00	40	41	38		N2	30/06/2019 12:30	49	51	44
N1	29/06/2019 02:15	39	41	38		N2	30/06/2019 12:45	50	53	45
N1	29/06/2019 02:30	40	41	39		N2	30/06/2019 13:00	50	52	46
N1	29/06/2019 02:45	40	42	39		N2	30/06/2019 13:15	51	52	47
N1	29/06/2019 03:00	40	41	39		N2	30/06/2019 13:30	49	52	45
N1	29/06/2019 03:15	40	42	39		N2	30/06/2019 13:45	50	53	45
N1	29/06/2019 03:30	40	41	39		N2	30/06/2019 14:00	51	53	46
N1	29/06/2019 03:45	40	42	39		N2	30/06/2019 14:15	52	54	46
N1	29/06/2019 04:00	41	42	39		N2	30/06/2019 14:30	49	52	46
N1	29/06/2019 04:15	40	42	39		N2	30/06/2019 14:45	49	51	45
N1	29/06/2019 04:30	41	42	39		N2	30/06/2019 15:00	48	51	45
N1	29/06/2019 04:45	44	48	39		N2	30/06/2019 15:15	50	52	46
N1	29/06/2019 05:00	44	48	39		N2	30/06/2019 15:30	51	52	46
N1	29/06/2019 05:15	45	49	39		N2	30/06/2019 15:45	49	51	46
N1	29/06/2019 05:30	40	42	38		N2	30/06/2019 16:00	49	51	45
N1	29/06/2019 05:45	45	44	39		N2	30/06/2019 16:15	51	53	46
N1	29/06/2019 06:00	43	45	39		N2	30/06/2019 16:30	49	51	45
N1	29/06/2019 06:15	50	50	40		N2	30/06/2019 16:45	49	51	45
N1	29/06/2019 06:30	44	46	40		N2	30/06/2019 17:00	50	52	47
N1	29/06/2019 06:45	43	47	41		N2	30/06/2019 17:15	49	52	45
N1	29/06/2019 07:00	47	49	40		N2	30/06/2019 17:30	49	51	47
N1	29/06/2019 07:15	48	50	42		N2	30/06/2019 17:45	50	52	45
N1	29/06/2019 07:30	50	51	42		N2	30/06/2019 18:00	49	51	46

