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Our Ref: 7879

13th July 2023

Planning Department
Carlow County Council
County Buildings,
Athy Road,
Carlow,
County Carlow,
R93 E7R7



Re: Section 5 Exemption Application for Underground Electrical Cable to Carlow County Council

Dear Sir or Madam,

On behalf our client Elgin Energy Services Limited, TOBIN Consulting Engineers is pleased to submit this application to Carlow County Council to confirm that the proposed development of an underground 10kV cable is exempted development.

The underground 10kV cable (hereafter referred to as the "proposed development") is associated with the approved 4.2MVA, Solar Farm at Kilcarrig in County Carlow, which secured planning permission from Carlow County Council on the 18th of April 2023 (Planning Register Reference: 22/118). The planning application for the solar project included the proposed development within the scope of various environmental assessments (ecology, cultural heritage and archaeology, Screening for Appropriate Assessment, Landscape etc.) undertaken in support of that application however did not seek planning permission for the full length of cabling works.

Description of Development

The route of the proposed underground cable will connect the permitted onsite substation to the existing ESB substation in Kilcarrig, Co. Carlow. Approximately 19m of the proposed 193m route is within the public road corridor. The remaining 174m is within lands under the ownership of the solar farm landowner. It exits the permitted solar farm site onto the landowner site boundary heading eastwards before turning north towards the 'Bagenalstown 38kV Substation', which is located directly across the Local L70031 Kilcarrig Road.

Works shall be carried out to the appropriate ESB specifications and will include any required site clearing, excavations, laying ducts and joint bays, backfilling and reinstatement. The area will be checked for existing underground services, particularly near the public road, and the area around any services will be carefully dug to avoid impacts to the service. The duct will be placed in the trench and the appropriate aggregate material will be backfilled and compacted in layers. The reinstatement and surface finish shall be agreed in advance with the local authority, ESB and the solar farm landowner. All reinstatement within public roads will be equal to or better than the original surface.

Directors: M. Shelly (Chairman) C. McGovern (Managing Director) E. Connaughton (Company Secretary)
B.J. Downes D. Grehan M. McDonnell J. McGrath
B. Carroll S. Kelly S. Tinnelly

Technical Directors: B. Gallagher B. Heaney C. Kelly O. Fitzpatrick P. Cloonan P. Cunningham

Associate Directors M. Casey E. Fenton N. Gibbons G. Gibson L. Kennedy T. Mackey D. Meade P. O'Connor
J. O'Flaherty B. Rudden

Co. Reg. No. 42654 - Registered Office: Fairgreen House, Fairgreen Road, Galway H91 AXK8. Ireland.

Justification for Exemption

Under the Planning Act, planning permission shall be required in respect of any development not being exempted development. The following definitions as per the Planning and Development Act 2000 (as amended) are relevant:

Section 2(1): "In this Act, except where the context otherwise requires

"Works" includes any act or operation of construction, excavation, demolition, extension, alteration, repair or renewal and in relation to a protected structure or proposed protected structure, includes any act or operation involving the application or removal of plaster, paint, wallpaper, tiles or other material to or from the surfaces of the interior or exterior of a structure."

"Structure" means any building, structure, excavation, or other thing constructed or made on, in or under any land, or any part of a structure so defined, and (a) where the context so admits, includes the land on, in or under which the structure is situate,"

Section 3(1) "In this Act

"Development" means, except where the context otherwise requires, the carrying out of any works on, in, over or under land or the making of any material change in the use of any structure or other land.

Section 4(1) sets out developments that shall be exempted development for the purposes of the Act.

Article 6(1) of the Planning and Development Regulations, 2001 states that:

"Subject to Article 9 development of a class specified in Column 1 and part 1 of Schedule 2 shall be exempted development for the purpose of the Act."

Schedule 2 of the Planning and Development Regulations 2001, (as amended) includes classes of development which are considered exempted development. Class 26 is directly relevant to this proposed development and refers to:

"the carrying out by any statutory undertaker authorised to provide an electricity service of development consisting of the laying of underground mains, pipes, cables or other apparatus for the purposes of the undertaking".

Under Article 3(3) of the Electricity Regulation Act 1999, electricity undertaking is defined as:

"any person engaged in generation, transmission, distribution or supply of electricity, including any holder of a license or authorisation under this Act, or any person who has been granted a permit under Section 37 of the Principle Act"

The applicant has been granted permission for an electricity generating development and as such are "authorised to provide an electricity service" through the "generation, transmission and distribution of supply of electricity."

In order to demonstrate that a development is exempt, it is also necessary to demonstrate that certain restrictions on exempted development do not apply. These restrictions are set out in various Articles/Sections set out in the Planning Regulations/Acts and are reproduced in Table 1 which includes an analysis as to the applicability of the restriction to the proposed development.

Table 1: Planning Regulations/Acts- Exemption Criteria Analysis

Article / Section	Article Description	Commentary
9(1)(a)(i)	Contravene a condition attached to a permission under the Act or be inconsistent with any use specified in a permission under the Act	The proposed development will not contravene any related planning conditions.
9(1)(a)(iii)	Endanger public safety by reason of traffic hazard or obstruction of road users,	The proposed development will be subject to a road opening licence from Carlow County Council and will be subject to a Traffic Management Plan to be agreed in advance of any works with Carlow County Council.
9(1)(a)(vi)	Interfere with the character of a landscape, or a view or prospect of special amenity value or special interest, the preservation of which is an objective of a development plan for the area in which the development is proposed or, pending the variation of a development plan or the making of a new	The proposed development will be an underground cable and will be installed in accordance with ESBs cable specification requirements. There will be no impact in the context of the landscape sensitivities identified over.

Article / Section	Article Description	Commentary
	development plan, in the draft variation of the development plan or the draft development plan,	
9(1)(a)(vii)	Consist of or comprise the excavation, alteration or demolition of places, caves, sites, features or other objects of archaeological, geological, historical, scientific or ecological interest, the preservation, conservation or protection of which is an objective of a development plan or local area plan (LAP) for the area in which the development is proposed or, pending the variation of a development plan or LAP, or the making of a new development plan or LAP, in the draft variation of the development plan or LAP, or the draft development plan or draft LAP.	The proposed development will be an underground cable and will be installed in accordance with ESBs cable specification requirements. There will be no impact in the context of the geological, archaeological and other sensitivities identified over.
9(1)(a)(viiA)	Consist of or comprise the excavation, alteration or demolition of any archaeological monument included in the Record of Monuments and Places.	The proposed development was considered as part of the wider solar project in a Cultural Heritage Assessment prepared by Maurice F. Hurley. This assessment was submitted to Carlow County Council in support of the planning application for the solar project. This assessment concluded that the development poses no potential impact to protected archaeological and architectural resources.
9(1)(a)(viiB)	Where the planning authority or the Board is competent authority for the purposes of Appropriate Assessment (AA) and the development would require an AA because it would be likely to have a significant effect on the integrity of a European Site;	The proposed development was considered as part of the wider solar project in a Screening for Appropriate Assessment prepared by Tobin Consulting Engineers. This assessment was submitted to Carlow County Council in support of the planning application for the solar project. This assessment concluded that the solar project (including the underground cable), that potential impacts associated with the proposed development will not result in likely significant effects on the qualifying interests/special conservation interests of any European sites within the ZOI of the proposed development, in view of their conservation objectives. A Stage 2 Appropriate Assessment is therefore not required.
9(1)(a)(viiC)	Where the development would be likely to have an adverse impact on an area designated as a Natural Heritage Area (NHA) under the Wildlife Act;	The proposed development was considered as part of the wider solar project in an Ecological Impact Assessment prepared by Tobin Consulting Engineers. This assessment was submitted to Carlow County Council in support of the planning application for the solar project. This assessment concluded that the solar project (including the underground cable) will not result in any adverse impact on an area designated as a Natural Heritage Area (NHA) under the Wildlife Act.
9(1)(a)(x)	Consist of the fencing or enclosure of any land habitually open to or used by the public during the 10 years preceding such fencing or enclosure for recreational purposes or as a means of access to any seashore, mountain, lakeshore, riverbank or other place of natural beauty or recreational utility	The proposed development will not result in the fencing or enclosing or obstructing access as described over.
9(1)(a)(xi)	Obstruct any public right of way	The proposed development will not result in any obstruction of public right of way.
9(1)(a)(xii)	Consist of or comprise the carrying out of works to the exterior of a structure, where the structure concerned is located within an architectural conservation area or an area specified as an architectural conservation area	The proposed development is not located within an architectural conservation area or an area specified as an architectural conservation area.
9(1)(c)	Where the development is subject to the Environmental Impact Assessment Directive (i.e. is of a class of project listed in Annexes I or II of the Directive);	Solar projects and electrical grid infrastructure comprising underground cables are not project types requiring EIA as set out in Schedule 5 of the Planning and Development Regulations 2001, as amended. This has been established most recently by the High Court in <i>Sweetman V An Bord Pleanála and others (2019 No. 33 JR)</i> .
Section 57 of Planning Act	The carrying out of works to a protected structure, or a proposed protected structure, shall be exempted development only if those works would not materially affect the character of— (a) the structure, or (b) any element of the structure which contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.	The proposed development will not materially affect the character of any protected structure.

Having regard to the applicability of Class 26 to the proposed development and the absence of any restrictions as set out in the above table, it is the opinion of TOBIN Consulting Engineers that the proposed development is exempted development. This is in line with a decision from An Bord Pleanála (ABP Ref. ABP-302895-18). We would request that Carlow County Council consider these details and, in the event that the same conclusions are reached, issue an Exemption Declaration as per statutory timelines.

Content of Exemption Application

The exemption application submitted to Carlow County Council comprises the following information:

- 2 no. copies of exempted development application form;
- 2 no. copies of exempted development application drawings:
 - Site Location Map;
 - Site Layout Map;
- 2 no. copies of Planning and Environmental Considerations Report which includes an Appropriate Assessment Screening;
- 2 no. copies of ESB specifications
- Cheque made payable to Carlow County Council to the value of €80.00.

We trust you will find the enclosed information sufficient in order to determine the exempted development application and issue an Exemption Declaration. If you require any further information then please do not hesitate to contact the undersigned.

Yours sincerely,



Louise Byrne

Senior Planner

For and on behalf of TOBIN Consulting Engineers and Elgin Energy Services Ltd

Block 10-4

Blanchardstown Corporate Park

Dublin

D15 X98N

Tel: + 353 (0)1 8030401

Louise.Byrne@tobin.ie



COMHAIRLE CHONTAE CEATHARLOCHA
CARLOW COUNTY COUNCIL

C A R L O W
COUNTY COUNCIL
COMHAIRLE CHONTAE CEATHARLOCHA



COUNTY BUILDINGS, ATHY ROAD, CARLOW.

Tel: Phone:059-9170300/ Fax: 059-9170836

Website: www.carlow.ie

Application Form for Section 5 Declaration on Development & Exempted Development

1. Name of applicant: Elgin Energy Service Ltd.
2. Address of applicant: 4th floor, Hambleden House, 19-26 Pembroke Street Lower, Dublin 2, D02WV96
3. Name and address for correspondence: Louise Byrne, Block 10-4, Blanchardstown Corporate Park, Dublin 15, D15 X98N

Tel. No: 353 (0)1 8030401_Fax No: N/a___E-mail: [REDACTED]
4. Location of Development: Townland: Killcarrig, Bagenalstown, Co. Carlow
Postal Address: (if different from Townland): N/a
5. Name and Address of Agent: TOBIN Consulting Engineers, Block 10-4, Blanchardstown Corporate Park, Dublin 15, D15 X98N
6. Outline clearly the description of the development / proposal: Proposed underground 10kV grid connection to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation. The total length of the route is 193m.

7. Is this a Protected Structure or within the curtilage of a Protected Structure: No _____

8. List any previous applications relating to the site: Planning Ref: 22/118 for solar energy development and associated work, granted planning permission March 2023.
9. Are you aware of aware of any enforcement proceedings relating to this site: ____ No ____

10. Please state applicant's interest in this site: Conditional Agreement to Lease
11. List of plans, drawings etc. submitted with this application: _____

Site Location Plan _____

Site Layout Plan _____

Signed:  (Agent on behalf of Applicant) Date: 13/07/2023
(Signature of Applicant)

Note: This application must be accompanied by:

Payment of Fee: This application must be accompanied by the statutory fee of €80

Lodgement: The application should be forwarded to:
Planning Department
Carlow County Council
Athy Road
Carlow

OFFICE USE ONLY

Date Received: _____ Date Decision Due: _____
Date of Decision: _____ Recommendation: _____

Advice Note:

This is a non-statutory advice note prepared by Carlow County Council for the purposes of advising applicants what information is required for a decision to be made under Section 5 by the Planning Authority.

Under Section 5 of the Planning and Development Act 2000 as amended any person may request in writing from the Planning Authority as declaration as to what, in any particular case, is or is not development or is or is not exempted development within the meaning of the Planning and Development Act 2000 as amended.

The Planning Authority is required to make a decision within 4 weeks of receipt of a Declaration Request under Section 5, along with the prescribed fee, however the Planning Authority can also request Additional Information if it is considered that insufficient information has been submitted.

Therefore, it is advised that the following information should be submitted to enable the Planning Authority to make a qualified decision within the prescribed period:

- A site location map (Scale 1:2500 in rural area and 1:1000 in an urban area), with the site clearly outlined in red.
- Site Layout Map (Scale 1:500) in compliance with Article 23 of the Planning and Development Regs 2001 as amended.
- Drawings (Scale 1:50) Where development involves any construction of a new structure, increase in size of existing structure or alterations to an existing structure, scaled floor plans and elevations. Drawings should differentiate between the original building, all extension and proposed development.

CARLOW COUNTY COUNCIL

PLANNING AND DEVELOPMENT ACTS 2000 AS AMENDED

NOTIFICATION OF FINAL GRANT

TO: Elgin Energy Services Ltd.,
C/o Tobin Consulting Engineers,
Block 10- 4,
Blanchardstown Corporate Park,
Dublin 15.

Planning Register Number: 22/118

Valid Application Receipt Date: 29/03/2022

Further Information Received Date: 10/02/2023

TOBIN CONSULTING ENGINEERS	
PROJECT NO:	
FILE REF:	
Date Received	19 APR 2023
PASS TO	D.L.
S. B. / S. C.	

In pursuance of the powers conferred upon them by the above-mentioned Acts, Carlow County Council have by Order dated 11/04/2023 GRANTED PERMISSION to the abovenamed, for the development of land, namely:-

the proposed works will include a solar farm on an area of approximately 14.16 hectares, comprising photovoltaic panels on ground mounted frames, 4 no. single storey inverter/transformer stations, 1 no. single storey terminal stations, 1 no. single storey electrical switch room, 1 no. storage container, security fencing, CCTV and all associated ancillary development works. Elgin Energy Services Ltd. are applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operation period of 40 years) AT Kilcarrig, Bagnelstown, Co. Carlow IN ACCORDANCE WITH THE PLANS SUBMITTED WITH THE APPLICATION.

Subject to the 24 conditions set out in the Schedule attached.

Signed on behalf of CARLOW COUNTY COUNCIL.


for SENIOR EXECUTIVE OFFICER

Date: 18/04/2023.

Planning permission for proposed works including a solar farm on an area of approximately 14.16 hectares, comprising photovoltaic panels on ground mounted frames, 4 no. single storey inverter/transformer stations, 1 no. single storey terminal stations, 1 no. single storey electrical switch room, 1 no. storage container, security fencing, CCTV and all associated ancillary development works at Kilcarrig, Bagnelstown, Co. Carlow. Elgin Energy Services Ltd. are applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operation period of 40 years).

For: Elgin Energy Services Ltd.

First Schedule	
Having regard to the nature and scale of the proposed development, to the character of the site and the surrounding rural area, to the policies and related provisions of the Carlow County Development Plan 2022-2028 regarding renewable energy and solar energy, and national and regional policy in relation to renewable energy production and targets, it is considered that subject to compliance with the conditions attached, the proposed development would be in accordance with national, regional and county policy for renewable energy, would not result in unacceptable impacts on the landscape character or the visual amenity of the area, would not seriously injure the amenities of the area or of property in the vicinity of the site, would not endanger public health, would be acceptable in terms of traffic safety and convenience, and would therefore be in accordance with the proper planning and sustainable development of the area.	
Second Schedule	
1)	a) The development shall be carried out in accordance with the plans and particulars received by the Planning Authority on 29/03/2022 as amended by further information received on 10/02/2023, except where altered or amended by conditions in this permission. b) The red line application boundary of the site shall be as delineated on the Site Master Plan, Site Location Map and Site Layout Plans received by the Planning Authority as Further Information on 10/02/2023. Reason: To enable the Planning Authority to check the development when completed, by reference to the approved particulars.
2)	The period during which the development hereby permitted may be carried out shall be 10 years from the date of the final grant of permission. Reason: Having regard to the nature and scale of the proposed development, the Planning Authority considers it appropriate to specify a period of validity of this permission in excess of five years.
3)	(a) This permission shall be for a period of 35 years from the date of commissioning of the solar farm permitted herein. The solar farm, including solar panels and related infrastructure and ancillary structures shall be then removed from the site, unless prior to the end of the 35 year period, planning permission shall have been granted for their retention for a further period.

	(b) Prior to the commencement of development, a detailed restoration plan, including a timescale for its implementation, providing for the removal of the solar farm, including solar panels and all related infrastructure and ancillary structures, shall be submitted for the written agreement of the Planning Authority. (c) On full or partial decommissioning of the solar farm, or if the development ceases operation for a period of more than one year, the solar farm, including solar panels and all related infrastructure and ancillary structures, shall be dismantled and permanently removed from the site. The site shall be restored in accordance with the restoration plan required under part (b) of this condition and all decommissioned structures shall be removed within three months of decommissioning. Reason: To enable the Planning Authority to review the operation of the solar farm over the stated time period, having regard to the circumstances then prevailing, and in the interest of orderly development.
4)	(a) This permission shall not be construed as any form of consent or agreement to a connection to the national grid or to the routing or nature of any such connection, or for the routing and installation of underground cabling within public roads. (b) Final route selection and installation proposals for underground cabling within public roads, including a methodology for excavation and reinstatement works to facilitate same, shall be subject to a separate Roads Opening Licence application which shall be submitted for the consideration of the Council's Transportation Department. (c) Excavation and reinstatement works within public roads shall be carried out in full compliance with the '<i>Guidelines for Managing Openings in Public Roads</i>' (the Purple Book) and the '<i>Requirements for the Reinstatement of Openings in National Roads</i>' CC-PAV-04007 (TII 2019). Reason: In the interest of clarity regarding the scope of this permission and the protection of the integrity and function of public roads.
5)	This permission authorises the development as detailed in the plans and particulars received by the Planning Authority and does not relate to any other development on the site not subject of the planning application whether or not such development would otherwise constitute exempted development. Reason: To avoid any misunderstanding as to the approved plans and particulars of the permission.
6)	(a) No artificial lighting shall be erected on the site, unless authorised by a separate grant of planning permission. (b) CCTV/Security cameras shall be erected such that they are fixed and angled to face into the site and shall not be directed towards adjoining properties and/or roads. (c) Cables within the site shall be located underground. (d) The inverter/transformer stations and equipment containers shall have matt dark green external colour. (e) Notwithstanding the provisions of the Planning and Development Regulations 2001 (as amended), or any statutory provision amending or replacing them, no advertisement signs, advertisement structures, banners, canopies, flags, or other projecting elements shall be displayed or erected on the development, on or along the boundaries of the site, or within the curtilage of the site, without a prior grant of permission from the Planning Authority. Reason: In the interests of visual amenity and in order to maintain the rural character of the area.
7)	(a) All archaeological, environmental, ecological and construction mitigation measures detailed in the '<i>Construction, Environmental Management Plan (CEMP) and the Archaeological</i>

	<i>Impact Assessment'</i>(AIA) received by the Planning Authority on 10/02/2023, shall be strictly adhered to and implemented in full. (b) The Construction Environmental Management Plan (CEMP) shall include the location of any and all archaeological or cultural heritage constraints relevant to the proposed development (as set out in AIA Report). The CEMP shall clearly describe all identified likely archaeological impacts, both direct and indirect, and all mitigation measures to be employed to protect the archaeological or cultural heritage environment during all phases of site preparation, construction and decommissioning activities. (c) Measures shall be implemented to prevent the spread of Alien Invasive Species during construction works and control measures shall have regard to '<i>The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road</i>' (NRA). (d) Hours of construction activities on the site shall be restricted from Monday to Friday 07.00 - 19.00, Saturday 07.00 - 16.00, unless otherwise agreed in writing with the Planning Authority. (e) No construction activity shall be undertaken on Sundays and Bank Holidays under any circumstances, unless otherwise agreed with the Planning Authority. (f) Any clearance of vegetation, including hedgerows or forestry, from the site should only be carried out in the period September to February inclusive i.e., outside the main bird breeding season. Where vegetation removal is required to be carried out outside this period, existing buildings and vegetation must be inspected for nesting birds, under licence issued by the National Parks and Wildlife Service (NPWS), by a suitably qualified Ecologist immediately prior to removal. Suitable mitigation measures must be put in place should nesting birds be found. Reason: In the interest of the protection of the environment during the construction and operational phases of the development.
8)	(a) All existing planting, including trees and hedgerows on and bounding the site, shall be retained and maintained as currently in situ, except where altered or amended by conditions of this permission. (b) All landscaping proposals, including landscape mitigation and restoration measures, shall be carried out and implemented in full in accordance with the details specified in Appendix 3 of the 'Hedgerow Planting, Management and Maintenance Plan received by the Planning Authority on 10/02/2023. (c) All new planting the subject of part (b) of this condition shall be carried out within the first planting season following the commencement of the construction of the development. Any trees or hedgerows planted in accordance with this condition which are removed, die, or which become seriously damaged or diseased within two years of planting, shall be replaced with trees and hedgerows of a similar size and species. (d) All landscaping and screening shall be maintained at regular intervals. Reason: To ensure the protection of the rural character, visual, and residential amenities of the area.
9)	The construction of the development shall be supervised by a suitably qualified and experienced environmental personnel and/or an Ecological Clerk of Works to ensure that all mitigation measures in relation to environmental management and drainage are implemented in full and to ensure impacts on the environment are minimised. Upon the commissioning of the development a Final Report certifying that all mitigation measures have been implemented shall be submitted for the written agreement of the Planning Authority. Reason: To prevent water pollution and in the interests of protecting the environment.
10)	(a) Construction and operational noise mitigation measures shall be implemented in full in accordance with the details specified in the "<i>Construction, Environmental Management Plan</i>"

	received by the Planning Authority on 10/02/2023, except where altered or amended by conditions of this permission. (b) Noise and vibration during the construction phase, at sensitive receptors, shall be limited to the levels recommended in BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 respectively. (c) Noise emissions during the operational phase of the development when measured at noise sensitive locations shall not exceed the following limits: i. <i>Daytime (07-00 to 19-00) 55dB L_{Ar,T}</i> ii. <i>Evening (19-00 to 23-00) 50dB L_{Ar,T}</i> iii. <i>Night (23-00 to 07-00) 45dB L_{Aeq,T}</i> (d) There shall be no tonal or impulsive element in night-time noise emissions during the operational phase of the development. (e) <u>Following the commissioning of the development</u> and in order to demonstrate that operational noise limits are being adhered to, a programme for noise monitoring shall be submitted for the written agreement of the Planning Authority. Exceedance of noise limits shall require additional mitigation measures. Reason: To safeguard the amenities of the area.
11)	(a) (a) The mitigation by design measures in Section 1.4.4 of the 'Glint and Glare Assessment' received by the Planning Authority on 29/03/2022 shall be carried out and implemented in full. (b) <u>Following the commissioning of the development</u> and in order to demonstrate that the development is not resulting in glint and glare impacts to adjoining properties and public roads, and to facilitate additional mitigation measures if necessary, a programme for glint and glare monitoring shall be submitted for the written agreement of the Planning Authority. Reason: In the interests of residential amenity and traffic safety.
12)	<u>Prior to the commencement of development</u>, the applicant shall consult with the Chief Fire Officer and shall strictly comply with their recommendations, including requirements in relation to (i) fire brigade access and (ii) fire-fighting water supplies. Reason: In the interests of fire safety and public health and safety.
13)	(a) (a) The development shall not impair the operation of existing land and roadside drainage and the applicant shall not interfere with land and roadside drainage without the prior written agreement of the Council's Municipal District Engineer. The entrances to adjoining public roads shall be designed, constructed, and maintained to ensure the uninterrupted flow of existing roadside drainage. (b) (b) All road surfaces, culverts, drains, roadside cuttings, gullies, verges and public lands shall be protected and maintained clean and operational at all times during the construction phase of the development, and any damage occurring, including all costs associated therewith, shall be borne by the applicant and shall be rectified to the satisfaction of the Planning Authority. (c) (c) All surface water generated on the site shall be disposed of on the site and shall not discharge onto adjoining public roads or to adjoining properties, and no surface water from public roads shall enter the site. (d) Only clean uncontaminated surface water from the development shall be discharged to the surface water drainage system. Reason: In the interest of public health, to avoid pollution, and to ensure the proper servicing of the development.

14)	(a) The ground under the solar panels shall be maintained as well drained grassland to reduce the risk of soil erosion and surface water flows across the site, and maintenance works, and monitoring shall be carried out at regular intervals to ensure that the any compacted or exposed soil occurrences are cultivated and reseeded as required. (b) The surface water generated by the solar panels shall not give rise to any surface water ponding at ground level. The solar panels shall be arranged to allow rainwater to infiltrate to the grassland below at a natural rate similar to current greenfield infiltration rates. (c) The on-site access roads shall be constructed using a permeable material which shall not give rise to surface water ponding, and all surface water generated by the on-site access roads shall disperse to suitably designed and located filter drains. No surface water ponding shall occur on the proposed surface roads or on the verges either side of the proposed surface roads (d) Following the commissioning of the development and to facilitate the identification of any soil cultivation and reseeded requirements, the applicant shall conduct a site survey on an annual basis to confirm that rainfall concentration, due to the installation of the solar panels and grazing animal tracks, have not combined to erode the existing ground and form a pathway which results in water quality deterioration due to surface water runoff during inclement weather. The site survey shall be submitted for the records of the Planning Authority on an annual basis. Reason: In the interests of the protection of the environment and the amenities of the area.
15)	(a) All measures specified in the drawings and particulars received by the planning authority on 29/03/2022 as amended by further information received on 10/02/2023 to provide a safe access shall be carried out and implemented in full prior to commencement of development on the site, except where altered or amended by conditions of this permission and unless otherwise agreed in writing with the Municipal District Engineer. (b) Lines of sight at entrances to public roads shall be provided in accordance with the Design Manual for Road and Bridges (D.R.M.B). (c) Roadside verges shall be kept free from obstruction and shall be maintained so as not to impede lines of sight at the entrance. Reason: In the interest of traffic safety.
16)	<u>Prior to the commencement of development</u>, the following information shall be submitted for the written agreement of the Planning Authority: (a) A Traffic Management Plan for the construction phase of the development, including details of: (i) road network/haulage routes and the vehicle types used to transport materials on and from the site (including abnormal load deliveries), (ii) a schedule of control measures for any exceptional wide and abnormal load deliveries, and details of any required arrangements for temporary traffic controls on public roads. (iii) Details of site and materials compound(s) including area(s) identified for the storage of construction refuse. (iv) details for warning signs for construction traffic to be erected at approaches to the site entrance. These are to be maintained clean and tidy during the construction works and be removed within one month following completion of the construction works; (v) details of areas for construction site offices and staff facilities; (vi) details of site security fencing and hoardings; (vii) details of on-site car parking facilities for site workers during the course of construction; (viii) details of the timing and routing of construction traffic to and from the construction site and associated directional signage, to include proposals to facilitate the delivery of abnormal loads to the site; (ix) measures to obviate queuing of construction traffic on the adjoining road network; (x) measures to prevent the spillage or deposit of clay, rubble or other debris on the public road network; (xi) the provision of a wheel wash for construction traffic;

	(xii) means to ensure that surface water run-off is controlled such that no silt or other pollutants enter local surface water sewers or drains. A record of daily checks that all works are being undertaken in accordance with the Traffic Management Plan shall be maintained on site and shall be made available to the Planning Authority upon request. Reason: In the interest of traffic safety.
17)	The developer is required to retain/engage the services of a suitably qualified Archaeologist to advise on and oversee the installation of suitable works exclusion zones and additional buffer areas around the identified archaeological material. (a) The works exclusion zone shall be a minimum of 10 metres from the identified extents of the archaeological features. The additional buffer areas must include a minimum of 10 metres from the outermost extents of the works exclusion zones. (b) The works exclusion zones shall be appropriately planted. No movement or storage of plant, machinery, vehicles, spoils and sundries shall be permitted within the works exclusion zones. (c) Solar panels within the additional 10 metres buffer areas shall be installed on pre-cast concrete 'feet'. The use of appropriate machinery to ensure the preservation of archaeological remains shall be necessary. Reason: To ensure the continued preservation (either in situ or by record) and protection of any archaeological remains that may exist within the site.
18)	The developer shall retain/engage a suitably qualified Archaeologist to monitor (licensed under the National Monuments Acts) all site clearance works, topsoil stripping, cable laying, groundworks and the implementation of agreed preservation <i>in situ</i> measures associated with the development. The use of appropriate machinery to ensure the preservation and recording of any surviving archaeological remains shall be necessary. (a) Should archaeological remains be identified during the course of archaeological monitoring, all works shall cease in the area of archaeological interest pending a decision of the Planning Authority, in consultation with the National Monuments Service of the Department of Housing, Local Government and Heritage, regarding appropriate mitigation (preservation in-situ/excavation). (b) The developer shall facilitate the Archaeologist in recording any remains identified. Any further archaeological mitigation requirements specified by the Planning Authority, following consultation with the National Monuments Service of the Department of Housing, Local Government and Heritage, shall be complied with by the developer. (c) Following the completion of all archaeological work on site and any necessary post-excavation specialist analysis, the Planning Authority and the National Monuments Service of the Department of Housing, Local Government and Heritage shall be furnished with a final archaeological report describing the results of the monitoring and any subsequent required archaeological investigative work/excavation required. All resulting and associated archaeological costs shall be borne by the developer. Reason: To ensure the continued preservation (either <i>in situ</i> or by record) of places, caves, sites, features or other objects of archaeological interest.
19)	(a) All measures shall be taken to prevent muck, dirt, debris or other materials being deposited on the adjoining public roads by machinery or vehicles travelling to and from the site during the construction, operational and decommissioning stages of the development. (b) All site access points and gates shall be maintained clean at all times to ensure that debris is not deposited onto public roads. (c) During the construction and decommissioning stages of the development, a Road Suction Sweeper shall be engaged during wet periods to ensure public roadways are kept clean. However, if necessary, this sweeper shall be engaged at any time, during wet or dry periods, to ensure the public roadways are kept in a clean and safe manner. A diary shall be

	maintained on the site documenting the use of the sweeper, which shall be available for inspection by the Planning Authority. (d) All road signage shall be maintained clean and tidy at all times. Reason: In the interest of traffic safety, amenity and orderly development.
20)	(a) 'Best Practicable Means' shall be used to prevent/minimise noise and dust emissions during the construction and decommissioning phases of the development, through the provision and proper maintenance, use and operation of all machinery to the satisfaction of the Planning Authority. (b) During the construction and decommissioning phases adequate off carriageway parking facilities shall be provided for all traffic associated with the development, including delivery and service vehicles/trucks. There shall be no parking along public roads. (c) The site shall be maintained in a neat and litter free condition during the construction and decommissioning phases of the development. Waste disposal skips shall be maintained on site for this purpose. (d) The applicant shall ensure that all works on site are carried out in a manner such that noise and dust emissions do not result in significant impairment of, or significant interference with amenities or the environment beyond the site boundary. (e) All material removed from the site during the construction and decommissioning phases shall be recovered/disposed of at licenced facilities and shall be transported using licenced operators. (f) Dust levels at the development site boundary during the construction phase shall be less than 350 mm/m²/day measured over a 30-day composite sample, complying with the German Standard VDI 2119 (Measurement of Dustfall, Determination of Dustfall using the Bergerhoff Instrument (Standard Method) German Institute). Reason: In the interest of public health and the protection of the environment, and to ensure proper development.
21)	(a) Any service poles which require relocation on or from this site shall be relocated prior to the construction works at the expense of the applicant. (b) All ESB, telephone cables, service lines and any other cables shall be located underground except as otherwise agreed with the Planning Authority. The applicants shall arrange in consultation with the relevant authorities for the relocation of any existing ESB or Telecom poles if necessary, prior to commencement of development and this shall be done at the full expense of the applicants. Reason: In the interests of public safety, traffic safety and visual amenity.
22)	(a) Where the applicant proposes to connect to a public water/wastewater network operated by Irish Water, they must sign a connection agreement/self-lay agreement with Irish Water prior to the commencement of the development and adhere to the standards and conditions set out in that agreement. (b) The applicant shall comply with Irish Waters connection and Developer Services (CDS) Technical Documentation (Standard Detail and Codes of Practice). (c) Any proposals by the applicant to divert or build over existing water or wastewater services shall be submitted to Irish Water for written approval prior to works commencing. (d) Separation distances between Irish Water assets and proposed structures, other services, trees etc., shall be in accordance with the Irish Water Codes of Practice and Standard Details. (e) Where the proposed development is served by an existing connection and where Irish Water deems that the impact on the provision of water services is significant then a new/revised Connection Agreement with Irish Water will be required, subject to appropriate conditions, including charges as set out therein. (f) Any proposed connections to the Water and Waste Water Infrastructure will be subject to the constraints of the Irish water Capital Investment Programme. Reason: In the interest of Public Health and Environmental Sustainability.

23)

Prior to the commencement of development, the applicant shall agree in writing with the Planning Authority payment of a cash deposit, a bond of an insurance company, or such other security as may be agreed with the Planning Authority to secure the satisfactory reinstatement of the site on cessation of the project coupled with an agreement empowering the Planning Authority to apply such security or part thereof to such reinstatement.

Reason: To ensure satisfactory reinstatement of the site.

24)

A development contribution in the sum of €48,720 set out hereunder to be paid prior to commencement of the development. An interest charge will apply from the date permission was granted to the actual payment date, at the rate of 5% per annum (0.0137% per day) rounded to the nearest euro. The first 90 days interest or part thereof will be discounted.

Description	MW Output	€ Rate of Charge per MW	Total
Class 17: Other Renewable Energy Development (Solar Farm) Greater than 0.1 MW	4.2	€11,600	€48,720
Total			€48,720

Reason: In order to contribute to the cost of Local Authority Services which facilitate the development.



NETWORKS

**Specification
Number:** 18153

Title: **Functional Specification for the
Installation of 20KV Underground Power
Cables for Contestable Projects**

Revision Number: 0

Issue Date: December 2013

Latest Review Date: December 2018

(ESB Specifications are subject to change, this specification version shall only be used
for the purpose/project for which it was issued by ESB to you)

Approved for Issue: **Specifications Manager
ESB Networks**

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Functional Specification for the Installation of 20kV Underground Power Cables for
Contestable Projects

History of Revisions

Rev No	Date	Revision Content
0	2013	New Document

Note:

This specification will be reviewed at minimum before the Latest Review Date, but may also be reviewed in the interim. Consequently the "Latest Review Date" does not indicate that this particular version of the Specification is current. Accordingly, only the version of the specification issued by ESB to the user for the particular purpose/project should be used.

ESB Technical Specification Approval

Title	Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects		
Specification revision number & date	Doculive Spec. No. : 18153	Rev: 0	Date: December 2013
	Consultant Reference No.: PG____-____-____-____ Rev: Date:		
Produced by:	ESB Networks		
Contract Conditions Reviewed:			

Eirgrid			
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Department:	Asset Management		
Approved :	Asset Manager, Underground Networks		
Date:	December 2013		

Functional Specification for the Installation of 20kV Underground Power Cables for
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Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

1.0 Scope

This document specifies the requirements for the supply, installation, jointing, testing and commissioning of **20kV Underground Power Cables and Accessories and Associated Communications Cables** in fully ducted systems for connection to the ESB Networks Distribution System.

The materials used and construction methods employed shall comply with the requirements of

1. This specification and also
2. Specification Number 18149 – General Specification for Contestably Built Underground Networks
3. Specification Number 18152 – Functional Specification for the Installation of Ducts and Ancillary Structures for 20kV Underground Power Cables and Associated Communications Cables for Contestable Projects
4. The individual ESB Networks **material** Specifications for ducting and cable materials and components and all ancillary structures

2.0 Design Review

Details of the proposed cable and associated jointing, termination and installation materials shall be submitted to ESB Networks for review.

3.0 Materials

The materials supplied and used shall comply with the following ESB Materials Specifications:

Spec Number	Material
16112	Lubricant for pulling Cable into Ducts
16120	Supply and Delivery of 52kV, 24kV and LV Polymeric Insulation Cable
16140	Link and Lug Connectors for 40kV, 20kV, 10kV and LV Underground Cables
16379	MV Heatshrink, Coldshrink and Premoulded Cable Accessories

4.0 Cable Handling

Care and attention is required in this area as any mishandling of cable drums could lead to damage of cable and injury to installers or members of the public. Proper practices of transportation, loading, unloading and storage on site shall be used.

4.1 *Transportation*

Drums shall be delivered to site by a drum trailer or on a truck fitted with a hydraulic crane.

4.2 *Loading / Unloading*

To avoid serious injury to personnel and damage to cable drums, an appropriately sized axle shall be used for lifting along with a spreader bar to prevent the lifting chains damaging the drum and crushing the cable. Appropriately rated proprietary lifting hooks that fit into and lock onto the axle hole can also be used. The chains and all associated lifting equipment shall be rated to lift the gross weight of the drums, with an appropriate factor of safety.



Figure 1 Drum trailer axle and spreader bar for safe damage free cable drum lifting.

4.3 *Storage*

All cable ends shall be sealed to stop the ingress of water and future deterioration of cable. Cables drums shall be stored on hard even surfaces to prevent the flanges from sinking into the ground, thereby causing all the drum weight to rest on the cable with resultant damage due to cable compression and penetration by sharp objects.



Figure 2 Storage of cables.

4.4 *Pre Pulling Inspection*

Prior to cable pulling the complete outer coils of the cable shall be inspected for any mechanical damage by rotating the drum and visually observing for any bumps/perforations or any other sign of damage. All damaged sections found shall be cut off and scrapped. This inspection shall take place for all cable drums before cable is pulled in. This measure will reduce the incidence of sheath faults which can be very costly and time consuming to locate and rectify at a later stage when the cable is installed along the ducted route.

5.0 Cable Installation

5.1 *Cleaning and Proving and Pre-Lubrication of Ducts*

Each duct shall be cleaned and proven prior to pulling in the cable winch rope by pulling the appropriate size of ESB Networks approved duct brush and mandrel through each duct. The direction of duct cleaning and duct proving shall be in the direction of the planned cable pull.

Following the cleaning and proving of the entire duct run, all power ducts shall be pre-lubricated during the operation of pulling back of the winch rope from the winch end. The lubricant (recommended quantity 10 litres per 100m of duct or as recommended by the manufacturer) shall be placed in the duct at the winch end and a suitably robust sponge securely attached to the winch rope to spread the lubricant uniformly over the entire length of the duct.

Duct Cleaning – Use of Approved Brushes

Only approved brushes, with the ESB Networks material code specified below, shall be used to ensure that any dirt or debris within ducts is transported out of the ducts rather than being merely loosened up and left within the duct. The approved suppliers of the brushes for normal and directional drilling 125mm O.D size duct are given on the ESB website.

Brushes shall be cleaned regularly using a powered water hose.

Duct Proving – Mandrel

Duct proving shall be achieved by pulling a mandrel through the duct in the direction of the planned cable pull. The proving equipment shall conform to the details and dimensions in the table below:

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Type and Size of Duct	Mandrel ESBN Material code	Brush ESBN Material code	Sonde	Sponge Diameter and Length 300mm
125mm uPVC SDR 17.6 For normal trenching	8783229	8783254	required	125mm
125mm HDPE for SDR 11.0 for Directional Drilling	8783228	8783250	required	125mm

All new mandrels shall be stamped with their size and the corresponding duct size to which they are applicable.

Duct Sponge

A sponge shall be used to remove excess water and pre-lubricate the duct prior to cable pulling.

Duct Proving – General

ESB Networks reserves the right to witness the duct proving tests.

ESB Networks approved duct brushes, mandrels and sponges are designed to provide thorough cleaning of the duct and a tight fit. The minimum rope size used shall be 12mm polypropylene. Cleaning and proving shall be carried out using a winch which has a calibrated dynamometer and printout. Pulling tension shall not exceed 1 Ton (10kN). The results shall be submitted to ESB Networks for review, using the Duct proving Sheet.

Following the duct proving process, approved waterproof rubber bungs shall be fitted to prevent ingress of water, sand or other debris getting into them. The ducts shall then be left roped in preparation for cable pulling.

Use of a Transmitter (Sonde)

A Sonde shall be connected close to the mandrel or brush to help locate a blockage quickly. It can be purchased for specific use with a C.A.T. or other precise cable location instruments, equipped with a Sonde detector.

Duct Lubrication Materials

Only ESB Networks approved lubricants which are proven not to damage the cable insulations semi-conductive layers and outer sheath shall be used. Petroleum based oils or greases shall not be used for power cables.

The list of approved suppliers for the above items is available from the following ESB Networks web site address:

http://www.esb.ie/esbnetworks/en/download_documents/builders_developers/approved_material.jsp

5.2 Cleanliness

All Joint Bays and Lubrication points shall be free from stones sand, grit, etc.

5.3 Duct Lubrication During Cable Pulling

Ducts and cables shall be thoroughly lubricated for all cable pulls.

ESB Networks approved Lubricant shall be used at a rate of 20 litres per 100 metres of duct as follows:

1. Pre lubricate ducts with 10 litres per 100m from winch end as mentioned in Section 5.1
2. Apply additional lubricant at a rate of 10 litres per 100 metres run at duct entry and,
3. Insert 20 litres of lubricant in advance of all major bends .

Lubrication points shall be installed in cable runs in close proximity to areas of high bend concentration. Optimised positions shall be chosen, e.g. on the crest of steep incline for maximum lubricant dispersion on the route. Lubrication points shall be properly sealed after the cable is pulled in.

Where the manufacturer of the cable recommends an alternative and specific cable pulling lubricant, such lubricant shall not be used without the prior agreement of ESB Networks.

5.4 Supervision

The cable installation works shall be continuously supervised by competent persons. Quality control checks shall be carried out throughout the cable pulling and jointing phases in addition to the pre commissioning checks.

5.5 Cable Installation into Ducts

The following equipment shall be used for the installation of cable into ducting

- Bell mouth installed for entry and exit positions
- Rollers to support cable entering and exiting duct
- The following as specified by the cable manufacturer
 - Cable pulling stocking
 - Cable pulling eye
- Swivel with torque relief
- Winch with force measurement facility and print out facility
- Mandrel
- Brush
- Sponge
- Sonde

Cable rollers shall be used at duct entry and exit positions to guide the cable from the drum into the duct and to prevent abrasion/ripping of the cable via contact with the trench bottom and sides and also to prevent the cable picking up debris before entry into the duct.

Appendix 1 details the set up for cable pulling.

5.6 Cable Pulling

Cable pulling shall be preceded by calculation of the pulling and sidewall forces for each cable pulling section based on the as laid duct installation. When bends are present in a duct run, the cable drum shall be positioned at the end closest to where most of the bends lay and the winch shall be positioned at the end furthest from the bends.

This method reduces

- The tensile and side wall forces on the cable.
- The likelihood of the winch rope sawing through or burning through the ducts at bend positions.
- The pulling forces and wear and tear on the winch and the winch rope.

See Appendix 3 for details on drum and winch set up on a route with a high bend concentration.

Cable pulling tensions shall be monitored and recorded during installation. The values obtained from the winch printout shall be attached to the Cable

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Installation Certificate and electronically presented to ESN representative.
The values shall also be within the cable manufacturers specification.

All cables shall be sealed and adequately supported after cable pulling.

5.7 Cable Jointing

Cable jointing shall be carried out by suitably trained and experienced cable jointers and in accordance with manufacturers instructions. Experience and training records for proposed cable jointing personnel shall be submitted to ESB Networks for review.

5.7.1 Phase Sectionalising Joint

Phase sectionalising joints shall be installed at joint bays to facilitate cable joint dismantling and reassembly at joint bays which are no greater than 2km apart.

5.7.2 Cable Sheath Sectionalising Joints

Cable sheath sectionalising joints shall be installed at joint bays to facilitate cable sheath testing at joint bays which are no greater than 1 km apart.

5.7.3 Sealing of cable ducts

Cable ducts shall be sealed using an ESB Networks approved method after completion of the cable joint. Details of the sealing method shall be submitted to ESB Networks for review.

5.7.4 Mechanical Protection of Overground Cables at Cable-end Pole Positions

All above ground cables shall be protected at cable end pole positions, by using two 1.75m galvanised steel cable guards, overlapped by 100mm, to give a protected height above ground of 3.3 m. The lower cable guard shall be embedded 100mm into the ground.

6.0 Cable Testing

All cables shall be electrically tested immediately after each pull is complete. All cables shall be tested again prior to any jointing activity to ensure that sheath fault location difficulties are minimised. Terminations shall not be connected to switchgear during tests.

The following list of tests shall be carried out after cable pulling and before and after cable jointing on each cable section:

1. Measure Insulation resistance, phase to screen and phase to phase
2. Check continuity of all phase and screen conductors
3. Check phasing of conductors
4. Check phase clearances and phase to earth clearances
5. Sheath test cables (A 5kV calibrated Insulation resistance test kit shall be used for this purpose)
6. Partial discharge test @ $1.7U_0$ at 50 Hz or 0.1Hz or other ESB Networks approved frequency and time duration. Partial discharge tests shall be carried out on the cable on jointed sections of length not exceeding 10kms. These tests shall be carried out in conjunction with ESB Networks prior to the commissioning of the completed cable circuit. Test result acceptability will be determined by ESB Networks.

If the sheath test results do not meet values in Appendix 5 Table 28 then jointing work of further sections shall not commence, based on results the cable shall be repaired or replaced and retested or passed by ESB Networks.

After each section of cable is jointed to an adjoining section the tests are to be repeated to verify compliance with test values as in Table 28 Appendix 5.

All test information shall be recorded and available for inspection and shall also be included in the 'As-Built' documentation.

Partial discharge tests shall be carried out on the cable on jointed sections of length not exceeding 10kms. These tests shall be carried out in conjunction with ESB Networks prior to the commissioning of the completed cable circuit. Test result acceptability will be determined by ESB Networks.

All cables shall be sealed / capped after cable testing.

7.0 Cable Reinstatement

The bedding sand used around electric cables joints shall be natural unwashed sand in accordance with BS EN 16120 (BS882). The grading, when determined in accordance with BS812, Section 103.1, shall comply with grading limit C in Table 4 of BS 882 -1992 (shown below) or the grading curve shown below.

The sand shall have a maximum resistivity of 2.5 K.m/watt at 0% moisture content. Test sheets confirming the thermal properties shall be available for on-site inspection and shall be submitted with the 'as-built' documentation.

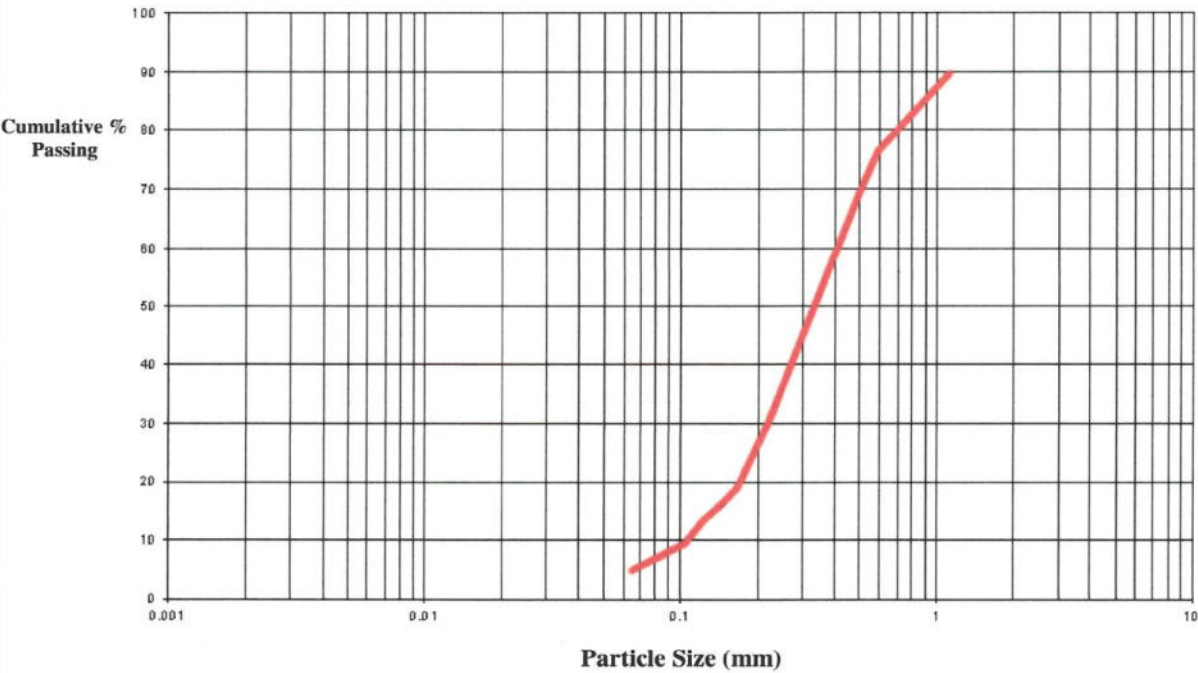
The sand shall be manually compacted around the cable and joints.

Pea gravel and foam concrete shall not be used for cable surround materials.

