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Environmental Impact Assessment Report (EIAR)

IE Licence Review Application Reg No. P0091-03

Volume 3 : Appendices

Wexport Ltd., T/A LEO Pharma Cork

September 2021

EPA Export 02-11-2021:02:48:42

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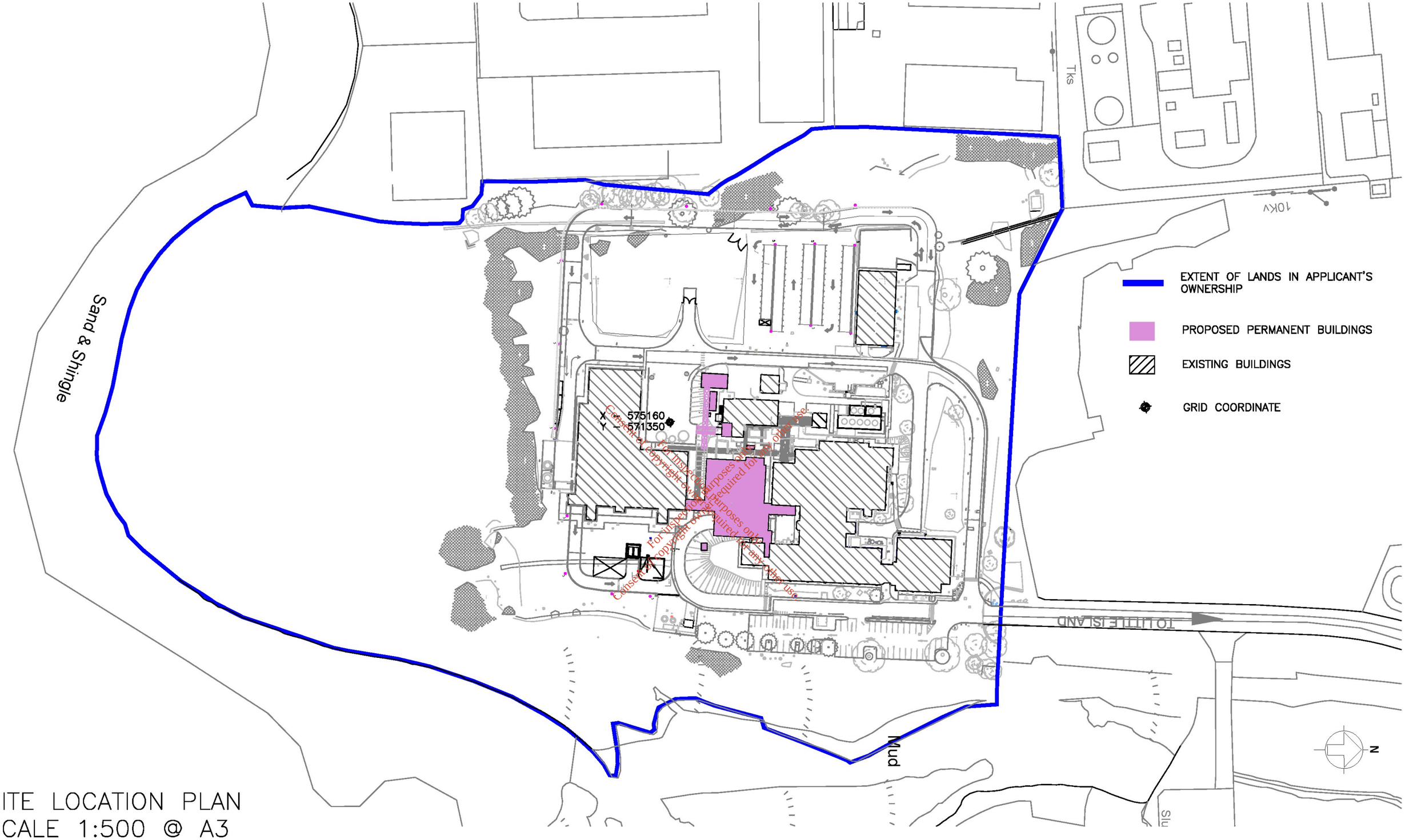
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Appendix 1.1

Drawings

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SITE LOCATION PLAN
SCALE 1:500 @ A3

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LEO Pharma Cork

PROJECT
LEO Pharma
Wet Processing Project (WPP)
Little Island, Cork, Ireland

PROJECT No. 79219700 | A3

DRAWING TITLE
SITE LOCATION PLAN
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
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DWG.No. Drawing001 REV. A

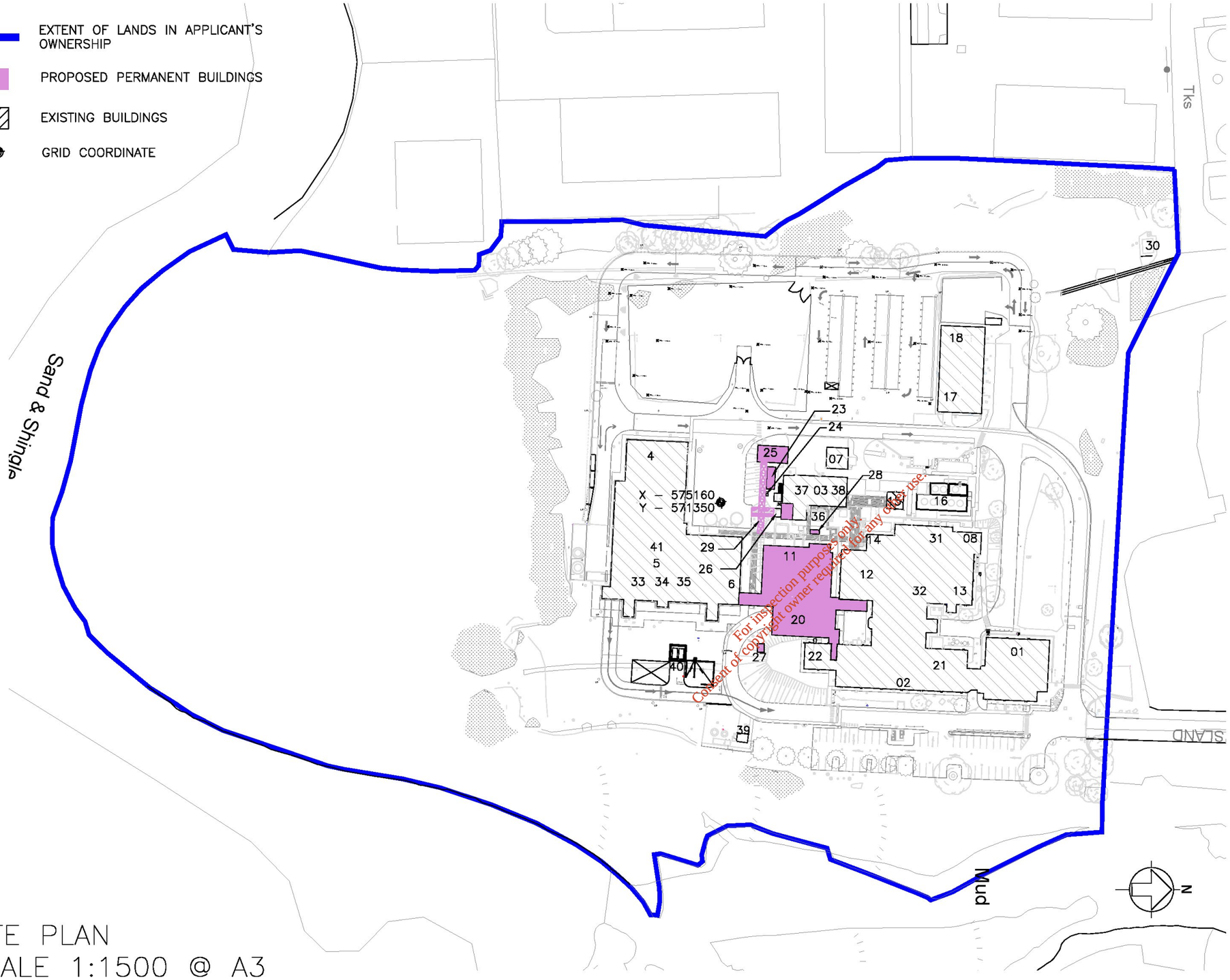
Layout 02-11-2021 02:48:42

EXTENT OF LANDS IN APPLICANT'S OWNERSHIP

PROPOSED PERMANENT BUILDINGS

EXISTING BUILDINGS

GRID COORDINATE



SITE PLAN
SCALE 1:1500 @ A3

REF.	BUILDING / AREA NAME
01	ADMIN
02	LABORATORY
03	UTILITY BUILDING
04	RAW PRODUCTION STORAGE
05	ELUATION BUILDING
06	BLEACHING ROOM
07	ESB SWITCH ROOM
08	FINAL PRODUCTION STORAGE
09	NO LONGER IN USE
10	NO LONGER IN USE
11	H&T PRODUCTION BUILDING
12	WET PROCESSING HEPARIN ROOM
13	PRODUCTION WASHROOM AND AUTOCLAVE
14	WFI ROOM
15	SOLVENT RECOVERY
16	TANK FARM
17	MAINTENANCE WORKSHOP / STORES
18	FINAL PACKAGING
19	NO LONGER IN USE
20	GOWNING ROOM
21	MSAT LAB
22	PILOT PLANT
23	PROCESS CHILLER
24	PROCESS CHILLER DUTY & PUMPSET
25	NITROGEN SKID
26	VOC ABATEMENT INCL. STACK
27	BELOW GROUND PRESSURISED DRAINAGE
28	EXISTING AIR COOLED CHILLER
29	NEW PIPERACK
30	GAS AGI
31	NEW SPRAY DRYER (TINZPARIN) SD3101
32	OLD SPRAY DRYER HEPARIN SODIUM SD3102/02
33	ELUATION VESSEL
34	FILTERPRESS / CENTRIFUGE ROOM
35	UF ROOM
36	COOLING TOWERS
37	BOILER ROOM
38	COMPRESSOR ROOM
39	EFFLUENT AREA
40	WASTE HANDLING AREA
41	CELKATE STORAGE (1ST FLOOR ELUATION BUILDING)

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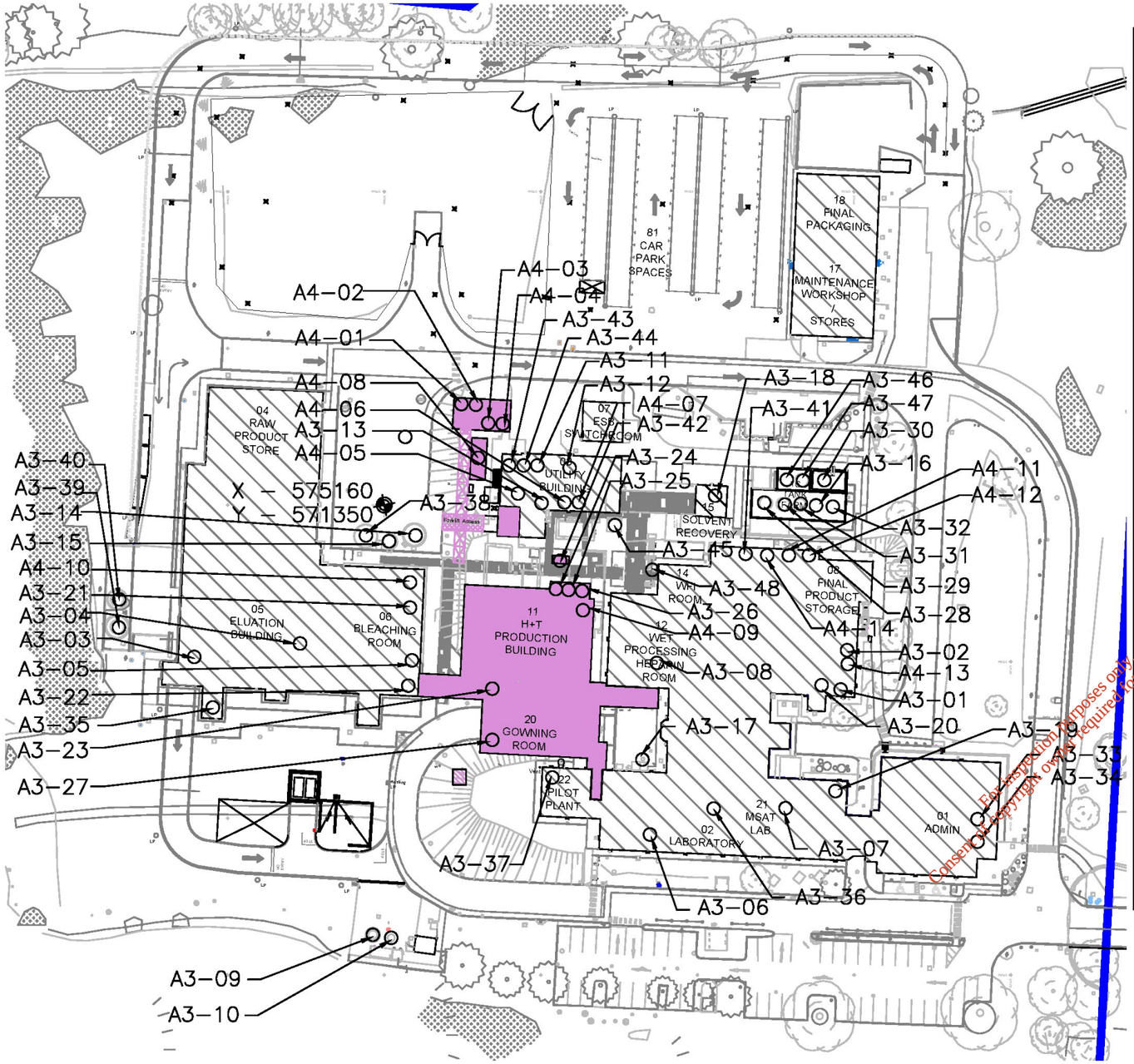
PROJECT No. 79219700 | A3

DRAWING TITLE
SITE PLAN
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
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DWG.No. Drawing002 | REV. A

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MINOR EMISSION POINT	EASTING	NORTHING
A3–01 CLEAN FILTER BLOWDOWN (EXISTING)	575195	571437
A3–02 AUTOCLAVE STEAM VENT (EXISTING)	575187	571438
A3–03 ELUATION AHU (EXISTING)	575189	571313
A3–04 ELUATION AHU (EXISTING)	575186	571333
A3–05 ELUATION AHU (EXISTING)	575189	571355
A3–06 LAB FUME HOOD EXHAUST (EXISTING)	575223	571400
A3–07 LAB FUME HOOD EXHAUST (EXISTING)	575218	571426
A3–08 HEPARIN HVAC EXHAUST (EXISTING)	575190	571402
A3–09 EFFLUENT HCl TANK (EXISTING)	575242	571374
A3–10 EFFLUENT NaOH TANK (EXISTING)	575242	571351
A3–11 UTILITIES BUILDING ROOF VENT (EXISTING)	575152	571378
A3–12 UTILITIES BUILDING ROOF VENT	575152	571385
A3–13 BOILER STEAM BLOWDOWN (EXISTING)	575159	571380
A3–14 SALT SATURATION TANK (EXISTING)	575165	571355
A3–15 3M. SALT TANK (EXISTING)	575167	571351
A3–16 MOTHER LIQUOR TANK (EXISTING)	575160	571432
A3–17 LAB VAC PUMP (EXISTING)	575208	571399
A3–18 DISTILLATION COLUMN BREATHER VENT (EXISTING)	575154	571413
A3–19 DEVELOPMENT LAB EXTRACTOR FAN (EXISTING)	575214	571436
A3–20 CLEAN STEAM VENT (EXISTING)	575194	571413
A3–21 EXTRACTION ARM VENT	575179	571354
A3–22 EXTRACTION ARM VENT	575194	571354
A3–23 EXTRACTION ARM VENT	575195	571370
A3–24 EXTRACTION ARM VENT	575176	571382
A3–25 EXTRACTION ARM VENT	575176	571385
A3–26 EXTRACTION ARM VENT	575176	571387
A3–27 FOUL WATER DRAIN VENTILATION LINE	575205	571370
A3–28 REGENERATED ETHANOL TANK (EXISTING)	575159	571423

MINOR EMISSION POINT	EASTING	NORTHING
A3–29 REGENERATED ETHANOL TANK (EXISTING)	575159	571426
A3–30 MOTHER LIQUOR TANK (EXISTING)	575155	571434
A3–31 PURE ETHANOL TANK (EXISTING)	575159	571429
A3–32 PURE ETHANOL TANK (EXISTING)	575160	571435
A3–33 DOMESTIC BOILER	575220	571463
A3–34 DOMESTIC BOILER	575224	571463
A3–35 DOMESTIC BOILER	575198	571317
A3–36 LAB FUME HOOD EXHAUST (EXISTING)	575218	571413
A3–37 EXTRACT FAN (EXISTING)	575212	571382
A3–38 PERMEATE OF PERMEATE TANK BREATHING VENT (EXISTING)	575165	571346
A3–39 OILS FATS & GREASES TANK BREATHING VENT (EXISTING)	575183	571298
A3–40 OILS FATS & GREASES TANK BREATHING VENT (EXISTING)	575178	571298
A3–41 SPRAY DRYER FEED VESSEL BREATHING VENT (NEW)	575169	571419
A3–42 PACKAGED CHILLER VENT (EXISTING)	575170	571383
A3–43 NATURAL GAS REGULATOR VENT (EXISTING)	575152	571373
A3–44 NATURAL GAS REGULATOR VENT (EXISTING)	575144	571376
A3–45 COOLING TOWER DOSING CHEMICALS VENT (EXISTING)	575163	571394
A3–46 COLUMNS BOTTOMS WASTE BREATHING VENT (EXISTING)	575155	571427
A3–47 COLUMNS BOTTOMS WASTE BREATHING VENT (EXISTING)	575155	571429
A3–48 STEAM VENT FROM WFI UNIT (EXISTING)	575172	571401

POTENTIAL EMISSION POINT	EASTING	NORTHING
A4–01 NITROGEN GENERATION SKID	575140	571364
A4–02 NITROGEN GENERATION SKID	575140	571367
A4–03 NITROGEN GENERATION SKID	575144	571136
A4–04 NITROGEN GENERATION SKID	575144	571372
A4–05 BOILER RELIEF VENT (EXISTING)	575157	571375
A4–06 BOILER RELIEF VENT (EXISTING)	575159	571384
A4–07 CHILLER VENT (EXISTING)	575159	571387
A4–08 NEW CHILLER	575151	571368
A4–09 BLEACHING VESSEL VENT	575180	571388
A4–10 TINZAPARIN REACTOR VESSEL VENT	575147	571354
A4–11 NEW SPRAY DRYER RELIEF VENT (MAIN CHAMBER)	575169	571427
A4–12 NEW SPRAY DRYER RELIEF VENT (BAG FILTER)	575169	571431
A4–13 NEW SPRAY DRYER FEED VESSEL 1 (NEW)	575190	571438
A4–14 AUTOCLAVE RELIEF VENT	575169	571423

MINOR AIR EMISSION POINTS
SCALE 1:1000 @ A3

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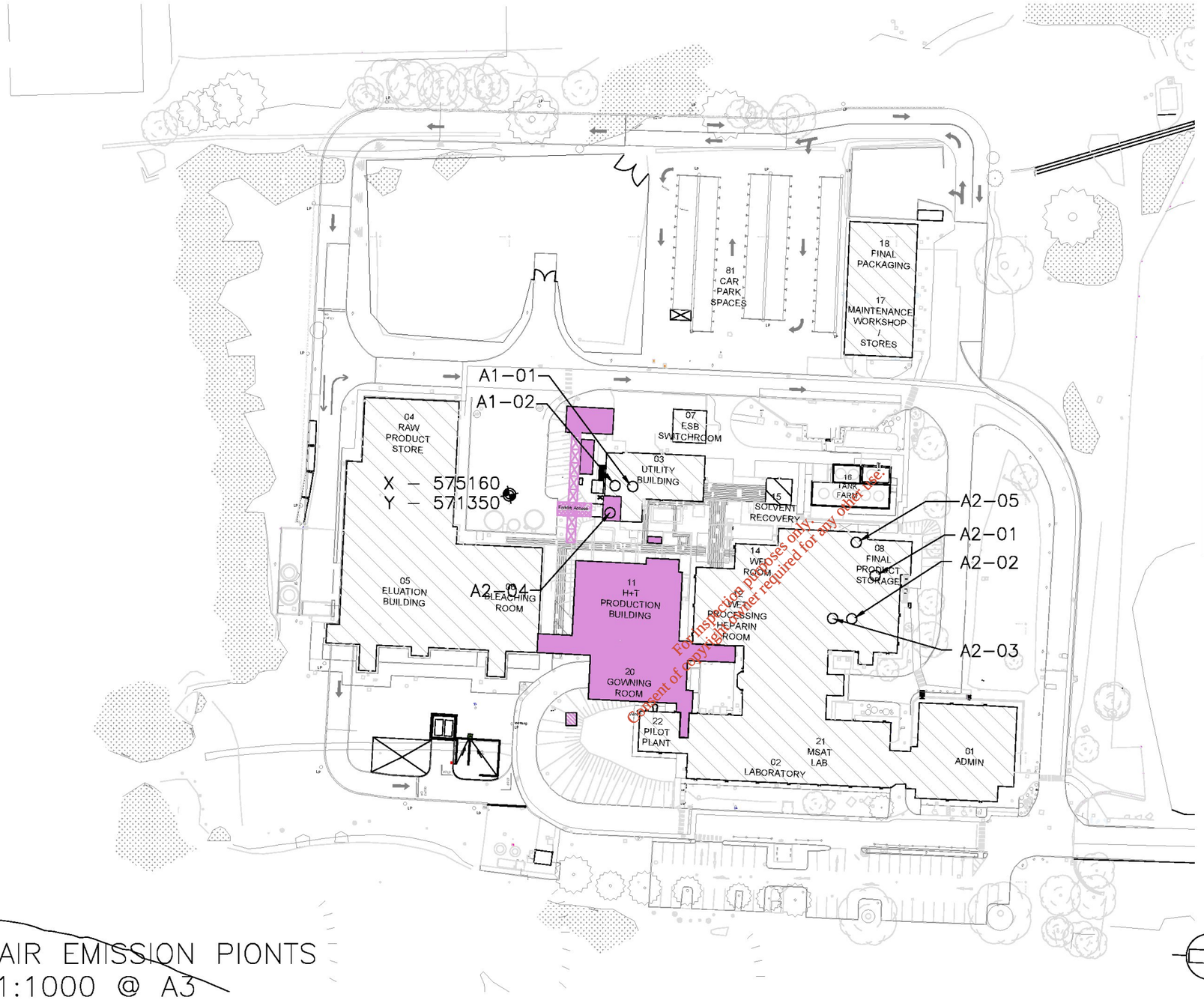
PROJECT No. 79219700 | A3

DRAWING TITLE
MINOR EMISSION POINTS
FOR I.E.L. APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0004.DWG			

DWG.No. Drawing004 REV. A

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PROPOSED PERMANENT BUILDINGS

EXISTING BUILDINGS

GRID COORDINATE

MAJOR EMISSION POINTS	EASTING	NORTHING
A1–01 EXISTING BOILER 1	575158	571374
A1–02 EXISTING BOILER 2	575157	571374
A2–01 EXISTING PRODUCTION AREA EXTRACTION WITH HEPA FILTER	575178	571434
A2–02 EXISTING SPRAY DRYER	575188	571429
A2–03 EXISTING SPRAY DRYER	575188	571425
A2–04 CARBON ABATEMENT UNIT VENT	575164	571373
A2–05 TINZAPARIN SPRAY DRYER VENT	575171	571430

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MAJOR AIR EMISSION PIONTS
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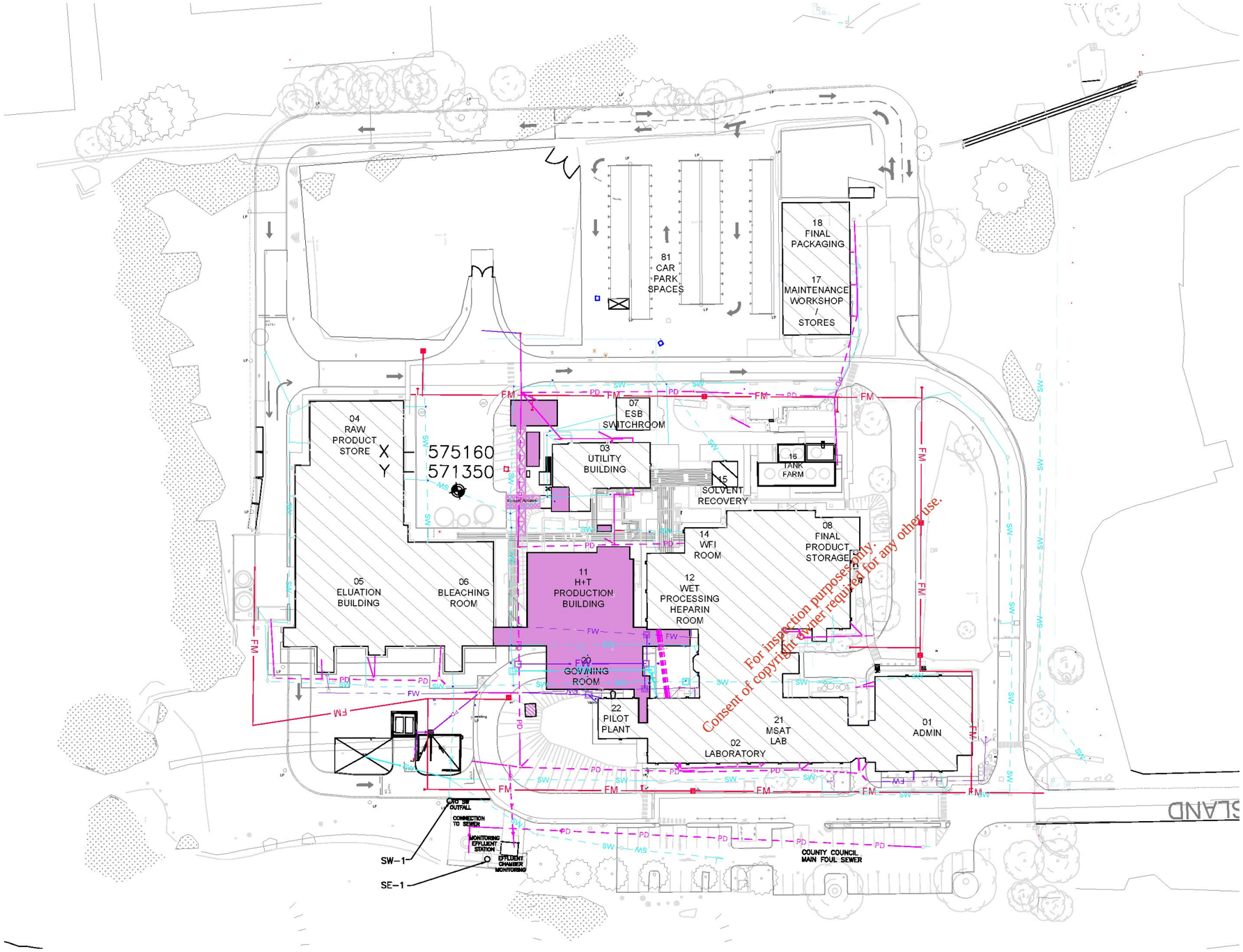
PROJECT No. 79219700 — A3

DRAWING TITLE: MAJOR EMISSION POINTS FOR I.E.L. APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0005.DWG			

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PROPOSED PERMANENT BUILDINGS

EXISTING BUILDINGS

GRID COORDINATE

LEGEND

- PD — EXISTING PROCESS LINE
- FM — EXISTING FIRE MAIN
- FW — EXISTING FOUL LINE
- SW — EXISTING STORM LINE
- EXISTING WATER MAIN
- SW — PROPOSED STORM LINE
- FW — PROPOSED FOUL LINE
- PD — PROPOSED PROCESS LINE
- W — PROPOSED WATER MAIN

EMISSION POINTS	EASTING	NORTHING
SW-1 STORM WATER EMISSION	575232	571433
SE-1 EFFLUENT EMISSION	575246	571352

SITE DRAINAGE PLAN
SCALE 1:1000 @ A3

N

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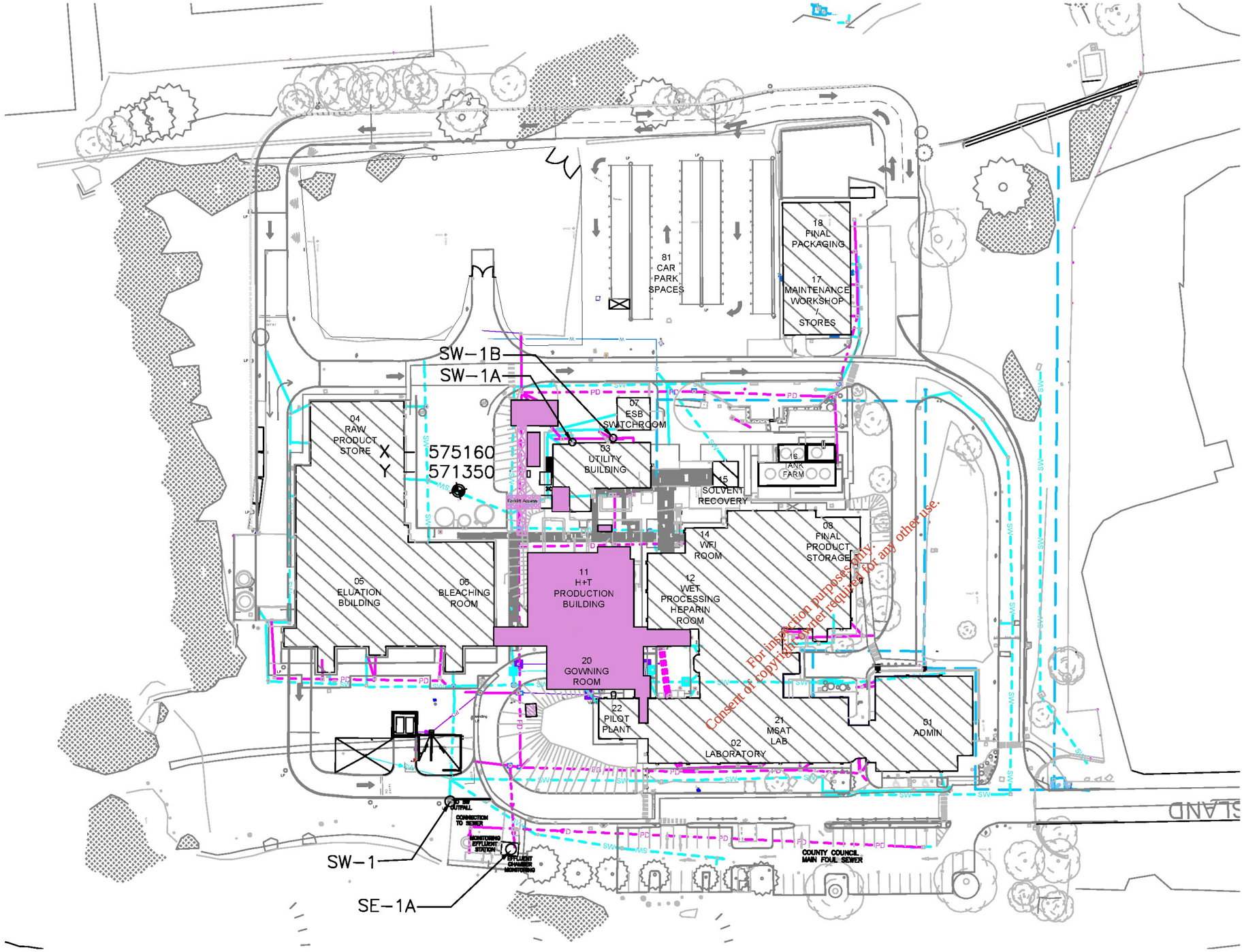
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SITE DRAINAGE PLAN
FOR I.E.L. APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0007.DWG			

DWG.No. Drawing007 | REV. A

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EFFLUENT MONITORING POINTS	EASTING	NORTHING
SE–1A EFFLUENT MONITORING	575244	571358
SW–1A STORM WATER MONITORING	575149	571337
SW–1B STORM WATER MONITORING	575149	571386
SW–1 STORM WATER EMISSION	575232	571433

EFFLUENT MONITORING POINTS
SCALE 1:1000 @ A3

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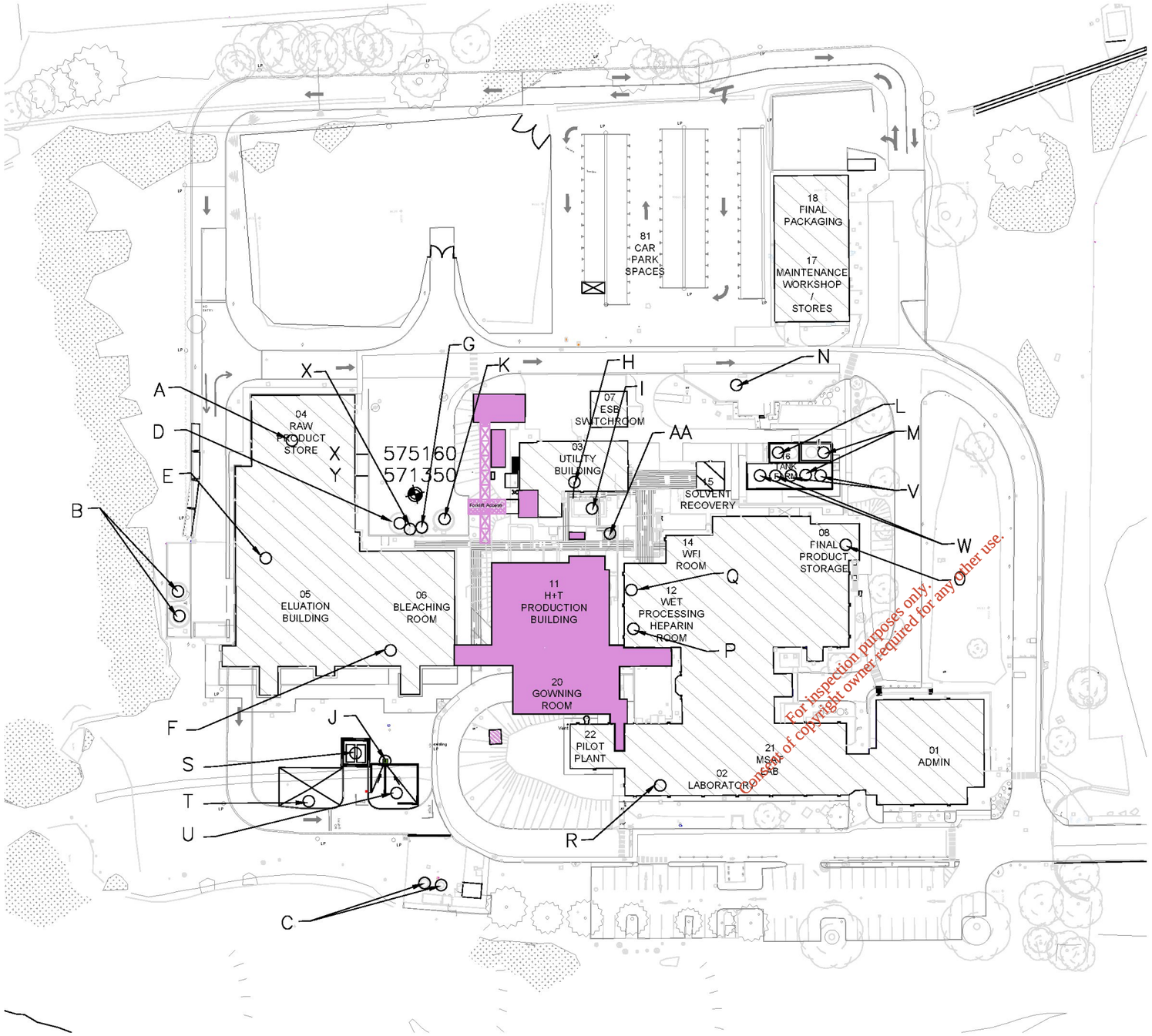
PROJECT No.	79219700	A3

DRAWING TITLE
SITE PLAN
EFFLUENT MONITORING POINTS
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0008.DWG			

DWG.No. Drawing008 REV. A

Plot Report 08-09-2020 02:38:42



LETTER REF.	CHEMICAL STORAGE	EASTING	NORTHING
A	WAREHOUSE	575147	571324
B	OIL, FAT, GREASES	575178	571298
C	ACID & BASE TANKS	575242 575242	571351 571247
D	UF PERMEATE WASTE	575165	571364
E	METABISULPHITE IBC	575171	571317
F	CAUSTIC DRUMS	575192	571343
G	3M SALT STORAGE TANK	575167	571351
H	BOILER TREATMENT CHEMICALS (O2 SCAVENGER, BIOCIDE)	575159	571383
I	COOLING TOWERS AND DOSING CHEMICALS	575164	571387
J	WASTE OIL	575216	571340
K	5M SALT STORAGE TANK	575165	571355
L	COLUMN WASTE (PROCESS WASTE) X2	575155	571427
M	ETHANOL AND MOTHER LIQUOR STORAGE	575155 575160	571436 571432
N	TANKER LOADING BAY	575140	571419
O	API STORE (HEPARIN SODIUM AND TINZAPARIN SODIUM	575175	571440
P	HYDROGEN PEROXIDE	575190	571394
Q	FLAMMABLES	575182	571394
R	LAB CHEMICALS	575224	571398
S	LAB SMALL WASTE	575214	571394
T	GENERAL WASTE SKIP	575223	571324
U	SOLID HAZ WASTE	575222	571342
V	PURE ETHANOL STORAGE TANKS	575160 575160	571435 571432
W	REGENERATED ETHANOL STORAGE TANKS	575159 575159	571426 571423
X	DOSING SKID	575167	571348
AA	ICE WATER TANK	575170	571390

