

INTEGRATED WASTE MANAGEMENT FACILITY AT HOLLYWOOD CIRCULAR ECONOMY CAMPUS

Environmental Impact Assessment Report Volume III: Technical
Appendices



MDR1492Rp0006c
F01
21st October 2022

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Appendix E Storm Water Design for the Landfill

STORM WATER DESIGN

EIAR Technical Appendix

MDR1492-IMS Hollywood
Environmental Services
Storm Water Design
A01
20 Feb 2020

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1 SURFACE WATER

1.1 General

As mentioned in **Chapter 10**, the site is located in the north western section of the Ballough Stream subcatchment at a maximum topographic height of 148mAOD and is close to the catchment divide with the Delvin 20 WFD sub-catchment to the north.

The OPW flood mapping website shows the site does not reside within river or coastal flood zones. Similarly, the site does not reside in any rainfall (pluvial) flood zones. From reviewing all available data regarding flood risk, it is concluded that surface water is the only source of flooding to be managed.

Infiltration should be prioritised as the method of controlling surface water runoff from a development site, unless it can be demonstrated that the use of infiltration would have a detrimental environmental impact. Infiltration may not be appropriate for this site for managing runoff. The landfill site was previously a quarry and was determined to be in soil type 4 something that indicates its poor capacity to drain.

All surface water will be collected from the landfills and their subsequent capping, with series of perimeter drains around the landfill body where it will flow by gravity to a proposed surface water attenuation pond. Drainage for the sites is designed such that water will flow into the filter drains located on the perimeter of the site. These filter drains are sized to provide the required storage for a 1:100 year storm event.

Surface water runoff will be discharged through a perforated pipe laid in crushed stone to a water course as shown in Drawing No DG2100. The crushed stone allows infiltration into the ground but also provides the required attenuation for the worst case scenario, i.e. assuming that there is no infiltration. This runoff will pass through oil interceptors, as required, prior to reaching the surface water attenuation pond.

At the north eastern section of the site, the collected surface water from the landfill area will be diverted to a proposed settlement pond close to the site.

A flow diagram has been provided in **Figure 1.1**, to further facilitate the understanding of the movement of water throughout the proposed development.

The design criteria of the GDSDS determined a minimum storage requirement of 12,350m³ including a climate change factor of 20% for the landfill site. The detailed attenuation calculations for the pond are contained in **Appendix A**.

The proposed surface water network showing interceptors, discharge locations, manhole locations, and direction of flow, is shown on Drawing No. DG2100 of the Planning Drawings.

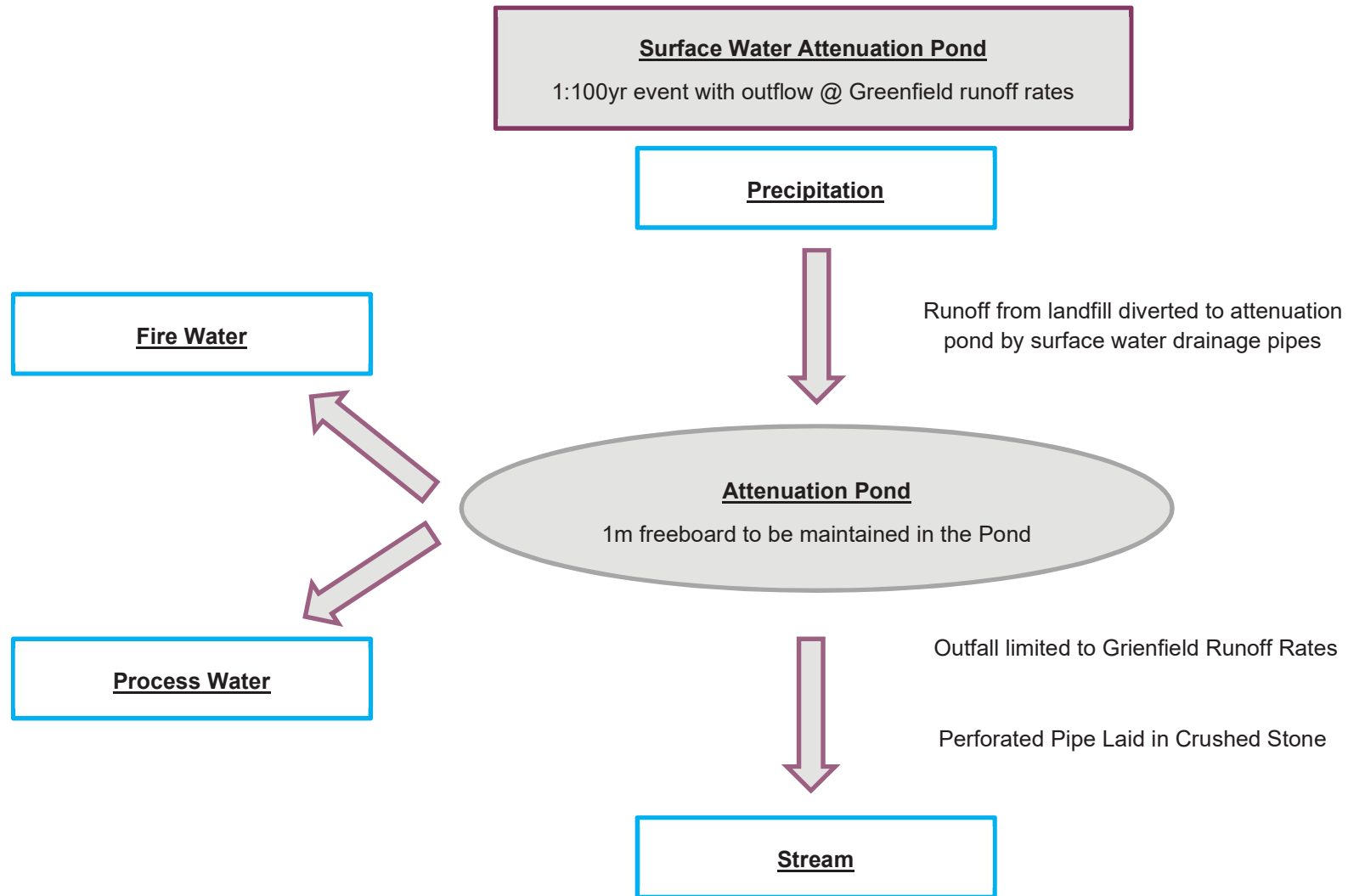


Figure 1.1 : Flow Diagram of proposed Surface Water Management

1.2 Surface Water Design

Surface water design has been carried out in accordance with requirements of BS 752; the GDSDS and the “Recommendations for Site Development Works for Housing Areas” – published by the Department of the Environment (D.O.E.). It is proposed to re-use water in the surface water attenuation pond for a number of purposes, namely:

- Supply of water for waste treatment processes,
- Supply of water for fire fighting requirements,
- Supply of water for operation and maintenance requirements

Drainage of the site is achieved by a combination of piped drainage systems. Calculations for the surface water network are included in **Appendix A**.

1.3 Sustainable Urban Drainage

Implementing the design standards of the GDSDS, the surface water drainage system takes into account the recommendations of the GDSDS and utilises SuDs (sustainable urban drainage) devices where appropriate.

The principle behind SuDs is to reduce the quantity of discharge from developments to predevelopment flows and also to improve the quality of runoff from proposed developments. In this case, it is proposed to decrease the quantity of runoff to Greenfield rates by providing a surface water attenuation pond and utilising some of the stored water in the processing and general onsite operations.

Applying the SuDs in conjunction with site specific rainfall data, an allowable outflow from the landfill site of 5.24 l/s/ha was calculated (See **Appendix A**). As discussed above, it is proposed to limit outflow from the site through the attenuation pond, controlled by way of actuated valves, ie a hydrobrake.

Bearing in mind the requirements of the GDSDS and in order to avoid flooding of the site, a storage volume for a 1 in a 100 yr storm event was used with provision included for a climate change factor of 20%. This resulted in a storage requirement of 12,350m³ (15,000m³ provided). This storage for a 1 in 100yr will be achieved through provision of 1m of freeboard in the pond. The detailed calculations are contained in **Appendix A**.

1.4 Network Design

The drainage pipe has been designed to incorporate gravity flow where feasible. The majority of the surface water flow comes from the landfill cover. This runoff will be collected by the proposed drainage pipes as shown in Drawing No. DG2100 and gravitate to the surface water attenuation pond.

1.4.1 Summary

The surface water discharge system was designed as follows:

- The surface water storage pond will cater for the 1:100yr storm event,
- The surface water storage pond will have a minimum free board of 1m,
- Outflow will be at greenfield runoff rates (5.24 l/s/ha)

The quality of the runoff from the proposed development will be improved by the following measures:

1. Runoff will pass through oil interceptor prior to discharge to the stream. These oil interceptors will retain any hydrocarbons in the runoff and thereby improve the quality of the runoff.
2. Surface water storage ponds will also act as settlement ponds to reduce the levels of suspended solids in the surface water.

Appendix A

Surface Water Design



Calculation Sheet

Project Title IMS Hollywood Environmental Services
 Project No. MDR1492
 Element Greenfield Runoff Calculation - Storage Required
 Package Surface Water Management

Designed by RO'S
 Checked by PT
 Approved by MD
 File Ref. MDR1492 Rev.: A01
 Package No. 1 Date: 05/09/2019

Item _____ Output _____

Equation: IH 124 (Institute of Hydrology, Ref. Report 124)
 $QBAR_{total} = 0.00108 AREA^{0.89} SAAR^{1.17} SOIL^{2.17}$ and
 $QBAR_{urban} = QBAR_{total} (1 + URBAN)^{0.6} (1 + URBAN / (2 / CIND) - 0.31)$

AREA	SAAR	SOIL	Qbar (0.5km2)	AREA/0.5km2	QBAR	QBAR	QBAR
[ha]	[mm]	[-]	m ³ /s	[-]	m ³ /s	l/s	l/s/ha
21.83	753	0.45	6.89	0.44	3.01	3010.14	137.89

Soil	Fraction of Area	QBAR	QBAR	QBAR
		m ³ /s	l/s	l/s/ha
0.15 :Type 1	0			
0.30 :Type 2	0			
0.40 :Type 3	0			
0.45 :Type 4	1	50 ha	3.01	3010.14
0.50 :Type 5	0	21.83 ha	0.11	114.42

Return Period (Years)	Growth Curve Factor FSR	Runoff (l/s)	Runoff (m3/s)
2	0.95	131.00	0.13
10	1.37	188.91	0.19
30	1.63	224.76	0.22
100	1.96	270.26	0.27
200	2.14	295.08	0.30

	Impervious	Pervious	Adjacent Lands	Total	
Total Area:	21.83	0	0	21.83	ha
Runoff Coefficient:	1	0.47	0.15	-	
Effective Area:	21.83	0	0	21.83	ha
Greenfield Runoff:				5.24	l/s/ha
Greenfield runoff rate:				114.42	l/s
Additional runoff (base flow):				-	l/s
Volume Out (Greenfield+baseflow):				114.42	l/s=

Greenfield Run off for 10 year Return Period =	188.91	l/s/ha
Greenfield Runoff for 100 year Return Period =	270.26	l/s/ha

Rate to watercourse
 0.11 m³/s

STORAGE VOLUME CALCULATION

6250

Storm Duration	Second	10 Year RP				100 Year RP			
		Rainfall (mm)	V _{in} (m ³)	V _{out} (m ³)	Storage (m ³)	Rainfall (mm)	V _{in} (m ³)	V _{out} (m ³)	Storage (m ³)
5 min	300	8.28	1,807.52	34.33	1,773.20	14.76	3,222.11	34.33	3,187.78
10 min	600	11.52	2,514.82	68.65	2,446.16	20.52	4,479.52	68.65	4,410.86
15 min	900	13.56	2,960.15	102.98	2,857.17	24.24	5,291.59	102.98	5,188.61
30 min	1800	17.28	3,772.22	205.96	3,566.27	29.88	6,522.80	205.96	6,316.85
1 hour	3600	21.84	4,767.67	411.91	4,355.76	36.96	8,068.37	411.91	7,656.46
2 hour	7200	27.72	6,051.28	823.83	5,227.45	45.72	9,980.68	823.83	9,156.85
3 hour	10800	19.80	4,322.34	1,235.74	3,086.60	51.84	11,316.67	1,235.74	10,080.93
4 hour	14400	35.16	7,675.43	1,647.65	6,027.78	56.52	12,338.32	1,647.65	10,690.66
6 hour	21600	40.32	8,801.86	2,471.48	6,330.38	64.08	13,988.66	2,471.48	11,517.19
9 hour	32400	46.32	10,111.66	3,707.22	6,404.44	72.48	15,822.38	3,707.22	12,115.17
12 hour	43200	51.12	11,159.50	4,942.95	6,216.54	79.2	17,289.36	4,942.95	12,346.41
18 hour	64800	58.68	12,809.84	7,414.43	5,395.41	89.64	19,568.41	7,414.43	12,153.98
24 hour	86400	64.80	14,145.84	9,885.91	4,259.93	97.92	21,375.94	9,885.91	11,490.03
48 hour	172800	76.92	16,791.64	19,771.82	-2,980.18	114.12	24,912.40	19,771.82	5,140.58



Calculation Sheet

Project Title	IMS Hollywood Environmental Services	Designed by	RO'S	Sheet 2 of 2
Project No.	MDR1492	Checked by	PT	
Element	Rainfall Data & Climate Change	Approved by	MD	
Package	Surface Water Management	File Ref.	MDR1492	Rev.: A01
		Package No.	1	Date: 05/09/2019

