ARUP

Technical Note

Project title	Glaslyn Cable Uprating
Job number	295280-00
File reference	GLAS-ARUP-DS-XX-FN-X-0010
cc	
Prepared by	Rob Belcher
Date	19 August 2025
Subject	TAN15 Drainage Statement

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DOCUMENT CHECKING

Rev: P01	**14/08/2025**		
	Prepared by	**Checked by**	**Approved by**
Name	Rob Belcher	Graham Tivey	Graham Tivey
Signature			

ARUP

Job number	295280
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1. Introduction

To facilitate the transmission of power generated by a proposed offshore wind farm into National Grid's broader transmission network, the Pentir – Trawsfynydd 4ZC route requires an upgrade to expand its circuit capacity. While the overall investment encompasses various projects, the primary focus of this initiative, collectively known as the Glaslyn Cables project, includes the following:

- Uprating the existing National Grid 400kV Glaslyn Cables (4ZC Pentir - Traws Circuit 1st Circuit) by replacing the current 1x cable per phase oil-filled 400kV Glaslyn Cable circuit running from Wern SEC at tower 4ZC044 to Garth SEC at Tower 4ZC037 with new 400kV XLPE cables.
- Substituting the two existing 132kV SPEN Glaslyn cables with new 400kV XLPE cables (Pentir - Traws 2nd Circuit) from Wern SEC at tower 4ZC044 to Garth SEC at Tower 4ZC037.

The proposed works involve installing a non-piled cable route in a buried duct system, in multiple sections of the route the cables will be installed using horizontal directional drilling (HDD).

Arup has been commissioned by Murphy Power Networks Limited (MPNL) to prepare a Drainage Strategy Statement to confirm design proposals are in line with Technical Advice Note 15 – Development, flooding and coastal erosion.

This report is split into three sections, as described below, which covers the drainage proposals across the development.

1. Wern Cable End Sealing Compound (CESC)
2. Minffordd Cable End Sealing Compound (CESC)
3. Cable Route

2. Technical Advice Note 15

The below table highlights the information required as per TAN15.

Table 1: TAN15 requirements

Information required	Details
Details of the site location and existing drainage arrangements.	The Drainage Statement should include a description of existing drainage arrangements for the site and any adjacent land that drains onto the site, along with details of both the existing and proposed permeable area (in m²).
Details of how surface water is to be managed and discharged, ensuring compliance with the existing SuDS standards.	The Drainage Statement should include a description on whether infiltration for the proposed development is feasible. An indication of which of the below discharge methods would be used should also be provided in accordance with the SuDS National Standards. These are ranked in order of priority and the reasons for not using any higher priority methods should be explained: 1. Surface water runoff is collected for use 2. Surface water runoff is infiltrated to ground 3. Surface water runoff is discharged to a surface water body i.e. watercourse 4. Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system 5. Surface water runoff is discharged to a combined sewer The Drainage Statement should include details on the consulting and obtaining of relevant permissions for the discharge location along with a sketch plan / map identifying its location as part of the proposal.

Information required	Details
Information for the proposed SuDS elements of the surface water drainage system and an indication of the intended future maintenance regime.	The Drainage Statement should provide a description of the sustainable drainage features and details on how they will be accommodated within the overall proposal. Further details could be provided as part of a supplementary sketch plan. Details on the intended future maintenance regime should specify whether there will be a requirement for adoption of the surface drainage system, or elements of it, by the SAB.

3. Wern CE-DP01e

3.1 Site location and drainage arrangements

Wern CESC is located in Wern at a nation grid reference of SH 54353 40175.

Currently the site has no formal impermeable areas as it comprises a gravel construction of approximately 1200m^2. Proposals are to extend this area with further gravel permeable build up. Surface water that lands here will drain through the permeable layers into the existing strata.

An existing access track is present at the Wern CESC which will be raised and re-surfaced in an impermeable asphalt finish. There are no changes to impermeable areas as the existing track is currently impermeable. Flows drain off the access track into a nearby watercourse.

The current topography of the site falls in an easterly direction and is proposed to continue to do so in the completed design.

3.2 Surface water management and discharge

During rainfall events where infiltration will not provide enough surface water discharge, flows will drain in an easterly direction through the gravel sub base towards a new filter drain located on the eastern part of the site, adjacent to the resurfaced track. This is in line with the SuDS hierarchy listed above as it is the highest option available at this site.

