CLIENT: COOLPOWRA FLEX GEN LIMITED

PROJECT NAME: COOLPOWRA

PROJECT DETAILS: PROPOSED DEVELOPMENT OF A RESERVE GAS-FIRED GENERATOR, ENERGY STORAGE SYSTEM FACILITY AND GIS SUBSTATION IN THE TOWNLANDS OF COOLPOWRA, COOLDORRAGHA, COOLNAGEERAGH BALLYNAHESKERAGH, GORTLUSKY, AND SHEEAUNRUSH, CO GALWAY

DOCUMENT: ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) (VOLUME 3)

DATE JUNE 2024

PROJECT REF. SEP-0398

Halston Environmental & Planning Limited
Unit 3, IHub Building, Westport Road, Castlebar Co. Mayo, Ireland F23 K162 Company Registration No. 588685
Tel. +353 (0)94 9010111 email: info@halston.ie Web: www.halston.ie

Document Control

Client:	Coolpowra Flex Gen Limited
Project Name	Coolpowra
Project Ref.	SEP-0398
Document Ref.	SEP-0398/WF/Reports/EIAR_vol3

Document Checking:

Originator:	Various	Signed:	-

Checked By:	C Staunton	Signed:	CS

Approved By:	Client	Signed:	

Issue	Date	Status
v1	17.04.2024	Draft
v2	17.05.2024	Draft
v3	23.05.2024	Draft
v4	30.05.2024	Draft For Review
v5	31.05.2024	Draft for Review
v6	07.06.2024	Final

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An Bord Pleanála SID Pre-application Consultation Letters

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SID Consultation Letters to Prescribed Bodies (Refer to SID Planning Form, Attachment E)

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Appendix 3.1
Architectural Design Statement

Appendix 4.1
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Appendix 4.2
Consequence Study Report

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Appendix 6.1
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Appendix 6.2
Bird Survey Report

HALSTON

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APPENDIX 1.1

LANDOWNER CONSENT LETTERS

Hanney Properties Limited,
Parsons House, 56 Axis Business Park, Tullamore, Co. Offaly, Ireland. R35K744

Coolpowra Flex Gen Limited,
Parsons House,
56 Axis Business Park,
Tullamore,
Co. Offaly,
Ireland.

22nd May 2024

Landowner Consent Letter

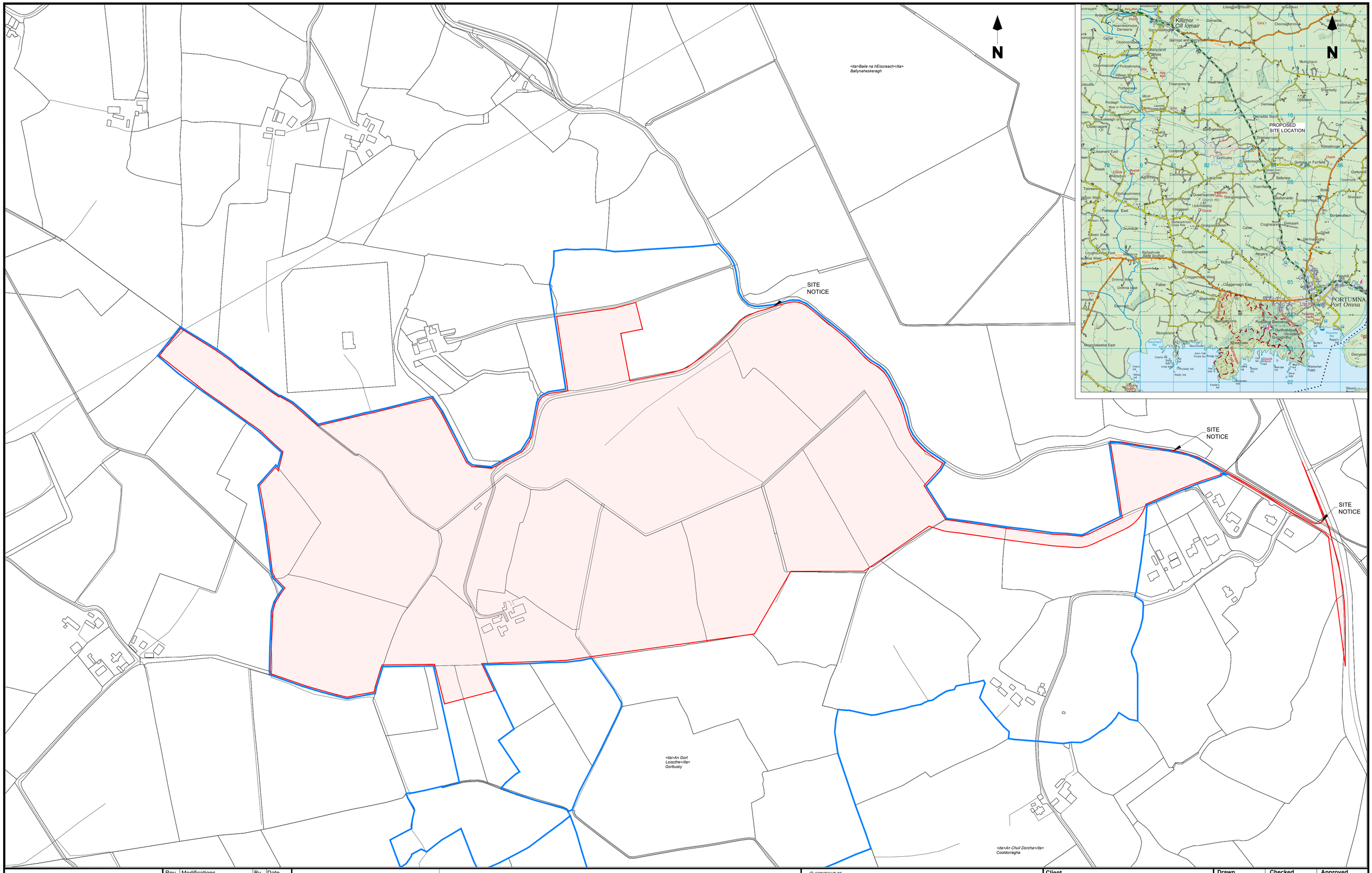
Applicant Name: Coolpowra Flex Gen Limited

Development Title: Coolpowra FlexGen

We, Hanney Properties Limited, DO HEREBY CONSENT to Coolpowra Flex Gen Limited making an application for planning permission on lands, outlined in blue on the attached map, which are controlled by Hanney Properties Limited situated in the townland of Coolpowra, Ballynaheskeragh, Gortlusky, Cooldorragha, and Coolnageeragh, Co. Galway.

Landowner: _____

Nigel Reams, Director, Hanney Properties Limited



NOTES:
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Rev.	Modifications	By	Date
P01	PRE SID	SK	26.03.24
P02	PLANNING	SK	30.05.24

LEGEND:
OWNERSHIP BOUNDARY
PLANNING BOUNDARY

HALSTON
IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162
Email: info@halston.ie
Tel: 094 9010111

Client	COOLPOWRA FLEXGEN LIMITED
Project	COOLPOWRA (OCGT)
Title	PROPOSED SITE LOCATION
Stage	PLANNING

Drawn	SK	Checked WD	Approved CS
Date	Mar 2024		
Scales	1:2,500 & 1:50,000		
Sheet	1 of 1	Sheet Size	A1
Job No.	SEP-0398	Status	
Dwg. No.	CPA-HAL-OC-XX-DR-PL-1000	Rev	P02

Hanney Properties Limited,
Parsons House, 56 Axis Business Park, Tullamore, Co. Offaly, Ireland. R35K744

Coolpowra Flex Gen Limited,
Parsons House,
56 Axis Business Park,
Tullamore,
Co. Offaly,
Ireland.

22nd May 2024

Landowner Consent Letter

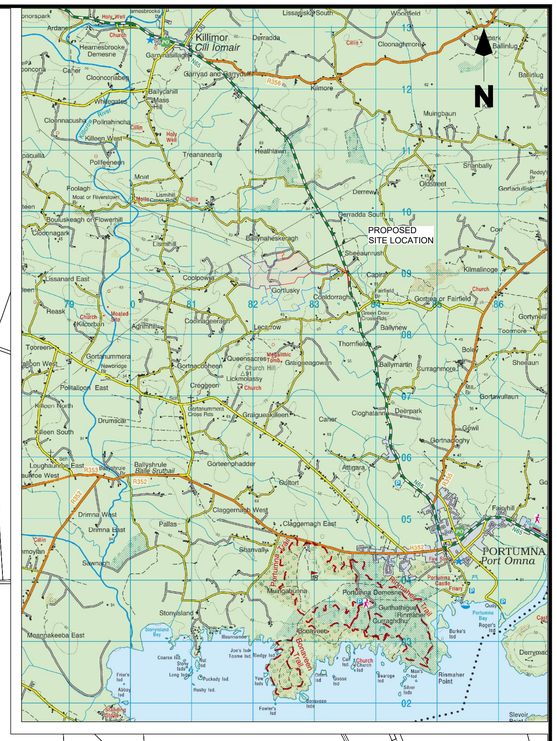
Applicant Name: Coolpowra Flex Gen Limited

Development Title: Coolpowra FlexGen

We, Hanney Properties Limited, DO HEREBY CONSENT to Coolpowra Flex Gen Limited making an application for planning permission on lands, outlined in blue on the attached map, which are controlled by Hanney Properties Limited situated in the townland of Coolpowra, Ballynaheskeragh, Gortlusky, Cooldorragha, and Coolnageeragh, Co. Galway.

Landowner: _____

Nigel Reams, Director, Hanney Properties Limited



N

<ita>Baile na hEiscreach</ita>
Ballynaheskeragh

SITE
NOTICE

SITE
NOTICE

SITE
NOTICE

<ita>An Gort
Loiscthe</ita>
Gortlusky

<ita>An Chúil Dorcha</ita>
Cooldorragha

NOTES:
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2 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.

Rev.	Modifications	By	Date
P01	PLANNING	SK	30.05.24

LEGEND:
OWNERSHIP BOUNDARY
PLANNING BOUNDARY

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IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162

Email: info@halston.ie
Tel: 094 9010111

Client	COOLPOWRA FLEXGEN LIMITED
Project	COOLPOWRA (LDES)
Title	PROPOSED SITE LOCATION
Stage	PLANNING

Drawn	SK	Checked WD	Approved CS
Date	Mar 2024		
Scales	1:2,500 & 1:50,000		
Sheet	1 of 1	Sheet Size	A1
Job No.	SEP-0398	Status	
Dwg. No.	CPA-HAL-SB-XX-DR-PL-3000	Rev	P01

Hanney Properties Limited,
Parsons House, 56 Axis Business Park, Tullamore, Co. Offaly, Ireland. R35K744

Coolpowra Flex Gen Limited,
Parsons House,
56 Axis Business Park,
Tullamore,
Co. Offaly,
Ireland.

22nd May 2024

Landowner Consent Letter

Applicant Name: Coolpowra Flex Gen Limited

Development Title: Coolpowra FlexGen

We, Hanney Properties Limited, DO HEREBY CONSENT to Coolpowra Flex Gen Limited making an application for planning permission on lands, outlined in blue on the attached map, which are controlled by Hanney Properties Limited situated in the townland of Coolpowra, Ballynaheskeragh, Gortlusky, Cooldorragha, and Coolnageeragh, Co. Galway.

Landowner: _____

Nigel Reams, Director, Hanney Properties Limited

N

<ita>Baile na hEiscreach</ita>
Ballynaheskeragh

SITE
NOTICE

SITE
NOTICE

SITE
NOTICE

<ita>An Gort
Loiscthe</ita>
Gortlusky

<ita>An Chuil Dorcha</ita>

NOTES:
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Rev.	Modifications	By	Date
P01	PRE SID	SK	26.03.24
P02	PLANNING	SK	30.05.24

LEGEND:
OWNERSHIP BOUNDARY
PLANNING BOUNDARY

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HALSTON
Email: info@halston.ie
Tel: 094 9010111

IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162

Client	COOLPOWRA FLEXGEN LIMITED
Project	COOLPOWRA (GIS)
Title	PROPOSED SITE LOCATION
Stage	PLANNING

Drawn	SK	Checked WD	Approved CS
Date	Mar 2024		
Scales	1:2,500 & 1:50,000		
Sheet	1 of 1	Sheet Size	A1
Job No.	SEP-0398	Status	
Dwg. No.	CPA-HAL-SS-XX-DR-PL-2000	Rev	P02

Áras an Chontae,
Cnoc na Radharc, Gaillimh.
H91 H6KX.

Áras an Chontae,
Prospect Hill, Galway.
H91 H6KX.

Fón/Phone: (091) 509 000
Facs/Fax: (091) 509 010
Idirlíon/Web: www.gaillimh.ie
www.galway.ie

@GalwayCoCo
GalwayCounty

Seirbhísí Corparáideacha
Corporate Services
☎(091) 509 225
✉corpserv@galwaycoco.ie

Tithíocht
Housing
☎(091) 509 300
✉housing@galwaycoco.ie

Timpeallacht & Tréidliacht
Environment & Veterinary
☎(091) 509 510
✉environment@galwaycoco.ie

Bóithre, Iompar, Cúrsaí Mara
& Seirbhísí Ginearálta
Roads, Transportation, Marine
& General Services
☎(091) 509 309
✉roads@galwaycoco.ie

Acmhainní Daonna
Human Resources
☎(091) 509 303
✉hr@galwaycoco.ie

Mótarcháin
Motor Taxation
☎(091) 509 099
✉motortax@galwaycoco.ie

Clár na dToghthóirí
Register of Electors
☎(091) 509 310
✉electors@galwaycoco.ie

Seirbhísí Uisce
Water Services
☎(091) 509 505
✉water@galwaycoco.ie

Pobal & Fiontar
Community & Enterprise
☎(091) 509 521
✉community@galwaycoco.ie

Pleanáil
Planning
☎(091) 509 308
✉planning@galwaycoco.ie

Leabharlann
Library
☎(091) 562 471
✉info@galwaylibrary.ie

Comhairle Chontae na Gaillimhe
Galway County Council

20/05/2024

Colm Stautaun
Halston Environmental & Planning Ltd,
IHub Building,
Westport Road,
Castlebar,
Co Mayo.
F23 K162

Dear Mr. Staunton,

RE: LETTER OF CONSENT TO MAKE PLANNING APPLICATION IN RELATION TO LANDS AT COOLPOWRA, BALLYNAHESKERAGH, COOLNAGEEERAGH & GORTLUSKY, CO. GALWAY

We refer to the above matter and the proposed planning application on behalf of Coolpowra Flexgen Limited.

Please note that Galway County Council, hereby consents to the making of a planning application by Coolpowra Flexgen Ltd., for the purposes of works to public areas / lands (outlined in blue on the attached drawing CPA-HAL-OC-XX-DR-PL-1010D) bounding the L-8763.

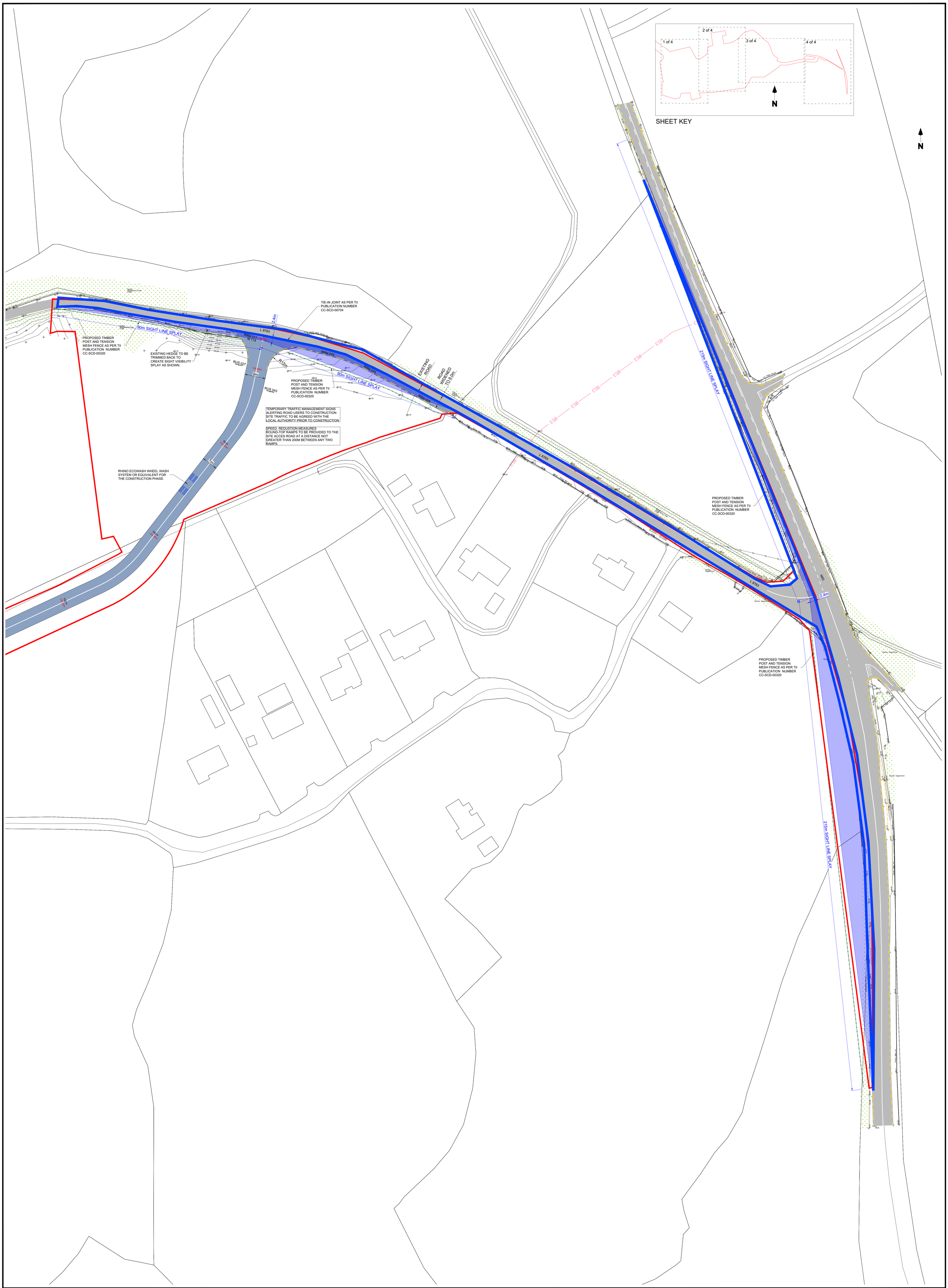
In the interest of clarity and for the avoidance of doubt this letter is issued under Article 22(2)(g) of the Planning & Development Regulations 2001-2022 solely for the purpose of making this planning application.

This consent is given strictly without prejudice to the outcome of the planning application.

Yours faithfully

Jean Braun

County Secretary
Galway Co. Council



Rev.	Modifications	By	Date
P01	PRE SID	SK	26.03.24
P01	PLANNING	SK	30.05.24

NOTES:
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2 THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.

Meters
15 0 15 30
1:500

LEGEND:
OWNERSHIP BOUNDARY (POST AND RAIL STOCK FENCE. EXISTING TREES / HEDGES TO BE RETAINED)
PLANNING BOUNDARY
2.65m PALISADE FENCE OR AS NOTED
NEW ROAD HOT ROLLED ASPHALT TO DOE SPECIFICATION FOR ROAD WORKS
EXISTING PUBLIC ROAD
EXISTING ROAD (APPLICANT)
EXISTING ROAD (ESB)
50mm CLEAN STONE AREA
GRASS AREA
GRAVEL CONSTRUCTION ROAD
PROPOSED BUILDINGS
STREAM DIVERSION
EXISTING STREAM
PROPOSED HV ELECTRICITY CABLE ROUTES
UNDERGROUND GAS PIPE
GAS

HALSTON
Email: info@halston.ie
Tel: 094 9010111
IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162

Client	COOLPOWRA FLEXGEN LIMITED
Project	COOLPOWRA (OCGT)
Title	PROPOSED SITE LAYOUT
Stage	PLANNING

Drawn SK	Checked WD	Approved CS	
Date Mar 2024			
Scales 1:500			
Sheet 4 of 4	Sheet Size A0		
Job No. SEP-0398	Status		
Dwg. No. CPA-HAL-OC-XX-DR-PL-1010D		Rev P01	

Date 22nd May 2024

Mr Nigel Reams

Coolpowra Flexgen Limited

Parsons House

56 Axis Business Park

Tullamore

Co. Offaly

SUBJECT TO CONTRACT /CONTRACT DENIED

Re. Consent Letter for the Purposes of a Planning Application

Dear Nigel,

I hereby provide consent to Coolpowra Flexgen Limited applying for planning permission over my lands (Folio GY120705F) in the townland of Cooldorragha and Sheeaunrush, Portumna Co. Galway, as shown in the attached drawing. I understand that this is required for the purposes of road improvement works and improved sight lines at the junction of the N65 and L8763 public roads.

Please note that this consent is for the sole purposes of Coolpowra Flexgen Limited making an application to the appropriate planning authority and is without prejudice to any future agreements between Coolpowra Flexgen Limited and myself, please also note that, if an agreement is made in the future, no contract shall be deemed to exist until such time as contracts have been signed and exchanged and the deposit payable thereunder paid and accepted and this letter or any other correspondence shall not be deemed to be in existence or operation by Section 51 of the Land and Conveyancing Law Reform Act, 2009 or otherwise within the meaning of the Statute of Frauds Acts.

Yours Sincerely,

Philip Treacy

Mr Philip Treacy

Date 07 May 2024

Mr Nigel Reams
Coolpowra Flexgen Limited
Parsons House
56 Axis Business Park
Tullamore
Co. Offaly

Re. Consent Letter for the Purposes of a Planning Application

Dear Nigel,

I hereby provide consent to Coolpowra Flexgen Limited applying for planning permission over my lands (Folio GY19443) in the townland of Cooldorragha, Portumna Co. Galway, as shown in the attached drawing. I understand that this is required for the purposes of road improvement works and improved sight lines at the junction of the N65 and L8763 public roads.

Yours Sincerely,

John Tuohy

Mr John Tuohy

E 583609
N 709330

N

Sián Ruis
Sheeaunrush

Baile na hEiscreach
Ballynaheskeragh

An Chúil Dorcha
Cooldorragha

Ceapaigh Oighre
Capira

4.65
2.53
0.42
3.20
0.59
2.72
2.91
0.56
0.94
0.62
2.78
3.64
0.24
0.22
0.24
0.92
0.28
0.30
0.22
0.21
2.08
4.20
0.31
0.28
0.59
11.2m
"A"
82.4m
3.35
3.37
0.85
2.46
2.75
3.52
3.53
2.69
2.55
1.00

E 582779
N 708715

HALSTON
Email: info@halston.ie
Tel: 094 9010111

IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162

Options Map

Sheet 1 of 1
Scale: 1:2500 (A3)

Plot "A" 0.05 ha in area or thereabout shown delineated in RED.

Date: 07 May 2024

Date 07 May 2024

Mr Nigel Reams
Coolpowra Flexgen Limited
Parsons House
56 Axis Business Park
Tullamore
Co. Offaly

Re. Consent Letter for the Purposes of a Planning Application

Dear Nigel,

I hereby provide consent to Coolpowra Flexgen Limited applying for planning permission over my lands (Folio GY120706F) in the townland of Sheeaunrush, Portumna Co. Galway, as shown in the attached drawing. I understand that this is required for the purposes of road improvement works and improved sight lines at the junction of the N65 and L8763 public roads.

Please note that this consent is for the sole purposes of Coolpowra Flexgen Limited making an application to the appropriate planning authority and is without prejudice to any future agreements between Coolpowra Flexgen Limited and myself.

Yours Sincerely,

Mr Kevin Treacy

APPENDIX 1.2

AN BORD PLEANÁLA SID PRE-APPLICATION CONSULTATION LETTERS

Our Case Number: ABP-319385-24

Your Reference: Coolpowra Flexgen Limited

An Bord Pleanála

Halston Enviroment & Planning Limited
IHUB, Westport Road
Castlebar
Co. Mayo
F23 K162

Date: 10 May 2024

Re: Proposed 400kV GIS Substation, HV Lines, Electric Plant and associated site works
Located in the townlands of Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, Co. Galway.

Dear Sir / Madam,

Please be advised that following consultations under section 182E of the Planning and Development Act 2000, as amended, the Board hereby serves notice that it is of the opinion that the proposed development falls within the scope of section 182A of the Planning and Development Act 2000, as amended. Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 182A of the Planning and Development Act 2000, as amended. Any application for approval for the proposed development must therefore be made directly to An Bord Pleanála under section 182A(1) of the Act.

Please also be informed that the Board considers that the pre-application consultation process in respect of this proposed development is now closed.

The following is a list of prescribed bodies to be notified of the application for the proposed development.

- Minister of Housing, Local Government and Heritage,
- Minister of the Environment, Climate and Communications,
- Galway County Council,
- Transport Infrastructure Ireland,
- Commission for Regulation of Utilities,
- Uisce Eireann,

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

• Inland Fisheries Ireland,

• Health Service Executive,

• Health and Safety Authority,

• Eirgrid,

• ESB,

• An Taisce,

• The Heritage Council,

• Office of Public Works.

Further notifications should also be made where deemed appropriate.

In accordance with section 146(5) of the Planning and Development Act 2000, as amended, the Board will make available for inspection and purchase at its offices the documents relating to the decision within 3 working days following its decision. This information is normally made available on the list of decided cases on the website on the Wednesday following the week in which the decision is made.

In accordance with the fees payable to the Board and where not more than one pre-application meeting is held in the determination of a case, a refund of €3,500 is payable to the person who submitted the pre-application consultation fee. As a meeting was not required / only one meeting was required in this case, a refund of 3,500 will be sent to you in due course.

The following contains information in relation to challenges to the validity of a decision of An Bord Pleanála under the provisions of the Planning and Development Act, 2000, as amended.

Judicial review of An Bord Pleanála decisions under the provisions of the Planning and Development Acts (as amended).

A person wishing to challenge the validity of a Board decision may do so by way of judicial review only. Sections 50, 50A and 50B of the Planning and Development Act 2000 (as substituted by section 13 of the Planning and Development (Strategic Infrastructure) Act 2006, as amended/substituted by sections 32 and 33 of the Planning and Development (Amendment) Act 2010 and as amended by sections 20 and 21 of the Environment (Miscellaneous Provisions) Act 2011) contain provisions in relation to challenges to the validity of a decision of the Board.

The validity of a decision taken by the Board may only be questioned by making an application for judicial review under Order 84 of The Rules of the Superior Courts (S.I. No. 15 of 1986). Sub-section 50(7) of the Planning and Development Act 2000 requires that subject to any extension to the time period which may be allowed by the High Court in accordance with subsection 50(8), any application for judicial review must be made within 8 weeks of the decision of the Board. It should be noted that any challenge taken under section 50 may question only the validity of the decision and the Courts do not adjudicate on the merits of the development from the perspectives of the proper planning and sustainable development of the area and/or effects on the environment. Section 50A states that leave for judicial review shall not be granted unless the Court is satisfied that there are substantial grounds for

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

contending that the decision is invalid or ought to be quashed and that the applicant has a sufficient interest in the matter which is the subject of the application or in cases involving environmental impact assessment is a body complying with specified criteria.

Section 50B contains provisions in relation to the cost of judicial review proceedings in the High Court relating to specified types of development (including proceedings relating to decisions or actions pursuant to a law of the state that gives effect to the public participation and access to justice provisions of Council Directive 85/337/EEC i.e. the EIA Directive and to the provisions of Directive 2001/12/EC i.e. Directive on the assessment of the effects on the environment of certain plans and programmes). The general provision contained in section 50B is that in such cases each party shall bear its own costs. The Court however may award costs against any party in specified circumstances. There is also provision for the Court to award the costs of proceedings or a portion of such costs to an applicant against a respondent or notice party where relief is obtained to the extent that the action or omission of the respondent or notice party contributed to the relief being obtained.

General information on judicial review procedures is contained on the following website, www.citizensinformation.ie.

Disclaimer: The above is intended for information purposes. It does not purport to be a legally binding interpretation of the relevant provisions and it would be advisable for persons contemplating legal action to seek legal advice.

If you have any queries in the meantime, please contact the undersigned officer of the Board or email sids@pleanala.ie quoting the above mentioned An Bord Pleanála reference number in any correspondence with the Board.

Yours faithfully,

pp HCM

Raymond Muwaniri
Executive Officer
Direct Line: 01-8737125

VC11A

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Our Case Number: ABP-319073-24

Your Reference: Coolpowra Flexgen Limited

An Bord Pleanála

Halston Environmental and Planning
IHub Building
Westport Road
Castlebar
Co. Mayo

Date: 10 May 2024

Re: Reserve Gas-Fired Power Generator, GIS Electrical Substation, Energy Storage System (ESS) and associated site development works.
Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, Co. Galway.

Dear Sir / Madam,

Please be advised that following consultations under section 37B of the Planning and Development Act 2000, as amended, the Board hereby serves notice under section 37B(4)(a) that it is of the opinion that the proposed development falls within the scope of paragraphs 37A(2)(a) and (b) of the Act. Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 37A of the Planning and Development Act 2000, as amended. Any application for permission for the proposed development must, therefore, be made directly to An Bord Pleanála under section 37E of the Act.

Please also be informed that the Board considers that the pre-application consultation process in respect of this proposed development is now closed.

Attached is a list of prescribed bodies to be notified of the application for the proposed development.

- Minister of Housing, Local Government and Heritage,
- Minister of the Environment, Climate and Communications,
- Galway County Council,
- Transport Infrastructure Ireland,
- Commission for Regulation of Utilities,
- Uisce Eireann

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1800 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

- Inland Fisheries Ireland
- Health Service Executive,
- Eirgrid,
- ESB,
- Environmental Protection Agency,
- An Taisce
- The Heritage Council,
- Health and Safety Authority,
- Office of Public Works.

Further notifications should also be made where deemed appropriate.

In accordance with section 146(5) of the Planning and Development Act 2000, as amended, the Board will make available for inspection and purchase at its offices the documents relating to the decision within 3 working days following its decision. This information is normally made available on the list of decided cases on the website on the Wednesday following the week in which the decision is made.

In accordance with the fees payable to the Board and where not more than one pre-application meeting is held in the determination of a case, a refund of €3,500 is payable to the person who submitted the pre-application consultation fee. As a meeting was not required / only one meeting was required in this case, a refund of 3,500 will be sent to you in due course.

The following information relates to challenges to the validity of a decision of An Bord Pleanála under the provisions of the Planning and Development Act 2000, as amended.

Judicial review of An Bord Pleanála decisions under the provisions of the Planning and Development Acts (as amended).

A person wishing to challenge the validity of a Board decision may do so by way of judicial review only. Sections 50, 50A and 50B of the Planning and Development Act 2000 (as substituted by section 13 of the Planning and Development (Strategic Infrastructure) Act 2006, as amended/substituted by sections 32 and 33 of the Planning and Development (Amendment) Act 2010 and as amended by sections 20 and 21 of the Environment (Miscellaneous Provisions) Act 2011) contain provisions in relation to challenges to the validity of a decision of the Board.

The validity of a decision taken by the Board may only be questioned by making an application for judicial review under Order 84 of The Rules of the Superior Courts (S.I. No. 15 of 1986). Sub-section 50(7) of the Planning and Development Act 2000 requires that subject to any extension to the time period which may be allowed by the High Court in accordance with subsection 50(8), any application for judicial review must be made within 8 weeks of the decision of the Board. It should be noted that any challenge taken under section 50 may question only the validity of the decision and the Courts do not

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D01 V902

adjudicate on the merits of the development from the perspectives of the proper planning and sustainable development of the area and/or effects on the environment. Section 50A states that leave for judicial review shall not be granted unless the Court is satisfied that there are substantial grounds for contending that the decision is invalid or ought to be quashed and that the applicant has a sufficient interest in the matter which is the subject of the application or in cases involving environmental impact assessment is a body complying with specified criteria.

Section 50B contains provisions in relation to the cost of judicial review proceedings in the High Court relating to specified types of development (including proceedings relating to decisions or actions pursuant to a law of the state that gives effect to the public participation and access to justice provisions of Council Directive 85/337/EEC i.e. the EIA Directive and to the provisions of Directive 2001/12/EC i.e. Directive on the assessment of the effects on the environment of certain plans and programmes). The general provision contained in section 50B is that in such cases each party shall bear its own costs. The Court however may award costs against any party in specified circumstances. There is also provision for the Court to award the costs of proceedings or a portion of such costs to an applicant against a respondent or notice party where relief is obtained to the extent that the action or omission of the respondent or notice party contributed to the relief being obtained.

General information on judicial review procedures is contained on the following website, www.citizensinformation.ie.

Disclaimer: The above is intended for information purposes. It does not purport to be a legally binding interpretation of the relevant provisions and it would be advisable for persons contemplating legal action to seek legal advice.

If you have any queries in the meantime, please contact the undersigned officer of the Board or email sids@pleanala.ie quoting the above mentioned An Bord Pleanála reference number in any correspondence with the Board.

Yours faithfully,

pp HCM

Raymond Muwaniri
Executive Officer
Direct Line: 01-8737125

PC09A

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Our Case Number: ABP-319385-24

Your Reference: Coolpowra Flexgen Limited

An Bord Pleanála

Halston Enviroment & Planning Limited
IHUB, Westport Road
Castlebar
Co. Mayo
F23 K162

Date: 23 May 2024

Re: Proposed 400kV GIS Substation, HV Lines, Electric Plant and associated site works Located in the townlands of Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, Co. Galway.

Dear Sir / Madam,

I have been asked by An Bord Pleanála to refer further to its letter to you dated 10th May, 2024.

Please be advised that the Board's Direction on this case was omitted from the letter and is now attached for your information.

Yours faithfully,

Raymond Muwaniri
Executive Officer
Direct Line: 01-8737125

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An Bord Pleanála

Board Direction
BD-016248-24
ABP-319385-24

The submissions on file and the inspector's report were considered at a Board Meeting held on 08/05/2024.

The Board decided that the proposed development consisting of a 400kV Gas Insulated Substation, and all associated works on lands at in the townlands of Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, Co. Galway, as described in the documents received by the Board on the 25th March 2024, and augmented by the updated layout received by the Board on the 29th April 2023, falls within the scope of Section 182A of the Planning and Development Act 2000, as amended, and that a planning application should be made directly to the Board.

The applicant shall be informed that the application documentation should be forwarded to the following prescribed bodies for the purposes of Section 182A(4)(b) of the Act:

- Minister of Housing, Local Government and Heritage,
- Minister of the Environment, Climate and Communications,
- Galway County Council,
- Transport Infrastructure Ireland,
- Commission for Regulation of Utilities,
- Uisce Eireann,
- Inland Fisheries Ireland,
- Health Service Executive,
- Health and Safety Authority,
- Eirgrid,
- ESB,
- An Taisce,

- The Heritage Council,
- Office of Public Works.

Further notifications should also be made, where deemed appropriate.

Board Member _____ **Date:** 08/05/2024

Peter Mullan

Our Case Number: ABP-319073-24

Your Reference: Coolpowra Flexgen Limited

An Bord Pleanála

Halston Environmental and Planning
IHub Building
Westport Road
Castlebar
Co. Mayo

Date: 23 May 2024

Re: Reserve Gas-Fired Power Generator, GIS Electrical Substation, Energy Storage System (ESS) and associated site development works.
Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, Co. Galway.

Dear Sir / Madam,

I have been asked by An Bord Pleanála to refer further to the above-mentioned proposed development and in particular to its letter to you dated 10th May, 2024.

Please note that the Board inadvertently omitted from this letter its decision in relation to the GIS substation Energy Storage System, Synchronous Condenser and their associated works.

The Board decided, in accordance with section 37B(4)(b) of the Planning and Development Act, 2000, as amended, that the proposed GIS substation, Energy Storage System, Synchronous Condenser and their associated works set out in the initial submission received by the Board on the 16th of February 2024, and shown on revised plans received 6th April 2024 do not fall within the scope of Section 37A of the Planning and Development Act, 2000 as amended. Attached is a copy of the Board Direction.

If you have any queries in the meantime, please contact the undersigned officer of the Board or email sids@pleanala.ie quoting the above mentioned An Bord Pleanala reference number in any correspondence with the Board.

Yours faithfully,

Raymond Muwaniri
Executive Officer
Direct Line: 01-8737125

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D01 V902

An Bord Pleanála

Board Direction
BD-016249-24
ABP-319073-24

The submissions on file and the inspector's report were considered at a Board Meeting held on 08/05/2024.

The Board decided that the proposed development consisting of a Reserve Gas Fired Generator and its associated works as set out and delineated in the revised plans and particulars received by An Bord Pleanála in correspondence received 6th April 2024, falls within the scope of Section 37A of the Planning and Development Act 2000, as amended, and that a planning application should be therefore be made in the first instance to An Bord Pleanála. The proposed development is also considered to be of strategic importance by reference to the requirements of Section 37A(2)(a) and 37A(2)(b) of the Planning and Development Act 2000, as amended. An application for permission for the proposed development must therefore be made directly to An Bord Pleanala under Section 37E of the Act.

The Board recommended the application documents should be forwarded the list of Prescribed Bodies below for their consultation and consideration for the purposes of Section 37E (3) (c) of the Act:

- Minister of Housing, Local Government and Heritage,
- Minister of the Environment, Climate and Communications,
- Galway County Council,
- Transport Infrastructure Ireland,
- Commission for Regulation of Utilities,
- Uisce Eireann
- Inland Fisheries Ireland
- Health Service Executive,
- Eirgrid,

- ESB,
- Environmental Protection Agency,
- An Taisce
- The Heritage Council,
- Health and Safety Authority,
- Office of Public Works.

Further notifications should also be made, where deemed appropriate.

Board Member _____ **Date:** 08/05/2024

Peter Mullan

Note:

For clarity I recommend that the applicant be informed that the GIS substation, Energy Storage System, Synchronous Condenser and their associated works set out in the initial submission received by the Board on the 16th of February 2024, and shown on revised plans received 6th April 2024 do not fall within the scope of Section 37A of the Planning and Development Act, 2000 as amended.

APPENDIX 1.3

SID CONSULTATION LETTERS TO PRESCRIBED BODIES (REFER TO SID PLANNING FORM, APPENDIX E)

APPENDIX 1.4

APPLICANT CONSENT LETTERS TO AGENT (APPLICATIONS TO GALWAY CO. CO & AN BORD PLEANÁLA)

Coolpowra Flex Gen Limited,
Parsons House, 56 Axis Business Park, Tullamore, Co. Offaly, Ireland. R35K744

Halston Environmental & Planning Limited
IHub Building,
Westport Road,
Castlebar,
Co. Mayo,
Ireland F23 K162

22nd May 2024

Applicant Consent Letter to Agent

Applicant Name: Coolpowra Flex Gen Limited

Development Title: Coolpowra FlexGen

I hereby authorise Halston Environmental & Planning Limited to submit a planning application on my behalf to Galway County Council and that all communications will issue to Halston Environmental & Planning Limited.

Signed by Applicant: _____

Nigel Reams, Director, Coolpowra Flex Gen Limited

Signed by Agent: _____

Colm Staunton, Director, Halston Environmental & Planning Limited

Halston Environmental & Planning Limited
IHub Building,
Westport Road,
Castlebar,
Co. Mayo,
Ireland F23 K162

22nd May 2024

Applicant Consent Letter to Agent

Applicant Name: Coolpowra Flex Gen Limited

Development Title: Coolpowra FlexGen

I hereby authorise Halston Environmental & Planning Limited to submit a planning application on my behalf to An Bord Pleanála and that all communications will issue to Halston Environmental & Planning Limited.

Signed by Applicant: _____

Nigel Reams, Director, Coolpowra Flex Gen Limited

Signed by Agent: _____

Colm Staunton, Director, Halston Environmental & Planning Limited

APPENDIX 2.1

PROPOSED DEVELOPMENT LAYOUT

N

GIS EQUIPMENT LEGEND:	
S1	PROPOSED 400kV GIS SUBSTATION
S2	GIS SUBSTATION COMPOUND
S3	FOUL HOLDING TANK
S4	COMMUNICATIONS TOWER - 36m HIGH
S5	OVERHEAD LINE GANTRY

AGI EQUIPMENT LEGEND:	
A1	AGI COMPOUND
A2	GAS FILTRATION EQUIPMENT COMPOUND

OCGT EQUIPMENT LEGEND:	
GT1	PROPOSED 400kV AIS COMPOUND
GT2	FIRE WATER RETENTION TANK (3000m³)
GT3	TRANSFORMERS
GT4	HOUSE TRANFORMER / AUX TRANSFORMER
GT5	OCGT BUILDING
GT6	ADMINISTRATION / CONTROL BUILDING
GT7	COOLING FANS
GT8	EMERGENCY GENERATORS
GT9	FIRE WATER PUMP HOUSE
GT10	FIRE WATER TANK (2000m³)
GT11	FUEL UNLOADING
GT12	WORKSHOP & STORAGE
GT13	FUEL POLISHING UNIT & AIR COMPRESSOR
GT14	FUEL STORAGE TANKS (22,000m³) & BUND
GT15	GAS HEATER COMPOUND
GT16	FOUL TREATMENT AREA
GT17	SECURITY CABIN
GT18	LIGHTNING MAST

SYNCON EQUIPMENT LEGEND:	
SYN1	LDES COMPOUND
SYN2	SYNCON BUILDING
SYN3	AIS 400kV
SYN4	FOUL HOLDING TANK
SYN5	COOLING FANS
SYN6	FIRE WATER TANK
SYN7	ESB RURAL SUPPLY COMPOUND
SYN8	LIGHTNING MAST

LDES EQUIPMENT LEGEND:	
LD1	LDES COMPOUND
LD2	IPP BUILDING
LD3	AIS 400kV
LD4	TRANSFORMER
LD5	FOUL HOLDING TANK
LD6	FIRE WATER TANK
LD7	LIGHTNING MAST

Rev.	Modifications	By	Date
P01	PRELIMINARY	SK	14.03.24
P02	CONSTRUCTION COMPOUND	SK	22.03.24
P03	GIS, AIS, OCGT, COOLERS	SK	29.03.24
P04	AGI, FIRE RETENTION TANK	SK	09.04.24
P05	AGI & COMPOUND LEVELS	SK	12.04.24
P06	GIS & OCGT	SK	16.04.24
P07	INFORMATION	SK	26.04.24
P08	PLANNING	SK	30.05.24

LEGEND:

- OWNERSHIP BOUNDARY (POST AND RAIL STOCK FENCE. EXISTING TREES / HEDGES TO BE RETAINED)
- PLANNING BOUNDARY
- 2.65m PALISADE FENCE OR AS NOTED
- NEW ROAD HOT ROLLED ASPHALT TO DOE SPECIFICATION FOR ROAD WORKS
- EXISTING PUBLIC ROAD
- EXISTING ROAD (APPLICANT)
- EXISTING ROAD (ESB)
- 50mm CLEAN STONE AREA
- GRASS AREA / UNDISTURBED
- GRAVEL CONSTRUCTION ROAD
- PROPOSED BUILDINGS
- STREAM DIVERSION
- EXISTING STREAM
- PROPOSED HV ELECTRICITY CABLE ROUTES
- UNDERGROUND GAS PIPE
- GAS

HALSTON
Email: info@halston.ie
Tel: 094 9010111

IHUB BUILDING
WESTPORT ROAD
CASTLEBAR
CO. MAYO.
F23 K162

Client	COOLPOWRA FLEXGEN LIMITED	Drawn SK	Checked WD	Approved CS
Project	COOLPOWRA	Date	Mar 2024	
		Scales	1:2000	
Title	MASTER PLAN LAYOUT	Sheet	1 of 1	Sheet Size A1
		Job No.	SEP-0398	Rev P08
Stage	PLANNING	Dwg. No.	CPA-HAL-MP-XX-DR-PL-1000	

APPENDIX 2.2

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

CLIENT: Coolpowra Flexgen Limited

PROJECT: Coolpowra Preliminary Construction Environmental Management Plan (CEMP)

Prepared by: Halston Environmental & Planning Limited

Date: June 2024

Document Control

Client:	Coolpowra Flexgen Limited (CPFL)
Project Name	Coolpowra (CEMP)
Project Ref. No.	SEP-0398

Document Checking:

Author:	Colm Staunton	Signed:

Checked by:	Client	Signed:

Issue	Date	Status
v1	03/06/2024	Draft
v2	07/06/2024	Final

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Westport Road
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APPENDICES

1 INTRODUCTION

This Construction Environmental Management Plan (CEMP) has been prepared by Halston Environmental & Planning Limited (Halston) on behalf of Coolpowra FlexGen Limited. ("the applicant") and is submitted to support applications for planning permission for the development of grid-connected energy support projects on lands with an area (redline boundary) of 42.3 hectares (ha) (105 acres) in the townlands of Coolpowra, Cooldorragha, Coolnageeragh, Ballynaheskeragh, Gortlusky and Sheeaunrush, County Galway.

The Proposed Development is comprised of three individual projects. These are:

- Project 1: Reserve Gas-Fired Generator,
- Project 2: Energy Storage System (ESS), and
- Project 3: Gas Insulated Switchgear (GIS) Electricity Substation.

The three projects have been determined as being distinct in the context of applying for, and obtaining, valid planning consents under the Planning and Development Act 2000, as amended, (*"the Act").* This Preliminary Construction Environmental Management Plan (CEMP) incorporates the Construction Waste Management Plan and Incident Response Plan.

1.1 PURPOSE AND OBJECTIVE

This CEMP outlines the approach to environmental and waste management throughout the construction works of the proposed development and associated activities with the primary aim of reducing any adverse impacts from construction on the environment and improving the overall environmental performance of the appointed construction contractor.

The purpose of this Plan is:

- To help ensure compliance with legal and contract requirements,
- To control and where possible minimise, the environmental impacts of the construction works,
- To minimise the risk of causing pollution or a nuisance and associated costs and delays, and
- Promote best construction and environmental on-site practices for the duration of the works.

The plan and methodology seek to demonstrate how works on the project can be delivered in a logical, sensible and safe sequence with the incorporation of specific measures to mitigate the impact on people, property and the environment. This document should be

viewed as an outline plan with the site-specific CEMP to be developed by the Main Contractor /EPC Contractor for implementation throughout the project in consultation with Statutory Undertakers / Authorities and affected Stakeholders prior to works commencing on site.

Proposed environmental measures that will be installed on site during construction are included in this preliminary CEMP. This document will be updated to include any additional conditions proposed by the relevant local authority as a result of their review of the preliminary CEMP. The CEMP is an integral part of the site health, safety, environmental and quality management system and constitutes a component of the Construction Health and Safety Plan documentation. The CEMP is also subject to the requirements of the site quality management system with respect to documentation control, records control and other relevant measures.

1.2 REVISIONS OF THE CEMP

All the elements of this CEMP will be included in the Contractor's CEMP, which will be produced prior to construction by the Contractor. The CEMP will be updated prior to the commencement of the development, to include any additional mitigation measures, conditions and or alterations to the EIAR and application documents that may emerge during the course of the planning process. The final CEMP will be submitted to the Planning Authority for written approval in advance of commencement of any construction works on site. The.

This CEMP is a live document and contents will be communicated to all site personnel and reviewed every month. In the event of an accident or emergency on site during the construction period, the CEMP will be reviewed, and procedures amended if necessary. All personnel and sub-contractors will be made aware of the CEMP during the toolbox talks. The site manager or his environmental manager will be responsible for maintaining and updating the approved document.

This document should be read in conjunction with the mitigation measures expressed in the Halston Environmental Impact Assessment Report (EIAR) document. The identification and control of environmental aspects are further examined as part of this document (Preliminary CEMP). As part of Contract CEMP works, the environmental aspects and control measures should be further reviewed and prioritised.

The Contractor is required to include further details and / or confirmation in the Contractor's CEMP which will include;

- Details of emergency plan including personnel and contact numbers.
- Details of fuel storage areas (including location and bunding).
- Site and traffic signage.
- Method statements.

2 LEGISLATION AND GUIDANCE

Relevant legislation and best practice guidance that have been considered includes but is not limited to the following.

2.1 NATIONAL AND INTERNATIONAL LEGISLATION

- Water Framework Directive (2000/60/EC);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009, as amended;
- Local Government (Water Pollution) Acts 1977, as amended;
- Habitats Directive (92/43/EEC);
- Air Pollution Act, 1987;
- Birds Directive (2009/147/EC); and
- Wildlife Act, 1976 (S.I. No. 39 of 1976)
- The Circular Economy and Miscellaneous Provisions Act 2022
-

2.2 ENVIRONMENT LIABILITY REGULATIONS

The Regulations supplement existing National and European Legislation to achieve the prevention and remediation of environmental damage. Environmental damage under the European Communities (Environmental Liability) Regulations 2008 means:

- Water damage that has significant adverse effects on water status under the Water Framework Directive (2000/60/EC);
- Land damage that creates a significant risk to human health as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms; and
- Damage to protected species and natural habitats.

The Regulations represent an overarching piece of legislation that can be used in concert with all the Agency's existing powers but will only be used in the appropriate circumstances when environmental damage has occurred as a result of an incident.

2.3 BEST MANAGEMENT GUIDELINES

The following Guidelines should be used, as a minimum, by the contractor to prepare their Method Statements and Environmental Management Plan:

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters. Inland Fisheries Ireland, January 2016;
- Fishery guidelines for Local Authority works. Department of Marine and Natural Resources 1998;
- CIRIA – Guideline Document C532 – Control of Water Pollution from Construction Sites;
- CIRIA – Guideline Document C624 – Development and Flood Risk – Guidance for the Construction Industry;
- CIRIA Guidance C515: 'Control of groundwater for temporary works' (Somerville et al., 1986);
- CIRIA Guidance C741: Environmental good practice on site guide (Charles & Edwards, 2015);
- CIRIA Guidance C750D: 'Groundwater control: design and practice' (Preene et al., 2016); and
- CIRIA - Control of water pollution from construction sites - guide to good practice (SP156);
- CIRIA - C648 Control of water pollution from linear construction projects & Site Guide C649;
- NetRegs Guidance for Pollution Prevention for works and maintenance in or near water (NetRegs, 2017);
- Environment Agency Pollution Prevention Guidelines for construction and demolition sites (EA, 2012).
- Inland Fisheries Ireland 2016 Guidance on Protection of Fisheries During Construction Works In and Adjacent to Waters.

Should this document further develop to contract stage, the following documents should be reviewed and associated requirements applicable to this contract be included within this Plan:

- Tender/contract documents
- Site Investigation
- Planning Application Documents (EIAR) and Planning Permission Conditions

2.4 WASTE MANAGEMENT CONTEXT

The Department of Environment, Climate and Communications (DECC) published the Waste Action Plan for a Circular Economy in September 2020 and is Ireland's new roadmap for waste planning and management. This Plan shifts focus away from waste disposal and looks instead to how we can preserve resources by creating a circular economy. The 2020 Plan replaced "A Resource Opportunity – Waste Management Policy in Ireland (DoECLG, 2012).

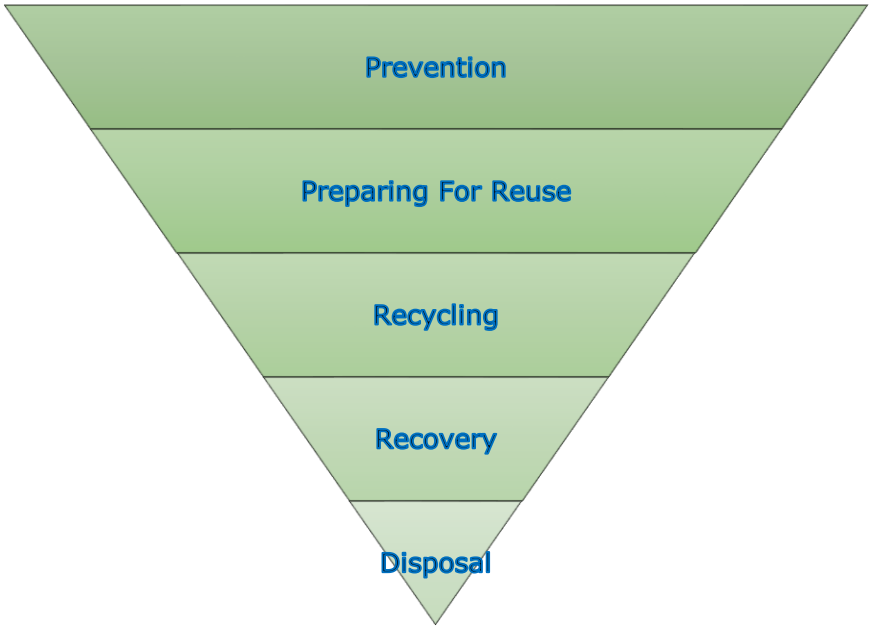
The Plan outlines the contribution of the sector to the achievement of a number of other national plans and policies including the Climate Action Plan. It also matches the level of ambition being shown across the European Union through the European Green Deal, which encompasses a range of actions supporting circularity and sustainability. The Waste Action Plan for a Circular Economy sets out a range of aims and targets for the State and the measures by which these will be achieved, including increased regulation and measures across various waste areas such as Circular Economy, Municipal Waste, Consumer Protection and Citizen Engagement, Plastics and Packaging, Construction and Demolition, Textiles, Green Public Procurement and Waste Enforcement.

The Circular Economy and Miscellaneous Provisions Act 2022, which was signed by the President and has become law, underpins Ireland's shift from a *"take-make-waste"* linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions.

The Connacht-Ulster Waste Management Plan 2015-2021 (CUWMP) provides a framework for the prevention and management of waste in a sustainable manner in Galway and the other local authority areas. The Connacht-Ulster Waste Management Plan was adopted in May 2015. The county of Galway is located within the Connacht-Ulster region which encompasses Galway County, Galway City, Leitrim, Mayo, Sligo, Roscommon, Cavan, Donegal and Monaghan

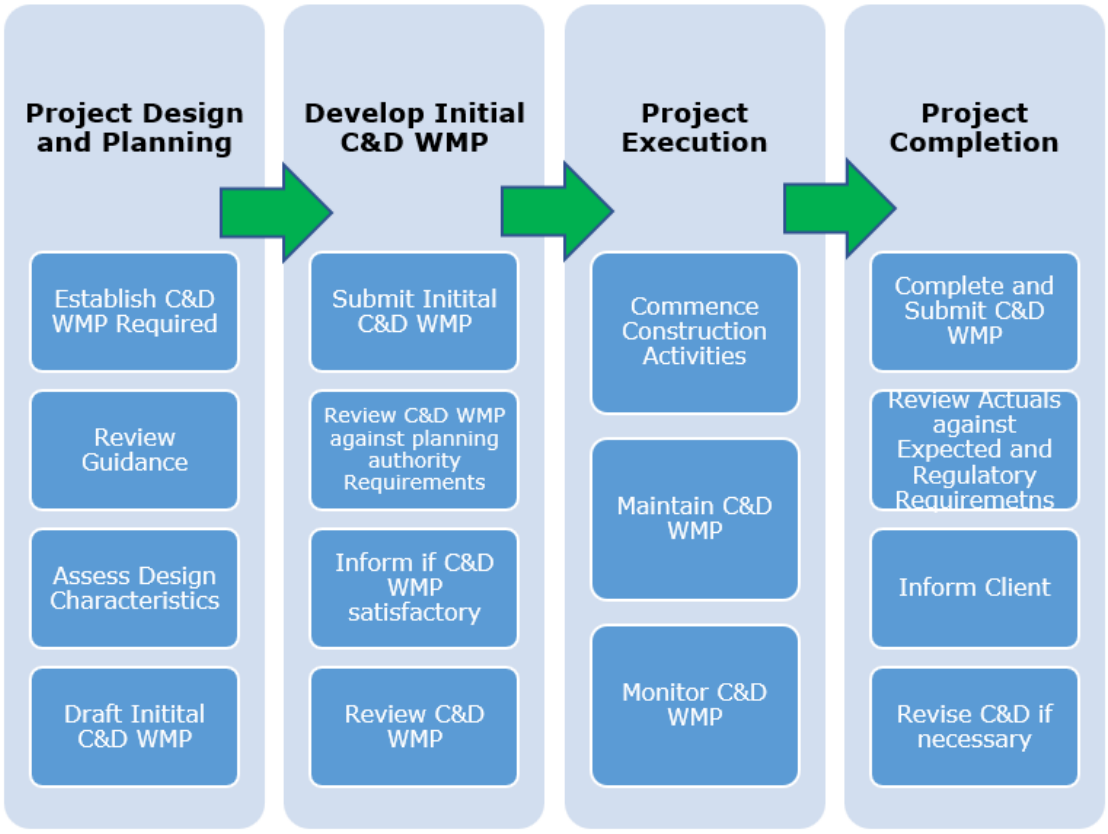
In terms of planning, the Plan sits alongside county and city development plans, guiding the development of regional and national waste treatment infrastructure. However, the scope of the regional plan is more than just the identification of infrastructure for the waste sector; it provides a roadmap for better coordination, prevention, resource efficiency and regulatory activities. This plan is currently being revised to accord with National Policy.

Figure 2.1 EU and National Waste Hierarchy



Waste management on construction sites is an iterative and step-by step process and accordingly the C&D WMP will be considered as a live document which requires inputs and updates over the entire construction phase.

Figure 2.2 EU and National Waste Hierarchy



In terms of the current Galway CDP and of relevance to the development proposal and waste management during the lifecycle (construction to decommissioning) of the project are the following waste management policies:

WM 1: Connacht and Ulster Waste Management Plan 2015-2021 *- Support the implementation of the Connacht and Ulster Waste Management Plan 2015- 2021 or any updated version of this document within the lifetime of the plan.*

WM 2: Requirements for Waste Management *- Support and promote the circular economy principles, prioritising prevention, reuse, recycling and recovery, and to sustainably manage residual waste. New developments will be expected to take account of the provisions of the Waste Management Plan for the Region and observe those elements of it that relate to waste prevention and minimisation, waste recycling facilities, and the capacity for source segregation.*

WM 4: Waste Legalisation *- To require that all waste disposal shall be undertaken in compliance with the requirements of the Environmental Protection Agency and relevant Waste Management Legislation.*

WM 5: Construction and Environmental Management Plans *- Construction Environment Management Plans shall be prepared in advance of the construction of relevant projects and implemented throughout. Such plans shall incorporate relevant mitigation measures which have been integrated into the Plan and any lower tier Environmental Impact Statement or Appropriate Assessment. CEMPs typically provide details of intended construction practice for the proposed development, including:*

(a) location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse;
(b) location of areas for construction site offices and staff facilities;
(c) details of site security fencing and hoardings;
(d) details of on-site car parking facilities for site workers during the course of construction;
(e) details of the timing and routing of construction traffic to and from the construction site and associated directional signage;
(f) measures to obviate queuing of construction traffic on the adjoining road network;
(g) measures to prevent the spillage or deposit of clay, rubble or other debris;
(h) alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works;

(i) details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels;

(j) containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained (such bunds shall be roofed to exclude rainwater);

(k) disposal of construction/demolition waste and details of how it is proposed to manage excavated soil, including compliance with 2006 Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, Heritage and Local Government;

(l) a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains;

***WM 9: Separate Collection of Waste** - Encourage and support the provision of separate collection of waste in accordance with the requirements of the Waste Management (Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011 and other relevant legislation.*

3 SITE DETAILS

The proposed development is located on a 42.3 hectares (ha) (105 acres) site in the townlands of Coolpowra, Cooldorragha, Coolnageeragh, Ballynaheskeragh, Gortlusky and Sheeaunrush, County Galway (see Figure 3.2 and Figure 3.3). The site is located approximately 5km north of the town of Portumna and 3.7km south of Killimor.

Lands within the development site boundary are in agricultural use and include a farmhouse and outbuildings which will be demolished as part of development works. The proposed lands are situated at an elevation of c. 51-54m AOD and are accessed by public road via the N65 (National Road) and the L8763 (local road). The three project compounds within the site are positioned c.500 m west of the N65, with an internal site access road providing connection to the public road (L8763). The proposed development is located adjacent to, and south of, the existing operational 400kV AIS electricity substation (Oldstreet).

The area in which the proposed development site is located is typical productive rural landscape that is not rare or distinctive at a national or regional level. The are a number of residential properties within the surrounding rural area and these are described as one-off housing with a total of 40 recorded within 1km offset from the main development with the proposed development lands. The closest residential dwelling to the proposed development boundary is approximately 300m to the west of the development site. The proposed development includes for construction of a new private entrance to the site from the L8763 with associated signage. Car parking serving Projects 1 and 2 is incorporated as part of infrastructure serving the overall development. The proposed development includes for the demolition and removal of a residential property (see Figure 3.1) within the site which contains a single storey house, associated outhouses and farm sheds.

Figure 3.1 Aerial view of Existing Residential Property

The construction and laydown area, as shown on the overall site layout plan and presented in Figure 3.4, will be provided for all projects described as part of the proposed development. The principal contractor will secure the area with temporary fencing, set up initial site accommodation and welfare facilities, and temporary services. It is envisaged that existing services serving the residential property on site will be altered to serve the contractors construction compound.