N1	29/06/2019 07:45	47	47	41		N2	30/06/2019 18:15	49	51	45
N1	29/06/2019 08:00	46	48	42		N2	30/06/2019 18:30	49	51	46
N1	29/06/2019 08:15	45	47	41		N2	30/06/2019 18:45	49	51	45
N1	29/06/2019 08:30	44	45	42		N2	30/06/2019 19:00	47	50	42
N1	29/06/2019 08:45	47	46	42		N2	30/06/2019 19:15	47	50	41
N1	29/06/2019 09:00	43	45	41		N2	30/06/2019 19:30	47	50	41
N1	29/06/2019 09:15	45	47	42		N2	30/06/2019 19:45	48	51	42
N1	29/06/2019 09:30	44	46	41		N2	30/06/2019 20:00	49	51	42
N1	29/06/2019 09:45	46	50	42		N2	30/06/2019 20:15	48	50	44
N1	29/06/2019 10:00	44	46	41		N2	30/06/2019 20:30	48	51	42
N1	29/06/2019 10:15	45	46	41		N2	30/06/2019 20:45	45	49	38
N1	29/06/2019 10:30	44	46	41		N2	30/06/2019 21:00	46	49	40
N1	29/06/2019 10:45	43	45	41		N2	30/06/2019 21:15	46	49	41
N1	29/06/2019 11:00	45	47	41		N2	30/06/2019 21:30	49	52	38
N1	29/06/2019 11:15	47	51	42		N2	30/06/2019 21:45	45	49	36
N1	29/06/2019 11:30	45	48	42		N2	30/06/2019 22:00	44	48	35
N1	29/06/2019 11:45	46	48	42		N2	30/06/2019 22:15	45	49	35
N1	29/06/2019 12:00	45	47	42		N2	30/06/2019 22:30	44	48	34
N1	29/06/2019 12:15	45	47	42		N2	30/06/2019 22:45	43	47	33
N1	29/06/2019 12:30	46	48	43		N2	30/06/2019 23:00	43	47	32
N1	29/06/2019 12:45	45	47	43		N2	30/06/2019 23:15	43	47	32
N1	29/06/2019 13:00	45	46	43		N2	30/06/2019 23:30	41	45	33
N1	29/06/2019 13:15	46	48	43		N2	30/06/2019 23:45	40	44	33
N1	29/06/2019 13:30	47	49	44		N2	01/07/2019 00:00	40	45	33
N1	29/06/2019 13:45	45	47	43		N2	01/07/2019 00:15	39	42	33
N1	29/06/2019 14:00	46	47	43		N2	01/07/2019 00:30	41	46	33
N1	29/06/2019 14:15	49	49	43		N2	01/07/2019 00:45	38	42	32
N1	29/06/2019 14:30	48	47	44		N2	01/07/2019 01:00	38	43	31
N1	29/06/2019 14:45	48	50	43		N2	01/07/2019 01:15	39	44	30
N1	29/06/2019 15:00	46	48	43		N2	01/07/2019 01:30	37	37	31
N1	29/06/2019 15:15	46	48	43		N2	01/07/2019 01:45	37	40	31
N1	29/06/2019 15:30	48	51	45		N2	01/07/2019 02:00	36	33	30
N1	29/06/2019 15:45	46	48	44		N2	01/07/2019 02:15	34	33	30
N1	29/06/2019 16:00	47	49	44		N2	01/07/2019 02:30	36	38	31
N1	29/06/2019 16:15	47	49	44		N2	01/07/2019 02:45	34	35	31
N1	29/06/2019 16:30	47	49	44		N2	01/07/2019 03:00	39	41	31
N1	29/06/2019 16:45	47	50	45		N2	01/07/2019 03:15	37	39	32
N1	29/06/2019 17:00	47	49	44		N2	01/07/2019 03:30	38	41	32
N1	29/06/2019 17:15	47	49	44		N2	01/07/2019 03:45	36	35	31
N1	29/06/2019 17:30	47	50	44		N2	01/07/2019 04:00	37	35	31
N1	29/06/2019 17:45	47	49	43		N2	01/07/2019 04:15	39	43	34
N1	29/06/2019 18:00	47	49	43		N2	01/07/2019 04:30	40	44	33
N1	29/06/2019 18:15	47	50	44		N2	01/07/2019 04:45	43	47	35
N1	29/06/2019 18:30	48	50	44		N2	01/07/2019 05:00	43	46	35
N1	29/06/2019 18:45	46	49	43		N2	01/07/2019 05:15	45	49	36
N1	29/06/2019 19:00	46	48	43		N2	01/07/2019 05:30	47	52	37
N1	29/06/2019 19:15	46	48	43		N2	01/07/2019 05:45	48	51	39
N1	29/06/2019 19:30	47	50	42		N2	01/07/2019 06:00	47	50	38
N1	29/06/2019 19:45	45	47	42		N2	01/07/2019 06:15	50	54	42
N1	29/06/2019 20:00	45	47	43		N2	01/07/2019 06:30	51	53	43
N1	29/06/2019 20:15	47	50	43		N2	01/07/2019 06:45	50	53	43
N1	29/06/2019 20:30	46	49	43		N2	01/07/2019 07:00	49	53	43
N1	29/06/2019 20:45	47	49	43		N2	01/07/2019 07:15	50	53	45
N1	29/06/2019 21:00	47	49	44		N2	01/07/2019 07:30	51	53	45
N1	29/06/2019 21:15	55	49	43		N2	01/07/2019 07:45	52	54	45
N1	29/06/2019 21:30	45	48	42		N2	01/07/2019 08:00	52	54	46
N1	29/06/2019 21:45	47	50	43		N2	01/07/2019 08:15	50	53	46
N1	29/06/2019 22:00	45	47	42		N2	01/07/2019 08:30	50	53	45
N1	29/06/2019 22:15	44	47	42		N2	01/07/2019 08:45	50	53	44
N1	29/06/2019 22:30	46	48	43		N2	01/07/2019 09:00	50	53	43
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N1	29/06/2019 23:00	44	46	42		N3	28/06/2019 15:15	63	68	42
N1	29/06/2019 23:15	44	45	42		N3	28/06/2019 15:30	64	68	40
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N1	29/06/2019 23:45	43	44	42		N3	28/06/2019 16:00	64	69	43
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N1	30/06/2019 00:45	44	45	43		N3	28/06/2019 17:00	64	69	42
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N1	30/06/2019 01:45	45	46	43		N4	01/07/2019 13:30	60	64	43
N1	30/06/2019 02:00	45	47	43		N4	01/07/2019 13:45	59	63	43
N1	30/06/2019 02:15	45	47	43		N4	01/07/2019 14:00	59	64	44
N1	30/06/2019 02:30	45	47	43		N4	01/07/2019 14:15	59	64	43
N1	30/06/2019 02:45	44	45	42		N4	01/07/2019 14:30	60	64	44
N1	30/06/2019 03:00	44	45	42		N4	01/07/2019 14:45	59	63	44
N1	30/06/2019 03:15	43	45	42		N4	01/07/2019 15:00	60	64	43
N1	30/06/2019 03:30	44	45	42		N4	01/07/2019 15:15	60	64	42
N1	30/06/2019 03:45	43	44	42		N4	01/07/2019 15:30	60	64	42
N1	30/06/2019 04:00	43	45	41		N4	01/07/2019 15:45	59	64	39
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N1	30/06/2019 05:00	45	47	43		N5	28/06/2019 17:00	58	61	43
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N1	30/06/2019 06:45	46	46	43		N5	01/07/2019 14:15	52	55	44
N1	30/06/2019 07:00	46	48	43		N5	01/07/2019 14:30	54	54	44
N1	30/06/2019 07:15	45	47	43		N5	01/07/2019 14:45	51	54	44
N1	30/06/2019 07:30	45	47	43		N5	01/07/2019 15:00	50	54	42
N1	30/06/2019 07:45	44	45	43		N5	01/07/2019 15:15	52	55	43
N1	30/06/2019 08:00	49	54	43		N5	01/07/2019 15:30	54	55	42
N1	30/06/2019 08:15	48	51	44		N5	01/07/2019 15:45	50	54	41
N1	30/06/2019 08:30	46	48	44		N5	01/07/2019 16:00	51	54	42
N1	30/06/2019 08:45	45	47	43		N6	03/07/2019 17:30	53	53	45
N1	30/06/2019 09:00	45	47	43		N6	03/07/2019 17:45	49	51	43
N1	30/06/2019 09:15	46	48	43		N6	03/07/2019 18:00	54	58	45
N1	30/06/2019 09:30	48	50	43		N6	03/07/2019 18:15	50	53	43
N1	30/06/2019 09:45	46	47	43		N6	03/07/2019 18:30	49	52	44
N1	30/06/2019 10:00	47	49	43		N6	03/07/2019 18:45	46	49	40
N1	30/06/2019 10:15	49	51	45		N6	03/07/2019 19:00	49	52	39
N1	30/06/2019 10:30	49	51	45		N6	03/07/2019 19:15	47	51	40
N1	30/06/2019 10:45	49	52	45		N6	03/07/2019 19:30	44	46	39
N1	30/06/2019 11:00	49	51	45		N6	03/07/2019 19:45	43	44	39
N1	30/06/2019 11:15	51	55	46		N6	03/07/2019 20:00	46	50	39
N1	30/06/2019 11:30	51	55	47		N6	03/07/2019 20:15	51	53	40
N1	30/06/2019 11:45	48	50	45		N6	03/07/2019 20:30	51	50	40
N1	30/06/2019 12:00	50	53	47		N6	03/07/2019 20:45	51	51	42
N1	30/06/2019 12:15	49	51	45		N6	03/07/2019 21:00	47	48	40
N1	30/06/2019 12:30	50	52	45		N6	03/07/2019 21:15	44	46	38
N1	30/06/2019 12:45	49	52	46		N6	03/07/2019 21:30	43	45	37
N1	30/06/2019 13:00	48	50	45		N6	03/07/2019 21:45	46	51	38
N1	30/06/2019 13:15	49	51	46		N6	03/07/2019 22:00	42	45	38
N1	30/06/2019 13:30	47	49	45		N6	03/07/2019 22:15	43	45	38
N1	30/06/2019 13:45	48	50	45		N6	03/07/2019 22:30	41	42	37
N1	30/06/2019 14:00	48	50	46		N6	03/07/2019 22:45	43	46	35
N1	30/06/2019 14:15	49	51	46		N6	03/07/2019 23:00	41	43	31
N1	30/06/2019 14:30	49	51	45		N6	03/07/2019 23:15	38	38	31
N1	30/06/2019 14:45	47	49	45		N6	03/07/2019 23:30	34	37	31
N1	30/06/2019 15:00	48	50	45		N6	03/07/2019 23:45	33	36	28
N1	30/06/2019 15:15	50	54	46		N6	04/07/2019 00:00	38	38	30
N1	30/06/2019 15:30	50	52	46		N6	04/07/2019 00:15	33	36	30
N1	30/06/2019 15:45	49	51	46		N6	04/07/2019 00:30	32	34	30
N1	30/06/2019 16:00	47	48	45		N6	04/07/2019 00:45	33	35	28
N1	30/06/2019 16:15	49	52	45		N6	04/07/2019 01:00	32	34	29
N1	30/06/2019 16:30	48	50	46		N6	04/07/2019 01:15	31	34	27
N1	30/06/2019 16:45	48	50	46		N6	04/07/2019 01:30	31	33	27
N1	30/06/2019 17:00	48	50	46		N6	04/07/2019 01:45	32	34	30