Surface water captured across the Wern CESC will drain through proposed Type 3 granular fill and into capping material beneath before draining towards existing strata. The filter drain picks up this sub-surface flows, as well as those from the surrounding access track.

The overarching principles of the surface water design therefore mimic those of the existing scenario.

Arup drawings showing proposed drainage regime are included within Appendix A.

3.3 SuDS & future maintenance regime.

The table below shows proposed maintenance regime for SuDS proposals at Wern CESC.

Table 2: Filter drain maintenance regime

Maintenance Schedule	Required action	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)

Maintenance Schedule	Required action	Typical Frequency
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

4. Minffordd CE-DP03e

4.1 Site location and existing drainage arrangements

Minffordd CESC is a new CESC located at an approximate nation grid reference of SH 59424 38813. This will replace the existing Garth CSEC compound. The Garth CSEC compound comprises an area of approximately 1000m2 of permeable gravel stone build up. This area will be decommissioned and returned to soft landscaping.

The land where the proposed Minffordd CESC site is located is entirely permeable soft landscaping.

4.2 Surface water management and discharge

It is understood that infiltration will not be able to provide all of the required surface water discharge at the Minffordd CESC. The highest available option within the drainage hierarchy is to capture water and discharge to a nearby watercourse.

Hence, due to the lack of topographical fall across the Minffordd CESC, surface water will be captured and drain through the permeable granular fill before draining within a network of filter drains in a herringbone layout. These drains will direct water towards an attenuation basin located at the south side of the CESC. Flows will be attenuated and discharge at a restricted greenfield QBAR runoff rate of 4.3 l/s to an existing watercourse. Flows will be restricted by the installation of a HydroBrake flow control (or similar). Also located within the Minffordd CESC is the relocation of the Garth Headhouse. This will also follow a similar drainage approach where surface water will drain via filter drain into the same attenuation feature.

Arup drawings showing proposed drainage regime are included within Appendix B.

The overarching principles of the surface water design therefore mimic those of the existing scenario and do not cause detrimental impact to local catchments downstream.

4.3 SuDS & future maintenance regime.

The table below shows proposed maintenance regime for SuDS proposals at Minffordd CESC.

Table 3: Operation and maintenance requirements for Filter drains

Maintenance Schedule	Required action	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table 4: Operation and maintenance requirements for detention basins

Maintenance Schedule	**Required action**	**Typical Frequency**
Regular maintenance	Remove litter and debris	Monthly
	Cut grass- for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadows grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, clear if required	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year) then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlets and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Table 5: Operation and maintenance requirements for a proprietary products

Maintenance Schedule	Required action	Typical Frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following a significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

5. Cable Route HVC DP01

5.1 Site location and existing drainage arrangements

The existing site covers a large area across near Porthmadog, North Wales. Given the substantial length of the route, which extends for roughly 6 km or more, the project area has been divided into five distinct sections, illustrated in Figure 1.