Figure 3.2 Site Location (1:50,000)

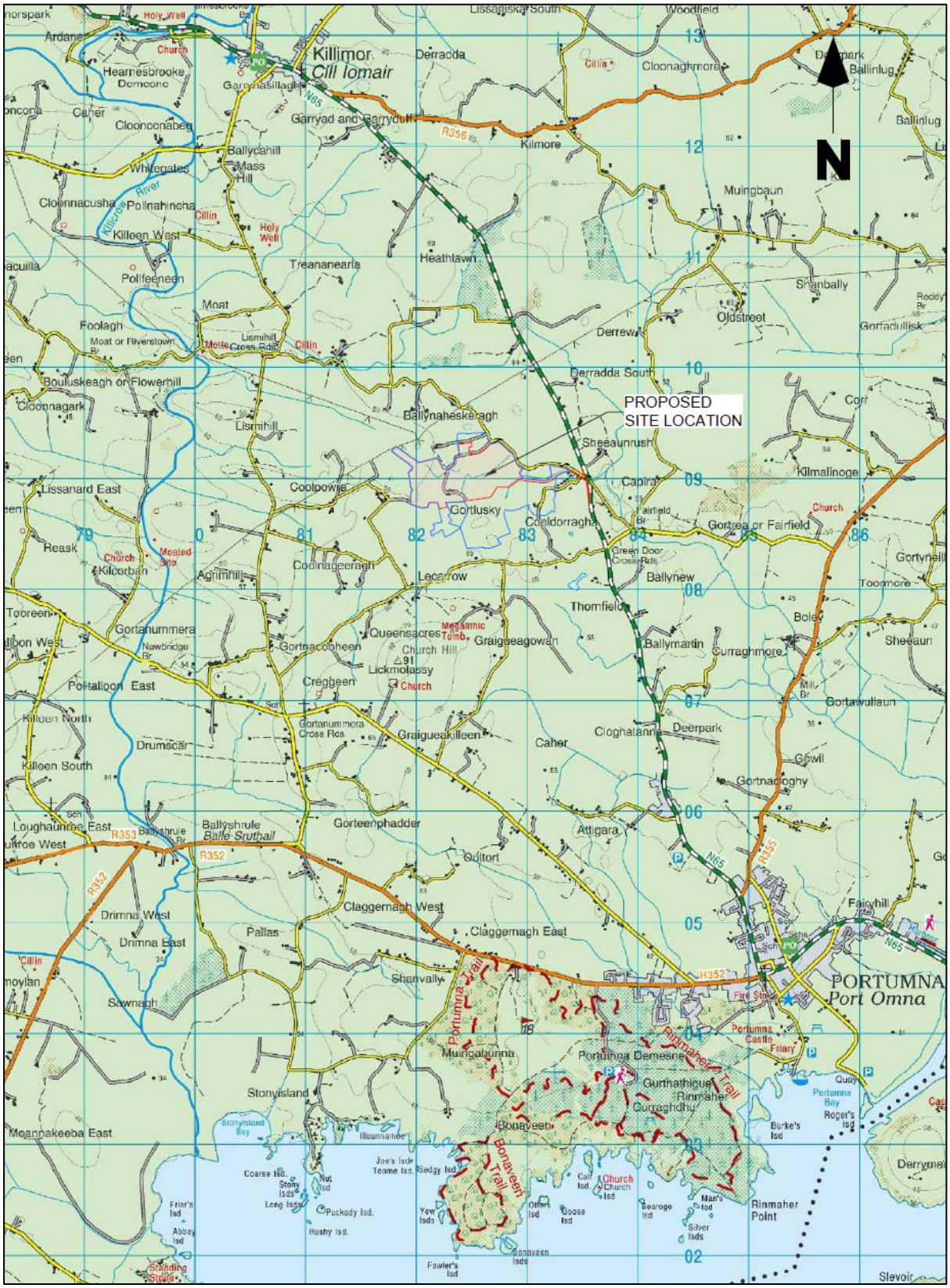


Figure 3.3 Site Location Map (1:2,500)

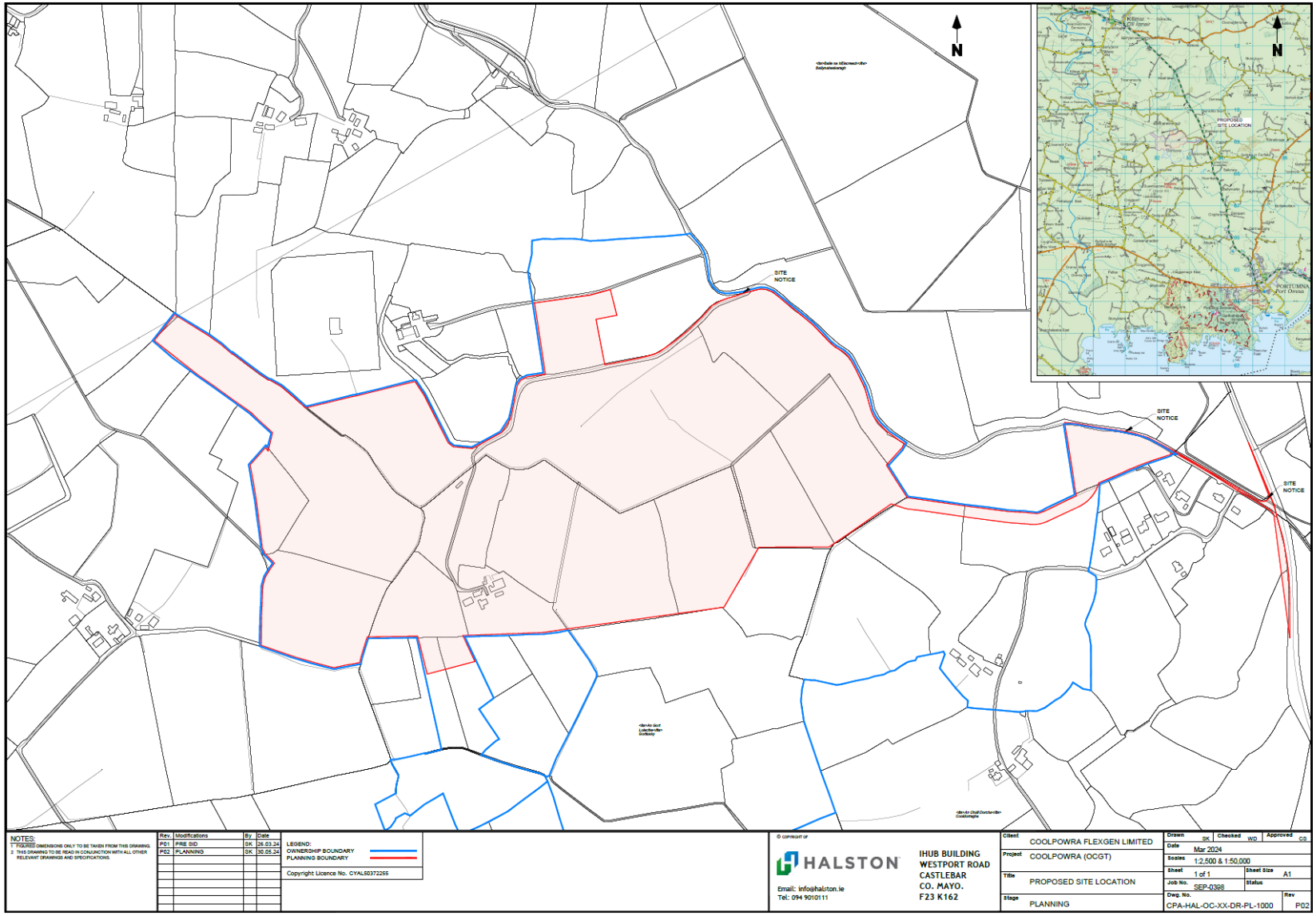
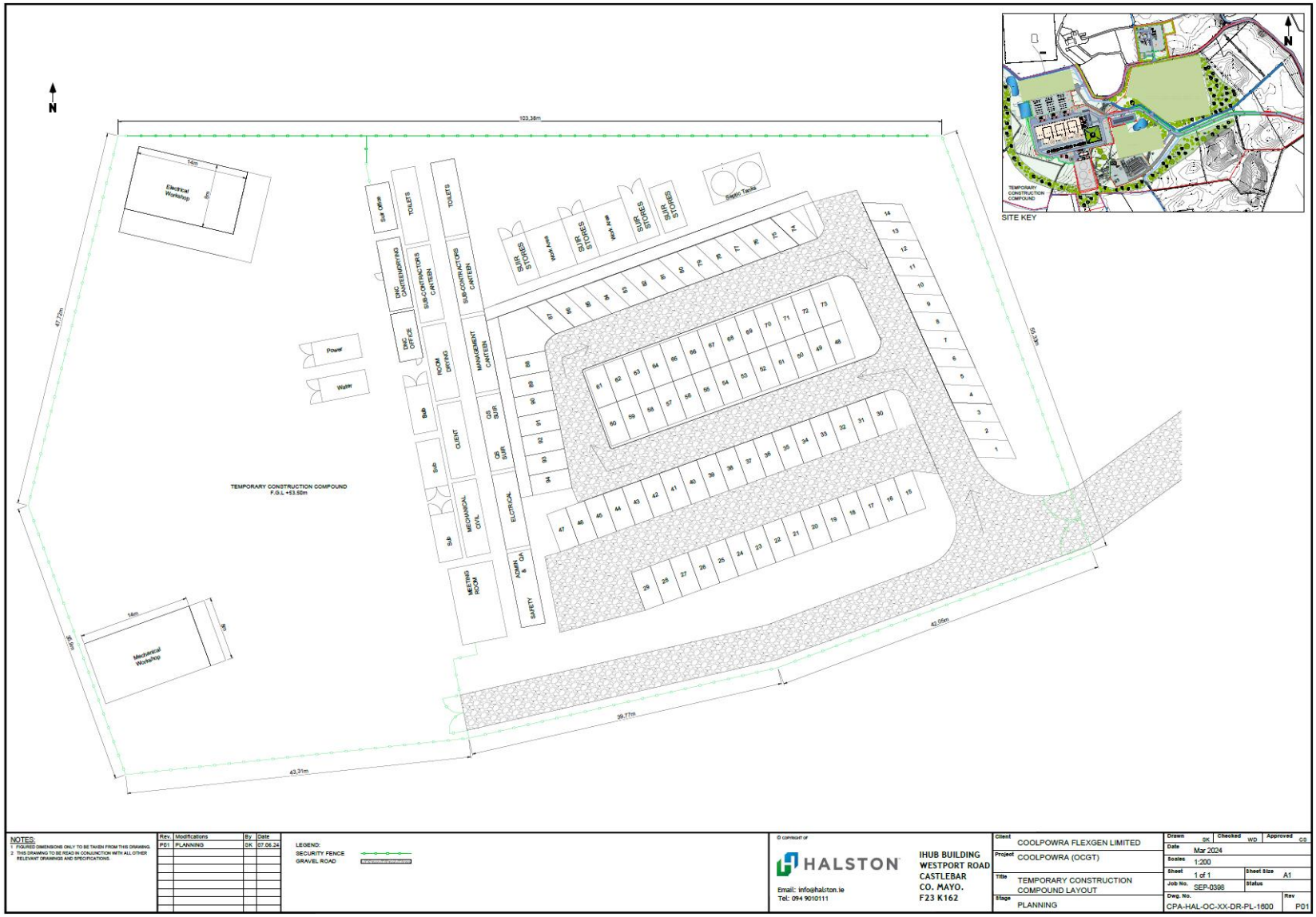


Figure 3.4 Construction Compound for the Proposed Development



4 PROJECT DESCRIPTION

As outlined above, this CEMP deals with construction works associated with three separate projects within the proposed development lands in County Galway. A description of the proposed projects is provided below, and the Proposed Development Layout and Landscape & Biodiversity Mitigation Plan are provided in Figure 4.1 and Figure 4.2. Further details regarding the proposed development, including drawings, are submitted in support of the planning applications.

4.1.1 Project 1: Reserve Gas Fired Generator

OCGT units, by the nature of their design, capability and efficiency are designed to operate intermittently and provide generation capacity during periods of high demand or when renewable energy generators cannot meet system demand. OCGT units are advantageous due to their operational flexibility and can be turned on quickly to match system demand. The selected turbines are capable of being converted to allow for inclusion of green hydrogen in the fuel mix in the future, which will further assist with climate-neutral targets.

The proposed Reserve Gas Fired Generator will have the ability to operate 24 hours a day, seven days a week. However, while the plant has the potential to operate in this manner, it is expected that it will only operate during peak periods for a limited number of hours per year, i.e. it will be 100% available, but will only run, as and, when the system operator requires. This typically means when demand is high and or when renewable energy generators cannot meet system demand.

The Reserve Gas Fired Generator comprises three open cycle gas-fired generator (OCGT) units positioned within a building (turbine hall) along with auxiliary equipment (including hydraulic oil skid, instrument air skid, cable racks, air enclosures for combustion turbines, fire-fighting system, power control centre, ventilation systems, etc.). An OCGT unit consists of a turbine connected to an electric power generator and the three turbines are designed to operate independently of each other. The OCGT units will receive natural gas from the gas network via an underground pipeline to an Above Ground Installation (AGI) compound within the development lands. Gas Networks Ireland (GNI), as the designated competent authority, will separately manage the process of delivering the underground gas transmission pipeline to the proposed AGI.

The proposed OCGT units are dual fuel units as required by system requirements specified by the Commission for Regulation of Utilities (CRU). Natural gas will be the primary combustion fuel to each of the OCGT units when operating. Secondary fuel (gas oil) will be stored in a bunded structure outside the turbine hall along with ancillary items of

electrical plant and machinery such as coolers and transformers. To ensure compliance with the Grid Code, the Reserve Gas-Fired Generator must be capable of running continuously on secondary fuel equivalent to 72 hours of operating on the primary fuel. This preparedness is crucial for scenarios involving an outage or interruption to the natural gas supply.

4.1.2 Project 2: Energy Storage System (ESS)

The ESS technology is designed to complement and support the reserve gas-fired generator by providing zero carbon, instantaneous power and balancing power to the grid. The Energy Storage System (ESS) facility comprises (a) a Long Duration Energy Storage (LDES) static battery (400MW) positioned within a secure outdoor compound, and (b) a Synchronous Condenser (400MVA electrical rating) which will operate within a building in a separately secured compound. The LDES will provide peaking, active power and back start capability services to the electricity grid. The LDES battery will comprise a total of 224 modular single storey battery enclosures and medium voltage power stations (MVPS) and IPP building. The LDES will connect to the 400kV electricity network via the proposed GIS substation using electric plant and HV electrical lines. The horizontal synchronous generator will be positioned within a building and ancillary equipment including proprietary air-cooling units and electrical plant (including transformer) will be positioned adjacent to the synchronous generator hall. The synchronous condenser will connect to the 400kV electricity network via the proposed GIS substation using electric plant and HV electrical lines. The synchronous condenser will provide short-circuit power, inertia, and reactive power for dynamic loads and stabilise the network through voltage recovery during faults.

4.1.3 Project 3: Gas Insulated Switchgear (GIS) Electricity Substation

The Gas Insulated Switchgear (GIS) Electricity Substation comprises a two-storey building positioned and secured within a palisade fenced compound. The GIS building will contain a battery room, generator room, stairs, cable pits, switchgear rooms, workshop, messroom and stores. The proposed GIS will upgrade the existing air insulated switchgear (AIS) substation with a new gas GIS substation at Oldstreet. The GIS substation will serve the existing function of the AIS substation and facilitate connection of the proposed Reserve Gas-Fired Generator and ESS facility to the node on the 400kV transmission network. HV lines and associated electric plant which will connect Project 1 & 2 to the substation are included as part of the proposed development. Associated internal roads, fencing, lighting, civils and drainage works will be appropriately developed for the subject development.

Figure 4.1 Proposed Overall Site Layout

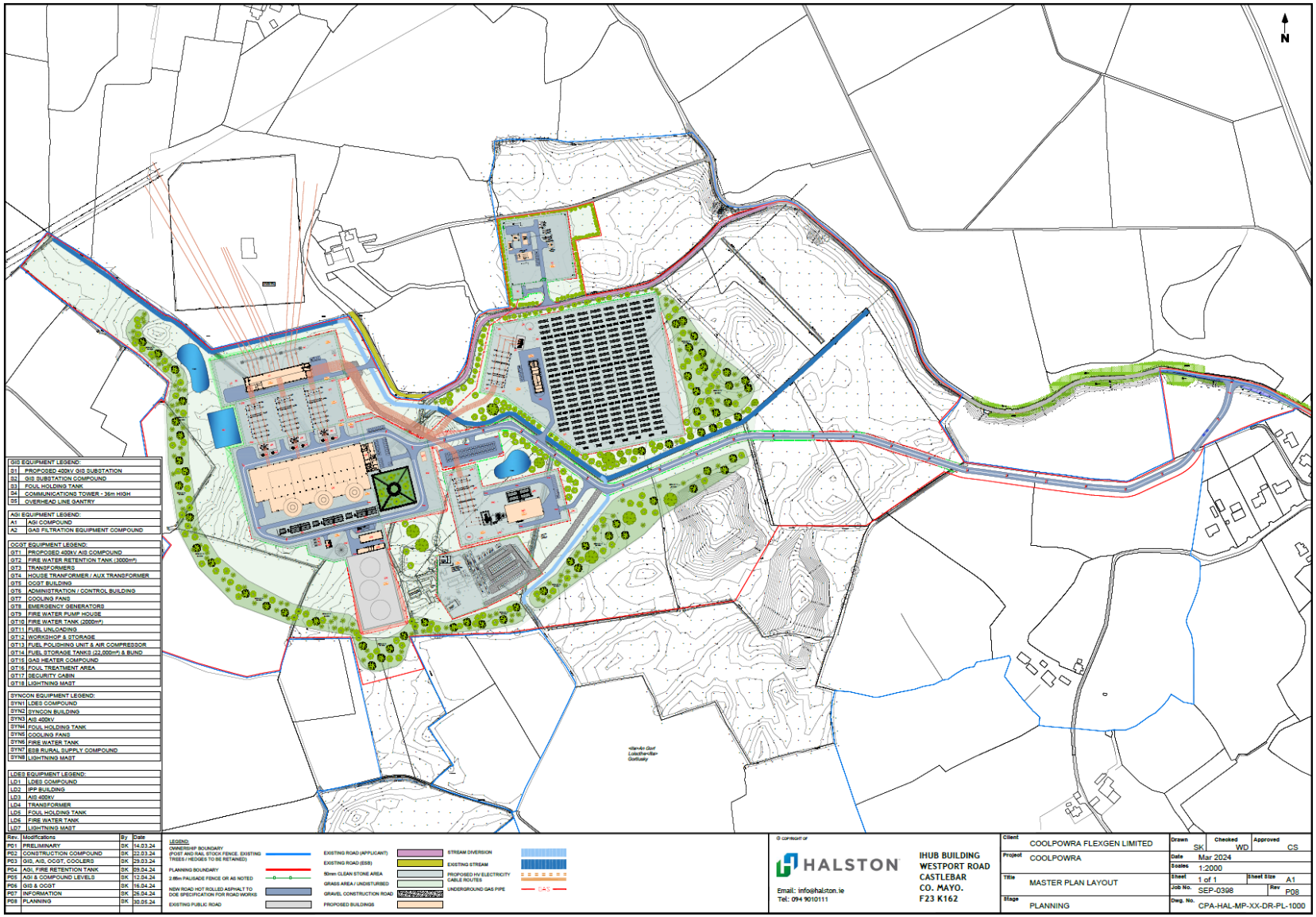
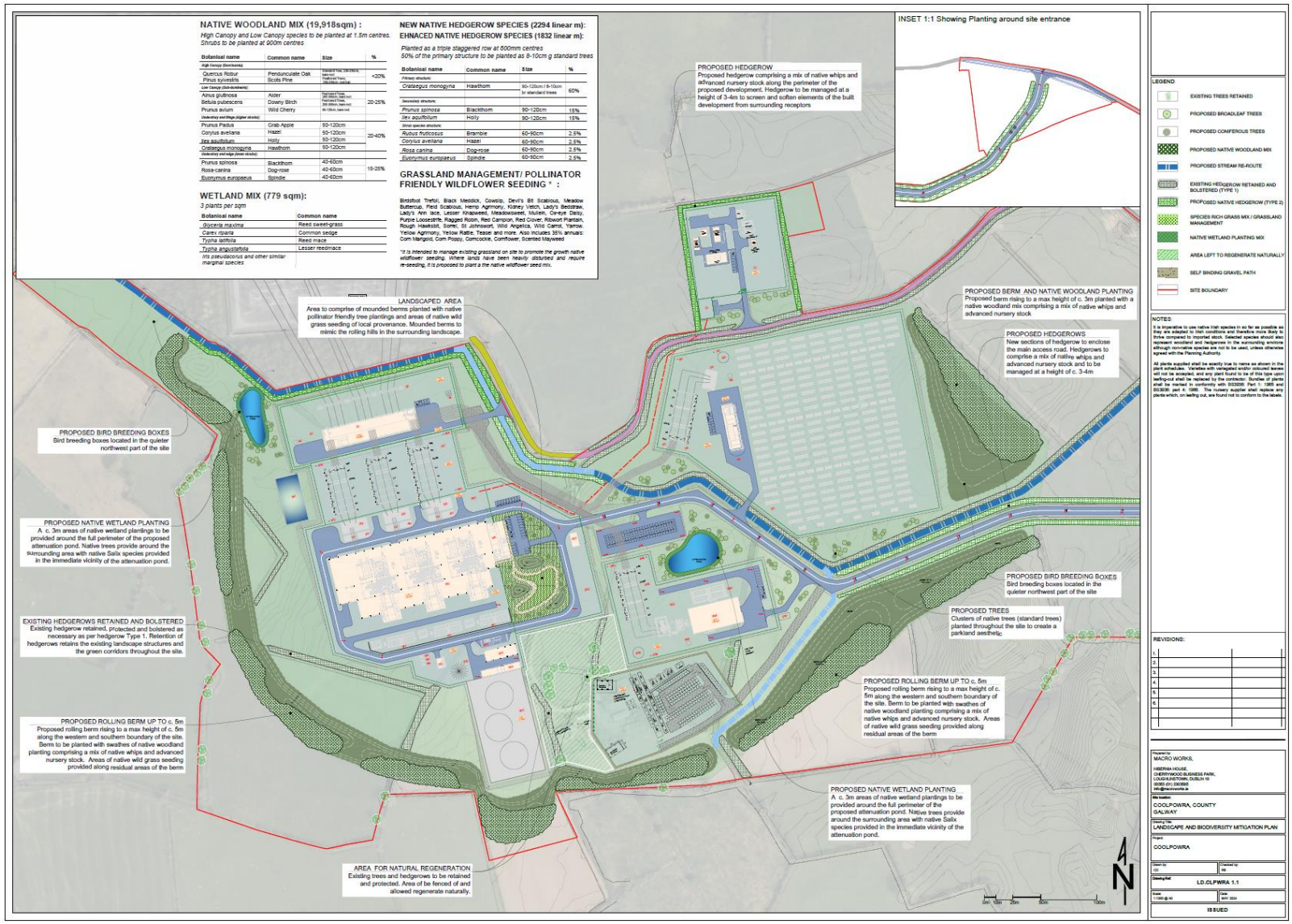


Figure 4.2 Landscape and Biodiversity Mitigation Plan



5 CONSTRUCTION WORKS

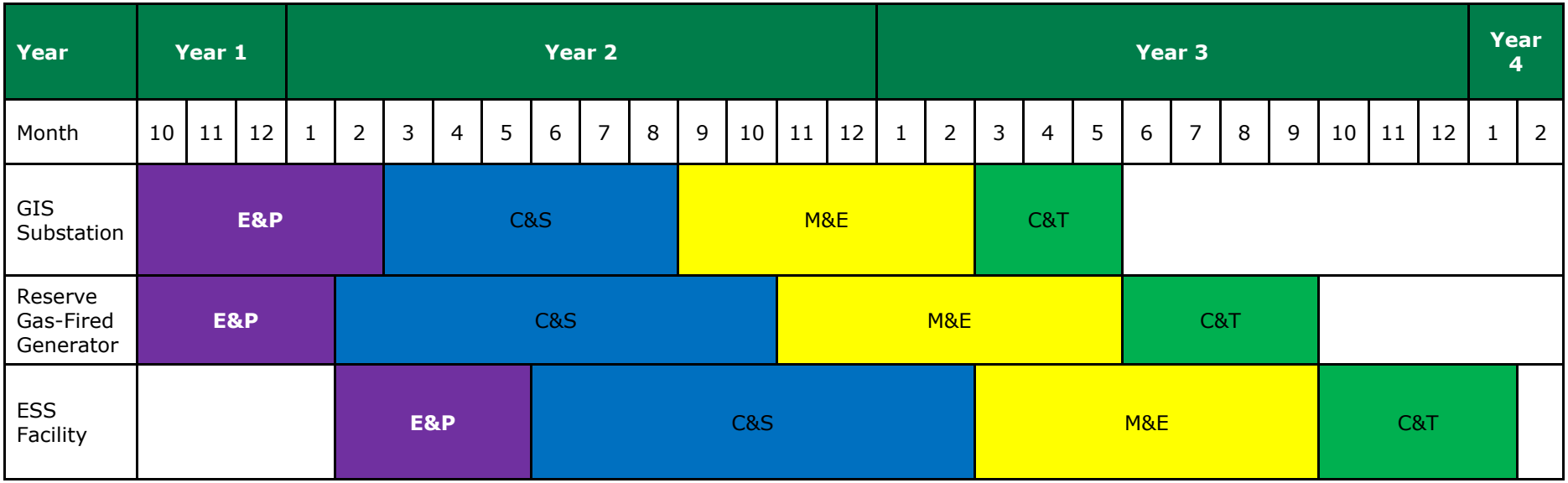
5.1 OVERVIEW

It is envisaged that the proposed development (three projects) will be constructed over an estimated 20–28-month period. After the estimated 28 month-month construction period, it is expected that all projects will be fully constructed, commissioned and capable of operating as designed. The design and undertaking of construction work associated with the connection of the Reserve Gas-Fired Generator (Project 1) to the gas network will be managed by Gas Networks Ireland (GNI). Whilst the planning application and EIAR assess the potential effects of the associated underground gas pipeline project, the final route determined may be subject to change as part of the detailed design process which has to be carried out by GNI. As such, detailed design, construction methodologies and proposed mitigation for the construction, operation and decommissioning of the underground gas pipeline will be defined by GNI at a later date and included in a CEMP to accompany their future planning application(s).

The specific details of the construction programme are not currently known as such this programme will be developed under EPC contract as part of the detailed design phase. It is therefore difficult to assess the staffing and delivery levels for the development. However, it is considered that the design and proposed layout of projects has developed sufficiently to discuss the potential environmental impacts of proposed construction methods. An estimate of construction traffic volumes has been made for a site of this size and typical works associated with a development of this type are described.

The timing of the commencement of construction is subject to planning, design, tendering and ecological constraints. Any works associated with site clearance and removal of soils and internal hedging would be seasonally limited to mitigate against any adverse ecological affects. The impact of construction activities on Biodiversity and Roads and Traffic are assessed in the EIAR. This preliminary construction environmental management plan will be developed and implemented for the construction phase of the development. The document will provide a framework under which construction activities, which have potential for environmental impact (e.g., generation of dust, ecological impacts, surface water discharge, etc.), will be managed. Mitigation measures as outlined in the EIAR are included within this plan. An indicative construction schedule for each project relative to each other is outlined below in Figure 5.1 subject to the granting of statutory consent for each development separately. It should be noted that the timing and phasing of projects and activities are approximate and are indicative rather than a definitive programme of works.

Figure 5.1 Indicative Construction Programme



Notes:

1. The construction timelines are for each project are indicative and will be finalised at detailed design stage of the projects.
2. In relation to GIS Project, timings of certain tasks /works will be subject to system outage planning by Eirgrid and EBS Networks.
3. Construction of the gas pipeline is non-contestable works and will be carried out by GNI.
4. E&P = Site Evaluation and Preparation (Works)
   C&S = Civil & Structural (Works)
   M&E = Mechanical & Electrical (Works)
   C&T = Commissioning and Testing (Works)

5.2 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

The construction project will be managed by an EPC /Main contractor. The EPC /Main contractor will appoint a Construction Project Manager who will have responsibility for coordinating and managing good environmental and health and safety practices during construction.

The Construction Project Manager shall maintain monthly environmental programmes to ensure that construction activities on this contract are planned and managed in accordance with the environmental requirements stipulated by the Client /Owners Engineer. This management structure will be further defined by the appointed contractor and will include the names of the assigned personnel with the appropriate responsibility and reporting structure

5.3 CONTACTS

5.3.1 Primary Contacts

Table 5.1 Primary Contacts

Title	Name	Phone	Email
Project Manager			
Construction Manager			
SHEQ Advisor			
Site Engineer			
Quantity Surveyor			
Waste Representative			

The EPC Contractor /Main Contractor is responsible for ensuring that all employees and sub-contractors follow the requirements of the CEMP. The Contractor will be required to provide training and supervision to ensure that the requirements are adhered to. It is anticipated that the main environmental responsibilities for the key staff will be as set out below (TBC by the Contractor).

5.3.2 Third Party Contacts

Table 5.2 Third Party Contacts

Organisation	Position	Name	Phone	Email
Galway County Council				
Inland Fisheries Ireland				
Transport Infrastructure Ireland (TII)				
Office of Public Works (OPW)				
Environmental Protection Agency (EPA)				
National Parks and Wildlife Services (NPWS)				
Health and Safety Authority (HSA)				
Emergency Services				
Other				

The **Construction Project Manager** will:

- Provide information on contract requirements, including scope of works and forecast of waste quantities to SHEQ Advisor following contract award and prior to start of works on site and also when any changes occur.
- Nominate the following as required: Waste Rep, person to undertake weekly Site Compound checks, person to check drip trays and bunds and person to supervise refuelling of tanks and bowsers, person to complete watercourse monitoring Booklet (where applicable), person to complete air quality and noise booklet (where applicable).
- Ensure a forecast of waste types, quantities and disposal routes is produced before works start on site.
- Ensure required consents are obtained before associated works start.
- Ensure environmental waste minimisation and environmental mitigation measures are incorporated into design, construction method and/ or materials employed, where possible.
- Ensure environmental and waste requirements are included on Requisitions and in Subcontracts and Orders.
- Ensure a current version of the Contract Organisation Chart is displayed on site notice boards and individuals with environmental responsibilities are named on the Authorised Signatures List where appropriate.
- Ensure oil, including diesel, is stored in properly bunded tanks/ bunded mobile bowsers/ drip trays.
- Report Incidents in accordance with the reporting system.
- Report Non-conformances via the non-conformance tool.
- Report Incidents and Non-conformances to the SHEQ Advisor as soon as possible.
- Ensure the SHEQ Advisor is informed of environmental complaints.
- Liaise with Statutory Authorities and Client as required and ensure records of communication (including verbal) are kept. Ensure Statutory Authorities are always accompanied on site (preferably by the Project Manager and the SHEQ Advisor).
- Notify the Environmental Health Officer of any particularly noisy works or any works outside the contract hours before construction begins.
- Ensure all residents are notified of noisy works before they begin.
- Ensure environmental performance including review of Incidents and Non-conformances, Waste arisings and any Contract Objectives and Targets are included as part of Contract Review Meetings.

- Approve the Contract Environmental Management Plan and ensure employees and subcontractors implement the environmental controls.
- Ensure employees and subcontractors receive Induction Training (including environment) and Tool Box Talks as appropriate.
- Ensure staff needed for audits are available when required.
- Ensure actions resulting from Corrective Action Requests and Observations raised during audits are completed by the deadlines and signed off copies of Corrective Action Requests are forwarded to the relevant SHEQ Advisor.

The Ecological Clerk of Works (ECoW)

- Ensure that all mitigation measures used to protect the environment are in place and are maintained during the work;
- Undertake and report on the weekly monitoring and undertake the weekly site audits;
- Revise the mitigation measure if the monitoring evidence indicates that the measure is not effectively protecting the environment;
- Undertake an invasive species survey in advance of any soil being excavated for disposal off-site. If invasive species are identified the ECoW will prepare an Invasive Species Management Plan;
- Supervise any excavation; and
- Provide toolbox talks to all sub-contractors before they start on site.

The **SHEQ Advisor** will:

- Ensure the implementation of the Environmental Management System, and associated documentation on a daily basis.
- Address day to day environmental matters and communicate with construction management team
- Obtain environmental regulatory consents/permits as required (e.g. EPA, Galway County Council, OPW. National Waste Collection Permit Office (NWCPO), Inland Fisheries & NPWS).
- Report Environmental Incidents to the Statutory Authorities if necessary.
- Log and monitor Environmental Incidents and Non-conformances.
- Disseminate information including changes to legislation, to relevant employees.
- Identify employees that require environmental training, provide training and maintain training records.
- Provide advice and deal with queries and correspondence on environmental issues.

- Identify significant environmental impacts for contracts and help set-up contracts and site compounds to include necessary controls.
- Identify any environmental consents that are required and ensure they are obtained.
- Produce the Contract Environmental Management Plan and / or Site-Specific Information.
- Produce/ maintain or ensure production/ maintenance of all aspects of Site Waste Management Plan
- Monitor waste quantities and verify & validate the waste records obtained from site.
- Undertake contract environmental inspections to ensure controls are in place and working.
- Monitor progress in closing out Corrective Action Requests and Observations raised during audits.
- Agree process for regular reporting to senior management on the Contract.
- Ensure all environmental records are kept and readily available.
- Obtain prior agreement from site management in writing for any deviations from assigned Procedures (e.g. use of client procedures or forms).

Quantity Surveyor will:

- Check that Waste Carriers are registered and Waste Management Sites are licensed before subcontracts or orders are placed.
- Ensure environmental and waste requirements are included on Requisitions/ Subcontracts or Orders.
- Reconcile waste invoice against Waste Transfer Notes/ Consignment Notes and tip receipts before authorising payment.
- Monitor waste quantities and costs and provide information to assist in the production of Site Waste Management Plan Reports.

Waste Rep will:

- Arrange for collection of waste.
- Keep an up-to-date record of waste removed from Site
- Confirm with SHESQ Advisor that Waste Collection Permits/ Waste Facility Licenses are valid and either keep a record of confirmation or obtain copies for site files
- Complete and sign Waste Transfer Notes/ Hazardous Waste Consignment Notes. Give copies to Drivers, send top copy to invoicing and keep photocopy on file.
- If hazardous waste is being removed, complete and retain a copy of the Waste Transfer Form.

- Ensure waste storage/ segregation/ recycling activities are correctly implemented and appropriate waste records and statistics are maintained.

Subcontract Buyers will:

- If a subcontractor is to act as a Waste Carrier and dispose of waste provide details of their Waste Collection Permit and the intended disposal sites Waste Licence to SHEQ Advisor before placing subcontract.
- Include environmental and waste requirements in subcontracts.

Drivers will:

- Inform the Waste Rep. what waste they are removing and where it is being taken prior to removing any waste from site.
- Collect Waste Transfer Note/ Consignment Note from Waste Rep when collecting waste.
- Only take waste to a licensed Waste Management Site as instructed by the Waste Rep/ SHESQ Advisor.
- Get Waste Management Site to sign Waste Transfer Note/ Consignment Note and give to SHESQ Advisor along with all associated receipts.

All Construction Staff will:

- If there is an incident, stop work, contain it and report it to the Site Manager.
- Contact the Waste Rep when waste needs to be removed.
- Pass any queries or correspondence on environmental issues to SHESQ Advisor.
- Work in accordance with Group SHESQ Procedures, Contract Environmental Management Plan and Method Statements.

5.4 TRAINING

Environmental awareness training on this project will include:

- Induction Training
- Tool Box Talks
- Communication/ Briefing Sessions

Environmental awareness training included at induction shall cover the following basic elements:

- The SHEQ Policy

- Overview of applicable environmental legal and regulatory requirements
- The Construction Environmental Management Plan including works specific environmental aspects and impacts
- The Environmental Emergency response training including Spill Control & Spill Kits.
- The Construction Waste Management Plan
- Water Pollution Prevention
- Environmentally sensitive areas
- Wildlife/ Invasive Plants
- Dust management controls
- Noise and vibration Controls
- Material Storage and Refuelling
- Responding to communications/complaints received by the public.
- Reporting an Environmental Incident
- Other matters of environmental interest

The Environmental Advisor shall retain details and records of all training provided. Additional environmental training shall be provided as required by the Environmental Advisor or environmental experts.

Contract specific information will be displayed on notice boards and briefed to all staff. Site-specific Environmental Do's & Don'ts, which list the key controls specified in this Plan, will be issued to site operatives and subcontractors.

Training will be provided in accordance with the Core Skills Matrix. A Training Attendance Form will be completed for each training session and an Environmental Training Matrix will be maintained.

5.5 COMMUNICATION

5.5.1 Internal

Environmental issues will be reviewed at the monthly Contract Review meeting, in accordance with the appointed contractor's management system. The issues covered will include:

- Compliance contractor management system and any contract specific environmental requirements.
- Legal compliance e.g. consent requirements
- Environmental Incidents & Non-conformances
- Audit Corrective Action Requests to ensure actions are completed by deadlines.

5.5.2 External

The Project Manager (in conjunction with the SHEQ Advisor) will be responsible for receiving, documenting and responding to any environmental communication from third parties. All verbal communication from third parties will be logged in the contract Communication Log in accordance with the agreed Communication Plan.

The SHEQ Adviser will meet as required and as agreed with the client**,** with statutory agencies, e.g. Environmental Protection Agency, local authority (Galway County Council) Environmental Health Officers, Inland Fisheries Ireland, NPWS, other Stakeholders (Gardai, local business owners, landowners) and the local community to ensure works are carried out with minimal environmental disturbance.

Complaints from the public will be logged on a Complaint Record form and a recorded on the Complaint Register.

5.6 DOCUMENT CONTROL

All environmental documents will be controlled by the Appointed Contractor Procedures /Method Statements.

5.7 DESIGN

Environmental impacts of design will be managed in accordance with the Appointed Contractor Procedures /Method Statements. This involves including Environmental Design Aims in the Design Brief and monitoring these through the Design Review meetings.

5.8 CONTRACT CHECKS AND INSPECTIONS

The following inspections will be undertaken:

- Supervisor Weekly Checklist
- SHEQ Monthly Inspection
- Management Tours

5.9 RECORDS

Records will be maintained in accordance with the Appointed Contractor Procedures.

5.10 AUDITS

Internal audit of this contract will be undertaken in accordance with the Appointed Contractor Procedures.

5.11 MANAGEMENT REVIEW

A Contract Management Review will be undertaken every 3 months. Management reviews will be undertaken in accordance with the Appointed Contractor Procedures.

5.12 SCHEDULE AND WORKING HOURS

It is envisaged that construction of the development proposal is likely to occur over an estimated 28-month period; refer to Figure 5.1 for the overall indicative timeframe and timeframes for each of the three projects.

Subject to agreement with the planning authority, it is anticipated that the following times will constitute the standard working hours[1] on the construction site.

- Monday to Friday 07:00 to 19:00
- Saturdays 07:00 to 13:00
- Site closed on Sundays and Bank Holidays,

Working hours may vary slightly depending on weather conditions and daylight hours during winter months. Heavy construction activities will be avoided where possible outside the normal working hours outlined above. Lighting for night-time working will be downward facing and directed towards the centre of the site so as to minimise any nuisance outside of the site in relation to residential receptors or light disturbance to ecological receptors.

5.12.1 Accommodation /Facilities

The relevant statutory requirements will be provided for all workers on the construction site and will be provided in a secure compound including:

- Canteen facilities and drinking water supply
- Toilet, wash up and locker facilities and hot water
- Drying room
- Car parking for workers
- First Aid Office
- Site Engineers & Resident Engineers offices
- Site offices for Contractors

[1] Typical Construction hours will apply with the exception of commissioning and specific engineering works (e.g., concrete pours) which could take place outside these hours, as and when agreed with the planning authority. It is likely that some construction activities will be required to continue for 24 hours for limited durations. The facility may be operational at any point during a 24-hour period during commissioning (and operation).

6 CONTROLS AND MITIGATION MEASURES

Controls specified in this section are designed to:

- Meet legal and contract requirements
- Limit the identified significant impacts
- Deal with unexpected environmental issues

Environmental controls (e.g. consent conditions) that are more specific to certain activities will be discussed and agreed in advance with the Project Manager and the appropriate public bodies including local authorities and the Environment Agency. The controls will then be included in site specific Method Statements in accordance with the Group Procedure – Preparation and Issue of Method Statements Risk Assessments.

6.1 SUBCONTRACTORS

Subcontractors will be appointed in accordance with the Appointed Contractor (EPC Contractor) Procurement Policy Procedures:

Subcontractors are required to work in accordance with this Construction Environmental Management Plan and Method Statements.

Table 6.1 Subcontractors

Subcontractor (name)	Scope of Works	Main Activities	Environmental Controls
TBC	Earthworks, Drainage & Services	Bulk excavation, filling, installation of drainage & site services	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Concrete and Structural Works	Construction of concrete foundations and Buildings	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Mechanical Works	Installation of modular equipment and process pipework	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Electrical Works	Installation of SCADA and process electrical works	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Testing & Commissioning	Testing & Commissioning of the process	Subcontractor's Method Statement's environmental

Subcontractor (name)	Scope of Works	Main Activities	Environmental Controls
TBC	Earthworks, Drainage & Services	Bulk excavation, filling, installation of drainage & site services	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
			controls reviewed by Main Contractor
TBC	Site Fencing	Installation of Permanent boundary fence	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Landscaping	Hard & Soft Landscaping of the site	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Waste Disposal & Difficult waste disposal	Skip Supply Waste Removal/ Disposal	Duty of Care Waste Collection Permit
TBC	Dust Monitoring	Set up dust deposition jars Collection of the dust deposition jars and lab analysis (if required)	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Noise Monitoring	Set up noise monitors at agreed locations (if required)	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Site Compound	Installation, maintenance & removal of temporary site compound & security	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor

The above is a non-exclusive list of the main subcontracted works.

6.2 RESOURCE USE

Measures to reduce resource usage during the planning and operational phases of the works will include the actions given in the table below.

Table 6.2 Management of Resources

TASK	RESPONSIBILITY
Fuel Combustion (Transport/Plant)	
Collect data on quantities of diesel/ petrol used in vehicles and plant.	Project Manager/ SHEQ Advisor/ Manager
Collect data on quantities of gas oil used.	Project Manager/ SHEQ Advisor/ Manager
Collect data on modes of transport to and from work and business miles travelled.	Project Manager/ SHESQ Advisor/ Manager
Explore options to reduce the amount of car travel to and from work and minimise the adverse environmental effects of business-related travel.	Project Manager/ SHEQ Advisor/ Manager
Promote good practise by encouraging use of sustainable modes of transport and where feasible use minibuses/ vans to transport staff.	Project Manager/ SHEQ Advisor/ Manager
Promote fuel efficiency and good driving practices	Project Manager/ SHEQ Advisor/ Manager
Ensure the correct vehicle, plant & equipment is provided and used for the work being undertaken. I.e. do not select equipment that is over-powered for the task being carried out.	Project Manager/ SHEQ Advisor/ Manager
Ensure vehicles, mobile plant, generators and other equipment are serviced regularly to maintain their efficiency.	Foreman
Switch off vehicles and other mobile plant when not in use.	All staff
Electricity	
Minimise the use of generators to provide electricity. Wherever possible connect to mains electricity as soon as possible.	Project Manager
Collect data on quantities of directly purchased electricity.	Project Manager/ SHEQ Advisor/ Manager

TASK	RESPONSIBILITY
Install energy efficient devices/ renewable energy where reasonably practicable e.g. Infrared sensors linked to lighting, air conditioning and heating controls.	Project Manager
Promoting energy efficiency with all staff. Identifying where energy savings can be made and implement them. E.g. turning off computers/ photocopiers when not in use.	SHEQ Advisor/ Manager
Water	
Measure per capita water use in the site offices.	Project Manager/ SHEQ Advisor/ Manager
Install water efficient devices in washrooms e.g. push taps, flow regulator/ restrictors, low flush toilets, cistern devices e.g. hippo, save-a-flush to reduce flush volumes	Project Manager
Promoting water efficiency with all staff and encourage good behaviour. e.g. maintaining hoses, pipes and water using equipment in good condition and checking for leaks regularly	SHEQ Advisor/ Manager
Fit trigger nozzles on hosepipes and flow restrictors and automatic shut off devices to hoses and water supply pipes where appropriate	Foreman
Use recycled or grey water for damping down dust where possible	Foreman
Use scrappers to clean up mud rather than washing down with water	Foreman
Waste	
Minimise waste by ensuring materials are stored properly and used efficiently.	Project Manager/ Foreman
Consider waste when purchasing materials. Where possible/ practicable select materials that can be re-used or recycled.	Project Manager
Recycle and reuse materials where possible.	Project Manager/ SHEQ Advisor/ Manager
Collect data on quantities of waste produced and percentage recycled (diverted from landfill).	Project Manager/ SHEQ Advisor/ Manager
Materials	
Procure materials from certified sources.	Project Manager/ Buying Department

TASK	RESPONSIBILITY
Designing out unsustainable materials where possible and minimising waste.	Designers
Specifying materials/ products that have less impact on the environment.	Designers
Specifying the use of peat free product for landscaping.	Project Manager
Procure recycled materials where possible.	Project Manager/ Buying Department
Introduce a '*take-back policy*' on suppliers, so where possible, no delivery will leave the site without taking associated waste and packaging with them.	Project Manager/ Buying Department

Note: Reducing resource usage by minimising wastage and preventing pollution is also addressed under the other sub-headings in this section of the Plan.

6.3 WASTE MANAGEMENT

All waste arising on the Contract, including that generated by sub-contractors will be managed in accordance with the *Appointed Contractors Procedures /Method Statements*; The principle of "Duty of Care", as set out in the Waste Management Act 1996, as amended, will apply, whereby the waste producer is responsible for all waste from generation to recovery or disposal.

A separate Site Waste Management Plan (Attachment A) has been produced detailing how waste will be managed on this contract. The Construction and Demolition Waste Management Plan describes the controls and processes that will be used to manage materials effectively and reduce the amount of waste disposed of to landfill by identifying opportunities to reduce, re-use and recycle.

Waste quantities and management options will be identified prior to works commencing on site and recorded on a Waste Forecast.

Throughout the course of the Contract, whenever waste is removed from site, information on the identity of the person removing the waste, the type and quantity of the waste and the site the where waste is being taken to will be recorded using a Waste Transfer Note or Hazardous Waste Consignment Note and/ or summarised on the Record of Waste Movements.

Actual waste quantities and disposal routes will be reviewed periodically and summarised in a *Waste Report.* This review will monitor performance against the Contract Waste

Forecast and identify opportunities for improvement. The review will be discussed at the Progress Meetings**.**

Upon completion of the works the total waste produced on the Contract, the costs associated with its disposal, the disposal locations and the percentage recycled will be summarised on the *Contract Waste Report*. The Report includes a review of performance and any recommendations for waste management on future contracts.

A copy of the Construction Waste Management Plan comprising the Waste Forecast, the Quarterly Waste Returns Contract Waste Report will be retained at the site offices for three years after completion of the works.

6.3.1 Waste Controls

The following environmental controls and monitoring activities will be implemented on site:

Table 6.3 Waste Controls

TASK	RESPONSIBILITY
Ensure all waste disposal is arranged via the Waste Rep.	Project Manager/ SHEQ Advisor/ Manager
Where possible waste will be retained and reused on site to reduced traffic movements.	All staff
Plan to segregate waste as far as technically, environmentally and economically practicable into reusable and recyclable waste.	Project Manager/ SHEQ Advisor/ Manager
Introduce a '*take-back policy*' on suppliers, so where possible, no delivery will leave the site without taking associated waste and packaging with them.	Project Manager/ Buying Department
Documentation:	
Ensure that copies of the following are retained on site: • Evidence of all relevant Waste Collection Permits. • All relevant Waste Management Licences / Exemption Certificates. • Waste Transfer Notes and Consignment Notes. • Site Waste Management Plan/ Hazardous Waste Register.	SHEQ Advisor/ Manager/ Waste Rep.
Do not accept damaged skips/ waste containers on to site	Foreman/ Waste Rep.

TASK	RESPONSIBILITY
Locate skips/ waste containers away from drains, watercourses and heavily trafficked areas.	Foreman/ Waste Rep.
Ensure hazardous waste containers are covered and located on hardstanding.	Foreman/ Waste Rep.
Locate non-hazardous skips/ waste containers on hardstanding if possible.	Foreman/ Waste Rep.
Ensure that waste is segregated and placed in the right skip/bin	Foreman/ Waste Rep.
Ensure all waste is stored securely so that it cannot escape (wind/ vermin).	Foreman/ Waste Rep.
Remove waste, disused materials, packaging and other debris at frequent intervals to ensure the site is kept clean and tidy.	Foreman/ Waste Rep.
Ensure all hazardous waste containers are covered.	Foreman/ Waste Rep.
Ensure all skips and bins are labelled with their contents (incl. EWC Code).	Foreman/ Waste Rep.
Place the correct waste in the correct skip.	All staff
Report skips that are leaking or overfull to your supervisor.	All staff
Report fly-tipping to the Foreman/ SHEQ Advisor/ Manager	All staff
Eliminate unnecessary wastage by: • storing materials neatly on flat solid ground to avoid damage and loss; • keeping materials in their packaging for as long as possible to protect them from damage; • protecting materials from the weather to avoid loss from exposure to the elements; • ensuring existing material containers are empty before opening new ones; and • keeping significant off-cuts for use elsewhere.	Foreman/ All staff

Should any contaminated land be encountered it will be stockpiled separately; covered to prevent wind or water spreading contaminants to the wider environment; tested, at a UKAS accredited laboratory and sent for remediation/ disposed of in accordance with 'Duty of Care'.

Other aspects of waste management such as inspections and waste training requirements are addressed in the relevant sections elsewhere in this CEMP.

6.4 FUEL AND OIL STORAGE

Fuel and oils will be stored in a manner to minimise the risk of pollution or ecological damage during fuel handling. The implementation of good fuel management practices and increased environmental awareness can significantly reduce the risk of environmental pollution or impact of ecological damage. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Secondary containment will be provided for all oil and diesel tanks:

- For a single tank, the secondary containment will be at least 110% of the maximum storage capacity
- For two or more tanks in one secondary containment system, the secondary containment will be at least 110% of the biggest tank's maximum storage capacity or 25% of the total maximum storage capacity of all the tanks, whichever is the greatest.

The types of fuel and oil that will be stored on this contract and how and where they will be stored are given in the table below:

Table 6.4 Fuel and Oil Storage

Type of Material	How and Where it will be stored
Diesel	• To be stored in bunded tanks or bowsers. • Fuel tanks and mobile bowsers must be kept locked when not in use and overnight. • Where a bulk tank is used, a 130-litre spill kit will be stored near the bunded area. • Metal jerry cans are to be used for hand carrying of fuel around the site. • Where practicable, only restricted hand carrying of fuel should be allowed on the site. • Metal jerry cans must be stored in a bund or drip tray when not in use. In vans /vehicles: • To be stored secure & upright in jerry cans (25 litres or less)

Type of Material	How and Where it will be stored
Oil	• To be stored in original container or in an appropriate container designed for the storage of oils. • Bowsers should be stored within site security compounds when not in operation. • Any tanks or drums should be stored in a secure container or compound, which should be kept locked when not in use. • Metal jerry cans are to be used for hand carrying of oil around the site. • Where practicable, only restricted hand carrying of fuel should be allowed on the site. • Metal jerry cans must be stored in a bund or drip tray when not in use. • The refuel of mobile plant will be undertaken well away from any drains or water bodies • A suitable spill kit or absorbent materials to be held in the vicinity

All refuelling and lubrication of equipment will take place on sealed and bunded surfaces within this area in order to avoid the potential for accidental spillage of hydrocarbons.

6.5 MATERIALS STORAGE

Materials and waste will be stored in a manner that minimises risk to the environment and reduces the potential for wastage due to exposure to the elements or damage. The types of potentially polluting materials associated with these works and how and where they will be stored is given in the table below:

Table 6.4 Material Storage

Type of Material	How and Where it will be stored
Topsoil	• To be stored beside the works to a height of no more than 3m. • Do not compact. • To be stored separately from subsoil. • Topsoil must be stored at least 3 metres away from any trees and hedgerows.

Type of Material	How and Where it will be stored
Subsoil	• To be stored beside the works to a height of no more than 5m. • Do not over compact. • To be stored separately from topsoil. • Subsoil must be stored at least 3 metres away from any trees and hedgerows.
Sand / Stone	• To be stockpiled in the allocated lay down area in the site compound in a way to minimise dust and wastage.
Cement	• To be stored in the original packaging on pallets inside the COSHH stores. • If cement is to be stored outside temporarily it should be stored off the ground on pallets, away from sensitive or heavily trafficked areas and covered with tarpaulin.
Other bagged materials	• To be stored inside a container where practicable otherwise off the ground on pallets and protected from the weather.
Chemicals, Bitumen, Paints, Solvents, Grease	• To be stored in the original packaging inside a drip tray. All chemicals should be stored appropriately in the COSHH stores. • Consult the SDS or COSHH sheets for details of particular storage requirements.
Batteries / fluorescent light tubes	• In a leak proof container within a designated covered storage area.
Contaminated Material	• To be stockpiled separately in a quarantined area, clearly marked and sealed off. To be covered to prevent wind or
Empty drums / containers	• To be stored in a designated area prior to disposal. • Away from sensitive boundaries and watercourses • Screening from external receptors, if possible
Inert waste	• To be kept separate from non-hazardous and hazardous waste in a clearly designated area, in a labelled skip located on hardstanding where possible.

Type of Material	How and Where it will be stored
Non-Hazardous waste	• To be kept separately from inert and hazardous waste. • To be segregated into its component streams where technically, environmentally and economically practicable. • To be kept in clearly labelled containers/ skips. • Containers/ skips to be in good condition, covered and located on hardstanding • Containers/ skips to be located away from sensitive
Hazardous waste	• To be kept separately from inert and non-hazardous waste. • To be segregated into its component streams and kept in clearly labelled containers/ skips. • Containers/ skip to be in good condition, covered and located on hardstanding • Containers/ skips to be located away from sensitive boundaries and watercourses • Containers/ skips to be screened from external receptors if possible.

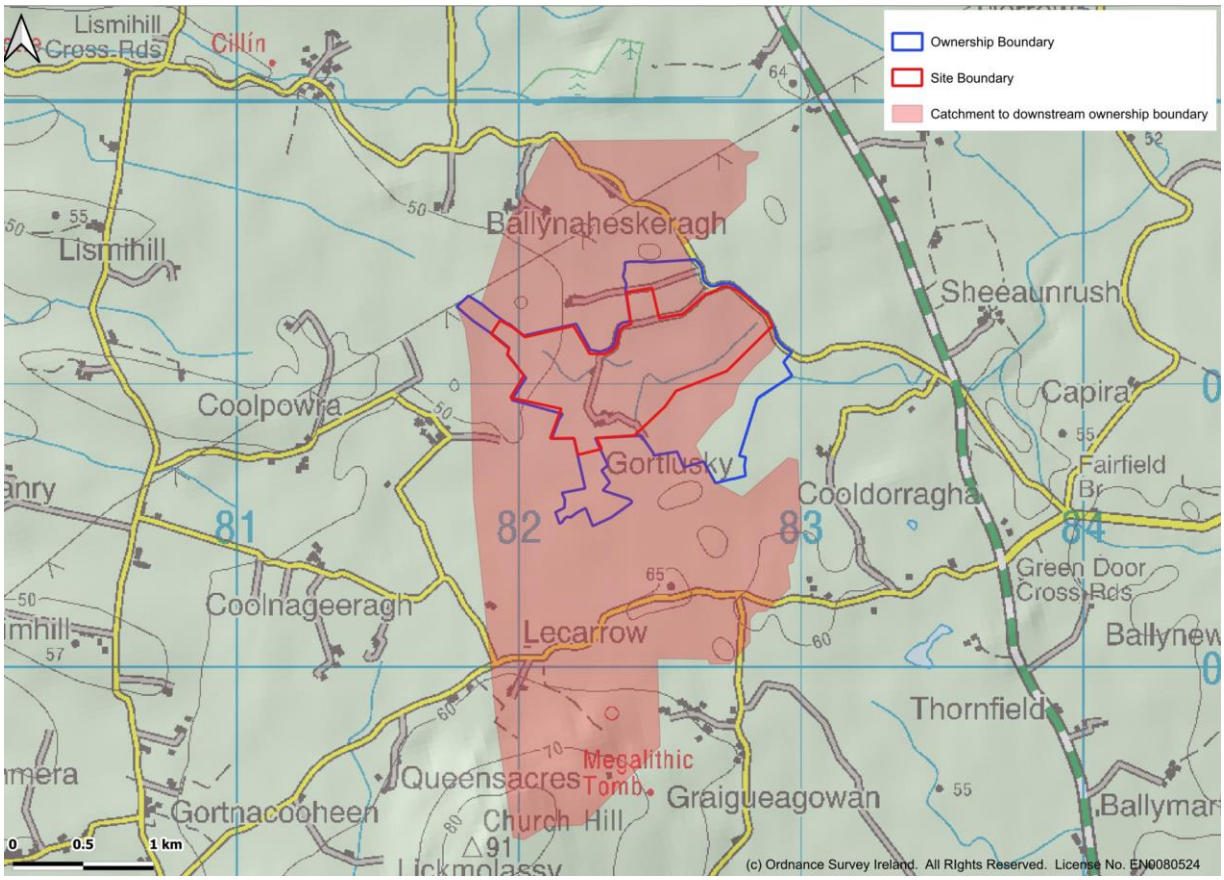
6.6 WATER

The two dominant sub-catchments in the area are the Gortaha (Catchment 025B), which drains to the east, and the Kilcrow (Catchment 025C), which drains to the west. These rivers are both part of the Lower Shannon Hydrometric Area. Following ground truthing it was established that the vast majority (main area of development works) of the proposal are contained in the Kilcrow_070 WFD subbasin (IE_SH_25K010700) of the Lower Shannon surface water catchment (Catchment ID 25C). There are several field boundary drains present within the site that contribute to the runoff at its downstream end. The largest of these drains extends 950m south, outfalling to the central stream just east of the on-site dwelling. This drainage channel has a sub-catchment of 0.675 km^2.

There are two culverts present on this tributary, with pipe diameters of 650 mm and 500 mm. The 500mm culvert lies immediately upstream of the confluence of the tributary and the main channel whilst the 650mm culvert acts as a field crossing further upstream. There is a 1m drop from the invert of the tributary channel to the invert of the main channel, resulting in a high velocity cascading flow regime at the confluence. The combined flows then continue westward. There are no other drainage channels that contribute significant flow to the central channel within the site.

The catchment (see Figure 6.1) falls within the Tynagh groundwater body (European Code IE_SH_G_236).

Figure 6.1 Catchment Map



6.6.1 Control of Construction Site Surface Water Runoff Quality[2]

The early establishment of temporary drainage facilities will manage the risk of impacts on watercourses on and adjacent to the site during construction. In addition, construction operations will adopt best working practices. An NIS has been prepared in support of the proposed development and includes mitigation measures which should be considered in addition to those presented below.

It is proposed to realign a portion of the Treananearla Stream within the site boundary. It is proposed that this is undertaken at the outset of development works in accordance with statutory obligations. It is proposed that the new channel is constructed initially and once complete the watercourse will be diverted.

Ground disturbance is unlikely to have indirect impacts the Lough Derg, North-east Shore SAC or the Lough Derg (Shannon) SPA. However, as a precaution, best practice construction methods are proposed to include standard site management to prevent local

[2] It should be noted that the controls measure are not prescribed to avoid or reduce adverse effects on European sites and are not considered in the determination of conclusions in the Screening Report for Appropriate Assessment.

impacts. The standard best practices also outline methods for the prevention of chemical pollution.

The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles and mitigation presented in the EIAR and with conditions which be attached to planning. The protection of watercourses and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the proposed development.

Prior to any works, all personnel involved will receive an on-site induction relating to operations adjacent to watercourses and the environmentally sensitive nature of the Treananearla Stream and re-emphasise the precautions that are required as well as the construction management measures to be implemented, in particular in relation to the diversion of this stream.

The project proponent will ensure that the engineer setting out the works is fully aware of the ecological constraints and construction management requirements.

Run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Care will be taken to ensure that exposed soil surfaces are stable to minimize erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All runoff will be prevented from directly entering any water courses as no construction will be undertaken directly adjacent to open water.

During the construction phase as part of standard practice, appropriate measures to prevent water pollution to any watercourses near the site will be implemented during all of the construction phases and will include referral to:

- Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532).
- Environmental Good Practice on Site (3rd edition) (C692).
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).

As part of detailed design and in advance of any construction activities, a construction site drainage plan will be developed to assist with micro siting of proposed drainage controls. Artificial drains will be excavated and settlement ponds constructed to eliminate any

suspended solids within surface water running off the site. Drainage infrastructure will include:

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained.
- Swales/road side drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment and channel it to settlement ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,

  Settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thus reducing the hydraulic loading to watercourses. The settlement ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period. Best practice and practical experience on other similar projects suggest that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager and Environmental Advisors. In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures of the EIAR and to ensure protection of all watercourses.
- Site boundary markings to safeguard features of interest/value, including drains and streams.
- Silt fencing will be installed strategically around and through the site. The location of the silt fencing will be determined in the construction stage CEMP and will be subject to a detailed assessment of the planned works methodology and works area. The purpose of the silt fencing is to prevent silt laden water leaving the site and entering adjoining lands and the existing watercourse with the potential to impact watercourses. A typical silt fence detail is shown below in the Figure below. It will consist of a double layer of geotextile membrane fixed to wooden stakes approximately 600mm high. The membrane will be anchored into the ground to form a continuous barrier to silt laden water from the works site. Silt fences will be monitored via a silt inspection log (to be maintained by the Environmental Manager/ ECoW) and periodically maintained during the construction period.

Typical maintenance will consist of repairs to damaged sections of membrane and removal of a build-up of silt on the upslope side of the fence. Daily silt fence inspections are recommended as part of their operation ensuring that any necessary repairs can be expedited.

Figure 6.2 Typical Silt Fence to be Employed

- Drainage ditches will be installed to intercept surface water where there is a risk of significant water flow into excavations, adjoining lands or the existing watercourse. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated.
- Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.
- Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same.
- The Environmental Manager or ECoW will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of the works, and a record of these inspections will be maintained.
- Any temporary storage of soil, hardcore, crushed concrete or similar material will be stored 50m from any surface water drains. All temporary storage areas should also have surface run- off controls in place to prevent migration of possible materials. There can be no direct pumping of silty water from the works directly to any watercourse. All water from excavations must be treated by infiltration over lands or via settlement areas, silt busters etc.

