Appendix 8.1: TII Criteria

APPENDIX 8.1

CRITERIA FOR RATING SITE ATTRIBUTES – ESTIMATION OF IMPORTANCE OF HYDROLOGY ATTRIBUTES

NATIONAL ROADS AUTHORITY (NRA, 2009)

Table 1 Criteria for rating Site Attributes - Estimation of Importance of Hydrology Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2- 3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

Appendix 9.1: Ambient Air Quality Standards

APPENDIX 9.1 – AMBIENT AIR QUALITY STANDARDS

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC) (see Table 9.1). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time. In response to the problem of acid rain, sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. Council Directive 1999/30/EC, as relating to limit values for sulphur dioxide, nitrogen dioxide, lead and particulate matter. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002. It started to reduce from 1 January 2003, continuing every 12 months thereafter by equal annual percentages to reach 0% by the respective attainment date for each pollutant. A second daughter directive, EU Council Directive 2000/69/EC, limit values for both carbon monoxide and benzene in ambient air is also included in the Air Quality Standards Regulations 2002. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. This has also been passed into Irish Law under the Air Quality Standards Regulations 2011 (S.I. 180 of 2011) (see Table 9.1). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The margin of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition,

new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ is to establish a target value of 25 µg/m^3, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m^3, as an annual average (to be attained everywhere by 2012), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 µg/m^3 to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m^3. Where the AEI is currently greater than 22 µg/m^3 all appropriate measures should be employed to reduce this level to 18 µg/m^3 by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008-2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m^3 has been set which was to be complied with by 2012 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 21 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other factors, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation[(A1)]. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

(A1) World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

Appendix 11.1 – 11.5: Noise Chapter Appendices

Appendix 11.1 Glossary of Noise and Vibration Terminology

Ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
Background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T (LAF90,T).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
sound power level	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) where: $$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$ Where: p is the rms value of sound power in Watts; and P_0 is 1 pW.
sound pressure level	The sound pressure level at a point is defined as: $$Lp = 20Log\frac{P}{P_0}\ \text{dB}$$ Where: p is the rms value of sound power in Pascals; and P_0 is $2x10^{-5}$ Pa.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AF10}	Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is typically representative of traffic noise levels. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.
L_{AFmin}	is the instantaneous fast time weighted minimum sound level measured during the sample period.

Appendix 11.2 Noise Modelling Software

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (LWA);
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, L_{AT}(DW), for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms^{-1} and 5ms^{-1}, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = LW + Dc - A \qquad \textbf{Eqn. A}$$

Where:

$L_{fT}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to $2x10^{-5}$Pa;
L_W is the octave band sound power of the point source;
D_c is the directivity correction for the point source;
A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table A2-1 below:

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

Table A2-1 Estimated Accuracy for Broadband Noise of $L_{AT}(DW)$

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.
N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Other Modelling Calculation Parameters

A ground attenuation factor of 1.0 has been assumed beyond the site boundary, i.e. soft ground. No metrological corrections were assumed for the calculations. The atmospheric attenuation outlined in Table A3-2 has been assumed for all calculations.

Temp (ºC)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

Table A2-2 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Foliage regions within the Castletown House grounds have been modelled as 18 m in height, as advised by TPA.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout The general site layout has been obtained from the drawings forwarded by the project architects.

Local Area The location of noise sensitive locations has been obtained from a combination of site drawings provided by the project architects and others obtained from Ordinance Survey Ireland (OSI).

Heights The heights of buildings on site have been obtained from site drawings forwarded by the projects. Off-site buildings have been assumed to be 8m high with the exception of industrial buildings where a default height of 15m has been assumed.

Contours Site ground contours/heights have been obtained from site drawings forwarded by the project architects.

Appendix 11.3 Noise Modelling Parameters

Energy Centre

The sound power levels for the gas-fired generators are presented in Table A3-1, based on information from a reference design supplied by the design team.

Item	Sound Power Level, L_{WA} (dB) at Octave-band Centre Frequency, (Hz)									dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000	
Booster Skid	43.6	69.6	85.1	86.6	90.9	95.1	94.3	88.1	78.1	99.4
Control Room	54.9	63.6	71.4	60.2	70.5	73.5	72.8	70	60.2	79.1
Turbine Ventilation	69.7	77.1	83.7	81.6	76.7	76.8	78.1	72.5	68.5	87.9
GLO 50 Hz	67.5	78.1	88.9	91.8	90.1	91.4	86.7	79.7	72.2	97.3
Aux 50 Hz	66.8	80.1	88.9	87.2	87.5	85	83.6	77.7	65.7	94.1
Fan Motor	66.6	77.1	87.3	88.1	91.3	92.4	90.6	82.3	70.8	97.5
Turbine 50 Hz	73.6	89.3	94.6	93.5	91.2	92.3	92.6	86.9	79.8	100.6
Air Filter OK	67.3	81.4	94.9	83.5	80.7	80.6	80.7	65.4	58.9	95.8
Coupling	58.6	73.1	87.2	74.3	79.6	85	83.3	84	81.1	92
GEN 50hz	70.9	82.6	97.2	88.7	85.3	91.5	97.5	81.9	72.8	101.4
Tempering Fan Entry	--	--	--	--	--	--	--	--	--	80
Tempering Air Fan Type B [A]	60	75	85	80	79	76	71	65	88	60
Exhaust Elbow 1	--	--	--	--	--	--	--	--	--	90.5
Exhaust Elbow 2	--	--	--	--	--	--	--	--	--	95
Exhaust Stage 1	--	--	--	--	--	--	--	--	--	96
Exhaust Stage 2	--	--	--	--	--	--	--	--	--	96
Exhaust Stage 3	--	--	--	--	--	--	--	--	--	90
Stack	--	--	--	--	--	--	--	--	--	84

Table A3-1 Summary of Noise Data for Noise Model supplied by generator manufacturer.

Note A A nominal 20 dB reduction is included in the figures presented to account for the enclosure of the tempering fan motor.

The barrier around the energy compound is assumed to be 14 m high and have the following acoustic performance:

Item	Sound Reduction Index, dB at Octave Band Centre Frequency, Hz.							
	63	125	250	500	1000	2000	4000	8000
Energy Centre Louvre	9	15	20	25	39	48	50	50

Table A3-2 Barrier Sound Reduction for energy centre.

Data Centres

The sound power levels for the data centre buildings are presented in Table A3-2, based on information from a reference design supplied by the design team.