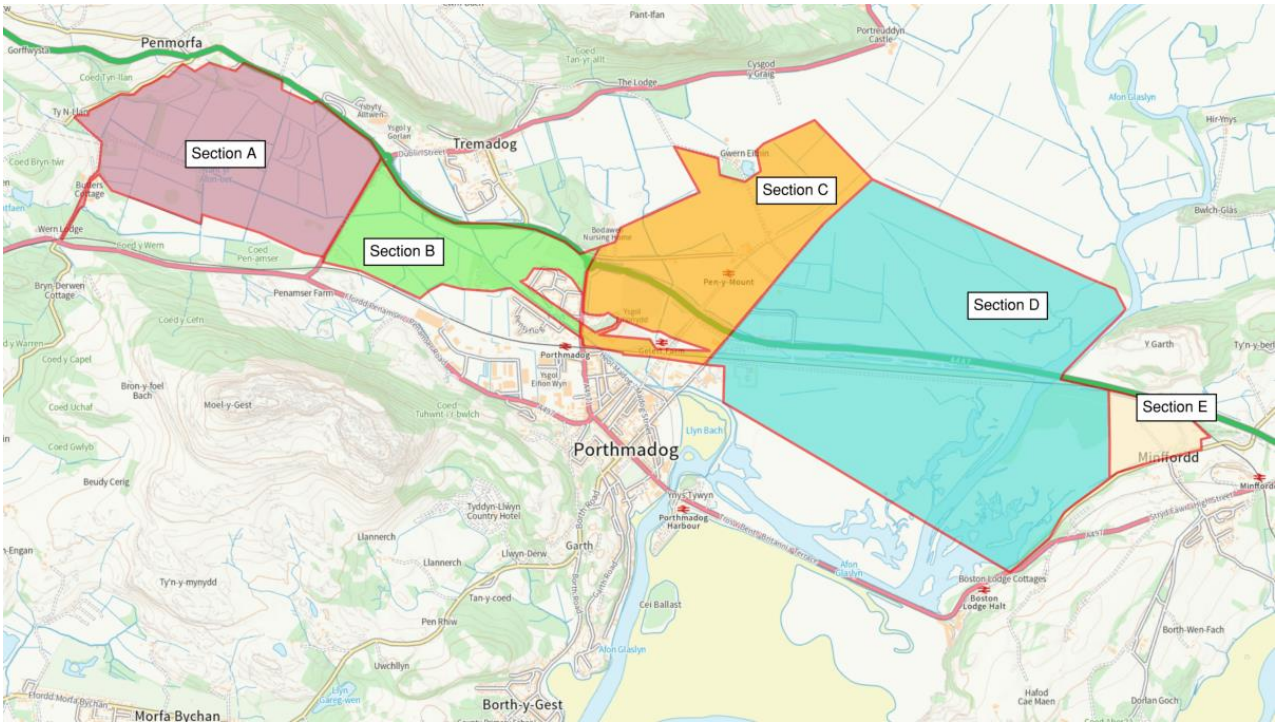

Figure 1: Project Area Sections

The majority of the area is agricultural land and therefore existing drainage regime is surface water will infiltrate into the ground until saturation point is met, beyond which flows will drain towards existing local watercourses.

5.2 Surface water management and discharge

The drainage proposals discussed in this section are proposed to be implemented during the construction phases of the development in order to aid groundwater flows and reduce dewatering requirements within excavations.

It is proposed that a fin drain is constructed alongside the excavations to intercept ground water flows. The fin drains will be follow the trenches and the natural topography of the land draining flows into existing watercourses.

No additional impermeable area will be removed or created and therefore proposals match the existing scenario.

Drawing of proposed fin drain detail and an example of proposed location adjacent to duct circuits is provided within Appendix C.

5.3 SuDS & future maintenance regime.

Table 6: Operation and maintenance requirements for fin drains

Maintenance Schedule	Required action	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from fin drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect fin drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the fin drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying fin medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