Item											Output																																																																																																																																																																																																																																																																																																											
<p>Location: Ballough</p> <p>Average Annual Rainfall: 24.9 mm (from Met Eirean SAAR GIS layer)</p> <p>Maximum rainfall (mm) of indicated duration expected in the indicated return period.</p> <p style="text-align: center;">Return Period (years)</p> <table border="1"> <thead> <tr> <th>Duration</th> <th>1/2</th> <th>1</th> <th>2</th> <th>5</th> <th>10</th> <th>20</th> <th>30</th> <th>50</th> <th>100</th> </tr> </thead> <tbody> <tr><td>5 min</td><td>2.9</td><td>3.9</td><td>4.4</td><td>6.3</td><td>8.3</td><td>9.2</td><td>10.2</td><td>11.7</td><td>14.8</td></tr> <tr><td>10 min</td><td>4.0</td><td>5.4</td><td>6.2</td><td>8.7</td><td>11.5</td><td>12.8</td><td>14.2</td><td>16.2</td><td>20.5</td></tr> <tr><td>15 min</td><td>4.6</td><td>6.4</td><td>7.3</td><td>10.2</td><td>13.6</td><td>15.1</td><td>16.7</td><td>19.0</td><td>24.2</td></tr> <tr><td>30 min</td><td>6.1</td><td>8.3</td><td>9.5</td><td>13.1</td><td>17.3</td><td>18.9</td><td>21.0</td><td>23.8</td><td>29.9</td></tr> <tr><td>1 hour</td><td>8.0</td><td>10.8</td><td>12.2</td><td>16.7</td><td>21.8</td><td>23.9</td><td>26.3</td><td>29.6</td><td>37.0</td></tr> <tr><td>2 hour</td><td>10.7</td><td>14.1</td><td>15.8</td><td>21.5</td><td>27.7</td><td>30.0</td><td>32.9</td><td>36.9</td><td>45.7</td></tr> <tr><td>3 hour</td><td>12.5</td><td>16.5</td><td>18.5</td><td>24.8</td><td>19.8</td><td>34.3</td><td>37.5</td><td>41.9</td><td>51.8</td></tr> <tr><td>4 hour</td><td>14.1</td><td>18.4</td><td>20.6</td><td>27.4</td><td>35.2</td><td>37.7</td><td>41.1</td><td>45.9</td><td>56.5</td></tr> <tr><td>6 hour</td><td>16.6</td><td>21.5</td><td>24.0</td><td>31.6</td><td>40.3</td><td>43.1</td><td>47.0</td><td>52.1</td><td>64.1</td></tr> <tr><td>9 hour</td><td>19.6</td><td>25.1</td><td>27.8</td><td>36.4</td><td>46.3</td><td>49.3</td><td>53.6</td><td>59.3</td><td>72.5</td></tr> <tr><td>12 hour</td><td>21.9</td><td>27.9</td><td>31.0</td><td>40.4</td><td>51.1</td><td>54.2</td><td>58.7</td><td>64.9</td><td>79.2</td></tr> <tr><td>18 hour</td><td>25.9</td><td>32.7</td><td>36.2</td><td>46.6</td><td>58.7</td><td>62.0</td><td>67.1</td><td>73.8</td><td>89.6</td></tr> <tr><td>24 hour</td><td>28.9</td><td>36.5</td><td>40.3</td><td>51.6</td><td>64.8</td><td>68.2</td><td>73.6</td><td>80.9</td><td>97.9</td></tr> <tr><td>48 hour</td><td>35.6</td><td>44.3</td><td>48.6</td><td>61.5</td><td>76.9</td><td>80.1</td><td>86.0</td><td>94.1</td><td>114.1</td></tr> </tbody> </table> <p style="text-align: center;">Rainfall Intensity (mm/h)</p> <table border="1"> <thead> <tr> <th>Duration</th> <th>1/2</th> <th>1</th> <th>2</th> <th>5</th> <th>10</th> <th>20</th> <th>30</th> <th>50</th> <th>100</th> </tr> </thead> <tbody> <tr><td>5 min</td><td>34.3</td><td>46.2</td><td>52.8</td><td>75.2</td><td>99.4</td><td>110.9</td><td>122.8</td><td>139.9</td><td>177.1</td></tr> <tr><td>10 min</td><td>23.8</td><td>32.3</td><td>37.0</td><td>52.1</td><td>69.1</td><td>76.6</td><td>85.1</td><td>97.0</td><td>123.1</td></tr> <tr><td>15 min</td><td>18.5</td><td>25.5</td><td>29.0</td><td>40.9</td><td>54.2</td><td>60.3</td><td>66.9</td><td>76.1</td><td>97.0</td></tr> <tr><td>30 min</td><td>12.1</td><td>16.5</td><td>18.9</td><td>26.2</td><td>34.6</td><td>37.8</td><td>42.0</td><td>47.5</td><td>59.8</td></tr> <tr><td>1 hour</td><td>8.0</td><td>10.8</td><td>12.2</td><td>16.7</td><td>21.8</td><td>23.9</td><td>26.3</td><td>29.6</td><td>37.0</td></tr> <tr><td>2 hour</td><td>5.3</td><td>7.0</td><td>7.9</td><td>10.7</td><td>13.9</td><td>15.0</td><td>16.4</td><td>18.4</td><td>22.9</td></tr> <tr><td>3 hour</td><td>4.2</td><td>5.5</td><td>6.2</td><td>8.3</td><td>6.6</td><td>11.4</td><td>12.5</td><td>14.0</td><td>17.3</td></tr> <tr><td>4 hour</td><td>3.5</td><td>4.6</td><td>5.1</td><td>6.8</td><td>8.8</td><td>9.4</td><td>10.3</td><td>11.5</td><td>14.1</td></tr> <tr><td>6 hour</td><td>2.8</td><td>3.6</td><td>4.0</td><td>5.3</td><td>6.7</td><td>7.2</td><td>7.8</td><td>8.7</td><td>10.7</td></tr> <tr><td>9 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hour	10.7	14.1	15.8	21.5	27.7	30.0	32.9	36.9	45.7	3 hour	12.5	16.5	18.5	24.8	19.8	34.3	37.5	41.9	51.8	4 hour	14.1	18.4	20.6	27.4	35.2	37.7	41.1	45.9	56.5	6 hour	16.6	21.5	24.0	31.6	40.3	43.1	47.0	52.1	64.1	9 hour	19.6	25.1	27.8	36.4	46.3	49.3	53.6	59.3	72.5	12 hour	21.9	27.9	31.0	40.4	51.1	54.2	58.7	64.9	79.2	18 hour	25.9	32.7	36.2	46.6	58.7	62.0	67.1	73.8	89.6	24 hour	28.9	36.5	40.3	51.6	64.8	68.2	73.6	80.9	97.9	48 hour	35.6	44.3	48.6	61.5	76.9	80.1	86.0	94.1	114.1	Duration	1/2	1	2	5	10	20	30	50	100	5 min	34.3	46.2	52.8	75.2	99.4	110.9	122.8	139.9	177.1	10 min	23.8	32.3	37.0	52.1	69.1	76.6	85.1	97.0	123.1	15 min	18.5	25.5	29.0	40.9	54.2	60.3	66.9	76.1	97.0	30 min	12.1	16.5	18.9	26.2	34.6	37.8	42.0	47.5	59.8	1 hour	8.0	10.8	12.2	16.7	21.8	23.9	26.3	29.6	37.0	2 hour	5.3	7.0	7.9	10.7	13.9	15.0	16.4	18.4	22.9	3 hour	4.2	5.5	6.2	8.3	6.6	11.4	12.5	14.0	17.3	4 hour	3.5	4.6	5.1	6.8	8.8	9.4	10.3	11.5	14.1	6 hour	2.8	3.6	4.0	5.3	6.7	7.2	7.8	8.7	10.7	9 hour	2.2	2.8	3.1	4.0	5.1	5.5	6.0	6.6	8.1	12 hour	1.8	2.3	2.6	3.4	4.3	4.5	4.9	5.4	6.6	18 hour	1.4	1.8	2.0	2.6	3.3	3.4	3.7	4.1	5.0	24 hour	1.2	1.5	1.7	2.1	2.7	2.8	3.1	3.4	4.1	48 hour	0.7	0.9	1.0	1.3	1.6	1.7	1.8	2.0	2.4
Duration	1/2	1	2	5	10	20	30	50	100																																																																																																																																																																																																																																																																																																													
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9 hour	19.6	25.1	27.8	36.4	46.3	49.3	53.6	59.3	72.5																																																																																																																																																																																																																																																																																																													
12 hour	21.9	27.9	31.0	40.4	51.1	54.2	58.7	64.9	79.2																																																																																																																																																																																																																																																																																																													
18 hour	25.9	32.7	36.2	46.6	58.7	62.0	67.1	73.8	89.6																																																																																																																																																																																																																																																																																																													
24 hour	28.9	36.5	40.3	51.6	64.8	68.2	73.6	80.9	97.9																																																																																																																																																																																																																																																																																																													
48 hour	35.6	44.3	48.6	61.5	76.9	80.1	86.0	94.1	114.1																																																																																																																																																																																																																																																																																																													
Duration	1/2	1	2	5	10	20	30	50	100																																																																																																																																																																																																																																																																																																													
5 min	34.3	46.2	52.8	75.2	99.4	110.9	122.8	139.9	177.1																																																																																																																																																																																																																																																																																																													
10 min	23.8	32.3	37.0	52.1	69.1	76.6	85.1	97.0	123.1																																																																																																																																																																																																																																																																																																													
15 min	18.5	25.5	29.0	40.9	54.2	60.3	66.9	76.1	97.0																																																																																																																																																																																																																																																																																																													
30 min	12.1	16.5	18.9	26.2	34.6	37.8	42.0	47.5	59.8																																																																																																																																																																																																																																																																																																													
1 hour	8.0	10.8	12.2	16.7	21.8	23.9	26.3	29.6	37.0																																																																																																																																																																																																																																																																																																													
2 hour	5.3	7.0	7.9	10.7	13.9	15.0	16.4	18.4	22.9																																																																																																																																																																																																																																																																																																													
3 hour	4.2	5.5	6.2	8.3	6.6	11.4	12.5	14.0	17.3																																																																																																																																																																																																																																																																																																													
4 hour	3.5	4.6	5.1	6.8	8.8	9.4	10.3	11.5	14.1																																																																																																																																																																																																																																																																																																													
6 hour	2.8	3.6	4.0	5.3	6.7	7.2	7.8	8.7	10.7																																																																																																																																																																																																																																																																																																													
9 hour	2.2	2.8	3.1	4.0	5.1	5.5	6.0	6.6	8.1																																																																																																																																																																																																																																																																																																													
12 hour	1.8	2.3	2.6	3.4	4.3	4.5	4.9	5.4	6.6																																																																																																																																																																																																																																																																																																													
18 hour	1.4	1.8	2.0	2.6	3.3	3.4	3.7	4.1	5.0																																																																																																																																																																																																																																																																																																													
24 hour	1.2	1.5	1.7	2.1	2.7	2.8	3.1	3.4	4.1																																																																																																																																																																																																																																																																																																													
48 hour	0.7	0.9	1.0	1.3	1.6	1.7	1.8	2.0	2.4																																																																																																																																																																																																																																																																																																													

Appendix B

Manhole and Pipe Schedules

Manhole Schedule

Manhole ID	Easting (Irish Grid)	Northing (Irish Grid)	Ground Level (m AOD)
MH-A01	315498	257896	148.000
MH-A01a	315498	257931	147.000
MH-A02	315524	257970	144.000
MH-A03	315582	258008	139.734
MH-A04	315618	258032	137.000
MH-A05	315661	258098	133.740
MH-A05a	315731	258090	132.110
MH-A06	315761	258087	131.544
MH-A07	315796	258132	128.860
MH-A07a	315823	258166	126.630
MH-A08	315846	258217	124.000
MH-A09	315859	258246	122.500
MH-A10	315909	258295	120.500
MH-A11	315954	258241	120.000
MH-A11a	315974	258218	119.854
MH-B01	315983	258177	120.834
MH-B02	315521	257831	147.226
MH-B03	315576	257793	145.000
MH-B03a	315645	257771	143.569
MH-B04	315679	257760	141.150
MH-B06	315712	257750	139.920
MH-B06a	315779	257728	136.290
MH-B06b	315823	257714	135.000
MH-B07	315836	257719	134.300
MH-B08	315854	257725	133.630
MH-B09	315871	257783	132.400
MH-B10	315891	257850	130.760
MH-B11	315902	257887	129.440
MH-B12	315930	257918	127.710
MH-B12a	315976	257969	124.880
MH-B13	315975	258015	123.736
MH-Hydrobrake	316116	258135	112.032

Pipe Schedule

Upstream Manhole ID	Downstream Manhole ID	Length (m)	Diameter (mm)	US invert level (m AD)	DS invert level (m AD)	Gradient (m/m)
MH-A01	MH-A01a	34.4	450	146.500	145.506	0.02886
MH-A01a	MH-A02	46.4	450	145.506	142.500	0.06481
MH-A02	MH-A03	69.9	450	142.500	138.234	0.06099
MH-A03	MH-A04	43.0	450	138.234	135.500	0.06361
MH-A04	MH-A05	79.5	450	135.500	130.500	0.06291
MH-A05	MH-A05a	70.0	450	130.500	130.147	0.00504
MH-A05a	MH-A06	30.0	450	130.147	130.044	0.00343
MH-A06	MH-A07	57.6	450	130.044	126.369	0.06378
MH-A07	MH-A07a	42.9	450	126.369	123.500	0.06689
MH-A07a	MH-A08	56.3	450	123.500	119.063	0.07883
MH-A08	MH-A09	31.5	450	119.063	117.984	0.03423
MH-A09	MH-A10	69.8	450	117.987	114.516	0.04975
MH-A10	MH-A10a	70.0	450	114.516	113.773	0.01062
MH-A10a	MH-A11	30.4	450	113.773	113.454	0.01050
MH-A11	MH-A11a	41.8	450	113.454	113.013	0.01055
MH-A11a	MH-Outfall Header	77.4	450	113.013	112.195	0.01057
MH-B01	MH-B02	66.6	450	145.729	143.500	0.03345
MH-B02	MH-B03	72.8	450	143.500	142.069	0.01965
MH-B03	MH-B03a	35.0	450	142.069	139.647	0.06916
MH-B03a	MH-B04	35.0	450	139.647	137.902	0.04990
MH-B04	MH-B05	70.0	450	137.902	134.169	0.05331
MH-B05	MH-B06	46.5	450	134.169	131.021	0.06777
MH-B06	MH-B06a	13.6	450	131.021	129.814	0.08877
MH-B06a	MH-B06b	19.5	450	129.814	129.370	0.02281
MH-B06b	MH-B07	60.5	450	129.370	128.641	0.01205
MH-B07	MH-B08	69.9	450	128.641	127.798	0.01205
MH-B08	MH-B09	38.5	450	127.798	126.864	0.02426
MH-B09	MH-B10	41.3	450	126.864	125.526	0.03238
MH-B10	MH-B11	69.2	450	125.526	122.818	0.03913
MH-B11	MH-B12	45.7	450	122.818	119.109	0.08114
MH-B12	MH-B12a	35.3	450	119.109	116.245	0.08115
MH-B12a	MH-B13	34.8	450	116.245	113.431	0.08084
MH-B13	MH-Outfall Header	15.2	450	113.431	112.189	0.08185
MH-Outfall Header	Attenuation Pond	65.6	450	112.189	111.487	0.01053
Attenuation Pond	MH-Hydrobrake	19.8	300	110.000	106.071	0.08036
MH-Hydrobrake	MH-A01a	118.0	300	106.071	95.000	0.08036

Appendix C

Stormwater Model Output

Manhole / Object ID	Level (m AOD)	Max Flood Volume (m ³)	Max Flood Depth (m)	Max Inflow (m ³ /s)	Max Volume (m ³)
MH-A01	146.567	-1.7	-1.433	0.01362	0.1
MH-A01a	145.578	-1.6	-1.422	0.01187	0.1
MH-A02	142.588	-1.6	-1.412	0.01937	0.1
MH-A03	138.34	-1.6	-1.394	0.02962	0.1
MH-A04	135.623	-1.6	-1.377	0.02915	0.1
MH-A05	130.803	-3.4	-2.937	0.05177	0.4
MH-A05a	130.521	-1.8	-1.589	0.03921	0.4
MH-A06	130.22	-1.5	-1.324	0.02678	0.2
MH-A07	126.554	-2.7	-2.306	0.02935	0.2
MH-A07a	123.688	-3.4	-2.942	0.02809	0.2
MH-A08	120.796	-3.7	-3.204	0.029	2
MH-A09	120.479	-2.3	-2.021	0.02371	2.9
MH-A10	119.695	-0.9	-0.805	0.0333	6
MH-A10a	118.804	-1.4	-1.196	0.03182	5.8
MH-A11	118.342	-1.7	-1.512	0.02004	5.6
MH-A11a	117.655	-3.7	-3.179	0.01835	5.4
MH-Outfall Header	116.309	-6.1	-5.26	0.02196	4.8
MH-B01	145.795	-1.7	-1.431	0.01346	0.1
MH-B02	143.603	-1.6	-1.397	0.02493	0.1
MH-B03	142.17	-1.6	-1.399	0.03058	0.1
MH-B03a	139.773	-1.6	-1.377	0.02864	0.1
MH-B04	138.041	-2.2	-1.879	0.0261	0.2
MH-B05	134.315	-2.3	-1.975	0.03228	0.2
MH-B06	131.166	-4.4	-3.834	0.01897	0.2
MH-B06a	130.024	-4.9	-4.276	0.00804	0.2
MH-B06b	129.635	-4.6	-3.995	0.01398	0.3
MH-B07	128.93	-4	-3.47	0.0262	0.3
MH-B08	128.055	-3.1	-2.705	0.0396	0.3
MH-B09	127.113	-2.7	-2.327	0.0246	0.3
MH-B10	125.78	-2.2	-1.93	0.03263	0.3
MH-B11	123.027	-2.1	-1.853	0.02506	0.2
MH-B12	119.325	-5.1	-4.411	0.02286	0.2
MH-B12a	117.172	-5.6	-4.855	0.01068	1.1
MH-B13	116.576	-5.9	-5.107	0.00802	3.6
Attenuation Pond	110.34	-39212.1	-4.692	0	1616.3
MH-Hydrobrake	104.522	-7.5	-7.51	0	0

Appendix D

Design Risk Register

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



Project Title: MDR1492_Hollywood		Project Number: MDR1492	
PSDP :	RPS	File Ref:	MDR1492 - Design Hazard Management List / Designer's Assessment of Risk_A01
Package or Element:	Conveyance Lines / Embankments	Design Stage: Preliminary Design	Date Completed: 23/12/19
Originator:	Pinelopi Tsira	Reviewer:	Approver:
Revision: A01			

No	Activity ¹	Hazard / Risk ₂ Identified	Design Measures Taken to Eliminate or Reduce the Risks and/or ³ Further Action Required? ⁴	Solutions Considered Not Reasonably Practicable ⁵ and/or Presumed Methods of Construction ⁶ and/or Designers Assumptions ⁷	Information Provided About the Residual Hazards ⁸ Information to be provided to other Designers ⁹	Design Phase Action Close out ¹⁰
1	Excavation of pipe trenches / pipelaying.	Burial under earthfalls.	Minimise pipe depths by designing to minimum suitable design gradient as appropriate.	Trenchless not feasible due to diameters and ground conditions.	Pipeline routes shown on Contract long section drawings. Inside site boundary for the pipe network.	
2	Attenuation pond excavation & pipe trench excavation.	Falling from height.	Minimise attenuation pond & pipe depths by designing to minimum cover and suitable design gradient as appropriate respectively.	Trenchless not feasible due to diameters and ground conditions.	Attenuation pond depths shown on Contract drawings. Pipe network routes shown on Contract long section drawings.	