CHEMICAL AND WASTE STORAGE PLAN
SCALE 1:1000 @ A3

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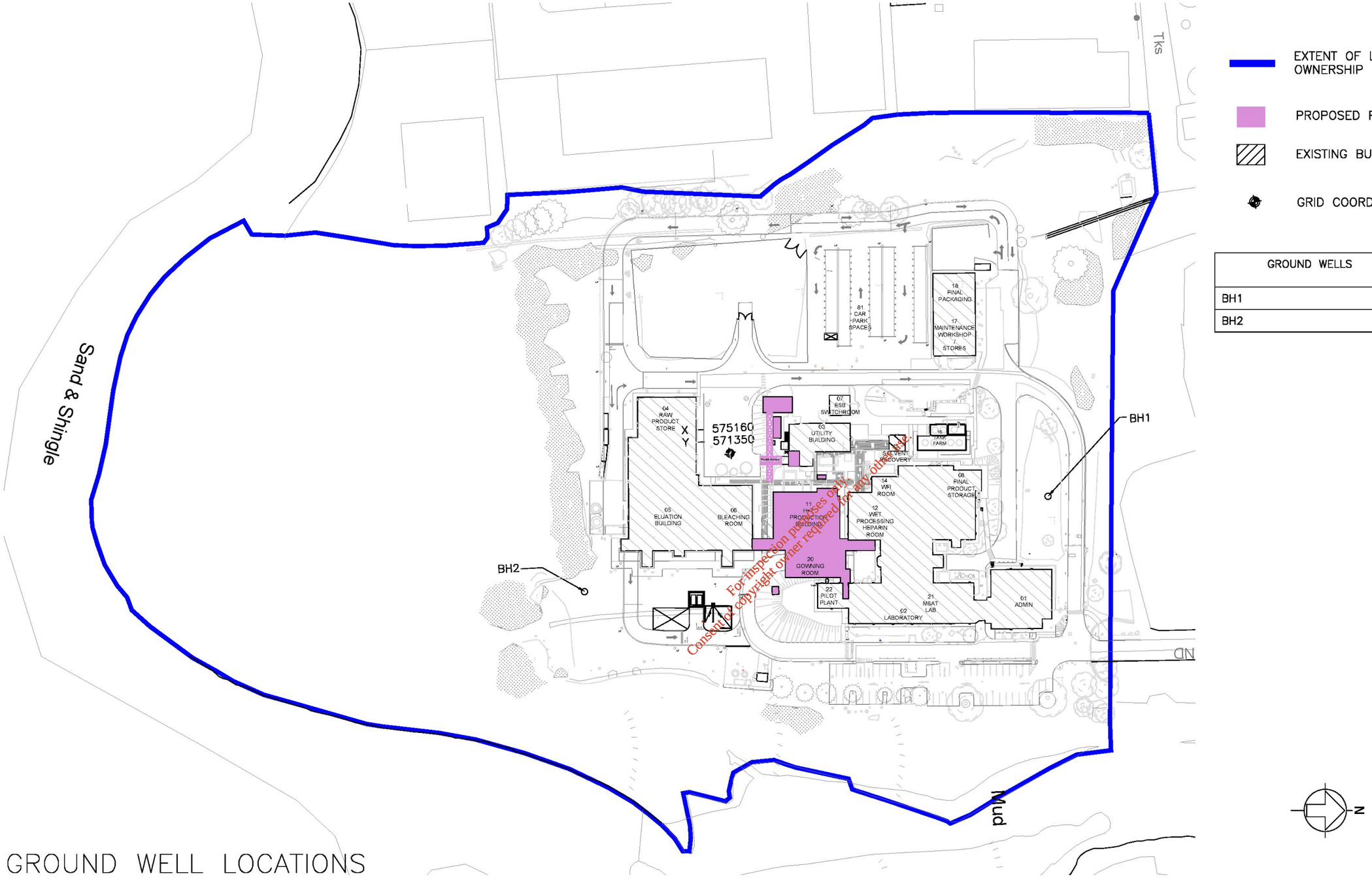
PROJECT No. 79219700 | A3

DRAWING TITLE
CHEMICAL AND WASTE STORAGE PLAN FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0009.DWG			

DWG.No. Drawing009 | REV. A

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GROUND WELLS	EASTING	NORTHING
BH1	575182	571468
BH2	575209	571293

GROUND WELL LOCATIONS
SCALE 1:500 @ A3

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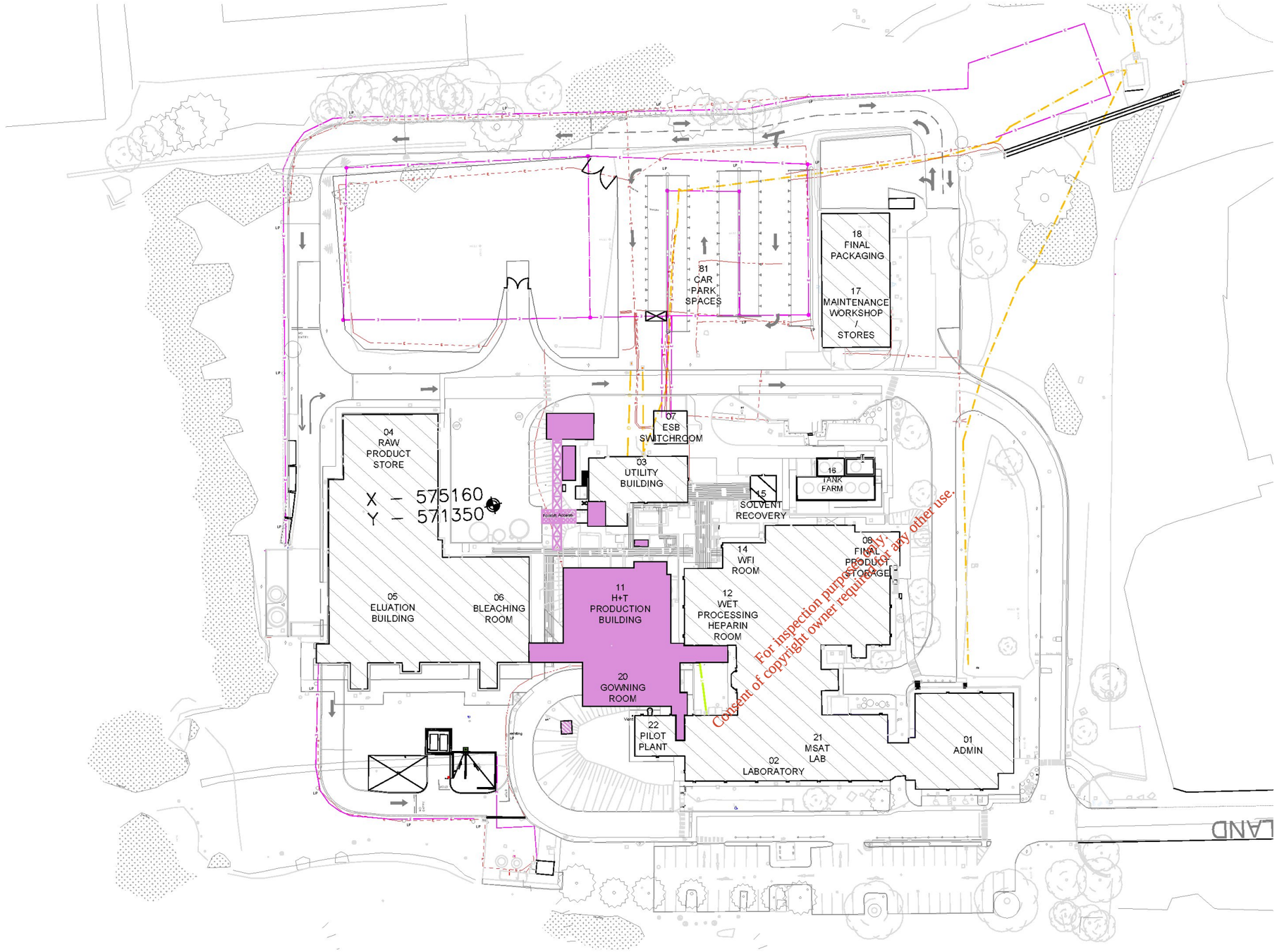
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DRAWING TITLE
GROUND WELL LOCATIONS
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0010.DWG			

DWG.No. Drawing010 | REV. A

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PROPOSED PERMANENT BUILDINGS

EXISTING BUILDINGS

GRID COORDINATE

EXISTING GAS LINE

EXISTING ELECTRICAL

EXISTING TELECOMMS

PROPOSED ELECTRICAL DUCTING

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SITE SERVICES PLAN
SCALE 1:1000 @ A3

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PROJECT
LEO Pharma
Wet Processing Project (WPP)
Little Island, Cork, Ireland

PROJECT No. 79219700 | A3

DRAWING TITLE
SITE SERVICES PLAN
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0012.DWG			

DWG.No. Drawing012 | REV. A

EPA Export 08-09-2020:02:38:22



EXTENT OF LANDS IN APPLICANT'S OWNERSHIP

PROPOSED PERMANENT BUILDINGS

EXISTING BUILDINGS

GRID COORDINATE

NOISE SOURCE	EASTING	NORTHING
NE–01 COMPRESSORS X2 (EXISTING)	575152	571393
NE–02 EXTRACT UNIT (EXISTING)	575178	571434
NE–03 COOLING TOWERS (EXISTING)	575170	571390
NE–04 CARBON ABATEMENT UNIT VENT	575164	571373
NE–05 TINZAPARIN SPRAY DRYER VENT (EXISTING)	575171	571430
NE–06 BLEACHING VESSEL VENT (EXISTING)	575180	571388
NE–07 TINZAPARIN REACTOR VESSEL VENT (EXISTING)	575147	571354
NE–08 ELUATION AHU (EXISTING)	575189	571313
NE–09 ELUATION AHU (EXISTING)	575186	571333
NE–10 ELUATION AHU (EXISTING)	575189	571355
NE–11 LAB FUME HOOD EXHAUST (EXISTING)	575223	571400
NE–12 HEPARIN HVAC EXHAUST (EXISTING)	575190	571402
NE–13 UTILITIES BUILDING ROOF VENT (EXISTING)	575152	571378
NE–14 UTILITIES BUILDING ROOF VENT (EXISTING)	575152	571385
NE–15 LAB VAC PUMP (EXISTING)	575208	571399
NE–16 DEVELOPMENT LAB EXTRACTOR FAN (EXISTING)	575208	571399
NE–17 PROCESS CHILLER	575151	571368
NE–18 AHU 117002	575177	571367
NE–19 AHU 117001	575189	571397
NE–20 AHU 207001	575187	571387
NE–21 AHU HEAT PUMP	575191	571367
NE–22 AHU 107001	575179	571354
NE–23 NITROGEN GENERATION SKID VAPOURISER	575141	571370
NE–24 ETHANOL TRANSFER PUMPS (EXISTING)	575164	571423
NE–25 AIR VENT FROM WASH ROOM (EXISTING)	575197	571436
NE–26 EXTRACT VENT FROM PILOT (EXISTING)	575214	571430

NOISE SOURCES
SCALE 1:1500 @ A3

NOTES

REV	Subject of revision	DRW	CHK	APPROVED	DATE
A	Issue For I.E.D. Licence Application				

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PROJECT
LEO Pharma
Wet Processing Project (WPP)
Little Island, Cork, Ireland

PROJECT No. 79219700 | A3

DRAWING TITLE
SITE PLAN – NOISE SOURCES
FOR I.E.L. LICENCE APPLICATION

CADFILE REF	DWG SCALE	SCALE	START DATE
79219700BIEL0013.DWG			

DWG.No. Drawing013 | REV. A

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Eluation Building

New WPP Production Building

Legend

Existing

New

Eluation Process

Mix Vessel

Centrifuge Feed Tank

Centrifuge

Eluation Storage Tank

UF

IBC

Store

Drain

IBC

Clean Utilities

Existing Production Building

Purified Water, Plant Steam

Utilities Building

Cooling Water

Carbon Adsorption Unit

External

External

Tank Farm

Solvent Recovery

Heparin Process

IBC

IBC

Bleach Vessel

Precipitation Vessel

UF

Spray Dryer Feed Vessel

Dryer

Existing Production Building

Can

Store

Drain

Acid & Base Storage & distribition

External

Tank Farm

Solvent Recovery

Can

Can

Reaction Vessel

LC Filter

Fractionation Vessel

Tinzaparin Process

Bleaching Vessel

Filter Press

Bleach Precipitation Vessel

Final Precipitation Vessel

Spray Dryer Feed Vessel

Dryer

Existing Production Building

Can

Store

Celkate Make-up Vessel

Celkate Re-Slurry Vessel

Collection Tray

External

Tank Farm

Solvent Recovery

Solvent Recovery

Tank Farm

Drain

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PROJECT
Leo Pharma
Wet Processing Project (WPP)
Little Island, Cork, Ireland

PROJECT No. 79219700

A3

DRAWING TITLE
Process Flow Diagram for I.E.L Application

CADFILE REF | DWG SCALE | SCALE | START DATE

DWG.No. Drawing014

REV. A

REV	Subject of revision	DRW	CHK	APPROVED	DATE
A	Issue For I.E.D. Licence Application				

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LEGEND

1 - Vent gas from process

2 - Ambient air inlet

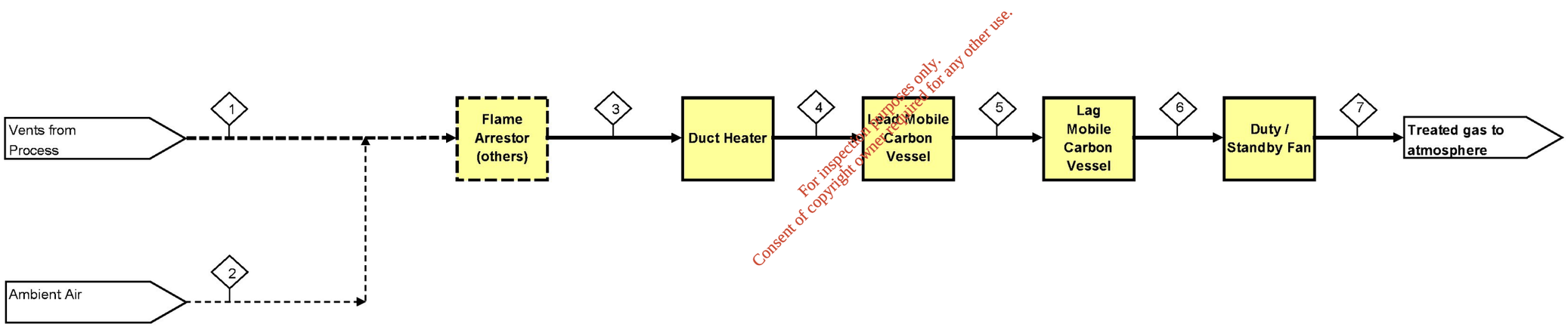
3 - Mixed air to duct heater

4 - Gas inlet to lead carbon filter

5 - Gas inlet to lag carbon filter

6 - Fan inlet

7 - Treated gas to atmosphere



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PROJECT: Leo Pharma Wet Processing Project (WPP) Little Island, Cork, Ireland

LEO Pharma Cork

PROJECT No. 79219700 | A3

DRAWING TITLE: Carbon Abatement Flow Diagram for I.E.L Application

CADFILE REF	DWG SCALE	SCALE	START DATE

DWG.No. Drawing015 | REV. A

REV	Subject of revision	DRW	CHK	APPROVED	DATE
A	Issue For I.E.D. Licence Application				

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Appendix 1.2

Consultation

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Correspondence between MWP and Irish Water re Fire Water Protection project (Planning Ref. 21/5239)

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From: Maurice Feehan <maufeehan@water.ie>
Sent: Friday 30 July 2021 16:30
To: Mark Casey <Mark.Casey@mwp.ie>
Cc: Stephen Casey <Stephen.Casey@mwp.ie>
Subject: RE: LEO-Pharma

Mark

See attached confirmation of feasible relating to the proposed water main diversion. Once planning is granted you are required to re-engage with the Irish Water diversions team to agree the detailed design of the diversion and to enter into a diversion agreement prior to any works commencing on site.

Regards

Maurice Feehan
Major Connections and Developer Services Project Lead (Diversions)

Uisce Éireann
Teach na hAbhann Móire, Páirc Ghnó Mhala, Mala, Contae Chorcaí, Éire
Irish Water
Blackwater House, Mallow Business Park, Mallow, County Cork, Ireland

P: +353 22 52284 M: 087 9027174
E: maufeehan@water.ie
www.water.ie

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Mark Casey
MWP
Park House,
Bessboro Road,
Blackrock,
Cork,
T12 X25

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

30 July 2021

Dear Mr Casey,

Re: Diversion Enquiry Reference DIV21187. Subject to contract | Contract denied

Irish Water has reviewed your enquiry in relation to the diversion of a 250mm water main to cater for the construction of a fire water tank at Leo Pharma, Little Island, Co Cork.

Based upon the details you have provided with your enquiry and as assessed by Irish Water, we wish to advise you that Irish Water have in principal, no objection to the diversion of the water main subject to below conditions and agreement being put in place.

1. The applicant shall enter into a Diversion Agreement with Irish Water prior to any works commencing on site.
2. The applicant shall carry out Site Investigation to confirm the exact location and depth of the existing watermains to inform their detailed design. Site investigation works on Irish Water assets shall be witnessed by Cork County Council Water Services Department.
3. The detailed design of the diversion shall be agreed with Irish Water and Cork County Council Water Services Department.
4. The applicant shall agree to register a wayleave in favour of Irish Water over all existing/proposed Irish Water watermains and existing Irish Water sewers passing through the site.

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If you have any further questions, please contact Maurice Feehan from the diversions team on 022 52284 or email maufeehan@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

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EXISTING GRAVITY MAIN MANHOLE CL: 8.61m IL: 4.96m

EXISTING IRISH WATER SEWER LINE

IRISH WATER WAYLEAVE

250mmØ SPRINKLER SUPPLY, 1.5m COVER

PROPOSED IRISH WATER PRESSURE MAIN DIVERSION

EXISTING GRAVITY MAIN

EXISTING GRAVITY MAIN MANHOLE CL: 9.75m IL: 5.16m

PROPOSED IRISH WATER PRESSURE MAIN DIVERSION

IRISH WATER PRESSURE MAIN DIVERSION TO BE MADE REDUNDANT

EXISTING IRISH WATER WAYLEAVE PRESSURE MAIN

PROPOSED 100mmØ FIRE WATER SUPPLY

PROPOSED 225Ømm STORM SEWER

PROPOSED 250mmØ SPRINKLER SUPPLY (IN),

FIRE WATER SUPPLY TANK 14.7mØ 793m³

PUMP HOUSE

2800

2500

9.900m

11.05m

RG

New SW MH 03

New SW MH 04

Ø225mm

FIRE WATER RETENTION POND 2000m³

Ø300mm Pump Sump Inlet

Pond Inlet IL: 3.20m

CONTROL BUILDING

NO ENTRY

New SW MH 01
CL: 6.0m
IL: 4.5m

Ø225mm @ 1/150

Ex. SW MH
CL: 5.76m
IL: 4.24m

Storm Network Diversion Chamber
New SW MH 02
CL: 5.29m
IL: 4.10m

New PW MH 04
CL: 5.84m
IL: 3.525m

Ø525mm @ 1/150

New PW MH 02
CL: 5.75m
IL: 4.05m (in)
IL: 3.775m (out)

New PW MH 01
CL: 6.0m
IL: 4.20m

Ø525mm @ 1/100

10650

4300

SITE LAYOUT MAP

SCALE: 1:500

For Planning purposes only.
Contractor to confirm details prior to any other use.

LEGEND:

- Existing Storm Sewer
- Existing Fire Main
- Existing Irish Water Gravity Main
- Existing Irish Water Pressure Main
- Proposed Irish Water Gravity Main Diversion Works
- Proposed Irish Water Pressure Main Diversion Works
- Existing Lines Made Redundant
- Proposed Storm Sewer
- Proposed Storm Water Diversion
- Proposed Process Water Diversion
- Proposed Combined Water Diversion
- Proposed Ø150 Storm Rising Main (Firewater Return To Storm Outfall, Min 1.2m Cover)
- Proposed Ø150 Process Rising Main (Firewater Return To Waste Water Treatment Plant, Min 1.2m Cover)
- Proposed Electrical Ducts
- Proposed 250Ø Sprinkler/Hydrant Supply (1.5m Cover)
- New 100Ø Fire Water Supply (1.5m Cover)
- Proposed Fire Hydrant
- Irish Water Wayleave
- Area of Works 1
- Area of Works 2
- Site Boundary
- 5.78m Existing Level
- 6.00m Proposed Level

REV	DATE	DESCRIPTION	BY	APP
P01	July.21	ISSUED FOR INFORMATION	JRC	MC

PROJECT:
LEO PHARMA -
FIRE PROTECTION PROJECT

TITLE:
IRISH WATER APPLICATION
SITE LAYOUT MAP

CLIENT:
LEO PHARMA CORK,
WALLINGSTOWN,
LITTLE ISLAND

MWP
ENGINEERING AND ENVIRONMENTAL CONSULTANTS
CORK | TRALEE | LONDON | LIMERICK
mwp.ie

DRAWN:	CHECKED:	APPROVED:
J.R.C.	J.D.	D.C.
PROJECT NUMBER:	DATE:	SCALE @ A1:
22102	JULY 2021	As Shown
STATUS DESCRIPTION:		STATUS:
FOR INFORMATION		S2

DRAWING NUMBER: 22102 - MWP - ZZ - ZZ - DR - C - 5111

REV: P01

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Correspondence between Irish Water and EPA re Section 99E Consent request

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Johnstown Castle Estate,
Co. Wexford

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Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
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T: +353 1 89 25000
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www.water.ie

Reg No: P0091-03

9/April/2021

Dear Sir/Madam,

I refer to your correspondence dated 24/Sep/2020 relating to an application from Wexport Limited, Wallingstown, Little Island, Cork for **Section 99E Consent Request**.

Please find attached Irish Water's consent to discharge to sewer subject to the consent conditions attached.

If you have any further queries please do not hesitate to contact us.

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Yours sincerely

Wastewater Source Control & Licensing

Stiúrthóirí / Directors: Cathal Marley (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

IW-HP
REV012

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IRISH WATER RESPONSE

Irish Water
Colvill House
24/26 Talbot Street
Dublin 1

Name of Facility: **Wexport Limited** **Reg. No: P0091-03**

Location Address: **Wallingstown, Little Island, Cork, T45 RP82**

Consent granted subject to the consent conditions outlined below.	Yes
Consent granted without conditions.	N/A
Consent refused [Note 1]**.**	N/A

The sewer, to which this consent relates, is vested or controlled by Irish Water.	Yes
Does the consent constitute a material change with respect to the associated waste water discharge authorisation? [Note 2] **(If 'Yes', you must attach to the consent a document describing the measures to be taken to bring about compliance with the waste water discharge authorisation including timeframes where appropriate.**	No

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Indicate either "Yes" or "No" to the request to include the condition(s) below in the licence as follows:

GENERAL CONSENT CONDITIONS	Condition to be Included *(Yes/No)*
1. Other than the trade effluent authorised to be discharged under this licence, the licensee shall at no time discharge or cause or permit to discharge into sewer trade effluent or any other matter unless authorised in writing by Irish Water.	Yes
2. Monitoring and analysis equipment shall be installed, operated and maintained as necessary, so that all monitoring, accurately reflects the emission/discharge.	Yes
3. The licensee shall carry out such sampling, analyses, measurements, examinations, maintenance and calibrations as set out below and as in accordance with *Schedule C: Control & Monitoring,* of this licence. (i) Sampling and analysis shall be undertaken by competent staff in accordance with documented operating procedures. (ii) Such procedures shall be subject to a programme of Analytical Quality Control using appropriate control standards with evaluation of test responses. (iii) Where any analysis is sub-contracted it shall be outsourced to a competent laboratory.	Yes
4. The licensee shall ensure that any trade effluent generated from canteen activities	Yes

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	shall pass through appropriate grease removal equipment prior to discharge to sewer.	
5.	The licensee shall maintain and implement a detailed programme for maintenance of all plant and equipment based on the instructions issued by the manufacturer/supplier or installer of the equipment or as otherwise approved in writing by IW.	Yes
6.	A summary report of volumes of trade effluent and other matter discharged to the sewer along with monitoring and analysis data as specified in *Schedule B: Emission Limits to Sewer* and *Schedule C: Control & Monitoring*, of this licence shall be forwarded to both Irish Water and the Local Authority in a manner and timeframe as may be specified by Irish Water.	Yes
7.	The licensee shall **prepare, maintain and implement** (text highlighted in black bold for new licence only) / maintain and implement (text highlighted in green bold for reviews) a Schedule of Environmental Objectives and Targets. The Schedule shall, as a minimum, provide for a review of all operations and processes, including an evaluation of practicable options, for energy and resource efficiency, the use of cleaner technology, cleaner production and the prevention, reduction and minimisation of waste and shall include waste reduction targets, reduction and diversion of storm water runoff to sewer. The Schedule shall include time frames for the achievement of set targets and shall address a five-year period as a minimum. The schedule shall be reviewed annually and submitted to Irish Water as requested.	No
8.	The licensee shall pay to Irish Water such sum as may be determined from time to time, having regard to the variations in the cost of providing drainage and the variation in effluent reception and treatment costs. Payment is to be made on demand from Irish Water.	Yes
9.	Silt Traps and Oil Separators The Licensee shall, within six months of date of grant of this licence, install and maintain silt traps and oil separators at the facility: (i) Silt traps to ensure that all storm water discharges, other than from roofs, from the facility pass through a silt trap in advance of discharge; (ii) An oil separator on the storm water discharge from yard areas. The separator shall be a Class I Class II full retention by-pass separator. <<EPA to select as appropriate>> (iii) The silt traps and separator shall be in accordance with I.S. EN-858-2: 2003 (separator systems for light liquids).	No
10.	The licensee shall conclude an end user agreement with Irish Water.	Yes
11.	In the event of any incident which relates to discharges to sewer having taken place, the licensee shall notify Irish Water and the Local Authority, in the manner prescribed by Irish Water, as soon as practicable after such an incident.	Yes
12.	No alteration to, or reconstruction in respect of, the activity, or any part thereof, that would, or is likely to, result in (i) a material change or increase in: ▪ the nature or quantity of any emission; ▪ the abatement/treatment or recovery systems; ▪ the range of processes to be carried out; ▪ the fuels, raw materials, intermediates, products or wastes generated, or (ii) any changes in: ▪ site management, infrastructure or control with adverse environmental significance; shall be carried out or commenced without prior notice to, and without the approval of, the Agency **and/or Irish Water <u>as appropriate</u>**.	Yes
13.	No specified emission from the installation shall exceed the emission limit values set out in Schedule B: Emission Limits, of this licence. There shall be no other emissions of environmental significance.	Yes
14.	The licensee shall undertake a desktop assessment and subsequent screening of trade effluent generated as a result of onsite activities for priority substances, priority hazardous substances and watchlist substances as listed in Tables 11,12 & 13 of S.I. No. 272/2009 – EC Environmental Objectives (Surface Waters)	Yes

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	Regulations 2009, as amended. A report on the assessment and screening shall be submitted to Irish Water within twelve months of the date of grant of this licence. The licensee shall ensure that where substances are identified as being present in the trade effluent, measures are taken to reduce, eliminate or phase out their emission as required and each are assessed against risks posed to the biological processes at the receiving Irish Water wastewater treatment plant (D0033-01) and the sludge generated at the plant. The licensee shall also ensure that identified substances are assessed against potential risks to public health and the whole aquatic environment. The environmental assessment shall specifically assess resultant concentrations of substances in the receiving environment against their applicable environmental quality standards (EQS) and environmental objectives established by S.I. No. 272/2009. Subsequent desktop assessments, screenings and reports shall be repeated at intervals commensurate with changes to the characteristics of the trade effluent as a result of changes to onsite processes/materials to be processed or as requested by Irish Water.	

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ADDITIONAL GENERAL CONSENT CONDITIONS **In respect of discharges or emissions to sewers, in accordance with Section 99E of the Environmental Protection Agency Act 1992, as amended.** ***(Specify, if required)***

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Limit Values for Process Effluent to Sewer

Schedule B: Emission Limits

Emission Point Reference No.: **SE1**

Emission to ***(sewer description):*** IW Sewer located at Wallingstown

Volume of Trade effluent emitted:

Maximum in any one day:	190 m^3
Average in any one day (on a monthly basis):	162 m^3
Maximum in any hour:	25.5 m^3

Parameter	Emission Limit Values		
pH	6-9 pH Units		
Temperature	30°C		
	Concentration (24 Hr. Composite Sample (mg/l)	**Mean Daily Load on a monthly basis (kg/day)**	**Max Daily Load (kg/day)**
BOD, 5 days with inhibition (Carbonaceous BOD)	2360	90	106
COD - Cr	3240	130	148
Suspended Solids	175	12	15
Total Nitrogen	20	1.7	2
Total Phosphorus (as P)	15	1	1.5
Sulphate	800	130	152

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Frequency of Monitoring Process Effluent to Sewer

Schedule C

Emission Point Reference No.: SE1

Parameter	Monitoring Frequency	Analysis Method/Technique
Flow Rate	Continuous	On-line flow meter with recorder
pH	Continuous	pH electrode/meter & recorder
Temperature	Continuous	On-line temperature sensor with recorder
BOD, 5 days with inhibition (Carbonaceous BOD)	Monthly	Standard Method
COD - Cr	Weekly	Standard Method
Suspended Solids	Monthly	Standard Method
Fats, Oils & Greases	Quarterly	Standard Method
Total Nitrogen	Quarterly	Standard Method
Total Phosphorus (as P)	Quarterly	Standard Method
Sulphate	Quarterly	Standard Method
Total Heavy Metals Note 1	Annually	Standard Method
Metals & Organic Compounds Note 2	Once Off & As Requested	Standard Method
Toxicity Note 3	As Requested	Standard Method

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Note 1: Range of metals as per Water Quality (Dangerous Substances) Regulations, 2001 (S.I. No. 12 of 2001): arsenic, chromium, copper, cyanide, fluoride, lead, nickel, zinc.
Note 2: Relevant Priority substances, Priority Hazardous substances and Watchlist substances (as per relevant Tables set out S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 – 2019, as amended) in trade effluent generated as a result of onsite activities (The list of parameters to be analysed shall be based on the assessment/ screening as per consent Condition 14).
Note 3: The number of toxic units (Tu) = 100/x hour EC/LC50 in percentage vol/vol so that higher Tu values reflect greater levels of toxicity. For test regimes where species death is not easily detected, immobilisation is considered equivalent to death.

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Control of Emissions to Sewer

Description of treatment: Neutralisation

Control Parameter	Monitoring	Key Equipment
Flow Rate	Continuous	On-line flow meter with recorder
pH	Daily	pH electrode/meter & recorder

Signed on behalf of

DocuSigned by:
Andrew Cartwright
EBDF6E0E3CDD42C...

Date 9/4/2021

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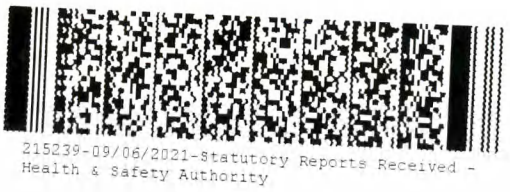
HSA response to Cork Co. Co. re Fire Water Protection project (Planning Ref. 21/5239).

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HEALTH AND SAFETY
AUTHORITY
T: 1890 289 389 W: http://www.hsa.ie E: landuseplanning@hsa.ie

Planning Department
Cork County Council
County Hall
Carrigrohane Road
Cork



Our Ref: PAR3494

9th June 2021

Re: Planning Application [ref.21/05239] for development by Wexport Ltd t/a LEO Pharma Cork at Wallingstown, Little Island, Co Cork & your email received on 27th May 2021.

Dear Sir, Madam,

The approach of the Authority to Land-use Planning is set out in the document 'Policy & Approach of the Health and Safety Authority to COMAH Risk-based Land-use Planning'. It is available from our website at https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/Land_Use_Planning/. The document should be consulted by you to fully understand the advice given in this letter.

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In that context, and the Health and Safety Authority remit, in respect of this specific application the following points are relevant:

1. The application is covered by Regulation 24(2) (c) of S.I. 209 of 2015

2. On the basis of the information supplied, the Authority **DOES NOT ADVISE AGAINST** the granting of planning permission in the context of Major Accident Hazards.

3. The advice is only applicable to the specific circumstances of this proposal at this period of time.

4. Future development around COMAH establishments has the potential to impact on the expansion of those establishments.

If you have any queries please contact the undersigned.

Yours sincerely

IDaly

Ita Daly
Inspector,
COMAH, Chemical Production & Storage (CCPS)

Encl: Note on the Approach of the HSA to the Provision of Land-use Planning Advice

PLANNING DEPARTMENT
09 JUN 2021
CORK COUNTY COUNCIL
County Hall, Cork

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Note on the Approach of the HSA to the Provision of Land-use Planning advice.

The Authority, acting as the Central Competent Authority under the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015), gives technical advice in response to a notice sent by a planning authority under Part 11 of the Planning and Development Regulations 2001-2015. Under Regulation 24(2) of S.I. 209 of 2015, the technical advice on the effects of a proposed development on the risk or consequences of a major accident relates to the following types of developments within the consultation distance for an establishment:

(a) the siting and development of new establishments;

(b) modifications to establishments of the type described in Regulation 12(1);

(c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or developments may be the source of, or increase the risk or consequences of, a major accident.

The advice given is for the purposes of assessing new development only. A full explanation of the Authority's Land Use Planning advice system can be found at https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/Land_Use_Planning/.

Your attention is drawn to Regulation 24(3) of S.I. 209 of 2015:

(3) The technical advice provided by the Central Competent Authority to a planning authority pursuant to paragraph (2) may be generic or case specific in nature and shall be so formulated that it will assist the planning authority to take into account the need, in the long term—

(a) to maintain appropriate safety distances between establishments covered by these Regulations and residential areas, buildings and areas of public use, recreational areas, and, as far as possible, major transport routes;

(b) to protect areas of particular natural sensitivity or interest in the vicinity of establishments, where appropriate through appropriate safety distances or other relevant measures; and

(c) for the operator to take additional technical measures, in the case of existing establishments, in accordance with Regulation 7, so as not to increase the risks to human health and the environment.

In giving its advice the Authority does not deal with routine emissions. Such emissions will be subject to EPA or Local Authority scrutiny and control.

The operator of an establishment covered by S.I. 209 of 2015 is also required to take all necessary measures to prevent major accidents occurring and to limit the consequences of any such major accidents for human health and the environment

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09 JUN 2021
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County Hall, Cork

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DAU response to Cork Co. Co. re Fire Water Protection project (Planning Ref. 21/5239)

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From: Sinéad Clifford
Sent: Tuesday 18 May 2021 16:08
To: manager.dau@chg.gov.ie
Subject: 22102 - Consultation [Filed 18 May 2021 16:08]
Attachments: 22102 DAU Consultation Letter.pdf

Hello,

Please find attached consultation letter in relation to a proposed development in Little Island, Co. Cork.

If you have any queries, please don't hesitate to get in touch.

Kind Regards,

Sinéad Clifford
BSc., GradCIEEM

Project Ecologist

e sinead.clifford@mwp.ie
t +353 (0)66 7123404 w www.mwp.ie

Reen Point, Blennerville,
Tralee, Co. Kerry, V92 X2TK, Ireland

MWP

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An Roinn Turasóireachta, Cultúir,
Ealaíon, Gaeltachta, Spóirt agus Meán
Department of Tourism, Culture,
Arts, Gaeltacht, Sport and Media

215239-16/06/2021-Statutory Reports Received -
Development Applications Unit

Planning Ref: 215239
(Please quote in all related correspondence)

16 June 2021

PLANNING DEPARTMENT
16 JUN 2021
CORK COUNTY COUNCIL

Director of Services – Planning
Cork County Council
County Hall
Carrigrohane Road
Cork

Via email: planninginfo@corkcoco.ie (sent via ereferral)

Re: Notification to the Minister under Article 28 (Part 4) or Article 82 (Part 8) of the Planning and Development Regulations, 2001, as amended.

Proposed Development: Planning Application Reg Ref No 215239 by Wexport Limited T/A LEO Pharma Cork for permission for Infrastructure upgrade works to include the construction of an above ground 790cu.m mains-fed circular galvanised, butyl lined steel firewater supply tank, a pumphouse and associated pipework to supply sprinkler systems and site fire hydrants and the construction of a new 2,000cu.m firewater retention pond, associated pipework and a control building with associated site works which includes installation of berms and a new 2.4m high palisade fencing. This application relates to an which has an Industrial Emissions License (PO091-02) at the existing LEO Pharma facility, Wallingstown, Little Island, County Cork

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A chara

I refer to correspondence dated 26th May received in relation to the above.

Outlined below are Nature Conservation observations/recommendations co-ordinated by the Development Applications Unit.

Nature Conservation

This site lies adjacent to the Cork Harbour Special Protection Area (SPA). The Natura Impact Statement (NIS) that has been prepared to accompany this application provides mitigation measures to avoid impacts on the SPA. These measures are to be followed in full. Included in the measures is mitigation to reduce impact from noise during rock breaking operations. In addition to these measures, consideration should be given to carrying out rock breaking works outside of the sensitive wintering bird period.

Aonad na nIarratas ar Fhorbairt
Development Applications Unit
Oifigí an Rialtais
Government Offices
Bóthar an Bhaile Nua, Loch Garman, Contae Loch Garman, Y35 AP90
Newtown Road, Wexford, County Wexford, Y35 AP90

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There is no information on the suitability of the site for breeding Shelduck. It is recommended that survey and assessment is carried out as to whether Shelduck breed either on the site or in the adjacent lands and that measures are drawn up to avoid any impacts on breeding Shelduck.

You are requested to send any further communications to the Development Applications Unit (DAU) at referrals@housing.gov.ie where used, or to the following address:

The Manager
Development Applications Unit (DAU)
Government Offices
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Sinéad O' Brien
Development Applications Unit

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PLANNING DEPARTMENT
16 JUN 2021
CORK COUNTY COUNCIL

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TII response to Cork Co. Co. re Fire Water Protection project (Planning Ref. 21/5239)

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Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Cork County Council
Planning Department
County Hall
Carrigrohane Road
Cork

Date/Dáta : 27-May-2021

Re: Planning Ref.: 2105239
Applicant: Wexport Limited T/A LEO Pharma Cork

Dear Sir/Madam,

In the case of this planning application, Transport Infrastructure Ireland has no observations to make.

Please acknowledge receipt of this submission in accordance with the provisions of the Planning and Development Regulations, 2001 as amended.