MANAGEMENT OF GROUNDWATER CONTAMINATION

The following measures will be required to avoid easy and rapid pathways to the ground water via high level bedrock:

- Stockpiles of soil shall be kept at areas of the site with low bedrock levels where there is at least 1m of soil above the bedrock.
- Silt fencing and settlement ponds shall be placed in areas with low bedrock levels where there is at least 1m of soil above the bedrock. Silt fences shall be inspected as part of the daily inspection regime. Trapped silt shall be removed from silt fencing at regular intervals and especially prior to any predicated flood event.
- Earthworks shall be left exposed for the minimum time possible. Earthworks formations shall be protected by a layer of imported granular fill.
- Landscaping and seeding of the site shall be carried out as early as possible.
- Site compounds, fuel storage areas, generators and the like shall be sited away from areas of high level bedrock.

Good housekeeping and facility management during the construction period will ensure that there will be no negative environmental impacts from the construction of the proposed facility. Sedimentation presentation controls include the following:

- Minimisation of exposed ground and soil stockpiles, through careful earthworks design.
- Minimising the time that ground is exposed and excavations are open through careful construction programming.
- Temporary stockpiles will be located away from drainage ditches, limited in height to 3m (topsoil) and the surface smoothed.
- Silt fences will be placed around the stockpiles where required to limit the potential for rainfall to wash fines into the drainage system. These comprise a technical filter fabric positioned as a fence around the exposed soil and sediment to catch fines within the runoff and reduce the input of fine sediment to the drainage system. Stockpiles which may be present for some time will be covered or seeded.
- Areas around infrastructure will be landscaped, and restored with topsoil and revegetated as soon as possible.
- Track drainage, designed to prevent the interception of large volumes of water, will be porous and act as soakaways thereby minimising any direct discharge to watercourses.
- Wheel washing activities will be conducted in designated areas, with runoff waters being conducted to soakaways constructed according to best practice.

- Use of buffer zones, silt traps and settlement ponds to avoid sediment reaching drains and watercourses

6.6.1.1 Fuel Oil, other Petroleum based substances and chemicals

- Construction compounds will be located at least 30m from local on site drains.
- Dedicated areas of hard standing for material deliveries separated a minimum of 10m drainage ditches
- Specific areas for oil storage and refuelling, separated a minimum of 10m from adjacent watercourses and comply with legislation, including providing bunds which contain 110% of on-site fuel storage capacity;
- Use spill kits, fill point drip trays, bunded pallets and secondary containment units;
- Enclosed and secured site and fuel storage areas will be secondarily secured;
- Develop a Construction Waste Management Plan;
- Develop a site-specific Incident Response Plan;
- Works involving the use of chemicals which are potentially harmful to the aquatic environment will be undertaken in a contained or lined area;
- Excavation and disposal off-site of contaminated soils (where required).
- Good housekeeping (daily site clean-ups, use of disposal bins, etc.) on the project site, and the proper use, storage and disposal of many substances used on construction sites, such as lubricants, fuels and oils and their containers can prevent soil contamination.

CONCRETE AND CEMENTOUS PRODUCTS

Wet concrete and cement are very alkaline and corrosive and can cause serious pollution to watercourses. Disposal of raw or uncured waste concrete will be controlled to ensure that watercourses will not be impacted.

- Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times will be implemented.
- Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline, therefore, washing will not be permitted on site.
- A suitable casing will be used where wet concrete is proposed to ensure protection of watercourses until concrete has set.
- No batching of wet-cement products will occur on site;
- Supply of ready-mixed wet concrete products where possible or emplacement of pre-cast elements,

- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;

ACCIDENTAL SPILLS AND LEAKS

- Bulk fuel storage areas should be adequately protected with the provision of appropriate bunding to provide a minimum storage volume of 110% of total fuel storage capacity with the provision of a spill kit and the use of drip trays. Fuel storage must be sited away from any watercourse or on-site services as far as possible and have a designated area.
- Where sub-contractors are required to refuel vehicles on-site, this will be carried out at a central refuelling location only. The sub-contractor will be required to make the necessary arrangements with the Main Contractor to access and purchase fuel oil from a central supply. All refuelling areas will be on areas of hard standing only at designated agreed locations. Open valves will not be left unattended.
- All fuel, oil and chemical deliveries will be supervised by a responsible person who will be trained to deal with any spillage to prevent a pollution problem occurring.
- Storage tank levels will be checked before delivery to prevent overfilling and to ensure that the product is delivered to the correct tank.
- The storage of materials in the main compound and work sites will be controlled in such a manner to ensure that materials are not damaged prior to use either through vehicle or people movements or through exposure to the elements.
- All fuel, oil and chemicals will be stored on an impervious base within a bunded area and secured. The bund shall have a capacity of 110% of the volume of the products stored within it. All tanks and containers will be kept in a secure compound and be protected from vandalism and will be clearly marked with their contents. Stores shall be located at least 10 metres from any watercourse.
- All mobile plant will be refuelled in a designated area on an impermeable surface and away from drains. In case of any spillages, there will be a spill response kit available at each refuelling point and within each machines working area. Where it is impractical to refuel within a bunded area, a drip tray will be available to catch any spills caused by over fuelling.

Every effort will be made to prevent pollution incidents associated with spills during the construction of the proposed development. The risk of oil/ fuel spillages will exist on the site and any such incidents will require an emergency response procedure. Given the scale and extent of the proposed development all contractors will carry spill kit materials in their site cabins.

The following steps provide the procedure to be followed in the event of an oil/ fuel spill occurring on site:

- Identify and stop the source of the spill and alert people working in the vicinity.
- Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses and/ or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- The Environmental Manager will notify the appropriate stakeholders, such as Galway County Council, National Parks and Wildlife Service, Department of Communications, Climate Action and Environment and Department of Housing, Planning and Local Government and/or the EPA.
- Environmental incidents are not limited to just fuel spillages, therefore, any environmental incident must be reported, recorded and investigated in accordance with the procedures described.

6.6.2 Water Monitoring

Proposed water quality monitoring is limited to the fact that there are no significant water features within the development lands. The water monitoring that will be undertaken on is outlined blow

- Check downstream watercourse to the south daily for:
    - Change in water colour.
    - Change in water transparency.

- Oily sheen on water surface.
- Scums & foams.
- Dead / decaying plants, animals & fish.

- Turbidity, pH, Temperature, DO and Conductivity will be monitored at a chosen location along the downstream water course using a portable meter to ensure that the levels/concentrations are within expected and typical ranges.
- Keep a record of these checks in the Sampling Register.
- Ensure gullies/ drains are kept free from ingress of stone, spoil, tarmac and other material by checking daily

6.7 NOISE

6.7.1 Noise Controls

Noise will be minimised and managed in accordance with the controls specified in the EIAR (Chapter 11). Proposed contract working hours are Monday to Friday 07.00 to 19.00 and 07:00 to 13:00 on Saturdays. The site will be closed on Sundays and Bank Holidays. Controls that will be in place on this project are given in the table below.

- A Site Representative will be appointed for matters related to noise and vibration.
- Any complaints received will be thoroughly investigated.
- A written complaints log will be maintained by the Site Representative. This will, at a minimum, record complainant's details (where agreed) the date and time of the complaint, details of the complaint including where the effect was observed, corrective and preventative actions taken and any close-out communications. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site.
- Specifically with regard to the access route construction potentially affecting NSRs to the southeast at the junction of the N65/L8763 the following measures apply:
  - Noise monitoring with capability for real-time review both on-site and remotely will be conducted at the boundary points when works are planned in close proximity.
  - In the event of meeting or exceedance of the threshold values at NSRs, works will be ceased and measures implemented immediately to ensure that the limits are complied with.
  - Temporary acoustic screening or hoarding will be placed along the boundaries where possible with the proposed access route and the nearest NSR; - NSR36. As a general rule of thumb, it is recommended that temporary screening break the "line of sight" from the sources to the lower windows of the nearest NSRs where possible.

  - The operation of certain pieces of equipment, where substitution, enclosure etc. cannot be carried out will be managed through monitoring and timing of use to ensure that noise levels remain below the threshold values/criteria specified.
  - As a precautionary measure and as part of good practice, vibration monitoring will be carried out where works such as the use of rollers are in close proximity to NSR36 and other NSRs in the cluster located at the N65/L8763 junction.
- Measures such as the use of low noise plant and/or the use of enclosures will be chosen to minimise construction noise impact.
- During the construction phase all equipment will be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks.

6.7.2 Noise Monitoring

Noise monitoring will be undertaken to ensure compliance with required limits. Noise monitoring with capability for real-time review both on-site and remotely shall be conducted at nearby NSRs throughout site development and construction. Monitoring shall be conducted in accordance with any planning conditions which may be attached to a grant of permission. Additionally, a Type 1 portable noise meter will be available for use on site.

6.8 AIR

As part of the air quality control measure a Dust Management Plan (DMP) will be developed and implemented. The appointed contractor will carry out dust monitoring along the site perimeter to confirm that the dust levels do not exceed 350mg/m^2/day average over 30 days in accordance with TA LUFT VDI Method (Bergerhoff Gauge). Dust gauges will be put in place at a number of locations (6No.) and the samples analysed at an accredited laboratory.

Controls that will be in place on this contract are given in the table below.

Table 6.5 Air Quality Controls

Dust	A designated Site Agent will be assigned overall responsibility for Dust Management;
Dust	Implementation of the Construction and Environmental Management Plan.

Dust	The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions;
Dust and general air quality	An effective training programme for site personnel will be implemented for the duration of the Construction Programme;
Dust and general air quality	A strategy for ensuring effective communication with the local community will be developed and implemented;
Dust	A programme of dust minimisation and control measures will be implemented and regularly reviewed;
Dust	A monitoring programme will be implemented.
Dust	Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors;
Dust	The areas on site which vehicles will be travelling on will generally be hard-surfaced or compressed ground thus significantly reducing the potential for dust emissions from the vehicles;
Dust	The construction compound area will have hard standing areas to minimize dust generation from windblow.
Dust	In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate.
Dust	Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.
Dust	A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management.
Dust	A dust deposition monitoring programme will be implemented at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits.
Aspergillus Risks	The National Guidelines will be followed with regard to the effective management of Aspergillus risks.

In addition to the above, the Construction Site Manager shall enforce the following:

- Enforce appropriate an on-site speed limit on surfaced roads. Have sign posts indicating these speed limits.
- Turn off engines when not in use. If any plant or equipment is emitting black / heavy smoke, cease use and send for servicing
- No burning on site.
- Ensure vehicles do not queue at the site entrance.
- Provide wheel washing facilities at the entrance to the extension construction site lands to remove mud from haulage vehicles and to ensure mud is not transferred onto the surrounding road network (detergents will not be used and washes will incorporate appropriate containment systems).

6.9 WILDLIFE & ECOLOGY

There are no designated conservation areas within or close to the proposed development site. Control measures associated with the potential impact on water quality are dealt with under the Water Quality Section of the CEMP and are informed by the EIAR and NIS which were prepared in support of the planning applications for the proposed development.

6.9.1 Consents

No specific consents are required for the project works, but shall be reviewed as part of Contract CEMP preparation works.

6.9.2 Biodiversity Protection Measures

It is proposed to realign a portion of the Treananearla Stream within the site boundary. It is proposed that this is undertaken at the outset of development works in accordance with statutory obligations. It is proposed that the new channel is constructed initially and once complete the watercourse will be diverted.

Wildlife will be protected in accordance with the controls specified in the Environmental Handbook. Mitigation measures that will be in place on this contract are given in the table below.

Some tree felling and hedgerow removal is planned, as well as removal of species poor agricultural grassland and arable land. The realignment of the Treananearla Stream with a new enhanced watercourse, together with the large area of new native woodland to be planted, as well as the new ponds and retained hedgerows will provide significant net gain of high quality habitat with improved connectivity for species in the wider landscape.

MITIGATION MEASURES FOR BATS

The current bat usage within the site is low as much of the site is open pasture and. The landscape plan will see a large quantity of woodland and tree planting providing more landscape features usable by bats. Treelines and woodlands to the north where an existing bat roost is located (outside the site) will be protected and enhanced, linking up other areas of the site. The addition of two ponds will allow for higher amounts of invertebrate prey for bats.

Tree felling

Trees will be felled in October to November or January to February. Any tree ranked category 1 or 2 will be examined 'at height' in order to ensure no bats are present.

Category 3 trees are defined as 'trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features which may have limited potential to support bats'. Also included within this category are trees with thick ivy however the ivy root is not thick enough to form mats, thus it is possible but unlikely a single bat may be roosting here. Following the precautionary approach all category 3 trees to be felled within the site the following procedure will be undertaken:

Tree-felling to be undertaken using heavy plant and chainsaw equipment. Normally trees are pushed over, with a need to excavate and sever roots in some cases. In order to ensure the optimum warning for any roosting bats that may still be present, the tree should be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. The tree should then be pushed to the ground slowly. A period of at least 24 hours, and preferably 48 hours, should elapse prior to such operations to allow bats to escape. Felling works should be overseen by an ecological clerk of works.

All trees ranked category 4 can be felled and removed immediately.

Demolition of structures

A dwelling house and sheds located within the site were examined for bat roosts. None were found. As bats are a mobile species and can avail of roosting structure a pre-demolition survey will be conducted on these structures. Should bats or their roosts be found a derogation license will be required before construction works begin.

Construction of new roost tower

A barn owl roosting tower is proposed within the site. This structure can also serve as a bat roost with a lower floor dedicated to roosting bats. Bat boxes will be installed within this lower section with a slot opening providing access into this room (15mm high by 40mm wide) positioned at a height of 2m.

MITIGATION MEASURES FOR BIRDS

Potential impacts on birds will be avoided by cutting of vegetation outside the bird nesting season March to August

In order to minimise the extent of light spill onto perimeter habitats, all lights that are pole mounted will be directional and/or cowled to ensure that light is directed downward and inwards. Lights will be programmed or otherwise to be off unless required.

An Ecological Clerk of Works will be involved in the construction and limit construction in areas based on when they are of value to birds, to avoid disturbance at vulnerable periods.

Planting of native tree species in linear features as well as woodland patches will provide ecological corridors, nest sites and will compensate for the loss of hedgerows as part of the development.

Sustainable Drainage Systems (SUDS) can also provide new still water habitats. As part of the design plan two attenuation pond on site will be designed to enhance biodiversity value with the provision of new wetland habitats. These new habitats will provide a breeding site for waterbirds such as Mallard, as well as a roost site for wintering waterbirds such as Teal, Widgeon or Lapwing.

The attenuation ponds will be created with gentle sloping side slopes that cover a large area, planted with a variety of suitable native wetland species.

A new roost tower for Barn owl and bats is to be constructed. This will provide enhanced roosting environment for species, including Barn swallow, House martin and Starling, which were observed to be using sheds on site, which are to be demolished as part of the development. Although no Barn Owls were seen on site, they are breeding within 1km of the site, and this purpose-built building will provide a suitable nest site for this species, as well as Kestrel and other roosting birds.

Table 6.6 Biodiversity

TASK	RESPONSIBILITY
General:	

TASK	RESPONSIBILITY
Ensure all staff are aware of any conditions/ requirements attached to consents/ licences and of the controls detailed below.	Project Manager/ SHEQ Advisor
If any wildlife is found unexpectedly (e.g. reptiles, badgers or bats), contact your SHESQ Advisor.	All Staff
Implement controls as instructed by the SHEQ Advisor.	Project Manager/ Foreman
Nesting Birds:	
Check the site for nesting birds (including ground nesting birds). Make a record of this survey.	Project Manager/ Foreman
If any nesting birds are found, fence off the area and inform all staff of their location. Do NOT conduct works in this area.	Project Manager/ Foreman
Check trees for nesting birds before removing them or trimming any branches	All Staff
Do not disturb any nesting birds.	All Staff
When working near trees:	
Inform the SHEQ Advisor so that the council may be contacted to ensure there are no Tree Preservation Orders in the area.	Project Manager/ Foreman
Do not damage or interfere with any tree or hedge unless permission has been obtained from the Local Authority.	All Staff
Ensure where practicable young trees are relocated rather than removed	Project Manager/ Foreman
If trees that are suitable as bat roosts are to be removed arrange for inspection by a bat license holder.	Project Manager/ SHEQ Advisor/ Manager/
If bats are present obtain a derogation licence prior to felling and supervise the work.	Specialist/ SHEQ Advisor
Undertake any pruning, crown lifting or removal of trees at an appropriate time of year (i.e. outside the bird-breeding season, which is March to August). Employ specialist contractors to carry out all tree cutting/surgery.	Project Manager/ SHEQ Advisor/ All Staff
Only remove the minimum of branches to allow access.	All Staff
Where branches must be lopped, make a clean cut above a joint.	All Staff
Ensure all site staff are briefed regarding the NJUG Guidelines on working in close proximity to trees and that the guidelines are implemented on site.	Project Manager/ SHEQ Advisor/ Manager/

TASK	RESPONSIBILITY
Work as far away from the trees as possible. Where trees are in close proximity to the works set up protection zones around the trees to prevent damage to their branch and root system.	Project Manager/ Foreman
Ensure the tree protection zone is cordoned off and if possible is large enough to prevent access under the canopy of the tree.	Project Manager/ Foreman
Do not lean any materials up against tree trunks.	All Staff
If excavation under the canopy is required: • Hand-dig around tree roots • Retain as many roots as possible • If a root must be severed, make sure it is a clean cut • If roots are to be left exposed overnight cover with damp sacking	All Staff
Invasive Plants:	
No invasive species were identified as part of EIA survey works undertaken in support of the planning application. However, in accordance with best practice, invasive plant species is included as a task. *Invasive and Non-native Flora.* Japanese knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*) have been recorded from within a 2km radius of the proposed development site, according to the NBDC data online. Should any of these plants be found in the general vicinity of the development site, please contact your SHEQ Advisor/ Manager for instructions on how to proceed.	Project Manager
If invasive plants are identified, contact specialist contractor to remove the plant off site in a safe manner in accordance with the relevant legal and other requirements.	SHEQ Advisor
Implement controls as instructed by the SHESQ Advisor/ Manager.	Project Manager/ Foreman

6.10 ARCHAEOLOGY AND HERITAGE

There are no previously recorded archaeological sites located within the proposed development lands and no adverse impacts are predicted upon the archaeological resource as a result of the proposed development. No materials assets including features of architectural, archaeological or cultural heritage were identified in the planning

applications (Refer to EIAR). There is no evidence that there are any material assets within the site. Archaeology and Heritage Protection Measures

6.10.1 Record of Protected Structures

Not Applicable

6.11 CONSTRUCTION SITE COMPOUND

The location of the Site Compound will be in the southern area of the site as shown in Figure 3.4.

Table 6.7 Construction Site Compound Set Up

TASK	RESPONSIBILITY
Before site set up works begin photograph the condition of the site compound area (to help avoid erroneous claims after the works have been completed).	Project Manager/ Foreman
Provide perimeter fencing /hoarding at any location such that the environment in the area is not blighted by the construction site.	Project Manager
Provide signage with out of hours contact details.	Project Manager
Ensure that perimeter fencing /hoarding are regularly checked and kept free damage.	Foreman
Position site lighting to prevent intrusion /nuisance to neighbouring properties	Project Manager
Locate temporary site toilets/ waste skips away from site neighbours.	Project Manager
Ensure that the sites are kept clean, tidy and safe.	Project Manager
Store plant, equipment & materials at least 10m away from drains.	Project Manager/ Foreman
Keep cabins/containers locked outside working hours	Foreman
Provide site drainage arrangements that comply with the requirements of any discharge consents	Project Manager/ Foreman
Prevent materials, waste, and dust from blowing around.	Foreman
Allocate a person to supervise all fuel deliveries.	Project Manager/ Foreman
Display a notice giving details of safe delivery and storage procedures.	SHEQ Advisor/ Manager
Supervise all deliveries at all times.	Nominated person

TASK	RESPONSIBILITY
Check level in tank prior to delivery to prevent overfilling.	Nominated person
Check delivery before discharge to ensure the correct fuel is being delivered.	Nominated person
Ensure that valve on bunded tank is closed and kept locked when not in use	All staff
Only re-fuel in designated areas within the site compound, using drip trays.	All staff
Ensure that hose is kept within bund at all times	All staff
Never leave a vehicle/ plant unattended during re-fuelling.	All staff
Ensure any emergency vehicle maintenance is carried out using drip trays.	Fitters/ Foreman
Appoint a member of staff to be responsible for liaising with local groups	Project Manager
Consult with local resident groups about planned activities that may cause a nuisance, e.g. rock breaking, major deliveries etc.	Appointed person/Liaison Officer

6.12 EMERGENCY PREPAREDNESS/ENVIRONMENTAL INCIDENTS

An Emergency Response Plan (ERP) is presented in this section of the Preliminary CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

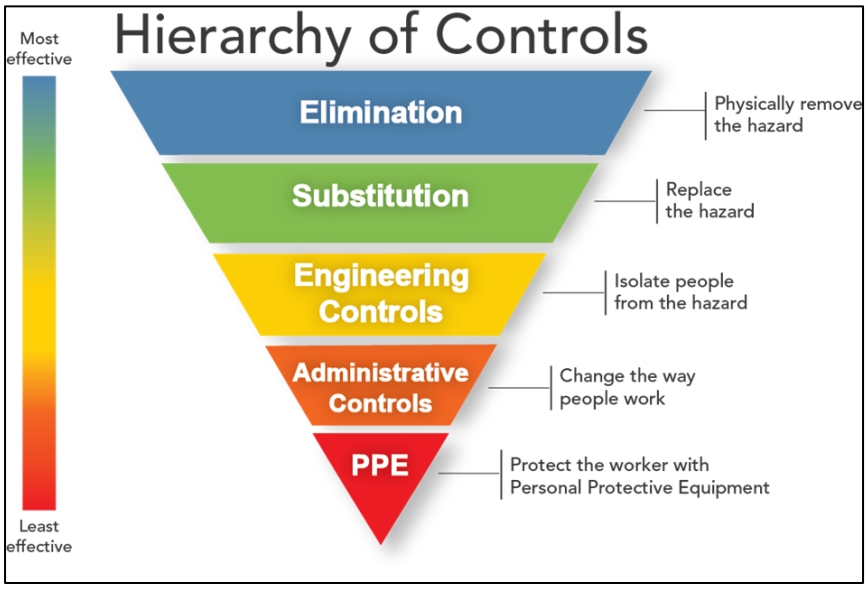
Environmental incidents have the potential to adversely affect the appointed contractor through potential prosecution, blight to a site, contractual issues, public relations issues, through to increased costs for clean-up / management fees and delays to the build programme. The reporting of environmental incidents is vital in order to ensure they are dealt with correctly, adverse effects negated or minimised and that valuable lessons are learnt. Where environmental incidents are reported, actions can be formally completed that ensure control measures are put in place to avoid any future recurrence on site and, where relevant, across the company as a whole.

Emergency response scenarios have been identified as part of the implementation of the IMS and the controls for prevention and management of these scenarios are documented in the "*Emergency Preparedness and Response Plan"*. The purpose of this plan is to identify the potential emergencies and the measures that are in place to prevent the emergency or procedure to follow should the emergency occur. Emergency scenarios include:

- Fire
- Gas Release
- Gas Explosion
- Major Spillage
- Minor Spillage
- Personnel Injury
- Adverse, Severe Weather Conditions
- Road Traffic Collision
- Mechanical Entrapment

For each scenario, actions and environmental controls are prescribed in accordance with the hierarchy of controls. The effectiveness of actions and controls are considered during internal audits, at monthly operations meetings, quarterly management meetings and at the Management Review.

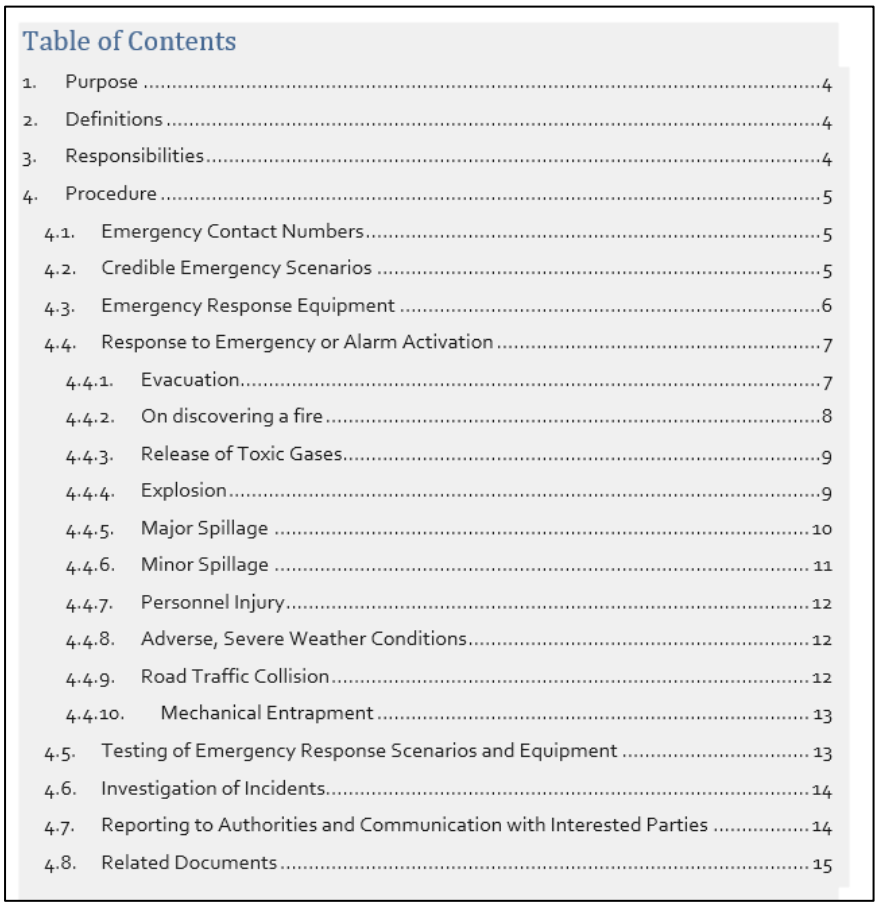
Figure 6.3 Hierarchy of Controls



It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where approved subcontractors on site are governed by their own emergency response procedure, a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document. This is a working document that will requires updating and review throughout the various stages of the project.

The *Emergency Preparedness and Response Plan* contains the following detail which should be considered as part of finalisation of the development of the Outline CEMP to Contract CEMP:

Figure 6.4 Emergency Preparedness and Response Plan Contents



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In relation to the proposed construction project, the Emergency and Preparedness Response Plan will include the following:

- Roles Responsibilities;
- Definitions;
- Pollution Prevention;
- Environmental Incident Action;
- Notification;
- Review and Reporting;
- Fire;
- Evacuation;
- Periodic Testing;
- Spill Kits.

6.12.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Construction Site Manager, will lead the emergency response which makes him/her responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response is the SHEQ manager. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the SHEQ manager.

6.12.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 6.8 Hazards associated with emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, scissor lifts and ladders	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in the above table, the Site Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog horn that activates an emergency evacuation on the site.

- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks, Galway County Council, Fire Brigade,
- Contact the next of kin of any injured personnel where appropriate.

6.12.3 Pollution Prevention;

The first priority is to prevent pollution occurring, in this regard, similar steps should be taken to managing the environment on site. In particular:

- Preplanning (e.g. Storage Bunding, Consent Licenses, Drainage Plan)
- Hazard identification and risk assessment
- Protective and preventative pollution measures incorporated in to the Environmental Management Plan (EMP), Method Statements and systems of work.
- Emergency planning e.g. procedures, spill kits etc.
- Information, instruction and training
- Inspection, supervision
- Performance auditing
- Review

6.12.4 Environmental Incidents /Non-Conformances

For the purposes of the CEMP, environmental incidents/ non-conformances are defined as follows:

- **Environmental Incident:** a failure to implement adequate environmental controls that has resulted in pollution of water, air or land, damage to wildlife and ecosystems (habitats) or nuisance to a local community.
- **Environmental Near Miss:** something that occurs that has the potential to cause an environmental incident but didn't.
- **Environmental Non-conformance:** a failure to implement environmental controls associated with planning conditions.

- **Complaint:** A significant grievance, dissatisfaction or accusation made by a client, member of the public or other third party relating to activities being completed by the appointed contractor

6.12.4.1 Types of Environmental Incident

To help with trend analysis incidents should be classified according to the type of incident. Incidents can usually be classified under one of the ten types listed below. However, this is not a definitive list and a different classification can be used if the incident does not fit within one of these.

- Air
- Archaeology & Heritage
- Contaminated Land
- Ecology
- Groundwater
- Noise & Vibration
- Oils & Chemicals
- Surface Water
- Traffic
- Waste

6.12.5 Notification

6.12.5.1 Response to an incident or imminent threat of an incident

All employees will be instructed to bring any environmental incidents they identify to the immediate attention of the Project /Site Manager, after first taking what steps they can to contain/ remediate the incident (without putting the health and safety of themselves or others at risk). If appropriate/ necessary the Project Manager/ SHEQ Manager will also inform the Client/ Statutory Authorities and liaise with their personnel in investigations, assessments and the implementation of appropriate corrective and preventive actions. Incident reports shall be completed within 1 day of occurrence. investigations shall be closed out within two weeks of occurrence. For more severe incidents, a full investigation report shall be carried out.

6.12.5.2 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

- Stay calm. It's important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, is an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

- Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but don't get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for any reason you are disconnected, at least emergency crews will know where to go and how to call you back.
- Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.
- If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.
- Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There's a good chance, however, that emergency services are already being sent while you are still on the line.
- Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly and ask for clarification if you don't understand.
- Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.
- Do not hang up the call until directed to do so by the call taker.

Table 6.9 Emergency Contacts List

Contact	Telephone No.
Emergency Services – Ambulance, Fire, Gardaí	To be completed
EPA Regional Inspectorate Castlebar	To be completed
Gardaí (Local)	To be completed
Gardai (Galway)	To be completed
Galway Fire Brigade	To be completed
Galway University Hospital	To be completed
Environmental Protection Agency	To be completed
Health & Safety Authority	To be completed
Eirgrid	To be completed
ESB Networks	To be completed
Galway County Council	To be completed
Inland Fisheries	To be completed

Other	

6.12.5.3 Reporting of Accidents and Dangerous Occurrences

Health and Safety Authority

Accidents and dangerous occurrences must be reported to the HSA in accordance with the Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016).

The key points in relation to reporting of accidents and dangerous occurrences are:

- Only fatal and non-fatal injuries are reportable. Diseases, occupational illnesses or any impairments of mental condition are not reportable.
- Fatal accidents must be reported immediately to the Authority or Gardaí. Subsequently, the formal report should be submitted to the Authority within five working days of the death.
- Injuries to any employee as a result of an accident while at work where the injury results in the employee being unable to carry out their normal work duties for more than three consecutive days, excluding the day of the accident, must be reported to the Authority.
- Non-fatal accidents or dangerous occurrences should be reported to the Authority within ten working days of the event.
- Accidents to a person who is not your employee and is not at work but is injured by a work activity resulting in the person being taken to a hospital or medical facility must be reported.

A 'dangerous occurrence' means an occurrence arising from work activities in a place of work that causes or results in –

- The collapse, overturning, failure, explosion, bursting, electrical short circuit discharge or overload, or malfunction of any work equipment,
- The collapse or partial collapse of any building or structure under construction or in use as a place of work,
- The uncontrolled or accidental release, the escape or the ignition of any substance,
- A fire involving any substance, or
- Any unintentional ignition or explosion of explosives, as may be prescribed.

The prescribed dangerous occurrences which must be reported to the Authority are listed in Schedule 15 of Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016)

6.12.6 Review and Reporting

The cause of any incident shall be determined by those involved when the incident or emergency occurred and those involved in the clean-up procedure. The appropriate corrective actions shall be implemented as soon as possible on detection of the incident. All incidents must be reported and documented on a site register. Where there has been direct damage to the environment it may be necessary to report this to the Regulator (e.g. Environmental Protection Agency /Local Authority). If direct damage has occurred the Construction Site Manager shall also be informed as soon as an incident has occurred.

6.12.7 Site Evacuation /Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Manager to account for all personnel on site.
- Once all personnel have been accounted for the Site Manager will decide the next course of action which be determined by the situation that exists at that time. The Site Manager will advise all personnel accordingly. All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills. Cognisance, integration and knowledge of emergency procedures associated with the existing biogas plant will be undertaken as part of Contract CEMP development works.

6.12.8 Periodic Testing

It is the responsibility of the Construction Site Manager or nominated SHEQ advisor to ensure that the emergency procedure is periodically tested to ensure it is effective. Frequency for testing should be determined by the level of risk for a particular project,

however, it is recommended that this be carried out at least once every six months or once during the project lifetime where project duration is less than one year.

The test should be logged as good practice. The test should be reviewed to determine the effectiveness of the procedure and the need to amend the requirements if necessary.

6.12.9 Spill Kits

Sufficient types and quantities of spill response equipment should be available on site and should be kept where spills may occur. The quantity of spill response equipment should be sufficient to contain any likely spill that may occur on site. Types of spill equipment suitable for containing spills arising from different types of pollutants are provided below:

Table 6.10 Spill Kit Types

	Pollutants				
Spill on Ground	**Concrete Cement**	**Paints**	**Oils**	**Silt**	**Detergents**
Sand	✓	✓	✓	✗	✓
Straw Bales	✗	✗	✓	✓	✗

APPENDICES

APPENDIX A

Construction and Demolition Resource Waste Management Plan

Construction and Demolition Resource Waste Management Plan

Introduction

The purpose of this C&D RWMP is to ensure that waste arisings during the construction and demolition phase will be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996 as amended, and associated regulations, and the Connacht and Ulster Waste Management Plan 2015-2021 2021 are complied with. It will also ensure that optimum levels of waste reduction, re-use and recycling are achieved.

The following matrix[3] (Table 1) was developed by Halston and is used to provide indicative construction and demolition (C&D) waste management complexity scoring. The matrix uses six key metrics to assess how likely the project is to require a high level of regulatory attention and the level of detail which should be contained in the C&D WMP. The overall score for the project is calculated by adding the individual score for each of the metrics. The level of detail which should be contained in the C&D WMP is appropriate to the rating of the site:

- No requirement for C&D WMP's are those with score of up to 6
- Standard C&D WMP's are those with score of 7 -15
- Detailed C&D WMP's are those with a score of >15

Table 1 Matrix to Estimate Site C&D WMP Complexity

Metric		Score 1	Score 2	Score 3	Score 4
1	Do works involve infrastructural demolition works and /or is there potential ground contamination	Greenfield – undeveloped site	Existing buildings on site –non-industrial /commercial use or agricultural	Former light Industrial brownfield Use – potential for ground contamination	Former heavy industrial brownfield site with known ground contamination
2	Site Setting and Environmental Sensitivity including invasive species	Low	Medium	High	Very High

[3] Matrix adapted from WG (Welsh Government), 2013. Waste (Wales) Measure 2010: Site Waste Management Plans Consultation Document and consideration of Irish Waste Regulations and Best Practice Guidance

Metric		Score 1	Score 2	Score 3	Score 4
3	Duration of Construction Phase	<3 months	3-12 months	12 months – 2 years	>2 years
4	Expected Volume of Waste (export)	<100m^3	100-500m^3	500 – 1,000m^3	>1,000m^3
5	Floor Area	<125m^2	125-1,250m^2	>1,250m^2	
6	Estimated Cost of Project	<€300,000	€300,000 – €1,000,000	€1,000,000 – €10,000,000	>€10,000,000

Table 2 Matrix Score Assigned to Project

Metric	Answer	Score	Overall Score
Do works involve infrastructural demolition works and /or is there potential ground contamination	Yes, ground contamination unlikely.	2	16 (Detailed C&D WMP)
Site Setting and Environmental Sensitivity	Low	1	
Duration of Construction Phase	28 months	4	
Expected Volume of Waste (export off-site)	<100m^3	1	
Floor Area	>1,250m^2	4	
Estimated Cost of Project	>10M -	4	

As can be seen in Table 2, the proposed development characteristics resulted in a score of 16; a detailed C&D WMP requirement. Outline details in respect of this is provided below.

Waste Classification

The EPA and the Connacht and Ulster Waste Management Plan 2015-2021 2021 defines Construction and Demolition (C&D) waste as *"...all waste that arises from construction and demolition activities including excavated soil from contaminated sites....listed in Chapter 17 of the European Waste Catalogue (EWC)*[4][5]*.*

If demolition waste is generated as part of the proposed development works it will involve careful decommission and removal of all plant and structures at the site (to provide for extension to the feedstock reception building and office building).

[4] Ref EPA Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. EWC codes referred to as LoW codes
[5] It is worth noting, however, that the C&D W stream can overlap into other EWC chapters (Chapters 8, 15 and 20)

Other anticipated wastes which will be generated on site include soils, blocks; concrete and reinforced concrete; timber; metal sheeting, steel, bituminous materials such as bitumen macadam and asphalt; paving slabs; kerbs; used shuttering; scrap metal, scrap pipes and other plastics; canteen and office waste; lubricating oil, hydraulic oil, scrap parts and other fluids generated from equipment maintenance; sewage from construction phase site toilets. The expected primary non-hazardous and hazardous waste streams that will be generated during construction activities are classified in accordance with the European Waste Catalogue in Table 3 below.

Table 3 EWC Classification of Wastes

Waste Description	EWC Code
Waste plastics	02 01 04
Soil and Stone	17 05 04
Concrete	17 05 07
Wood	17 02 01
Bituminous mixtures	17 03 02
Gypsum	17 08 02
Iron and steel	17 04 05
Insulation materials	17 06 04
Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04
Canteen waste	20 03 01

Construction Site Waste Management

Roles and Responsibilities

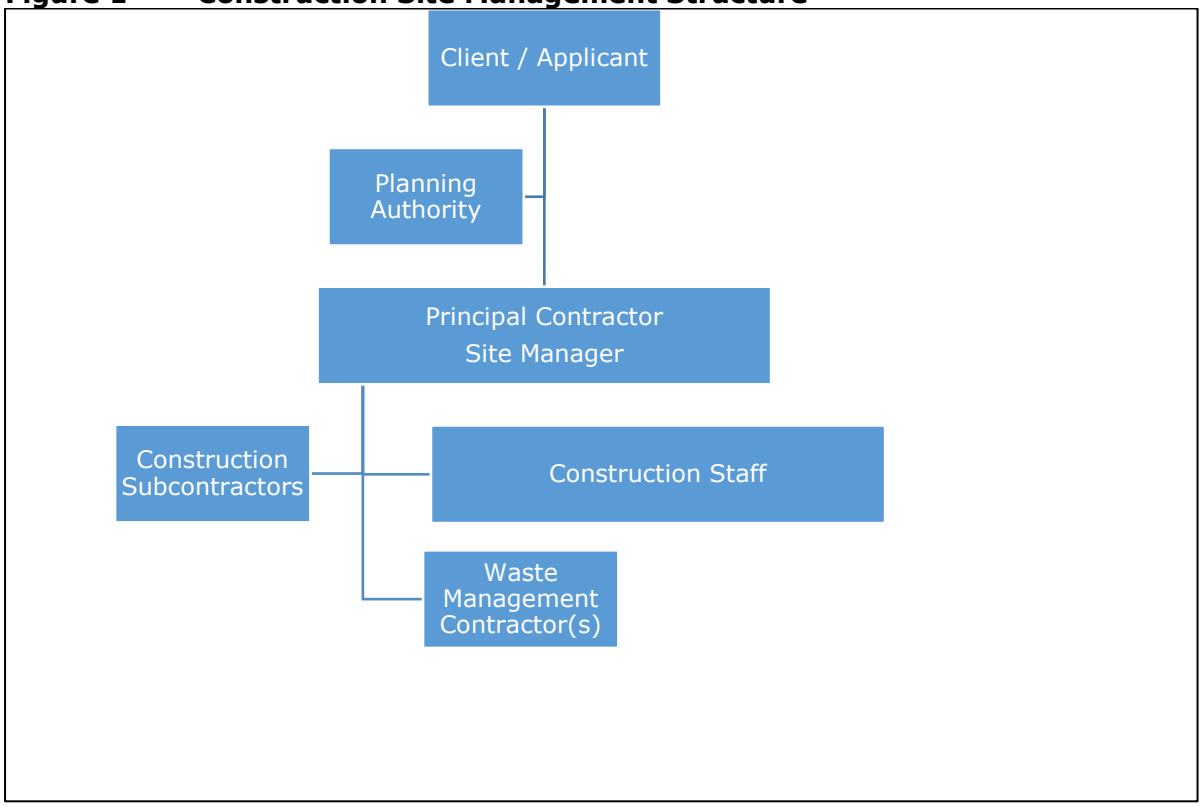
Both the applicant and principal contractor have roles and responsibilities in relation to the C&D WMP. The Appointed Contractor will be responsible for most aspects of the Construction Waste from the date of the contract.

The Site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site C&D WMP. The site manager will be assigned the authority to instruct all site personnel to comply with the specific provisions of the C&D WMP. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site will be assigned the direct responsibility to ensure that the discrete operations stated in the overall construction plan are performed on an on-going basis. Figure 1 below provides a management structure for the construction site.

Table 4 Roles and Responsibilities

Description of Duty	Client	Principal Contractor
Ensure that from the start of the Project, an approach to waste management is taken that complies with all relevant waste regulations Produce and submit a C&D WMP that meets Galway Co. Co. requirements and industry guidance	✓	
Give reasonable directions to any contractor so far as is necessary to enable the Principal Contractor to comply with his duties under these Regulations.	✓	✓
Make and maintain arrangements to record waste arisings within the Project.		✓
Communicate the C&D WMP to all those affected by it, including workers on site and any subcontractors, and undertake monitoring checks to ensure that it is implemented.		✓
Receive and record waste carrier registration details and waste transfer notes in the C&D WMP to ensure that waste removed from the site is transferred to the prescribed destination and is managed in accordance with applicable waste management legislation		✓
Ensure so far as is reasonably practicable that every worker carrying out the construction work is provided with (i) suitable site induction; and (ii) any further information and training which the worker needs for the particular work to be carried out within the terms of the C&D WMP		✓
View, revise and update the C&D WMP as and when necessary, ensuring that any changes in roles and responsibilities are clearly communicated to those affected	✓	✓
Take reasonable steps to ensure that sufficient site security measures are put in place at the site to prevent any illegal disposal of waste	✓	✓
Inform the Client on the requirements of a construction waste management plan to ensure that Client is aware of obligations to meet under regulations (applies to Principal Contractors where appointed)		✓

Figure 1 Construction Site Management Structure



Designated skips and receptacles will be provided on site for all recyclable wastes. The appointed waste contractor will collect and transfer the recyclable wastes as skips are filled. The non-recyclable waste will be transferred by an authorised waste collector to licensed facilities (e.g. canteen waste, general waste). Numerous licensed waste contractors are available in the area and will be obtained from the waste management authority listing.

A successful C&D WMP is largely dependent on how readily it can be integrated in to normal site operations by site manager. The C&D WMP will be implemented to compliment site construction activities and will be promoted by raising awareness and its importance via site inductions, site training, toolbox talks, etc.

Demolition Waste Generation

The majority of the C&D waste will be clean, inert material and it is proposed to reuse it for construction purposes where possible. The existing house farm outbuilding, farm will be demolished and removed from site in accordance with best practice. Works will involve careful decommission and removal of all farm structures at the site. Anticipated wastes which will be generated include soils, bricks and blocks; concrete and reinforced concrete; timber; metal sheeting and steel. Materials arising from this process will be recycled /disposed of at authorised waste management facilities.

Construction Waste Generation

During construction activities, it is expected that construction waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, glass, packaging waste, steel etc.

Soils, Subsoils and Bedrock

A key aspect in the design stage of the project was to aim to eliminate the off-site disposal of excavated materials wherever possible and to reduce the potential for landscape and visual effects.

Construction activities during the construction phase have the potential to release contaminants to the surface waters via drainage channels, specifically silt /sediment, concrete /grouting materials, foul effluent and oils. However, these impacts can be controlled and mitigated and considered as imperceptible negative temporary impacts on the basis that construction mitigation measures are carried out as outlined below.

- Prior to commencement of construction, the outline CEMP will be further development and submitted to the planning authority for agreement.
- Planned construction works will be carried out with the least feasible disturbance of soils. It is proposed that no excavated soil materials (spoil) will be exported off site and will be near boundaries (particularly to the north). Soil stripping and site levelling works will be confined to the site itself. Low lying areas of the site will be filled and levelled with the spoil material. Timetabling of vegetation removal, topsoil stripping and the development of earthworks on-site will fully consider seasonal, ecological and hydrological constraints.
- An accident management plan will be developed to provide spill response procedures, emergency contact details in addition to equipment inventories and their location. All staff will be made aware of this document, and its content, during site induction and it will be available in the site office. Staff will be trained in the implementation of the Plan and the use of any spill control equipment as necessary.
- A drainage plan will be prepared for the construction programme and showing proposed sediment traps and monitoring /discharge control points. The plan will include use of settlement features and traps.
- Concrete will be mixed off–site and imported to the site. The pouring of concrete will take place within a designated area to prevent concrete runoff into the soil / groundwater media.
- Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

- Good housekeeping (daily site clean-ups, use of disposal bins, etc.) on the project site, and the proper use, storage and disposal of many substances used on construction sites, such as lubricants, fuels and oils and their containers can prevent soil contamination.
- Pollution of aquatic systems during the construction phase will be reduced by the implementation of the following best practice mitigation measures. Due cognisance is paid to the following guidance documents for construction work on or near water;
    - IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters - Guidance for consultants and contractors;
    - CIRIA (2004) – Guideline Document C697 The SUDS Manual;
    - CIRIA (2004)– Guideline Document C624 Development and flood risk - guidance for the construction industry;
    - CIRIA (2006) Control of water pollution from linear construction projects. Site guide;
    - SEPA (2010) Engineering in the water environment good practice guide sediment management;
    - SEPA (2009) Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods; and,
    - SEPA (2017) Works and maintenance in or near water. GPP 5.
- All chemical and fuel fill points and hoses will be contained within bunded areas. Adequate protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with recognised standards as prescribed out by the EPA.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution of local watercourses in accordance with the relevant statutory regulations.
- Routine monitoring of water quality will be carried out at appropriate locations during construction. Parameters to be monitored should include pH, total suspended solids, BOD and COD.

It is not expected that any contaminated material will be encountered during the construction works due to the history of the site (greenfield). However, in this unlikely instance, the material will be segregated, classified and suitably disposed of under waste permit to a waste licensed facility following notification to the Council. This highly unlikely event would increase the off-site disposal rates.

Plastic

As plastic is now considered a highly recyclable material, much of the plastic generated during construction will be diverted from landfill and recycled. The plastic will be segregated at source and kept as clean as possible and stored in a dedicated skip.

Timber /Wood

There will be timber waste generated from the construction work as off-cuts or damaged pieces of timber from building construction. Timber that is uncontaminated (free from paints, preservatives, glues etc.) will be recycled. Again, designated signed areas will be used for segregation and collection on site. A permitted contractor will be used to transfer the material to a waste licensed facility for recovery /recycling (e.g. energy use, wood chips, etc.).

Scrap Metal

Steel is a highly recyclable material and there are numerous companies that will accept waste steel and other scrap metals. A segregated skip will be available for steel/metal storage on-site pending recycling.

Cardboard Packaging

Cardboard packaging will be flattered and placed in a covered skip to prevent it getting wet prior to its recovery off site.

Plasterboard

Waste gypsum can be recycled into new plasterboard. A skip will be provided for the separate collection of waste plasterboard and collected as necessary.

Hazardous Wastes

On-site storage of any hazardous wastes produced will be minimised with off-site removal organised on a regular basis. Appropriate storage of all hazardous wastes on-site will be undertaken including bunding of fuels, lubricants etc. to minimise exposure and risk to human beings and environmental receptors. Segregated hazardous wastes (such as waste oils) will be recovered wherever possible and failing this, disposed of appropriately.

Canteen and General Waste

Regular housekeeping of the temporary canteen/W/C areas will be carried out. Removal of domestic waste from the construction compound will be carried out by a permitted

waste contractor. Any temporary W/C utilities used on site during the construction phase will be maintained by an approved and permitted contractor.

There will be a general skip or receptacle for C&D waste not suitable for reuse or recovery. This skip will include general wet waste (mixed food waste and food packaging), contaminated cardboard, contaminated plastic etc. Workers on the site will be encouraged to recycle as much municipal waste as possible and segregated bins will be provided. Prior to removal, the municipal waste receptacle will be examined to confirm not cross contamination has occurred.

Tracking and Documentation

The site manager will maintain a copy of all waste collection permits in the construction site office. A record of all imported material (such as clean fill material such as broken rock, clause 804 gravel, etc.) will also be kept on file. If waste is being transported to another site, a copy of the waste permit or EPA waste licence will be kept on file at the site construction office. It is not expected that any waste will be produced on site that will require transfrontier shipping documentation (TFS). If this instance arises, this will be arranged via the national competent authority; Dublin City Council is designated as the National Competent Authority for the export, import and transit of waste shipments under S.I. No. 419 of 2007 Waste Management (Shipments of Waste) Regulations, 2007.

Estimated Cost of Waste Management

The cost associated with waste management for the site will be further developed and incorporated into the CEMP (containing Construction Waste Management Plan) by the construction site manager once construction contracts have been put in place and appointments made. Estimated waste totals will initially be calculated during costing of the project and these will be comparted against actual waste total as construction on the project progresses. The CEMP will be updated with this information when available will be inputted to the CEMP and a summary overview will be available.

Training of construction staff in relation to the CEMP will be the responsibility of the site manager. A copy of the CEMP will be made available to all personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the CEMP and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the CEMP. Signage will be designed to reinforce the key messages within the CEMP and will be displayed prominently for the benefit of site staff.

Record Keeping and Waste Audits

Records will be kept for each waste material which leaves the site, wither for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site.

The waste manager or delegate will record the following:

- Waste taken off-site for reuse.
- Waste taken off-site for recovery.
- Waste taken off-site for recycling.
- Waste taken off-site for disposal.
- Waste (soil & stone) accepted on-site for recovery.

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

Waste Audits

The site manager will be responsible for conducting waste audits at the site during the construction of the development. The site manager will arrange for full details of all arisings, movements and treatment of construction and demolition waste discards to be recorded during the construction stage of the project. Each consignment of C&D waste taken from the site will be subject to documentation to ensure full traceability of the material to its final destination.

Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site, as well as waste accepted, will be undertaken mid-way through the C&D phase. If waste movements are not accounted for, the reasons for this will be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the waste reduction targets can be achieved. Waste management costs will also be reviewed.

Consultation with Relevant Authorities

The site manager will consult and respond to any planning requirements of Galway County Council during the construction phase of the project. The Council will also be consulted to discuss all available all available waste reduction, re-use and recycling opportunities are identified and utilised.

Post-Construction

Within three months of all construction works being completed, a final version of the CEMP (including construction waste management plan) will be completed and made available to the planning authority for inspection. The report will summarise the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

APPENDIX 3.1

ARCHITECTURAL DESIGN STATEMENT (RESERVE GAS FIRED GENERATOR)

Taylor McCarney
Architects

Architectural Design Statement

Proposed Energy Building, Killimor, Co. Galway

27707-ZZ-ZZ-ZZZ-PP-TMA-AR-P1.2

2024.05

Taylor McCarney Architects

Taylor McCarney Architects

Project	Proposed Energy Building, Killimor, Co Galway
Client	Halston
Project Number	27707
Document Reference	27707-ZZ-ZZ-ZZZ-PP-TMA-AR-P1.0
Date	May 2024

Revision	Description	Date Revised
P1.0	Design Statement	2024-05-20
P1.1	Design Statement	2024-05-21
P1.2	Design Statement	2024-05-21

Taylor McCarney
Architects

Contents

01. Background

Taylor McCarney Architects were commissioned by Halston to carry out an architectural executive design function in relation to the building envelope at Coolpowra, Co. Galway.

This study was to appreciate the context and operations of a building such as this, and to develop a design concept and strategy around site integration , materiality and volumetric form for this project - on this site.

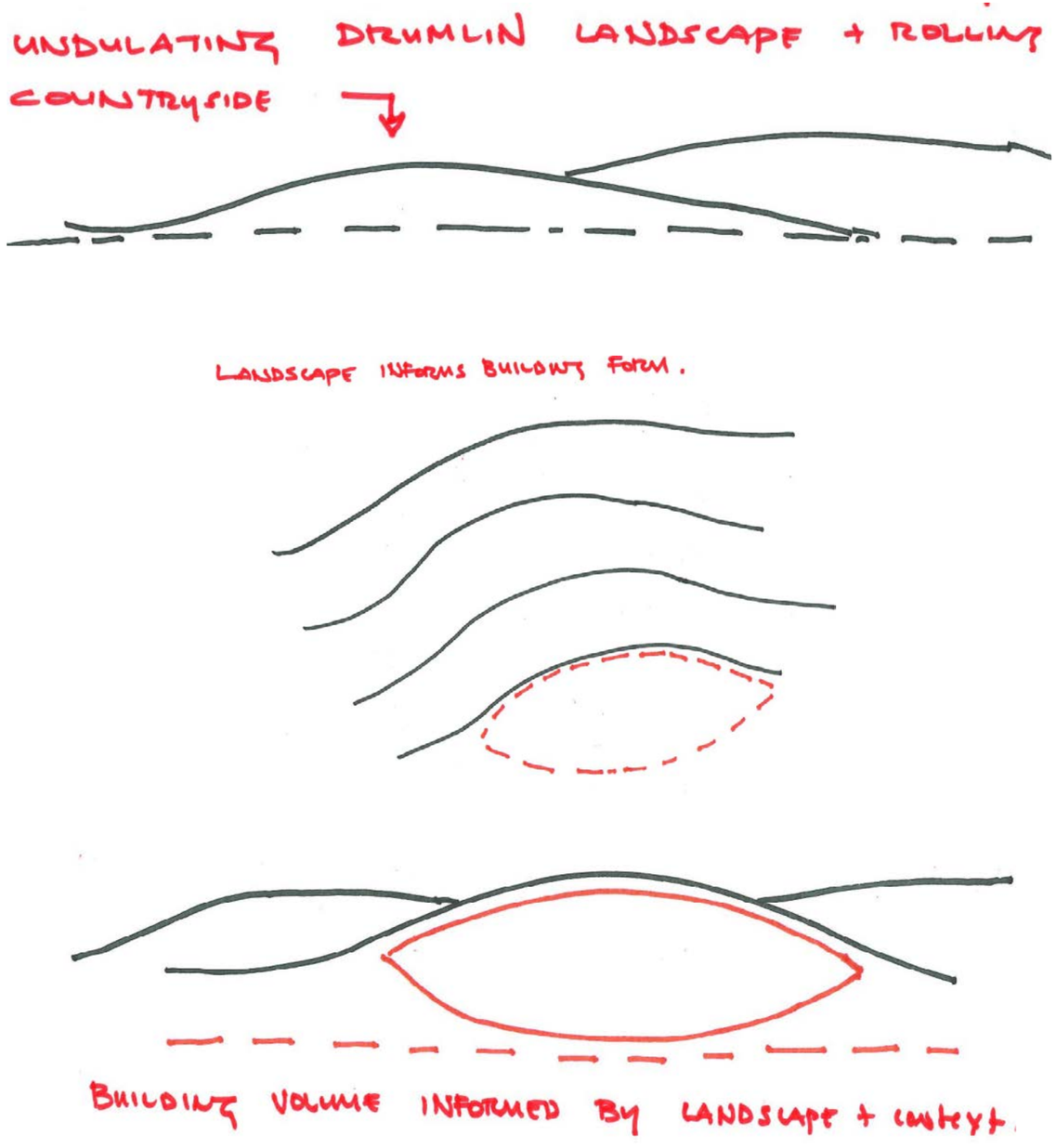
We have visited the site a number of time and carried out a series of iterations of the design, refining the concept to the conclusion of this application. The story of that design evolution is contained in the following pages.

02. Concept

Taylor McCarney Architects

The site topography is one of rolling hillside and farmland. It is this landscape that forms the basis for the building form and volume. The building is envisaged as another “fold” in the landscape- a further undulation in section that captures the workings of this building typology.

It is imagined as another rolling wave and curve - as opposed to a solid block of a structure which would bear no relationship to its context.



02. Concept

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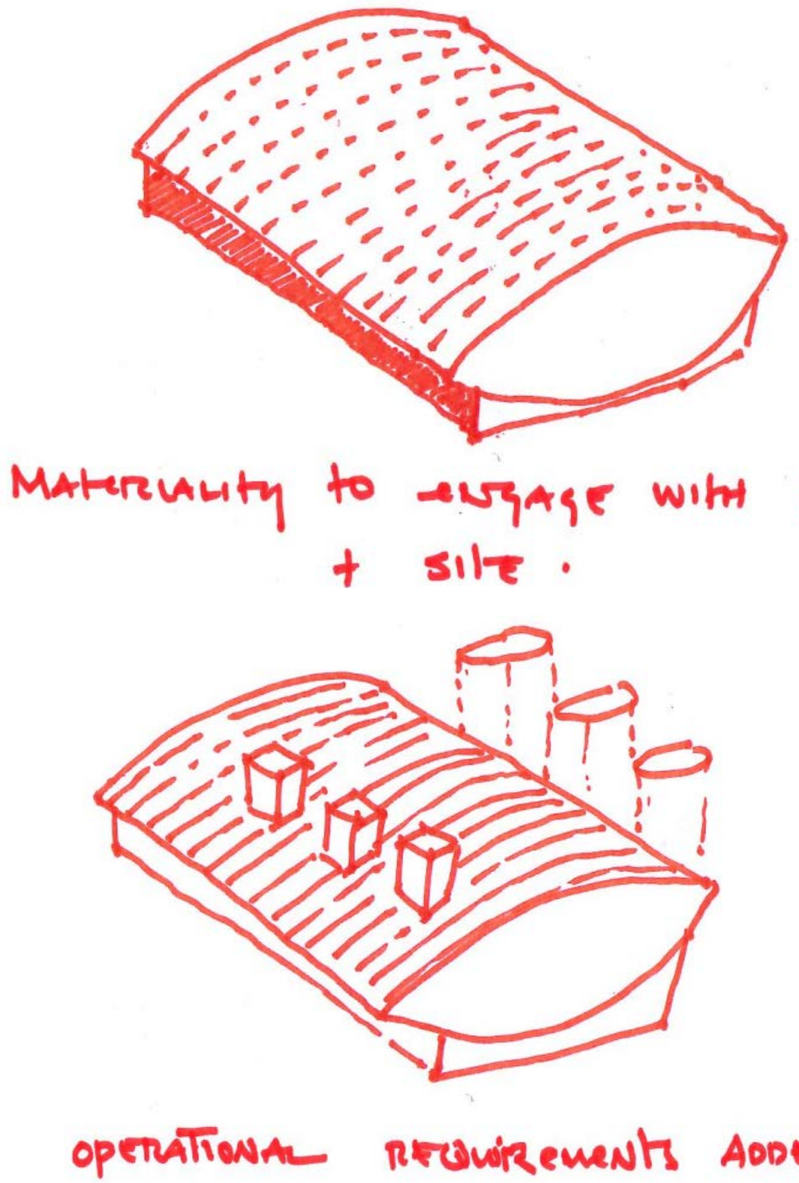
Architects

It is within this “folded” landscape that the building shape and form begins to develop. A soft edged form, appropriately finished - a familiar curvature in the landscape which draws reference from traditional Irish Countryside vernacular architecture , utilised in a new and contemporary way for a large scale building.



02. Concept

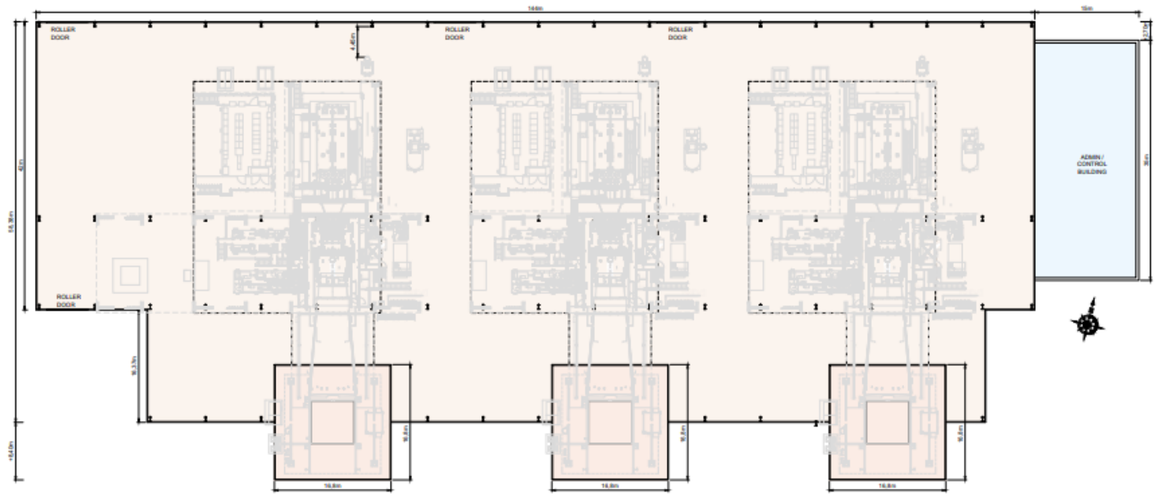
Taylor McCarney Architects

Once the concept of the building form that relates to the landscape is established , the building envelope and volume must be developed. The building must capture the critical operational dimensions in section of these building types

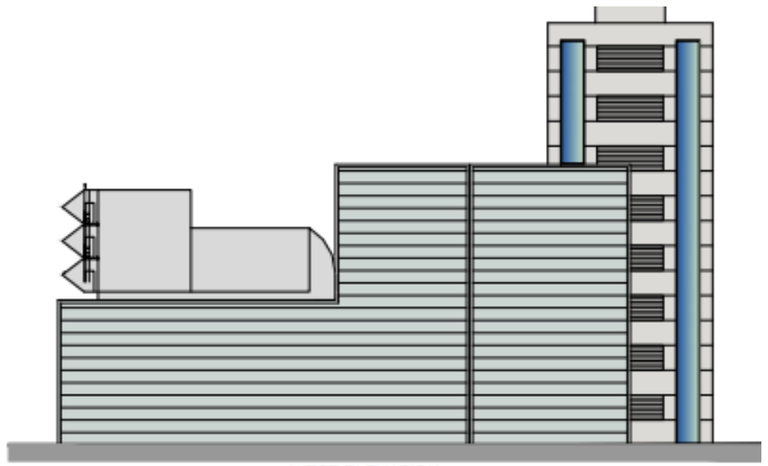
This must be captured however, in a way that does not represent the traditional " box " approach for a site like this as per the attached.

