



Awel y Môr Offshore Wind Farm

Outline Construction Method Statement (Clean)

Deadline 2

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Abbreviations and acronyms

TERM	DEFINITION
ALEP	Artificial Light Emissions Plan
AIL	Abnormal Indivisible Load
CBS	Cement Bound Sand
CFA	Continuous Flight Auger
CMS	Construction Method Statement
CoCP	Code of Construction Practice
DCC	Denbighshire County Council
DEFRA	Department of the Environment, Food and Rural Affairs
DCO	Development Consent Order
EA	Environment Agency
Onshore ECC	Onshore Export Cable Corridor
ECOW	Ecological Clerk of Works
HVAC	High Voltage Alternating Current
HGV	Heavy Good Vehicle
LEMP	Landscape and Ecology Management Plan
NRW	Natural Resources Wales
OWF	Offshore Wind Farm
PPEIRP	Pollution Prevention and Emergency Incident Response Plan
PEIR	Preliminary Environmental Information Report
PRoW	Public Rights of Way

TERM	DEFINITION
SEPA	Scottish Environment Protection Agency
TCC	Temporary Construction Compound
WTGs	Wind turbine generators

1 Introduction

1.1 Purpose of this Outline CMS

- 1 This Outline Construction Method Statement (CMS) is provided as Appendix 1 to the Outline Code of Construction Practice (CoCP) (application ref: 8.13) as part of the Environmental Statement (ES).
- 2 This is an outline document that, by reference to the assessments reported in the ES, sets out the key elements that will be secured in the detailed CMS which Awel y Môr Offshore Wind Farm Limited (The Applicant) will be required to submit to Denbighshire County Council (DCC) for approval as a requirement of the DCO.
- 3 This Outline CMS sets out the construction methods which will be implemented by the Applicant and its contractors during the construction of the Awel y Môr OWF and should be read in conjunction with the Outline CoCP and all of its supporting appendices.

1.2 Scope of this Outline CMS

- 4 For the avoidance of doubt, this Outline CMS relates to the onshore elements of the Awel y Môr OWF only (i.e. landward of Mean Low Water). This document does not relate to offshore works seaward of Mean Low Water that are principally marine activities.

2 General Construction Management

2.1 Introduction

- 5 This section addresses construction methods which are common to, or shared by, some or all of the component elements of the proposed onshore works.

2.2 Construction Working Hours

- 6 The working hours for the project are explained in detail within the Outline CoCP (application ref 8.13).

2.3 Construction of Temporary Construction Compounds

- 7 Where a Temporary Construction Compound (TCC) is to be constructed in association with the onshore works, the following provisions will apply.
- 8 The temporary construction compound base area will be constructed by removing the topsoil and setting aside for reuse, laying a geotextile membrane or similar separation membrane directly on top of the subsoil, over which layers of granular stone will be spread or alternatively use of protective matting, temporary metal road surface (i.e. trackway) or a tarmac surface could be used. Any existing services in the area will be crossed in a manner agreed with the services owner. All temporary services necessary for the activities of onshore works within a temporary construction compound will be ducted through the temporary haul road under the membrane and the location will be identified for future reference. Where an impermeable surface is used, suitable surface water drainage measures will be used.
- 9 Once the compound has been constructed, foundations for the site cabins will be installed. Once this work is completed, the cabins will be delivered and placed using a suitably sized all terrain crane.
- 10 Any lighting used within temporary construction compound will comply with the approved Artificial Light Emissions Plan (ALEP) to be submitted for the approval of DCC. An Outline ALEP can be found in Appendix 10 (application ref: 8.13.10) of the Outline CoCP.

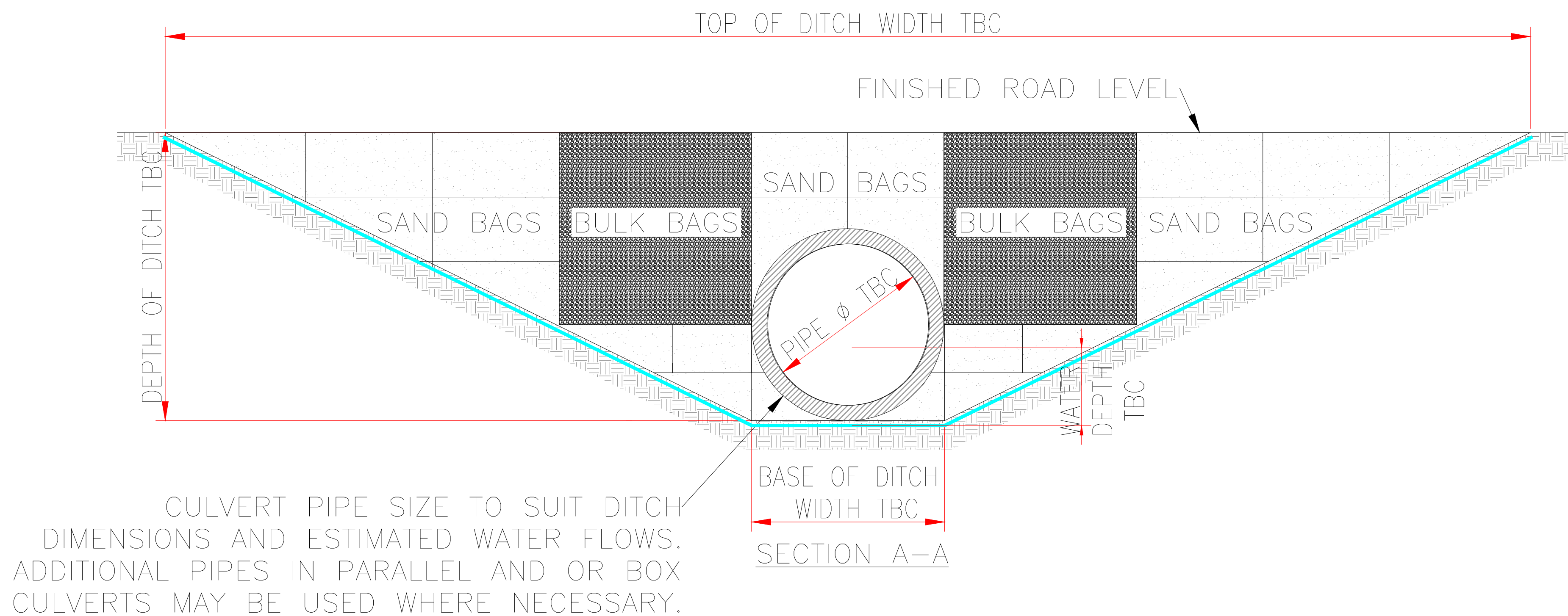
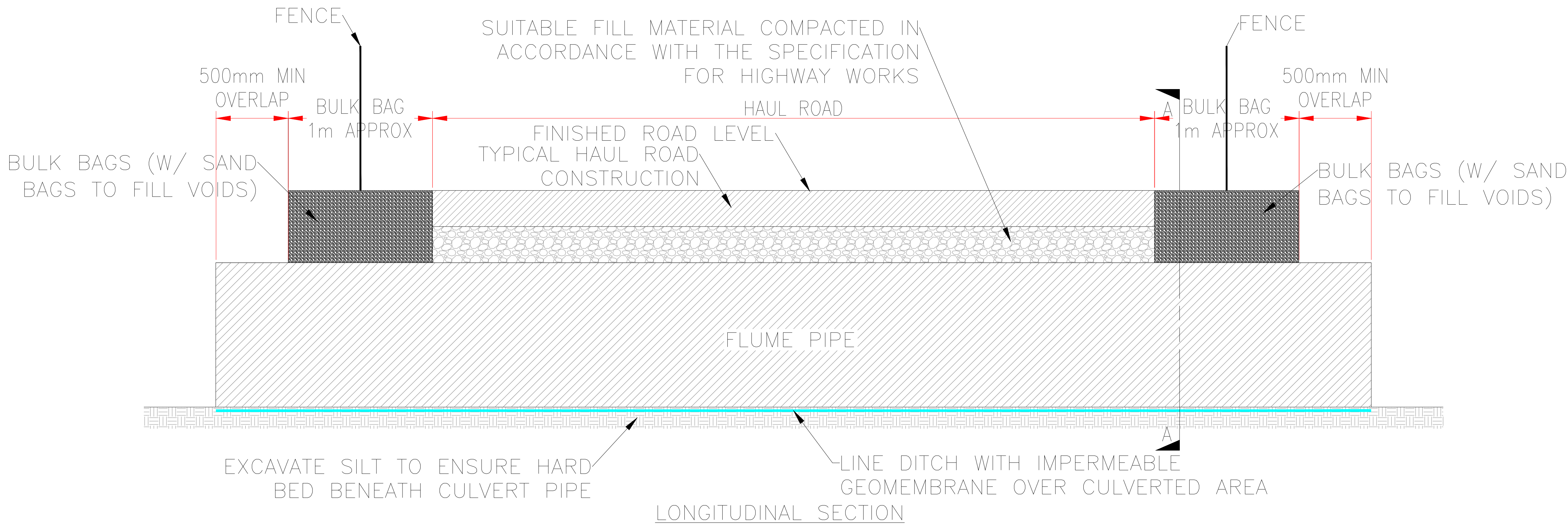
- 11 Material and non-static plant for the installation of the onshore cable will be stored at each compound and transported out to the active cable installation sites.
- 12 Each compound would be removed at the end of the project and the land reinstated to its former condition as far as reasonably practicable.