Yours faithfully,

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215239-01/06/2021-Statutory Reports Received -

on behalf of
Land Use Planning Unit

PLANNING DEPARTMENT
01 JUN 2021
CORK COUNTY COUNCIL
County Hall, Cork

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Irish Water response to Cork Co. Co. re Fire Water Protection project (Planning Ref. 21/52339)

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Irish Water's Statutory Response to **Cork County** **Planning Authority**

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
Ireland

T +353 1 89 25000
F +353 1 89 25001
www.water.ie

Planning Application No. 21/5239

Date Lodged with Planning Authority: 07.05.2021

Development:
Infrastructure upgrade works to include the construction of an above ground 790cu.m mains-fed circular galvanised, butyl lined steel firewater supply tank, a pumphouse and associated pipework to supply sprinkler systems and site fire hydrants and the construction of a new 2,000cu.m firewater retention pond, associated pipework and a control building with associated site works which includes installation of berms and a new 2.4m high palisade fencing. This application relates to an which has an Industrial Emissions License (PO091-02). A Natura Impact Statement will be submitted to the planning authority with the application.

Location :
The existing LEO Pharma facility, Wallingstown Little Island, Co. Cork

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215239-02/06/2021-Statutory Reports Received - Irish Water

IW Recommendation: **Further Information Required**

IW Observations:

Irish Water records indicate the presence of water/waste infrastructure which may be impacted by the proposed development.
There is an existing watermain/public sewer in the vicinity of the property that may be impacted by the proposed extension. The applicant is shall engage with Irish Water and pending the outcome of any assessment, proposals by the applicant to build over or divert existing water or wastewater services shall be agreed Irish Water prior to works commencing and if required enter a Diversion/Buildover agreement prior to the commencement of the development and adhere to the standards and conditions set out in that agreement.
Enquiries can be made at https://www.water.ie/connections/developer-services/diversions/.

Signed on Behalf of Irish Water: Maria O'Dwyer

Date: 02/06/2021

Planning Department
02 JUN 2021
Cork County Council
County Hall
Cork.

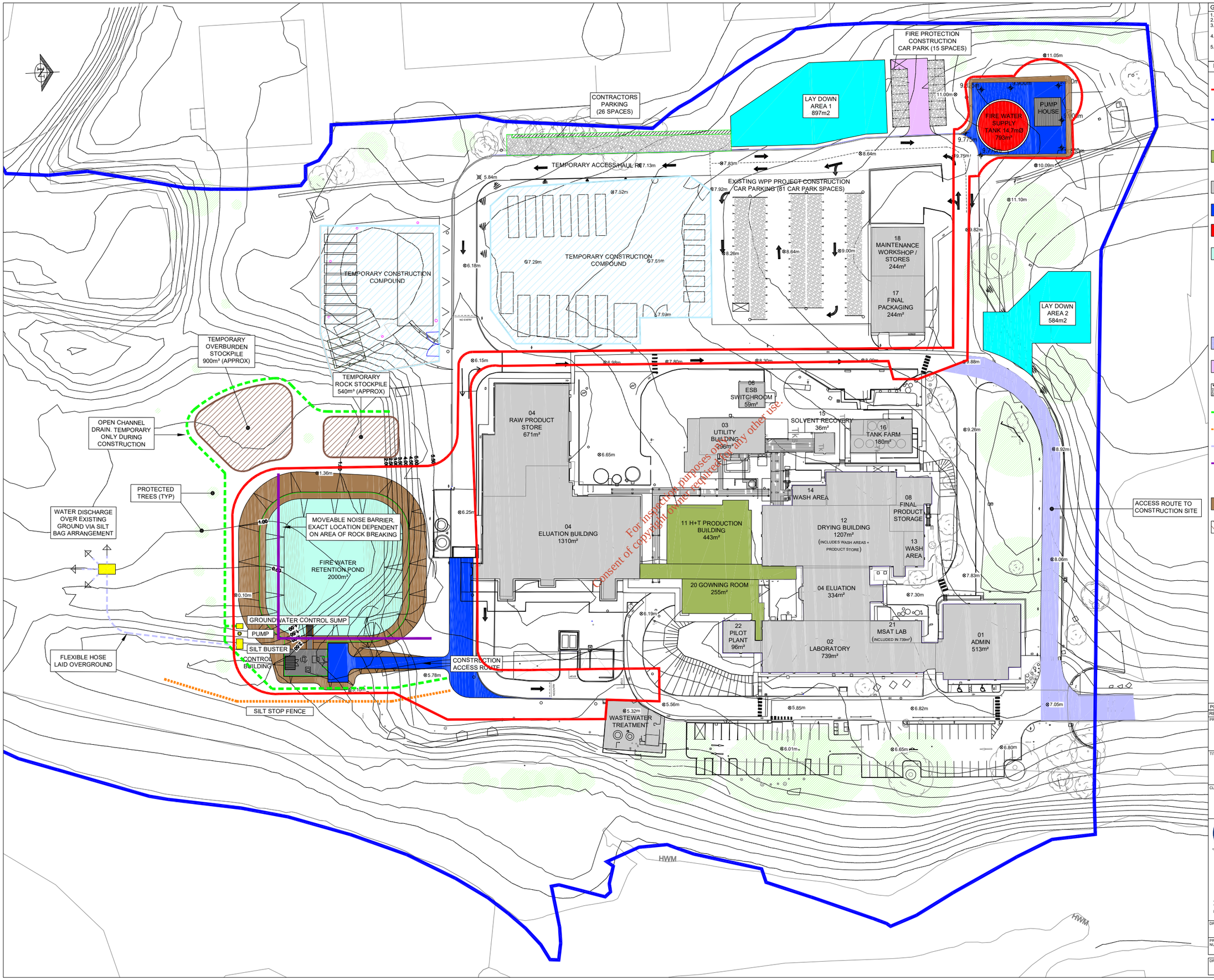
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Appendix 2.1

CEMP Site Layout Plan

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GENERAL NOTES :

1. DO NOT SCALE FROM THIS DRAWING.
2. USE FIGURED DIMENSIONS IN ALL CASES.
3. VERIFY DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE DESIGNERS IMMEDIATELY.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE DESIGNERS SPECIFICATION.
5. © THIS DRAWING IS COPYRIGHT AND MAY ONLY BE REPRODUCED WITH THE DESIGNERS PERMISSION.

LEGEND:

- LAND SUBJECT TO THIS PLANNING APPLICATION REF 21/05239 (OUTLINED IN RED)
  LANDS ADJOINING, ABUTING OR ADJACENT TO LANDS SUBJECT TO THIS APPLICATION UNDER THE CONTROL OF THE APPLICANT (OUTLINED IN BLUE)
- BUILDING UNDER CONSTRUCTION (Planning Ref 18/4614)
- EXISTING BUILDING / PROCESS AREAS
- PROPOSED ROADWAY / HARDSTANDING
- PROPOSED Ø14.7m FIRE WATER SUPPLY TANK (FIRE FIGHTING)
- PROPOSED FIRE WATER RETENTION POND
- PROPOSED PUMP HOUSE & CONTROL BUILDING
- 5.78m — EXISTING LEVEL
- 6.00m — PROPOSED LEVEL
- CONSTRUCTION SITE ACCESS ROUTE
- TEMPORARY CAR PARK TARMAC SURFACE
- TEMPORARY CAR PARK STONE SURFACE
- OPEN CHANNEL DRAIN
- SILT STOP FENCE
- OVERGROUND FLEXIBLE HOSE
- NOISE BARRIER
- TREE ROOT PROTECTION ZONE
- GRADED EARTHWORKS
- TEMPORARY SPOIL STORAGE AREAS

REV	DATE	DESCRIPTION	BY	APP
P01	29/07/21	ISSUED FOR INFORMATION	MJ	DC

PROJECT:
LEO PHARMA - FIRE PROTECTION PROJECT

TITLE:
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN
SITE LAYOUT

CLIENT:
LEO PHARMA CORK, WALLINGSTOWN, LITTLE ISLAND

Malachy Walsh and Partners
Engineering and Environmental Consultants
Cork | Tralee | London | Limerick
Park House
Mahon Technology Park
Bessboro Road
Blackrock
Cork
T12 X251
Tel :+353 (0)21 4536400
E-mail :cork@mwp.ie

DRAWN:	CHECKED:	APPROVED:
MJ	JD	DC

PROJECT NUMBER:	DATE:	SCALE @ A1:
22102	July 2021	1:500

DRAWING NUMBER:	STATUS:	REV:
22102-MWP-ZZ-ZZ-DR-C-5301	S2	P01

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Appendix 4.1

Results of Planning Enquiry

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22/11/2019	*19/6783 ABP Ref 307938	Belvelly Marino Development Company DAC, Belvelly Port Facility, Marino Point, Cork	Demolition, site infrastructure improvements, and utility upgrade works to stabilise the existing site and to provide capacity for future industrial development proposals at the Belvelly Port Facility.
22/01/2020	*19/5706 ABP Ref: 305481-19 Permitted	Amarenco Solar Cobh Ltd Ballynacrusha, Cobh.	A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 12 hectares,
06/10/2020	20/5135 ABP Ref: 308434	Oscar Fusion Ltd Newtown, Ringmeen, Cobh, Co. Cork.	The construction of 21 no. apartments in 5 no. three-storey buildings (block A,B,C,E & G); 6 no. apartments in 1 no. three/four storey building (block F); and 3 no. two-storey townhouses (block D), together with all associated services and site development works

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02/04/2019	194261 Permitted	Mijos Developments Limited Cooline, Ballyvoloon, Cobh.	Demolition of sports pavilion and construction of 280 no. dwelling houses, creche, sports pitch, 3 no. recycling facilities, 2 no. ESB sub-stations and associated site works - Extension of duration of permission granted under Planning Reg. No. 05/2345 and 14/4847.
15/04/2019	194922	Harbour Point Warehousing and Logistics Limited Harbour Point Business Park, Courtstown, Little Island, Co. Cork	Four Strategic Logistical, storage and distribution warehousing/light industrial units with a total floor area of 19,064.3m2 incorporating 2,670m2 office accommodation, ESB sub-station, 2No. sprinkler tanks, 3No. security Kiosks, 5No. bicycle shelters, Associated site signage (5No. 1.8m high totem signs and 1No. curved entrance sign), new site entrance access point and one emergency fire truck access off existing Estates Road, site levelling and contouring, 5no. waste compactors, Truck loading, hardstanding and truck parking bay areas, 215No. parking spaces to include 205 regular and 10no.

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			disabled spaces and all other ancillary and associated site development works including landscaping.
21/05/2019	195276	Harbour Point Warehousing and Logistics Limited Harbour Point Business Park, Courtstown, Little Island, Co. Cork	Five number strategic logistical, storage and distribution warehousing/light industrial units in four number buildings, incorporating office accommodation within, ESB sub-station, 2No. sprinkler tanks, 3No. security kiosks, 5No. bicycle shelters, associated site signage (5No. 1.8m high totem signs and 2 no. curved entrance signs), provide a new public footpath, two number site entrance access points and one emergency fire truck access, site levelling and contouring, 5no. waste compactors, truck loading, hardstanding and truck parking bay areas, 215 no. parking spaces to include 205 regular and 10 no. disabled spaces, 10 no. electric car charging points and all other ancillary and associated site

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			development works including landscaping.
09/08/2019	195995	JPEC Partnership Wallingstown, Little Island, Co. Cork	Revisions to existing building (warehouse and transport logistics with ancillary office use) Previously permitted under reg. ref. 15/4447 and 15/5254 to include, 1. Construction of a lobby extension, 2. Demolition of part of building, 3. Omission of previously permitted extension and dock levellers, 4. Alterations to roof heights, 5. Alterations to elevations and all associated works.
10/09/2019	196222	Forge Hill Properties Limited Wallingstown, Little Island, Co. Cork	To carry out alterations and construct new extensions at existing light industrial building. The proposed works include: Demolition of existing plant rooms at northern side of building and construction of new single-storey extension for light industrial use with ancillary storage and plant rooms, together with alteration of roadway and underground services and associated

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			site works to facilitate the extension, demolition of office area stairwell and canopy and office entrance canopy and construction of new two-storey office extension with elevational alterations to the existing two-storey office area at east elevation together with changes to car-parking layout and associated site works.
20/09/2019	196303	IBC Bulk Bags Ltd Unit 08, Euro Business Park, Ballytrasna, Little Island, Co. Cork.	Retention of first floor for light industrial use. Permission is sought for a two storey extension to the side of the existing two storey light industrial unit and alterations to existing front and side elevations to include new cladding and windows along with new signage and all associated site works.
21/11/2019	196777	Right Price Carpet and Furniture Centre (Cork) Ltd, T/A Ez Living Furniture Harbour Point Business Park, Courtstown, Little Island, Co. Cork	The construction of 2 no. warehouse buildings with total floor areas of 4,666m2 and 4,860m2 respectively, along with a car park area, hardstanding areas, entrance off existing estate road, site levelling and contouring works and

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			all associated site development works on a site of 2.44 hectares.
21/11/2019	196778	Upjohn Manufacturin g Ireland Unlimited Company Wallingstown, Little Island, Co. Cork	The construction of a roof top extension, elevation change and new personnel door to be added to the existing utility building and all ancillary site development works. The proposed development is for modifications to an establishment to which the Major Accident Directive applies and is for the purposes of an activity requiring an Integrated Pollution Prevention and Control Licence (now Industrial Emissions Directive Licence).
			Construction of a new single-storey extension for the surface treatment (anodising) of aluminium sections, underground services and associated site works at the existing light industrial building. This application relates to development which consists of an activity for which an Industrial

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			Emissions Directive license under Part IV of the Environmental Protection Agency act 1992 (as amended) is required. An Environmental Impact Assessment Report (E.I.A.R) and Natura Impact Statement (N.I.S) are also required and will be submitted to the planning authority with the application.
13/12/2019	196964	Architectural and Metal Systems Limited Wallingstown, Little Island, Co. Cork	Construction of a new single-storey extension for the surface treatment (anodising) of aluminium sections, underground services and associated site works at their existing light industrial building. This application relates to development which consists of an activity for which an Industrial Emissions Directive License under Part IV of the Environmental Protection Agency act 1992 (as amended) is required. An Environmental Impact Assessment Report (E.I.A.R) and Natura Impact Statement (N.I.S) are also required and will be submitted to the planning authority with the application.

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20/12/2019	197073	Greenvalley Transport & Plant Hire Ltd. Lower Courtstown, Little Island, Co. Cork	Construction of truck haulage depot including site office, water and diesel storage sheds, truck washing with percolation area, re-location of vehicular entrance, HGV parking, new footpath, palisade fencing and all associated site works.
13/08/2019	195607 (Permitted on 13th August 2019)	Cork Dockyard Holdings, Rushbrooke, Cobh.	Development of two waste facilities; a metal recycling facility and a recovered waste storage facility
28/08/2019	195706 Permitted 28th August 2019,	Amarenco Solar Cobh Ltd Ballynacrusha, Cobh.	A 5 MW solar farm comprising approximately 22,200 photovoltaic panels on ground mounted frames within a site area of 12 hectares,
21/02/2020	204350	Liam Davis Courtstown, Little Island, Co. Cork	To construct a warehouse building consisting of five separate units for light industrial / warehouse use, parking and yards, entrance off existing estate road and all associated site works.

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22/07/2020	205549	South Coast Logistics Ltd. Inchera Little Island Co. Cork	Construction of a renewable bioenergy plant to generate up to 4MW of electricity from 90,000 tonnes of non-hazardous biodegradable waste per annum utilising anaerobic digestion (AD) technology on a 2.01 hectares site. The proposed plant will comprise the following elements: (1) Demolition of the existing decommissioned waste water treatment plant and associated ancillary buildings and the existing utility building located on the east side of the site (c.1425sqm footprint); (2) Main processing building (c.4500sqm floor area up to 14.5m high) incorporating feedstock reception and processing areas, digestate treatment areas, dewatering and storage areas, quarantine areas and the odour control system (c. 12m high, 773sqm floor area) and 25m high stack; (3) Service yard area including 2no. weighbridges, weighbridge office (c.435m high and 17sqm floor area), 2no. car parking

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			spaces, bunded vehicle refuelling area (c.56sqm floor area) with diesel storage tank (2500 litres), workshop (c. 7m high and c. 70sqm floor area), and 1no. wheel wash; (4) Tank farm (c.2900sqm footprint) encompassing 4no. digester tanks (up to 25.5m max. height, c. 5000 metres cubed), 4no. grit removal buffer tanks (up to 24m max. height, c. 630 metres cubed), 2no. post-digestion buffer tanks (up to 24m max. height, c. 630 metres cubed) and 2no. pasteurisation tanks (up to 19m max. height, c. 217metres cubed), 2no. post pasteurisation and sludge storage tanks (up to 24m max. height, c. 630 metres cubed), 1no. process water tank (up to 25.5m max. height, c. 1280 metres cubed), 1no. concentrate tank (up to 10m max. height, c. 240 metres cubed) , 4no. chemical storage tanks (up to 5m max. height, c. 48.1 metres cubed), total 20no. tanks in the tank farm, to include a stairwell tower (up to 25m

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			max. height), gantry walkways, 3m high bund wall, 2no. bund access stairs, and 6no. tank emergency access ladders; (5) 2no. enclosed Combined Heat and Power (CHP) 2MW engines (c. 3.6m high and c.66sqm floor area each), 29m high CHP stack, c.14m high gas storage dome (1800 metres cubed) with 4no. lightning rod electrodes (c.18m high), 8.2m high biogas flare stack, gas treatment equipment enclosed in a c.1.8m high container (c.31sqm floor area) containing a gas booster and dryer and a c.2.5m high container (c.79sqm floor area) containing a boiler, 10m high boiler stack, 3no. bunded electrical transformers (c.5m high with 1m high bund wall and c.117sqm floor area), c.3.0m high substation (c.70sqm flo
04/01/2021	205627	Portfolio Concentrate Solutions UC (PepsiCo Ireland). Ballytrasna	An extension to the existing production building, expansion of the site utility services, and provision of a new waste water treatment plant at this site. The

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		Little Island Co. Cork.	proposed development will comprise of: (i) a three storey 1,723 sqm extension to a maximum height of 21.145m, including roof mounted equipment, to the north-west side of the existing single storey production building (maximum height of 9.35m), (ii) expansion of the utility yard to the west and north of the extension which will include; a chilled water system and buffer tanks, a clean-in-place system, a bunded diesel storage tank, a diesel generator and associated flue, a new boiler flue, a juice unloading bund, a 24 sqm single storey extension to the sprinkler pump house, and associated equipment access platforms and pipe racks (iii) a 118 sqm single storey chemical drum store lean-to enclosure (iv) a new waste water treatment plant, which will include c.1,856 sqm area of bunded tanks, a 165sqm single storey control building, a 64 sqm single storey electrical substation building, and a

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			reconfigured access from the public road (v) the decommissioning and relocation of 40 No. existing car parking spaces from the existing R&D facility to a proposed extension to the car park (under construction) permitted under planning application reference 19/06776, and the addition of 13 No. new parking spaces (vi) temporary contractor's compound, and (vii) all associated underground services, site development works and landscaping. The proposed development will also include the demolition and removal of redundant structures and equipment and the decommissioning of the existing waste water treatment plant. An Environmental Impact Assessment Report (EIAR) has been prepared and will be submitted to the Planning Authority with the application.
29/10/2020	205659	Upjohn Manufacturing Ireland Unlimited Company. Wallingstown	a)The demolition of a 6.3 sq.m modular type environmental monitoring building, b) the construction of a 47.8

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		Little Island Co. Cork.	sq.m single storey cylinder charging building, c) the construction of a 9 sq.m single storey environmental monitoring building and d) all associated site works. The site currently operates under an Industrial Emissions (IE) licence (PO 136-04) under part IV of the Environmental Protection Agency Act 1992 (as amended for the Protection of the Environment Act, 2003). The new development is on a site to which the Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) regulations 2015 (S.I. 209 of 2015) applies.
02/10/2020	206155	Transport Infrastructure Ireland, Inchera, Little Island, Co. Cork	A proposed saltbarn. The application will involve the construction of a 3-bay 1,223sqm salt barn and machinery store and all associated works. This application is accompanied by a Natura Impact Statement.

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21/12/2020	206851	Portfolio Concentrate Solutions UC. Little Island Business Park Ballytrasna Little Island Co. Cork.	(1) The demolition of the existing Emerald and Inis Buildings. (2) the construction of a two storey research and development facility that includes laboratories, offices, training/meeting rooms, kitchen, canteen area, WCs, open courtyard, open plant area to rear at first floor level, storage areas, link at ground and first floor level to the existing research and development facility. (3) the existing canopy walkway to the rear of the O'Neill's building to be demolished. (4) The construction of a new 2.5m wide footpath and cedar clad boundary fence to the south and east of the building to match existing with sliding gates and pedestrian/turnstiles and the replacement of the existing chain link fence with new chain link fence to the northern boundary. (5) the construction of a new service yard and associated vehicular entrance to the east of the building, waste compound and gas

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			bottle storage area. (6) the installation of roof top mounted plant, flues and 60m2 of photovoltaic solar panels. (7) the installation of a new bicycle stand, new road crossings a revised parking layout to the east of O'Neill's Building and all associated site works.
29/06/2021 Application Finalised	215225	Wallingstown, Little Island, Co. Cork	The development of an 110kV substation at the former Mitsui Denman site. The proposed substation will comprise of: a two-storey Gas Insulated Switcher (GIS) 110/20kV substation building, an associated single storey Gas Insulated Switchgear (GIS) 20kV substation building, associated outdoor electrical equipment, including filter banks, transformers, cable sealing ends and surge arresters, two number lightning protection masts (12.5 metres in height), associated internal access road, boundary treatment including substation perimeter fencing and all ancillary site development works. Construction of two number 110kV

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			underground cable ducts between the proposed substation and the existing Eirgrid 110kV substation to the North in Wallingstown. The site area of the proposed substation is approximately 0.60ha. The proposed substation is to support development in the Wallingstown area in Little Island. - Extension of duration of permission granted under planning reference: 16/5606.
29/06/2021 Application Finalised	215226	Viatris Manufacturing Ireland Unlimited Company Wallingstown Little Island Co. Cork	Data centre development on a site formerly occupied by Mitsui Denman. The proposed development provides for the construction of 3 no. data centre buildings as one development or in phases. The proposal will modify an existing consent for 3 no. office buildings and access infrastructure at the site consented under 07/12475, as extended under 15/5450, so that one permitted office building is omitted and the permitted access off the R623 is also omitted in favour of a priority junction at the R623 with the permitted remaining offices accessed off the proposed internal

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			access road. The proposed development also includes demolition of existing structures, ancillary services and site works, connections to permitted infrastructure, landscaping and associated boundary treatments, provision of ancillary structures including 3 no. security buildings, 3 no. waste compounds, a utility building, water tank and fencing, ground works with associated localised level changes and car parking.- Extension of duration of permission granted under planning reference: 16/5011.
19/08/2021 Application Finalised	215403	Viatris Manufacturing Ireland Unlimited Company Wallingstown Little Island Co. Cork	The erection of a 50.35m2 single storey modular server room to the west of the existing security building and all ancillary site development works. The site currently operates under an Industrial Emissions (IE) licence (PO136-04) under part IV of the Environmental Protection Agency Act 1992 (as amended for the Protection of the Environment Act, 2003). The new development is on a site to which the Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances)

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			regulations 2015 (S.I. 209 of 2015) applies.
29/07/2021 Further Information Requested	215574	Tapella Ltd, Hoffmann Park Inchera Little Island Co. Cork	Proposed change of use/alterations of an existing pharmaceutical facility building to a data centre including ground and first floor extension to the existing building. The proposed development will include demolition of an existing storage shed, connection to existing mains services and provision of ancillary plant/services including 3 no. chillers, 1 no. fuel storage tank, 3 no. generators, 1 no. medium voltage electrical substation, and 3 no. switch rooms, together with all associated site works.
06/08/2021 New Application	216173	Harbour Point Warehousing and Logistics Limited Harbour Point Business Park Courtstown Little Island Co. Cork	The demolition of an existing structure and existing hardstanding areas, and the construction of a business park comprising 5no. single-storey light industry /warehousing/distribution/logistics buildings (B1-B5) ranging in size from c.2,600.7m2 to c.7,602.8m2 (total c.

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			23,534.2m2) each to include a 2-storey internal ancillary office area, apart from building B3 where the 2-storey ancillary office area is external; external yard areas; dock levellers; 3no. substations; single-storey security hut (to include rooftop solar PV panels); car parking, cycle parking, motorcycle parking and truck parking; internal palisade fencing; tree protection fence; signage, including a stand-alone totem sign; 1no. new vehicular/pedestrian/cyclist access and 1no. new gated pedestrian and cycle access; closure of 2no. existing accesses; shared pedestrian/cycle path on the public road (L7078); and all site development, drainage, lighting, boundary treatment and landscaping works. A Natura Impact Statement will be submitted to the Planning Authority with the application.

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06/09/2021 New Application	216440	BASF Ireland Limited Inchera Industrial Estate Inchera Little Island Co. Cork	Replacement of existing 60m3 external dry goods storage silo, with 120m3 external dry goods storage silo, with external maintenance access stairway. This development is within a site to which the Major Accident Directive applies. No alteration to the existing Integrated Pollution Prevention and Control (IPPC) license is required.
06/08/2021	216173	Harbour Point Warehousing and Logistics Limited Harbour Point Business Park Courtstown Little Island Co. Cork	The construction of 2 no. Strategic Logistical, storage and distribution warehouse units, incorporating office accommodation, 2 no. bicycle shelters, associated site signage (4 no. 1.8m high totem signs), adjusted site entrance access off existing Estates Road, site levelling and contouring, 2no. waste compactors, truck loading, hardstanding and truck parking bay areas, 66 no. car parking spaces of which include, 4 no. disabled spaces, and 4 no. electric charging spaces, and all other ancillary and associated site development works including landscaping. A Natura Impact Statement will be submitted to the

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			planning authority with the application.
10/09/2021	216488	Geared Up Limited Unit 3002 Euro Business Park Courtstown Little Island Co. Cork	The change of use of the Unit 3002 from light industrial/manufacturing to a warehouse with ancillary trade counters (for the sale of building related products principally to trade). Construction of a new first floor mezzanine area for storage and a new internal stair case to link to the proposed mezzanine area. External works include a small mechanical plant area on the south elevation of the building and a new door on the north elevation to serve as entrance to the proposed trade counter areas. All works to complete the development.

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MWP

Appendix 6.1

Preliminary
Construction and Environmental Management Plan

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Malachy Walsh and Partners
Engineering and Environmental Consultants

LEO Pharma Fire Protection Project
Wallingstown, Little Island, County Cork
Preliminary Construction and Environmental Management Plan (CEMP)



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ISSUE FORM	
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Document number	6005
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Document title	Preliminary Construction and Environmental Management Plan
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Document checked by	Á. Ryan

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1 INTRODUCTION

1.1 GENERAL PROJECT DETAILS

Wexport Ltd. trading as LEO Pharma Cork (hereafter referred to as LEO Pharma) is making a planning application to Cork County Council for an upgrade to its existing firewater infrastructure at its facility at Wallingstown, Little Island, County Cork. The proposed upgrade follows a review of the existing firewater infrastructure which deemed it appropriate to upgrade both the firewater supply infrastructure, firewater drainage and firewater retention/containment infrastructure.

The aim of the proposed upgrade works is to provide LEO Pharma with adequate fire water storage/supply and firewater retention infrastructure to enable the site to address potential firewater demand and safe capture of firewater run-off, during a fire event.

1.2 CEMP PURPOSE AND OBJECTIVES

Construction Environmental Management Plans (CEMP) are prepared in order to ensure that the project is constructed in accordance with Best Practice, with the minimum impact on the surrounding environment.

The purpose of a CEMP is to outline how the Contractor(s) will implement a Site Construction Management System to meet the specified requirements which include contractual, Regulatory and Statutory Requirements, Environmental Mitigation Measures and Planning Conditions.

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It outlines the environmental risks posed by the construction works: how risks are to be managed; and assigns responsibilities for ensuring the effective implementation of this plan.

This preliminary Construction and Environmental Management Plan (CEMP) outlines construction practices and environmental management measures which are to be implemented during the construction phase of the project in order to ensure that the project is constructed in accordance with best practice and with the minimum impact on the surrounding environment. This preliminary CEMP is for planning purposes only and a more detailed CEMP that is cognisant of the proposed construction activities, equipment and plant usage will be produced at construction stage by the appointed contractor.

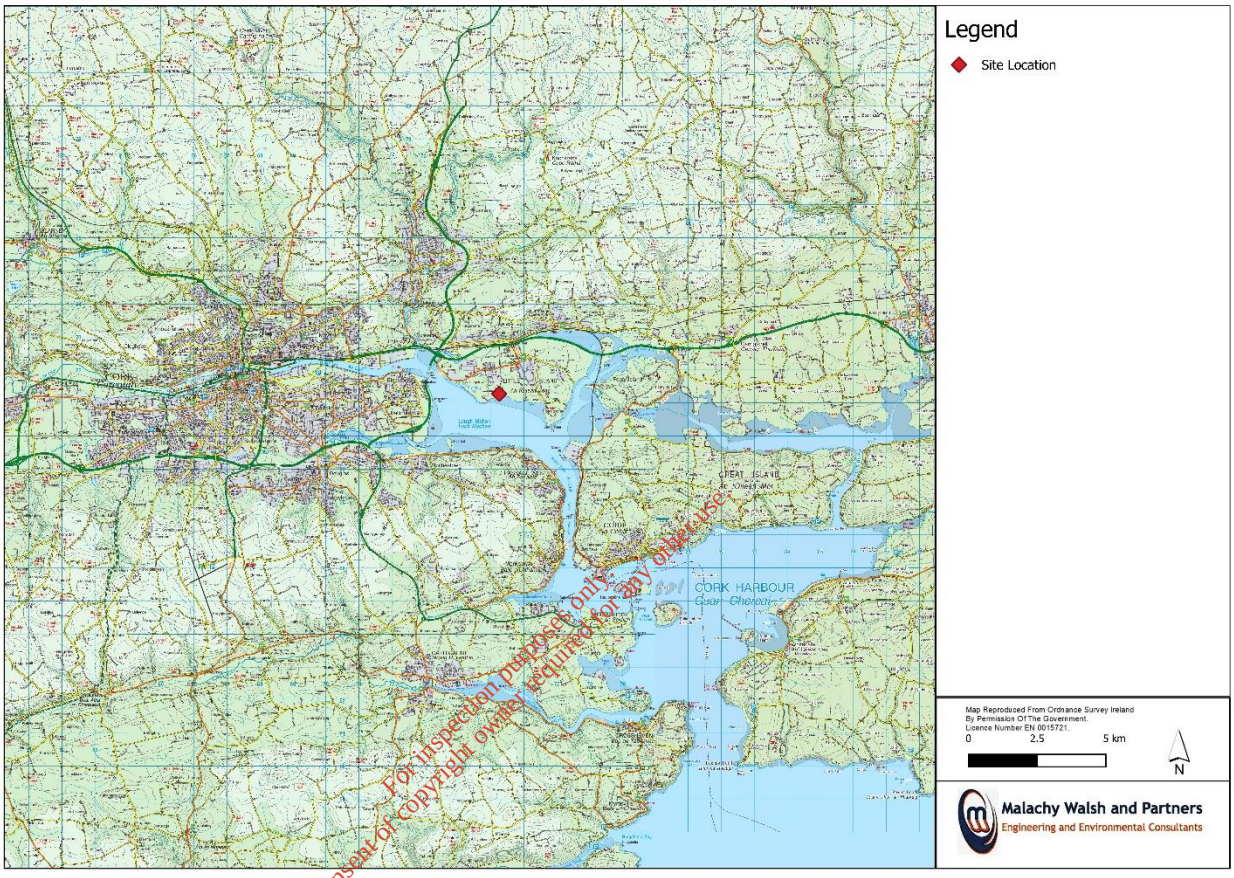
The preliminary CEMP achieves this by providing the environmental management framework to be adhered to during the construction phase of the proposed development. It outlines the work practices, construction management procedures, management responsibilities, mitigation measures and monitoring proposals that are required to be adhered to in order to construct the works in an appropriate manner.

All site personnel will be required to be familiar with the plan's requirements as related to their role on site. There will be a requirement on the Appointed Contractor that details are updated with progress, including the roles and responsibilities of those appointed on the site for the construction of the project.

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1.3 SUMMARY OF PROPOSED WORKS

The proposed firewater supply and retention systems are designed in line with EPA Guidance Note to Industry on the Requirement for Fire-Water Retention Facilities, 2019. The main elements of the proposed works are outlined below. The site location is shown on **Figure 1** below. The **Construction and Environmental Site Layout Plan** which outlines the site layout and the physical environmental mitigation measures is provided in **Appendix 1**.



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Figure 1 Site location

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1.3.1 Firewater Supply

The proposed firewater infrastructure comprises:

- A new mains-supplied 790m^3 circular galvanised, butyl lined steel Firewater Supply Tank: 4.8m high and 15.5m diameter. The tank will be supported on a reinforced concrete slab.
- Pumphouse to comprise:
  - a 6.85m x 8.85m rendered and insulated cavity block wall structure, with sloped Kingspan roof, varying in height from 2.56m to 3.2m.
  - 200mm reinforced floor with underlying insulation and DPM & Radon barrier.
- New supply to the firewater supply tank from the public water supply, downstream of the existing meter at the site entrance.
- 2 No. new firewater delivery mains constructed from the Pumphouse to buildings fitted with sprinkler systems and connection to new and relocated hydrants.
- Connection of the new system to the existing Fire Alarm & Site Control Systems.
- 4 No. new fire hydrants connected to the new firewater delivery mains.
- The existing fire main shall be left intact and continue to supply the remaining site hydrants from the public water supply.

1.3.2 Firewater Retention

The Firewater retention infrastructure will comprise the following principal elements:

- A new 2,000m^3 Firewater Retention Pond will be constructed and located in the south eastern corner of the site to collect all diverted water by gravity flow. Its location will also facilitate return pumping to the storm outfall or Effluent Balancing Tank, depending on suitability. It shall be capable of retaining the full fire flow, if used during a fire event and also the 24-hour 10-year rainfall event as prescribed by the EPA Guidance Document.
- New valved diversion chambers and pipelines on the existing process and surface water pipeline infrastructure to divert potential firewater (used) to the firewater retention pond.
- New firewater retention return pumps and return flow rising mains to the existing Effluent Balancing Tank in the wastewater treatment area/Stormwater Outfall.
- Return Pumps Control Building, 4m x 3.41m. (This control building shall also serve to facilitate controls for the proposed Diversion Chambers valves and future TOC monitors where required)
- Connection of the new system to the existing Fire Alarm & Site Control Systems.
- The retained Fire Water will remain in containment until such time as it can be tested for contaminants / pollutants.
- Should tests prove that the retained storm water poses no threat (in the event of an accidental trigger of the alarm) it can be pumped to the site's storm water outfall. However, if the tests confirm that the retained diverted water is contaminated, then it will be pumped to the on-site effluent balancing tank for further treatment or be tankered off-site for disposal.

1.3.3 Construction Method

The main elements of construction activity include the following:

- Site setup and separation of the construction site from the active production site.
- A Construction Compound will be constructed within the site. This will accommodate Contractor personnel, Portacabins, storage containers and some Lay Down Area for light goods. It will be enclosed in secure hoarding. The Compound will be removed at the end of the works.

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Firewater Supply Tank:

- Strip soil/overburden on the footprint of the area
- Construction of new mains supplied 790m^3 circular galvanised, butyl lined steel Firewater Supply Tank: 4.8m high and 15.5m diameter. The tank will be supported on a reinforced concrete slab.
- Construction of pumphouse to comprise:
  - a 7m x 7.5m rendered and insulated cavity block wall structure, with sloped Kingspan roof, varying in height from 3.4m to 4.3m.
  - 200mm reinforced floor with underlying insulation and DPM & Radon barrier.
- Installation of 2 No. new firewater delivery mains constructed from the Pumphouse to buildings fitted with sprinkler systems and connection to new and relocated hydrants.
- Connection of the new system to the existing Fire Alarm & Site Control Systems.
- Installation of 4 No. new fire hydrants, connected to the new firewater delivery mains.

Firewater Retention:

- Erection of 3m noise barrier along eastern and southern perimeter of proposed pond.
- Construction of shallow retention pond for collection of construction phase surface water run-off.
- Strip site of overburden and bulk excavation generally consisting of made ground and some bedrock.
- Construction of the new 2,000m^3 Firewater Retention Pond. The pond will be lined with a geomembrane layer on 50mm of fine quarry dust on 300mm of compacted liner based over a compacted sub-base. A drainage layer will surround the pond structure and the pond will be surrounded by security fencing.
- Berms will be constructed around the proposed firewater retention pond using site won suitably graded rock overlain by subsoil and topsoil and finished with grass seed. The berms will have a crest elevation of 4.0mOD.
- Construction of new valved diversion chambers and pipelines on the existing process and surface water pipeline infrastructure to divert potential firewater (used) to the firewater retention pond.
- Construction of new firewater retention return pumps and return flow rising mains to the existing Effluent Balancing Tank in the wastewater treatment area/Stormwater Outfall.
- Construction of 4m x 3.41m return Pumps Control building.
- Connection of the new system to the existing Fire Alarm & Site Control Systems.

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1.4 PROPOSED PROGRAMME DURATION

The construction of the project will be carried out over a period of 5 - 8 month.
A detailed programme for the works will be developed prior to construction stage as this can be influenced by the delivery of key elements of heavy equipment and also depends on manufacturing/operations planning.

1.5 WORKING HOURS

Construction working hours are typically from 07.30 to 19:00 Monday-Friday and 8.30 to 15:30 on Saturday, as required. No activity on Sundays and Public Holidays. The hours worked may vary within the above hours, depending on the main contractor and the programme of works which will also see specialist subcontractors having to work different hours which are directly related to a key element of plant or equipment being installed or commissioned. It is envisaged that the working week, as outlined above will be typical for a project of this scale and complexity.

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As part of the construction management plan for the project, all aspects such as working hours, and sequence will be agreed at the outset with the project team which will comprise of the LEO Pharma Construction Management Team, the Main Contractor and the Design Consultants involved. A clear strategy will be agreed and consultation with Cork County Council and relevant stakeholders.

During the construction of the Firewater Supply Infrastructure and Retention Pond, the number of construction employees on site will vary between 5 and 20 personnel.

These figures include construction operatives in addition to construction management and administrative personnel. It is intended that many of the construction workers will be based in the local area, travelling from Cork and surrounds to the construction site each day as required.