Source	L_w (dB) per Octave Band (Hz)								L_w dB(A)
	63	125	250	500	1000	2000	4000	8000	
Extract Fans [Note A]	85	87	85	88	86	80	76	72	94

Source	L_w (dB) per Octave Band (Hz)								L_w dB(A)
	63	125	250	500	1000	2000	4000	8000	
DAHU Note B	90	102	92	82	75	71	61	62	89
Condensers	--	78	75	70	71	68	60	53	75
Admin AHU – Sides and Top	67	75	69	77	77	74	70	63	80
Admin AHU – Ends	63	71	65	73	73	79	66	59	77
Admin AHU – Exhaust	68	76	69	77	77	74	70	63	82
Split Condenser	64	66	65	68	63	60	58	57	69
VRF Condenser	83	85	84	87	82	79	77	76	88
Generator – Side	79	96	92	93	93	91	86	89	101
Generator -Front	80	88	83	85	85	89	86	88	95
Generator -Rear	83	97	91	81	70	71	78	91	99
Gen. – Roof (Solid)	79	96	92	92	93	91	85	89	101
Gen. Discharge	85	98	83	64	65	67	71	94	100
Generator -Exhaust Outlet	78	87	80	80	79	78	74	68	90
House Gen – Side	70	86	79	85	85	86	80	84	93
House Gen – Front	68	76	76	76	78	79	73	68	85
House Gen – Rear	74	84	67	59	58	56	57	66	85
House Gen – Roof (Solid)	56	70	67	66	67	67	62	63	75
House Gen – Roof – Discharge	61	74	58	39	41	42	47	70	75
Exhaust Outlet	68	77	70	70	69	69	64	58	80

Table A3-3 Noise Data for Data Centre Plant.

Note A In relation to the Extract Fans, it is assumed that the vertical orientation of fan output is gives a directivity pattern with a value of -4dB at 90 degrees, i.e. in the horizontal plane. In addition to this, the following reduction is assumed for night-time periods due to fans running at 90% load rather than full load. These values are based on in-situ measurements at a similar site:

Description	Sound Reduction, dB at Octave Band Centre Frequency, Hz.							
	63	125	250	500	1000	2000	4000	8000
90% load	1	5	3	4	4	5	4	4

Note B Note that the DAHU louvres are assumed to be contained in spaces with a reverberation time of 1.0 seconds. It is assumed that the louvres at the north facades of the B building is an acoustic louvre as are the louvres on the west sides of the 'C' buildings. The following table summarises the assumed louvre performances.

Element	Sound Reduction Index, dB at Octave Band Centre Frequency, Hz.							
	63	125	250	500	1000	2000	4000	8000
DAHU Louvre 'B' Buildings – North Facade	4	5	8	9	12	9	7	6
DAHU Louvre 'B' Buildings – South Facade	1	1	1	2	2	2	3	3
DAHU Louvre 'C' Buildings (Non-	4	5	5	5	5	5	5	5

Element	Sound Reduction Index, dB at Octave Band Centre Frequency, Hz.							
	63	125	250	500	1000	2000	4000	8000
generator sides)								
DAHU Louvre 'C' Buildings (Generator sides)	1	1	1	2	2	2	3	3

Rinawade Substation

The following sound power level has been assumed for each transformer at the substation

Source	L_w (dB) per Octave Band (Hz)								L_w dB(A)
	63	125	250	500	1000	2000	4000	8000	
Transformer	43	63	77	72	64	60	40	36	79

Table A3-4 Noise Data for Substation

Appendix 11.4 Measured Baseline Noise Levels

Loc	Period	Time	dB L_{Aeq}	dB L_{A90}
A	Day	12:14 on 4 Nov 21	67	65
	Day	15:18 on 4 Nov 21	67	65
	Day	11:50 on 5 Nov 21	65	63
	Evening	21:25 on 5 Nov 21	59	56
	Night	22:40 on 5 Nov 21	57	54
	Night	23:28 on 5 Nov 21	56	50
B	Day	12:36 on 4 Nov 21	61	58
	Day	15:39 on 4 Nov 21	61	58
	Day	12:10 on 5 Nov 21	60	56
	Evening	21:52 on 5 Nov 21	51	48
	Night	23:02 on 5 Nov 21	50	46
	Night	23:50 on 5 Nov 21	49	46
C	Day	13:13 on 4 Nov 21	56	55
	Day	16:00 on 4 Nov 21	62	56
	Day	12:29 on 5 Nov 21	58	55
	Evening	22:28 on 5 Nov 21	47	46
	Night	23:36 on 4 Nov 21	47	44
	Night	00:42 on 5 Nov 21	48	46
D	Day	13:51 on 4 Nov 21	53	49
	Day	16:31 on 4 Nov 21	57	53
	Day	13:04 on 5 Nov 21	53	48
	Evening	22:51 on 5 Nov 21	38	28
	Night	01:14 on 5 Nov 21	30	27
	Night	23:59 on 5 Nov 21	38	26
E	Day	14:42 on 4 Nov 21	62	60
	Day	17:10 on 4 Nov 21	64	62
	Day	13:42 on 5 Nov 21	67	65
	Evening	22:01 on 5 Nov 21	56	51
	Night	23:17 on 5 Nov 21	55	44
	Night	00:23 on 6 Nov 21	55	45