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BS882 Sieve Size	3/16"	1/8"	7	14	25	52	100
% Passing weight	95	89	84	75	54	18	1.6

Thermal Sand Grading Curve



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Appendices

Appendix 1 Set Up for Cable Pulling

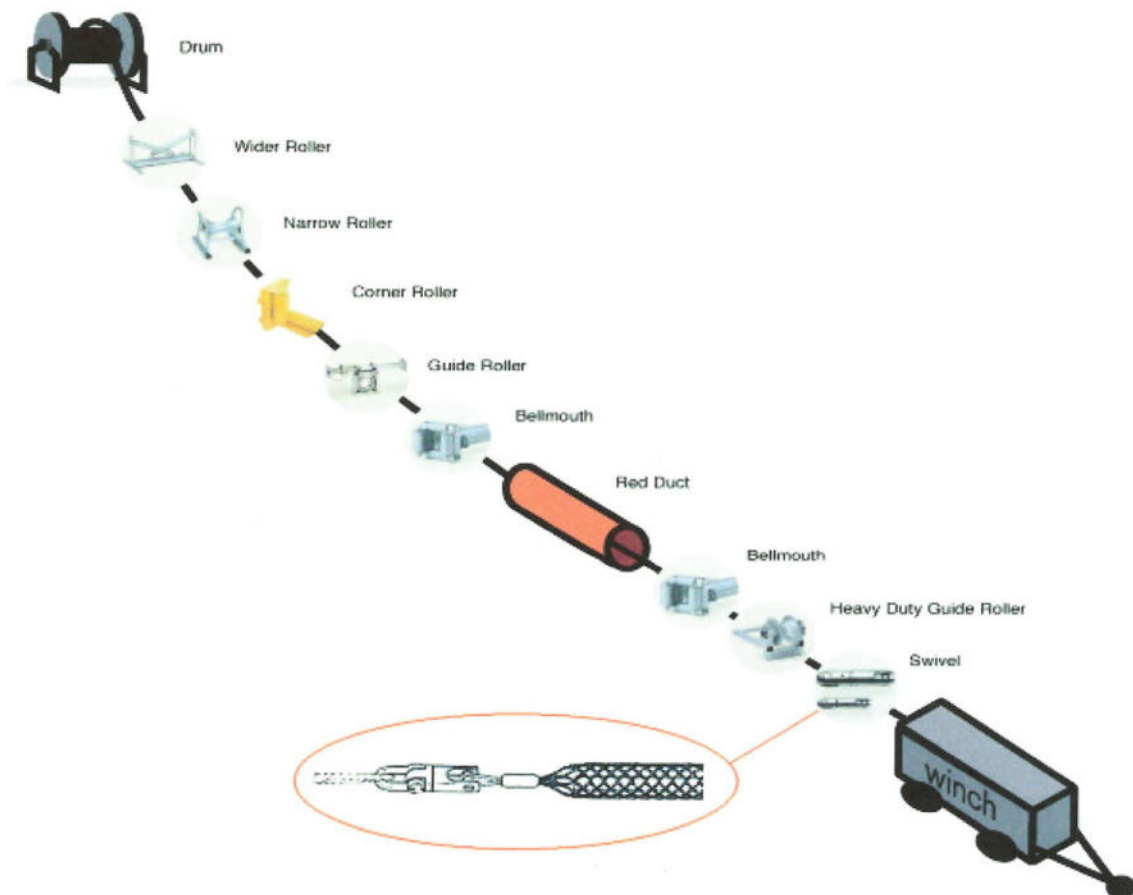


Fig 11B - Set up for Swivel, Brush, Mandrel and Sonde for Duct proving and Cleaning

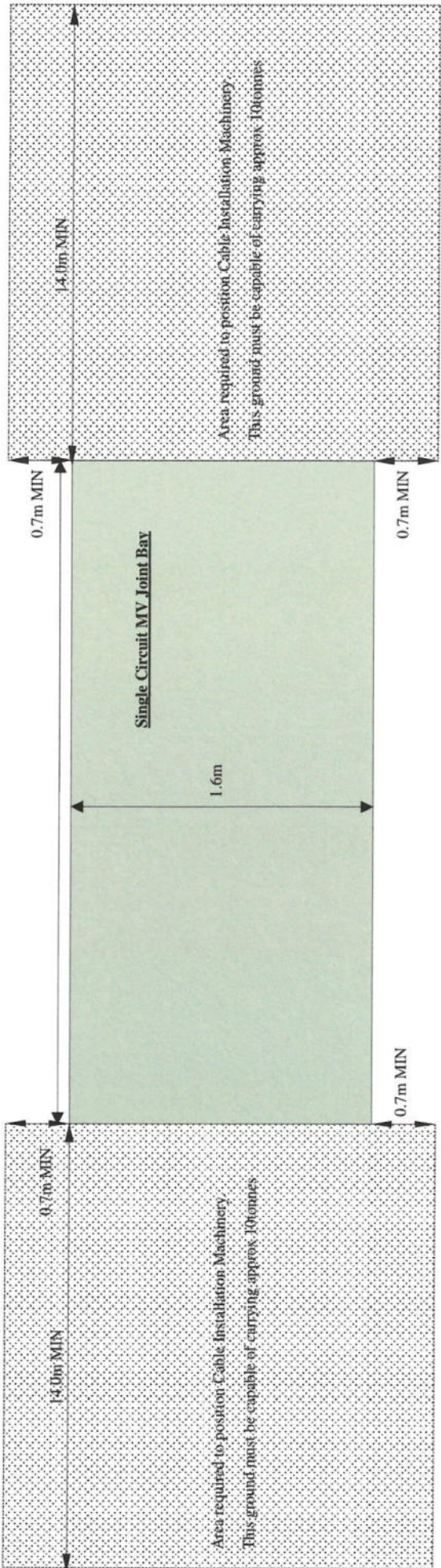


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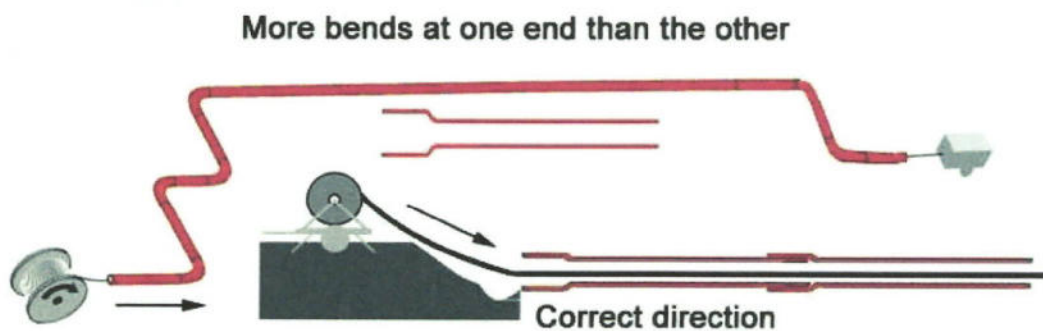
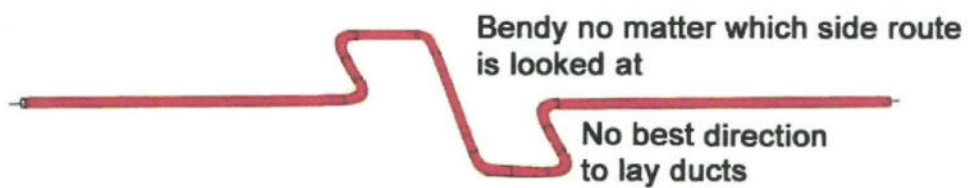
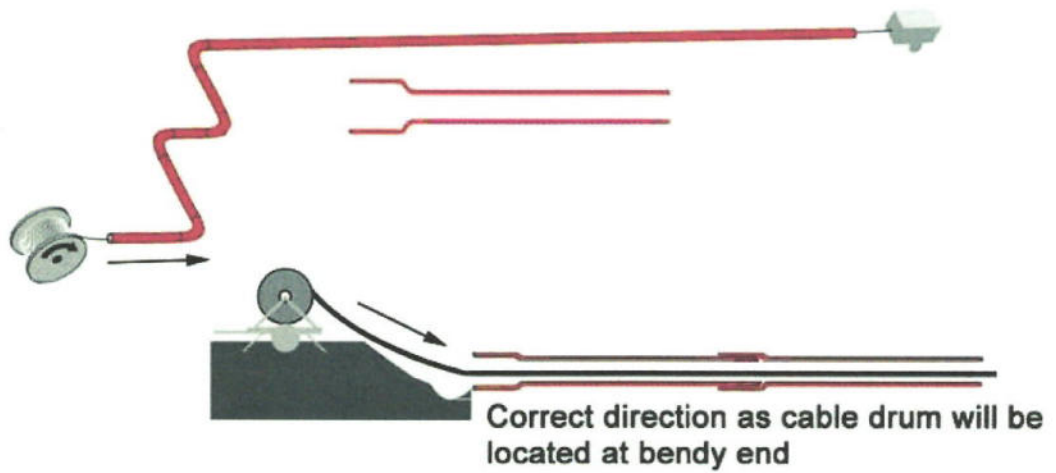
Appendix 2 Required Ground and Surface for MV Cable Installation at Joint Bay positions

Drawing Not To Scale

Please note that this 'Area' either side of the Joint Bays may need to be removed after cable installation, this must be assessed case by case

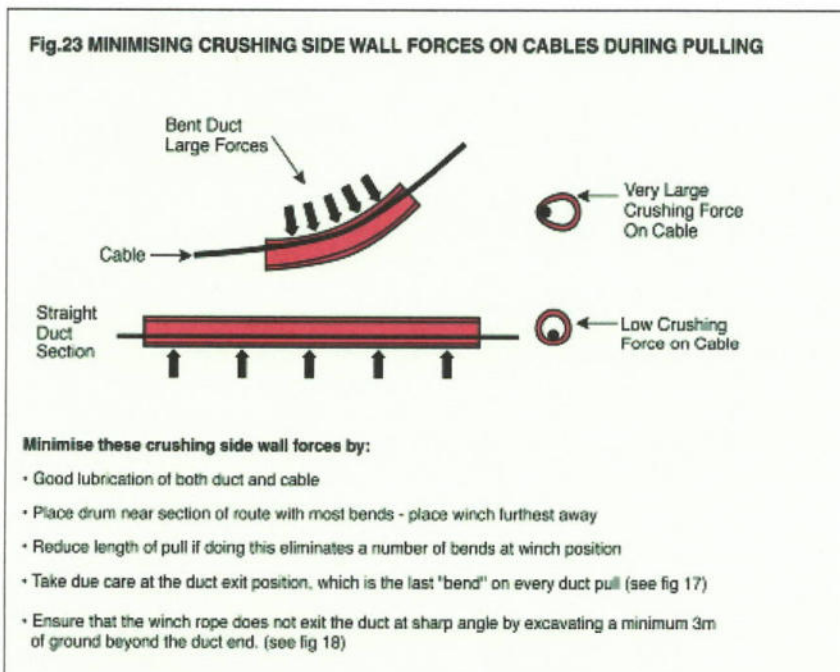
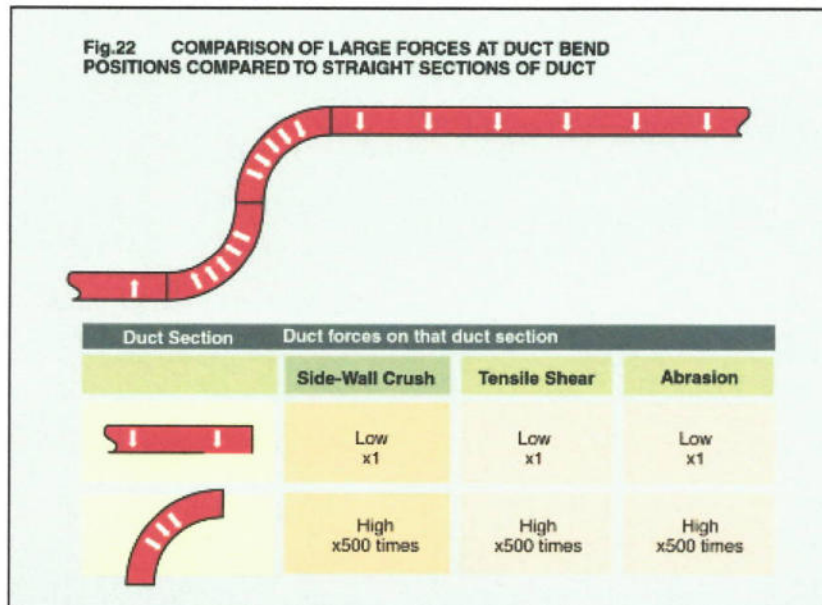


Appendix 3. Drum and Winch Set up on Bendy route



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Appendix 4. Cable Side Wall Forces



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Appendix 5. Pre Commissioning Standards

ESB NETWORKS CABLE PRE COMMISSIONING STANDARDS FOR MV CABLES

Commissioning Policy for all new XLPE MV cable circuits is to:

1. Measure insulation resistance (phase to earth with cable screen earthed)
2. Sheath test, measure insulation resistance between the metallic cable screen (disconnected from earth) and earth
3. Check continuity of phase conductors
4. Check phasing
5. Check inter-phase clearances and phase to earth clearances

See Table 28 below for Commissioning Test Standards.

All tests to be performed using calibrated test equipment.

All testing on MV cables must be carried out using a 5kV insulation Resistance tester.

Sheath Faults on MV cables will not be accepted by ESB Networks.

Table 28 – Commissioning Test – Standards for MV Cable

Route km	Screen to earth		Core to Earth	
	Minimum Values		Minimum Values	
Km	Giga Ohms	Micro Amps	Giga Ohm	Micro Amps
0.25	2	2.5	8	0.62
0.5	1	5	4	1.25
	Mega Ohms		Mega Ohms	
0.5-1	500	10	2000	2
2	250	20	1000	5
3	170	29	666	7
4	130	38	500	10
5	100	50	400	12
6	83	60	333	15
7	71	70	286	17
8	62	80	250	20
9	55	90	222	22
10	50	100	200	25
11	45	111	182	27
12	41	122	167	30
13	38	131	154	32
14	36	139	143	35
15	33	151	133	37
16	31	161	125	40
17	29	172	118	42
18	27	185	111	45
19	26	192	105	47

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NB: Above values refer to cables only – not to cables connected to OH lines or other apparatus which would reduce the values considerably.

Wet, damp weather and dirty leads or cable ends can also reduce the values considerably.

Large differences between insulation values for different phases should be noted and investigated as such differences can be an indication of cable damage or deterioration

Clearances Metal to Metal/Metal to Screen

Voltage	Indoor	Outdoor
MV	300mm	300mm

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MV Cable Pre Commissioning Test Report**To Be Completed for Each Separate Cable Section****Location of Cable Section:** _____**City/Town/Townland****Connection From: END 1** _____**To: END 2** _____**Length & Type of Cable:** _____**INSULATION TEST**

Note: Where the connection consists of underground cable to an overhead line, the jumpers, (point of interconnection) should be removed and separate insulation tests carried out on the line and on the cable.

Cable Insulation Test Screen must be earthed for this test.	Insulation Test Reading <i>See Table 28 for values specific to particular cable length</i>	Remarks Fail/Pass
R phase to Earth		
S phase to earth		
T phase to Earth		
Insulation Test* Voltage & duration of test = 5kV for 2 minutes or time for stable reading	State: Calibration Date of Instrument	
Weather Conditions Coastal /Inland	State: Dry or Wet	

INSULATION TEST: **PASS** **YES** ☐ **NO** ☐**OVERALL**

Comments

Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

CABLE SHEATH TEST

Test the cable sheath insulation of each cable length prior to jointing. Use a calibrated 5kV Cable Sheath Test instrument. Cable screens must be disconnected at both ends from earth. Test all screens together or individually.

Insulation Resistance Tester Type & Calibration Date of Instrument	Overall Screen Resistance to Earth (Mega Ohms) In accordance with Table 28	Test Time** (minutes)	Length (metres)	Resistance Value (Mega Ohms)
				R = S = T =

* Insulation Tester Voltage 5kV (Note: 1kV Insulation resistance Tester is inadequate – it will not breakdown sheath spark gap.)

** Test time minimum 2 Minutes (or longer to obtain stable or increasing reading)

SHEATH TEST: PASS YES ☐ NO ☐

(See Table 28 for Pass values of screen insulation resistance to earth for lengths 0 -20km long)

Comments _____

PHASING/CONTINUITY

		R	S	T
Test Point _____ (Station//Pole)	_____	_____	_____	_____
Remote Point _____ (Station//Pole)	_____	_____	_____	_____

GENERAL INSPECTION

	Yes/No.	End 1	End 2
Are clearances both from live parts to live parts & live to earth parts adequate?			
Is all structural steelwork earthed?			
Are lightning arrestors earthed?			
Are cable screen wires earthed?			

Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

Is cable trench backfilled?			
Is cable trench reinstated?			
Are all joint bays and lubrication points reinstated ?			
Is cable adequately clamped/supported?			
Are pole /mast vertical cable guards in place?			
Are cable anti –climbing guards fully fitted in place?			
Are sheath disconnect vault covers in place?			
List of items requiring attention before cable may be put into commission			
Outstanding work on site, other than that on the cable, which must be completed before cable may be put into commission e.g. labelling, phase identification, anti-climbing screens etc.			

Signed: _____ Date: _____

Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

Appendix 6. Cable Installation Certificate for MV Cable

CONTRACTOR NAME:

PROJECT NAME:

LOCATION:

	Description/Location	Date	Length of Pull	Cable size	Winch Serial No.	Max Pulling Force Recorded (kgf)	Volume of Lubricant Used	Was Cable Sealed	Was Pull witnessed by ESB N Civil Inspector		Person in Charge (signature)
									Yes	No	
Pull 1											
Pull 2											
Pull 3											
Pull 4											
Pull 5											
Pull 6											

We certify that the information supplied in the Table above is accurate and that all cable pulls for this project are included.

Signed: _____ Acting for _____ Date: _____

(Person in Charge of Cable Installation)

Counter Signed: _____ Acting for _____ Date: _____

(Main Contractor's Management Representative)

ESB Networks Inspector: _____ Acting for: _____ Date: _____

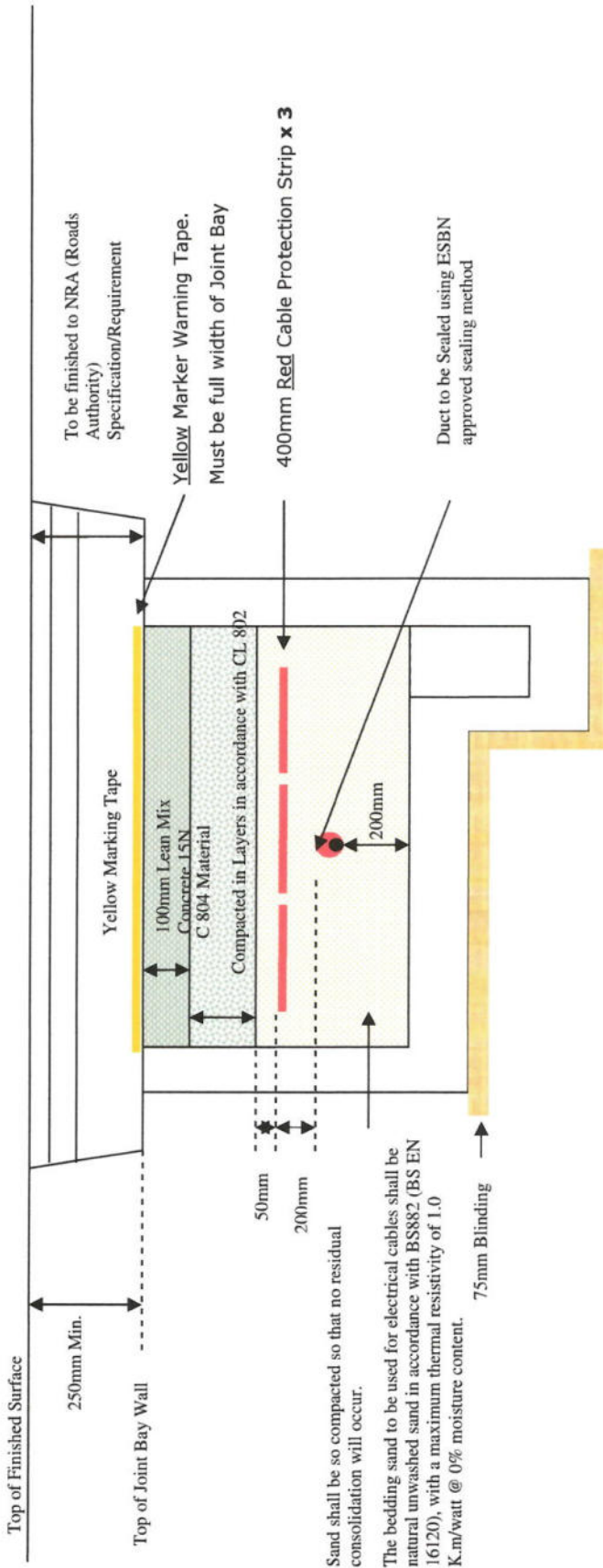
Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

Appendix 7. Joint Bay Backfill

Backfilling of Joint Bay with MV Power cables in place

ESB Networks require a copy of the agreement between the IPP and the Roads Authority stating how the road is to be completed.

Drawing Not To Scale

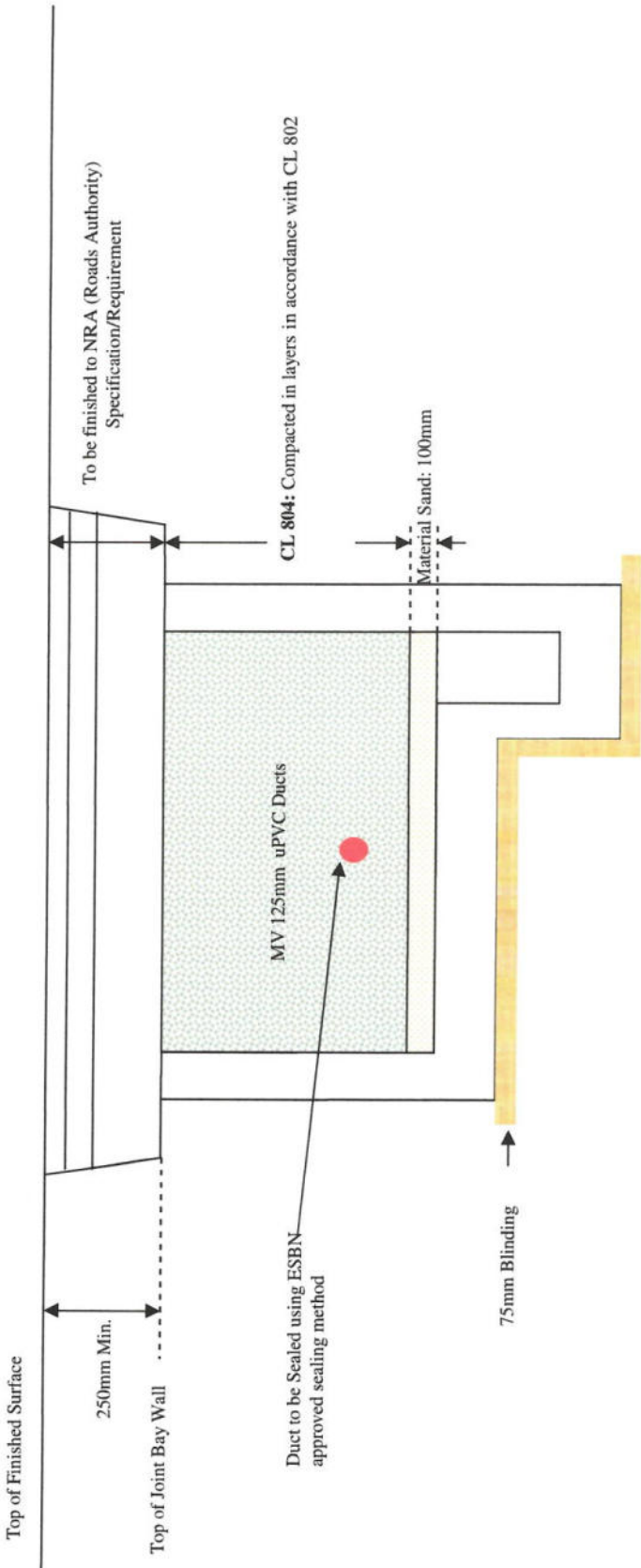


Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects

Backfilling of Joint Bay with **no** MV Power Cables in place

ESB Networks require a copy of the agreement between the IPP and the Roads Authority stating how the road is to be completed

Drawing Not To Scale



A

B

C

D

E

F

G

FINISHED SURFACE LEVEL

PERMANENT REINSTATEMENT TO COMPLY WITH
LOCAL AUTHORITY SPECIFICATION /DRAWING

300 MAX.

WARNING TAPE

2 X YELLOW MARKER WARNING
TAPE 250 mm WIDE
ESB CODE : 2955090FOR TRENCH BACKFILL DETAILS REFER
TO TABLE BELOW1 X RED CABLE MARKER (20 m ROLL)
200 mm WIDE X 2.5 mm THICK
ESB CODE : 2955101125 mm OD uPVC DUCT IN
ACCORDANCE WITH ESB CODE: 9317553FOR DUCT SURROUND DETAILS REFER
TO TABLE BELOW

12 mm DIAMETER PULL ROPE

325 MIN.

TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 84 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm² AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT



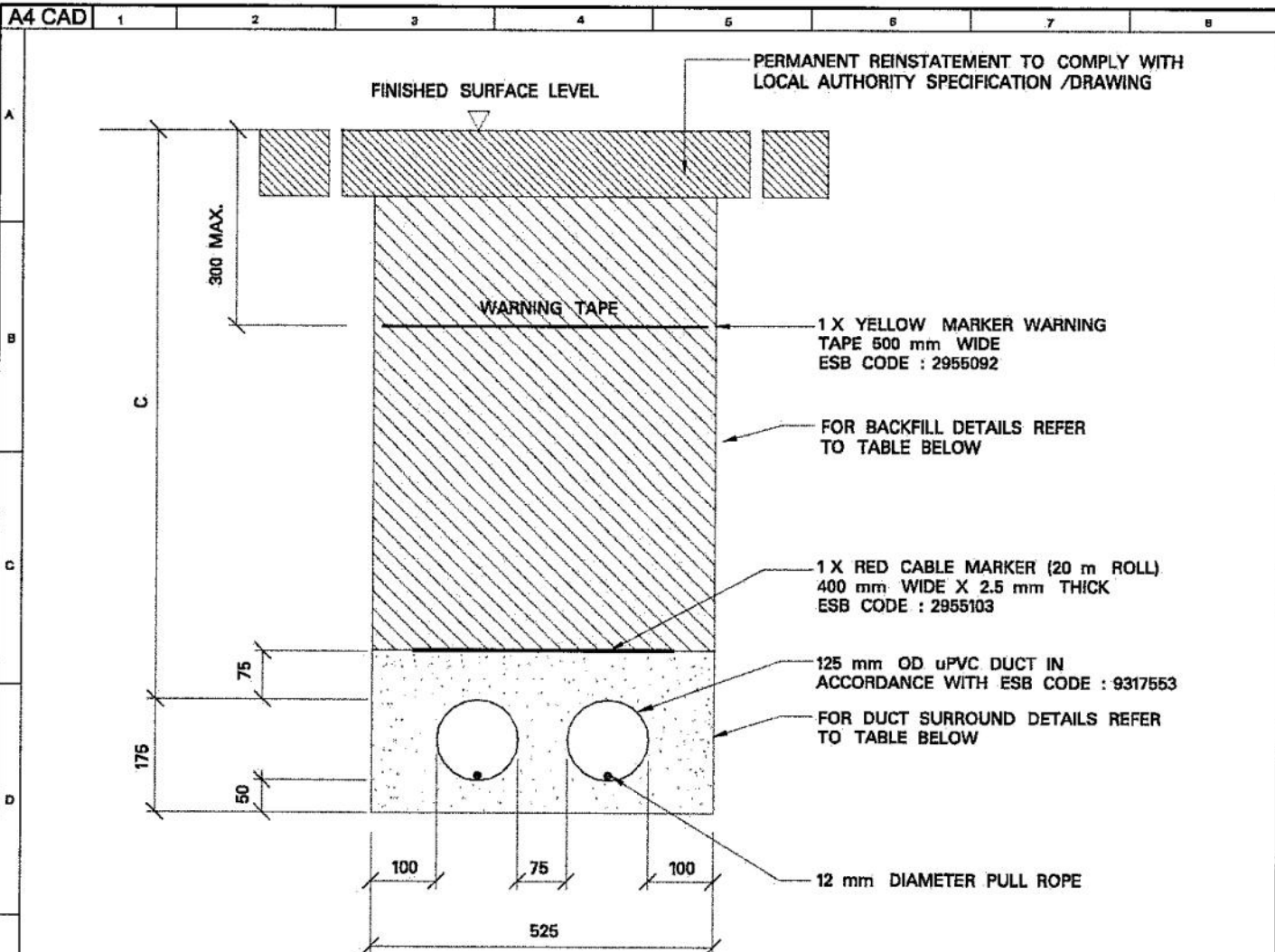
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ESB International is a trading name of ESB Engineering & Facility Management Limited.
Registered Office: 15-17 St. Stephen's Green, Dublin 2, Ireland.

Client  ESB NETWORKS

Contract: MV CABLES STANDARDS

1	2011/01	BACKFILL AND SURROUND MATERIALS REVISED							
0	18/05/13	ISSUED FOR CONSTRUCTION							
Rev	Date	Revision Description	GR	GR	TS	MA			
Purpose of Issue - Preliminary unless indicated									
Tender ☐ Client Approval ☐ Construction ☒ As-built ☐ Revised ☐									
Project: MV Standard Drawings									
Production Unit: Civil Building and Environmental									

Drawn: G. Ryan	Produced: G. Ryan	Verified: M. Amet	Approved: T. Sheridan	Approved date: 02/12/13
Client Ref: TC210096			No. of this: -	Size: A4
Drawing Number: PE424-D7002-008-001-001			SHEET: REV	Scale: N.T.S.
Drawing Title: MV SINGLE CIRCUIT TRENCH CROSS SECTION 1 WAY DUCT FORMATION				



TRENCH LOCATION	MIN. DEPTH OF COVER TO TOP OF DUCTS (C)	TRENCH BACKFILL DETAILS	DUCT SURROUND MATERIAL
EXISTING FOOTPATH (NON HOUSING ESTATE)	450 mm	CL 804	ESB N APPROVED SAND
NEW ESTATE & NON ESTATE FOOTPATH	600 mm	CL 804	ESB N APPROVED SAND
NEW & EXISTING ESTATE ROADS, ESTATE GRASS VERGES & ADJOINING ROADS	600 mm	CL 804	ESB N APPROVED SAND
ESTATE OPEN GRASSED AREAS	600 mm	SUITABLE BACKFILL MATERIAL	CBGM B
NEW & EXISTING NON ESTATE ROADS	750 mm	CL 804	ESB N APPROVED SAND
FARM LAND, FOREST TRACK, BOG LAND, PUBLIC OPEN GRASSED AREAS & PRIVATE PROPERTY	750 mm	CL 804	CBGM B

NOTES:

1. RED CBGM B BACKFILL IN ACCORDANCE WITH CLAUSE 822 AND COMPACTED TO CLAUSE 813.10 AND TABLE 84 OF N.R.A. SPECIFICATION FOR ROADWORKS (15 N/mm² AFTER 7 DAYS)
2. ESB N APPROVED WELL COMPACTED NATURAL UNWASHED SAND TO BS 882 OR EQUIVALENT MATERIAL APPROVED BY ESB NETWORKS. MAXIMUM THERMAL RESISTIVITY OF THE SURROUND MATERIAL SHALL BE 1.0 K.m/W AT 0% MOISTURE CONTENT

ESB International ESB International, Stephen Court, 48-50 St. Stephen's Green, Dublin 2, Ireland. Tel: (01) 703 8000 Fax: (01) 703 8008 Email: marketing@esb.ie Web: www.esb.ie ESB International is a trading name of ESB Engineering & Property Management Limited. Registered Office: as above. Registered in Ireland No. 100246		Drawn: J. Ryan Produced: G. Ryan Verified: M. Ainet Approved: J. Sheridan Approved date: 02/12/13	
Client: ESB NETWORKS		Client Ref: TC210096	
Contract: MV CABLES STANDARDS		Drawing Number: PE424-D7002-008-002-001	
Project: MV Standard Drawings		Drawing Title: MV DOUBLE CIRCUIT TRENCH CROSS SECTION 2 WAY DUCT FORMATION	
Production Unit: Civil Building and Environmental		No. of Sheets: 1 Size: A4 Scale: N.T.S.	

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NETWORKS

Specification Number: 18152

Title: Functional Specification for the
Installation of Ducts and Ancillary
Structures for 20kV Underground Power
Cables and Associated Communications
Cables for Contestable Projects

Revision Number: 0

Issue Date: December 2013

Latest Review Date: December 2018

(ESB Specifications are subject to change, this specification version shall only be used
for the purpose/project for which it was issued by ESB to you)

Approved for issue: Specifications Manager
ESB Networks

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document without permission in writing from ESB Specifications Manager.

History of Revisions

Rev No	Date	Revision Content
0	2013	New Document

Note:

This specification will be reviewed at minimum before the Latest Review Date, but may also be reviewed in the interim. Consequently the “Latest Review Date” does not indicate that this particular version of the Specification is current. Accordingly, only the version of the specification issued by ESB to the user for the particular purpose/project should be used.

ESB Technical Specification Approval

Title	Functional Specification for the Installation of Ducts and Ancillary Structures for 20kV Underground Power Cables and Associated Communications Cable for Contestable Projects		
Specification revision number & date	Doculive Spec. No. : 18152	Rev: 0	Date: December 2013
	Consultant Reference No.: PG_____	Rev:	Date:
Produced by:	ESB Networks		
Contract Conditions Reviewed:			
Eirgrid			
Department:	N/A		
Accepted::			
Date:			
ESB Networks:			
Department:	Asset Management		
Approved :	Asset Manager, Underground Networks		
Date:	December 2013		

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1.0 Scope

This document specifies the requirements for the supply and installation of **Ducts and Ancillary Structures for 20kV Underground Power Cables and Associated Communications Cables on the ESB Networks Distribution System.**

The materials used and construction methods employed shall comply with the requirements of

1. This specification and also
2. Specification Number 18149 – General Specification for Contestably Built Underground Networks
3. Specification Number 18153 – Functional Specification for the Installation of 20kV Underground Power Cables for Contestable Projects
4. The individual ESB Networks **materials** Specifications for ducting and cable materials and components and ancillary structures

In the event of any dispute arising from a difference of interpretation regarding the contents of these specifications, ESB Networks interpretation shall be taken as final.

2.0 Cable Route

2.1 *Design Review*

Cable route design and associated risk assessment shall be submitted to ESB Networks for review prior to any works commencing on site.

2.2 *Cable Route Terrain*

The route of the cable duct shall follow solid stable ground on flat or gently graded slopes not subject to erosion. Trial excavations shall be conducted in advance to determine the suitability of the route.

Where the gradient of the route exceeds 1 in 3 metres, specialist measures shall be designed and implemented to achieve satisfactory long term duct and cable performance.

Where the route cannot avoid unstable wet ground, bogland, landfill or steep slopes, etc., specialist measures shall be designed and implemented to achieve satisfactory long term duct and cable performance.

Where there are multi circuit situations e.g. near or in electricity switching stations, provision shall be for separation from other circuits to avoid derating of the existing or proposed cables.

The design of measures to deal with any such situations shall be submitted to ESB Networks for review.

2.3 *Bridges / Culverts / Non Standard Terrain / other Services etc.*

Provision shall be made for additional protection of the cable duct where burial depth to specification cannot be achieved. These additional measures shall be submitted to ESB Networks for review. ESB Networks will provide guidance on each case.

Higher voltage underground cables shall be routed under lower voltage cables for safety reasons.

2.4 *Reinstatement Finishes*

The reinstatement and surface finish for trenches, manholes and joint bays shall be agreed in advance with the local authority, relevant public body or private landowners.

Upon completion of the works, a statement of satisfaction with the completed works shall be obtained from the relevant landowners, public body or local authority.

3.0 Duct Installation

3.1 *Supervision*

All works shall be continuously supervised by competent persons. Quality control checks shall be carried out throughout the installation phase and along the full length of the route.

3.2 *Works Included*

Duct installation shall also include cleaning, proving, draw rope installation, and capping of the ducts. It shall also include excavation of joint bays, backfilling around direct buried cable joints (with the cable jointer in attendance) and reinstatement of joint bays to facilitate cable installation and jointing.

Sand used in the backfilling of directly buried cable joints shall comply with BS EN 126120 (BS882).

3.3 *Transport, Storage and Handling of Ducts*

Great care shall be taken during handling of ducts to avoid damage. Ducts shall be delivered with end caps in place which shall remain in place until installation of the duct to prevent the entry of dirt.

The ducts shall not be stored in a place where they are likely to be in contact with surface water or other foreign matter which could make its way into the ducts. The method of stacking shall be such as to avoid distortion and the integrity of the ducts shall be maintained throughout their site storage and transport. The bales of ducts shall not be stacked over two tiers.

The Quality Assurance management system shall include detailed inspection of delivered ducts and accessories. Each delivery of ducts shall be inspected to ensure compliance with specification and to verify the following:

- Correct labelling
- Correct dimensions
- Duct ovality
- Duct caps are installed
- Correct packaging on delivery and storage

Ducts which have become discoloured due to external storage and/or UV exposure shall not be installed.

3.4 Materials

- All ducts and associated installation materials detailed in this specification shall be supplied by an ESB Networks approved manufacturer. Details are available on ESB Networks website:
(http://www.esb.ie/esbnetworks/en/download_documents/builders_developers/approved_material.jsp)
- Ducts for use at MV shall be 125mm UPVC – see Appendix 2 for summary technical requirements.
- Concrete for structural work shall be in accordance with the NRA “Specification for Road Works”, except where amended below.
- Cement Bound Material shall be used for duct surround and trench backfill and shall comply with CGBM B, 15N/mm² after 7 days. The maximum thermal resistivity shall be 1.0Km/watt at 0% moisture content, in accordance with Series 1000 of the NRA “Specification of Road Works” and it shall be in final position within its ‘setting time’. Test sheets confirming the thermal properties shall be available for on-site inspection and shall be submitted with the ‘as-built’ documentation.
- Concrete for road reinstatement shall be grade C40/N20 with a minimum cement content of 350 kg/m³ in accordance with Series 1000 of the NRA “Specification for Road Works”.
- Concrete for joint bay and communication chambers shall be grade C35/N30 with a minimum cement content of 325 kg/m³.
- Formed finishes to Joint Bays shall be to class F2 and unformed finishes shall be to class U1 in accordance with Clause 1708 of Series 1000 of the NRA “Specification for Road Works”.
- Pre-Cast Joint Bays and Chambers shall be obtained from approved ESB Networks suppliers only.
- Pea gravel and foam concrete shall not be used for duct surround materials.

The materials supplied and used shall comply with the following ESB Materials Specifications:

Spec No.	Material
16001	Plastic Warning and Protection Tapes, Tiles and Concrete Marker Posts
16002	Plastic Cable Ties
16110	Galvanised Steel Cable Protection Covers Plates and Cast Steel Warning Plate
16112	Lubricant for Pulling Power Cables into Cable Ducts
16113	Plastic Ducts and Fittings for Power and Telecommunications Cables

3.4.1 MV Joint Bay Reinstatement Sand

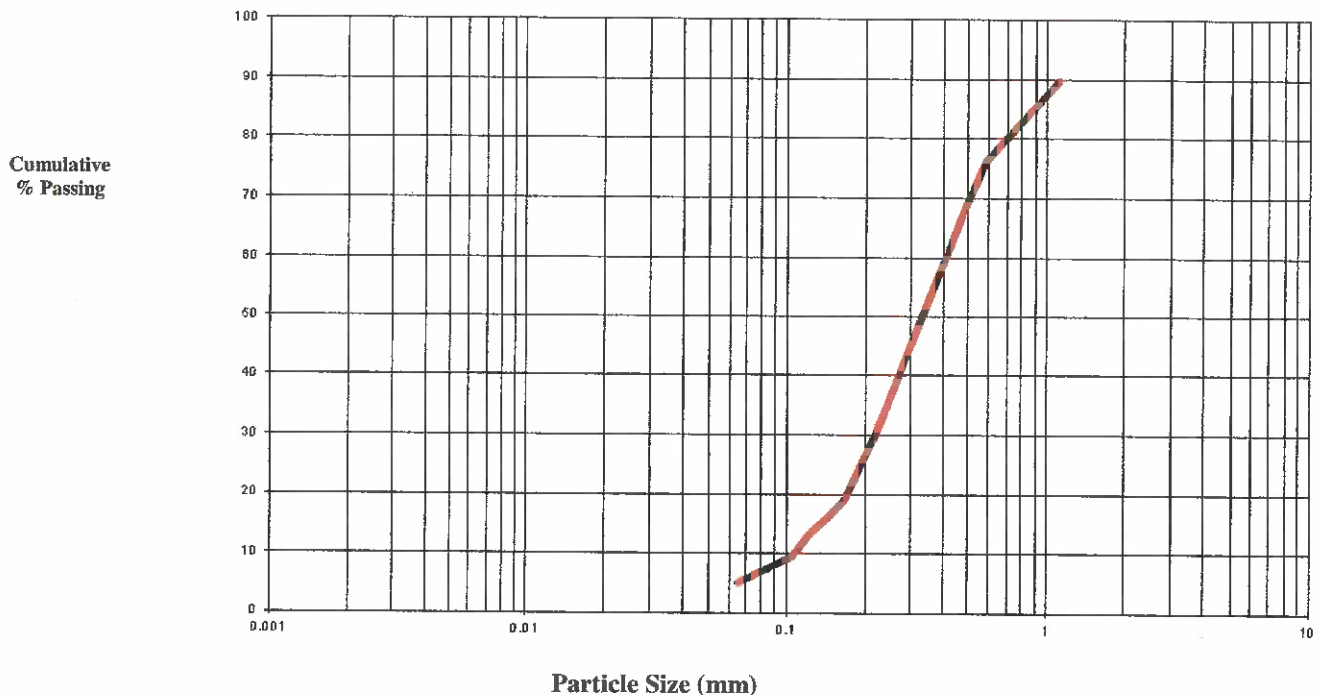
The bedding sand used around electric cables shall be natural unwashed sand in accordance with BS EN 16120 (BS882). The grading, when determined in accordance with BS812, Section 103.1, shall comply with grading limit C in Table 4 of BS 882 -1992 (shown below) or the grading curve shown below .

The sand shall have a maximum resistivity of 2.5 K. m/watt at 0% moisture content. Test sheets confirming the thermal properties shall be available for on-site inspection and shall be submitted with the 'as-built' documentation.

The sand shall be manually compacted around the cable and joints.

Pea gravel and foam concrete shall not be used for cable surround materials.

BS882 Sieve Size	3/16"	1/8"	7	14	25	52	100
% Passing weight	95	89	84	75	54	18	1.6

Thermal Sand Grading Curve

3.4.2 Underground Cable Protection Material for Unavoidably Shallow Depths

Wherever the trench layout and burial depth standards set out in this specification cannot be achieved, because of the terrain or the presence of other services, the design for all such deviations from the standards shall be submitted by the IPP for review and comment by ESB Networks.

The following additional materials shall be used in these situations:

3.4.2.1 Heavy Duty Underground Cable Protection Plate

Description:

750mm long x 200mm wide x 6mm thick galvanised steel plate, with red marker strip fixed to top surface. These shall be laid over the power and communication ducts as specified in the design drawings.

3.4.2.2 Surface Cable Markers

Description:

Metallic plate; 300mm x150mm; 4 screw-holes and hold down bolts. These shall be placed on footpaths/fences, bridges, walkways etc., where cable depth is unavoidably shallow. They shall be fitted to solid durable surfaces and shall be fitted flush with their surround when placed on footpaths or walkways, with full embedment of hold down bolts.

3.4.2.3 Marker Posts

Description:

Corrosion proof aluminium triangular danger sign, with 750mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background. They shall be installed in adequately sized concrete foundations and shall be placed at both sides of river crossings, wherever directional drilling has been used and where burial depth is not to standard. They shall also be used in non roadway routes and in forestry routes to delineate the duct route and joint bay positions.

3.4.2.4 Other items for unavoidably shallow burial depths

For additional mechanical protection underneath and at the side of the duct route, 6mm thick galvanised steel plate and A393 reinforcement mesh may be required, as specified by ESB Networks.

3.5 Trench Layout

The trench layout shall be as per the relevant ESB Networks drawing(s) in the Appendices to this specification. The specification of the relevant Local Authorities shall be followed for the excavation and reinstatement of the ducted cable trenches.

Where a change in the gradient of the trench is required to accommodate other services, the gradient change shall be as minimal as possible. Ducts shall be laid in straight lines to even gradients.

Ducts may be laid to slow and even curves on plan to avoid an obstruction. If a change in direction is required, bends formed by evenly bending the ducts themselves only shall be used and the couplers shall be braced so that there is no bending or stress on the coupler. No heat shall be applied to the ducts when bending ducts. The spacing of the ducts shall be in accordance with the drawings in the Appendices to this specification.

Natural bends in the ducts shall be as wide and gradual as possible. Clearances from other services shall be strictly observed and shall be maintained at all times.

The duct route shall be designed and constructed to ensure that the cable manufacturer's maximum tensile and sidewall pressure forces shall not be exceeded on the relevant MV Cable. Design calculations to confirm this requirement shall be included in the design review submission.

3.6 Joint Bays

Joint bays shall be provided to meet the requirements of standard cable drum lengths and/or as required to limit cable pulling forces.

Joint Bay locations shall be chosen with suitable terrain and access to facilitate the operation of cable pulling equipment, cable jointing and future operation of the installation. A hard core surface shall be provided at either end of the Joint Bay as detailed in drawings in the Appendices to this specification.

The construction of the joint bays shall be as specified by ESB Networks and pre-cast joint bays shall be sourced from an approved ESB Networks Supplier.

Pre-cabling temporary backfill and reinstatement shall comply with the drawing in the Appendices to this Specification.

3.7 *Communications Chamber*

Communications chambers shall be provided to meet the requirements of standard telecommunications cable drum lengths or as required to limit cable pulling forces.

Communications Chamber locations shall be chosen with suitable terrain and access to facilitate the operation of cable pulling equipment, cable jointing and future operation of the installation.

The construction of the Communication Chamber shall be as specified by ESB Networks and shall be sourced from an approved ESB Networks Supplier. The chamber shall be installed as detailed in drawing in the Appendices to this specification.

3.8 *Cable Sheath Sectionalising Chamber*

Cable Sheath Sectionalising Chambers shall be installed at every second joint bay subject to the distance between chambers not exceeding 2.5km. Cable Sheath Sectionalising Chamber locations shall be chosen with suitable terrain and access to facilitate the cable installation and future operation of the installation.

The construction of the Cable Sheath Sectionalising Chambers shall be as specified by ESB Networks and shall be sourced from an approved ESB Networks Supplier.

The chamber shall be installed as detailed in drawing in the Appendices to this specification.

3.9 *Lubrication Points*

Lubrication points shall be provided to ensure cable installation can be carried out without exceeding the manufacturer's maximum permissible cable pulling forces of the proposed cable. Lubrication points shall be installed in cable runs in close proximity to areas of high bend concentration. Optimised positions shall be chosen, e.g. on the crest of steep incline for maximum lubricant dispersion on the route. Lubrication points shall be properly sealed to prevent the ingress of dirt.

Lubrication Point locations shall be chosen with suitable terrain and access to facilitate the operation at any phase of the development and future operation of the installation.

The construction of the Lubrication Points shall be as specified by ESB Networks and shall be sourced from an approved ESB Networks Supplier.

The chamber shall be installed as detailed in drawings in the Appendices to this specification.

3.10 Clearances from Other Services and ESB Networks LV, MV and HV Cables

A minimum clearance of 300mm from outermost power duct edge to other normal service shall be strictly observed. A clearance of 600mm from outer most power duct edge to transmission high pressure infrastructure services shall be observed. See Appendix 3 for requirements.

Deviations from ESB Networks minimum clearances may be unavoidable at "Pinch Points". Where reduced clearances only can be achieved, the design shall be submitted to ESB Networks for review.

Written clarification in respect of reduced clearances shall be obtained from the relevant utility owner and, in the case of LV, MV and HV cables , clarification shall be obtained from ESB Networks and shall be included in the 'as built' documentation.

3.11 Joining of Ducts

As the duct is installed the socket end shall be towards the duct lay and the inside of the socket and the spigot end shall be cleaned with a dry cloth before being pushed together by hand. A wooden batten shall then be placed across the socket at the leading end. The duct shall be tapped home with a hammer until the ring mark on the duct, indicating the fully "home " position, meets the edge of the socket.

3.12 Cutting of Ducts

Where duct cutting is required, they shall be suitably held, supported and protected during the process. All ends shall be cut square to the longitudinal axis of the pipe and suitably finished (chamfered) with no rough edges.

3.13 Avoidance of Power Duct Crossovers

Duct crossovers shall be prevented and shall be deemed an unacceptable defect. Cables shall not be installed in ducting that contains a crossover of the ducts.

3.14 Bends

Bends in the ducts shall be as large and as gradual as possible to minimise thrust force on socket and the spigot end.

The term "Bends", also includes trench offsets/sidesteps both in the horizontal and vertical plane, which may be necessary to avoid obstructions e.g. manholes or to maintain clearances with other under ground services running parallel and diagonal to the trench.

At all trench route deviations/bends, the radius of the overall bend shall be maximised/made uniform over the entire bend. The centre of rotation of the arc shall be chosen so that the bend radius is as large as possible and such that at the start and finish of the bend (i.e. where it meets the straight duct sections) the radius is no worse than that at any intermediate point on the arc.

IPP shall use ESB Networks approved pre-formed bends only and these are available in angles of 11⁰, 22.5⁰, 45⁰, 90⁰. Duct lengths shall not be bent at bend positions – preformed bends in conjunction with straight duct sections shall be used to ensure that there are no cable ripping protruding edges at duct joint positions for any direction of cable pull.

3.15 Avoidance of Crinkling/Flattening of Ducts While Laying Ducts at Bend Positions

The ducts shall be uniformly/regularly supported as they are being formed around the curve to avoid imposing concentrated (point) sidewall forces which result in crinkling or excessive flattening of the ducts at the bend position.

3.16 Trenchless Technology

Should it be necessary to cross obstacles such as bridges, railways, water courses etc. with the cable duct(s), and all possible routes and installation possibilities have been thoroughly examined and are deemed not possible, then the method of installing the cable duct(s) by trenchless technology may be accepted by ESB Networks. Details of such locations and the proposed design and mechanical protective measures shall be submitted to ESB Networks for review and comment.

The route length undertaken using trenchless technology shall be an absolute minimum and shall only be that length required to clear the crossing that cannot be undertaken by conventional trenching methods

The design for the proposed crossing by trenchless technology shall be submitted to ESB Networks for review and comment

The following duct type shall be used for directional drilling for MV ducting and it shall be chamfered to allow correct transition to the standard ducting I.D

Type and Size of Duct
125mm HDPE for Directional Drilling
SDR 14.7 (to allow 3x400 sq 20kv cable)

3.17 Dirt Ingress into the Ducts

Dirt ingress into the ducts shall be prevented as any dirt or pebbles trapped in the ducts may lead to cable failure. During cable pulling, dirt or other sharp objects will be pressed between the duct and cable resulting in deep scores and gashes on the cable sheath which may result in cable failure. Allowing dirt to enter ducts

and attempting to remove it later by cleaning the ducts with brushes is not acceptable.

The ingress of dirt into the ducts shall be prevented by the following measures:

- On delivery from the supplier, the ducts shall be fitted with end caps. These shall remain in place to prevent dirt entering on the duct bales.
- When the ducts are installed, rubber bungs shall be immediately fitted to exposed installed duct ends and retained in place at all times. These bungs shall be fitted with an internal D-ring to facilitate the tying of draw rope.
- Trenches, joint bays, etc. shall be kept free of water so as to prevent any risk of the cables and other materials to be laid in the trenches etc. being detrimentally affected.

3.18 ESB Networks Approved Protection Strip, Warning Tape and Marker Posts

ESB Networks Protection Strip (Red) and ESB Networks Warning Tape (Yellow), shall be used at all times as specified in the relevant ESB Networks drawings in the Appendices to this specification.

Where ducts are laid, the red protection strip shall be placed on top of the CGBM B layer. In all situations yellow warning tape shall be placed higher up in the trench, at a distance of not more than 300mm below the finished surface.

Sufficient parallel layers of red marker strip and yellow marking tape shall be used to fully cover and slightly extend beyond the full plan widths of the ducts below it. The layer of backfill immediately underneath the yellow marker tape or red marker strip shall be properly levelled and compacted prior to laying the marker tape and warning strip evenly along the trench.

ESB Networks cable protection and marking materials shall not be used over any other ducting which is not intended for use by ESB Networks.

3.19 Trench backfilling

Provision shall be made to prevent duct movement during the placing of the duct surround. All duct bedding, duct surround and backfill materials shall be suitably compacted in layers using manually operated vibrating plate which shall not crush the ducts beneath.

3.20 Reinstatement Specifications General Requirements

All reinstatement works shall be in accordance with the NRA Specification for Road Works and any conditions specified in the Road Opening Licence and/or route consents. If any part of the route impinges on private property, the reinstatement specification shall be as agreed with the Landowner.

3.21 Cleaning, Proving, Roping and Capping

When the ducts have been installed and backfilled the duct run shall be thoroughly cleaned by pulling the appropriate size of ESB Networks approved duct brush through the duct and shall be proven by pulling the appropriate size of ESB Networks approved mandrel through the duct.

Each duct shall be cleaned and proven at completion/handover and immediately prior to pulling in the cable winch rope and the cable in the case where the IPP is also responsible for cable installation.

Duct Cleaning – Brushes

Brushes with the specified dimensions only shall be used to ensure that any dirt or debris within ducts is transported out of the ducts rather than being merely loosened up and left within. The brush shall have the following dimensions:

Duct Outside Diameter	Minimum Length of Brush	Brush Code
125mm UPVC	250mm	8783254

Brushes shall be cleaned regularly using a power hose. Approved Brushes have two sets of brushes per core.

Duct Proving – Mandrel

Proving shall be achieved by pulling a sponge, cleaning brush and mandrel assembly through the duct. The equipment shall have the following dimensions:

Type and size of duct	Mandrel Code	Brush Code	Sonde	Sponge
125mm UPVC SDR 17.6	8783229	8783254	required	125mm
125mm HDPE for Directional Drilling SDR 11.0	8783228	8783250	required	125mm

All mandrels are stamped with their size and the corresponding duct size to which they are applicable.

Duct Cleaning – Sponge

A sponge shall be used to remove excess water and pre-lubricate the duct prior to cable pulling.

Duct Proving – General

ESB Networks reserves the right to witness the duct proving tests.

ESB Networks approved duct brushes, mandrels and sponges are designed to provide thorough cleaning and a tight fit. The minimum rope size used shall be 12mm polypropylene. Cleaning and proving shall be carried out using a winch which has a calibrated dynamometer and printout. Pulling tension shall not exceed 1 Tonne (10kN). The results shall be submitted to ESB Networks for review.

Following the duct proving process, water sealing rubber bungs shall be fitted to prevent water, sand or other debris getting into the ducts. The ducts shall then be left roped in preparation for cable pulling.

Use of a Transmitter (Sonde)

A Sonde shall be connected close to the mandrel or brush to help locate a blockage quickly. It can be purchased for specific use with a C.A.T. or other precise cable location instruments, equipped with a Sonde detector.

Duct Lubrication Materials

Ducts and cables shall be thoroughly lubricated for all cable pulls. Only ESB Networks approved lubricants which are tested so as not to damage the cable insulations semi-conductive layers and outer sheath shall be used. Petroleum based oils or greases shall not be used for power cables.

The list of approved suppliers is available from the following ESB Networks web site address:

http://www.esb.ie/esbnetworks/en/download_documents/builders_developers/approved_material.jsp

3.22 Recording of Duct Installation

This shall be as specified in ESB General Specification for Contestably Built Underground Networks.