N1	30/06/2019 17:15	49	50	46		N6	04/07/2019 02:00	32	35	30
N1	30/06/2019 17:30	49	51	47		N6	04/07/2019 02:15	32	33	31
N1	30/06/2019 17:45	50	51	46		N6	04/07/2019 02:30	33	35	31
N1	30/06/2019 18:00	49	51	47		N6	04/07/2019 02:45	33	34	30
N1	30/06/2019 18:15	48	50	46		N6	04/07/2019 03:00	32	34	29
N1	30/06/2019 18:30	49	51	46		N6	04/07/2019 03:15	33	36	30
N1	30/06/2019 18:45	48	50	46		N6	04/07/2019 03:30	34	36	31
N1	30/06/2019 19:00	47	49	45		N6	04/07/2019 03:45	35	37	32
N1	30/06/2019 19:15	46	47	44		N6	04/07/2019 04:00	46	53	33
N1	30/06/2019 19:30	47	48	45		N6	04/07/2019 04:15	35	37	33
N1	30/06/2019 19:45	47	49	44		N6	04/07/2019 04:30	38	38	33
N1	30/06/2019 20:00	47	48	45		N6	04/07/2019 04:45	34	36	33
N1	30/06/2019 20:15	48	49	45		N6	04/07/2019 05:00	34	36	32
N1	30/06/2019 20:30	48	49	44		N6	04/07/2019 05:15	37	39	34
N1	30/06/2019 20:45	45	46	43		N6	04/07/2019 05:30	38	40	36
N1	30/06/2019 21:00	45	46	43		N6	04/07/2019 05:45	44	44	37
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N1	30/06/2019 23:30	43	44	42		N6	04/07/2019 08:15	49	52	42
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N1	01/07/2019 02:30	44	45	43		N6	04/07/2019 11:15	45	50	37
N1	01/07/2019 02:45	43	45	42		N6	04/07/2019 11:30	48	52	38
N1	01/07/2019 03:00	44	45	43		N6	04/07/2019 11:45	45	48	37
N1	01/07/2019 03:15	45	46	43		N6	04/07/2019 12:00	51	50	38
N1	01/07/2019 03:30	44	45	42		N6	04/07/2019 12:15	46	48	40
N1	01/07/2019 03:45	44	45	43		N6	04/07/2019 12:30	44	47	40
N1	01/07/2019 04:00	44	45	42		N6	04/07/2019 12:45	46	48	40
N1	01/07/2019 04:15	49	49	43		N6	04/07/2019 13:00	47	53	40
N1	01/07/2019 04:30	60	66	44		N6	04/07/2019 13:15	48	51	42
N1	01/07/2019 04:45	44	45	43		N6	04/07/2019 13:30	49	51	42
N1	01/07/2019 05:00	45	46	42		N6	04/07/2019 13:45	48	50	43
N1	01/07/2019 05:15	47	49	43		N6	04/07/2019 14:00	49	52	43
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N1	01/07/2019 06:15	47	48	44		N6	04/07/2019 15:00	48	51	42
N1	01/07/2019 06:30	47	51	44		N6	04/07/2019 15:15	49	52	45
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N2	28/06/2019 21:00	48	52	37		N6	05/07/2019 00:30	37	38	35
N2	28/06/2019 21:15	48	52	41		N6	05/07/2019 00:45	36	38	34
N2	28/06/2019 21:30	45	49	34		N6	05/07/2019 01:00	35	37	33
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N2	28/06/2019 23:00	45	49	32		N6	05/07/2019 02:30	36	37	34
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N2	29/06/2019 00:00	43	47	30		N6	05/07/2019 03:30	36	38	34
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N2	29/06/2019 07:45	48	51	38		N6	05/07/2019 11:15	46	48	40

N2	29/06/2019 08:00	49	53	39		N6	05/07/2019 11:30	46	49	41
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N2	29/06/2019 08:30	50	53	40		N6	05/07/2019 12:00	50	54	41
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N2	29/06/2019 09:45	51	54	41		N6	05/07/2019 13:15	45	48	40
N2	29/06/2019 10:00	49	52	41		N6	05/07/2019 13:30	44	46	38
N2	29/06/2019 10:15	48	51	41		N6	05/07/2019 13:45	45	47	39
N2	29/06/2019 10:30	49	52	42		N6	05/07/2019 14:00	46	49	38
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N2	29/06/2019 15:45	48	50	44		N7	28/06/2019 10:00	54	57	48
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N2	29/06/2019 16:30	48	51	43		N7	28/06/2019 10:45	54	57	49
N2	29/06/2019 16:45	49	51	46		N7	28/06/2019 11:00	55	58	50
N2	29/06/2019 17:00	49	51	45		N7	28/06/2019 11:15	56	57	50
N2	29/06/2019 17:15	48	51	45		N7	28/06/2019 11:30	54	57	50
N2	29/06/2019 17:30	48	51	43		N7	28/06/2019 11:45	55	58	50
N2	29/06/2019 17:45	49	51	43		N7	28/06/2019 12:00	55	58	50
N2	29/06/2019 18:00	49	51	44		N7	28/06/2019 12:15	55	58	49
N2	29/06/2019 18:15	48	51	42		N7	28/06/2019 12:30	54	58	50
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N2	29/06/2019 18:45	48	50	40		N7	28/06/2019 13:00	54	57	48
N2	29/06/2019 19:00	47	50	42		N7	28/06/2019 13:15	53	57	47
N2	29/06/2019 19:15	47	50	42		N7	28/06/2019 13:30	54	58	47
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N2	29/06/2019 20:30	49	52	39		N8	01/07/2019 09:45	40	42	38
N2	29/06/2019 20:45	46	50	40		N8	01/07/2019 10:00	40	41	38
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N2	29/06/2019 21:15	46	50	39		N8	01/07/2019 10:30	43	44	37
N2	29/06/2019 21:30	46	49	37		N8	01/07/2019 10:45	40	42	36
N2	29/06/2019 21:45	48	51	41		N8	01/07/2019 11:00	38	40	36
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N2	29/06/2019 22:15	43	47	36		N8	01/07/2019 11:30	45	43	35
N2	29/06/2019 22:30	45	48	38		N8	01/07/2019 11:45	43	41	36
N2	29/06/2019 22:45	44	48	33		N8	01/07/2019 12:00	43	46	36
N2	29/06/2019 23:00	46	49	36		N8	01/07/2019 12:15	37	38	35
N2	29/06/2019 23:15	43	47	34		N8	01/07/2019 12:30	43	44	37
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N2	29/06/2019 23:45	42	46	33		N9	28/06/2019 10:00	48	50	40
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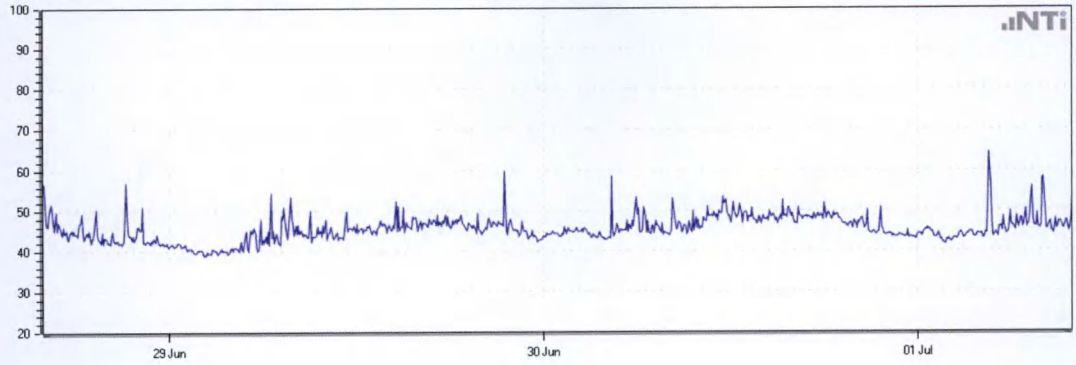
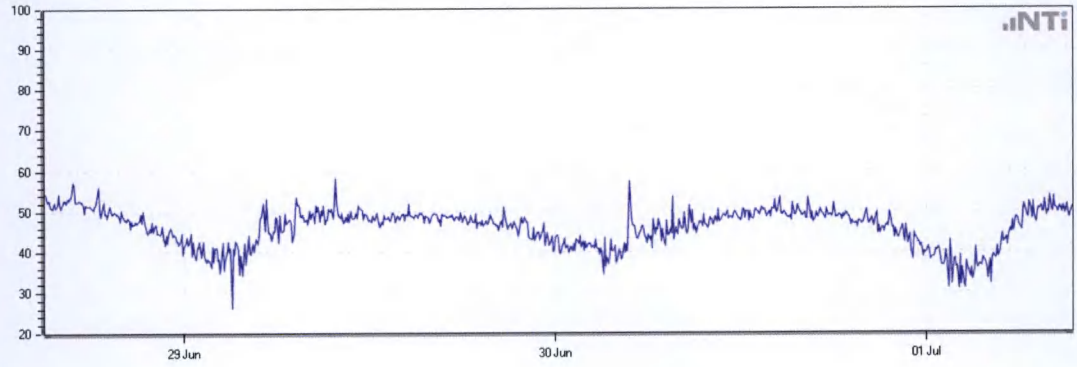
Appendix 14.3
2019 Baseline LAeq1s Profiles