That said, the building must also operationally manage the sectional requirements for a building of this type.

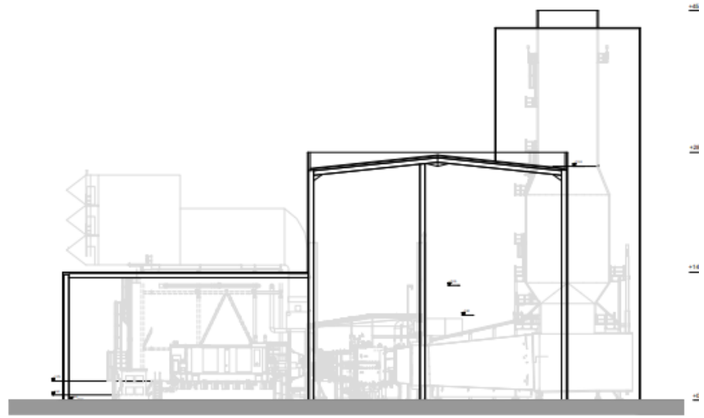
Early volumetric analysis established the building plan and sections and design reviews of this challenge.



OCGT BUILDING FLOOR LAYOUT



WEST ELEVATION



SECTION

02. Concept

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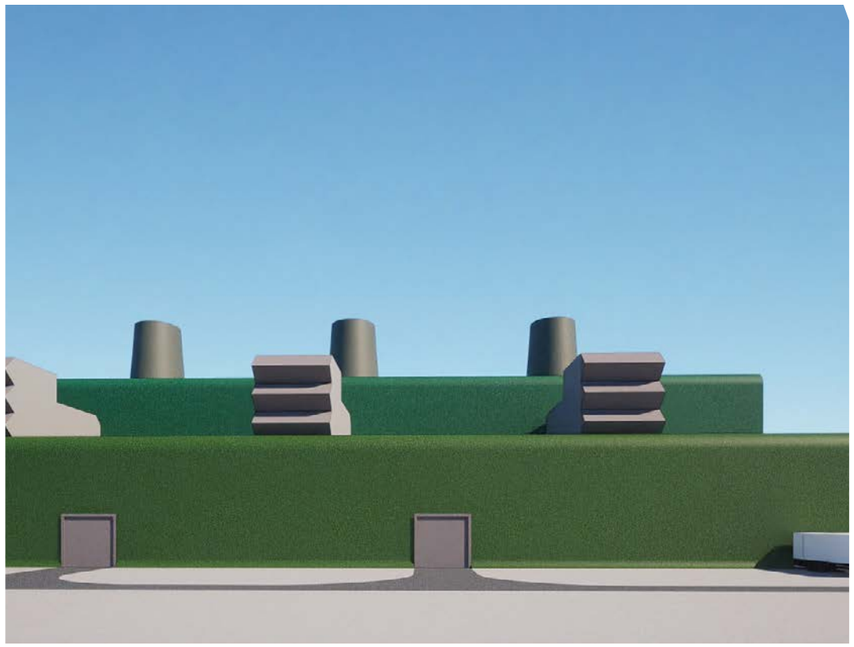
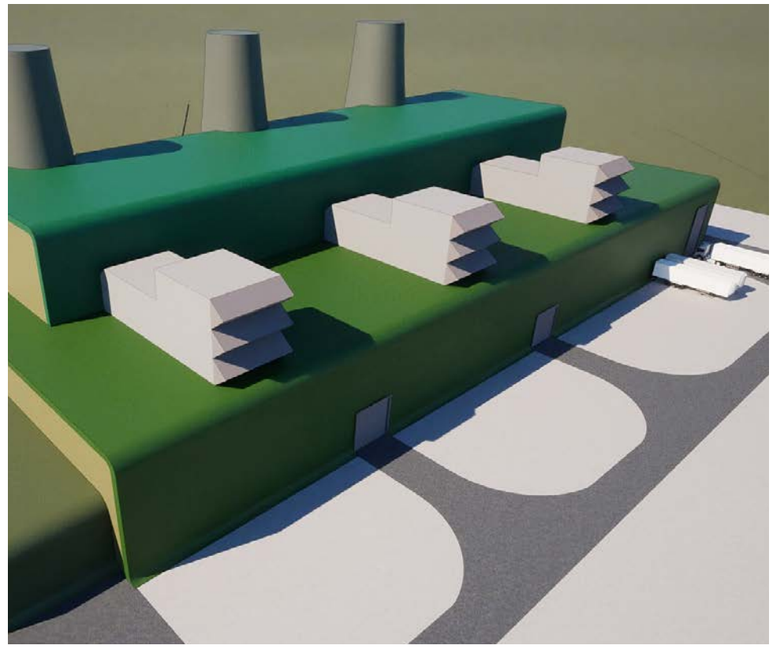
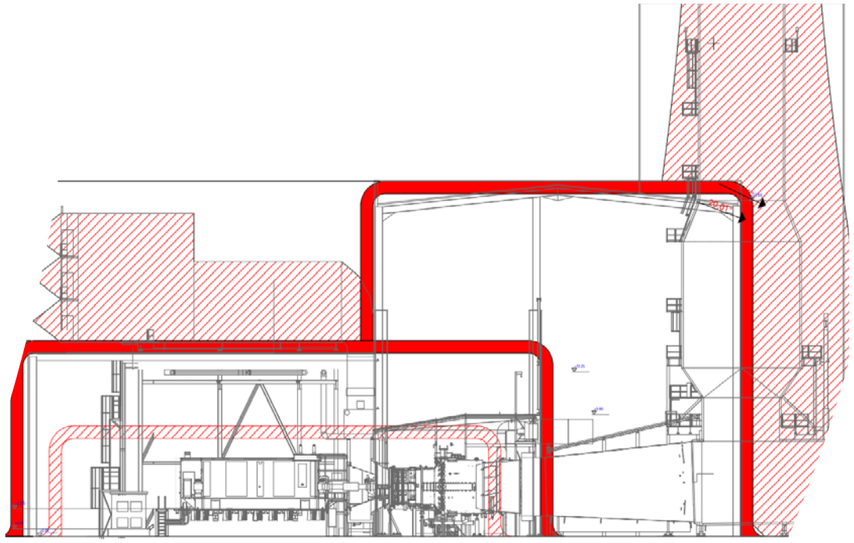
These sections were then extruded in built form to establish building heights , stack heights, plant etc. This allowed interrogation of the most appropriate site placement for the structure, building colour studies and most critically volumetric analysis and the management of the building form.







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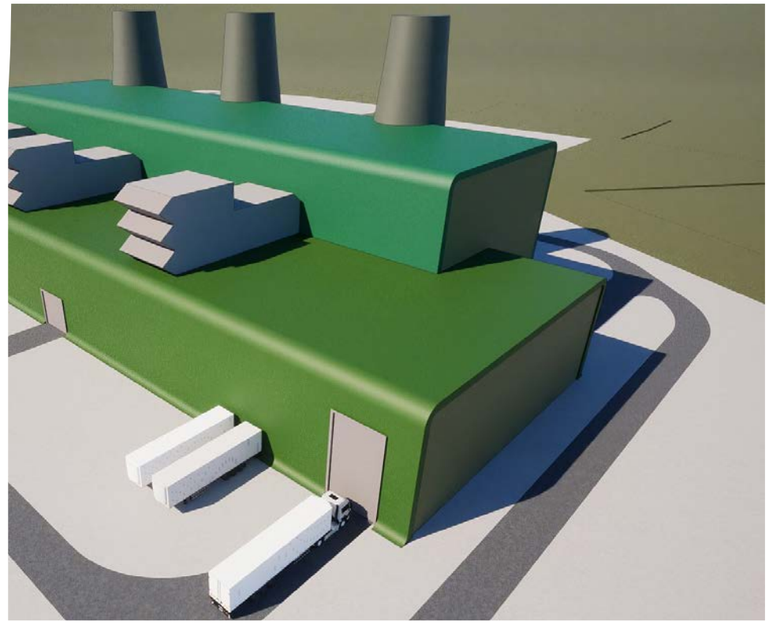


02. Concept

Taylor McCarney Architects

Materials were explored on early design options, and exploration of a curvature at the edges to soften the visual impact of the project utilised.

However, what became apparent quickly was that the management of the building volume in a " traditional" form for buildings such as this (which are also usually more urban) was challenging.

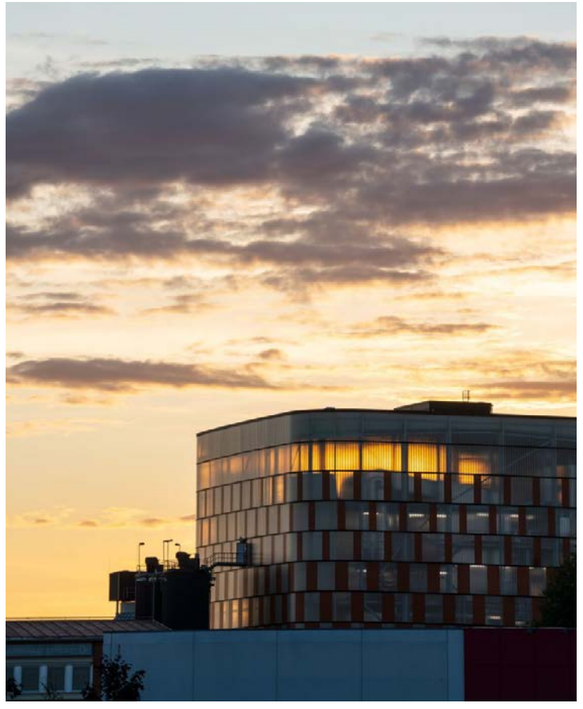
It was determined therefore that something more integrated with the land and informed by the site positioning would need to be developed.

03. Typologies

Taylor McCarney Architects

There are a number of interesting typologies for a building such as this, particularly in Scandanavia.

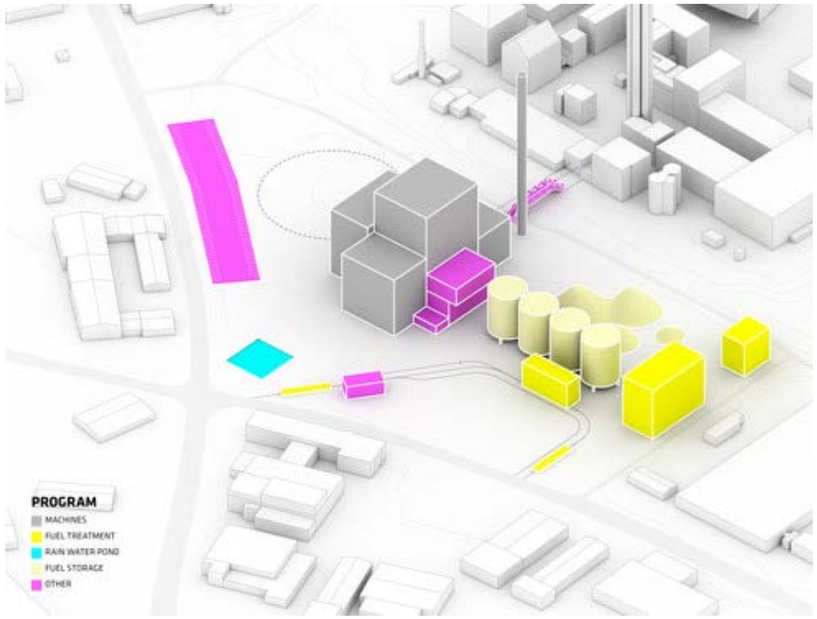
Plants in Copenhagan and and Uppsala are particularly interesting, in that they share the common theme with this project in " wrapping " the operational section in a softer form.

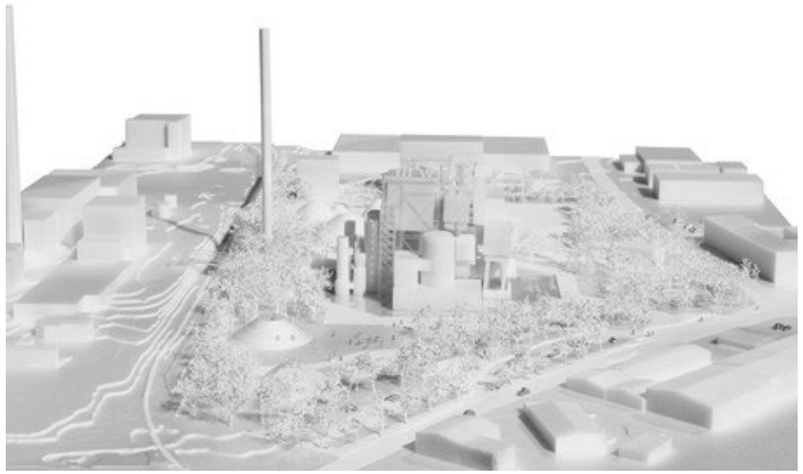


03. Typologies

Taylor McCarney Architects

This Power Plant project in Upsala Sweden By BIG Architects particularly demonstrates the idea of softening the volume of the plant – by enveloping the traditional workings of the plant in a more contemporary envelope - in that case via a coloured PV frame.



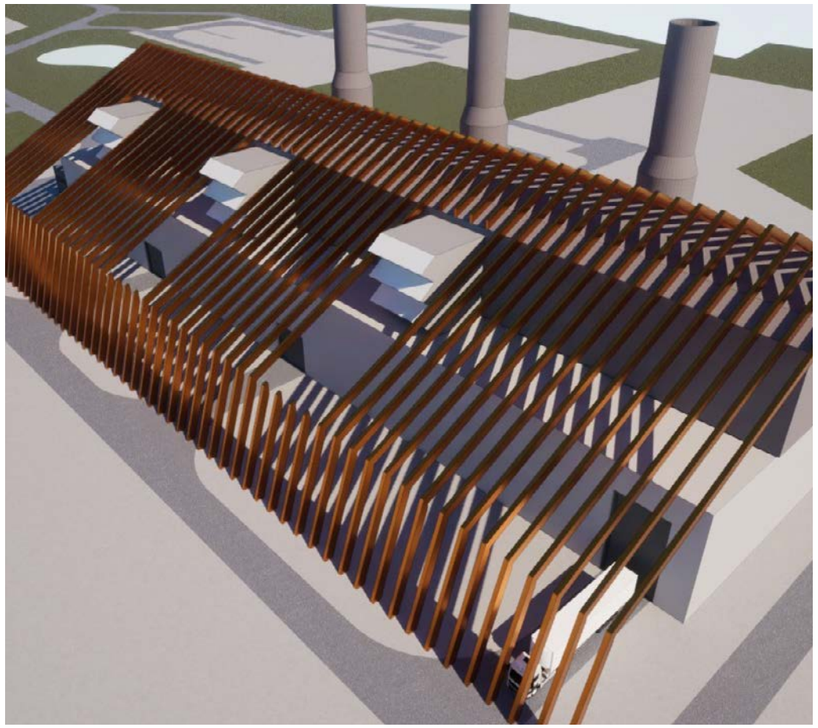


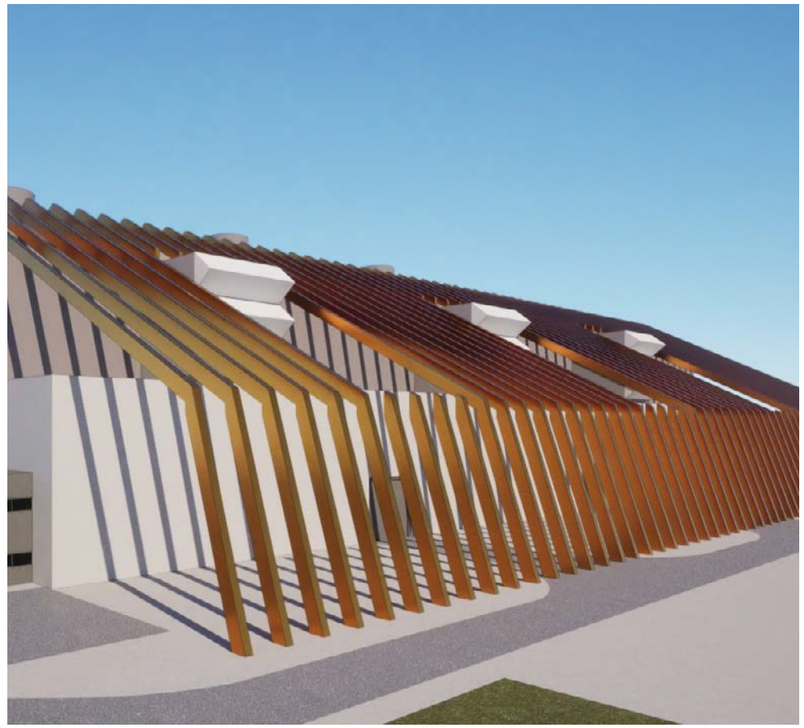
04. Design Process

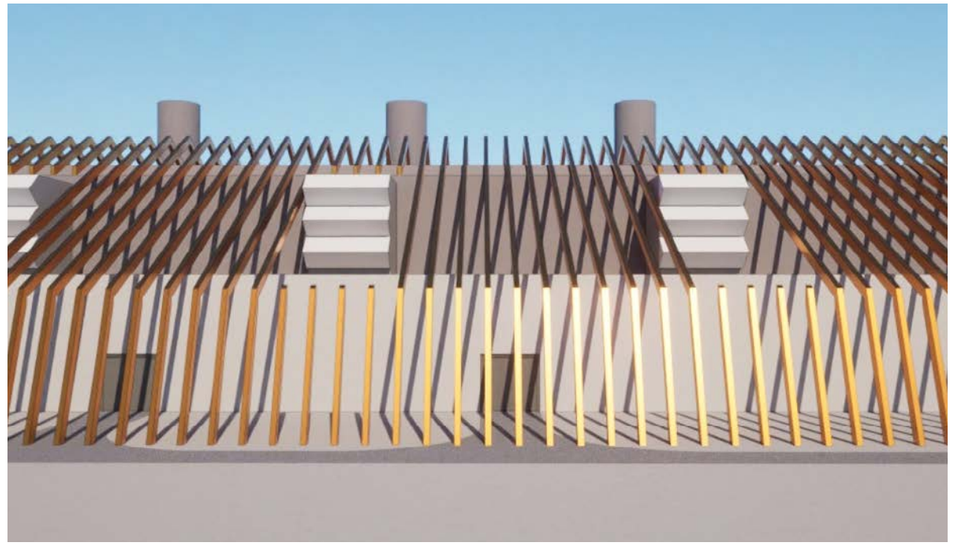
Taylor McCarney Architects

This then led us to explore how we would “ wrap” the building here.

A series of structural iterations exploring the frame and shape of the building (without cladding) followed. This ultimately led to a departure from the traditional box portal type structure, and into a softened curvature more befitting of this site.



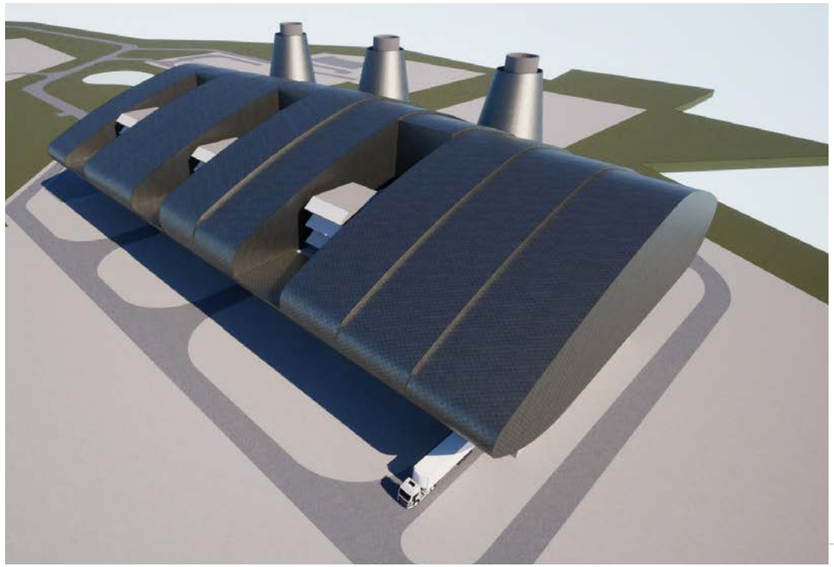


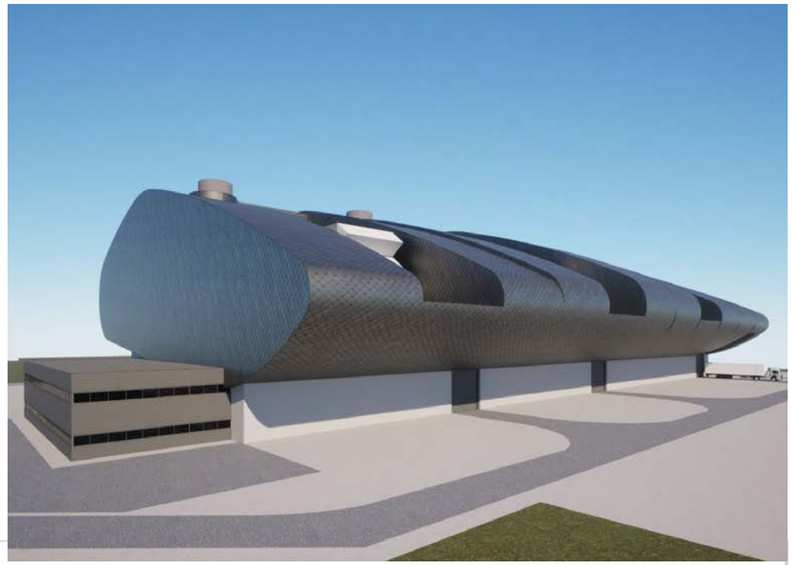


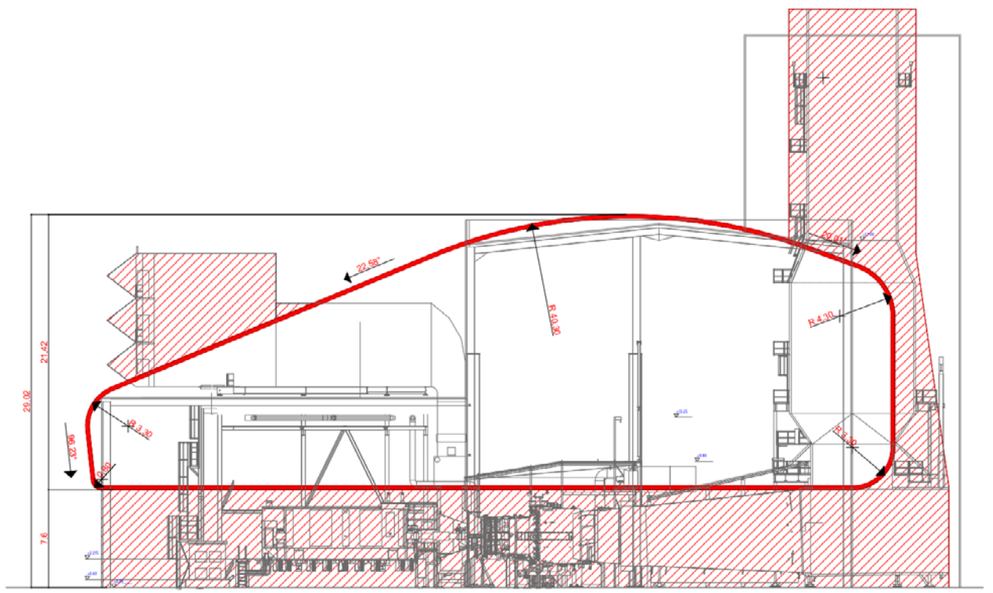
04. Design Process

Taylor McCarney Architects

Early design development envisaged wrapping a curved form atop a plinth entry level with stacks to the rear in a designed volume. These early sketches would form the basis for the finished design.







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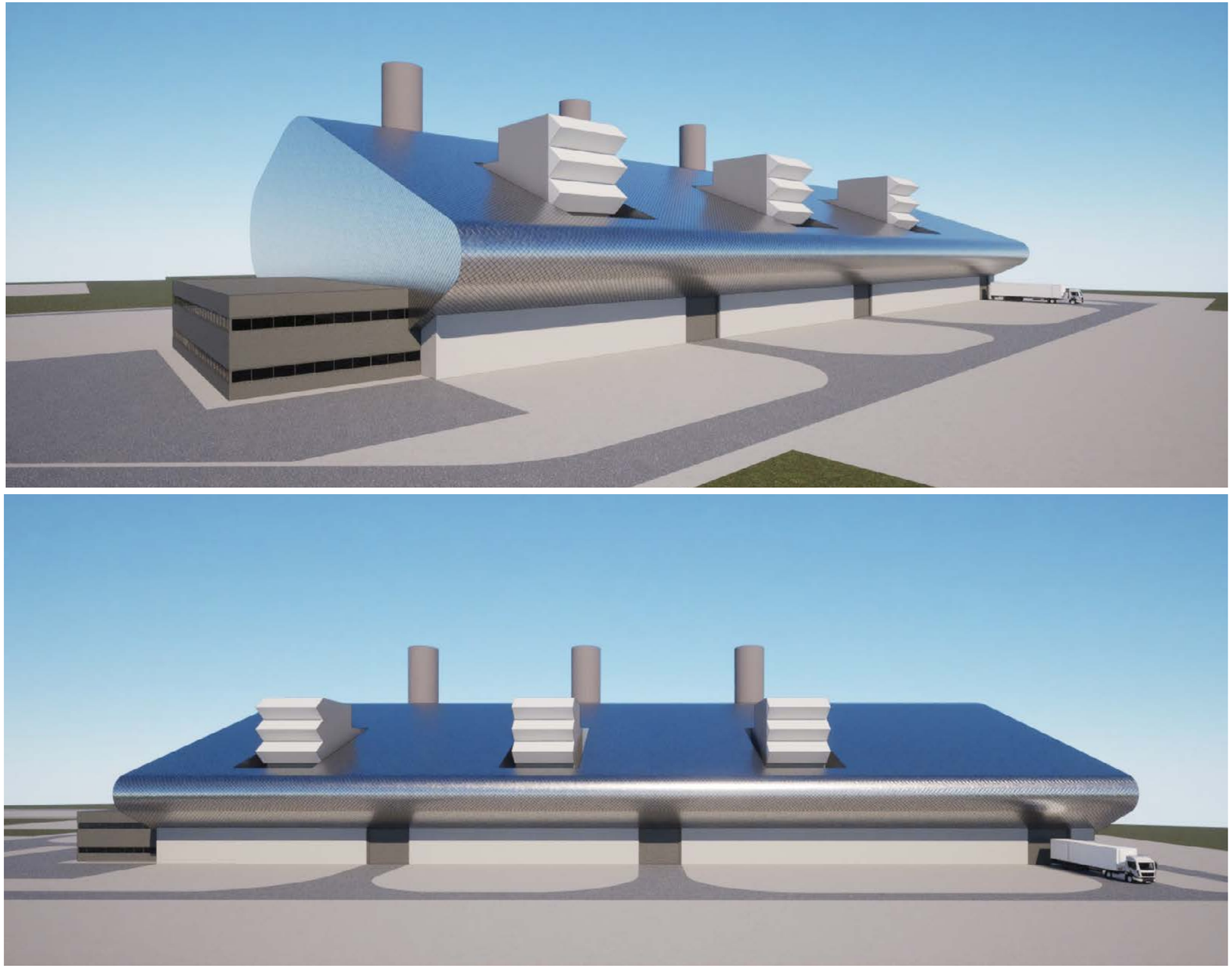
04. Design Process

Taylor McCarney Architects

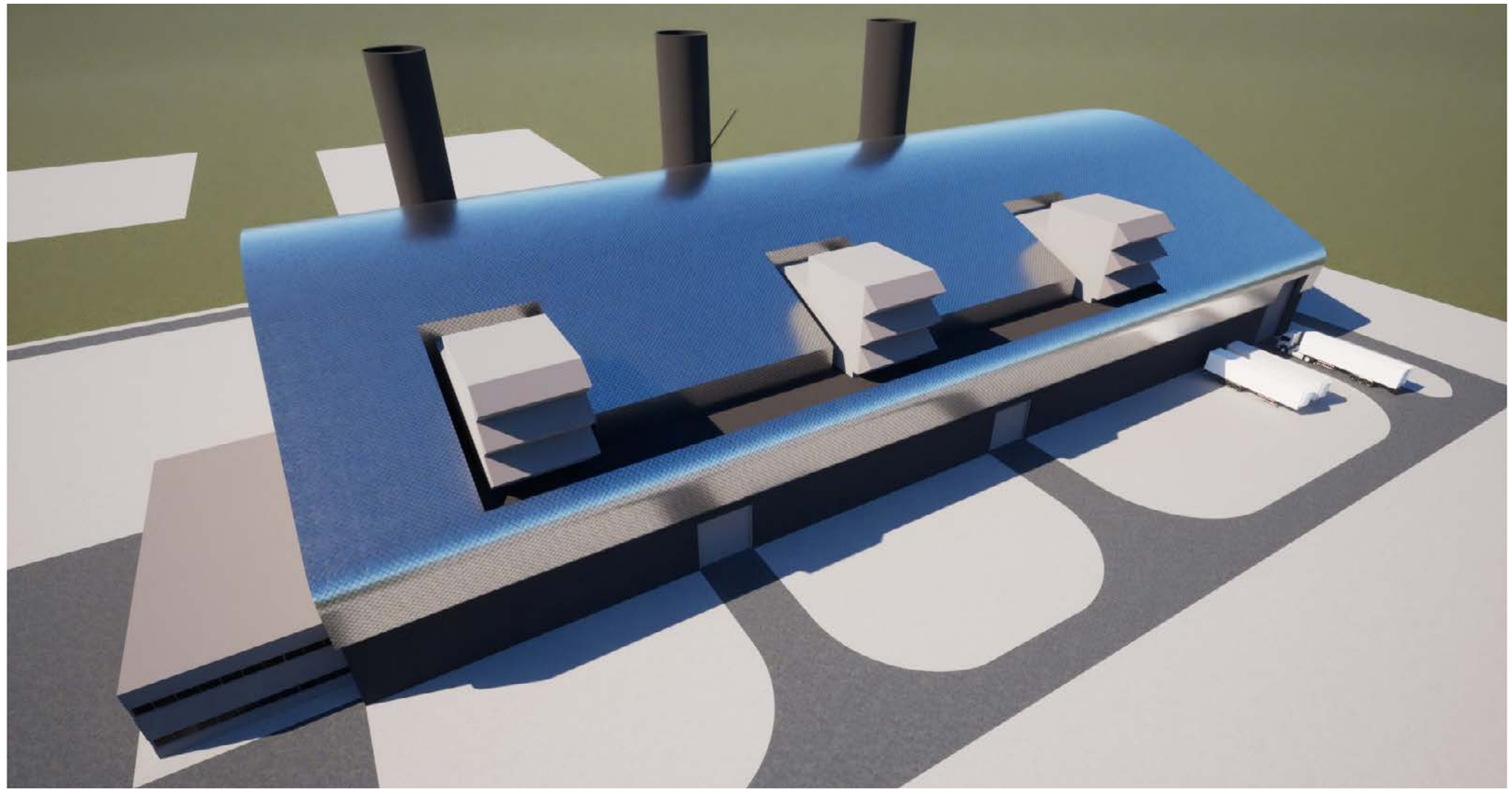
The consideration of the ancillary and admin spaces and the relationship between the volumes also needed development as did operational linkages at high level between AHU's.

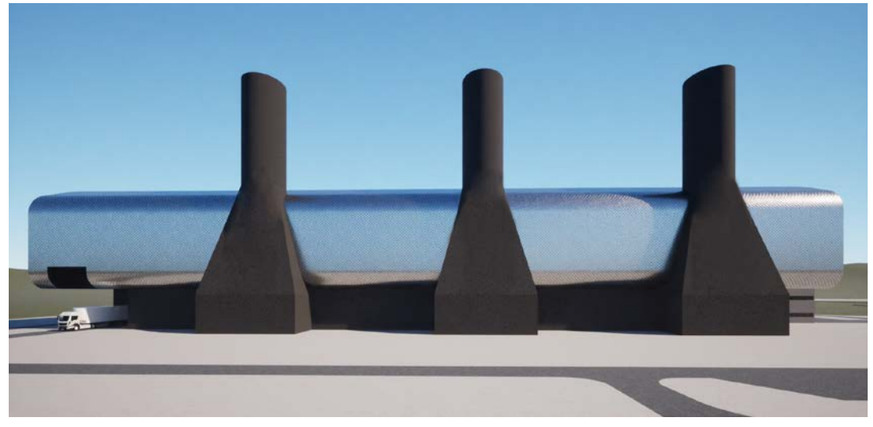


04. Design Process

Taylor McCarney Architects

These were then linked and further consideration was carried out around materials, stack finishes, access etc.





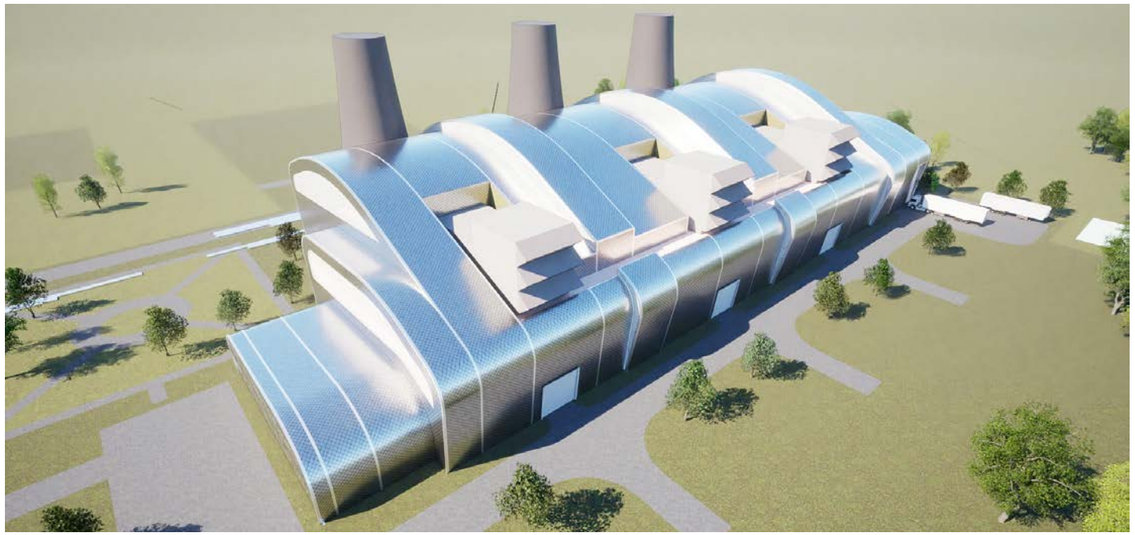
04. Design Process

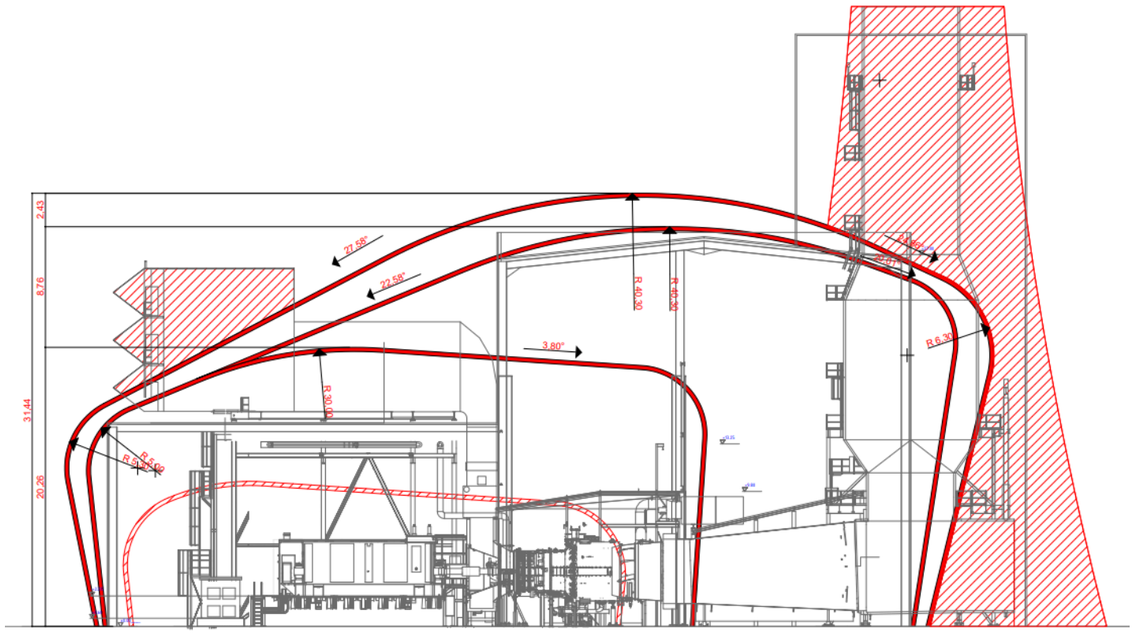
Taylor McCarney Architects

The design then evolved to envelope the “plinth” also within the volume, leaving a single curved form.

This form was replicated for the admin block and areas of polycarbonate or glazing introduced to provide natural daylight into the building.

Three pop ups in the main volume were added with glazing each side to replicate the gable treatments.





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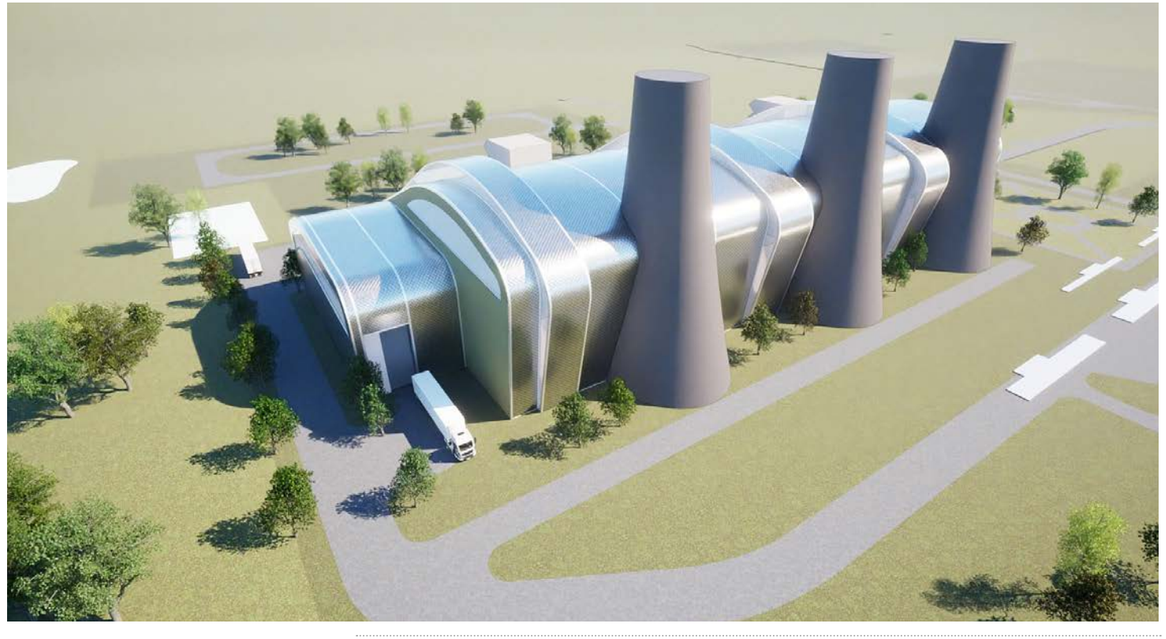
04. Design Process

Taylor McCarney Architects

Design considerations around the materiality, the colour and the stack treatment now started to be firmed up upon. A deliberate strategy of different materials between the building and the stack were explored. Colours for the stack that would " blur" them into the grey Galway skies were also interrogated for optimum solutions.

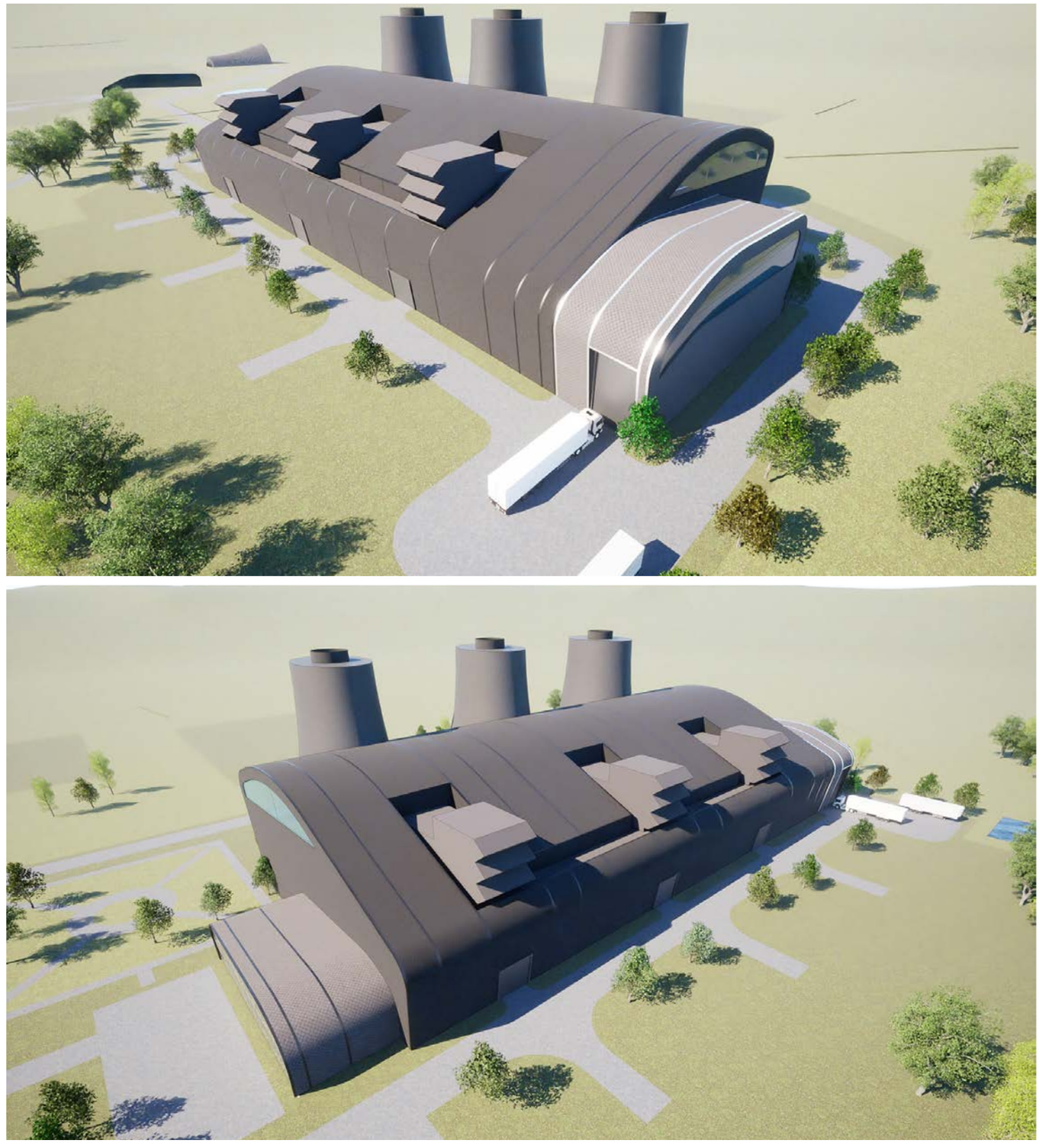


04. Design Process

Taylor McCarney Architects

Stack volumes and scale were also explored and the next iterations removed “pop ups” with a view to making the form as simple and pure as possible.

Material colours were also discussed in conjunction with photomontage development and broader site visibility factors.

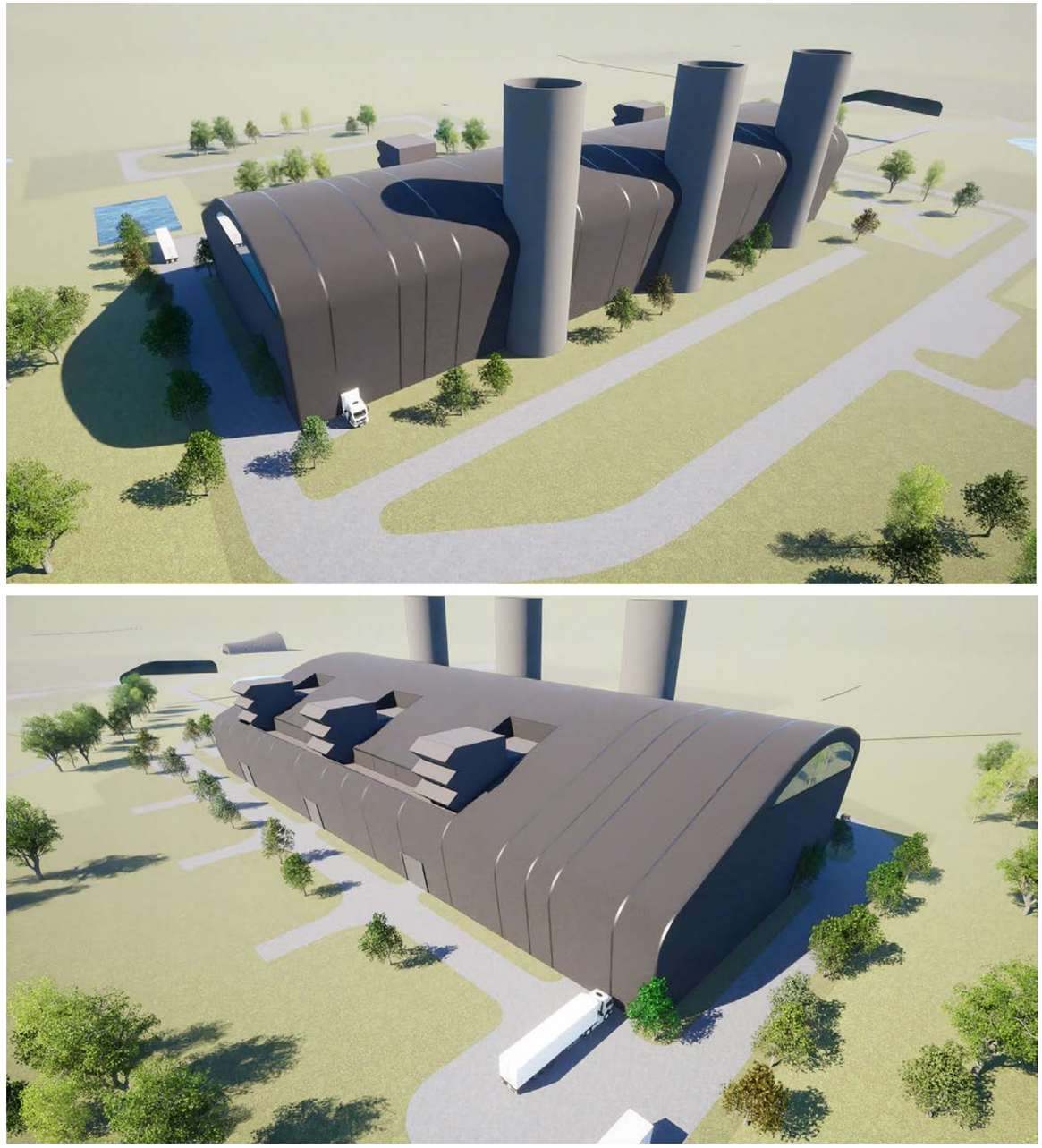


04. Design Process

Taylor McCarney Architects

The building volume was then further extended to encapsulate all the functions save the admin in one block.

Stack design and material were explored and developed towards the ultimate final solutions.



05. Materiality Study

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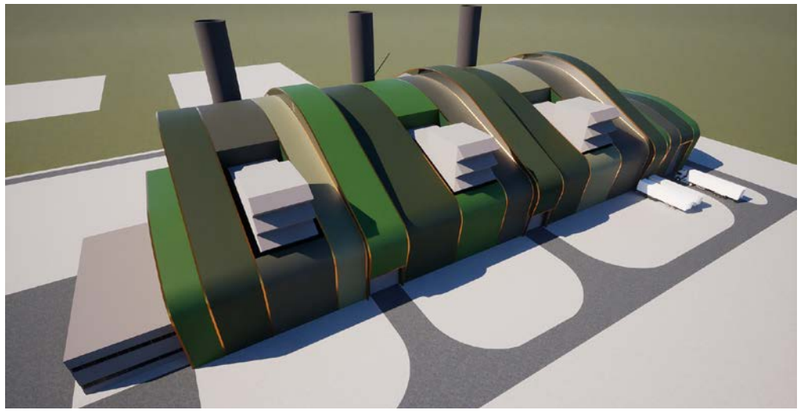
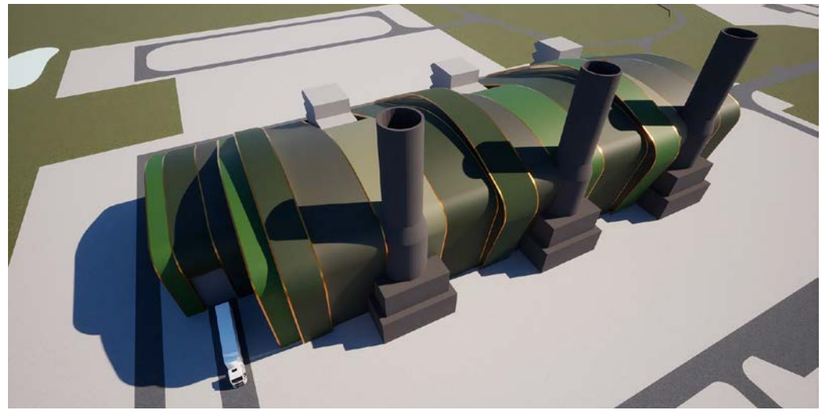
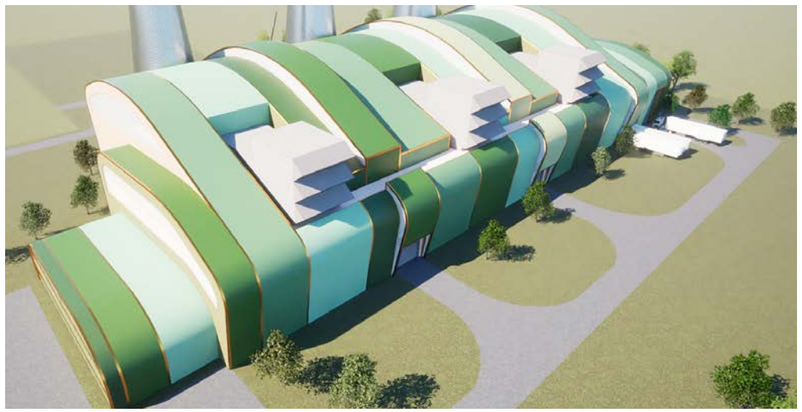
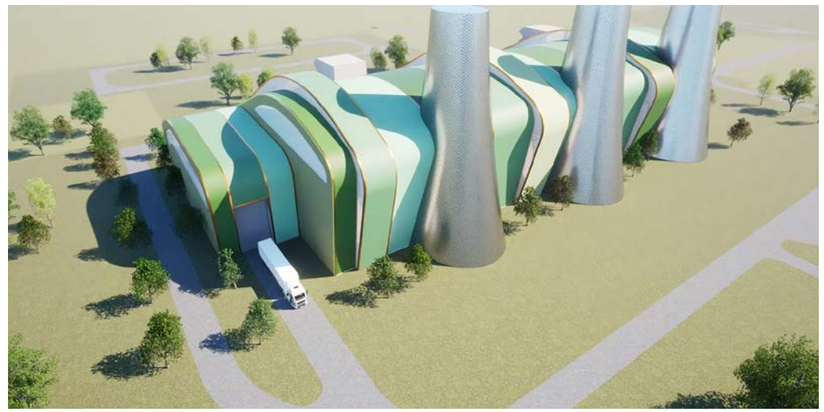
A series of materials for the external envelope were explored ranging from varied green materials, to more metallic and reflective materials .

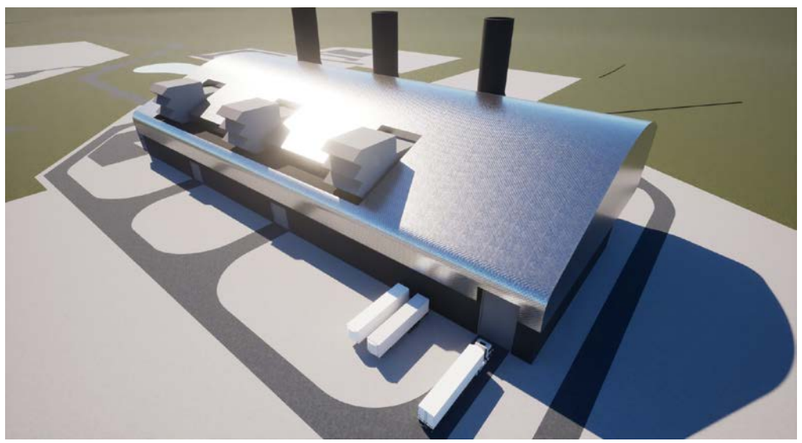
The analysis was carried out for both the building and the stacks.











05. Materiality Study

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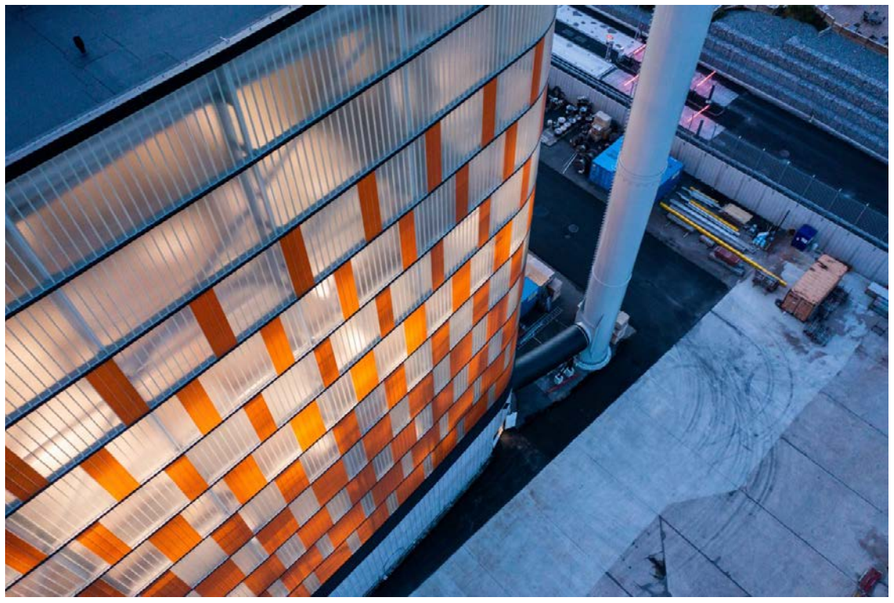
The final material selection is for a standing seam metal roofing system for the main volume in a grey or matt silver.

This will avoid excessive glare which would have made the building more visible on the horizon. Instead, it will merge soften the building into the skyline and landscape.

Glass and coloured glass panels to the elevation and admin block will provide high quality internal environments as well as maximising on orientation and sustainable measures.



06. Conclusion

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The final design solution remains true to the earliest concept ideals.

The building has been refined and simplified over a series of design iterations to form a single curved volume sitting in the landscape. A continuity of its context which has informed its architectural form.

The material colours have been deliberately selected to provide opportunity for merger in the skies and to reduce glint or glare. Supplemented by landscape, we believe this form to be an excellent and site specific design solution for this building typology in this location.