2.4 Temporary Haul Road

- 13 The temporary haul road which is to be constructed along the cable route, to provide access to the duct/cable installation work sites, will be constructed from a range of different materials depending on ground conditions. All temporary haul roads will be suitably engineered to support the axle weight from the construction vehicles. Haul roads will be periodically inspected and maintained throughout the construction phase.
- 14 Depending upon the ground conditions and weather conditions it may not be necessary to construct a designated haul road. Where the ground is sufficiently firm enough it may be acceptable to drive directly on the sub-soil (this will be confirmed in line with the Final Soil Management Plan).
- 15 The stone haul road will be constructed by placing successive layers of stone compacted on a layer of permeable geo-textile membrane which provides additional ground stability. In certain areas the installation of drainage measures for the haul road may be required which will be detailed at the design stage.
- 16 The use of the haul road will reduce road traffic movements on the local highway network between entry and exit points along the cable route.
- 17 Construction work across surface watercourses will require measures to ensure that the water quality and flow rates are unaffected either directly or indirectly.
- 18 Where the haul road crosses smaller watercourses and land drainage, measures would be discussed with the relevant stakeholders (e.g. construction access roads installed over pre-installed culverts, flumes, installation of bailey bridges etc).

- 19 It is proposed to disapply the Environmental Permitting (England and Wales) Regulations 2016 Flood Risk Activity Permits (FRAPs) and Land Drainage Act 1991 Ordinary Watercourse Consent (OWC) within the draft DCO for the proposed development. The Applicant will provide the final CMS which will include the final detailed design and approach to water way crossings.
- 20 At land drain crossings and smaller watercourses the haul road will be installed over a pre-installed culvert pipe of suitable size to accommodate the water volumes and flows necessary. The design (and reinstatement following removal) will be dependent on the particular setting and characteristics of the watercourse at the crossing location. All works will be designed in accordance with recognised best practice guidance current at the time of the design, including guidance developed by NRW and other UK environment agencies (EA, SEPA) including CIRIA C689 'Culvert design and operation guide' (2010).
- 21 Where culverts are used, care will be taken to preserve the channel bed. If channel bed materials are excavated in order to install the culvert at an appropriate depth (to permit flow), then these will be stockpiled and stored separately to other materials and reinstated following removal of the culvert. Appropriate techniques (such as geotextiles membranes) will be used to minimise mixing of natural in situ materials with temporary imported aggregates or fill.
- 22 During installation and removal of culverts, temporary silt mitigation measures will be put in place to avoid pollution of the watercourse with suspended solids.
- 23 Design, installation and removal of culverts will be in liaison with the ECoW to allow for appropriate crossings to be included, as appropriate, for mammals and aquatic species.

- 24 As an alternative, and only where appropriate, diversion of the land drain or watercourse may be used. It is not proposed to pipe larger or deeper watercourses. Where appropriate, another alternative which could be deployed is the use of temporary 'Bailey' bridges (steel framed modular units), or similar, supported on abutments outwith the channel. Figure 1 and Figure 2 provide indicative arrangements for these crossing options.



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- NOTES
- DO NOT SCALE FROM THIS DRAWING.
 - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 - ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.
 - ANY HAUL ROAD CROSSING OF WATERCOURSES MUST BE UNDERTAKEN IN CONSULTATION NATURAL RESOURCES WALES AND / OR DENBIGHSHIRE COUNTY COUNCIL AS APPROPRIATE.
 - DESIGN OF CULVERT CROSSING WILL BE DEPENDANT ON SIZE OF WATERCOURSE, LOCAL GROUND CONDITIONS ETC AND TO BE CONFIRMED AT DETAILED DESIGN.

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01	24-03-2022	DRAFT FOR COMMENT	DB	PM	AH
REV	DATE	REASON FOR ISSUE	BY	CHK	APP

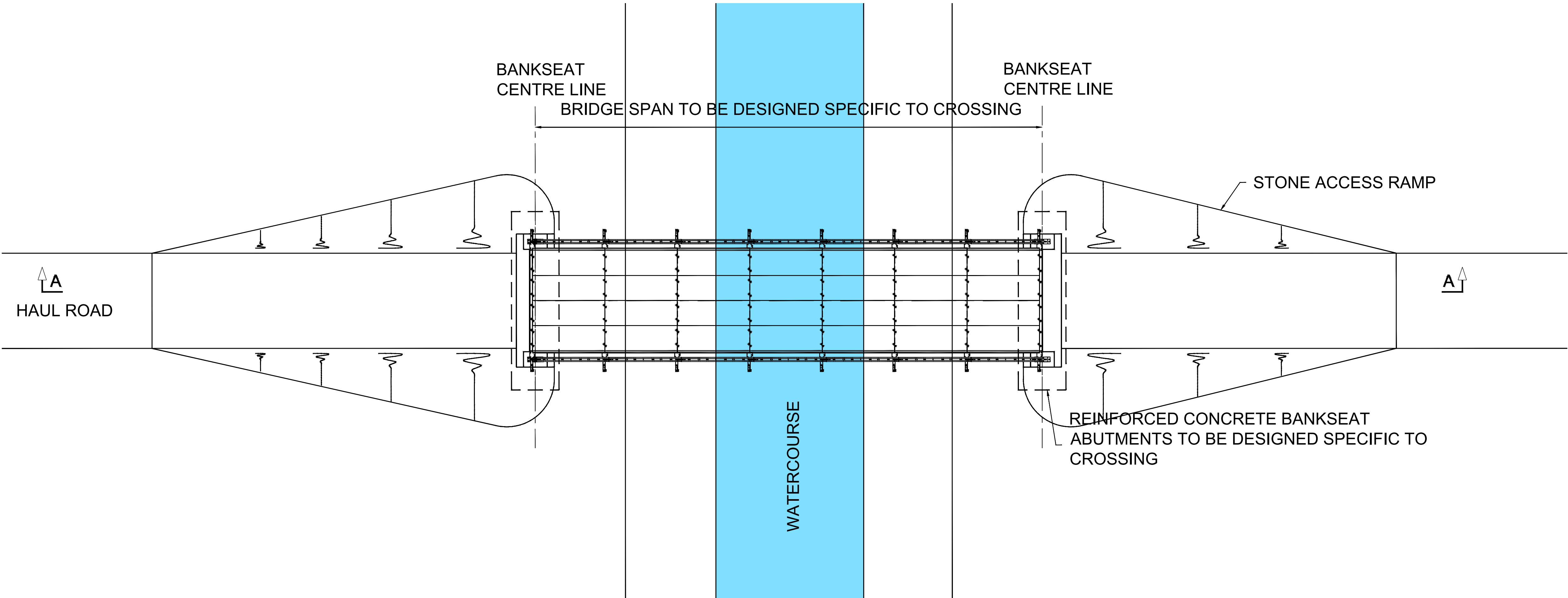


PROJECT TITLE
AWEL Y MÔR OFFSHORE WIND FARM

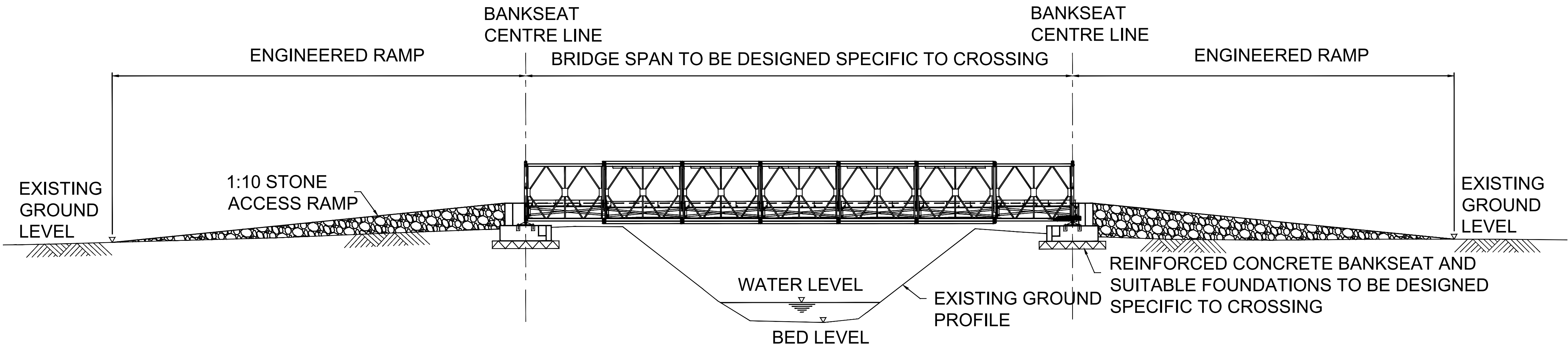
DRAWING TITLE
FIGURE: 1 INDICATIVE HAUL ROAD
WATERCOURSE CROSSING - GENERAL
ARRANGEMENT - TEMPORARY CULVERT