1.6 PLANT & EQUIPMENT

Typical plant and equipment required for the construction phase of the proposed development are listed below in **Table 1**. The list outlined below is typical of a project of this scale.

Table 1 Key construction equipment

Description	Purpose	Approx. No.
Tracked excavators	Excavation, substructures, drainage	1
Rock ripper/breaker	Excavation of rock	1
Dump truck	Excavations, drainage, landscaping, movement of materials	1
Mobile crane	Movement of large materials and plant	1
Ready-mix concrete trucks	Delivery of concrete to site for new structures, slabs, substructures etc	1
Pump unit for ready-mix concrete	For placement of concrete	1
HGV – 20 foot trailers	Delivery of materials, steel, concrete blocks, components etc	1
Small tools – grinders, saws, drills, Kango hammers, powerfloats, water pumps, concrete vibrators etc.	For use during all stages of construction	1

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1.7 CONCURRENT SITE WORKS

The proposed development is being undertaken on land within an existing operational production facility.

Construction works are currently underway on a new extension to the production building as per Planning Reference 18/4614, which commenced construction in January 2020 and has an expected completion date of June 2022. All underground infrastructural services and excavations for foundation works are complete. The building frame has been erected and external cladding has commenced. Completion of external cladding and internal fit-out are ongoing. A separate CEMP has also been produced for this project.

A separate CEMP has been produced for the construction of the extension for the production building.

The Contractors appointed for each project will be required to coordinate on all matters relating to the requirements of the respective CEMPs and site health and safety.

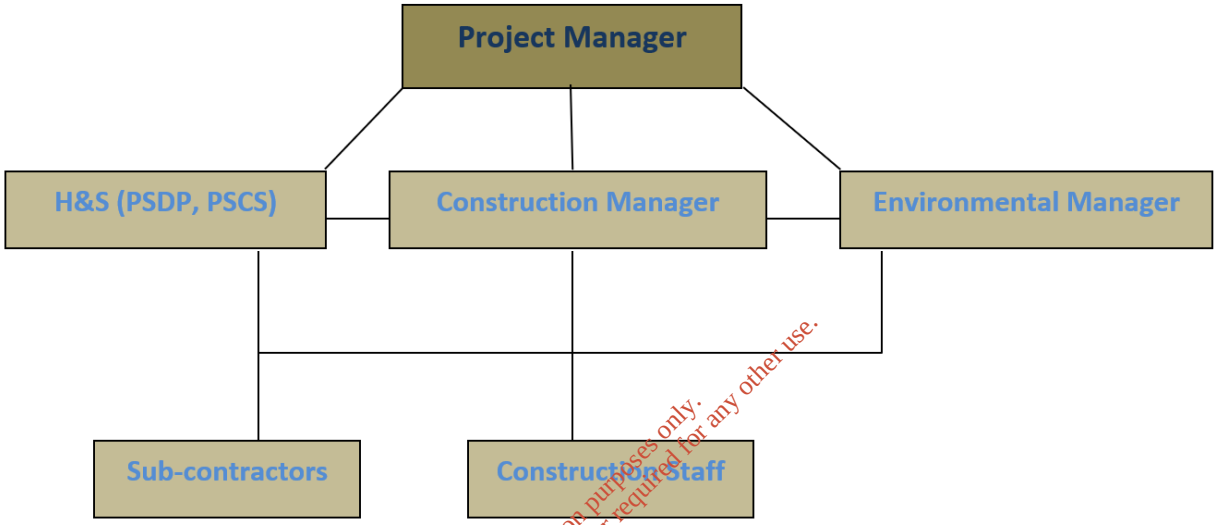
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2 MANAGEMENT AND RESPONSIBILITIES

2.1 ON SITE ORGANISATIONAL STRUCTURE AND RESPONSIBILITY

An example of an Organisational Structure for the Contractor's Project Team is included below. This structure will be defined by the Contractor and will include the names of the assigned personnel with the appropriate responsibility and reporting structure reflected.

The appointed Contractor will be *required to finalise the Organisational Structure* for the project to oversee this CEMP and to outline the specific responsibilities for the roles required.



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2.2 DUTIES AND RESPONSIBILITIES

The general role of key people on site implementing the CEMP will be;

Project Manager:

- Liaises with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project team.

Construction Manager:

- Liaises with the Environmental Manager when preparing site works where there is a risk of environmental damage and manages the construction personnel and general works.

Design Engineer:

- Undertakes and certifies the Design and supervises the standard of works, including geotechnical aspects (Geotechnical engineer may need to be consulted).

Environmental Manager: ensures that the CEMP is developed, implemented and maintained.

Other roles may be outlined as follows;

- Health and Safety (PSDP and PSCS)
- Project Archaeologist (report to the Environmental Manager)
- Project Ecologist (report to the Environmental Manager)
- Geotechnical Engineer (as required by Design Engineer)

The roles and responsibilities outlined below are indicative and will be updated on the appointment of the main contractor (Contractor). Details of the personnel and their responsibilities must be added to the CEMP. An outline of potential roles is provided in **Appendix 2** but will require revision by the appointed contractor.

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3 ENVIRONMENTAL COMMITMENTS AND BEST PRACTICE

3.1 ENVIRONMENTAL MANAGEMENT PLANS (EMP)

A number of outline environmental management plans (EMP) have been prepared for managing the impacts of Construction Activities associated with the proposed development. See **Table 2** below. Prior to commencement of construction these plans are to be updated and implemented by the Appointed Project Manager and/or Project Contractor as relevant.

Once appointed, it is the Contractor's responsibility, to update and add (where required) project specific control measures relevant to the environmental management plans and procedures. The Contractor will ensure that plans/procedures are communicated to all site staff, including sub-contractors, through induction, training and at relevant meetings.

Table 2 Plans for managing Impacts of Construction Activities

Ref:	Procedure
EMP-1	Fuels and Oils management
EMP-2	Management of Concrete
EMP-3	Waste Management
EMP-4	Construction Noise
EMP-5	Dust Management
EMP-6	Water Quality Management
EMP-7	Ecology and Management of Invasive Species

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3.2 EMP-1

3.2.1 Fuel and Oils Management

Fuel Management Measures that will be employed during the Construction phase include:

- The potential for hydrocarbons getting into the existing drains and Lough Mahon will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure;
- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using;
- To reduce the potential for oil leaks, only mechanically sound vehicles and machinery will be allowed onto the site. An up to date service record will be required from the main contractor;
- Mobile bowsers, tanks and drums should be stored in secure, impermeable storage area, away from drains and open water.
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements.
- Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete and crushed stone to the site will be contractually required to supply their products using roadworthy vehicles;
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits. This contaminated material will be properly disposed of in a licensed waste facility;

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- The Environmental Manager will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary;
- The LEO Pharma EHS team will be notified immediately of any oil spill.
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery;
- Corrective action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction;
- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider.

Responsibilities

The Construction Manager and Environmental Manager are responsible for ensuring Fuel and Oils are managed in line with this procedure. The Appointed Contractor, in updating the CEMP, must designate personnel to the tasks relating to Fuels and Oil, as outlined above.

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3.3 EMP-2

3.3.1 Management of Concrete

To reduce the potential for cementitious material entering surface waters, concrete pours will be supervised by the Construction Manager, a suitably qualified Engineer and the Environmental Manager. Management Measures will include the following:

- The Construction Manager will ensure that the area of the pour is completely drained of water before a pour commences;
- Pours will not take place during forecasted heavy rainfall;
- Incidental rainfall from light showers during the period of a pour is typically absorbed into the concrete matrix but heavier showers can result in some run off from the top surface of the concrete pour. If run-off is encountered the Environmental Manager will block the outflow from the drains to retain or treat the run-off until the pH is neutral before discharge to the drainage network;
- In the event of a spillage on site, the Environmental Manager will temporarily block the dirty water drains in the immediate area and monitor the pH levels of the water in the open drainage channel and if necessary, will adjust the pH levels using CO2 entrainment. Any spillage will be cleared immediately and deposited in the Chute wash down area;
- To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site at the source quarry. Only Concrete truck chutes will be allowed to be cleaned on site at a central concrete wash out area.

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Responsibility

The Project Manager, the Construction Manager and the Environmental Manager will supervise all concrete pours.

The Environmental Manager is responsible for ensuring that appropriate water pollution prevention measures are put in place and that water sampling is carried out. Where standards are breached he/she should carry out an investigation and in conjunction with the Construction Manager, he/she should ensure remedial action is taken and further samples taken to verify that the situation has returned to normal. The Environmental Manager will also be responsible for ensuring spill kits are readily available in vulnerable locations and that booms for watercourses are long enough and have adequate anchorage.

3.4 EMP-3

3.4.1 Waste Management

A hierarchy of waste management favouring elimination of wastes over minimisation and disposal is practiced onsite. LEO Pharma is licensed by an Industrial Emissions Licence (IEL Reg. No. P0091-02), currently under review. The production of any waste associated with the project will be managed as per current operations in accordance with the IE Licence. Materials will be ordered as required to reduce the potential for waste. All waste will be removed from the site by suitably licensed contractors to appropriately licensed waste facilities and records kept and reported to the EPA.

The waste management strategy for the project will follow the accepted waste hierarchy. See **Figure 2** below.

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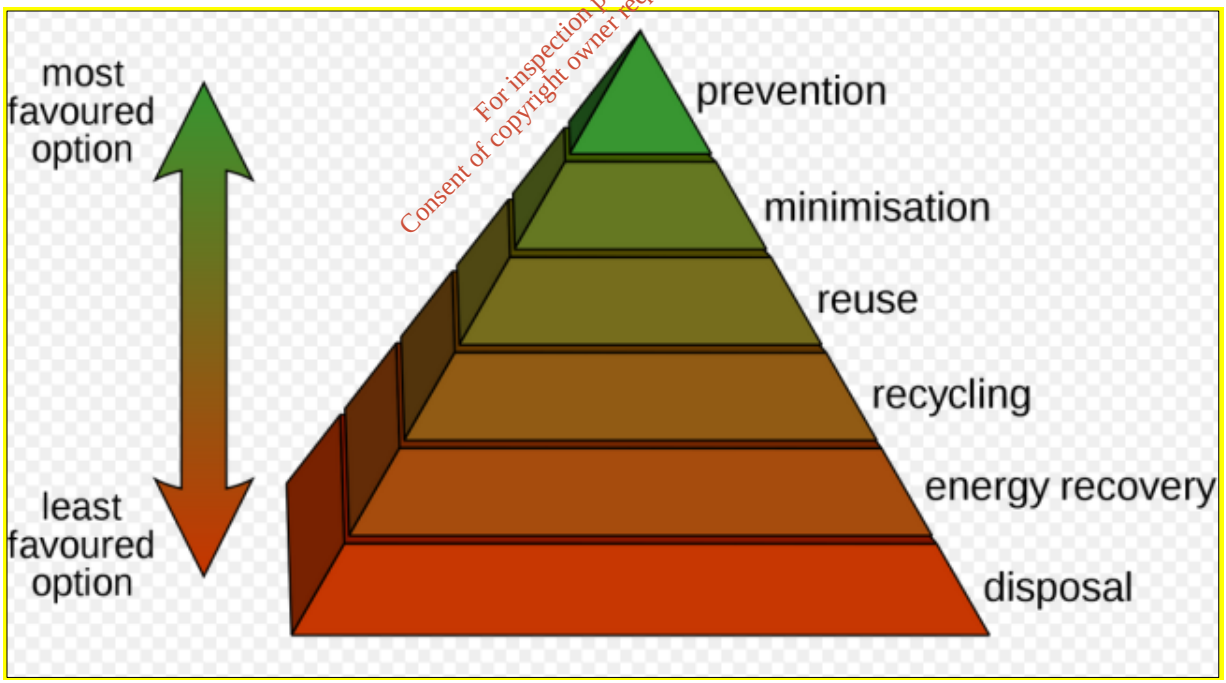


Figure 2 Waste Hierarchy

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General Waste Measures to be employed

- Access to materials will be controlled. A dedicated storage area will be provided in the immediate site area for building materials such as cables, geotexile matting, blocks, tools and equipment, fence posts and wire, booms, pipes etc;
- Access to stored materials will be restricted; the site compound will be securely fenced from the outset and will be locked when there are no site personnel present;
- To contain and manage construction phase waste, multiple skips will be provided at the storage compound; one for recyclable waste and others for various construction waste. These skips will be emptied when required by a licensed waste management company. Waste oil and waste oil drums will be collected and stored in containers and on a bunded tray within the storage container;
- The Contractor shall consider the potential to re-use existing materials on site in so far as is possible.

Waste generated during construction will include wrapping from materials, oils, filters & cleaning materials, food waste, packaging materials and dry recyclables.

All wastes will be segregated and removed off-site to an appropriately licensed or permitted waste or recycling facility.

As part of the proposal, excavation works will be required to facilitate the laying of foundations for the pump house, 2,000m^3 Firewater Retention Pond, firewater infrastructure pipes and other services. Levelling of the site will also be required, as well as the removal of hardcore and potentially some underlying soil and subsoil. It is anticipated that approximately 900m^3 of overburden, 440m^3 of weak rock, and 100m^3 of solid rock material will be excavated during the construction works. Where material excavated during the site clearance and preparatory works cannot be beneficially reused onsite within the proposed berms, excess spoil material will be transported offsite by a licensed waste contractor to a suitably permitted waste facility.

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Construction and Demolition (C&D) Waste

No demolition is planned for this project, however, there may be small quantities of soil, stone and other materials from excavations and construction works. All C&D waste will be segregated onsite, and the materials will be stored in a specifically designated area of the site. Waste contractors that have recovery facilities for different materials, will be sourced to achieve a high level of recovery and recycling. All waste taken from the site will only be removed by a permitted waste contractor. All waste that is collected from the site will be only taken to a site permitted by a Local Authority or licensed by the EPA.

Other typical measures for C&D waste include:

- An Environmental Manager will be appointed by the construction contractor to oversee and take ownership of the waste programme.
- All non-hazardous waste materials will be transferred to skips or other suitable receptacles in designated waste storage areas.
- All hazardous waste will be packaged in appropriate UN approved receptacles and stored in dedicated hazardous waste storage areas pending transportation offsite.
- All waste storage areas will be audited regularly to ensure the wastes are being segregated and stored in accordance with the CEMP.

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- If any potentially contaminated soil is encountered during the construction works, it will be segregated from all other soils, tested to confirm the classification of the soil for disposal purposes and will be collected and disposed of by a permitted waste contractor to a suitably licensed landfill.
- All waste leaving site will be recycled, recovered or reused where possible, with the exception of those waste streams where appropriate facilities are currently not available.
- Quantities of waste leaving the site will be recorded and copies of relevant documentation maintained onsite.

Responsibility

The Environmental Manager will be responsible for adherence to correct waste management procedures. They will also identify a waste contractor to remove waste that can be recycled or re-used.

The Environmental Manager will keep records provided by waste contractors of all waste being removed from site. The Environmental Manager will record waste removed from site regularly. This information will be recorded in a standard format. It will be the construction manager's responsibility to organise the removal of skips from their area when they are full.

3.5 EMP-4

3.5.1 Construction Noise

There is potential for increased noise emissions during periods of rock ripping and rock breaking. The applicant proposes to apply the following measures in order to reduce offsite impacts:

- Establish channels of communication between the contractor/developer, Local Authority and neighbours;
- Appoint a site representative responsible for matters relating to noise and vibration;
- Monitor levels of noise during critical periods and at sensitive locations in consultation with LEO Pharma EHS department;
- Maintain site access roads to avoid development of uneven surfaces (and hence vibration from lorries).
- Construction phase operations will apply guidance and recommendations included in *British Standard BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Parts 1 & 2* (2014) in order to minimise emissions where possible.
- Select plant with low inherent potential for generation of noise and/ or vibration;
- Locate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary;
- A complaints procedure will be established for the duration of the construction phase. Any complaints received regarding alleged noise and/or groundborne vibration will be investigated immediately. Details of the complainant, the complaint (time of occurrence and nature of noise/vibration) and follow up action will be logged in the complaints record;
- Erect barriers as necessary around items such as generators or high duty compressors and rock breaking equipment.

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3.5.1.1 Noise Barrier

The noise barrier proposed to be erected is a Ventac NoiseBreak (Figure 3). This is a temporary acoustic barrier for construction and industrial activities designed to reduce noise pollution by up to 30dB.

The barrier (Ventac Noise Break 10P) has a density of 12kg/m2 and consists of absorbing and insulating layers of 15-20mm thick. The material is waterproof and can withstand temperatures of up to 120OC and fluctuating weather conditions.

The location of the noise barrier is depicted on the **Construction Environmental Management Site Layout Plan**, in **Appendix 1**. This will be optimised on site to maximise its effect relative to the location of the rock breaker and Cork Harbour SPA.

The noise barrier will be erected along the eastern and southern boundaries of the fire water retention pond footprint for the duration of the rock breaking. The proposed noise barrier will be 3 m in height and must have a minimum density of 10 kg/ m2. The Ventac NoiseBreak has a higher density at 12kg/m2. This will ensure that the SPA will be exposed to noise levels below 70dB(A), below which disturbance to estuarine bird species is not predicted to occur (Cutts et al., 2013).



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Figure 3 Ventac NoiseBreak

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3.6 EMP-5

3.6.1 Dust Management

There is potential for dust to be emitted depending on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

The management of dust during construction will be reviewed at regular intervals during the to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

Dust and fine particulate emissions (PM_{10}) arising during the construction phase will be reduced and controlled via the following measures:

- All trucks departing from the site will pass through a wheel wash, which will be installed on the main site access road at the rear of the existing administration building.
- The internal paved access roads shall be sprayed during dry windy weather conditions to control fugitive dust emissions from the road surface.
- Regular maintenance of the road surface near the site entrance will be undertaken to prevent fugitive dust and PM emissions generated by passing vehicles. A mechanical vacuum road sweeper shall be used if necessary.
- Loose, fine aggregates and other similar sized building materials that can be easily re-suspended by the wind will be stored in temporary covered stockpiles in designated areas of the site.
- Maximum vehicle speeds shall be controlled to 15 km/h within the construction site areas to prevent high levels of dust being re-suspended from the internal road surfaces;
- Dampening of exposed earthwork activities and site haul roads during dry weather;
- Protective hoarding screens shall be erected around construction activities to reduce dust-blow from the site;
- Ensure there is access to a water source in close proximity to each area on site where dust is deemed most likely to occur;
- Periodic maintenance of the public road surface near the entrance will be undertaken. This will include the removal of any spillages so as to prevent the dispersion of dust along the road, which is likely to be re-suspended by passing vehicles. A mechanical vacuum road sweeper will be used if necessary;
- Any spillage of material from vehicles departing the site will be removed to prevent re-suspension of silt from the road surface by passing vehicles;
- Dust control measures will be active on equipment used for drilling or pavement cutting, grinding of block surfaces and similar types of stone finishing is taking place as significant fine particulate emissions can be generated which may cause a local nuisance;
- Stockpiles will be located away from drainage systems and soil retaining measures (silt fence/ silt curtain or other suitable materials) to reduce risk of silt run-off;
- Vehicles and plant machinery operating on-site will be properly maintained to prevent excessive emissions of particulates and other pollutants from the exhaust pipes;
- Burning of construction waste will be prohibited.

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Responsibility

The Environmental Manager is responsible for managing dust in line with best practice procedures during construction. The Construction Manager is responsible for organising dust suppression through use of bowsers and cleaners.

3.7 EMP-6

3.7.1 Water Quality Management

Additional Water Quality Control Measures - infrastructure and measures used to control water quality are described in the following sub-sections.

3.7.1.1 Open Drainage Channel

An open drainage channel will be installed around the western, southern and eastern perimeter of the proposed retention pond works. See **Appendix 1**: **Construction, Environmental Management Site Layout Plan**. This drain will collect any surface water run-off and will drain to a sump described below.

3.7.1.2 Sump

A temporary sump will be installed to a level to allow the existing overburden material from the footprint of the proposed firewater retention pond to be excavated to existing rock level. This will allow the new fill material to be placed on a firm subgrade. The invert level of the sump will be at a level to allow the groundwater in the footprint of the retention pond base to be lowered to permit removal of the overburden, and rock, where present. Once the pond base is constructed the sump will then also drain the open drainage channel during construction, and the invert level of the sump will be raised accordingly.

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3.7.1.3 Pump

A suitably sized pump will be located adjacent to the sump. This pump will pump water from the sump via a flexible hose up to a mobile silt buster which will be located at a higher elevation to permit gravity flow away from the silt buster (described below). Bunding will be provided as necessary for the diesel generated pump.

3.7.1.4 Mobile Silt Buster

This is a proprietary mobile unit which removes suspended solids and settleable matter from silt and solids-laden surface water run-off and groundwater. See Figure 4 below. Its typical applications are for construction site water management, pumping and de-watering and when working in or near river works. The Silt buster will be located at an elevation of circa 2.5mOD to which water will be pumped from the sump. After passing through the Silt buster which will remove the larger particles, water will discharge under gravity into a flexible hose from where it will enter a sediment dewatering bag for removal of any remaining fine sediment. The larger sediment will be removed from the silt buster will be disposed of to an appropriately authorised waste facility.

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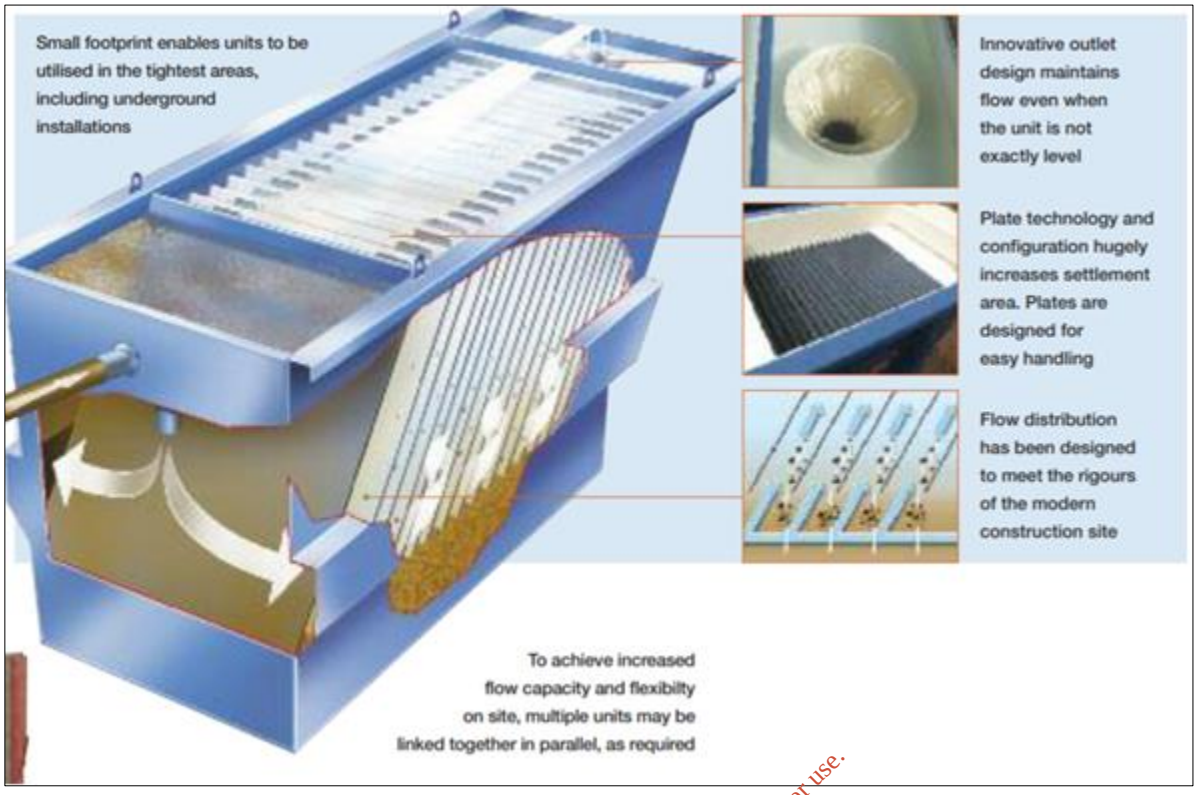


Figure 4 Mobile Silt Buster

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3.7.1.5 Sediment Dewatering Bags:

Appropriately sized dewatering bags will be used. The dewatering bags comprise a geotextile membrane through which water can pass but solids remain inside the bag. Refer to **Plate 1** below. It is proposed that the cleaned water will discharge to ground and overland and will percolate into the surrounding soil. This material will be disposed of to an appropriately authorized waste facility.



Plate 1 Sediment Dewatering Bags

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3.7.1.6 Silt Fencing

As an additional measure where the construction works will be closest to Lough Mahon, silt fencing will be installed on the sea-ward side of the open construction drainage channel along the eastern perimeter of the fire water retention pond. See **Appendix 1: Construction, Environmental Management Layout Site Plan** and Plate 2 below. The purpose of the silt fence is to retain any soil and silt disturbed during construction. The silt fence will act as an additional mitigation measure, in addition to the drainage channel, to prevent the egress of sediment into Lough Mahon.


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Plate 2 Silt Fencing

3.7.1.7 Minimise Exposed Areas

The area of exposed ground will be kept to a minimum by maintaining where possible existing vegetation. The clearing of topsoil and existing surfaces will be delayed until just before construction begins rather than stripping months in advance. In the unlikely event of flooding occurring on the site, the works will be suspended, and if practicable and known in advance, preventative measures will be implemented to reduce the risk of pollution from the site.

3.7.1.8 Wheel Wash

A wheel wash will be installed on the main site access road at the rear of the existing administration building. All vehicles entering the construction site will be required to exit through this before leaving the main plant site.

3.7.1.9 Inspection and Maintenance

The construction drainage system for the proposed development must be managed and monitored at all times and particularly after heavy rainfall events during the construction phase. The construction drainage system will be inspected and maintained on a daily basis to ensure that any failures are quickly identified and repaired so as to prevent water pollution.

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3.8 EMP-7

3.8.1 Ecology & Management of Invasive Species

3.8.1.1 Protection of Habitats

To prevent incidental damage by machinery or by the deposition of spoil during the initial stages, any trees /habitats earmarked for retention will be securely fenced early in the construction phase. The fencing will be clearly visible to machine operators.

Any habitats earmarked for retention that are damaged and disturbed will be left to regenerate naturally or will be rehabilitated and landscaped, as appropriate, once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.

To prevent Japanese Knotweed from outside the site being inadvertently being brought on to the site, the contractor will be required to inspect vehicles before using them on site and will pay particular attention to caterpillar tracks and where trucks and dumpers are stowed. The supplier of fill, if applicable, will be required to provide a guarantee that the fill to be imported does not contain knotweed. In addition, the fill will be inspected for signs of knotweed, prior to importation to site.

3.8.1.2 Fauna (Mammal & Avian)

All removal of trees and hedgerows required to accommodate the works will be done outside of the bird breeding period, March 1st to August 31st, inclusive.

No night time construction works will be permitted in order to avoid disturbance of potential night roosting species during the winter period (September to March) where possible.

Lighting provided during the operational and construction phase (security lighting) will be focused away from the nearby treeline and estuary habitats. Lights will be as low as possible and light spillage will be minimised. The use of accessories such as hoods, cowls, louvres and shields on luminaires will help reduce light spillage and direct light to the intended areas only, avoiding spillage onto the estuary. This will alleviate impacts to the qualifying interests of Cork Harbour SPA, as well as potential disturbance of bats. Where possible, works will follow the Bat Conservation Ireland Lighting Guidelines and the Bat Conservation Trust 'Bats and artificial lighting in the UK' 2018 Guidelines, as applicable.

3.8.1.3 Invasive Species Control

There is minor infestation of the non-native medium-impact Buddleia *Buddleja davidii* (NBDC, 2021) within the site boundary. The species is not restricted under restrictions under Regulations 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011. The following measures will be taken to avoid the spread of the plant both within and outside of the site:

- The infested areas will be demarcated prior to construction commencing (ie. exclusion zone)
- Toolbox talks will be carried out to communicate measures to all personnel involved;
- As the plants lie within the proposed works footprint, the whole plant will be removed by an excavator prior to construction commencing. The stem/trunk of the plant will be first cut to the

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base, and the roots grubbed out using an excavator. The plant will be immediately placed into a designated skip for transport to a licenced facility. The removal of Buddleia to a Licensed Facility will require the following;

  - Source landfill that that will accept the waste, ensuring that the facility is licensed/permitted to receive the waste.
  - Notify Landfill site to prepare to accept the waste/have the capacity to receive the waste.
  - Transported by a licensed waste carrier who is informed that the waste material contains an invasive species as part of the waste transfer documentation.

- A qualified ecologist will oversee the removal of Buddleia;
- Any vehicles/plant operating within the infested areas will be cleaned thoroughly when entering and / or leaving the exclusion zones.
  - Designated wash-down areas will be set up within the exclusion zone, and away from drains and watercourses; plant/equipment will be washed down on geotextile membrane, so that any potential contaminated material will be contained.
  - Vehicles will be cleaned of all earth and loose sediments, with particular attention paid to tyre treads, wheel arches and hinged joints.
  - All tools, materials and work wear will be inspected, and cleaned as necessary, with particular attention paid to footwear and hand tools.
  - Following the thorough cleaning, the membrane will be safely loaded on to skip/truck/dumper/bagged and will be included with material to be transported to landfill, as outlined above.
- The area will be monitored, with follow-up grubbing (as required) the following year to deal with re-growth or seedlings which can result from exposure of soil.

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Bio-security

To reduce the likelihood of invasive species being introduced to the site from construction works on other sites, it will be required that vehicles and tools will arrive on site clean. Work boots will be dipped in or scrubbed with a disinfectant solution and thoroughly dried afterwards before being used on the site for the first time (Also requirement during water quality sampling between different catchments). All PPE will be visually inspected and any attached vegetation or debris removed. PPE and tools will remain on site for the duration of construction. Any machinery or equipment returning from a different construction site will cleaned, power washed/steam washed and visually inspected again before re-entering the site.

Methodologies

Invasive species management methodologies and plans outlining Best Available Techniques (BAT) will be sourced from the National Invasive Species Database, from previously published documents and from the Invasive Species Ireland and Inland Fisheries Ireland websites.

3.8.1.4 Tree Protection

Trees to be retained but whose root network are vulnerable to damage during construction will be protected, as per *Guidelines for The Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes* (National Roads Authority, 2009).

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The details of trees to be retained are presented in **Appendix 3**.

Barriers

Vertical barriers (Figure 5) and/or ground protection must protect all trees that are being retained on site.

These will be installed prior to construction work or soil excavations commencing and exclude any construction activity from the RPA. This will protect trees whose root network is vulnerable to being damaged during construction.

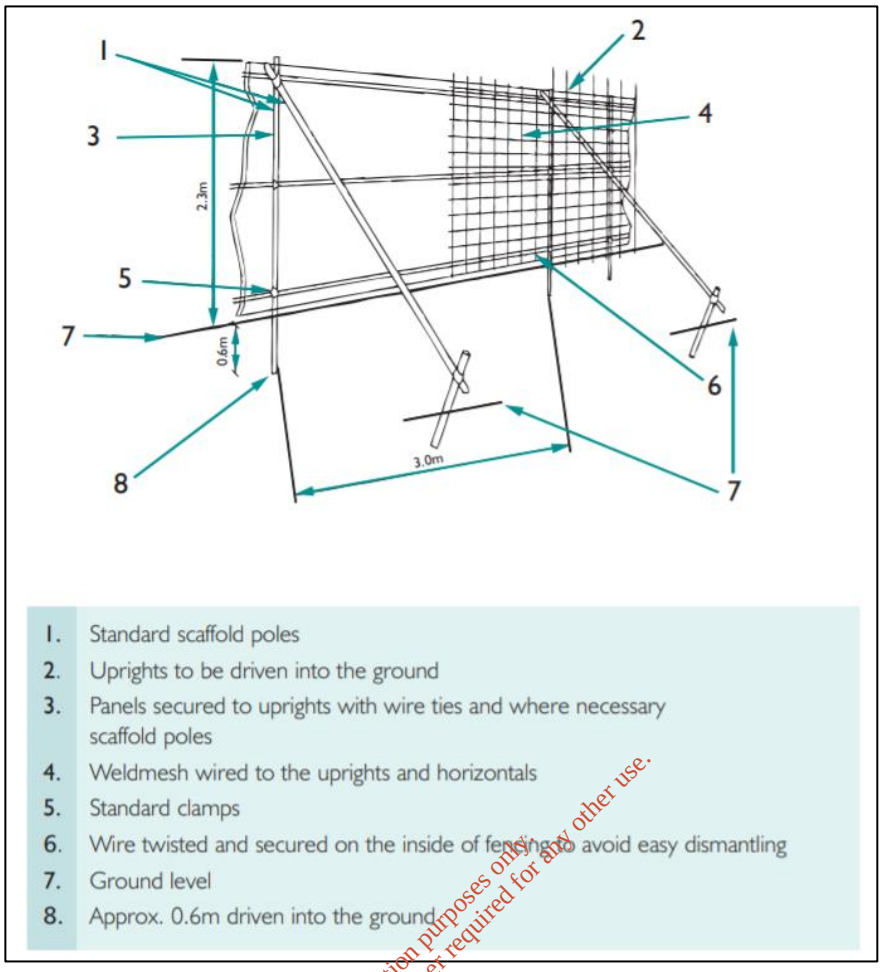
By excluding machinery from the area, they will also protect the main stem/trunk of the tree. Due to the nature of machinery being used on site, these barriers will be durable to withstand impact. The barrier will consist of a vertical and horizontal frame and should be at least 2.3m in height, and extend to the required length to ensure the RPA is fully captured.

It is noted that roots are often asymmetric if the ground is sloping to one side or if there are other variables restricting root development. As such, an arbitrarily chosen circular protection zone can often prove to be inadequate (NRA, 2009). Cognisance was taken of this during the survey on 07th July 2021, and no such restriction to root development was noted.

Toolbox talks will be given to all site personnel, and clear concise signage will be installed on the barriers to ensure adherence to these protection measures (Figure 6). This signage will specify that no construction activity is to take place within the RPA, and that no materials are to be stored or spill into the RPA. The barrier and the affixed signage will remain in place until construction works are completed.

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1. Standard scaffold poles
2. Uprights to be driven into the ground
3. Panels secured to uprights with wire ties and where necessary scaffold poles
4. Weldmesh wired to the uprights and horizontals
5. Standard clamps
6. Wire twisted and secured on the inside of fencing to avoid easy dismantling
7. Ground level
8. Approx. 0.6m driven into the ground

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Figure 5 Example of a suitable protection barrier (NRA, 2009)



Figure 6 Example of signage to be affixed to barrier

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Ground protection

Where it is unavoidable that vehicular and pedestrian traffic is required within the calculated RPA, the RPA will be protected with suitable ground protection. However, this will only be authorized where it is deemed absolutely necessary, and no suitable alternative is available. If it is suspected that vehicular and/or pedestrian traffic may be required within the RPA, consultation with an ecologist and/or arborist will be first carried out to design and establish protection measures within the RPA.

For pedestrian access within the RPA, single thickness scaffolding boards will be placed upon a layer of geotextile material. For vehicular access, a *temporary* buffer zone may be created which will allow medium sized vehicles (not heavy goods vehicles) to cross the RPA. The ground within the temporary buffer zone shall be covered by 25mm plywood sheets, layered upon 25mm of quarry gravel, layered upon 150mm of bark mulch. Once access within the RPA is complete, all materials will be removed and the tree protection barrier reinstated.

Access within the RPA will only be done under the supervision of an ecological clerk of works (ECoW) who will be authorized to stop works if it is deemed there is a risk of damaging the RPA.

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4 AUDITING, MONITORING AND RESPONSE

4.1 ENVIRONMENTAL MONITORING SCHEDULE

The Monitoring Schedule for construction will also provide for the checking of equipment, materials storage and transfer areas and specific environmental controls.

A *Preliminary Monitoring Schedule* is provided in **Table 4** below and will be finalised pending appointment of the Contractor. The Contractor's developed daily Site Checklists must have the following information included at a minimum:

Table 4 Preliminary Monitoring Schedule

Aspect	Monitoring Required	Frequency	Note	Responsibility
Ecology	Material and Waste Storage	Daily		Environmental Manager
Water	Sediment & Erosion Controls (Drainage Performance)	Daily visual inspections during the construction phase as well as during and after significant rainfall events		Environmental Manager
	Fuel & Oil Storage inspection	Daily		Environmental Manager
	Concrete Pours	As Required	To be scheduled with pours	Environmental Manager
Waste	Waste Storage	Daily to weekly	Depending on Construction Phase	Environmental Manager
Air Quality	Dust	Daily visual inspections during the construction phase as well as during and after significant rainfall events		Environmental Manager

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The Contractor will assign an on-site Environmental Manager to monitor the construction activities on a day-to-day basis. The duties will include completing the required checklists and coordinating with the relevant personnel (e.g. Project Ecologist, and the Design Engineer as required) ensuring all environmental monitoring is carried out.

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4.2 ENVIRONMENTAL PERFORMANCE INDICATORS

The Appointed Project Contractor will outline the key performance indicators for the site in gauging successful site management in the prevention of pollution and the protection of the environment.

Environmental performance indicators will at a minimum include:

- Number of environmental accidents logged;
- Number of environmental incidents logged;
- Breach of procedure and corrective actions;
- Number of environmental complaints received;
- Results of site audits.

The performance indicators will be finalised by the Appointed Contractor and communicated to all relevant personnel and sub-contractors. The review periods for analysing site performance indicators must also be specified.

4.3 RESPONSE PROCEDURE

In the event of an environmental incident, or breach of procedure, or where a complaint is received, the contributing factors are to be investigated and remedial action taken as necessary. The Main Contractor will ensure that the following response actions will take place:

1) The Project Manager must be informed of any incident, breach of procedure and/or complaint received and details must be recorded in the incident/complaint register

2) The Project Manager is to conduct/co-ordinate an investigation to determine the potential influence that could have led to the non-compliance.

3) The Project Manager is to notify and liaise with the appropriate site personnel where required, e.g. Site Environmental Manager, Project Ecologist.

4) If necessary, the Project Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.

5) The details of the incident will be recorded on an Incident / Complaints Form which is to record information such as the cause, extent, actions and remedial measures used following the incident/complaint. The form will also include any recommendations made to avoid reoccurrence of the incident.