07. Appendix

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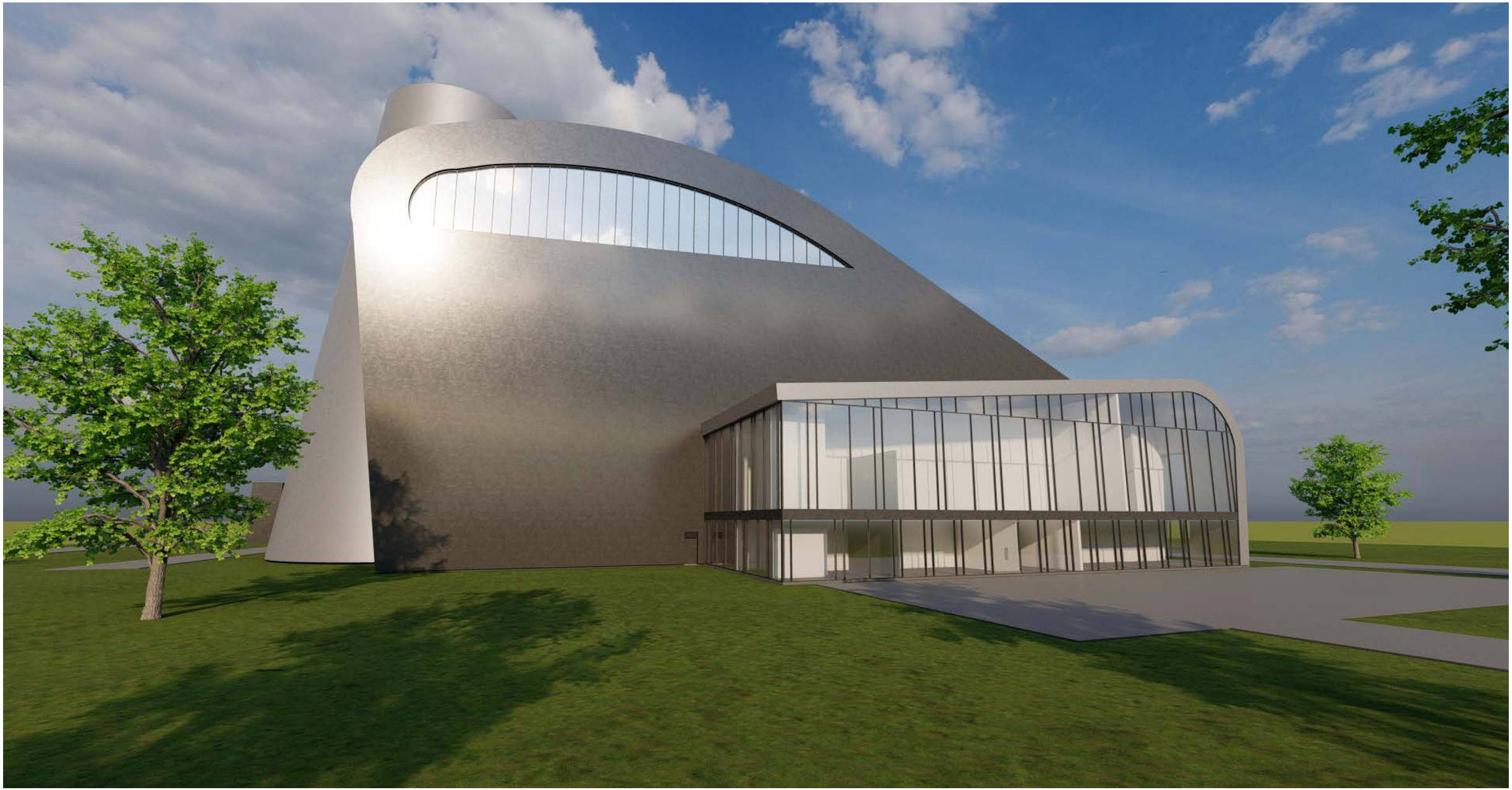

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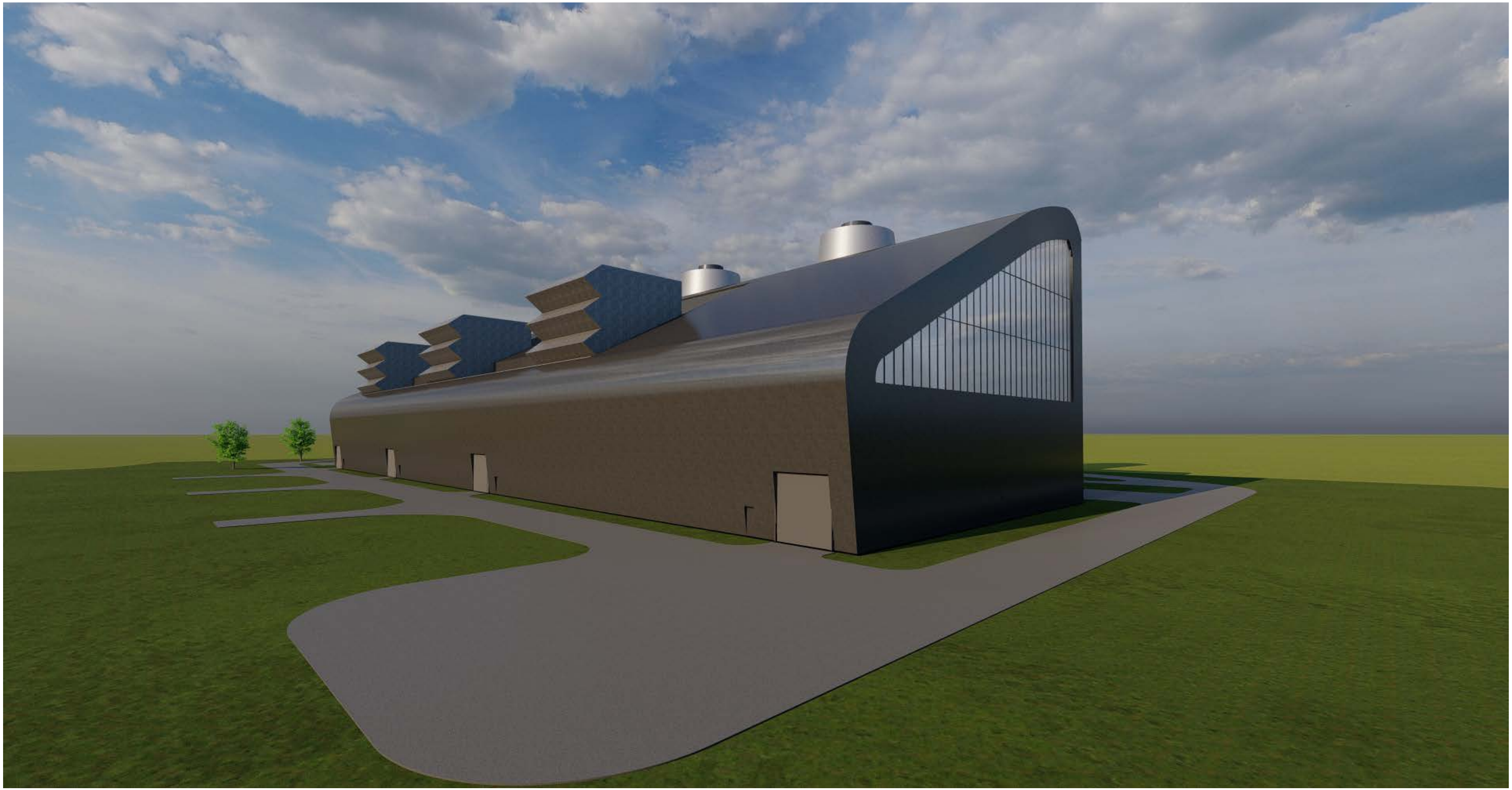

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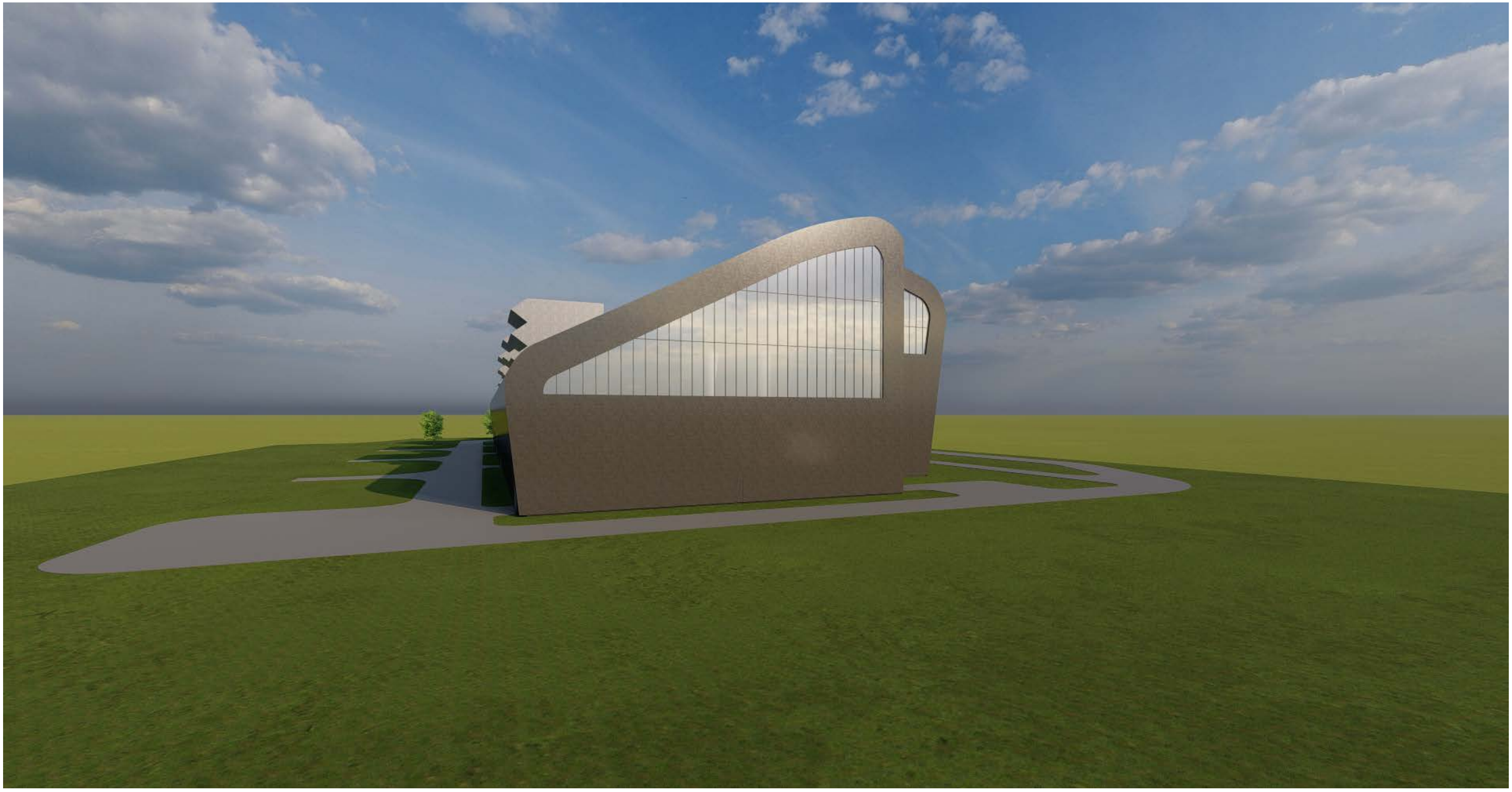

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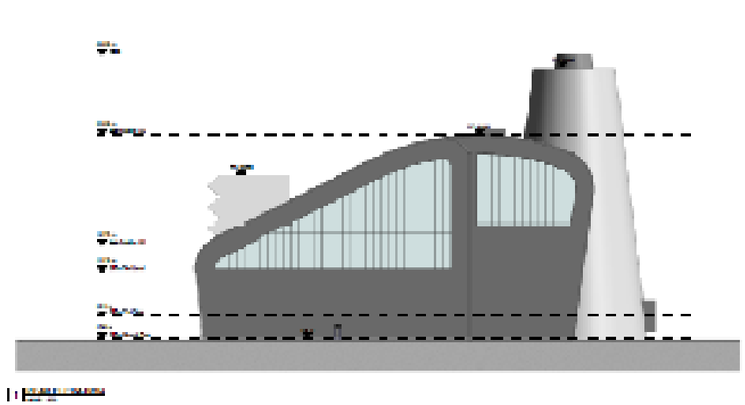
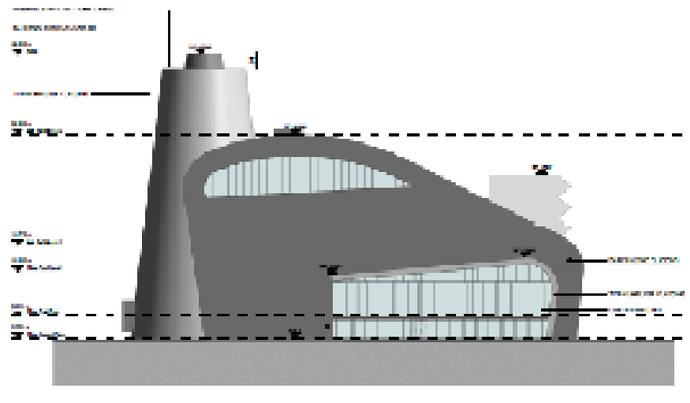
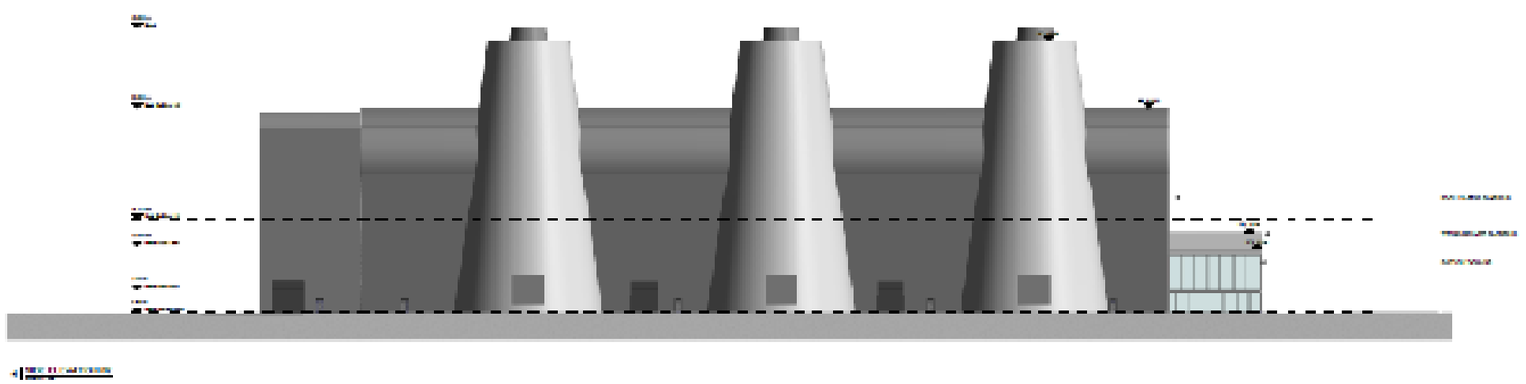
Kalzip

DarkFalZinc

Titaniumsilver







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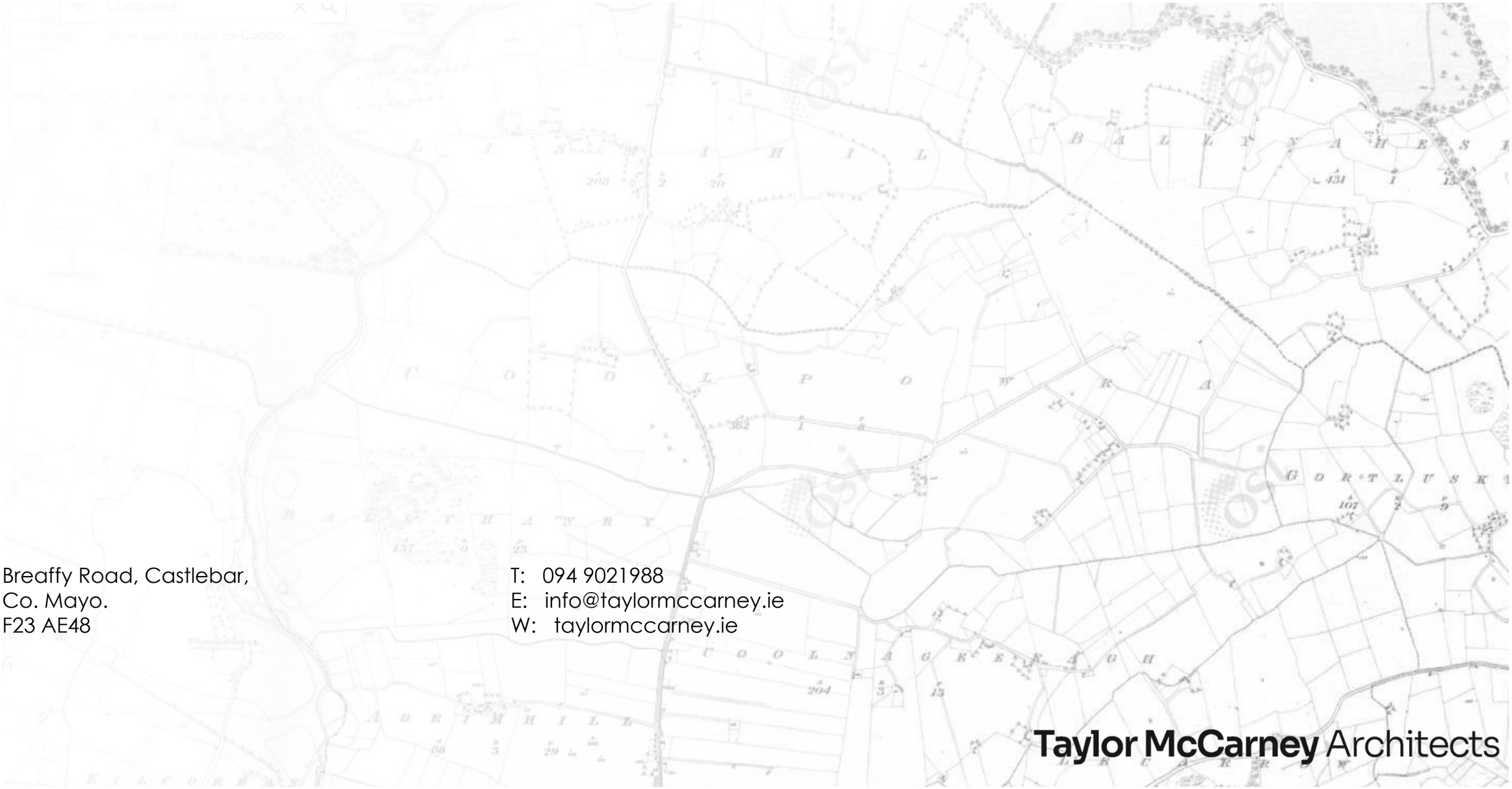

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APPENDIX 4.1

ENVIRONMENTAL RISK ASSESSMENT (ERA)

COMAH SUPPORT FOR PROJECT COOLPOWRA

Project Coolpowra Environmental Risk Assessment

Halston Environmental and Planning Limited

Report No.: 2, Rev. 1
Document No.: 2246099
Date: 2024-05-24

Project name:	COMAH SUPPORT FOR PROJECT COOLPOWRA	DNV Services UK Limited
Report title:	Project Coolpowra Environmental Risk Assessment	Applicon House,
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Date of issue:	2024-05-24	
Project No.:	10510406	
Organisation unit:	Aberdeen SHE Risk	
Report No.:	2, Rev. 1	
Document No.:	2246099	

Applicable contract(s) governing the provision of this Report: 1236811

Objective:

To carry out an environmental risk assessment of the Project Coolpowra planning application stage

Prepared by:	Verified by:	Approved by:
Digitally signed by Fraser, John Date: 2024.05.28 14:22:18 +01'00'	M.P.Simms Digitally signed by Michael Simms Date: 2024.05.28 15:07:54 +01'00'	M.P.Simms Digitally signed by Michael Simms Date: 2024.05.28 15:08:06 +01'00'
John Fraser Senior Consultant	Michael Simms Head of Section	Michael Simms Head of Section

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Keywords:

ERA, CDOIF, Environmental, COMAH

Rev. No.	Date	Reason for Issue	Prepared by	Verified by	Approved by
0	2024-05-20	First issue	J Fraser	M Simms	M Simms
1	2024-05-24	Draft Second issue incorporating update to hydrology information	J Fraser		

Table of contents

1 EXECUTIVE SUMMARY

This report presents the Environmental Risk Assessment for the Project Coolpowra planning application stage.

The ERA methodology follows the Source-Pathway-Receptor model outlined in the Chemical and Downstream Oil Industries Forum (CDOIF) Guideline on Environmental Risk Tolerability for COMAH Establishments. The source of environmental risk identified was diesel from three liquid fuel tanks with a capacity of 7333m^3 each.

One Source-Pathway-Receptor trio with MATTE potential was identified as the release of approximately 6196 tonnes of diesel stored in 7333m^3 liquid fuel tank capacity impacting on the Kilcrow River

The overall unmitigated level of risk posed by the establishment from the release of diesel to the Kilcrow River was found to be in the tolerable if ALARP (TifALARP) on the CDOIF risk matrix. Following the identification of the control measures in place and their probability of failure on demand, it was found that the level of mitigated risk posed by the establishment to the Kilcrow River falls into the Broadly Acceptable region.

2 INTRODUCTION

Project Coolpowra is a proposed Reserve Gas-Fired Power Generator, GIS Electrical Substation and Energy Storage System.

Halston Environmental and Planning Limited (Halston) is to produce an environmental risk assessment (ERA) as part of its COMAH HSE submission. The Health and Safety Authority (HSA) can request it to see the ERA. DNV has been subcontracted by Halston Environmental and Planning Limited to carry out the ERA in support of the application.

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations") (Ref. /1/), implement the Seveso III Directive (2012/18/EU) and aim to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious harm to people and/or the environment, with the overall objective of providing a high level of protection in a consistent and effective manner. The site development qualifies as a "lower tier" site under the COMAH Regulations 2015 as it holds quantities of dangerous substances above threshold quantities specified in Schedule 1 of the COMAH Regulations 2015 (Ref. /1/).

The ERA outlined in this document has been undertaken in accordance with the Chemical and Downstream Oil Industries Forum (CDOIF) Guideline on Environmental Risk Tolerability for COMAH Establishments (Ref. /2/), the Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (Ref. /3/) and the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Enforcement Regulations, 2008 (Ref. /4/). The CDOIF guideline for carrying out ERAs is an industry wide accepted methodology.

3 RISK ASSESSMENT METHODOLOGY

3.1 What is a Major Accident to the Environment?

It is not possible to provide a scientific definition of changes in the environment caused by an event at an establishment that would constitute a major accident to the environment. However, the more extensive the areas and quantities of natural and semi-natural resource damaged, the longer the effects are likely to last, and the more intense or severe these effects, then the more likely it is that the event will be regarded as a major accident to the environment by the competent authority. Moreover, if the event affects nationally or internationally sites designated for nature conservation purposes then the event is likely to be regarded as a major accident at lower thresholds than those that apply to other designated areas, amenity areas, the wider countryside or the more common types of agricultural land. As a general rule, the specific threshold levels that apply to other designated sites, scarce habitats and more widespread habitats vary in relation to the importance of the particular type of site.

In the most general terms, major accident hazards to the environment will be those where events have the potential to: (i) pose knock-on threats to human health by contamination of food or drinking water or impacts on sewage treatment regimes; (ii) affect large areas of land designated for conservation, amenity or planning purposes. Note that large in an ecological sense may include extensive agglomerations of fragmented habitats; (iii) be long-term or persistent and/or inhibit natural processes of regeneration; (iv) be severe by causing significant permanent or long-term damage to the ecosystem (direct, indirect, or knock-on), such as reduced breeding success of protected species, or reduced biodiversity of protected habitats (including local or national extinctions of protected species), or destruction/reduction in quality of a significant proportion of the area of a rare habitat (Ref. /5/).

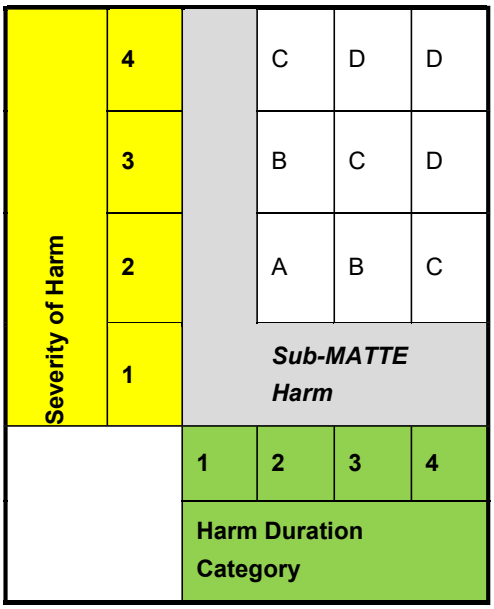
3.2 Environmental Risk Assessment Approach

DNV's environmental risk assessment methodology follows the Source-Pathway-Receptor model that is outlined in the CDOIF (Ref. /2/) and DETR Guidelines (Ref. /5/). The assessment involves the following steps which are described below:

1. **Source-pathway-receptor assessment -** The first stage involves a detailed assessment of the materials stored on site, identification of the natural and man-made receptors surrounding the site and the pathways leading from the site to these receptors.

2. **Determination of the severity and duration of harm to receptors –** to determine the consequence level for each unmitigated liquid, gaseous and ignited release event, the severity levels, S1, S2, S3 and S4 for significant, severe, major and catastrophic respectively were established.

Three approaches are used to determine the severity of harm caused by liquid releases. These include an oil slick approach and an LC_{50} approach for releases on water and analysis of a representative pool diameter for releases on land. These are described later in Section 3.2.1. For particular species, the severity of harm is based on an estimate of the proportion of the national population which is affected, if a release impacts the receptor where the species is resident. Once established, these severity levels are then compared with the likely duration of harm D1, D2, D3 and D4 for short term, medium term, long term and very long term respectively to establish a consequence level between A and D as shown in the matrix presented in Figure 3-1. The reference tables from the CDOIF guidelines (Ref. /2/) used to establish the consequence levels and the duration of harm categories associated with each MAH scenario are shown in Appendix A. The method used for predicting the duration of harm caused by the release scenarios to the environmental receptors is presented in Section 3.2.2.



Frequency at which the CDOIF consequence level is reached or exceeded	Frequency per receptor per establishment per year	
	Intolerable (greater than)	Broadly Acceptable (less than)
A	1.0 E-02	1.0 E-04
B	1.0 E-03	1.0 E-05
C	1.0 E-04	1.0 E-06
D	1.0 E-05	1.0 E-07

Figure 3-1: Method and matrix for determining MATTE consequence level and corresponding receptor frequency tolerability thresholds

3. **Quantification of unmitigated risk to receptors –** the frequencies of the unmitigated occurrences of any scenarios qualifying as MATTEs are determined using site specific or generic quantitative risk assessment (QRA) data. This includes similar releases of the material which could follow the same pathway to the receptor. These frequencies are aggregated to determine the total unmitigated risk posed to each receptor by the establishment. A comparison of the unmitigated risk posed to each receptor against the criteria in the risk matrix presented in Figure 3-2 to establish whether the risk is intolerable, tolerable if as low as reasonably practicable (TifALARP) or broadly acceptable.

	Frequency per establishment per receptor per year						
Frequency at which CDOIF Consequence Level is equalled or exceeded	10^{-8} - 10^{-7}	10^{-7} - 10^{-6}	10^{-6} - 10^{-5}	10^{-5} - 10^{-4}	10^{-4} - 10^{-3}	10^{-3} - 10^{-2}	>10^{-2}
D- MATTE						Intolerable	
C- MATTE				TifALARP			
B - MATTE	Broadly Acceptable						
A- MATTE							
Sub MATTE	Tolerability not considered by CDOIF						

Figure 3-2: CDOIF Risk Matrix

4. **Quantification of mitigated risk to receptors –** the frequencies of the unmitigated MATTE scenarios are multiplied by the probability of failure on demand (PFD) of any relevant protection layers on the site. These mitigated frequencies are aggregated to determine the total mitigated risk posed to each receptor by the establishment. The mitigated risks posed to each receptor are again compared to the criteria in the risk matrix presented in Figure 3-2 to establish whether the risk is intolerable, TifALARP or broadly acceptable.

5. **ALARP demonstrations if necessary -** Operators may be required to conduct a ALARP demonstration if the mitigated level of risk posed by the establishment to any of the surrounding receptors is found to be intolerable or TifALARP.

3.2.1 Determining Severity of Harm to Receptors

Harm to Water Receptors

Two approaches are used to determine the severity of harm caused by a liquid release to a water based environmental receptor. These are based on a lethal concentration (LC_{50}) of material in the receptor and the critical thickness of an oil slick. The type of approach applied depends on the properties of the material being released. For releases onto land, an approach based on a representative diameter for liquid pool is used.

If a release can reach a receptor where particular species can be found, the severity of harm is assessed using the MATTE tolerability tables in Appendix A.

1. LC_{50} Approach

An LC_{50} approach can be used to determine the severity of harm caused by water soluble substances which can exert toxic effects on aquatic life. The median lethal concentration, LC_{50} (lethal concentration, 50%) is the concentration of a substance required to kill half of the members of a tested population after a specified test duration. The value may be obtained by direct observation or from interpolation. LC_{50} values are a useful indicator of the substance's ecotoxicity with lower values indicative of increased toxicity. LC_{50} values can therefore define maximum allowable toxicant concentrations. As a general rule the longer the exposure time for a particular species, the lower the LC_{50} value. The reason for this observation is that it takes time for the compound to penetrate the bodies of test organisms to affect harm.

The following simple equation is then used to determine the minimum amount of material which could credibly cause a MATTE scenario:

$$\text{Mass of material for MATTE potential} = \text{Area of receptor} \times \text{Water depth} \times LC_{50}\ \text{value} \qquad (1)$$

2. Oil Slick Approach

The fate and behaviour of oil in the marine environment depends on many processes including dissolution, emulsification, oxidation and destruction, physical transport and the marine environment. According to "Offshore Environment" (Ref. /6/), it is stated that an oil slick with a thickness of less than 0.1 mm in the marine environment will tend to disintegrate into separate fragments and spread over larger and more distant areas. It is therefore assumed that a critical thickness greater than or equal to 0.1 mm is feasible for an oil slick that has the potential to cause a MATTE.

To calculate the minimum volume of material required to cause a MATTE to a receptor, the critical thickness of 0.1 mm is multiplied by the defined minimum threshold area for a MATTE in the receptor (Ref. /2/).

In addition, the way in which an oil slick breaks up and dissipates depends largely on how persistent the oil is. Light products such as kerosene tend to evaporate, dissipate quickly and naturally and rarely need cleaning up. Such products are termed non-persistent oils. Persistent oils, such as many crude oils, break up and dissipate more slowly and usually require a clean-up response. An oil slick usually drifts in the same direction as the wind, and as it does, it dissipates and thins.

Harm to Land Receptors

Liquid spills on land surfaces will spread to form pools, the extent of which will depend on a number of factors such as the ground surface and topography.

Low viscosity liquids (e.g. light distillates) spilt on concrete are assumed to spread to form pools with a uniform thickness of 5 mm. DNV's Safeti software is used for quantified risk assessment and sets this thickness value as a default for pools. This value is used for releases to areas of made ground within the site area. Liquids with higher viscosities (e.g. middle distillates and crude / heavy oils) that are spilt on concrete are assumed to spread to form pools with a uniform thickness of 20 mm. If liquid hydrocarbons are spilt onto unmade ground that is covered with vegetation they will form pools with significantly greater thicknesses due to the liquid hold-up provided by the vegetation. A value of 50 mm has been assumed in the case where crude oil is spilt onto unmade ground.

Harm to Soil and Groundwater Receptors

Liquids which are released to permeable ground will migrate downwards through the soil and potentially into groundwater layers due to the effect of gravity and capillary forces. For hydrocarbon releases, the depth and size of the plume depends on (Ref. /7/):

1. Properties of the hydrocarbon material – heavier hydrocarbons show lower rates of permeation through the soil due to their higher viscosity and tendency to adsorb to soil particles. On the other hand, BTEX (benzene, toluene, ethylbenzene and xylene) have lowest soil sorption coefficients and move quickly through the soil;

2. Properties of the soil – porosity and permeability are the two most important factors which influence liquid flow through the ground. Soils such as sand with high porosities and permeabilities allow for the fastest rates of permeation.

Hydrocarbons that have been released into the ground break down over time due to vaporisation and the action of bacteria in the soil. The length of time that the hydrocarbons remain in the ground depends on the molecular weight of the compound, with heavier hydrocarbons being more resistant to degradation than lighter ones. Hydrocarbons also degrade more quickly in hot and humid climates. In general, sub-surface hydrocarbon releases tend to degrade quite quickly – a field study of a crude oil spill site in India indicated that up to 75% of the hydrocarbons could be degraded within a year (Ref. /7/).

Accurately predicting the subsurface spread of hydrocarbons is difficult even with complex modelling solutions. DNV will employ a simplified semi-quantitative approach to determine the severity and duration of harm of releases. This approach will involve the following steps:

1. Determine if the released hydrocarbons have the potential to permeate through the soil layer and enter the groundwater layer depending on the properties of the released material and the properties and thickness of the soil layer.

2. If the hydrocarbon release can permeate into the groundwater layer, any BTX components and light hydrocarbons present in the material will be assumed to be able to spread indefinitely in the groundwater until they occupy a volume with a concentration greater than the legal or recommended concentration of the pollutant in question. It will be assumed that middle distillates and heavy hydrocarbons will not be able to spread easily within the groundwater layers due to their higher viscosities. The following simple equation is then used to determine the minimum amount of material which could credibly cause a MATTE scenario:

   Mass of material for MATTE potential = Groundwater area x Groundwater table depth x Legal limit of pollutant (2)

3.2.2 Determining Duration of Harm

The overall receptor tolerability for MATTE, as defined in Figure 3-1, is dependent on the level of harm caused by the incident and also the duration of that harm. A supporting document to the CDOIF guidance has been produced by ENVIRON titled 'Environmental Recovery Guide' - Supporting Guide to the Environmental Risk Tolerability for COMAH Establishments Guideline' (Ref. /8/). This document lays out a straightforward method for determining harm duration for any environmental release based on the chemical and receptor type under analysis. The guidance in the document is based on a review of around 300 case studies of environmental incidents in the CDOIF related industries and a review of monitoring studies of the Exxon Valdez incident.

The environmental recovery guidance document provides two flow charts, which are based on water habitats and land habitats, allowing the assessor to determine the harm duration. The flowcharts contain all 60 of the chemicals listed in the COMAH Regulations and split these substances by their ability to be broken down or dispersed in the natural environment. The flowchart then splits up different habitat (receptor) types by their ability to regenerate and their environmental sensitivity i.e. a river is classed as a different type of habitat to a coral reef. A harm duration category is then selected, for each potential MATTE event, based on the categories of chemical and habitat.

The recovery flowchart for water and land receptors is provided in Figure 3-3 and Figure 3-4 respectively. The method presented in Figure 3-3 is not applicable for firewater, so engineering judgement was used to determine the harm duration category.

The recovery time for each particular species is taken as the breeding lifecycle. The harm duration category is selected based on the relevant water or land habitat flowchart provided in Figure 3-3 or Figure 3-4.

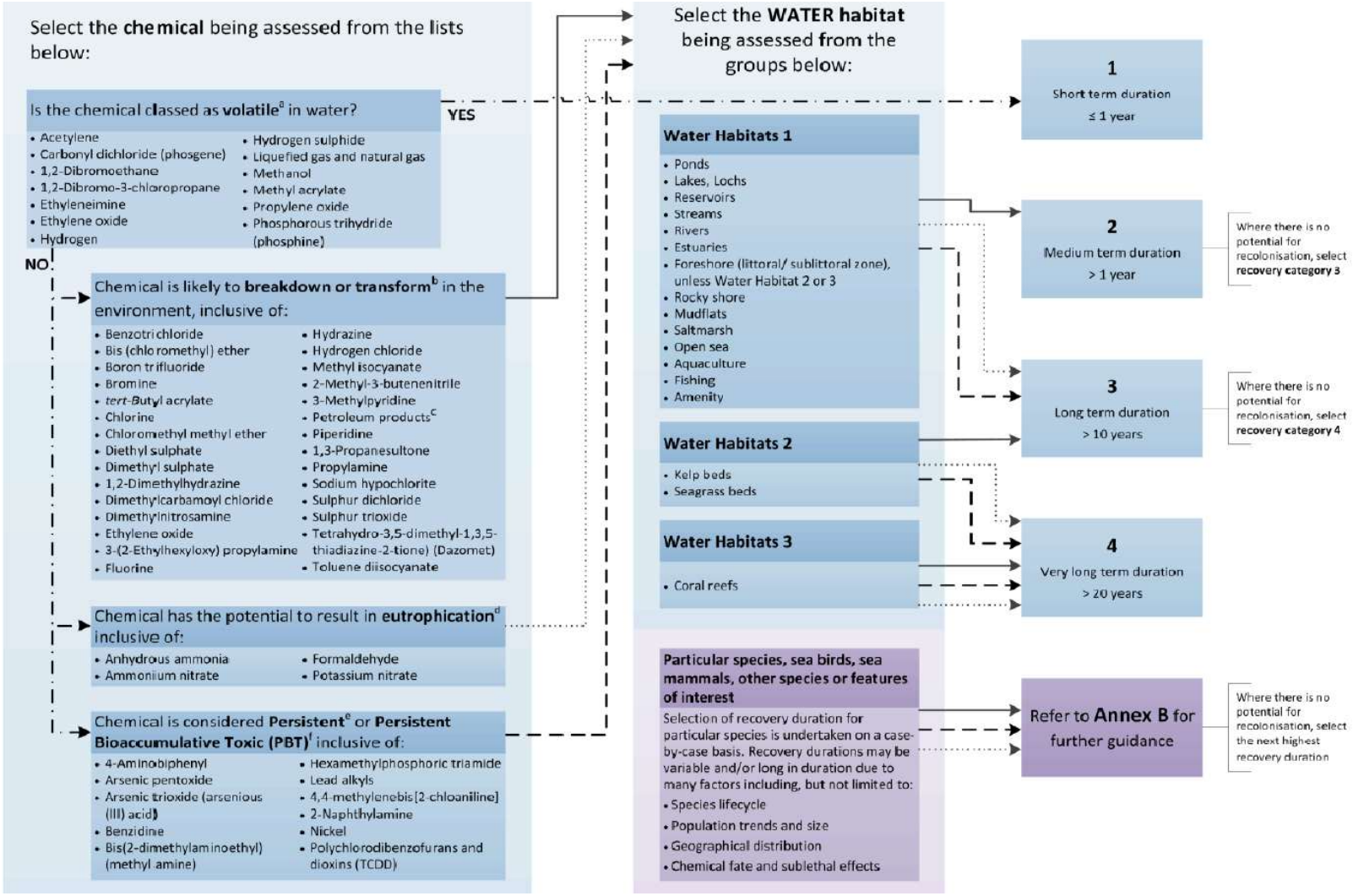


Figure 3-3: Recovery flowchart for water receptors (Ref. /8/)

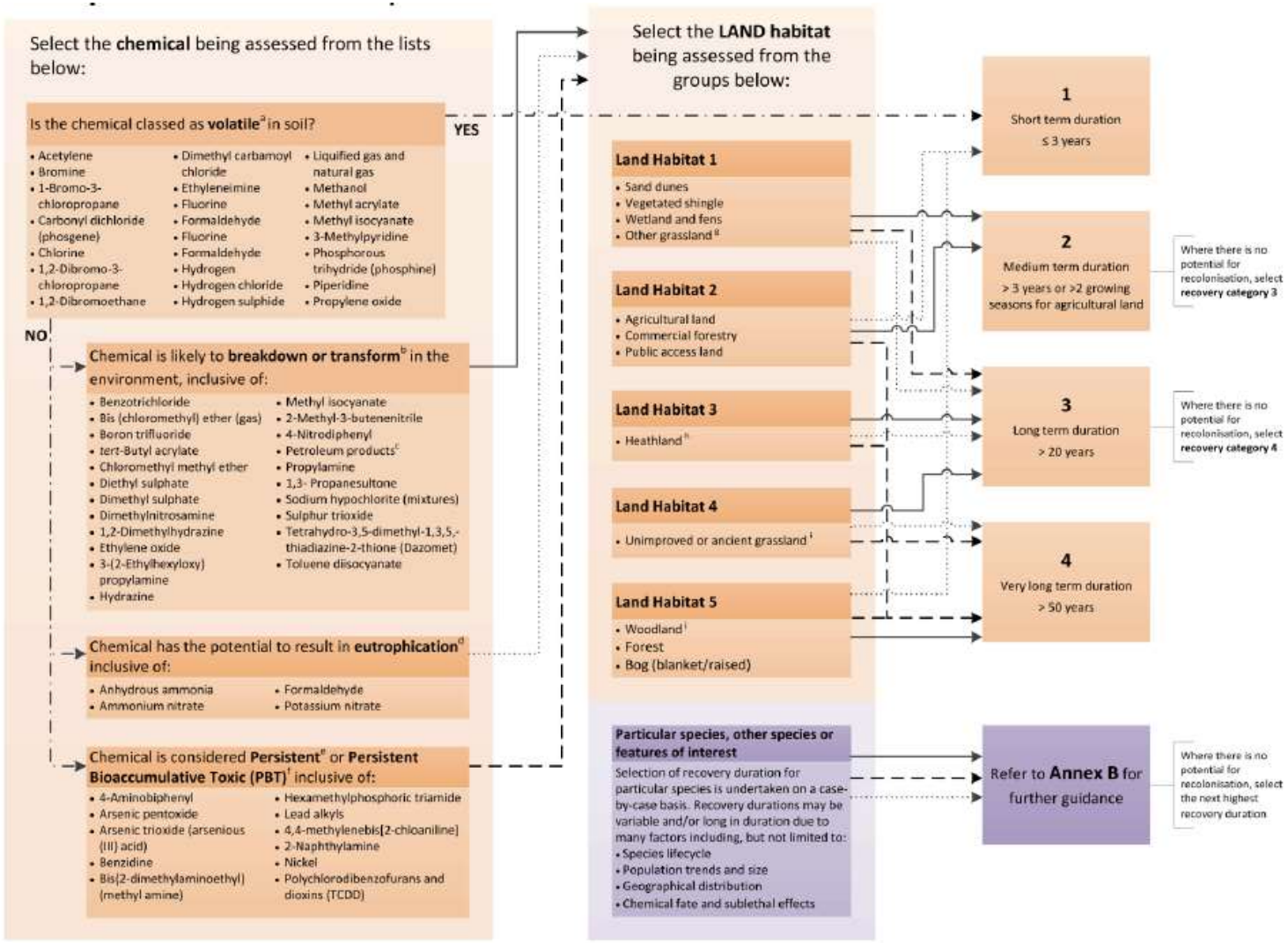


Figure 3-4: Recovery flowchart for land receptors (Ref. /8/)

4 SITE DESCRIPTION

The proposed development is located in the townland of Coolpowra, Ballynaheskeragh, Coolnageeragh and Gortlusky, County Galway, and is located approximately 4km north of Portumna and 3.1km south of Killimor. See Figure 4-1 for site location and Figure 4-2 for site layout plan.

The project includes a Reserve Gas-Fired Generator which comprises three opencycle gas-fired generator (OCGT) units located within a turbine hall, accompanied by auxiliary equipment, with secondary fuel (gas oil) stored in a bunded structure outside the turbine hall, alongside cooling equipment and other electrical plant items (e.g. transformers). The Reserve Gas-Fired Generator will include an above ground installation (AGI) compound.

An underground gas pipeline, designed to operate at pressures of 16bar or higher, will be established by Gas Networks Ireland (GNI) through a separate planning application. This pipeline will be directed to the proposed AGI at the development site from the nearest connection point on the gas transmission network.

The project includes a 400kV Gas Insulated Switchgear (GIS) Substation comprising a two-storey building positioned and secured within a palisade fenced compound. The proposed GIS will upgrade and replace the existing air insulated switchgear (AIS) substation with a new gas GIS substation at Oldstreet. The GIS substation will facilitate connection of the reserve gas fired generator and ESS to the existing node on the transmission network.

Finally, the project includes an energy Storage System which includes: (i) a long duration energy storage (LDES) battery (200MW) positioned in an outdoor compound and (ii) a synchronous condenser (400MVA electrical rating) positioned within a building. The technology is designed to complement and support the reserve gas fired generator by providing zero carbon, instantaneous power and balancing power to the grid.

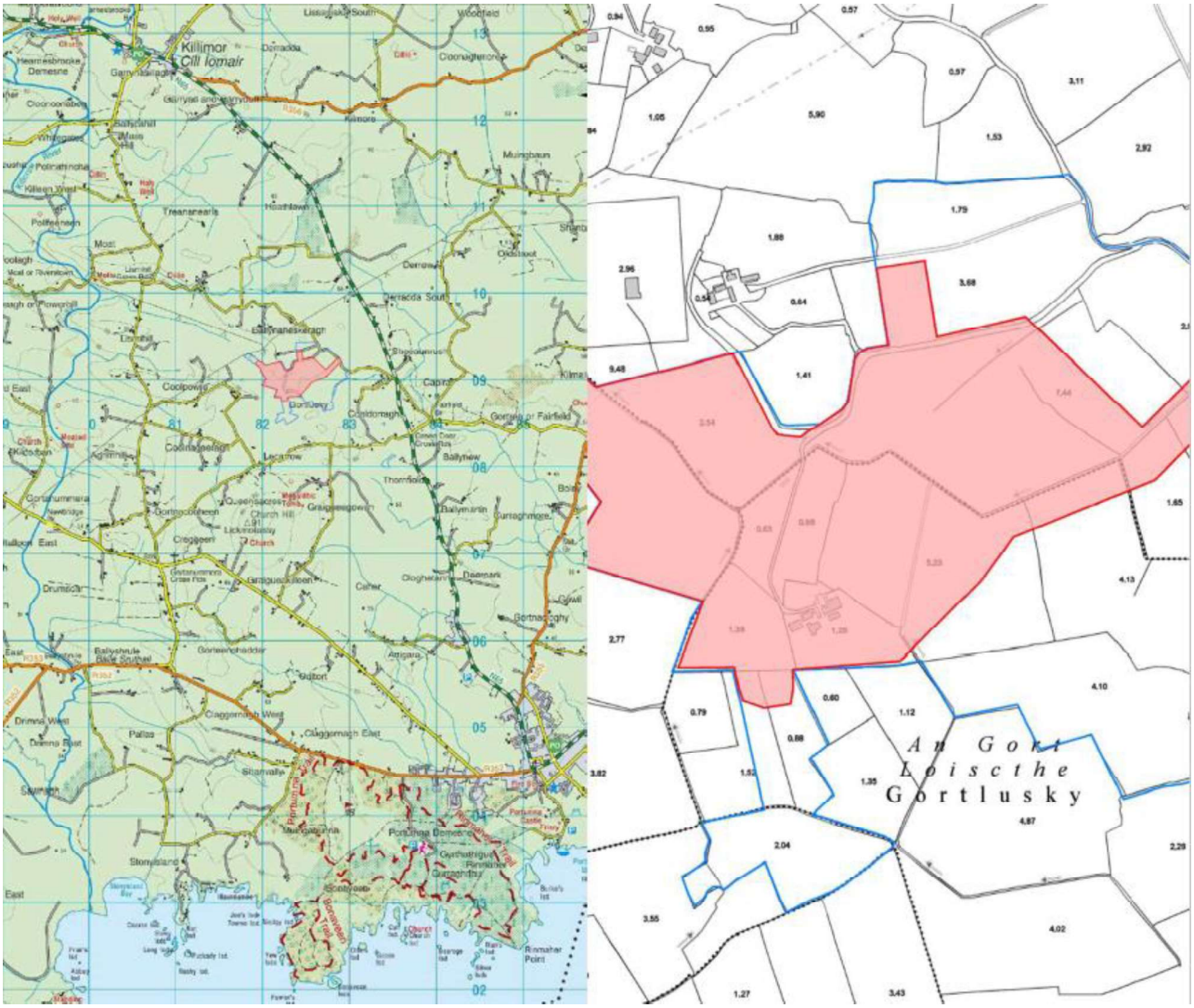


Figure 4-1 Site Location Plan

Figure 4-2 Site Layout Plan

5 BASELINE DESCRIPTION OF THE LOCAL ENVIRONMENT

The site setting descriptions are detailed in the Summary Description of Receiving Environment (Ref. /9/) and summarised in the following sections.

5.1 Topography

Lands within the development site boundary are in agricultural use and include a farmhouse and outbuildings which will be demolished. The proposed lands are situated at an elevation of c. 51-54m.

5.2 Geology

Bedrock Formation Beneath the site is Visean basinal limestone "Calp" described as Dark-grey argillaceous & cherty limestone & shale. Soils on the site are described as Mullabane (Teagasc Code 1100q) and described as mostly Brown Earths and Calcareous Brown Eaths on drift with limestones, associated with Luvisols and some inclusions of Rendzinas and peat.

5.3 Soil and Sediment

The soils are classed as well drained (Type BminSW). The Killimor Esker (Code GY078), a moderate-sized ridge comprised of esker sands and gravels, deposited under the ice sheet and trends east west is located 2.6km north of the site at its nearest point.

5.4 Groundwater

The bedrock aquifer beneath the site is a locally important aquifer with bedrock which is moderately productive only in local zones (Aquifer Category Ll). Aquifer vulnerability is classed as moderate mainly with the exemption of the south-western corner of the site where vulnerability is classed as high with some outcropping rock /rock near the surface,

There are no karst features (including Turloughs) within the boundary of the proposed development lands; the closest karst feature being Pollnabreeka Spring, an enclosed depression approximately 2.8km south of the site. There are no known (recorded by GSI) groundwater abstraction wells within 4km of the site.

5.5 Hydrology

The site is within the Lower Shannon Hydrometric Area (River Basin District IEGBNISH), which has an area of 5,032km^2. The application site is primarily within the Lower Shannon catchment (catchment ID 25B) with the western part of the site bordering Lower Shannon catchment ID 25B. Desktop studies show that the proposed development lands are contained in the Gortaha_010 and Kilcrow_070 WFD River subbasins. There are a number of field ditches and streams within the proposed development site. The main watercourse within the development land is the Ballynaheskeragh stream (also known as GORTAHA_010) which is shown (see Figure 5-1) to be flowing generally in a north western and discharges to the Kilcrow River.

The Kilcrow River is located approximately 1.8km west of the development land boundary and it flows generally in a southern direction and through Barroughter Bog SAC approximately 9km downstream of the site, before flowing into Lough Derg (Shannon) SPA (Code 004058) /Lough Derg, North-east Shore SAC (Code 002241) a further 1.1km downstream of Barroughter Bog SAC.

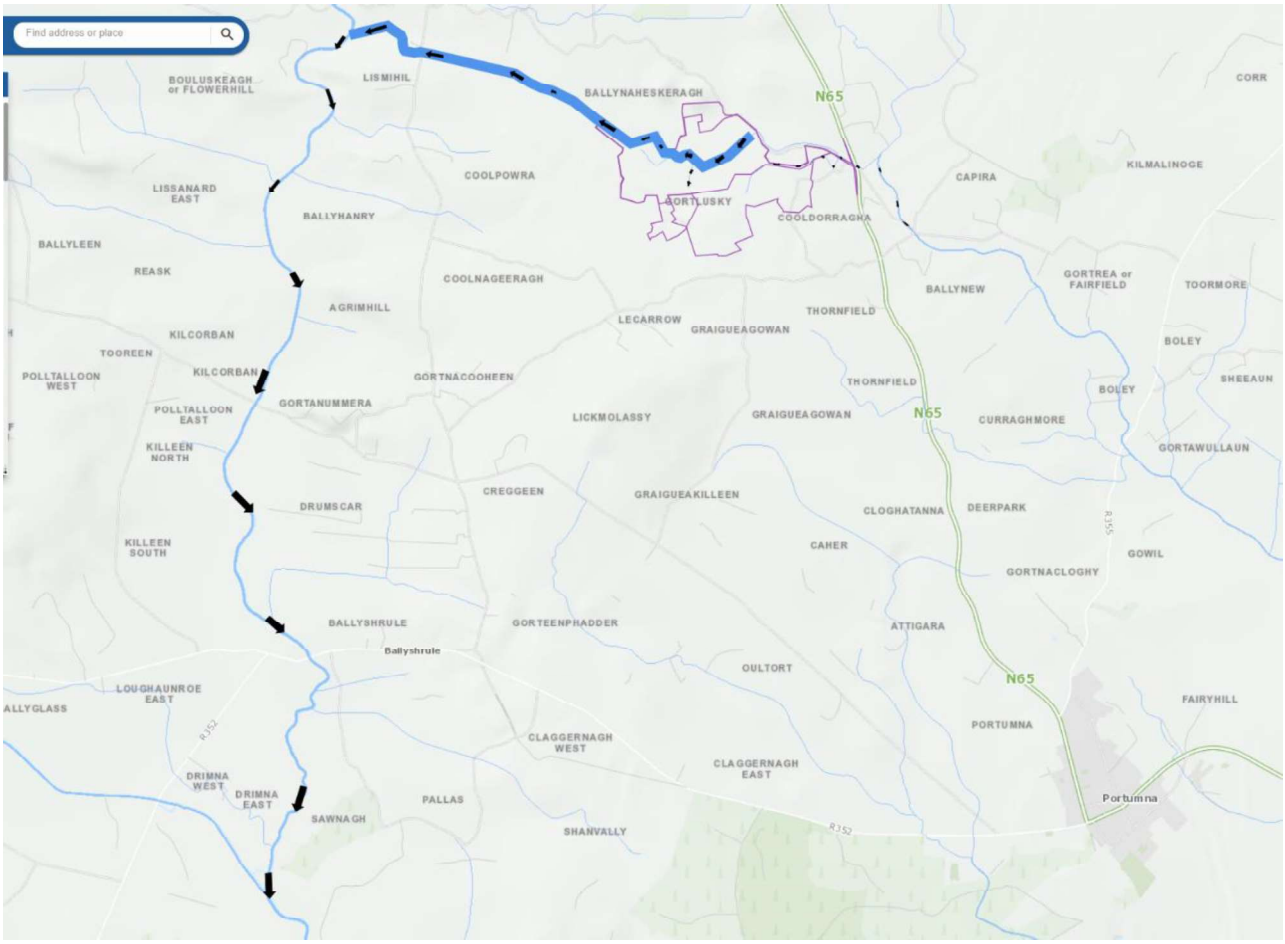


Figure 5-1: Ballynaheskeragh Stream and Kilcrow River Flow Path

5.5.1 Flooding

The application site boundary is located within (fluvial) Flood Zone C (low probability of flooding) as confirmed by a review of Office of Public Works(OPW) available flood mapping. Historical flood events are recorded by OPW. A review of the online historical data indicates that there is no record of past flooding events mapped within a 2km radius of the application site. The application site is located on lands with clear drainage paths away from the site, so the risk of pluvial flooding is categorised as low. There is no groundwater flood risk as identified from a review of Groundwater Flood Probability Maps prepared by Geological Survey Ireland. No Areas of Further Assessment (AFA) are identified at the proposed site in the Strategic Flood Risk Assessment (SFRA) for the Galway CDP 2022-2028.

5.6 Cultural Heritage

There are no listed or known architectural heritage, archaeological monuments or geological heritage sites within the proposed development site.

5.7 Biodiversity, Flora and Fauna

There are no protected sites within the development land. Capira/Derrew Bog NHA (Site code 001240) is 1.3km east of the site and is the closest designed site. Ardgraigue Bog SAC (Site Code 002356)/pNHA (Site Code 01224) is 3.7km northwest of the site and Middle Shannon Callows SPA (Site Code 004096) /River Shannon Callows SAC/pNHA (Site Code 000216) is 5.2km at its closest point southeast of the site.

A map showing the location of European Sites (SAC, SPA) within a 15km radius of the proposed development lands is presented in Figure 5-2.

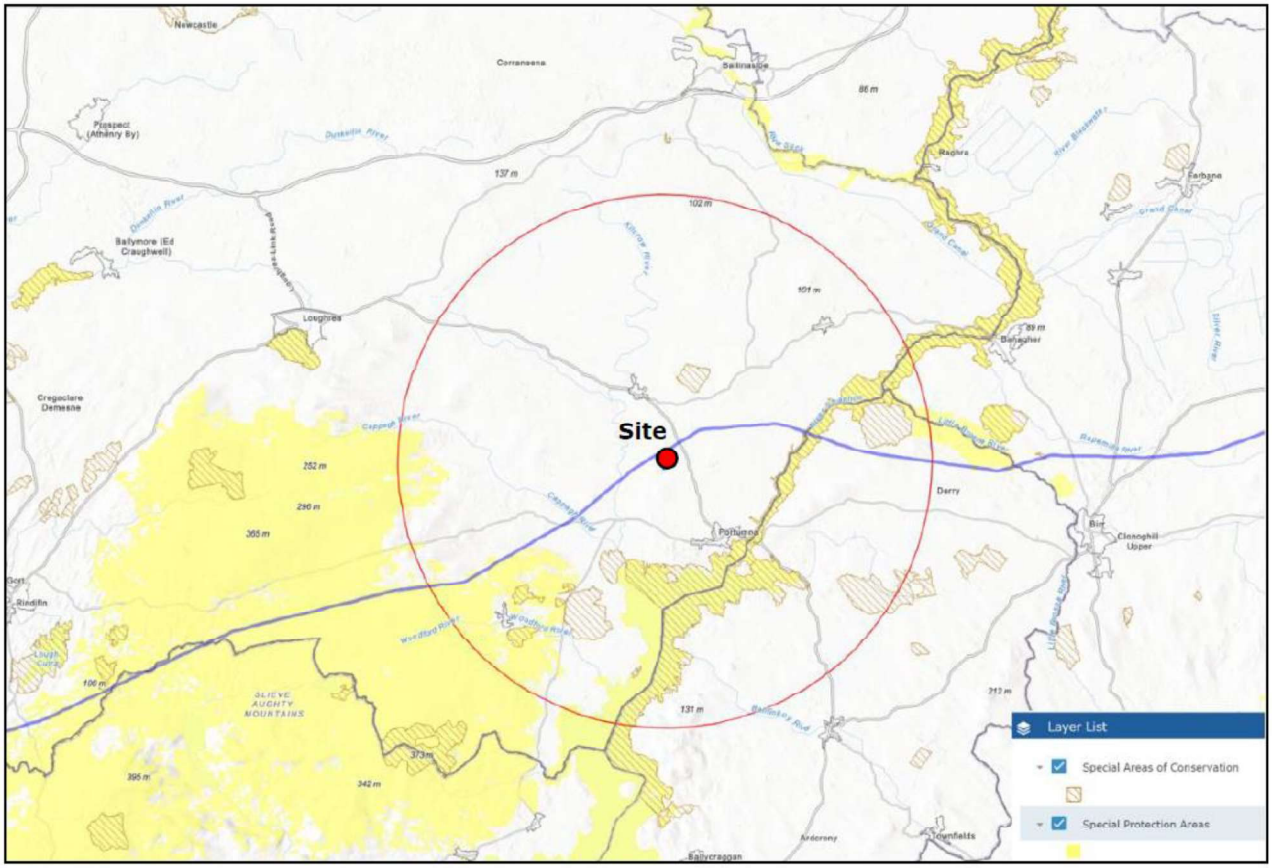


Figure 5-2 European Sites (15km radius from the site presented) along with the 400kV power line

5.8 Landscape and Visual

The proposed development is located within the 'Eastern Plains Region', which 'derives most of its character from the covering blanket of glacial soils that give rise to extensive, level plains of grasslands, with many areas of bog in the north'. Within this landscape region, the site is within the 'Central Galway Complex Landscape' Type, described as 'Level plain of productive grassland containing many settlements and dwellings'. The site sensitivity is classed as 'Low', the lowest degree of sensitivity, and defined as 'unlikely to be adversely affected by change'. Whilst a considerable number of designated scenic routes are located throughout County Galway, according to the Galway CDP 2022-2028 none of these occur within the 2km study area. The area in which the proposed development site is located is typical productive rural landscape that is not considered rare or distinctive at national or regional level.

The proposed development will be located adjacent to, and south of, the existing operational 400kV AIS electricity substation (Oldstreet). The proposed site was chosen as the preferred site following analysis of sites along the two 400kV transmission lines which runs from Moneypoint to the east coast of Ireland. The site adjoins the 400kV line which routes from Moneypoint to Oldstreet (an intermediate substation) and then to Woodland, where there is a connection to the East West Interconnector (EWIC)1. Oldstreet is the only substation along the HV line between Moneypoint and Woodland.

5.9 Air Quality and Climate

The site is located in Air Zone D (rural Ireland, i.e. remainder of the state excluding Zones A, B and C). According to the Environmental Protection Agency (EPA), the Air Quality Index is classed as 3 (Good).

6 SOURCE TERM

All of the materials handled on the site must be identified and assessed in order to determine whether they have the potential to cause a MATTE to any of the environmental receptors surrounding the site. In this section, the identified materials are assessed in a preliminary substance screening step in which materials are screened out if their release quantities or parameters related to their behaviour in the environment (e.g. ecotoxicity, degradability, water solubility, etc.) are deemed insufficient to result in environmental harm.

The only dangerous material present on the site that has been identified is the secondary fuel (diesel). The material parameters are detailed in Table 6-1.

6.1 Preliminary Substance Screening

A preliminary substance screening process is conducted using the following criteria:

1. Where the material does not have any physical, chemical, toxic or eco-toxic properties that could adversely affect the environment following a release, the material is screened out.
2. Where the material does not meet a minimum inventory criterion of 250 litres (equivalent to a single barrel), the material is screened out. The 250 litre minimum inventory criterion has been set based on engineering judgement.

The ERA considers the worst-case unignited catastrophic (full-inventory) failures of the liquid fuel tanks (diesel) stored on site. All releases are assumed to be unignited for the purposes of the preliminary substance screening.

There is the potential for ignited release of natural gas as per Coolpowra Project - Proposed gas-fired generator which will combust natural gas supplied from the GNI transmission system. This is discussed in Sections 9.2 and 9.3.

The proposed 400kV Gas Insulated Switchgear (GIS) Electrical Substation may contain a greenhouse gas such as sulphur hexafluoride which is identified as a non-flammable and non-toxic gas and unlikely to cause a MATTE.

The site has three liquid fuel tanks with a capacity of 7333m^3 each. The calculated tonnage of diesel stored in each tank is calculated as 6196 tonnes based on a diesel density of 845 kg/m^3.

6.2 Summary of Representative MATTE Scenarios

The representative scenario is the release of approximately 6196 tonnes of diesel stored in one of the liquid fuel tanks on the site. This is the worst-case unignited catastrophic (full-inventory) release scenario. The release of diesel representative scenario will be assessed to determine whether it has the potential to cause a MATTE to one of the identified environmental receptors surrounding the site.

Table 6-1 List of Materials Held on Site with Chemical Properties

Material	CAS No.	Composition	Solubility in Water	Other Physical and Chemical Properties	Toxicity	Aquatic Toxicity	Degradability	Bioaccumulation	Comment
Diesel		Mixture of C9-C25 hydrocarbons	Insoluble	State (ambient conditions): liquid Boiling point: 170-390 °C Flash point: 55-75 °C Density: 820-845 kg/m^3 Flammability: flammable	Rat (inhalation): LC_{50} 4.1 mg/L (4 h)	Invertebrates: *Daphnia magna* (water flea): EL_{50} (48 h) 68 mg/l Fish: LL_{50} (96 h) 65 mg/l	Biodegradable	Not expected to bioaccumulate	Spillages may penetrate the soil and accumulate in sediments.

7 PATHWAY TERM

The pathways describe how unignited and ignited releases can potentially make their way offsite and into the surrounding environment via air, water and land pathways. At this stage of the assessment, it is assumed that no mitigation measures (for example bunds and tertiary containment) are in place.

7.1 Releases to Atmosphere

For substances that are released to atmosphere, the pathway of dispersion through air and subsequent deposition is viable. Atmospheric release scenarios include:

1. Transmission of thermal radiation, flame and overpressure through the atmosphere.
2. Dispersion and subsequent deposition of gaseous/vapour releases (including fire plume gases) through the atmosphere.
3. Atmospheric deposition of solids/liquids (for example from boilover events).

7.2 Releases to Water

There is potential for a release to the Ballynaheskeragh stream which flows within the proposed development land. Any release into this water course then has potential to continue to the Kilcrow River

7.3 Releases to Ground

For scenarios that result in releases with the potential for environmental damage that are transported by land, the existence of a complete source-pathway-receptor linkage is more complex and the pathway component of the linkage may be scenario location specific. The following land pathways have been considered:

1. Overland flow of the substance from point of release to receptor. This is more likely to occur where the ground at the point of release is impermeable, either through the presence of made ground or natural conditions.
2. Throughflow of material through the ground – the substance is released onto permeable ground and then flows laterally through the sub-surface over a short distance to surrounding environmental receptors. In this case, the soil layer would be considered to be both a receptor and a pathway.
3. Groundwater flow – the substance is released onto permeable ground and percolates through the surface layers into groundwater. Further dispersion through the groundwater may then occur, potentially leading to the exposure of more distant environmental receptors. In these cases, the groundwater can be both a receptor and a pathway.
4. Flow of released material offsite via the drainage system.

A discussion on whether the abovementioned land pathways present credible pathways that can result in the transportation of released material from specific points of release on site to any of the surrounding environmental receptors is given in the subsections below.

7.3.1 Overland Flow

Released liquids will be able to reach the surrounding environmental receptors via overland flow if the gradient of the land slopes in the direction of the receptors, the flow pathway is not excessively long and there are no significant impediments to flow (e.g. vegetation).

The site development is within agricultural pastures and the overall topography of the site has been considered to be flat. Any liquid releases are therefore expected to spread out form circular pools around their point of release.

7.3.2 Throughflow and Groundwater Flow

The three liquid fuel tanks storing diesel have a bund. Which is designed to contain 150% capacity of a single tank within. Pumping of water from bunds can only be manually initiated by an operator following inspection of the water within the bund. In the event of a spillage from an unloading fuel tanker the liquid will runoff into a central gully. The spill will be detected by a below ground forecourt oil separator which will contain and store the liquid for removal off site. The retention separator will be capable of retaining the maximum spillage likely to occur for road tanker delivery. The below ground separator is designed to accommodate 150% of this volume.

However, there are areas outside of the tank bunds through which liquids can permeate. Where bund overtopping may occur, diesel is not expected to percolate quickly through the ground due to the viscosity dependence on outside temperature.

7.3.3 Releases via Site Drainage System

The structure of the site's drainage system is assessed to determine if there is a potential for collected material to be discharged offsite and into any of the surrounding receptors.

The drainage system is incorporates below-ground oil interceptors, a firewater retention tank, stormwater attenuation pond, silt sumps (at gully positions) and infiltration trenches. Large external areas/compounds at the site will be surfaced with stone /grassed areas to allow rainwater to percolate to the underlying soils (e.g., AIS compound, AGI and areas beyond the main compound areas but within the development site boundary).

The access roads to the site are to be drained utilising filter drains. These are to run longitudinally along the road and allow the stormwater to filter directly to ground /soils via infiltration trenches. Surface water collected from impermeable areas will be delivered to the site stormwater drainage system. Surface water will be routed via the fire wastewater retention tank and an oil/water interceptor prior to entering an attenuation pond. The outfall from the attenuation pond will be controlled using a hydrobrake which will limit the discharge of stormwater to the receiving watercourse to 9.4l/s (4l/s per hectare).