4.0 Appendices

Appendix 1	ESB Approved Chambers and Covers
Appendix 2	Supply of Ducts
Appendix 3	10 / 20 kV Clearances
Appendix 4	Ducting & Cable Installation Forms
Appendix 5	Drawings

- 1.0 Trench Layout 10 / 20 kV Single Circuit (Roadway)
- 1.1 Trench Layout 10 / 20 kV Single Circuit (Grassed Area)
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- 1.6 10 / 20 kV Single Circuit Ducts and Single Comms Duct - Plan
- 1.7 Communication Chamber - Section
- 1.8 10 / 20 kV Single Circuit Ducts and Single Comms Duct – Section
- 1.9 10 / 20 kV Single Circuit Ducts – Plan
- 1.10 Required Cable Installation Solid Ground - Plan
- 1.11 10 / 20 kV Single Circuit Joint Bay – Section
- 1.12 10 / 20 kV Single Circuit Joint Bay – Section backfill detail no cable
- 1.13 10 / 20 kV Single Circuit Joint Bay – Section backfill detail with cable
- 1.14 Cable Screen Sectionalising Chamber – Section
- 1.15 10 / 20 kV Single Circuit Ducts and Cable Screen Sectionalising Chamber– Plan
- 1.16 10 / 20 kV Single Circuit Ducts and Cable Screen Sectionalising Chamber– Section
- 1.17 10 / 20 kV Single Circuit Ducts and Cable Screen Sectionalising Chamber– Elevation
- 1.18 Joint Bay: Cable Screen Sectionalising Chamber and Communication Chamber

Appendix 1. ESB Networks Approved Communications, Lubrication Point and Cable Screen Sectionalising Chamber (Photograph) and Chamber Cover



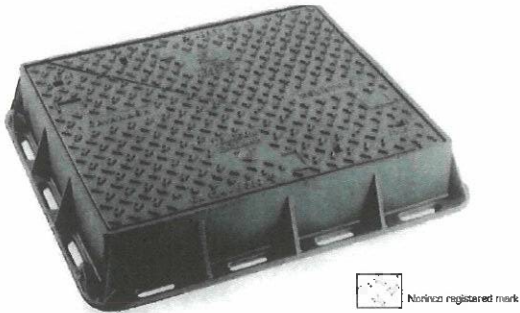
ESB Networks Approved Communication and Cable Screen Sectionalising Chamber

DT6S

Description

Material
Spheroidal graphite cast iron in accordance with ISO 1083 and NF EN 1563.

Frame
One piece monoblock construction, incorporating 4 No. Lifting Points for handling and 6 No. 20 mm diameter holes for fixing to chamber. Safety grids can be accommodated.



Covers

- Double triangular non-rock with feature to prevent displacement in longitudinal direction.
- Separate sections of cover loosely coupled with nut and bolt.

Handling
Each cover section is fitted with a keyhole for lifting.

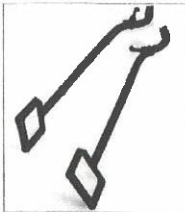
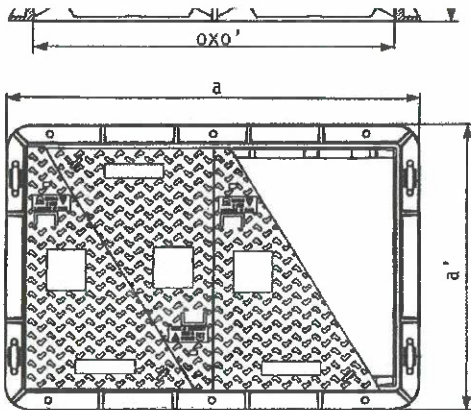
Coating
Non-toxic water based black paint.

Product Certification
KITEMARK.

Place of Installation
In accordance with EN 124 Standard.
Group S : Areas imposing high wheel loads (e.g. docks, aircraft pavement) ; and lower groups.

Options

- Special badging: please enquire.



Ref.	Dimensions (mm)			Weight (kg)		
	a x a' overall flange	b x b' clear opening	h height	Frame	Cover(s)	Total
DT6S 075.000	800 x 800	350 x 600	150	60	2 x 50	170
DT6S 107.075	1220 x 950	1070 x 750	150	110	4 x 51	314

Appendix 2. Supply of Ducts

All ducts must be supplied in accordance with the summary of requirements and properties listed below.

ESB Networks Specification for Red 125mm uPVC Mains (ABRIDGED FROM ESNB SPEC. 16113)

	MAINS CABLE DUCT
Duct outside Diameter (Mean)	125.0mm – 125.4mm
Duct Type	uPVC, Spigot & socket type 6m lengths measured end to end
Duct Rating	Normal duty per EN 50086–2 Specification
uPVC & MDPE Material Quality	Virgin or own clean reworked material .Use of externally sourced reworked or reprocessed material is not acceptable to ESB Networks
Duct Colour – External and Internal Surfaces	Red – BS Type 5252 04E53 – 04E56 Minimum 0.3 mm thickness of red coloured material required throughout length of duct on both internal and external duct surfaces
Duct Deformation Requirement	Must pass EN50086 – 2 <5% deformation requirement for 500N loading on 200mm sample
Impact Resistance	Per EN 50086 – 2 12 samples. 7.5 kg striker: 2m fall height;>150 Joules – no crack in at least 9 samples; Duct temperature;15-20 deg C
Duct Minimum Wall Thickness	The larger of the two criteria below; Wall thickness to pass 5% deformation / impact requirement above ESB Networks minimum wall thickness of 3.8mm (required for cable pulling)
Duct Spigot (plain) End	Spigot; plain end bevelled to allow easy jointing of duct on site, minimum thickness 1.3mm, bevel length ≥ 5mm ;end cut square
Duct Socket (expanded) End	Push Fit Type Tapered Socket 3.4mm minimum expanded wall thickness 110.0mm– 116.0mm socket length; end cut square
Black indelible Circumferential mark on plain duct end for correct push-in distance	Black circumferential mark required to indicate correct push in distance for duct jointing for spigot and socket joints. Location: 110mm – 116mm from duct plain end to match socket length below
Duct Ovality incl. Socket	- 2.00mm. max.
Eccentricity and misalignment of expanded Socket relative to duct centre line axis	Zero offset of the expanded socket centre line relative to the duct centreline is required. Also the expanded socket centre line and the duct longitudinal axis must be collinear – no deviation angle allowed
Duct Inner Surface	Smooth low friction surface completely free of surface ripples and waves, sharp edges & protrusions. Friction coefficient <0.25
DUCT MARKING Duct Legend Content:	"DANGER ELECTRICITY CABLES" in 18-20mm lettering height ;" Batch No , Manufacturers Name, Date of manufacture & ESB Networks Spec 16113 " in 6mm minimum lettering height
Maximum Spacing between Consecutive Legends	Maximum 150mm gap between consecutive Legends
Colour of Legend	Black
Size of Lettering for main safety legend above	Three 18- 20mm height legends disposed @ 120° apart on duct circumference.
Durability of Duct Legend Lettering & Circumferential mark	Legend/Mark shall not wash off or become illegible due to Irish outdoor weather effects

Red Colour Fastness	1 year minimum required so as to provide 12 month storage period at builder's provider's premises. . 1 year outdoor weathering test required or suitable accelerated colourfastness test
Bend Radius for all Bend Angles For 125MM Duct	For all Angles ;radius = 1.2m minimum for 11°, 22°, 45° & 90°. Material as per duct specification above. (3.8mm minimum wall thickness) 150 mm straight section between. start of bend section and circumferential mark
Bend ovality	2mm max (Same as for straight duct)
Duct Length	Duct Length to be 6m measured end to end
Endcaps for Ducting	Bag of 15 duct end caps to be supplied with each bale of ducts - capable of fitting each duct end. Caps securely fitted on two lowest rows and top row in bale at both ends, which will not fall off during transport. Caps to be securely fitted to ducts to eliminate falling off during transport.
Packaging Support for duct bale Or coil	Duct bales to be held in position by at least two sets of good quality timber battens supported by steel straps. Supplementary support to prevent overstraining and breakage of timber battens to be provided by polypropylene tension straps or other suitable means. Collapsed bales are a safety hazard; which must be designed out.
Labels for Duct Bales/ Pallet of Bends /Coils of Ducting	Indelible Weatherproof labels to be placed on each bale of ducting stating; "Approved for ESB Networks use ". A4 size laminated Installation Labels as provided by ESB Networks in 2007 to be fixed to each bale of ducting , Each bend to be labelled "Approved for ESB Networks use " & labelled with ESB Networks Installation requirements.

**ESB Networks Specification for 125mm Red HDPE Ducting for Directional
Drilling/Trenchless
Technology use only**

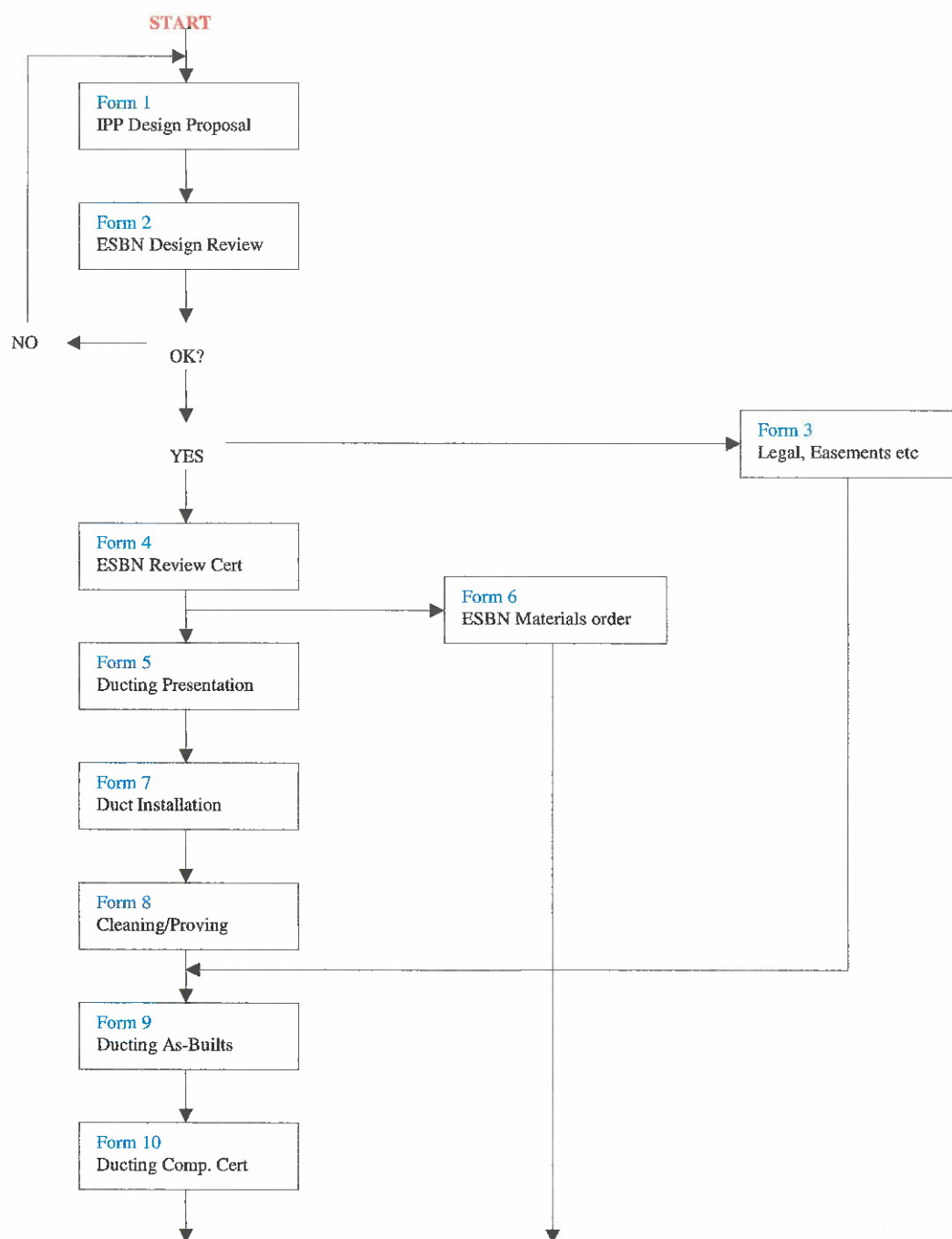
HDPE CABLE DUCT- DIRECTIONAL DRILLING USE ONLY	
Approved ESB Networks suppliers	- see approved list, available on ESB Networks website
Duct outside Diameter (Mean)	125.0mm – 125.4mm
Duct Type	HDPE: Coiled approx 3.5m coil diameter
Duct Wall Thickness	8.5mm
Duct Rating	Heavy duty per EN 50086 – 2 Specification
uPVC Quality	100% Virgin Material
Duct Colour – Outside	Red – BS Type 5252 04E53 –04E56 Minimum 1mm thickness of colour material if dual layer extrusion
Duct Deformation Requirement	Must pass EN50086 – 2 <5% deformation requirement for 750N loading on 200mm sample
Impact Resistance	Per 50086 – 2; 12 samples. 7.5kg striker: Minimum fall height of 2Mts:>150 Joules – no crack in at least 9 samples
Duct Minimum Wall Thickness	The larger of the two criteria below: Wall thickness to pass 5% deformation / impact requirement above & ESB Networks minimum wall thickness of 8.5mm (existing stock 8.5 mm required from year 2004 onwards as soon as existing stock is used up)
Duct End	Ends of each length bevelled to allow easy jointing of duct on site, minimum thickness of plain end to be 2.4mm, bevel length ≥ 5mm
Circumferential Mark On pipe end for correct push-in distance	Circumferential ring mark required to indicate Correct push in distance for duct jointing Location: to match half long coupler length less half coupler centre stop thickness
Duct Ovality	2.00mm. max.
Duct Inner Surface	Smooth low friction surface completely free of ripples, sharp edges & protrusions. Friction coefficient <0.28
Duct Marking Legend Content: Repetition Rate/Gap between Legend	“Danger Electricity Cables” 150mm max. gap between adjoining legends.
Colour of Legend	Black
Size of Legend Lettering	3 X 20mm height i.e. 3 lines of 20mm height @ 120° apart.
Batch No., Manufacturers Name AND Date of Manufacture	Letter sizing should not be less than 6mm.
Red Colour Fastness	1 year minimum required so as to provide 12 month storage period 1 year outdoor weathering test required or suitable accelerated colourfastness test to prove that duct meets Specification
Endcaps for Ducting	Endcaps to be supplied on both ends of coil
Couplers	Slip or rubber gasket type with no internal obstructions/sharp edges .A Centring ridge is required which does not protrude above the duct wall. The coupler must effectively seal out water over the 40 year lifetime of the installation even at bend positions when buried 3 m below groundwater level

Appendix 3. 10-20kV Clearances

ESB Cable Type	Clearance From	Minimum Clearance for General Parallel Run	Minimum Clearance at Networks Pinch Points and Crossings
MV & LV Mains	Gas Water Sewerage Telecoms including Fibre Optic Cable	300mm lateral clearance ESB cables must not be laid above parallel runs of other services.	100mm minimum, but in this case, concrete slabs or bricks bedded in sand must be placed between the electricity cables/ducts and the conflicting service. ESB to cross underneath except where necessary due to depth of other service. Whenever possible cross at right angles to minimise extent of areas of close proximity to other service. Place red strip accurately over ESB ducts.
MV & LV Mains	Large infrastructure e.g. large high pressure gas mains, large main drainage sewers and large high pressure waterpipes (where cabling is done in conjunction with or subsequent to such works).	600mm lateral clearance is recommended. Actual clearance should be agreed in writing.	100mm minimum, but in this case, concrete slabs or bricks bedded in sand must be placed between the electricity cables/ducts and the conflicting service. ESB to cross above except where necessary due to depth of other service. Whenever possible cross at right angles to minimise extent of areas of close proximity to other service. Place red strip accurately over ESB ducts.
MV & LV Mains	HV cables i.e. 38kV, 110kV & 220kV cables.	Minimum clearance is dictated by risks of considerable derating of both MV/LV and HV cables. Minimum clearance for avoiding derating should be 2m or more. If less than 2m then for 38kV and 110kV cables consult Underground Networks Section, AM. For Eirgrid cable consult the Transmission System Operator.	For parallel runs: If clearance is less than 2m for more than 2m length of parallel run, then for 38/110kV cables, see Section 3.3 of this manual or consult ESN representative. For crossings: Maintain 200mm min. vertical clearance. Consult the Sections listed above if the number of MV cables exceeds two cables. See Section 3.3.12
MV & LV Mains	MV & LV Mains Cable	Case 1: In Same Trench 75mm min. separation, both horizontally and vertically, edge to edge between adjacent ducts if there are <u>not</u> more than 2 layers of ducts with max. of 2 ducts per layer OR if the number of ducts <u>exceeds two</u> in any horizontal layer, minimum separation both horizontally and vertically edge to edge must be 150mm Case 2: New Trench If new trench is being dug parallel to existing cables min separation should be 150mm. This requires use of a "Safe System of Work for Digging". Risk of collapse of existing trench must be considered and protected against as necessary in each case. See Section 1.4.7, & Section 1.4.8.7 for protection of any exposed cables/ducts.	

Appendix 4. 10-20kV Ducting & Cable Installation (+ Fibre Cable)

The following flow chart is the project process for a non-contestable 10-20kV & communication ducting and cables. This process is aimed at how ESB Networks and the IPP interact and the roles ESB Networks have.

**Cable Installation**

Appendix 5. Quick Reference Guide

Quick Reference Guide for 10/20kV Ducting

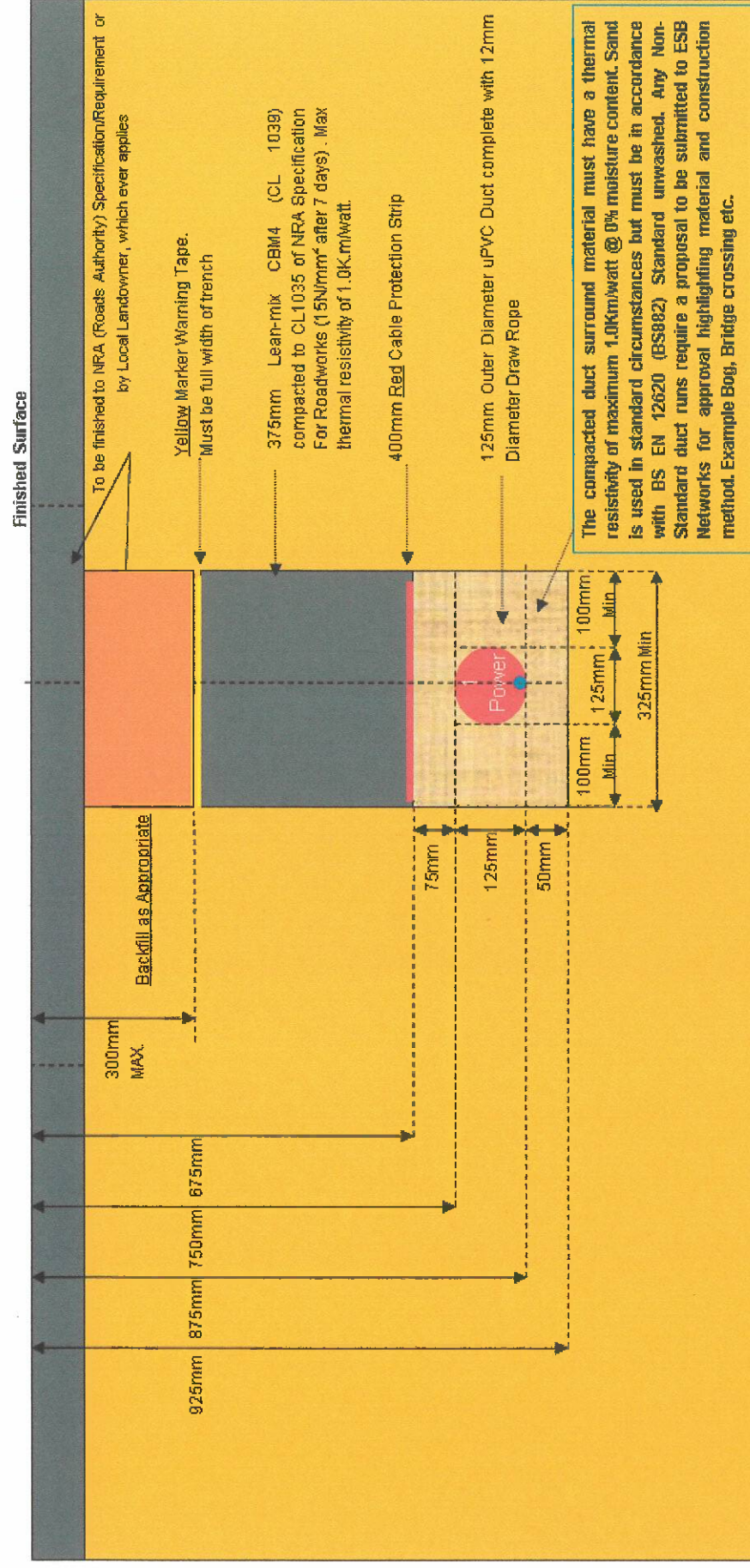
This document is only a quick reference guide and it must be read in conjunction with ESB Networks 'Specification for the Installation of MV Ducts'.

Link for approved suppliers

http://www.esb.ie/esbnetworks/en/download_documents/builders_developers/approved_material.jsp

1.0: Trench Layout 10/20kV Ducting – One Power Duct (Roadway)

Drawing Not To Scale



Permanent Reinstatement in Private Property, Public Open Space Grassed Areas, Grass Verges, Medians and other Grassed Areas

Finished Surface

To be finished to NRA (Roads Authority) Specification/Requirement or by Local Landowner, which ever applies

Yellow Marker Warning Tape.
Must be full width of trench

Backfill as Appropriate

300mm MAX.

675mm

750mm

875mm

925mm

400mm Red Cable Protection Strip

Lean-mix CBM4 (CL 1039) compacted to CL1035 of NRA Specification For Roadworks (15N/mm² after 7 days). Max thermal resistivity of 1.0K.m/watt.

Test reports required

125mm Outer Diameter UPVC Duct complete with 12mm Diameter Draw Rope

Power

100mm Min

125mm

100mm Min

325mm Min

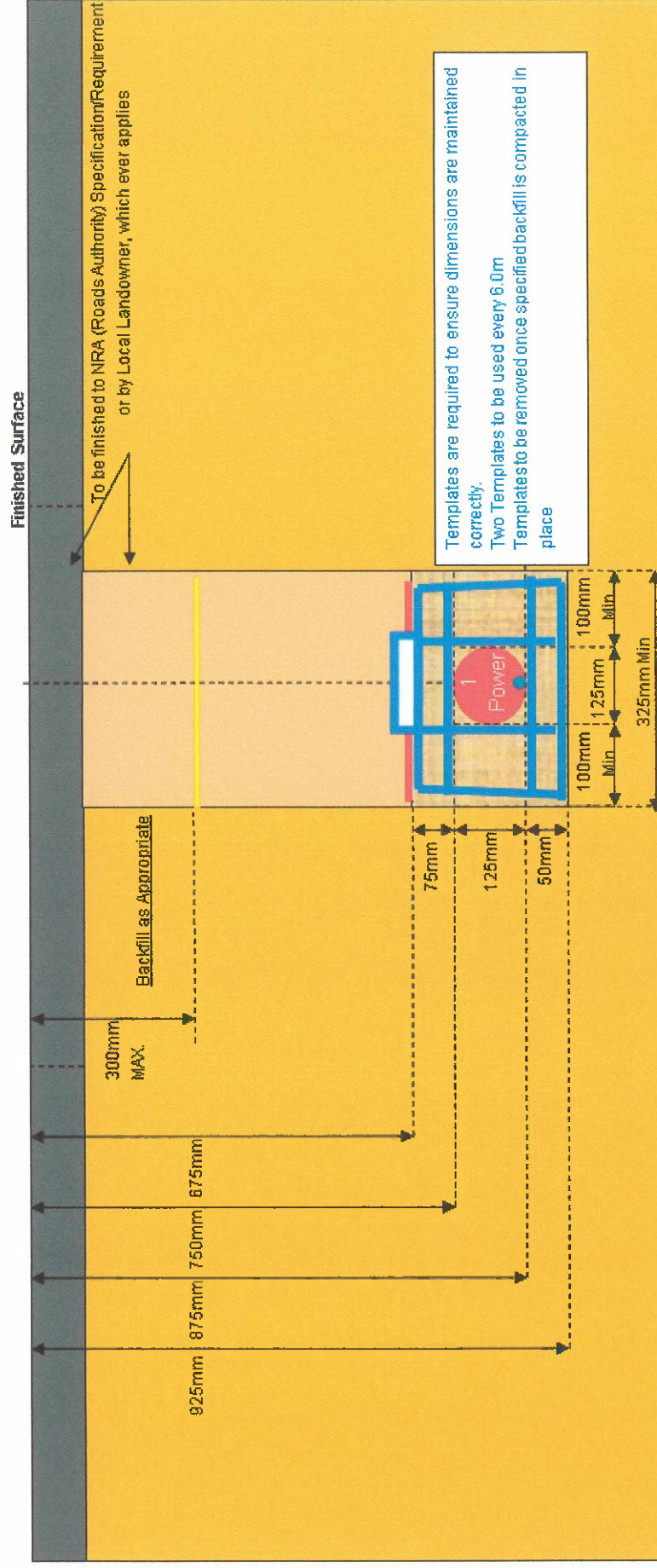
75mm

125mm

50mm

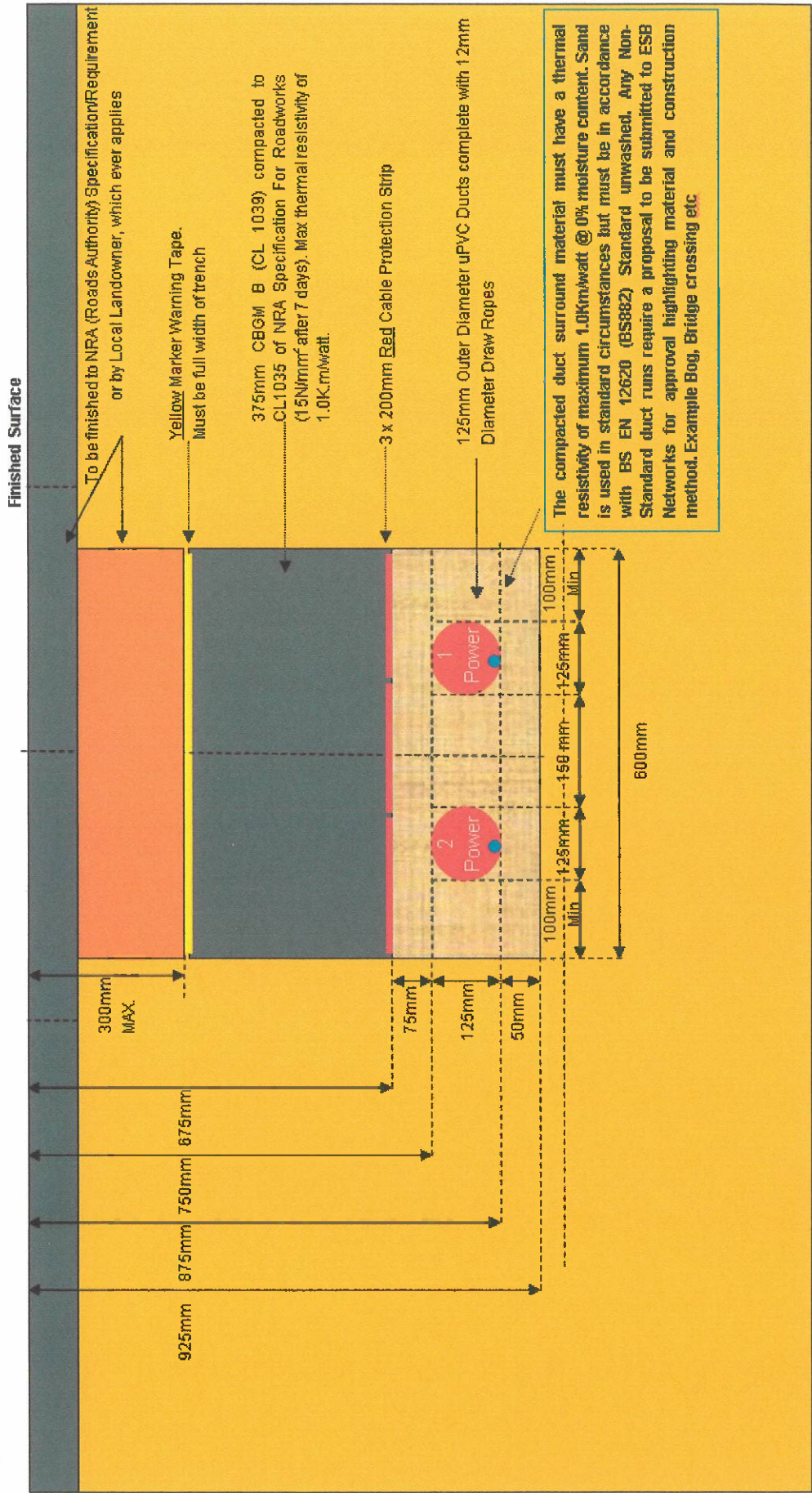
1.2: Trench Layout 10/20kV Ducting – One Power Duct (Template)

Drawing Not To Scale

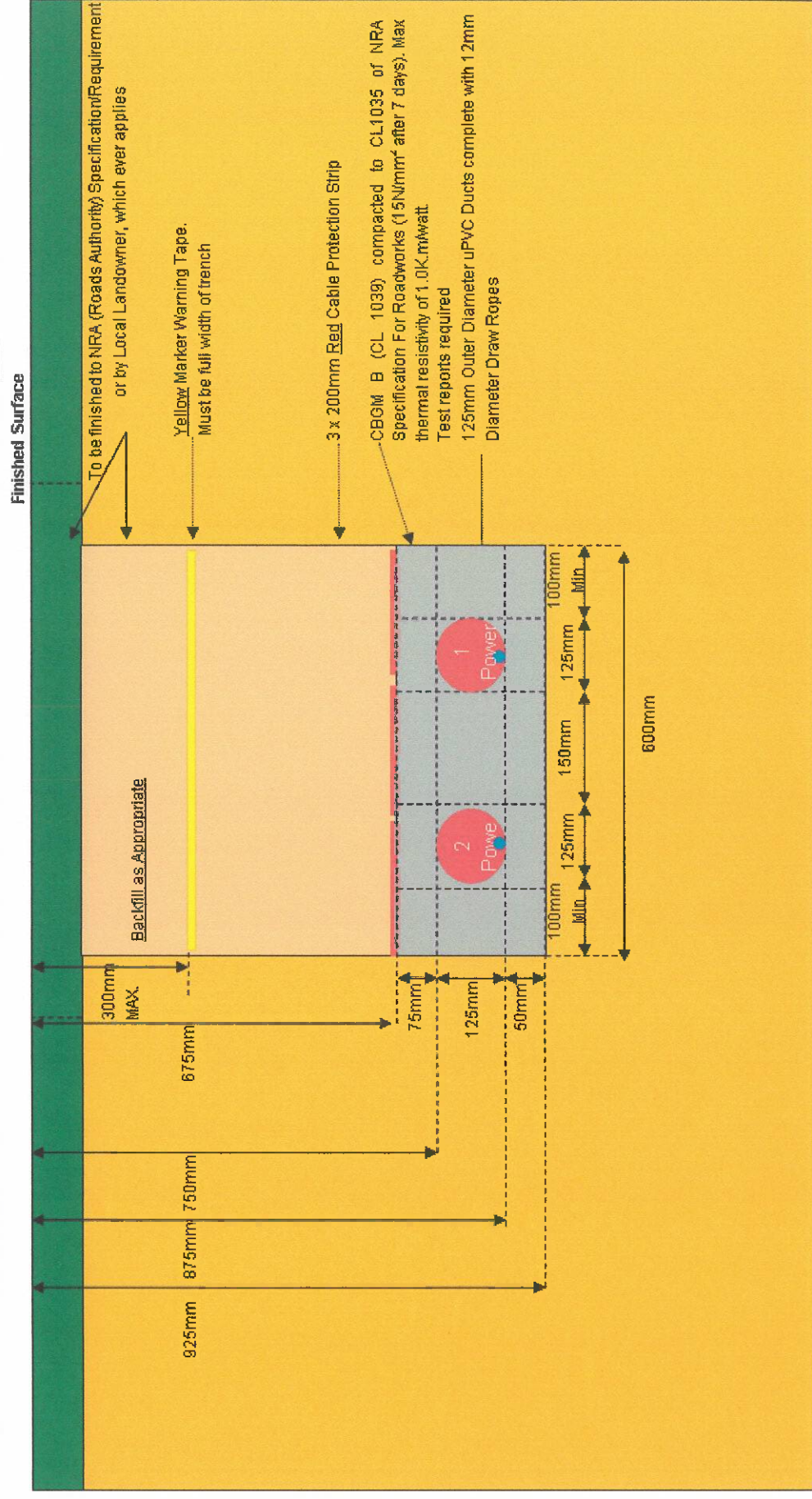


1.3: Trench Layout 10/20kV Ducting – 2 Power Ducts (Roadway)

Drawing Not To Scale

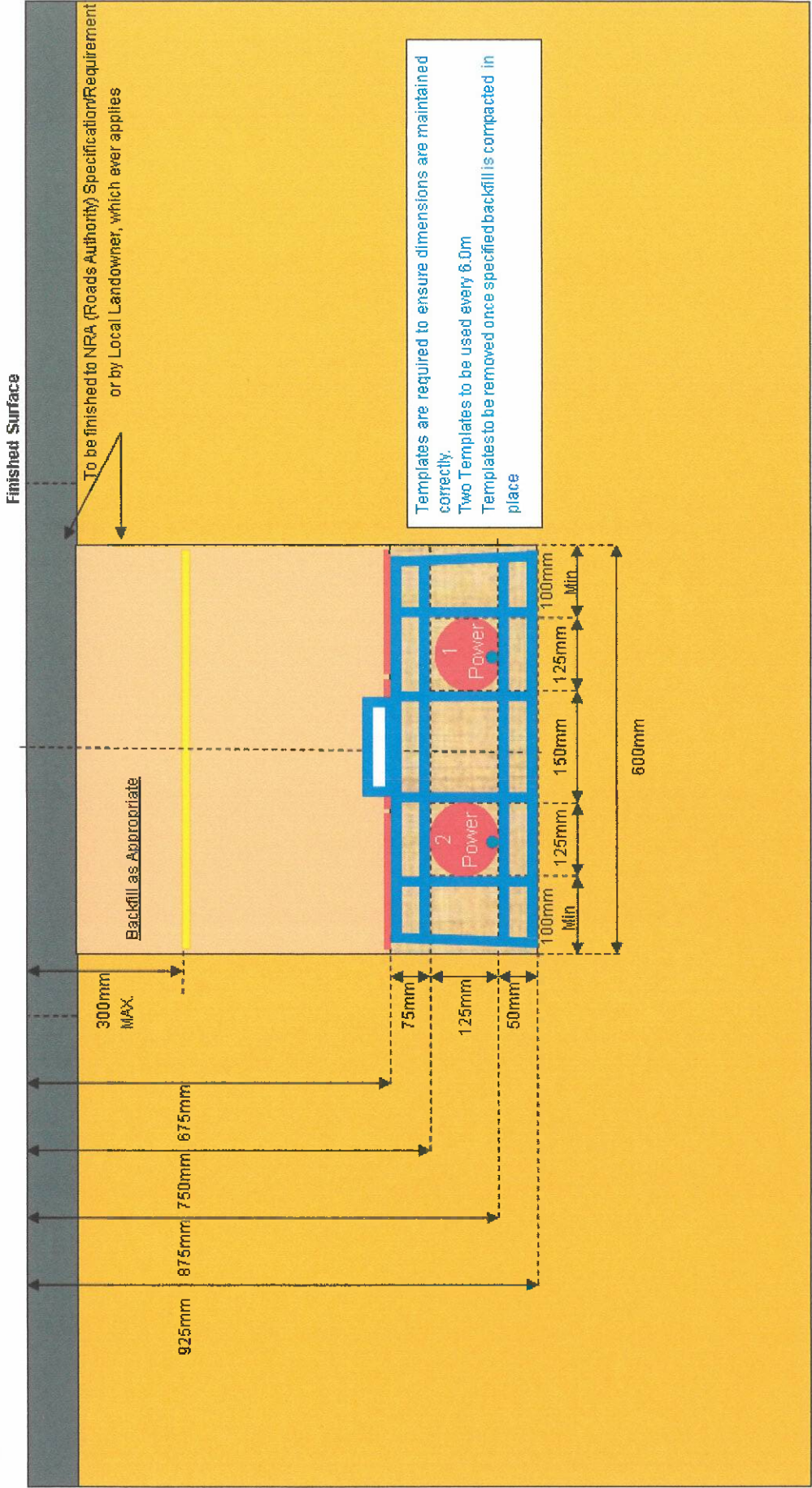


Drawing Not To Scale Permanent Reinstatement in Private Property, Public Open Space Grassed Areas, Grass Verges, Medians and other Grassed Areas

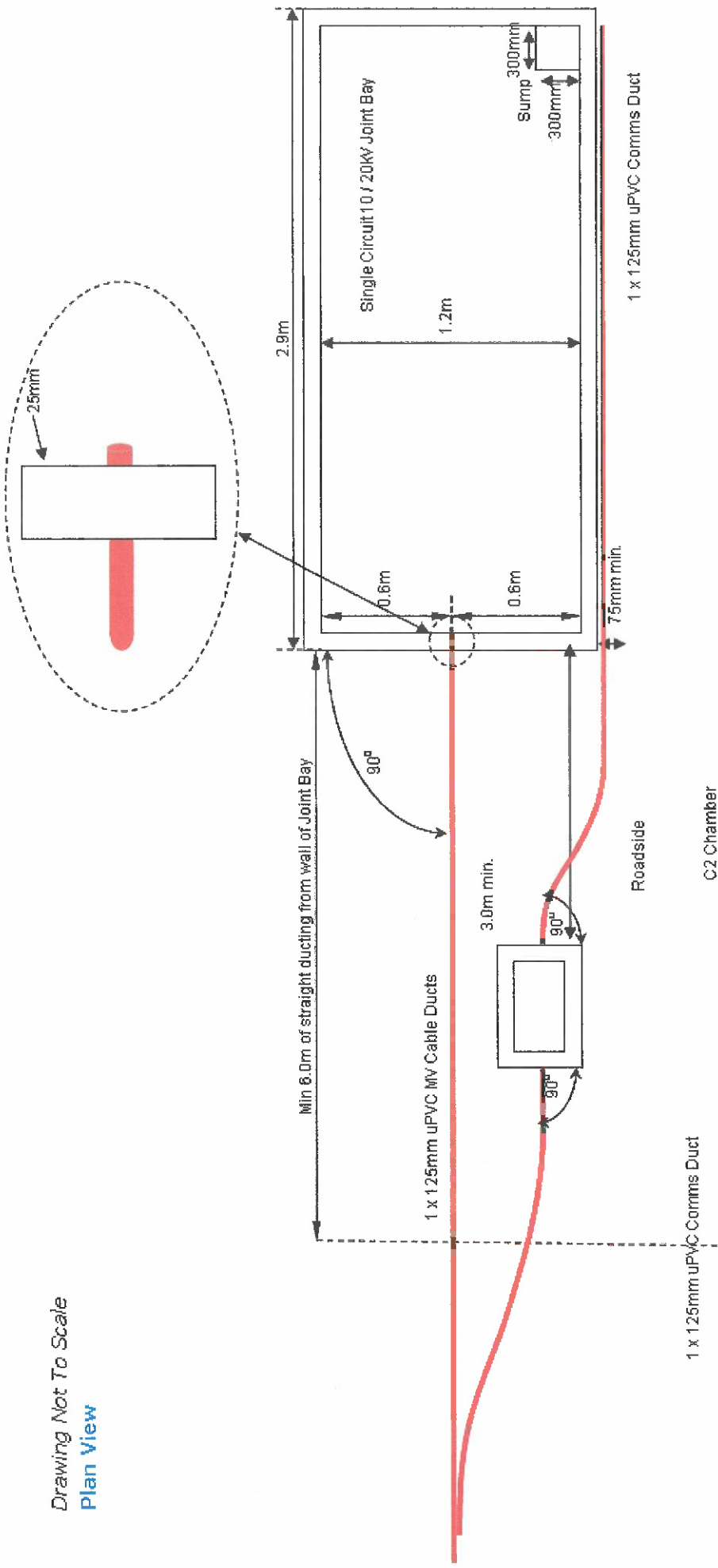


1.5: Trench Layout 10/20kV Ducting – 2 Power Ducts (Template)

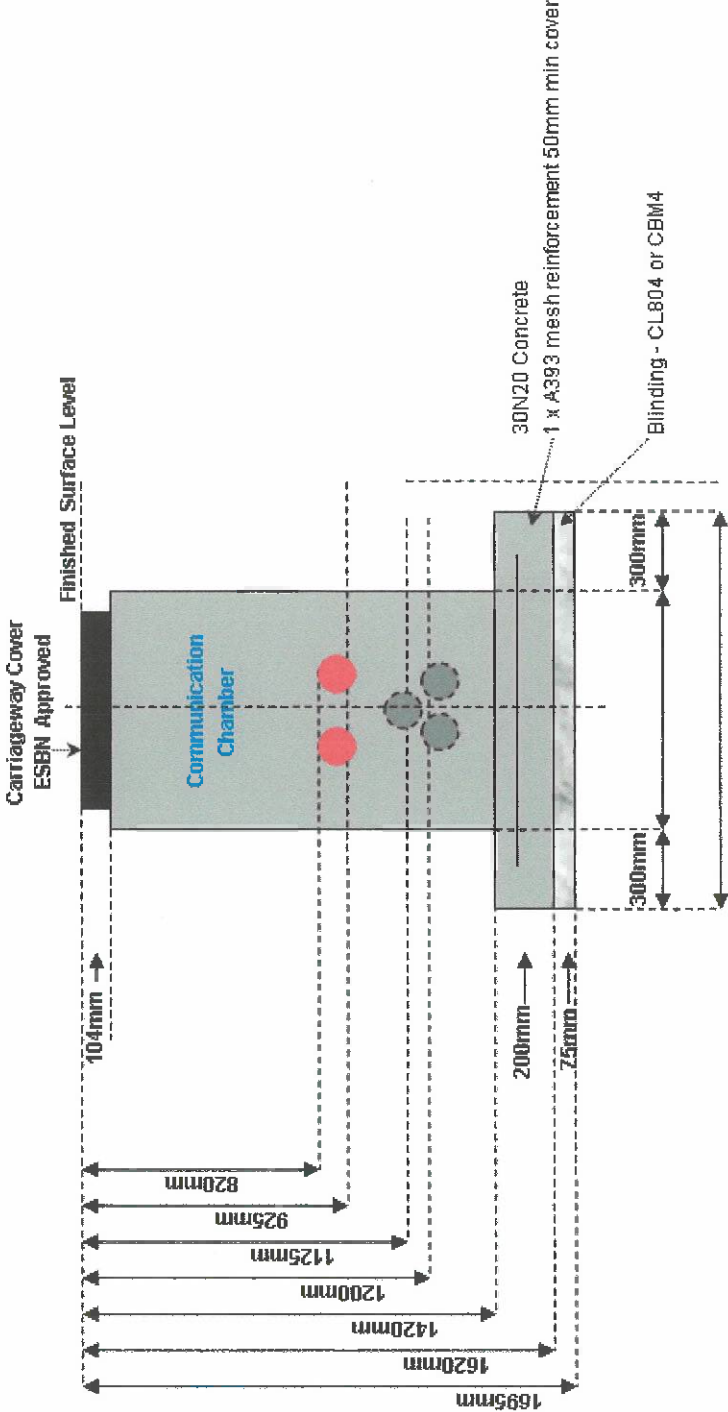
Drawing Not To Scale



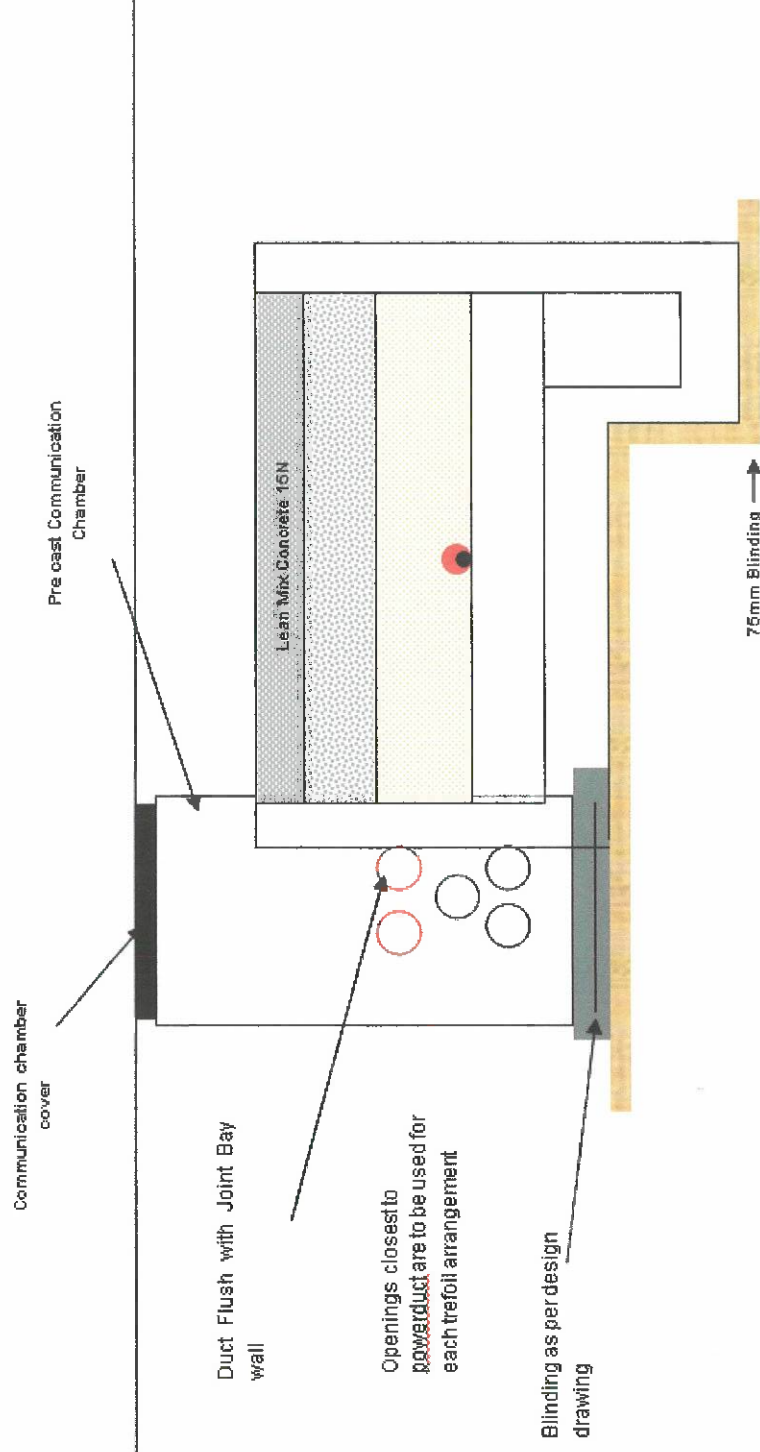
1.6: Joint Bay Layout 10/20kV Ducting – One Power Duct



1.7: Joint Bay Layout 10/20kV Ducting – **Communication Chamber**

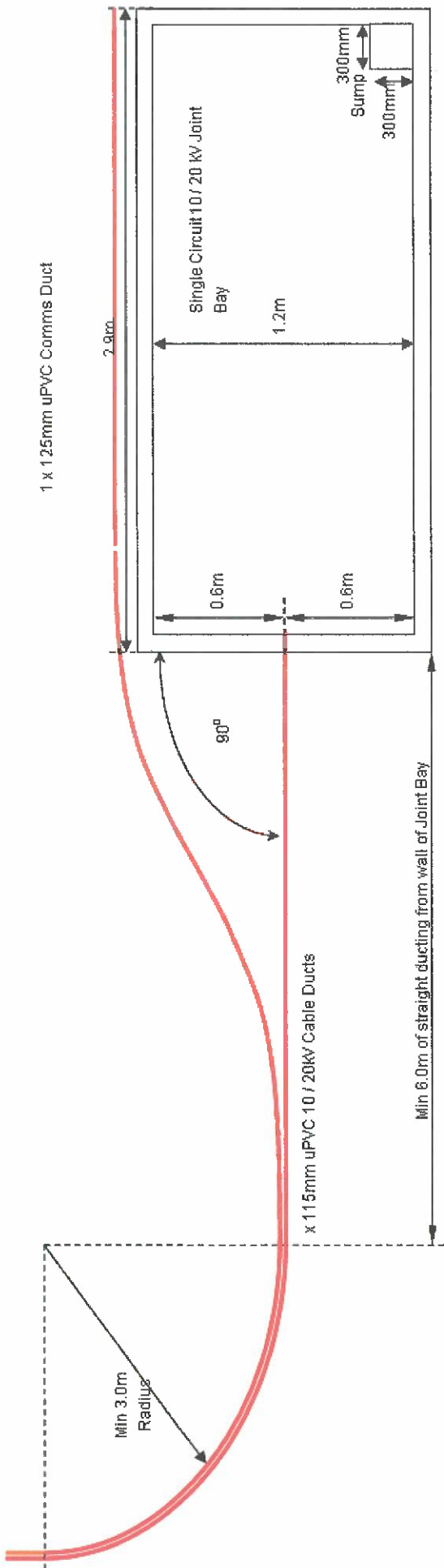


1.8: Joint Bay Layout 10/20kV Ducting – One Power Duct



1.9: Joint Bay Layout 10/20kV Ducting – One Power Duct

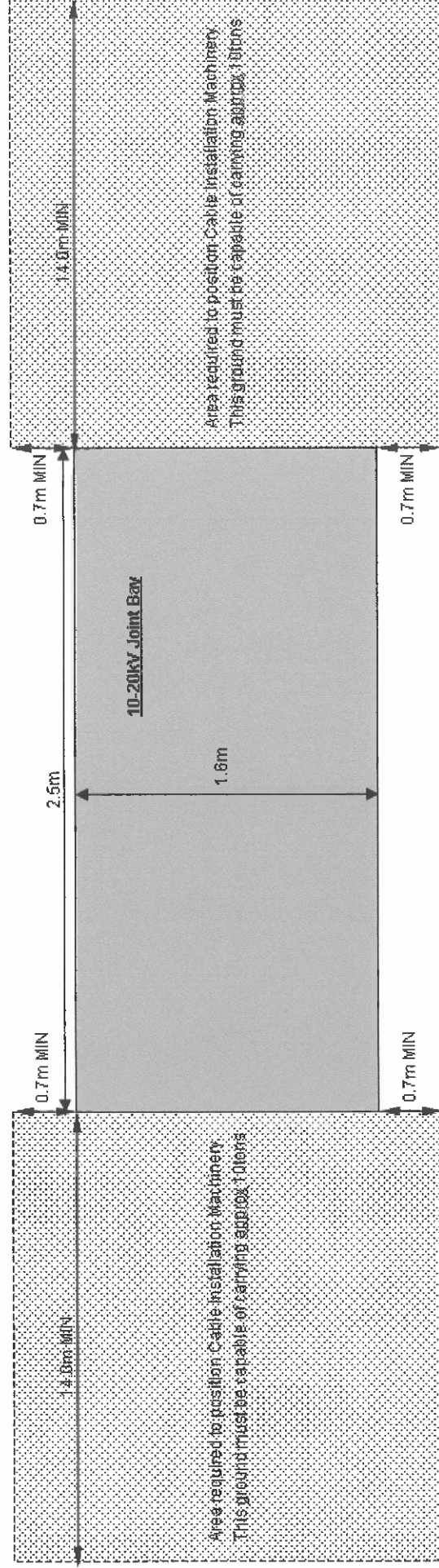
Drawing Not To Scale



1.10: Required Ground & Surface for MV Cable Installation

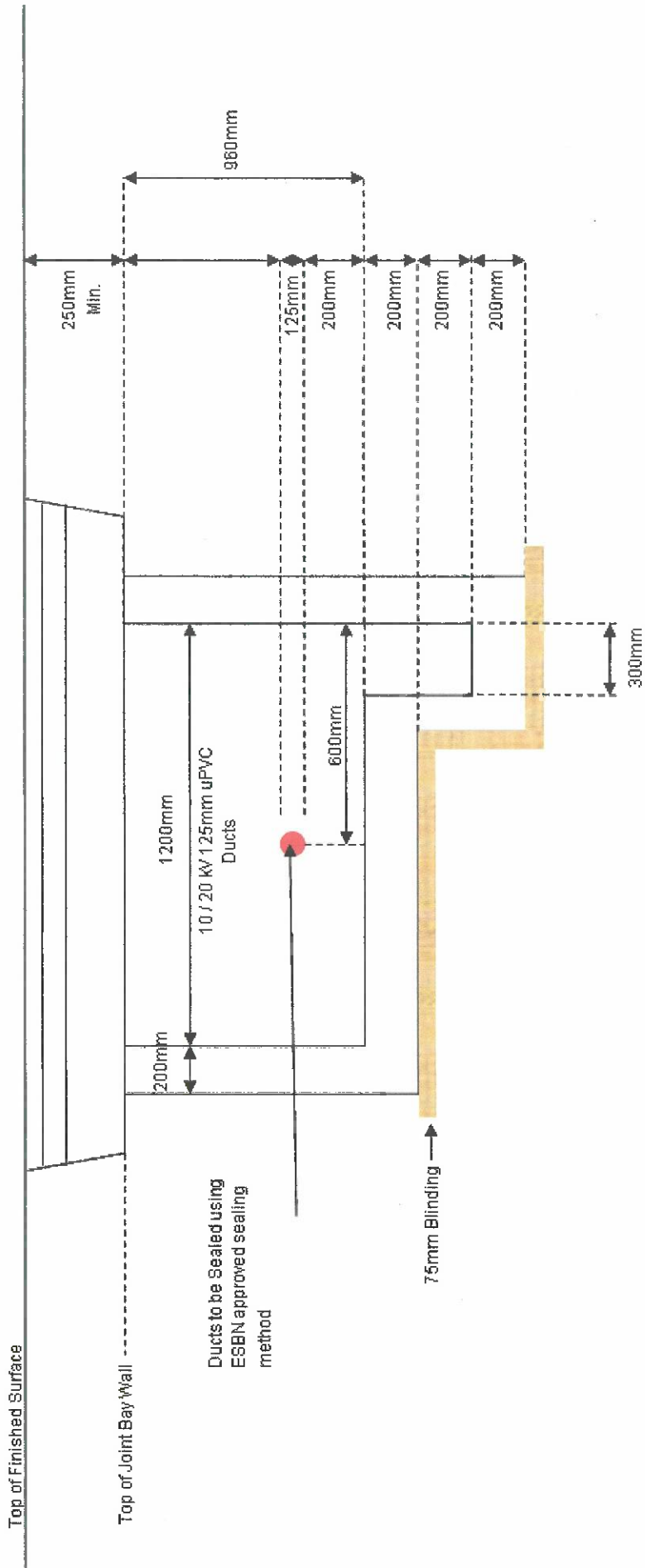
Drawing Not To Scale

Please note that this temporary surface 'Area' either side of the Joint Bays, strengthened to carry cable laying machinery, shown in plan elevation below, may need to be removed /replanted reinstated after cable installation, this must be assessed on a case by case basis



1.11 10 / 20 kV Single Circuit Joint Bay

End View Drawing Not To Scale

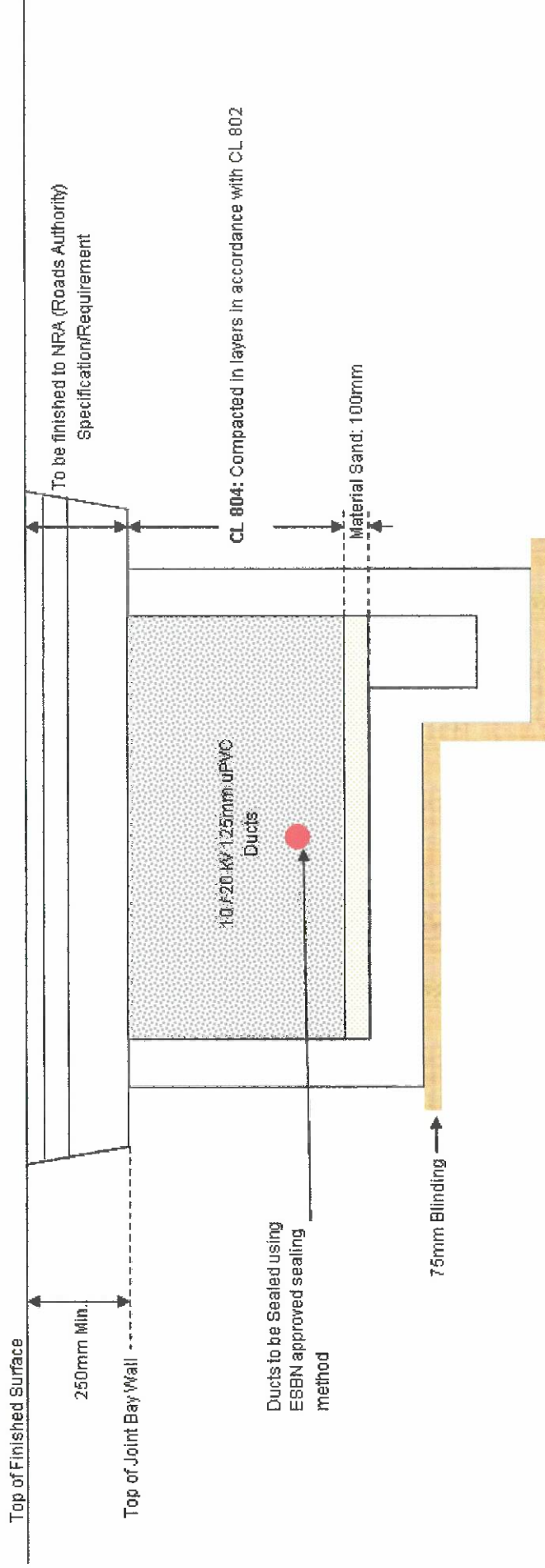


1.12 : 10 / 20 kV Single Circuit Joint Bay

Backfilling of Joint Bay with **no** 10 / 20 kV Power Cables in place

ESB Networks require a copy of the agreement between the IPP and the Roads Authority stating how the road is to be completed.