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



			Design security fencing to go around the attenuation pond.		Inside site boundary for the attenuation pond.	
3	<p>Trenches & excavations.</p> <p>Construction of the storm water outfall at the river.</p> <p>Attenuation pond.</p> <p>Pipe network – bursts, connections & repairs.</p>	Risk of drowning.	<p>Minimise attenuation pond & pipe depths by designing to minimum cover and suitable design gradient as appropriate respectively.</p> <p>Use prefabricated materials which will lesson time spent around the river.</p> <p>Design secondary grills/guards in all openings to all chambers.</p> <p>Trenchless where possible if cover permits.</p>	<p>Trenchless not feasible due to diameters and ground conditions.</p> <p>No outfall not feasible as the attenuation pond must have an outfall to a water body.</p> <p>No attenuation pond not feasible as must have one.</p>	<p>Pipe network works set out in Contract documents & drawings.</p> <p>Inside site boundary for the pipe network.</p> <p>Inside site boundary for the attenuation pond</p>	
4	Lifting heavy components - construction attenuation pone, construction pipe network and connections,manhole construction.	Risk of injury from lifting components if lift procedure not followed.	Methodology for lifting to be submitted by contractor.			

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



5	General Construction	Traffic, Environmental, Ecological, Aquatic Surveys	<ul style="list-style-type: none"> • Traffic Management Plan for residential area • Delivery Plans and schedules to avoid peak commute times • Communication Plan to inform residents that works will be ongoing • The sequencing of works has to be considered during detailed design and prior to planning if required • Access for construction shall be considered, temporary lands. Flood levels to be made aware to the Contractor • Environmental, ecological and aquatic surveys may be required. To be carried out in the correct season. 	Allow traffic to continue as normal	<ul style="list-style-type: none"> • Preliminary Health & Safety Plan • Specifications • Drawings <p>Traffic Management Plan</p>	
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Other parties please take note: these are designer's risk evaluations of design options carried out in-house for the purpose of our complying with designers' duties under the Safety, Health and Welfare at Work (Construction) Regulations 2013. The evaluations relate only to those aspects/elements of the project which we are responsible for designing

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



under the terms of our appointment by our client. Other parties should not rely on these evaluations for their own purposes; in particular, contractors, who must deal with and control all risks arising during construction, must carry out their own definitive risk assessments ab initio for that purpose.

Particular Risks (Schedule 1 to the Construction Regulations lists Particular Risks as follows :)	Element of location/activity identified which includes Particular Risks
1a Burial under earthfalls where the risk is particularly aggravated*	
1b Falling from Height where the risk is particularly aggravated*	
1c Engulfment in Swampland*	
2 Work which puts persons at work at risk from chemical or biological substances constituting a particular danger to the safety and health of such persons or involving a statutory requirement for health monitoring.	
3 Work with ionising radiation requiring the designation of controlled or supervised areas as defined in Article 20 of Directive 96/29/Euratom.	
4 Work near high voltage power lines. (<i>overground and underground</i>). <i>Cables could also be within structure.</i> <i>The Safety, Health and Welfare at Work (General Application) Regulations, define high voltage as any voltage exceeding 1,000 volts alternating current, or 1500 volts direct current.</i>	
5 Work exposing persons at work to the risk of drowning.	
6 Work on wells, underground earthworks and tunnels.	
7 Work carried out by divers at work having a system of air supply.	
8 Work carried out in a caisson with a compressed-air atmosphere.	
9 Work involving the use of explosives.	
10 Work involving the assembly or dismantling of heavy prefabricated components.	

*Where the risk is particularly aggravated by the nature of the work or processes used or by the environment at the place of work or construction site. Note that the above list is classified as 'non-exhaustive'. Thus, there could be further particular risks identified on a particular project.

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



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	Other Particular Risks	Element of work identified which includes Particular Risks
1		
2		

	SPECIALIST DESIGNERS / SUB-CONTRACTORS WITH DESIGN RESPONSIBILITY anticipated	Design Element identified
	e.g. Structural Steel Contractor, Structural Steelwork Connections, Precast Concrete Manufacturer, AHU Manufacturer, Structural Anchors – Contractors' Supplier, Secondary Support, Building Façade For Stone, Glazed And Louvred Façade Elements, Crane Base And Lift Plan (Tower Crane And Mobile Crane), Handrails And Balustrades, Piling	
	Temporary Works	Anticipated Temporary Works Required
	Anticipated Temporary Works Required	

Other parties please take note: these are designer's risk evaluations of design options carried out in-house for the purpose of our complying with designers' duties under the Safety, Health and Welfare at Work (Construction) Regulations 2013. The evaluations relate only to those aspects/elements of the project which we are responsible for designing under the terms of our appointment by our client. Other parties should not rely on these evaluations for their own purposes; in particular, contractors, who must deal with and control all risks arising during construction, must carry out their own definitive risk assessments ab initio for that purpose.

DESIGN HAZARD MANAGEMENT LIST / DESIGNER'S ASSESSMENT OF RISK



Notes

1. List the activity to be undertaken that is being assessed. Consider Demolition, Construction, Operation, Maintenance. *e.g. stripping topsoil as part of site mobilisation, future maintenance activities such as changing of filters.*
2. List the hazard identified and/or the associated hazards/risks *e.g. High Voltage Overhead Power Line - Entering exclusion zone will cause electrocution, burns, serious injury or death.* Particular Risks are also to be noted in the 'Particular Risks' table.
3. Record what design measures were taken by taking into account the principles of prevention to eliminate or reduce the risks *e.g. Location of Power lines including exclusion zone shown on drawings. Contact with ESB made to explore diversion options. Provision for temporary works and liaison with ESB included in contract documents.*

Do not record here actions that may be taken by the Contractor or another party.

4. If no action could be taken at this time record what action needs to be taken at the next stage *e.g. Requirement for Liaison with ESB and information to be included on drawings.*
5. Record feasible solutions that were considered and the reasons why deemed not to be suitable *e.g. Moving site away from overhead lines or moving overhead lines away from site.*
6. Record presumed methods of construction *e.g. Temporary works will be used to protect the overhead power lines.*
Where specific construction methods or sequences are envisaged by designers during design which, in the opinion of the designer, are not reasonably discernible from the contract documents or are outside the normal scope of a competent contractor in the context of the proposed work or could be considered particularly unusual or awkward, these should be identified. This information should be read in conjunction with the contract documents where appropriate and reference to these documents may be required.
7. List assumptions relation to the design. These assumptions may have a bearing on the whether their design can be built safely. They may relate to the provision of information from other designers or parties and may not be readily foreseen by contractors. *Assumptions may include ground conditions, loading bearing capacity of floor, client restrictions on access, construction methods by contractors etc.*
8. List where information on the residual risks is included *e.g. Powerlines shown on tender/information drawings, requirements for temporary works included in contract documents and information on the particular risk included in the Preliminary Safety and Health Plan.*

This section may include information for other designers, information on Particular Risks, information re presumed construction methodology, information for the Safety File, information to be brought forward to future stages of design.

Where appropriate, detail the means of communication to Contractors / Tenderers / PSDP or state if to be included in Safety File *e.g. Preliminary Safety & Health Plan, Specifications, Drawings, Safety File, Residual Risks Forms, Letters, Site Meetings, Addendums to Preliminary Safety & Health Plan*

9. List information that is to be made known to other designers *e.g. loading requirements, space and access requirements.*
10. Record the date when the issue was first raised, who was assigned to address the issue and then the date when the risks have been designed out or information on the residual risks is included in the relevant documents to be issued *e.g. date powerlines identified recorded; identify who was to follow up with contacting ESB and ensuring information is included in documents and date the information is completed / issued.*

NOT ALL THE OF THE ABOVE SECTIONS WILL BE REQUIRED TO BE COMPLETED FOR EACH DESIGNER'S ASSESSMENT OF RISK / HAZARD MANAGEMENT LIST

Appendix F

Biodiversity Assessment Criteria

Appendix F

Geographical Context and Ecological Evaluation

The table below outlines the geographic scales used to inform the valuation of IEFs (which is adapted from the National Roads Authority Guidelines (NRA, 2009)) and is used to inform the sensitivity of the ecological receptors in biodiversity study area.

Ecological Valuation
<p>International importance:</p> <ul style="list-style-type: none"> • 'European Site', including Special Areas of Conservation (SAC) and candidate SACs, Sites of Community Importance, SPAs or proposed SPAs (pSPAs). • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network¹ • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level)² of the following: <ul style="list-style-type: none"> – Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or – Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Sites hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe. <p>Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)³.</p>
<p>National importance:</p> <ul style="list-style-type: none"> • Site designated or proposed as an Natural Heritage Area/proposed NHA. • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts 1976-2012. • Undesignated site fulfilling the criteria for designation as an NHA; a Statutory Nature Reserve; a Refuge for Fauna and Flora protected under the Wildlife Acts 1976-2012; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level)⁴ of the following: <ul style="list-style-type: none"> – Species protected under the Wildlife Acts; and/or – Species listed on the relevant Red Data list. <p>Site containing 'viable areas'⁵ of the habitat types listed in Annex I of the Habitats Directive.</p>
<p>County importance:</p>

¹ See Articles 3 and 10 of the Habitats Directive

² It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

³ Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

⁴ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁵ A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

- Area of Special Amenity⁶
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan (CDP).
- Resident or regularly occurring populations (assessed to be important at the county level)⁷ of the following:
 - species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - species protected under the Wildlife Acts; and/or
 - species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or national importance.
- County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP)⁸, if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.

Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.
- Resident or regularly occurring populations (assessed to be important at the local level)⁹ of the following:
 - species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - species protected under the Wildlife Acts; and/or
 - species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.

Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local importance (lower value):

- Sites containing small areas of semi-natural habitats that are of limited local importance for wildlife.
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

⁶ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

⁷ It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁸ BAP: Biodiversity Action Plan

⁹ It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.



Appendix G 2018 Biodiversity Study



Baseline Ecology Report

Murphy's Quarry, Naul, Co.
Dublin


Doherty Environmental

January 2019

Ecology Baseline Report

January 2019

Document Stage	Document Version	Prepared by
Draft	1	Pat Doherty MSc, MCIEEM

<p>For and on behalf of</p> <p>Doherty Environmental Consultant Ltd.</p> <p>Prepared By: Pat Doherty</p> <p>Signed: </p>
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This report has been prepared by Doherty Environmental with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for Integrated Materials Solutions Ltd. and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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1.0 INTRODUCTION

Doherty Environmental Consultants (DEC) Ltd. has been commissioned by Integrated Materials Solutions Ltd to undertake a baseline ecology review and survey of Murphy's Quarry at Naul, Co. Dublin (see Figure 1.1 for site location).

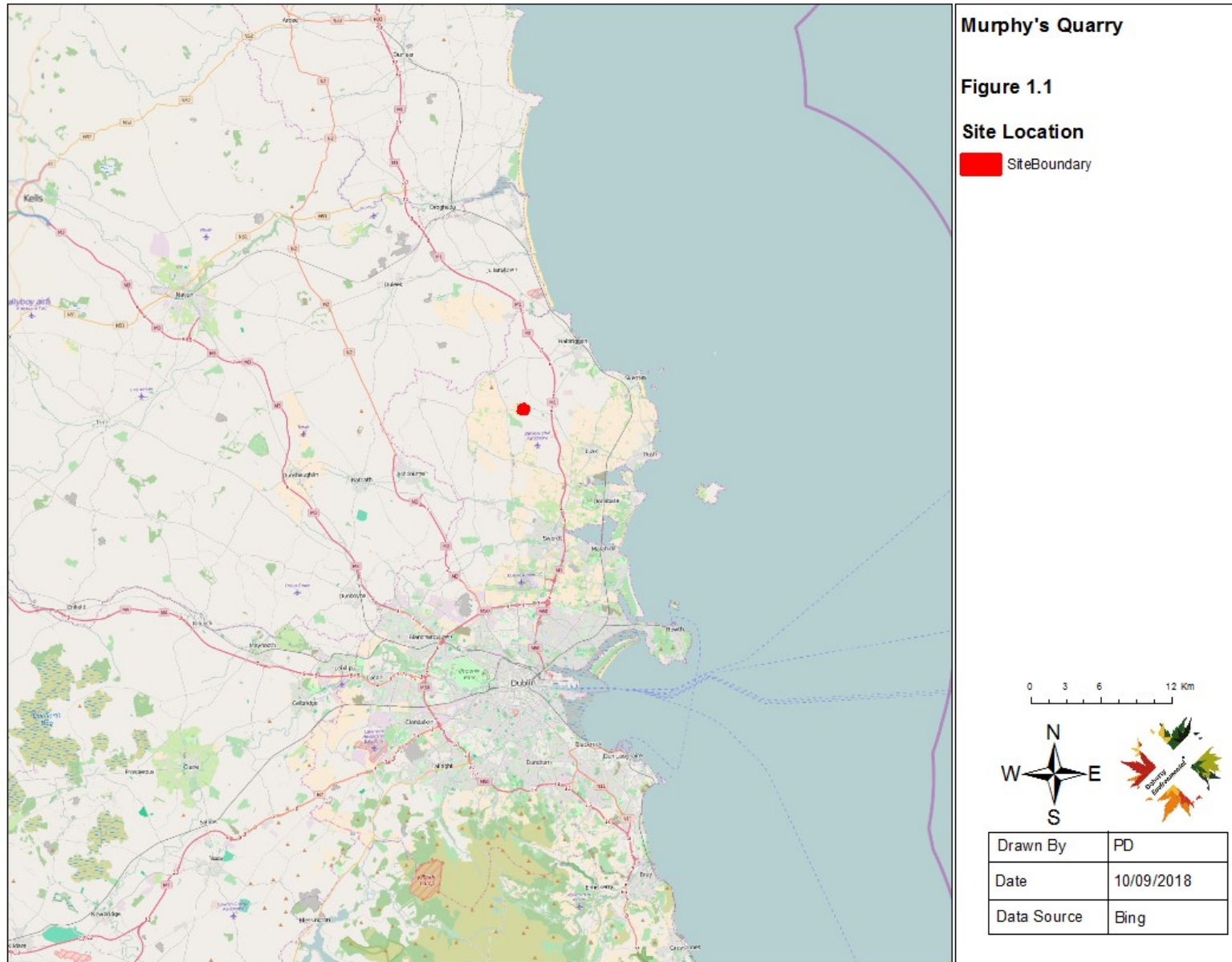
The results of the review and surveys completed for the site along with an evaluation of scientific interest and conservation value of habitats, flora and fauna encountered at the project site is also outlined in this baseline report.

2.0 LEGISLATION

Flora and fauna in Ireland is protected at a national level by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000 and the Flora (Protection) Order, 1999 (SI 94/1999). They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC).

The transposition of the EU Habitats Directive by the European Communities (Natural Habitats) Regulations 1997 – 2011 (referred to as the Habitat Regulations) provides the legal basis for the protection of habitats and species of European importance in Ireland.

The legislative protection of habitats and species provided by the Habitats Directive has been implemented in Ireland and throughout Europe through the establishment of a network of designated conservation areas known as the Natura 2000 (N2K) network (with individual sites being referred to as Natura 2000 Sites). The N2K network includes sites designated as Special Areas of Conservation (SACs), under the EU Habitats Directive and Special Protection Areas (SPAs) designated under the EU Birds Directive. SACs are designated in areas that support habitats listed on Annex I and/or species listed on Annex II of the Habitats Directive. SPAs are designated in areas that support: 1% or more of the all-Ireland population of bird species listed on Annex I of the EU Birds Directive; 1% or more of the population of a migratory species; and more than 20,000 waterfowl. Under the National Habitat Regulations all designated Natura 2000 Sites are referred to as European Sites.



The Wildlife Act 1976 (as amended) also provides for the statutory designation of nature conservation areas. These areas are referred to under the Wildlife Acts as Natural Heritage Areas and are designated in areas that support habitats and/or species of national importance.