Appendix 14.3: 2019 baseline $L_{Aeq\ 1\ s}$ profiles

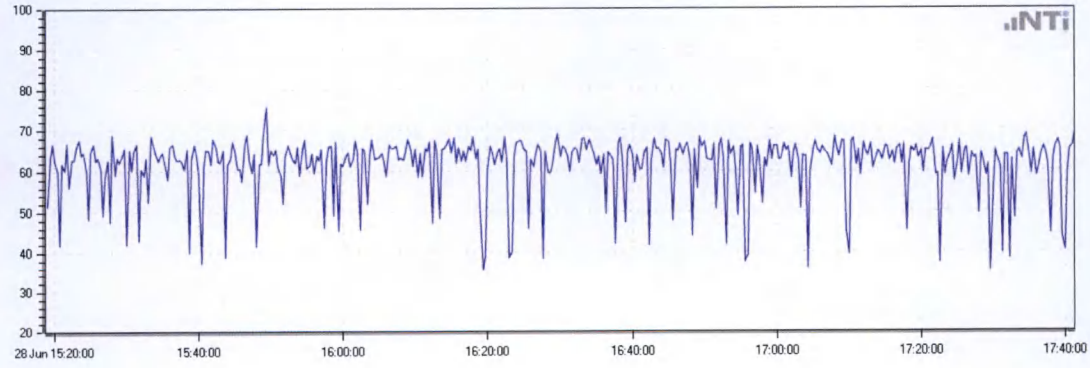
N1:



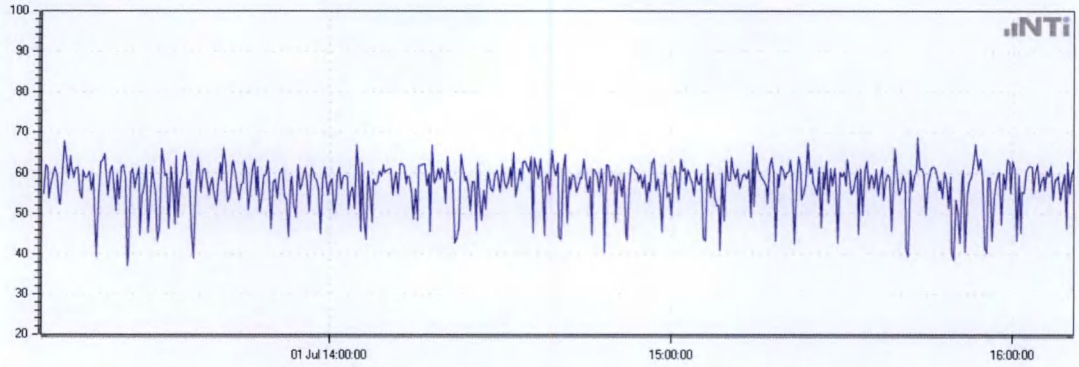
N2:



N3:



N4: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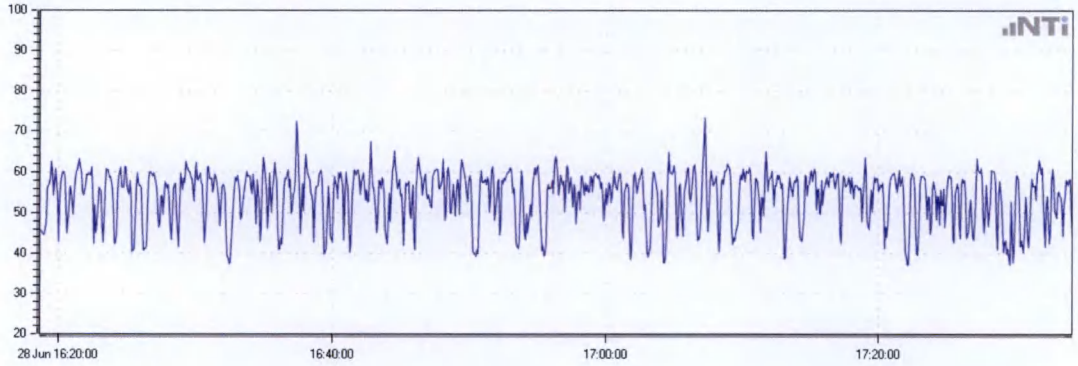
90
80
70
60
50
40
30
20
01 Jul 14:00:00
15:00:00
16:00:00

N5 (1):