Appendix 11.5 Noise Contours

Figure A5-1: Noise Contours for Scenario A

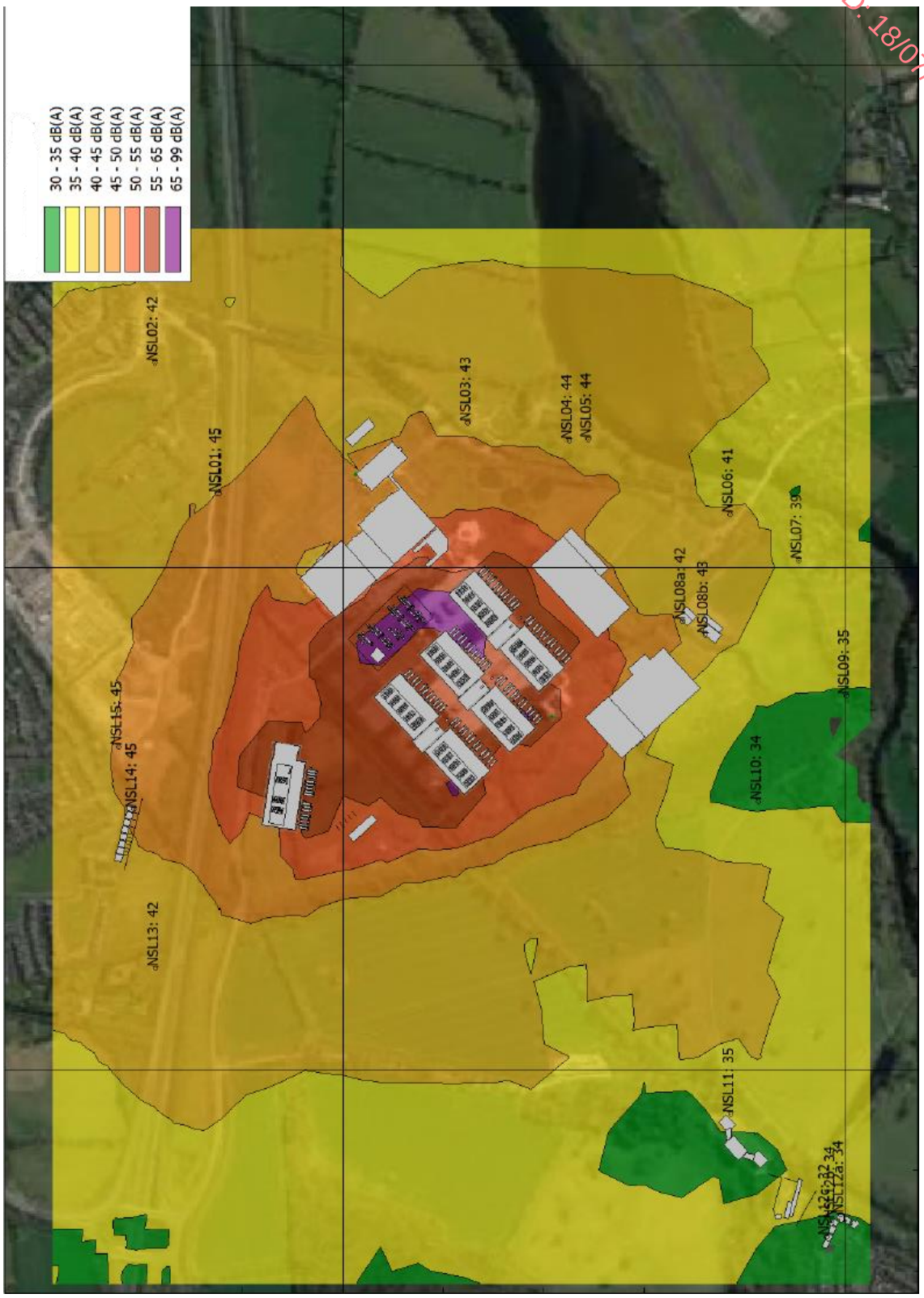


Figure A5-2: Noise Contours for Scenario B

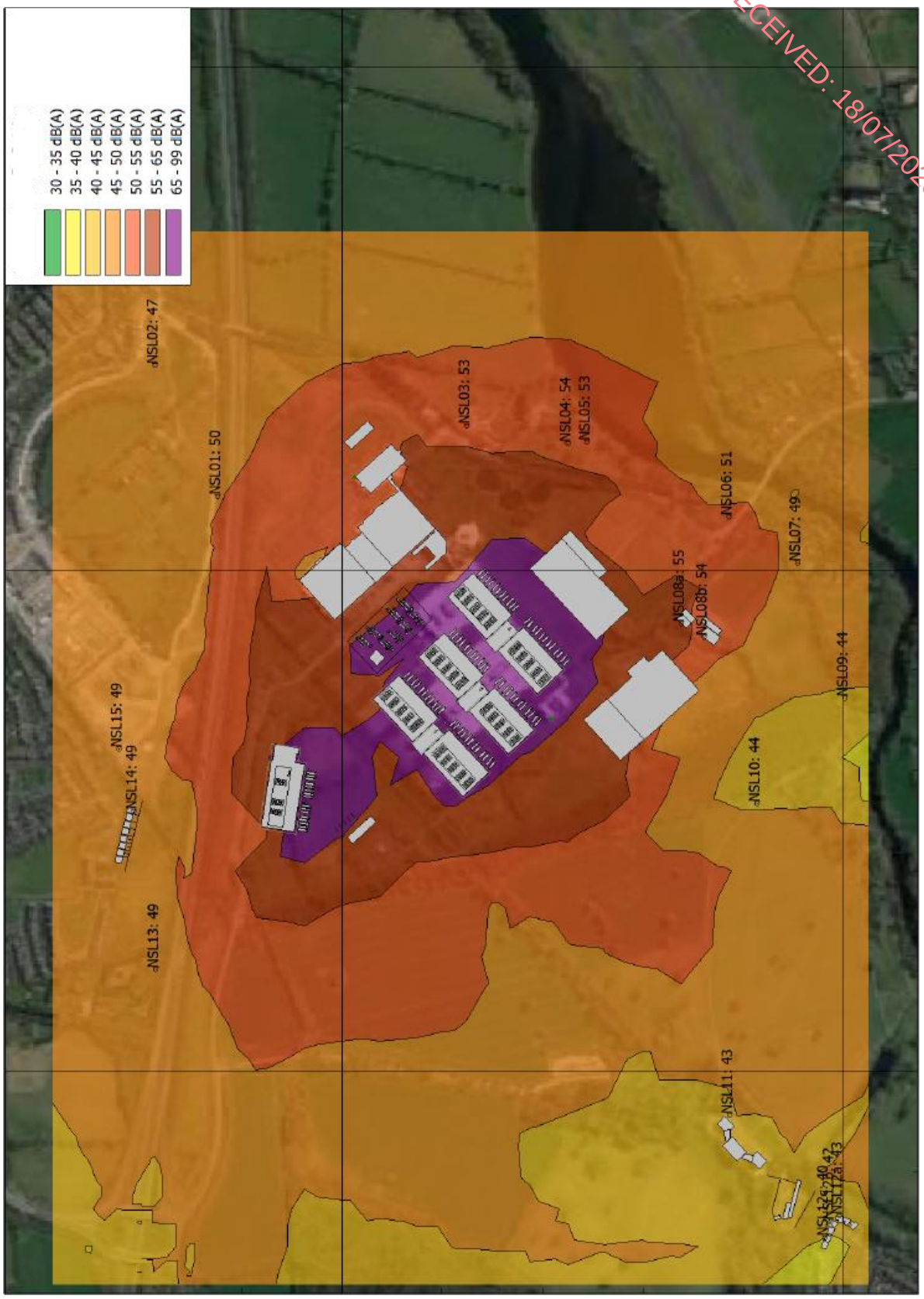
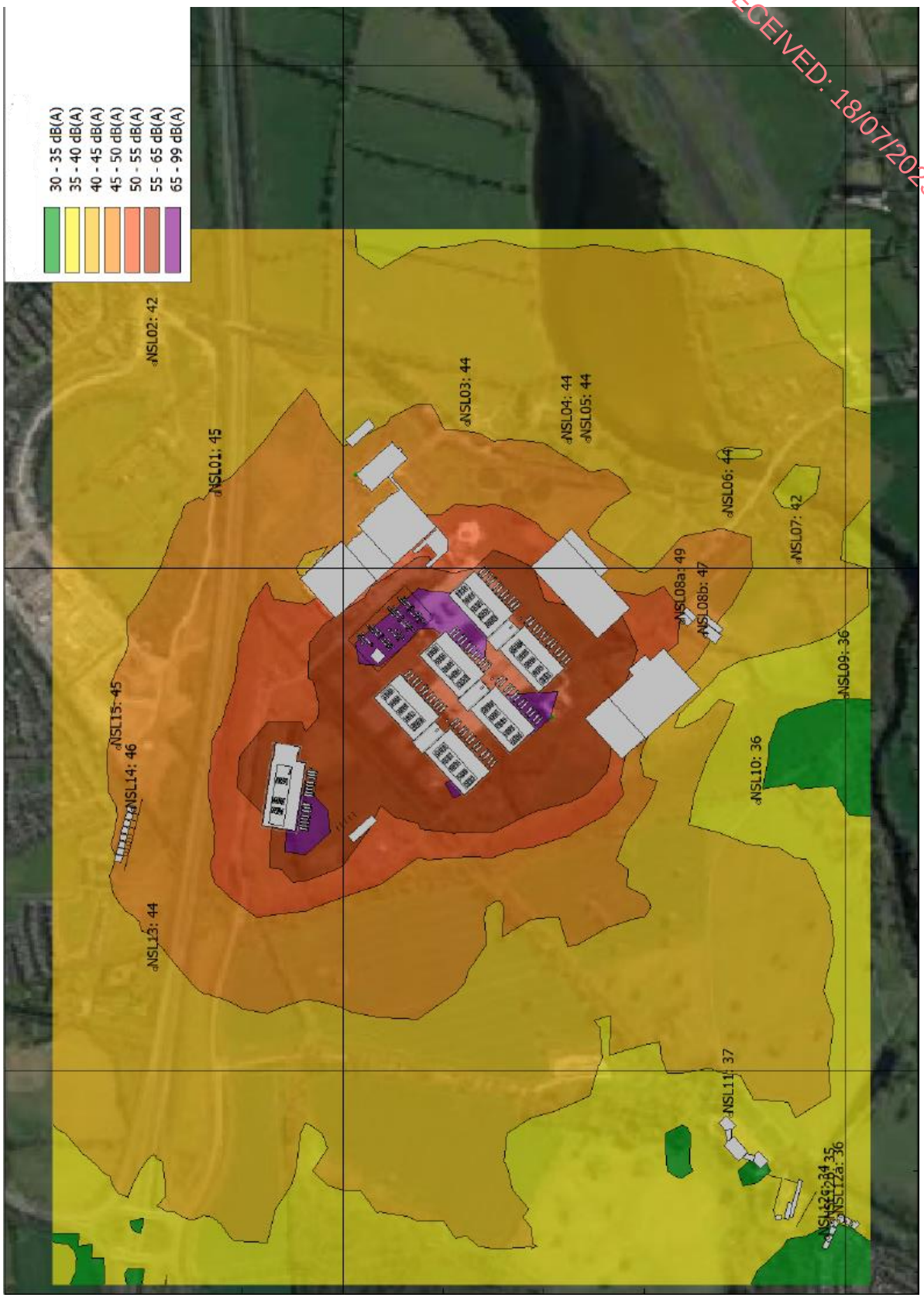