Other relevant national legislation concerning the protection of flora, fauna and fisheries include the:

- Planning Act 2010;
- European Communities (Quality of Salmonid Waters) Regulations, 1988;
- The Freshwater Fish Directive 1978 (78/659/EEC);
- The Surface Water Regulations, 2009; and
- Flora Protection Order, 2009

3.0 METHODS

3.1 EXTENDED PHASE 1 HABITAT SURVEY

An extended Phase 1 Habitat Survey was undertaken by DEC Ltd on the 30th August 2018. The methodology used during this survey was based on the Heritage Councils *Best Practice Guidance for Habitat Survey and Mapping* (2010). The classification of habitats recorded during the field survey is based on the Heritage Council's *A Guide to Habitats in Ireland*.

The *Guide to Habitats in Ireland* classifies habitats according to a hierarchical framework with Level 1 habitats representing broad habitat groups, Level 2 representing habitat sub-groups and Level 3 representing individual habitat types. The Phase I Field Survey focused on identifying habitats to Level 3 of the *Guide to Habitats in Ireland*.

The annotation of vegetation occurring within sites was undertaken using the DAFOR scale. This scale refers to plant species in terms of dominance, abundance, frequency, occasional and rare (DAFOR). Plant nomenclature in this report follows Webb (1996) for vascular plants and Smith (2004) for mosses.

A survey for field signs indicating the presence of protected non-volant mammal species such as badgers was undertaken during the field surveys. This survey was undertaken during the daytime and particular attention was given to habitat features normally associated with badgers. Any mammal field signs typical of badger activity were recorded during the surveys. These field signs, as described in Neal & Cheeseman ⁽¹⁾ and Bang & Dahlstrom ⁽²⁾, include:

- mammal breeding and resting places, such as setts, holts, couches, lairs;
- pathways;
- prints;
- spraints and faecal deposits;
- latrines (and dung pits used as territorial markers);
- prey remains and feeding signs (snuffle holes);
- hair; and
- scratch marks.

All bird species seen using the site (as opposed to simply flying over it) were recorded.

In addition a dedicated late breeding season bird survey was completed at the project site on the 21st August 2018. The focus of this survey was to identify the presence of Peregrine falcon at the project site and to establish through direct observation or field signs evidence of Peregrine occupation during the 2018 breeding season.

(1) Neal, E., & Cheeseman, C., (1996). 'Badgers'. Poyser Natural History, London.

(2) Bang, P., & Dahlstrom, P., 'Animal Tracks and Signs'. Oxford University Press, Oxford.

3.2 ECOLOGICAL EVALUATION

Commentary on the ecological value of habitats is provided in Section 4 of this report.

The nature conservation value of habitats and ecological sites occurring within the proposed site are based upon an established geographic hierarchy of importance as outlined by the National Roads Authorities (NRA, 2009). The outline of this geographic hierarchy is provided below and this has been used to determine ecological value in line with the ecological valuation examples provided by the NRA (see NRA, 2009). The geographic evaluation hierarchy is as follows:

- International Sites (Rating A);
- National Importance (Rating B);
- County Importance (Rating C);
- Local Importance (higher value) (Rating D); and
- Local Importance (lower value) (Rating E)

4.0 RESULTS

4.1 SITE OVERVIEW

Murphy's quarry in Hollywood Great, Naul, Co. Dublin is currently a fully operational inert landfill regulated by the EPA under waste licence W0129-02 and Fingal County Council Planning Permission. Quarrying activity commenced at the site in the late 1940's and ceased in 2007. A review of recent historical orthophotography from 1995 shows that the quarrying activity was restricted to the western side of the existing site (see Figure 4.1). The footprint of the site expanded in a easterly direction between 1995 and 2012 (see Figure 4.1). The current footprint of the project site reflects the footprint of the site operations illustrated in the 2012 imagery. The 2012 imagery depicts a predominantly bare surface cover within much of the site. Since then vegetation has started to spread in areas of the site with recolonising grassland and scrub habitats now occurring in parts of the site that are not subject to ongoing site operations. Immature dry grassland habitat has become established in some parts of the site. It is noted that due to the nature of the site operations and the waste licence and planning permission requirements, under which the site is currently operated, restoration of the original

topography of the project site are required. As such the land cover and associated habitats within the project site are transient in nature are a subject to change during ongoing site operations and future restoration.

No surface watercourses occur within the project site. The Rath Stream flows along the northern boundary of the site. This stream discharges into the Ballough Stream, which in turn drains to the sea at Rogerstown Estuary. Rogerstown Estuary is located approximately 7.5km to the east or approximately 14km downstream from the project site.

Figure 4.1: Comparison of 1995 and 2012 Orthophotography. 1995 imagery shows the footprint of the site operations restricted to the west while the 2012 imagery shows the footprint of the site operations within the majority of the project site

The site is located on an elevated hill that rises to the south and peaks to the north at Knockbrack. It is situated between 100m and 150m OD Malin. Land levels fall away to the south and east of the project site.

The site is underlain by a complex sequence of lithologies, ranging from Namurian and Brigantian shales to Asbian limestones and volcanics to the north. The quaternary subsoil strata in the area is dominated by Namurian shales and sandstones. The original soil cover at the project site was representative of well drained mineral brown earths.

4.2 DESKTOP ANALYSIS

4.2.1 Designated Conservation Areas

The project site is not located within or immediately adjacent to any designated conservation areas. A number of European Sites occur in the wider area surrounding the project site. These sites and their distance from the project site are listed in Table 4.1 below and shown on Figure 4.2 and 4.3.

Table 4.1: European Sites occurring within a 15km radius of the project site

Site Name	Site Code	Distance	Summary of Reasons for Designation
Rogerstown Estuary SAC	000208	7.5km to the southeast	Coastal Annex 1 habitats
Rogerstown Estuary SPA	004015	7.5km to the southeast	Wintering waterbirds
Skerries Island SPA	004122	10km to the east	Wintering waterbirds
Malahide Estuary SPA	000205	10km to the south	Wintering waterbirds
Broadmeadow/Swords Estuary SPA	004025	10km to the south	Wintering waterbirds

River Nanny Estuary and Shore SPA	004158	10km to the north	Wintering waterbirds
Rockabill SPA	004014	12.3km to the east	Breeding Waterbirds
Rockabill to Dalkey Island SAC	003000	12km to the east	Marine Annex 1 Habitats & Annex II Species

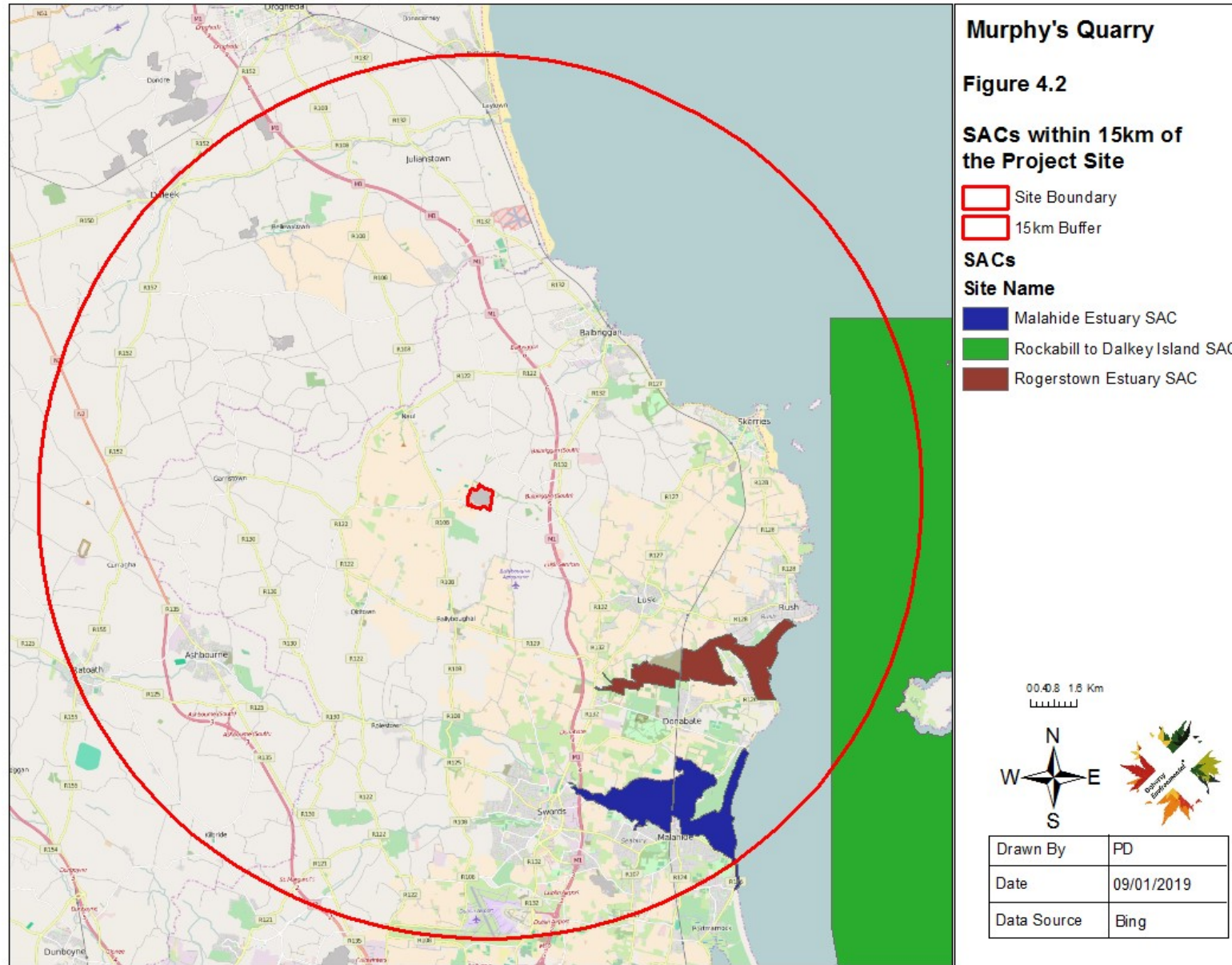
Only one NHA, Skerries Island NHA (Site Code: 001218) occurs within a 15km radius of the project site. The boundary of this NHA is contiguous with the Skerries Island SPA boundary, as shown on Figure 4.3.

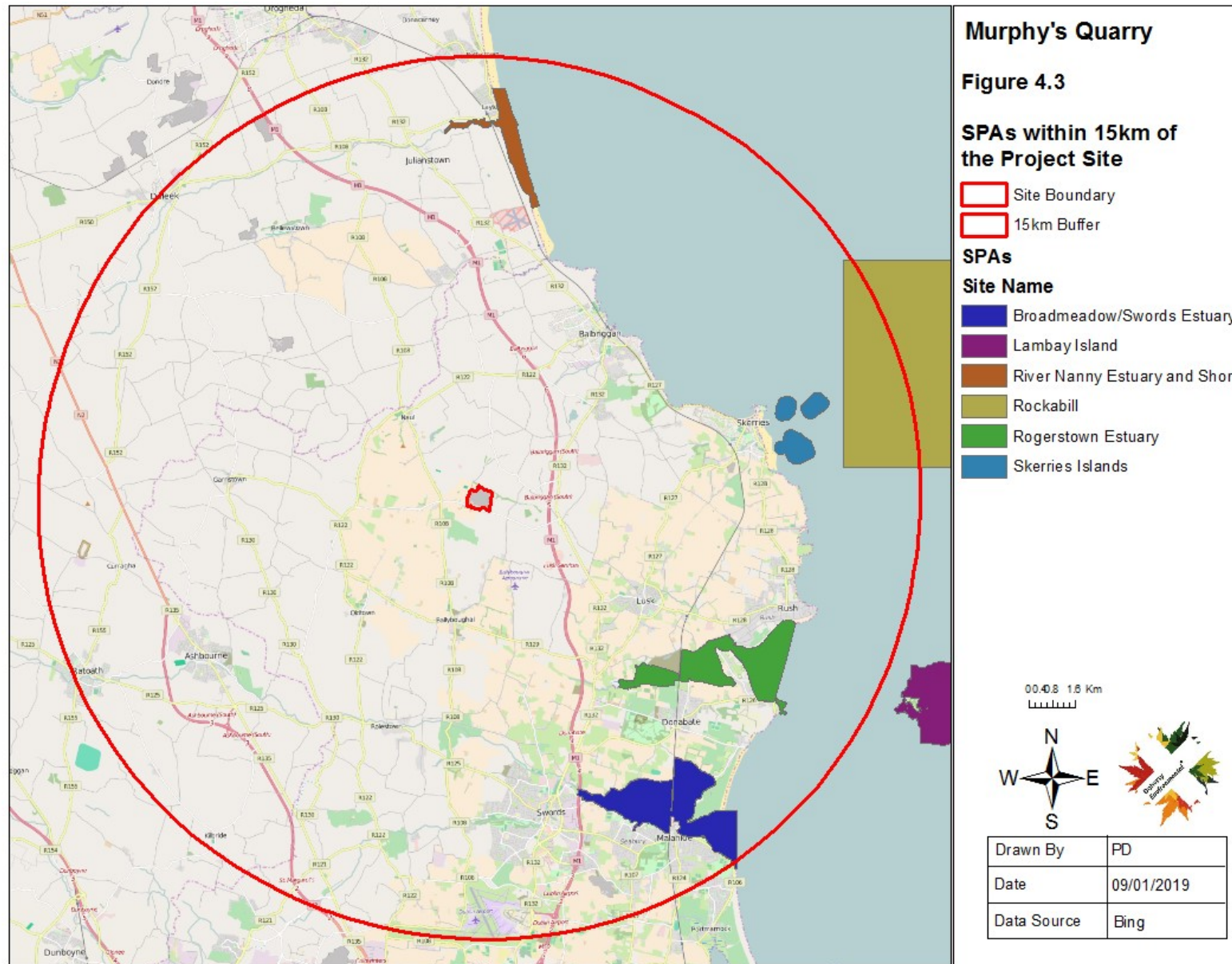
A total of nine pNHAs occur within a 15km radius of the project site. These pNHAs are listed in Table 4.2 below and their location are shown on Figure 4.4.