6) The Project Manager will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

7) The Project Manager is to ensure that the relevant environmental management plans/procedures are revised and updated as necessary.

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5 SUMMARY

This preliminary CEMP provides the information which will be contained in the final Contractor-developed Plan at the construction stage of the project. The requirement on the Contractor to update these details has been explained, and there is a particular requirement for an update to the roles and responsibilities of those appointed on the site for the construction of the project.

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6 APPENDICES

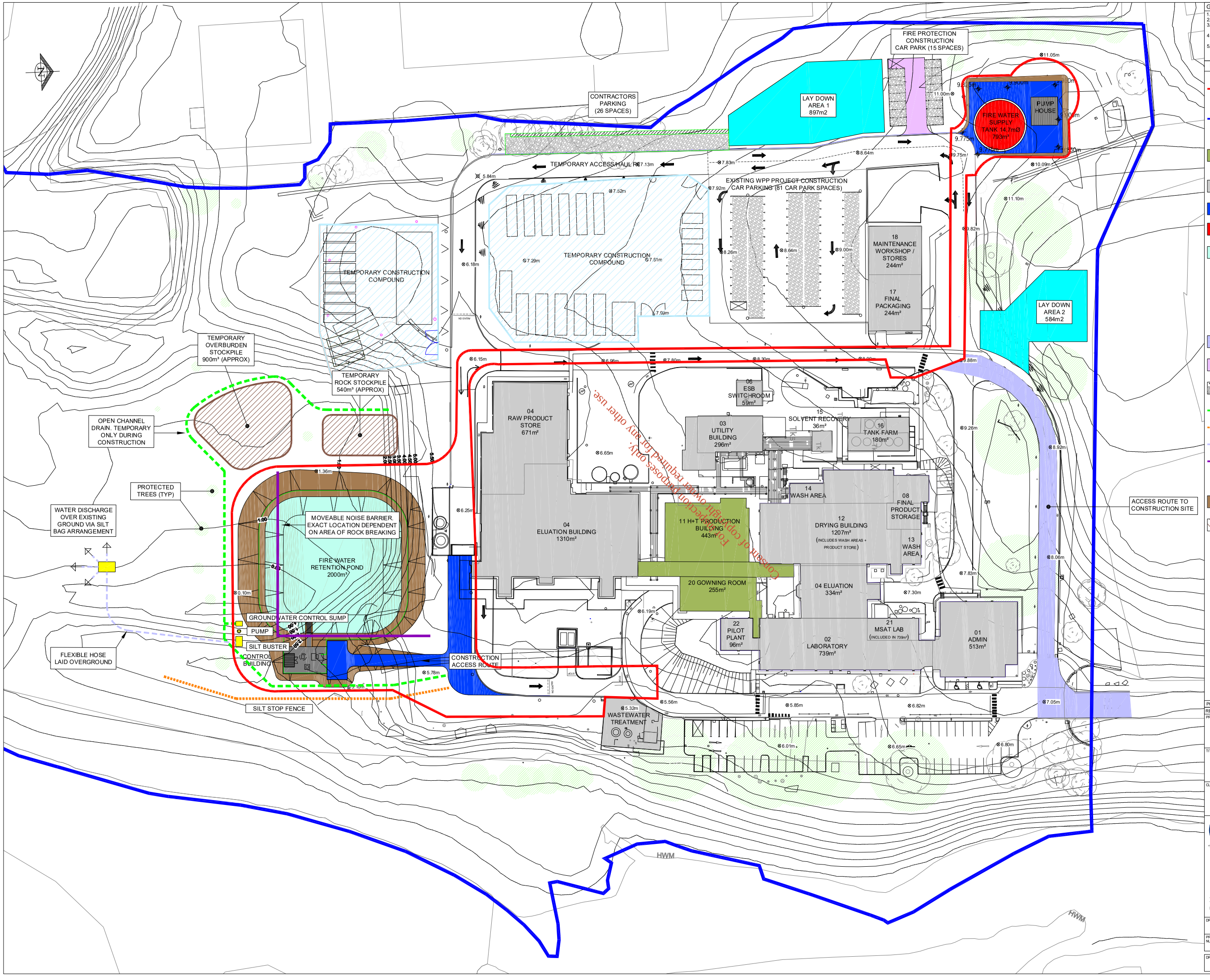
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APPENDIX 1 - CONSTRUCTION ENVIRONMENTAL SITE LAYOUT PLAN

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GENERAL NOTES :

1. DO NOT SCALE FROM THIS DRAWING.
2. USE FIGURED DIMENSIONS IN ALL CASES.
3. VERIFY DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE DESIGNERS IMMEDIATELY.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE DESIGNERS SPECIFICATION.
5. © THIS DRAWING IS COPYRIGHT AND MAY ONLY BE REPRODUCED WITH THE DESIGNERS PERMISSION.

LEGEND:

- LAND SUBJECT TO THIS PLANNING APPLICATION REF 21/05239 (OUTLINED IN RED)
  LANDS ADJOINING, ABUTING OR ADJACENT TO LANDS SUBJECT TO THIS APPLICATION UNDER THE CONTROL OF THE APPLICANT (OUTLINED IN BLUE)
- BUILDING UNDER CONSTRUCTION (Planning Ref 18/4614)
- EXISTING BUILDING / PROCESS AREAS
- PROPOSED ROADWAY / HARDSTANDING
- PROPOSED Ø14.7m FIRE WATER SUPPLY TANK (FIRE FIGHTING)
- PROPOSED FIRE WATER RETENTION POND
- PROPOSED PUMP HOUSE & CONTROL BUILDING
- 5.78m — EXISTING LEVEL
- 6.00m — PROPOSED LEVEL
- CONSTRUCTION SITE ACCESS ROUTE
- TEMPORARY CAR PARK TARMAC SURFACE
- TEMPORARY CAR PARK STONE SURFACE
- OPEN CHANNEL DRAIN
- SILT STOP FENCE
- OVERGROUND FLEXIBLE HOSE
- NOISE BARRIER
- TREE ROOT PROTECTION ZONE
- GRADED EARTHWORKS
- TEMPORARY SPOIL STORAGE AREAS

REV	DATE	DESCRIPTION	BY	APP
P01	29/07/21	ISSUED FOR INFORMATION	MJ	DC

PROJECT:
LEO PHARMA - FIRE PROTECTION PROJECT

TITLE:
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN
SITE LAYOUT

CLIENT:
LEO PHARMA CORK,
WALLINGSTOWN,
LITTLE ISLAND

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Engineering and Environmental Consultants
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DRAWN:	CHECKED:	APPROVED:
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PROJECT NUMBER: 22102	DATE: July 2021	SCALE @ A1: 1:500

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APPENDIX 2 - MANAGEMENT AND RESPONSIBILITIES

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MANAGEMENT AND RESPONSIBILITIES

Project Manager – *To be updated upon appointment of Contractor/finalisation of CEMP*

Name: _____

A Project Manager is to be appointed on behalf of the main Contractor to manage and oversee the entire project. The Project Manager is responsible for:

- implementing of the Construction and Environmental Management Plan (CEMP)
- implementing the Health and Safety Plan
- management of the construction project
- liaison with the client/developer
- liaison with the Project Team
- assigning duties and responsibilities in relation to the CEMP
- production of construction schedule
- materials procurement
- maintaining a site project diary

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Construction Manager – *To be updated upon appointment of Contractor/finalisation of CEMP*

Name: _____

The Construction Manager manages all the works to construct the fire water storage/supply and firewater retention infrastructure at LEO Pharma Cork, on behalf of the main contractor. The Construction Manager reports to the Project Manager. In relation to the CEMP, the Construction Manager is responsible for:

Site-Specific Method Statements

- Liaising with the Environmental Manager in preparing site-specific Method Statements for all Works activities where there is a risk of environmental damage, by incorporating relevant Environmental Control Measures and referring to relevant Environmental Control Measure Sheets;
- Liaising with the Environmental Manager in reviewing and updating site-specific Method Statements for all Works activities where Environmental Control Measure and Environmental Control Sheets have been altered, and
- Liaising with the Environmental Manager where third party agreement is required in relation to site-specific Method Statements, Environmental Control Measures and/or Environmental Control Measure Sheets.

General

- Being aware of all project Environmental Commitments and Requirements

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- Ensuring that all relevant information on project programming, timing, construction methodology, etc., is communicated from the Project Manager, to the Environmental Manager in a timely and efficient manner in order to allow pre-emptive actions relating to the environment to be taken where required;
- Programming and planning of excavation works and communicating this schedule to the Environmental Manager;
- Ensuring that adequate resources are provided to design and install any environmental interventions;
- Liaising with the Design Engineer and providing information on environmental management to the Design Engineer during the course of the construction phase;
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project staff; and
- Ensuring that the Environmental Manager performs regular and frequent environmental site inspections.

Design Engineer – *To be updated upon appointment of Contractor/finalisation of CEMP*

Name: _____

The Design Engineer is appointed by the Contractor for the works.

The Design Engineer reports to the Project Manager and is responsible for:

- Design of the Works;
- Review and approval of relevant elements of the method statements – assist the Construction Manager with the overall review;
- Participating in Third Party Consultations; and
- Liaising with Third Parties through the Environmental Manager.

Environmental Manager – *To be updated upon appointment of Contractor/finalisation of CEMP*

Name: _____

The Environmental Manager is appointed by the Contractor and reports to the Project Manager.

The Environmental Manager is responsible for:

General

- Being familiar with the project environmental commitments and requirements;
- Being familiar with baseline data gathered for the various environmental assessments and during pre-construction surveys;

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- Assisting the Construction Manager in liaising with the Design Engineer and the provision of the information on environmental management to the Design Engineer during the course of the construction phase;
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project staff;
- Implementing the environmental procedures of the CEMP;
- Liaising with the Construction Manager to ensure that the control measures set out in the Schedule of Environmental Mitigation are implemented;
- Liaising with the client/developer in relation to environmental issues; and
- Auditing the construction works from an environmental viewpoint.

Site-Specific Method Statements

- Liaising with the Construction Manager in preparing site-specific Method Statements for all Works activities where there is a risk of environmental damage. These site-specific Method statements should incorporate relevant Environmental Control Measures and take account of relevant Environmental Control Measure Sheets;
- Liaising with the Construction Manager in reviewing and updating site-specific Method Statements for all Works activities where Environmental Control Measure and Environmental Control Sheets have been altered, and
- Liaising with the Construction Manager where third party agreement is required in relation to site-specific Method Statements, Environmental Control Measures and/or Environmental Control Measure Sheets.

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Third Party Consultations

- Overseeing, ensuring coordination and playing a lead role in third party consultations required statutorily, contractually and in order to fulfil best practice requirements;
- Ensuring that the minutes of meetings, action lists, formal communications, etc., are well documented and that the consultation certificates are issued to the Design Engineer as required;
- Liaising with all prescribed bodies during site visits, inspections and consultations;
- Where new Environmental Control Measures are agreed as a result of third party consultation, ensuring that the CEMP is amended accordingly;
- Where new Environmental Control Measures are agreed as a result of third party consultation, the Environmental Manager should liaise with the Construction Manager in updating relevant site-specific Method Statements, and
- Where required, liaising with the Construction Manager in agreeing site-specific Method Statements with third parties.

Licensing

- Ensuring that all relevant works have (and are being carried out in accordance with) the required permits, licences, certificates, planning permissions, etc,;

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- Bringing to the attention of the Project, Design and Construction Team any timing and legal constraints that may be imposed on the carrying out of certain tasks.

Waste Management Documentation

- Holding copies of all permits and licences provided by waste contractors;
- Ensuring that any operations or activities that require certificates of registration, waste collection permits, waste permits, waste licences, etc., have appropriate authorisation, and
- Gathering and holding documentation with the respect to waste disposal.

Legislation

- Keeping up to date with changes in environmental legislation that may affect environmental management during the construction phase;
- Advising the Construction Manager of these changes, and
- Reviewing and amending the CEMP in light of these changes and bringing the changes to the attention of the main contractor's senior management and subcontractors.

Specialist environmental contractors

- Identifying requirements for specialist environmental contractors (including ecologists, waste contractors and spill clean-up specialists) before commencement of the project;
- Procuring the services of specialist environmental contractors and liaising with them with respect to site access and report production;
- Ensuring that the specialist environmental contractors are competent and have sufficient expertise to co-ordinate and manage environmental issues, and
- Co-ordinating the activities of all specialist environmental contractors on environmental matters arising out of the contract.

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Environmental Induction Training and Environmental Tool Box Talks

- Ensuring that Environmental Induction Training is carried out for all the main contractor's site personnel. The induction training may be carried out in conjunction with Safety Induction Training,
- Providing toolbox talks on Environmental Control Measures associated with Site-specific Method Statements to those who will undertake the work.

Environmental Incidents/Spillages

- Prepare and be in readiness to implement at all times an Emergency Response Plan.
- Notifying the relevant statutory authority of environmental incidents, and
- Carrying out an investigation and producing a report regarding environmental incidents. The report of the incident and details of remedial actions taken should be made available to the relevant authority, the Design Engineer and the Construction Manager.

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Site environmental inspections

- Carrying out regular documented inspections of the site to ensure that work is being carried out in accordance with the Environmental Control Measures and relevant site-specific Method Statements, etc.,
- Carrying out a daily inspection of the bunded areas and site drainage system.
- Appending copies of the inspection reports to the CEMP.
- Liaising with the Construction Manager to organise any repairs or maintenance required following the daily inspection of the site.

Other Roles

Health and Safety Personnel – To be updated upon appointment of Contractor/finalisation of CEMP

The Health and Safety personnel for the construction project is appointed by the Contractor in line with the Construction Regulations:

- carrying out duty of Project Supervisor Construction Stage
- responsible for safety induction of all staff and personnel on site
- implementing the Health and Safety Plan
- auditing and updating the Health & Safety Plan
- all other required legal duties

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Ecological Clerk of Works– To be updated upon appointment of Contractor/finalisation of CEMP

The Ecological Clerk of Works will be appointed by the Developer or the Contractor and is responsible for overseeing the correct implementation of ecological mitigation measures throughout construction works, as required.

All site personnel – To be updated upon appointment of Contractor/finalisation of CEMP

The site personnel appointed by the Contractor are responsible for:

- adhering to the relevant Environmental Control Measures and relevant site-specific Method Statements
- adhering to the Health and Safety Plan
- reporting immediately to the Environmental Manager and Construction Manager any incidents where there has been a breach of agreed procedures including:
  - a spillage of a potentially environmentally harmful substance;
  - an unauthorised discharge to ground, water or air, damage to a protected habitat, etc.

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CONTACTS

Main Contractor Contacts

Position Title:	Name:	Phone:	Email:
Project Manager			
Construction Manager*			
Environmental Manager*			
Safety (PSCS)*			
Safety Officers*			
Site Emergency Number*			

*24 hour contact details required

Employer Contacts

Organisation:	Position:	Name:	Phone:	Email:
Employers Ecologist	Project Ecologist			
Safety (PSDP)	Overall Project PSDP			
Employers Public Liaison Officer	Project Liaison Officer			

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Third Party Contacts

Organisation:	Position:	Name:	Phone:	Email Address:
Inland Fisheries Ireland				
National Parks and Wildlife Service				
Environmental Protection Agency				
Local authorities				
Department of the Environment, Heritage and Local Government				
Health and Safety Authority				
Department of Ag Food & Marine				
Emergency Services				
Other, as appropriate.				

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APPENDIX 3 – TREE PROTECTION MEASURES

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Table 3 Trees to be retained within potential zone of influence

Label (figure 3a)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)	Notes	Root Protection Zone[1]
1	Crab apple	1.5	Single	160	No nests. No PRF.	8.04 m^2
2	Blackthorn	1.75	Single	165	No nests. No PRF.	8.55 m^2
3	Ash	2.5	Multi-Stem	180	No nests. No PRF.	14.65 m^2
4	Hawthorn	1.5	Single	180	No nests. No PRF.	10.17 m^2
5	Hawthorn	1.5	Single	180	No nests. No PRF.	10.17 m^2
6	Blackthorn	1.5	Multi-Stem	180	No nests. No PRF.	14.65 m^2
7	Buddleia	1.25	Single	110	No nests. No PRF.	N/A Non-native invasive species. Not within footprint of works.
8	Ash	1	Single	150	No nests. No PRF. Appears to be dead (no evidence of ash dieback)	7.06 m^2
9	Scots Pine	9	Single	850	No nests. No PRF.	226.98 m^2
10	Holm Oak	5.5	Single	900	No nests. No PRF.	254.46 m^2
11	Holm Oak	6	Single	900	No nests. No PRF.	254.46 m^2
12	Poplar (treeline)	10	Single	400	No nests. No PRF.	50.26 m^2
13		10	Single	450	No nests. No PRF.	63.61 m^2
14		10	Single	415	No nests. No PRF.	54.10 m^2
15		10	Single	350	No nests. No PRF.	38.48 m^2
16		10	Single	410	No nests. No PRF.	52.81 m^2
17		10	Single	400	No nests. No PRF.	50.26 m^2

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[1] Measured based on guidance within *Guidelines for The Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes*. National Roads Authority, 2009.

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Label (figure 3a)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)	Notes	Root Protection Zone[1]
18	Ash	10	Single	230	No nests. No PRF.	16.61 m^2
19	Ash	10	Single	400	No nests. No PRF.	21.23 m^2
20	Holm Oak	5	Single	845	No nests. No PRF.	26.533
21	Downy birch	5	Single	350	No nests. No PRF.	10.99 m^2
22	Downy birch	5	Single	350	No nests. No PRF.	10.99 m^2
23	Acer sp.	4.5	Single	350	No nests. No PRF.	10.99 m^2
24	Acer sp.	5	Single	350	No nests. No PRF.	10.99 m^2
25	Acer sp.	4.5	Single	350	No nests. No PRF.	10.99 m^2
26	Acer sp.	4.5	Single	350	No nests. No PRF.	10.99 m^2
27	Acer sp.	5	Single	350	No nests. No PRF.	10.99 m^2
28	Acer sp.	5	Single	350	No nests. No PRF.	10.99 m^2
29	Poplar	10	Single	400	No nests. No PRF.	50.26 m^2
30	Poplar	10	Single	450	No nests. No PRF.	63.61 m^2
31	Poplar	10	Single	415	No nests. No PRF.	54.10 m^2
32	Poplar	10	Single	350	No nests. No PRF.	38.48 m^2
33	Hawthorn	1.5	Single	150	No nests. No PRF.	7.06 m2
34	Ash	6	Single	550	No nests. No PRF.	17.27 m^2
35	Hawthorn	1.5	Single	150	No nests. No PRF.	7.06 m^2
36	Ash	5.5	Single	455	No nests. No PRF.	14.287 m^2
37	Ash	6	Single	420	No nests. No PRF.	13.188 m^2
38	Ash	6	Single	350	No nests. No PRF.	10.99 m^2
39	Downy birch	3	Single	190	No nests. No PRF.	5.966 m^2
40	Poplar	10	Single	415	No nests. No PRF.	54.10 m^2

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Label (figure 3a)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)	Notes	Root Protection Zone[1]
41	Poplar	10	Single	350	No nests. No PRF.	38.48 m^2
42	Hawthorn	1.5	Single	150	No nests. No PRF.	7.06 m^2
43	Hawthorn	1.5	Single	160	No nests. No PRF.	8.04 m^2
44	Goat Willow	2	Single	250	No nests. No PRF.	19.63 m^2

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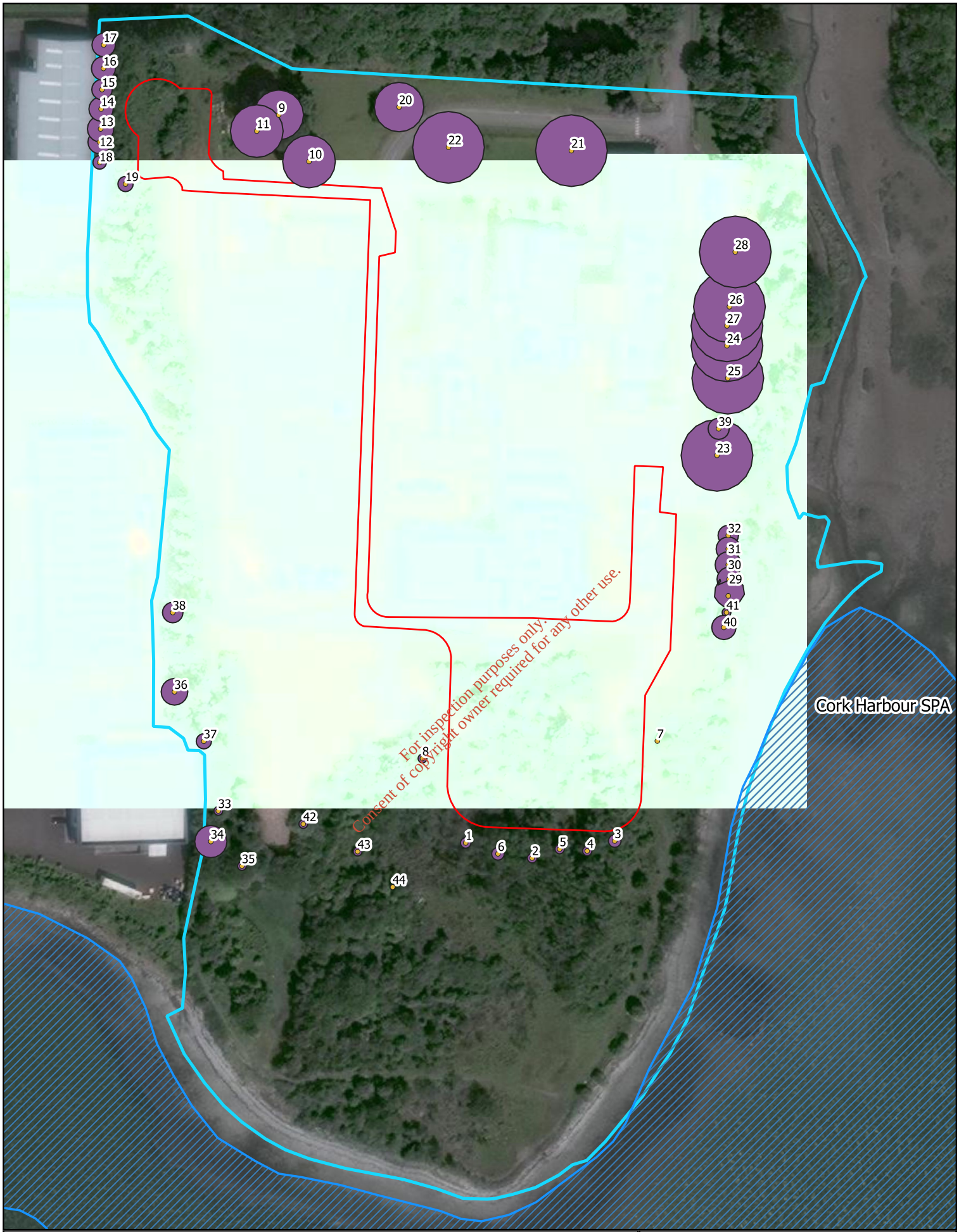


Figure 3a: Trees to be Retained

- Planning Boundary
- Root Protection Areas (drawn to scale, as per table 3 of CEMP Appendix 3)
- Cork Harbour SPA
- Study Area

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Table 4 Trees to be Removed – individual trees

Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)[2]	Notes	Photo
1	Ash	3.5	Multi-stem	450	No nest. No potential roosting features for bats (PRF).	
2	Ash	3.5	Multi-stem	450	No nest. No PRF	

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[2] Measured based on guidance within *Guidelines for The Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes*. National Roads Authority, 2009.

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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
3	Ash	1.5	Multi-stem	200	Immature. No nest. No PRF	

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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
4	Crab apple	1.5	Single stem	50	Immature. No nest. No PRF	

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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
5	Sycamore	3	Multi-stem	445	No nest. No PRF	

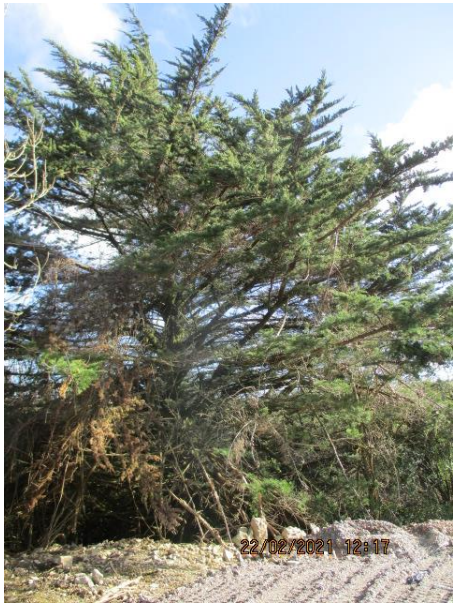
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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
6	Ash	3.5	Multi-stem	410	No nest. No PRF	

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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
7	Monterey Pine	5.5	Single stem	1198	No nest. No PRF	

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Label (figure 3b)	Species	Height (m)	Multi-Stem or Single-Stem	Stem Diameter (mm)²	Notes	Photo
15	Hawthorn	2	Multi-stem	300	No nest. No PRF	
17	Ash Treeline	10	Single	350	No nest. No PRF	 
18		9	Single	350	No nest. No PRF	
19		9	Single	350	No nest. No PRF	
20		10	Single	350	No nest. No PRF	

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Table 5 Trees to be Removed – stands (m^2)

Label (figure __)	Species	Area (m^2)	Notes	Photo
8	Blackthorn	249.406 m^2	No nest. No PRF	
9	Blackthorn	321.287 m^2	No nest. No PRF	
10	Blackthorn	245.929 m^2	No nest. No PRF	
11	Blackthorn	187.580 m^2	No nest. No PRF	
12	Blackthorn	28.862 m^2	No nest. No PRF	
13	Blackthorn	7.721 m^2	No nest. No PRF	
14	Blackthorn	255.590 m^2	No nest. No PRF	

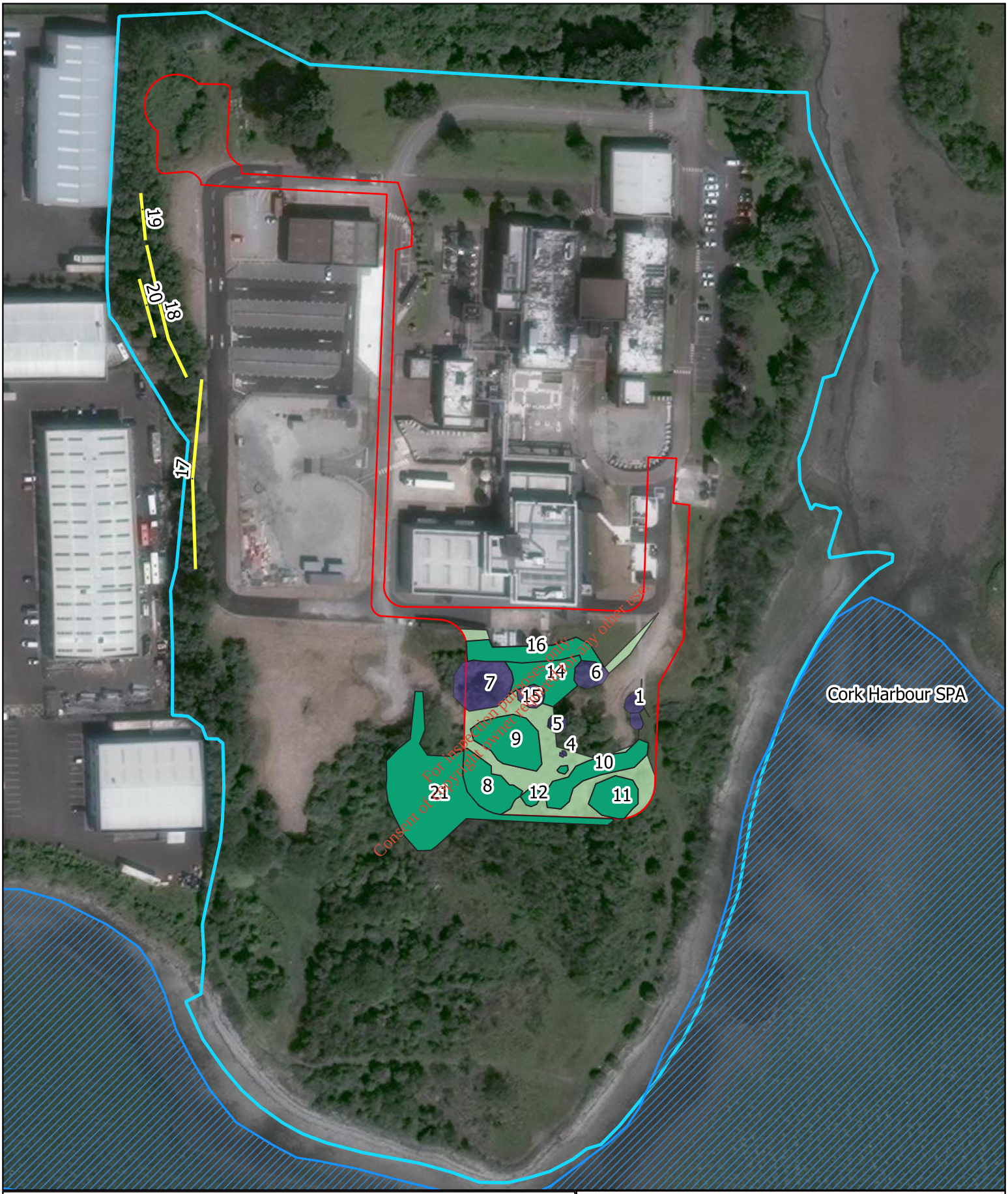
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Label (figure __)	Species	Area (m^2)	Notes	Photo
16	Buddleia *Buddleja davidii*	266.256 m^2	No nest. No PRF	

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Figure 3b: Trees to be Felled

- Planning Boundary
- Cork Harbour SPA
- Study Area
- Trees to be Felled (as per table 4 and 5 of CEMP Appendix 3)
- Treeline - To be felled (as per table 4 of CEMP Appendix 3)
- Bramble scrub and Ground Vegetation

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MWP

Appendix 8.1

Determination Of Air Emissions to Atmosphere from The LEO Pharma Cork Facility At Little Island, Cork (AWN, 2020)

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DETERMINATION OF AIR EMISSIONS TO ATMOSPHERE FROM THE LEO PHARMA FACILITY AT LITTLE ISLAND, CORK

Technical Report Prepared For

LEO Pharma Cork
Little Island
Cork City
Co. Cork

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Technical Report Prepared By

Dr. Edward Porter C Chem MRSC MIAQM

Our Reference

EP/20/11671AR01a

Date Of Issue

25 August 2020

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Document History

Document Reference		Original Issue Date	
EP/20/11671AR01		18 August 2020	
Revision Level	Revision Date	Description	Sections Affected
EP/20/11671AR01a	25 August 2020	Model Input Changes	Section 3

Record of Approval

Details	Written by	Checked by
Signature		
Name	Dr. Edward Porter	Dr. Avril Challoner
Title	Director (Air Quality)	Senior Air Quality Consultant
Date	25 August 2020	25 August 2020

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EXECUTIVE SUMMARY

AWN Consulting Ltd were commissioned by Jacobs Engineering to carry out an air dispersion modelling study of emissions from the LEO Pharma Cork facility in Little Island, Co. Cork. The modelling assessment was undertaken to assess the environmental significance of both proposed new main emission points and existing main emission points which will emit a range of air pollutants from the facility.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulatory model AERMOD (Version 19191). The aim of the study was to assess ethanol emissions from the facility and to identify the location and maximum of the worst-case ground level concentrations of ethanol in the ambient environment. The dispersion model study consisted of the following components:

- Review of proposed emissions data and other relevant information needed for the modelling study;
- Dispersion modelling of NO_X, dust and ethanol under the proposed licenced emission scenario;
- Presentation of predicted ground level concentrations of NO_X, dust and ethanol;
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality guideline values.

Assessment Summary

The results indicate that the ambient ground level concentrations due to emissions from the proposed main emission points A1-1 and A1-2 are in compliance with the relevant air quality standards for Nitrogen Dioxide (NO_2). Emissions from the facility lead to an ambient NO_2 concentration (including background) which is less than 94% of the maximum ambient 1-hour (as a 99.8th%ile) and 59% of the annual mean limit value at the worst-case receptor.

The results indicate that the ambient ground level concentrations due to emissions from the existing main emission points A2-1, A2-2 and A2-3 and the proposed main emission point A2-5 are in compliance with the relevant air quality standards for PM_{10}/$PM_{2.5}$. Emissions from the facility lead to an ambient PM_{10}/$PM_{2.5}$ concentration (including background) which is less than 57% of the maximum ambient 24-hour (as a 90th%ile) and annual mean limit value at the worst-case receptor.

The results indicate that the ambient ground level concentrations due to emissions from the proposed new main emission point A2-4 are in compliance with the relevant air quality standards for ethanol. Emissions from the facility lead to an ambient ethanol concentration which is less than 0.02% of the maximum ambient 1-hour and annual mean limit value at the worst-case receptor.

In summary, impacts from the facility based on the proposed and existing main emission points will be in compliance with the ambient air quality standards and will not lead to a risk to the surrounding environment.

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1.0 INTRODUCTION

AWN Consulting Ltd were commissioned by Jacobs Engineering to carry out an air dispersion modelling study of emissions from the LEO Pharma Cork facility in Little Island, Co. Cork. The modelling assessment was undertaken to assess the environmental significance of both proposed new main emission points and existing main emission points which will emit a range of air pollutants from the facility.

The site is located approximately 6km east of Cork City within Little Island. In the immediate region of the facility, the land-use is dominated by industry with local residential areas approximately 1 km north and 2 km east of the facility. The Cork Harbour SPA is also located approximately 0.4 km south of the facility.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulatory model AERMOD (Version 19191). The aim of the study was to assess a range of air emissions from the facility (NO_X, dust and ethanol) and to identify the location and maximum of the worst-case ground level concentrations of NO_X, dust and ethanol in the ambient environment. The dispersion model study consisted of the following components:

- Review of proposed emissions data and other relevant information needed for the modelling study;
- Dispersion modelling of NO_X, dust and ethanol under the proposed licenced emission scenario;
- Presentation of predicted ground level concentrations of NO_X, dust and ethanol;
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality guideline values.

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Information supporting the conclusions has been detailed in the following sections. The assessment methodology and study inputs are presented in Section 2. The dispersion modelling results and assessment summaries are presented in Section 3 and 4. The model formulation is detailed in Appendix I, a review of the meteorological data used is detailed in Appendix II and detailed meteorological data is presented in Appendix III.

2.0 ASSESSMENT METHODOLOGY

Emissions from the facility have been modelled using the AERMOD dispersion model (Version 19191) which has been developed by the U.S. Environmental Protection Agency (USEPA)[1] and following guidance issued by the EPA[2]. The model is a steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources and has replaced ISCST3[3] as the regulatory model by the USEPA for modelling emissions from industrial sources in both flat and rolling terrain[4-6]. The model has more advanced algorithms and gives better agreement with monitoring data in extensive validation studies[7-10]. An overview of the AERMOD dispersion model is outlined in Appendix I.

The air dispersion modelling input data consisted of information on the physical environment (including building dimensions and terrain features), design details from all emission points on-site and five years of appropriate hourly meteorological data. Using this input data the model predicted ambient ground level concentrations beyond the site boundary for each hour of the modelled meteorological years. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC).

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The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

Throughout this study a worst-case approach was taken. This will most likely lead to an over-estimation of the levels that will arise in practice. The worst-case assumptions are outlined below:

- Maximum predicted concentrations were reported in this study, even if no residential receptors were near the location of this maximum;
- The effects of building downwash, due to on-site and any nearby off-site buildings, has been included in the model;
- Worst-case operations assume that the proposed emission point was running continuously for a full year at maximum concentration and volume flow.

2.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health- or environmental-based levels for which additional factors may be considered. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC (see Table 1).

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Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 1 EU Ambient Air Quality Standards Based on Directive 2008/50/EC (S.I. 180 of 2011)

In line with the approach outlined in AG4[(3)], where no EU air quality standard exists, relevant statutory standards from other EU countries such as the UK, Germany or Denmark should be used. The most stringent European guideline / limit value from the sources outlined below should be referenced when determining compliance in the absence of an applicable EU ambient air quality standard. The relevant statutory guidance can be obtained from the following sources:

- Environmental Assessment Level (EAL) based on the Health & Safety Authority publication 2007 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001). The EAL should be derived using the approach outlined in Appendix D of UK Environment Agency "IPPC H1 - IPPC Environmental Assessment for BAT"[(11)]. The guidance outlines the approach for deriving both short-term and long-term EALs. In relation to the

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long-term (annual) EAL, this can be derived by applying a factor of 100 to the 8-hour Occupational Exposure Level (OEL). The factor of 100 allows for both the greater period of exposure and the greater sensitivity of the general population. For short-term (1-hour) exposure, the EAL is derived by applying a factor of 10 to the short term exposure limit (STEL). In this case, only the sensitivity of the general population need be taken into account as there is no need for additional safety factors in terms of the period of exposure. Where STELs are not listed then a value of 3 times the 8-hour time weighted average occupational exposure limit may be used[11].

- EALs outlined in Appendix D of UK Environment Agency "IPPC H1 - IPPC Environmental Assessment for BAT"[11]

Table 2 identifies the appropriate short-term and long-term EALs, derived from the most stringent sources above, for ethanol which is the only solvent which will be released from this emission point.

Pollutant	Regulation	Limit Type	1-Hour EAL	Annual Mean EAL
Ethanol	UK EA H1 Guidance	Guideline Value	576,000 µg/m^3	19,200 µg/m^3

Table 2 VOC Guideline Values Derived From OEL For Compounds Used Onsite.

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2.2 Background Concentrations Of Pollutants

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities[11,12]. The most recent annual report on air quality "Air Quality Monitoring Annual Report 2018"[11] details the range and scope of monitoring undertaken throughout Ireland. As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes[11]. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, Little Island is categorised as Zone B[11].

NO_2

NO_2 monitoring was carried out at two urban Zone B location in 2018, South Link Road and UCC Distillery Fields[11]. The NO_2 annual average in 2018 was 25 µg/m^3 and 11 µg/m^3 respectively. Hence long-term average concentrations measured at this location were significantly lower than the annual average limit value of 40 µg/m^3. The average results over the last five years at South Link Road suggest an upper average of no more than 25 µg/m^3 as an average concentration at this roadside location as shown in Table 3 whilst the one year of data at UCC is significantly lower. Based on the above information a conservative estimate of the background NO_2 concentration in the region of the facility, which is a significant distance from a major road, in 2020 is 15 µg/m^3.