Figure A5-3: Noise Contours for Scenario C



Appendix 12.1: Resource & Waste Management Plan

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RESOURCE & WASTE MANAGEMENT PLAN FOR A PROPOSED DEVELOPMENT

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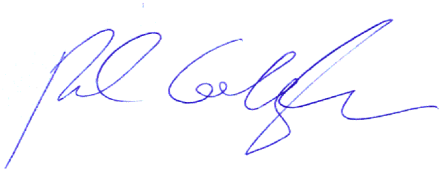
Si□nat□re		
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1.0 INTRODUCTION

AWN Consulting Ltd (AWN) has prepared this Resource & Waste Management Plan (RWMP) on behalf of The Dairy Platform (TDP) for and on behalf of the [illegible]ey S[illegible]b[illegible]nd in support of a planning application to Kildare County Council for planning permission for the proposed development of a brownfield site of approximately [illegible] Hectares located approximately [illegible]m south of the M[illegible] motorway and west of the Leixlip Reservoir in Leixlip, Co. Kildare.

The site consists of a [illegible],[illegible]m² manufacturing facility for Hewlett Packard (HP). The land has since been further developed for a mix of manufacturing, office and warehousing with a total area of [illegible],[illegible]m². It is proposed to demolish three of the existing six buildings and provide an additional [illegible],[illegible]m² gross floor space across [illegible] no. new buildings as a part of the new development along with facilitating works for the power lines and gas pipeline.

This plan will provide information necessary to ensure that the management of construction & demolition (C&D) waste and resources at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3], the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4] *and the* Draft National Waste Management Plan for a Circular Economy (NWMP) [illegible]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible.

2.0 C&D RESOURCE AND WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September [illegible], *Changing Our Ways* [illegible], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least [illegible]% of C&D waste within a five year period (by [illegible]), with a progressive increase to at least [illegible]% over fifteen years (i.e. [illegible]).

In response to the *Changing Our Ways* report, a task force (Task Force B[illegible]), representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [illegible] concerning the

development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September □□□□, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period □□□□-□□□□. This plan, *'A Waste Action Plan for a Circular Economy'* [□] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to □□□□. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over □□□ measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy □□□□–□□□□ *'Living More, Using Less'* (□□□□) [□] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December □□□□. It is anticipated that the Strategy will be updated in full every □□ months to □ years.

The Circular Economy and Miscellaneous Provisions Act □□□□ [□□] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines circular economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* in □□□ember □□□□ [□□]. These guidelines replace the previous guidelines issued by the National Construction and Demolition Waste Council (NCDWC) in □□□□ and the Department of the Environment, Heritage and Local Government (DoEHLG) in □□□□ [□□]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

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2.2 Regional Level

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The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the KCC area published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices have issued the new draft NWMPCE in June 2023.
The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

Proposed National Target

1b. (Construction Materials) 2% Reduction / year – Construction & Demolition Waste Generated

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The KCC *Kildare County Development plan 2023-2029* [14] came into force in 28th January 2023 and sets policies and objectives in support of the regional development plan and the Waste Action Plan for a Circular Economy 2020-2025 for the proper planning and sustainable development of the Kildare area. The following policies and objectives are of particular relevance to waste management:

- *IN P6:* *Implement European Union, National and Regional waste related environmental policy, legislation, guidance, and codes of practice, in order to support the transition from a waste management economy towards a circular economy.*
- *IN O39:* *Encourage a just transition from a waste economy to a green circular economy in accordance with 'A Waste Action Plan for a Circular Economy 2020-2025' and the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'*
- *IN O40:* *Provide, promote, and facilitate high quality sustainable waste recovery and disposal infrastructure / technology in keeping with the EU waste hierarchy to cater for anticipated population growth and the business sector in the County.*
- *IN O41:* *Ensure the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use / extensions of existing commercial developments where appropriate to maximise access by the public.*
- *IN O44:* *Encourage waste prevention, minimisation, re-use, recycling, and recovery as methods for managing waste.*
- *IN O47:* *Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used, recycled or composted.*
- *IN O49:* *Support the implementation of the actions outlined in the Kildare Litter Management Plan 2020-2023 (and any subsequent updates).*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- Waste Management Act □□□□ as amended;
- Environmental Protection Agency Act □□□□ as amended;
- Litter Pollution Act □□□□ as amended;
- Circular Economy and Miscellaneous Provisions Act □□□□;
- Planning and Development Act □□□□ as amended [□□].

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act* as amended and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the developer ensures that the waste contractors engaged by the demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a Waste or Industrial Emissions Licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESIGN APPROACH

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post demolition and construction. Further details on these design principles can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point

of the design process and material selections and will continue to be analysed and investigated throughout the design process and when selecting materials.