DRAWING STATUS FINAL				
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SHEET SCALE NTS	DATE 01.04.2022	DATE 01.04.2022	DATE 01.04.2022	DATE 01.04.2022
WA DRAWING NUMBER ED13184-C-3052				REVISION 02
AYM DOCUMENT NUMBER AYM-WAR-V2-XX-M2-C-0068-B				REVISION 02
RWE ECODEC NUMBER 004322627-01			SHEET No 001 OF 001	REVISION 01

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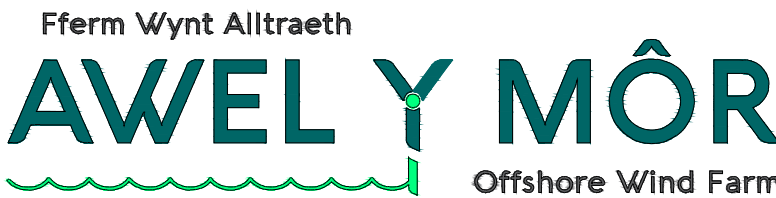
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NOTES

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- DESIGN OF BRIDGE CROSSING WILL BE DEPENDANT ON SIZE OF WATERCOURSE, LOCAL GROUND CONDITIONS ETC AND TO BE CONFIRMED AT DETAILED DESIGN.
- ALL SURFACE MATERIALS WOULD BE REMOVED AFTER COMPLETION OF WORKS.
- BANKSEAT TO BE FOUNDED ON COMPETENT SOIL OR SHEET PILED SUPPORT.

02	01-04-2022	UPDATE AND ISSUE AS FINAL	PM	AH	AH
01	24-03-2022	DRAFT FOR COMMENT	DB	PM	AH
REV	DATE	REASON FOR ISSUE	BY	CHK	APP



PROJECT TITLE
AWEL Y MÔR OFFSHORE WIND FARM

DRAWING TITLE
FIGURE 2: INDICATIVE HAUL ROAD
WATERCOURSE CROSSING - GENERAL
ARRANGEMENT - BAILEY BRIDGE

DRAWING STATUS
FINAL

SHEET SIZE A1	DESIGNED PM	DRAWN PM	CHECKED PM	APPROVED AH
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02	01-04-2022	UPDATE AND ISSUE AS FINAL	PM	AH	AH
01	24-03-2022	DRAFT FOR COMMENT	DB	PM	AH
REV	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED

- 25 The onshore ECC will be fenced on all sides, with stock-proof fencing used where farming practices require, prior to works starting. At designated points along the route identified in consultation with each landowner, gated crossing points will be provided to facilitate access across the working corridor for both accesses of landowners, Public Rights of Way (PRoW) and livestock.
- 26 The haul roads and temporary watercourse crossing points will be removed at the end of the installation process and the land reinstated to its previous condition and levelled out.

2.5 Permanent Access Roads

- 27 Permanent access roads are to be constructed to the onshore substation from Glascoed Road to allow delivery of abnormal indivisible loads (ALLs) and for access during the operational phase.
- 28 Permanent access roads will be designed, constructed to tie in with existing highways and to accommodate the ALL vehicle loadings, along with normal traffic movements associated with the construction, maintenance and operation of the substation.

2.6 Speed Limit

- 29 The site speed limit shall be 15 mph on all site access roads and must be adhered to at all times. Appropriate speed limits within the temporary construction compounds will be set. Speed limit signs shall be installed on all construction roads and site access roads.
- 30 Vehicles on site shall be fitted with visual and audible warning devices for reversing where appropriate.
- 31 Banksmen will be used, if required, when reversing in the compounds and on the temporary haul road.

2.7 Emergency Contacts

- 32 Emergency contact details and an emergency incident response plan are provided for in the Outline Pollution Prevention and Emergency Incident Response Plan (PPEIRP) within Appendix 6 (application ref: 8.13.6) of the Outline CoCP.

2.8 Landowner Liaison

- 33 General disruption impacts will be mitigated early in the construction planning process where possible by allowing a sufficient time period between the serving of notice for entry and the commencement of on-site activities. This will allow farmers and landowners time to adapt their working practices in anticipation of the works. Further information on agricultural liaison is provided within CoCP Appendix 4 outline Soil Management Plan (application ref: 8.13.4).

2.9 Fuel, Chemical and Waste Handling and Storage

- 34 All fuels, chemicals and wastes shall be handled and stored in accordance with the approved PPEIRP and Site Waste Management Plan. Outline versions of those documents are provided in Appendices 6 (application ref: 8.13.6) and 5 (application ref: 8.13.5) of the Outline CoCP.

2.10 Works on Existing Drains, Sewers and Chambers

- 35 Where any works are carried out in connection with existing drains, adequate precautions shall be taken to ensure that no earth, rubble or foreign matter is introduced into the drains. The contractor will inspect existing drains prior to commencing work. Any existing contamination, blockage or damage shall be recorded and reported to the site manager or appropriate alternative personnel.
- 36 The principal contractor shall ensure that surface water is prevented from entering foul water sewers and that foul sewage is not allowed to leak or overflow into surface water drains, adjacent to sewers or elsewhere.

- 37 On completion of any works, the principal contractor shall inspect the affected drains, sewers or chambers to ensure that no contamination, blockage or damage has occurred to the drain, sewer or chamber as a consequence of the said works. Any such contamination, blockage or damage shall be made good by the principal contractor.
- 38 In order to connect new drainage ducts to the existing drainage system the principal contractor shall expose existing gully tails until they have reached a depth of about 1.5 metres. A new manhole will be constructed to form the tie in.

2.11 Utilities Providers and Existing Services

- 39 All potentially affected utility providers will be contacted and the location of existing services will be accurately identified on the ground prior to construction or intrusive ground investigations.
- 40 On exposure of services the contractor shall record the position and depth of each service encountered and shall report his findings to the project manager. All measures for protection, as agreed, will be implemented before any works commence.
- 41 All utility crossings will be undertaken in accordance with standards agreed with the utility owner/operator, as required.

2.12 Ecological Management

- 42 Works will be undertaken in line with the final Landscape and Ecology Management Plan (LEMP), that will be submitted to DCC for approval, in consultation with NRW and other relevant stakeholders, as a requirement of the DCO. The LEMP will be in accordance with the Outline LEMP (application ref: 8.4) and include the following:
- ▲ Details of pre-construction ecology surveys;
 - ▲ Measures to protect retained habitat during construction;
 - ▲ Measures to minimise and compensate for potential impacts on protected and notable species and ensure compliance with relevant wildlife-related legislation, e.g. the Wildlife and Countryside Act 1981 and the Conservation of Habitats and Species Regulations 2017;

- ▲ Ecological monitoring measures during construction; and
 - ▲ Details for habitat reinstatement post construction
- 43 An outline LEMP (application ref: 8.4) that sets out the in-principle measures, including measures during construction, which will be implemented by the Applicant to avoid, reduce, mitigate or compensate for potential impacts on landscape and biodiversity resources was provided with the DCO application.
- 44 Removal of hedgerows, trees and scrub will be conducted outside of the bird breeding season wherever possible, or the vegetation will be examined for active nests by an ecologist immediately prior to removal.
- 45 Surveys for protected species (if required) will be undertaken prior to commencement of ground works to ensure compliance with relevant legislation (e.g. Wildlife and Countryside Act 1981), and final details contained within the final LEMP submitted for each stage of the onshore works. Micrositing of project elements will be used to avoid important ecological features, where possible.
- 46 All habitats will be reinstated, in accordance with the final LEMP, as soon as possible after construction. Hedgerows along the onshore Export Cable Corridor (onshore ECC) will be reinstated using a species-rich, locally appropriate native mixture including heavy standard trees at a 3:1 ratio for any lost. Trees and deep rooted plants will not be planted over and in proximity to the edge of the cable trench to avoid the risk of damage to the cable by their roots.
- 47 Checks for the presence of badger setts, reptiles, hedgehogs, polecats, hares or other protected or notable species will be carried out by the Ecological Clerk of Works (ECoW) prior to vegetation clearance. Additional reasonable avoidance measures will be implemented/ mitigation licences applied for as necessary.
- 48 An ECoW shall be employed for the duration of the project to ensure species specific mitigation, method statements and plans are implemented effectively.