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Year	South Link Road (µg/m^3)	UCC Distillery Fields (µg/m^3)
2014	27	-
2015	22	-
2016	23	-
2017	27	-
2018	25	11
Average	**25**	**11**

Table 3 Annual Mean NO_2 Concentrations in Zone B Location (2014-2018) (µg/m^3)

PM_{10}

Long-term PM_{10} monitoring was carried out at the Zone B locations of South Link Road and Heatherton Park in 2018. The PM_{10} annual averages for these two locations in 2018 ranged from 12 to 18 µg/m^3[3(11)] (Table 4). Based on the above information, a conservative estimate background PM_{10} concentration for Little Island of 15 µg/m^3 has been used. In relation to the maximum 24-hour averaging period (as a 90th%ile), a conservative value of 28.0 µg/m^3 was employed using the methodology outlined in Appendix E of AG4[(2)] based on worst-case data from two Zone B sites in 2018 (South Link Road).

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Year	South Link Road	Heatherton Park
2014	19	16
2015	17	11
2016	18	12
2017	17	10
2018	17	11
Average	**18**	**12**

Table 4 Annual Mean PM_{10} Concentrations in Zone D Locations (2014-2018) (µg/m^3)

The results of $PM_{2.5}$ monitoring at the Zone B location of Heatherton Park from 2015 – 2018[(11)] indicated that $PM_{2.5}/PM_{10}$ ratios ranged from 0.50 – 0.72 over that period. Based on this information, a conservative ratio of 0.7 was used to generate a background $PM_{2.5}$ concentration of 10.5 µg/m^3.

In relation to the annual averages, the ambient background concentration was added directly to the process concentration. However, in relation to the short-term peak concentration, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the EPA[(2)] advises that for PM_{10} an estimate of the maximum combined pollutant concentration can be obtained as shown on the following page:

PM_{10} - The 90.4th%ile of total 24-hour mean PM_{10} is equal to the maximum of either A or B below:

a) 90.4th%ile of 24-hour mean background PM_{10} + annual mean process contribution PM_{10}

b) 90.4th%ile 24-hour mean process contribution PM_{10} + annual mean background PM_{10}

In relation to ethanol, no monitoring is undertaken by the EPA for this compound. However, background levels are likely to be insignificant in the region of Little Island.

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2.3 Air Dispersion Modelling Methodology

The United States Environmental Protection Agency (USEPA) approved AERMOD dispersion model has been used to predict the ground level concentrations (GLC) of compounds emitted from the principal emission sources on-site.

The modelling incorporated the following features:

- Two receptor grids were created at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids were based on Cartesian grids with the site at the centre. An outer grid extended to 9,000m^2 with the site at the centre and with concentrations calculated at 150m intervals. A smaller denser grid extended to 3,000m from the site with concentrations calculated at 50m intervals. Boundary receptor locations were also placed along the boundary of the site, at 20m intervals, giving a total of 7,525 calculation points for the model as shown in Figure 1 (outer and boundary receptors shown for ease of viewing).

- All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.

- Detailed terrain has been mapped into the model using SRTM data with 30m resolution. The site is located in gentle terrain. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP[13] as shown in Figure 2.

- Hourly-sequenced meteorological information has been used in the model. Meteorological data over a five year period (Cork Airport, 2014 – 2018) was used in the model (see Figure 3 and Appendix III).

- The source and emission data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model.

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Background Mapping from Google Earth

Receptor

Scale
1:60,000

N

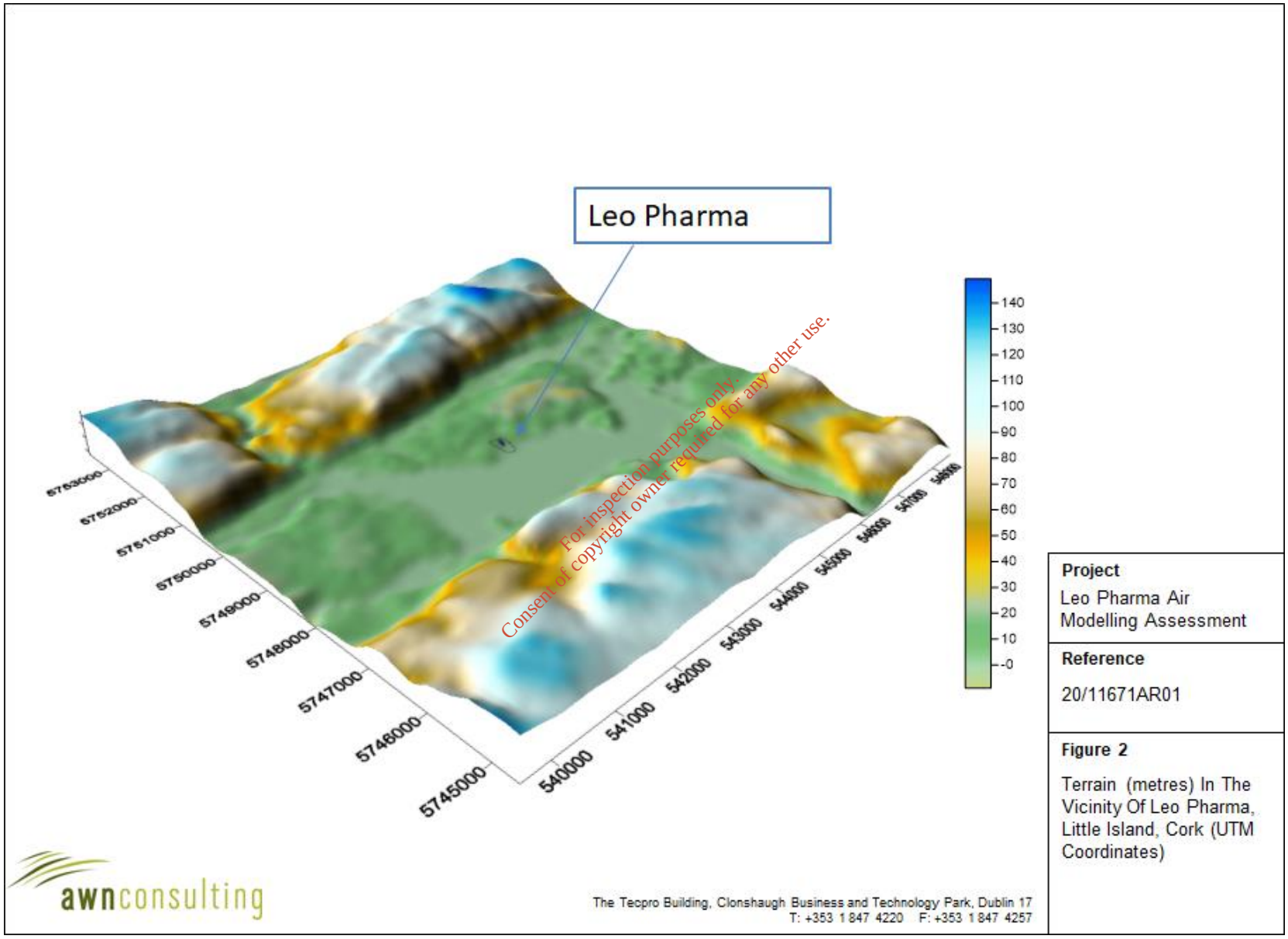
Project
Leo Pharma Air Modelling Assessment

Reference
20/11671AR01

Figure 1
AERMOD
2-Tier Receptor Grid
7,525 Calculation points

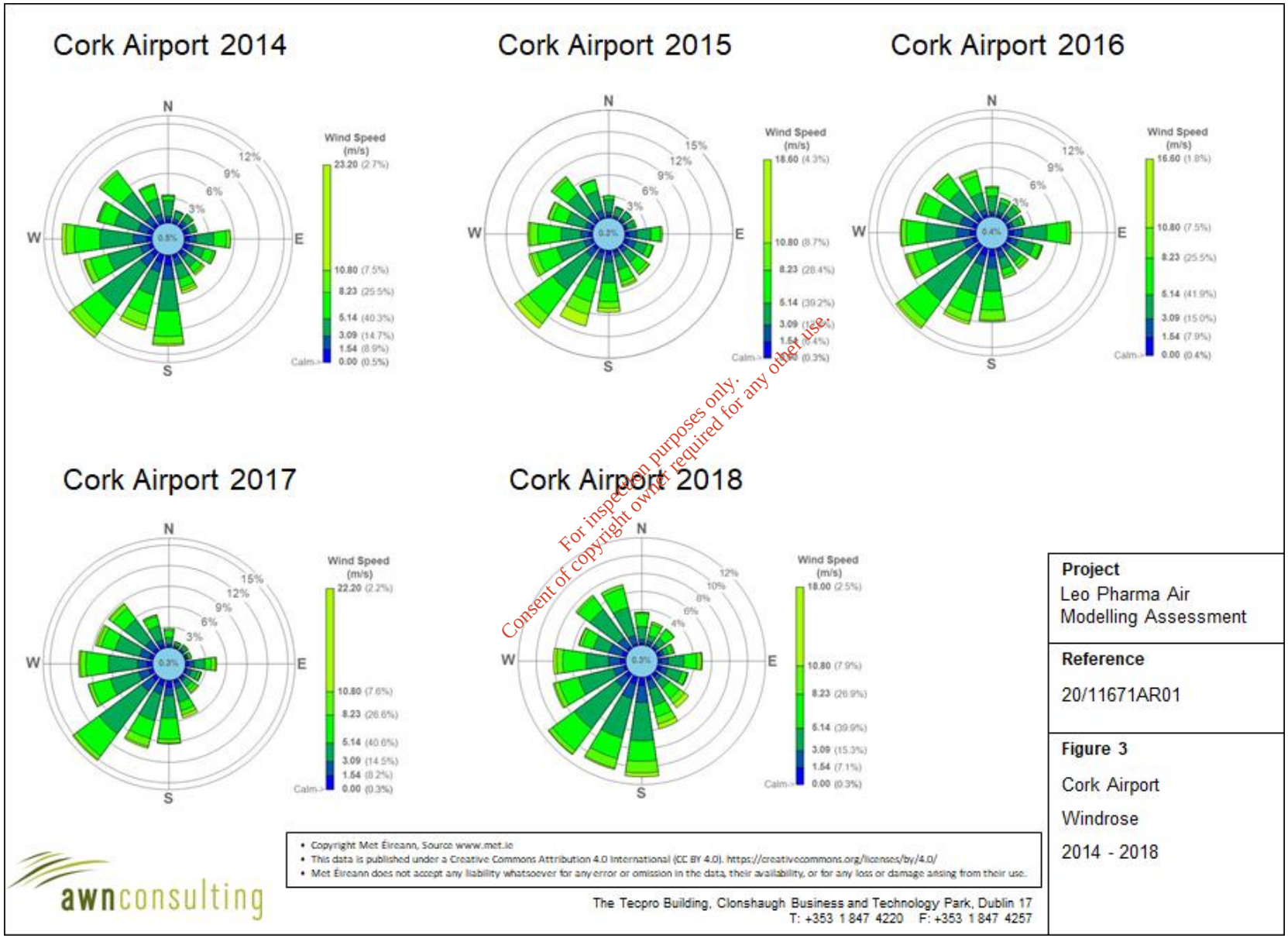
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2.4 Terrain

The AERMOD air dispersion model has a terrain pre-processor AERMAP[13] which was used to map the physical environment in detail over the receptor grid. The digital terrain input data used in the AERMAP pre-processor was obtained from SRTM. This data was run to obtain for each receptor point the terrain height and the terrain height scale. The terrain height scale is used in AERMOD to calculate the critical dividing streamline height, H_{crit}, for each receptor. The terrain height scale is derived from the Digital Elevation Model (DEM) files in AERMAP by computing the relief height of the DEM point relative to the height of the receptor and determining the slope. If the slope is less than 10%, the program goes to the next DEM point. If the slope is 10% or greater, the controlling hill height is updated if it is higher than the stored hill height.

In areas of complex terrain, AERMOD models the impact of terrain using the concept of the dividing streamline (H_c). As outlined in the AERMOD model formulation[1] a plume embedded in the flow below H_c tends to remain horizontal; it might go around the hill or impact on it. A plume above H_c will ride over the hill. Associated with this is a tendency for the plume to be depressed toward the terrain surface, for the flow to speed up, and for vertical turbulent intensities to increase.

AERMOD model formulation states that the model "*captures the effect of flow above and below the dividing streamline by weighting the plume concentration associated with two possible extreme states of the boundary layer (horizontal plume and terrain-following). The relative weighting of the two states depends on: 1) the degree of atmospheric stability; 2) the wind speed; and 3) the plume height relative to terrain. In stable conditions, the horizontal plume "dominates" and is given greater weight while in neutral and unstable conditions, the plume traveling over the terrain is more heavily weighted*"[2].

The terrain in the region of the facility is complex in the sense that the maximum terrain in the modelling domain peaks at 148m which is above the stack top of all emission points onsite. However, in general, as shown in Figure 2, the region of the site has gently sloping terrain particularly in the immediate vicinity of the facility.

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2.5 Meteorological Data

The selection of the appropriate meteorological data has followed the guidance issued by the USEPA[4]. A primary requirement is that the data used should have a data capture of greater than 90% for all parameters. Cork Airport meteorological station, which is located approximately 10 km south-west of the site, collects data in the correct format and has a data collection of greater than 90%. Long-term hourly observations at Cork Airport meteorological station provide an indication of the prevailing wind conditions for the region (see Figure 3 and Appendix III). Results indicate that the prevailing wind direction is from south-easterly to westerly in direction over the period 2014 - 2018. The mean wind speed is approximately 5.4 m/s over the period 1981-2010. Calm conditions account for only a small fraction of the time in any one year peaking at 44 hours in 2014 (0.5% of the time). There are also no missing hours over the period 2014 – 2018.

2.6 Geophysical Considerations

AERMOD simulates the dispersion process using planetary boundary layer (PBL) scaling theory[1]. PBL depth and the dispersion of pollutants within this layer are influenced by specific surface characteristics such as surface roughness, albedo and the availability of surface moisture. Surface roughness is a measure of the aerodynamic roughness of the surface and is related to the height of the roughness element. Albedo is a measure of the reflectivity of the surface whilst the Bowen ratio is a measure of the availability of surface moisture.

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AERMOD incorporates a meteorological pre-processor AERMET[14] to enable the calculation of the appropriate parameters. The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and albedo and to a distance of 1km for surface roughness in line with USEPA recommendations[14,15] as outlined in Appendix II.

In relation to AERMOD, detailed guidance for calculating the relevant surface parameters has been published[14]. The most pertinent features are:

- The surface characteristics should be those of the meteorological site (Cork Airport) rather than the installation;
- Surface roughness should use a default 1km radius upwind of the meteorological tower and should be based on an inverse-distance weighted geometric mean. If land use varies around the site, the land use should be sub-divided by sectors with a minimum sector size of 30º;
- Bowen ratio and albedo should be based on a 10km grid. The Bowen ratio should be based on an un-weighted geometric mean. The albedo should be based on a simple un-weighted arithmetic mean.

AERMOD has an associated pre-processor, AERSURFACE[15], which has representative values for these parameters depending on land use type. The AERSURFACE pre-processor currently only accepts NLCD92 land use data which covers the USA. Thus, manual input of surface parameters is necessary when modelling in Ireland. Ordnance survey discovery maps (1:50,000) and digital maps such as those provided by the EPA, National Parks and Wildlife Service (NPWS) and Google Earth® are useful in determining the relevant land use in the region of the meteorological station. The Alaska Department of Environmental Conservation has issued a guidance note for the manual calculation of geometric mean for surface roughness and Bowen ratio for use in AERMET[16]. This approach has been applied to the current site with full details provided in Appendix II.

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2.7 Building Downwash

When modelling emissions from an industrial installation, stacks which are relatively short can be subjected to additional turbulence due to the presence of nearby buildings. Buildings are considered nearby if they are within five times the lesser of the building height or maximum projected building width (but not greater than 800m).

The USEPA has defined the “Good Engineering Practice” (GEP) stack height as the building height plus 1.5 times the lesser of the building height or maximum projected building width. It is generally considered unlikely that building downwash will occur when stacks are at or greater than GEP[17].

When stacks are less than this height, building downwash will tend to occur. As the wind approaches a building it is forced upwards and around the building leading to the formation of turbulent eddies. In the lee of the building these eddies will lead to downward mixing (reduced plume centreline and reduced plume rise) and the creation of a cavity zone (near wake) where re-circulation of the air can occur. Plumes released from short stacks may be entrained in this airflow leading to higher ground level concentrations than in the absence of the building.

The Plume Rise Model Enhancements (PRIME)[8,9] plume rise and building downwash algorithms, which calculates the impact of buildings on plume rise and dispersion, have

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been incorporated into AERMOD. The building input processor BPIP-PRIME produces the parameters which are required in order to run PRIME. The model takes into account the position of each stack relative to each relevant building and the projected shape of each building for 36 wind directions (at 10º intervals). The model determines the change in plume centreline location with downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model[9].

Given that the stack (at 10m) is less than 2.5 times the lesser of the building height or maximum projected building width, building downwash will need to be taken into account and the PRIME algorithm run prior to modelling with AERMOD.

2.8 Process Emissions

LEO Pharma Cork are currently licenced (IED Licence No. P0091-02) to operate 3 dust emission points (A2-1, A2-2 and A2-3). It is proposed to install two new main emission points. The new spray dryer (A2-5) will emit dust at a similar level to the existing dryers whilst A2-4 (the carbon adsorption unit) will emit ethanol only. The details of the new and existing emission points are outlined below in Table 5 in addition to the two existing boilers (A1-1 and A1-2) which will now be classified as main emission points.

Active Pharmaceutical Ingredient

The approach to assessing the impact of an API (active pharmaceutical ingredient) is normally to determine the therapeutic dose and thereafter to compare the worst-case exposure of the population, based on the API concentration beyond the site boundary and the average air volume inhaled by an adult (20 Nm^3 of air /day)[18], to that therapeutic dose.

However, the API potentially released from A2-1, A2-2, A2-3 & A2-5 is a carbohydrate (complex type of sugar) which is quickly broken down without toxicity. There are 2 versions of the drug – in relation to A2 and A3 dry only LEO Haprain (Heparin Sodium) is potentially released whereas for A2-5 only dry Innohep (Tinzaparin Sodium) is potentially released.

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Stack Reference	Stack Height Above Ground Level (m)	Exit Diameter (m)	Temp. (K)	Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_X Concentration (mg/Nm^3 as C)	NO_X Mass Emission (g/s)	Dust Concentration (mg/Nm^3 as C)	Dust Mass Emission (g/s)	Ethanol Concentration (mg/Nm^3 as C)	Ethanol Mass Emission (g/s)
A1-1	8.15	0.30	448.15	3,600	23.2	250	0.25	-	-	--	--
A1-2	8.65	0.30	448.15	3,600	23.2	250	0.25	-	-	--	--
A2-1	8.0	0.855	291.15	15,000	7.7	-	-	0.15	0.000625	-	-
A2-2	7.6	0.126	351.65	1,200	34.4	-	-	0.15	0.000050	-	-
A2-3	7.6	0.123	358.3	1,200	36.8	-	-	0.15	0.000050	-	-
A2-5	10.6	0.127	332.85	1,500	40.1	-	-	0.15	0.000063	-	-
A2-4	10	0.20	298.15	600	5.8					150 mg/Nm^3 as C (287 mg/Nm^3 as ethanol)	0.025 g/s (as C) (0.48 g/s as ethanol)

Table 5 Leo Pharma, Little Island Co. Cork – Stack Emission Details

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3.0 RESULTS & DISCUSSION

3.1 Proposed Operation NO_2 / NO_X Results

The NO_2 / NO_X modelling results are detailed in Table 6. The results indicate that the ambient ground level concentration is below the relevant air quality standard for NO_2 / NO_X. Emissions from the facility lead to an ambient NO_2 concentration (including background) which is 93.6% of the maximum ambient 1-hour limit value (as a 99.8th%ile) at the worst-case receptor (see Table 6 and Figure 4). In relation to the annual mean concentration, ambient NO_2 concentrations (including background) are at most 58.3% of the annual mean limit value at the worst-case receptor (Table 6 and Figure 5).

Pollutant / Year	Background (µg/m^3)	Averaging Period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/Nm^3)	Standard (µg/Nm^3) Note 1
NO_2 / 2014	30	Maximum 1-hr mean (as a 99.8th%ile) Note 2	154.7	184.7	200
	15	Annual mean	7.1	22.1	40
NO_2 / 2015	30	Maximum 1-hr mean (as a 99.8th%ile) Note 2	145.8	175.8	200
	15	Annual mean	7.2	22.2	40
NO_2 / 2016	30	Maximum 1-hr mean (as a 99.8th%ile) Note 2	143.6	173.6	200
	15	Annual mean	7.1	22.1	40
NO_2 / 2017	30	Maximum 1-hr mean (as a 99.8th%ile) Note 2	157.2	187.2	200
	15	Annual mean	8.3	23.3	40
NO_2 / 2018	30	Maximum 1-hr mean (as a 99.8th%ile) Note 2	149.3	179.3	200
	15	Annual mean	6.5	21.5	40

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC)
Note 2 Based on the PVMRM Methodology

Table 6 Dispersion Model Results for the Proposed Scenario – NO_2

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3.2 Proposed Operation PM_{10} / $PM_{2.5}$ Results

The PM_{10} / $PM_{2.5}$ modelling results are detailed in Table 7 The results indicate that the ambient ground level concentration is below the relevant air quality standard for PM_{10} / $PM_{2.5}$. Emissions from the facility lead to an ambient PM_{10} concentration (including background) which is 56% of the maximum ambient 24-hour limit value at the worst-case receptor (see Table 7). In relation to the annual mean concentration, ambient PM_{10} / $PM_{2.5}$ concentrations (including background) are at most 38% of the annual mean limit values at the worst-case receptor (Tables 7 and 8).

Pollutant / Year	Background (µg/m³)	Averaging Period	Process Contribution (µg/m³)	Predicted Environmental Concentration (µg/Nm³)	Standard (µg/Nm³) Note 1
PM_{10} / 2014	28.0	Maximum 24-hr mean (as a 90th%ile) Note 2	0.12	28.1	50
	15.0	Annual mean	0.05	15.1	40
PM_{10} / 2015	28.0	Maximum 24-hr mean (as a 90th%ile) Note 2	0.11	28.1	50
	15.0	Annual mean	0.04	15.0	40
PM_{10} / 2016	28.0	Maximum 24-hr mean (as a 90th%ile) Note 2	0.12	28.1	50
	15.0	Annual mean	0.04	15.0	40
PM_{10} / 2017	28.0	Maximum 24-hr mean (as a 90th%ile) Note 2	0.13	28.1	50
	15.0	Annual mean	0.05	15.1	40
PM_{10} / 2018	28.0	Maximum 24-hr mean (as a 90th%ile) Note 2	0.14	28.1	50
	15.0	Annual mean	0.05	15.1	40

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC)

Note 2 Short-term Environmental Concentrations calculated according to UK DEFRA guidance(17) based on the maximum background 24-hr mean (as a 90th%ile) of 28.0 µg/m³

Table 7 Dispersion Model Results for the Proposed Scenario – PM_{10}

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Pollutant / Year	Annual Mean Background (µg/m³)	Averaging Period	Process Contribution (µg/m³)	Predicted Environmental Concentration (µg/Nm³)	Standard (µg/Nm³) Note 1
$PM_{2.5}$ / 2014	10.5	Annual mean	0.05	10.55	25
$PM_{2.5}$ / 2015	10.5	Annual mean	0.04	10.54	25
$PM_{2.5}$ / 2016	10.5	Annual mean	0.04	10.54	25
$PM_{2.5}$ / 2017	10.5	Annual mean	0.05	10.56	25
$PM_{2.5}$ / 2018	10.5	Annual mean	0.05	10.56	25

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC)

Table 8 Dispersion Model Results for the Proposed Scenario – $PM_{2.5}$

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3.3 Proposed Operation Ethanol Results

The ethanol modelling results are detailed in Table 9. The results indicate that the ambient ground level concentration is below the relevant air quality standard for ethanol. Emissions from the facility lead to an ambient ethanol concentration (including background) which is less than 0.01% of the maximum ambient 1-hour limit value at the worst-case receptor (see Table 9). In relation to the annual mean concentration, ambient ethanol concentrations (including background) are again less than 0.02% of the annual mean limit value at the worst-case receptor.

The geographical variation in the maximum 1-hour mean ethanol ground level concentrations is illustrated as a concentration contour in Figure 6. The contents of each figure are described below:

Figure 6 Predicted 1-Hour Maximum Ethanol Concentrations (2018)

The locations of the maximum concentrations for ethanol are close to the boundary of the site with concentrations decreasing with distance from the facility.

Pollutant / Year	Background (µg/m^3)	Averaging Period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/Nm^3)	Standard (µg/Nm^3) Note 1
Ethanol / 2014	N/A	Maximum 1-hr mean	73.4	73.4	576,000
	N/A	Annual mean	7.2	7.2	19,200
Ethanol / 2015	N/A	Maximum 1-hr mean	68.0	68.0	576,000
	N/A	Annual mean	1.2	1.2	19,200
Ethanol / 2016	N/A	Maximum 1-hr mean	71.5	71.5	576,000
	N/A	Annual mean	1.3	1.3	19,200
Ethanol / 2017	N/A	Maximum 1-hr mean	70.2	70.2	576,000
	N/A	Annual mean	7.2	7.2	19,200
Ethanol / 2018	N/A	Maximum 1-hr mean	83.1	83.1	576,000
	N/A	Annual mean	1.6	1.6	19,200

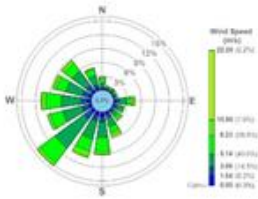
Note 1 UK EA H1 Guidance

Table 9 Dispersion Model Results – Ethanol Emissons

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Background Mapping from Google Earth

Maximum 1-Hr NO_2 Concentration (as a 99.8th%ile) (excluding background)
Maximum Concentration = 157.2 µg/m^3

Boundary Of Facility

Scale
1:10,000

N

Project
Leo Pharma Air Modelling Assessment

Reference
20/11671AR01

Figure 4

Proposed Operation - Maximum 1-Hr NO_2 Concentration (µg/m^3) (as a 99.8th%ile) (Year 2017)

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4.0 ASSESSMENT SUMMARY

The results indicate that the ambient ground level concentrations due to emissions from the proposed main emission points A1-1 and A1-2 are in compliance with the relevant air quality standards for Nitrogen Dioxide (NO_2). Emissions from the facility lead to an ambient NO_2 concentration (including background) which is less than 94% of the maximum ambient 1-hour (as a 99.8th%ile) and 59% of the annual mean limit value at the worst-case receptor.

The results indicate that the ambient ground level concentrations due to emissions from the existing main emission points A2-1, A2-2 and A2-3 and the proposed main emission point A2-5 are in compliance with the relevant air quality standards for PM_{10}/$PM_{2.5}$. Emissions from the facility lead to an ambient PM_{10}/$PM_{2.5}$ concentration (including background) which is less than 57% of the maximum ambient 24-hour (as a 90th%ile) and annual mean limit value at the worst-case receptor.

The results indicate that the ambient ground level concentrations due to emissions from the proposed new main emission point A2-4 are in compliance with the relevant air quality standards for ethanol. Emissions from the facility lead to an ambient ethanol concentration which is less than 0.02% of the maximum ambient 1-hour and annual mean limit value at the worst-case receptor.

In summary, impacts from the facility based on the proposed and existing main emission points will be in compliance with the ambient air quality standards and will not lead to a risk to the surrounding environment.

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References

(1) USEPA (2018) AERMOD Description of Model Formulation
(2) EPA (2010) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)
(3) USEPA (1995) User's Guide for the Industrial Source Complex (ISC3) Dispersion Model Vol I & II
(4) USEPA (2016) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
(5) USEPA (2000) Seventh Conference on Air Quality Modelling (June 2000) Vol I & II
(6) USEPA (1998) Human Health Risk Assessment Protocol, Chapter 3: Air Dispersion and Deposition Modelling, Region 6 Centre for Combustion Science and Engineering
(7) USEPA (1999) Comparison of Regulatory Design Concentrations: AERMOD vs. ISCST3 vs. CTDM PLUS
(8) Schulman, L.L; Strimaitis, D.G.; Scire, J.S. (2000) Development and evaluation of the PRIME plume rise and building downwash model. Journal of the Air & Waste Management Association, 50, 378-390.
(9) Paine, R & Lew, F. "Consequence Analysis for Adoption of PRIME: an Advanced Building Downwash Model" Prepared for the EPRI, ENSR Document No. 2460-026-450 (1997).
(10) Paine, R & Lew, F. "Results of the Independent Evaluation of ISCST3 and ISC-PRIME" Prepared for the EPRI, ENSR Document No. 2460-026-3527-02 (1997).
(11) Environmental Protection Agency (2018) Air Quality Monitoring Report 2017 (& earlier reports)
(12) EPA (2019) http://www.epa.ie/whatwedo/monitoring/air/data/
(13) USEPA (2018) AERMAP Users Guide
(14) USEPA (2018) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)
(15) USEPA (2008) AERSURFACE User's Guide
(16) Alaska Department of Environmental Conservation (2008) ADEC Guidance re AERMET Geometric Means (http://dec.alaska.gov/air/ap/modeling.htm)
(17) USEPA (1985) Good Engineering Practice Stack Height (Technical Support Document For The Stack Height Regulations) (Revised)
(18) Konz et al (1989) USEPA Exposure Factors Handbook, EPA/600/8-89/043
(19) Auer Jr, (1978) Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology 17(5):636-643.

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APPENDIX I

Description of the AERMOD Model

The AERMOD dispersion model has been developed in part by the U.S. Environmental Protection Agency (USEPA)[1,4]. The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets[8].

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Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

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The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3[1,3]. ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height[1,3]. The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also has the capability of modelling both unstable (convective) conditions and stable (inversion) conditions. The stability of the atmosphere is defined by the sign of the sensible heat flux. Where the sensible heat flux is positive, the atmosphere is unstable whereas when the sensible heat flux is negative the atmosphere is defined as stable. The sensible heat flux is dependent on the net radiation and the available surface moisture (Bowen Ratio). Under stable (inversion) conditions, AERMOD has specific algorithms to account for plume rise under stable conditions, mechanical mixing heights under stable conditions and vertical and lateral dispersion in the stable boundary layer.

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AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

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APPENDIX II

Meteorological Data - AERMET

AERMOD incorporates a meteorological pre-processor AERMET (version 16216)[14]. AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

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The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations[4] and using the detailed methodology outlined by the Alaska Department of Environmental Conservation[16]. AERMET has also been updated to allow for an adjustment of the surface friction velocity (u*) for low wind speed stable conditions based on the work of Qian and Venkatram (BLM, 2011). Previously, the model had a tendency to over-predict concentrations produced by near-ground sources in stable conditions.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Cork Airport Meteorological Station is shown in Table A1.

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Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
350-50	60% Urban, 40% Grassland	0.213	0.305	0.093	0.093
50-350	100% Grassland	0.050	0.100	0.010	0.010

(1) Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983))[19]. Thus for the current location autumn more accurately defines "winter" conditions in Ireland.

Table A1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Cork Airport Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Cork Airport Meteorological Station is shown in Table A2.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
19% Urban, 81% Grassland	0.17	0.18	0.20	0.20

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Cork Airport Meteorological Station.

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Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Cork Airport Meteorological Station is shown in Table A3.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
19% Urban, 81% Grassland	0.47	0.95	1.14	1.14

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Cork Airport Meteorological Station.

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APPENDIX III

Detailed Meteorological Data – Cork Airport 2014 - 2018

Cork Airport 2014

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	34	38	168	46	12	0	298
22.5	20	32	81	9	0	0	142
45.0	30	43	70	18	1	0	162
67.5	37	26	58	21	1	0	143
90.0	52	74	185	131	43	2	487
112.5	49	58	119	93	23	8	350
135.0	39	45	115	70	20	20	309
157.5	35	82	152	91	34	32	426
180.0	109	150	333	272	79	20	963
202.5	88	103	251	213	122	46	823
225.0	60	134	551	239	103	43	1,130
247.5	45	89	350	194	61	14	753
270.0	52	148	351	271	91	39	952
292.5	51	109	255	166	18	7	606
315.0	41	90	318	257	31	0	737
337.5	36	66	173	141	16	3	435
Total	778	1,287	3,530	2,232	655	234	8,716
Calms							44
Missing							0
Total							8,760

Cork Airport 2015

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	32	40	155	47	0	0	274
22.5	10	24	104	12	0	0	150
45.0	24	23	102	3	0	0	152
67.5	22	21	83	24	0	0	150
90.0	51	94	174	111	24	0	454
112.5	49	96	141	67	14	1	368
135.0	26	58	149	144	36	13	426
157.5	36	59	159	145	49	22	470
180.0	54	90	253	231	80	47	755
202.5	44	83	249	279	158	146	959
225.0	47	102	507	375	129	72	1,232
247.5	33	83	337	251	76	31	811
270.0	46	99	240	283	101	23	792
292.5	34	65	234	177	52	9	571
315.0	33	96	301	204	32	15	681
337.5	19	84	244	137	7	2	493
Total	560	1,117	3,432	2,490	758	381	8,738
Calms							22
Missing							0
Total							8,760

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Cork Airport 2016

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	24	31	167	85	17	1	325
22.5	24	35	104	46	1	0	210
45.0	19	47	109	33	1	0	209
67.5	27	36	84	34	9	0	190
90.0	57	98	258	213	31	14	671
112.5	42	71	182	72	14	7	388
135.0	32	45	138	48	34	16	313
157.5	33	79	119	69	32	2	334
180.0	79	128	246	204	107	15	779
202.5	85	106	318	210	88	31	838
225.0	51	131	557	262	84	22	1,107
247.5	46	98	352	201	69	18	784
270.0	65	144	330	207	52	11	809
292.5	45	137	248	190	31	14	665
315.0	36	78	283	176	38	7	618
337.5	31	56	182	188	54	2	513
Total	696	1,320	3,677	2,238	662	160	8,753
Calms							31
Missing							0
Total							8,784

Cork Airport 2017

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	22	25	85	88	24	0	244
22.5	13	17	22	27	8	0	87
45.0	14	23	31	19	12	0	99
67.5	18	16	18	33	2	2	89
90.0	39	73	133	82	54	15	400
112.5	29	58	84	38	9	3	221
135.0	29	35	32	54	36	17	263
157.5	45	72	178	113	55	40	503
180.0	91	108	287	272	50	7	815
202.5	78	109	352	236	106	23	904
225.0	63	164	678	355	55	15	1,330
247.5	57	134	372	243	49	4	859
270.0	70	125	373	289	71	22	950
292.5	54	126	325	181	50	27	763
315.0	46	125	333	180	59	18	761
337.5	47	64	186	121	22	4	444
Total	715	1,274	3,553	2,331	662	197	8,732
Calms							28
Missing							0
Total							8,760

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Cork Airport 2018

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	20	37	126	131	8	0	322
22.5	16	32	58	109	24	0	239
45.0	19	27	78	105	11	0	240
67.5	33	34	44	42	16	0	169
90.0	35	68	152	125	46	8	434
112.5	43	60	144	54	5	3	309
135.0	37	44	94	126	61	50	412
157.5	43	82	168	114	72	47	526
180.0	82	165	376	200	115	37	975
202.5	75	147	397	207	97	14	937
225.0	50	110	507	265	45	7	984
247.5	29	102	350	196	46	15	738
270.0	55	113	220	229	61	30	708
292.5	43	131	158	113	29	7	481
315.0	24	108	343	148	23	0	646
337.5	22	83	281	195	34	0	615
Total	626	1,343	3,496	2,359	693	218	8,735
Calms							25
Missing							0
Total							8,760

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Appendix 8.2

Determination Of Air Emissions to Atmosphere from The LEO Pharma Cork Facility At Little Island, Cork and Impact on Nearby Sensitive Habitats (AWN, July 2021)

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DETERMINATION OF AIR EMISSIONS TO ATMOSPHERE FROM THE LEO PHARMA FACILITY AT LITTLE ISLAND, CORK AND IMPACT ON NEARBY SENSITIVE HABITATS

Technical Report Prepared For

Leo Pharma
Little Island
Cork City
Co. Cork

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Technical Report Prepared By

Dr. Edward Porter C Chem MRSC MIAQM

Our Reference

EP/21/12410AR01

Date Of Issue

14 July 2021

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Date	14 July 2021	14 July 2021

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EXECUTIVE SUMMARY

AWN Consulting Ltd were commissioned by MWP to carry out an air dispersion modelling study of emissions from the Leo Pharma facility in Little Island, Co. Cork. The modelling assessment was undertaken to assess the likely impacts of air emissions from the facility on ecology and nearby designated sites.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulatory model AERMOD (Version 21112). The aim of the study was to assess nitrogen oxide (NO_X) emissions from the facility and to identify the location and maximum of the worst-case ground level concentrations of NO_X in the nearby designated sites. The dispersion model study consisted of the following components:

- Review of proposed emissions data and other relevant information needed for the modelling study;
- Dispersion modelling of NO_X under the proposed licenced emission scenario;
- Presentation of predicted ground level concentrations of NO_X in the nearby designated sites;
- Determination of predicted critical loads of nitrogen (N) in the nearby designated sites;
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality guideline values for ecosystems.

Assessment Summary

The results indicate that the ambient ground level concentrations due to emissions from the proposed main emission points A1-1 and A1-2 are in compliance with the relevant air quality standards for NO_X. Emissions from the facility lead to an ambient NO_X concentration (including background) which is less than 71% of the annual mean limit value at the worst-case receptor within the boundaries of the nearby designated sites.

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The dispersion modelling study has confirmed that the operation of the facility will not lead to any significant increase in nitrogen deposition levels in the Cork Harbour Special Area of Conservation (SAC) and SPA (Special Protection Area for birds), the Great Island Channel SAC and the proposed Natural Heritage Areas (pNHA) Great Island Channel and Douglas River Estuary. The additional impact of the operation of the facility, above background levels, is less than 5% of the lower end of the range given for all critical loads for all relevant vegetative types.