The approaches presented are based on international principles of optimising resources and reducing waste on demolition and construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the client and design team considered:

- Establishing the potential for any reusable site assets (buildings, structures, equipment, materials, soils, etc.).
- The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build.
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The design team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just in Time' delivery and use ordering procedures that avoid excessive waste. The green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use off-site construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.
  - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.

- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using precast hollowcore flooring instead of in-situ ready mix pouring or timber flooring to reduce the residual volumes of concrete formwork and wood packaging, respectively; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite as outlined in section □□□, structures should be designed with the intent of designing out waste. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of offsite manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce flexible, adaptable spaces that enable a resource efficient, low waste future. Change of use, durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE DEVELOPMENT

4.1 Location, Size and Scale of the Development

The subject site is located to the south of the M□ and to the west of the □□□□ and the Liffey Reservoir in Leixlip, Co. Kildare. The overall site extends to over □□□□ ha of mainly brownfield lands.

The site consists of a □□□□,□□□m² manufacturing facility for Hewlett Packard (HP). The land has since been further developed for a mix of manufacturing, office and warehousing with a total area of □□□□□□,□□□m². It is proposed to demolish three of the existing six buildings and provide an additional □□□□,□□□m² of gross floor space across □ no. new buildings as a part of the new development.

The proposed development is described as follows:

- Demolition of existing Buildings No's 7, 8 and 9 (total gfa c. 84,838sqm).
- Existing Buildings No's 1 – □ will be retained for deep tech and innovation related uses (total gfa □□□□,□□□sqm).
- Construction of □ no. new deep tech buildings and □ no. new data centre buildings, all including ancillary office spaces. The deep tech buildings will have an overall maximum height of □□□□m and vary in size from □□,□□□sqm – □□,□□□sqm with a combined total gfa of □□□□□,□□□ sqm. The data centres will be □□□□ m in height to parapet and □□□□□m in height to top of roof plant screening. The data centres will vary in size from □□,□□□ sqm – □□,□□□ sqm with a combined total gfa of □□□□

[illegible]sqm. All buildings will be provided with Solar PV panels at roof level and green walls along selected elevations.

- The new deep tech buildings (A[illegible] – A[illegible]) will be provided with service yard areas, loading docks, car parking, access roads, security fencing/gates and landscaping. The deep tech buildings will include rainwater harvesting tanks and green roofs over office areas.
- Each data centre ([illegible]) will include data halls, admin blocks comprising offices, breakroom, loading dock, storage, and ancillary areas and a variety of mechanical and electrical plant areas/structures including battery storage rooms and mechanical rooms. Car parking, access roads, security fencing/gates, gate houses and landscaping will also be provided.
- [illegible] will include [illegible] no. [illegible] oil generators, MV rooms and associated mechanical flues. [illegible] – [illegible] will each include [illegible] no. [illegible] oil generators, MV rooms and associated mechanical flues (each [illegible]m high). Car parking, access roads, security fencing/gates, gate houses and landscaping will also be provided.
- [illegible] no. district heating pump house areas and inground piping for district heating system.
- Construction of a replacement [illegible] Gas Insulated Switchgear (GIS) Substation adjacent to the existing [illegible] Rinawade Substation. The current Air Insulated Switchgear (AIS) substation known as the Rinawade [illegible] sub is fed by [illegible] overhead lines. The new substation will connect to these overhead lines via short runs of underground cable. The replacement [illegible] substation will include [illegible] transformers, with client control building and a [illegible] storey GIS substation building within a [illegible]m high fenced compound.
- Decommissioning and removal of the existing [illegible] Rinawade substation.
- Construction of an onsite energy centre to provide dispatchable power to the national electrical grid. The Energy Centre will include [illegible] no. gas powered combustion turbine generators (CTG’s) and 9no. flues with a maximum height of [illegible] metres. The turbines will be enclosed by a screen wall [illegible]m in height. The energy compound will include all required infrastructure including [illegible] no. ba[illegible] fuel oil (HVO) tanks, an administration building, pump house, fire water tank, access roads, [illegible] no. car parking bays, security fencing etc.
- Provision of a Gas Networks Ireland (GNI) gas skid surrounded by a [illegible]m high fence and access from Celbridge Road ([illegible]). The [illegible] skid will replace the existing gas skid along Celbridge Road.
- Provision of a [illegible] (Above Ground Installation) including [illegible] kiosk building, [illegible]m high, surrounded by a [illegible]m high fence.
- Closure of the existing main entrance to the campus on Celbridge Road and reinstatement of the boundary.
- Construction of a new signalised entrance/exit on Celbridge Road [illegible] metres north of the existing main entrance.
- Use of the existing secondary entrance/exit off Barnhall Road roundabout in the south-east as a principal entry/exit.
- Construction of internal access roads, footpaths and cycle paths including a publicly accessible link road between Celbridge Road ([illegible]) to the east and Barnhall Road ([illegible]) to the west.

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Figure 4.1 *Site Location Map*