- 49 Pollution will be controlled during construction works through measures described in the Outline PPEIRP within Appendix 6 (application ref: 8.13.6) of the Outline CoCP. This will minimise damage to habitats and/or food resources used by fauna and prevent direct toxic effects on individual animals.
- 50 Subject to the final design parameters, piling (if required for the establishment of a temporary cofferdam at the landfall) would either take place outside the winter period (October to March) or utilize less noisy, vibro-piling technology, unless otherwise agreed with DCC through provision of a CMS.
- 51 If required, depending on the final locations and timing of the works, HDD pits and other working areas at the landfall and River Clwyd crossing would be screened, where possible, to provide an element of visual and acoustic screening of active working areas. The need for screening and details of proposed screening, if required, will be determined during detailed design and will be agreed with DCC and NRW via approval of the final CoCP and CMS (post consent).
- 52 Trenchless installation techniques working areas at the landfall and River Clwyd crossing would be partially fenced, where required.
- 53 The above ground construction works associated with trenchless crossing of the River Clwyd will be located to the east and west of the existing flood defence embankments (and therefore outside the area identified as saltmarsh within the Habitat and Hedgerow Survey Report (APP-125)). Although construction works within the saltmarsh area would be underground, there could be a requirement for personnel to access the saltmarsh area on foot in order to monitor and guide the trenchless crossing (or other underground equipment).
- 54 The final depth of the trenchless crossing installation will be sufficient to avoid the area of saltmarsh located next to the River Clwyd and also to minimise any potential for future cable exposure. The final details for the trenchless crossing will be agreed via the Final CMS that will be submitted to DCC under DCO Requirement 10.

2.13 Ground Investigations

- 55 Ground investigation for geotechnical and or environmental purposes would be undertaken pre-construction at key points including at the onshore substation and where surface water, road and rail crossings occur. Those investigations will inform the detailed design and the final CMS submitted for each stage of the onshore works.

2.14 Invasive Species

- 56 Measures contained in relevant Department of the Environment, Food and Rural Affairs (DEFRA) and NRW best practice guidance on the control and removal of invasive weed species will be implemented. Further detail is provided in the outline Invasive Non-Native Species Management Plan (outline CoCP Appendix 11 (application ref: 8.13.11)).

2.15 Surface Water Drainage

- 57 Construction of the onshore ECC will require temporary management of surface water along the route. Where required, drainage would be installed within either side of the onshore ECC to ensure existing land drainage flow is maintained. A surface water drainage scheme for the onshore ECC works will be informed by detailed design and provided for approval by DCC prior to construction. The onshore ECC surface water drainage scheme will be prepared in line with the principles of surface water management that are provided in Volume 5, Annex 7.1 (application ref: 6.5.7.1). An outline surface water drainage scheme has been provided as part of the OnSS Flood Consequences Assessment (Volume 5, Annex 7.2 (application ref: 6.5.7.2)).
- 58 Drainage will be directed away from Network Rail land and no drainage works will be designed within 5m of the Network Rail boundary.

- 59 The surface water drainage scheme will include measures to minimise water within the trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via appropriate means to areas of settlement to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains.

2.16 Flood Risk

- 60 Storage on the floodplain of excavated material and other construction materials will be positioned in a manner that does not constrain potential flood waters unduly or direct flood waters towards population or industrial centres of high sensitivity.
- 61 Construction activity will not be undertaken without appropriate mitigation during very extreme wet weather where erosion of sediments and risk from flooding may increase.
- 62 The construction site access roads will be designed to minimise land take and to avoid, where possible, impacts on existing drainage networks and features. Specific details for the surface water drainage design at each section of the works shall be provided in the surface water drainage scheme for the onshore ECC works that will be informed by detailed design and provided for approval by DCC prior to construction.
- 63 A flood response plan, including emergency flood evacuation procedures, will be prepared as part of the final CMS for approval by DCC, setting out actions in the event of flooding or a flood warning during construction works. This would include a procedure for evacuation of personnel and the securing or relocating plant or materials stored in bulk.

2.17 Restoration and Reinstatement

- 64 Following completion of construction operations all agricultural land will be restored to its previous condition as far as possible. This will include the replacement of field boundaries and stock fences. Topsoil will be prepared and seeded using an appropriate seed mix or returned to arable cultivation. Further details of these measures are provided in the Outline Soil Management Plan within Appendix 4 (application ref: 8.13.4) of the Outline CoCP.
- 65 Land drains within the cable route, which may be temporarily affected by construction operations, will also be restored following completion of construction. This is important to ensure that the growth of trees and hedgerows is not affected by changes to the surface water drainage system.
- 66 Ecological reinstatement will be undertaken in accordance with the final LEMP. Hedgerows which will have been removed during the construction period will be replanted, including on the cable route. Trees and deep rooted plants will not be planted over and in proximity to the edge of the cable trench to avoid the risk of damage to the cable by their roots.

2.18 Pre-Commencement

- 67 The draft DCO (as amended at Deadline 1 during Examination), includes the following definition of 'pre-commencement' activities:

onshore works comprising surveying or investigatory works including archaeological investigations, environmental surveys, investigations for the purpose of assessing ground conditions; preparatory works to existing infrastructure and diversion and laying of utilities and services; creation of any temporary means of access; site clearance including vegetation clearance; erection of screening and fencing, site security works, creation of temporary hard standing, or the temporary display of site notices or advertisements

- 68 The General Construction Management measures set out in Section 2 (other than Restoration and Reinstatement that would follow construction), represent aspects of this CMS that that will be adhered to in carrying out 'pre-commencement' activities (where relevant to those activities), as set out above.

3 Construction Management for Onshore Components

- 69 This section considers aspects of construction that relates to the onshore component of the works at landfall, onshore ECC and proposed substation.
- 70 A full description of the site of the onshore components is provided in Volume 3, Chapter 1: Onshore Project Description (application ref: 6.3.1) of the PEIR.

3.1 Onshore Export Cable Duct Installation

- 71 The onshore export cables will be installed in a flat formation or trefoil formation. In addition to the onshore power cables, fibre optic cables will be installed in additional, smaller ducts with each formation.
- 72 Suitably engineered and tested granular backfill material, in this case cement bound sand (CBS), will be used to backfill around each set of cable ducts during installation. This will aid heat dissipation. CBS will be delivered by lorry to the appropriate cable access points and distributed as needed along the temporary haul road during duct installation.
- 73 Where open cut trenches are used for the excavation of the cable route, the following measures will be implemented:
- Deep excavations may require de-watering. Water pumped or removed from excavations would be passed through a silt-separator tank or equivalent, and discharged to ground or surface water. An environmental permit would be sought from NRW prior to undertaking such operations.
 - Extended excavations would be arranged so as not to create preferential drainage pathways with the potential to cause flooding of lower land.
 - Cable protection strips would be placed on top of compacted CBS over each set of ducts, in accordance with relevant Standards.

3.2 Onshore Export Cable Trenchless Techniques

- 74 Volume 5, Annex 1.1 provides a copy of the Crossing Schedule (application ref: 6.5.1) which comprises a table noting the identified obstacles on the cable route that will be crossed by the onshore ECC. The list of obstacles where HDD (or other trenchless techniques) will be used to cross them is not exhaustive. The most suitable method for crossing obstructions will be determined during the construction stage of AyM which may identify additional trenchless crossings. Any variation to the Crossing Schedule for any section of the onshore ECC will be agreed with the relevant local authority within the final CoCP.
- 75 Where variations to the Crossing Schedule are necessary, they shall be addressed at this point of the CMS for any given stage of works.
- 76 The directional drills will be installed in line with construction design drawings based on ground topography and cable design depth / spacing etc.