Drawing Not To Scale

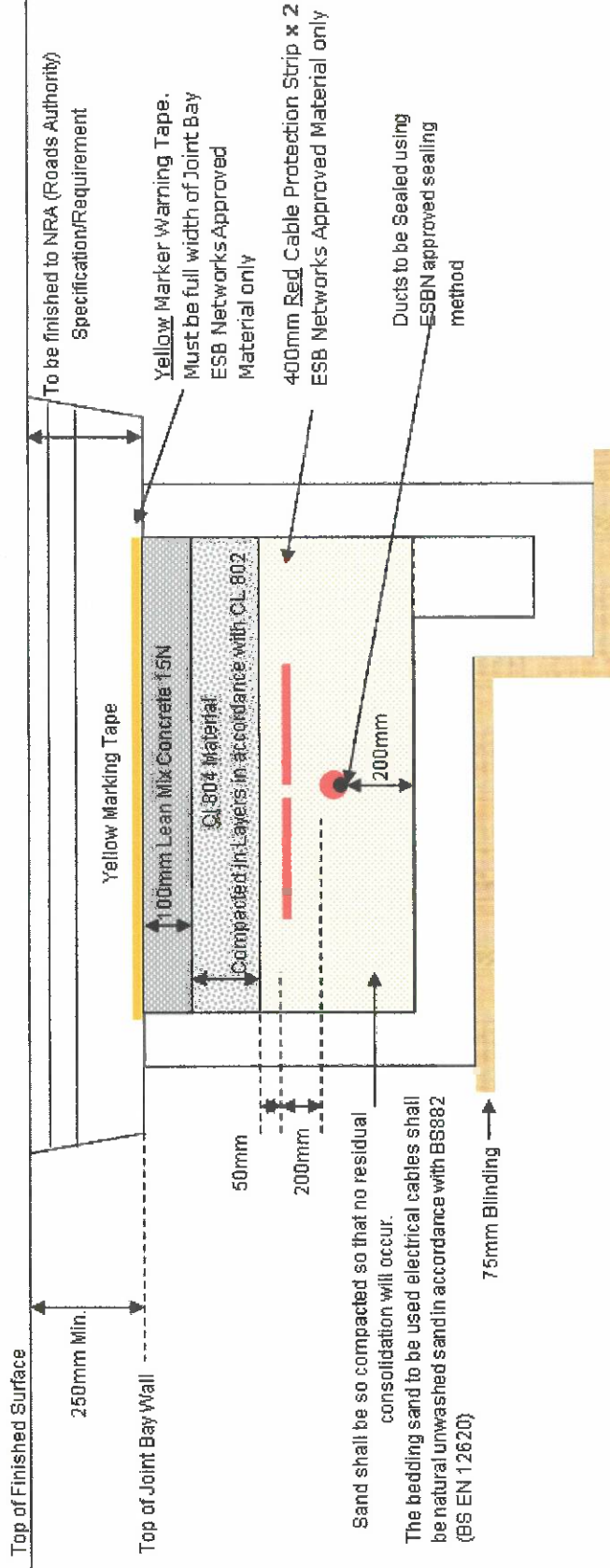


1.13: 38kV Single Circuit Joint Bay

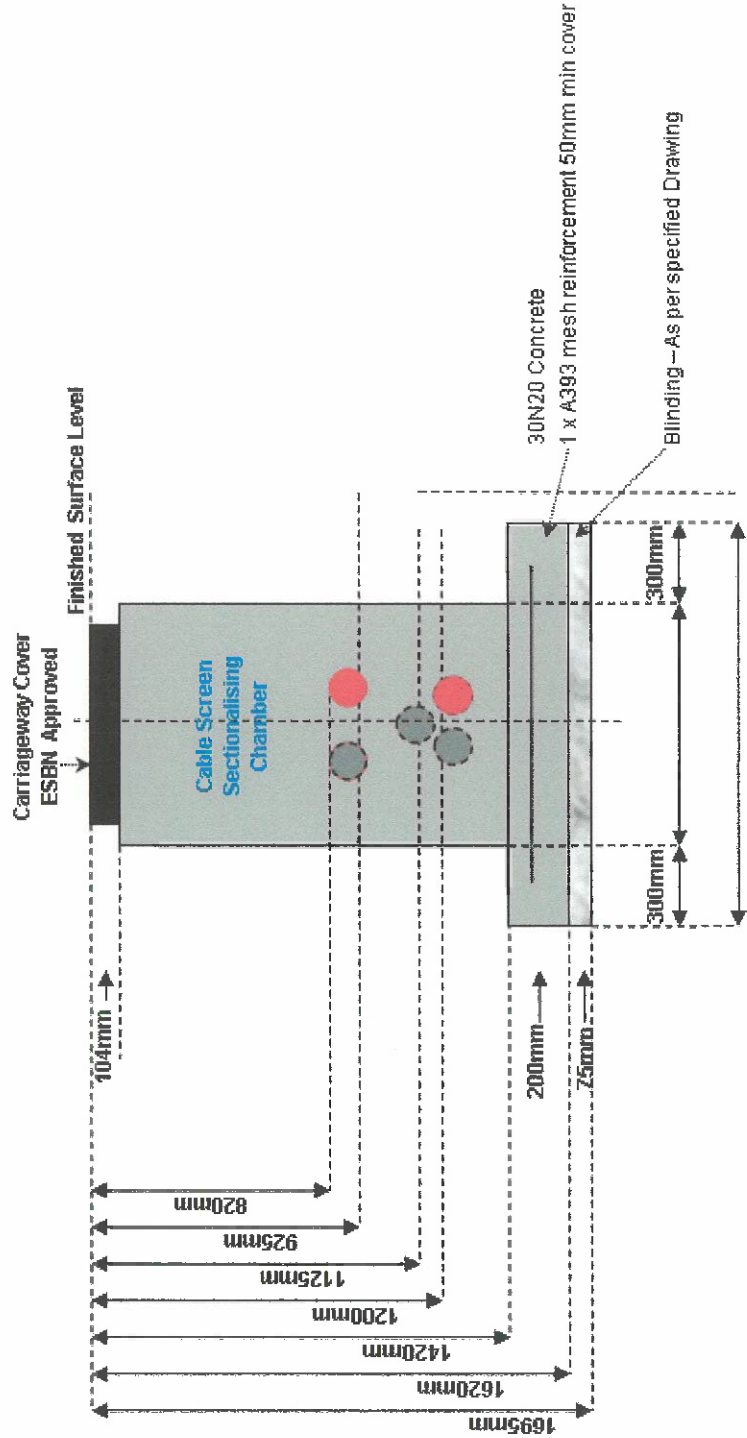
Backfilling of Joint Bay with 10 / 20 kV Power cables in place

ESB Networks require a copy of the agreement between the IPP and the Roads Authority stating how the road is to be completed.

Joint Bay End view Drawing Not To Scale



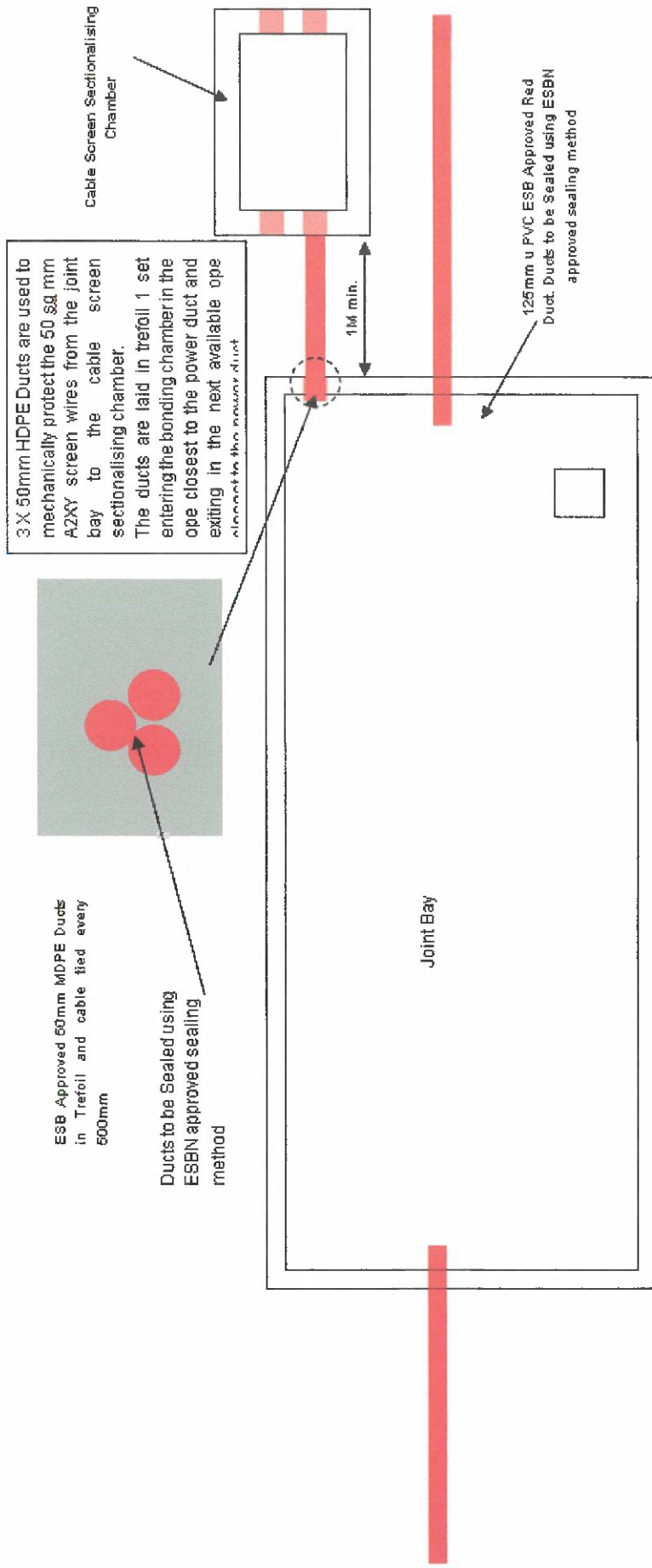
1.14: Joint Bay Layout 10/20kV Ducting – Cable Screen Sectionalising Chamber



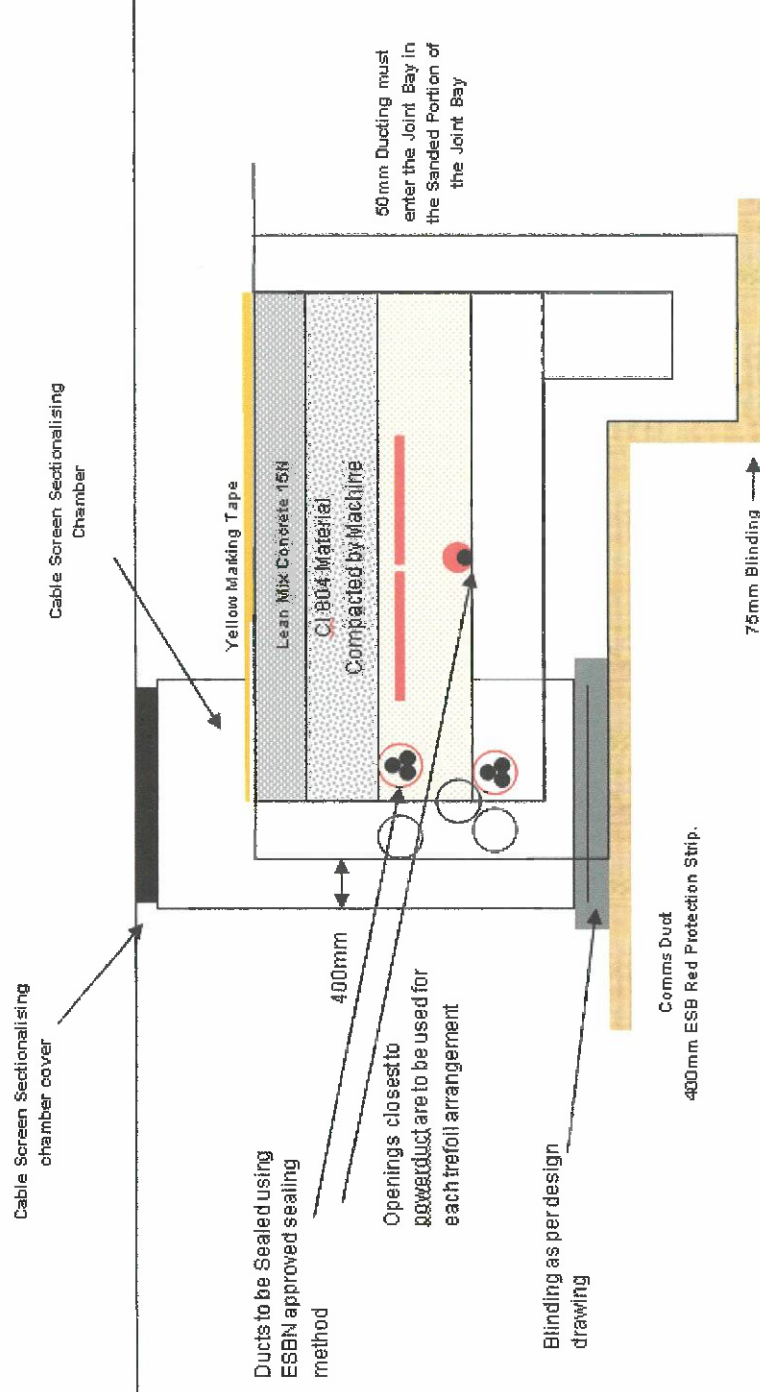
1.15: Cable Screen Sectionalising Chamber Layout 10/20kV Ducting – One Power Duct

Drawing Not To Scale

Plan View Joint Bay



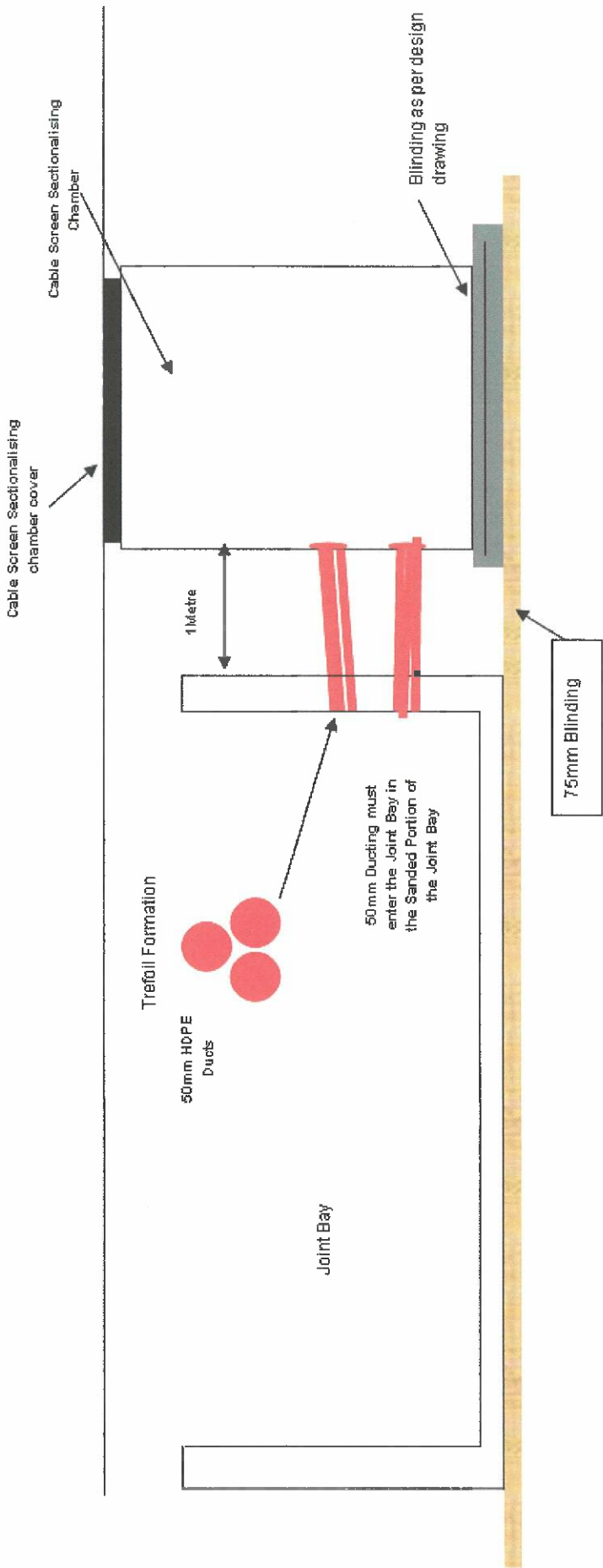
1.16: Joint Bay and Cable Screen Sectionalising Chamber



1.17: Joint Bay and Cable Screen Sectionalising Chamber

Drawing Not To Scale

Side View

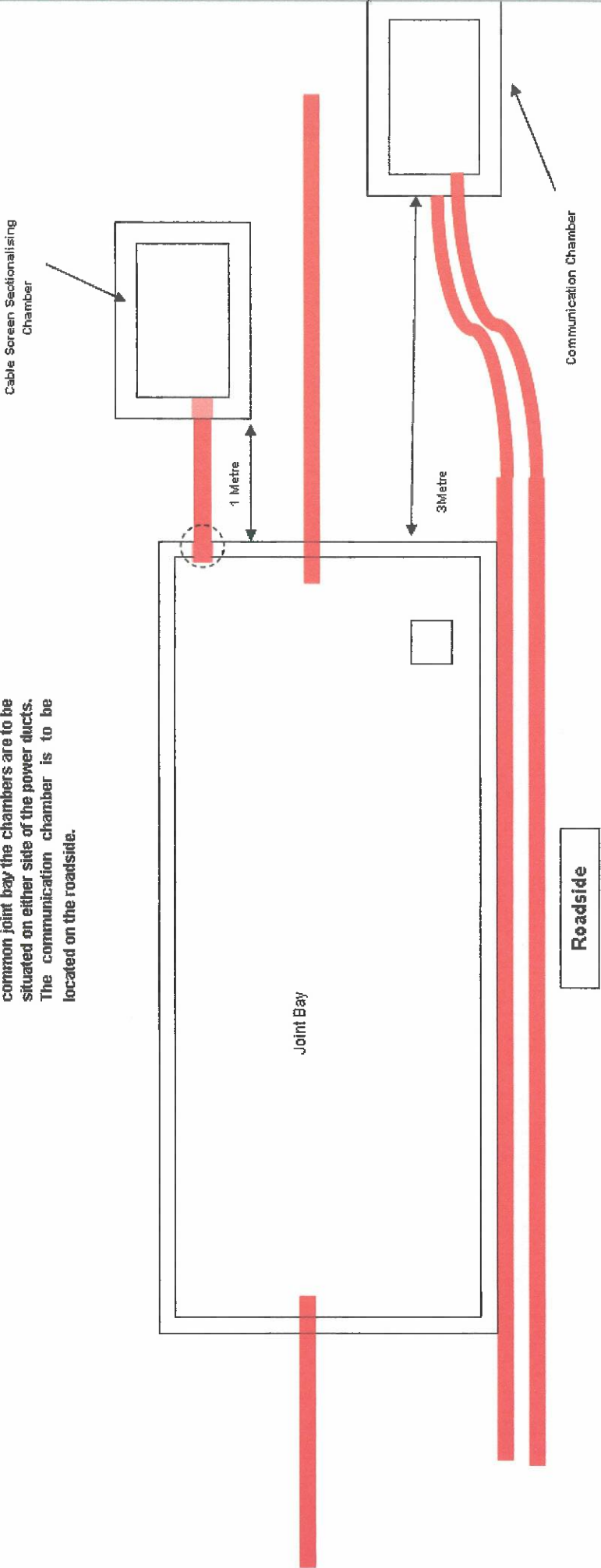


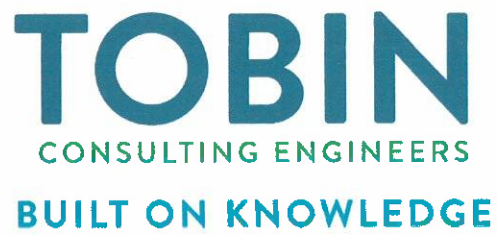
1.18: Joint Bay: Cable Screen Sectionalising Chamber and Communication Chamber

Drawing Not To Scale

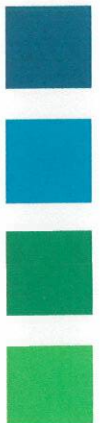
Plan View

When a communications cable chamber and a Cable screen sectionalising chamber are to be constructed at a common joint bay the chambers are to be situated on either side of the power ducts. The communication chamber is to be located on the roadside.





Bagenalstown (Kilcarrig) Solar Farm, County Carlow
Planning and Environmental Considerations Report



Bagenalstown (Kilcarrig) Solar Farm, County Carlow

Planning and Environmental Considerations Report

Document Control Sheet	
Document Reference	11043 PECR
Report Status	Report
Report Date	March 2022
Current Revision	A
Client:	Elgin Energy Services Limited
Client Address:	4 th Floor Hambleden House 19-26 Pembroke Street Lower Dublin 2 D02 WV96
Project Number	11043

Galway Office Fairgreen House, Fairgreen Road, Galway, H91 AXK8, Ireland. Tel: +353 (0)91 565 211	Dublin Office Block 10-4, Blanchardstown Corporate Park, Dublin 15, D15 X98N, Ireland. Tel: +353 (0)1 803 0406	Castlebar Office Market Square, Castlebar, Mayo, F23 Y427, Ireland. Tel: +353 (0)94 902 1401
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Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
B	PECR	OT	23/03/22	JD	23/03/22	ST	23/03/22
A	PECR	AM	13/01/16	KMN	15/01/16	AM	15/01/16

TOBIN Consulting Engineers

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OF IRELAND



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1 INTRODUCTION

This Planning and Environmental Considerations Report has been prepared to accompany a planning application from Elgin Energy Services Ltd (herein referred to as Elgin Energy) to Carlow County Council to obtain permission for a Solar Photovoltaic (PV) Farm development in the townlands of Kilcarrig in County Carlow.

Due to delays with the granting of solar connections to the national grid, Elgin energy are reapplying for Kilcarrig Solar Farm. The overall Landowner Property Folio is approximately 32.9ha (81.3 acres) with the area of the proposed solar site (i.e., area within planning boundary) totalling approximately 14.16ha (35 acres). The project includes: linear arrays of solar PV panels mounted on steel supported structures with associated cabling and ducting; 4 No. central inverter substations (at 2 No. locations); a terminal station; an electrical switchroom; 1 No. steel storage containers; perimeter deer fencing; paladin type security gate; permeable gravel access track; onsite pole mounted CCTV cameras (at 7 No. locations); temporary construction compound/material storage area; and temporary construction stage Moby Dick type wheelwash system (with overhead settlement tank). The proposed solar farm will provide up to 10 MW of power to the national grid.

Elgin Energy is applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operational period of 40 years).

The request for a 10-year planning permission is based on the pending grid connection from ESB Networks. Connection to the grid will be subject to significant timeframes currently unspecified by ESB Networks for the provision of a viable grid connection.

Elgin Energy is seeking an operational lifetime of 40 years therefore ensuring that the Kilcarrig Solar Farm can provide low cost green energy to homes, businesses and farms in the region. The new government Renewable Energy Support Scheme (RESS) seeks to provide price certainty for projects through a competitive auction scheme which forms part of the Ireland Project 2040 plan and Climate Action Plan. Elgin Energy are seeking to make the solar farm as competitive as possible for the auction and in turn lower the cost for the consumers of electricity in Ireland. By providing a 40-year operational life for the site, Elgin Energy can submit a more competitive support price by allowing for a greater capacity to repay the finance required to construct the site. A site with a 35-year operational life will require greater financial support from the government than one with a 40-year operational life.

In recent years, there have been very significant improvements in the efficiency and durability of Solar PV panels. It can be expected that Solar PV panels installed now can remain useful for 40 or more years. The term 'useful' is typically defined as being where 99% of modules will produce at least 70% of their power from when they were first installed. Therefore, to seek to remove the panels while they are still producing clean electricity in an effective manner is not considered sustainable and in keeping with government targets with respect to CO2 reduction and increased utilisation of renewables. Furthermore, the cost of potentially needing to reapply to extend the operational life beyond any shorter period which may be permitted, is disproportionate to the length of time for which the technology might remain viable beyond that permitted period and therefore adds to the overall cost of development and subsequently the competitiveness of the development.

In similar jurisdictions and environments as Ireland where solar farms are now common, it is now typical to be given a 40-year operational life term as part of the planning consent process.

The solar panels (modules) will be fixed in position so there will be no moving parts. The panels use galvanised steel framing pile driven into the ground. The solar PV panels are to be arranged in south facing rows ranging from 2 meters (m) to 6 m apart within the existing field boundaries. The project will include a 2.45 m high deer fence around the perimeter of the site. It is proposed not to disturb the existing field boundaries, allowing a 5 m buffer between the field boundaries/hedgerows and fencing.

With increasing efficiencies and development of technology, solar PV will become the most prevalent source of renewable technology over the coming years. In 2015 the UK installed 3,500 Megawatt (MW) of solar PV projects and now have greater than 12,000 MW installed. Ireland can take advantage of the development of this technology which will greatly assist in meeting the country's renewable energy targets. The White Paper on Energy released by the Department of Communications, Energy & Natural Resources (DCENR) recognises the benefits of solar such as its quick and versatile deployability. The proposed project will help deliver on Carlow's ambitions to be a low carbon county by 2021 as outlined in the Carlow County Development Plan 2015 - 2021.

At the UN climate talks in Paris (COP21) in December 2015, solar energy was one of the central focal points of conversation in delivering renewable targets as it is recognised as the most versatile of technologies available. The president of the World Bank Mr Jim Yong Kim stated in 2016 at the European Climate Ministerial "Photovoltaics (PV) is a key technology option for implementing the shift to a decarbonised energy supply and can be deployed in a modular way almost everywhere on this planet. Solar resources in Europe and across the world are abundant".

In 2017 Ireland imported approximately 66% of its energy needs from abroad¹. The proposed project will help minimise the dependence on imported fossil fuels and will power approximately 2,500 homes locally. This project will help contribute to develop a low carbon economy and reduce our national dependence on fossil fuels to produce our electricity and eliminate 160,000 tonnes of carbon dioxide emissions over its lifespan.

Project Ireland 2040 is the Government's high-level strategic plan to shape Ireland's development out until the year 2040. It acknowledges that new energy systems and transmission grids will be necessary for a more distributed, more renewables focused energy generating system, from energy sources such as solar. It states that key future planning and development and place-making policy priorities for Ireland's regions include harnessing the potential in renewable energy terms across the technological spectrum, including solar energy.

As part of Project 2040 The National Development Plan acknowledges that Ireland's energy system requires a radical overhaul to achieve its energy and climate objectives by 2050. This means how energy in Ireland is generated and used needs to fundamentally change. Investment in renewable energy sources, ongoing capacity renewal, and future technology affords Ireland the opportunity to comprehensively decarbonise our energy generation. Renewable energy, including solar technology will play a key role in helping to diversify away from a reliance on fossil fuels.

Solar energy, if correctly deployed, can be located on the outskirts of towns across Ireland and provide each town a source of low carbon sustainable electricity. Solar PV farms have a low impact on the landscape and are less than 2.9 m high and can be screened with existing hedgerows. The proposed development will assist in creating a local area for ecological

¹ Sustainable Energy Authority of Ireland 'Energy in Ireland 2018 Report'

biodiversity to prosper and help diversify the landowner's income allowing them to continue to farm in the area for future generations.

TOBIN Consulting Engineers have been appointed by Elgin Energy as lead consultants for this project to determine the optimum location and design of the proposed development and to prepare a Planning Application and accompanying 'Planning and Environmental Considerations Report'.

1.1 SITE LOCATION AND BACKGROUND

The overall landholding is approximately 32.9ha (81.3 acres) with the area of proposed solar site (i.e., area within planning boundary) totalling approximately 14.16ha (35 acres). The site is owned by a private landowner who has an agreement with Elgin Energy to construct a solar farm on their land. For further reference, a letter of consent from the landowner is included in the planning application documents. The proposed site access road is also on privately owned land. A letter of consent from the landowner for Elgin Energy to construct an access road to the solar farm is included in the planning application documents.

The solar farm development is in the north of County Carlow in the townlands of Kilcarrig, Bagenalstown. The project development includes a proposal to construct a solar farm consisting of solar photovoltaic (PV) panels laid out in arrays across an area of two fields (one small field and one larger field divided by fencing), of approximately 14.16 hectares (ha) in total, located in the western outskirts of Bagenalstown, along the Local L70031 Kilcarrig Road. The site is located south of the Local L70031 Kilcarrig Road, which is a mainly agricultural setting, with Kilcarrig Quarries Ltd. active quarry located to the north of the Local L70031 Kilcarrig Road, opposite the existing entrance to the western area of the site.

A temporary "Construction" entrance is proposed along the L70031 (to access the solar farm location using Geoterra construction mats (or similar) across the landowner's field immediately south of the L70031). The proposed construction site entrance is located approximately 900m along the Local L70031 Kilcarrig Road, from its junction with the regional road network (R724). The existing farm entrance to the east of the application boundary will be utilised for management visits during the "Operational" phase of the development (a maximum of one visit per month). The existing entrance used to access the site to the west of the proposed solar farm (directly across from Kilcarrig Quarry) will only be used for the cable connection route. The Local L70031 Kilcarrig Road runs in a generally easterly direction through the townland of Kilcarrig before again joining with the Regional R724 Road at Ballymoon Cemetery. The Regional R724 Road connects Bagenalstown (in a eastwards direction) with the villages of Feenagh, Myshall and Kildavin (approximately 23km to the east).

Figure 1-1 below shows the regional setting for the proposed development. Figure 1-2 shows the Landowner's Property Folio and the Planning Application Boundary for the proposed development site.

The site is located with the Landscape Character Area of the Central Lowlands and in the Landscape Type of Farmed Lowland². The general development pattern in the wider area predominantly consists of one-off housing along the R726 road, with some dispersed houses and associated farm buildings. A previous application for a solar farm was granted Carlow county Council at this site. No changes to the site layout are proposed. There are several permitted solar farms in the Carlow area.

² Carlow County Development Plan 2015-2021

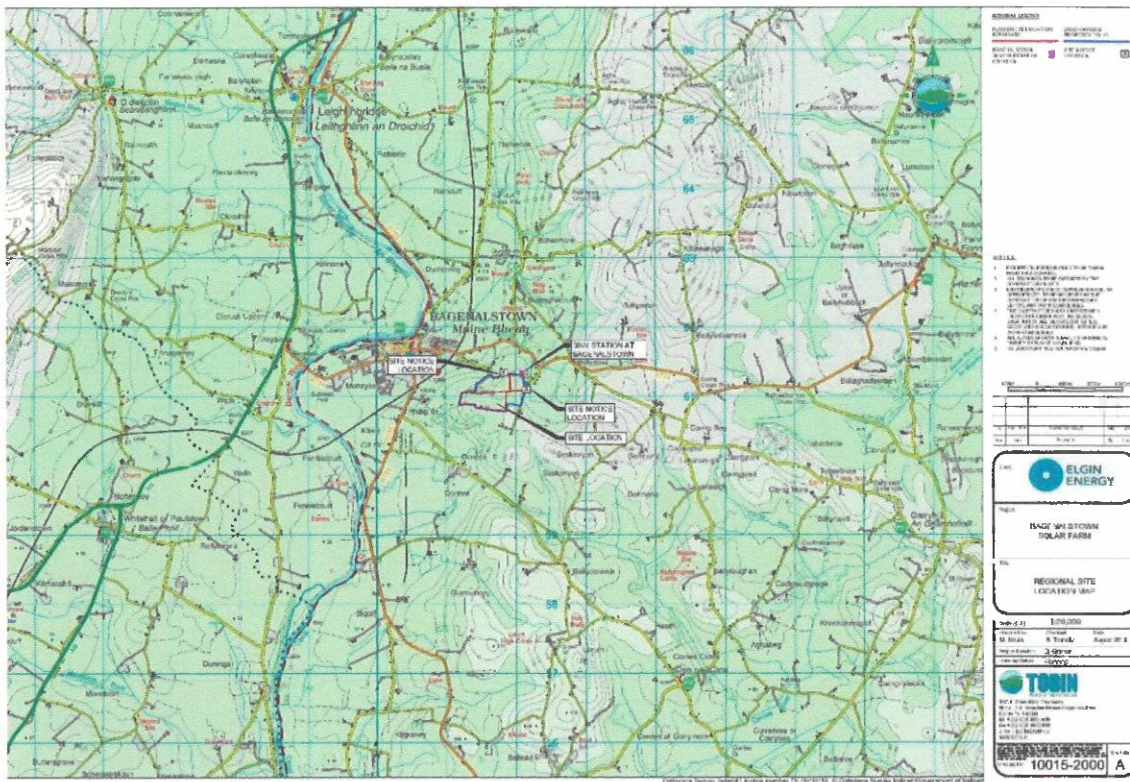


Figure 1-1: Regional Site Location Map (Large scale attached in Appendix A)

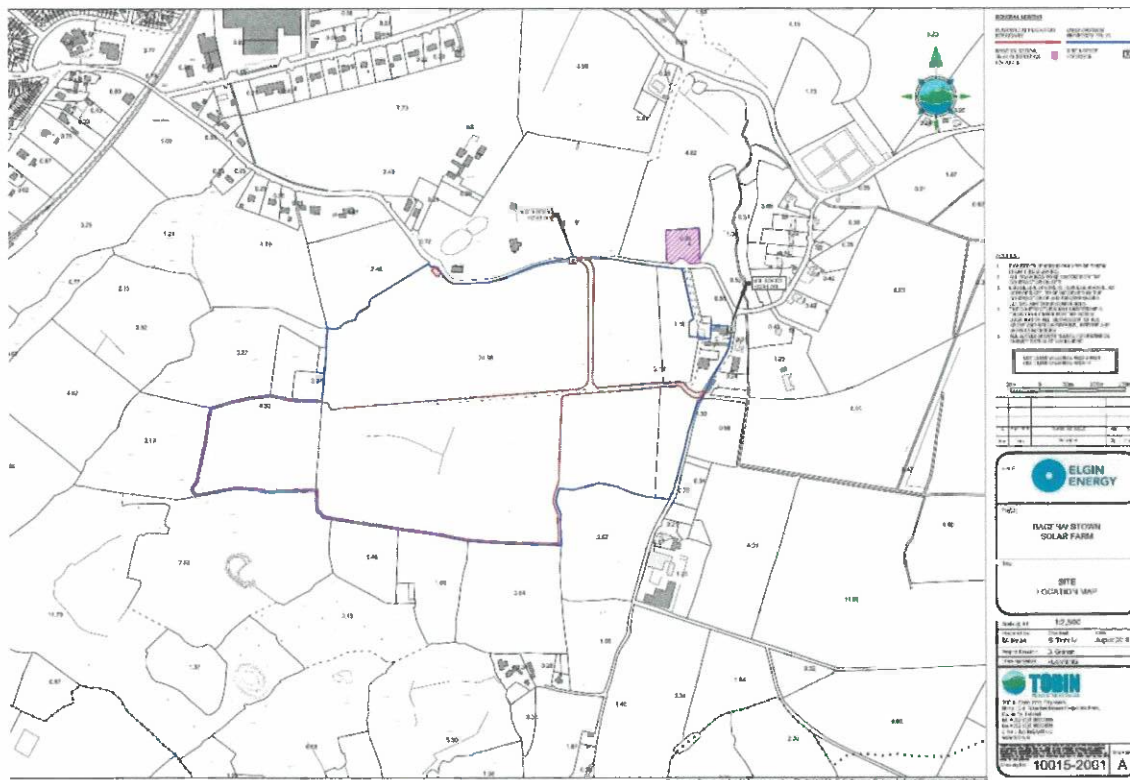


Figure 1-2: Site Location Map (Large scale attached in Appendix A)



Figure 1-3: Settlements & Archaeological Feature

1.2 THE APPLICANT

Elgin Energy is an Irish solar energy company based in Dublin. Elgin Energy have delivered successful solar farm projects across sites in Northern Ireland, England, Scotland and Wales and have provided clean, green energy for over 75,000 households (250 MW) over the past number of years.

As a result of the projects delivered in the UK and Northern Ireland, Elgin Energy has significant experience of the range of parameters that should be considered when proposing the development of a solar farm project. For example, the successful planning application for a 46 MW solar farm near the village of Rasharkin, in the borough of Ballymoney, County Antrim included assessments on the potential impact on features such as Landscape, Visual Amenity and Ecology and proposed appropriate mitigation measures, where required. Some examples of Elgin's Solar Farms that were granted planning in Ireland since 2015 are included in Table 1-1. In each case, the planning application was supported by a comprehensive Planning and Environmental Considerations Report.

Table 1-1: Examples of Elgin Energy Solar Farms Granted Planning Permission in Ireland since 2015

Solar Farm Name	Location/ County	Date of Grant of Planning Permission	Planning Reference No.
Rasharkin Solar Farm	Antrim	May 2015	D/2014/0181/F
Castlekelly Solar Farm	Kilkenny	May 2016	16/1
Mountmellick Solar Farm	Laois	30 th Jan 2017	16/536
Bagenalstown Solar Farm	Carlow	1st March 2017	16/289
Mountrath Solar Farm	Laois	6 th March 2017	16/217
Holycross Solar Farm	Thurles, Tipperary	30 th March 2017	16/600484
Talbot's Inch Solar Farm	Kilkenny	25 th April 2017	16/634
Ballyragget Solar Farm	Kilkenny	6 th March 2018	17/669
Glenamaddy Solar Farm	Galway	8 th March 2018	17/1195
Pickering Forest	Kildare	15 th November 2019	18250
Friarstown Solar Farm	Carlow	4 th June 2020	19/46
Ardnehue Solar Farm	Carlow	2 nd March 2022	21/38

Elgin Energy is now seeking to develop a solar farm project in Kilcarrig, County Carlow which will supply up to 10 MW of power to the national grid. The success of this application will result in the supply of a secure indigenous source of electricity to the national grid in Ireland. This electricity can be utilised at a local level in Kilcarrig, and in the nearby villages and towns.

1.3 SOLAR ENERGY TECHNOLOGY

1.3.1 What is solar energy and how does it work?

The amount of energy that the sun sends to the earth within one hour is enough to provide the world's population with electricity for one year. It's completely free and clean and does not produce harmful emissions. Elgin Energy's objective is to use this energy in meaningful ways to counteract global warming, air pollution and limited resources. It is now possible to harness this renewable energy resource in a cost-effective manner using solar PV technology.

Solar PV technology, which converts solar energy to electricity via the use of semi-conducting materials on a panel, has become much more affordable, with an 82% decrease in costs between 2010 and 2019³. The potential for continued cost reduction raises the prospect of solar PV becoming the cheapest form of renewable electricity in the coming years. In addition, these projects are extremely flexible in terms of design and scale and can be deployed very quickly, unlike many other energy technologies⁴.

It should be noted that solar PV technology is not the same as solar thermal technology. Solar thermal electric energy generation concentrates the light from the sun to create heat, and that heat is used to run a heat engine, which turns a generator to make electricity. The working fluid that is heated by the concentrated sunlight can be a liquid or a gas. In the case of the solar PV technology proposed for this project, the sun's light is directly converted into electricity using solar panels/modules. This means that solar panels are effective and operational during daylight hours, as well as in direct sunlight.

The Module

Solar installations take advantage of what is known as the photovoltaic (photoelectric) effect, referenced above. As stated, photovoltaic technology is the direct conversion of sunlight into electrical current.

Crystalline technology solar modules are manufactured from silicon wafers. With thin film technology, semi-conducting materials are applied to a glass plate. When sunlight hits the solar module, a voltage develops between the treated silicon or the semi-conduction materials and direct current is generated.

The System

A solar installation is made up of an array of modules or panels. Modules are connected to an inverter station. The inverter station turns the direct current (DC) into grid-compliant alternate current (AC) and feeds it into the existing electricity network. The modules (PV panels) used in solar farms come from a range of suppliers. Elgin Energy will choose a suitable supplier prior to ordering equipment before construction.

There are several approaches that can be used for solar technology projects including commercial rooftop panels, domestic rooftop solar installations (<6 kilowatts [kW]) and utility-scale ground mounted solar panels (linear arrays of solar panels/modules). Utility-scale solar

³ International Renewable Energy Agency (IRENA) "Renewable Power Generation Costs in 2019"

⁴ KPMG, "A Brighter Future, The Potential Benefits of Solar PV in Ireland", A KPMG report for the Irish Solar Energy Association

projects are defined as those projects that are >1 MW in capacity and are typically installed on greenfield or brownfield sites. Generated electricity is exported directly to the grid and is available for local electricity requirements.

For this project Elgin Energy proposes the development of a solar PV farm, which includes the use of utility-scale ground mounted solar PV panels.

1.3.2 What are the benefits of solar photovoltaic (PV) projects in Ireland?

Solar energy technology is an established form of renewable energy technology worldwide. This form of technology has many benefits. The Republic of Ireland currently has the second-lowest amount of installed PV capacity in the European Union, at just 36 MW by the end of 2019.

The Irish Solar Energy Association (ISEA) recognises the potential for solar in Ireland, not only as a means for meeting Ireland's renewable energy and electricity targets, but as a long-term sustainable and clean option with numerous benefits for Ireland economically, socially and environmentally.

The benefits of solar PV to Ireland's energy mix have also been recognised by the Department of Communications, Climate Action and Environment (DCCAE), who have adopted the technology as a component of the Renewable Electricity Support Scheme (RESS). The scheme will provide support to renewable energy projects in Ireland, whilst increasing energy security and sustainability.

In 2017 Ireland imported 66% of its energy needs from abroad. Local sources of electricity, such as solar farms, help to secure Ireland's energy supply while reducing CO2 emissions.

The Irish Solar Energy Association (ISEA) estimates that 5 GW of solar power could create over 7,000 jobs whilst meeting 7 per cent of the country's electricity demand⁵.

More importantly, the benefits of commercial-scale solar energy extend far beyond fiscal savings. Solar projects would provide not only economic benefits but also environmental and social benefits on a local, regional and national scale.

Solar PV technology has a predictable energy curve and is most efficient at the time of day when utility rates are at their highest. This technology produces local and on-site energy which reduces the need for extensive high-voltage transmission lines or a complex infrastructure. The proposed Kilcarrig Solar Farm will connect in to the off-site 38 kV Bagenalstown substation.

The ground mounted solar panels proposed are clean, quiet and visually unobtrusive (details of the structures proposed for this project are described in more detail in Chapter 2 of this report). Solar energy farms do not have any polluting emissions and can be placed in virtually every geographical region because the sun and daylight are available everywhere. Solar PV projects offset the need for polluting, expensive and inefficient power plants.

Typically, the timescale for construction of a solar farm is quite short, from approximately three to four months, with only management and intermittent maintenance of the site required during the operational phase of the project. Agricultural activities on the land can continue during the lifetime of the project e.g., sheep grazing.

⁵ <https://www.energyireland.ie/solar-energy-in-ireland/> (published 25th November 2019)

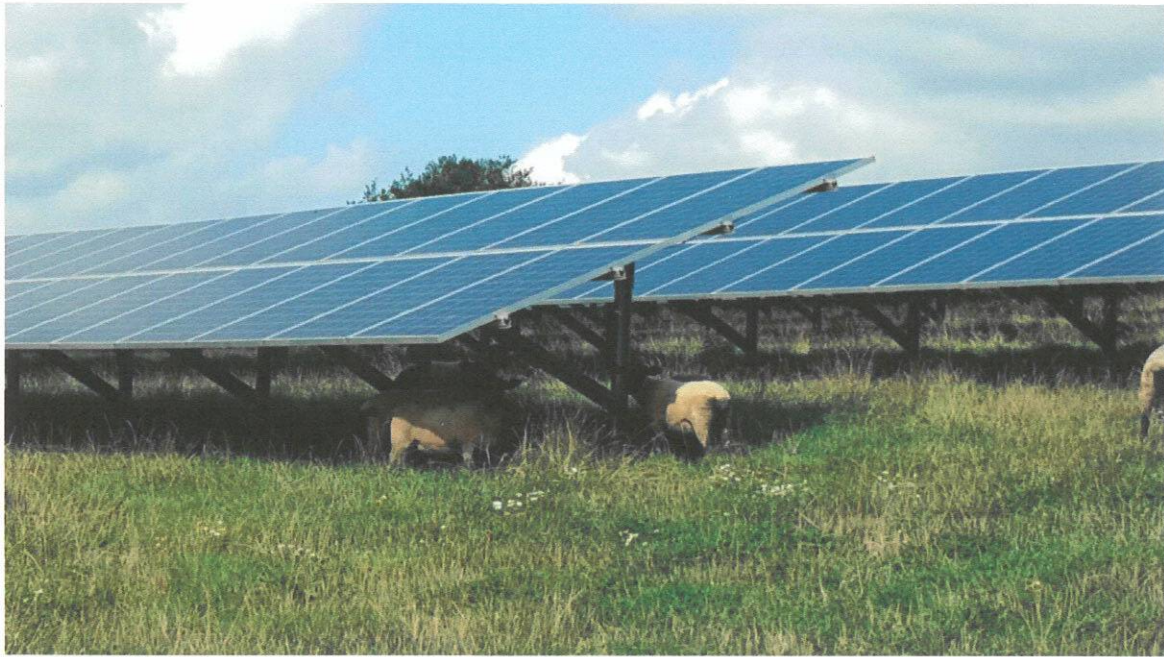
Socially, solar farms create clean, renewable energy that will sustain and support the health of future generations. Solar energy does not require the use of external fuel for operational purposes and, therefore, supports national energy independence. As stated above, solar farms provide the potential for a significant number of jobs at a local level for the new energy economy. Jobs will be created during the construction phase in particular.

The proposed Kilcarrig site is currently used for agricultural purposes. Solar Farms can encourage multi-purpose land use through continued agricultural activity (e.g., grazing small livestock such as sheep and free-range poultry) pro-Agri-environmental measures (e.g. sowing of wildflowers seeds and bee keeping) that supports biodiversity, yielding both economic and ecological benefits.

The National Development Plan (NDP) 2018-2027 sets out significant levels of investment, which will underpin the National Planning Framework (NPF) – Project Ireland 2040 and drive its implementation. The NPF recognises the importance of rural areas such as the proposed Kilcarrig site. The NPF states rural areas have significantly contributed to the energy needs of the country and will continue to do so, having a strong role to play in securing a sustainable renewable energy supply. The NPF further states “*In meeting the challenge of transitioning to a low carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment and respecting the needs of people who live in rural areas*”.

Solar projects also act as a complement to wind energy projects, particularly because of rapidly changing weather patterns. The output of solar plants is seasonal and can be predicted very accurately on a monthly basis. Also, by its nature, the output is predictable on an intraday basis, with peak output occurring during the middle of the day, when demand is relatively high. Wind output, on the other hand, increases at the end of the day, as solar output declines and electricity demand peaks. Given the complementarities, a balanced mix of solar and wind technologies will facilitate a reduction in the amount of base load generation required from fossil fuel sources.

Sheep grazing is very common at established solar energy farm locations, which have been developed by Elgin Energy in the UK. The images below were taken at an Elgin Energy solar farm near Plymouth, southwest England by a member of the team from Tobin Consulting Engineers who visited the site in September 2015 (and also visited several other similar solar farms in the area, which are all operating as simultaneous solar farms and agricultural farms for sheep grazing). It should be noted that these farms operate in a similar climate to Ireland, with similar solar insulation rates (the measure of the amount of solar radiation hitting the earth).



Insert 1-1: Photographs of an operational Solar Farm in Trewidland, Cornwall, UK. (Photographs taken by Tobin Consulting Engineers during a site visit in September 2015)

Solar projects also act as a complement to wind energy projects, particularly as a result of rapidly changing weather patterns. The output of solar plants is seasonal and can be predicted very accurately on a monthly basis. Also, by its nature, the output is predictable on an intraday basis, with peak output occurring during the middle of the day, when demand is relatively high. Wind output, on the other hand, increases at the end of the day, as solar output declines and electricity demand peaks. Given the complementarities, a balanced mix of solar and wind technologies will facilitate a reduction in the amount of base load generation required from fossil fuel sources.

1.4 CONSULTATION

TOBIN undertook a process of consultation with Carlow County Council; Planning Department and Roads Department, Iarnród Éireann and the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (Development Applications Unit). The primary objective of involving statutory bodies in the preparation of the Planning and Environmental Considerations Report is to aid scoping and to allow all parties to highlight issues of concern prior to completion of the application.

A copy of correspondence sent to the statutory bodies and stakeholders is included in Appendix B 'Statutory Consultee Correspondence'. All queries and recommendations raised in the course of this planning and environmental assessment are addressed in this report. Table 1-2 below lists the various parties consulted to date.

Table 1-2: Scoping Record for Bagenalstown Solar Farm Planning and Environmental Assessment

Consultee	Date of Correspondence	Date of Response
Carlow County Council - Planning Department	17/11/ 2015 (meeting) and 01/07/2016 (by email)	-
Carlow County Council - Roads Department	23/05/2016 and 29/06/2016 - Email	23/05/2016 - Email
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs	20/07/16	Acknowledgement received on 21/07/16. Ref. Number G Pre00244/2016
Iarnród Éireann	02/08/16	-
Irish Water	29/07/16	11/08/16

Consultation has also taken place with local residents whereby correspondence was issued to residents including a project description, site location map and Elgin Energy contact details for any queries. Consultation was undertaken with Carlow County Council in relation to the potential to extend the granted permission on the site. It is not possible to extend the existing permission so it is therefore required to resubmit the application. No significant changes were proposed in relation to the site layout.