100
90
80
70
60
50
40
30
20
28 Jun 16:20:00
16:40:00
17:00:00
17:20:00

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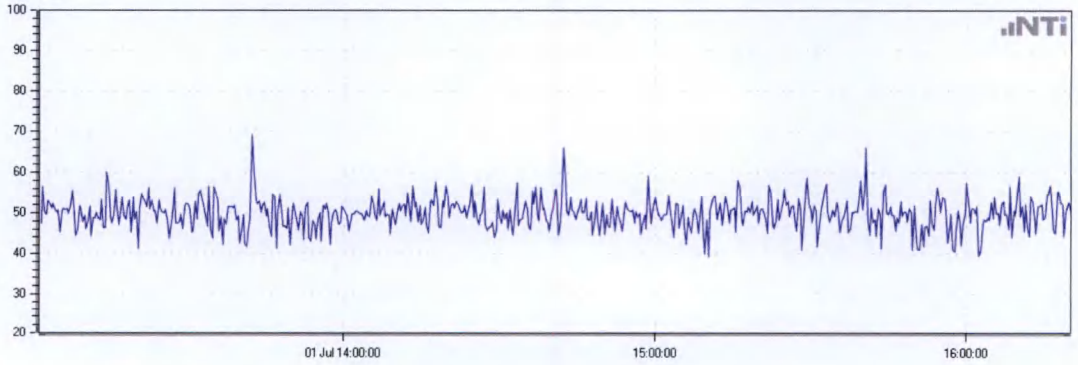
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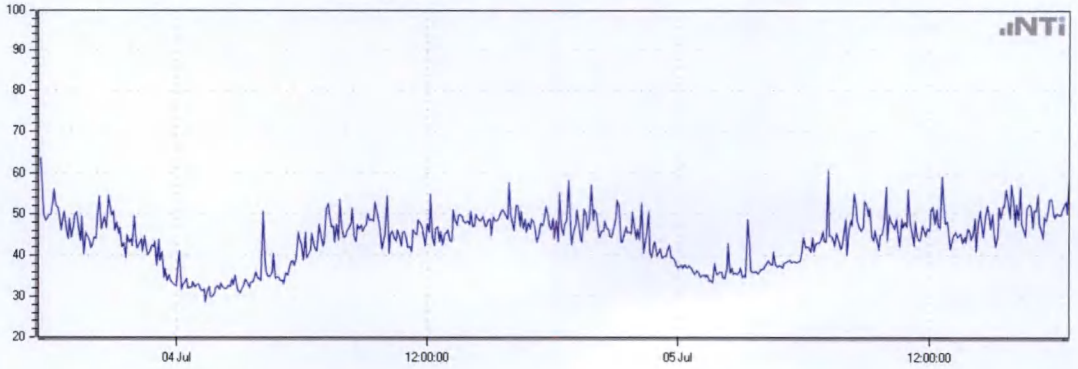
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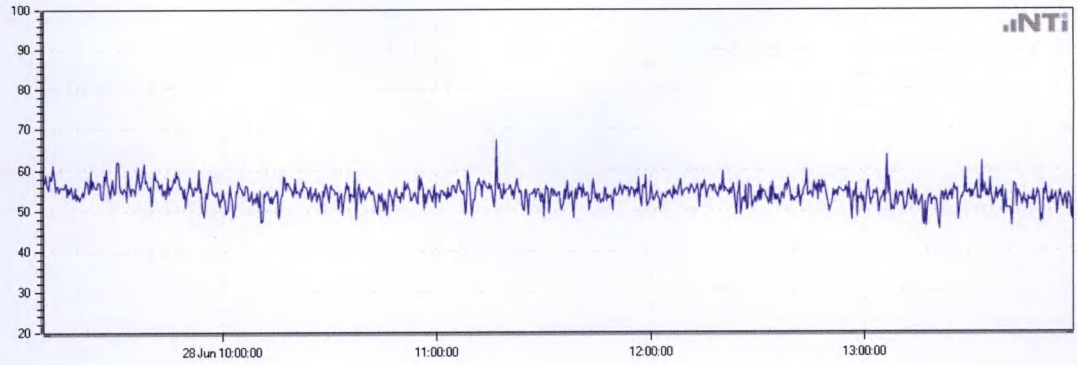
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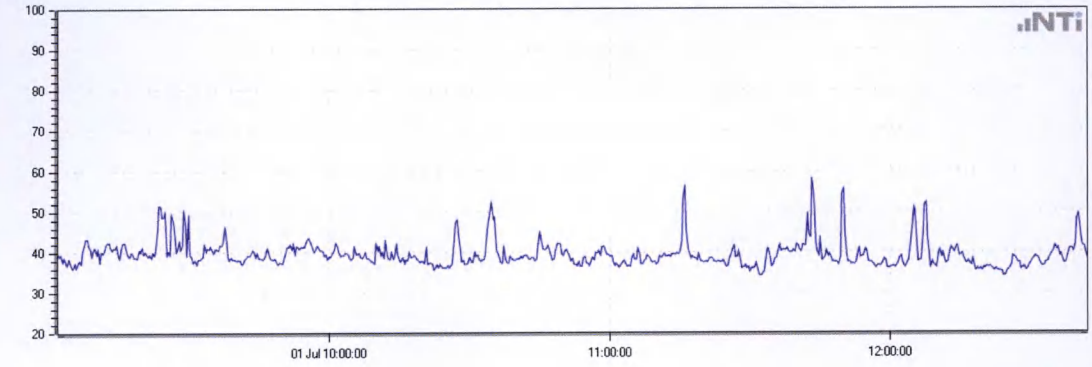
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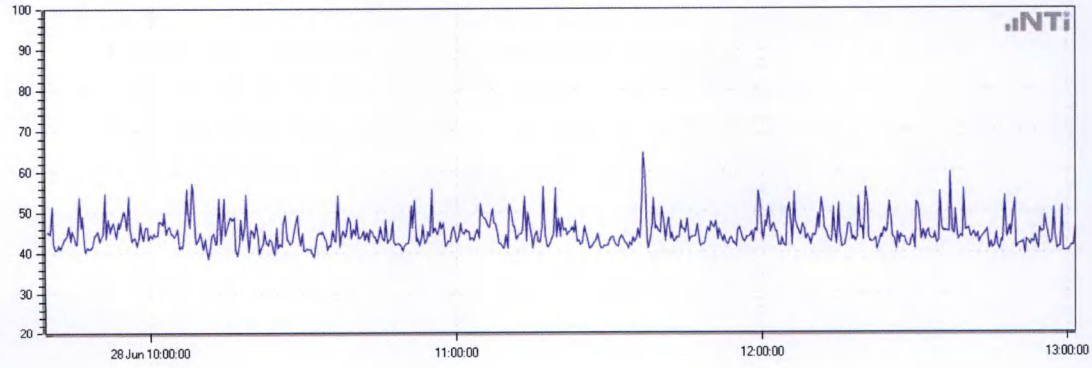
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Appendix 14.4
2020 Survey Details

Appendix 14.4: 2020 survey details

Station	N4 (evening & night)
Survey date	30.01.20-31.01.20
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	10 ^{0}C
Wind direction	SW
Wind speed	1-4 m/s
Instrument	NTi XL2 ('xl4') IEC 61672-1:2013 Class 1
SLM serial	A2A-15429-E0
Microphone serial	A16329 + pre-amp 7945
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	30.01.20 1845 @ 41.8 mV/Pa
Post survey drift check	93.9 dB

Station	N7 & N9 (evening)
Survey date	30.01.20
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	10 ^{0}C
Wind direction	SW
Wind speed	1-4 m/s
Instrument	NTi XL2 ('xl3') IEC 61672-1:2013 Class 1
SLM serial	A2A-15392-E0
Microphone serial	A16340 + pre-amp 7956
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	30.01.20 1906 @ 43.4 mV/Pa
Post survey drift check	93.9 dB

Station	N7 (night)
Survey date	30.01.20-31.01.20
Microphone position	Free field , 1.5 m above ground level
Operator	Damian Brosnan BSc MSc MIOA MIEI
Method	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems
Cloud cover	100 %
Precipitation	0 mm
Temperature	10 ^{0}C
Wind direction	SW
Wind speed	1-4 m/s
Instrument	NTi XL2 ('xl2') IEC 61672-1:2013 Class 1
SLM serial	A2A-14337-E0
Microphone serial	A14972 + pre-amp 7266
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	30.01.20 2357 @ 43.6 mV/Pa
Post survey drift check	93.8 dB