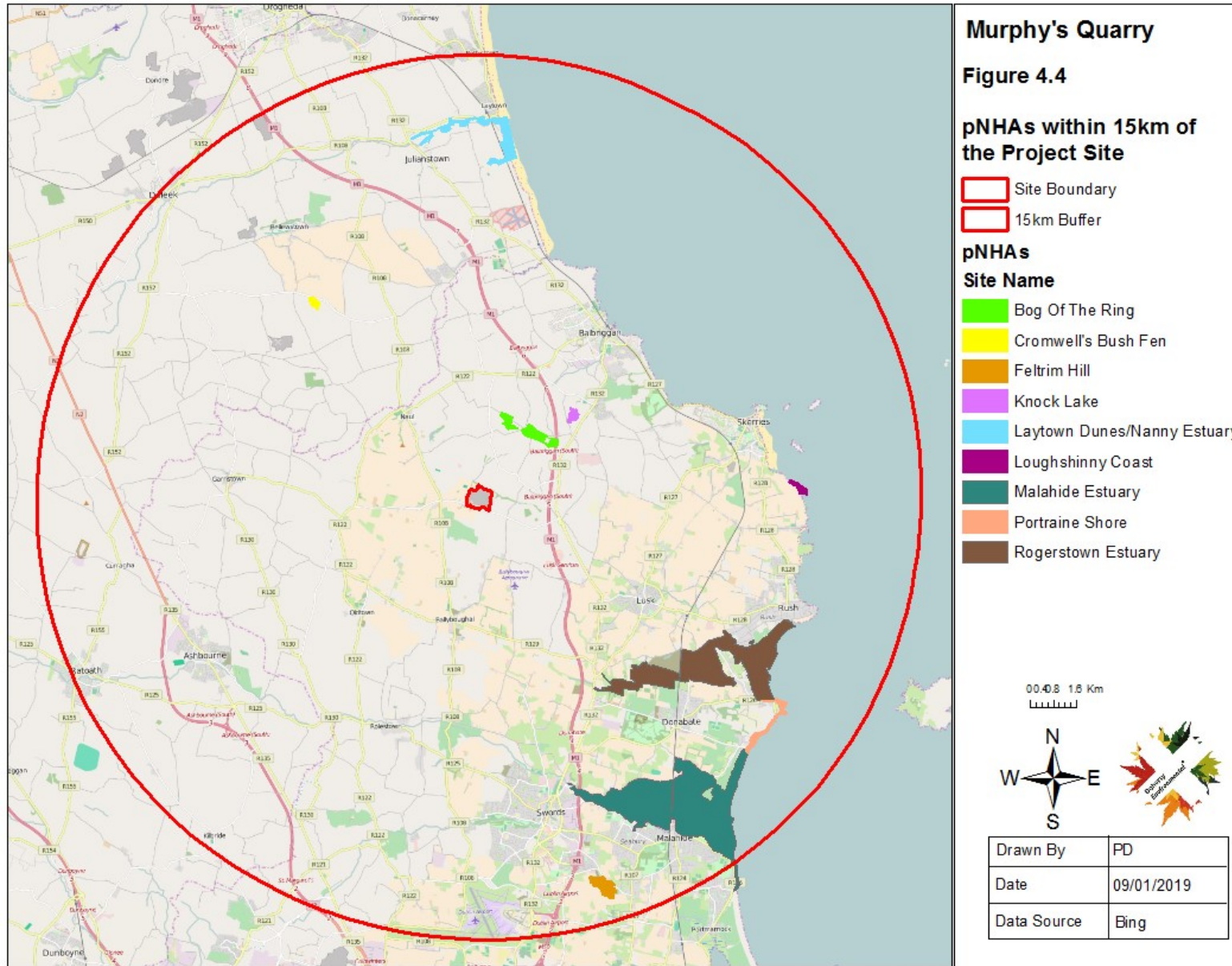
Table 4.2: pNHAs occurring within 15km of the project site

Site Name	Site Code	Distance
Malahide Estuary	205	10.2 to the south
Rogerstown Estuary	208	7.5 to the southeast
Laytown Dunes/Nanny Estuary	554	10.4km to the east

Knock Lake	1203	3.7 to the northeast
Bog Of The Ring	1204	2.2 to the north
Feltrim Hill	1208	13.5km to the south
Portraine Shore	1215	12.5km to the southeast
Cromwell's Bush Fen	1576	8.3km to the northwest
Loughshinny Coast	2000	10.5km to the east







4.2.2 Protected Species Records

A search of the National Biodiversity Data Centre (NBDC) for records of rare and/or threatened species previously identified in the vicinity of the project site was completed in January 2019. Information for the four tetrads (i.e. 2km² grid) O15P, O15N, O15U and O15T in which the project site is located, was downloaded.

The protected species identified as occurring within these two tetrads are listed in Table 4.3 below and a comment on the project site's potential to support these species is also provided. Note that only bird species listed as Amber or Red on the Birds of Conservation Concern in Ireland (BOCCI, 2014) or those protected under the European Birds Directive are listed on Table 4.3.

Table 4.3: Protected Species recorded in the Four Tetrads O15P, O15N, O15U & O15T

Species name	Date of last record	Designation	Occurrence in Project Site
Barn Swallow (Hirundo rustica)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Present
Black-headed Gull (Larus ridibundus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Present
Common Kestrel (Falco tinnunculus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Foraging over the project site.
Common Linnet (Carduelis cannabina)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Common Starling (Sturnus vulgaris)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.

Common Swift (Apus apus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Eurasian Curlew (Numenius arquata)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Suitable habitat present.
House Martin (Delichon urbicum)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
House Sparrow (Passer domesticus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Mallard (Anas platyrhynchos)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species	Present
Peregrine Falcon (Falco peregrinus)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species	Present
Sky Lark (Alauda arvensis)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Present
Spotted Flycatcher (Muscicapa striata)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Stock Pigeon (Columba oenas)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.

Yellowhammer (Emberiza citrinella)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Suitable habitat present.
Eurasian Tree Sparrow (Passer montanus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
European Golden Plover (Pluvialis apricaria)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Suitable habitat present.
Herring Gull (Larus argentatus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Suitable habitat present.
Lesser Black- backed Gull (Larus fuscus)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Common Grasshopper Warbler (Locustella naevia)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Mute Swan (Cygnus olor)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Suitable habitat present.
Eurasian Badger (Meles meles)	31/12/2006	Protected Species: Wildlife Acts	Suitable habitat present.
Eurasian Red Squirrel (Sciurus vulgaris)	22/09/2013	Protected Species: Wildlife Acts	Suitable habitat present.
Brown Long-eared Bat (Plecotus)	10/07/2005	Protected Species: EU Habitats Directive Protected Species: EU	Suitable foraging habitat present.

auritus)		Habitats Directive >> Annex IV Protected Species: Wildlife Acts	
Lesser Noctule (Nyctalus leisleri)	10/07/2005	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts	Suitable foraging habitat present.
Natterer's Bat (Myotis nattereri)	10/07/2005	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts	Suitable foraging habitat present.
Pipistrelle (Pipistrellus pipistrellus sensu lato)	10/07/2005	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts	Suitable foraging habitat present.
Soprano Pipistrelle (Pipistrellus pygmaeus)	10/07/2005	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts	Suitable foraging habitat present.
West European Hedgehog (Erinaceus europaeus)	15/09/2015	Protected Species: Wildlife Acts	Suitable habitat present.

4.3 SURVEY RESULTS

4.3.1 Habitats

The following Sub-Sections describe the habitats occurring within and immediately adjacent to the project site. Each habitat described below has been identified to Level 3 of Fossit's *Guide to Habitats in Ireland*. The alpha-numeric code for each habitat is also provided alongside the habitat name (e.g. Treeline WL2). The locations and extent of each habitat described below are illustrated in Figure 4.5: Habitat Map. Appendix 1 provides plates detailing a photographic record of the project site and surrounding area.

The nature conservation value of each of the habitats occurring within the project site is also outlined in the following sub-sections. The nature conservation value of habitats has been determined with reference to the methods outlined in Section 2.3 above.

4.3.1.1 Eroding Watercourse FW1

A Rath Stream flows west to east along the project site northern boundary. This stream is representative of an eroding watercourse (FW1) and rises a short distance to the west of the

project site. The stream is up to 2m wide but mostly about 1m wide with a stoney gravelly substrate. Water depth is shallow, rarely exceeding 10cms deep. Flow is a swift trickle. The water has a slight turbidity and the stones have a fine film of silt over them. There is no aquatic vegetation. The stream has cut into the bed rock in places. The southern bank of the stream is mostly fringed with mature trees forming a band of mixed broadleaved woodland (WD1). This watercourse is a tributary of the Ballough Stream (also referred to as the Corduff River), which drains to the sea at Rogerstown Estuary. This watercourse represents a highly significant salmonid catchment (IFI, 2011). The IFI consider the Ballough River to be exceptional in the area in supporting a small but biologically significant population of Atlantic Salmon and Sea Trout as well as a resident population of Brown Trout. Downstream of the project site nearer Rogerstown Estuary the Ballough Stream has been classified at Poor status due to loss of nutrients from adjacent lands to this watercourse (EPA, 2018).

4.3.1.2 Artificial Lakes & Ponds FL8

There are a number of ponds occurring within the site, with five ponds being located within the area of site operations. These ponds are labeled 1 to 5 on Figure 4.5 below. The largest pond (Labeled 1 Figure 4.5) occurs to the south of the site where the excavation went below the water table. Another pond (labeled Pond 2) is located in the central part of the site and this contains standing water from rainfall. No aquatic vegetation is associated with ponds 1 and 2. There are two smaller attenuation ponds at the northern end of the site (labeled 3 and 4 on figure 4.5). Emergent vegetation fringing these ponds and includes *Typha latifolia*, *Juncus effusus*, *Carex rostrata*, *Equisetum palustre* and *Alopecurus geniculatus*. *Potamogeton obtusifolia* was noted in the pond.

A small attenuation tank (labeled as pond no. 5 on Figure 4.5) covered by a metal grill occurs to the west of the site. This tank supports a population of smooth newt. The two vegetated attenuation ponds to the north of the site (i.e. ponds 3 and 4 as per Figure 4.5) also provide suitable habitat for smooth newt and common frog.

4.3.1.3 Improved agricultural grassland GA1

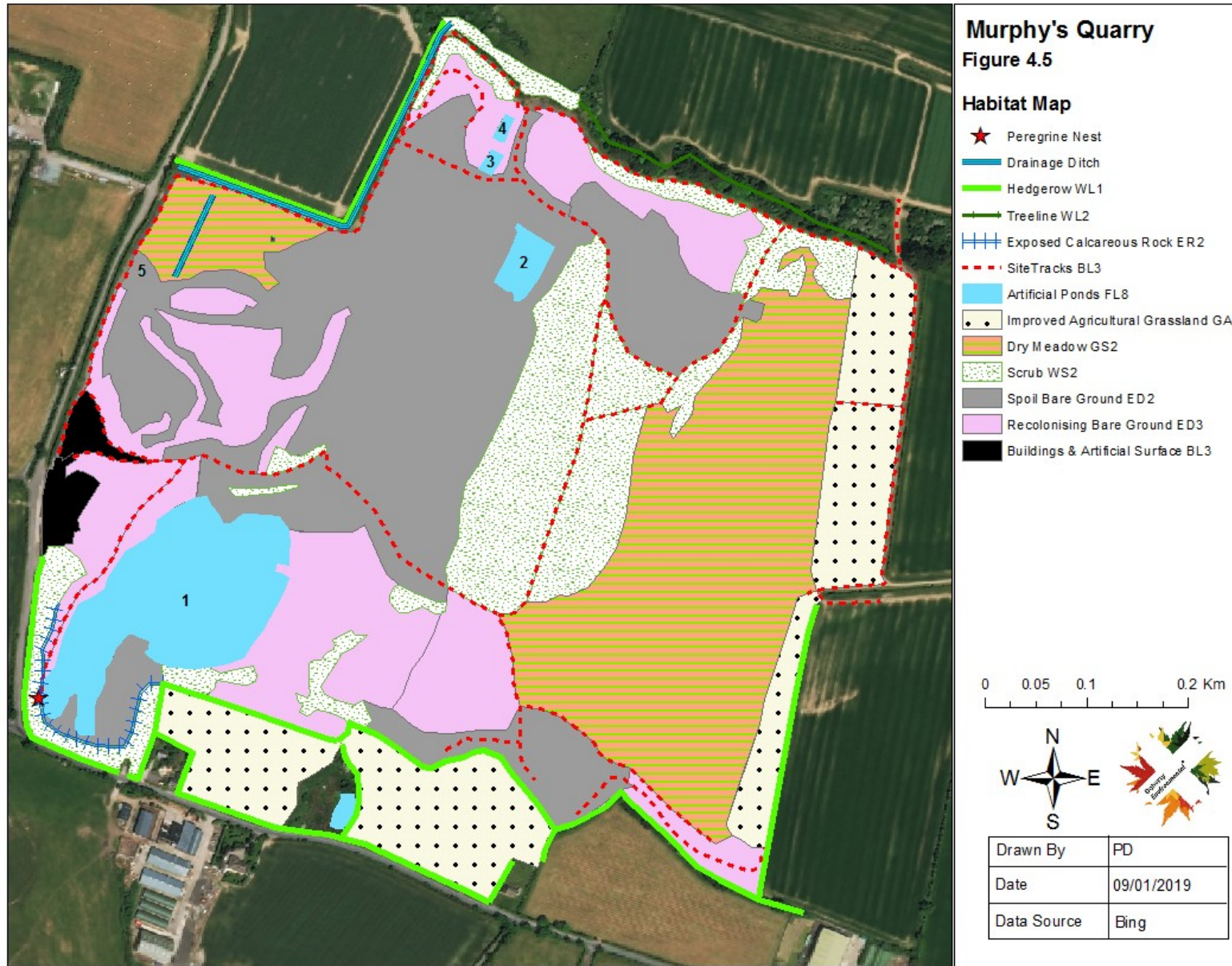
Improved agricultural grassland occurs within the project site land holding to the east and south of the footprint of site operations. The improved agricultural grassland occurring to the

east of the project site have been recently planted with a surface water colonising the ground in August 2018.

The examples to the south of the project site are traditionally used for cattle grazing. The vegetation associated with this habitat comprises a restricted range of grasses such as *Lolium perenne*, *Holcus lanatus*, *Poa species*, *Alopecurus pratensis* and *Phleum pratense*. Herbs include *Bellis perennis*, *Ranunculus repens*, *Trifolium pratense*, *Trifolium repens*, *Rumex acetosa*, *Cirsium arvense* and *Plantago lanceolata*.

4.3.1.4 Dry Meadow Grassland GS2

Grassland swards have established on areas of the site that were previously subject to site operations and were identified as bare ground habitat during surveys in 2010 and in 2012 orthophotography. The principal areas of recently established dry meadow occur to the west and east of the site. The grassland is dominated by stands of *Arrhenatherum elatius*, *Phleum pratense* and *Agrostis stolonifera*. Other species noted in this grassland include *Anthoxanthum odoratum*, *Poa pratensis* agg., *Lolium perenne*, *Ononis repens*, *Epilobium hirsutum*, *Chamerion angustifolium*, *Juncus inflexus*, *Tussilago farfara*, *Lotus corniculatus*, *Centaurea nigra*, *Rumex acetosa*, *Poa pratensis*, *Sonchus asper*, *Senecio jacobaea*, *Eurhynchium striatum*, *Trifolium repens*, *Ulex europaeus*, *Hypochaeris radicata*, *Taraxacum officinale* agg, and *Rubus fruticosus* agg.



4.3.1.5 Scrub WSI

Scrub habitat has recolonized areas of the site that are not currently subject to site operations. The dominated scrub species spreading within the site are willows, *Salix aurita* and *Salix cinerea* along with *Cystisus scoparius*, *Ulex europaeus* and *Rubus fruticosus* agg. *Buddleja davidii* occurs within the site and is spreading in recently undisturbed areas.

4.3.1.6 Hedgerow WL1 & Treelines WL2

Hedgerows bound the site to the north, west and south. The hedgerows are dominated by willow species including *Salix aurita* and *Salix cinerea* and *Crataegus monogyna*. *Ulex europaeus* is also abundant along the hedgerow. *Sambucus nigra*, *Ligustrum vulgare*, *Rosa canina* and *Rubus fruticosus* agg. also occur. Grasses and herbs occurring include *Tussilago farfara*, *Vicia sepium*, *Polystichum setiferum*, *Arrhenatherum elatius*, *Rubus fruticosus* agg., *Hypochaeris radicata*, *Hedera helix*, *Senecio jacobaea*, *Plantago lanceolata*, *Poa trivialis*, *Dactylis glomerata*, *Equisetum arvense*, *Solanum dulcamara*, *Lotus corniculatus*, and *Epilobium hirsutum*.

The treeline occurring along the northern boundary site is dominated by mature *Pinus sylvestris*, *Acer pseudoplatanus*, *Quercus robur*, *Fraxinus excelsior*, *Larix decidua* and *Populus nigra*. *Betula pubescens* and *Alnus glutinosa* also occur. *Sambucus nigra*, *Crataegus monogyna*, *Corylus avellana*, *Ulex europaeus* and *Rubus fruticosus* agg. occur in the shrub layer along the treeline. Herbs occurring along the base of the treeline include *Phyllitis scolopendrium*, *Dryopteris filix-mas*, *Glechoma hederacea*, *Geranium robertianum*, *Geum urbanum*, *Hypericum androsaemum*, *Viola riviniana* and *Veronica chamaedrys*.

4.3.1.7 Exposed Calcareous Rock ER2

At the southern end of the project site, there is a limestone cliff face, exposed by the former quarrying activities. It is approximately 50m high and 300m long. It is comprised of layers bedded limestone with bands of shale which show folding, characteristic of the Loughshinny formation. The more-or-less vertical cliff face includes ledges with pockets of vegetation. The ledges are used by peregrine falcon as roosting and nest sites.

4.3.1.8 Spoil & Bare Ground ED2

The main habitat on the MEHL site is spoil and unconsolidated material excavated from the former quarry. It includes the glacial overburden material, fragmented limestone rock and shale and a darker clay material excavated from the base of the quarry, which has been deposited on the eastern side of the site. In a few places, this material is beginning to be colonised with plants such as *Tussilago farfara* and *Reseda luteola*, but it is largely unvegetated.