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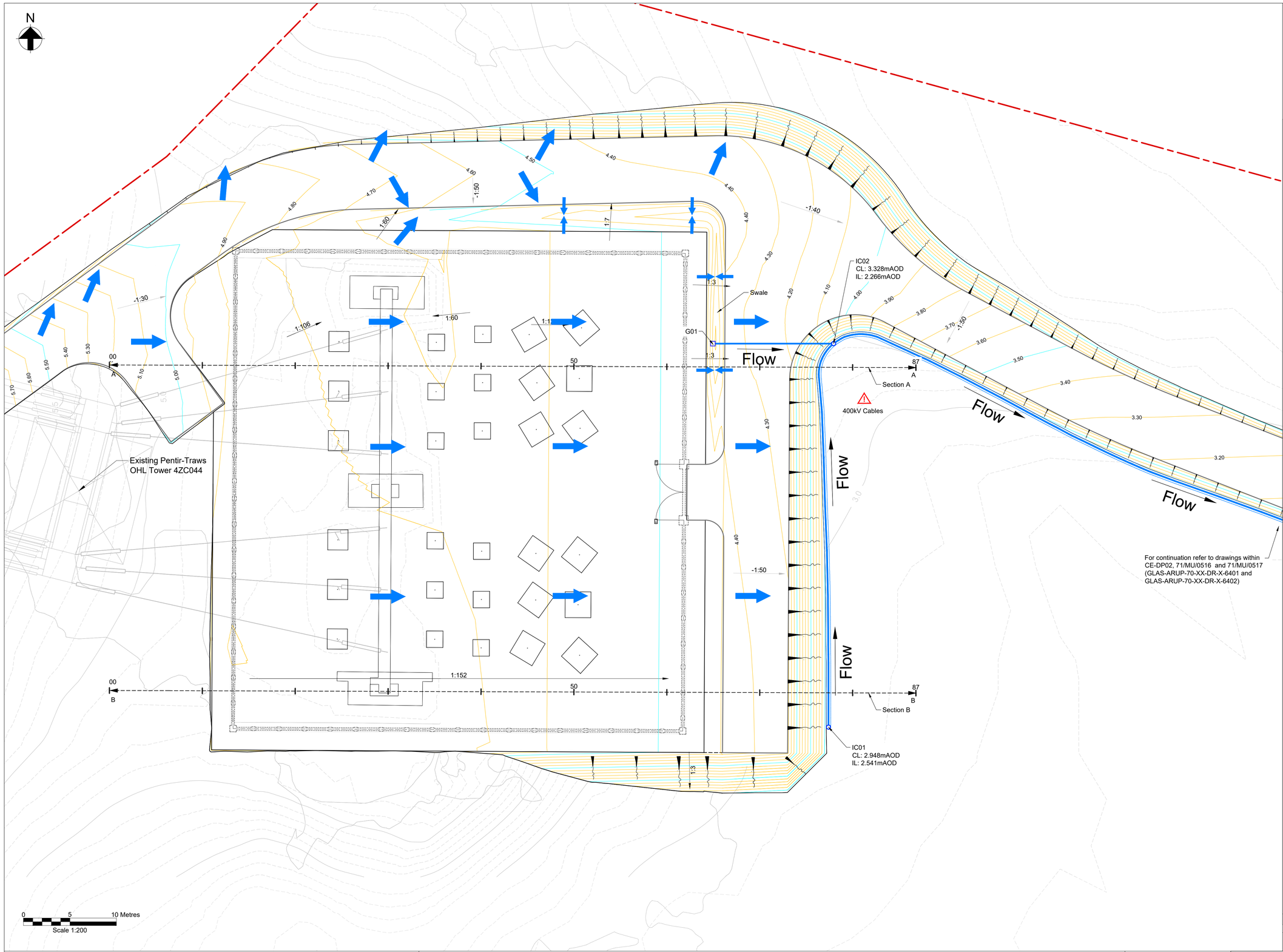
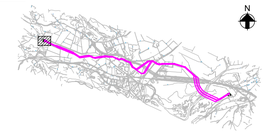
Appendix A – Wern CESC



Key Plan



Notes

1. Do not scale from this drawing.
2. All dimensions in metres unless otherwise stated.
3. Drawing to be printed in colour.
4. All elevations are specified as metres above Ordnance Datum Newyln (mAODN) unless otherwise stated.
5. Existing ground model and utilities information based on survey MGS54157 dated 08/09/23 and undertaken by Murphy Geospatial, with additional data from subsequent GPR.
6. The GPR utilities information is to be read in conjunction with the desktop utilities information. Where the GPR utilities information differs from the desktop utilities information, the GPR utilities information prevails.
7. The surface water drainage has been designed in accordance with Sewer Sector Guidance Appendix C, the Manual of Contract Documents for Highway Works (MCHW) Volume 3, National Grid Technical Specification TS 2.10.05 - Access Covers/Ducts/Trenches, TS 2.10.09 - Site Drainage and TS 3.10.02 - Materials.
8. To be read alongside the following drawings:

CE-DP01 Wern CSEC
CE-DP01a: Civils Layout 71/MU/0202 to 71/MU/0206 (GLAS-ARUP-71-XX-DR-X-5100 series)
CE-DP01b: Earthworks 71/MU/0207 to 71/MU/0211 (GLAS-ARUP-71-XX-DR-X-5150 series)
CE-DP01c: HV Foundations 71/MU/0212 to 71/MU/0218 (GLAS-ARUP-71-XX-DR-X-5200 series)
CE-DP01d: HV Support Structures 71/MU/0219 to 71/MU/0222 (GLAS-ARUP-71-XX-DR-X-5250 series)
CE-DP01e: Drainage
- Drainage Permanent Details Sheet 1; 71/MU/0224 (GLAS-ARUP-71-XX-DR-X-5302)