During times when chemicals are handled, isolation valves in the drainage system will be closed. This is to assure that accidently spilled chemicals do not enter the storm water drain. The isolation valves will only be opened again once it has been assured that contamination of the downstream system can be excluded.

Any overwhelming which occurs will follow the flow path discussed in Section 7.3.1 and 7.3.2. It is assumed that a flow pathway from the site to the Kilcrow River via the drainage system therefore exists.

8 RECEPTOR TERM

The receptors which are located nearest to the site development are considered to be at the highest risk of harm from unignited and ignited releases. An overview of the sensitive features that are found in the receptors that have been identified to be at the highest risk of harm from the site are given in the subsections below.

8.1 Kilcrow River

The Kilcrow flows from north to south, before joining the Duniry River which subsequently joins Lough Derg/River Shannon. The River Shannon empties into the Atlantic Ocean through the Shannon Estuary. The Kilcrow River is located approximately 1.8km which then flows for about 9km and meets Duniry River approximately 1km upstream of Lough Derg. Lough Derg is approximately 11km from the site.

8.2 Agricultural Land

The site development is within agricultural pastures and releases from the site may impact the agricultural pastures assumed to 200 ha of land surrounding the site.

8.3 Soil

The soil located below the site area within agricultural pastures is considered as a separate environmental receptor as per the CDOIF Guidelines (Ref./3/). This receptor group refers to the material at the earth's surface to a depth of 1 m.

8.4 Groundwater

The site development is located above an aquifer classed as being of moderate vulnerability and located within a locally important aquifer. The bedrock is moderately productive in local zones.

The flow of groundwater in the area is assumed to be from north to south, in line with the Kilcrow River flow direction. There are no groundwater drinking water protection areas within, or close to, the proposed site development lands.

For the purposes of this assessment, a single groundwater receptor with a depth of 12 m will be considered with properties equivalent to the Dinantian Pure Unbedded Limestone – Waulsortian Limestone aquifer.

8.5 Heritage Sites

There are no listed or known architectural heritage, archaeological monuments or geological heritage sites within the proposed development site.

8.6 Designated Areas

There are no protected sites within the development lands. Capira/Derrew Bog NHA (Site code 001240) is 1.3km east of the site and is the closest designed site. Ardgraigue Bog SAC (Site Code 002356)/pNHA (Site Code 01224) is 3.7km northwest of the site and Middle Shannon Callows SPA (Site Code 004096) /River Shannon Callows SAC/pNHA (Site Code 000216) is 5.2km at its closest point southeast of the site.

8.7 Summary of Receptors at Risk of Harm from Site

The environmental receptors that have been deemed to be at potential risk of harm from operations at the site are listed in Table 8-1 below. Details on the size and CDOIF designation of each receptor are also provided.

Table 8-1: Environmental receptors which may potentially be affected by Site Development

Receptor ID	Receptor Name	Size	CDOIF Designation
R1	Kilcrow River / Lough Derg	Kilcrow River - 22 km length, (9km under consideration) Lough Derg – 118km^2	Fresh and estuarine water habitats
R2	Agricultural Land	200 ha	Widespread Habitat – non-designated Land
R3	Soil	N/A	Soil or sediment
R4	Dinantian Pure Unbedded Limestone – Waulsortian Limestone aquifer	12 m depth	Not a groundwater source of drinking water
R5	Capira/Derrew Bog NHA	119 ha	Designated Area
R6	Ardgraigue Bog SAC	24.3 ha	Designated Area
R7	Middle Shannon Callows SPA	3750 ha	Designated Area
R8	River Shannon Callows SAC	5856 ha	Designated Area

9 DETERMINING MATTE POTENTIAL

The MATTE potentials of the unmitigated liquid and unignited gaseous release scenarios are determined in this section. The first step taken was to establish which of the surrounding receptors can be affected and then it was checked whether the quantity of material that is predicted to reach the receptor is sufficient to cause a MATTE. If the potential for a MATTE exists, the level of harm caused to the affected receptor is determined by establishing the severity of harm caused and the likely duration of harm of the effects of the release on the impacted receptor.

9.1 Unignited Liquid Scenario

The first step taken was to determine whether the released liquid have the potential to affect the surrounding environmental receptors by establishing whether flow pathways exist between the sources and receptors. The severity of harm caused to the affected receptors by the released material was then determined using the approaches described in Section 3.2.1 (LC_{50} approach, oil slick approach, etc.). The duration of harm caused to the affected receptors was then determined using the approach outlined in Section 3.2.2. The severity and duration of harm were then used to establish the MATTE consequence level to each receptor between A and D as shown in the matrix presented in Figure 3-1.

The representative unignited liquid scenario is the release of approximately 6196 tonnes of diesel stored in 7333m^3 liquid fuel tank capacity identified in the preliminary screening stage. The scenario is assessed to determine if there is a potential for a MATTE to any of the surrounding receptors. This scenario examines the release of diesel following a catastrophic failure of a 7333m^3 tank and represents the largest worst case single release of diesel. Details of the maximum releasable inventory and pool radius are presented in Table 9-1 below.

Table 9-1: Scenario of Diesel Release Details

Scenario Description	Release Location	Worst Case Quantity Released		Pool Radius (m)
		m^3	Tonnes	
Catastrophic failure of one diesel tank	Fuel Tank Bund Area	7333	6196	683

The surface of the site is considered to be flat and the release is expected to spread out in a circular pool with an assumed thickness of 20 mm from its point of origin. A conservative assumption has been made for the purposes of simplification that there will be no flash-off of any of the light components in the released material and there will be no reduction in the mass of liquid. The released material may potentially impact the following environmental receptors:

- **R1 Kilcrow River / Lough Derg –** in the absence of containment measures i.e., the bund, the released diesel is expected to either:
    - Spread across the surface until it flows into the Ballynaheskeragh stream which flows within the proposed development land. Any release into this water course then has potential to continue to Kilcrow River. No direct flow of the released material into the Kilcrow River is expected to occur due to the distance of the site to the river itself.
    - Spread across the surface of the site until it is infiltrated to the below ground fire wastewater retention tank or intercepted via upgradient of infiltration. The diesel, if it is not infiltrated into the below ground wastewater retention tank or intercepted there, will be routed into the Ballynaheskeragh stream which flows within the proposed development land. Any release into this water course then has potential to

continue to the Kilcrow River . No direct flow of the released material into the Kilcrow River is expected to occur due to the distance of the site to the river itself.

- **R2 Agricultural Land and R3 Soil –** the released diesel is not expected to flow far enough to impact the agricultural land or its soil. Therefore, no significant environmental harm to these receptors is expected to occur.
- **R4 Groundwater –** some of the released diesel will spread to areas of unmade ground and the well on the site. However, the material is expected to permeate into the ground slowly. This will allow the majority of the spill to be cleaned up before a significant volume can permeate into the ground. A small percentage of the released diesel will enter the sub-surface but this is expected to remain above the groundwater layer due to the low solubility of its components in water. Therefore, no significant environmental harm to this receptor is expected to occur.

The potential environmental harm to the Kilcrow River (R1) is discussed in the following sub-section and the findings are summarised in Table 9-2.

9.1.1 Potential Impacts on R1 – Kilcrow / Lough Derg

A release of diesel into the waters of the Kilcrow River may potentially cause harm via the formation of an oil slick on the surface of the water. Thus, the oil slick approach has been used to assess the potential level of environmental harm. The length of the Kilcrow River that would be covered if a slick of slop oil spread evenly across the width of the river with a thickness of 0.1 mm and an assumed average width of 5m was calculated as:

$$Length\ of\ river\ affected\ (m) = \frac{Volume\ released\ (m^3)}{Slick\ thickness\ (m) \times Width\ of\ River\ (m)} \quad (9.1)$$

The calculations show that a release of 7333m^3 of diesel will cover the entire 9km length of the Kilcrow River under consideration with a 0.1 mm slick. The slick will therefore continue into Lough Derg where the remain diesel will cover a 14.6km length of Lough Derg. This is the equivalent to approximately 63% of Lough Derg, which constitutes a severity level of 3 (Major) as per Table A-1. It is expected that it will be possible to remove the majority of the released oil from the water in the river/lough within a year. However, it is expected that due to the very high release volume, a significant quantity of the released oil may mix with sediments and vegetation on the banks of the river and create effects which last longer than 1 year. A medium-term duration of harm (>1 year) was therefore selected as per Table A-2. The overall consequence level is therefore a level B MATTE.

Table 9-2: MATTE Assessment results for Release of Diesel Scenario

Receptor	Minimum Area Required for MATTE	Min. Release Quantity Required for MATTE	Area Affected by Full Inventory Release	Severity Rating	Duration Category	MATTE Consequence Level
R1 – Kilcrow River (oil slick approach)	2 km	8.45 te	9km of Kilcrow River 14.6km length of Lough Derg	3	2	B

9.1.2 Releases of Firewater

Firewater systems present on site will provide an immediate response to events that involve fires. The release of firewater will be assumed to only occur following releases of flammable materials or occurrences of fires on the site.

Firewater itself does not have the potential to cause environmental harm. However, firewater run-off from the site can contain combusted and un-combusted forms of the substances involved in the fire. Therefore in the event of a fire, any fire wastewater generated will drain through the system and be held in a below ground tank (fire wastewater holding tank), which will accord with EPA requirements (3,690m3 capacity). An actuated penstock valve will be positioned on the outlet of the below ground tank which will be activated to close upon the activation of the fire alarm within the development. The contaminated water will be subsequently tested and appropriately disposed of. Gaseous extinguishing systems will also be provided for use on electrical systems.

The application of firewater can increase the potential for the release of diesel to reach the surrounding receptors via run-off from the site and it is assumed that the flow pathways will remain the same. It is difficult to estimate exactly how much further release of diesel will spread if firewater is applied simultaneously. It is expected that the spill radii will increase slightly but will not increase in the MATTE levels determined previously.

9.2 Ignited Scenario

Environmental receptors can be harmed by ignited events, either as a result of direct flame engulfment or, outside the flame, by short or long-term exposure to elevated levels of thermal radiation transmitted through the atmosphere. Overpressure generated by an explosion can also result in environmental impacts.

A variety of consequence types are considered including jet fire, flash fire, fireball, pool fire and vapour cloud explosion. The consequence types and the potentially affected receptors are presented in Table 9-3.

The assessment show that the only ignited consequence types that have the potential to impact the surrounding environmental receptors are:

- Flash fires – flash fires may impact the Agricultural Land (R2). However, any land or vegetation which is burnt is expected to recover within a year which will avoid the potential for a MATTE being realised;
- Overpressure events – an overpressure of 0.1 bar is typically strong enough to break glass on buildings but is not strong enough to cause harm to flora and fauna and generally predict that stronger overpressure levels are not expected to extend for significant distances.

It should be noted that diesel is difficult to ignite. In general diesel needs a sustained naked flame with a heat source to ignite. Therefore ignited events from the site are therefore not expected to result in any MATTEs to the surrounding receptors.

Table 9-3: Receptors potentially impacted by ignited events

Consequence Type	Receptors Potentially Affected	Notes
Jet fire	-	Consequence effects not expected to impact any of the surrounding receptors.
Flash fire	R2	Affected receptors are expected to recover in <1 year. No potential for MATTE.
Fireball	-	Consequence effects not expected to impact any of the surrounding receptors.
Pool fire	-	Consequence effects not expected to impact any of the surrounding receptors.

Vapour cloud expansion (0.1 bar)	R2	No harm to flora or fauna expected to be caused by an overpressure of 0.1 bar.

9.3 Combustion Products

Combustion products are the materials produced as a result of the decomposition of the material involved in a fire including intermediate breakdown products, smoke and particulates. The likely fall-out products following a fire or explosion will mainly be limited to CO, CO_2, H_2O and a number of partially oxidised products such as soot and smoke etc. Polycyclic Aromatic Hydrocarbons (PAHs) may also be produced during the combustion of natural gas.

Soot formation is expected to be an issue with fires involving solid or liquid fuels such as crude oil. Soot is generated by the incomplete combustion of hydrocarbons and it can be transported as fine particulates through the air. Particulate matter is also expected to be produced if the fire from an ignited event burns the ground, vegetation or other structures on or off the site.

There is a wide spectrum of particle sizes released during a fire. Smaller sized particles tend to travel further distances than the larger sized particles. In general, within a few kilometres of the site, material with diameters of a few millimetres to even centimetres will settle. Particles with diameters of a few to tens of micrometres may be transported up to ten kilometres away from the source (Ref. /11/). Particles may be deposited directly on to land or surface water sources, or washed out of the atmosphere by precipitation and indirectly deposited. The extent of environmental damage will depend on the meteorological conditions (e.g. the wind direction, wind speed, atmospheric stability and rainfall) and generally decreases non-linearly with distance from the site of the release.

Wind direction will influence the likely environmental receptors; the wind speed will influence the dispersion rate and the extent that a material is carried downwind. Similarly, rainfall can have differing impacts on an atmospheric release. The reactivity and solubility of a material will influence whether it is likely to undergo hydrolysis or deposition through precipitation. Deposition onto land could result in soil contamination or percolation into groundwater causing contamination. The properties of the material, such as its persistence and ecotoxicity will also influence the extent of environmental damage. Soot can also impact surface water receptors either via direct deposition or via land run-off.

Any fall-out, which reaches the surrounding receptors, may result in some short-term impacts but particle degradation is likely to occur relatively quickly. Therefore, a release of combustion products via the atmosphere is unlikely to result in a MATTE.

10 FREQUENCY ASSESSMENT OF UNMITIGATED CONSEQUENCES

The frequency assessment follows the approach defined in Section 6.2 of the CDOIF guidance (Ref. /2/). It is undertaken by assigning an unmitigated event frequency to the release of diesel scenario that has the potential to cause a MATTE to the Kilcrow River/Lough Derg. The unmitigated event frequency for the release of diesel is used to establish the unmitigated risk posed by the establishment to the identified receptor.

10.1 Unmitigated Scenario Frequency and Risk Summary

The unmitigated event frequency for the release of diesel scenario identified to have the potential to cause a MATTE is summarised in Table 10-1. The sources of the frequency data used is also stated in the table.

Table 10-1: Unmitigated event frequencies for each potential MATTE scenario

Scenario Description	Receptor	MATTE Consequence Level	Frequency (event per year)	Source of Frequency data
Release of Diesel	R1 – Kilcrow River / Lough Derg	B	1.5E-04	Calculated using Table 2.2 Atmospheric Storage Tank Fire Frequencies for Large bund fire (full bund area), assuming 25 year tank life (Ref. /12/).

The unmitigated event frequency is the total unmitigated risk posed by the establishment to the receptor identified. The establishment risk to the receptor is plotted against the CDOIF tolerability criteria for event frequency per receptor per year in Figure 10-1 and found to be in the tolerable if ALARP (TifALARP) on the CDOIF risk matrix.

	Frequency per establishment per receptor per year (unmitigated)						
Frequency at which CDOIF Consequence Level is equalised or exceeded (events/year)	10^{-8} - 10^{-7}	10^{-7} - 10^{-6}	10^{-6} - 10^{-5}	10^{-5} - 10^{-4}	10^{-4} - 10^{-3}	10^{-3} - 10^{-2}	>10^{-2}
D - MATTE							
C - MATTE							
B - MATTE				**R1**			
A - MATTE							
Sub-MATTE	Tolerability not considered by CDOIF						

Figure 10-1: Unmitigated frequency per establishment per receptor per year

11 MITIGATED FREQUENCIES

The layers of protection in place to prevent the release scenario from reaching the surrounding environmental receptors are considered, in order to determine the mitigated levels of risk from the site. The mitigated frequency of harm caused to the surrounding environmental receptors is calculated by multiplying the unmitigated frequency by the probability of failure on demand (PFD) values of any layers of protection which may potentially stop the release from making its way to the receptor.

A description of the relevant layers of protection in place to prevent the scenario identified as having the potential to cause a MATTE to the surrounding receptor is given below.

11.1 Release Impacting R1 – Kilcrow River/ Lough Derg

The layers of protection relevant to releases from the site which have been identified to have the potential to cause MATTEs to the Kilcrow River / Lough Derg are:

- Tank bund.
- Fire wastewater retention tank.

A description and the PFD values allocated to each of these layers of protection are provided in the table below.

Table 11-1: Layers of protection relevant to preventing releases to the Kilcrow River / Lough Derg

Layer of Protection	Description	PFD
Tank bund	The diesel fuel tanks surrounded by a concrete bund which provide capacity for 110% of the contents of the tanks. Tank releases may breach the containment provided by the bund following a structural failure of the bund walls, overtopping of the bund walls or if the bund drain valve has been left open.	0.01 (Ref. /13/)
Fire wastewater retention tank	The catastrophic failure of one of the diesel fuel tanks will result in the release of a very large volume of diesel which has the potential to spread and form a pool from the release point. Collection and infiltration to the below ground fire wastewater retention tank occurs around the site. In addition, there are a number of interceptors (oil/water separators) upgradient of the infiltration points which are also routed to the fire wastewater retention tank.	0.3 (Ref. /13/)

The event tree which illustrates the layers of protection that are in place to prevent the release of diesel from causing a MATTE in the Lough Derg are shown in Figure 11-1. The event tree is used to calculate the risk reduction factors that the layers of protection expected to provide to reduce the unmitigated frequencies of the scenarios.

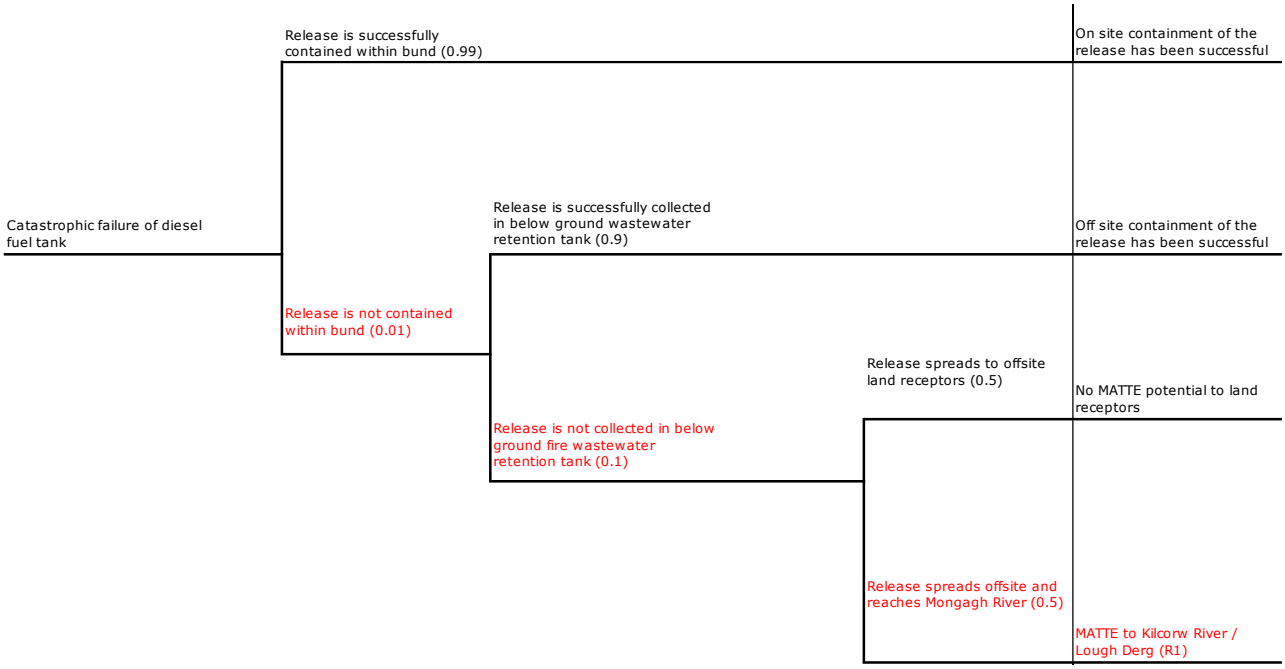


Figure 11-1: Event tree for catastrophic failure of diesel tank in bunded area

11.2 Mitigated Event Frequency Calculations

The mitigated event frequency for the MATTE scenario was calculated by multiplying the unmitigated event frequency by the risk reduction factor associated with the layers of protection in place for the scenario.

Table 11-2: Mitigated event frequencies for each potential MATTE scenario

Receptor	Scenario Description	MATTE Consequence Level	Unmitigated Frequency (per year)	Risk Reduction Factor	Mitigated Frequency (per year)
R1 – Kilcrow River / Lough Derg	Release of Diesel	B	1.5E-04	5.00E-04	7.50E-08

11.3 Mitigated Risk Summary

The mitigated event frequency for release of diesel scenario as reported in Table 11-2 is used to establish the mitigated risk posed by the establishment to the identified receptor.

The mitigated establishment risk per receptor per consequence level is summarised in Table 11-3. The establishment risk to the identified receptor was then plotted against the CDOIF tolerability criteria for event frequency per receptor per year in Figure 11-2 and found to be in the Broadly Acceptable Region of the CDOIF risk matrix.

Table 11-3: Mitigated establishment risk

Receptor	MATTE Consequence Level	Total Mitigated MATTE Frequency (events/year)
R1 – Kilcrow River / Lough Derg	B	2.25E-07

	Frequency per establishment per receptor per year (mitigated)						
Frequency at which CDOIF Consequence Level is equalised or exceeded (events/year)	10^{-8} - 10^{-7}	10^{-7} - 10^{-6}	10^{-6} - 10^{-5}	10^{-5} - 10^{-4}	10^{-4} - 10^{-3}	10^{-3} - 10^{-2}	>10^{-2}
D - MATTE							
C - MATTE							
B - MATTE		**R1**					
A - MATTE							
Sub-MATTE	Tolerability not considered by CDOIF						

Figure 11-2: Mitigated frequency per establishment per receptor per year

12 CONCLUSIONS

One Source-Pathway-Receptor trio with MATTE potential was identified as the release of approximately 6196 tonnes of diesel stored in 7333m^3 liquid fuel tank capacity impacting on the Kilcrow River / Lough Derg

The overall unmitigated level of risk posed by the establishment from the release of diesel to the Kilcrow River / Lough Derg was found to be in the tolerable if ALARP (TifALARP) on the CDOIF risk matrix. Following the identification of the control measures in place and their probability of failure on demand, it was found that the level of mitigated risk posed by the establishment to Kilcrow River / Lough Derg falls into the Broadly Acceptable region.

13 REFERENCES

/1/ The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), Health and Safety Authority, 2015

/2/ Guideline – Environmental Risk Tolerability for COMAH Establishments, Version 2.0, Chemical and Downstream Oil Industries Forum.

/3/ A Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015

/4/ The REACH Enforcement Regulations 2008, European Parliament No. 1906/2006.

/5/ Guidance on the Interpretation of Major Accident to the Environment for the Purpose of the COMAH Regulations 1999, Department of the Environment, Transport and the Region (DETR), 1999.

/6/ Oil Spills in the Sea, Offshore Environment, S. Patin. Available at: http://www.offshore-environment.com/oil.html.

/7/ Behaviour of Hydrocarbons in the Subsurface, Pennsylvania Department of Environmental Protection. Available at: http://files.dep.state.pa.us/EnvironmentalCleanupBrownfields/LandRecyclingProgram/LandRecyclingProgramPortalFiles/CSSAB/2004/fprg_chap3.pdf

/8/ Supporting Guide to the Environmental Risk Tolerability for COMAH Establishments Guideline - Environmental Recovery Guide, ENVIRON, 2015.

/9/ Halston, Environmental Planning, Project Coolpowra Summary Description of Receiving Environment, February 2024

/10/ https://www.epa.ie/our-services/licensing/air/

/11/ Using Science to Create a Better Place – Review of Emission Factors for Incident Fires, Environment Agency, 2009.

/12/ OGP Risk Assessment Data Directory, Storage Incident Frequencies, Report No 434-3, March 2010

/13/ CCPS LOPA guidance by DNV, 2010

APPENDIX A
MATTE Tolerability Tables

Table A-1: Severity of harm criteria for environmental receptors (Ref. /2/)

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
1	Designated Land/Water Sites (Nationally important)	<0.5ha or <10%	>0.5ha or 10-50% of site area, associated linear feature or population	>50% of site area, associated linear feature population	*N/A*	Land or Surface Water	NNR, SSSI, MNR
2	Designated Land/Water Sites (Internationally important)	<0.5ha or <5% (<5% LF/Pop)	>0.5ha or 5-25% of site area or 5-25% of associated linear feature or population	25-50% of site area, associated linear feature or population	>50% of site area, associated linear feature or population	Land or Surface Water	SAC, SPA, RAMSAR
3	Other Designated Land	<10ha or <10%	10-100ha or 10-50% of land	>100ha or >50% of land	*N/A*	Land	ESA, AONB, National Park, etc.
4	Scarce Habitat	<2ha or <10%	2-20ha or 10-50% of habitat	>20ha or >50% of habitat	*N/A*	Land or Surface Water	BAP habitats, geological features

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
5	Widespread Habitat – Non-designated Land	<10ha	Contamination of 10-100ha of land, preventing growing of crops, grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances. Alternatively, contamination of 10ha or more of vacant land.	100 – 1000ha (applied as per text under 'Severe')	>1000ha (applied as per text under 'Severe')	Land	Land/water used for agriculture, forestry, fishing or aquaculture
6	Widespread Habitat – Non-designated Water		Contamination of aquatic habitat which prevents fishing or aquaculture or renders is inaccessible to the public.	*N/A*	*N/A*	Surface Water	Land/water used for agriculture, forestry, fishing or aquaculture

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
7	Source of Public or Private Drinking Water (Groundwater or Surface Water)	Interruption of drinking water supply <1000 person-hours or For England & Wales only <1ha SPZ	Interruption of drinking water supplied from a ground or surface source (where persons affected x duration in hours [at least 2] >1,000) or For England & Wales only 1-10ha of SPZ where drinking water standards are breached	>1 x 10^7 person-hours interruption of drinking water (a town of ~100,000 people losing supply for month) or For England & Wales only 10-100ha SPZ drinking water standards breached	>1 x 10^9 person-hours interruption of drinking (~1 million people losing supply for 1 month) or For England & Wales only >100ha SPZ drinking water standards breached	Groundwater body or Surface Water Public Drinking Water Source	In England the area of groundwater, used for public drinking water, at risk from pollution is mapped using Source Protection Zones (SPZs). In Scotland, there is not an equivalent mapping of SPZs and only the interruption criteria should be used.

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
8	Groundwater Body (non-Drinking Water Source)	<1ha	1-100ha of groundwater body where the WFD status has been lowered	100-10,000ha	>10,000ha	Groundwater body or Surface Water Public Drinking Water Source	UKTAG has determined that to qualify as a body of groundwater, an aquifer must be capable of supplying $10m^3$ per day or 50 people (on a continuous basis) and that such aquifers/groundwater bodies have future resource value which must be protected. Groundwater Bodies have been identified and mapped in accordance with guidance under the Water Framework Directive – see 3.2.3 and Appendix 3 for further information
9	Other Groundwater (outside of groundwater bodies)	Groundwater not a pathway to another receptor.	*Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.*			*N/A*	

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
10	Soil or sediment (i.e. as receptor rather than purely a pathway)	Contamination not leading to environmental damage (as per ELD), or not significantly, affecting overlying water quality.	Contamination of 10-100ha of land etc. as per Widespread Habitat; Contamination sufficient to be deemed environmental damage (Environmental Liability Directive)	Contamination of 100-1000ha of land, as per Widespread Habitat; Contamination rendering the soil immediately hazardous to humans (e.g. skin contact) or the living environment, but remediation available.	Contamination of >1000ha of land, as per Widespread Habitat; Contamination rendering the soil immediately hazardous to humans (e.g. skin contact) or the living environment and remediation difficult or impossible.	Land	
11	Built environment	Damage below a level at which designation of importance would be withdrawn.	Damage sufficient for designation of importance to be withdrawn.	Feature of built environment subject to designation of importance entirely destroyed.	*N/A*	Built environment	This is limited to Grade 1 / Cat A Listed buildings, scheduled ancient monuments, conservation area, etc.
12	Various receptors. Should not be used to identify and assess MATTE.	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	Refer to DETR. Standards relating to continuous emissions, contained in other EU legislation.

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
12	Particular species (Note – these criteria apply nationally – i.e. England, Wales, Scotland)	Loss of <1% of animal or <5% of plant ground cover in a habitat.	Loss of 1-10% of animal or 5-50% of plant ground cover.	Loss of 10-90% of animal or 50-90% of plant ground cover.	Total loss (>90%) of animal or plant ground cover.	Land	
14	Marine	<2ha littoral or sub-littoral zone, <100ha of open sea benthic community, <100 dead sea birds (<500 gulls), <5 dead/significantly impaired sea mammals.	2-20ha littoral or sub-littoral zone, 100-1000ha of open sea benthic community, 100-1000 dead sea birds (500-5000 gulls), 5-50 dead/significantly impaired sea mammals.	20-200ha littoral or sub-littoral zone, 100-10,000ha of open sea benthic community, 1000-10,000 dead sea birds (5,000-50,000 gulls), 50-500 dead/significantly impaired sea mammals.	>200ha littoral and sub-littoral zone, >1000ha of open sea benthic community, >10000 dead sea birds (>50000 gulls), >500 dead/significantly impaired sea mammals.	Surface Water	

Row	Receptor Type	Severity of Harm				Reference to	Comments
		Significant *While this level of harm might be significant pollution, it is not considered a MATTE.*	**Severe** *DETR Criteria – the lowest level of harm that might be considered MATTE.*	**Major**	**Catastrophic**	*Corresponding Harm/Duration/ Recovery row in Table A-2*	*The 'Severe' to 'Catastrophic' levels of harm are considered to be included as 'Serious' with respect to the COMAH definition of a major accident.* *Receptors include:*
	Severity Level →	**1**	**2**	**3**	**4**		
15	Fresh and estuarine water habitats	Impact below that of Severity level 2	WFD Chemical or ecological status lowered by one class for 2-10km of watercourse or 2-20ha or 10-50% area of estuaries or ponds. Plus interruption of drinking supplies, as per DETR Table 6.	WFD Chemical ecological status lowered by one class for 10-200km of watercourse or 20-200ha or 50-90% area of estuaries and ponds. Plus interruption of drinking water supplies, as per DETR Table 6.	WFD Chemical or ecological status lowered by one class for >200km of watercourse or >200ha or >90% area of estuaries and ponds. Plus interruption of drinking water supplies, as per DETR Table 6.	Surface Water	

Table A-2: Duration / recovery criteria (based on unmitigated consequence) (Ref. /2/)

	Short term	Medium term	Long term	Very long term
Description	Harm with such short recovery is not considered a MATTE.			
Harm Duration Category →	**1**	**2**	**3**	**4**
LAND	≤ 3 years	> 3 years or > 2 growing seasons for agricultural land	> 20 years	> 50 years
SURFACE WATER (ALL EXCEPT PUBLIC OR PRIVATE DRINKING WATER SOURCE)	≤ 1 year	> 1 year	> 10 years	> 20 years
GROUNDWATER BODY OR SURFACE WATER PUBLIC OF PRIVATE DRINKING WATER SOURCE	*N/A*	Harm affecting non-public drinking water source.	Harm affecting public drinking water source or SPZ.	*N/A*
BUILT ENVIRONMENT	Can be repaired in < 3 years, such that its designation can be reinstated.	Can be repaired in > 3 years, such that its designation can be reinstated.	Feature destroyed, cannot be rebuilt, all features except world heritage site.	Feature destroyed, cannot be rebuilt, world heritage site

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APPENDIX 4.2

CONSEQUENCE STUDY REPORT

COMAH SUPPORT FOR PROJECT COOLPOWRA

Consequence Study Report

Halston Environmental and Planning Limited

Rev. 1
Document no.: 2246462
Date: 2024-05-28

Project name:	COMAH Support for Project Coolpowra	DNV Services UK Limited Energy Systems
Report title:	Consequence Study Report	
Customer:	Halston Environmental and Planning Limited, IHub Building Westport Road Castlebar F23 K162 Co. Mayo Ireland	Aberdeen SHE Risk 5th Floor Vivo Building Vivo Building 30 Stamford Street SE1 9LQ London United Kingdom
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Date of issue:	2024-05-28	
Project no.:	10510406	Tel:
Organisation unit:	Aberdeen SHE Risk	GB 440 60 13 95
Rev.	1	
Document no.:	2246462	

Applicable contract(s) governing the provision of this Report:

Objective:

Prepared by:	Verified by:	Approved by:
PP Digitally signed by Thomas Newman Date: 2024.05.28 09:15:46 +01'00'	Digitally signed by Thomas Newman Date: 2024.05.28 09:16:07 +01'00'	Digitally signed by Michael Simms Date: 2024.05.28 09:21:18 +01'00'
Aadil Chaudhary Consultant	Thomas Newman Senior Consultant	Michael Simms Head of Department, Manchester Risk Advisory Services

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Keywords: Project Coolpowra, Consequence Modelling, QRA.

Rev. no.	Date	Reason for issue	Prepared by	Verified by	Approved by
0	2024-05-24	Issued for Review	AC	TN	MS
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Table of contents

Abbreviations

AGI	Above Ground Installation
AIS	Air Insulated Switchgear
ALARP	As Low as Reasonably Practicable
CFD	Computational Fluid Dynamics
CIA	Chemical Industries Association
DAL	Dimensioning Accidental Load
FBR	Full Bore Rupture
GIS	Gas Insulated Switchgear
GNI	Gas Networks Ireland
HCRD	Hydrocarbon Leak Frequency Database
HSE	Health and Safety Executive
IOGP	International Association of Oil and Gas Producers
LDES	Long Duration Energy Storage
LFL	Lower Flammability Limit
OCGT	Open Cycle Gas-Fired Generators
PFD	Process Flow Diagram
QRA	Quantitative Risk Assessment
UG	Underground

1 EXECUTIVE SUMMARY

1.1 Background

The aim of Project Coolpowra is to design, develop, and expand Ireland's 400kV transmission system to improve the reliability, resilience, and efficiency of the electricity supply, supporting the transition to greener energy. It facilitates the integration of renewable energy sources, aligning with Ireland's goals to reduce greenhouse gas emissions and combat climate change.

This study has conducted a preliminary consequence modelling, which by its nature, results in typically **worst-case hazard contours**. In order to provide context to the results, a semi-quantitative risk assessment has been carried out based on DNVs experience in assessing similar industrial facilities.

1.2 Conclusions

The consequences derived have been both for small 5 mm releases and full bore/catastrophic releases. There are no notable consequences for any small leak scenario, except for the firewater tanker locations. Given the high flash point of diesel, it is difficult to ignite and this is reflected by the low likelihoods associated with the ignited diesel scenarios in the risk assessment.

The following conclusions are made from this study:

- **Risk**: None of the risks associated with the facility are considered intolerable. A high-level semi-quantitative risk assessment has not highlighted any serious concerns at this point, and given that further risk assessment studies are planned for further stages of the project (detailed design), it is likely that all risks will be demonstrated to be tolerable.
    - **Off-site risk:** No natural gas or diesel hazards have been identified with the potential to impact off-site populations. Given the proposed safeguards and control measures associated with the long duration energy storage (LDES) compound (including fire water application, spacing, and inert gas application), a full scale LDES compound fire, which may have the potential to result in smoke passing the site boundary, is considered unlikely.
- **Consequence Results:** Consequence modelling results are considered representative of worst-case scenarios. Still, no off-site impacts have been identified during the consequence modelling. Furthermore, a full risk-based study (such as a quantitative risk assessment, QRA, to be undertaken in detailed design) is likely to demonstrate that the safety risk from the proposed facility is tolerable both on and off-site.
    - **Pool Fires:** In the highly unlikely event of a catastrophic rupture of a diesel road tanker resulting in a pool fire, the thermal radiation intensity is at levels sufficient to cause multiple fatalities at the administration/control building. Furthermore, there is potential for fuel tank pool fires to escalate to the adjacent tanks, or to cause catastrophic damage to the fire water tanks.
    - **Jet Fires:** There is potential for the 37.5 kW/m^2 contours to extend across a large section of the facility, which suggests that there is potential for escalation due to jet fires associated with the natural gas system on-site. There is also potential for personnel situated outside (e.g. walking between areas of the site) to be fatally injured from natural gas jet fires. There is also potential (based on unmitigated risk) for escalation of jet fires originating in the AGI or on-site pipeline to the LDES compound, however given the protective systems at the LDES compound, a compound-wide fire is considered unlikely.
    - **Fireballs:** The hazard contours associated with fireballs are relatively large, however these are short lived events and therefore do not contribute greatly to escalation, and the likelihood of a fireball has been deemed improbable over the lifetime of the facility.

- **Flash Fires:** Flash fires can have far reaching effects; however, cloud shapes can be seen to be much smaller than the entire cloud envelope. The ½ LFL cloud can impact the majority of the site such that muster points could be considered compromised.
- **LDES System:** The safety risk posed by LDES systems must not be underestimated, and there is potential for very large fires should propagation between containers occur. Should an LDES fire be contained to a single container (as is likely the case given the protective measures proposed for the facility), there is potential for localised asset damage and safety risk to first responders.
- **Off-site impacts:** Natural gas and fuel oil consequence modelling has highlighted no particular concerns to third-party buildings or properties outside of the site boundary. In the unlikely event that a large-scale LDES compound fire occurs, with the fire propagating across multiple containers, there is potential for off-site impacts from smoke and evolved gases.

1.3 Recommendations

The following recommendations are made:

1. Consider fire protection strategies for the tanker unloading and fuel oil storage areas, which could include separate bunds for each storage tank, deluge (sprinkler) systems, and/or foam application on confirmation of a fire. Also consider relocation of the fire water tanks to a location away from all flammable inventories to ensure they are not impacted by fire events.
2. There is currently potential two occupied buildings (security and administration/control building) to be within the 37.5 kW/m^2 hazard ranges associated with jet fires and pool fires. If possible, Halston Lumcloom should consider relocating these buildings to an area outside all hazard contours – which would be considered an inherently safe solution.
3. Ensure any muster points are located outside of the ½ LFL clouds, as shown in Section 5.4.
4. If possible, the spacing between the natural gas-containing systems and the LDES compound should be increased to reduce the likelihood of a natural gas jet fire escalating to a large-scale battery fire, which could potentially have off-site impacts.
5. Undertake further risk assessments in later design stages and review the input data and assumptions. This should primarily address any uncertainties or assumptions in process information, as these will be more accurately defined as the design progresses. Particular attention should be given to fire and explosion risk within the LDES compound - ensuring and demonstrating that all applicable design standards have been followed to minimise the risk associated with stored electrical energy.

Note, these recommendations aim to further reduce any risk associated with Project Coolpowra, however other risk reduction measures may be deemed more appropriate as the design develops

2 INTRODUCTION

Halston Lumcloon Energy is designing, developing, and expanding Ireland's 400kV transmission system to improve the reliability, resilience, and efficiency of the electricity supply, supporting the transition to greener energy. It facilitates the integration of renewable energy sources, aligning with Ireland's goals to reduce greenhouse gas emissions and combat climate change.

Halston have developed a proposal, which consists of units such as reserve gas-fired generators, Gas Insulated Switchgear Substations, long duration energy storage batteries and more. The first site for application of the plant concept is a facility in Ireland, and the modules and components are designed for use with gas oil. Natural gas is present in the underground pipelines and equipment associated with integration into Gas Network Ireland's network.

2.1 Study Scope

The study covers:

- Quantitatively model a set of identified major accident hazards, at a level of detail commensurate with the design data currently available.
- Both full bore pipework ruptures and catastrophic vessel ruptures are modelled, as well as smaller (5mm diameter) leaks, giving an indication as to the likely extent of hazard ranges associated with the project.
- Risk to people and asset in terms of flammable leak major accident hazards (i.e. potential fire and explosion loads to the plant itself and surrounding facilities) will be assessed at a high level to give an early indication of the risk profile of the facility.

The following aspects are excluded from the study scope:

- Risk during construction, commissioning or other phases not representing normal operation of the facilities.
- Risks to the environment and of business interruption / remediation / reputation.

2.2 Study Objectives

The objectives of the report are:

- Conduct a high-level risk study (consequence modelling and semi-quantitative risk assessment) to highlight any preliminary siting or layout concerns for the facility based on the current layout.
- To understand the potential risk exposure of site personnel, key buildings, offsite populations, and other siting aspects.

3 DESCRIPTION AND STUDY BASIS

The assumptions for this study were derived from the project description and discussion with project team members, which are summarised below:

The key inputs defining the design as modelled in this study are:

- Process details are given by the Project Description document /1/ and discussion with the project team
- The overall process structure and major equipment items are given by the Project Description /1/.

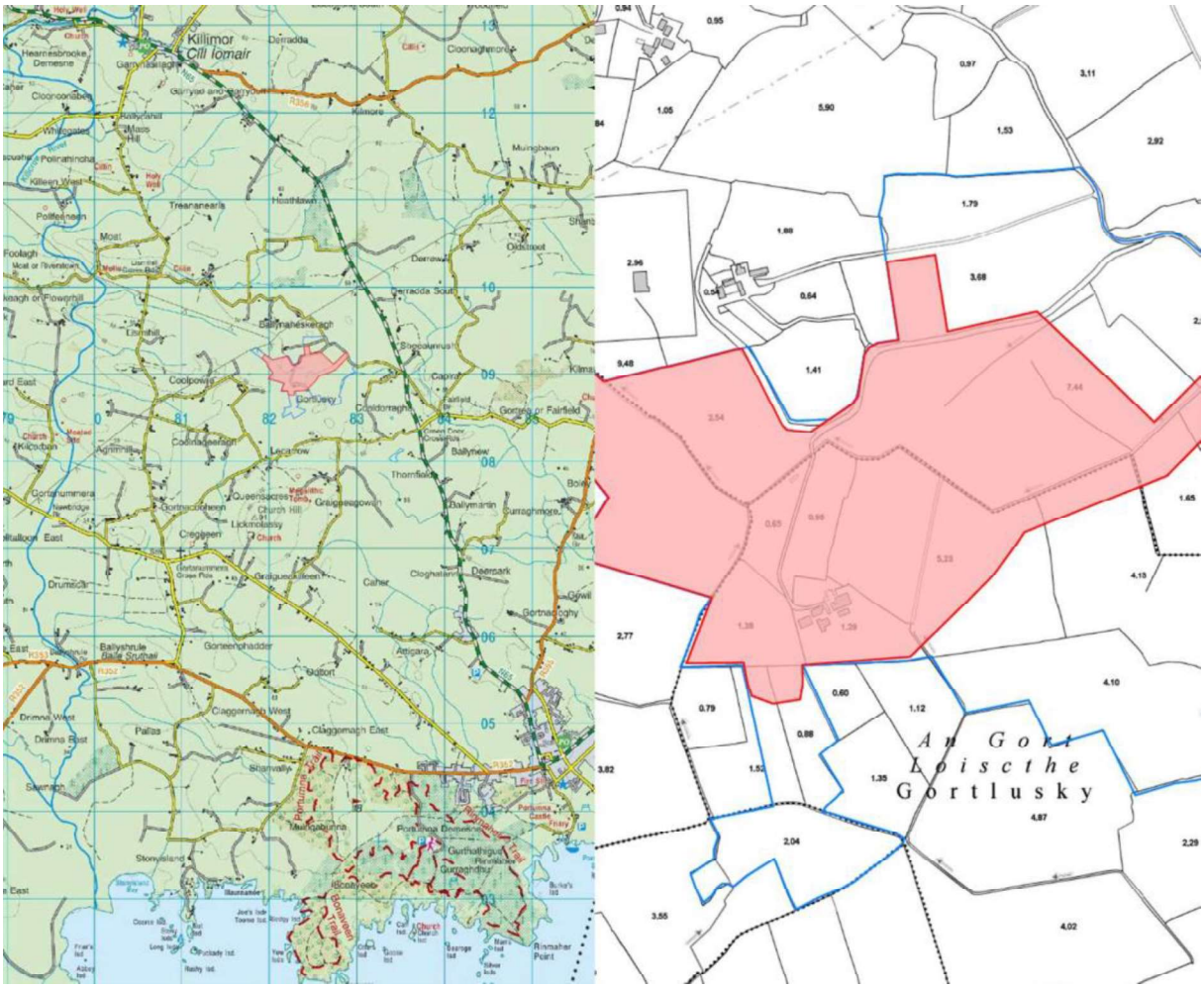
Other data provided by Halston, and public information sources provide underlying basis for the study modelling as discussed in the remainder of this section.

3.1 Site Location

The proposed development is located approximately 4km north of Portumna and 3.1km south of Killimor. Lands within the development site boundary are in agricultural use and include a farmhouse and outbuildings which will be

demolished. The proposed lands are situated at an elevation of c. 51-54m AOD and are accessed by road via the N65 (National Road) and the L8763 (local road). The N65 connects the towns of Loughrea and Portumna. The proposed development will be located adjacent to, and south of, the existing operational 400kV AIS electricity substation (Oldstreet).

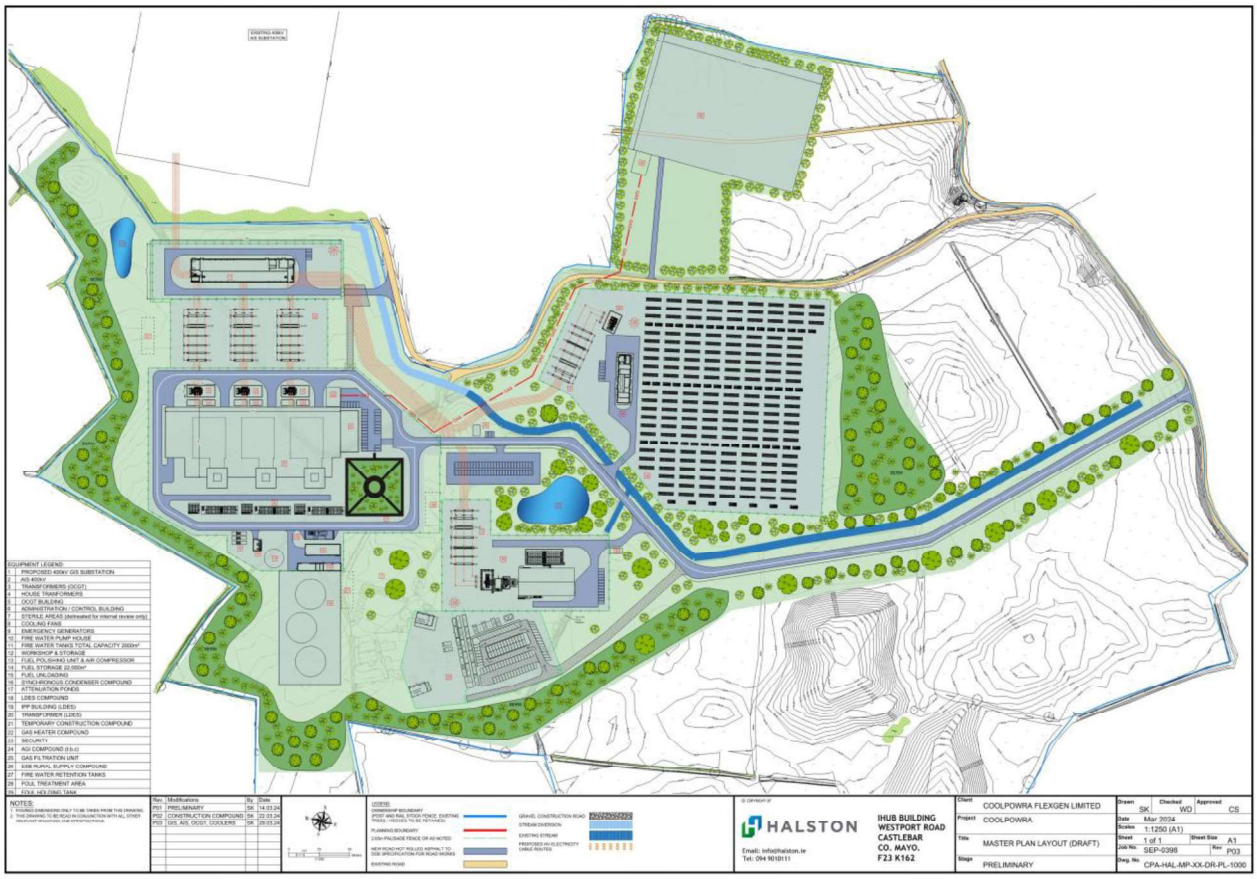
Figure 3-1 Location of the Halston Plant



3.2 Site Layout

The facility layout shown in Figure 3-2 is used as the basis for this study.

Figure 3-2 Layout of the Halston Site



3.3 Process Description

The plant processing equipment within the scope of this study is defined within Table 3-1. Note that not all of these items present hazards that form part of the consequence modelling.

Table 3-1 Summary of The Plant Processing Equipment and Systems

System	Description
Reserve Gas-Fired Generator	Three OCGT units, 1,125 MW (3 x 375 MW) Output will connect to the electricity system via the gas insulated switchgear (GIS).
Under Ground Gas Pipeline	Delivers gas to proposed AGI on site. Operating at pressures of 16 bar or higher, established by Gas Networks Ireland (GNI) through separate planning application at the time of this report. Around 400m run-length across the site in zig-zag formation.
Gas Insulated Switchgear (GIS) Substation	Forms part of the Electricity Transmission System. Two-storey building positioned and secured within a palisaded fenced compound. The proposed GIS will upgrade and replace the existing air insulated switchgear (AIS) substation with a new gas GIS substation at Oldstreet. The GIS substation will facilitate connection of the reserve gas fired generator and ESS to the existing node on the transmission network thereby securing energy supply into the future
Energy Storage System Energy – Grid Stability	LDES with 200 MW / 800 MWh Output. Synchronous Condenser with 400 MVA output. Both connect to electricity system via the GIS. The technology is designed to complement and support the reserve gas fired generator by providing zero carbon, instantaneous power and balancing power to the grid.
Diesel Storage Tanks	Three vessels containing gas oil, with a gross maximum inventory of 22,000 m^3.
Diesel Road Tanker	Located between the OCGT units and the diesel storage tanks, assumed to have an internal capacity
Grid Connection AGI	Connects to the main gas pipeline run by Gas Networks Ireland
Diesel Transfer Pumps	For safe delivery of diesel from tanks to process.
Foul Holding Tank	For use with the foul treatment area

3.4 Ambient Conditions

It is necessary to define certain meteorological constants as inputs to the consequence modelling. These values are summarised in Table 3-2, based typical values for facilities located in the United Kingdom.

Table 3-2 Meteorological Parameters

Parameter	Value	Notes and References
Atmospheric Temperature	10°C	Based on average annual temperatures.
Relative Humidity	70%	Typical annual average for Ireland.
Surface Temperature	10°C	Taken to be the same as atmospheric temperature

The contribution of solar flux to thermal radiation is not accounted for risks from fires (as is typical for these studies).

Those parameters above which are not based on any available site/ project specific data source are assumed values, selected based on experience or using model defaults, with the intention of providing the most appropriate modelling results whilst still taking a conservative approach so as not to underestimate any of the risk levels.

4 METHODOLOGY

The outline methodology to be adopted for this preliminary consequence modelling shown in Figure 4-1 and is described in more detail in in the following sections.

Figure 4-1 Simplified QRA Methodology Flowchart

4.1 Software

DNV Phast software v9.0 is used to carry out the study. A summary of global modelling parameters to be applied in the study are provided in Table 4-1. Other values not mentioned in this document can be assumed to remain as default settings in the software.

Table 4-1 General Phast Parameters to be Used for Modelling

Parameter	Value	Notes
Software version	V9.0	Latest version
Height of interest	1 m	Population is assumed to be located at ground level with a receptor height of 1 m (equal to release height); this applies to the whole population identified for the study.
Default leak direction for above-ground releases	Horizontal impinged	Releases from any containerised equipment are considered as impinged. Modelling all releases as horizontal is somewhat conservative, however is typical practice for QRA studies.
Default release elevation	1.5 m	Typical standard value representing 'head height'
Surface Type	Concrete	
Surface Roughness	183 mm	Affects the turbulence in the air reaching the release source and is related to effective average obstacle height over the terrain. 183 mm is the Phast default and is suitable for occasional large obstacles, and is selected as the site has neither open, flat terrain (typically assigned a value of 30 mm), nor a significantly built-up area (typically assigned a value of 500 mm or more) in close proximity to the site.
Flammable averaging time	18.75 sec	Phast default value for flammable dispersion.
Flammable vapour cloud extent allowing ignition	Lower Flammability Limit (LFL)	Effects are calculated at effect height rather than the default cloud centreline height (affects buoyant cloud delayed ignition risk)

4.2 Failure Cases

Normal operating conditions for each failure case have been assumed, namely pressure, temperature, and operating flowrate.

Table 4-2 Operating parameters and parameters assumed for modelling.

Vessel/Equipment	Parameter	Value used
Diesel Storage Tanks	Temperature	20 °C
Diesel Storage Tanks	Volume inventory (per tank)	7333.3 m3
Diesel Road Tanker	Pressure	Atmospheric
Diesel Road Tanker	Temperature	20 °C
Diesel Road Tanker	Volume inventory	40 m^3
Diesel Transfer Pumps	Pressure	2 barg
Diesel Transfer Pumps	Temperature	20 °C
Diesel Transfer Pumps	Maximum Diameter	6 inches (full bore)
Diesel Transfer Pumps	Flow Rate	0.5 kg/s
Grid Connection AGI	Pressure	25 barg
Grid Connection AGI	Temperature	20 °C
Grid Connection AGI	Maximum Diameter	6 inches (full bore)
Gas Pipeline	Pressure	16 barg
Gas Pipeline	Temperature	20 °C

4.2.1 Leak Sizes

A range of representative leak sizes has been modelled as shown in Table 4-3.

Table 4-3 Representative Leak Sizes Modelled

Leak Size Name	Representative Hole Diameter (mm)	Hole Size Range for Frequency Analysis (mm)
Medium Leak	5	3-10
Full-Bore Rupture (FBR)	Line Size	Residual from total frequency for component

Additionally, catastrophic rupture of all vessels has been modelled, which is representative of vessel failure e.g. due to vehicle impact of mechanical defects.

4.2.2 Locations

A single representative leak location is defined per failure case, based on the plot plans and information provided.

The gas pipeline was modelled as an extended line source with potential leak locations along the pipeline length, however only the worst-case results are reported in this document.

4.3 Consequence Analysis

This section outlines the approach to be used for consequence modelling analysis.

4.3.1 Process Fluid Compositions

Some key assumptions have been made when defining the process fluid compositions to be modelled:

- The natural gas feed is assumed to be 100% methane.
- Secondary fuel oil (gas oil) is modelled as diesel.

4.3.2 Discharge

The discharge parameters have been determined within Phast on the basis of the defined failure case parameters (pressure, temperature). Where releases occur downstream of equipment such as a pump or compressor, the release rate will typically be driven by the normal flow rate of the section in forward flow. Therefore, the release rates are capped at a maximum of 150% of the inflow rate.

Detection and isolation are not modelled at this stage.

4.3.3 Dispersion

Releases have been modelled with a “horizontal” release direction, accounting for the open nature of the facility, with limited opportunity for direct impingement to adjacent equipment.

A default representative release height of 1.5 m applies for all failure cases, as is typical QRA practice.

4.3.4 Fire Modelling

Standard Phast models for flash fires and fireballs are used.

4.3.5 Explosion Modelling

Explosions are assumed to have the potential to occur where a vapour cloud with concentration within the flammable range is ignited and there is simultaneously a mechanism to accelerate the flame front. Such explosion scenarios require delayed ignition of the vapour cloud.

The potential detonation of natural gas in the open (i.e. outside areas of congestion/confinement) is not considered credible, and therefore a single area of congestion has been defined in the model, this being the Transformers shown by location 20 in Figure 3-2.
The approach to modelling a vapour cloud explosion (VCE) associated with a flammable cloud interacting with these transformers is to calculate the mass of methane associated with filling the transformer area with a stoichiometric mixture of methane in air, in this case approximately 80 kg of methane, and assuming ignition in the centre of this location. All explosion results outlined in this report are based on an explosion in this transformer compound.

4.3.6 Ignition Modelling

For the sake of consequence modelling, it is always assumed that the natural gas and secondary fuel (diesel) are ignited and the worst-case results are presented in Section 5. In reality, diesel is difficult to ignite - having a flash point of between 52 and 96ºC, it is classified as ‘combustible’ rather than ‘flammable’. This means that diesel is not readily ignited with a naked flame and requires sustained energy input (or atomisation) for it to ignite.
As a result, although the consequences of a diesel fire can appear severe, the likelihood of this event occurring can be considered less than for a more readily ignitable fluid (such as petrol or gases such as natural gas). This is reflected in the high-level risk assessment presented in Section 6.

4.3.7 Long Duration Energy Storage Modelling

DNV are currently unable to model fires associated with battery energy storage systems (BESSs), however a qualitative assessment is undertaken for the likely impacts of BESS fires, based on DNVs experience in risk assessment of these systems.

4.4 Vulnerability Criteria

This section covers the integration of the consequence and frequency modelling to provide risk estimates for human receptors. The vulnerability criteria in Table 4-4 are for information only and provide context to the choice of hazard levels reported in this document.

Table 4-4 Vulnerability Criteria

Hazard	Effect Threshold (model ≥ threshold)	Fatality Probability				Notes
		Outdoor	Indoor CIA 4*	Indoor CIA 3*	Indoor CIA 2*	
Flash fire	LFL	100%	50%	20%	20%	DNV internal guidance.
Jet fire	4.7 kW/m^2	0%	0%	0%	0%	4.7 kW/m^2 is considered the 'safe limit' for on-site personnel. 6.3 kW/m^2 is considered the point at which escape routes are considered impaired. 37.5 kW/m^2 is considered the point at which process equipment can sustain damage.
	6.3 kW/m^2	0%	0%	0%	0%	
	12.5 kW/m^2	50%	25%	25%	25%	
	37.5 kW/m^2	100%	100%	50%	50%	
Fireball	4 kW/m^2	0%	0%	0%	0%	0% at lower radiation thresholds to account for the short exposure duration.
	12.5 kW/m^2	0%	0%	0%	0%	
	37.5 kW/m^2	100%	100%	50%	50%	
Pool fire	4 kW/m^2	0%	0%	0%	0%	4.7 kW/m^2 is considered the 'safe limit' for on-site personnel. 6.3 kW/m^2 is considered the point at which escape routes are considered impaired. 37.5 kW/m^2 is considered the point at which process equipment can sustain damage.
	12.5 kW/m^2	50%	25%	25%	25%	
	37.5 kW/m^2	100%	100%	50%	50%	
Explosion overpressure (side-on)	0.07 bar	0%	3%	2%	0%	Linearly interpolated between thresholds. 0% below lowest threshold. Outdoors represents people adjacent to buildings. Indoors from IOGP /11/ based on Chemical Industries Association (CIA) guidance.
	0.14 bar	0%	15%	8%	3%	
	0.35 bar	30%	90%	55%	70%	
	0.5 bar	100%	100%	65%	80%	
Toxicity	-	-	-	-	-	No toxic components have been identified for this study.

Note*: CIA4: 'Portacabin' type timber construction, single storey, CIA3: Typical domestic building: two-storey, brick, walls, timber floors, CIA2: Typical office block: four storey, concrete frame and roof, brick block wall panels.

4.5 Tolerability of Risk

The Health and Safety Authority (HSA) in Ireland follow a similar approach to the Health and Safety Executive (HSE) in the United Kingdom in respect to tolerability of risk, and the ALARP principle (Ref /12/). Risks can be designated into one of three categories:

a) **Broadly Acceptable**, whereby the individual risk is calculated to be below 1x10^{-6} per year. As long as it can be demonstrated that good practice has been followed in terms of management of these risks, no further action is required.

b) **Tolerable if ALARP.** Individual risk calculated to lie between 1x10^{-6} and 1x10^{-3} /1x10^{-4} for on-site and off-site populations respectively are considered tolerable if it can be demonstrated that further risk reductions are not practicable. In practice, this would mean demonstrating that further risk mitigation measures could not be justified in terms of cost (monetary or time/effort) against the level of risk reduction gained.

c) **Intolerable**. If the risk is found to exceed $1x10^{-3}$ /$1x10^{-4}$ for on-site and off-site populations respectively, risk reduction measures must be implemented regardless of cost, to bring the risk into the Tolerable if ALARP region before operation can continue.

Note, the quantitative figures outlined above are typically the outcome of a full QRA. This is outside the scope of the scope of this document given the early stage of the project however a QRA is planned for detailed design. The risk ranking matrix used in this semi-quantitative assessment aims to map the identified hazards across the three categories listed above.

5 CONSEQUENCE ASSESSMENT

Note, these results are for consequences only and do not consider the likelihood of the initial release, ignition probability, or any other conditional modifiers such as occupancy. They are necessarily coarse given the relatively early design maturity, and it is likely that any risk results derived during detailed design will give less severe contours.

5.1 Pool Fire Thermal Radiation

The thermal radiation consequence contours representing all diesel pool fires (irrespective of duration) are shown in Figure 5-1 to Figure 5-6. It can be seen from the shape of the contours that:

- The control room is located outside of all pool fire contours for all scenarios except for the catastrophic rupture of the Diesel Road Tanker where it lies within the 6.3 kW/m^2 contour, but this only impairs escape routes and leads to no fatalities.
- The radiative flux of 37.5 kW/m^2 is the key thermal load in terms of escalation and the risk effects. Any pool fire could escalate to any of the adjacent equipment (i.e. a single pool fire from any storage tank would cause all of the other storage tanks, the diesel road tanker and diesel transfer pump, and vice versa).
- Catastrophic rupture of the road tanker with subsequent pool ignition could result in high thermal loads on the OCGT building, however the effects of drainage in mitigating pool formation have not been modelled.
- The fire water retention tanks lay within the pool fire contours at 12.5 kW/m^2 for all catastrophic ruptures of any fuel storage tanks, road tanker and diesel transfer pumps, however this level of thermal flux is unlikely to cause damage to the fire water tanks.
- Given that all three fuel storage tanks currently share a bund, it is possible that catastrophic failure of one vessel could escalate to a large fire resulting in catastrophic damage to all three tanks. Furthermore, the integrity of the firewater tanks could be compromised in such an event which would result in loss of a key protective safeguard.