4.3.1.9 Recolonising Bare Ground ED3

Areas of the project site that are not subject to ongoing site operations are being recolonized by vegetation. Recolonising scrub habitat are described above. Other areas are being colonised by grasses and herbs. The species identified recolonising former area of spoil and bare ground include: *Achillea millefolium*, *Anagalis arvensis*, *Anthoxanthum odoratum*, *Catapodium rigidum*, *Carex binervis*, *Carex nigra*, *Carex flacca*, *Centaurea nigra*, *Chamerion angustifolium*, *Chamomilla suaveolens*, *Crepis capillaris*, *Cystisus scoparius*, *Dactylis glomerata*, *Epilobium hirsutum*, *Epilobium montanum*, *Epilobium brunescens*, *Equisetum arvense*, *Heracleum sphondylium*, *Holcus lanatus*, *Matricaria discoides*, *Medicago lupulina*, *Fumaria officinalis*, *Hypochaeris radicata*, *Juncus effusus*, *Juncus bulbosus*, *Lotus corniculatus*, *Lotus uliginosus*, *Lathyrus pratensis*, *Medicago lupulina*, *Potentilla reptans*, *Reseda luteola*, *Tussilago farfara*, *Trifolium repens*, *Sagina procumbens*, *Saponia officinalis*, *Scrophularia nodosa*, *Senecio jacobaea*, *Senecio vulgaris*, *Sonchus asper*, *Sonchus oleraceus*, *Trifolium dubium*, *Trifolium repens*, *Trifolium pratense*, *Tussilago farfara*, *Tripleurospermum inodorum*, *Vicia sepium*, *Vicia crecca* and *Vicia sativa*.

Bryophyte noted in this habitat include *Mnium hornum*, *Polytrichum commune*, *Eurhynchium striatum*, *Kindbergia praelonga* and *Ceratodon purpureus*.

4.3.1.10 Buildings & Artificial Surfaces BL3

Buildings and artificial surfaces occur to the west of the project site. This habitat support little vegetation. The structures occurring within the site offer low potential for use by birds as nest sites and bats as roost sites.

4.3.2 Fauna

An overview of the fauna supported by the site is outlined in the following sections. The nature conservation value of the site in supporting populations of fauna is also outlined in the following sub-section.

4.3.2.1 Non-Volant Mammals

Irish hare was observed on site during field surveys. Hares were also recorded on site during previous ecological surveys of the project site in 2010 (Arup, 2010). The site offers good open spaces for hare and the recolonising grassland and scrub habitats also provide improved foraging habitat for this species.

No other protected non-volant mammal species were recorded at the project site.

4.3.2.2 Volant Mammals – Bat

4.3.2.3 Insects, Reptiles & Amphibians

A number of butterfly species were noted on site during the field surveys in August 2018. A population of small tortoiseshell was noted to the south of the site in the vicinity of the artificial ponds. Other species recorded throughout the site include speckled wood, common blue, green-veined white and wood white.

There is suitable habitat within the project site for common lizard.

A population of smooth newt were observed within the attenuation tank towards the west of the site. Site management advised that this population has been known to occur at this location for a number of years. Numerous individuals were observed in the tank. No amphibians were observed at the ponds to the south or north of the site (i.e. ponds 1 and 2 as per Figure 4.5). The absence of submerged aquatic vegetation in these ponds decreases their suitability to support amphibians. However the attenuation ponds to the north of the site (ponds 3 and 4 as per Figure 4.5), which support aquatic vegetation provide more suitable habitat. It is noted that quarry and colonised pond habitats associated with them are recognised as important habitat for amphibians (Meehan, 2013).

4.3.2.4 Birds

A range of bird species were seen and heard on site during the Phase 1 Habitat Survey and during the focused survey for peregrine falcon at the south of the project site. The species recorded are listed on Table 4.4 below.

Table 4.4: Bird Species Recorded at the project site

Common Name	Scientific Name	Conservation Status	EU Birds Directive: Annex 1 Listed Species
Barn Swallow	<i>Hirundo rustica</i>	BoCCI Amber List	
Blackbird	<i>Turdus merula</i>	BoCCI Green List	
Blue tit	<i>Cyanistes caeruleus</i>	BoCCI Green List	
Buzzard	<i>Buteo buteo</i>	BoCCI Green List	
Chaffinch	<i>Fringilla coelebs</i>	BoCCI Green List	
Coal tit	<i>Periparus ater</i>	BoCCI Green List	
Dunnock	<i>Prunella modularis</i>	BoCCI Green List	
Grey Wagtail	<i>Motacilla cinerea</i>	BoCCI Red List	

Hooded Crow	<i>Corvus cornix</i>	BoCCI Green List	
House Sparrow	<i>Passer domesticus</i>	BoCCI Green List	
Little Grebe	<i>Tachybaptus ruficollis</i>	BoCCI Green List	
Mallard	<i>Anas platyrhynchos</i>	BoCCI Green List	
Meadow pipit	<i>Anthus pratensis</i>	BoCCI Red List	
Peregrine falcon	<i>Falco peregrinus</i>	BoCCI Green List	Annex 1
Raven	<i>Corvus corax</i>	BoCCI Green List	
Reed bunting	<i>Emberiza schoeniclus</i>	BoCCI Green List	
Robin	<i>Erithacus rubecula</i>	BoCCI Amber List	
Rook	<i>Corvus frugilegus</i>	BoCCI Green List	
Song thrush	<i>Turdus philomelos</i>	BoCCI Green List	
Starling	<i>Sturnus vulgaris</i>	BoCCI Amber List	

Stonechat	<i>Saxicola rubicola</i>	BoCCI Amber List	
Wood pigeon		BoCCI Green List	
Wren	<i>Troglodytes troglodytes</i>	BoCCI Green List	

The peregrine falcon is the most important bird species associated with the project site as it is listed on Annex 1 of the EU Birds Directive. A detailed survey of the use of the site by Peregrine falcon was completed in 2010 (R & D Avian Ecology, 2010).

The project site is a known traditional nesting site for peregrine for the past 20 years. The 2010 study noted that Peregrine successfully bred at the site between 1998 and 2008, while breeding at the site was unsuccessful during the 2009 and 2010 season. Nevertheless Peregrine continued to forage and roost at the site during these years. During the 2010 survey four ledges were identified as representing suitable nest sites for Peregrine. These locations are shown in Figure 4.6. Ledge 1 on Figure 4.6 represents a traditionally used nest site, while ledges 2 to 4 were identified as suitable ledges for nesting.

Since 2010 Peregrine have continued to be associated with the project site. They were present at the site throughout the 2018 breeding season, and while fledglings were not observed at the site during the August 2018 field surveys it is thought that a pair successfully bred at the site during the 2018 season.

During the 2018 field surveys a lone adult male was observed during both surveys on the 21st August and again on the 30th August. This individual was observed foraging over the site and roosting on the cliff to the west of the ponds, in the vicinity of Ledge 1 as shown in Figure 4.6.

Abundant field signs indicating the presence of Peregrine were observed during the August field surveys. Significant faecal splashing was observed at two location on the cliff face and prey remains in the form of plucked feathers were noted in the vicinity of the cliffs. The

splashing was located at the same location as the traditional nest location shown as Ledge 1 on Figure 4.6. Splashing was also identified on the southern cliff at the same location as Ledge 3 as shown on Figure 4.6.

In addition to Peregrine falcon, other species recorded breeding in the vicinity of the pond at the southern end of the project site include a pair of little grebe, a pair of mallard and a pair of grey wagtail.

Figure 4.6: Location of Suitable Peregrine Nest Ledges

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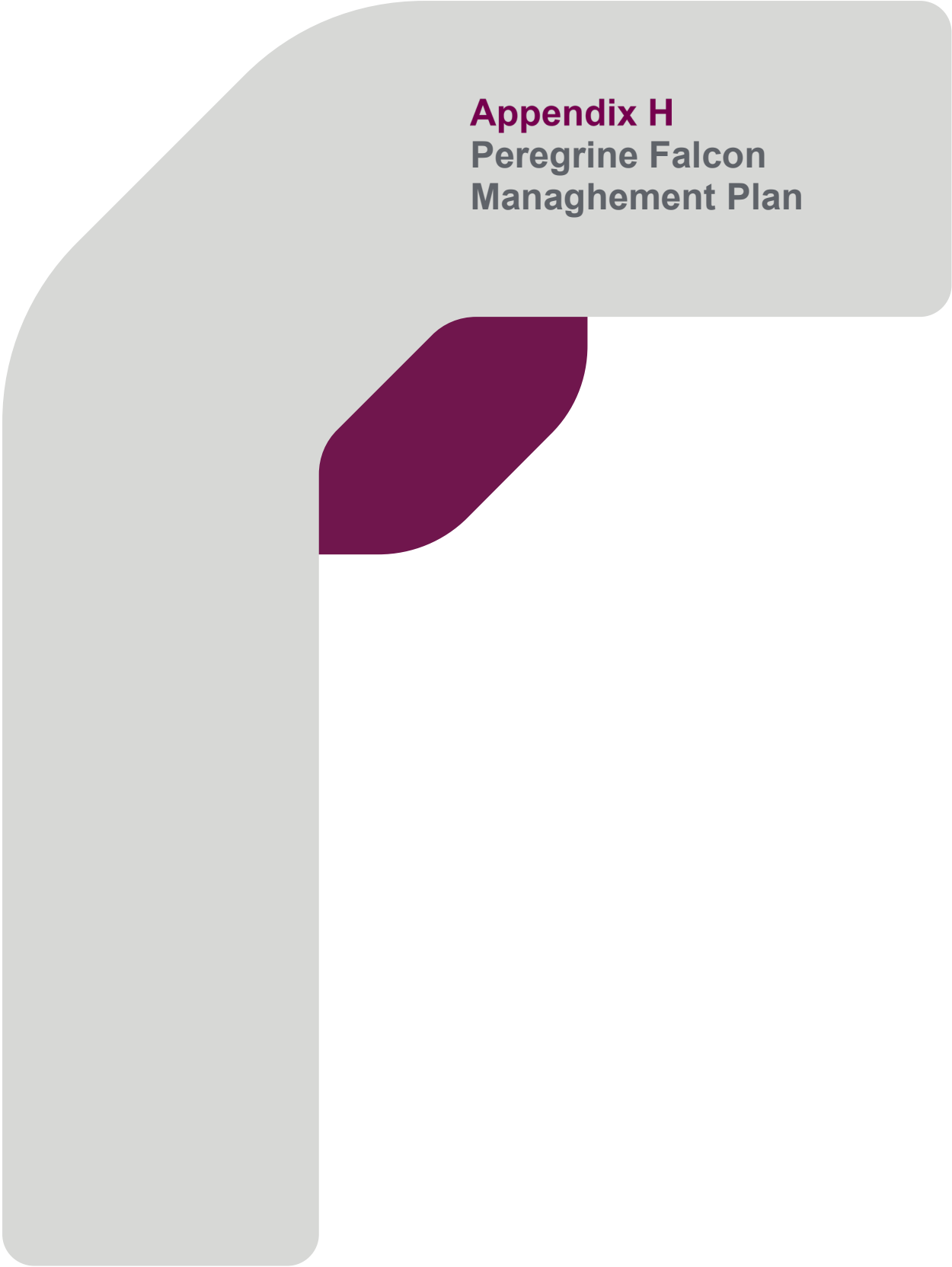
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Appendix H Peregrine Falcon Management Plan




Peregrine Falcon Management Plan for Hollywood Landfill

Document Control Sheet

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1 INTRODUCTION

RPS has prepared this Peregrine Falcon Management Plan to inform ongoing development of the landfill at Hollywood Great, Nag's Head, Naul, County Dublin.

Peregrine falcon is listed in Annex I of the Birds Directive (79/409/EEC, as amended 2009/147/EC) and is also protected by the Wildlife Act (1976, as amended 2000). While Annex I birds are considered to be particularly threatened, and Ireland must designate Special Protection Areas (SPAs) for their survival, all birds are also afforded protected status through the Wildlife Act.

Landfilling works have the potential to disturb Peregrine falcon in the area and the potential impacts on the peregrine may include:

- Direct loss of habitat; and
- Displacement of birds due to disturbance and/or reduction of habitat suitability.

In order to maintain the habitat for the falcon on the Hollywood site, this was prepared in 2019 and is currently being implemented on site and will continue to operate through the proposed ongoing development.

2 BASELINE

The following baseline description of peregrine falcon within the study area is based on monitoring data and updated with observations from the 2019 bird breeding season.

Peregrine falcons were observed overflying the study area and roosting locations have been identified from faecal and scapping markings on the cliffs located at the south-western study area's boundary. These observations were supplemented by historical records of peregrine falcon activity in the study area, as described in a Peregrine falcon Survey Report undertaken for the Environmental Impact Statement in 2010 (R&D, 2010), and the Baseline Ecology assessment carried out in January 2019.

Within the proposed development site, the peregrine falcon habitat identified in 2009 and 2010 and in the recent surveys (2019 and 2020) refers to secluded area in the south-western corner of the study area (**Figure 2**). This area is a square shape excavation of approximately 15,000m², with three artificial quarry face cliffs (exposed since early 2000s) with an average height of approximately 35m (**Figure 1**). At present, the only ground level access is made through the north side which provides the habitat with a high degree of protection. Roosting locations have been identified from faecal and scapping markings on the cliffs located at the south-western study area's boundary (**Figure 1**).

The 2010 peregrine falcon survey (R&D, 2010) reported evidence of a peregrine falcon nest locations within the study area, and surroundings, through dedicated field surveys. A pair of falcons (male and female) were identified, roosting on the ledge identified in the present survey. Although they did not show nesting behaviour then, signs of intense activity were observed (e.g. prey remains and faecal splashes). Concurrent with this evidence, the survey report included a local fieldworker testimony of an observation of a peregrine falcon female incubating in the ledge in 2009.

The 2010 peregrine falcon report also surveyed the overall area around the Hollywood landfill and identified several nesting, and potentially nesting, sites within the estimated foraging distance for peregrine falcons; i.e. c. 18km (Scottish Natural Heritage, 2016).



Figure 1. Two Ledges identified as Peregrine roosting sites




Legend

- Proposed development boundary
- New infrastructure
- Waste cells
- Peregrine falcon habitat

Peregrine falcon nests:


- Confirmed (2019)
- Potential

Client 

Project **Development at Hollywood Landfill**

Title

Figure 1. Peregrine falcon habitat

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3 POTENTIAL IMPACT TO THE FALCON

Published literature indicates median disturbance distances (i.e. distance below which an individual bird will demonstrate alert or retreat behaviour) for the Peregrine falcon between 125m to 225m (Whitfield *et al.*, 2008). Therefore, direct loss of habitat and/or displacement of birds due to disturbance or reduction of habitat suitability is not perceived as a likely consequence of the construction works on the new infrastructure proposed.

However, the proposed landfilling on the areas around Cells 6, 7 and 8 are directly adjacent to the habitat and have potential for direct adverse impact. The *Peregrine Survey Report* undertaken in 2010 estimated the potential impacts on the Peregrine falcon from that development which is an analogous infilling operation to this proposed development. The impacts associated with the proposed landfilling during the operation phase are predicted as:

- **Direct loss of breeding habitat** – The operation of the site will result in the infill of the former quarry area and, consequently, the direct loss of the cliffs as suitable breeding habitat;
- **Direct loss of foraging habitat** – It is not common for Peregrines to forage within the nesting quarry and, therefore, it is concluded the proposed development will have negligible effects on the amount of available foraging habitat;
- **Direct loss of roosting habitat** – Similar to the potential impacts on breeding habitat, infilling the quarry area will necessarily implicate covering the cliffs and, consequently, the direct loss of the cliffs as suitable roosting habitat;
- **Displacement from breeding location** – As a consequence from the above mentioned *direct loss of breeding habitat*, the peregrine will likely abandon the study area in search of suitable breeding habitat;
- **Displacement from foraging range** – Since the Peregrine falcon shows long foraging ranges – 6km up to 18 km (Weir, 1978; Mearns, 1982) – it is considered the proposed development infilling activities will result in a negligible loss of foraging habitat; and
- **Displacement from roosting habitat** - As a consequence from the above mentioned *direct loss of breeding habitat*, the peregrine will also lose the mention cliffs as roosting habitat and will likely abandon the study area.

It is likely that the peregrines may already habituated in this locality to on-going works on the site (quarrying and more recently infilling). It is recognised that median disturbance recorded distances in Ruddock & Whitfield, (2007) are 125 – 312m with a mean of 199 – 354m, therefore it is likely that sites and individual birds will vary in their response to disturbance and there may be some habituation, particularly in urban or quarry sites.