CE-DP02 Access Road to Wern
CE-DP02: Access Road 71/MU/0499 to 71/MU/0525 (GLAS-ARUP-70-XX-DR-X-6000 series)

Legend

- Work site boundary
- Proposed access road and embankment (1:3 slope unless noted otherwise)
- Proposed major contour (0.5m intervals) 2.5
- Proposed minor contour (0.1m intervals)
- Existing watercourse
- Existing trees and vegetation
- Proposed filter trench
- Proposed carrier pipe
- Proposed Ø450mm inspection chamber ICxx
- Proposed gully with grid type cover Gxx
- Surface water flow route based on proposed levels

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
Ci) Wern CSEC - interaction with live equipment - death by electrocution.
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
For SHE information relevant to decommissioning/demolition refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003

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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
B	01/10/24	TSJ	JPV	GT	Accepted for Construction
A	29/07/24	TSJ	JPV	GT	First Issue - For Review

Name of Contractor J MURPHY & SONS	Working Copy	Site Reference
Accepted for Construction - Civils		
AS INSTALLED (Final Verified Copy Awaited)		
	Name / Sign / Date	
Contractors Engineer		
Drawing Contains Mark Ups	Yes	No

Dwg Title:
Wern CSEC
Drainage
Permanent Layout

Site: Glaslyn Cable Uprating	A1 100%	CAD
Originator Dwg No: GLAS-ARUP-71-XX-DR-X-5301	Originators Proj.Ref: 295280-00	
NG Investment No: WS3420853381		
NG Dwg No: 71/MU/0223	Sheet No: 1 / Total No. of Sheets 1	Issue: B
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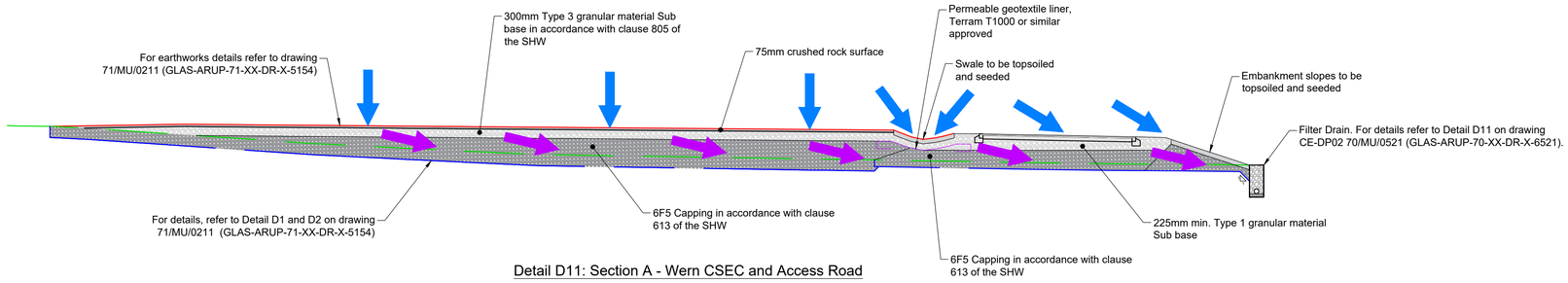
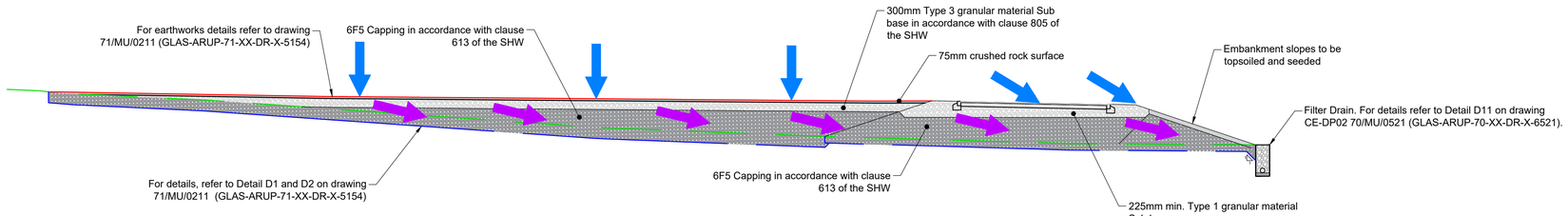