3.3 Onshore Export Cable Watercourse and Flood Defence Crossings

- 77 It is proposed to disapply the Environmental Permitting Regulations (2016) FRAPS and Land Drainage Regs 1991 OWC within the draft DCO for the proposed development. The Applicant will provide the final CMS which will include the final detailed design and approach to water way crossings.
- 78 The specific design and depth of each cable at every watercourse or flood defence crossing will be determined through the Crossing Schedule in consultation and agreement with the relevant authority on a case-by-case basis in collaboration with the respective owner / operator to ensure that routine maintenance, repairs and any engineering works to adapt to climate change can be undertaken in the future.
- 79 Options for open cut or trenchless crossing of watercourses will be finalised following ground investigation.

- 80 Cables will be installed at a minimum of two metres underneath any flood defence, to reduce potential construction effects. Cable entry and exit points within transition pits and cable junction bays will be sealed with an appropriate water proofing material to mitigate flood risk.
- 81 Where practically possible, trenchless techniques will not be undertaken on sections of flood defence where other assets such as culvert intersect i.e. not where the defence is inherently weaker.
- 82 Clay stacks or other vertical barriers shall be constructed within trench excavations where necessary to prevent the section of preferential mitigation pathways for contaminants.
- 83 Where required, drainage would be installed within either side of the onshore ECC to ensure existing land drainage flow is maintained. A Final Construction Drainage Scheme will be developed prior to works commencing in agreement with the appropriate stakeholders.
- 84 Surface water flowing into the trenches during the construction period will be pumped via the appropriate means to remove sediment and potential contaminants, before being discharged into local ditches or drains via temporary interceptor drains. Where gradients on site are significant, where required, cable trenches will include a hydraulic brake (bentonite or natural clay seals) to reduce flow rates along trenches and hence reduce local erosion.
- 85 Any field drainage intercepted during the cable installation will either be reinstated following the installation of the cable or diverted to a secondary channel through agreement with the appropriate stakeholders.
- 86 Consideration to surface water runoff will be given when sizing stockpiles along the cable route with stockpiles kept to minimum size, where possible, with gaps to allow surface water runoff to pass through.

3.4 Onshore Export Cable Open Cut Trenching Techniques at Watercourse crossings

- 87 Ducts may be installed under smaller watercourses or ditches using open-cut techniques. Such smaller watercourses or ditches may be temporarily flumed, dammed-up and over-pumped or diverted to allow installation to take place. Figure 3, Figure 4 and Figure 5 provide indicative arrangements for such crossings. Trench support may be required to temporarily hold open the excavated trenches either side of the ditch. Trench support would be removed prior to reinstatement, including reinstatement of the watercourse or ditch.
- 88 As noted in Section 3.3 the specific design and depth of each cable at every watercourse or flood defence crossing will be determined through the Crossing Schedule. In the case of ditches (that are not main rivers or ordinary watercourses), the depth of cable crossing (i.e. depth of ducts beneath the base of the ditch), would be identified with the relevant landowner and in discussion with DCC.

3.4.1 Monitoring works within watercourses

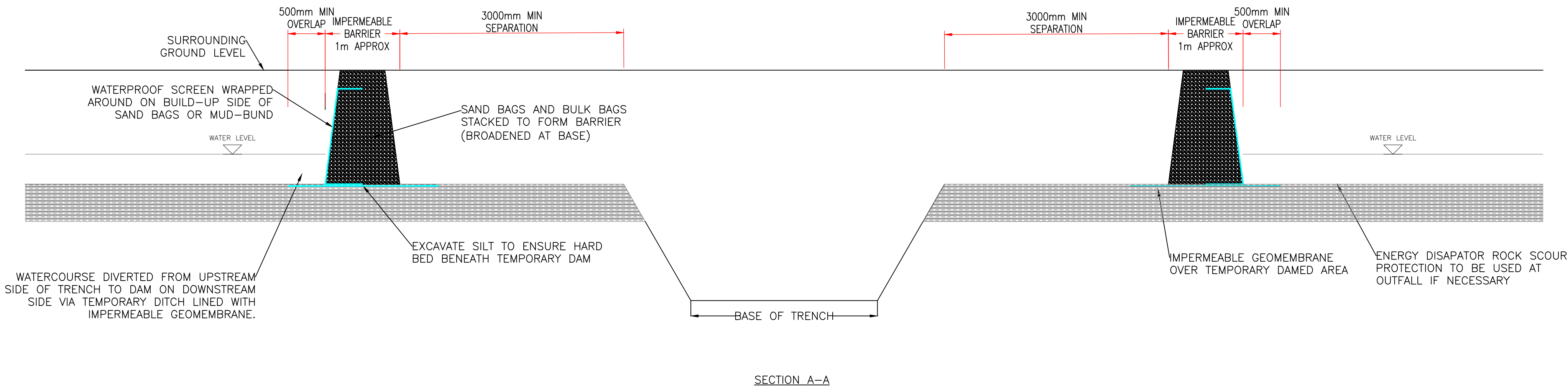
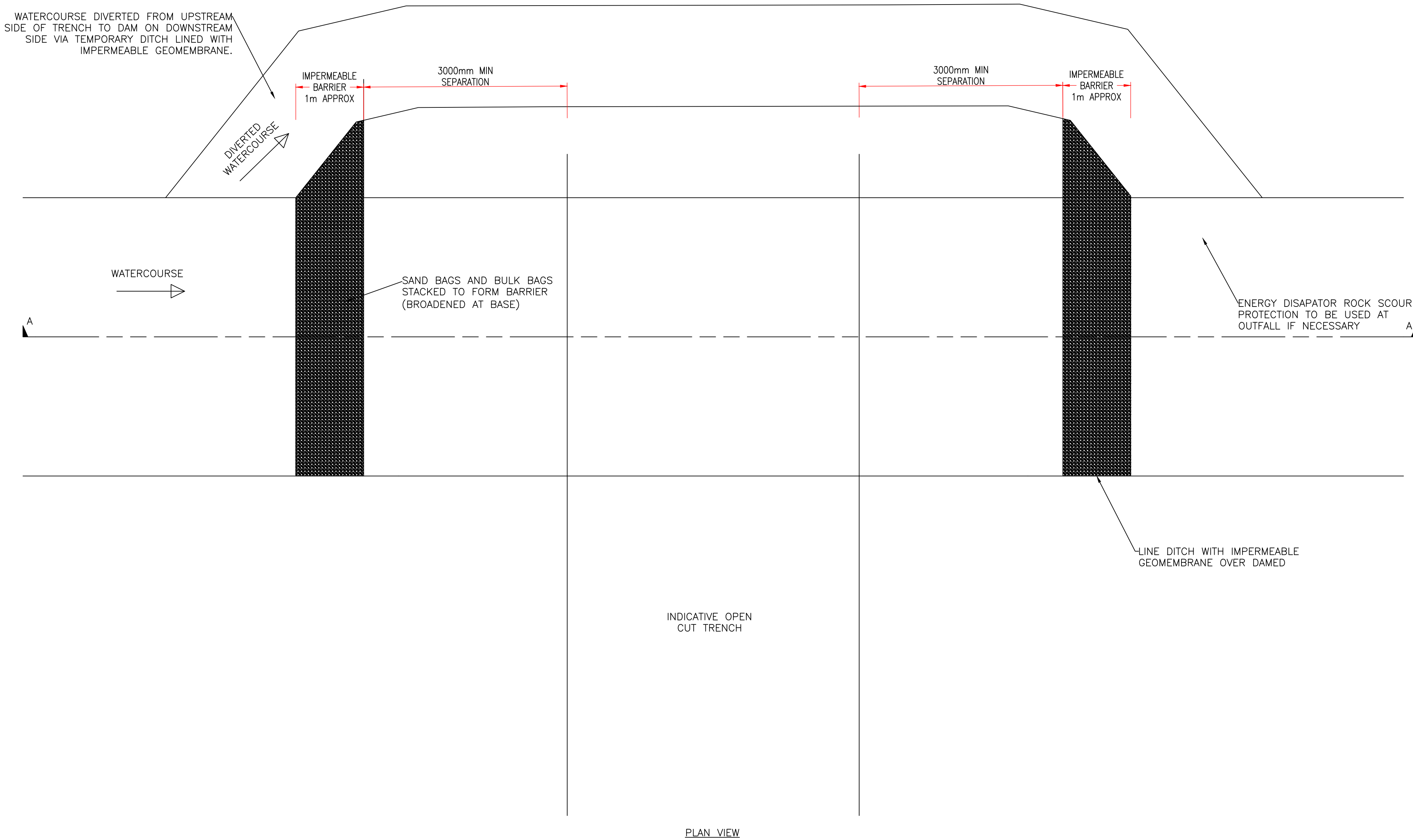
- 89 Any works undertaken within watercourses, including reinstatement, will be regularly monitored to check for erosion or any other effects on bank morphology as a result of the works. Where an effect is identified, appropriate action will be taken. Water quality will be monitored during and following the works to check for sediment mobilisation.