Appendix 14.5
2020 Baseline Noise Data

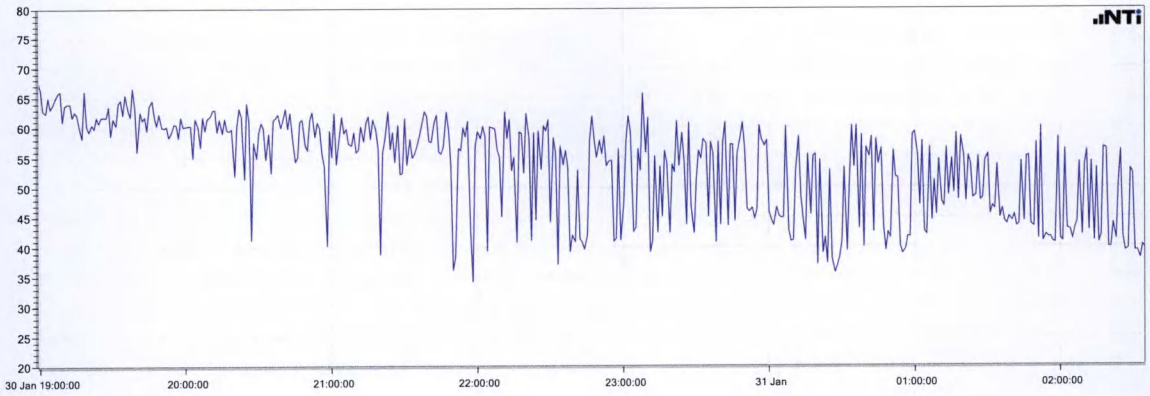
Appendix 14.5: 2020 baseline noise data

Station	Start Date & Time	$L_{Aeq\ 15min}$	$L_{AF1015min}$	$L_{AF9015min}$		Station	Start Date & Time	$L_{Aeq\ 15min}$	$L_{AF1015min}$	$L_{AF9015min}$
N4	30/01/2020 19:00	64	69	47		N7	30/01/2020 19:08	58	62	49
N4	30/01/2020 19:15	62	67	44		N7	30/01/2020 19:23	58	62	48
N4	30/01/2020 19:30	63	68	46		N7	30/01/2020 20:30	57	61	44
N4	30/01/2020 19:45	61	66	44		N7	30/01/2020 20:45	57	62	41
N4	30/01/2020 20:00	61	66	43		N7	31/01/2020 00:00	49	50	34
N4	30/01/2020 20:15	60	65	42		N7	31/01/2020 00:15	36	37	32
N4	30/01/2020 20:30	60	66	40		N7	31/01/2020 00:30	50	49	34
N4	30/01/2020 20:45	59	64	40		N7	31/01/2020 00:45	47	47	34
N4	30/01/2020 21:00	59	65	40		N7	31/01/2020 01:00	49	47	35
N4	30/01/2020 21:15	59	64	38		N7	31/01/2020 01:15	49	46	37
N4	30/01/2020 21:30	59	64	40		N7	31/01/2020 01:30	49	48	35
N4	30/01/2020 21:45	58	62	36		N7	31/01/2020 01:45	50	49	33
N4	30/01/2020 22:00	58	63	38		N9	30/01/2020 19:48	46	49	38
N4	30/01/2020 22:15	58	62	39		N9	30/01/2020 20:03	46	50	40
N4	30/01/2020 22:30	53	54	38		N9	30/01/2020 21:07	38	39	34
N4	30/01/2020 22:45	56	60	40		N9	30/01/2020 21:22	40	39	34
N4	30/01/2020 23:00	58	61	39		N9	30/01/2020 21:37	41	42	35
N4	30/01/2020 23:15	55	57	41						
N4	30/01/2020 23:30	56	59	41						
N4	30/01/2020 23:45	56	56	44						
N4	31/01/2020 00:00	52	48	40						
N4	31/01/2020 00:15	50	45	35						
N4	31/01/2020 00:30	56	57	39						
N4	31/01/2020 00:45	53	49	39						
N4	31/01/2020 01:00	53	51	42						
N4	31/01/2020 01:15	54	54	46						
N4	31/01/2020 01:30	48	47	43						
N4	31/01/2020 01:45	53	46	40						
N4	31/01/2020 02:00	51	48	40						
N4	31/01/2020 02:15	51	46	39						
N4	31/01/2020 02:30	40	42	37						

Appendix 14.6
2020 Baseline LAeq1s Profiles

Appendix 14.6: 2020 baseline $L_{Aeq\ 1\ s}$ profiles

N4:



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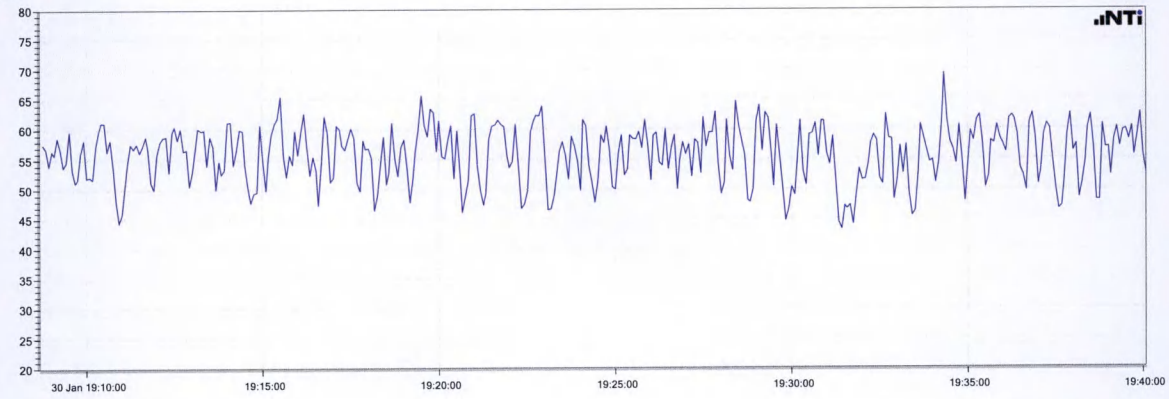