2 DESCRIPTION OF THE EXISTING ENVIRONMENT AND PROPOSED DEVELOPMENT

2.1 DESCRIPTION OF THE EXISTING ENVIRONMENT

The site is located in the west of County Carlow (close to the border with County Kilkenny), in the townland of Kilcarrig, on the western outskirts of Bagenalstown. A temporary "Construction" entrance is proposed along the L70031 (to access the solar farm location using Geoterra construction mats (or similar) across the landowner's field immediately south of the L70031). The proposed construction site entrance is located approximately 900m along the Local L70031 Kilcarrig Road, from its junction with the regional road network (R724). The existing farm entrance to the east is proposed as the "operational" entrance for the solar farm. The Local L70031 Kilcarrig Road runs in a generally easterly direction through the townland of Kilcarrig before again joining with the Regional R724 Road at Ballymoon Cemetery. The Regional R724 Road connects Bagenalstown (in an eastwards direction) with the villages of Feenagh, Myshall and Kildavin (approximately 23km to the east).

The overall Landowner Property Folio is approximately 32.9ha (81.3 acres) with the area of the proposed solar site (i.e., area within planning boundary) totalling approximately 14.16ha (35 acres).

Figure 1-2 shows the Landownership Boundary and the Planning Application Boundary for the proposed development site.

There are approximately 10 no. residential dwellings (one-off houses) and 1 No. farmyard along the 600m stretch of the Local L70031 Kilcarrig Road between its junction with the Regional R724 Road (close to Bagenalstown) and the site entrance. There are approximately 18 No. residential dwellings (one-off houses) and 1 No. farmyard and commercial premises along the Local L70031 Kilcarrig Road between the site entrance and the location at which it rejoins the Regional R724 Road (at Ballymoon Cemetery).

A reservoir adjoins the northern boundary of the western section of the site.

The Kildare to Waterford Irish Rail Line includes a station at Bagenalstown. The rail lines run in a northeast to southwest direction, along the eastern outskirts of Bagenalstown. At its closest, it is 450m to the east of the proposed development site and well screened from the site and will not be impacted by the project. In addition, the railway line is at an approximate topographical level of 50-60mOD and the proposed solar farm will be located at a level between 86-98mOD. Therefore, the solar panels on the site will not be visible from the railway line.

The site is characterised by gently rolling farmland under agricultural use. The site consists of two fields which have been used for grassland in recent years. The site boundaries comprise predominantly of hedgerows and treelines. There are no surface water features or archaeological features recorded within the application boundary. However, a marsh area was noted in the centre of the main field. Although not a protected area, a buffer has been proposed around this marsh area in the interests of promoting biodiversity, as shown on the Site Layout Plan (Master Plan), Figure 2-1. One archaeological feature is recorded within the overall landowner's property folio (blue line boundary) and this feature is shown in Figure 1-3 and has been avoided in the design of the solar farm.

The closest designated conservation site is the River Barrow and River Nore Special Area of Conservation (SAC), located approximately 1km to the west of the site.

A number of existing ESB 38kV overhead power lines cross the Landowner's Property Folio, as shown on Figure 2-1. One of these lines crosses the land within the Planning Application Boundary (in a southwest to northeast direction).

There is an existing ESB Network Substation known as 'Bagenalstown 38kV Substation' directly across the Local L70031 Kilcarrig Road from the north easterly tip of the application boundary, as shown on Figure 1-1 and Figure 1-2. It is proposed to connect the solar farm to this ESB substation using a 10kV underground cable.

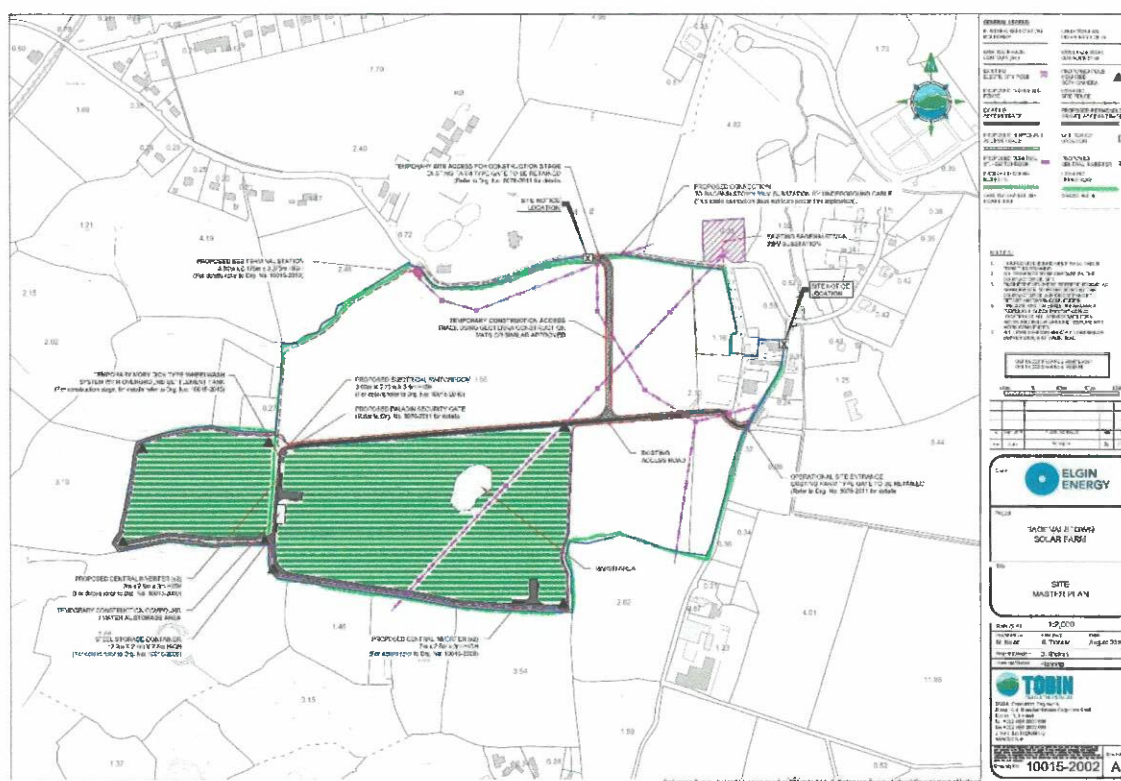
2.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposal for this project is to develop a solar PV energy development with an export capacity of 4.2MVA, which will supply enough energy for approximately 1,000 homes. Elgin Energy is applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operational period of 30 years).

Figure 2-1 – Site Master Plan details the proposed development. The project includes: linear arrays of solar PV panels mounted on steel supported structures with associated cabling and ducting (including underground cable connection to the existing ESB Networks 38kV Bagenalstown Substation); 4 No. central inverter substations (at 2 No. locations); a terminal station; an electrical switchroom; 1 No. steel storage containers; 2.45m high perimeter deer fencing; paladin type security gate; permeable gravel access track; onsite pole mounted CCTV cameras (at 7 No. locations); temporary construction compound/material storage area; and temporary construction stage Moby Dick type wheelwash system (with overhead settlement tank).

The proposed solar panels are typically set 0.8m above ground level at the lowest point increasing to a typical height above ground level of 2.9m. The panels will be mounted typically at 25 degrees to the horizontal.

All 4 no. central inverter stations and the terminal station will sit on a 250mm reinforced concrete slab, with the typical inverter stations measuring 7m (length) x 2.5m (width) x 3m (high), which will be lifted into place. The electrical switchroom will sit on an elevated 400mm reinforced concrete slab and will consist of a building measuring 3.65m x 2.75m x 3.1m and the terminal station will consist of a building measuring 4.80m x 5.25m x 3.9m. Both will be constructed onsite, at the locations shown on Figure 2-1.



2.2.4 Earthworks

There are no site levelling works proposed for the Bagenalstown Solar Farm site. As a result, only minimal earth works will be required for the overall development of the site. These will include the following:

- Access tracks to consist of CL804 material where required (i.e., in areas of soft ground);
- Underground cable trenches and cabling connecting the solar arrays to inverter stations and subsequently to the Bagenalstown 38kV ESB substation; and
- Finally, associated ground works with all inverter and terminal stations, which will sit on 250mm deep reinforced concrete slab on 200mm deep compacted CL804 material on adequate bearing ground. The slab will be recessed 100mm into the ground with 150mm projecting above ground level and surrounded by an infiltration trench with a stone soakaway. The electrical switchroom will sit on an elevated 400mm reinforced concrete slab.

2.3 CONSTRUCTION SEQUENCE

The following is the sequence of the activities that will be involved in constructing the solar PV development at Bagenalstown:

- A temporary construction compound/material storage area is used for storage of the modules, which are delivered to the site to suit the three to four month construction programme. Materials are generally transported around the site by means of teleporter/small dumpers/tractor and trailer;
- Erection of perimeter 2.45m paladin gate/deer fencing and 7 No. CCTV Poles – usually completed by a tractor or a small tracked machine. Fencing is erected approximately 5m away from existing boundary hedge/fence, while the CCTV poles are placed at field boundaries throughout the site;
- Cable Trench Excavation – Trenches are excavated; ducting installed and trench backfilled throughout the site to accommodate cables between the inverters and the terminal station and also the CCTV cabling. This work is usually carried out using a track machine/tractor with a plough on the back. Backfilling would be carried out by a track machine;
- Installation of Mounting System Foundations - The foundation system for the panel mounting system are usually the earth screw or driven type (depending on ground conditions). Both techniques involve a small track machine with a ram/screw attached. This machine tracks up and down in rows installing as it goes. The noise impacts are typical of the existing agricultural use of the lands. The short term nature of the works is also a mitigating factor;
- Installation of Mounting System – This involves the erection of the aluminium frame to hold the panels. This usually comes in kit format for ease of assembly on site. The solar PV panels are then secured to the mounting systems;
- Installation of the inverter stations – Involves excavation and levelling for a reinforced concrete base. The station is then just dropped in place on top; and
- Installation of the terminal station and switch room - Involves excavation and levelling for a reinforced concrete base. The station is then constructed on top.

2.4 SITE MAINTENANCE AND MANAGEMENT

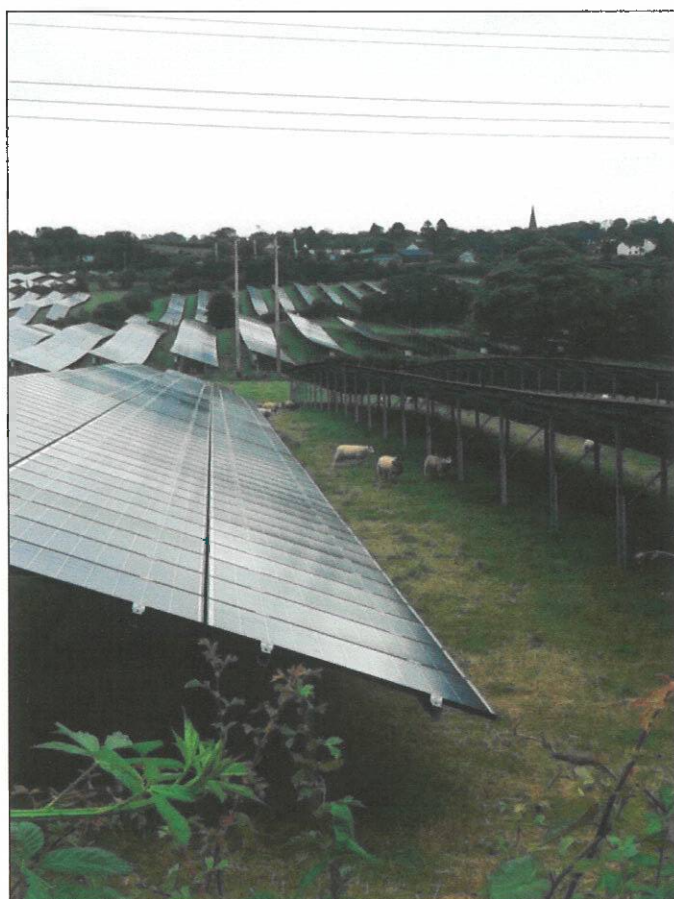
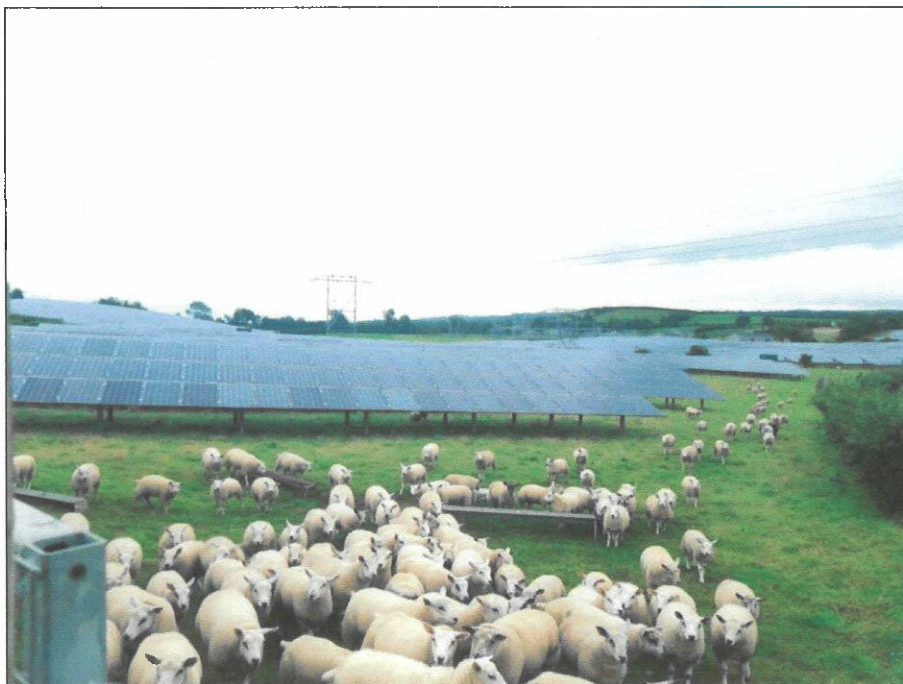
Typically, the timescale for construction of a solar farm is quite short, approximately three to four months, with only management and intermittent maintenance of the site required during the operational phase of the project, with agricultural use continuing during the lifetime of the project e.g., sheep grazing.

The ground under the panels shall be maintained as grassland which will serve to reduce the risk of erosion and limit surface water flows across the site. The operation and maintenance of the solar farm shall include monitoring and maintenance of the grassland beneath the panels. Where compaction of soil is observed, the ground will be cultivated and re-seeded.

Table 2-1: Existing Operational Elgin Energy Solar Farms

Solar Farm Name	Year Built	Location	MW
Trewiland	2013	England	5
Trequite Farm	2013	England	11
Clawdd Ddu	2013	England	12
Burthy Farm	2014	England	13
Lands at Sundorne	2014	England	18
Little Neath	2014	Wales	6
Llwyndu	2014	Wales	8
Errol	2015	Scotland	13
Jesus College	2015	Wales	7
Sutor Farm	2015	England	5
Carnemough Farm	2016	England	8
Wick Road	2016	England	7
Rose & Crown	2016	England	30
Bann Road	2017	Northern Ireland	46

Bann Road Solar Farm in Northern Ireland was built in 2017. Insert 2-1, taken in July 2020, shows the site with dual functionality; operating as a 46 MW solar farm and also providing sheep grazing.



Insert 2-1: Photographs of Bann Road Solar Farm Northern Ireland (July 2020)

In England solar farms at Trequite and Trewidland also have sheep grazing on site. The grassland at each solar farm has been managed and maintained. Insert 2-2 and Insert 2-3 show the ground conditions beneath the operational solar panels at both locations, in this regard.



Insert 2-2: Photograph of the Ground Beneath the Solar PV Panels at the Trequite Site



Insert 2-3: Photographs of the Ground Beneath the Solar PV Panels at the Trewidland Site

2.5 DECOMMISSIONING AND RESTORATION

The project lifetime of this solar farm will be 40 years as determined by the grant of planning. At the end of the project lifetime the system will be completely dismantled (including underground electrical interconnection and distribution cables) and the site restored to its preconstruction state. Elgin Energy is committed to improving the global environment and working with panel and mounting system manufacturers to establish policies and procedures to maximise recycling and minimise waste during the project's construction, subsequent operation and eventual decommissioning.

There are several aspects involved with the decommissioning phase and the main activities will comprise of the following:

- The PV facility will be disconnected from the ESB power grid;
- Individual PV modules shall be disconnected and shipped to recycling facilities for recycling and material re-use;
- Site overhead (if any) and underground electrical interconnection and distribution cables shall be removed and recycled off-site by an approved recycling facility;
- PV module support steel shall be removed and recycled off-site by an approved metals recycler. The support legs will be removed by vertical extraction and recycled off-site;
- Electrical and electronic devices including inverters, transformers, switchgear and metering equipment shall be removed and recycled off-site by an approved metals recycler;
- Prefabricated shelters shall be removed from their concrete bases and for recycling off-site;
- Concrete bases to sheltered housings shall be broken up and removed off site. The ground will then be re-levelled to original contours using imported soil where necessary;
- Hard areas such as the terminal station compound shall be broken up and removed off site. The ground will then be re-levelled to original contours using imported soil where necessary;
- Security systems, CCTV, associated supports and wiring shall be dismantled and removed off-site for recycling by an approved recycling facility;
- Fencing shall be dismantled and removed off site for recycling by an approved metals recycler; and
- The above activities will be carried out in accordance with timescales conditioned within the planning permission.

2.6 GRID CONNECTION

It is currently proposed to connect the project into the ESB Network via the existing 38kV Bagenalstown Substation. The proposed electrical switchroom on site will connect to the terminal station, which will be located near the entrance to the site. The proposed terminal station, located within the landowner's folio, will connect directly to the existing 38kV substation by means of approximately 485m of underground cable along the local road.

Elgin Energy has requested an underground cable connection from the site to the Bagenalstown 38kV substation. A Grid Connection application for 4.2MVA was lodged with ESB Networks (Reference Number DG1145). The application for grid connection will be processed by ESB Networks.

An environmental constraints review was completed by TOBIN specialists for the area between the application area of Bagenalstown Solar Farm and the existing 38kV substation. No significant environmental features or designations were identified in this area. Therefore, standard best practice construction methods are recommended for the placement of the proposed cable connection and the reinstatement of the area where the cable will be routed.

2.7 AGRONOMY / LAND USE

The proposed solar farm is located in an area of gently rolling terrain. The site and its immediate environs lie on something of a small plateau or terrace above the base of the Barrow river valley. The River Barrow itself is located just under 2km to the west of the site at its nearest point. The terrain rises to the north and east of the site to form the rolling hills and undulating ridgelines

that define the eastern side of the Barrow Valley. The western side is defined by the flat-topped Castlecomer Plateaux.



Insert 2-4: Enclosed plateaux landscape of the central study area

The landscape surrounding the site is predominantly fertile farmland, consisting of improved pasture within a network of geometric fields, defined by broadleaf hedgerows and treelines. Areas of scrub and grassland occur further to the south and southwest of the site.

The site is located south of the L70031 Kilcarrig Local Road. There are approximately 11 no. residential dwellings (one-off houses) and 1 No. farmyard along the 600m stretch of the Local L70031 Kilcarrig Road between its junction with the Regional R724 Road (close to Bagenalstown) and the site entrance. Approximately 18 No. residential dwellings (one-off houses) and 1 No. farmyard and commercial premises along the Local L70031 Kilcarrig Road between the site entrance and the location at which it rejoins the Regional R724 Road (at Ballymoon Cemetery). A large quarry (Kilcarrig Quarries Ltd.) and the 38kV substation are located to the north of the Local L70031 Kilcarrig Road.

The application area itself consists of two fields which have been used for pasture in recent years.

2.8 NOISE

2.8.1 Construction Noise

The installation of the solar panel arrays will only be a temporary source of intermittent noise during the construction phase of the development when the posts for the panels are erected on site. The characteristic of such noise is similar to normal agricultural works.

Based on a worst-case baseline noise level in the existing area i.e., an assumption that the baseline noise environment in the area of Kilcarrig Solar Farm is less than Category A⁶, which is the lowest ambient noise level of 65 dB during a weekday daytime (07:00 -19:00 and Saturdays 08:00 to 14:00), a construction noise threshold limit of 65 dB during weekday daytime applies. This threshold will also apply for the future grid connection works which will form a separate planning application. This is the most onerous noise level threshold limit for construction noise.

Based on the location of the nearest solar panels to the nearest noise sensitive location, approximately 220m, the worst case predicted noise impact is modelled below. The calculation

⁶ BS 5228:2009 and A1:2014 'Code of practice for noise and vibration control on construction and open sites'

of the noise source during the construction phase of the development is based on the standard specification of a Solar Pile Driver⁷. The specification of this track machine is included in Appendix H. With a standard 35.9kW Deutz diesel motor, the Solar Pile Driver is not a significant source of noise with a continuous noise level of 55dB L_{Aeq} at a distance of 10m.

Table 2-2: Review of nearest property location from nearest Solar Panel Arrays

Property ID	Distance from Solar Panel Arrays	Worst Case L _{Aeq} at 10m (dBA)	BS5228:2009+A1:2014 Category A Noise Threshold Limit for Weekday Daytime Works
Nearest Sensitive Receptor (Southern Boundary)	220m	55	65

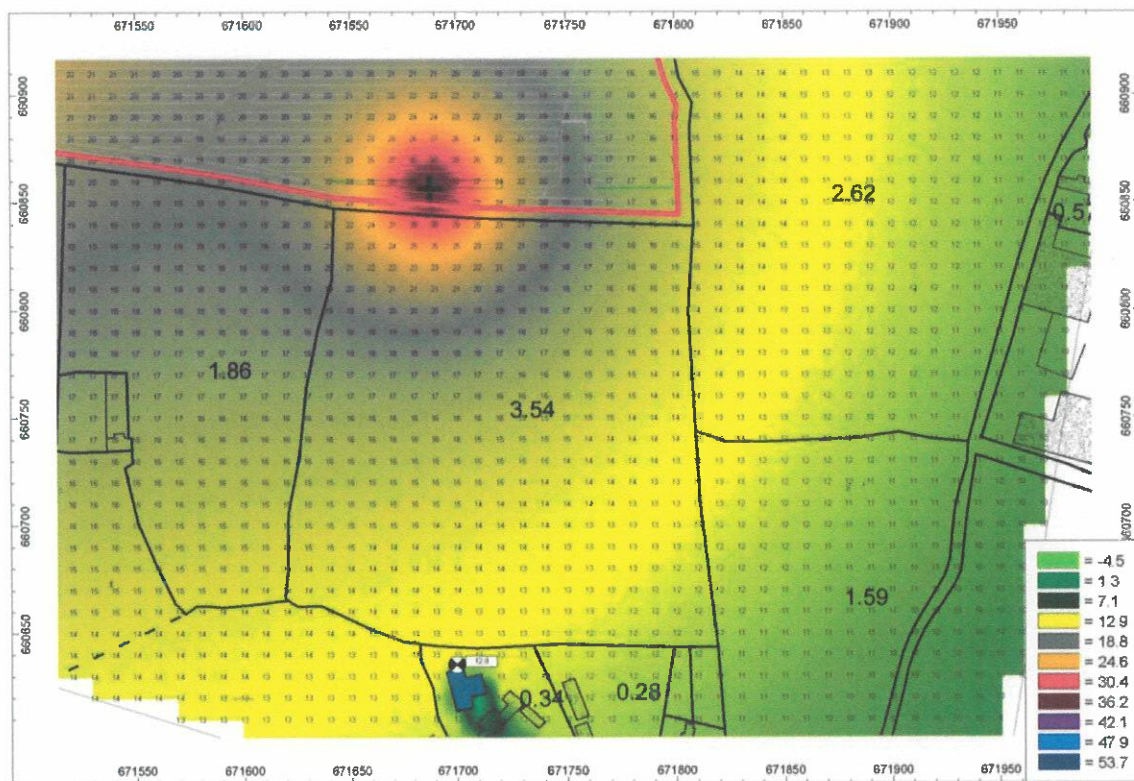


Figure 2-2: Construction Noise Assessment

The maximum predicted noise level from this activity in the vicinity of the nearest sensitive receptor is 12.8dBA to the south of the site. This noise level is within the British Standard limit

⁷ The standard Solar Pile Driver used will be similar to the Pauselli 700 Solar Pile Drive

of 65dB and will only be operating at the nearest and worst-case location once and, due to the nature of the installation of the posts, only for a very short time period (less than 15mins).

2.8.2 Operational Noise

There will be no noise from the panels during the operational phase of the development. There are no recorded noise issues with any existing solar panels which are fixed in place with no moving parts, nor with the mounting structures causing any audible noise. The panels and mountings are designed to withstand excessive wind speeds and other forces of nature.

There will be no noise from the panels during the operational phase of the development. There are no recorded noise issues with any existing solar panels which are fixed in place with no moving parts, nor with the mounting structures causing any audible noise. The panels and mountings are designed to withstand excessive wind speeds and other forces of nature.

The terminal station proposed for location adjacent to the site entrance along the Local L70031 Kilcarrig Road will comprise of a small, single storey building (as opposed to the established ESB 38kV Bagenalstown Substation located nearby which is significantly larger and to which the on-site terminal station will connect). A small electrical switchroom will be located to the south of the access road, within the Landowner's Property Folio.

The on-site terminal station will not contain a power transformer which is the primary source of noise from substations, such as those contained in the local existing Bagenalstown 38kV substation. Likewise, very little noise will be produced within the electrical switchroom, which will primarily house switchgear inside the small building. The terminal station proposed on-site for the Bagenalstown Solar Farm will not be a large structure and will measure approximately 4.90m x 8.175m x 3.375m in scale. The electrical switchroom will measure approximately 3.65m x 2.75m x 3.1m.

Although very little noise is expected from the on-site terminal station during the operational phase of the development, for modelling purposes, a very conservative worst-case scenario of a 75dBA noise output at 1m was assumed (the noise level is based on a standard PVS800 electrical inverter station, which would include transformers and will not be representative of the low levels of noise anticipated at the terminal station and switchroom).

Two sets of two inverter stations will also be located at an approximate 220m and 401m remove from the nearest sensitive receptor, as shown in Figure 2-1. Based on the standard specification of an inverter station referenced above, and included in Appendix H, it is predicted that the worst-case cumulative operational noise experienced in the vicinity of the nearest sensitive receptor will be 21dBA.

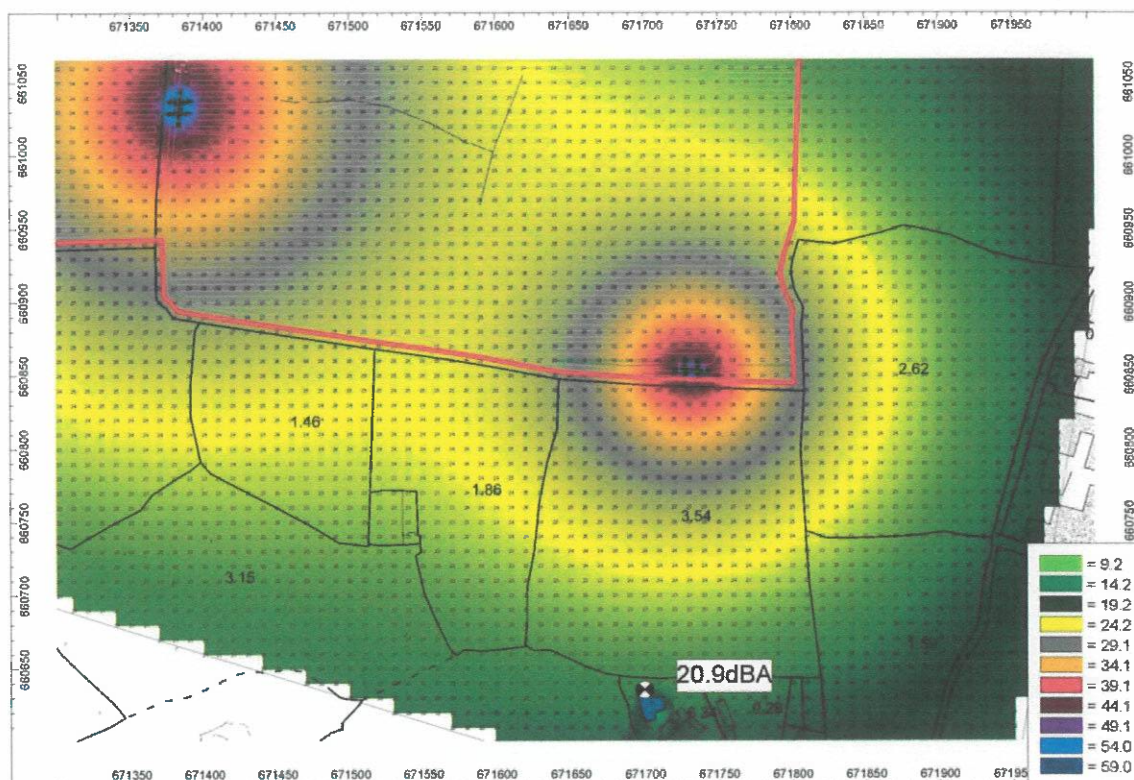


Figure 2-3: Operational Noise Assessment

Taking account of the transformers and fans that are expected to be located within the inverter stations, a tonal penalty of +5dB has been added to the highest predicted noise levels. This increases the predicted rated noise level at the nearest house to 26dBA. These levels are conservative and well within the recommended statutory day-time operational noise limit of 55dB (07:00- 19:00).

As shown in the illustration above, even at this unlikely maximum noise level, the predicted noise levels at the nearest sensitive receptor will not be significant (and, therefore, at all other potentially sensitive receptors in the local area also).

In summary, any potential noise produced from the operation of the on-site stations will be inaudible at the nearest sensitive receptors.

2.8.3 Noise Mitigation Measures

The site and all associated on-site inverter stations and equipment, during both the construction and operational phases of the development, will be operated in accordance with best practice. Any potential noise impact from the proposed Kilcarrig Solar Farm (and from future grid connection works which are outside of this project application) will be controlled in accordance with BS 5228:2009 and A1:2014 'Code of practice for noise and vibration control on construction and open sites', the National Roads Authority 'Guidelines for the Treatment of Noise and Vibration in National Road Schemes', World Health Organisation 'Community Noise Guidelines' and BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'.

Measures to control noise emissions from the works will include:

- Ensuring that HGV drivers turn off engines when parked for prolonged periods on the site, use minimal impact reversing alerts and avoid use of horns, where possible;

- Choosing equipment with reduced noise output and silencers/dampeners where possible;
- Using radio contact across the site to avoid workers shouting or whistling;
- Maintaining plant and equipment in good condition to ensure noise emissions are as per plant specifications; and
- Use of mains power supply instead of generators insofar as is possible.

Any noise complaints made during the works will be logged, investigated and followed up with measures to limit noise emissions, where appropriate.

2.8.4 Noise Conclusions

As discussed above, any potential noise impact during both the construction and operational phases of the development is expected to remain below recommended noise level thresholds at the nearest sensitive receptors and at the location of all sensitive receptors in the surrounding area.

Any potential noise impact will be controlled in accordance with BS 5228:2009 and A1:2014 'Code of practice for noise and vibration control on construction and open sites', the National Roads Authority 'Guidelines for the Treatment of Noise and Vibration in National Road Schemes', World Health Organisation 'Community Noise Guidelines' and BS 8233:2014 'Guidance on Sound Reduction and Noise Insulation for Buildings'.

As discussed, and modelled above, any potential noise impact during both the construction and operational phases of the development will remain below recommended noise level thresholds at the nearest sensitive receptors and at the location of all sensitive receptors in the surrounding area.

2.9 FIRE

The individual solar modules are primarily constructed of glass, metal and plastic and would not reasonably be considered as a potential source of fuel for a fire. All solar modules are to be located externally in rows between 2 m and 6 m apart, therefore the risk of spread of fire from one row to another adjacent row would be minimal.

The most significant fire risk on a solar farm site is around transformer/ inverter stations. The electrical energy in these areas is very high and it would be foolish to attempt to fight a fire. Usual practice is to let them burn out and then, if the fire service offers to assist, they can damp down the remains of the fire once all electrical supplies have been disconnected. The fire service would never be expected to fight a fire on a transformer/inverter station, since they are sited well away from the public. The only foreseeable risk to the public would be from grass fire spreading out past the site boundary. At this point the fire service could assist in damping down the fire. The entire site is designated as an electrical generating station and access should only be for suitably trained and authorised persons.

While the risk of fire occurring on a solar farm site cannot be completely eliminated, the levels of mitigation and controls that can be included provide a level of safety that reduces the potential for outbreak of a fire to a level that would be considered as low as reasonably practicable.

The fire risk across the Kilcarrig Solar Farm site will be managed by including mitigation as part of the detailed design. A Fire Risk Assessment will be undertaken as part of the detailed site design.

The following mitigation measures will be included as part of the detailed site design.

2.9.1 Fire Mitigation for all work in electrical areas

- All work will be risk assessed.
- Arc proof clothing, gloves and face visor will be worn as deemed necessary throughout risk assessment.

2.9.2 Fire Mitigation for all work in combiner boxes

- Design specific for Irish weather.
- Avoid negative earthing of DC system unless technically unavoidable.
- Install DC insulation monitors in inverters with connection through solar farm monitoring system and default setting to disconnect DC supplies if there is no operator intervention after a set time period.

2.9.3 Fire Mitigation for work in transformer/inverter stations

- Design of HV areas to IEC 62271-202.
- Remote operation and monitoring of inverters and HV equipment.
- Take steps to avoid vermin entry.
- 15 min fire escape lighting and fire escape doors.
- Explosion vents on all high voltage rooms.
- 15-minute fire breaks between rooms.
- No fire-fighting equipment necessary – electrical energy output so high that a quick exit is the best course of action.
- Install both AC and DC insulation monitors with connection through solar farm monitoring system and default setting to disconnect supplies if there are no operator intervention after a set time period.

2.9.4 Fire Mitigation for work in other significant areas – stores, monitoring room etc.

- 15-minute fire escape lighting and fire escape doors.
- Good housekeeping to avoid unnecessary piles of paper/card.
- Site rooms to include no smoking in or around rooms.
- Provide basic fire-fighting equipment and training.
- No storage of flammable materials in buildings.

2.10 ELECTROMAGNETIC FREQUENCY (EMF) AND ELECTROMAGNETIC COMPATIBILITY (EMC)

There are two matters with respect to electromagnetic fields for the proposed development. These are Electromagnetic Fields and human health (EMF) and Electromagnetic Compatibility (EMC).

EMF together with optical radiation, which includes infrared (IR), visible light (and laser), and ultraviolet radiation, collectively make up the non-ionising radiation (NIR) spectrum. This type of radiation does not have enough energy to break up (ionise) atoms or molecules. It is therefore different to ionising radiation such as X-rays or radioactive substances, that can break up molecules and is known to cause damage to human cells.

EMF are generated by everyday items such as mobile phones and electrical appliances. EMF are intentionally produced and used to transmit information or to heat things such as food. So, we use EMF every time we listen to the radio, watch television, warm up food in a microwave oven or use our mobile phone. EMF are also generated when electricity is produced (e.g., power

plants) and distributed (e.g., power lines), and whenever we use an electric appliance at home or in work. EMF sources also occur in nature and include the earth's magnetic field, that causes compasses to point North, or the electric fields produced in the atmosphere during lightning storms. EMF are also emitted by the Sun and even by our own bodies.

EMC relates to the ability of different electromagnetic devices to function properly when they are situated in the same environment, i.e., it relates to the compatibility between different devices. Electromagnetic devices can generate and propagate energy causing electromagnetic interference (EMI). Devices can also receive and be interfered with by energy generated and propagated by other devices in the same environment. If an electromagnetic device is not compatible with other devices in the same environment, EMI can lead to the device not functioning properly.

2.10.1 International EMF standards and guidelines

The EMF aspects are based on the following guidelines:

- International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300GHz). Health Physics 74 (4): 494-522; 1998
- EU Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz) 1999/519/EC
- ICNIRP Guidelines for limiting exposure to time varying electric and magnetic fields (1Hz–100kHz) Health Physics 99(6):818-836; 2010
- Directive of the European Parliament and of the Council on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) 2013/35/EU

Guidance on EMF in Ireland is the responsibility of the Department of Environment, Climate and Communications who rely on the World Health Organisation (WHO) and the ICNIRP. These organisations have set out to inform public policy by issuing recommendations of safe limits of exposure. For public exposure, Irish government policy is to comply with the 1998 ICNIRP guidelines in the terms of the 1999 EC Recommendation.

Magnetic flux densities for AC magnetic fields are reported using units of microtesla (μT) and AC electric fields are reported as Volts per metre (V/m). The public limit advised by the EU EMF Recommendation and ICNIRP 1998 guidelines is 100 microtesla.

The solar farm at Kilcarrig will be a source of EMF which will be strongest at the inverters. However, it has been shown through evidential research and testing that limits experienced at inverters are well below international guidance limits. EMF levels at the proposed inverters as part of the proposed Kilcarrig Solar Farm can be expected to also be well below international guidance limits and below many household objects. Exposure to EMF also falls off dramatically with distance.

As the cables in the proposed development (and proposed grid connection route) are underground there are no electric fields. Conversely, there will be magnetic fields that will decrease with distance from the underground cables.

2.10.2 Magnetic Field Strength

The closest dwelling to the solar panels is at approximately 130 m.

The closest dwelling to the internally routed cables is at approximately 115 m.

The closest dwelling to the 33 kV /38 kV substation is at approximately 270 m.

2.10.3 EMF Levels at source, from all components, effects of distance and levels at sensitive receptors

Table 2-3: Magnetic Field levels at distances from the 38 kV cables.

Magnetic Fields (microtesla)				
Distance	10MW	20MW	50MW	100MW
12m	0.03	0.08	0.19	0.33
50m	0.002	0.008	0.01	0.02
100m	0.001	0.001	0.002	0.005

The magnetic field levels from both the 33 kV cables and the 38 kV cables have been modelled and have been found to be well below the respective limits at nearby properties.

The highest levels (and, therefore, the worst-case scenario) are experienced from the 38 kV cables which pass within 12 m of a dwelling at the entrance to the development. At this distance, the magnetic field levels from the cables operating on full load at 10 MW are 0.03 microtesla. This is more than 3000 times below the public limit advised by the EU EMF Recommendation and ICNIRP 1998 guidelines (i.e., 100 microtesla).

2.10.4 Electromagnetic Compatibility (EMC)

Photovoltaic systems are a potential source of radiofrequency fields. These are caused predominately by the switching technology in the inverter used to convert the DC current from the solar panels to AC current for transmission to the National Grid.

Radiofrequency emissions are controlled by the EMC Directive 2014/30/EU which is published as Irish national legislation and is mandatory for all electrical electronic equipment, including the inverters for this proposed development.

All the equipment installed at the proposed development will be CE marked and compliant with the EMC Directive 2014/30/EU which will protect radio receivers and TV in nearby dwellings from radio frequency interference. As the protection distance yielded by the EMC Directive is 10 m, the inverters are well segregated from potential receptors with the closest residential dwelling (i.e., landowner residence) located approximately 127 m away. The next nearest property to an inverter station is located at a distance of approximately 590 m away.

From a magnetic field point of view disruption of normal household appliances usually occurs when magnetic flux densities of 1 μ T (microtesla) or more are present. For the substation and the 38 kV AC underground cable, magnetic flux densities of 1 μ T do not persist at distances of more than 1 m from the cable route under normal load conditions. Consequently, magnetic fields are highly unlikely to have any impact on even the most sensitive equipment at distances of more than 1 m.

3 POLICY, PLANNING AND DEVELOPMENT CONTEXT

3.1 INTRODUCTION

At present there are no specific national planning guidelines relating to location, design, or siting of solar PV developments. The National Development Plan (NDP) 2018-2027 sets out significant levels of investment, which will underpin the National Planning Framework (NPF) – Project Ireland 2040 and drive its implementation. The NPF recognises the importance of rural areas and states they have significantly contributed to the energy needs of the country and will continue to do so, having a strong role to play in securing a sustainable renewable energy supply. The NPF further states “*In meeting the challenge of transitioning to a low carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment and respecting the needs of people who live in rural areas*”⁸.

This chapter provides a detailed description of the plans and policies that support the proposed Kilcarrig Solar Farm.

3.2 THE EUROPEAN GREEN DEAL

Globally, there is a clear recognition that action to mitigate climate change is necessary. The European Green Deal is a set of policy initiatives with an overarching aim to make the EU climate neutral in 2050. It also includes a new reductions target for the EU's greenhouse gas emissions by 2030 to at least 50% and towards 55% compared with 1990 levels. This replaces the current objective of a 40% reduction. This is a considerable increase in ambition and will place a heavy reliance on the transformation of the power sector. The EU will need to push for huge growth in wind and solar power levels over the coming decades and an accelerated demise in coal⁹. The Green Deal sets targets to reduce carbon emissions and enhance forests, farming, green transport, recycling and renewable energy. The action plan includes potential carbon tariffs for countries that do not curtail their greenhouse gas pollution at the same rate.

Developments such as the proposed solar farm at Kilcarrig are not only essential to achieving renewable energy goals and contributing towards a reduction in the EU's green-house gas emissions, but also to achieving the wider goals of decarbonising the economy in Ireland.

3.3 CLIMATE ACTION AND LOW CARBON DEVELOPMENT (AMENDMENT) BILL 2020

The Climate Action and Low Carbon Development (Amendment) Bill commits Ireland, in law, to move to a climate resilient and climate neutral economy by 2050. The Programme for Government commits to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieving net zero emissions by 2050.

The Bill brings in a system of 5-year economy-wide carbon budgets, which will outline a ceiling for total greenhouse gas emissions. These will be prepared by the Climate Change Advisory Council and presented to Government to consider and approve, with input from the Oireachtas.

⁸ https://www.housing.gov.ie/sites/default/files/publications/files/project_ireland_2040_npf_7mb.pdf

⁹ <https://www.woodmac.com/nsip/european-green-deal/>

The Bill includes the following key elements:

- Establishes a 2050 emissions target;
- Introduces system of successive 5-year, economy-wide carbon budgets starting in 2021;
- Strengthens the role of the Climate Change Advisory Council in proposing carbon budgets;
- Introduces a requirement to annually revise the Climate Action Plan and prepare a National Long-Term Climate Action Strategy at least every decade;
- Introduces a requirement for all Local Authorities to prepare individual Climate Action Plans which will include both mitigation and adaptation measures; and
- Gives a stronger oversight role for the Oireachtas through an Oireachtas Committee.

This legislation sends a clear signal to businesses, to farmers and to Irish communities that climate action is good for the economy. It will allow Ireland to reach our climate targets while creating jobs and sustainable growth in new sectors.

Developments such as Kilcarrig Solar Farm allow farmers to diversify their farm landholding to include for the production of renewable energy and to contribute to climate action.

3.4 IRELAND'S DRAFT NATIONAL ENERGY AND CLIMATE PLAN 2021-2030

This first draft of the National Energy and Climate Plan (NECP) considers energy and climate policies developed to date, the levels of demographic and economic growth identified in the Project 2040 process and includes all of the climate and energy measures set out in the National Development Plan 2018-2027. It is the first step in the process of putting together the final National Energy and Climate Plan and further iterations of the plan will consider additional policies and measures and the all-of-Government climate action response.

The draft integrated National Energy and Climate Plan (NECP) builds on the existing national energy and climate policy framework documents, which aim to diversify and decarbonise Ireland's electricity generation sector, with the long-term objective of decarbonising the energy sector and achieving an economic transformation with a carbon neutral agriculture and land use sector by 2050. Developments such as the proposed Kilcarrig Solar Farm can assist with these policy objectives. The draft NECP is structured according to the Governance Regulation¹⁰, covers all Energy Union dimensions and includes a robust analytical basis, presenting several scenarios with existing and additional measures.

3.5 THE CLIMATE ACTION PLAN 2021

The Climate Action Plan 2021 sets a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050. The updated action plan recognises that Ireland has been very successful in deploying renewable electricity, with 30.1% of electricity produced from renewable sources in 2017. The Plan notes that demand for electricity is forecasted to increase by 50% above existing capacity in the next decade.

¹⁰ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

The plan outlines the current state of play across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and charts a course towards ambitious decarbonisation targets. The Plan sets out governance arrangements including carbon-proofing policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas.

To achieve Ireland's 2030 target and subsequent net zero carbon energy system by 2050, a detailed sectoral roadmap has been designed to deliver a cumulative reduction in emissions over the period 2021 to 2030 of 58.4 MtCO₂eq. The analysis presented in the Plan shows that it is technically feasible to meet this target and also economically achievable.

One of the most important measures in the plan is to increase the proportion of renewable electricity to up to 80% by 2030. This target includes for 1500 – 2500 MW of installed solar energy. In order to achieve the target of 70% in the context of rising energy demand, significant progress in renewable electricity deployment will need to continue, with an increased deployment rate of all renewable electricity technologies, including up to 1.5 GW of grid-scale solar energy.

The Plan reinforces the Government's commitment to a significant increase in clean, renewable energy and provides an overview of the Renewable Energy Support Scheme (RESS) which is expected to support up to an additional 4.5GW of renewable electricity by 2030.

3.5.1 Renewable Energy Support Scheme (RESS)

The Renewable Energy Support Scheme (RESS) is a flagship Government policy designed to deliver on Ireland's commitments to decarbonise the electricity grid, harness the natural resources available and bring renewable energy into the heart of Irish communities. RESS will provide financial support to renewable electricity projects in the Republic of Ireland by providing predictable revenue streams under a contract for difference. The Department of Communications, Climate Action and Environment has committed to annual auctions held between 2020 and 2025 to deliver on the targets which will open bidding to a variety of technologies. Action Number 28 of the Climate Action Plan 2019 addresses the design and implementation of RESS. The action calls on the need to increase the volumes and frequencies of RESS auctions to deliver on the 70 % renewable electricity target by 2030.

The first auction RESS-1 was held on August 4th, 2020, with provisional results announced. Final auction results were announced on September 10th, 2020, with the notice of final award announced September 25th, 2020. A total of 114 projects applied to participate with 82 successful projects. Elgin Energy was successful in two of these projects.

The RESS 2 auction process has commenced, qualification for RESS 2 opened on December 7th, 2021, with results expected to be published in June 2022. The RESS 2 auction aims to support the achievement of the increased ambition of 80% renewable electricity by 2030 as set out under the National Development Plan and the policies and measures in the Climate Action Plan 2021. The RESS Scheme ensures that we are on a pathway to meet our ambitious climate targets and lays the foundations of a thriving and cost effective renewable electricity market. This will support the growth of the green economy, create sustainable work opportunities, and ultimately benefit the consumer as renewables become more cost effective.

Solar PV formed a large portion of the successful projects in RESS 1 which were awarded support and there is now a recognition by all actors in the delivery of renewable energy in Ireland that Solar PV will play a large part in decarbonising Ireland's electricity network by 2030. It is anticipated that solar costs will continue to fall with the advancement in technology and that

this will lead to greater opportunities to supply clean energy to Irish consumers at a competitive cost.

3.6 2050 ENERGY STRATEGY

The EU has set a long-term goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 levels, by 2050. The Energy Roadmap 2050 examines the transition of the energy system in ways that would be compatible with this greenhouse gas reductions target while also increasing competitiveness and security of supply. It is recognised that in order to achieve these goals, significant investments need to be made in new low-carbon technologies, renewable energy, energy efficiency, and grid infrastructure. The scenarios in the Energy Roadmap 2050 explore routes towards decarbonisation of the energy system. These scenarios examine the impacts, challenges and opportunities of possible ways of modernizing the energy system. This includes increasing the share of renewable energy and using energy more efficiently. The Energy Roadmap 2050 recognises that much of the energy infrastructure in the EU built 30 to 40 years ago needs to be replaced and that replacing it with low-carbon alternatives immediately can avoid more costly changes in the future.

3.7 PROJECT IRELAND 2040

The National Planning Framework and the National Development Plan together make up Project Ireland 2040.

The National Planning Framework is a framework to guide Ireland's development and investment in the coming years. It is the Government's high-level strategic plan to shape Ireland's development out until the year 2040. It contains a set of national objectives and key principles from which more detailed and refined plans will follow. This document acknowledges that new energy systems and transmission grids will be necessary for a more distributed, more renewables focused energy generating system, from energy sources such as solar.

The National Planning Framework states that key future planning and development and place-making policy priorities for Ireland's regions include harnessing the potential in renewable energy terms across the technological spectrum, including solar energy.

The National Development Plan 2018 -2027 is clearly aligned with the delivery of the objectives of the National Planning Framework. It sets out the significant level of investment, almost €116 billion, which will underpin the successful implementation of the National Planning Framework and drive it forward over the next 10 years.

The National Development Plan includes National Strategic Outcome 8 – Transition to a Low-Carbon and Climate Resilient Society. The Plan recognises that the national objective of transitioning by 2050 to a competitive low-carbon, climate resilient, and environmentally sustainable economy and society must influence public capital investment choices over the next 10 years. It acknowledges that Ireland's energy system requires a radical overhaul to achieve its energy and climate objectives by 2050. This means how energy in Ireland is generated and used needs to fundamentally change. Investment in renewable energy sources, ongoing capacity renewal, and future technology affords Ireland the opportunity to comprehensively decarbonise our energy generation. Renewable energy, including solar technology will play a key role in helping to diversify away from a reliance on fossil fuels.

3.8 NATIONAL RENEWABLE ENERGY ACTION PLAN – IRELAND

The National Renewable Energy Action Plan for Ireland was required under Article 4 of EU Directive 2009/28/EC. The Directive establishes the basis for the achievement of the EU's 20 % renewable energy target by 2020. Member States are required to adopt a National Renewable Energy Action Plan and submit this to the European Commission. Ireland submitted its National Renewable Energy Action Plan (NREAP) to the European Commission in July 2010. The plan follows a common template agreed by the European Commission. It sets out the targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020, taking into account the effects of other policy measures relating to energy efficiency on final consumption of energy. Ireland's overall target is to achieve 16 % of energy from renewable sources by 2020. The Plan set out measures which the Government considers necessary to achieve Ireland's 16 % target.

However, in April 2020 the Sustainable Energy Authority of Ireland (SEAI) published its "Renewable Energy in Ireland" 2020 update report. This report, which is based on 2018 data, finds that renewable energy sources only supplied 11 % of overall energy use in Ireland during 2018 suggesting that Ireland is not on track to meet its binding EU target of 16 % of energy to come from renewable sources by 2020.

3.9 IRELAND'S TRANSITION TO A LOW CARBON ENERGY FUTURE, 2015 - 2030 (WHITE PAPER), DEPARTMENT OF COMMUNICATIONS, ENERGY AND NATURAL RESOURCES (DCENR)

On December 16th, 2015, the DCENR issued the White Paper on Energy Policy in Ireland. The White Paper sets out a vision for transforming Ireland's fossil fuel-based energy sector into a clean, low carbon system by 2050.

Paragraph 137 of the paper is relevant to Solar PV developments in Ireland and states:

"Solar photovoltaic (PV) technology is rapidly becoming cost competitive for electricity generation, not only compared with other renewables but also compared with conventional forms of generation. The deployment of solar in Ireland has the potential to increase energy security, contribute to our renewable energy targets, and support economic growth and jobs. Solar also brings a number of benefits like relatively quick construction and a range of deployment options, including solar thermal for heat and solar PV for electricity. It can be deployed in roof-mounted or ground-mounted installations. In this way, it can empower Irish citizens and communities to take control of the production and consumption of energy. Solar technology is one of the technologies being considered in the context of the new support scheme for renewable electricity generation which will be available in 2016."

3.10 REGIONAL SPATIAL AND ECONOMIC STRATEGY FOR THE SOUTHERN REGION 2020 – 2032

The Regional Spatial and Economic Strategy for the Southern Region (RSES) is a 12-year strategic regional development framework, which was adopted on the 31st January 2020. It establishes a broad framework for the way in which the society, environment, economy and the use of land in the southern region should evolve. It includes Metropolitan Area Strategic Plans (MASPs) for Cork, Limerick-Shannon and Waterford and strategies for Key Towns, towns, villages and rural areas. The Region has nine counties Cork, Clare, Kerry, Limerick, Tipperary, Waterford, Carlow, Kilkenny and Wexford and is administered by 10 local authorities.

The RSES primarily aims to support the delivery of the programme for change set out in Project Ireland 2040, the National Planning Framework (NPF) and the National Development Plan 2018-27 (NDP). As the regional tier of the national planning process, it will ensure coordination between the City and County Development Plans (CCDP) and Local Enterprise and Community Plans (LECP) of the ten local authorities in the Region. The challenge for the RSES is to implement a changed strategy to ensure that future growth is managed in a sustainable way.

The RSES Vision is to:

- Nurture all our places to realise their full potential;
- Protect and enhance our environment;
- Successfully combat climate change;
- Achieve economic prosperity and improved quality of life for all our citizens;
- Accommodate expanded growth and development in suitable locations; and
- Make the Southern Region one of Europe's most creative, innovative, greenest and liveable regions.

The RSES contains 11 Statements to build a Strong, Resilient and Sustainable Region. The proposed Kilcarrig Solar Farm can assist with No. 8: 'Safeguarding and enhancing our environment through sustainable development, prioritising action on climate change across the region, driving the transition to a low carbon and climate resilient society'.

3.11 CARLOW COUNTY DEVELOPMENT PLAN 2015-2021

The Carlow County Development Plan 2015 – 2021 (CCDP) sets out the planned direction for growth within County Carlow from 2015 to 2021. The Strategy, which forms part of the Carlow County Development Plan, was prepared in the context of national and EU renewable energy targets and gives local effect to Regional Planning Guidelines.