Recommendation – Assess the potential to relocate the fire water tanks to an area where they are unlikely to sustain damage in the event of a fire.

Figure 5-1: Contours for Pool Fire Radiation at category 5/D for Diesel Storage Tank (Southern) Catastrophic Rupture in kW/m^2

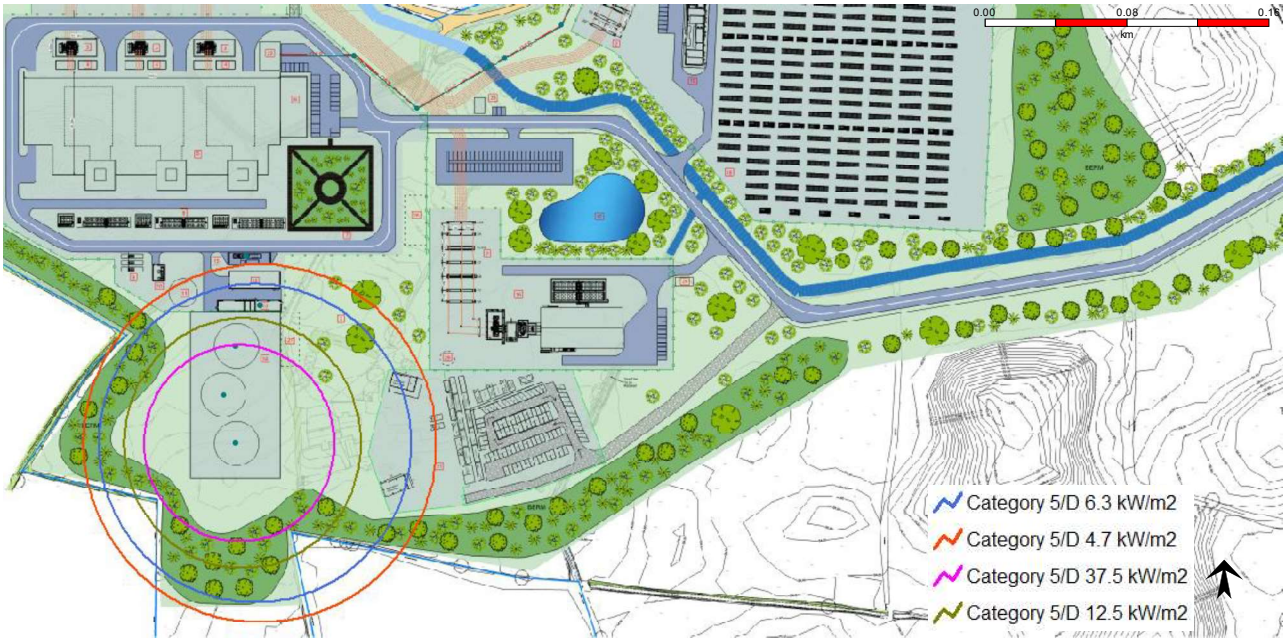


Figure 5-2: Contours for Pool Fire Radiation at category 5/D for Diesel Storage Tank (Central) Catastrophic Rupture in kW/m^2

Figure 5-3: Contours for Pool Fire Radiation at category 5/D for Diesel Storage Tank (Northern) Catastrophic Rupture in kW/m^2

Figure 5-4: Contours for Pool Fire Radiation at category 5/D for Diesel Storage Tank (Northern) for a small 5mm hole size leak in kW/m^2

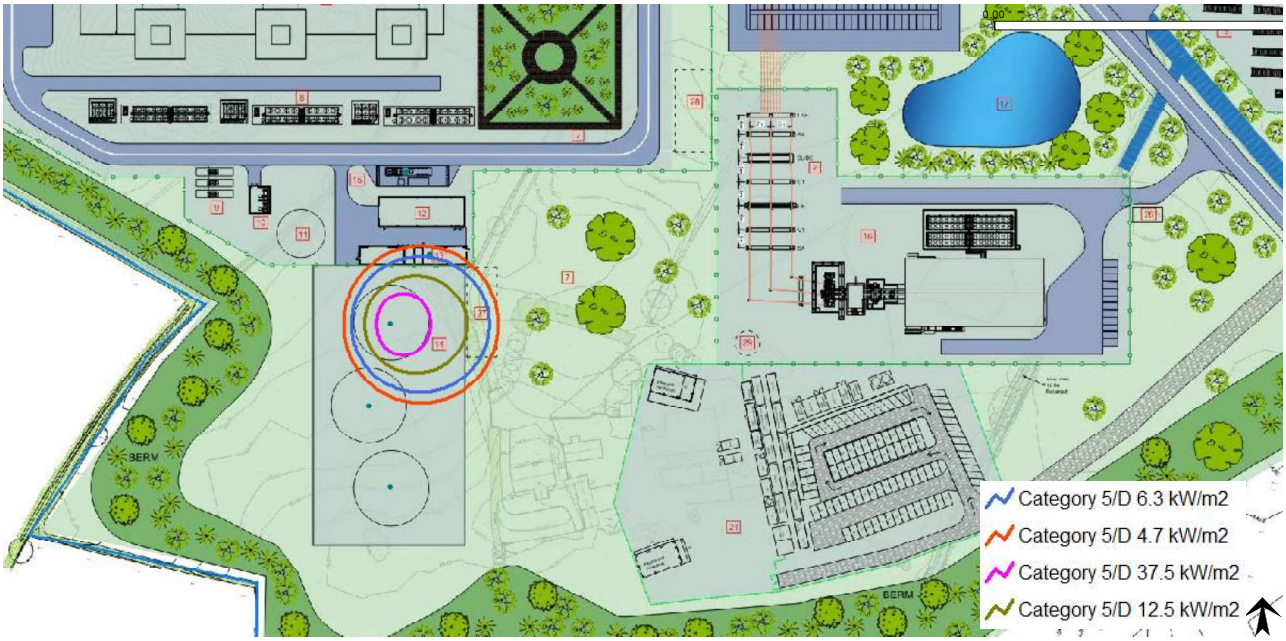


Figure 5-5: Contours for Pool Fire Radiation at category 5/D for Diesel Road Tanker Catastrophic Rupture in kW/m^2

Figure 5-6: Contours for Pool Fire Radiation at category 5/D for Diesel Transfer Pump Full Bore Rupture in kW/m²

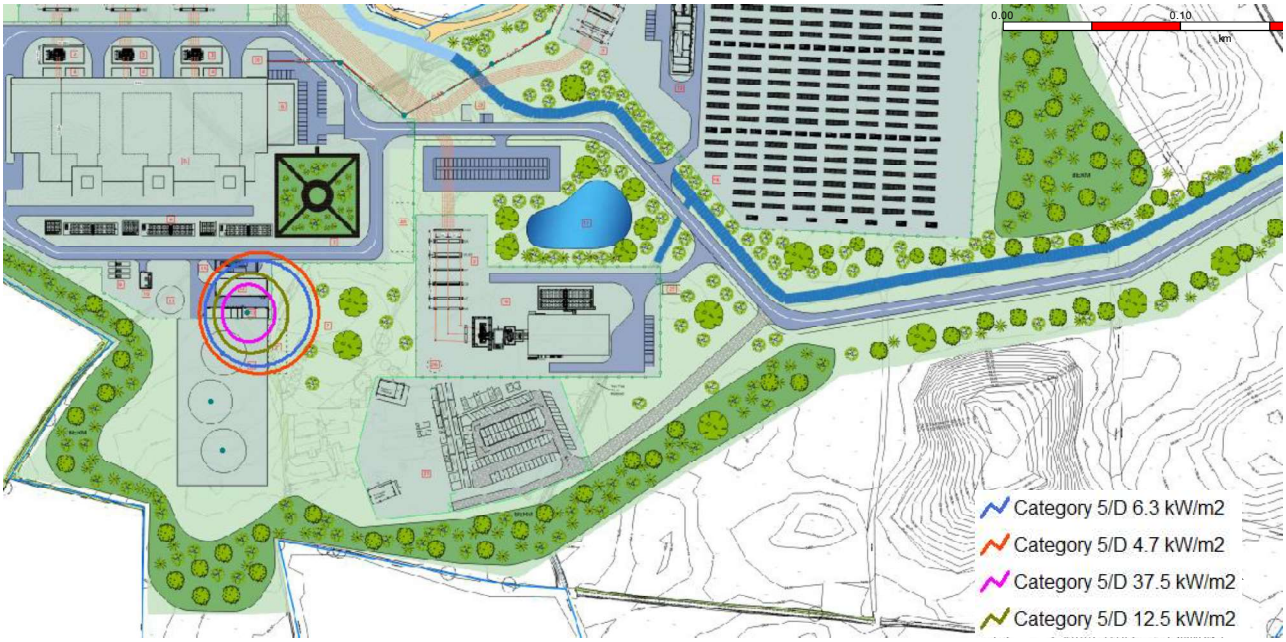
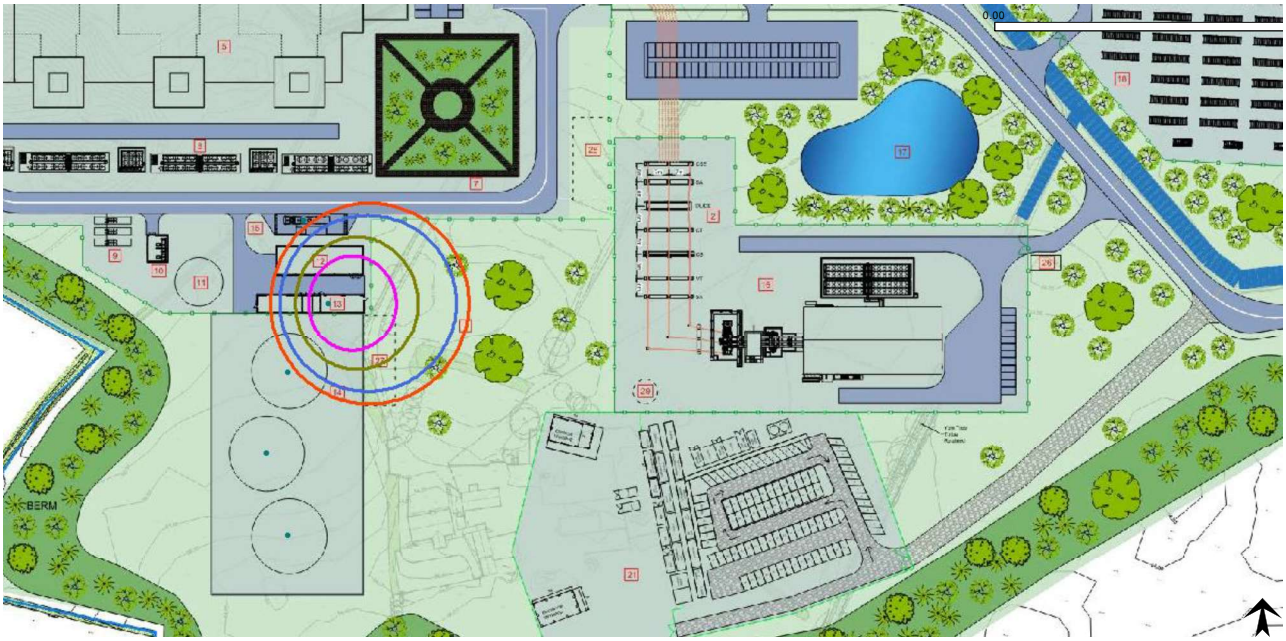


Figure 5-7: Contours for Pool Fire Radiation at category 5/D for Diesel Transfer Pump small 5mm hole leak in kW/m²



5.2 Jet Fire Thermal Radiation

The thermal radiation consequence contours representing all jet fires (irrespective of duration) are shown in Figure 5-8 and Figure 5-9. Jet fires form following ignition of a high momentum natural gas leak, assumed to occur at the facility AGI or on the buried gas pipeline. It can be seen from the shape of the contours that:

- The control room is located outside of all jet fire contours for the AGI.
- The control room is located outside of the long pipeline rupture's 37.5 kW/m^2 hazard frequency contours (corresponding to 100% chance of fatality for occupants for a portakabin style building) and outside the 12.5 kW/m^2 hazard frequency contours (corresponding to 25% chance of fatality for occupants for a portakabin style building). It is within the 6.3 kW/m^2 contour, but this only impairs escape routes and is unlikely to lead to fatalities.
- Security building lies within the 37.5 kW/m^2 contour of the long pipeline rupture and thus if any personnel are present during this event, there could be fatalities.
- There is potential for jet fires to escalate to the adjacent LDES compound, which could result in large fires within the system.

Figure 5-8: Contours for Jet Fire Radiation at category 5/D for Grid Connection AGI in kW/m^2

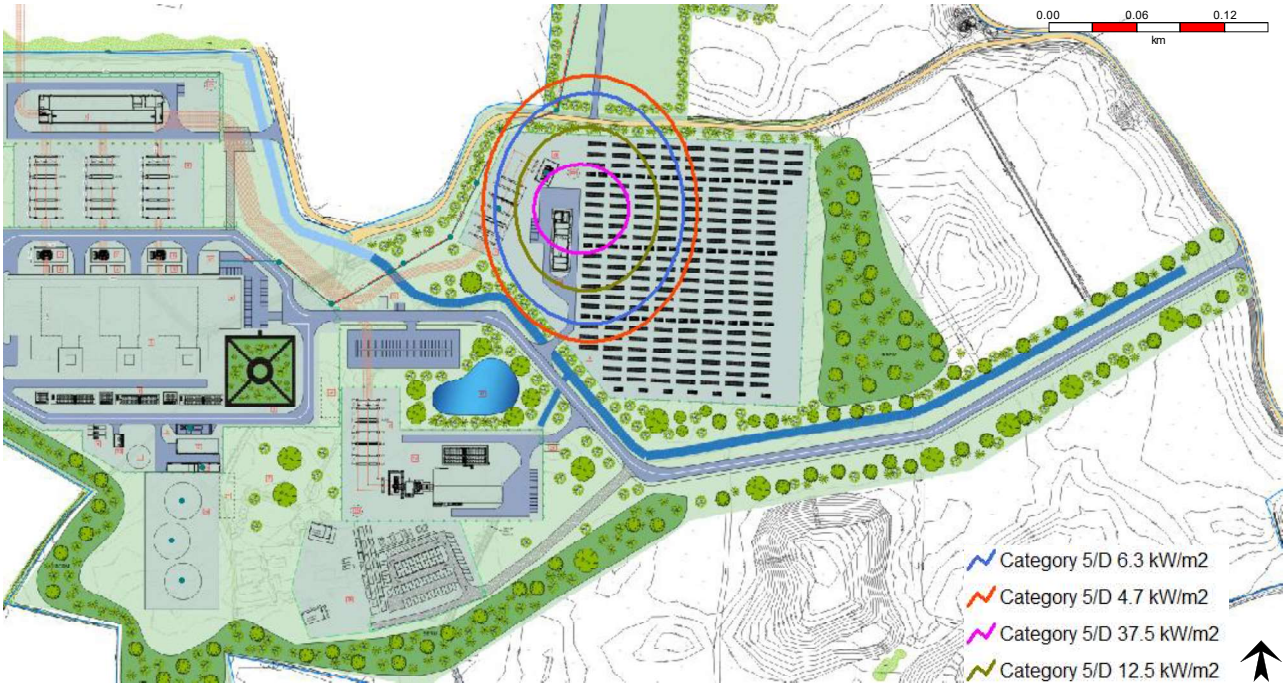
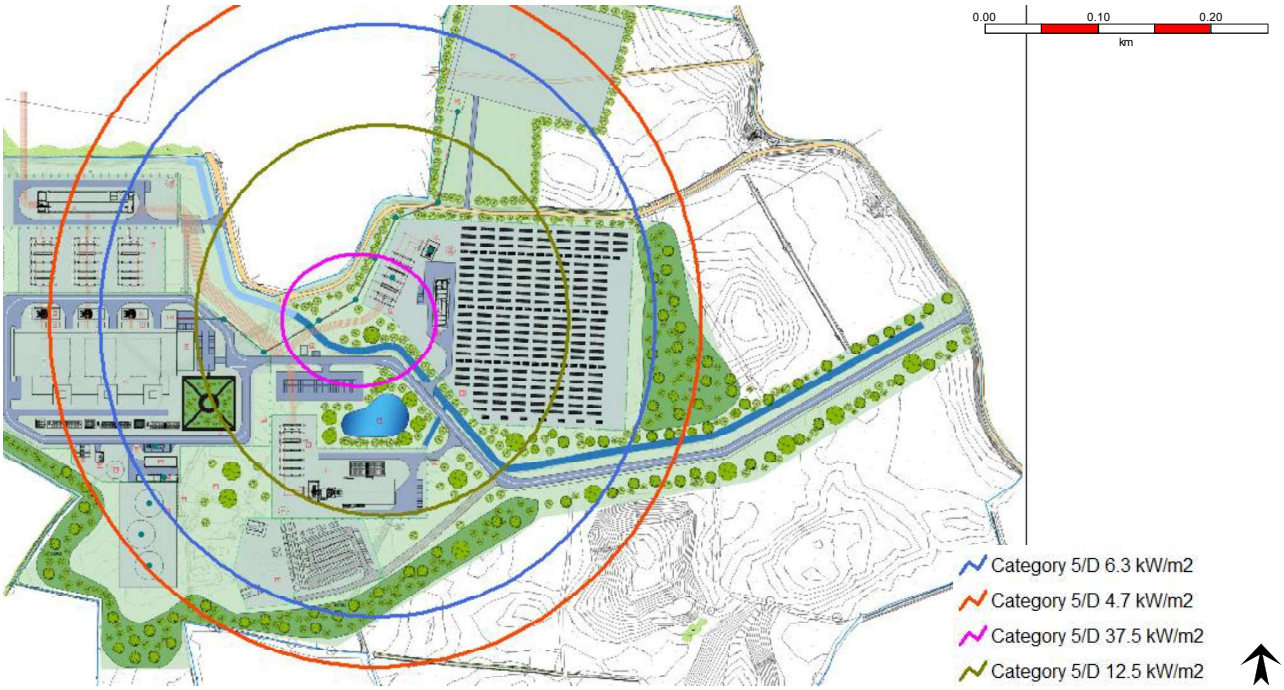


Figure 5-9: Contours for Jet Fire Radiation at category 5/D for Long Pipeline Full Bore in kW/m^2

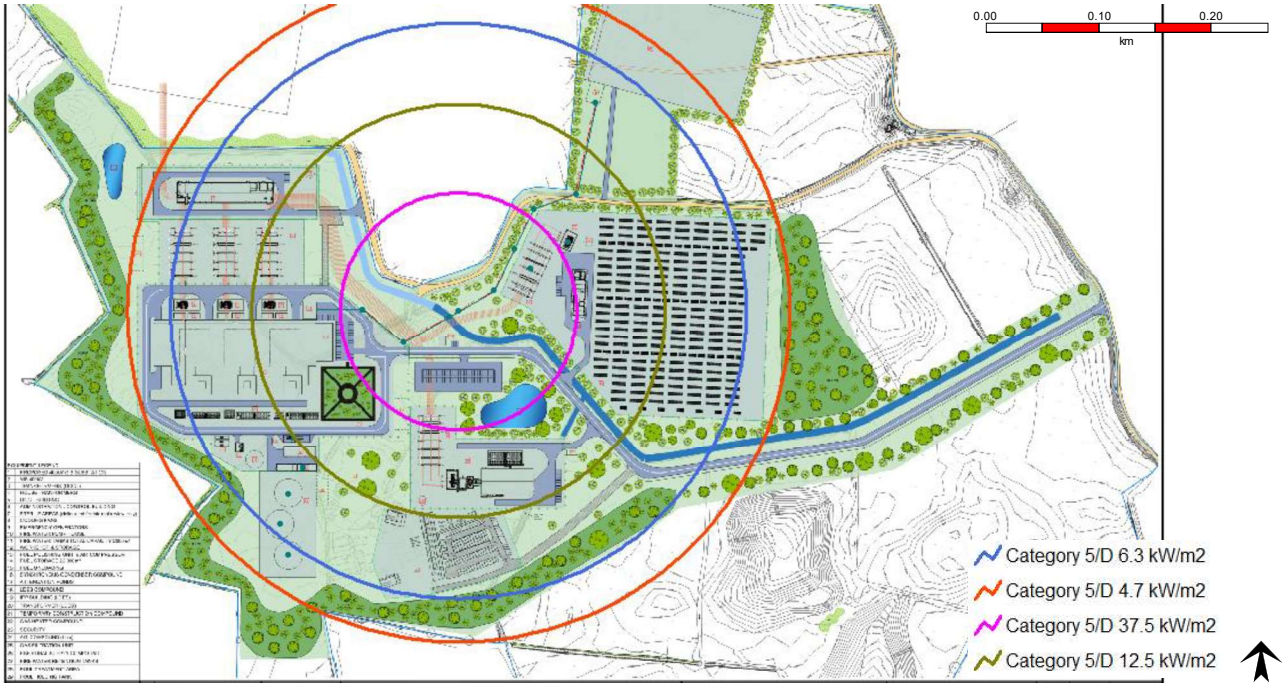


5.3 Fireball Thermal Radiation

The thermal radiation hazard frequency contours representing thermal loading from fireballs is shown in Figure 5-10. Fireballs are typically short duration events associated with catastrophic loss of containment. In the case of the buried pipeline, these are considered highly unlikely.

Security building lies within the 37.5 kW/m^2 and thus if any personnel are present during this event, there could be fatalities. The control room lies within the 12.5 kW/m^2 contour which does not lead to any causalities from fireballs

Figure 5-10: Contours for 5/D Fireball Radiations (kW/m^2) of long pipeline



5.4 Flash Fires

The vapour dispersion / flash fire to LFL hazard contours are shown in Figure 5-11 to Figure 5-16. These provide an indication of the flammable dispersion extents from the plant.

Flash fires associated with the fuel storage systems generally remain very localised, this is due to the fluid being a liquid at ambient temperature with a relatively high flash point. The flash fires associated with releases upstream of the AGI appear to have the potential to engulf the majority of the site within the 1/2LFL envelope, however the shape of the cloud is extremely thin, as shown in Figure 5-15, and the overall risk is consequently reduced.

Figure 5-11: Flash Fire at 5/D for both 3500 and 7000 ppm for catastrophic rupture of Diesel Storage Tank (northern)

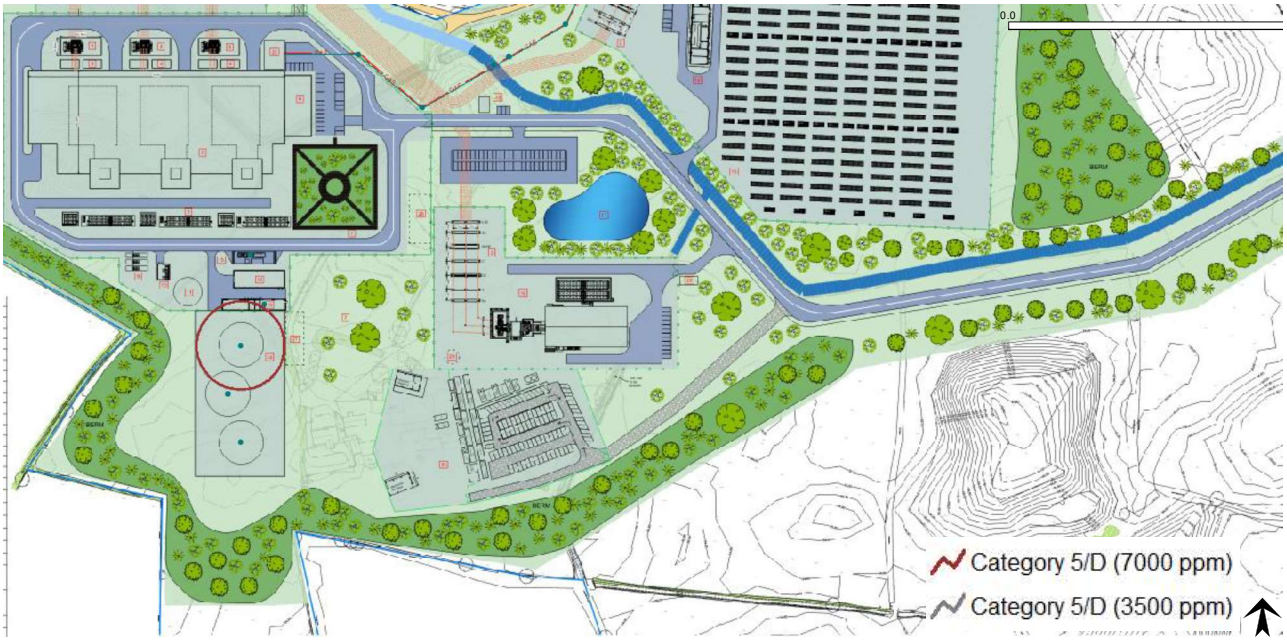


Figure 5-12: Flash Fire at 5/D for both 2500 and 5000 ppm for catastrophic rupture of Diesel Road Tanker

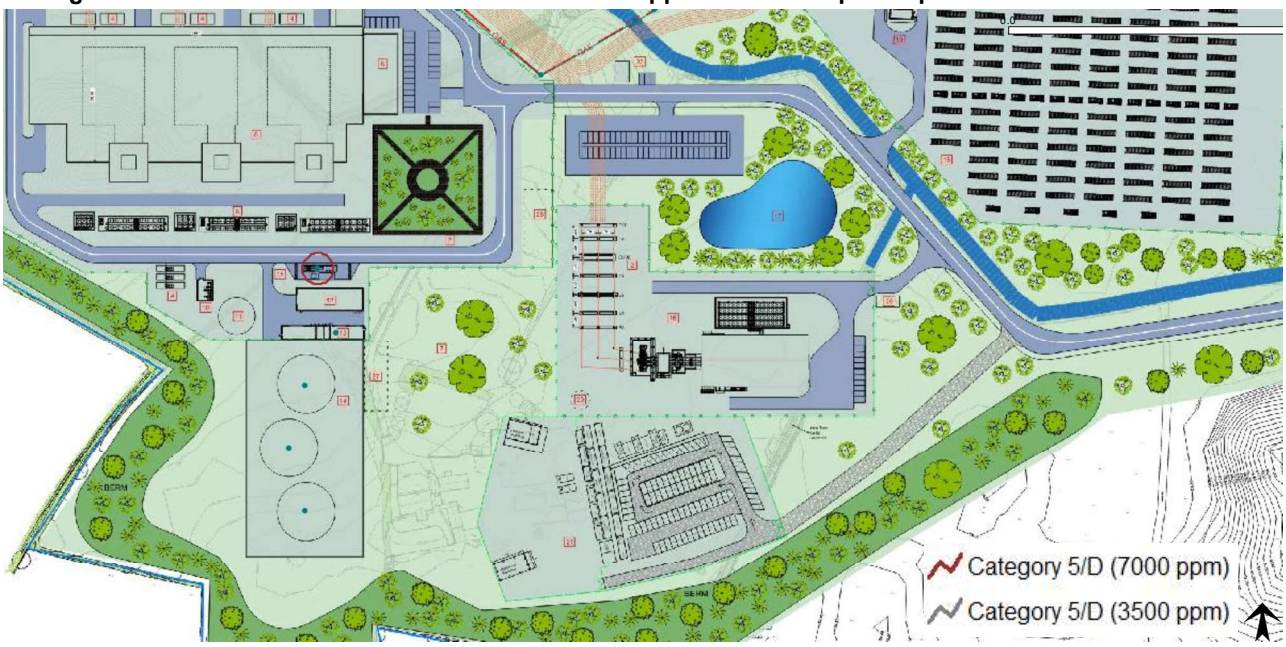


Figure 5-13: Flash Fire at 5/D for both 2500 and 5000 ppm for catastrophic rupture of Diesel Transfer Pump

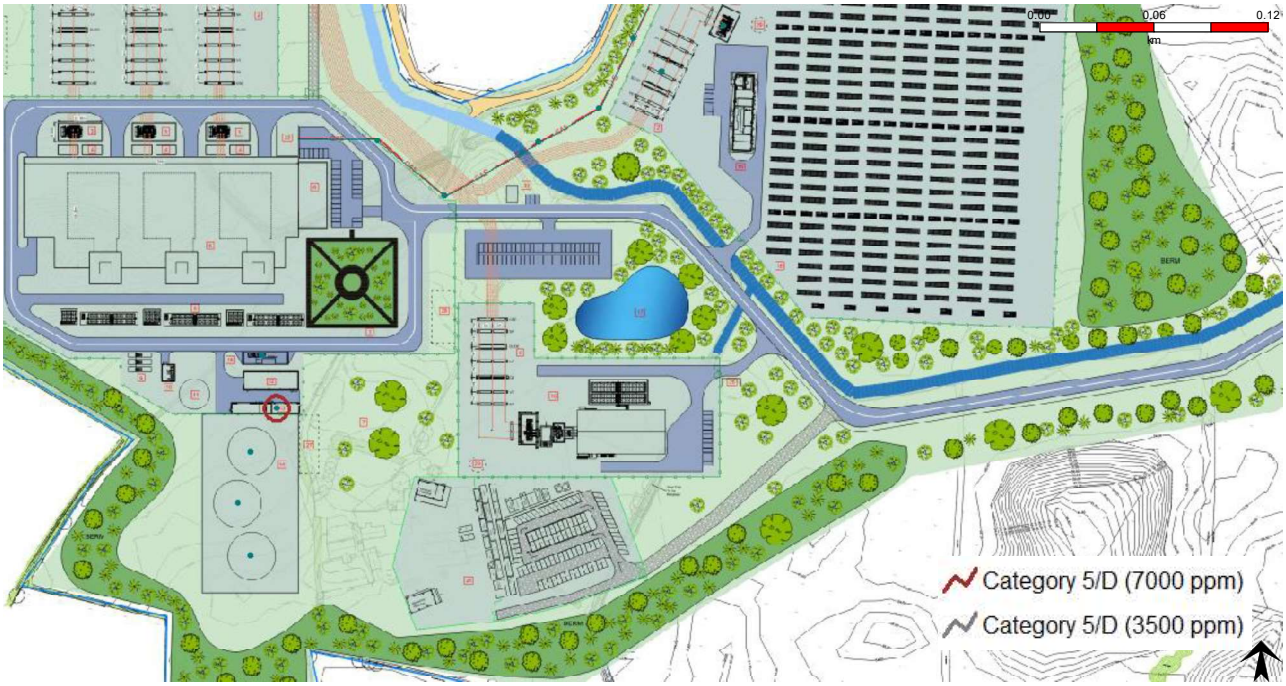


Figure 5-14: Flash Fire at 5/D for both 25000 and 50000 ppm for full bore (6 inch) of AGI grid connection

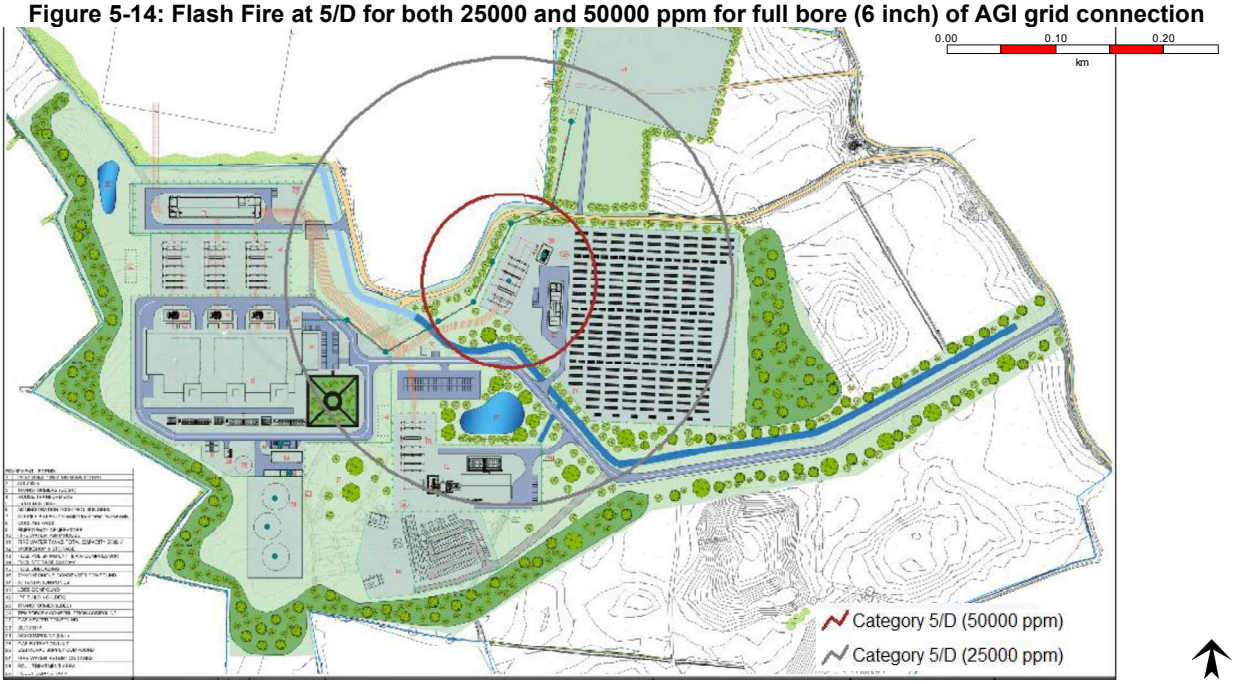
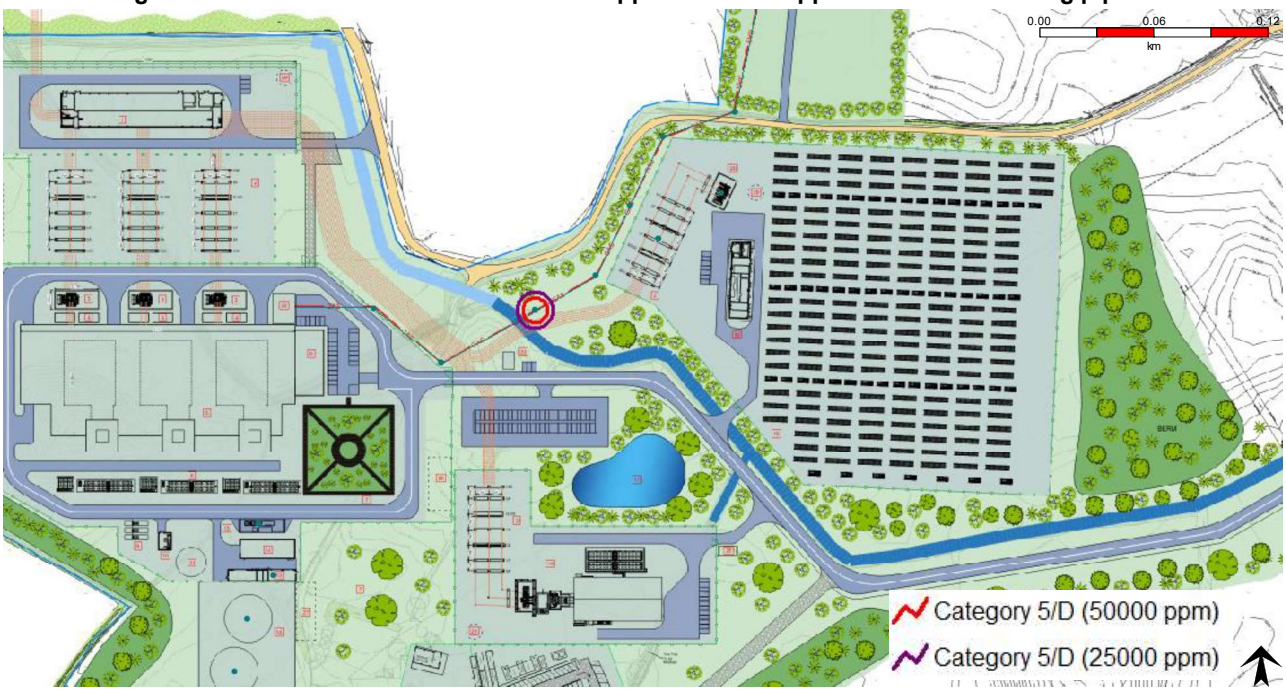


Figure 5-15: Shape of LFL and ½ LFL cloud shown for a release at the AGI.

Figure 5-16 Flash Fire at 5/D for both 25000ppm and 50000 ppm for full bore of long pipeline



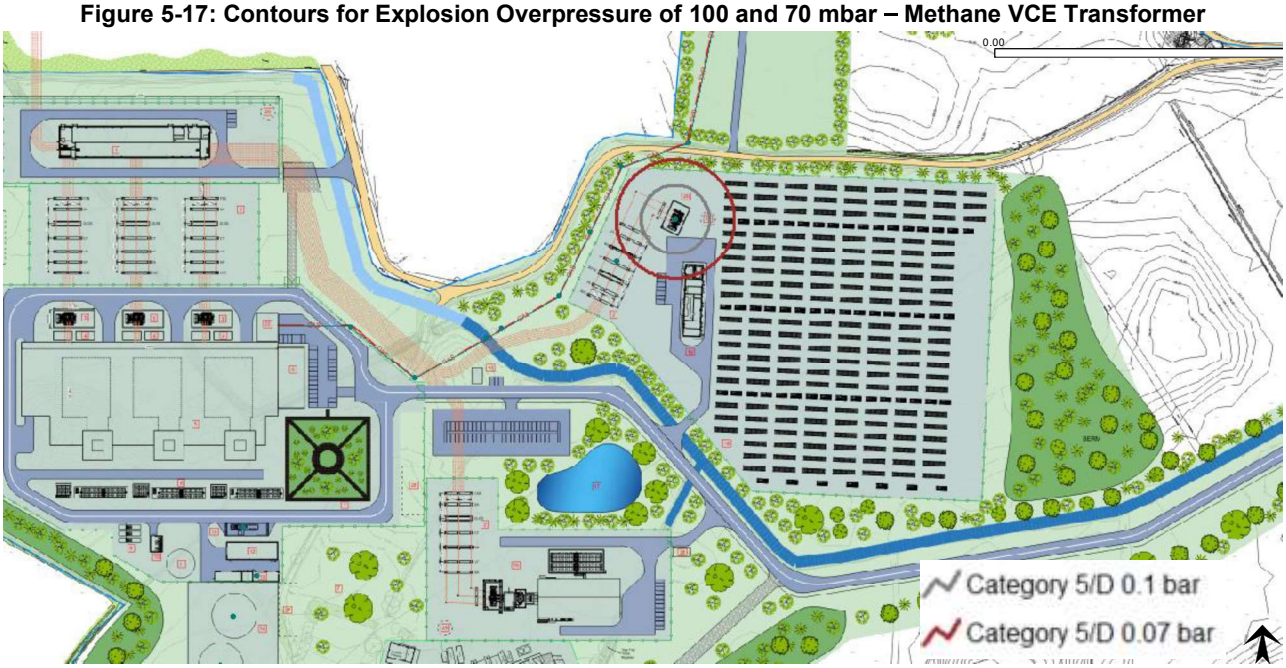
5.5 Explosion Overpressures

The explosion overpressure contours are shown in Figure 5-17 for overpressures of 0.1 bar and 0.07 bar.

The key observations from these contours are:

- The overpressure hazard contours remain localised to the transformer area, however the 0.07 bar contour does reach the IPP building, and there is therefore potential for damage to this building.

Figure 5-17: Contours for Explosion Overpressure of 100 and 70 mbar – Methane VCE Transformer



5.6 Long Duration Energy Storage (LDES) Battery System

Battery Energy Storage Systems (BESS) present significant safety risk through fire and explosion (thermal runaway). In case of the proposed development, the aggregate stored energy will likely exceed 1 GWh (assuming 400 MW with at least 5 hours of capacity); making it one of the largest installations under development globally.

Should a fire occur in one of the LDES battery containers, there is potential that the fire propagates through the entire system, which would have catastrophic consequences in terms of asset loss and potential risk to personnel and first responders. Proper fire management design should be followed during the design of the LDES system such that the potential for a fire to propagate from one container to the next is reduced to ALARP. It is likely that the LDES system will be of particular interest to regulators and insurers, and as such, DNV recommend specific risk assessment for the system when the design is sufficiently mature.

6 PRELIMINARY RISK ASSESSMENT

Given the early stage of this project, and the resulting lack of engineering design detail, a full quantitative risk assessment (QRA) cannot be undertaken. However, based on engineering judgement and experience of assessing other similar industrial facilities, DNV have conducted a preliminary risk assessment using the consequence results reported above.

The following basis is taken for assessing the severity (S) of the modelled scenarios:

Table 6-1: Severity ranking categories.

Severity Category	Criteria
S5	Multiple Fatalities or one off-site fatality
S4	Multiple serious injuries or one fatality
S3	Serious (life altering) Injury
S2	Serious (non-life altering) injury
S1	Minor injury

The following basis is used for assessing the likelihood (L) of the modelled scenarios:

Table 6-2: Likelihood ranking categories.

Likelihood Category	Criteria
L5	Can occur multiple times per year
L4	Can occur once in a year
L3	Can occur once during the lifetime of the facility
L2	Potential to occur once in 100 years
L1	Unlikely to occur once in 100 years

And the following risk matrix is proposed to rank risks at this stage.

Figure 6-1: Proposed risk matrix

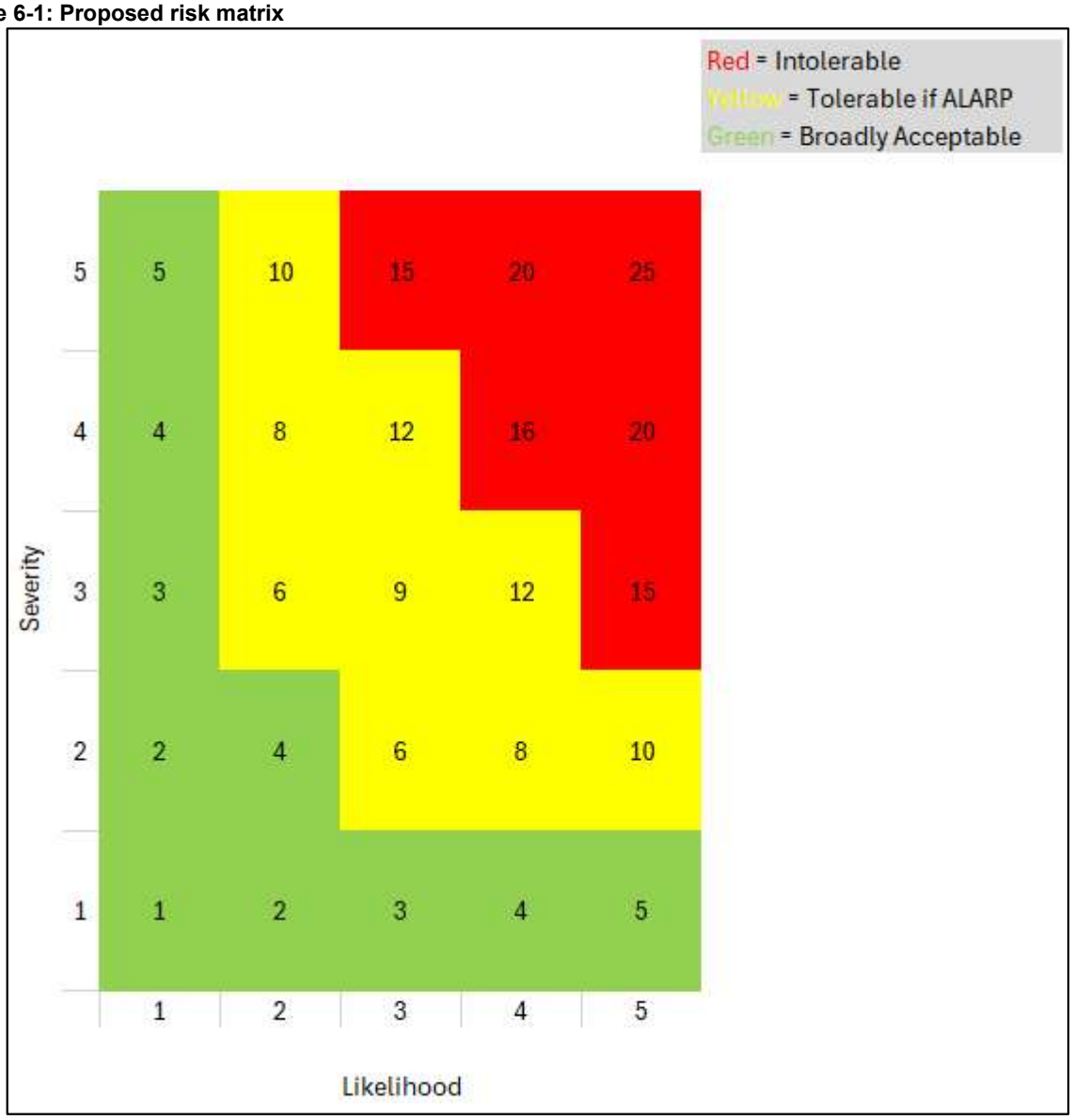


Table 6-3: Semi-quantitative risk assessment of modelled scenarios.

System	Scenario	Severity	Likelihood	Risk
Diesel Storage Tanks	Catastrophic rupture with pool fire	5	1	5
	Small leak with pool fire	3	2	6
Diesel Road Tanker	Catastrophic rupture with pool fire	5	1	5
	Small leak with pool fire	3	2	6
Diesel Transfer Pumps	Small leak with pool fire	3	2	6
	Full bore rupture with pool fire	3	1	3
Grid Connection AGI	Small leak with jet fire/flash fire/VCE	3	3	9
	Full bore rupture with jet fire/flash fire/VCE	5	2	10
Long Pipeline	Small leak with jet fire/flash fire/VCE	3	2	6
	Full bore rupture with jet fire/flash fire/VCE	5	2	10
VCE	Explosion	4	2	8
LDES Battery	Single container fire	4	3	12
	Multi-container fire	5	2	10

At this stage, no intolerable risks have been identified. However, the facility operator will be required to demonstrate that all risks have been managed and that all reasonably practicable measures have been implemented to reduce the risk. The ALARP demonstration principle is a key feature of the Control of Major Accident Hazards (COMAH) regulations, and it is likely that further risk assessments will be required as the design of the facility matures, such that the control of risk can be adequately demonstrated.

7 CONCLUSIONS & RECOMMENDATIONS

7.1 Conclusions

The consequences derived have been both for small 5 mm releases and full bore/catastrophic releases. Despite there being no notable consequences for any small leaks except for the firewater tank locations.

The following conclusions are made from this study:

- **Risk**: All facility risks are, at this point in time, considered tolerable if ALARP. Halston Lumcloom energy will be required to demonstrate that all risks have been controlled as low as reasonably practicable before the facility can be operational.
- **Pool Fire Radiation:** In the event of a catastrophic rupture of a diesel road tanker resulting in a pool fire, the thermal radiation intensity is at levels sufficient to cause multiple fatalities at the administration/control building. Furthermore, there is potential for fuel tank pool fires to escalate to the adjacent tanks, or to cause catastrophic damage to the fire water tanks.
- **Jet Fires:** There is potential for the 37.5 kW/m^2 contours to extend across a large section of the facility, which suggests that there is potential for escalation due to jet fires associated with the natural gas system on-site. There is also potential for personnel situated outside (e.g. walking between areas of the site) to be fatally injured from natural gas jet fires. There is also potential for escalation of jet fires originating in the AGI or on-site pipeline to the LDES compound.
- **Fireballs:** The hazard contours associated with fireballs are relatively large, however these are short lived events and therefore do not contribute greatly to escalation, and the likelihood of a fireball has been deemed improbably over the lifetime of the facility.
- **Flash Fires:** Flash fires can have far reaching effects, as seen in Figure 5-14, however Figure 5-15 provides an indication as to the shape of the flammable cloud which can be seen to be much smaller than the entire cloud envelope. However, the ½ LFL cloud can impact the majority of the site such that any muster points could be considered compromised.
- **LDES System:** The safety risk posed by LDES systems must not be underestimated, and there is potential for very large fires should propagation between containers occur. Should an LDES fire be contained to a single container (as should be the case for properly designed systems), there is potential for localised asset damage and safety risk to first responders.
- **Off-site impacts:** Natural gas and fuel oil consequence modelling has highlighted no particular concerns to third-party buildings or properties outside of the site boundary. In the unlikely event that a large-scale LDES compound fire occurs, with the fire propagating across multiple containers, there is potential for off-site impacts from smoke and evolved gases.

7.2 Recommendations

The following recommendations are made:

1. Consider fire protection strategies for the tanker unloading and fuel oil storage areas, which could include separate bunds for each storage tank, and deluge (sprinkler) systems, and/or foam application on confirmation of a fire. Also consider relocation of the fire water tanks to a location away from all flammable inventories to ensure they are not impacted by fire events.
2. There is currently potential for occupied buildings (security and administration/control building) to be within the 37.5 kW/m^2 hazard ranges associated with jet fires and pool fires. If possible, Halston Lumcloom should

consider relocating these buildings to an area outside all hazard contours – which would be considered an inherently safe solution.

3. Ensure any muster points are located outside of the ½ LFL clouds, as shown in Section 5.4.
4. If possible, the spacing between the natural gas-containing systems and the LDES compound should be increased to reduce the likelihood of a natural gas jet fire escalating to a large-scale battery fire, which could potentially have off-site impacts.
5. Undertake further risk assessments in later design stages and review the input data and assumptions. This should primarily address any uncertainties or assumptions in process information, as these will be more accurately defined as the design progresses. Particular attention should be given to fire and explosion risk within the LDES compound - ensuring that all applicable design standards have been followed to minimise the risk associated with stored electrical energy.

Note, these recommendations aim to further reduce any risk associated with Project Coolpowra, however other risk reduction measures may be deemed more appropriate as the design develops.

8 REFERENCES

/1/ Project Coolpowra, Proposed Reserve Gas-Fired Power Generator, GIS Electrical Substation and Energy Storage System, Project Description SEP-0398, February 2024, Rev 01.

/2/ CPA-HAL-OC-XX-DR-PL-1000, Proposed Site Location, March 2024, Rev P01.

/3/ CPA-HAL-MP-XX-DR-PL-1000,.Master Plan Layout, March 2024, Rev P03

/4/ Summary description of receiving environment, SEP-0398, February 2024, Rev 01

/5/ UK HSE, "Reducing risks, protecting people", ISBN 0 7176 2151 0, 2001.

/6/ UK HSE, "HSE's Land Use Planning Methodology", https://www.hse.gov.uk/landuseplanning/methodology.htm, accessed February 2024.

/7/ IOGP, "Risk Assessment Data Directory – Process Release Frequencies", 434-01, Version 3.0, September 2019.

/8/ TNO, "Guidelines for Quantitative Risk Assessment – 'Purple Book", CPR 18E, 2005.

/9/ UK HSE Failure Rate and Event Data (FRED) report.

/10/ IOGP, "Risk Assessment Data Directory – Ignition Probabilities", 434-06, Version 1.0, September 2019.

/11/ IOGP, "Risk Assessment Data Directory – Vulnerability of Humans", 434-14, Version 1.0, July 2023.

/12/ Guidance to Inspectors on the Assessment of Safety Reports under the COMAH Regulations 2015, HSA, Rev 4, 2017.

APPENDIX A
Flammable Dispersion Results

Scenario	Weather	Hole size (mm)	Distance to LFL fraction (m)	Distance to LFL (m)
Diesel Storage (central) - Catastrophic rupture	Category 1.5/F	Full rupture	22	22
Diesel Storage (central) - Catastrophic rupture	Category 1.5/D	Full rupture	22	22
Diesel Storage (central) - Catastrophic rupture	Category 5/D	Full rupture	25	25
Diesel Storage (central) - leak	Category 1.5/F	5	Not reached at height of interest	Not reached at height of interest
Diesel Storage (central) - leak	Category 1.5/D	5	Not reached at height of interest	Not reached at height of interest
Diesel Storage (central) - leak	Category 5/D	5	Not reached at height of interest	Not reached at height of interest
Road tanker - Catastrophic rupture	Category 1.5/F	Full rupture	6	6
Road tanker - Catastrophic rupture	Category 1.5/D	Full rupture	6	6
Road tanker - Catastrophic rupture	Category 5/D	Full rupture	7	7
Road tanker - Leak	Category 1.5/F	5	Not reached at height of interest	Not reached at height of interest
Road tanker - Leak	Category 1.5/D	5	Not reached at height of interest	Not reached at height of interest
Road tanker - Leak	Category 5/D	5	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 1.5/F	5	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 1.5/D	5	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 5/D	5	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Catastrophic rupture	Category 1.5/F	Full rupture	5	5
Diesel Transfer Pumps - Catastrophic rupture	Category 1.5/D	Full rupture	5	5
Diesel Transfer Pumps - Catastrophic rupture	Category 5/D	Full rupture	6	6
Grid Connection AGI - Leak	Category 1.5/F	5	Not reached at height of interest	Not reached at height of interest

Scenario	Weather	Hole size (mm)	Distance to LFL fraction (m)	Distance to LFL (m)
Grid Connection AGI - Leak	Category 1.5/D	5	Not reached at height of interest	Not reached at height of interest
Grid Connection AGI - Leak	Category 5/D	5	Not reached at height of interest	Not reached at height of interest
Grid Connection AGI - Full bore rupture	Category 1.5/F	152	187	83
Grid Connection AGI - Full bore rupture	Category 1.5/D	152	182	77
Grid Connection AGI - Full bore rupture	Category 5/D	152	205	80
Long pipeline (single point) - 5mm	Category 1.5/F	5	1	1
Long pipeline (single point) - 5mm	Category 1.5/D	5	1	1
Long pipeline (single point) - 5mm	Category 5/D	5	Not reached at height of interest	Not reached at height of interest
Long pipeline (single point) - Full bore	Category 1.5/F	914	Not reached at height of interest	Not reached at height of interest
Long pipeline (single point) - Full bore	Category 1.5/D	914	6	5
Long pipeline (single point) - Full bore	Category 5/D	914	9	6

APPENDIX B
Jet fire results

Scenario	Weather	Hole size (mm)	Flame emissive power (kW/m2)	Distance downwind to intensity level 1 (4.7 kW/m2) (m)	Distance downwind to intensity level 2 (6.3 kW/m2) (m)	Distance downwind to intensity level 3 (12.5 kW/m2) (m)	Distance downwind to intensity level 4 (37.5 kW/m2) (m)	Ellipse area at intensity level 1 (4.7 kW/m2) (m2)
Diesel Storage (central) - leak	Category 1.5/F	5	33	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Diesel Storage (central) - leak	Category 1.5/D	5	33	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Diesel Storage (central) - leak	Category 5/D	5	64	1	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	1
Road tanker - Leak	Category 1.5/F	5	21	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Road tanker - Leak	Category 1.5/D	5	22	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Road tanker - Leak	Category 5/D	5	50	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 1.5/F	5	39	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 1.5/D	5	40	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest
Diesel Transfer Pumps - Leak	Category 5/D	5	78	1	Not reached at height of interest	Not reached at height of interest	Not reached at height of interest	1
Grid Connection AGI - Leak	Category 1.5/F	5	40	4	4	Not reached at height of interest	Not reached at height of interest	3
Grid Connection AGI - Leak	Category 1.5/D	5	40	4	4	Not reached at height of interest	Not reached at height of interest	3
Grid Connection AGI - Leak	Category 5/D	5	37	4	4	Not reached at height of interest	Not reached at height of interest	2
Grid Connection AGI - Full bore rupture	Category 1.5/F	152	350	134	124	106	82	20943
Grid Connection AGI - Full bore rupture	Category 1.5/D	152	350	134	124	106	82	20943
Grid Connection AGI - Full bore rupture	Category 5/D	152	350	135	126	108	88	20639
Long pipeline (single point) - 5mm	Category 1.5/F	5	42	4	4	2	1	29
Long pipeline (single point) - 5mm	Category 1.5/D	5	42	4	4	2	1	29
Long pipeline (single point) - 5mm	Category 5/D	5	70	6	5	4	4	34
Long pipeline (single point) - Full bore	Category 1.5/F	914	184	300	248	132	15	232841
Long pipeline (single point) - Full bore	Category 1.5/D	914	184	300	248	132	15	232841
Long pipeline (single point) - Full bore	Category 5/D	914	286	335	295	219	102	274608

APPENDIX C
Pool fire results

Scenario	Weather	Hole size (mm)	Pool diameter (m)	Distance downwind to intensity level 1 (4.7 kW/m2) (m)	Distance downwind to intensity level 2 (6.3 kW/m2) (m)	Distance downwind to intensity level 3 (12.5 kW/m2) (m)	Distance downwind to intensity level 4 (37.5 kW/m2) (m)
Diesel Storage (central) - Catastrophic rupture	Category 1.5/F	Full rupture	94	104	91	69	54
Diesel Storage (central) - Catastrophic rupture	Category 1.5/D	Full rupture	94	104	91	69	54
Diesel Storage (central) - Catastrophic rupture	Category 5/D	Full rupture	94	112	98	71	55
Diesel Storage (central) - leak	Category 1.5/F	5	14	34	30	22	13
Diesel Storage (central) - leak	Category 1.5/D	5	14	34	30	22	13
Diesel Storage (central) - leak	Category 5/D	5	14	36	33	25	13
Road tanker - Catastrophic rupture	Category 1.5/F	Full rupture	101	107	94	71	57
Road tanker - Catastrophic rupture	Category 1.5/D	Full rupture	101	107	94	72	57
Road tanker - Catastrophic rupture	Category 5/D	Full rupture	101	117	103	74	59
Road tanker - Leak	Category 1.5/F	5	11	28	25	19	10
Road tanker - Leak	Category 1.5/D	5	11	28	25	19	10
Road tanker - Leak	Category 5/D	5	11	30	27	22	10
Diesel Transfer Pumps - Leak	Category 1.5/F	5	17	35	32	23	15
Diesel Transfer Pumps - Leak	Category 1.5/D	5	17	36	32	24	15
Diesel Transfer Pumps - Leak	Category 5/D	5	17	38	35	26	16
Diesel Transfer Pumps - Catastrophic rupture	Category 1.5/F	Full rupture	50	60	53	39	30
Diesel Transfer Pumps - Catastrophic rupture	Category 1.5/D	Full rupture	50	60	53	39	30
Diesel Transfer Pumps - Catastrophic rupture	Category 5/D	Full rupture	50	66	58	40	31

APPENDIX D
Fireball results

Scenario	Weather	Hole size (mm)	Distance downwind to intensity level 1 (4.7 kW/m2) (m)	Distance downwind to intensity level 2 (6.3 kW/m2) (m)	Distance downwind to intensity level 3 (12.5 kW/m2) (m)	Distance downwind to intensity level 4 (37.5 kW/m2) (m)
Long pipeline (single point) - Full bore	Category 1.5/F	914	292	254	182	104
Long pipeline (single point) - Full bore	Category 1.5/D	914	292	254	182	104
Long pipeline (single point) - Full bore	Category 5/D	914	292	254	182	104

APPENDIX E

Explosion results

Scenario	Weather	Material	Distance downwind to overpressure 1 (0.07 bar) (m)	Distance downwind to overpressure 2 (0.1 bar) (m)	Distance downwind to overpressure 3 (0.35 bar) (m)
Methane VCE - Transformer	Category 1.5/F	METHANE	33	19	Not reachable
Methane VCE - Transformer	Category 1.5/D	METHANE	33	19	Not reachable
Methane VCE - Transformer	Category 5/D	METHANE	33	19	Not reachable

About DNV

DNV is the independent expert in risk management and assurance, operating in more than 100 countries. Through its broad experience and deep expertise DNV advances safety and sustainable performance, sets industry benchmarks, and inspires and invents solutions.

Whether assessing a new ship design, optimizing the performance of a wind farm, analysing sensor data from a gas pipeline or certifying a food company's supply chain, DNV enables its customers and their stakeholders to make critical decisions with confidence.

Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.

APPENDIX 4.3

LIGHTING STUDY

DATE: **18 May 2024**

DESIGNER: **Don Kinghan**

PROJECT No: **DAR24011**

PROJECT NAME: **Coolpowra Flexgen, Co. Galway R1**

DARAMACK
Exterior Lighting Design

Lighting designed to the recommendations of BS5489-1:2020 and Lighting Class P4 and in conjunction with CIBSE SLL outdoor lighting guides to provide suitable lighting levels for the safe movements of vehicular and personnel movements.