3.4.2 Potential mitigation for open trench techniques

- 90 Where open-cut techniques are used, the works will be designed to minimise disturbance to the watercourse bed and the banks of the watercourse, including minimising the size of excavations and minimising the time that these are left open (to reduce degradation due to weather conditions such as heavy rain, frost, etc).
- 91 Where open cut techniques within the watercourse is required, mitigation measures will be agreed with DCC (through approval of DCO Requirement 10 in consultation with NRW) and installed to reinstate the existing watercourse geomorphology of the banks and / or bed.

- 92 Bank and bed material will be stored separately to aid reinstatement. Topsoil, subsoil and bedrock will be stored separately and replaced in sequence as part of site restoration work. Where possible spoil will be set back 5m from watercourses to minimise potential for silt run off from the working width, and outside Flood Zones 2 or 3 where possible. Where unavoidable, heaps will be placed as far away from the watercourse as is possible and for the shortest time possible.
- 93 Appropriate measures will be applied to match the individual circumstances of each watercourse or ditch crossing. The techniques used will aim to provide rapid reinstatement, bank stabilisation and cable protection. In all instances, banks will be re-profiled to match the existing bank. If necessary, additional measures will be taken to ensure that the banks remain stable. The size of the bank and flow rate in the channel will determine the techniques or combination of techniques to be used, and this will be discussed with NRW/DCC.
- 94 All reinstatement works will be designed in accordance with recognised best practice guidance current at the time of the design, including guidance developed by NRW and other UK environment agencies (EA, SEPA).
- 95 There are a range of potential reinstatement techniques available. Wherever possible, the preference will be to utilise natural sustainable techniques and materials to stabilise the reinstated bank sections, such as a one or more of:
- Seeding and vegetation planting - using species appropriate to the ecological setting
 - Coir matting
 - Willow spiling
 - Brash, root wads, etc
- 96 Where natural materials are considered not to provide an adequate level of protection then 'engineering' measures would be considered. For example:
- Reinforcement mats
 - Reinforced earth (using geogrids, geotextiles and other reinforcing elements)

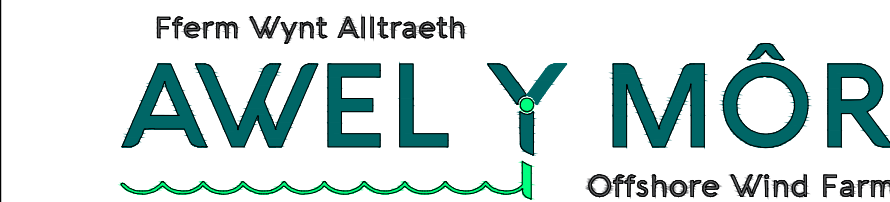
- ▲ Timberwork, stone revetments, concrete bags
 - ▲ Gabions and or gabion mattresses
- 97 On completion of installation and backfilling, any flume pipes or temporary dams will be carefully removed to allow the river to flow over the excavated area as slowly as possible to minimise sediment generation.
- 98 The reinstated watercourse will be checked subsequently to ensure that flood flows have not caused damage. A maintenance monitoring regime will be agreed with NRW/DCC through approval of the final CMS under DCO Requirement 10.



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NOTES

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- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
- ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.
- ANY OPEN TRENCH CROSSING OF WATERCOURSES MUST BE UNDERTAKEN IN CONSULTATION NATURAL RESOURCES WALES AND / OR DENBIGHSHIRE COUNTY COUNCIL AS APPROPRIATE.
- DESIGN OF TEMPORARY DIVERSION OF WATERCOURSE WILL BE DEPENDANT ON SIZE OF WATERCOURSE, LOCAL GROUND CONDITIONS ETC AND TO BE CONFIRMED AT DETAILED DESIGN. STREAM SURGE ASSESSMENT TO BE CARRIED OUT ON WATERCOURSE.
- SEE DRAWING ED13184-C-3006 GENERAL ARRANGEMENT FOR WATERCOURSE CROSSING FOR TRENCH EXCAVATION AND BACKFILL DETAILS



PROJECT TITLE

AWEL Y MÔR OFFSHORE WIND FARM

DRAWING TITLE

FIGURE 3: OPEN TRENCH WATERCOURSE CROSSING - GENERAL ARRANGEMENT - TEMPORARY DIVERSION OF WATERCOURSE

DRAWING STATUS

FINAL

SHEET SIZE	DESIGNED	DRAWN	CHECKED	APPROVED
A1	PM	PM	AH	AH
SHEET SCALE	DATE	DATE	DATE	DATE
NTS	01.04.2022	01.04.2022	01.04.2022	01.04.2022

WA DRAWING NUMBER

ED13184-C-3055

REVISION

02

AYM DOCUMENT NUMBER

AYM-WAR-V2-XX-M2-C-0071-B

REVISION

02

RWE ECODEC NUMBER

004322630-01

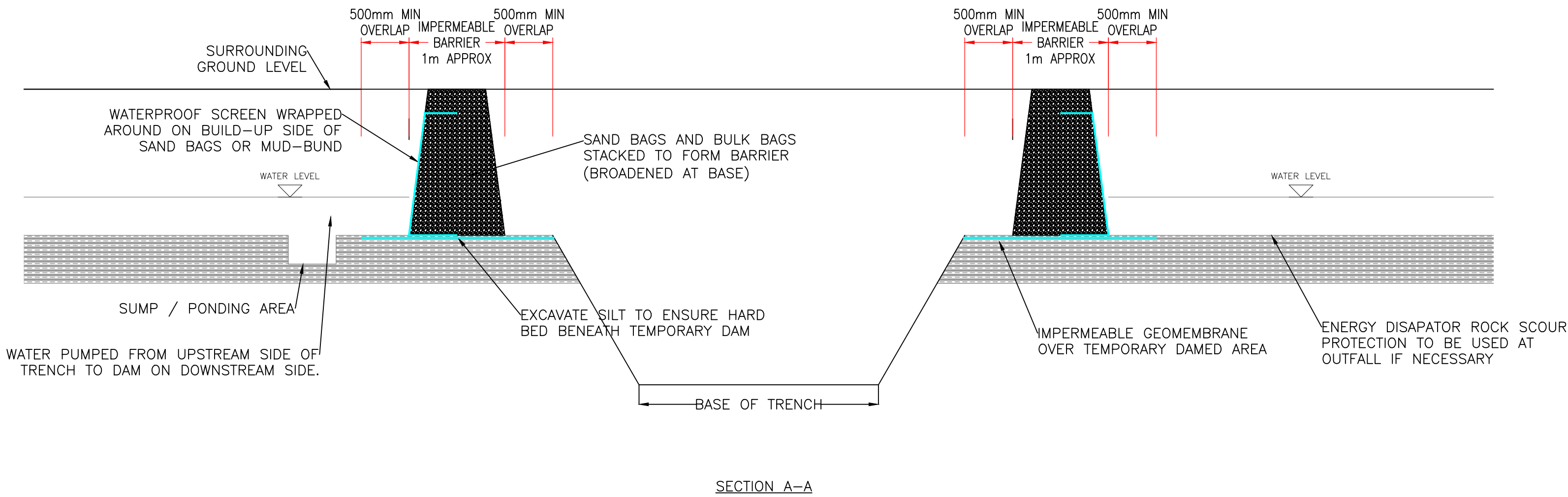
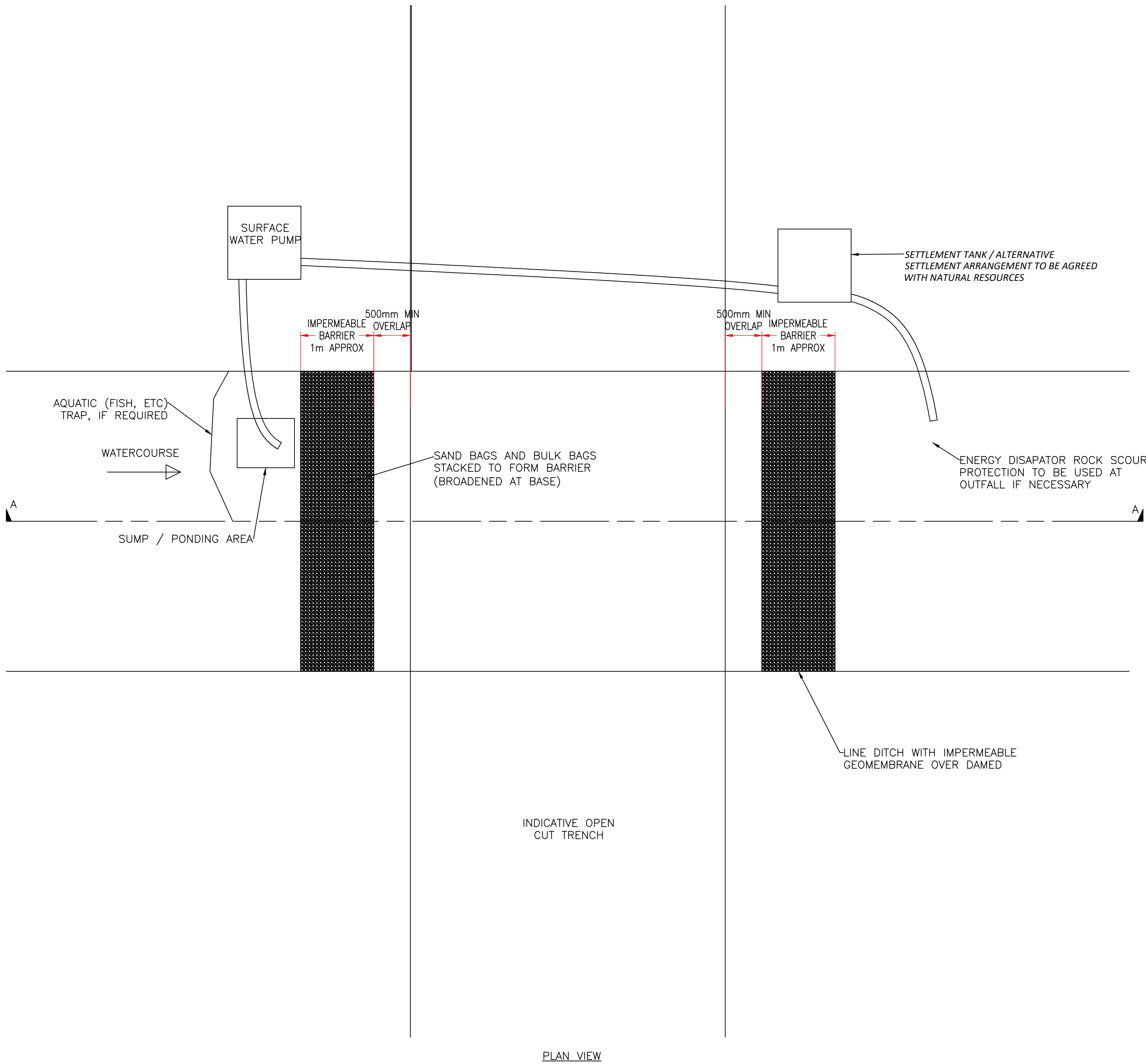
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REVISION