The Carlow County Development Plan 2015-2021 includes several strategies, including promotion and support for the development of the "renewable energy resources of the County" and explicitly cites solar energy as a resource that will be integrated into County Carlow's overall energy balance.

The three main forms of solar energy listed within the development plan are Passive Solar Energy, Active Solar Energy and Photovoltaic Solar Energy. Within the plan there is a descriptive paragraph on each. The CCDP states that it is the policy of Carlow County Council to "*Promote commercial scale Photovoltaic Generators up to 10 MW subject to compliance with normal planning and environmental criteria and development management standards*".

The Development Plan also acknowledges that both renewable and non-renewable energy generation have the potential to be significant employers in the county and states that solar energy can provide a sustainable source of energy for buildings and reduces demand from the national grid.

The Development Plan outlines several Energy Objectives that are relevant to the current application for a solar farm, including;

Energy Policy 1:

- 'Facilitate, promote and achieve a balance between responding to Central Government policy on renewable energy and enabling energy resources within the plan area to be harnessed in a manner which is in accordance with the principles of proper planning and sustainable development and in accordance with Article 6 of the Habitats Directive';

- 'Facilitate the achievement of a secure and efficient energy supply and storage for County Carlow';
- 'Promote County Carlow as a low carbon county by 2021 as a means of attracting inward investment and to facilitate the development of energy sources which will achieve low carbon outputs'; and
- 'Raise awareness of the need to reverse fossil fuel dependency, to mitigate the effects of peak oil and reduce carbon emissions, to mitigate the effects of climate change'.

Energy Policy 9:

- 'Promote commercial scale Photovoltaic Generators up to 10MW subject to compliance with normal planning and environmental criteria and development management standards'.

Energy Policy 13:

- 'Encourage and favourably consider proposals for renewable energy developments and ancillary facilities in order to meet national, regional and county renewable energy targets and to facilitate a reduction in CO2 emissions and the promotion of a low carbon economy, subject to compliance with development management standards and compliance with Article 6 of the Habitats Directive'.

3.12 CARLOW COUNTY COUNCIL DEVELOPMENT PLAN 2022-2028 (ISSUE PAPER)

Carlow County Council are currently developing a new development plan which will set out an overall strategy for proper planning and sustainable development in the county. The publication of the Issue Paper is the first step in the Plan-making process, and it sets out the key development issues impacting the county that need to be addressed.

Within the Issue Paper, Carlow County Council are cognisant of National Policy which seeks to promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050. It is noted that the new County Development Plan will provide for the sustainable development of energy infrastructure throughout the county subject to appropriate planning and environmental considerations. The Issue Paper also acknowledges that renewable energy production is an opportunity for rural economy diversification in County Carlow.

The proposed Kilcarrig Solar Farm can assist Carlow County Council in achieving its sustainable development goals as noted in the Issue Paper, specifically Goal 7 which is to 'Ensure access to affordable, reliable, sustainable and modern energy for all' and Goal 13 which is to 'Take urgent action to combat climate change and its impacts'.

3.13 LOCAL AUTHORITY CLIMATE CHANGE ADAPTATION STRATEGY 2019-2024

The Climate Change Adaptation Strategy for Carlow is based around nine thematic areas with high level goals identifying the desired outcomes which are further supported by specific objectives and adaptation actions. The Climate Change Adaptation Strategy represents a proactive step by Carlow County Council in the process of adaptation planning to build resilience and respond effectively to the threats posed by climate change. The proposed Kilcarrig Solar Farm is relevant to the strategy goals, specifically:

- Theme 3 Land Use and Development GOAL: Sustainable policies and measures are devised influencing positive behavioural changes, supporting climate adaptation actions and endorsing approaches for successful transition to low carbon and climate resilient society; and
- Theme 8 Economic Development GOAL: Protect the economy of Carlow with communities acknowledging the benefits which can be gained from adjusting to a 'Green Economy'.

3.14 CONCLUSION

Government Policy promotes the development of both large and small-scale renewable energy developments, with their associated essential electrical infrastructures, provided that the environmental impacts of individual proposal are acceptable or can be made so through mitigation strategies. The current Kilcarrig Solar Farm forms part of the new direction for renewable energy generation in Ireland, which responds to key environmental challenges facing the country including the need to reduce carbon emissions in accordance with the national, regional and local policy. The proposed solar farm will make a direct contribution towards meeting Ireland's commitments to the EU of having 70% of total electricity consumption coming from renewable energy sources. The subject site has been selected on the basis of key technical, planning as well as environmental considerations and is deemed suitable for the intended use.

Overall, we consider that the proposed solar farm at Kilcarrig will not negatively impact on the local environment but rather it would contribute positively to the realisation of policy objectives for renewable energy targets in full accordance with the proper planning and sustainable development of the area.

4 BIODIVERSITY

4.1 INTRODUCTION

This section of the PECR has been prepared to examine the possible ecological impacts of the proposed Bagenalstown Solar Farm development on flora and fauna both within and surrounding the proposed development site. Existing site conditions are presented, potential impacts are assessed, and mitigation measures are recommended where appropriate.

4.2 METHODOLOGY

4.2.1 *Legislation and Policy*

Legislation and policy relevant to this ecological assessment and referenced herein are as follows:

- Wildlife Act, 1976 and Wildlife (Amendment) Act (2000) including all amendments. In this document, the legislation is referred to collectively as the Wildlife Acts;
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011, as amended, hereafter referred to as the Birds and Habitats Regulations);
- EC Birds Directive 79/409/EEC;
- EC Habitats Directive 92/43/EEC;
- Convention on the conservation of European wildlife and natural habitats (Bern Convention): Entry into Force in Ireland 01/08/1982;
- (EIA) Regulations, including all amendments 1989-2011;
- Fisheries (Consolidation) Act 1959 to 2017;
- Flora (Protection) Order, 2015;
- Bird species of medium and high conservation concern listed in the publication Birds of Conservation Concern in Ireland (BoCCI) 2020-2026;
- Planning and Development Act (2000) including all amendments;
- Planning and Development (Amendment) Act 2010;
- Carlow County Development Plan, 2015 – 2021
- Draft Carlow County Development Plan, 2022 – 2028; and
- National Biodiversity Plan, 2017 – 2021.

4.2.2 *Data Collection Methods*

4.2.3 *Desktop Study*

A desktop study of available online databases was carried out to identify potential ecological constraints. The following databases were consulted to retrieve ecological data:

- Review of rare and protected fauna including those obtained from the National Parks and Wildlife Service (NPWS) website¹¹ and those available in published NPWS reports;
- Review of the National Biodiversity Data Centre (NBDC) records and mapping¹² following 2km square grids surrounding the proposed development: S76A and S76F;
- Review of the Bat Conservation Ireland (BCI) database (2021) of roost records, including ad hoc detector records and waterways surveys;
- Review of Ordnance Survey maps and aerial photography to determine broad habitats that occur within the study area;

¹¹ National Parks and Wildlife Service Website: www.npws.ie (Accessed: September 2020)

¹² National Biodiversity Data Centre Mapping Website: <https://maps.biodiversityireland.ie/Map> (Accessed: September 2020).

- Birdwatch Ireland (BWI) Irish Wetland Bird Surveys (I-WeBS) datasets;
- River Basin Management Plan (RBMP) 2022-2027;
- Environmental Protection Agency (EPA) (www.catchments.ie);
- Identification of European Sites with links to the proposed development site; and
- Review of any other relevant ecological reports and literature.

The results of the desktop study were used to identify ecological features within the study area for the proposed development and to inform detailed field surveys. Relevant environmental data gathered during the desktop review was collated and used to assist with the ecological assessment and evaluation; however, no impact assessments were made or conclusions drawn based upon the results of the desktop studies alone.

4.2.4 Field Studies

An ecological field survey was undertaken to establish the existing environment at the proposed site by a TOBIN Ecologist on the 31st January 2022.

A habitat assessment was undertaken in accordance with The Heritage Council's *Best Practice Guidance for Habitat Survey and Mapping (2011)*¹³. Habitats were classified according to The Heritage Council's *A Guide to Habitats in Ireland (2000)*¹⁴ and following the *EU Habitats Interpretation Manual for Annex I Habitats (2013)*¹⁵. Searches for evidence of protected species and or presence of suitable habitats were also undertaken. The proposed development site was also searched for evidence of invasive plant species listed in Part 1 of the Third Schedule of S.I No. 477/2011 – European Communities (Birds and Natural Habitats) Regulations 2011. Species protected under Flora Protection Order, 2015 (S.I. No. 356/2015) or listed under the Irish Red Data List of Irish Plants were also searched for.

A terrestrial mammal survey was also carried out at the proposed development site in line with guidance outlines in the NRA Guidance: *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (2008)*¹⁶. Additionally, an emergence bat survey and a walking transect was conducted in accordance with the National Road Authority's (NRA) *Best practice guidance for the Conservation of Bats in the Planning of National Road Schemes*¹⁷ and Collins' *Bat surveys for Professional Ecologists: Good Practice Guidelines*¹⁸.

4.3 RECEIVING ENVIRONMENT

4.3.1 Site Description

The proposed development site is located in the west of County Carlow (close to the border with County Kilkenny), in the townland of Kilcarrig, approximately 1km east of Bagenalstown. The proposed site entrance will be assessed via the L70031 (**Error! Reference source not found.**). The overall landholding is approximately 32.9ha (81.3 acres) with the area of proposed solar site (i.e., area within planning boundary) totalling approximately 14.16ha (35 acres).

¹³ Smith, G.F., O'Donoghue, P., O'Hara, K., Delaney, E. (2011). *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council, Kilkenny.

¹⁴ Fossitt, J.A. (2000). *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.

¹⁵ EU (2013). *Interpretation Manual of European Union Habitats*, EUR 28.

¹⁶ National Road Authority (NRA) (2008). *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme*.

¹⁷ NRA(2006). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*.

¹⁸ Collins, J. (Editor) (2016) *Bat Surveys for Professional Ecologist: Good Practice Guidelines* (3rd edition). Bat Conservation Trust, London.

The proposed development site is located within the Landscape Charter Area of the Killeslin Hills/Central Lowlands and in the Landscape Type of Farmed Lowland¹⁹. The general development pattern in the wider area predominantly consists of one-off housing along the L70031 road, with some dispersed houses and associated farm buildings. An operational quarry, Kilcarrig Quarries Limited, is located opposite the site entrance to the north.

The desktop study illustrated nearby watercourses to the proposed development site includes the Lower Clorusk River (EPA code: 14L31) approximately 259m north, an unnamed stream/river approximately 514m south and Donore River (EPA code: 14D32) approximately 684m south, all of which are tributaries of the River Barrow (EPA code: 14B01) which is located approximately 1.7km west. The River Barrow forms part of the River Barrow and River Nore SAC [site code: 002162] and is of moderate quality status with a Q-Value of 3-4²⁰ as of 2018. The proposed development site sits within the Barrow catchment and sub-catchment with the underlying groundwater body of New Ross present beneath. No watercourses are present within the proposed site boundary.

4.3.2 Designated Conservation Sites

The proposed development site is not contained within or adjacent to any National or European protected sites. The closest designated conservation site is the River Barrow and River Nore SAC [Site Code: 002162] which is located approximately 1km northwest. One additional European site, the Blackstairs Mountains SAC [000770] is located approximately 9.7km southeast. No hydrological or ecological pathways to these European sites have been identified.

An Appropriate Assessment (AA) Screening has been conducted for the proposed development as required under Article 6 of the EU Habitats Directive. The AA Screening concluded that potential impacts associated with the proposed development, either alone or in-combination with other plans or projects, will not result in likely significant effects on the qualifying interests/special conservation interests of any European sites.

Nationally protected sites (Natural Heritage Areas [NHAs] and proposed Natural heritage Areas [pNHAs]) within the 15 km radius include:

- Ballymoon Esker pNHA [000797] located c. 7.67km northeast;
- Whitehall Quarries pNHA [000855] located c. 6.7km west;
- Cloghrick Wood pNHA [000806] located c. 7.7km north;
- Blackstairs Mountains pNHA [000770] located c. 9.7km southeast;
- Ardistan Fen pNHA [000788] located c. 13.9km northeast;
- Red Bog, Dungarvan pNHA [000846] located c. 14.3km south;
- Coan Bogs NHA [02382] located c. 14.8km northwest; and
- Clohastia pNHA [000830] located c. 14.8km south.

No source-pathway-receptor links were identified between the proposed development and any national sites.

4.3.3 Habitats and Flora

Habitats present within the proposed development site were classified using habitat descriptions and codes published in the Heritage Council's '*A Guide to Habitat Types in Ireland*'

¹⁹ Carlow County Development Plan 2015-2021

²⁰ <https://gis.epa.ie/EPAMaps/> (accessed January 2022)

(Fossitt, 2000)²¹. The site consists primarily of improved agricultural grassland (GA1) bounded by hedgerows (WL1) and treelines (WL2) with small areas of scrub (WS1) and dense bracken (HD1) in the southwest of the site boundary and a small conifer plantation (WD4) in the southeast. Access tracks (BL3 – buildings and artificial surfaces) are present to the east and traverse the centre of the fields, with a domestic dwelling and farm buildings (BL3) in the east

Hedgerows (WL1) were identified as being dominated by hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus*), ivy (*Hedera helix*), ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*) with treeline (WL2) habitat defined by mature ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*) trees.

In total, nine habitat types based on Fossitt (2000) were identified within the proposed development site boundary, as shown in **Error! Reference source not found.** An assessment of the habitats was undertaken in accordance with the NRA Guidelines (2009)^{Error! Bookmark not defined.} and described hereunder.

Improved agricultural grassland (GA1)

The proposed development site is dominated by agricultural grassland, managed for dairy production. The western field contains a higher percentage of semi-natural grassland species, with some exposed bedrock, encroaching bracken (*Pteridium aquilinum*) and bramble (*Rubus fruticosus*) occurring intermittently. Flora species composition included perennial ryegrass (*Lolium perenne*), creeping bent (*Agrostis stolonifera*), cock's-Foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), annual meadow-grass (*Poa annua*), white clover (*Trifolium repens*), common chickweed (*Stellaria media*), creeping thistle (*Cirsium arvense*), spear thistle (*Cirsium vulgare*), nettle (*Urtica dioica*), broad dock (*Rumex obtusifolius*), creeping buttercup (*Ranunculus repens*), daisy (*Bellis perennis*), ribwort plantain (*Plantago lanceolata*), greater plantain (*P. major*), and meadow buttercup (*Ranunculus acris*).

This habitat is evaluated as being of local importance (lower value).

Wet grassland (GS4)

An area of wet grassland can be found in the southern section of the proposed development site and is associated with a topographical depression from surrounding sloping grasslands. This region consists of waterlogged soil and large boulders with soft rush (*Juncus effusus*) and perennial ryegrass dominating this habitat with bramble and hawthorn also present.

This habitat is evaluated as being of local importance (lower value).

²¹ Fossitt, J. A. (2000). A guide to habitats in Ireland. Heritage Council/Chomhairle Oidhreachta.



Insert 4-1: Improved agricultural grassland GA1 (Left) and Wet grassland GS4 (Right)

Hedgerows (WL1)

Hedgerows are the dominant habitat bordering the proposed development site. The hedgerows don't appear to be managed and have become gappy in nature, allowing tree growth to occur. Species dominating this hedgerow include hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus*), ivy (*Hedera helix*), ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). Other species include blackthorn (*Prunus spinosa*), cleavers (*Galium aparine*), hogweed (*Heracleum sphondylium*), cow parsley (*Anthriscus sylvestris*), herb-Robert (*Geranium robertianum*) and sweet violet (*Viola odorata*). Ground elder (*Aegopodium podagraria* L.) was also noted on the grass verge of the hedgerow on the western section of the site adjacent to an access road.

The majority of this habitat is evaluated as being of local importance (higher value), with some hedgerows being gappy and poor in quality and thus evaluated as being of local importance (lower value).

Treelines (WL2)

Treelines on site are associated with some unmanaged hedgerows, consisting primarily of ash. However, two distinct treelines are present in the southeast corners of the site and comprised mature ash, beech and horse-chestnut (*Aesculus hippocastanum*). A large, mature, partially fallen beech tree is present in the southeast corner which was identified as having low bat roost potential.

This habitat is evaluated as being of local importance (higher value).



Insert 4-2: Hedgerows WL1 (Left) and Treelines WL2 (Right)

Stone walls and other stonework (BL1)

The southern boundary of the proposed development site comprises a 1m high stone wall which run parallel to the hedgerows. Species present included ivy, herb-Robert, pennywort (*Umbilicus rupestris*), ferns such as polypody sp., (*Polypodium agg.*) and moss species. A rabbit burrow was recorded within a earth bank located adjacent to the stone wall.

This habitat is evaluated as being of local importance (lower value).



Insert 4-3: Stone walls and other stonework (BL1)

Buildings and artificial surfaces (BL3)

This habitat is present in the form of an access pathway/track along the western border of the site. The track also traverses through the centre of the proposed development site and grassland habitats before connecting to the residential property and farm buildings to the east.

The gravel track on the western side of the site runs adjacent to a hedgerow with ground elder present along the grass verge.

This habitat is evaluated as being of local importance (lower value).



Insert 4-4: Buildings and artificial surfaces (BL3)

Dense bracken (HD1)

A small area of bracken occurs along the southwestern field boundary. This habitat is evaluated as being of local importance (lower value).

Scrub (WS1)

Small areas of scrub, with large boulders present, occur in the southwestern corner of the proposed development site and within the southern improved agricultural grassland habitat. This habitat consists of bracken, bramble, blackthorn, hawthorn and gorse (*Ulex*). The scrub habitat is likely to provide suitable nesting habitat for breeding bird species.

This habitat is evaluated as being of local importance (higher value).



Insert 4-5: Dense bracken HD1 (Left) and Scrub WS1 (Right)

Conifer plantation (WD4)

A small conifer plantation with an open understory occurs in the south-eastern section of the proposed development site. Species found include Norwegian spruce (*Picea abies*), with occasional beech, silver birch (*Betula pendula*) and elder were also present.

This habitat is evaluated as being of local importance (lower value).



Insert 4-6: Conifer plantation (WD4)



1.1.1.1 *Invasive and Protected Flora*

A review of the National Biodiversity Data Centre (NBDC) database²² was conducted for the 2km grid squares S76A and S76F which the development site sits within.

Invasive Alien Plant Species (IAPS) Spanish Bluebell (*Hyacinthoides hispanica*), Three-cornered Garlic (*Allium triquetrum*) and Traveller's-joy (*Clematis vitalba*) were recorded for grid square S76A, no IAPS were recorded at S76F. However, no IAPS were identified during the ecological field surveys.

No protected flora was recorded within the 2km grid squares S76A and S76F, with no protected flora identified during the surveys.

4.3.4 *Fauna*

A search of the NBDC²³ and NPWS²⁴ databases identified records of protected fauna in the 2km Irish Grid squares S76A and S76F. The results are presented in Table 4-1 below.

The potential exists for these species to occur where suitable habitat exists within the proposed development site. It is noted that all species of birds are protected under the Wildlife Act 1979 (Amendment 2000), however individual bird species identified within the 2km grid squares S76A and S76F have been included in Table 4-1 below.

During the survey, species recorded were common to the Irish countryside. Two BoCCI amber listed species swallow and sand martin were identified during the 2016 survey. These migratory birds may have been utilising the proposed development site for foraging, with similar habitats also available surrounding the proposed development site. No rare or protected bird species were recorded within the proposed development site during surveys.

Table 4-1 Protected Fauna listed on the NBDC Database

Grid Square	Common Name	Latin Name	Protected Status	Source NBDC ¹²
S76A	Daubenton's Bat	<i>Myotis daubentonii</i>	EU Habitats Directive Annex V; Wildlife Acts	National Bat Database of Ireland
S76A	Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	EU Habitats Directive >> Annex IV; Wildlife Acts	National Bat Database of Ireland
S76A & S76F	Eurasian Badger	<i>Meles meles</i>	Wildlife Acts	Mammals of Ireland 2016-2025
S76A	Eurasian Pygmy Shrew	<i>Sorex minutus</i>	Wildlife Acts	Atlas of Mammals in Ireland 2010-2015

²³ <https://maps.biodiversityireland.ie/Map>

²⁴ <https://www.npws.ie/maps-and-data>



Grid Square	Common Name	Latin Name	Protected Status	Source NBDC ¹²
S76A	Common Kingfisher	<i>Alcedo atthis</i>	EU Habitats Directive >> Annex I; Wildlife Acts	Bird Atlas 2007 - 2011
S76A	Little Egret	<i>Egretta garzetta</i>	EU Habitats Directive >> Annex I; Wildlife Acts	Birds of Ireland
S76A	Mute Swan	<i>Cygnus olor</i>	Wildlife Acts	Birds of Ireland
S76A	Northern Lapwing	<i>Vanellus vanellus</i>	EU Habitats Directive >> Annex II; Wildlife Acts	Birds of Ireland
S76A	Peregrine Falcon	<i>Falco peregrinus</i>	EU Habitats Annex I; Wildlife Acts	Bird Atlas 2007 - 2011
S76A	Common Swift	<i>Apus apus</i>	Wildlife Acts	Birds of Ireland
S76A	House Martin	<i>Delichon urbicum</i>	Wildlife Acts	Kingfisher Survey 2010
S76A & S76F	Common Pheasant	<i>Phasianus colchicus</i>	EU Habitats Annex II; Wildlife Acts	Bird Atlas 2007 - 2011
S76A & S76F	Common Snipe	<i>Gallinago gallinago</i>	EU Habitats Directive Annex II & III; Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76F	Barn Swallow	<i>Hirundo rustica</i>	Wildlife Acts	Bird Atlas 2007 - 2011
S76F	Common Linnet	<i>Carduelis cannabina</i>	Wildlife Acts	Bird Atlas 2007 - 2011
S76F	Common Pheasant	<i>Phasianus colchicus</i>	EU Habitats Directive Annex II; Wildlife Acts	Bird Atlas 2007 - 2011
S76F	Common Snipe	<i>Gallinago gallinago</i>	EU Habitats Directive Annex II & III; Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76A & S76F	Common Starling	<i>Sturnus vulgaris</i>	Wildlife Acts	Bird Atlas 2007 - 2011
S76A & S76F	Common Wood Pigeon	<i>Columba palumbus</i>	EU Habitats Directive Annex II; Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76A & S76F	House Sparrow	<i>Passer domesticus</i>	Wildlife Acts	Bird Atlas 2007 - 2011
S76A & S76F	Mallard	<i>Anas platyrhynchos</i>	EU Habitats Directive >> Annex II & III; Wildlife Acts	Bird Atlas 2007 - 2011
S76A & S76F	Rock Pigeon	<i>Columba livia</i>	EU Habitats Directive >> Annex II; Wildlife Acts	Bird Atlas 2007 - 2011



Grid Square	Common Name	Latin Name	Protected Status	Source NBDC ¹²
S76A & S76F	Sand Martin	<i>Riparia riparia</i>	Wildlife Acts	Bird Atlas 2007 - 2011
S76A & S76F	Sky Lark	<i>Alauda arvensis</i>	Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76A & S76F	Spotted Flycatcher	<i>Muscicapa striata</i>	Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76A & S76F	Stock Pigeon	<i>Columba oenas</i>	Wildlife Acts	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
S76A & S76F	Yellowhammer	<i>Emberiza citrinella</i>	Wildlife Acts	Bird Atlas 2007 - 2011

4.3.5 Mammals

No evidence of protected mammal species such as badger were recorded within the proposed development site during field surveys; however, there is potential that this site is utilised by this species, at least on occasion, given the habitats present such as suitable grasslands, high value hedgerows bordering open fields and treelines with open understory. Badger have also been previously recorded within the 2km Irish Grid square which encompasses the proposed development site.

Due to the absence of waterbodies within the proposed development site there is no potential for otter to occur within the site.

There is potential that the proposed development site may support other small, protected mammal species such as hedgehogs (*Erinaceus europaeus*), pygmy shrew, Irish stoat (*Mustela erminea hibernica*) and Irish hare (*Lepus timidus*). The NBDC dataset indicates that some of these species have previously been recorded within proximity to the proposed development site.

The local population of badger and other small, protected mammals was assessed as being of Local Importance (higher value).



4.3.6 Amphibians

Wet grassland habitat located within the centre of the proposed development site may be used by breeding frogs during the early spring period; however, no evidence of this species was recorded during the walkover surveys.

4.3.7 Birds

Bird species recorded onsite during the survey included robin (*Erithacus rubecula*), wren (*Troglodytes troglodytes*), rook (*Corvus frugilegus*), swallow (*Hirundo rustica*), sand martin (*Riparia riparia*), blackbird (*Turdus merula*), woodpigeon (*Columba palumbus*), starling (*Sturnus vulgaris*), buzzard (*Buteo buteo*) and treecreeper (*Certhia familiaris*). No bird species of high conservation concern were noted onsite²⁵.

No suitable habitat, such as wetlands and lakes, are present within or near the proposed development site to support significant numbers wintering bird species associated with national and international populations.

Overall, based on the extent and nature of the proposed development site, the local bird populations were assessed as being of local importance (higher value).

4.3.8 Bats

Treelines and hedgerows within and surrounding the proposed development site are likely to be used as foraging corridors by commuting and foraging bats. Mature trees, particularly in the south-eastern corner of the proposed development site, were recorded as having 'Low' bat roost potential as per Collins (2016)¹⁸ due to the presence of a number of roost features. No trees will be felled however as part of the proposed development.

A study of the bat suitability index (scale from 0 to 100) on the NBDC website¹², showed that the site is moderately suitable for bats Table 4-2.

Table 4-2 NBDC bat suitability index for the proposed site.

Species	Landscape Suitability Index
All Bats	38.11
Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	46
Brown long-eared bat (<i>Plecotus auratus</i>)	55
common pipistrelle (<i>Pipistrellus pipistrellus</i>)	52
lesser horseshoe bat (<i>Rhinolophus hipposideros</i>)	0
Leisler's bat (<i>Nyctalus leisleri</i>)	50
whiskered bat (<i>Myotis mystacinus</i>)	43
Daubenton's bat (<i>Myotis daubentonii</i>)	44
Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>)	6
Natterer's bat (<i>Myotis nattereri</i>)	47

²⁵ Gilbert G, Stanbury A and Lewis L (2021) Birds of Conservation Concern in Ireland 2020 – 2026. Irish Birds 9: 523–544

4.4 APPRAISAL METHOD FOR THE ASSESSMENT OF IMPACTS

4.4.1 Evaluation of Ecological Significance

Ecological receptors are evaluated following NRA (2009)²⁶ guidelines which set out the importance of the receptors in a geographical context. These guidelines are consistent with the CIEEM approach recommended in the 'Guidelines for Ecological Impact Assessment in the UK and Ireland (2018)²⁷.

The information gathered from desk studies and field surveys was used to evaluate the proposed development works upon the identified ecological receptors on an importance scale ranging from international (A) - national (B) - county importance (C) - local importance, higher value (D) - local importance, lower value (E). Those features identified as being of high local importance or greater, are carried forward in the ecological evaluation as KERs when considering the potential for significant effects. The evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and the social values of an ecological feature such as educational, recreational, and economic value. Additional detail and criteria on this evaluation can be found in the NRA guidelines for Guidelines for Assessment of Ecological Impacts of National Road Schemes^{Error! Bookmark not defined.}.

4.4.2 Assessment of Impacts and Impact Significance

All potential impacts are assessed against parameters as set out within the NRA (2009) guidance and take cognisance of guidance produced by the EPA (EPA 2017)²⁸ and CIEEM (CIEEM 2018) via this approach, a scientific and repeatable method is applied whereby all aspects of a potential impact are considered. Unless otherwise stated, impacts identified in the assessment are considered to be negative.

4.4.3 Ecological Valuation and Identification of Key Ecological Receptors

Following a review of the existing environment it is possible to determine the KERs that occur within the Zone of Influence (Zoi) which require consideration regarding potential impacts and mitigation. These include specific receptors that have been identified as being of Local Importance (Higher Value) or greater. The identified KERs which may potentially be impacted by works associated with the proposed development are evaluated in this chapter. The importance of each ecological feature described in Section 4.4 is presented in Table 4-3 along with the rationale for its selection/exclusion as a KER.

In addition to the European sites presented in Table 4-3, these were also assessed separately in the Appropriate Assessment screening under the requirements of the Habitats Directive.

²⁶ <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf>

²⁷ <https://cieem.net/wp-content/uploads/2019/02/Combined-EcIA-guidelines-2018-compressed.pdf>

²⁸ Environmental Protection Agency (EPA) (2017). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Draft, August 2017.



Table 4-3 Summary Evaluation of Key Ecological Receptors and Locations within and around the Proposed Development

Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
Protected Sites				
River Barrow and River Nore SAC [002162]	International	Riverine & riparian habitat; alluvial forests; petrifying springs; old oak woodlands; dry heath; salt meadows; grassland habitats.	c. 1km west	No – no source-pathway-receptor link was identified. A significant area of land including grassland, treelines, hedgerows, roads, housing etc., are all present between the proposed site and this European site.
Blackstairs Mountains SAC [000770]	International	Wet and dry heaths	c. 9.7km southeast	No – no source-pathway-receptor link was identified. This SAC is located at a significant distance from the proposed development site.
Ballymoon Esker pNHA [000797]	National	The site is an esker, a long hill of sand and gravel; Calcareous grassland covers much of the esker; protected species under Flora Protection Order	c. 767m northeast	No – no source-pathway-receptor link was identified.
Whitehall Quarries pNHA [000855]	National	Two disused shale/slate quarries - provide a rich variety of dry acidic habitat. Nesting raptors in quarry cliffs.	c. 6.7km west	No – no source-pathway-receptor link was identified.
Cloghristic Wood (pNHA) [000806]	National	No site synopsis available.	c. 7.7km north	No – no source-pathway-receptor link was identified.



Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
Blackstairs Mountains pNHA [000770]	National	No site synopsis available.	c. 9.7km northeast	No – no source-pathway-receptor link was identified.
Red Bog, Dungarvan pNHA [000846]	National	main habitat is floating fen comprised of emergent vegetation with several small areas of open water; wet grassland and scrub; bounded by conifer plantations	c. 13.9km northeast	No – no source-pathway-receptor link was identified.
Coan Bogs NHA [02382]	National	No site synopsis available.	c. 14.8km northwest	No – no source-pathway-receptor link was identified.
Clohasia pNHA [000830]	National	No site synopsis available.	c. 14.8km south	No – no source-pathway-receptor link was identified.
Habitats				
Improved agricultural grassland (GA1)	Local Importance (Lower Value)	Intensively managed or highly modified grassland that has been reseeded and/or regularly fertilised and is now heavily grazed and/or managed.	Dominant habitat throughout the proposed development.	No
Hedgerows (WL1)	Local Importance (Higher Value)	Hedgerows have been identified as occurring throughout the proposed development, primarily bordering GA1 habitats. They were evaluated as	Hedgerows border the site boundary and GA1 habitats.	Yes



Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
		being higher value.		
Treelines (WL2)	Local Importance (Higher Value)	Treelines are concentrated to the southeast of the field boundary, where mature ash and beech trees are present.	Southeast corner of the proposed development site, bordering GA1 habitats and alongside WL1.	Yes
Wet grassland (GS4)	Local Importance (Lower Value)	An area of waterlogged wet grassland is present onsite consisting of <i>Juncus sp.</i> , perennial ryegrass, bramble and large boulders.	Present in a topographical depression in the southern GA1 habitat.	No
Scrub (WS1)	Local Importance (Higher Value)	Small areas of scrub within the site, consisting primarily of bramble, hawthorn, blackthorn and gorse.	Small areas located in the southwest and southeastern corners of the site boundary.	Yes
Bracken (HD1)	Local Importance (Lower Value)	Concentrated area of bracken consisting of fern species.	Small area of bracken in the southwestern corner of the site boundary.	No
Conifer plantation (WD4)	Local Importance (Lower Value)	Small strip of conifer plantation containing Norwegian spruce, with some beech, silver birch and elder also present.	Small area in the southeast of the site.	No



Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
		Open understory.		
Stone walls and other stonework (BL1)	Local Importance (Lower Value)	Stone walls covered in moss sp., pennyworth, herb-robert and fern sp.	Concentrated on the southern site boundary, run parallel with WL1.	No
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	Access trackways, residential property and farm buildings.	Access track present in the west and traverses the centre of the proposed site. Dwelling and farm buildings present in the east.	No
Protected Fauna				
Bats	International Importance – Annex II and IV of Habitats Directive and Wildlife Acts	Hedgerows and treelines provide foraging and commuting corridors. Some mature treelines in the southeast of the site were identified as having potential for bat roosts. However, they were noted as being low potential.	Suitable habitats such as hedgerows and treelines, throughout the study area are used by commuting and foraging bats. Roost potential in mature trees was identified as having low bat roost potential.	No
Badger	National Importance - Annex V of Habitats Directive and Wildlife Acts	Badger is protected under the Wildlife Acts and may potentially occur within the proposed development.	No evidence of badger activity recorded throughout the development site. However, badger have been previously recorded within the wider area and may utilise the proposed	Yes



Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
			development site on occasion.	
Other faunal species protected under the Wildlife Acts or Annex V of the Habitats Directive	National Importance – Wildlife Acts	Species protected under the Wildlife Acts and occurring or potentially occurring within the proposed development include: pine marten, red squirrel, Irish hare, hedgehog, pygmy shrew, common frog, smooth newt, common lizard and Irish stoat.	No evidence of protected species was recorded onsite. Suitable habitat exist for other protected species. Wet grassland area may provide habitat for frog, however no species were recorded onsite.	Yes
Invertebrates protected under Annex II of the Habitats Directive	International Importance – Annex II of Habitats Directive	Invertebrates protected under Annex II of the Habitats Directive and occurring or potentially occurring within the proposed development include Marsh Fritillary.	No evidence of protected invertebrate species was recorded onsite with no suitable habitat identified during surveys.	No
Aquatic species protected under Annex II of the Habitats Directive	International Importance – Annex II of Habitats Directive	Aquatic species protected under Annex II of the Habitats Directive and potentially occurring downstream of the proposed development	No waterbodies present onsite with no hydrological connection to any waterbodies or European sites.	No



Site/Feature	Evaluation	Brief Description of Ecological Feature	Relevant Location from the proposed development site	Key Ecological Receptor(s)?
		include Lamprey sp. and Atlantic Salmon.		
Birds of Conservation Concern	International Importance – Annex I of the Birds Directive, Wildlife Acts and avifauna listed on red and amber lists of BoCCI (Gilbert <i>et al.</i> 2021) ^{Error! Bookmark not defined.}	These species are considered to be of conservation concern in Ireland and are consequently of International Importance. Potential nesting areas within the proposed development include: hedgerows, treelines, wet grasslands.	During 2016 surveys, BoCCI amber listed species swallow and sandmartin were recorded onsite.	Yes

4.5 POTENTIAL IMPACTS

4.5.1 Potential Impacts during Construction Phase

Designated Sites

The proposed development site is not located within or adjacent to any designated conservation site (Special Area of Conservation (SAC), Special Protection Area (SPA) or Natural Heritage Area (NHA)), therefore there are no potential direct impacts identified. In accordance with the Article 6.3 of the EU Habitats Directive (92/43/EEC), an Appropriate Assessment Screening was conducted for the proposed development, which concluded, that potential impacts associated with the proposed development will not result in likely significant effects on the qualifying interests/special conservation interests of any European sites. This assessment was conducted using the source-pathway-receptor model^{29,30} which concluded that no hydrological and/or ecological pathways to European sites were identified and as such significant effects on the

²⁹ Cooper, L. M. (2004). Guidelines for Cumulative Effects Assessment in SEA of plans. EPMG Occasional Paper 04/LMC/CEA, Imperial College London.

³⁰ OPW (2012), Arterial Drainage Maintenance categories, Source » Pathway » Receptor Chains for Appropriate Assessment. OPW, Galway



qualifying interests/special conservation interests of any European sites within the ZOI will not result from the proposed development.

Habitats and Flora

The results of the desktop study and field habitat surveys found that the proposed development supports nine habitat classifications of which three were identified as KERs (see Table 4-3). No Annex I habitats or protected flora were recorded within the proposed development site.

Construction stage impacts will involve the embedment of supporting posts to depths of approximately 1.5m below ground. The panels will be placed on this supporting structure, 0.8m above ground level increasing to a maximum height of approximately 2.9m. In effect, this will allow field habitat (likely to be seeded with grass prior to installation for management) to be maintained and used for grazing by stock if desired or left to recolonise naturally. Cabling between panels will result in excavation of minor cable routes/channels that will result in direct disturbance to the surface of the ground. The agricultural grassland habitat will remain intact underneath the solar panels. These construction requirements will be within the context of improved agricultural grassland and are evaluated as imperceptible negative in the local context.

Cabling from the onsite terminal substation will be laid underground along the access track and site entrance, following the local road to the existing Bagenalstown 38kV Substation located approximately 500m west of the site entrance. The placement onsite of three proposed central inverters, terminal station, an electrical switchroom and two steel storage containers will require a landtake footprint within the agricultural grassland habitat. No habitat, with the exception of these infrastructure features and a permeable gravel access track (accounting for <2% area coverage), will be lost directly to the proposed development. This impact is evaluated as imperceptible negative in the local context.

No hedgerows or treelines will be lost as a result of this proposed development, as access routes and cabling works will use existing gaps in these linear features, avoiding the requirement to break new entrances. Existing hedgerows and treelines will be fenced off with a 5m buffer between hedgerows/treelines and the solar panels so as not to disturb existing field boundaries. Cabling works between the inverter stations, the terminal station and the existing substation will follow the footprint of the existing access tracks and local access road, where possible. Following completion of cabling works, all terrain will be reinstated.

In addition to habitat disturbance, terrestrial habitats within the proposed development may also be impacted by habitat degradation as a result of the spread of or introduction of IAPS. No IAPs were recorded during the survey, however the survey was undertaken outside the optimal survey period and some invasive species, which were not yet visible, may have been missed. Similarly, machinery and construction activities can introduce and disperse IAPS to new areas (TII 2020)³¹. Without appropriate mitigation measures in place IAPS could have a direct and/or likely significant negative effect on terrestrial habitats in a local context.

Protected Fauna

Disturbance to local fauna during the construction stage may potentially arise due to the short-term increase in human presence on-site, construction noise and temporary construction lighting use within the proposed development site. Construction works will be temporary and

³¹ Transport Infrastructure Ireland (TII) 2020. The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. GE-ENV-01105.



short-term in nature and additional similar habitats exist adjacent to the proposed development site. Construction works will be undertaken in daylight hours and nocturnal species such as badgers and bats which may be present within the development site, should consequently not be subject to significant disturbance. During surveys, no presence of protected fauna such as badgers and bats, were identified within the proposed development site, however, it is still likely that these species may occur.

Due to the absence of protected fauna onsite, the nature and scale of the development, the potential for impacts affecting local fauna are evaluated as being low, and of imperceptible significance in the local context.

No rare or protected bird species were recorded within the proposed development site. Species recorded were common in the Irish countryside. Two BoCCI amber listed species swallow and sand martin were identified during the 2016 survey. These migratory birds may have been utilising the proposed development site for foraging, with similar habitats also available surrounding the proposed development site. The proposed development will not give rise to significant habitat loss which would impact upon these species. Due to the mobile nature of these species, and the mitigation measures proposed to avoid the removal of breeding bird habitat during the nesting season, it is evaluated that the potential impacts affecting birds are imperceptible and limited to the local context.

The proposed construction works have the potential to give rise to the increased mobilisation of silt and suspended solids via surface water run-off. However, there are no watercourses within or adjacent to the proposed development site. The potential for significant impacts affecting water quality and aquatic ecological receptors is therefore evaluated as being low and imperceptible in the local context.

4.5.2 Potential Impacts during Operational Phase

Security fencing (Paladin) will be installed around the site perimeter and will be supported by posts, driven to 0.6m into the ground, with the wire fencing erected to 0.05m above ground. This will allow the movement of fauna through the site and will not result in the fragmentation of habitat. Notwithstanding, no mammal activity was recorded within the proposed development during the surveys. In the absence of any evidence of protected mammal dwellings or territorial markings recorded from the site, it is evaluated that the long-term operational effects of the project on mammal species are imperceptible negative in the local context.

Maintenance works within the operational solar farm will require the ongoing management of existing hedgerows and treelines. This will be in line with the existing agricultural management regime. Therefore, potential long-term operational impacts on hedgerow and treeline habitats are evaluated as being imperceptible in the local context.

Bat species and their prey (insects, including moths) are sensitive to the effects of lighting during hours of darkness. The proposed security system only includes CCTV cameras, with no proposals for perimeter or security lighting. Therefore, there are no negative impacts on local bat populations predicted, operational impacts are therefore evaluated as being imperceptible in the local context

4.6 MITIGATION MEASURES

4.6.1 *Habitats and Flora*

The majority of the key ecological receptor habitats i.e., treelines, hedgerows, stonewalls, scrub and bracken (HD1) will be avoided by the footprint of the proposed development and be maintained in-situ. A protective buffer zone of 5m between the centre of each treeline/hedgerow and the footprint of the development will be established. Additionally, due to the unsuitability of ground conditions in the wet grassland area, a 10m buffer zone will be implemented.

A pre-construction IAPS survey will be undertaken prior to the construction works commencing. Any IAPS found to develop within the site, either during the intervening period following the current field surveys, or during the operational phase of the development will require a specialist Method Statement for its eradication to avoid the spread of invasive species, to ensure compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Prior to construction all equipment and machinery must be cleaned prior to entry as a biosecurity measure. This is to avoid transfer of invasive species on equipment and machinery which may have been used elsewhere. Reference will also be made to the Inland Fisheries Ireland (IFI) biosecurity protocol for Field Survey Work³².

During the operational phase, existing treelines and hedgerows that are currently in poor condition will undergo supplementary planting, as per the hedgerow management and maintenance plan, which can be found in Appendix G. All species must be native, found in the local area and be of local provenance. New species not found onsite can be included and will increase diversity. The supplementary planting with continued management will increase the longevity of linear wooded habitat.

4.6.2 *Protected Fauna*

Bats

Whilst mature ash and beech trees were recorded within the southeast of the proposed site, these were established as having low bat roost potential. Trees and/or branches are likely to be pruned/lopped as part of the proposed works. No tree felling is proposed as part of the proposed development. In addition, all temporary construction lighting will be directed away from the trees.

Birds

Breeding bird habitats (e.g., hedgerows, treelines) should not be removed, cleared or trimmed between the 1st March and 31st August, to avoid impacts on nesting birds which are protected under the Irish Wildlife Acts. Where the construction programme does not allow this time restriction to be observed, then these areas will be inspected by a qualified Ecologist for the presence of breeding birds prior to commencement of construction works. Where any nests are found, the appointed ecologist will provide recommendations as to whether a licence is required for vegetation removal and will detail the process for obtaining such a derogation from the NPWS.

³² Inland Fisheries Ireland (2010). IFI Biosecurity Protocol for Field Survey Work, [research/biosecurity/biosecurity_for_fieldsurveys_2010.pdf](https://www.fisheriesireland.ie/research/biosecurity/biosecurity_for_fieldsurveys_2010.pdf) (fisheriesireland.ie). Accessed: December 2021.



Other faunal species

All proposed fencing will ensure that protected mammals are not excluded, with the ground-clearance of all fencing installed to a minimum height of 0.05m above ground. If any protected species or their resting places (e.g., bat roosts or badger setts) are discovered during works, works within the area must be suspended and a qualified ecologist contacted immediately to liaise with the NPWS and potential requirements for derogation licences to avoid contravention of legislation which protects such species and their dwellings.

Due to the potential for a lengthy time span to elapse between planning (if consented) and commencement of works, a pre-construction mammal survey will be carried out prior to the commencement of construction works. This is of particular importance with reference to badger and bat species which may have developed dwellings or roosts within the proposed development site during the intervening period.

4.7 RESIDUAL IMPACTS

Through the implementation of well-established approaches to mitigation, which will be implemented in accordance with best practice guidance, it will be possible to reduce the impacts to not significant for all ecological features.

4.8 CONCLUSION

Ecological desk and field studies were undertaken for the proposed Bagenalstown Solar Farm development. Key ecological receptors identified with reference to the proposed development site include five habitat types of treelines, hedgerows, stonewalls, scrub and bracken and protected faunal species including birds. Mitigation measures are recommended and once implemented, potential impacts are considered to be of low magnitude in the temporary to short-term and therefore insignificant.

5 SOILS AND GEOLOGY

5.1 INTRODUCTION

This chapter aims to assess the impact of works related to the Bagenalstown Solar Farm project as described in Chapter 2. This Chapter includes an assessment of any potential impact on the geological environment (soils, subsoils, bedrock), as a result of the proposed development at this location.

5.2 METHODOLOGY

The assessment of soils and geology consisted of:

- A desk study of soils, subsoils and bedrock;
- Site visits by a hydrogeologist from TOBIN Consulting Engineers; and
- Interpretation of all data and reporting.

Guidelines used in the preparation of the report included the Environmental Protection Agency (EPA) document 'Guidelines on Information to be contained in Environmental Impact Statements' (2002) and the Institute of Geologists of Ireland (IGI) publication 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (2013).

Information held by the Geological Survey of Ireland (GSI) and Environmental Protection Agency (EPA) was accessed to provide the geological setting of the site. Datasets used to provide the setting of the site included GSI bedrock geology datasets and the EPA/Teagasc soil mapping information.

Mitigation measures are proposed, where required, to ensure that any proposed activities at the site will not adversely impact upon the geological environment outside of the site boundary.

5.3 RECEIVING ENVIRONMENT

5.3.1 Topography

The topography of the application area varies from approximately 88mOD at the lowest point in the west of the site to approximately 98mOD at the highest point in the south and east.

5.3.2 Soils

Reference to the GSI Soils Map for this area indicates that the site contains three soil types within the planning boundary. The western section of the site is underlain by shallow, well-drained acidic soil (AminSW), the southern area is classified as deep, well-drained acidic soil (AminDW), while the northeastern section of the site is recorded as shallow, well-drained alkaline soil (BminSW). All three soil types are derived mainly from non-calcareous parental material. See Figure 5-1.

5.3.3 Subsoil Geology

The subsoil underlying the western area of the site, and either side of the existing access road, is described by the GSI subsoil map (www.GSI.ie) as "bedrock at surface" (Rck). During site walkovers completed in 2016 and January 2022, rock exposures were evident in this area. The



southern area is comprised of Granite Till (TGr) and the eastern area is classified as Limestone sands and gravels (GLs). See Figure 5-2.

5.3.4 Bedrock Geology

Reference to the relevant geological information, the 1:100,000 scale Sheet No. 19 – Geology of Carlow-Wexford (Geological Survey of Ireland (GSI), 2001) and the GSI bedrock data (www.GSI.ie), indicates that the Bagenalstown Solar Farm site is located on bedrock described as “Granites and other igneous intrusive rocks”. See Figure 5-3.

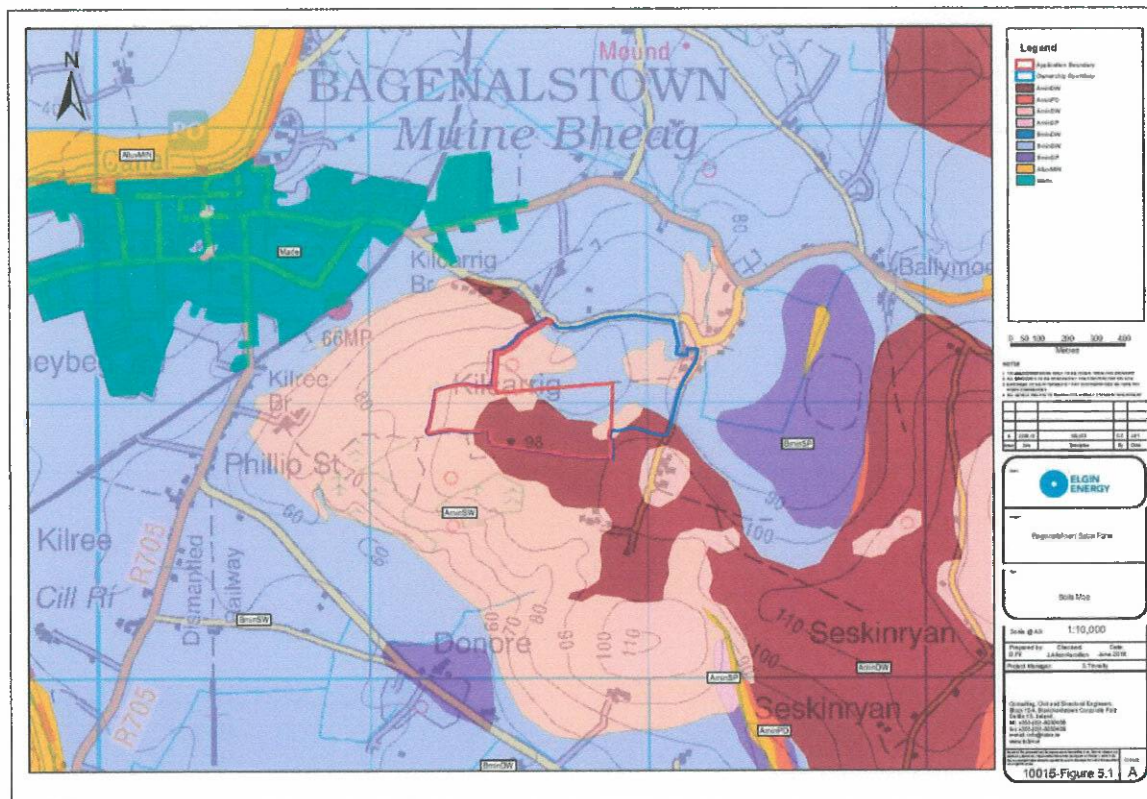
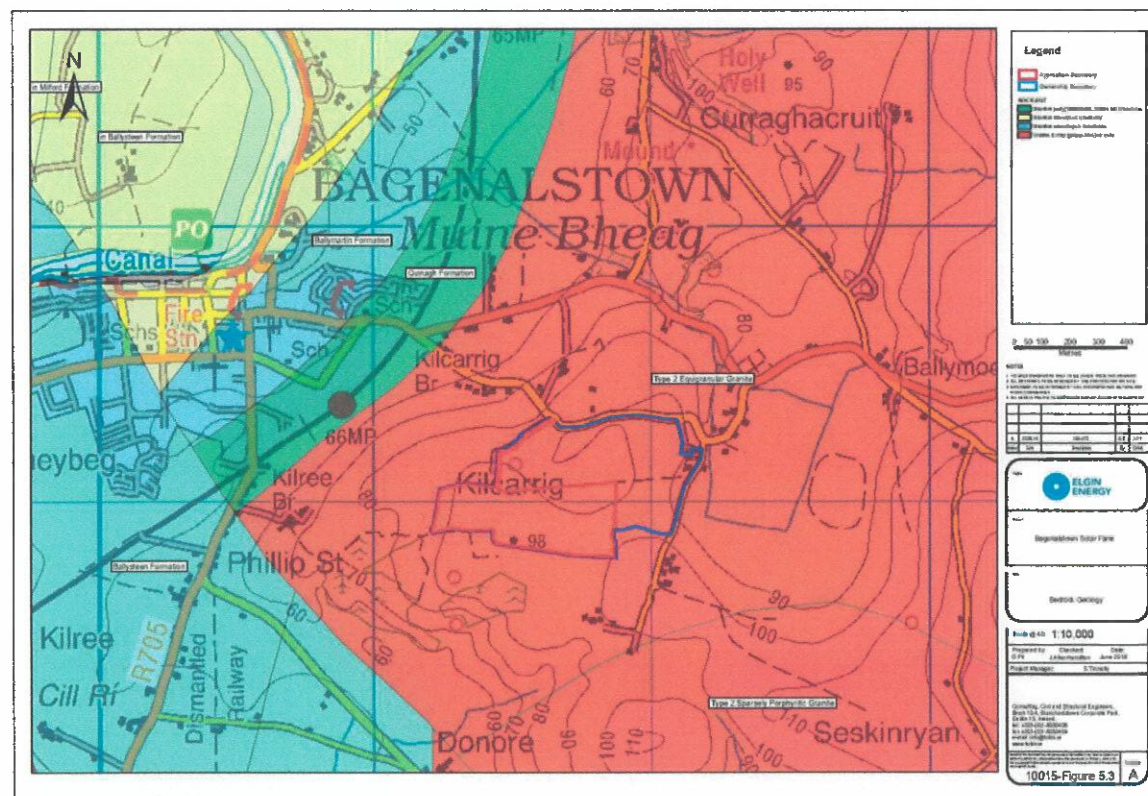
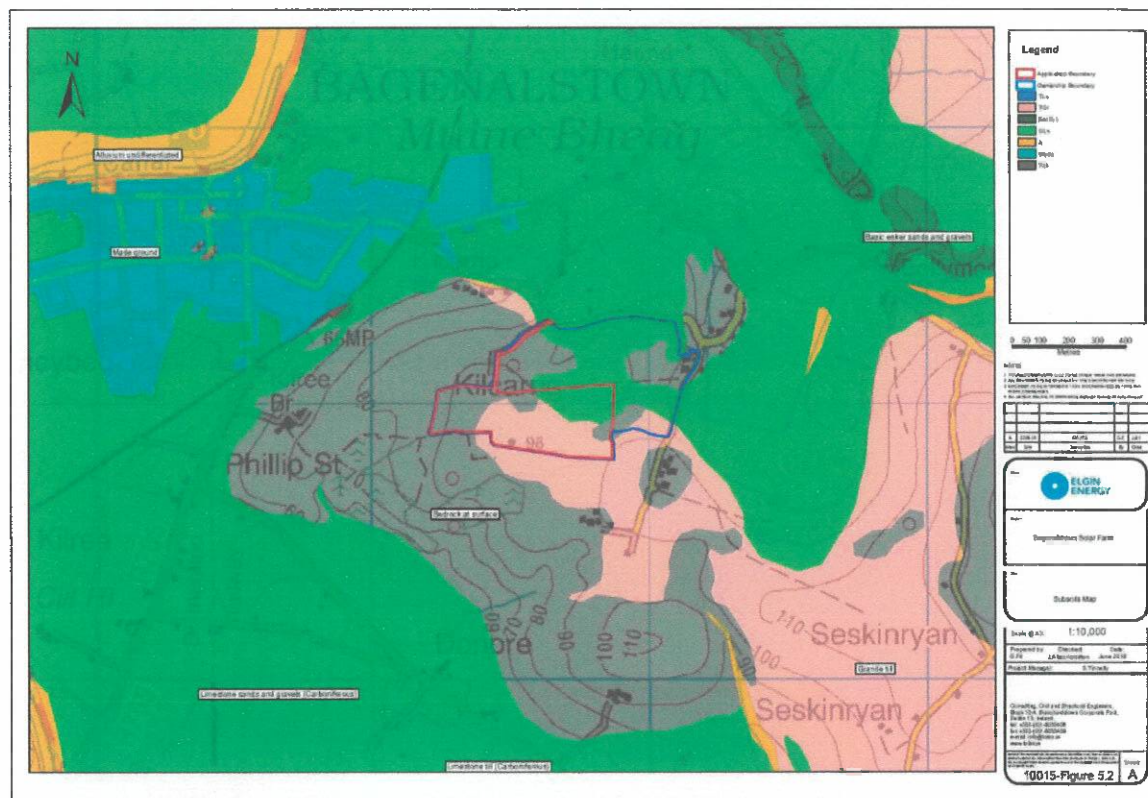


Figure 5-1: Soils Map



5.4 POTENTIAL IMPACTS

The solar panels will be installed using piling techniques resulting in minimal disturbance to soils, subsoils and bedrock. There are no significant site levelling works proposed for the solar farm site with only minimal earth works, and removal of localised stockpiles of boulders retained from land improvement works, required for the overall development of the site.