4 MANAGEMENT PLAN

4.1 OVERVIEW

Since the catastrophic population declines in the 1950s and 1960s, peregrine falcons demonstrated great adaptability by being able to not only nest in the traditional coastal areas, but also occupy active quarries and, more recently, observations have been made of an increasing number of peregrine falcons nesting in artificial and man-made structures (Wilson *et al.*, 2018). Peregrine falcon nests located on man-made structures such as power stations, bridges, quarry machinery, churches and electricity pylons are becoming more common (Ratcliffe, 1993). These observations support the use of artificial structures as nesting sites for mitigation of potential impacts to existing peregrine falcon habitats. Peregrine falcons may have 'nesting ranges' containing a number of different and widely separated areas with groups of closely spaced alternative nests (Hardey *et al.*, 2013).

In Britain and Ireland, most nests are on cliffs or crags. Peregrine falcons tend to use the largest suitable cliffs available, although the quality of ledges for breeding is important and large cliffs will be ignored if they do not provide adequate ledges. Inland breeding cliffs are often above or overlooking a river or a loch, with most breeding ledges are on the upper third of the cliffs. They occasionally breed in trees, using the old nests of other species, such as raven. Artificial ledges can be created to facilitate peregrine nesting in sites where natural ledges are unsafe or vulnerable to predation (Hardey *et al.*, 2013).

To maintain the study area as a nesting habitat for peregrines, alternative nesting locations to the existing nests will have to be developed and maintained. Two sequential short term and long term approaches will be adopted with a third contingency measure also proposed if required:

1. Short Term - Installation and maintenance of a nest box initially on the cliff face and then within the south western boundary;
2. Long-Term - Installation and maintenance of artificial ledges/boxes at suitable locations in the Hollywood area for nesting habitat for peregrines.
3. Fund and facilitate the development and maintenance of an alternative nesting site in an off-site area within the peregrine's foraging range in the event that approaches 1 and 2 are unsuccessful.

Each of these measures is outlined in greater detail in the following sections.

4.2 INSTALLATION OF A NEST BOX ON THE CLIFF FACE

In 2019, the scraped depression used by peregrines to nest was identified as located in a zone at the south western corner of the site within one of the vertical cliffs in this area. The project ornithologists recommended the installation and development of an alternate suitable nesting site at higher elevations on this north east facing cliff face. This alternate nesting site has been installed in February 2020 in advance of the breeding season and a photo showing the box is presented in **Figure 3**.

The following sequence will be followed with regard to the installation of the short term nest boxes:

Step 1: Install nesting box in year 1 (2020) on the cliff face (complete);

Step 2: Start infilling of Cell 6 in year 1 (currently underway under existing permissions);

Step 3: Monitor nest boxes (surveys planned for 2020 breeding season);

Step 4: Continue filling Cell 6 to within 10 m (below) of known peregrine falcon nesting location.

- a. If no uptake of nest box and breeding peregrine still present in cliff, continued infilling will take place outside of the breeding bird season only. The breeding season timeframe will be agreed with a suitably qualified ecologist. This will result in the eventual loss of the suitable nesting location through infilling of location. An alternate, nest box location has been identified adjacent to the cliff face – long term location.
- b. If uptake of nest boxes is successful, continue infilling to 10 m of nesting site.

Step 5: If nesting box is lost, site management will provide a long term nesting box at a suitable alternate location.

Within one year of the installation, a review report will be issued to the Local Authority Biodiversity Officer and local NPWS Conservation Ranger with details of the above to allow for a consensus on future monitoring/management.



Figure 4. Current Artificial Nest Box for the Peregrine Falcon

4.3 INSTALLATION OF A NEST BOX ABOVE THE CLIFF

This measure involves the installation of a nesting box above the cliff in Cell 6 in year 2 (2021). This will consist of an elevated pole-mounted nesting box, containing a sheltered nesting ledge, and will be located within the site boundary and in the area identified in **Figure 2**. The nesting box will be located at least 10m above the top of the capped landfill and will be installed prior to the 2021 Peregrine falcon breeding season. A team of suitably qualified ecologists have identified this longer term location and elevation for the installation of a nesting box.

As above, within one year of the installation, a review report will be issued to the Local Authority Biodiversity Officer and local NPWS Conservation Ranger with details of the above to allow for a consensus on future monitoring/management.

4.4 IDENTIFICATION OF AN ALTERNATIVE NESTING LOCATION

During the 2020/2021 surveys, a suitably qualified ecologist will identify alternative off-site locations for the installation of ledges/platforms/nesting boxes, in the event that the alternative location offered within the proposed development site are not utilised by nesting peregrine falcons.

Investigation into landowner agreement will be carried out in year one to ensure that viable options exist if measures are not successful. Alternative locations will include existing communication towers and quarries within a suitable distance of the proposed development site, but also outside the nesting ranges of known peregrine falcon sites.

Within one year of the proposed development operation, a review report will be issued to the Local Authority Biodiversity Officer and local NPWS Conservation Ranger with details of the above to allow for a consensus on future monitoring/management.

4.5 CAMERA INSTALLATION

The installation of monitoring cameras was originally suggested in 2010, as a way to monitor the nest box sites remotely rather than via field visits. The proposed monitoring regime is deemed to be robust enough to forgo the additional requirement of the camera installation. It is proposed that the installation of a camera will be reconsidered in year 2 and 3, based on the monitoring results and feasibility.

4.6 OCCUPANCY MONITORING

A suitably qualified ecologist will complete the following to monitor peregrine falcon occupancy:

- An annual breeding survey for peregrine falcon within the site to be carried out by a suitably qualified ecologist. The survey shall include at least 3 surveys between the months of March and July.
- An annual winter occupancy survey for peregrine falcon to be carried out by a suitably qualified ecologist. The survey shall include at least 3 surveys between the months of November and February.

- A yearly submission of an '*occupancy monitoring report*', to be submitted to the local NPWS Conservation Ranger and the Local Authority Biodiversity Officer.

The longer term monitoring and reporting regime is presented in **Section 6**.

5 PHASING OF CONSTRUCTION ACTIVITY AND OPERATIONS

The following sections include a description of activities and a number of measures to minimise the potential impacts identified in the EIAR. These measures shall be included in a Construction Management Plan (CMP) for the Construction Phase and transcribed to an updated Landfill EMS for the Operation Phase. These plans shall be prepared by the appointed contractor, in the case of the Construction Phase, and by IMS, for the Operation Phase, to ensure full implementation.

A number of ecological mitigation measures proposed below will also include the supervision with a suitably qualified ecologist and, in the case of mitigation measures in relation to the peregrine falcon, an experienced raptor ornithologist.

5.1 CONSTRUCTION PHASE

For the purpose of this report, construction refers to the proposed development works including:

- The construction of a new facility entrance on the Nevitt Road, which bounds the south of the site. This will replace the existing facility entrance at the western boundary of the site which will revert to a secondary and emergency access. This new entrance will provide provision of safe access and reduce the road traffic risk associated with haulage to and from the site;
- A new internal access road from the existing site entrance to the main site reception area which comprises a reception building, weighbridges, car parking, etc.;
- A new administration building is to be located in the south-eastern portion of the site adjacent to the new access road. This building comprises of a single-storey flat roof structure and has a gross floor area of circa 149m²;
- A new steel framed portal ash maturation building of circa 12m in height;
- Two new weighbridges are to be located on either side of the administration building;
- Car parking for 10 vehicles will be provided adjacent to the administration building; and
- A revised internal unpaved road network serving the deposition areas from the reception area.

The following mitigation measures shall be employed during the construction phase:

- In order to mitigate disturbance impacts to nesting peregrine falcon, no construction activities will take place within 200 m of the confirmed peregrine falcon nest (see **Figure 2**).
- In order to mitigate disturbance impacts to nesting peregrine falcon, no construction material will be stored within 200 m of the confirmed peregrine falcon nest (see **Figure 2**).
- During construction, a suitably qualified ecologist will complete a disturbance assessment of the peregrine falcon before and during construction.
- Enacting temporal restrictions to construction from 1st March to 31st July unless the breeding status of the peregrines is confirmed (by suitably qualified ecologist) to have failed, or not be initiated, or peregrines are not present during the breeding season, by an experienced ecologist.

- Advise staff and contractors of location of significant species and habitats prior to commencements of works through provision of maps and an induction talk on wildlife law and disturbance to birds.

In the event that the construction works will be planned for the period between incubation and/or chick rearing season (i.e. March to August), prior to undertaking any construction works, the contractor must engage an experienced raptor ecologist to undertake a dedicated pre-construction Peregrine falcon habitat survey and assess the falcons breeding activity and explicitly identify the extant nesting location and determine any associated breeding activity and/or breeding status.

During these periods and while the nesting/breeding activity is confirmed, the north-eastern face of the cliffs will be cordoned off and no waste infilling will be permitted without prior consultation of the ornithologist. The IE Licence management systems shall be updated to include a section with detailed guidance for best practice measures for the protection of Peregrine falcon.

5.2 OPERATIONAL PHASE

For the purpose of this report, the proposed operation refers to the following:

- The proposal consists of permission for a 25-year lifetime of operation to develop engineered landfill cells on the site to landfill a mixture of hazardous (as stable non-reactive hazardous waste), non-hazardous and inert wastes at a rate of 500,000 tonnes per annum.
- Accept suitable Article 27 by-product material that meets the above waste acceptance criteria.

The proposed infilling of Cell 6 (in addition to Cells 7 and 8) will be undertaken in the period 2020 to 2030 under the indicative project phasing. The complete restoration of the site to natural ground levels would eventually result in a loss of confirmed breeding habitat. The gradual infill of the area adjacent to the cliffs identified with peregrine falcon's activity as part of the re-profiling of the former quarry area to original ground levels will gradually reduce cliff height.

The following mitigation measures shall be employed during the operational phase:

- Manage the infilling activities in Cell 6 during confirmed peregrine falcon breeding season, through the control of the number of loads and restriction of non-essential activities in the cell (e.g. parking of vehicles, high-frequency reversing beacons).
- Restriction of access above the nest cliffs using fencing and/or other appropriate barriers and signage. Signage shall not identify the presence of any protected species, including peregrine falcon.
- Increasing site security through the installation of cameras, or signage to indicate the presence of security camera, to deter wildlife crime in the area and establish if this is occurring.

6 LONG TERM MONITORING REGIME

The assigned raptor ornithologist shall implement a detailed and long term plan involving monitoring, implementation of the approaches 1 and 2 and works phasing and assessment of the infilling activities in relation to peregrine's behaviour. All works shall be carried out under licence where required. The plan shall be developed in conjunction with National Parks and Wildlife Service (NPWS), the Irish Raptor Study Group (IRSG) and shall involve:

Year 1:

- While cell preparation works may be undertaken, no waste infilling works in the south-western corner of the study area during breeding period (March until August);
- Outside the breeding period and prior to any infilling in the area adjacent to the cliffs in the south-western corner of the study area, the works involved in the implementation of approach 1 and 2 shall be undertaken. Such works shall be supervised by the raptor ornithologist who will assess any specific aspects in relation to the execution of these mitigation measures. Special attention is to be paid on the creation of the two depressions/ledges at a suitable location near the cliff top;
- The raptor ornithologist shall undertake a minimum of three specific peregrine surveys: at the beginning, middle and end of the nesting season (i.e. March to July) following best practice guidance, Hardey *et al.*, 2013 and assess peregrine's activity, breeding behaviour and breeding success or otherwise. Special attention shall be paid to reporting the use of the created ledges, any relevant findings captured by any installed camera equipment and future measures shall be proposed;
- A review of alternate sites will be undertaken by the raptor ornithologist and an assessment shall be made regarding the suitability of any site to harbour peregrines; and
- A review report will be issued to the FCC biodiversity officer, NPWS and IRSG with details of the above to allow for a consensus on future monitoring/management.

Year 2-24:

- The raptor ornithologist shall undertake a minimum of three specific peregrine surveys during the nesting season (i.e. March until August) and assess peregrine's activity, breeding behaviour and breeding success or otherwise. Special attention shall be paid reporting the use of the created ledges, any relevant findings captured by any installed camera equipment and future measures shall be proposed;
- A review of alternate sites will be undertaken by the raptor ornithologist and an assessment shall be made regarding the suitability of any site to harbour peregrines.
- A review report will be issued to the FCC biodiversity officer, NPWS and IRSG with details of the above to allow for a consensus on future monitoring/management.

Year 25:

- The suitably qualified ecologist shall undertake a minimum of three specific peregrine falcon surveys: at the beginning, middle and end of the nesting season (e.g. March to July) following best practice guidance (Hardey *et al.*, 2013) to assess peregrine falcon activity, breeding behaviour and breeding success, or otherwise. The status of the created nesting ledges/boxes will also be monitored, as above.

- An overall monitoring report shall be submitted to the local NPWS Conservation Ranger and the Local Authority Biodiversity Officer.
- Following discussion with the NPWS Conservation Ranger and the Local Authority Biodiversity Officer, a continued monitoring strategy of the alternate nesting sites will be agreed.

All the monitoring results shall be communicated to the FCC biodiversity officer, NPWS and IRSG, as well as future actions to be adopted by IMS that can potentially impact the peregrine's re-establishment in the study area or at any alternate location shall be performed in cooperation with NPWS and IRSG. The establishment and maintenance of a link between NPWS, IRSG and IMS is crucial to achieve success in minimising the impacts to peregrines.

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Appendix I Cultural Heritage Legislation

National Monuments Legislation

All archaeological sites have the full protection of the national monuments legislation (Principal Act 1930; Amendments 1954, 1987 and 1994).

In the 1987 Amendment of Section 2 of the Principal Act (1930), the definition of a national monument is specified as:

any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections,

any artificial cave, stone or natural product, whether forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position,

any, or any part of any, prehistoric or ancient

(i) tomb, grave or burial deposit, or

(ii) ritual, industrial or habitation site,

and

any place comprising the remains or traces of any such building, structure or erection, any cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...

Under Section 14 of the Principal Act (1930):

'It shall be unlawful...

to demolish or remove wholly or in part or to disfigure, deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned (a licence issued by the Office of Public Works National Monuments Branch),

or

to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance...

Under Amendment to Section 23 of the Principal Act (1930),

'A person who finds an archaeological object shall, within four days after the finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum...'

The latter is of relevance to any finds made during a watching brief.

In the 1994 Amendment of Section 12 of the Principal Act (1930), all the sites and 'places' recorded by the Sites and Monuments Record of the Office of Public Works are provided with a new status in law. This new status provides a level of protection to the listed sites that is equivalent to that accorded to 'registered' sites (Section 8(1), National Monuments Amendment Act 1954) as follows:

The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the State.

The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of the county drawn up and publish in a prescribed manner information about when and where the lists and maps may be consulted.

In addition, when the owner or occupier (not being the Commissioners) of a monument or place which has been recorded, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having given the notice.

The National Monuments Amendment Act 2004

The National Monuments Amendment Act enacted in 2004 provides clarification in relation to the division of responsibilities between the Minister of Environment, Heritage and Local Government, Finance and Arts, Sports and Tourism together with the Commissioners of Public Works. The Minister of Environment, Heritage and Local Government will issue directions relating to archaeological works and will be advised by the National Monuments Section and the National Museum of Ireland. The Act gives discretion to the Minister of Environment, Heritage and Local Government to grant consent or issue directions in relation to road developments (Section 49 and 51) approved by An Bord Pleanála and/or in relation to the discovery of National Monuments

14A. (1) The consent of the Minister under section 14 of this Act and any further consent or licence under any other provision of the National Monuments Acts 1930 to 2004 shall not be required where the works involved are connected with an approved road development.

(2) Any works of an archaeological nature that are carried out in respect of an approved road development shall be carried out in accordance with the directions of the Minister, which directions shall be issued following consultation by the minister with the Director of the National Museum of Ireland.

Subsection 14A (4) Where a national monument has been discovered to which subsection (3) of this section relates, then

- (a) the road authority carrying out the road development shall report the discovery to the Minister
- (b) subject to subsection (7) of this section, and pending any directions by the minister under paragraph (d) of this subsection, no works which would interfere with the monument shall be carried out, except works urgently required to secure its preservation carried out in accordance with such measures as may be specified by the Minister

The Minister will consult with the Director of the National Museum of Ireland for a period not longer than 14 days before issuing further directions in relation to the national monument.