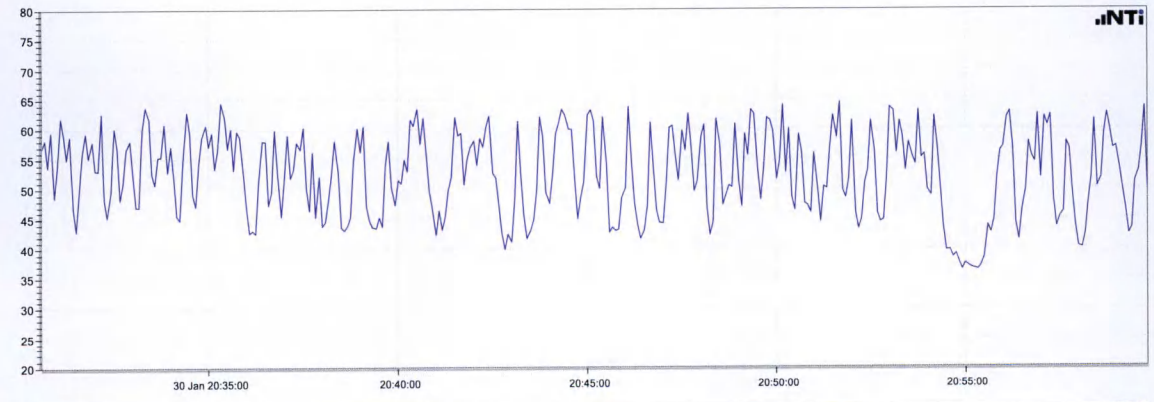

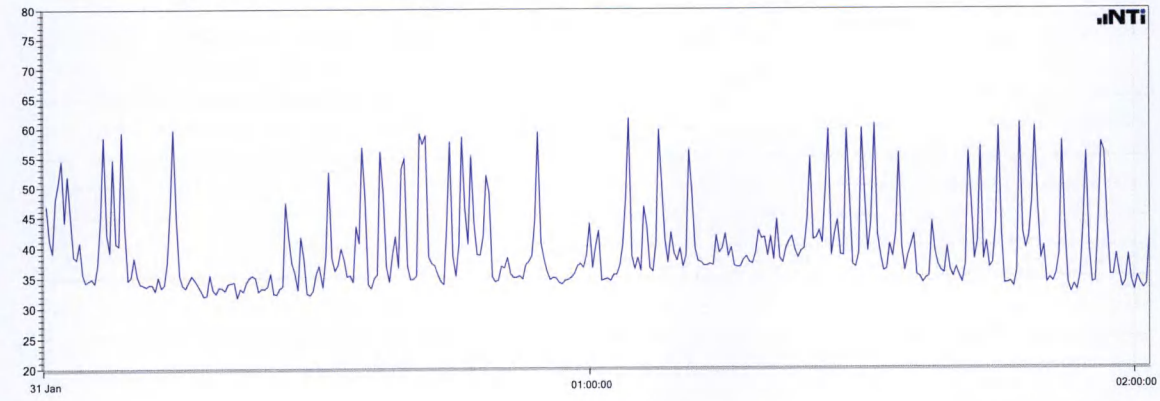

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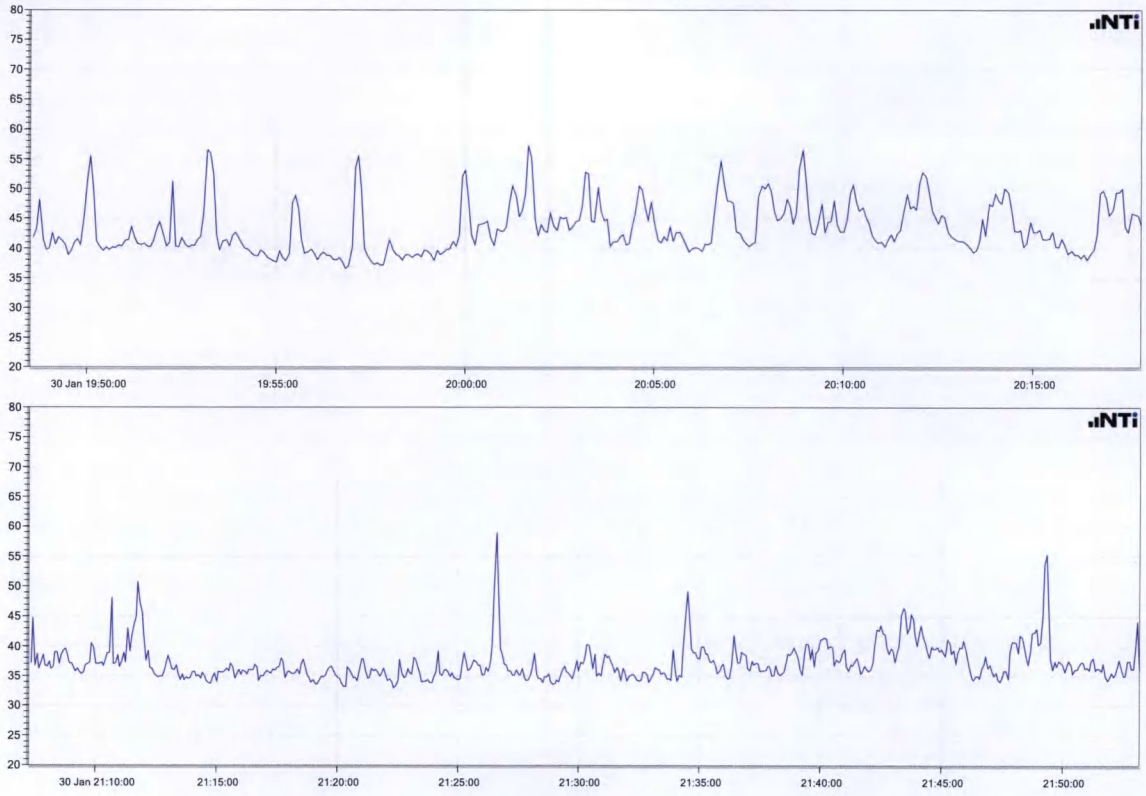
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NTi
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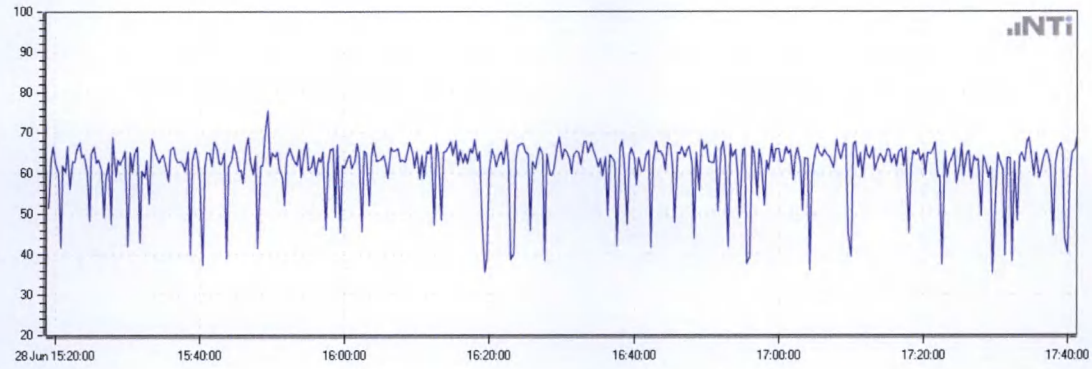
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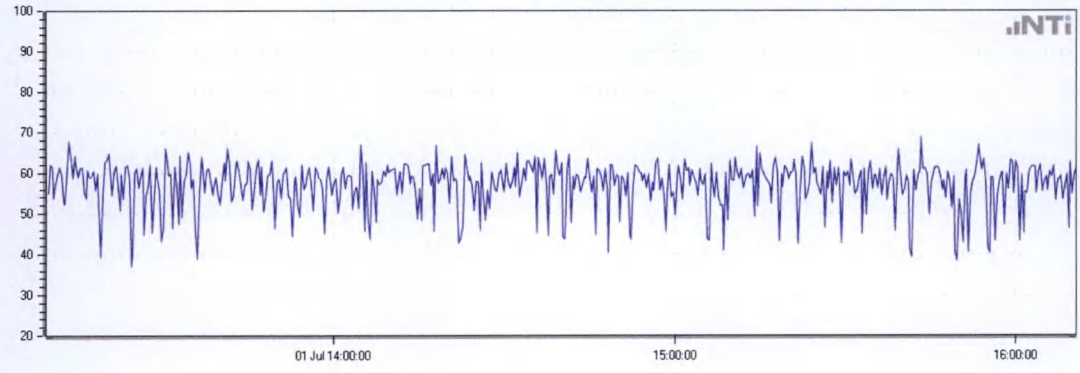
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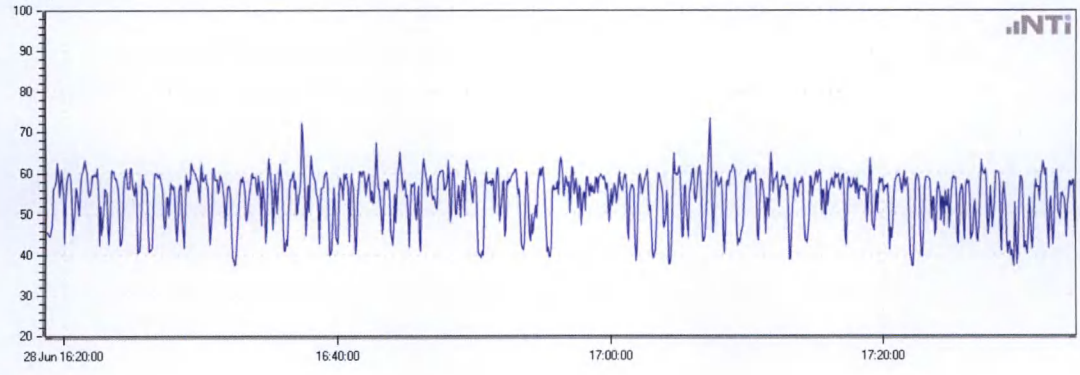