Lighting Class P4
Maintained average illuminance >5.0Lux
Minimum point illuminance >1.0Lux

Outdoor Lighting Report

PREPARED BY: W Don Kinghan
www.daramacklighting.co.uk

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Grid 1	582642.99	709081.71	400.00	39.00	1.60	1.50
2	Grid 2	582496.91	708967.80	198.00	90.00	1.50	1.50
3	Grid 3	582332.54	709088.85	159.00	60.00	1.50	1.50
4	Grid 4	582239.67	709062.06	120.00	36.00	1.50	1.50
5	Carpark	582259.09	709033.71	99.00	36.00	1.50	1.50
6	Grid 6	582020.96	708915.96	258.00	180.00	1.50	1.50
7	Grid 7	581978.58	709109.85	207.00	60.00	1.50	1.50
8	Grid 8	582185.90	709045.78	21.00	42.00	1.50	1.50
9	Grid 9	582333.01	709243.54	93.00	129.00	1.50	1.50
10	Grid 10	582326.38	708947.72	150.00	90.00	1.50	1.50
11	Grid 11	582368.61	709077.91	60.00	126.00	1.50	1.50
12	Grid 12	583036.95	709013.61	171.00	42.00	1.50	1.50
13	Grid 13	583197.40	709043.20	120.00	36.00	1.50	1.50

Luminaires

Luminaire A Data

Supplier	Philips
Type	BGP291 DW50 BL2
Lamp(s)	LED-HB 5.2S 730
Lamp Flux (klm)	6.00
File Name	LumiStreet Gen2 Micro_BGP291_DW50 BL 2_6000_20LED_5.2S_CLO_L90_730.ies
Maintenance Factor	0.83
Lum. Int. Class	G3
No. in Project	98

Layout

ID /Mast	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	583257.80	709142.03	6.00	166.00	0.00	0.00	0.40			
2	A	583249.25	709116.60	6.00	144.00	0.00	0.00	0.40			
3	A	583232.05	709093.77	6.00	147.00	0.00	0.00	0.40			
4	A	583214.09	709070.42	6.00	140.00	0.00	0.00	0.40			
5	A	583194.71	709049.26	6.00	124.00	0.00	0.00	0.40			
6	A	583159.32	709042.48	6.00	299.00	0.00	0.00	0.40			
7	A	583133.07	709030.18	6.00	293.00	0.00	0.00	0.40			
8	A	583105.36	709027.99	6.00	265.00	0.00	0.00	0.40			

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Layout Continued

ID /Mast	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
9	A	583069.27	709031.33	6.00	262.00	0.00	0.00	0.40			
10	A	583037.48	709035.73	6.00	259.00	0.00	0.00	0.40			
11	A	583002.19	709040.61	6.00	261.00	0.00	0.00	0.40			
12	A	582964.42	709045.84	6.00	261.00	0.00	0.00	0.40			
13	A	582930.07	709050.62	6.00	260.00	0.00	0.00	0.40			
14	A	582895.20	709059.90	6.00	252.00	0.00	0.00	0.40			
15	A	582863.87	709070.07	6.00	251.00	0.00	0.00	0.40			
16	A	582834.22	709079.62	6.00	250.00	0.00	0.00	0.40			
17	A	582802.11	709089.92	6.00	250.00	0.00	0.00	0.40			
18	A	582767.80	709093.52	6.00	271.00	0.00	0.00	0.40			
19	A	582733.94	709093.97	6.00	269.00	0.00	0.00	0.40			
20	A	582697.68	709094.71	6.00	271.00	0.00	0.00	0.40			
21	A	582666.04	709094.41	6.00	267.00	0.00	0.00	0.40			
22	A	582634.39	709092.57	6.00	294.00	0.00	0.00	0.40			
23	A	582601.59	709079.03	6.00	293.00	0.00	0.00	0.40			
24	A	582564.66	709063.48	6.00	294.00	0.00	0.00	0.40			
25	A	582531.18	709049.67	6.00	291.00	0.00	0.00	0.40			
26	A	582495.52	709034.83	6.00	292.00	0.00	0.00	0.40			
27	A	582474.84	709014.82	6.00	113.00	0.00	0.00	0.40			
28	A	582455.11	709037.46	6.00	238.00	0.00	0.00	0.40			
29	A	582425.40	709058.35	6.00	234.00	0.00	0.00	0.40			
30	A	582397.69	709077.86	6.00	230.00	0.00	0.00	0.40			
31	A	582372.10	709095.88	6.00	233.00	0.00	0.00	0.40			
32	A	582340.01	709107.09	6.00	279.00	0.00	0.00	0.40			
33	A	582303.53	709098.14	6.00	283.00	0.00	0.00	0.40			
34	A	582267.03	709089.41	6.00	282.00	0.00	0.00	0.40			
35	A	582238.42	709081.86	6.00	270.00	0.00	0.00	0.40			
36/ENC01	A	582272.98	709062.25	6.00	283.00	0.00	0.00	0.90			
37/ENC01	A	582272.98	709062.25	6.00	103.00	0.00	0.00	0.90			
38/ENC03	A	582329.00	709075.89	6.00	283.00	0.00	0.00	0.90			
39/ENC03	A	582329.00	709075.89	6.00	103.00	0.00	0.00	0.90			
40/ENC02	A	582300.97	709068.96	6.00	283.00	0.00	0.00	0.90			
41/ENC02	A	582300.97	709068.96	6.00	103.00	0.00	0.00	0.90			
42	A	582235.80	709054.97	6.00	192.00	0.00	0.00	0.40			
43	A	582210.67	709058.80	6.00	107.00	0.00	0.00	0.40			
44	A	582206.91	709092.40	6.00	238.00	0.00	0.00	0.40			

Layout Continued

ID /Mast	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
45	A	582162.93	709091.49	6.00	283.00	0.00	0.00	0.40			
46	A	582244.45	709020.15	6.00	193.00	0.00	0.00	0.40			
47	A	582226.88	708989.97	6.00	104.00	0.00	0.00	0.40			
48	A	582191.20	708981.07	6.00	104.00	0.00	0.00	0.40			
49	A	582155.98	708972.74	6.00	104.00	0.00	0.00	0.40			
50	A	582125.05	708965.18	6.00	103.00	0.00	0.00	0.40			
51	A	582097.20	708958.35	6.00	106.00	0.00	0.00	0.40			
52	A	582069.23	708952.62	6.00	88.00	0.00	0.00	0.40			
53	A	582034.22	708964.67	6.00	42.00	0.00	0.00	0.40			
54	A	582022.53	708997.41	6.00	19.00	0.00	0.00	0.40			
55	A	582013.71	709035.66	6.00	15.00	0.00	0.00	0.40			
56	A	582006.93	709063.94	6.00	13.00	0.00	0.00	0.40			
57	A	582031.76	709069.35	6.00	196.00	0.00	0.00	0.40			
58	A	582056.14	709056.39	6.00	104.00	0.00	0.00	0.40			
59	A	582090.74	709065.08	6.00	106.00	0.00	0.00	0.40			
60	A	582067.92	709079.72	6.00	193.00	0.00	0.00	0.40			
61	A	582105.74	709088.47	6.00	198.00	0.00	0.00	0.40			
62	A	582127.35	709073.76	6.00	104.00	0.00	0.00	0.40			
63	A	582143.26	709097.83	6.00	197.00	0.00	0.00	0.40			
64	A	582042.57	708997.26	6.00	200.00	0.00	0.00	0.40			
65	A	582063.93	708976.20	6.00	106.00	0.00	0.00	0.40			
66	A	582098.14	708984.31	6.00	103.00	0.00	0.00	0.40			
67	A	582132.70	708992.67	6.00	104.00	0.00	0.00	0.40			
68	A	582166.63	709000.78	6.00	107.00	0.00	0.00	0.40			
ANC01	A	582158.88	709184.99	6.00	282.00	0.00	0.00	0.40			
ANC03	A	582115.44	709186.56	6.00	280.00	0.00	0.00	0.40			
ANC02	A	582127.90	709161.74	6.00	101.00	0.00	0.00	0.40			
ANC04	A	582095.87	709154.25	6.00	105.00	0.00	0.00	0.40			
ANC05	A	582069.06	709147.67	6.00	102.00	0.00	0.00	0.40			
ANC06	A	582042.56	709141.00	6.00	106.00	0.00	0.00	0.40			
ANC07	A	582013.85	709134.10	6.00	109.00	0.00	0.00	0.40			
ANC08	A	582009.34	709152.71	6.00	279.00	0.00	0.00	0.40			
77	A	582179.13	709079.49	6.00	14.00	0.00	0.00	0.40			
78	A	582200.09	709069.26	6.00	198.00	0.00	0.00	0.40			
79	A	582186.10	709050.31	6.00	24.00	0.00	0.00	0.40			
80	A	582392.40	709265.24	6.00	0.00	0.00	0.00	0.40			

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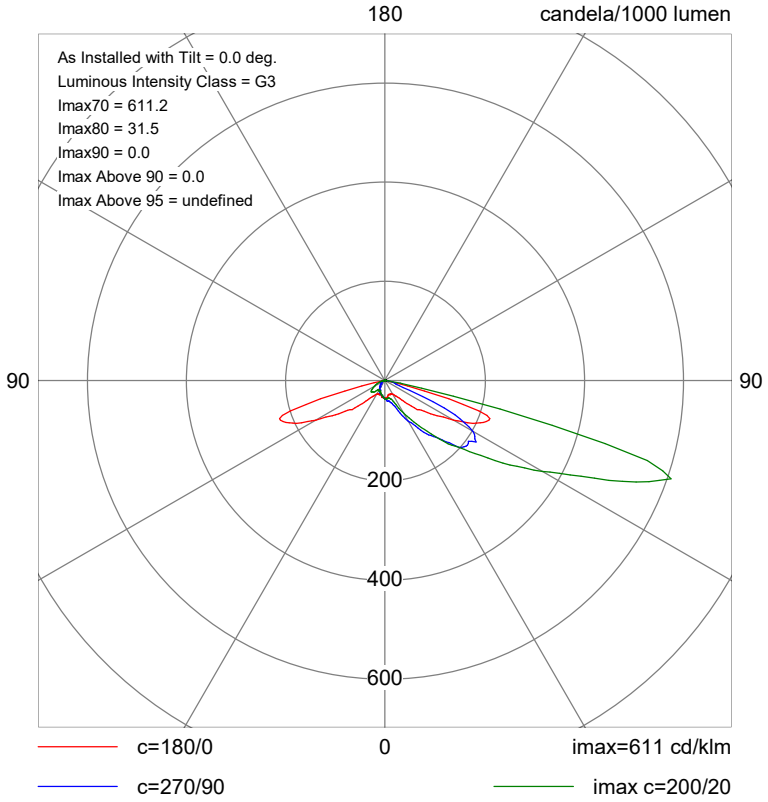
Layout Continued

ID /Mast	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
81	A	582378.90	709268.22	6.00	102.00	0.00	0.00	0.40			
82	A	582387.02	709303.75	6.00	8.00	0.00	0.00	0.40			
83	A	582388.27	709342.48	6.00	188.00	0.00	0.00	0.40			
84	A	582363.11	709342.22	6.00	97.00	0.00	0.00	0.40			
CNC01	A	582440.24	709011.55	6.00	140.00	0.00	0.00	0.40			
CNC02	A	582419.75	708995.92	6.00	104.00	0.00	0.00	0.40			
CNC03	A	582398.62	708981.03	6.00	108.00	0.00	0.00	0.40			
CNC04	A	582366.72	708973.34	6.00	104.00	0.00	0.00	0.40			
CNC05	A	582395.69	709011.68	6.00	332.00	0.00	0.00	0.40			
CNC06	A	582409.18	709031.50	6.00	201.00	0.00	0.00	0.40			
CNC07	A	582372.66	709033.36	6.00	282.00	0.00	0.00	0.40			
CNC08	A	582332.04	709023.69	6.00	283.00	0.00	0.00	0.40			
DNC01	A	582400.84	709100.44	6.00	149.00	0.00	0.00	0.40			
DNC04	A	582396.70	709152.30	6.00	189.00	0.00	0.00	0.40			
DNC03	A	582370.33	709154.98	6.00	16.00	0.00	0.00	0.40			
DNC06	A	582389.49	709189.60	6.00	195.00	0.00	0.00	0.40			
DNC05	A	582360.47	709184.39	6.00	9.00	0.00	0.00	0.40			
DNC02	A	582388.93	709126.28	6.00	59.00	0.00	0.00	0.40			

Polar Diagram

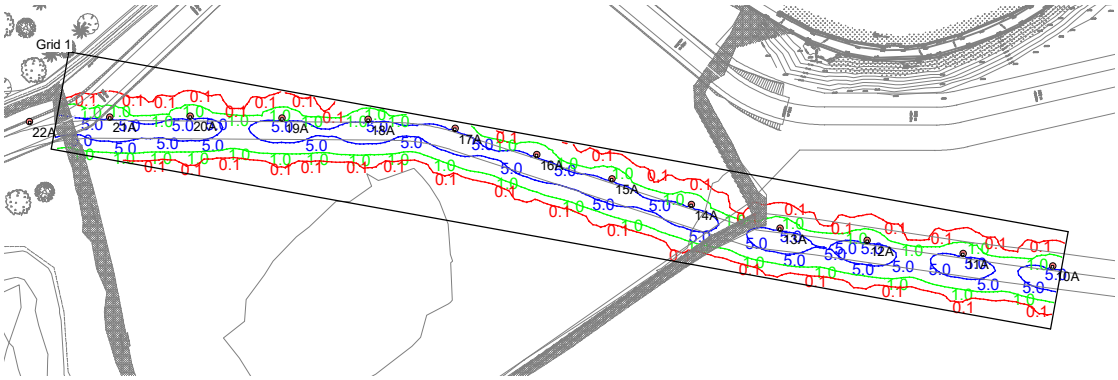
Luminaire A BGP291 DW50 BL2



9196878517

Horizontal Illuminance (lux)

Grid 1

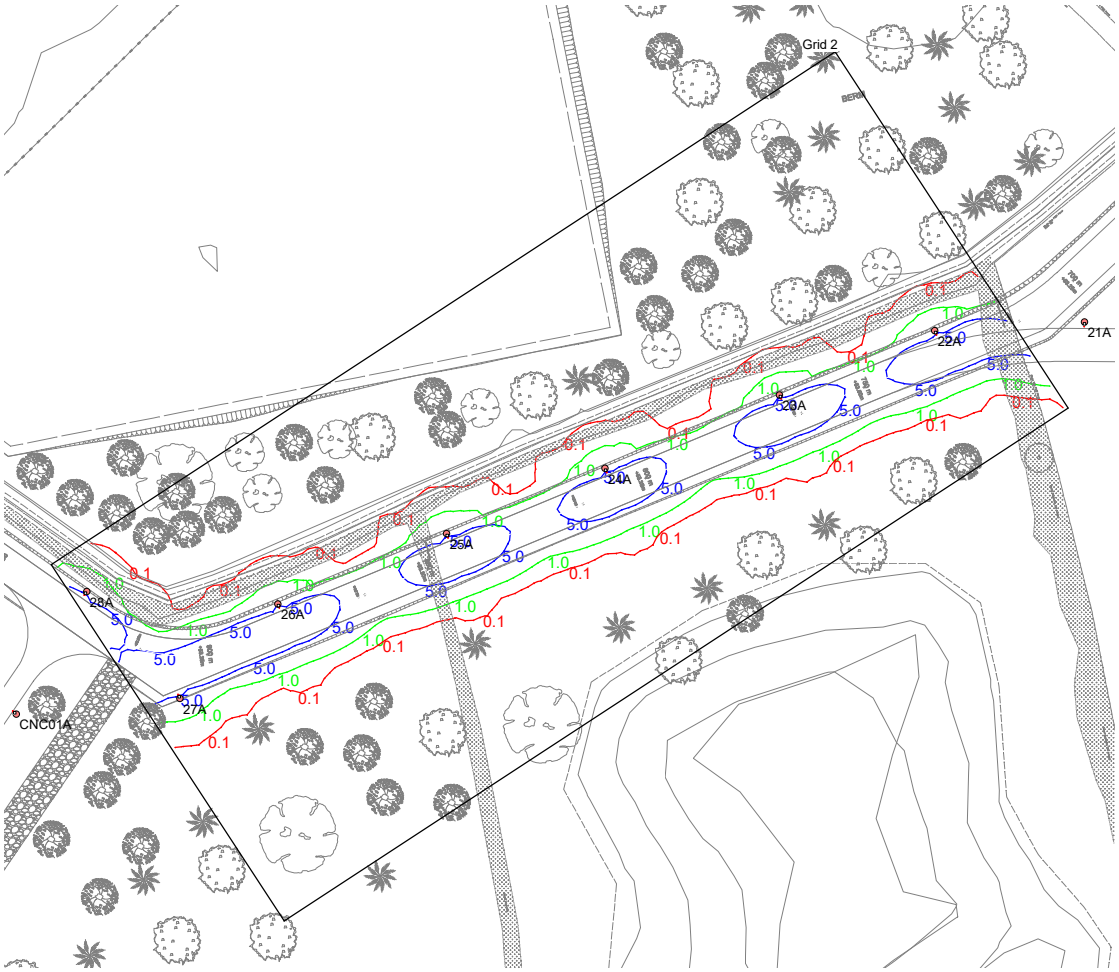


Results

Eav	5.62
Emin	1.14
Emax	10.38
Emin/Emax	0.11
Emin/Eav	0.20

Horizontal Illuminance (lux)

Grid 2



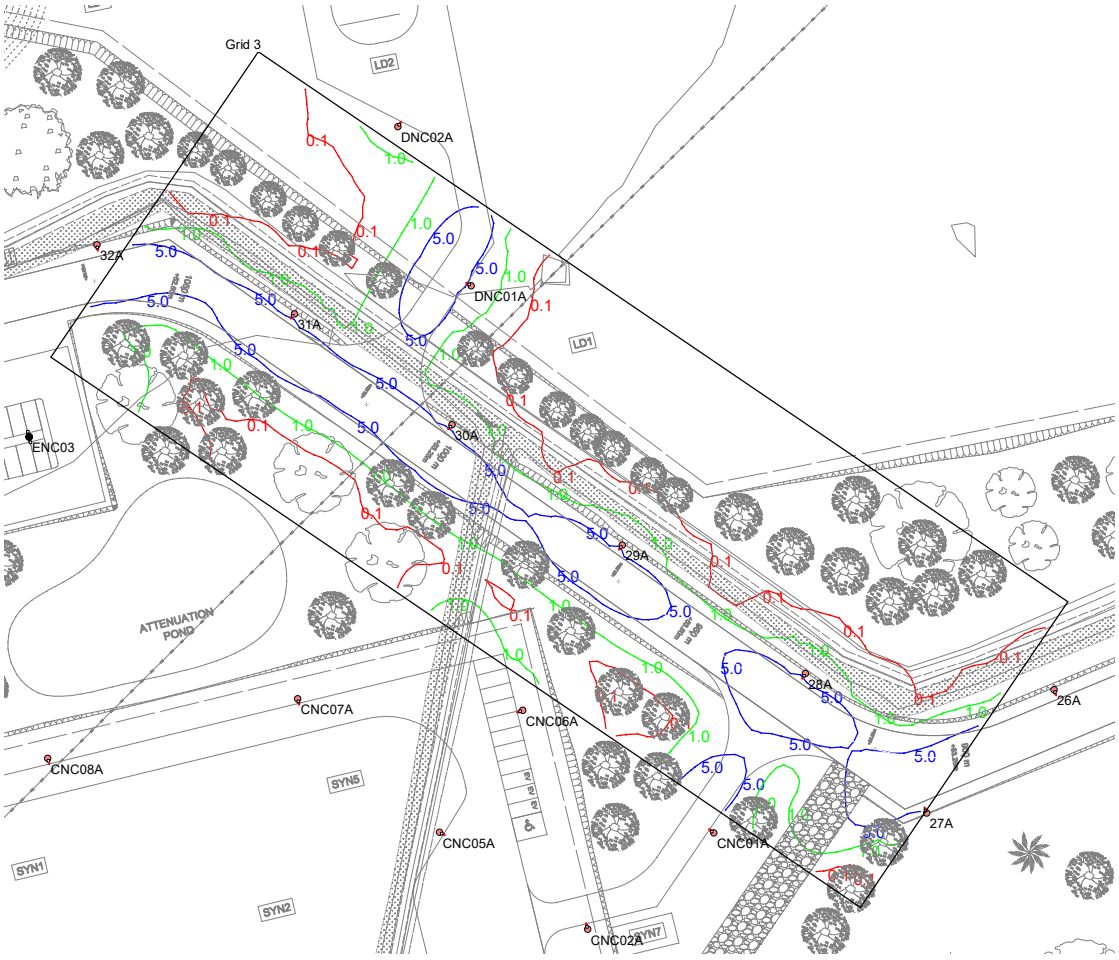
Results

Eav	5.57
Emin	1.12
Emax	10.91
Emin/Emax	0.10
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Grid 3



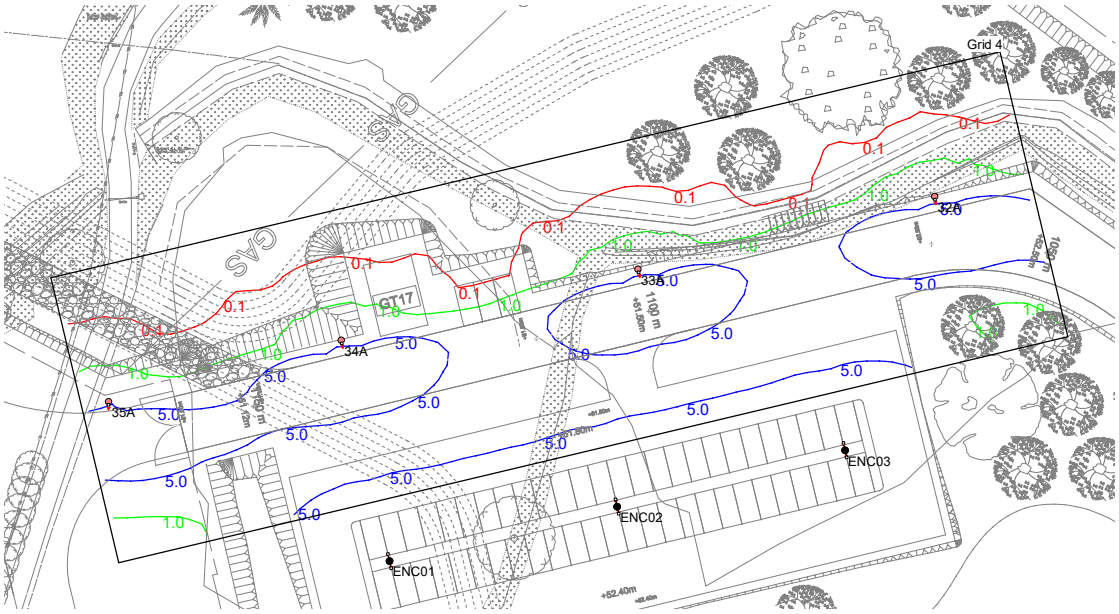
Results

Eav	5.69
Emin	1.15
Emax	10.30
Emin/Emax	0.11
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Grid 4



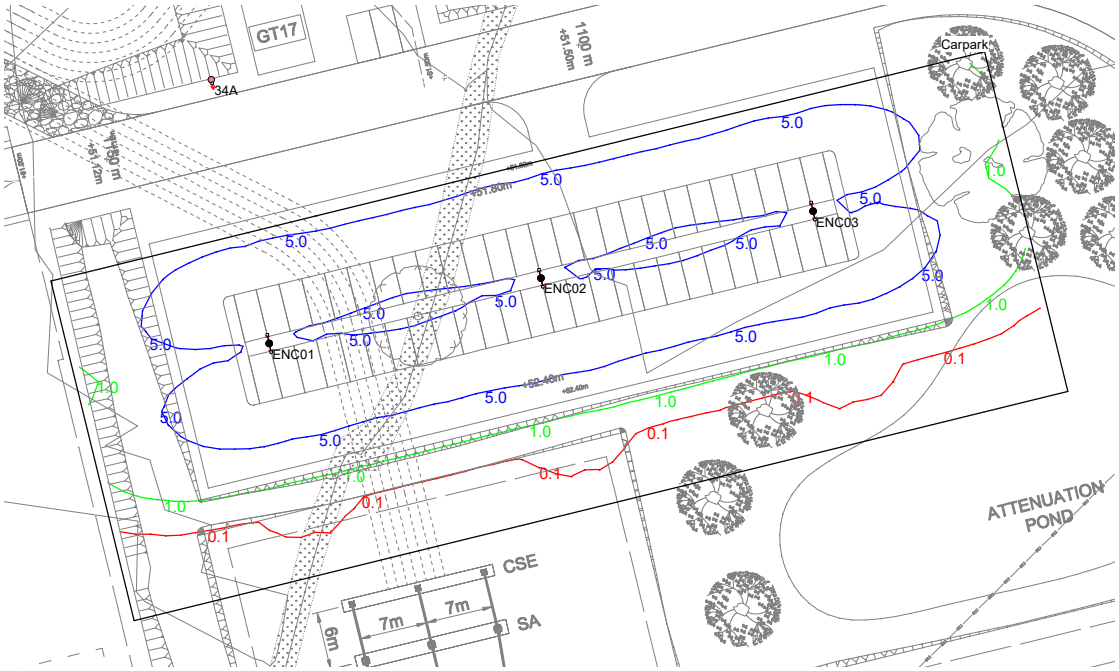
Results

Eav	5.32
Emin	1.07
Emax	10.25
Emin/Emax	0.10
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Carpark



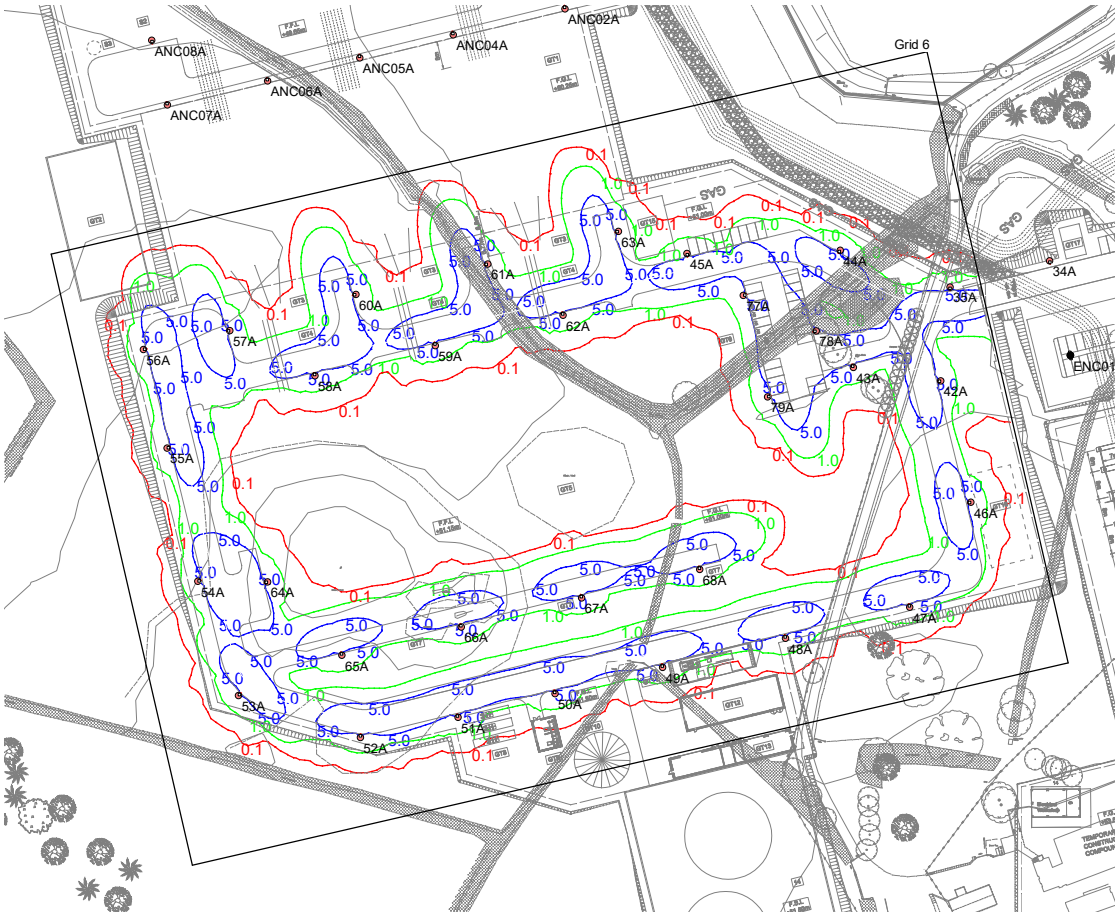
Results

Eav	6.97
Emin	2.78
Emax	11.16
Emin/Emax	0.25
Emin/Eav	0.40

9196878517

Horizontal Illuminance (lux)

Grid 6

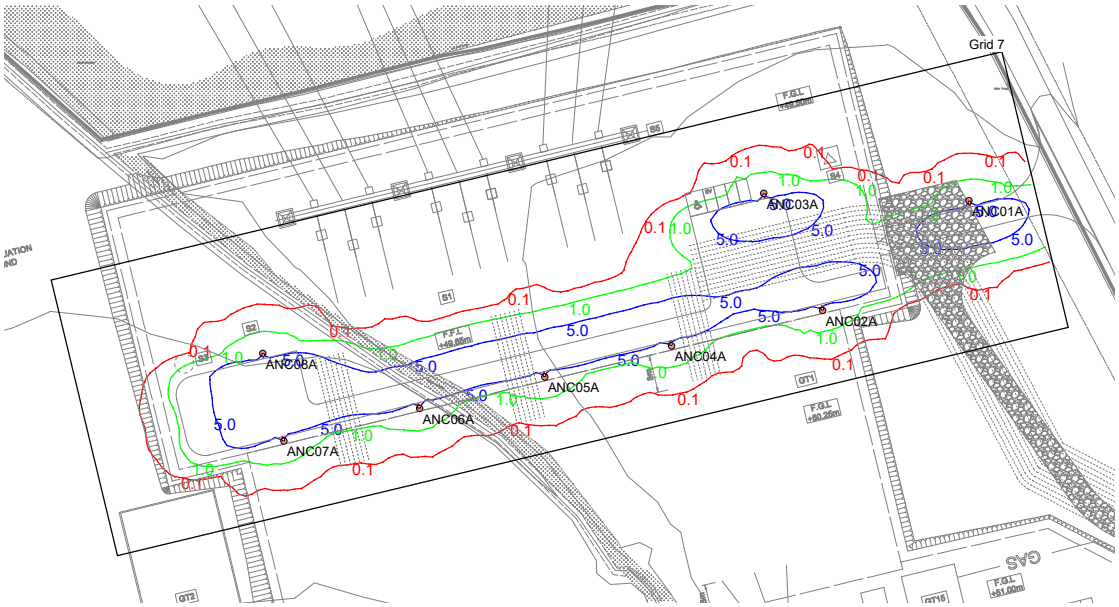


Results

Eav	6.59
Emin	1.29
Emax	11.56
Emin/Emax	0.11
Emin/Eav	0.20

Horizontal Illuminance (lux)

Grid 7



Results

Eav	6.37
Emin	1.33
Emax	11.27
Emin/Emax	0.12
Emin/Eav	0.21

9196878517

Horizontal Illuminance (lux)

Grid 8

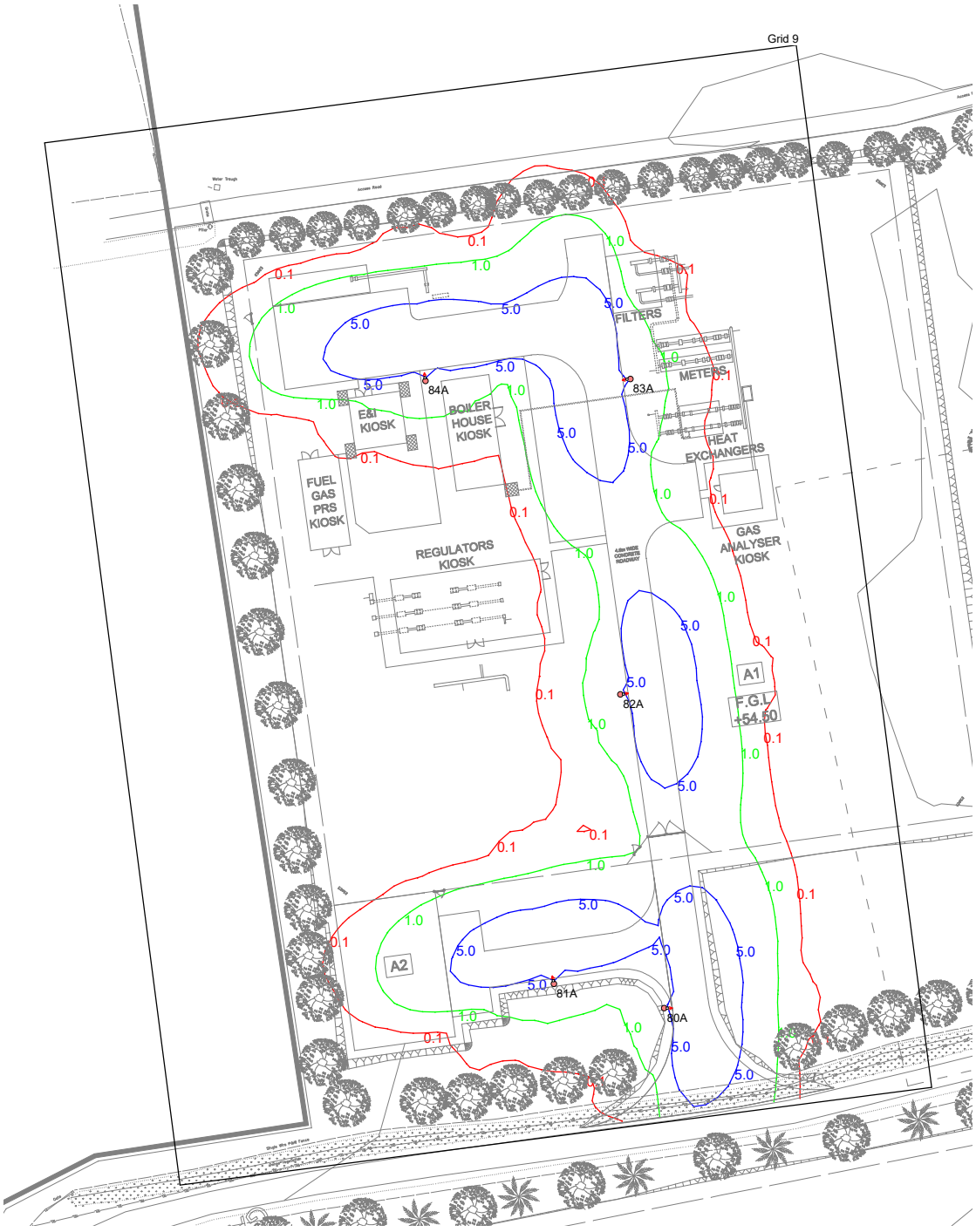
Results

Eav	8.98
Emin	2.85
Emax	14.69
Emin/Emax	0.19
Emin/Eav	0.32

9196878517

Horizontal Illuminance (lux)

Grid 9



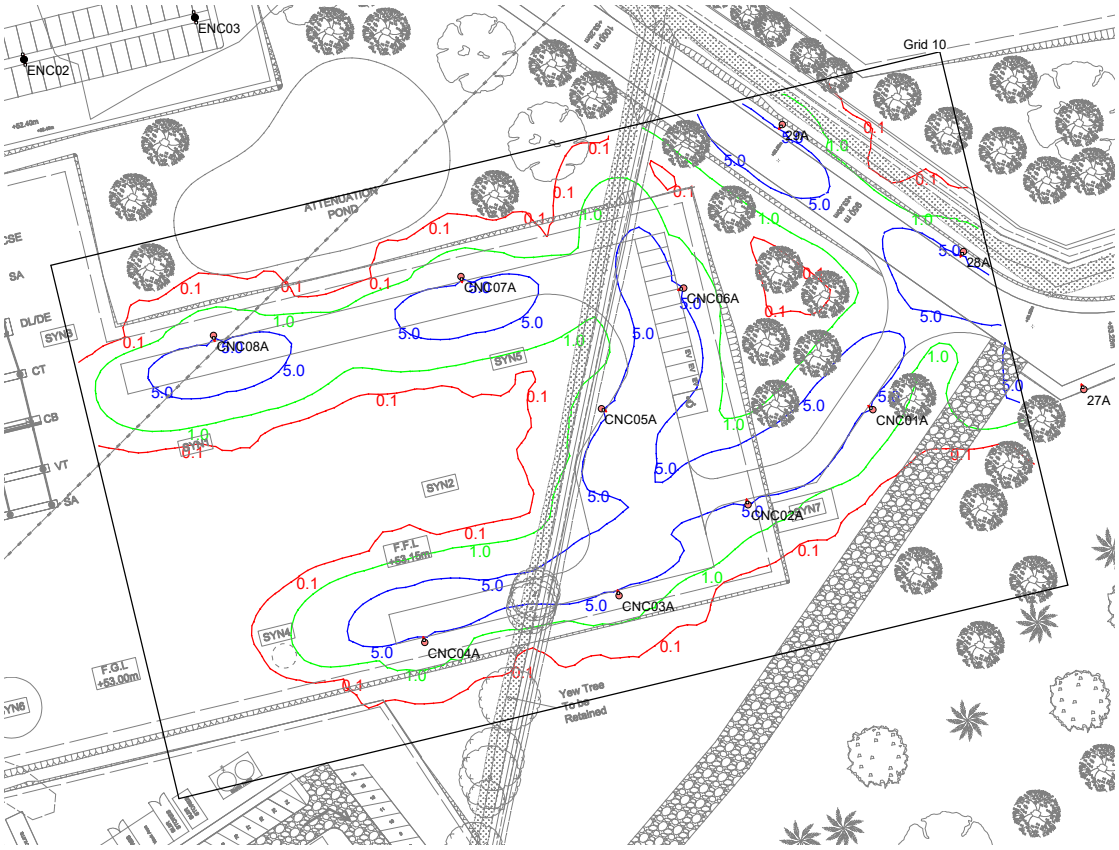
Results

Eav	6.10
Emin	1.19
Emax	10.82
Emin/Emax	0.11
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Grid 10



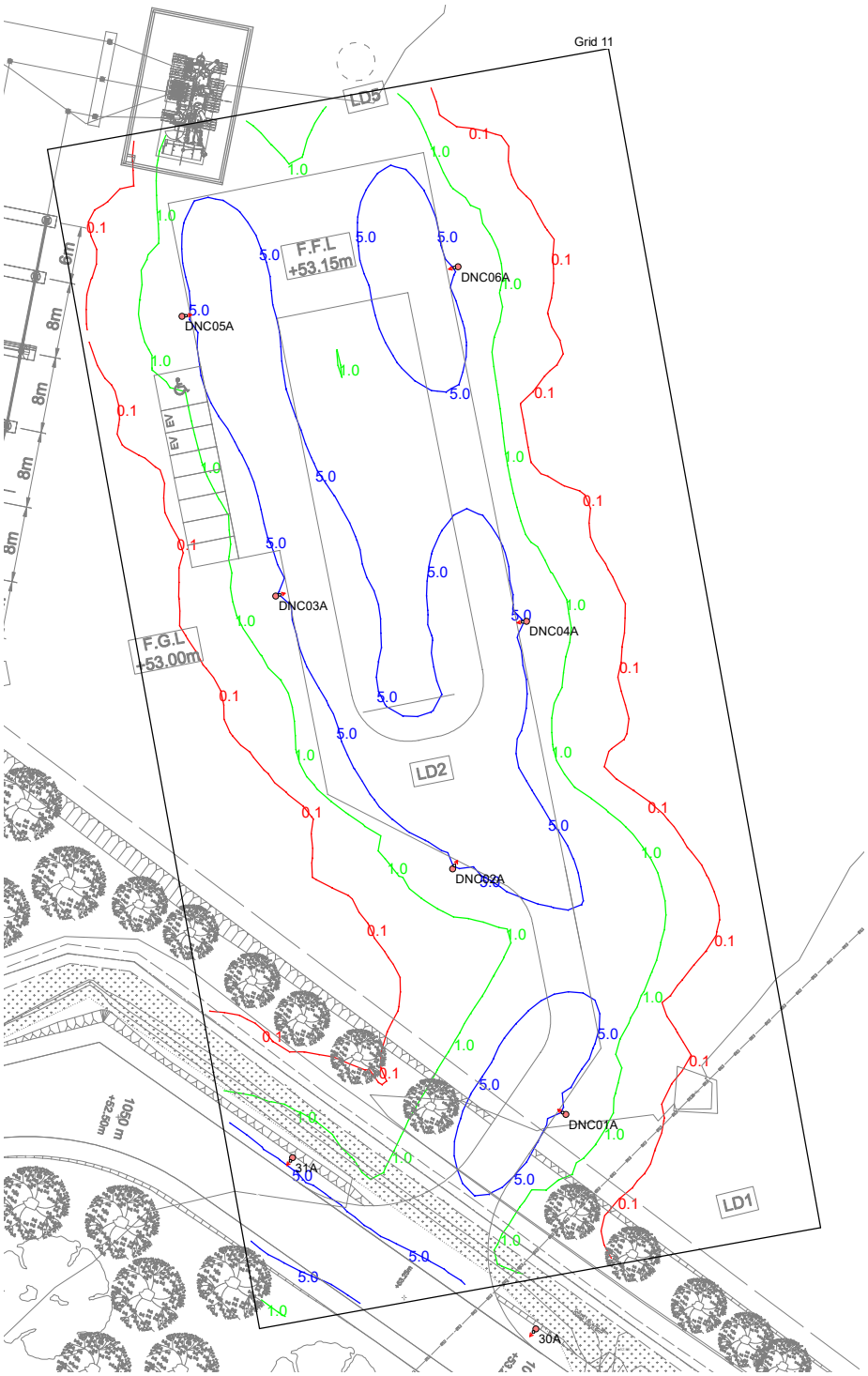
Results

Eav	6.33
Emin	1.24
Emax	11.91
Emin/Emax	0.10
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Grid 11



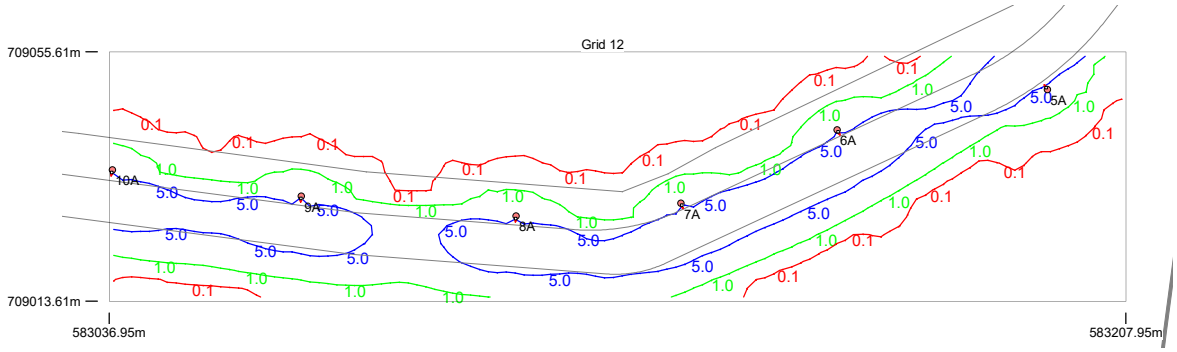
Results

Eav	6.03
Emin	1.18
Emax	10.83
Emin/Emax	0.11
Emin/Eav	0.20

9196878517

Horizontal Illuminance (lux)

Grid 12



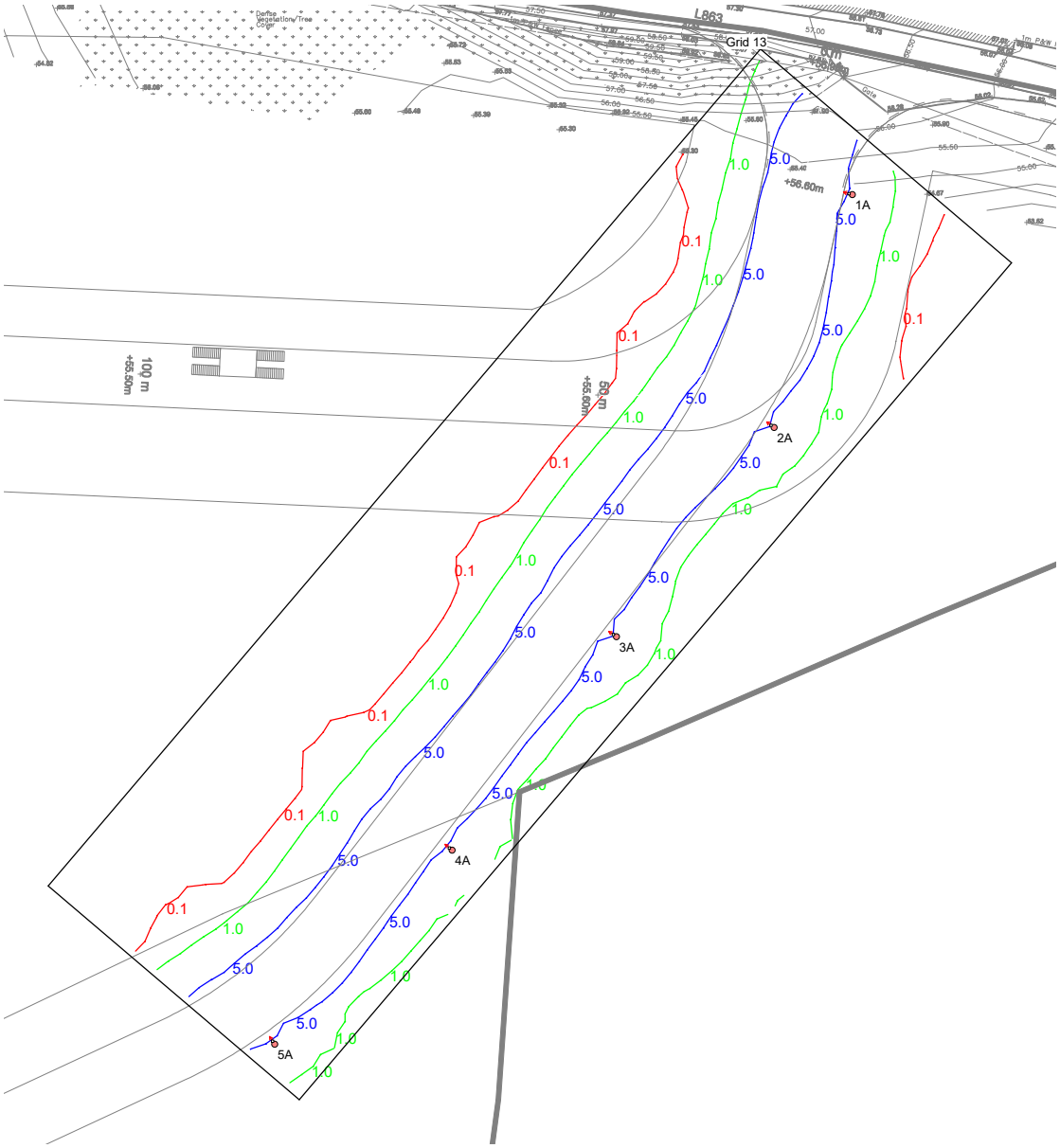
Results

Eav	5.88
Emin	1.22
Emax	10.44
Emin/Emax	0.12
Emin/Eav	0.21

9196878517

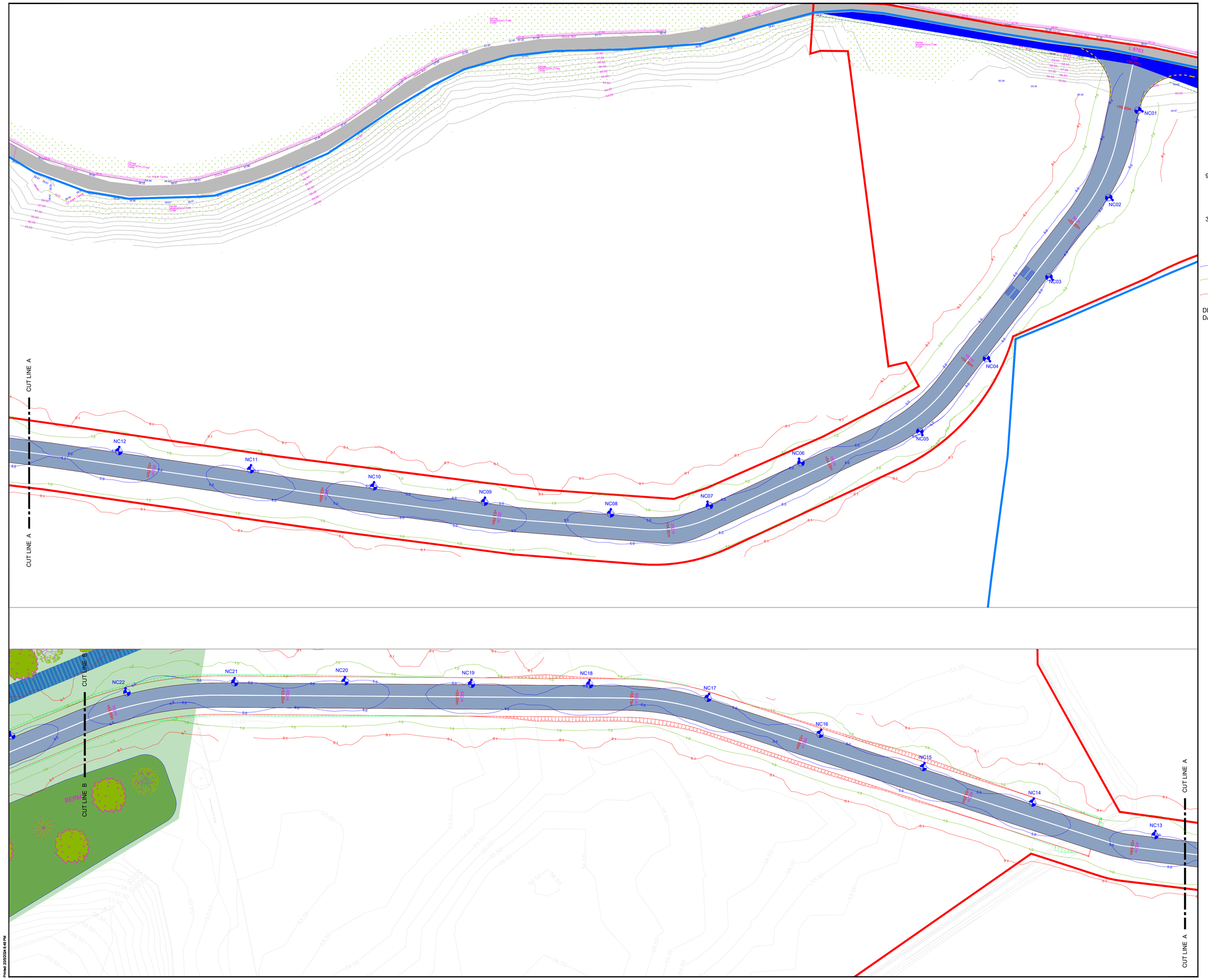
Horizontal Illuminance (lux)

Grid 13



Results

Eav	6.83
Emin	1.38
Emax	11.22
Emin/Emax	0.12
Emin/Eav	0.20



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CDM RESIDUAL DESIGN RISKS AND RESIDUAL ENVIRONMENTAL RISKS

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Notes:

92 Luminaire as Philips LumiStreet Gen2 Micro BGP291, 6.0klm 20LED 39W DW50 BL2 3000K Warm White CLO post top mounted luminaire complete with factory-fitted integral rear shields at 0° tilt on 6m standard galvanized steel planted lighting columns.

3 2x Luminaire as Philips LumiStreet Gen2 Micro BGP291, 6.0klm 20LED 39W DW50 BL2 3000K Warm White CLO twin 0.5m outreach bracket mounted luminaire complete with factory-fitted integral rear shields at 0° tilt on 6m standard galvanized steel planted lighting columns.

5.0 5.0Lux Contour Line - Target average illuminance

1.0 1.0Lux Contour Line - Target minimum illuminance

0.1 0.1Lux Contour Line - equivalent to full moon on clear night

DRAWING TO BE READ IN CONJUNCTION WITH DAR24011/002 AND DAR24011/003

LUX RATING CHART

	Condition	Light Level (LUX)	Foot Candles (FC)
Day Time	Sunlight	107,527	10,000
	Daylight	10,752.70	1,000
	Overcast Day	1,075.30	100
	Very Dark Day	107.53	10
	Twilight	10.75	1
Night Time	Deep Twilight	1.08	0.1
	Full Moon	0.108	0.01
	Quarter Moon	0.0108	0.001
	Starlight	0.0011	0.0001
	Overcast Night	0.0001	0.00001

Rev	Date	Description	Drn	Chk'd
R0	14/05/24	FIRST ISSUE	WDK	WDK

Revisions

Site Key Plan

Drawing Originator

DARAMACK EXTERIOR LIGHTING DESIGN www.daramacklighting.co.uk

Drawing Status

PRELIMINARY

Project Name

COOLPOWRA FLEXGEN, Co. GALWAY

Drawn by	Drawn Date	Checked by	Checked Date
WDK	10/05/24	WDK	14/05/24
Approved by	Approved Date	Scale	
		1:500	

Title — Original drawing sheet is A1

EXTERNAL LIGHTING LAYOUT WITH LUX LEVEL CONTOURS SHEET 1 OF 3

Drawing Number	Revision
DAR24011/001	R0

1. LIGHTING DESIGN

Lighting Levels

Internal road lighting designed to the recommendations of BS5489-1:2020 and Lighting Class P4 for roads. This is based on a safe movement of traffic level for motorized and pedestrians in an Environmental Zone 2 (sparsely inhabited rural areas), speed limit <30mph, quiet traffic flow, occasional vehicles which can be applied to the site roads. P4 was the base level.

Table A.5 — *Lighting classes for subsidiary roads*

Traffic flow	Lighting class		
	E1 to E4[A)]	E1 to E2[A)]	E3 to E4[A)]
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy [B)]	P5	P4	P3
Normal [C)]	P5	P5	P4
Quiet [D)]	P6	P5	P4

Table 3 — P lighting classes

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{vc,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2

Lighting calculations have been produced for the compound using the industry recognized Lighting Reality (Version 2.1). The lux level targets should be read in conjunction with the results in "3.RESULTS".

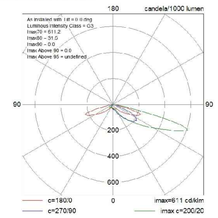
2. LUMINAIRE

Lighting Arrangement

Lighting columns are arranged to achieve the required minimum lighting levels while avoiding excessive light spill onto the site perimeter. These lighting columns are installed with luminaires mounted at 6m, with factory fitted rear shields, a 0° tilt angle and a G3 rating. (This is a rating (G1 - G6) of the control of obtrusive light and upward light output with G6 being the highest.)

The Philips Lighting luminaire range - Philips LumiStreet Gen2 Micro - has been selected to provide the lighting. Philips are a reputable and approved manufacturer which have lighting units installed on Ireland's road networks and many exterior lighting applications. Polar diagram, right, for the G3 rated luminaire right shows the light distribution.

Luminaire A BGP291 DW50 BL2



3. RESULTS

Illuminance results are provided in a separate accompanying lighting calculation report. The site area is broken down into 12No. number of grids to cover the site area. The results show that a light spill is limited to within a few metres behind the lighting column with the use of a low 6m mounting height , 0° tilt, integral back shields to maximize the optical control and minimize the spill light beyond the development perimeter. A warmer 3000K colour temperature LED light source has been selected as opposed to a typical 4000K neutral white light as the warmer colour temperature has a less detrimental effect on flying insects and bats.

Illuminance levels have been exported as lux level contours and overlaid on the site layout.

NOTES:

The electricity storage facility will not be a manned facility. It is anticipated that personnel will only be on site for planned maintenance which would be expected to be carried out in daylight hours.

The chosen lighting level has been selected from the BS5489-1:2020 to provide safe movement of both personnel and vehicular traffic were the risk level is low and with only occasional vehicles.

Light spill has been limited to approximately 1.0Lux where the lighting is next to a site boundary which can be verified by the inclusion of the 1.0Lux contour on the site layout.

LIGHT SPILL MITIGATION MEASURES

The luminaires have been proposed with integral rear shields and a mounting tilt of 0° to reduce back spill lighting and upward light. Additional lighting mitigation measures could be applied such as photocell control to switch lights on and off at dusk and dawn and programmed off at preset times such as the example switching regime below.

Motion sensors could be utilized to activate the lighting only when movement is detected such as the Philips Interact and Multisensor system which can operate as a standalone installation or be locally networked and remotely managed by the Interact software. However, the method of lighting control will be a decision based on the operational requirements of the client.

Example switching regime.
Dusk - 22:00hrs - ON
22:00 - 06:00hrs - OFF
06:00 - Dawn - ON

It is anticipated the buildings within the facility will have perimeter wall-mounted lighting installed which should select fittings with downward optical lighting control. For maintenance purposes portable lighting would be recommended to be carried by the maintenance personnel to provide localized lighting where required which further reduces the amount of permanent site lighting required.

The contour Lux plots show that the light levels will be considerably below the maximum allowed levels as described in the ILP "*Guidance notes for the reduction of obtrusive light*" Table 3 shown below.

Additional guidance has been taken from the Institution of Lighting Professionals (ILP) guidance documents "*Bats and Lighting in the UK*" and "*Dark Sky Ireland - Policy Document*"

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1.0 1.0Lux Contour Line - Target minimum illuminance

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DRAWING TO BE READ IN CONJUNCTION WITH DAR24011/001 AND DAR24011/003

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	Twilight	10.75	1
Night Time	Deep Twilight	1.08	0.1
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	Overcast Night	0.0001	0.00001

Rev	Date	Description	Drn	Chkd
R1	20/05/24	ENTRANCE ROAD - ROUTE ALTERED	WDK	WDK
R0	14/05/24	FIRST ISSUE	WDK	WDK

Revisions

Site Key Plan

Drawing Originator

DARAMACK
EXTERIOR LIGHTING DESIGN
www.daramacklighting.co.uk

Drawing Status

PRELIMINARY

Project Name

COOLPOWRA FLEXGEN, Co. GALWAY

Drawn by	Drawn Date	Checked by	Checked Date
WDK	10/05/24	WDK	14/05/24
Approved by	Approved Date	Scale	
		1:500	

Title — Original drawing sheet is A1

EXTERNAL LIGHTING LAYOUT WITH LUX LEVEL CONTOURS SHEET 2 OF 3

Drawing Number	Revision
DAR24011/002	R1

DAR24011 COOLPOWRA FLEXGEN, Co. GALWAY

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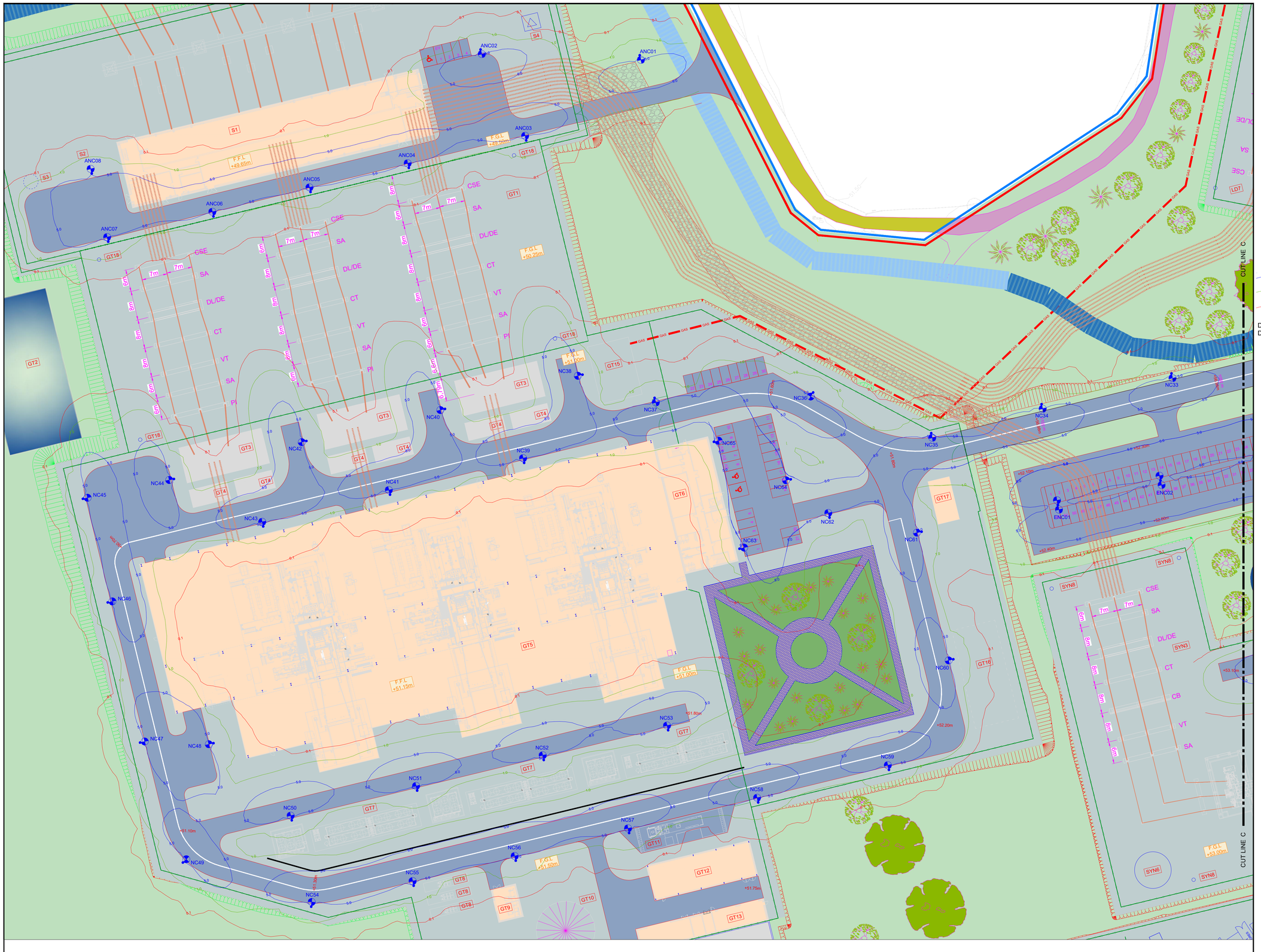

COM RESIDUAL DESIGN RISKS AND RESIDUAL ENVIRONMENTAL RISKS

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0.1 0.1Lux Contour Line - equivalent to full moon on clear night

DRAWING TO BE READ IN CONJUNCTION WITH DAR24011/001 AND DAR24011/002

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Rev	Date	Description	Drn	Chkd
R1	20/05/24	ENTRANCE ROAD - ROUTE ALTERED	WDK	WDK
R0	14/05/24	FIRST ISSUE	WDK	WDK

Revisions

Site Key Plan

Drawing Originator

DARAMACK EXTERIOR LIGHTING DESIGN
www.daramacklighting.co.uk

Drawing Status

PRELIMINARY

Project Name

COOLPOWRA FLEXGEN, Co. GALWAY

Drawn by	Drawn Date	Checked by	Checked Date
WDK	10/05/24	WDK	14/05/24
Approved by	Approved Date	Scale	
		1:500	

Title — Original drawing sheet is A1

EXTERNAL LIGHTING LAYOUT WITH LUX LEVEL CONTOURS SHEET 3 OF 3

Drawing Number	Revision
DAR24011/003	R1

DAR24011 COOLPOWRA FLEXGEN, Co. GALWAY

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