Detail D11: Section A - Wern CSEC and Access Road

Scale 1:100



Detail D12: Section B - Wern CSEC and Access Road

Scale 1:100

0 0.5 1 1.5 2 3 4 5 Metres

Scale 1:100

Notes

1. Do not scale from this drawing.
2. All dimensions in millimetres unless otherwise stated.
3. Drawing to be printed in colour.
4. All elevations are specified as metres above Ordnance Datum Newyln (mAODN) unless otherwise stated.
4. The designer takes no responsibility for any utility works / damage to the utilities during the proposed works. The contractor is to make all the necessary searches / investigations to confirm the utility locations on site and avoid damage.
5. Refer to the specification document GLAS-ARUP-XX-ZZ-SP-C-0001.
6. The SHW acronym refers to the Manual of Contract Documents for Highway Works - Volume 1 Specification for Highway Works.
7. The surface water drainage has been designed in accordance with Sewer Sector Guidance Appendix C, the Manual of Contract Documents for Highway Works (MCHW) Volume 3, National Grid Technical Specification TS 2.10.05 - Access Covers/Ducts/Trenches, TS 2.10.09 - Site Drainage and TS 3.10.02 - Materials.
8. To be read alongside the following drawings:

CE-DP01 Wern CSEC
CE-DP01a: Civils Layout 71/MU/0202 to 71/MU/0206 (GLAS-ARUP-71-XX-DR-X-5100 series)
CE-DP01b: Earthworks 71/MU/0207 to 71/MU/0211 (GLAS-ARUP-71-XX-DR-X-5150 series)
CE-DP01c: HV Foundations 71/MU/0212 to 71/MU/0218 (GLAS-ARUP-71-XX-DR-X-5200 series)
CE-DP01d: HV Support Structures 71/MU/0219 to 71/MU/0222 (GLAS-ARUP-71-XX-DR-X-5250 series)
CE-DP01e: Drainage
- Drainage Permanent Layout; 71/MU/0223 (GLAS-ARUP-71-XX-DR-X-5301)

CE-DP02 Access Road to Wern
CE-DP02: Access Road 71/MU/0499 to 71/MU/0525 (GLAS-ARUP-70-XX-DR-X-6000 series)

Legend

Existing Wern Compound Ground Level
Proposed Wern Compound Ground Level
Overland Flow Route
Sub-Surface Flow Route

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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
B	01/10/24	TSJ	JPV	GT	Accepted for Construction
A	29/07/24	TSJ	JPV	GT	First Issue - For Review

Name of Contractor J MURPHY & SONS	Working Copy	Site Reference
Accepted for Construction - Civils		
AS INSTALLED (Final Verified Copy Awaited)		
	Name	Sign	Date
Contractors Engineer			
Drawing Contains Mark Ups	Yes	No

Dwg Title:
Wern CSEC
Drainage
Permanent Details Sheet 1

Site: Glaslyn Cable Uprating		A1 100%	CAD
Originator Dwg No: GLAS-ARUP-71-XX-DR-X-5302	Originators Proj.Ref: 295280-00		
NG Investment No: WS3420853381			
NG Dwg No: 71/MU/0224	Sheet No: 1	Total No. of Sheets 1	Issue: B
Scale: 1:100			