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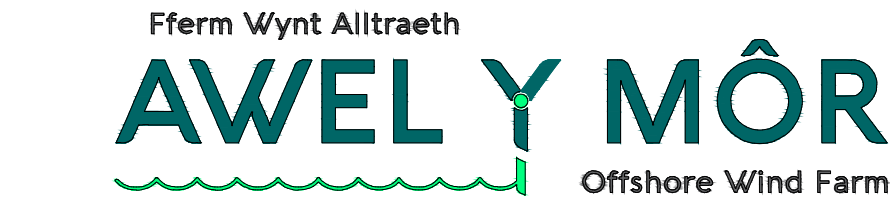
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01	24-03-2022	DRAFT FOR COMMENT	PM	NP	AH	PM



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- DESIGN OF OVER PUMPING OF WATERCOURSE WILL BE DEPENDANT ON SIZE OF WATERCOURSE, LOCAL GROUND CONDITIONS ETC AND TO BE CONFIRMED AT DETAILED DESIGN.
- SEE DRAWING ED13184-C-3006 GENERAL ARRANGEMENT FOR WATERCOURSE CROSSING FOR TRENCH EXCAVATION AND BACKFILL DETAILS



PROJECT TITLE
AWEL Y MÔR OFFSHORE WIND FARM

DRAWING TITLE
FIGURE 4: OPEN TRENCH WATERCOURSE CROSSING - GENERAL ARRANGEMENT - OVER PUMPING OF WATERCOURSE

DRAWING STATUS
FINAL

SHEET SIZE A1	DESIGNED PM	DRAWN AM	CHECKED PM	APPROVED AH
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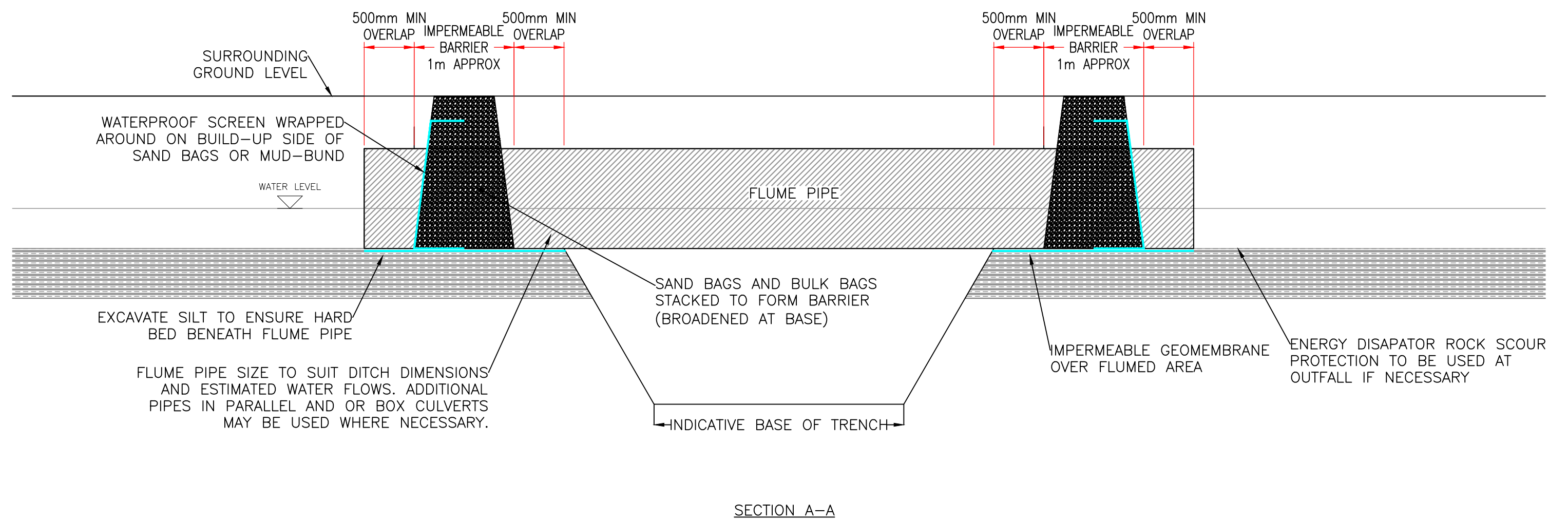
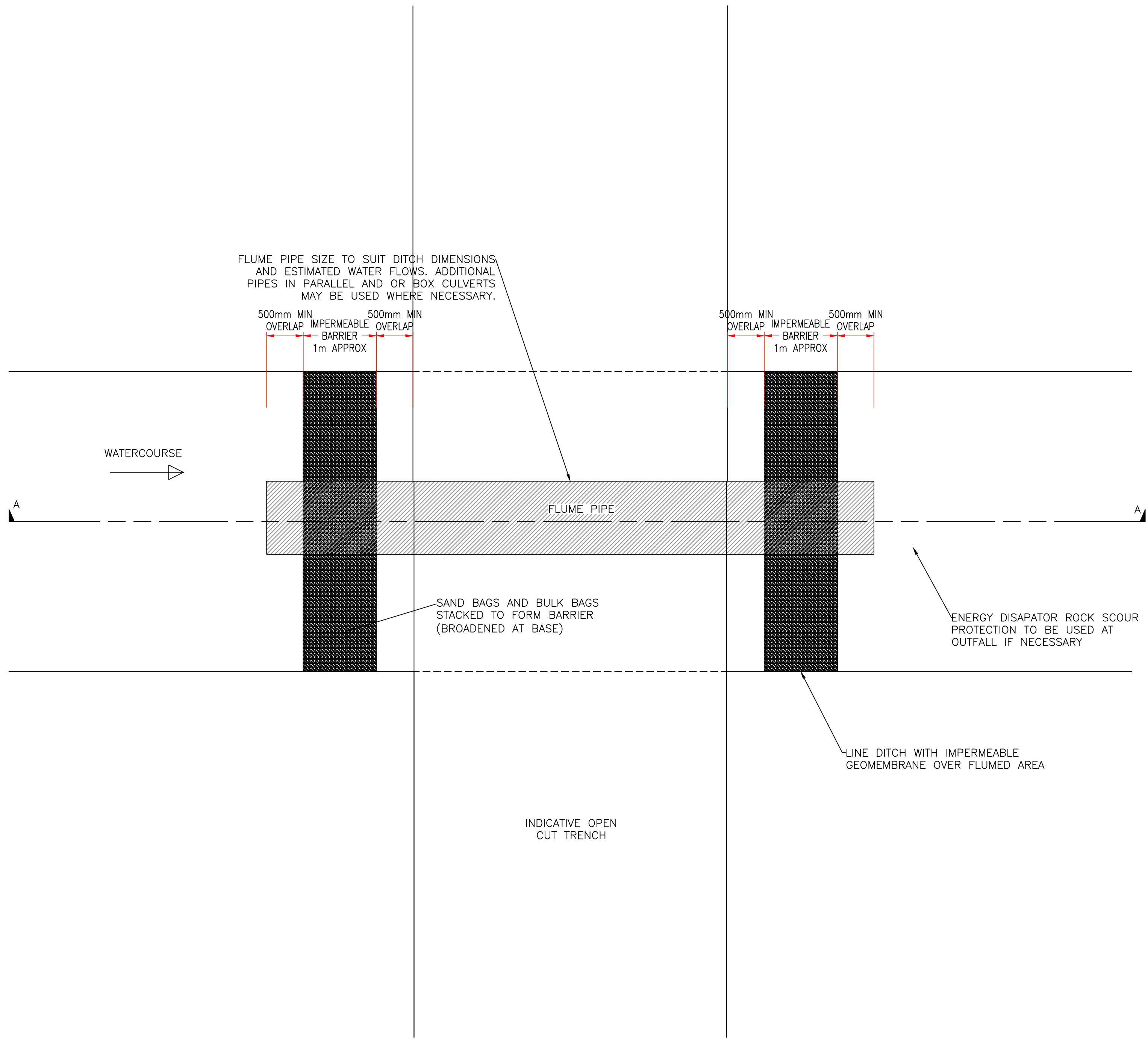
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WA DRAWING NUMBER ED13184-C-3054	REVISION 03
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AYM DOCUMENT NUMBER AYM-WAR-V2-XX-M2-C-0070-C	REVISION 03
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RWE ECODEC NUMBER 004322623-02	SHEET No 001 OF 001	REVISION 02
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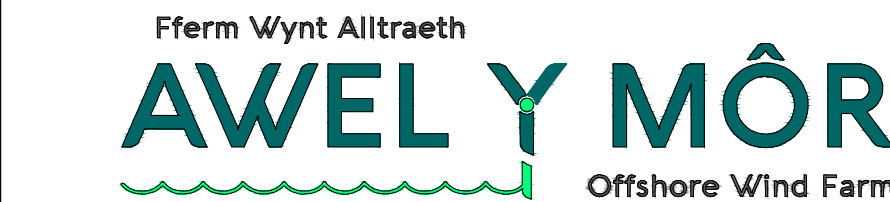
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02	01-04-2022	UPDATE AND ISSUE AS FINAL	PM	AH	AH	PM
01	24-03-2022	DRAFT FOR COMMENT	PM	NP	AH	PM