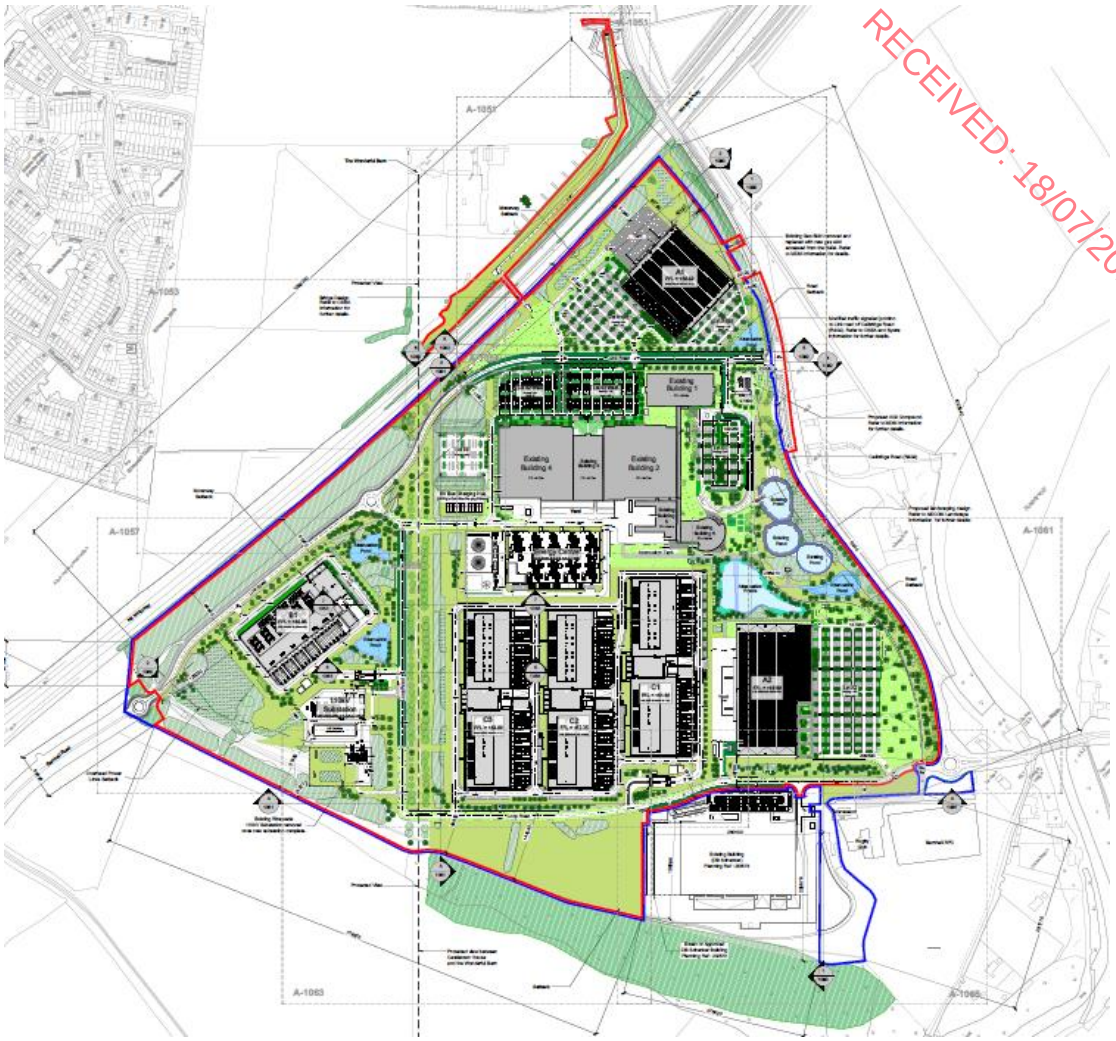

Figure 4.2 *Proposed site layout plan*

4.2 Details of the Non-Hazardous Wastes to be Produced

There will be waste materials generated from the demolition (Buildings No's 7, 8 and 9 and renovation (Building No's 1-6) of the existing buildings and hardstanding areas on site to accommodate the new development. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete, etc.

It is predicted by the project development engineers, Clifton Scannell Emerson Associates, that 115,117 m^3 of the cut material generated during site preparation/levelling (365,750 m^3) will be reused to facilitate construction of the proposed roads, car parks, buildings and landscaping berms. It is estimated c.250,634 m^3 will be exported off the site and disposed of in accordance with relevant requirements. No fill will be required to be imported to the site to accommodate the development.

The facilitating works from the Gas Networks Ireland (GNI) upgrades will involve c. 754.55 m^3 of material excavated along the length of the line. It is estimated c.60% may be

reused, leaving [illegible] m³ that will be removed offsite for appropriate reuse, recycling or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, plastics, metals and waste from contractors generated. Plastic and cardboard waste from packaging and supply of materials will also be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from demolition and construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

4.3 Potential Hazardous Wastes Arising

4.3.1 Contaminated Soil

Site investigations were undertaken by [illegible] Limited during October to December [illegible].

If any potentially contaminated material is encountered, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [illegible] using the HazWasteOnline™ application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [illegible], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify [illegible] and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials, any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

4.3.3 Invasive Plant Species

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4.3.4 Asbestos

Asbest□s Mana□ement S□r□eys □ere □arried □□t at the □r□□□sed de□el□□ment site □n the e□istin□ b□ildin□s in □□□□ and □□□□□Asbest□s □□ntainin□ materials □A□Ms□ha□e been □□n□irmed in the e□istin□ b□ildin□s al□n□ □ith □res□med□str□n□ly □res□med A□Ms □hi□h re□□ires □□rther in□esti□ati□n□Please see the Asbest□s Mana□ement S□r□ey by □□ral en□ir□nmental and ab□□t sa□ter □imited □□r □□rther details

During the asbestos survey of the site, asbestos containing materials (ACM's) were identi□ied in b□t n□t limited t□ □as□ets and □i□e□□r□. ACM's are als□ □res□med in all □ri□inal □i□e□□r□, □an□es and □al□es a□r□ss the de□el□□ment. These ACM's will be re□□ired t□ be identi□ied and rem□□ed by a s□itably trained and □□m□etent □ers□n □ri□r t□ □□mmen□ement □□dem□liti□n □□r□□

□em□□al □□asbest□s □r A□Ms □ill be □arried □□t by a s□itably □□ali□ied □□ntra□t□r and A□Ms □ill □nly be rem□□ed □□m site by a s□itably □ermitted □li□en□ed □aste □□ntra□t□r, in a□□□rdan□e □ith *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All material □ill be ta□en t□ a s□itably li□ensed □r □ermitted □a□ility□

4.3.5 Other Known Hazardous Substances

Paints, □l□es, adhesi□es and □ther □n□□n hazard□□s s□bstan□es □ill be st□red in desi□nated areas□□hey □ill □enerally be □resent in small □□l□mes □nly and ass□□iated □aste □□l□mes □enerated □ill be □e□t t□ a minim□m□□ astes □ill be st□red in a□□r□□riate re□e□ta□les □endin□ □□lle□ti□n by an a□th□rised □aste □□ntra□t□r□

□n additi□n, □ □□□ □□ntainin□ hazard□□s □□m□□nents□, □rinter t□ner □□artrid□es, batteries □□ead, □i□□d □r Mer□□ry□and □□r □l□□res□ent t□bes and □ther mer□□ry □□ntainin□ □aste may be □enerated □□m d□rin□ □□□□ a□ti□ities □r tem□□rary site □□i□es□□hese □astes, i□ □enerated, □ill be st□red in a□□r□□riate re□e□ta□les in desi□nated areas □□the site □endin□ □□lle□ti□n by an a□th□rised □aste □□ntra□t□r□

5.0 ROLES AND RESPONSIBILITIES

□he *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* □r□m□tes that a □es□□r□e Mana□er □□M□sh□□ld be a□□□inted□□he □M may be □er□□rmed by n□mber □□di□erent indi□id□als □□er the li□e□

cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client is the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission.
- The Client is to commission the preparation and submission of an updated RWMP as part of the demolition and construction tendering process.
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site.
- The Client is to request the end-of-project RWMP from the contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project.
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team.
- Managing and valuing the demolition work with the support of quantity surveyors.
- Handing over of the RWMP to the selected contractor upon commencement of demolition and construction of the development, in a similar fashion to how the safety file is handed over to the contractor.
- Working with the contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future demolition and construction contractors have not yet been decided upon for this RWMP. However, once selected they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the (including the Pre-demolition) RWMP throughout the demolition and construction phases (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines.