The following earthworks will, however, impact on the existing geological environment:

- Access tracks along the southern perimeter and centre of the site;
- Trenches for cabling connecting the solar arrays to inverter stations, electrical switchroom and the terminal station; and
- Bases for the electrical switchroom and the inverter and terminal stations.

Potential impacts of works within the application area comprise of:

- Excavation of soils, subsoils and bedrock material during the localised earthworks described above increasing the risk of surface water runoff containing elevated suspended solids. If silt laden runoff enters the local surface water network it will negatively impact on water quality; and
- Permanent loss of soil and subsoil during earthworks.

5.5 MITIGATION MEASURES

The piling technique to be employed during the installation of the solar panels is one of the main mitigation measures ensuring minimal disturbance to soil, subsoils and bedrock. Excavated soils and subsoils during the installation of access tracks, trenches and bases will be localised and managed onsite to ensure that no material enters the atmosphere as dust during periods of dry weather or is mobilised into the surface or groundwater environments during rainfall events.

These mitigation measures include:

- Soils and subsoil stored separately to allow for potential reuse onsite or offsite;
- All soil and subsoil stored onsite will be mounded to reduce wind erosion or lightly seeded to aid stability thus preventing dust arising; and
- Silt fencing to be installed at the base of mounds to capture and retain any solids mobilised during rainfall events.

5.6 CONCLUSION

In summary, there will be no significant alterations to the geological environment as a result of works within the site area.



6 WATER

6.1 INTRODUCTION

This chapter aims to assess the impact of works related to the Bagenalstown Solar Farm project as described in Chapter 2. This Chapter includes an assessment of any potential impact on the water environment (surface water, groundwater, water quality), as a result of the proposed development at this location.

6.2 METHODOLOGY

The assessment of the water environment consisted of:

- A desk study of surface water and groundwater features;
- Site visit by a hydrogeologist from TOBIN Consulting Engineers; and
- Interpretation of all data and reporting.

Information held by the Environmental Protection Agency (EPA), the Water Framework Directive (WFD) and the Geological Survey of Ireland (GSI) was accessed to provide the hydrological and hydrogeological settings of the site. Datasets used to provide the setting of the site included the EPA/WFD water quality datasets and mapping information and the GSI hydrogeology datasets.

Mitigation measures are proposed, where required, to ensure that any proposed activities at the site will not adversely impact upon the water environment outside of the site boundary.

6.3 SURFACE WATER

The Bagenalstown site is located within the Barrow Catchment and the Barrow (100) sub-catchment (hydrometric area 14_4). The main water feature in the catchment is the River Barrow, located approximately 1.2km northwest of the western site boundary.

There are no watercourses within or adjacent to the proposed development site. There is however a small marsh area within a topographic depression located in the eastern portion of the site, which will be fenced off as part of the solar farm design (identified as a “Marsh Area” on Figure 2-1).

The nearest mapped surface water feature, which is identified as an unnamed stream, is located approximately 500m south of the site. This stream is identified under the WFD assessment as being an “At risk” waterbody which is failing to meet its water quality objectives. The stream has consistently been assigned a “Poor” ecological status since it was first assessed in the 2007-2009 cycle. However, it is currently also assigned a “Good” chemical surface water status.

The Lower Clorusk River is located some 500-600 m north of the site, separated by the local road and an operational quarry site. This river is identified under the WFD assessment as being “Not at risk” and has been consistently assigned a “Good” ecological status. A tributary of the Lower Clorusk is located to the east of the existing 38kV substation. All drains and streams in the surrounding area are tributaries of the River Barrow.



6.4 HYDROGEOLOGY (GROUNDWATER)

The Bedrock Aquifer underlying the Bagenalstown site is identified as the New Ross Groundwater Body and is classified as a Locally Important Aquifer (LI), whose bedrock is moderately productive only in local zones. The WFD have assessed this groundwater body as being “Not at risk” with “Good” overall groundwater status. The aquifer extends in all directions from the site and is adjacent to a Poor Aquifer (PI) – bedrock which is generally unproductive except for local zones to the south-east, to a Regionally Important Gravel Aquifer (Rg) to the north-west, and to a Regionally Important Aquifer (Rkd) which is karstified to the west.

The groundwater vulnerability within the application area of the Bagenalstown site is mapped as ‘Extreme’, with ‘X Extreme’ vulnerability (rock at/close to the surface) mapped in the west of the site. This classification is supported by the findings of the site walkover, where rock outcrop was recorded on site.

According to the Geological Survey of Ireland (GSI), there are no karst features recorded within the site boundary. The nearest karst features, a number of springs, are located 5-6 km to the west and south-west of the site. A series of depressions associated with Dinantian Upper Impure Limestones and Dinantian Dolomitised Limestones are located 8.5 km to the southwest near Gowran.

The Inner Protection Area (SI) for the Paulstown Public Water Supply Scheme is located 5.5 km to the south-west of the site. The Outer Protection Area (SO) which is bounded by the complete catchment area to the source is located 7 km to the west. This water supply consists of a number of springs which discharge into a small area called Tobergoorlick pool.

6.5 FLOOD RISK ASSESSMENT

The proposed solar farm development is classified as a “Highly Vulnerable Development” by the Planning System & Flood Risk Management (PSFRM) Guidelines. The guidelines specify that this type of development is appropriate within Flood Zone C, i.e., that there is less than a 0.1% probability of the site flooding (1-in-1000 years).

An assessment of the flood risk to the proposed solar farm development was carried out as part of the design phase of the project.

Records of Historic Flooding

The OPW’s online National Flood Hazard Mapping database³³ provides information on reported floods, in the form of reports, photos and newspaper articles. While there were records of the River Barrow flooding in Bagenalstown, the database did not provide any record of flood events occurring at the Solar Farm site itself.

³³ www.floodmaps.ie





Figure 6-1: Extract from National Flood Hazard Mapping database

OPW Preliminary Flood Risk Assessment (PFRA)

In 2009, the OPW produced a series of maps to assist in the development of a Preliminary Flood Risk Assessment (PFRA) throughout the country. The indicative flood mapping of the area shows the proposed site to be located outside the fluvial flood extents of the River Barrow and the Lower River Clorusk (see Figure 6-2). It should be noted that *“the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location”*³⁴. The PFRA study identified Bagenalstown as an Area for Further Study; subsequently the Barrow was assessed in more detail as part of the South Eastern CFRAM study. The CFRAM mapping produced also indicated that the site is located outside the 1-in-1000 year flood extents of the River Barrow.

Analysis carried out by HR Wallingford as part of their PFRA study in 2010 has predicted that some pluvial flooding (ponding of surface water) may occur in the vicinity of the proposed site when subject to an extreme rainfall event. The PFRA mapping shown in Figure 6-2 shows two areas of low lying land which may be liable to pluvial flooding to the north east and south of the application boundary. The layout of the solar farm was revised as part of the design process to avoid construction within these areas i.e, the northern section of the development was removed from the scheme. The proposed solar farm is located outside the 1-in-1000 year pluvial flood extents as predicted by HR Wallingford as part of the PFRA study.

³⁴ The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

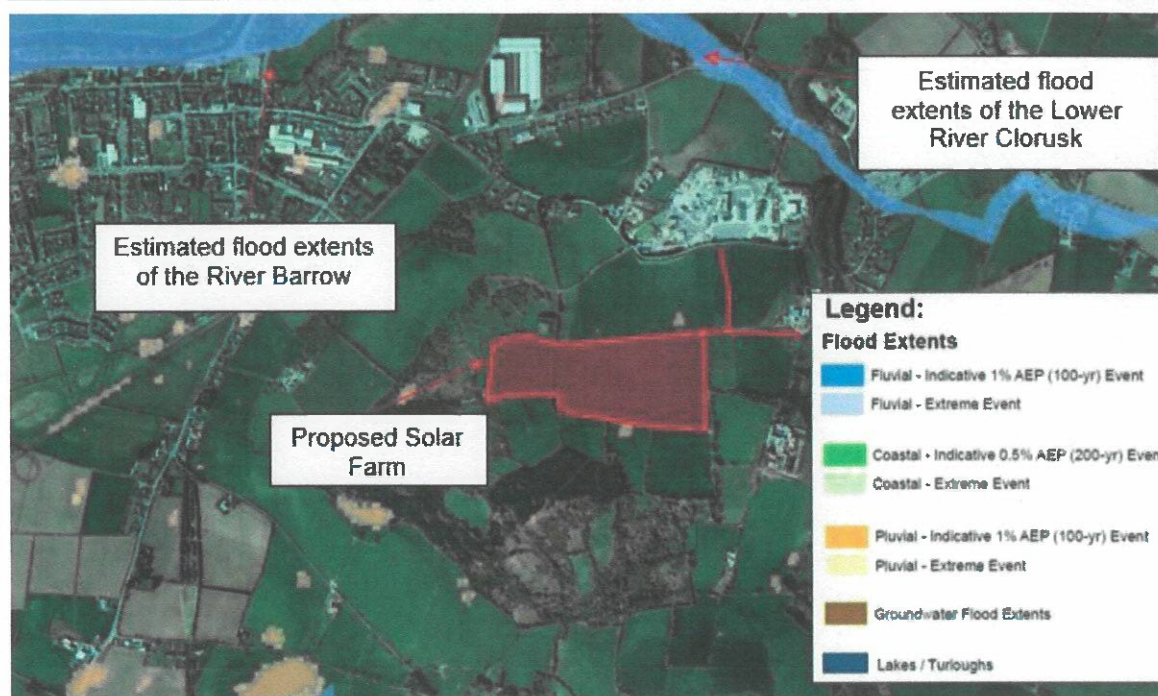


Figure 6-2: Solar farm study area, including potential areas of pluvial flooding (avoided by the redesign of the site layout plan) (source: OPW PFRA)

In summary, it is estimated that the proposed development is located in Flood Zone C, i.e., there is less than a 0.1% probability of the site flooding (1-in-1000 years).

6.6 SURFACE WATER RUNOFF FROM THE PHOTOVOLTAIC PANELS

The ground under the panels shall be maintained as grassland which will serve to reduce the risk of erosion and limit surface water flows across the site. The installed solar panels will not form large impermeable surfaces as they will be approximately 0.6m off the ground. The panels will be arranged in solar arrays with open space between each array. In addition, there are spaces between the panels that are attached to the supporting framed structure. These spaces will allow rainwater to pass through the arrays and disperse and infiltrate to the grassland below at a natural rate, in a similar manner to the current greenfield infiltration rates.

As described in Section 2.4 above, the operation and maintenance of the solar farm shall include monitoring and maintenance of the grassland beneath the panels. Where compaction of soil is observed, the ground will be cultivated and re-seeded.

Furthermore, we would note that the applicant (Elgin Energy Services Ltd.) has overseen the construction and operation of similar solar farm installations at a number of locations throughout Ireland and Great Britain. These include solar farms at Trequite and Trewidland, which have been in operation since 2013 and during which time the establishment of preferential flow paths beneath the drip lines has not been observed. Please find below photographs of the ground beneath the solar panels at both locations, in this regard.



Trequite – Photograph of the ground beneath the panels at this site that has been in operation since 2013.

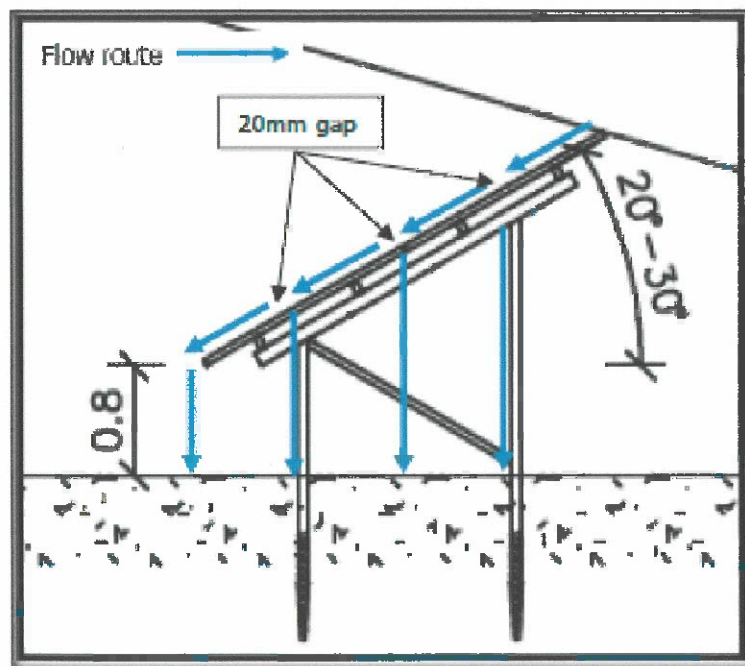




Trewidland – Photographs of the ground beneath the panels at this site that has been in operation since 2013.

Surface Water Management

The ground under the panels shall be maintained as grassland which will serve to reduce the risk of erosion and limit surface water flows across the site. The installed solar panels will not form large impermeable surfaces as they will be approximately 0.6m off the ground. The panels will be arranged in solar arrays with open space between each array. In addition, there are spaces between the panels that are attached to the supporting framed structure. These spaces will allow rainwater to pass through the arrays and disperse and infiltrate to the grassland below at a natural rate, in a similar manner to the current greenfield infiltration rates.



6.7 POTENTIAL IMPACTS

There is potential for sediment runoff from the site during the construction phase of the development, where minor and localised areas of the site will be disturbed in order to prepare the ground for the siting of inverter stations, an electrical switchroom and a terminal station. The individual solar panels will be fixed to frames which are proposed to be driven into the ground with minimal disturbance to the existing environment.

Use of plant and equipment during construction could pose a risk of surface water and groundwater pollution in the event of a spillage during refuelling or via unreported leaks from hydraulic hoses and fittings.

Given that there are no direct surface water connections from the site to the watercourses (described in Section 6.3), the potential for surface water interactions, or indeed groundwater interactions are limited and unlikely. No potential significant impacts are identified with respect to surface water connectivity.

Based on the proposal to operate a solar farm with the potential to continue agricultural use at the site e.g., sheep grazing on grassland, the site does not pose any potential water pollution impact from sediment runoff during the operational phase of the development. Therefore, the potential impact on the surface water environment during the operational phase of the development is considered low to negligible.

Rainfall runoff from the panels during the operational phase of the development will percolate to ground (the underlying and surrounding managed agricultural grassland) as per current baseline conditions.

As the access route proposed around the site will consist of a permeable gravel track (as shown in the Site Layout Plan (Master Plan), Appendix D), the underlying bedrock will not be significantly disturbed. Based on the limited disturbance of soils and bedrock, the proposed solar farm will not pose any threat to the underlying hydrogeological (groundwater) environment.

6.8 MITIGATION MEASURES

Mitigation measures to prevent the mobilisation of suspended solids into the nearby watercourse via surface water runoff should be employed, similar to those outlined in Section 5, Soils and Geology.

Given the extreme vulnerability rating assigned to the aquifer under the site, it means that during construction and operation of the site, care will be taken when operating or refuelling plant and equipment to prevent hydrocarbon contamination. Although the use of plant and equipment on site will be limited, if bowsers are to be employed for refuelling purposes, then they must be double skinned, bunded and equipped with appropriate fuel delivery systems, including level indicators.

The operation and maintenance of the solar farm shall include monitoring and maintenance of the grassland beneath the panels. Where compaction of soil is observed, the ground will be cultivated and re-seeded.

In the event of a hydrocarbon release to the environment, appropriate spill response procedures and equipment, such as spill kits, must be available to stop and contain any polluting matter.



Appropriate means to store used oil absorbent materials such as spill mats also need to be in place.

Surface Water on Access Roads

The site is underlain by permeable material with limited surface water runoff to the existing marsh area on site. It is proposed that the surface of the access roads will comprise of a permeable gravel surface. A Filter Drain/Soakaway trench will be installed along the access roads. This filter drain will comprise of filter material to Clause 503, underlain by 1.5m of single size washed stone surrounding a 100mm diameter perforated land drainage pipe. The detail for this filter drain is shown on Drawing 10015-2018 and the location of the proposed filter drains on both sides of the access road are also shown on Drawing 10015-2018. The installation of the filter drains and the use of a permeable gravel surface for the access roads will ensure that no surface ponding forms along the verges of the access roads.

6.9 CONCLUSIONS

Desktop studies and site walkovers undertaken at the proposed development site have ensured that the surface water and groundwater environment has been considered in the design and potential construction and operation of the Bagenalstown Solar Farm. Implementation of the mitigation measures outlined in Section 6.8 will ensure that the impact on the aquifer is insignificant.

7 AIR QUALITY

7.1 INTRODUCTION - DUST

All developments have the potential to adversely affect air quality within the surrounding area, particularly during the construction stage of a project. Disturbance of soils and the use of plant and equipment on site can cause windblown dust to develop on site and in the surrounding area.

7.2 METHODOLOGY

The TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring has become the most commonly used method. This method involves using a direct collection pot to standardised dimensions of either glass or plastic. The system benefits from being a direct collection method i.e., less transferring of material and consequent reduction in sampling errors. This method is defined as an internationally recognised standard and has been adopted by the Environmental Protection Agency (EPA) as the method of choice for licensed facilities. The compliance threshold limit is 350mg/m²/day, as recommended by the TA Luft/VDI 2119/Bergerhoff Method.

Dust monitoring will be carried out pre-construction to establish the baseline dust environment and during construction to monitor any potential increases in dust emissions.

7.3 RECEIVING ENVIRONMENT

The proposed development is located within the townland of Kilcarrig, immediately east of Bagenalstown, approximately 15km south of Carlow town. The site is characterised as improved agricultural grassland. Mature hedgerows and treelines around the field boundaries separate the site from surrounding agricultural lands. A gravel access track connects the site to the local road (L70031) to the north, which joins the R724 in Bagenalstown. An operational quarry, Kilcarrig Quarries Limited, is located opposite the existing site entrance to the north. A reservoir adjoins the northwestern boundary of the western section of the site.

7.4 POTENTIAL IMPACTS

There will be some dust and exhaust emissions from construction activities during the construction phase. These impacts will be temporary in duration and are not considered likely to give rise to significant impacts following the implementation of mitigation measures. Dust or pollutants generated from the proposed solar farm will typically arise from:

- Movement of construction vehicles;
- Laying hardstanding areas and access tracks (i.e., Construction access road will comprise of Geoterra construction mats (or similar));
- Movement and placement of stockpiles (excavated soils / fill materials); and
- Wind generated dust from stockpiles and exposed unconsolidated soils.

As the plant and equipment required for the construction of the proposed solar farm will include small scale construction machinery (ranging from quads to agricultural tractors, tracked excavators and cranes), machine emissions are not expected to be any greater than those used in the construction of domestic and agricultural buildings.

Due to the minimal works that will be required at the proposed site during the operational phase of the development, the potential impact on air quality is expected to be low to negligible.



7.5 MITIGATION MEASURES

Potential impacts during the construction stage arising from dust emissions will be minimised through the provision of mitigation measures that will be incorporated into the Construction Environmental Management Plan (CEMP). These may include:

- Minimisation of extent of working areas.
- Use of a self-contained wheelwash.
- Stockpiling of excavated materials will be limited to the volumes required to practically meet the construction schedule.
- Daily inspections by site personnel to identify potential sources of dust generation along with implementation measures to remove causes where found.
- Use of dust suppression measures (e.g., sweeps / covers/ water bowsers) on stockpiles and the road surface during periods of extended dry weather.
- All machines shall be suitably maintained to ensure that emissions of engine-generated pollutants shall be kept to a minimum in accordance with 'Measures Against the Emission of Gaseous and Particulate Pollutants from Internal Combustion Engines to be Installed in Non Road Mobile Machinery' (2002/88/EC) and 'Emissions of Pollutants from Diesel Engines' (2005/21/EC).
- Vehicles will not be left running unnecessarily and low emission fuels will be used where possible.

7.6 CONCLUSION

The implementation of the above mitigation measures will ensure that construction works at the Bagenalstown Solar Farm site will not result in an increase in dust levels in the local environment and the potential impact on air quality will be low. It is not anticipated that there will be any impact on air quality as a result of the operational phase of the development.

8 TRAFFIC

8.1 INTRODUCTION

This chapter presents an assessment of the potential for impacts arising from the proposed development (both during construction and operation) of the existing road network. The assessment outlines the potential impacts and proposed mitigation measures to be put in place to reduce these impacts where appropriate. These impacts and mitigation measures have been presented in the form of an Outline Traffic Management Plan at the request of the Roads Department of Carlow County Council as discussed below.

8.1.1 Consultation with Relevant Statutory Bodies

As discussed in Section 1.4, a scoping consultation was undertaken with Carlow County Council's Roads Department in May and June 2016. This consultation was undertaken to outline the location, size and description of the proposed development and to scope the methodology and approach to be undertaken in relation to the assessment of the proposed development and the existing road network. Initial scoping was undertaken with the Planning Department of Carlow County Council and a follow up scoping discussion was held with the Roads Department of Carlow County Council in May 2016, with follow up correspondence in June 2016.

8.2 METHODOLOGY

This Chapter has been prepared following consultation with Carlow County Council's Roads Department, as outlined above. The Roads Department indicated that due to the minimal operational traffic which will be generated by the proposed development, a Traffic and Transportation Assessment and Road Safety Audit Report would not be required for the development.

The Roads Department of Carlow County Council have requested that an Outline Traffic Management Plan (OTMP) be developed from which the appointed Contractor will be required to undertake the development of a Construction Stage Traffic Management Plan (CSTMP) in conjunction with the Roads Department of Carlow County Council.

As such, the OTMP detailed herein will address the following items, with further development to be undertaken by the appointed Contractor to develop the CSTMP:

- (1) Objectives of Outline Traffic Management Plan (OTMP);
- (2) Site Location & Existing Conditions;
- (3) Proposed Development;
- (4) Envisaged Construction Traffic Generation;
 - a. Staffing Levels;
 - b. Proposed Material Deliveries;
 - c. Envisaged Construction Equipment;
 - d. Abnormal Loads;
- (5) Traffic Management Plan:
 - a. Site access and Egress;



- b. Traffic Management Signage;
 - c. Routing of Construction Traffic;
 - d. Temporary Road Closure;
 - e. Timing of Material Deliveries;
 - f. Recommended Traffic Management Speed Limits;
 - g. Road Cleaning;
 - h. Enforcement of Traffic Management Plan;
- (6) Emergency Procedures during Construction.

8.3 OBJECTIVES OF OUTLINE TRAFFIC MANAGEMENT PLAN (OTMP)

Chapter 8 of this report shall be considered as an OTMP, prepared in accordance with the requirement of Carlow County Council as part of the 'Planning & Environmental Considerations Report', to accompany the Planning Application for the Bagenalstown Solar Farm Development. This report has been prepared prior to the appointment of a principal contractor, material suppliers and detailed construction programme.

It is envisaged that the preparation of a 'Construction Stage Traffic Management Plan' (CSTMP) will be a condition of the Carlow County Council Planning Permission, should it be granted. The document will be developed on an on-going basis during construction. The CSTMP will be developed with reference to the particulars and conditions of the Planning Application and associated 'Planning & Environmental Consideration Report'. Preparation of a CSTMP is a normal part of such construction projects and will be prepared irrespective of any planning conditions attached by Carlow County Council taking account of and developing the outline measures detailed below.

The objectives of this OTMP are to:

- Outline minimum road safety measures to be undertaken at site access / egress locations, during the works and including approaches to such access / egress locations;
- Demonstrate to the developer, contractor and supplier the need to adhere to the relevant guidance documentation for such works; and
- Provide the basis for the preparation of a Construction Stage TMP by the contractor appointed to carry out the works.

The site is located in the south of County Carlow, approximately 1km south east of the village of Bagenalstown. The site is located approximately 900m along a local road (L70031) to the south of the R724 regional road, as shown in Figure 8.1 below.

As per attached Drawing 10015-2017, a temporary traffic management design has been completed for the construction stage of the proposed solar farm. This complies with Chapter 8 of Traffic Signs Manual.



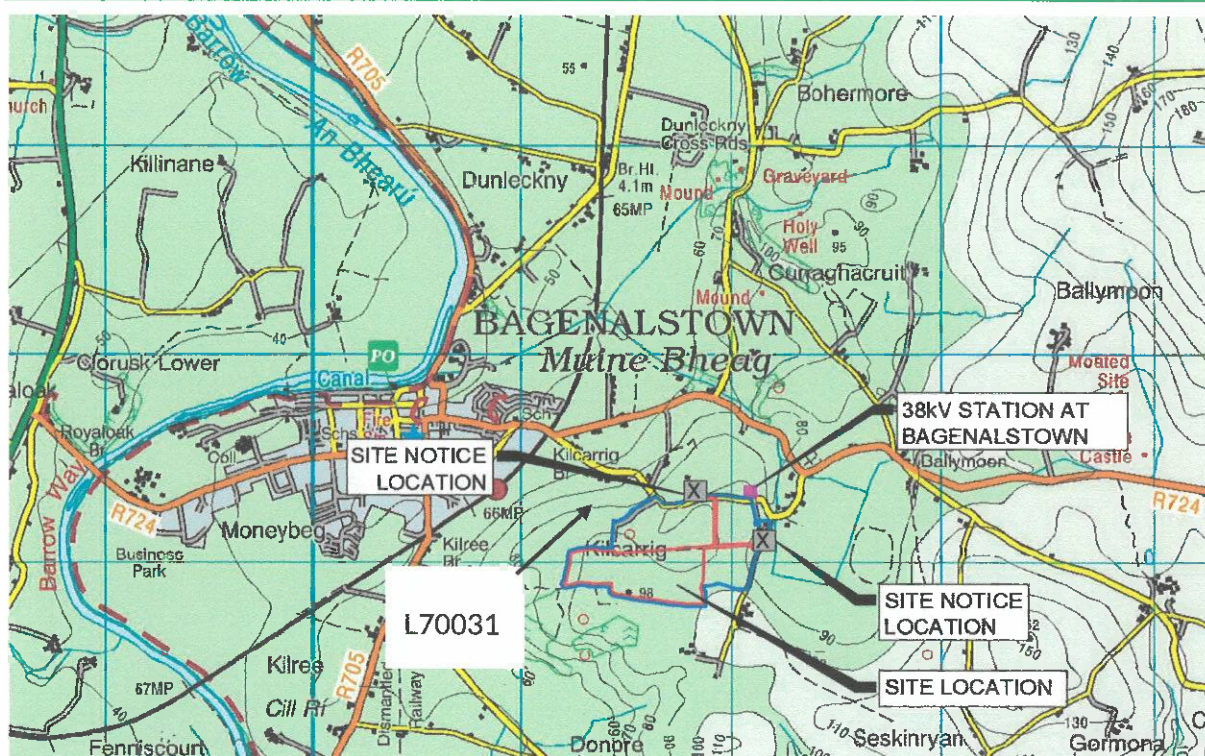


Figure 8.1: Site Location

The applicant site comprises approximately 14.16ha of agricultural land situated along the L70031 local road, east of Bagenalstown, Co. Carlow. The existing local road L70031 has a carriageway cross section of approx. 5.3m wide, with variable width grass verges to both sides.

The L70031 local road is bounded to the east by the R724 regional road. The R724 regional road proceeds west joining the R705 advancing north where access is facilitated via Junction 6 on the M9. The existing carriageway between the Junction 6 Link Road Roundabout to Bagenalstown consists of a cross section comprising variable width grass verge, variable width hard shoulder and approximately 3.3m wide traffic lanes both sides. The R705 regional road is signposted as 80km/h to within 1.1km north of Bagenalstown.

8.4 PROPOSED DEVELOPMENT

8.4.1 Proposed Site Development

As detailed in Section 2.2 of this report, the proposed development will comprise the development of a Solar Farm with a maximum export capacity of 4.2MVA, which will supply enough energy for approximately 1,000 homes.

The project will include;

- linear arrays of solar PV panels mounted on steel supported structures with associated cabling and ducting (including cable connection to the existing ESB 38kV Bagenalstown Substation);
- four proposed inverter substations (at two locations);
- an ESB substation (comprising of an electrical switch-room and a terminal station);
- perimeter fencing;
- temporary storage area and container;

- onsite CCTV cameras (at seven locations); and
- Access tracks incorporating a temporary wheelwash (for construction phase).

8.4.2 Proposed Site Access

The proposed construction access will meet the required sightlines of 90m at a 2.4m set-back with amendments to the existing hedgerow as shown in Drawing 10015-2012. The works proposed will be undertaken within land that is under the control of the developer/landowner and will not impact on third party lands. As such, no third party consent is required for these works. Where hedgerows are proposed to be set-back, the applicant commits to the replacement of the hedgerows. Additional planting using native species is included in Chapter 10 Landscape.

The existing farm entrance to the east of the application boundary will be utilised for management visits during the "Operational" phase of the development (a maximum of one visit per month). The existing entrance used to access the site to the west of the proposed solar farm (directly across from Kilcarrig Quarry) will only be used for the cable connection route. At present, visibility splays to the right and left are less than 10m at the site access junction with the L70031 local road at 3m set-back.

The existing farm entrance to the eastern boundary of the site was proposed for the operational stage of the solar farm as the traffic numbers during this phase of the development will be negligible, with only one vehicle visiting the site on a monthly basis for site management purposes.

The existing entrance proposed for the operational phase is also deemed appropriate for the operation of the solar farm as farm traffic, including milk trucks, are currently using this entrance on a daily basis for agricultural activity.

8.4.3 Network Improvements

There are currently no proposed road network improvements in the vicinity of the proposed development.

8.5 ENVISAGED CONSTRUCTION TRAFFIC GENERATION

Generated traffic resulting from the construction stage of the project has been calculated based on similar construction activities related to solar farm developments and an indicative construction programme. Staffing levels, material deliveries and envisaged plant requirements, and the associated access and traffic and transport impacts, were calculated based on similar project activities and in consideration of the anticipated programme and construction methodology. Table 8.1 below, details the indicative Construction Programme with corresponding construction related traffic.

Table 8.1: *Envisaged Construction Programme and Generated Traffic*

Envisaged Construction Programme & Generated Traffic		
Description / Activity	Duration	Predicted Traffic Volumes
Ground Works	Week 1 – Week 12 (12 Weeks)	100 LV & 10 HGV Per Week
Mounting System	Week 5 – Week 21 (17 Weeks)	100 LV & 1 HGV Per Week
Panel Fitting	Week 9 – Week 22 (14 Weeks)	100 LV & 3 HGV Per Week
Testing & Commissioning	Week 22 – Week 24 (3 Weeks)	50 LV & 2 HGV Per Week
Combined Programmed Activities (Period of Peak Activity)		
Ground Works Mounting Works Panel Fitting	Week 9 – Week 12 (4 Weeks)	100 LV & 14 HGV Per Week

8.5.1 Staffing Levels

To facilitate the construction of the proposed development, it is anticipated that there will be an average of 20 construction workers required per day. Arrivals and departures to and from the site are to be carried out in as few vehicle movements as possible to minimise impacts on the adjoining road network. Temporary parking will be provided within the site development in order to eliminate parking on the adjoining road network.

Proposed parking arrangements shall be risk assessed and where a risk / hazard is identified, a shuttle service shall be provided for staff between a safe off road parking location and the proposed site location. Parking shall not be permitted along the side of any road and parking will not be authorised within or within close proximity to any European Sites.

8.5.2 Proposed Material Deliveries

The majority of traffic generated by delivery of materials during the project is envisaged to occur during the following construction elements:

- Construction of internal access road and standing areas; and



- Delivery and erection of mounting system components and solar panels.

It is envisaged that a peak in material delivery vehicles will occur during weeks 9 and 12, where completion of ground works activities, progression of mounting system installation and installation of solar panel units will be undertaken concurrently. It is estimated that a maximum of 14 HGV deliveries will be required each week between weeks 9 and 12.

The remaining deliveries associated with the proposed development are considered to result in minimal impacts on existing traffic levels. Proposed material sources and finalisation of haul routes will be determined on appointment of the principal contractor and relevant suppliers. Delivery of materials to site will be undertaken by Maximum Legal Articulated Lorries or smaller vehicles.

8.5.1 Envisaged Construction Equipment

Construction equipment and vehicles required for each construction element/operation will be delivered to site by appropriate vehicles. Delivery of mounting system and solar panel components will be undertaken using shipping containers delivered to site via Maximum Legal Articulated Lorries or smaller vehicles. The delivery of prefabricated inverter station units will also be delivered to site via Maximum Legal Articulated Lorries or smaller vehicles. A city crane up to 10m in length will be required on site to facilitate the unloading of the inverter substation units (up to 15 tonnes) and shipping containers. An Autotrack assessment was carried out for a large mobile crane of 12m in length for the site access with L70021 as shown in Figure 8.3.

Specific equipment and vehicles which are deemed to be required for the project will be identified by the appointed contractor in the development of the CSTMP. Details of suppliers, supplier sources and staffing levels are to be confirmed by the appointed contractor in the CSTMP.

8.5.2 Abnormal Loads

There are no abnormal loads envisaged with this project. The maximum vehicle to be delivered to site is envisaged to be a crane suitable for the unloading of materials on site.

8.6 CONSTRUCTION STAGE TRAFFIC MANAGEMENT PLAN

This section outlines the content of the proposed CSTMP which shall be prepared prior to construction activities taking place at the proposed applicant site. It shall be a requirement of the project that prior to construction, the appointed contractor shall liaise with the relevant authorities, including Transport Infrastructure Ireland (where applicable to construction haulage on the National Road Network), Carlow County Council and Emergency Services for the purpose of finalising the CSTMP.

The CSTMP shall be termed a "Living Document" such that any changes to construction programme, operations or unforeseen issues can be incorporated into the CSTMP at any stage throughout the project as deemed necessary by the Employer, their agents or relevant authorities.

The contractor will prepare the plan such that the elements of this OTMP shall be incorporated into the detailed CSTMP. The principal contractor shall also agree and implement monitoring measures to monitor the effectiveness of the CSTMP. On finalisation of the CSTMP, the



contractor shall adopt the plan and associated monitoring measures. The CSTMP shall address the following issues:

- Site Access & Egress;
- Traffic Management Signage;
- Routing of Construction Traffic;
- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning; and
- Enforcement of Traffic Management Plan.

These items are explained in detail in the remainder of this section of the report.

8.6.1 Site Access & Egress

Minor improvements to sight lines where possible will be required at the proposed temporary construction site access and existing site access junction locations in order to provide a safe means of access and egress from sites.

The proposed construction site access location is detailed on the Site Layout Plan (Master Plan), in Appendix D. These improvement works will consist of improvements to existing sight lines in the form of trimming of existing foliage. Such works will only be carried out once such improvement works have been assessed and approved by a qualified ecologist. Visibility splays of 2.4m x 91m to the left and 2.4m x 42m to the right can be achieved with some minor trimming to hedgerows. In accordance with Heritage Objective No. 2 of the Carlow County Development Plan 2015 to 2021, it is proposed to utilise a system of traffic management operatives at the proposed temporary construction access location for all access and egress. This will facilitate the protection of existing hedgerows as required under the objective set down in the county development plan.

As the existing eastern farm access is proposed to be utilised for the operational phase of the proposed development, minor hedge trimming will be undertaken to improve existing visibility splays. As stated in the Carlow County Development Plan 2015-2021, visibility splays of 90m are required for local roads. The sightline is restricted to the right due to a bend on the road resulting in an approximate 57m splay. However, to the left the required 90m can be achieved with the removal of vegetation. The site access will at minimum coincide with DMURS which requires sightlines 45m for 50km/h speed limit zone.

As a precautionary measure, to facilitate deliveries to the site, the principle contractor shall be required to utilise a safe system of permanent flag men (traffic management operatives) for the control of traffic during all access/egress construction and operational traffic movements at the proposed and existing site access locations.

8.6.2 Traffic Management Signage

The principle contractor shall undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements. Such signage shall be installed prior to works commencing on site.

Proposed signage may include warning signs to provide warning to road users of the works access/ egress locations and the presence of construction traffic. All signage shall be provided in accordance with the *Department of Transport's Traffic Signs Manual, November 2010* -



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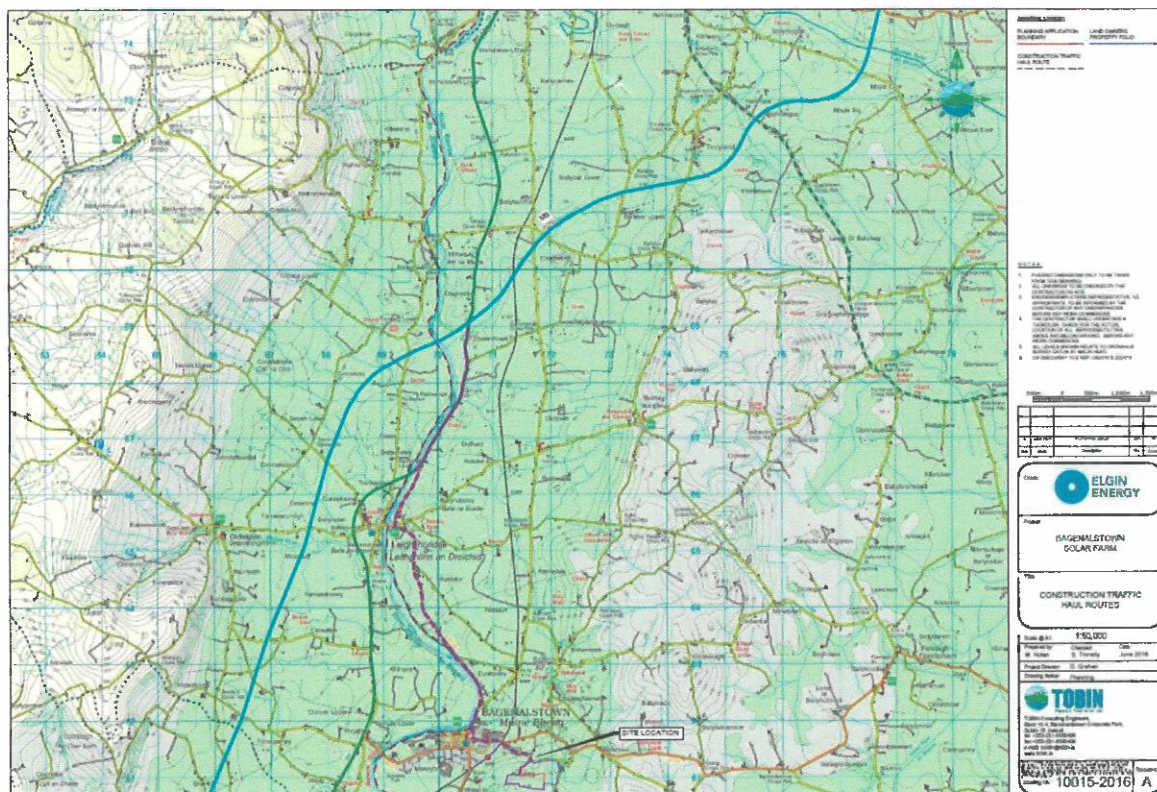
Chapter 8 – Temporary Traffic Measures and Signs for Roadworks. In particular, the Road Classification along the L70031 shall as a minimum be classified Level 3 Type A (i.e., 80 to 100km/h single carriageway road).

In summary, the contractor will be required to ensure that the following elements are implemented:

- Consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements;
- Provision of temporary signage indicating site access location and proposed haul route for contractors and associated suppliers;
- Provision of temporary signage indicating shuttle control ahead; and
- Provision of general information signage to inform road users and local communities of the nature and locations of the works, including project contact details.

8.6.3 Routing of Construction Traffic

Project construction HGV traffic will be directed away from communities where possible to minimise the effect on these communities. As detailed in Section 8.6.2, the majority of materials delivered to site will be delivered using Maximum Legal Articulated Lorries or smaller vehicles. Materials delivered to site will include mounting and solar panel components, delivered from Dublin Port to the site via the M9 Motorway to Junction 6. From here, deliveries will utilise the R448 Regional Road and R705 to Bagenalstown before turning east along the R724 Regional Road to the proposed site on the L70031 Local Road for the proposed construction deliveries as shown in Drawing 10015-2016 below.



Drawing 10015-2016: Haulage route



Other Construction Materials such as stone fill required for internal site roads, concrete, fencing materials and landscaping elements will be sourced by the principle Contractor. Such material deliveries are envisaged to utilise a combination of the aforementioned haul route and the local road network. The principle Contractor shall be required, in the preparation of the CSTMP, to identify the sources and proposed haul routes for all material supplies.

Autotrack assessments of the proposed haul route and site access junction are detailed on Figure 8.2 to 8.6 below. The drawing details the assessment of the swept path requirements of a Max Legal Articulated Lorry and Large Mobile Crane for deliveries to site. The assessment has been undertaken from the R724 / L70031 junction and site access junction with the L70031.

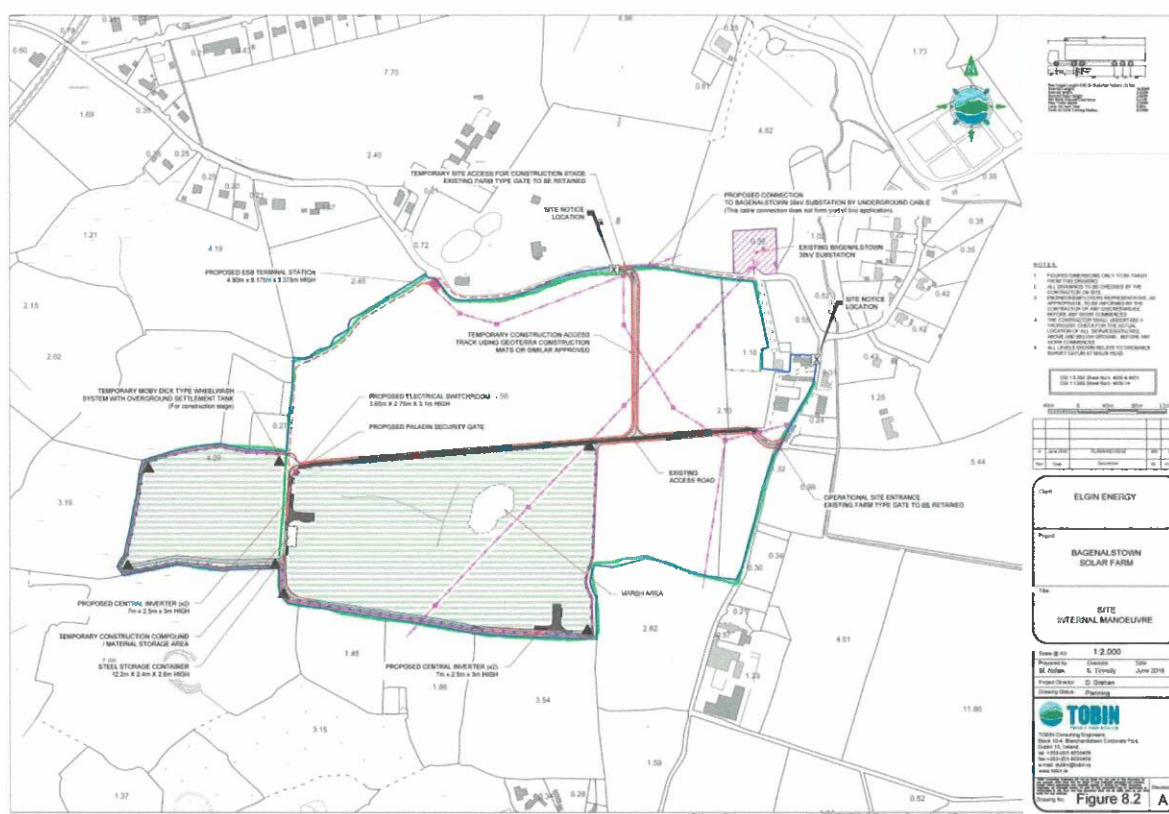


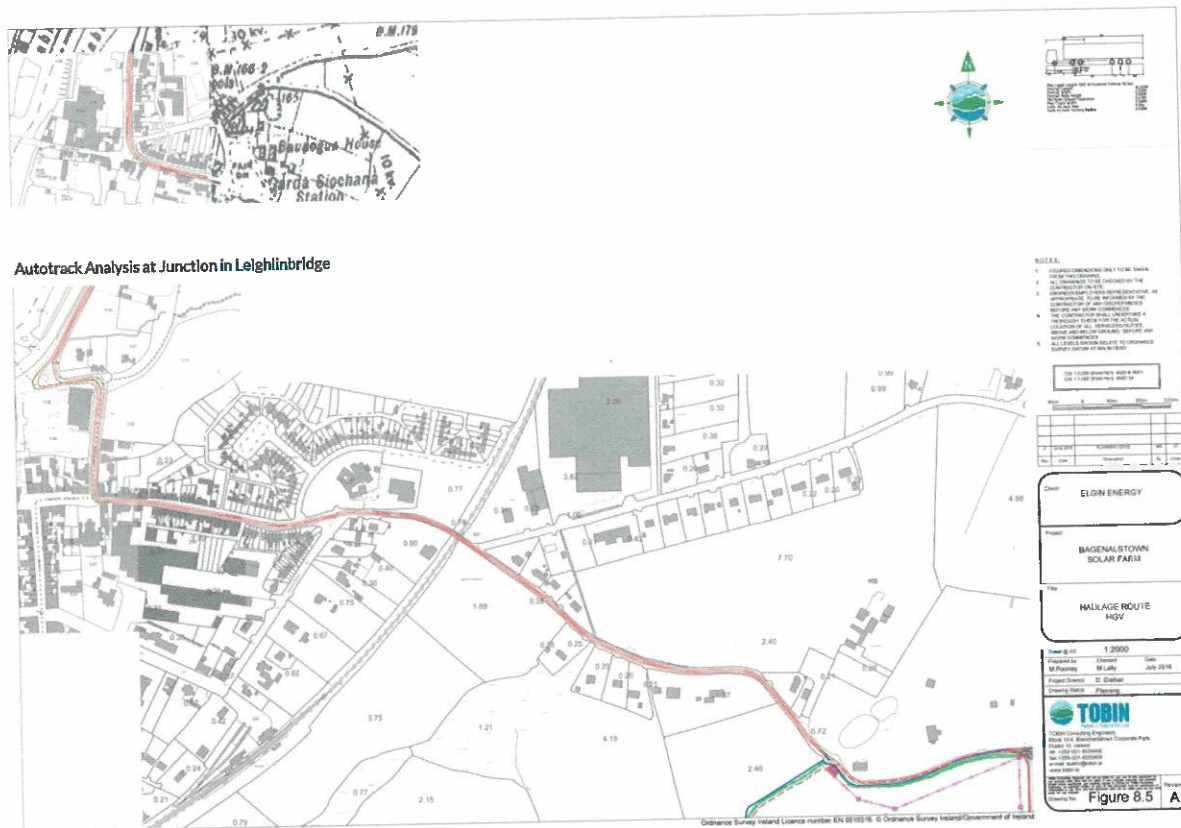
Figure 8.2 Autotrack Assessment - Internal Turning Manoeuvre



Figure 8.3 Autotrack Assessment Entrance – Crane



Figure 8.4 Autotrack Assessment Entrance - HGV



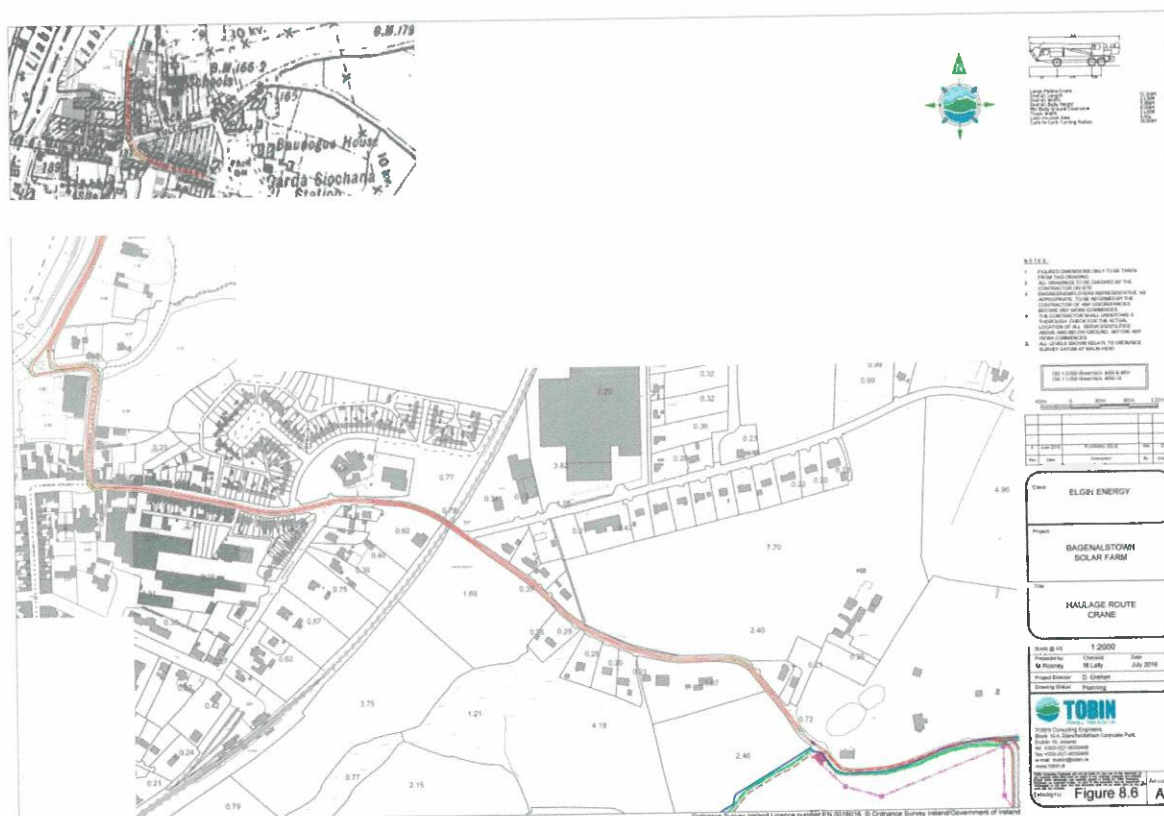


Figure 8.6 Autotrack Assessment Haulage Route – Crane

The assessment has identified that the swept path of a Max Legal Articulated Lorry and Large Mobile Crane can be facilitated along the proposed haul route. At some locations, it will be necessary for the driver of any similar sized delivery vehicle to cross over the centre of the road in order to facilitate turning movements into adjoining roads. The junctions requiring these manoeuvres are:

- The R724 / L70031 Junction;
- The proposed site access junction along the L70031; and
- Leighlinbridge.

As outlined in Section 8.6.5, the Contractor will be required to schedule deliveries in such a way that construction activities and deliveries activities do not occur during peak traffic flows or run concurrently with other deliveries / activities. The scheduling of material deliveries is required in order to facilitate the implementation of traffic management activities at each of the locations identified above.

It is envisaged that a series of Traffic Management Operatives, or a stop/go system, will be implemented on the approaches to these junctions to facilitate the swept paths of large articulated lorries. It should be noted that due to the low level of construction traffic generated by the proposed development, the impacts associated with such manoeuvres shall be for short durations and shall be a minor impact on local traffic.

8.6.4 Connection to Substation

In order to facilitate the connection of the proposed solar farm to the national grid, a connection between the proposed site and the adjacent substation is required, as detailed in Section 2.6 of this report.