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- DESIGN OF FLUME CROSSING WILL BE DEPENDANT ON SIZE OF WATERCOURSE, LOCAL GROUND CONDITIONS ETC AND TO BE CONFIRMED AT DETAILED DESIGN.
- SEE DRAWING ED13184-C-3006 GENERAL ARRANGEMENT FOR WATERCOURSE CROSSING FOR TRENCH EXCAVATION AND BACKFILL DETAILS



PROJECT TITLE
AWEL Y MÔR OFFSHORE WIND FARM

DRAWING TITLE
FIGURE 5: OPEN TRENCH WATERCOURSE CROSSING - GENERAL ARRANGEMENT - TEMPORARY FLUME

DRAWING STATUS
FINAL

SHEET SIZE	DESIGNED	DRAWN	CHECKED	APPROVED
A1	PM	PM	AH	AH
SHEET SCALE	DATE	DATE	DATE	DATE
NTS	01.04.2022	01.04.2022	01.04.2022	01.04.2022

WA DRAWING NUMBER ED13184-C-3053			REVISION 02
AYM DOCUMENT NUMBER AYM-WAR-V2-XX-M2-C-0069-B			REVISION 02
RWE ECODEC NUMBER 004322628-01		SHEET No 001 OF 001	REVISION 01

02	01-04-2022	UPDATE AND ISSUE AS FINAL	PM	AH	AH	PM
01	24-03-2022	DRAFT FOR COMMENT	PM	NP	AH	PM
REV	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED	RELEASED

3.5 Onshore Export Cable Ecological Management

- 99 As noted in Section 2.12, a final LEMP will be approved by DCC, in consultation with NRW, prior to the commencement of construction works. A pre-construction walkover survey of the working area will be undertaken by an appropriately experienced arboriculturist and the guidance set out in BS5837:2012 Trees in Relation to Construction will be adhered to where applicable. The survey will define specific mitigation measures required for all trees situated in or adjacent to the working width, including where practical, measures such as the erection of protective fencing in order to minimise the impacts on trees and their roots. Those measures will be identified in the final CMS for each stage of the works.
- 100 In addition, hedgerows in proximity to the working width will be protected from disruption and, if necessary, protection fences will be erected to ensure that roots remain undisturbed.
- 101 A reduced working width will be used, where practicable, when crossing ecologically sensitive water courses and hedgerows.
- 102 Reinstatement will be undertaken in accordance with the final LEMP.

3.6 Onshore Export Cable Jointing Pits

- 103 The jointing equipment will be assembled on the concrete foundation base pad, constructed within the joint bay to support the cable joint. A container and small welfare facilities will be delivered to the location of the joint bay to provide a clean room for storage and some of the jointing operations.
- 104 During the jointing operation the joint bay is completely enclosed under a temporary jointing shelter.
- 105 On completion of jointing works the joint pit is backfilled in line with the normal trench backfilling method.

3.7 Onshore Export Cable Deliveries

- 106 The onshore cables will be delivered by road and will be held in temporary construction compounds until needed to install as and when required.
- 107 Specialist Low Loader lorries will deliver the loaded cable drums and remove empty drums from the compound. The drums will be off loaded using a specialist crane company. Cable drums will be transported from the compound area to each cable installation site by the means of a specially designed cable trailer pulled by suitable vehicle.

3.8 Onshore Substation Piling

- 108 Foundations for the substation may require piling. It is anticipated that the majority of piling, if not all, can take place using methods of piling such as Continuous Flight Auger (CFA) or rotary displacement that are quieter than percussive piling methods. Details of specific piling requirements are not yet known for the project and will be confirmed following detailed design and further geotechnical investigations.
- 109 CFA piling involves boring a hole using an auger drill, with concrete injected as the drill is removed, allowing a pile to be installed without leaving an open hole. Reinforcements may be added to the wet concrete once the drill is removed.

3.9 Onshore Substation Platform Earthworks

- 110 Preliminary site works will be required before construction can commence. These may include:
- ▲ Fencing;
 - ▲ Upgrade of existing or installation of new access from Glascoed Road
 - ▲ Utility diversions and installation of temporary site drainage where required;
 - ▲ Archaeological and ecological survey and mitigation works as necessary;
 - ▲ Identification of trees and other vegetation to be retained alongside appropriate protective fencing;

- ▲ Vegetation clearance; and
 - ▲ Establishment of temporary construction compound, offices, welfare facilities, security, wheel wash, lighting and signage.
- 111 The first operation will be to strip the topsoil from the site of the substation platform and TCC.
- 112 Following completion of the topsoil stripping, the pre-earthworks drainage will be installed prior to cut and fill works to level the substation platform and TCC areas. A temporary ditch will also be installed along the relevant boundary of the substation site which will catch runoff from the substation platform during the construction period. This shall also intercept any existing land drainage crossing the substation site. At a later date a filter drain will be installed to collect surface water runoff from the substation platform. This two stage methodology has been devised to avoid silts from exposed earthworks during construction from reducing the effectiveness of a permanent filter drain.

3.10 Onshore Substation Abnormal Indivisible Loads (ALLs)

- 113 Due to the size and weight of the transformers' tanks, these deliveries will be classed as ALLs. Such loads will require specialist delivery methods to be employed.



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