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6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

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6.2 Main Construction Waste Categories

□he main n□n□hazard□□s and hazard□□s □aste streams that □□□ld be □enerated by the dem□liti□n and □□nstr□□ti□n a□ti□ities at a ty□i□al site are sh□□n in □able □□□□ □he □ist □□ □ aste □□□□ □□□de □a□□li□able as □□□ □□ne □□□□□□als□ re□erred t□ as the □□r□□ean □ aste □□de □□□ □□□□□r ea□h □aste stream is als□ sh□□n□

Table 6.1 Typical waste types generated and [illegible] codes (individual waste types may contain hazardous substances)

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	[illegible]
Wood, glass and plastic	[illegible]
Treated wood, glass, plastic, containing hazardous substances	[illegible]
Bituminous mixtures, coal tar and tarred products	[illegible]
Metals (including their alloys) and cable	[illegible]
Soil and stones	[illegible]
Gypsum-based construction material	[illegible]
Paper and cardboard	[illegible]
Mixed [illegible] waste	[illegible]
Green waste	[illegible]
Electrical and electronic components	[illegible]
Batteries and accumulators	[illegible]
Liquid fuels	[illegible]
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	[illegible]
Insulation materials	[illegible]
Organic [illegible] waste	[illegible]
Mixed Municipal Waste	[illegible]

* *Individual waste type may contain hazardous substances*

6.3 Demolition Waste Generation

There will be waste materials generated from the demolition (Buildings No's 7, 8 and 9 and renovation (Building No's 1[illegible]) the existing buildings and hardstanding areas on site to accommodate the new development and facilitating works. The demolition areas are identified in the planning drawings provided with the planning application. The anticipated demolition waste and rates [illegible] reuse, recycling / recovery and disposal are shown in Table [illegible] below.

Table 6.2 Estimated [illegible] site reuse, recycle and disposal rates for demolition waste.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Concrete, Bricks, Tiles, Ceramics	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Plasterboard	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asphalts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Slate	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Timber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asbestos	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	**23377.6**		**4383.1**		**15512.4**		**3482.1**

6.4 Construction Waste Generation

Table [illegible] shows the breakdown of [illegible] waste types produced on a typical site based on data from the EPA *National Waste Reports* [illegible] and the joint *EPA & GMIT study* [illegible] and other research reports.

Table 6.3 Waste materials generated on a typical Irish construction site

Waste Types	[illegible]
Mixed [illegible]	[illegible]
Timber	[illegible]
Plasterboard	[illegible]
Metals	[illegible]
Concrete	[illegible]
Other	[illegible]
Total	**100**

Table [illegible], below, shows the estimated construction waste generation for the proposed development and facilitating works based on the area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on waste generation rate per m². These have been calculated from the schedule of development areas provided by the design team.

Table 6.4 Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Timber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Plasterboard	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Concrete	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	**5998.4**		**1361.6**		**4072.9**		**563.8**

In addition to the waste streams in Table [illegible], it is predicted that [illegible] m³ of the cut material generated during site preparation levelling [illegible] m³ will be reused to facilitate construction of the proposed roads, car parks, buildings and landscaping berms. It is estimated [illegible] m³ will be exported off the site and disposed of in accordance with relevant requirements. [illegible] fill will be required to be imported to the site to accommodate the development.

The facilitating works from the [illegible] upgrades will involve [illegible] m³ of material excavated along the length of the line. It is estimated [illegible] may be reused, leaving [illegible] m³ that will be removed off-site for appropriate reuse, recycling or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste

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6.5 Proposed Resource and Waste Management Options

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approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Regulation 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Regulation 27. Regulation 28 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from [illegible].

Silt & Sludge

During the demolition and construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off-site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the demolition and construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from [illegible].

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<u>Other Hazardous Wastes</u>

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

<u>On-Site Crushing</u>

It is currently not envisaged that the crushing of waste materials will occur on-site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from DCC and the destination of the accepting waste facility will be supplied to the DCC Waste Unit.

6.6 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RWM (see Section [illegible]).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RWM (see Section [illegible]) will maintain a copy of all waste collection permits on-Site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste/Industrial Emissions Licence for that site will be provided to the nominated project RWM (see Section [illegible]). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-Site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on-site.

7.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

7.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle/recovery/disposal costs associated with the requirement for a waste contractor to take the material

Off-Site – Clean and inert soils, gravel, stones, etc., which cannot be reused on-Site may be used as access roads or capping material for landfill sites, etc. This material is often taken free-of-charge or at a reduced fee for such purposes, reducing final waste disposal costs.

7.2 Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips.

Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

7.3 Disposal

Landfill charges are currently at around €130 – €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8.0 DEMOLITION PROCEDURES

There will be waste materials generated from the demolition of buildings No's 7, 8 and 9 and renovation (Building No's 1 – 6) of the existing buildings and hardstanding areas on site to accommodate the new development. A formal demolition plan including safety procedures will be prepared by the demolition contractor. However, in general, the following sequence of works should be followed during the demolition stage.

Check for Hazards

Prior to commencing works, buildings and structures to be demolished will be checked for any likely hazards including asbestos, ACMs, electrical power lines or cables, gas reticulation systems, telecommunications, unsafe structures and fire / explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

Removal of Components

All hazardous materials will be removed first. All components from within the buildings that can be salvaged will be removed next. This will primarily be comprised of metal, however, may also include timbers, doors, windows, wiring and metal ducting, etc.

Removal of roofing

Steel roof supports, beams, etc., will be dismantled and taken away for recycling / salvage.

Excavation of Services, Demolition of Walls and Concrete

Services will be removed from the ground and the breakdown of walls will be carried out once all salvageable or reusable materials have been taken from the building. Finally, any existing foundations and hard standing areas will be excavated.

9.0 TRAINING PROVISIONS

A member of the demolition and construction teams will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the [illegible] phases of the development.

9.1 Resource Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the RM to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this [illegible] MP.

9.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the [illegible] MP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A subsection on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

10.0 TRACKING AND TRACING / RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

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A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or PM with a waste docket (or Waste Transfer Form [illegible] for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or sub-contractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- [illegible]
- Weight/Quantity

The waste vehicle will be checked by security personal or the PM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the PM on a weekly basis and can be placed in the Waste Tracking [illegible] file. This information will be forwarded onto the [illegible] Waste Regulation Unit when requested.

Alternatively, each sub-contractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets to be maintained on file and available for inspection on site by the main contractor as required. These sub-contractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, [illegible]s, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically checked by the PM. Sub-contractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and [illegible] Permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

11.0 OUTLINE WASTE AUDIT PROCEDURE

11.1 Responsibility for Waste Audit

The appointed PM will be responsible for conducting a waste audit at the site during the [illegible] phase of the proposed development. Contact details for the nominated PM will be provided to the [illegible] Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

11.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the construction phase of the proposed development.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

11.3 Pest Management

A pest control operator will be appointed as required to manage pest onsite during the demolition and construction phase of the project. Organic and food wastes generated by staff will not be stored in open skips, but in closed waste receptacles. Any waste receptacles will be carefully managed to prevent leaks, odours and pest problems.

12.0 C&D ENVIRONMENTAL MITIGATION MEASURES

During the demolition and construction phase the project Construction Environmental Management Plan (CEMP) will be followed in regard to implementing and managing all environmental management requirements.

This CEMP explains the construction techniques and methodologies which will be implemented during demolition and construction of the proposed development.

The CEMP mitigation measures will be implemented to ensure that pollution and nuisances arising from site clearance and construction activities is prevented where possible and managed in accordance with best practice environmental protection.

The CEMP will be implemented and adhered to by the demolition and construction contractors and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, □M and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures.