The existing substation is situated approximately 485m to the east of the proposed terminal station along the L70031 local road. It is proposed to undertake a temporary lane closure between the proposed development site and the substation location to facilitate the laying of a duct. The principle contractor shall carry out such temporary lane closures outside of peak traffic flow times, and only for the duration of the working day. A stop-go system of work shall be put in place along the route of the cable duct for the duration of the cable laying works. Trenches shall be suitably backfilled at the end of each working day, with the provision of suitable temporary surfacing material, as may be requested by the local authority. Such closures shall only be undertaken following consultation with the local authority and following any requests for notifications by the local authority. A road opening licence shall also be applied for, by the principle contractor to the local authority. The contractor will also be required to provide the requisite bond to ensure reinstatement is completed to the satisfaction of the roads authority.

8.6.5 Timing of Material Deliveries

In order to reduce impacts on local communities and residents adjacent to the proposed sites, it is proposed that:

- The contractor will be required to liaise with the management of other construction projects and the local authority to co-ordinate deliveries;
- The contractor will be required to schedule deliveries in such a way that construction activities and deliveries activities do not occur during peak traffic flows or run concurrently e.g., avoiding pouring of concrete on the same day as material deliveries in order to avoid conflict;
- HGV deliveries to the development site will be suspended on the days of any major agricultural shows, sports events, etc. that have the potential to cause larger than normal traffic volumes to use the stretch of the R724 and local roads in the vicinity of the works;
- The contractor will be required to interact with members of the local community to ensure that deliveries will not conflict with sensitive events such as funerals;
- HGV deliveries will avoid passing schools at opening and closing times where it is reasonably practical; and
- Construction activities will be undertaken based on a six-day working week, with deliveries being restricted to 07:00-19:00 on weekdays and 08:00-14:00 on Saturdays. It is likely that some deliveries will be required to be undertaken outside these hours; however, such deliveries will be agreed in advance with Carlow County Council.

8.6.6 Recommended Traffic Management Speed Limits

Adherence to posted/legal speed limits will be emphasised to all staff/suppliers and contractors during induction training.

Drivers of construction vehicles/HGVs will be advised that vehicular movements in sensitive locations, such as schools and local community areas, shall be restricted to 60 km/h, or other as requested by Carlow County Council. Such recommended speed limits will only apply to



construction traffic and shall not apply to general traffic. It is not proposed to signpost such speed limits in the interest of clarity for local road users.

8.6.7 Road Cleaning

Regular visual condition surveys of the road network in the vicinity of the site will also be required to be carried out. Where identified / required, the contractor shall carry out road sweeping operations, employing a suction sweeper, to remove any project related dirt and material deposited on the road network by construction / delivery vehicles. A wheel wash facility shall also be used at the proposed site access junction.

8.6.8 Enforcement of the Construction Stage Traffic Management Plan

All project staff and material suppliers will be required to adhere to the CSTMP. As outlined above, the principal contractor shall agree and implement monitoring measures to monitor the effectiveness of the CSTMP and compliance will be monitored by the Resident Engineer on behalf of Developer. Inspections / Spot checks will also be carried out to ensure that all project staff and material supplies follow the agreed measures adopted in the CSTMP.

8.6.9 Pavement Condition Survey

The contractor shall liaise with the local authority in order to assess the requirement for pre and post pavement condition surveys. This will ensure that local road will be returned to its existing condition if not enhanced for further use.

8.7 EMERGENCY PROCEDURES DURING CONSTRUCTION

In the case of an emergency the following procedure shall be followed:

- Emergency Services will be contacted immediately by dialing 112;
- Exact details of the emergency/ incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner;
- The emergency will then be reported to the Site Team Supervisors and the Safety Officer;
- Where required, appointed site first aiders will attend the emergency immediately; and
- The Safety Officer will ensure that the emergency services are en route.

8.8 POTENTIAL IMPACTS

8.8.1 Construction Traffic Impact

Due to the low levels of construction generated traffic, the traffic impact at the proposed development access location are considered to have minimal impacts on existing traffic levels provided the measures in the OMTP are adopted in the development of the CSTMP and are adhered to. Motorists may encounter minor delays along the L70031 local road fronting the proposed development where flag men control is required to facilitate safe access / egress or the unloading / loading of materials or plant. In addition, the requirement for a temporary lane closure of the L70031 local road, between the applicant site and the existing substation, may result in minor disruption for local road users.

Similar minor delays will also be encountered at the R724/L70031 Junction in Bagenalstown to facilitate the swept paths of max legal articulated delivery lorries. Similar to the site access



junction, the delivery of material utilising the location will be agreed with the local authority prior to the construction of the development to facilitate the required turning movements. Any disruptions will be of short duration with minimal effect to the background traffic.

8.8.2 Operational Traffic Impact

On completion of the construction works, and when the solar farm is operational, the facility will be remotely monitored with quarterly visits undertaken for routine maintenance and the cleaning of any panels, if required. Occasionally, additional visits may be required undertake minor repairs where necessary. Due to the relatively low operational traffic, it is envisaged that the operational impacts of the proposed development will be imperceptible when compared to the existing background traffic.

8.9 MITIGATION MEASURES

8.9.1 Construction Phase

1.1.1.2 Construction Stage Traffic Management Plan (CSTMP)

The appointed contractor will develop and finalise a CSTMP in consultation with the roads authority, Carlow County Council. The contractor will, during the development and adoption of the CSTMP, agree and implement an appropriate way of monitoring the effectiveness of the plan.

The requirements associated with the required temporary road closure of the L70031 to facilitate the grid connection, as outlined in Section 8.6.4, will reduce the potential impact of the grid connection works on local road users.

8.9.2 Operational Phase

As outlined in Section 8.8.2, following completion of the construction works, and when the solar farm is operational, the majority of the traffic generated for the operation of the site will be monthly visits made to undertake routine maintenance and the cleaning of any panels, if required. Occasionally, additional visits will be required to undertake minor repairs where necessary. Due to the relatively low operational traffic, it is envisaged that the operational impacts of the proposed development will be imperceptible when compared to the existing background traffic. As such, no mitigation measures are proposed for the operation of the proposed solar farm.

8.10 CONCLUSION

The proposed project will utilise the R448 and R705 Regional Roads from the M9 motorway, to Bagenalstown before turning east along the R724 Regional Road to the proposed site along the L70031 for the proposed construction activities. Construction and Operational Traffic volumes associated with the proposed development are low in number and relate primarily to the delivery of construction equipment and materials, and inspection/ maintenance of the proposed development on completion. The implementation of an approved CSTMP will minimise the potential for traffic and transport impacts during construction activities and the residual impact will be minor.



9 GLINT AND GLARE

9.1 INTRODUCTION

A "Glint and Glare" assessment has been prepared to calculate the possible impact upon road safety and residential amenity of nearby residents caused by possible solar reflections (glint and glare) from solar panels within the proposed Bagenalstown Solar Farm. An assessment of the possible impact upon railway infrastructure in the wider study area of the proposed solar farm has also been undertaken. The glint and glare assessment has considered the location and heights of the panels, the receptors, including 30 dwelling locations within 1km of the study area, and the Sun as it passes across the sky through the year. The assessment was carried out by solar panel glint and glare specialists at Macro Works Ltd. The full report is attached in Appendix F.

9.2 DISCUSSION AND MITIGATION

The receptors in this instance are the nearby dwellings, road users, railway signals and train drivers. The potential impacts to each of these are discussed below.

Road Receptors

Solar reflections are theoretically possible towards up to approximately 300m of the local road to the immediate east of the proposed solar farm and a 150m section of the R705 1km east of the site. However, identified existing screening will shield the reflecting panels from view of the lengths of road. No significant impact is expected.

Dwellings Receptors

Solar reflections are theoretically possible at 14 no. of the 30 dwellings surrounding the proposed solar farm. Of the 14 no. dwellings potentially affected by glint and glare, only one house was classified as having a *low* effect while the remaining houses had a *very low* effect. Identified existing screening will shield the reflecting panels from view of these dwellings and the additional proposed landscape screening will further mitigate this very low potential impact.

Railway Line Receptor

It should be noted that a short section (approximately 100m) of the railway line that passes to the southeast of Bagenalstown is contained within the zone of potential reflectance (illustrated in Appendix F). This runs at an oblique angle to the solar farm and within a section of 'cut' (below prevailing ground levels) in this area and will not be affected by solar reflectance.

Mitigation Measures

It is not considered that the low levels of glint and glare nuisance outlined above warrant specific mitigation in this instance. However, it should be noted that as part of landscape and visual mitigation proposals from the project Landscape Architect, existing hedgerows within and around the perimeter of the site will be bolstered with additional whip planting and managed to a height of 3-4m.



9.3 CONCLUSION

No significant impact upon road safety or residential amenity is expected as a result of the presence of existing vegetation screening and additional proposed landscaping at the boundaries of the proposed solar farm development.

10 LANDSCAPE AND VISUAL IMPACT

10.1 INTRODUCTION

A Landscape and Visual Assessment (LVIA) report has been prepared by landscape architect specialists from MacroWorks Ltd. The LVIA report describes the landscape context of the proposed Bagenalstown Solar Farm and assesses the likely landscape and visual impacts of the scheme on the receiving environment and is attached in Appendix G. Although closely linked, landscape and visual impacts are assessed separately.

This landscape and visual impact assessment has been based on:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2002) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (2003); and
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (2013).

10.2 DISCUSSION

A computer generated Zone of Theoretical Visibility (ZTV) map (attached in Appendix G) has been prepared to illustrate the locations from where the solar farm is potentially visible. The ZTV map is based solely on terrain data (bare ground visibility). Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the proposed solar farm will definitely not be visible, due to terrain screening.

The most important point to make in respect of this terrain based ZTV map is that it is theoretical. The proposed PV panels will not rise more than 2.9m above the underlying terrain and will therefore be considerably screened by surrounding hedgerow vegetation resulting in a much lesser degree of actual visibility.

The second form of ZTV mapping relies on drone based data capture, which also maps the terrestrial elements on the landscape such as hedgerows and buildings with an accuracy down to 2cm. This is of far more value in determining the likely visibility of the solar panels, which will not rise more than 2.9m above the ground plane. It was not practical to survey the entire study area using the drone so a more consolidated area incorporating the surrounding network of roads and dwellings within approximately 500m of site boundaries was the focus of this more intensive level of spatial data capture. Analysis of both forms of ZTV map and a comparison between them is provided in Appendix G.

The following points were illustrated:

- There is a dramatic drop-off in the amount of the developed site that will be seen from surrounding receptors once hedgerow screening is accounted for. Much of the central study area will have either no potential view of the proposed solar farm or partial glimpses of less than 20% of the development (yellow pattern).
- The area immediately to the northeast of the site still retains 40-60% visibility due to the higher ground level and absence of hedgerows along these boundaries of the site (Magenta pattern). It should be noted that this area is substantially contained in farmed



fields and does not coincide with any sensitive receptors not otherwise enclosed by vegetation.

- Mature treelines to the south and southeast of the site strongly contain visibility in these directions at the site boundaries. A combination of forestry (to the south) and scrubby land cover (south and west) on the plateau containing the site provide a second line of development screening. Very little visibility is shown beyond this immediate context (edge of yellow pattern).

The assessment also focused on views of recognised scenic value which are primarily indicated within County Development Plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, guide books, road side rest stops or on post cards that represent the area.

Within the 5km extent there are three designated scenic views, however, fieldwork investigations revealed that none of the views afford potential visibility of the proposed solar site. The investigated viewpoints include:

- Viewpoint 34: Muine Bheag - View of town from point to north of entrance along River Barrow;
- Viewpoint 35: Ballymoon Castle - Heritage Site; and
- Viewpoint 36: Swing Cross - Panorama across central plain to Blackstairs.

Viewshed Reference Points (VRP's) are the locations used to study the visual impacts of the proposal in detail. The selected viewpoints are intended to reflect a range of different receptor types, distances and angles. In total, eight Viewshed Reference Points were assessed, with the individual details found within the LVIA report attached in Appendix G.

10.3 MITIGATION

The main mitigation by avoidance measure employed in this instance is the siting of the proposed solar farm in a robust and well-contained rural area that also avails of considerable hedgerow forestry screening so that the scheme will not be prominent within the surrounding landscape. Retention of existing hedgerows boundaries both within and around the site also prevents a sense of ambivalence, aids visual screening, and maintains the existing field pattern. In this respect the proposed solar farm is not perceived to impose itself on the existing landscape pattern.

Where necessary, existing hedgerows will be bolstered with under-planting and inter-planting of whip transplants in order to ensure dense and consistent screening of the site in perpetuity (details of planting are included on Appendix G).

The LVIA report (attached in Appendix G) includes photomontages of the existing environment and the existing environment including the proposed development and with screening added (where a view of the solar farm is anticipated). The Landscape Plan, included with the Planning Application Drawings, also illustrates the landscaping proposals for this development.

Macro Works have prepared a 'Landscape Mitigation Plan' (A1 size) for the development as well as a separate Hedgerow Management and Maintenance document which is included in Appendix G.



10.4 CONCLUSION

Based on the landscape and visual impact assessments prepared for the proposed solar farm at Bagenalstown, the landscape impacts are considered to be no greater than moderate-slight and this degree of impact will be contained within the site and its immediate surrounds. There is also likely to be only slight visual impacts from surrounding receptors due to the high degree of vegetative screening around the site.

11 ARCHAEOLOGY/CULTURAL HERITAGE

11.1 INTRODUCTION

The archaeological, architectural and cultural heritage assessment for the Bagenalstown Solar Farm evaluated both the potential for direct and indirect impacts on the archaeological, architectural and cultural heritage resource within a 1.5km zone of the proposed site boundary.

11.2 ARCHAEOLOGICAL CONSULTATION AND ASSESSMENT

As part of this application, the project team consulted with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Details of the Consultation are included in Appendix B of this PECR.

As a result of the correspondence received from the Department, an archaeological site survey and assessment was undertaken by Dr. Maurice Hurley (Consultant Archaeologist). The report from Dr. Hurley is included in Appendix I and a summary of the assessment findings is included below.

11.3 SITE INSPECTION, CARTOGRAPHIC RESEARCH AND POTENTIAL IMPACTS

There are no identifiable archaeological features within the boundary of the site of the proposal but the western field falls within a Recorded Monument (CW016-026, *field system*). The identification of the field system is based on oblique aerial photographs taken in 1969 at a time when the landscape to the west and north of the site was marginal agricultural grazing land. The landscape has since been extensively altered by modern agricultural practices and today no trace of an ancient field system is visible at ground level. Several enclosures (all Recorded Monuments) lie in the vicinity of the development but all are at distances of 70m or more from the site boundary. The surface features of the enclosures have been removed from the landscape since 1969 but below ground buried features may survive.

The proposal will have no impact on any of the enclosures as the distances from the boundary are more than what is necessary to form an adequate buffer. As there is no surface expression for these enclosures, then there is no visual impact.

11.4 MITIGATION MEASURES AND RECOMMENDATIONS

It is proposed that appropriate mitigation for the potential archaeological resource of the site, including the field system, be provided by archaeological testing to examine the potential for the survival of subsurface elements of the ancient field system. This might most appropriately be required as a condition of planning permission. Elsewhere on the site, archaeological monitoring of ground disturbance associated with the development may also form a condition of planning permission.

In addition, the applicant (Elgin Energy) has significant experience in developing solar farms in rural environments in the UK. Elgin has worked with English Heritage to avoid areas of archaeological interest as the solar farm system deployed is versatile and local areas of interest can be avoided, where necessary.



12 INTERACTION OF THE FOREGOING

12.1 INTRODUCTION

This Planning and Environmental Considerations Report has been prepared to accompany a planning application to Carlow County Council to obtain permission for a proposed development of a solar PV farm at Bagenalstown, County Carlow.

The potential environmental impacts of proposed works at this location have been outlined in this report. This section discusses the potential for interaction between impacts of the different environmental aspects.

12.2 DISCUSSION OF INTERACTIONS

Human Beings/Socio Economic/Traffic/Dust/Noise

Adverse impacts may be associated with noise and vehicular disturbance during construction and to a limited extent during the operational phase. The construction programme is short (i.e., three to four months) and with limited operational maintenance, the impact on local residents will be minimal.

Low noise and dust disturbance levels are expected during the installation of the steel support structures for mounting the solar arrays. Requirements for construction vehicles will be minimal as clearance of topsoil, subsoils and bedrock is restricted to access tracks and bases for the inverter stations. However, site activities will be sensitively managed to ensure that all potential noise and vibration impacts on nearby dwellings will be minimised to acceptable levels.

Social and travel patterns, pedestrian or otherwise, will not be disrupted by the works associated with this development.

Construction and operation of the solar farm at Bagenalstown will generate employment, particularly during the construction phase of the development

The application also involves the retention of existing hedgerows along the internal and external boundaries of the site which will reduce the visual impact of the site.

No impact upon road safety or residential amenity is expected because no solar reflection (glint and glare) is expected to be visible from surrounding roads or dwellings. No impact is expected upon the safety of railway operations in the wider area.

Ecology/Water

There are no significant water features within the site. A small marsh area will remain undisturbed in the centre/east of the site to support biodiversity. Key ecological receptors in the regional and local area of the site include the River Barrow and River Nore SAC, treelines, hedgerows and marsh habitat onsite and protected faunal species including birds. Mitigation measures are recommended and once implemented, potential impacts are considered to be of low magnitude in the temporary to short-term and therefore insignificant and the proposed works will not impact on the local or regional ecological or hydro(geo)logical environment.



Soils/Geology and Hydrogeology/Ecology

Due to the minimally invasive construction methodology (use of steel support structure for solar panel arrays) there will be no significant alteration to the natural geological conditions as a result of this development.

Retention of the soils and subsoils underneath the solar panel arrays ensures that recharge of the underlying hydrogeological units is unaffected. Soils, subsoils and bedrock will be undisturbed except for excavation for access tracks and inverter stations, minimising the impact on vegetation and associated terrestrial invertebrates.

Air Quality and Climate

Works within the application area will have no effect on the microclimate in the immediate vicinity of the site or surrounding area.

Dust suppression and site management mitigation measures will reduce the potential impact of windblown dust around the site and to nearby dwellings. These measures will reduce the impact on human beings and material assets in the community.

Noise and Ecology

Noise emissions from the construction plant and vehicular traffic will cause short term, localised disturbance to habitats and fauna within the boundary and to a lesser extent beyond the site boundary. The application of mitigation measures in Section 4, will ensure that all fauna will be minimally impacted.

Landscape & Visual Assessment/Human Beings/Ecology

A number of landscape and visual impacts interact with both the local human population, and flora and fauna. All existing field boundaries, which includes hedgerows and trees, will be retained for visual screening purposes and this will ensure that there are no long term negative impacts on nesting birds and other associated flora and fauna. Perimeter fencing will be designed to allow access to mammals for continued use of the site during construction and operation.

Cultural Heritage & Archaeology

Due to the limited extent of the excavations and the distance to the nearest protected site, there will be no impact on surface cultural heritage, archaeological sites, monuments, artefacts, designated or undesignated structures as a result of this development. However, slight potential exists for unknown archaeology to be encountered during construction and a specialist archaeologist will be consulted post-planning and during the construction phase to mitigate against any potential impact on archaeological features in the area.

Traffic

Traffic generated from the site will not have a significant impact on traffic in the area of Kilcarrig or Bagenalstown. The volume of traffic at the site will not be intensified and will result in only a



minor to negligible impact on traffic capacity on the surrounding road network during the operational phase of the development and will not have an impact on the use of the road by local residents and/or passers-by. Sightlines at the proposed construction entrance and existing operational entrance will be improved as result of the mitigation measures proposed for the construction and operational phases of this development.

12.3 CONCLUSION

While there is the potential for the above parameters to interact and result in a cumulative impact, it has been demonstrated that none of these cumulative impacts will result in significant environmental degradation. The mitigation measures currently outlined at Bagenalstown are designed to ameliorate the potential impact of the construction and operational activities within the site and on the wider environment.

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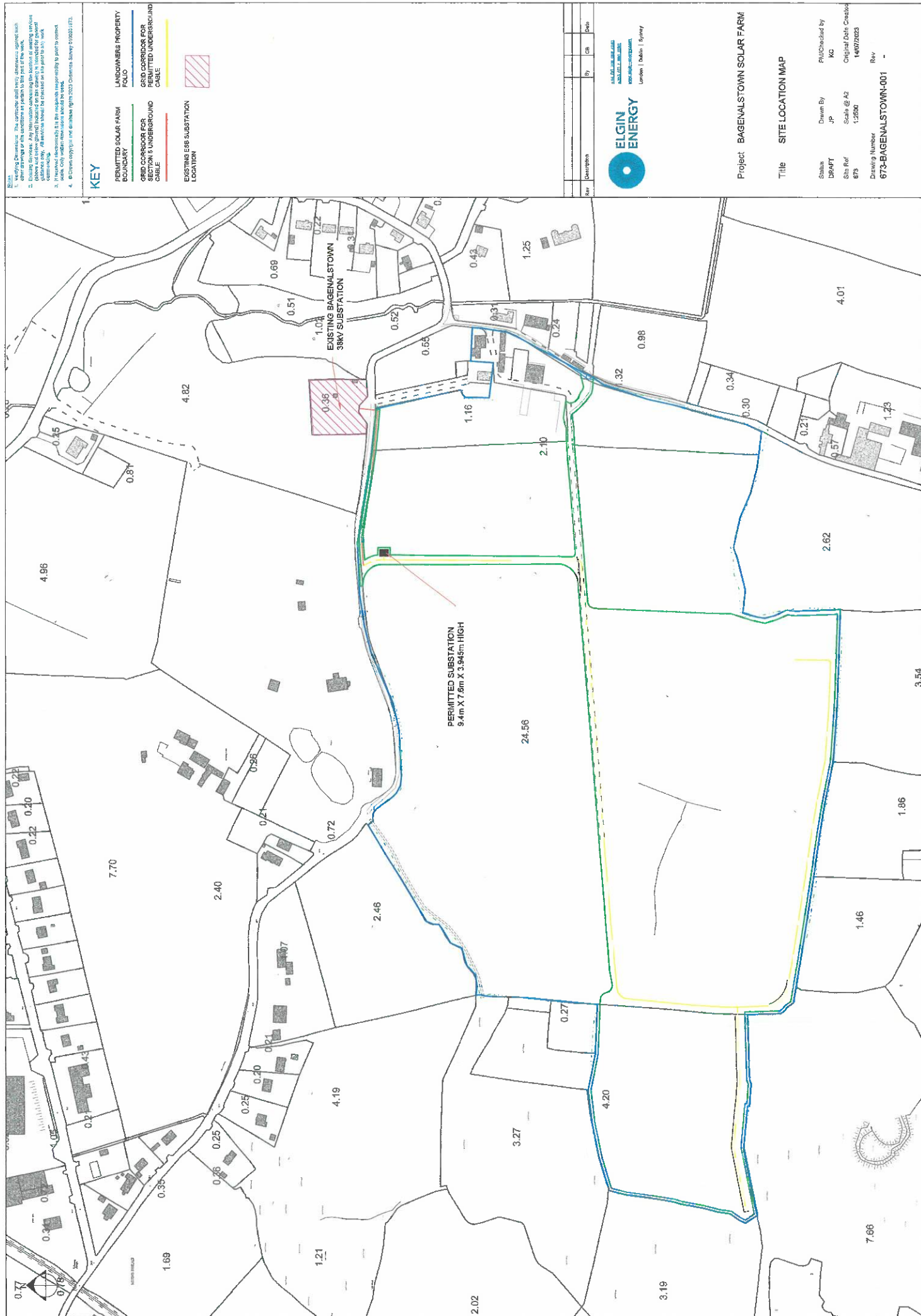
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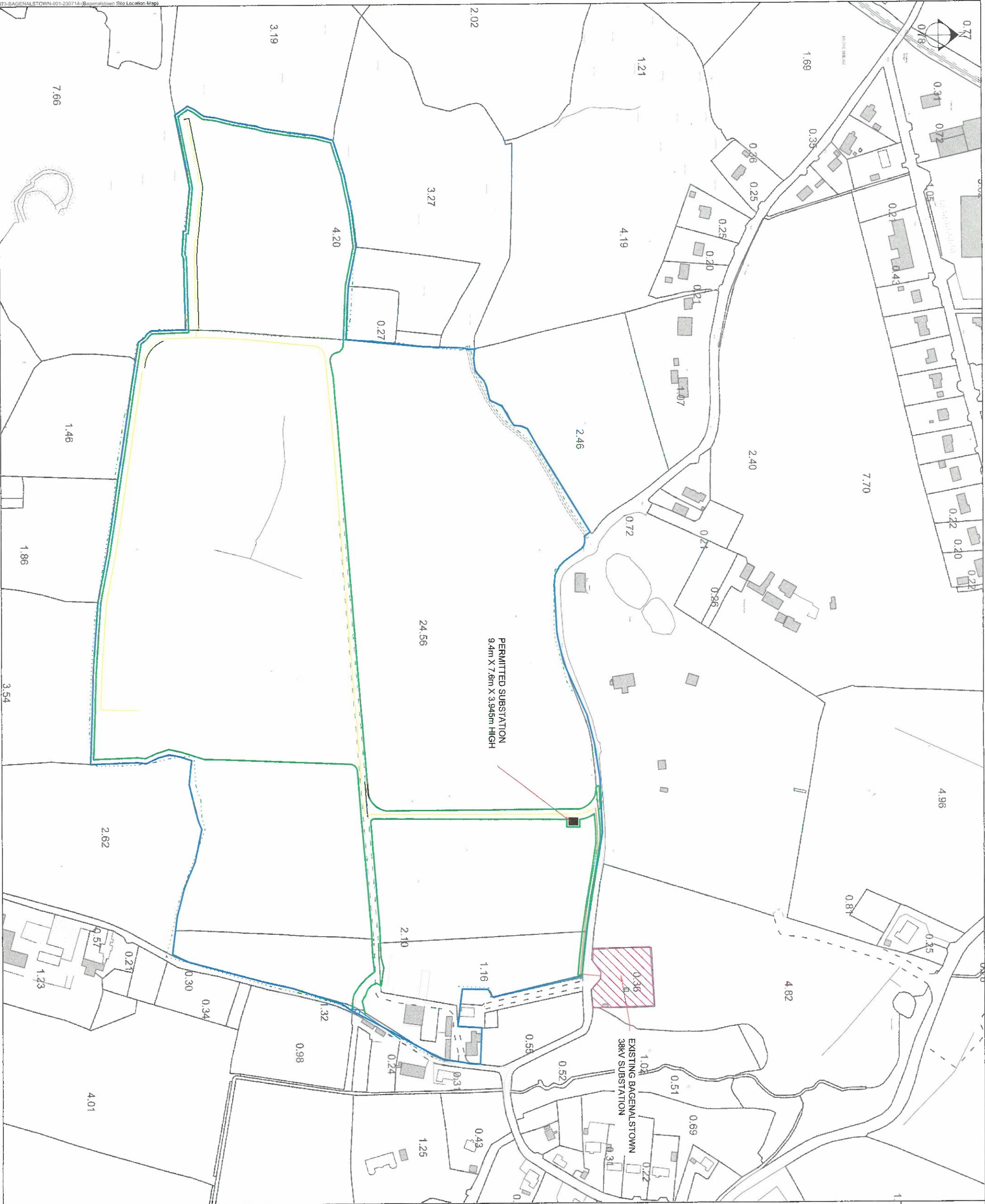
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- Notes
1. Varying Dimensions: The contractor shall verify dimensions against such other drawings or data considered as pertinent to the part of the work.
 2. Existing Services: Any information concerning the location of existing services (including underground services) shall be obtained from the relevant authorities and checked on site prior to any work commencing.
 3. If received electronically it is the contractor's responsibility to print to correct scale. Only written dimensions should be used.
 4. © Crown copyright and database rights 2023 Ordnance Survey 6100016173.

KEY

- | | |
|---|---|
| PERMITTED SOLAR FARM BOUNDARY | LANDOWNERS PROPERTY FOLIO |
| GRID CORRIDOR FOR SECTION 5 UNDERGROUND CABLE | GRID CORRIDOR FOR PERMITTED UNDERGROUND CABLE |
| EXISTING ESB SUBSTATION LOCATION | |



044 000 000 000
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Rev	Description	By	CR	Date

Project BAGENALSTOWN SOLAR FARM

Title SITE LOCATION MAP

Status	Drawn By	PM/Checked by
DRAFT	JP	KC
Site Ref	Scale @ A2	Original Date Created
673	1:2500	14/07/2023
Drawing Number	Rev	
673-BAGENALSTOWN-001	-	

CARLOW COUNTY COUNCIL
PLANNING DEPARTMENT

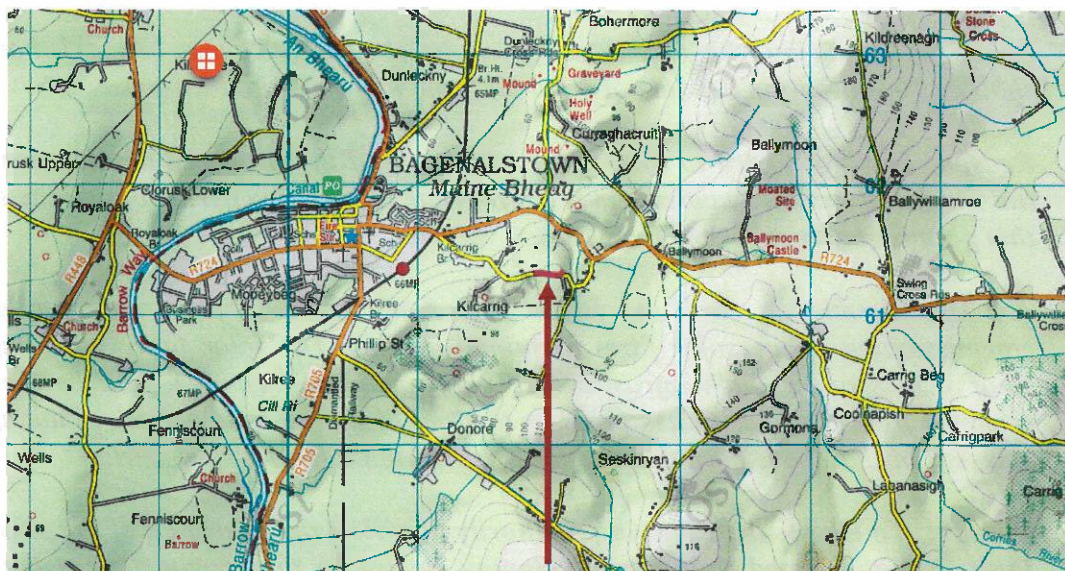
Section 5 declaration & referral on development & exempted development
Planning & Development Act 2000 (as amended)

Reference No. SEC5/23/27

Name of Applicant:	Elgin Energy Services Ltd.
Site Address:	Kilcarrig, Bagenalstown, Co. Carlow.
Referral:	Proposed underground 10kV cable grid connection to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation. The total length of the route is 193m.

1) Site Location

The site in question is located in the townland of Kilcarrig, a rural area c. 1km west of the town. It comprises a proposed underground cabling route (grid connection) totalling 193m in length. The cabling is to connect an onsite substation (relating to a solar farm development that was permitted under reg. ref. 22/118) with the Bagenalstown substation. Approximately 19m of the cabling route will be on a public road (the L70031 local road), and the remainder of approximately 174m will be on private land in the ownership of the solar farm developer.



Route of proposed underground cabling indicated with red line



Application site the subject of permission reg. ref. 22/118 outlined in red

2) Relevant Planning History

22/118: Planning permission GRANTED to Elgin Energy Services Ltd. solar farm on an area of approximately 14.16 hectares, comprising photovoltaic panels on ground mounted frames, 4 no. single storey inverter/transformer stations, 1 no. single storey terminal stations, 1 no. single storey electrical switch room, 1 no. storage container, security fencing, CCTV and all associated ancillary development works. Elgin Energy Services Ltd. are applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operation period of 40 years). Conditions of note include:

2. The period during which the development hereby permitted may be carried out shall be 10 years from the date of the final grant of permission.

Reason: Having regard to the nature and scale of the proposed development, the Planning Authority considers it appropriate to specify a period of validity of this permission in excess of five years.

3a. This permission shall be for a period of 35 years from the date of commissioning of the solar farm permitted herein. The solar farm, including solar panels and related infrastructure and ancillary structures shall be then removed from the site, unless prior to the end of the 35-year period, planning permission shall have been granted for their retention for a further period.

Reason: To enable the Planning Authority to review the operation of the solar farm over the stated time period, having regard to the circumstances then prevailing, and in the interest of orderly development.

4a. This permission shall not be construed as any form of consent or agreement to a connection to the national grid or to the routing or nature of any such

connection, or for the routing and installation of underground cabling within public roads.

b. Final route selection and installation proposals for underground cabling within public roads, including a methodology for excavation and reinstatement works to facilitate same, shall be subject to a separate Roads Opening Licence application which shall be submitted for the consideration of the Council's Transportation Department.

c. Excavation and reinstatement works within public roads shall be carried out in full compliance with the 'Guidelines for Managing Openings in Public Roads' (the Purple Book) and the 'Requirements for the Reinstatement of Openings in National Roads' CC-PAV-04007 (TII 2019).

Reason: In the interest of clarity regarding the scope of this permission and the protection of the integrity and function of public roads.

5. This permission authorises the development as detailed in the plans and particulars received by the Planning Authority and does not relate to any other development on the site not subject of the planning application whether or not such development would otherwise constitute exempted development.

Reason: To avoid any misunderstanding as to the approved plans and particulars of the permission.

SEC5/22/10: Proposed underground 10kV grid connection to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation. The total length of the route is 0.86km. Section 5 lodged 21/03/2022- The Planning Authority sought further information as set out below however no response was received;

1. In order to enable the Planning Authority to issue a declaration on the proposed underground 10kV electrical cable (grid connection), the applicant is requested to submit further information addressing the following:

Previous Section 5 referrals to An Bord Pleanála have highlighted that being granted permission for an electricity generating development was sufficient to classify an applicant as coming within the scope of Class 26 of the Planning and Development Regulations 2001 (as amended), and therefore as falling within the category of a 'statutory undertaker'. That is, under Section 3 of the Planning and Development Act 2000 (as amended), a developer is a statutory undertaker by reason of being authorised (for the time being) to construct a solar farm development, and because the solar farm is a project for the provision of electricity. The Planning Authority is not satisfied that the applicant currently qualifies as a 'statutory undertaker' under Section 3 of the Act in relation to the proposed grid connection. This is by reason that the basis of the Section 5 referral and proposed grid connection relates to a planning permission for a solar farm development (reg. ref. 16/289) that:

- (a) has not been commenced;
- (b) cannot avail of an extension of duration to its appropriate period;
- (c) cannot be implemented by the applicant; and,
- (d) would be superseded and replaced by a new application for permission from the applicant under reg. ref. 22/118, a decision on which has yet to be made by the Planning Authority.

In view of the foregoing considerations, it would appear that the proposed grid connection is premature at this time and pending the outcome of a decision on reg. ref. 22/118, and therefore would not currently come within the scope of Class 26 in Part 1 of Schedule 2 of the Planning and Development Regulations 2001 (as amended).

2. It would appear that the terms and conditions of permission reg. ref. 16/289, including the approved plans and particulars, cannot be used in considering the 'planning status' of the proposed grid connection with respect to the restrictions on exemptions in Article 9 of the Regulations. Parts (a) to (d) of item 1 of this further information request refer in this regard, and namely that on the basis of the information available to the Planning Authority the permission cannot/will not be implemented. The applicant is requested to submit further information to address this matter.

16/289: Permission GRANTED to Elgin Energy Services Ltd. for a solar farm on an area of approximately 14.16 hectares, comprising photovoltaic panels on ground mounted frames, 4 no. Single storey inverter/transformer stations, 1 no. single storey terminal station, 1 no. single storey electrical switchroom, 1 no. storage container, security fencing, CCTV and all associated ancillary development works. The permission was granted on 01/03/17 and expired on 28/02/22. 26 no. conditions were attached to the permission and are appended to this planning report.

3) Relevant Statutory Provisions

Planning and Development Act 2000 (as amended) – (hereafter the Act)

- Section 2(1)

*“**works**” includes any act or operation of construction, excavation, demolition, extension, alteration, repair or renewal and, in relation to a protected structure or proposed protected structure, includes any act or operation involving the application or removal of plaster, paint, wallpaper, tiles or other material to or from the surfaces of the interior or exterior of a structure.*

- Section 3(1)

*In this Act, “**development**” means, except where the context otherwise requires, the carrying out of any works on, in, over or under land or the making of any material change in the use of any structures or other land.*

*“**statutory undertaker**” means a person, for the time being, authorised by or under any enactment or instrument under an enactment to –*

(a) Construct or operate a railway, canal, inland navigation dock, harbour or airport,

(b) Provide, or carry out works for the provision of, gas, electricity or telecommunications services, or

(c) Provide services connected with, or carry out works for the purposes of the carrying on of the activities of, any public undertaking.

Also, Section 4(2) of the Act, which makes a provision for ministerial regulations to set out further exemptions. The Planning and Development Regulations as amended

derive from this section and designate further works as being exempted development for the purposes of the Act.

- Section 4(4)
Notwithstanding..... any regulations under subsection (2), development shall not be exempted development if an environmental impact assessment or an appropriate assessment of the development is required"
- Section 172(1)
"An environmental impact assessment shall be carried out by a planning authority or the Board, as the case may be in respect of an application for consent for –

(a) Proposed development of a class specified in Schedule 5 to the Planning and Development Regulations 2001 which exceeds a quantity area, or other limit specified in that Schedule, and

(b) Proposed development of a class specified in Schedule 5 to the Planning and Development Regulations 2001 which does not exceed a quantity, area or other limit specified in that Schedule but which the planning authority or the Board determines would be likely to have significant effects on the environment."
- Section 177U(9)
"In deciding upon a declaration or a referral under section 5 of this Act a Planning Authority or the Board, as the case may be shall where appropriate, conduct a screening for appropriate assessment in accordance with the provisions of this section".

Planning and Development Regulations 2001 (as amended) – (hereafter the Regulations)

- Article 3(3)
*"**electricity undertaking**" means an undertaker authorised to provide an electricity service".*
- Article 6(1)

Subject to article 9, development of a class specified in column 1 of Part 1 of Schedule 2 shall be exempted development for the purposes of the Act, provided that such development complies with the conditions and limitations specified in column 2 of the said Part 1 opposite the mention of that class in the said column 1.

Article 9(1) as referred to in Article 6(1) sets out a list of restrictions on exempted development.

- Schedule 2, Part 1
Development by Statutory Undertakers
Class 26
"the carrying out by any undertaker authorised to provide an electricity service of development consisting of the laying underground of mains, pipes, cables or other apparatus for the purposes of the undertaking",

Article 9(1) Restrictions on Exemption Development to which Article 6 relates shall not be exempted development for the purposes of the Act –

(a) If the carrying out of such development would

(i) Contravene a condition attached to a permission under the Act or be inconsistent with any use specified in a permission under the Act.

(iii) endanger public safety by reason of traffic hazard or obstruction of road users,

(vii) consist of or comprise the carrying out under a public road of works other than a connection to a wired broadcast relay service, sewer, watermain, gas main or electricity supply line or cable, or any works to which class 25, 26 or 31(a) specified in Column 1 of Part 1 of Schedule 2 applies.

(vii) consist of or comprise the excavation, alteration or demolition (other than peat extraction) of places, caves, sites, features or other objects of archaeological, geological, historical, scientific or ecological interest the preservation, conservation or protection of which is an objective of a development plan or local area plan for the area in which the development is proposed or, pending the variation of a development plan or local area plan, or the making of a new development plan or local area plan, in the draft variation of the development plan or the local area plan or the draft development plan or draft local area plan,

(viiA) comprise of or comprise the excavation, alteration or demolition of any archaeological monument included in the Record of Monuments and Places, pursuant to section 12(1) of the National Monuments (Amendment) Act 1994, save that this provision shall not apply to any excavation or any works, pursuant to and in accordance with a consent granted under section 14 or a licence granted under section 26 of the National Monuments Act 1930 (No 2 of 1930) as amended.

(viiB) comprise development in relation to which a planning authority or An Bord Pleanála is the competent authority in relation to appropriate assessment and the development would require an appropriate assessment because it would be likely to have a significant effect on the integrity of a European site,

Case Law

O Grianna (and others) v An Bord Pleanála (and others) Record L 2014 No 2014 No 19 JR; 2014 No 10 COM. High Court judgement on judicial review of a permission granted on appeal by the Board for a development comprising 6 wind turbines and associated infrastructure in County Cork. The High Court judgement, quashing the Board's decision, was based on the conclusion that the windfarm and grid connection constitute one single project and that both elements together would have to be subject to EIA in order to comply fully with the terms of the Directive.

Previous Referrals

PL302895: The Board determined that the provision of a medium voltage grid connection between a permitted solar farm and the Dunfirth ESB substation at Dysart, Johnstownbridge, County Kildare, is development and is exempted development.

RL3503: The Board determined that the provision of a connection between the 110kv substation of the Yellow River Windfarm granted under PA0032 & the National Grid is development and is exempted development at Rhode, Co. Offaly.

RL3375: The Board determined that 220m of 20kv underground cable forming part of grid connection at Raragh, Kingscourt, Co Cavan is development and is exempted development.

RL3408 RL3409 RL3410 RL3411: The Board determined that the development of grid connection from Crory / Lodgewood substation to Ballycadden windfarm is development and is not exempted development. I note that this determination found that the development came within the scope of Article 9(1) (a) of the Regulations as their construction contravened a condition of the planning permission for the relevant windfarms.

RL 2789: The Board determined that the laying of a 110kv underground electricity cable forming the grid connection to windfarm at Knockacummer Co Cork is development and is exempted development.

RL2778 The Board determined that the provision of 10.2km of underground cable forming the grid connection of windfarm at Loughaun North, Tulla, Co Clare to existing substation at Tooreen Ennis Co Clare is development and is exempted development.

RL3377 RL3401: The Board determined that the provision of a 20kv electrical connection between Cnoc windfarm and Ballybeagh 38kv substation, Tullaroan, Co Kilkenny is development and is exempted development.

4)Environmental Impact Assessment

Having regard to the nature, size and location of the development as detailed in the plans and particulars received, it is considered that there is no real likelihood of significant effects on the environment arising from the proposed development. The need for environmental impact assessment can, therefore, be excluded and a screening determination is not required.

5)Appropriate Assessment

At its closest point, the River Barrow and River Nore cSAC (Site Code 002162) is c.1.8km west of the site. From river catchment mapping for the area the nearest watercourses to the site are c. 500m to the south and c. 380m to the northeast, which are both hydrologically connected to the SAC.

The proposal has been assessed having regard to the requirements of the EU Habitats Directive. Given the proximity of the nearest European Site and the nature and extent of the referral in question, and intervening land uses located in the area, it is considered reasonable to conclude on the basis of the information available which is deemed adequate to inform a screening determination, that the development (i.e.

proposed underground cabling) on its own or in combination with other plans or projects, would not be likely to result in any potential significant effects on the European Site. Therefore, Appropriate Assessment is not required.

6)Flood Risk

On the basis of CFRAM flood maps for the area the proposed cabling route is not located in an area at risk of flooding.

7)Built Heritage

Archaeology

There is a recorded archaeological feature beside the southern end of the proposed cabling route which is on private land. This relates to ref. CW016-041, an enclosure.

There is a group of archaeological features further the south by c. 340m. These are CW016-042 (an enclosure), CW016-043 (a rath), CW016-044 (a rath), CW016-046 (field system), CW016-130 (rock art),

Architectural Heritage (RPS, NIAH & ACA)

No recorded features on or in the vicinity of the site.

8)Assessment

In addition to an application form, covering letter and location/site maps, the referral documentation includes particulars submitted as part of Pl ref; 22/118 including a Planning and Environmental Considerations Report, an AA Screening Report, and ESB Networks construction specification documents on the installation of ducts and ancillary structures for 20kV underground power cables.

The relevant statutory provisions for this referral are set out in section 3 of this planning report, which includes relevant case law and previous referrals decided on by the Board.

Definition of Works & Development

It is firstly evident that the proposal does constitute development for planning purposes pursuant to the definition of 'works' and 'development' in Section 3 of the Act.

Exempted Development

The next matter to consider is whether the proposal constitutes exempted development. The relevant exempted development provision in this regard is Class 26 in Part 1 of Schedule 2 of the Regulations, which refers to:

“the carrying out by any undertaker authorised to provide an electricity service of development consisting of the laying underground of mains, pipes, cables or other apparatus for the purposes of the undertaking”,

It is accepted in relation to the wording of Class 26 that the proposal is a development consisting of the laying of underground cables for the purposes of the undertaking.

On the matter of the requirement for the proposal to be carried out by an undertaker authorised to provide an electricity service, Article 3(3) of the Regulations is of relevance. Article 3(3) states:

“electricity undertaking” means an undertaker authorised to provide an electricity service”.

A further definition of an ‘electricity undertaking’ is provided in Electricity Regulation Act 1999 as follows:

“electricity undertaking” means any person engaged in generation, transmission, distribution or supply of electricity, including any holder of a licence or authorisation under this Act, or any person who has been granted a permit under Section 37 of the Principal Act.”

The broader definition of a ‘statutory undertaker’ as applies to Class 26 in the Regulations, is set out in Section 2 of the Act, which states:

“statutory undertaker” means a person, for the time being, authorised by or under any enactment of instrument under an enactment to –

- (a) Construct or operate a railway, canal, inland navigation dock, harbour or airport,*
- (b) Provide, or carry out works for the provision of, gas, electricity or telecommunications services, or*
- (c) Provide services connected with, or carry out works for the purposes of the carrying on of the activities of, any public undertaking.*

Previous relevant referrals before the Board highlight that being granted permission for an electricity generating development is sufficient to classify applicants as coming within the scope of Class 26 of the Regulations and therefore as falling within the category of a statutory undertaker. Elgin Energy Services Limited were granted permission under Pl Ref; 22/118 by order dated the 11/04/2023 and valid until the 10/04/2033 and are therefore considered a statutory undertaker for the purposes of the current proposal and the associated planning application. That is, an applicant/developer is a statutory undertaker by reason of being authorised to construct a solar farm development under the Planning Act, and because the solar farm is a project for the provision of electricity.

The Planning Authority are therefore satisfied on the basis of the planning history of the site that the applicant qualifies as a statutory undertaker.

Article 9 Restrictions on exemptions

EIA

Developments requiring EIA or AA are de-exempted under Section 4(4) of the Act. The proposal for underground cabling is not a prescribed class of development for the purposes of EIA. Also, as detailed in section 4 of this planning report, it is considered by reason of the limited nature and scale of the works involved, that the proposal does not require EIA. The criteria in Schedule 7 of the Regulations have been taken into account in this regard. It is also relevant to note that the solar farm development permitted under reg. ref. 22/118 was not subject to EIA, and solar farm developments are not a prescribed class of development for the purposes of EIA. The O’Grianna judgement is of relevance to this matter.

AA

An Appropriate Assessment Screening Report has been included with the referral, which was submitted to the Planning Authority in support of the application under reg. ref. 22/118. Underground cabling to connect the solar farm to the Bagenalstown substation was considered in this screening report. As per section 5 of this planning report: - *Given the proximity of the nearest European Site and the nature and extent of the referral in question and intervening land uses located in the area, it is considered reasonable to conclude on the basis of the information available which is deemed adequate to inform a screening determination, that the development (i.e. proposed underground cabling) on its own or in combination with other plans or projects, would not be likely to result in any potential significant effects on the European Site.*

Conditions of a Permission

Part (a)(i) of Article 9 removes exemptions where the carrying out of a development would contravene a condition attached to a permission under the Act or be inconsistent with any use specified in a permission under the Act. Condition no. 2 of the permission states:

None of the conditions attached to the grant of planning under Pl Ref; 22/118 place a restriction on the exemption being sought by the applicant and it is considered that the proposed would not contravene a condition of this grant of permission.

Public Safety/Traffic Hazard

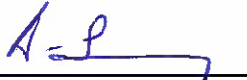
Part (a)(iii) of Article 9 removes exemptions where the carrying out of a development would endanger public safety by reason of traffic hazard or obstruction of road users. The works proposed are subject to a road opening license and a Traffic Management Plan and Traffic Safety Measures are required as part of compliance with Conditions No. 15 and 16 of Pl Ref; 22/118.

It is considered that none of the restrictions on exemptions in Article 9 would be triggered by the proposed development. The information set out in Table 1 in the covering planning report submitted with the referral have also been considered in this regard.

9)Recommendation

It is recommended that a declaration is issued confirming that the proposed underground 10kV cable grid connection to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation is development and is exempted development. Please see attached declaration.

Signed: 
Executive Planner
Date: 15/09/23

Signed: 
Senior Planner
Date: 15/8/23

Development & Exempted Development
Section 5 of the
Planning and Development Act 2000 (as amended)

WHEREAS a question has arisen as to whether the installation of the proposed underground 10kV cable grid connection of 193m to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation at Kilcarrig, Bagenalstown, Co. Carlow is or is not development and is or is not exempted development;

AS INDICATED on the plans and particulars received by the Planning Authority on 21/07/2023;

AND WHEREAS Elgin Energy Services Ltd requested a declaration on the said question from Carlow County Council;

AND WHEREAS Carlow County Council as the Planning Authority, in considering this application for a declaration under Section 5 of the Planning and Development Act 2000 (as amended), had regard to;

- (a) Sections 2, 3, 4 and 172, and 177 in the Planning and Development Act 2000 (as amended);
- (b) Articles 3, 6 and 9 and Schedules 2 Part 1 Class 26 in the Planning and Development Regulations 2001 (as amended);
- (c) The planning history of the site;

AND WHEREAS Carlow County Council has concluded that the installation of the proposed underground 10kV cable grid connection of 193m to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation would constitute 'works' and therefore 'development' pursuant to the meanings ascribed to same in Sections 2 and 3 of the Planning and Development Act 2000 (as amended);

AND WHEREAS Carlow County Council has concluded that the installation of Proposed underground 10kV cable grid connection of 193m to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation would come within the scope of Class 26 in Part 1 of Schedule 2 of the Planning and Development Regulations 2001 (as amended);

NOW THEREFORE Carlow County Council, in exercise of the powers conferred on it by Section 5(2)(a) of the Planning and Development Act 2000 (as amended), hereby decides that the proposed underground 10kV cable grid connection of 193m to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation at Kilcarrig, Bagenalstown, Co. Carlow **is development and is exempted development.**

Please note that any person issued with a declaration under subsection 2(a) of the Planning and Development Act 2000 (as amended) may on payment to the Board of

the prescribed fee, refer a declaration to An Bord Pleanála within 4 weeks of the issuing of the decision.

APPENDIX 1

APPROPRIATE ASSESSMENT SCREENING REPORT

DESCRIPTION OF PROJECT AND LOCAL SITE

Reg. ref. SEC5-23/27 – Proposed underground 10kV grid connection to connect a permitted onsite solar farm substation to the existing 38kV Bagenalstown substation.

Site Location:

Kilcarrig, Bagenalstown, Co. Carlow.

Total Site Area:

Grid connection route 193m in length.

Floor area of proposed development:

N/A. Grid connection route 193m in length.

Identification of nearby Natura 2000 site(s):

At its closest point, the River Barrow and River Nore cSAC (Site Code 002162) is c.1.8km west of the site. From river catchment mapping for the area the nearest watercourses to the site are c. 500m to the south and c. 380m to the northeast, which are both hydrologically connected to the SAC.

Is the application accompanied by an EIS?

No.

B. IDENTIFICATION OF THE RELEVANT NATURA 2000 SITE(S)

The reasons for the designation of the Natura 2000 site:

(A site synopsis can be obtained from www.npws.ie)

The conservation objectives/qualifying interests of the site and the factors that contributes to the conservation value of the site:

(A site synopsis can be obtained from www.npws.ie)

C. NPWS ADVICE

Advice received from NPWS over phone:

None

Summary of advice received from NPWS in written form:

None

D. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

(Purpose of this is to identify if the effect(s) identified could be significant – if uncertain assume the effect(s) are significant).

If answer yes to any of the questions, below then the effect is significant.

Would there be any impact on an Annex 1 habitat? (Annex 1 habitats are listed in Appendix 1 of AA Guidance)

No.

Would there be a reduction in habitat area on a Natura 2000 site?

No.

Would there be direct/indirect damage to the physical quality of the environment (e.g. water quality and supply, soil compaction) in the Natura 2000 site?

No.

Would there be serious/ongoing disturbance to species/habitats for which the Natura 2000 site is selected (e.g. because of increased noise, illumination and human activity)?

No.

Would there be direct/indirect damage to the size, characteristics or reproductive ability of populations on the Natura 2000 site?

No.

Would the project interfere with mitigation measures put in place for other plans/projects. (Look at in-combination effects with completed, approved but not completed, and proposed plans/projects. Look at projects/plans within and adjacent to Natura 2000 sites and identify them).

No.

E. SCREENING CONCLUSION

The development has been assessed having regard to the requirements of the EU Habitats Directive.

The proposal has been assessed having regard to the requirements of the EU Habitats Directive. Given the proximity of the nearest European Site and the nature and extent of the referral in question and intervening land uses located in the area, it is considered reasonable to conclude on the basis of the information available which is deemed adequate to inform a screening determination, that the development (i.e. proposed underground cabling/grid connection) on its own or in combination with other plans or projects, would not be likely to result in any potential significant effects on the European Site. Therefore, Appropriate Assessment is not required.

Signed: 
Executive Planner
Date: 15/09/23



Development & Exempted Development
Section 5 of the
Planning and Development Act 2000 (as amended)
SEC5/23/27

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Please note that any person issued with a declaration under subsection 2(a) of the Planning and Development Act 2000 (as amended) may on payment to the Board of the prescribed fee, refer a declaration to An Bord Pleanála within 4 weeks of the issuing of the decision.

Signed:

Nicola Candler

Date:

16/08/2023