In summary, impacts from the facility based on the main emission points will be in compliance with the ambient air quality standards and critical loads for the protection of ecosystems and will not lead to a risk to the nearby designated sites.

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1.0 INTRODUCTION

AWN Consulting Ltd were commissioned by MWP to carry out an air dispersion modelling study of emissions from the Leo Pharma facility in Little Island, Co. Cork. The modelling assessment was undertaken to assess the likely impacts of air emissions from the facility on ecology and nearby designated sites.

The site is located approximately 6km east of Cork City within Little Island. In the immediate region of the facility, the land-use is dominated by industry with local residential areas approximately 1 km north and 2 km east of the facility. The Cork Harbour Special Area of Conservation (SAC) and SPA (Special Protection Area for birds), the Great Island Channel SAC and the proposed Natural Heritage Areas (pNHA) Great Island Channel and Douglas River Estuary are all in the vicinity of the facility.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulatory model AERMOD (Version 21112). The aim of the study was to assess NO_X emissions from the facility and to identify the location and maximum of the worst-case ground level concentrations of NO_X in the nearby designated sites. The dispersion model study consisted of the following components:

- Review of proposed emissions data and other relevant information needed for the modelling study;
- Dispersion modelling of NO_X under the proposed licenced emission scenario;
- Presentation of predicted ground level concentrations of NO_X in the nearby designated sites;
- Determination of predicted critical loads of nitrogen (N) in the nearby designated sites;
- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the relevant ambient air quality guideline values.

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Information supporting the conclusions has been detailed in the following sections. The assessment methodology and study inputs are presented in Section 2. The dispersion modelling results and assessment summaries are presented in Section 3 and 4. The model formulation is detailed in Appendix I, a review of the meteorological data used is detailed in Appendix II and detailed meteorological data is presented in Appendix III.

2.0 ASSESSMENT METHODOLOGY

Emissions from the facility have been modelled using the AERMOD dispersion model (Version 21112) which has been developed by the U.S. Environmental Protection Agency (USEPA)[1] and following guidance issued by the EPA[2]. The model is a steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources and has replaced ISCST3[3] as the regulatory model by the USEPA for modelling emissions from industrial sources in both flat and rolling terrain[4-6]. The model has more advanced algorithms and gives better agreement with monitoring data in extensive validation studies[7-10]. An overview of the AERMOD dispersion model is outlined in Appendix I.

The air dispersion modelling input data consisted of information on the physical environment (including building dimensions and terrain features), design details from all emission points on-site and five years of appropriate hourly meteorological data. Using this input data the model predicted ambient ground level concentrations beyond the site boundary for each hour of the modelled meteorological years. The model post-processed the data to identify the location and maximum of the worst-case ground

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level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

Throughout this study a worst-case approach was taken. This will most likely lead to an over-estimation of the levels that will arise in practice. The worst-case assumptions are outlined below:

- Maximum predicted concentrations were reported in this study, rather than averaging the values over 1,000 km^2 (as per Directive 2008/50/EC);
- The effects of building downwash, due to on-site and any nearby off-site buildings, has been included in the model;
- Worst-case operations assume that the proposed emission point was running continuously for a full year at maximum concentration and volume flow.

2.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health- or environmental-based levels for which additional factors may be considered. The applicable standards for NO_X, in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC (see Table 1).

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Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Oxides (NO_x)	2008/50/EC	Critical level for protection of vegetation	30 µg/m^3 NO + NO_2

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 1 EU Ambient Air Quality Standards Based on Directive 2008/50/EC (S.I. 180 of 2011)

2.2 Background Concentrations Of Pollutants

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities[11,12]. The most recent annual report on air quality "Air Quality Monitoring Annual Report 2019"[11], details the range and scope of monitoring undertaken throughout Ireland. As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes[11]. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, Little Island is categorised as Zone B[11].

NO_x

NO_x monitoring was carried out at two urban Zone B location in 2018, South Link Road and UCC Distillery Fields[11]. The NO_x annual average for UCC Distillery Fields in 2018 and 2019 was 15 µg/m^3 and 15 µg/m^3 respectively. Hence long-term average concentrations measured at this location were significantly lower than the annual average limit value of 30 µg/m^3. The South Link Road is not an appropriate background site as it is located at an urban roadside location. Based on the above information a

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conservative estimate of the background NO_x concentration in the region of the facility, which is a significant distance from a major road, in 2021 is 15 µg/m^3.

Year	UCC Distillery Fields (µg/m^3)
2018	15
2019	15
Average	**15**

Table 2 Annual Mean NO_x Concentrations in Zone B Background Locations (2018-2019) (µg/m^3)

2.3 Air Dispersion Modelling Methodology

The United States Environmental Protection Agency (USEPA) approved AERMOD dispersion model has been used to predict the ground level concentrations (GLC) of compounds emitted from the principal emission sources on-site.

The modelling incorporated the following features:

- Two receptor grids were created at which concentrations within the nearby designated sites would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" within the designated sites were identified without adding unduly to processing time. The receptor grids were based on Cartesian grids with the site at the centre. An outer grid extended to 9,000m^2 with the site at the centre and with concentrations calculated at 150m intervals. A smaller denser grid extended to 3,000m from the site with concentrations calculated at 50m intervals. Boundary receptor locations were also placed along the boundary of the designated sites in the region, at 20m intervals.

- All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.

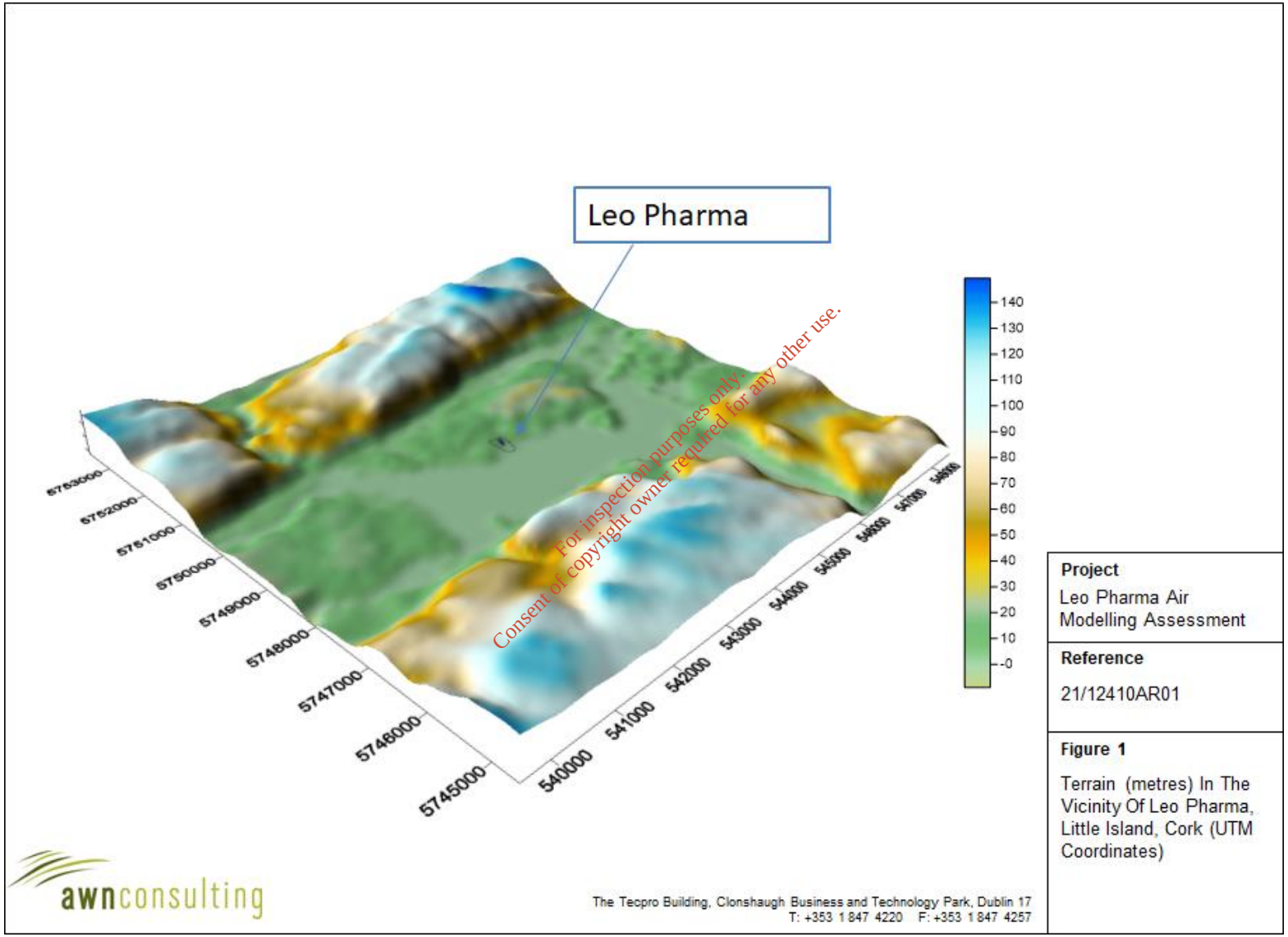
- Detailed terrain has been mapped into the model using SRTM data with 30m resolution. The site is located in gentle terrain. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP[13] as shown in Figure 1.

- Hourly-sequenced meteorological information has been used in the model. Meteorological data over a five-year period (Cork Airport, 2016 – 2020) was used in the model (see Figure 2 and Appendix III).

- The source and emission data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model.

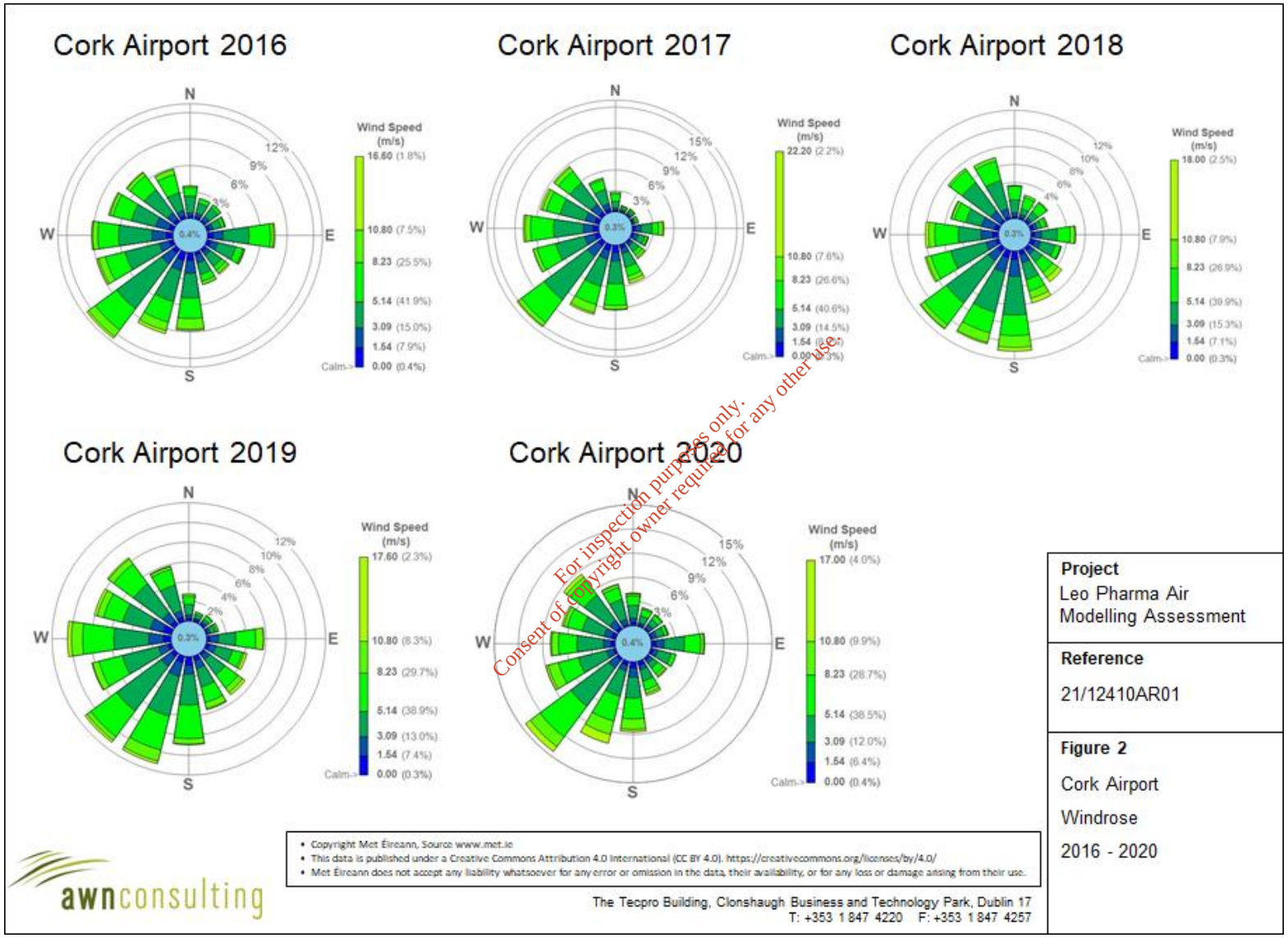
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2.4 Terrain

The AERMOD air dispersion model has a terrain pre-processor AERMAP[13] which was used to map the physical environment in detail over the receptor grid. The digital terrain input data used in the AERMAP pre-processor was obtained from SRTM. This data was run to obtain for each receptor point the terrain height and the terrain height scale. The terrain height scale is used in AERMOD to calculate the critical dividing streamline height, H_{crit}, for each receptor. The terrain height scale is derived from the Digital Elevation Model (DEM) files in AERMAP by computing the relief height of the DEM point relative to the height of the receptor and determining the slope. If the slope is less than 10%, the program goes to the next DEM point. If the slope is 10% or greater, the controlling hill height is updated if it is higher than the stored hill height.

In areas of complex terrain, AERMOD models the impact of terrain using the concept of the dividing streamline (H_c). As outlined in the AERMOD model formulation[1] a plume embedded in the flow below H_c tends to remain horizontal; it might go around the hill or impact on it. A plume above H_c will ride over the hill. Associated with this is a tendency for the plume to be depressed toward the terrain surface, for the flow to speed up, and for vertical turbulent intensities to increase.

AERMOD model formulation states that the model "*captures the effect of flow above and below the dividing streamline by weighting the plume concentration associated with two possible extreme states of the boundary layer (horizontal plume and terrain-following). The relative weighting of the two states depends on: 1) the degree of atmospheric stability; 2) the wind speed; and 3) the plume height relative to terrain. In stable conditions, the horizontal plume "dominates" and is given greater weight while in neutral and unstable conditions, the plume traveling over the terrain is more heavily weighted*"[2].

The terrain in the region of the facility is complex in the sense that the maximum terrain in the modelling domain peaks at 148m which is above the stack top of all emission points onsite. However, in general, as shown in Figure 1, the region of the site has gently sloping terrain particularly in the immediate vicinity of the facility.

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2.5 Meteorological Data

The selection of the appropriate meteorological data has followed the guidance issued by the USEPA[4]. A primary requirement is that the data used should have a data capture of greater than 90% for all parameters. Cork Airport meteorological station, which is located approximately 10 km south-west of the site, collects data in the correct format and has a data collection of greater than 90%. Long-term hourly observations at Cork Airport meteorological station provide an indication of the prevailing wind conditions for the region (see Figure 2 and Appendix III). Results indicate that the prevailing wind direction is from south-easterly to westerly in direction over the period 2016 - 2020. The mean wind speed is approximately 5.4 m/s over the period 1981-2010. Calm conditions account for only a small fraction of the time in any one year peaking at 35 hours in 2020 (0.4% of the time). There are also no missing hours over the period 2016 – 2020.

2.6 Geophysical Considerations

AERMOD simulates the dispersion process using planetary boundary layer (PBL) scaling theory[1]. PBL depth and the dispersion of pollutants within this layer are influenced by specific surface characteristics such as surface roughness, albedo and the availability of surface moisture. Surface roughness is a measure of the aerodynamic roughness of the surface and is related to the height of the roughness element. Albedo is a measure of the reflectivity of the surface whilst the Bowen ratio is a measure of the availability of surface moisture.

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AERMOD incorporates a meteorological pre-processor AERMET[14] to enable the calculation of the appropriate parameters. The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and albedo and to a distance of 1km for surface roughness in line with USEPA recommendations[14,15] as outlined in Appendix II.

In relation to AERMOD, detailed guidance for calculating the relevant surface parameters has been published[14]. The most pertinent features are:

- The surface characteristics should be those of the meteorological site (Cork Airport) rather than the installation;
- Surface roughness should use a default 1km radius upwind of the meteorological tower and should be based on an inverse-distance weighted geometric mean. If land use varies around the site, the land use should be sub-divided by sectors with a minimum sector size of 30º;
- Bowen ratio and albedo should be based on a 10km grid. The Bowen ratio should be based on an un-weighted geometric mean. The albedo should be based on a simple un-weighted arithmetic mean.

AERMOD has an associated pre-processor, AERSURFACE[15], which has representative values for these parameters depending on land use type. The AERSURFACE pre-processor currently only accepts NLCD92 land use data which covers the USA. Thus, manual input of surface parameters is necessary when modelling in Ireland. Ordnance survey discovery maps (1:50,000) and digital maps such as those provided by the EPA, National Parks and Wildlife Service (NPWS) and Google Earth® are useful in determining the relevant land use in the region of the meteorological station. The Alaska Department of Environmental Conservation has issued a guidance note for the manual calculation of geometric mean for surface roughness and Bowen ratio for use in AERMET[16]. This approach has been applied to the current site with full details provided in Appendix II.

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2.7 Building Downwash

When modelling emissions from an industrial installation, stacks which are relatively short can be subjected to additional turbulence due to the presence of nearby buildings. Buildings are considered nearby if they are within five times the lesser of the building height or maximum projected building width (but not greater than 800m).

The USEPA has defined the “Good Engineering Practice” (GEP) stack height as the building height plus 1.5 times the lesser of the building height or maximum projected building width. It is generally considered unlikely that building downwash will occur when stacks are at or greater than GEP[17].

When stacks are less than this height, building downwash will tend to occur. As the wind approaches a building it is forced upwards and around the building leading to the formation of turbulent eddies. In the lee of the building these eddies will lead to downward mixing (reduced plume centreline and reduced plume rise) and the creation of a cavity zone (near wake) where re-circulation of the air can occur. Plumes released from short stacks may be entrained in this airflow leading to higher ground level concentrations than in the absence of the building.

The Plume Rise Model Enhancements (PRIME)[8,9] plume rise and building downwash algorithms, which calculates the impact of buildings on plume rise and dispersion, have

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been incorporated into AERMOD. The building input processor BPIP-PRIME produces the parameters which are required in order to run PRIME. The model takes into account the position of each stack relative to each relevant building and the projected shape of each building for 36 wind directions (at 10º intervals). The model determines the change in plume centreline location with downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model[9].

Given that the stacks (at 8m) are less than 2.5 times the lesser of the building height or maximum projected building width, building downwash will need to be taken into account and the PRIME algorithm run prior to modelling with AERMOD.

2.8 Process Emissions

Leo Pharma are currently licenced (IED Licence No. P-0091_2) to operate two existing boilers (A1-1 and A1-2) which will now be classified as main emission points as shown in Table 3.

Stack Reference	Stack Height Above Ground Level (m)	Exit Diameter (m)	Temp. (K)	Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_X Concentration (mg/Nm^3 as C)	NO_X Mass Emission (g/s)
A1-1	8.15	0.30	448.15	3,600	23.2	250	0.25
A1-2	8.65	0.30	448.15	3,600	23.2	250	0.25

Table 3 Leo Pharma, Little Island Co. Cork – Stack Emission Details

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3.0 RESULTS & DISCUSSION

3.1 Proposed Operations - NO_X Results

The NO_X modelling results are detailed in Table 4. The results indicate that the ambient ground level concentration is below the relevant air quality standard for NO_X. Emissions from the facility lead to an ambient NO_x concentration (including background) which is at most 71% of the annual mean limit value at the worst-case receptor (Table 4 and Figure 3).

Pollutant / Year	Background (µg/m³)	Averaging Period	Process Contribution (µg/m³)	Predicted Environmental Concentration (µg/Nm³)	Standard (µg/Nm³) Note 1
NO_X / 2016	15	Annual mean	5.6	20.6	30
NO_X / 2017	15	Annual mean	6.3	21.3	30
NO_X / 2018	15	Annual mean	4.5	19.5	30
NO_X / 2019	15	Annual mean	5.9	20.9	30
NO_X / 2020	15	Annual mean	5.3	20.3	30

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC)

Table 4 Dispersion Model Results – NO_X

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3.2 Critical Loads For N Deposition

In order to consider the effects of nitrogen deposition, owing to emissions from the installation, on the nearby sensitive habitats, the installation's contribution to eutrophication has been determined.

As a first step, the NO_X concentration determined above in Table 4 must be converted firstly into a dry deposition flux using the equation below which is taken from UK Environment Agency publication "*AGTAG06 – Technical Guidance On Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air*"[18].

Dry deposition flux (μg m^{-2} s^{-1}) = ground-level concentration (μg/m^3) x deposition velocity (m/s)

The deposition velocities for various pollutants are outlined in AQTAG06 (EA, 2014) and is reproduced below in Table 5:

Chemical Species	Recommended Deposition Velocity (m/s)	
NO_2 / NO_X	Grassland	0.0015
	Forest	0.003

Table 5 Recommended Dry Deposition Velocities

In order to convert the dry deposition flux from units of μg m^{-2} s^{-1} to units of kg ha^{-1} $year^{-1}$ the dry deposition flux is multiplied by the conversion factors shown in Table 6 (taken from AQTAG06 (EA, 2014)):

Chemical Species	Conversion factor μg m^{-2} s^{-1} of species X to kg ha^{-1} $year^{-1}$	
NO_2 / NO_X	Of N:	96

Table 6 Conversion Factors To Convert Units From μg m^{-2} s^{-1} Of Species X to kg ha^{-1} $year^{-1}$

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The calculation of the nitrogen critical load is as follows using the default deposition velocity:

Dry deposition flux (μg m^{-2} s^{-1}) = ground-level concentration (NOx, Year 2017) (μg/m^3) x deposition velocity (m/s)

= 21.3 μg/m^3 x 0.0015 m/s = 0.032 μg m^{-2} s^{-1}

When expressed in units of kg ha^{-1} $year^{-1}$ as N

= 0.032 x 96 kg ha^{-1} $year^{-1}$

NO_2 dry deposition flux (kg ha^{-1} $year^{-1}$) = **3.06 kg ha^{-1} $year^{-1}$ as N**

3.3 Comparison With Critical Loads For Surrounding Sensitive Habitat

The NATURA 2000 standard data form (Site Code IE004030) for the Cork Harbour Special Area of Conservation (SAC) and SPA (Special Protection Area for birds) outlines the dominant land use categories in the region as shown in Table 7. Nearby, the Great Island Channel SAC (Site Code IE001058) is of priority for Tidal Mudflats and Sandflats and Atlantic Salt Meadows. The proposed Natural Heritage Area (pNHA) Great Island Channel and Douglas River Estuary are also in the vicinity of the facility. Also shown in Table 7 are the relevant critical loads for Nitrogen taken from the UNECE Empirical Critical Loads & Dose-Response Relationships (2010)[19].

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Habitat Class	Critical load for N deposition (UNECE 2010)[1]
Inland Water Bodies	N: not available
Low and medium altitude hay meadows	N: 20 – 30 kg ha^{-1} $year^{-1}$
Mid-upper salt marshes	N: 20 – 30 kg ha^{-1} $year^{-1}$
Pioneer and low-mid salt marshes	N: 20 – 30 kg ha^{-1} $year^{-1}$

Note 1: UNECE (2010) Empirical Critical Loads & Dose-Response Relationships

Table 7 Critical Loads For N Deposition (kg ha^{-1} $year^{-1}$) & Acid Deposition (keq ha^{-1} $year^{-1}$)

Comparing the range of critical loads for N deposition in Table 7 across the various habitat types with the value of 3.06 kg ha^{-1} $year^{-1}$ indicates that the N deposition rate is below the lower end of the range given for all relevant habitat class peaking at no more than 15% of the lower limit of all habitat types. It should also be borne in mind that this assessment is based on the maximum operations of all NO_X emitting stacks for every hour of the worst-case assessment year. In reality, ambient concentrations and deposition loads will be significantly lower than the levels reported above.

Thus, the results confirm that the effects of nitrogen deposition, owing to emissions from the facility on the Cork Harbour Special Area of Conservation (SAC) and SPA (Special Protection Area for birds), the Great Island Channel SAC and the proposed Natural Heritage Areas (pNHA) Great Island Channel and Douglas River Estuary are not significant and will not lead to an adverse impact on the priority habitats. The additional impact of the operation of the facility, above background levels, is less than 5% of the lower end of the range given for all critical loads for all relevant vegetative types.

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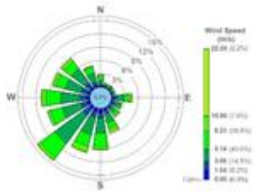
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Background Mapping from Google Earth

Annual Mean NO_X Concentration (excluding background)
Maximum Concentration = 6.3 µg/m³

Boundary Of Sensitive Habitats

Scale
1:30,000

N

Project
Leo Pharma Air Modelling Assessment

Reference
21/12410R01

Figure 3
Proposed Operation – Annual Mean NO_x Concentration (µg/m³) (Year 2017)

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4.0 ASSESSMENT SUMMARY

The results indicate that the ambient ground level concentrations due to emissions from the proposed main emission points A1-1 and A1-2 are in compliance with the relevant air quality standards for NO_X. Emissions from the facility lead to an ambient NO_X concentration (including background) which is less than 71% of the annual mean limit value at the worst-case receptor within the boundaries of the nearby designated sites.

The dispersion modelling study has confirmed that the operation of the facility will not lead to any significant increase in nitrogen deposition levels in the Cork Harbour Special Area of Conservation (SAC) and SPA (Special Protection Area for birds), the Great Island Channel SAC and the proposed Natural Heritage Areas (pNHA) Great Island Channel and Douglas River Estuary. The additional impact of the operation of the facility, above background levels, is less than 5% of the lower end of the range given for all critical loads for all relevant vegetative types.

In summary, impacts from the facility based on the main emission points will be in compliance with the ambient air quality standards and critical loads for the protection of ecosystems and will not lead to a risk to the nearby designated sites.

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References

(1) USEPA (2021) AERMOD Description of Model Formulation
(2) EPA (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)
(3) USEPA (1995) User's Guide for the Industrial Source Complex (ISC3) Dispersion Model Vol I & II
(4) USEPA (2016) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
(5) USEPA (2000) Seventh Conference on Air Quality Modelling (June 2000) Vol I & II
(6) USEPA (1998) Human Health Risk Assessment Protocol, Chapter 3: Air Dispersion and Deposition Modelling, Region 6 Centre for Combustion Science and Engineering
(7) USEPA (1999) Comparison of Regulatory Design Concentrations: AERMOD vs. ISCST3 vs. CTDM PLUS
(8) Schulman, L.L; Strimaitis, D.G.; Scire, J.S. (2000) Development and evaluation of the PRIME plume rise and building downwash model. Journal of the Air & Waste Management Association, 50, 378-390.
(9) Paine, R & Lew, F. "Consequence Analysis for Adoption of PRIME: an Advanced Building Downwash Model" Prepared for the EPRI, ENSR Document No. 2460-026-450 (1997).
(10) Paine, R & Lew, F. "Results of the Independent Evaluation of ISCST3 and ISC-PRIME" Prepared for the EPRI, ENSR Document No. 2460-026-3527-02 (1997).
(11) Environmental Protection Agency (2020) Air Quality Monitoring Report 2019 (& earlier reports)
(12) EPA (2019) http://www.epa.ie/whatwedo/monitoring/air/data/
(13) USEPA (2018) AERMAP Users Guide
(14) USEPA (2021) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)
(15) USEPA (2008) AERSURFACE User's Guide
(16) Alaska Department of Environmental Conservation (2008) ADEC Guidance re AERMET Geometric Means (http://dec.alaska.gov/air/ap/modeling.htm)
(17) USEPA (1985) Good Engineering Practice Stack Height (Technical Support Document For The Stack Height Regulations) (Revised)
(18) EA (2014) AGTAG06 – Technical Guidance On Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air
(19) UNECE (2010) Nitrogen taken from the UNECE Empirical Critical Loads & Dose-Response Relationships
(20) Auer Jr, (1978) Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology 17(5):636-643.

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APPENDIX I

Description of the AERMOD Model

The AERMOD dispersion model has been developed in part by the U.S. Environmental Protection Agency (USEPA)[1,4]. The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets[8].

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Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

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The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3[1,3]. ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height[1,3]. The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also has the capability of modelling both unstable (convective) conditions and stable (inversion) conditions. The stability of the atmosphere is defined by the sign of the sensible heat flux. Where the sensible heat flux is positive, the atmosphere is unstable whereas when the sensible heat flux is negative the atmosphere is defined as stable. The sensible heat flux is dependent on the net radiation and the available surface moisture (Bowen Ratio). Under stable (inversion) conditions, AERMOD has specific algorithms to account for plume rise under stable conditions, mechanical mixing heights under stable conditions and vertical and lateral dispersion in the stable boundary layer.

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AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

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APPENDIX II

Meteorological Data - AERMET

AERMOD incorporates a meteorological pre-processor AERMET (version 21112)[14]. AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

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The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations[4] and using the detailed methodology outlined by the Alaska Department of Environmental Conservation[16]. AERMET has also been updated to allow for an adjustment of the surface friction velocity (u*) for low wind speed stable conditions based on the work of Qian and Venkatram (BLM, 2011). Previously, the model had a tendency to over-predict concentrations produced by near-ground sources in stable conditions.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Cork Airport Meteorological Station is shown in Table A1.

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Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
350-50	60% Urban, 40% Grassland	0.213	0.305	0.093	0.093
50-350	100% Grassland	0.050	0.100	0.010	0.010

(1) Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983))[20]. Thus for the current location autumn more accurately defines "winter" conditions in Ireland.

Table A1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Cork Airport Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Cork Airport Meteorological Station is shown in Table A2.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
19% Urban, 81% Grassland	0.17	0.18	0.20	0.20

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Cork Airport Meteorological Station.

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Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Cork Airport Meteorological Station is shown in Table A3.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
19% Urban, 81% Grassland	0.47	0.95	1.14	1.14

(1) For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Cork Airport Meteorological Station.

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APPENDIX III

Detailed Meteorological Data – Cork Airport 2016 - 2020

Cork Airport 2016

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	24	31	167	85	17	1	325
22.5	24	35	104	46	1	0	210
45.0	19	47	109	33	1	0	209
67.5	27	36	84	34	9	0	190
90.0	57	98	258	213	31	14	671
112.5	42	71	182	72	14	7	388
135.0	32	45	138	48	34	16	313
157.5	33	79	119	69	32	2	334
180.0	79	128	246	204	107	15	779
202.5	85	106	318	210	88	31	838
225.0	51	131	557	262	84	22	1,107
247.5	46	98	352	201	69	18	784
270.0	65	144	330	207	52	11	809
292.5	45	137	248	190	31	14	665
315.0	36	78	283	176	38	7	618
337.5	31	56	182	188	54	2	513
Total	696	1,320	3,677	2,238	662	160	8,753
Calms							31
Missing							0
Total							8,784

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Cork Airport 2017

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	22	25	85	88	24	0	244
22.5	13	17	22	27	8	0	87
45.0	14	23	31	19	12	0	99
67.5	18	16	18	33	2	2	89
90.0	39	73	137	82	54	15	400
112.5	29	58	84	38	9	3	221
135.0	29	35	92	54	36	17	263
157.5	45	72	178	113	55	40	503
180.0	91	108	287	272	50	7	815
202.5	78	109	352	236	106	23	904
225.0	63	164	678	355	55	15	1,330
247.5	57	134	372	243	49	4	859
270.0	70	125	373	289	71	22	950
292.5	54	126	325	181	50	27	763
315.0	46	125	333	180	59	18	761
337.5	47	64	186	121	22	4	444
Total	715	1,274	3,553	2,331	662	197	8,732
Calms							28
Missing							0
Total							8,760

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Cork Airport 2018

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	20	37	126	131	8	0	322
22.5	16	32	58	109	24	0	239
45.0	19	27	78	105	11	0	240
67.5	33	34	44	42	16	0	169
90.0	35	68	152	125	46	8	434
112.5	43	60	144	54	5	3	309
135.0	37	44	94	126	61	50	412
157.5	43	82	168	114	72	47	526
180.0	82	165	376	200	115	37	975
202.5	75	147	397	207	97	14	937
225.0	50	110	507	265	45	7	984
247.5	29	102	350	196	46	15	738
270.0	55	113	220	229	61	30	708
292.5	43	131	158	113	29	7	481
315.0	24	108	343	148	23	0	646
337.5	22	83	281	195	34	0	615
Total	626	1,343	3,496	2,359	693	218	8,735
Calms							25
Missing							0
Total							8,760

Cork Airport 2019

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	25	31	94	69	21	1	241
22.5	20	13	35	21	0	0	89
45.0	19	20	26	33	5	0	103
67.5	15	24	42	16	17	0	114
90.0	29	74	154	176	70	3	506
112.5	30	62	149	88	18	26	373
135.0	23	50	169	141	52	27	462
157.5	43	73	167	142	56	10	491
180.0	77	79	273	299	50	5	783
202.5	61	125	364	310	101	25	986
225.0	40	106	493	284	40	23	986
247.5	32	88	329	213	59	5	726
270.0	67	130	309	276	99	35	916
292.5	79	116	251	174	60	25	705
315.0	42	92	318	219	55	13	739
337.5	44	54	237	145	25	6	511
Total	646	1,137	3,410	2,606	728	204	8,731
Calms							29
Missing							0
Total							8,760

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Cork Airport 2020

Dir \ Spd	<= 1.54	<= 3.09	<= 5.14	<= 8.23	<= 10.80	> 10.80	Total
0.0	37	46	141	102	23	8	357
22.5	19	21	81	71	17	1	210
45.0	19	50	72	50	12	0	203
67.5	21	46	84	39	11	0	201
90.0	51	89	222	178	33	10	583
112.5	31	49	151	53	0	0	284
135.0	26	41	68	80	29	11	255
157.5	47	48	129	98	39	24	385
180.0	67	100	227	227	115	27	763
202.5	44	63	284	280	150	101	922
225.0	30	105	514	420	131	66	1,266
247.5	24	78	316	226	114	25	783
270.0	46	85	284	203	75	14	707
292.5	45	85	246	170	39	21	606
315.0	34	91	340	192	51	41	749
337.5	20	60	222	135	33	5	475
Total	561	1,057	3,381	2,524	872	354	8,749
Calms							35
Missing							0
Total							8,784

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MWP

Appendix 10.1

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

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

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

The prehistoric period: Mesolithic - (*circa* 8000 to 4000 BC); Neolithic - (*circa* 4000 to 2400 BC); Chalcolithic c. 2450-2200; Bronze Age (*circa* 2200 to 700 BC) – Iron Age (*circa* 700 BC to AD 400)

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

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There are no known archaeological sites dating to the Mesolithic or Neolithic Periods within the Study Area. The general lack of sites does not, however, mean that such early settlement and occupation were unknown to the region. Many archaeological sites from the early prehistoric period leave little or no surface evidence on the landscape. In many cases they only come to light during archaeological testing/monitoring in association with industrial, residential and infrastructural development. Prehistoric settlement sites are often concentrated along river valleys and along the coastline and the evidence for early prehistoric activity in Cork is likewise predominantly found in the estuarine and harbour areas. A polished stone axe almost 0.12m long was identified during monitoring of topsoil removal prior to the construction of the waste-water treatment plant at Carrigrenan, *c.* 1.3km to the southeast of the proposed development site (Lane 2001). A large area surrounding the location of the axe head was inspected, but nothing of an archaeological nature was noted. Polished stone axe finds are very often isolated and this would seem to have been the case here (*ibid*). The Files of the National Museum give details of a dugout canoe that was washed ashore in the townland of Pembroke, Passage West *c.* 2km across Lough Mahon to the southeast. The example at Pembroke consisted of a round-bottomed wooden dugout hewn from a single piece of wood, elm (*ulmus*). The bow and stern were pointed and the sides damaged and it had been hollowed out to a depth of approximately 19cm. Although this boat was not dated, it is typical of the earliest boats known to have been made by humans.

Within the broader area of Cork harbour, there are a number of Neolithic sites, including a simple megalithic tomb in Rostellan (CO088-010) on the modern shoreline, approximately 13km to the southeast. Within the inner reaches of the harbour, Neolithic settlement activity was discovered

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during development at Ballinure on the Mahon peninsula (CO074-130), approximately 2.8km to the southwest (Purcell, 2005) and at Foaty on Fota Island (CO075-077), approximately 4km to the east (Power *et al.* 1994, 365). Just outside and to the east of the mouth of Cork harbour a number of finds of flint scatters, some of which date to the later Mesolithic period, are spread across the townlands of Ballintra West (CO100-042), Inch (CO100-043), Lahard (CO100-016), and Ballybranagan (CO100-044) approximately 16km to the southeast of the proposed development site.

The Chalcolithic, meaning the 'Copper and Stone Age' is a transitional phase in Ireland between the Neolithic and Bronze Age that is characterised by the adoption of copper metallurgy as an established technology prior to the use of bronze. This period is also frequently represented on excavated sites 'by the widespread cultural adoption of a new form of pottery, collectively referred to as Beaker Ware' (Hanley, 2013). Much evidence for primitive copper mining in Ireland has been discovered in the south-west, at Ross Island, Co. Kerry, *c.* 80km to the northwest and Mountgabriel in Co. Cork, *c.* 90km to the southwest. The communal burial tradition in large megalithic tombs of the Neolithic continued in this period in the form of wedge tombs. The large majority of megalithic tombs found in Co Cork are wedge tombs which generally date to this transitional period, the Chalcolithic. The majority of wedge tombs conform to a general design; they have a pronounced wedge shape in plan and section with the entrance generally located at the broader southwestern end. The human remains interred in the monuments are generally cremated and grave goods frequently accompany them.