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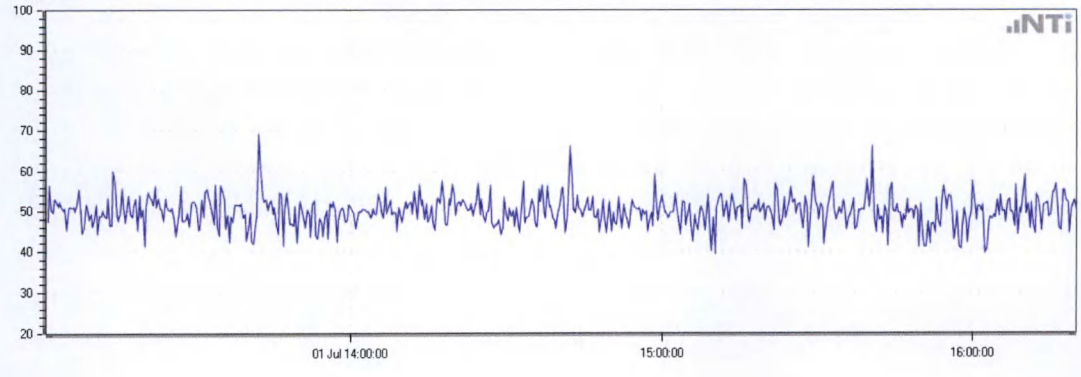
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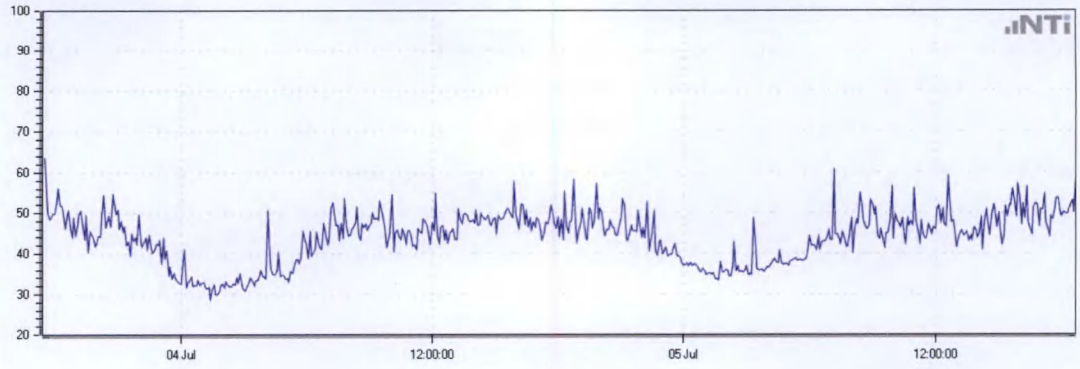
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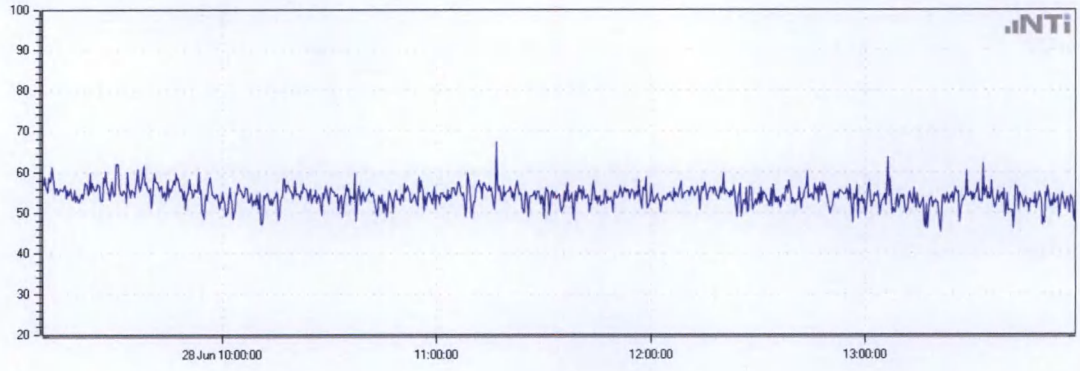
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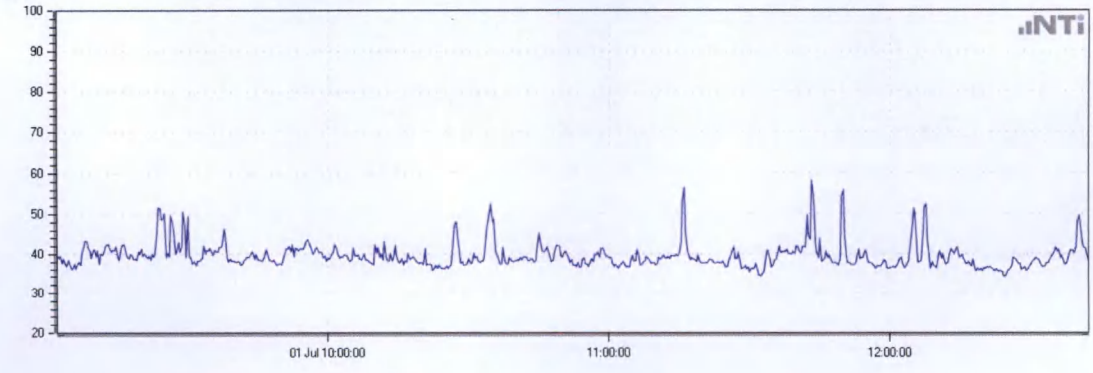
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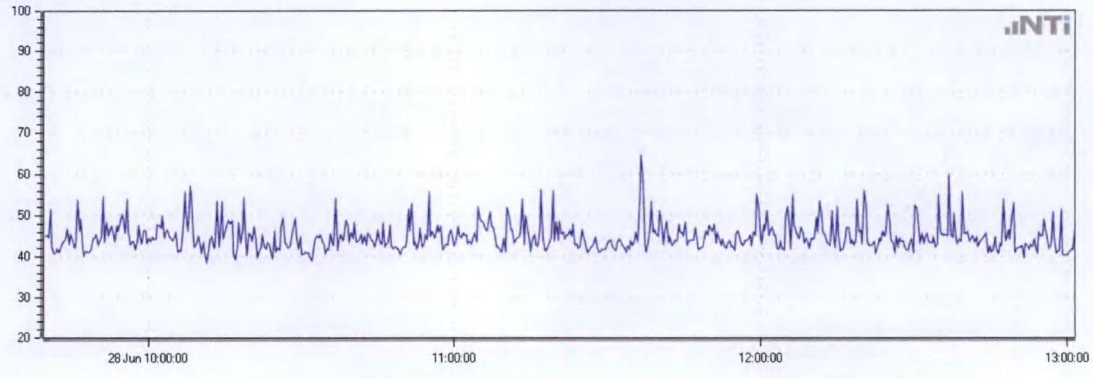
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