The Minister will not be restricted to archaeological considerations alone, but will also consider the wider public interest.

Planning and Development Act, 2000

Structures of architectural, cultural, scientific, historical or archaeological interest can also be protected under the Planning and Development Act, 2000.

This act provides for the inclusion of protected structures into the planning authorities' development plans and sets out statutory regulations regarding works affecting such structures. Under the new legislation, no distinction is made between buildings formerly classified under development plans as List 1 and List 2. Such buildings are now all regarded as 'protected structures'.

The act defines a 'protected structure' as follows:

(a) a structure, or

(b) a specified part of a structure,

which is included in a record of protected structures, and, where that record so indicates, includes any specified feature which is within the attendant grounds of the structure and which would not otherwise be included in this definition.

'Protection', in relation to a structure or part of a structure, includes conservation, preservation, and improvement compatible with maintaining the character and interest of the structure or part;

Part IV of the act deals with architectural heritage, and Section 57 deals specifically with works affecting the character of protected structures or proposed protected structures.

...the carrying out of works to a protected structure, or a proposed protected structure, shall be exempted development only if those works would not materially affect the character of—

(a) the structure, or

(b) any element of the structure which contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Section 58, subsection 4 states that:

Any person who, without lawful authority, causes damage to a protected structure or a proposed protected structure shall be guilty of an offence.



Appendix J **Cultural Heritage** **Assessment Criteria**

Significance Criteria (NRA Guidelines 2006)

The significance criteria can be used to evaluate the significance of an archaeological site, monument or complex. It should not, however, be regarded as definitive, rather it is an indicator which contributes to a wider judgment based on the individual circumstances of a feature. Different archaeological heritage asset types lend themselves more easily to assessment and it should be borne in mind that this can create a bias in the record, for example an upstanding stone monument such as a fortified house is easier to examine with a view to significance than a degraded enclosure site.

Significance Criteria, NRA Guidelines 2006 (Archaeological Heritage)

Criteria	Explanation
Existing Status	The level of protection associated with an archaeological site / monument is an important consideration.
Condition /Preservation	The survival of a monument's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highlighted, this assessment can only be based on a field inspection.
Documentation /Historical Significance	The significance of a monument may be enhanced by the existence of records of previous investigations or contemporary documentation supported by written evidence or historic maps. Sites with a definite historical association or an example of a notable event or person should be highlighted.
Group Value	The value of a single monument may be greatly enhanced by its association with related contemporary monuments or with monuments from different periods indicating an extended time presence in any specific area. In some cases it may be preferable to protect the complete group, including associated and adjacent land, rather than to protect isolated monuments within that group.
Rarity	The rarity of some monument types can be a central factor affecting response strategies for development, whatever the condition of the individual feature. It is important to recognise sites that have a limited distribution.
Visibility in the Landscape	Monuments that are highly visible in the landscape have a heightened physical presence. The inter-visibility between monuments may also be explored in this category.
Fragility/ Vulnerability	It is important to assess the level of threat to archaeological monuments from erosion, natural degradation, agricultural activity, land clearance, neglect, careless treatment or development. The nature of the archaeological evidence cannot always be specified precisely but it may still be possible to document reasons to justify the significance of the feature. This category relates to the probability of monuments producing material of archaeological significance as a result of future investigative work.
Amenity Value	Regard should be taken of the existing and potential amenity value of a monument.

Determining Significance of Architectural Heritage Assets

The significance of perceived impact on structures and sites of architectural merit is determined by a combination of the architectural heritage importance of the structure and the degree of impact. In each case the structure is given a rating as to its importance and, if higher than "Record only", the nature of its special interest is given. The rating definitions are in accordance with those given by the National Inventory of Architectural Heritage (NIAH):

- *International:* Structures or sites of sufficient architectural heritage importance to be considered in an international context. Examples include St Fin Barre's Cathedral, Cork. These are exceptional structures that can be compared to and contrasted with the finest architectural heritage in other countries.
- *National:* Structures or sites that make a significant contribution to the architectural heritage of Ireland. These are structures and sites that are considered to be of great architectural heritage significance in an Irish context. Examples include Ardnacrusha Power Station, Co. Clare; the Ford Factory, Cork; Carroll's Factory, Dundalk; Lismore Castle, Co. Waterford; Sligo Courthouse, Sligo; and Emo Court, Co. Laois.
- *Regional:* Structures or sites that make a significant contribution to the architectural heritage within their region or area. They also stand in comparison with similar structures or sites in other regions or areas within Ireland. Examples would include many Georgian terraces; Nenagh Courthouse, Co. Tipperary; or the Bailey Lighthouse, Howth. Increasingly, structures that need to be protected include structures or sites that make a significant contribution to the architectural heritage within their own locality. Examples of these would include modest terraces and timber shop fronts.
- *Local:* These are structures or sites of some vintage that make a contribution to the architectural heritage but may not merit being placed in the RPS separately. Such structures may have lost much of their original fabric.
- *Record only:* These are structures or sites that are not deemed to have sufficient presence or inherent architectural or other importance at the time of recording to warrant a higher rating. It is acknowledged, however, that they might be considered further at a future time.

Where the rating is deemed to be higher than "Record only" the category of special interest is noted. It should be noted that the term "special architectural interest" applies only in the context of this assessment of architectural heritage and does not imply that those buildings and other structures that are not considered to be of special architectural interest are in any way inferior or are of lower value.

The special interest is based on the categories set down in the Planning and Development Act, 2000. While that Act gives no criteria for assigning a special interest to a structure, the National Inventory of Architectural Heritage (NIAH) offers guidelines to its field-workers. This offers guidance by example rather than by definition, and is the system adopted for the present assessment. There are eight categories set down in the Act, viz. archaeological, architectural, historical, technical, cultural, scientific, social and artistic, and the NIAH guidance for each is as follows:

Archaeological

It is to be noted that the NIAH is biased towards post-1700 structures. Structures that have archaeological features may be recorded, providing the archaeological features are incorporated within post-1700 elements. Industrial fabric is considered to have technical significance, and should only be attributed archaeological significance if the structure has pre-1700 features.

Architectural

A structure may be considered of special architectural interest under the following criteria:-

- An aspiration of aesthetic appeal to its design.
- Good quality or well executed architectural design
- The work of a known and distinguished architect, engineer, designer, craftsman

- Modest or vernacular structures may be considered to be of architectural interest, as they are part of the history of the built heritage of Ireland.
- Well-designed decorative features, externally and/or internally.

-

Historical

A structure may be considered of special historical interest under the following criteria:

- A significant historical event associated with the structure
- An association with a significant historical figure
- Has a known interesting and/or unusual change of use, e.g. a former workhouse now in use as a hotel
- A memorial to a historical event.

-

Technical

A structure may be considered of special technical interest under the following criteria:

- Incorporates building materials of particular interest, i.e. the materials or the technology used for construction
- Incorporates innovative engineering design, e.g. bridges, canals or mill weirs
- A structure which has an architectural interest may also merit a technical interest due to the structural techniques used in its construction, e.g. a curvilinear glasshouse, early use of concrete, cast-iron prefabrication.
- Mechanical fixtures relating to a structure may be considered of technical significance.

-

Cultural

A structure may be considered of special cultural interest where there is an association with a known fictitious character or event, e.g., Sandycove Martello Tower which featured in Ulysses.

Scientific

A structure may be considered of special scientific interest where it is considered to be an extraordinary or pioneering scientific or technical achievement in the Irish context, e.g., Mizen Head Bridge, Birr Telescope.

Social

A structure may be considered of special social interest under the following criteria:

- A focal point of spiritual, political, national or other cultural sentiment to a group of people, e.g. a place of worship, a meeting point, assembly rooms.
- Developed or constructed by a community or organisation, e.g. the construction of the railways or the building of a church through the patronage of the local community
- Illustrates a particular lifestyle, philosophy, or social condition of the past, e.g. the hierarchical accommodation in a country house, philanthropic housing, vernacular structures.

-

Artistic

A structure may be considered of special artistic interest under the following criteria:

- Work of a skilled craftsman or artist, e.g. plasterwork, wrought-iron work, carved elements or details, stained glass, stations of the cross.

- Well-designed mass produced structures or elements may also be considered of artistic interest.
- In the evaluation of the special interest of a structure it is possible for the structure to have a special interest under more than one of the above categories.

Assessment of Material Assets, as Defined by the EPA (2002)

Context	Describe the location and extent of the asset. Does it extend beyond the site boundary?
Character	Describe the nature and use of the asset. Is it exploited, used or accessible? Is it renewable or non-renewable and if so over what period?
Significance	Describe the significance of the asset. Is the material asset unique, scarce or common in the region? Is its use controlled by known plans, priorities or policies? What trends are evident or may reasonably be inferred?
Sensitivity	Describe the changes in the existing environment which could limit the access to, or the use of, the material asset.

Glossary of Impacts as defined by the NRA Guidelines 2006, with reference to the EPA (2002 & 2015)

Impacts are generally categorised as either being a direct impact, an indirect impact or as having no predicted impact. A glossary of impacts as defined by the EPA are as follows: -

- A **direct impact** occurs when a cultural heritage asset is located within the proposed development area and entails the removal of part, or the entire asset.
- **Indirect impacts** may be caused due to the close proximity of a development to a cultural heritage asset. Mitigation strategies and knowledge of detail design can often ameliorate any adverse indirect impact. Indirect impacts may include severance of linked features, degradation of setting and amenity or provide a visual intrusion.
- **No predicted** impact occurs when the proposed development does not adversely or positively affect a cultural heritage asset.

The impacts of the proposed scheme on the cultural heritage environment are first assessed in terms of their quality i.e. positive, negative, neutral (or direct and indirect):

Negative Impact	A change that will detract from or permanently remove a cultural heritage asset from the landscape.
Neutral Impact	A change that does not affect the cultural heritage asset.
Positive Impact	A change that improves or enhances the setting of a cultural heritage asset.

Duration of Impacts:

<i>Temporary Impact</i>	Impact lasting for one year or less.
<i>Short-term Impacts</i>	Impact lasting one to seven years.
<i>Medium-term Impact</i>	Impact lasting seven to fifteen years.
<i>Long-term Impact</i>	Impact lasting fifteen to sixty years.
<i>Permanent Impact</i>	Impact lasting over sixty years.

Types of Impacts:

<i>Cumulative Impact</i>	The addition of many small impacts to create one larger, more significant, impact.
<i>Do Nothing Impact</i>	The environment as it would be in the future should no development of any kind be carried out.
<i>Indeterminable Impact</i>	When the full consequences of a change in the environment cannot be described.
<i>Irreversible Impact</i>	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
<i>Residual Impact</i>	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
<i>'Worst case' Impact</i>	The impacts arising from a development in the case where mitigation measures substantially fail.

Magnitude of Impact

- *Extent* – size, scale and spatial distributions of the effect
- *Duration* – period of time over which the effect will occur
- *Frequency* – how often the effect will occur
- *Context* – how will the extent, duration and frequency contrast with the accepted baseline conditions.

Magnitude Criteria

Magnitude of Impact	Criteria
Very High	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where a cultural heritage asset is completely and irreversibly destroyed by a proposed development.
High	An impact which, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where part of a cultural heritage asset would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological / cultural heritage feature/site.
Medium	A moderate direct impact arises where a change to the site is proposed which though noticeable is not such that the archaeological / cultural heritage integrity of the site is compromised and which is reversible. This arises where an archaeological / cultural heritage feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
Low	An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological / cultural heritage feature, site or monument.
Negligible	An impact capable of measurement but without noticeable consequences.
No change	No change to the asset or setting

Sensitivity Criteria

An evaluation of the sensitivity / value of sites and features is based on the extent to which assets contribute to the archaeological or built heritage character, though their individual or group qualities, either directly or potentially and guided by legislation, national policies, acknowledged standards, designations and criteria. The table below presents the scale of sensitivity / value together with criteria.

Sensitivity Criteria

Sensitivity / Value	Criteria
Very High	Sites of international significance: World Heritage Sites National Monuments Protected Structures of international and national importance Designed landscapes and gardens of national importance Assets of acknowledged international importance or that can contribute significantly to international and national research objectives
High	RMP / SMR sites Designated assets that contribute to regional research objectives Protected Structures of regional importance Architectural Conservation Areas
Medium	Recently / newly identified archaeological sites (not yet included on the SMR / RMP; the importance of the resource has yet to be fully ascertained) Undesignated assets that contribute to regional research objectives NIAH Building Survey and Garden Survey Sites
Low	Undesignated Sites of local importance (e.g. townland / field boundaries) Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value but with the potential to contribute to local research objectives (e.g. potential buried foundations associated with features / structures shown the 1 st edition OS six-inch mapping) Historic townscapes or built up areas of limited historic integrity in their building or their settings
Negligible	Assets with very little or no surviving archaeological interest. Buildings of no architectural or historic note
Unknown	The nature of the resource has yet to be fully ascertained, e.g. sites or areas of specific archaeological potential, greenfield areas or riverine / stream / coastal environs with inherent archaeological potential. Structures with potential historic significance (possibly hidden or inaccessible).

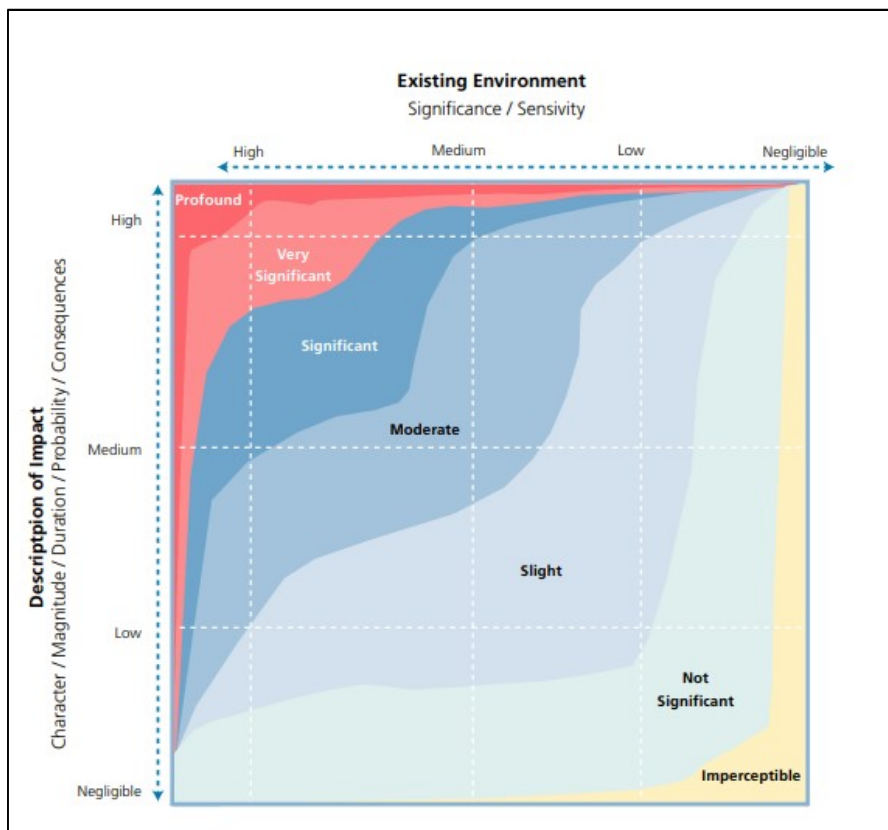
Criteria for Assessment of Impact Significance

Using both the sensitivity of the heritage asset and the magnitude of impact, the impact significance is established (see second table below).

The Draft EPA Revised Guidelines on Information to be contained within an EIS (September 2015) has also added the following levels of significance of effect (as per figure below):

Significance of Effects (EPA draft 2015)

Significance of Effect	Description
Very Significant	An impact which by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment, for example in this case a monument
Not Significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.



Source: Draft EPA Revised Guidelines on Information to be contained within an EIS (September 2015), p.43

Impact Significance Matrix

Impact Significance					
Magnitude Impact (+/-)	Sensitivity / Value of Cultural Heritage asset				
	Very Low	Low	Medium	High	Very High
Neutral	Very Low	Low	Medium	High	Very High
Very Low	Imperceptible	Not significant	Slight	Slight	Slight
Low	Imperceptible	Slight	Moderate	Moderate	Moderate
Medium	Slight	Moderate	Moderate	Significant	Significant
High	Slight	Moderate	Significant	Significant	Profound
Very High	Slight	Moderate	Significant	Very Significant	Profound