The Irish Bronze Age is characterised by the adoption of bronze, distinctive pottery styles, changes in burial traditions and an increase in population. The burial traditions of the Bronze Age were generally much simpler than the elaborate megalithic tombs of the earlier Neolithic and Chalcolithic periods, although these were frequently reused for later burials. Most Bronze Age burials, either cremated or inhumed, were placed in stone-lined cists or simple earth-cut pits often accompanied by grave goods. Some graves were marked with a cairn or a mound of stones, while others were marked by a mound of earth known as a barrow. The earliest recorded archaeological site in the study area is a fulacht fia (CO075-082) in the townland of Castleview, c. 950m to the north of the proposed development site. Fulachtai fia are generally interpreted as ancient cooking sites but could have been used for any purpose that required large quantities of hot or boiling water such as bathing, processing textiles, tanning, brewing, extraction of fats from meat, and soap making, or even a combination of these functions (Ó Drisceoil, 1988; Monk 2007; Quinn & Moore 2007). According to Hawkes (2011) 'the tradition of open-air boiling using hot stones for activities such as communal feasting, bathing, steaming and other possible industrial processes seems to have died out in Ireland in the mid-first millennium BC. An oral tradition appears to have survived as part of a mythologised understanding of burnt mounds, which led to a certain degree of fanciful elaboration in later periods'. While many fulachtai fia have been dated to the later Bronze Age (2400-500BC), a minority of excavated examples have been dated to the Neolithic. The example in Castleview was excavated in 1999 in advance of development of an industrial and retail complex. Excavation revealed a D-shaped spread (10.46m E-W; L 9.6m; D 0.1-0.45m) of heat-shattered stone and charcoal enriched soil which covered a trough of two conjoined unlined pits (Ronan *et. al.* 2009). Radiocarbon dates retrieved from the site place the use of this fulacht fia in the Late Bronze Age (*ibid*).

The Iron Age in Ireland marks the transition from bronze to iron working which was a significant technological innovation that had a major impact on agriculture, making it more efficient and productive and thus having an effect on society as a whole. Iron, a much harder substance than bronze was used to make more efficient tools to clear large tracts of dense forest. There is no evidence for widespread production and use of iron in the Early Iron Age (c. 700-400BC). From around 300BC there was a widespread adoption of iron metallurgy across Ireland and the La Tene style of art practiced by the Celtic peoples of Europe, named 'Keloti' by the Greeks. Although there is

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little sign of earlier Hallstatt-like Celtic culture in Ireland, the later La Tene culture is represented in metalwork and some stone sculpture, mainly in the north and west of the country. Rotary querns, linear earthworks and the continued use of hillforts are all aspects of Iron Age Ireland. Burial practices included cremation and inhumation interred in pits or in pre-existing tumuli. Burial monuments associated with the period include ring barrows, ring-ditches and embanked enclosures. Cremation burial appears to have declined in the Iron Age, a trend that has been attributed to a Roman and Christian influence. There are no known sites dating to the Iron Age within the study area or surrounding landscape. However, finds such as the 'Cork Horns' discovered close to the jetties around Victoria Road in Cork City and dated to the 1st century AD (Rynne, 1993) are a clear indication of Iron Age activity in the Cork area.

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

Early Medieval Period

This period in Ireland is characterised by the influx and influence of Christianity, which had become widely established by the 6th century AD such as the ecclesiastical site (CO087-065002) on Spike Island, situated *c.* 8km to the southeast of the proposed development site in Cork Harbour. Hurley (1980) describes the ecclesiastical site on Spike Island as "identifiable with the early ecclesiastical site of Inispicht". A map of 1625 appears to show the remains of a ruined church on the island (1980 quoted in Power *et al.* 1994, 290). A distinctive feature of the development of early Irish Christianity was the important role played by monasticism. From its monasteries, Irish monks set out as pilgrims preaching the gospel and establishing new communities across the Continent. The earliest beginnings of Cork City, (*c.* 7km to the west of the development site) as an established settlement can be traced to the monastic foundation of St. Fin Barre, in the 6th/early 7th century (Gwynn and Hadcock 1970, 66) on the site of the present St. Finbarr's Cathedral and graveyard (CO074-038002 and CO074-038001).

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Monasteries became a focal point for the lay communities of this period who were spread throughout the countryside in settlements such as ringforts/raths, crannogs and simple huts. Irish society in the Early Christian Period was divided into the free elite and the unfree cottiers, tenants-at-will and serfs/slaves. The elite and their families would have lived in ringforts, while the labourers and others of lower status in society lived outside the ringfort in small huts. Ringforts (also known by the names rath, lios, cathair or caiseal/cashel) are the most widespread and characteristic field monument in Ireland, a single bank and ditch (univallate) being the most common form, with double rings (bivallate) and triple rings (trivallate) rarer and thought to have been of higher status. Cattle dominated the farm economy of the period, with dairying being the primary pursuit. Tillage was secondary, the most important crops being wheat, oats, barley, rye and flax. In the absence of money (coinage did not become widespread until the medieval period), cattle were the indicator of one's status and were the currency for payment of fines, rent, tributes and gifts. Land was valued on the basis of the number of cows it could support (Feehan, 2003). Cattle raiding was widespread and the ringfort provided protection for the animals at night when they would have been kept within its defensive palisade (*ibid*, 62). Ringforts are generally circular or oval in plan defined by an earthen bank with an external ditch or fosse. The sub-surface remains of circular dwelling houses and associated outbuildings are frequently revealed within ringforts during excavation. More occasionally evidence of specialised craft-working is also found during excavation indicating the possibility of higher status sites. The main phase of construction and occupation of these sites dates from the beginning of the 7th century AD to the end of the 9th century AD. Many of these sites appear to have been levelled in modern times by agricultural activity, although archaeological

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features may still remain undisturbed below ground level. Some ringforts have associated souterrains or underground structures that generally contain one or more chambers linked by narrow creepways. Their function may have been for storage or as a defensive feature. There is one ringfort (CO075-023) in the study area, 2km across Lough Mahon in the townland of Ardmore. The site, depicted on the OS 6-inch map of 1842 as a circular enclosure, 40m in diameter is levelled with no visible surface trace (Power et al. 1994). The Viking invasion of Ireland began in 795AD with an attack on Rathlin Island off the Antrim coast. From about 830AD raids intensified, with the Vikings navigating major rivers and plundering inland. Although, there is no evidence at present for Viking settlement around Cork Harbour, a number of place names such as Dunkettle and Foaty reflect a Scandinavian influence.

High Medieval and Late Medieval Periods

The Anglo-Normans arrived in Ireland in 1169 at the request of Diarmait Mac Murchada, the deposed king of Leinster. By 1350 Norman influence was evident on the rural landscape in the form of manorial villages with open field systems, occupied by colonists from England and Wales (Aalen, Whelan, Stout 1997, 55). The earth and timber fortresses constructed by the Anglo-Normans settlers in the late 12th/early 13th century functioned as defensive homesteads, replacing the earlier ringfort. They were also a means of consolidating infiltration into Irish territory. Only the earthworks of these fortresses survive above ground in the form of mottes or ringworks. They generally consist of a conical, flat-topped earthen mound that has been artificially raised and is usually enclosed by a fosse. The motte would have supported a wooden surperstructure with a palisade and tower, sometimes referred to as 'timber castles'.

The less formidable moated sites form part of the second wave of Anglo Norman settlement in Ireland. They were most likely the homes of minor lords and well-to-do tenant farmers and would have formed the focal point of large agricultural estates. In some instance they may also have represented outlying grange farms associated with monastic establishments, while research by Dr Kieran O'Connor (2000) has indicated that a smaller number, especially in the north and west of the country, may have been used by Gaelic Lords. Moated sites, which functioned as farmsteads, are among the most numerous earthworks of the medieval period. It is estimated that there are close to 1,000 moated sites in Ireland (*ibid.*), with the vast majority occurring in the south and east, where there are notable concentrations in counties, Wexford, Kilkenny and Tipperary and Limerick. They were often built on the outer edges of the Anglo Norman colonies and it has been suggested that they may represent a second wave of settlement into more marginal land. There are no known moated sites in the study area or in the broader landscape surrounding the development area.

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At the same time as the Anglo-Norman invasion of Ireland, the church in Europe experienced a period of reform, which resulted in the foundation of many new religious orders, like the Cistercians who founded their first house in Ireland at Mellifont, county Louth in 1157. Within a few years other houses were established around the country like that in the historic town of Midleton (CO076-063005) 11km to the northeast. The Cistercian abbey of Chore, also called St. Mary of Chore (CO076-063003) was founded in 1180 (Gwynn & Hadcock 1988) adjacent to the Owenacurra River giving the town its name Midleton, in Irish *Mainistir na Corrann*, meaning monastery of the ford. The Abbey was suppressed in 1543 and in ruins in 1615 (Gwynn & Hadcock 1088). The site is now occupied by Midleton Church of Ireland church and graveyard (CO076-063002 and -063001).

Following Anglo-Norman colonisation, the old Gaelic system of farming with its dominance on dairying was replaced. The Anglo-Norman system of agriculture was predominantly arable, based generally on the open field system used in England with crops such as wheat, rye, flax and corn. New crops such as peas, beans, celery and onions were introduced. Sheep were more important on the Anglo-Norman farm and improved breeds meant that wool and sheepskin exports rose.

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

There is one tower house is the study area, Wallingstown Castle (CO075-021; PS00491), now within a large industrial estate in Little Island, c. 730m to the northwest of the proposed development site. The site consists of a small rectangular tower (6.1m N-S; 7.6m E-W) which stands to 4 storeys. It is known as Wallingstown Castle although there is no apparent link with the Wallyns or Waleys (later Walsh) family. The castle was held by the Fitzgeralds for a time in the 16th century and stood in the demesne lands of Little Island House which no longer survives. The following excerpt is taken from an archaeological assessment carried out as part of a proposed programme of conservation works for the castle (Sherlock, January 2003); '*The remains of Wallingstown Castle stand in an area of rough grass within a modern industrial estate and so it is difficult to establish the original landscape context of the site, though a ruined medieval church and graveyard are located a short distance away to the west. The structure is a Later Medieval tower house and as such belongs to a late form of castle architecture that was common in Ireland, and particularly in Munster, in the fifteenth and sixteenth centuries. Wallingstown is a relatively simple tower house and is comprised of a rectangular stone-built structure which appears to have had a single room at each level within it. The structure is built with limestone rubble and lime mortar, though there have been many alterations to the original building over time. The building is now in a ruinous state and the timber floors, the roof, the doors and the window fittings are no longer in situ. The building measures 7.65m long (east-west) by 6m wide externally and a slight basal batter was noted on the northern, eastern and western sides. The external face of the east wall has an apparently modern render upon it, but the other faces of the building are now generally unrendered. The structure is openly accessible to the public and the interior may be accessed through the ground-floor doorway in the north wall'*. The conservation works were archaeologically monitored (Sherlock, September 2003) and no finds or features of archaeological interest were identified. It was noted at the time that the works '*should considerably improve the stability of the structure and ensure its preservation for future years*' (ibid).

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There is no visible surface trace of the castle in Courtstown (CO075-025), c. 2km to the northeast of the proposed development site, which is marked as '*site of castle*' on the OS 1st edition map (1841). The castle would have stood in a commanding position, on top of a natural knoll. According to Healy (1988) it was a Barry castle and the name 'court' may indicate a 17th century date for its construction. Outside the study area, 3km to the northwest, is Blackrock castle, a tower house built in c. 1582. Although undergoing a number of reconstructions since the first tower was built, the castle is a landmark building on the south shore of the River Lee. Belvelly Castle (CO075-030) is situated *c.* 4km to the east of the proposed development site. This castle is located on the north shore of Great Island overlooking the ford which was the only access to the island before Belvelly Bridge was built in 1803. The four-storey tower (13.5m E-W; 10m N-S), built by the Hodnett family in 15th century was described as 'broken down' in 1581 but apparently occupied by Sir Peter Courthorpe (Healy 1988). A plaque bearing coat of arms over the ground floor door may belong to Courthorpe (ibid). The castle was restored in late 2018 and is currently in use as a private residence.

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Post Medieval Period

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

The eighteenth century was an era of relative peace and political stability in Ireland. This encouraged a growing sense of prosperity and order, which in turn created an environment favourable to industrial and agricultural innovation as well as intellectual and aesthetic pursuits. Perhaps the most notable cultural heritage site-type of this period and the ensuing century is the country house and its demesne. The term 'demesne' or 'demaine' is Norman French in origin and denotes that portion of the manorial estate not leased out to tenants but retained by the Lord for his own use and occupation' (Reeves-Smyth, 1997, 549). The estate system was finally dismantled in Ireland in the early twentieth century. Although demesnes were widespread in medieval Ireland, the foundation of those still evident on the modern landscape date to the middle of the eighteenth century when 'natural style' landscape parks were adopted by Irish landowners. The typical demesne consisting of the big house with associated buildings, ornamental grounds, landscaped gardens and woodlands, often enclosed by high walls and belts of trees still remains the dominant man-made feature of the post medieval landscape in Ireland. At one time demesnes occupied nearly 6% of the country (Aalen et al., 2000, 197). This was the era of great landed estates, a period when landowners signalled the extent of their authority with the scale of their homes. Abandoned castles and fortified houses were often utilised, either to form the core of the new building or as an attractive focal point on the demesne along with ponds, decoys, bridges and follies. Designed landscapes became an essential part of country estates. Formal design elements dominated the early part of the century but were gradually replaced by more naturalistic compositions characterised by smooth, undulating lawns and casual arrangements of trees.

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Little Island is described by Lewis in 1837 as being '*..embellished with several handsome seats'* which are attracted to the island by the '*pure atmosphere, fertile soil and sylvan scenery'*. Amongst those houses mentioned by Lewis are Flaxfort, Carrigrennan, Little Island House and Ditchley. The only one surviving of these is Ditchley which is now part of a hotel. The first edition OS map, drawn up in the 1840s, depicts the houses and their attendant demesne features in great detail while subsequent maps generally depict the contraction of these ornate grounds within the landscape. Many country houses with larger demesnes had associated features such as demesne walls, walled gardens, gate lodges, ornamental towers, tree-lined avenues, tree rings, deer parks, ice houses and lime kilns.

Ditchley House (PS00502; NIAH20907527) at the northern end of Little Island, is now occupied by the Radisson Hotel. It was built by S. Jackson as the Dower House to Little Island House. Jackson was from an English family and reputedly owned a large amount of land on Little Island, including quarries (Sutton, 2002). The house is described in the NIAH as a six-bay, two-storey over half-basement built in c. 1820 and despite more modern extensions and alterations, the country house retains much of its early character (NIAH). Remaining demesne features include the house, gate lodge and gate piers (*ibid*). The house is named Castleview on the OS 6-inch map of 1842. In the latter half of the 19th century the house and farm buildings were held in separate ownership and the house became known as Ditchley House (Sutton, 2002). Both the second and third editions of the OS maps name Ditchley as the house and Castleview as the farm (*ibid*). A record of tenants carried out in 1853 by the Valuation Office (Griffith, 1852) refers to Robert de la Cour Beamish as the occupier of

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Ditchley House when the property of 13 acres was valued at £34.00. The same valuation record notes that Castleview farm was owned by Edmond Murphy and that the 208 acres were valued at £13.10s (Sutton, 2002). The Jackson family may still have been landlords of both Castleview and Ditchley at this time with separate tenants paying them a ground rent. Ditchley House was purchased by the Julian family around 1900. Arthur Julian, a solicitor in the South Mall in Cork City, married Mary Louisa Grey around 1880. They first lived in Carrigrenan House on Little Island and then moved to Ditchley House. Their daughter, Dorothy, married Judge D.B. Sullivan and lived in Carrigrenan House. Their second daughter remained in Ditchley and was known as Miss Julian. Miss Julian, inherited Ditchley house and lived there until it was sold to the Ellis family in the 1960's (*ibid*, 2002).

Carrigrenan House, situated c. 1.3km to the southeast of the proposed development site was demolished in the early 2000s and the site is now occupied by a water treatment plant. The now demolished house is described in Bence Jones (1988) as '*A pleasant square late-Georgian house of 2 storeys over a basement on a promontory jutting out into Lough Mahon… and a seat of the Bury family*'. The demesne associated with the house is depicted on the OS 6-inch map of 1842 comprising a large house, a cottage, walled garden, a thrashing mill, boat house and quay. A castellated tower (CO075-024002; PS00503), known as Carrigrenan Tower stands on the water's edge to the west of where the house once stood. The tower is described in the Archive Unit Files of the NMS as a single storey tower over basement of cut limestone that is now missing its gabled roof which adjoins a five-bay circular two-storey over basement tower. All wall tops are castellated to give it a castle look (Archive Unit Files, NMS). The tower is most probably a folly, similar to that at Foaty (CO075-046), c. 2.7km to the northeast. In 1837, the house was occupied by J.M. Ashlin (father of the architect George Ashlin), in the early 1850s it was occupied by the Reverand Robert Bury and in the 20th century it was home to the Sullivans (NUI Galway, Landed Estates database).

The OS 6-inch map of 1842 depicts Little Island House, now also demolished, situated to the northwest of the proposed development site in Wallingstown. The house was a Palladian style building built for the Bury family in c. 1780 (Bence Jones, 1988). It was occupied by Richard Bury in 1814, by Phineas Bury in 1837 and by his widow Eliza at the time of Griffith's Valuation (1847-1864) when it was valued at £51 (landed estates database). The building was a ruin in 1978 having been derelict for many years (Bence Jones, 1988). The house is depicted on the OS 6-inch map of 1842 with the still extant Wallingstown tower house (PS00491; CO075-021) and church and graveyard (PS00495; CO075-020001, 002), a pond and walled garden lying within extensive demesne grounds. The site of the house is now occupied by an industrial estate.

Other country houses of note, outside Little Island but within the Study Area include Dunkettle House (PS 00494; NIAH 20907518) built in c. 1790 in the Palladian style and Dunsland House and gate lodge (PS00494; NIAH20907519 and PS00494; NIAH20907158) dating to 1930 and 1890 respectively to the northwest. Rockgrove House and gate lodge (PS00490; NIAH20907531) to the northeast were built in *c.* 1760. The house along with remnant demesne features such as a gate lodge, grotto and well-executed limestone gate piers, according to the NIAH, adds significantly to the architectural heritage of the area. Ardmore House (PS01474; NIAH 20975009) across Lough Mahon to the south is the country house at Ardmore is a five-bay, three-storey house built in c. 1780 and was once the home to Captain Richard Roberts who captained the steamship Sirius, the first such craft to cross the Atlantic to America in 1838 (NIAH).

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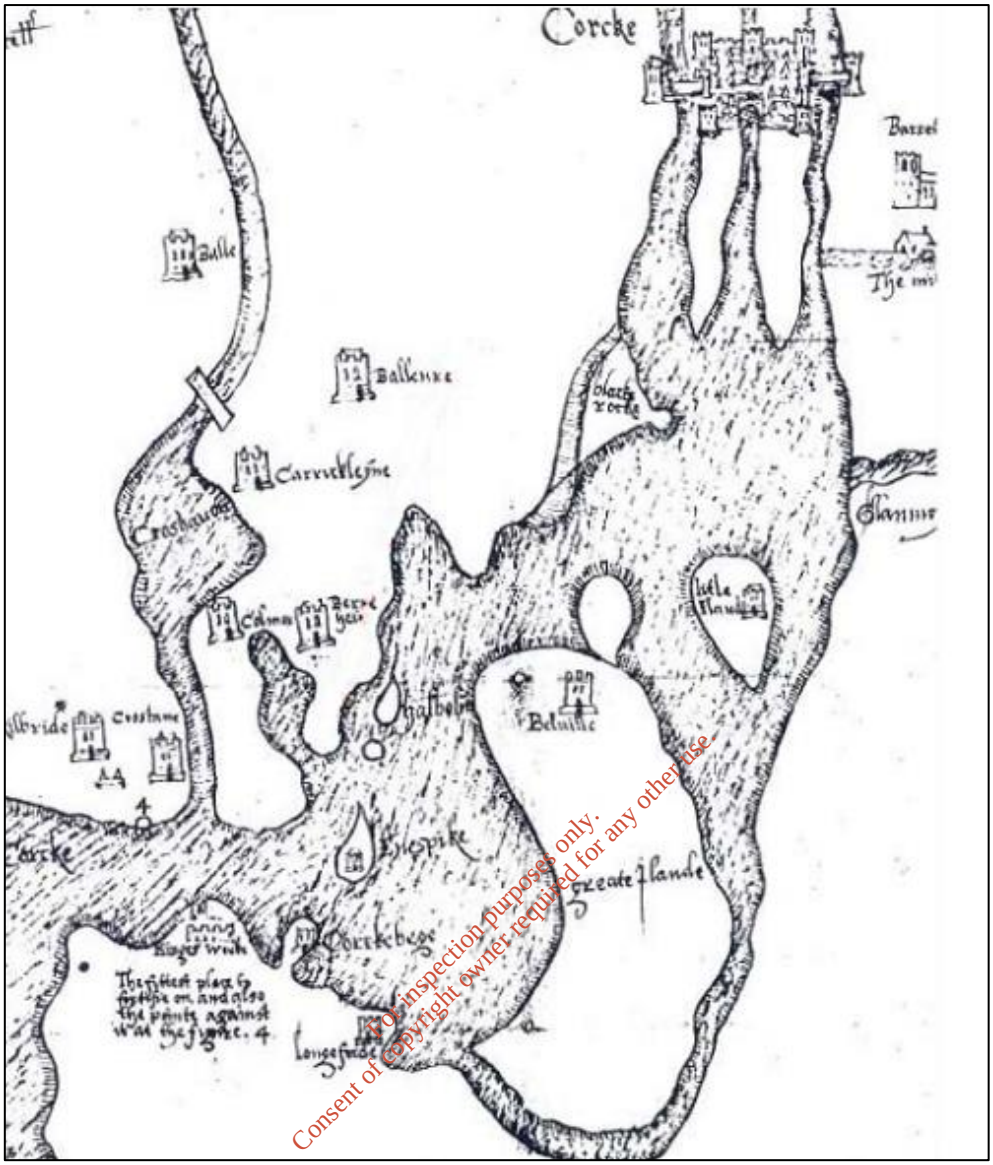
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Appendix 10.2

Cartographic Sources

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Figure 10.1: Candell's map of Cork Harbour (1587) showing '*Little Islande*' and '*Greate Islande'* to the southwest www.corkpastandpresent.ie

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Figure 10.2: John Speed's Map of Munster 1610 depicting Little Island as Lord Barry Island
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Figure 10.3: Down Survey Parish Map of Little Island (1655-66) www.downsurvey.tcd.ie

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Figure 10.4: Smiths map of county cork 1750 depicting Little Island completely separate from the mainland www.corkpastandpresent.ie

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Figure 10.5: Taylor and Skinner (1777) depicting Little Island completely separate from the mainland www.corkpastandpresent.ie

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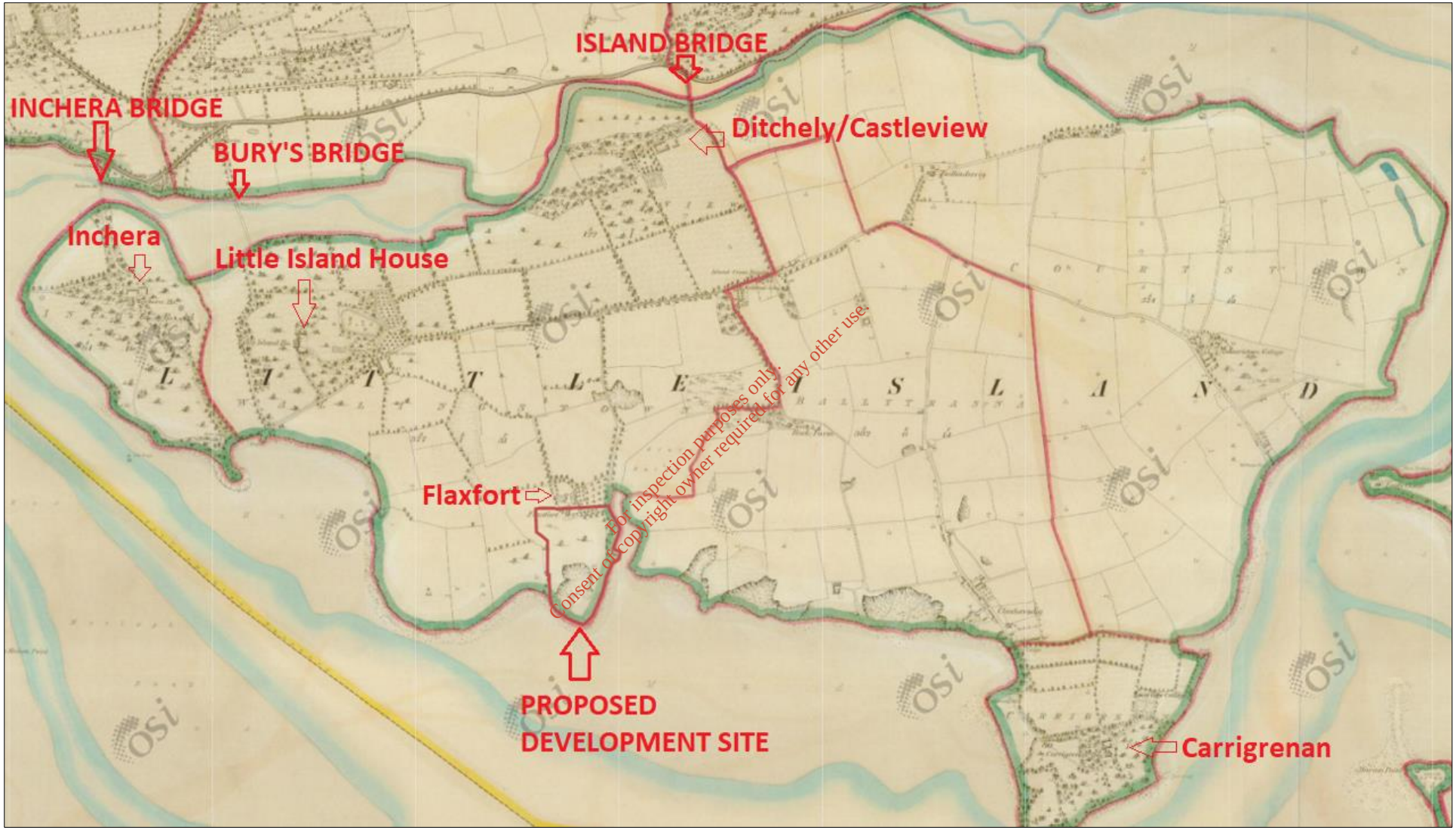


Figure 10.6: OS map of 1842 depicting Little Island with its country houses and landscaped gardens and the bridges which connected it to the mainland www.archaeology.ie

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Appendix 10.3

Photographs

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Plate 1: Site of former Flaxfort House, looking southeast

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Plate 2: Area to the front of the former Flaxfort House, looking northeast

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Plate 3: Area to the front of the former Flaxfort House, looking east

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Plate 4: Carpark and admin area at the eastern side of the Leo Pharma facility, looking south

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Plate 5: Western side of Leo Pharma facility, looking southeast

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Plate 6: Looking southeast

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Plate 7: New production building under construction, looking northwest

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Plate 8: Rough pathway to the west of quarry, looking south

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Plate 9: Interior of former quarry at the southwest of the proposed development site, looking northwest



Plate 10: Southern extremity of the proposed development site, looking west

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Plate 11: Location of firewater tank and pump house in Area A, looking east



Plate 12: Location of firewater tank and pump house in Area A, looking northeast

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Plate 13: Location of firewater tank and pump house in Area A, looking north



Plate 14: Location of retention pond in Area 2, looking south

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Plate 15: Location of retention pond, looking southeast

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Appendix 12.1

Noise Impact Assessment for Fire Protection Project

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Malachy Walsh and Partners
Engineering and Environmental Consultants

Noise Impact Assessment for Fire Protection Project

LEO Pharma



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ISSUE FORM	
Project number	22102
Document number	6006
Document revision	A
Document title	Noise Impact Assessment
Document status	FINAL
Document prepared by	Peter Barry
Document checked by	PB 040521 / AR 040521/ SC 040521

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1 INTRODUCTION

Malachy Walsh and Partners have been commissioned to carry out a noise impact assessment in relation to the construction of a proposed Firewater Retention Pond at the LEO Pharma plant at Little Island.

This report describes the extent of construction noise on the adjacent Special Protected Area (SPA). The noise propagation presented herein is used within the Natural Impact Statement (NIS) to determine the potential significance of impact on the birdlife within Cork Harbour SPA.

The nearest human noise sensitive locations have also been considered. The Environmental Protection Agency defines a Noise Sensitive Location (NSL) as *any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.* For the purpose of this assessment, this includes the Golf Course approximately 150 m east of the proposed Firewater Retention Pond and a residential property approximately 480 m north of the proposed development on the access road to the LEO Pharma.

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2 POTENTIAL CONSTRUCTION NOISE IMPACTS

2.1 MAIN NOISE SOURCES

The exact equipment to be used is not known at this stage, however the plant and machinery outlined in **Table 1** are typical of the plant used and can provide an accurate assessment of construction noise emissions.

The associated noise levels have been sourced from *BS 5228 Noise and Vibration from open and construction sites*.

The main items of construction plant employed to build the firewater pond will be a tracked excavator and dump trucks used to construct the earth berms and a rock breaker. The rock breaker will be used for a period of approximately 2 weeks to break out rock within the footprint of the proposed firewater pond.

Table 1 Main Noise Sources

Name	Sound Power Levels in dB(A)								
	Frequency Banding Hz dB(A)								Total
	63	125	250	500	1000	2000	4000	8000	dB(A)
Tracked Excavator	80	83	76	73	72	70	69	66	86
Dump Truck	86	79	79	79	79	84	69	60	90
Rock Breaker	107	112	110	112	116	113	112	110	121

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The construction works will be sequenced and all the noise sources in **Table 1** above will not be in operation continuously or simultaneously for the duration of the construction. It can be seen that the rock breaker will be the main noise source by a significant margin.

2.2 ASSSESSMENT CRITERIA

2.2.1 Cork Harbour SPA – Bird Population

The significance of impact on the Cork Harbour SPA has been assessed within the NIS, to which this document is appended. The dose thresholds are taken from the UK Environmental Agency Waterbird Disturbance Mitigation Toolkit.

2.2.2 Nearest Noise Sensitive Receptors – Human Population

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in the *British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* has been adopted in this assessment, as they are recognised by the expert community as the most appropriate in the assessment of construction noise. The noise levels, which are reproduced in **Table 2**, are typically deemed acceptable.

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Table 2 Construction Stage Noise Level Thresholds

Assessment category and threshold value period (T)	Threshold values, L_{AeqT} dB		
	Category A [Note A]	Category B [Note B]	Category C [Note C]
Night-time (23:00 to 07:00hrs)	45	50	55
Evening and Weekends [Note D]	55	60	65
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	65	70	75

Note A: Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B: Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C: Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

Given the location of the site, the nearest noise sensitive receptors will be afforded a Category A designation. Therefore, if the predicted construction noise exceeds 65dB $L_{Aeq(T)}$ then this is assessed as a significant impact.

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2.3 PREDICTED NOISE EMISSIONS

Noise prediction computer software was used to quantify the impact of the construction noise. The noise predictions were undertaken using noise prediction software, specifically Bruel & Kjaer's Predictor software (iNoise 2021 V1). The software calculations are based on ISO 9613, Attenuation of sound during propagation outdoors, Part 2, General Method of Calculation. The ISO 9613-2 model can take account of the following factors that influence sound propagation outdoors:

- Geometric divergence
- Air Absorption
- Reflecting obstacles
- Screening
- Vegetation; and
- Ground reflections

Table 3 Model Input Data

Item	Description
Noise Source Locations	Aerial Photography
House Locations	Aerial Photography
Acoustic Emission	BS 5228
Source Height	1.5 m
Landform	Flat No Landform Screening
Ground Factor	0
Receptor Height	1.5 m
Wind Direction	Downwind
Relative Humidity	70%
Temperature	10°C

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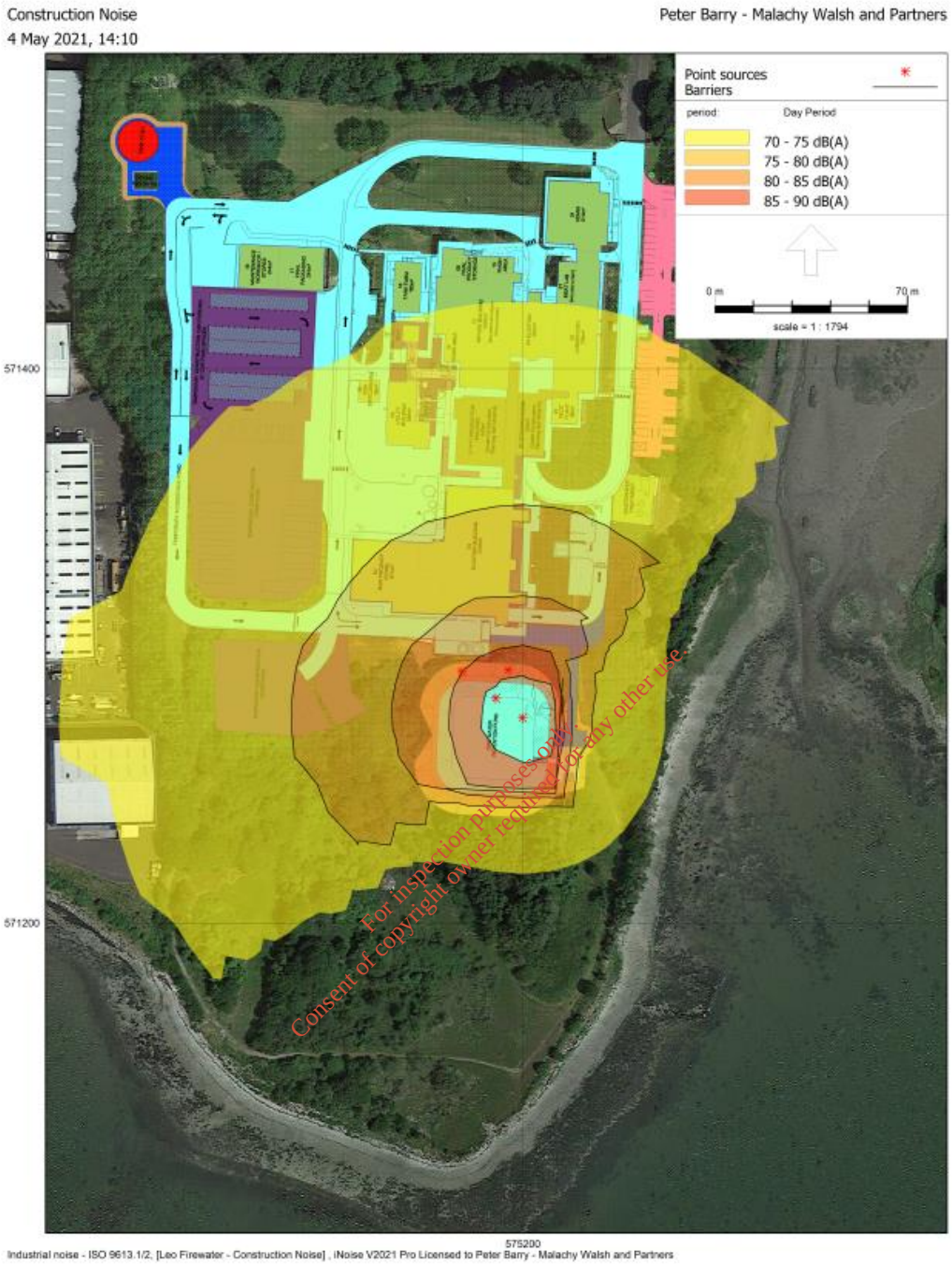
Note 1: Ground Factor is a value between 0 and 1, where 0 represents hard/ reflective surfaces and 1, represents soft absorbent surfaces.

2.4 POTENTIAL IMPACT ON CORK HARBOUR SPA - BIRD POPULATION

The predicted noise emissions and propagation is illustrated in **Figure 1** below. Areas outside the shading are below 70 dB(A). It is understood that the zone of significant impacts for birds is 70dB(A) or above. It can be seen from the map below that the SPA will be exposed to noise levels below 70dB(A).

A temporary noise barrier to be erected for the duration of the rock breaking has been included in the calculations. The noise barrier is 3 m in height and must have a minimum density of 10 kg/ m^2. The barrier is situated along the south and east perimeter of the firewater pond footprint. The effect can be seen in the **Figure 1**.

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Figure 1 Noise Propagation Contours

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2.5 POTENTIAL IMPACT ON NEAREST NOISE SENSITIVE RECEPTORS - HUMAN POPULATION

Using the following equation, noise emissions from the construction site are extrapolated to the nearest noise sensitive receptors approximately 150 m and 480 m away.

$$SPL_2 = SPL_1 - 20\log(r2/r1)$$

Where:

- Sound Pressure Level 1 (SPL1) = Known noise level at 10m from construction site
- Sound Pressure Level 2 (SPL2) = Unknown noise level at nearest receptor
- r2 = Distance between noise sensitive receptor and construction site
- r1 = 10 m
- 10 dB(A) reduction due to screening of noise barrier.

All the noise sources in **Table 1** above will not be in operation continuously or simultaneously for the duration of the construction. The resultant theoretical worst-case noise emission level at the nearest receptor (150 m) is 58 dB(A). The predicted noise level at the nearest residential property (480 m) is 48dB(A).

These results are below the construction noise thresholds. Therefore, there will be no significant impact during the construction of the firewater retention pond.

For periods when the rock breaker is not in operation construction noise levels will be lower. The rock breaker will only be in operation for a period of two weeks.

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2.6 CUMULATIVE IMPACT

There will be an overlap of construction works between the ongoing construction works at the facility in relation to the extension of the production building (Planning Ref 18/4614) and the construction of the firewater retention pond. The noisiest phases of works have been completed (piling, demolition, excavation, and erection of the steel frame) and the works are currently in the final finishing phase.

Cumulatively when the rock breaker is in operation, it will remain the dominant noise source.

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3 CONCLUSION

Noise modelling of the proposed construction phase of the firewater retention pond has been undertaken, assuming a worst-case scenario. All items of plant have been assumed to be operating at the same time and 100% of the time. The rock breaker will by far be the noisiest item of plant, when in operation.

However, if a temporary noise barrier is erected along the east and south perimeter of the works area, noise levels below 70dB(A) can be achieved within the SPA. Naturally, the noise levels will decrease further as one progresses into the SPA.

The impacts on the human population nearest noise sensitive receptors will be below the construction noise thresholds.

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