13.0 CONSULTATION WITH RELEVANT BODIES

13.1 Local Authority

Once demolition and construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the □□□ Waste Regulation Unit.

KCC will also be consulted, as required, throughout the demolition, excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

13.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the demolition and construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

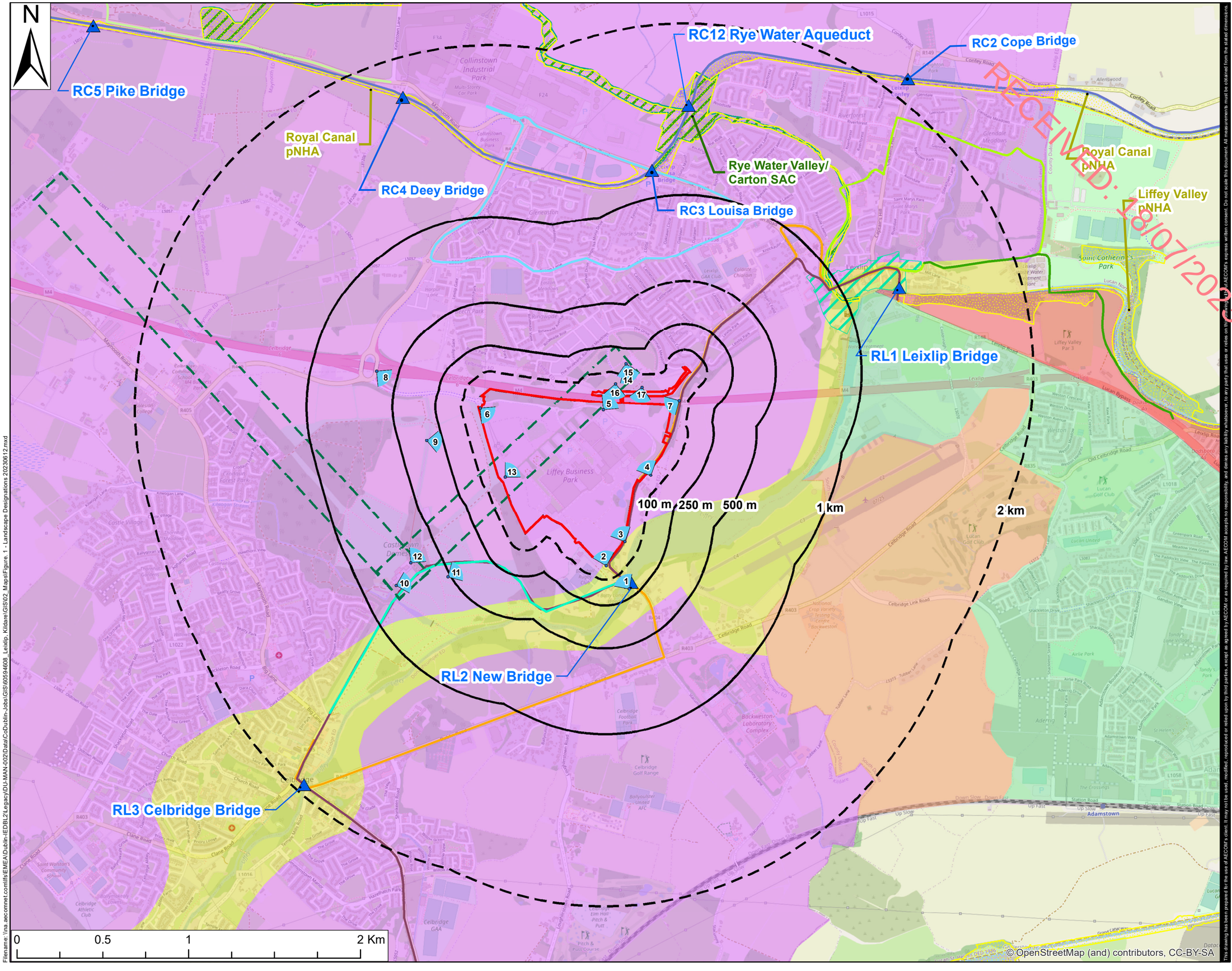
14.0 CONCLUSION

Adherence to this plan will also ensure that the management of Construction & Demolition (C&D) waste and resources at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations, *Environmental Protection Agency Act 1992* as amended, *Litter Pollution Act 1997* as amended and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021.*

15.0 REFERENCES

1. Waste Management Act [illegible] as amended.
2. Environmental Protection Agency Act [illegible] amended.
3. Litter Pollution Act [illegible] (S.I. [illegible]) as amended.
4. Eastern-Midlands Region Waste Management Plan [illegible] – [illegible]
5. Regional Waste Management Planning Offices, *Draft The National Waste Management Plan for a Circular Economy (2023).*
6. Department of Environment and Local Government [illegible] *Waste Management – Changing Our Ways, A Policy Statement* [illegible]
7. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
8. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept [illegible])
9. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'* (2021).
10. Circular Economy and Miscellaneous Provisions Act [illegible]
11. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)*
12. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* [illegible]
13. [illegible]S and the Construction Industry Federation [illegible], *Construction and Demolition Waste Management – a handbook for Contractors and site Managers* [illegible]
14. [illegible], *Kildare County Development Plan 2023-2029* [illegible]
15. Planning and Development Act [illegible] (S.I. [illegible]) as amended.
16. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* [illegible]
17. Council Decision [illegible], establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article [illegible] and Annex [illegible] to Directive [illegible]
18. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2020*.
19. EPA and Galway-Mayo Institute of Technology [illegible], *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* [illegible]

Appendix 16.2: Landscape Designations



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Project Title:

LIFFEY BUSINESS CAMPUS

Client:

KILDARE INNOVATION CAMPUS

LEGEND

- Proposed Development Site
- Study Area
- Viewpoints
- Protected Viewing Corridor
- Architectural Conservation Areas

Ecological Designations

- Special Area of Conservation (SAC)
- Proposed Natural Heritage Area (pNHA)

Scenic Routes

- Castletown / Celbridge
- Views of and within Carton Demesne
- Scenic View Point

Walking Routes

- The Royal Canal Way
- Arthur's Way Heritage Trail
- Slí na Sláinte – Celbridge Kildare
- Slí na Sláinte – Leixlip West
- Slí na Sláinte – St. Catherine's Park Slí (Leixlip)
- Slí na Sláinte – Leixlip Lucan Demesne

LCA County Kildare

- Northern Lowlands
- River Liffey

LCA South Dublin County

- Liffey Valley
- Newcastle Lowlands
- Urban

AECOM Internal Project No:

60663890

Drawing Title:

LANDSCAPE DESIGNATIONS

Scale at A3: 1:20,000

Drawing No:

APPENDIX 16.2

Drawn:	Chk'd:	App'd:	Date:
TS	JS	MH	12/06/2023

Filename: \\na.aecomnet.com\ffs\EMEA\Dublin-IEDBL2\Legacy\DU-MAN-002\Data\CoDublin-Jobs\GIS\60594608_Leixlip, Kildare\GIS\02_Maps\Figure 1 - Landscape Designations 20230612.mxd