ARUP

Job number	295280
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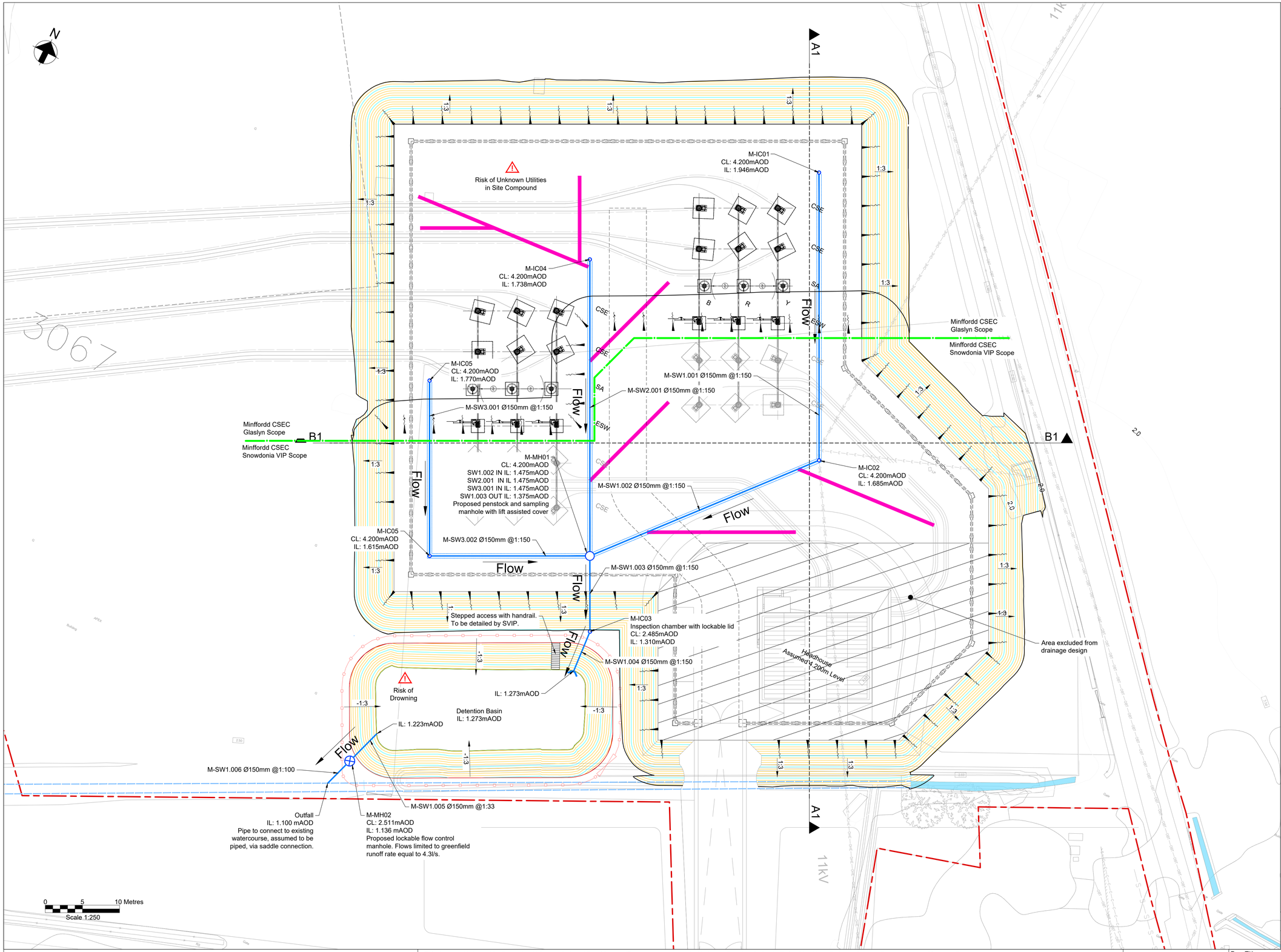
Appendix B – Minffordd CESC



Key Plan

Notes

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3. Drawing to be printed in colour.
4. All elevations are specified as metres above Ordnance Datum Newyln (mAODN) unless otherwise stated.
5. Existing ground model and utilities information based on survey MGS54157 dated 08/09/23 and undertaken by Murphy Geospatial, with additional data from subsequent GPR survey.
6. The GPR utilities information is to be read in conjunction with the desktop utilities information. Where the GPR utilities information differs from the desktop utilities information, the GPR utilities information prevails.
7. To be read alongside the following drawings:

CE-DP03 Minffordd CSEC
CE-DP03a: Civils Layout 71/MU/0252 to 71/MU/0256 (GLAS-ARUP-71-XX-DR-X-7100 series)
CE-DP03b: Earthworks 71/MU/0257 to 71/MU/0261 (GLAS-ARUP-71-XX-DR-X-7150 series)
CE-DP03c: HV Foundations 71/MU/0262 to 71/MU/0266 (GLAS-ARUP-71-XX-DR-X-7200 series)
CE-DP03d: HV Support Structures 71/MU/0267 to 71/MU/0269 (GLAS-ARUP-71-XX-DR-X-7250 series)
CE-DP03e: Drainage
- Permanent Drainage Layout; 71/MU/0270 (GLAS-ARUP-71-XX-DR-X-7301)
- Permanent Sections Sheet 1; 71/MU/0271 (GLAS-ARUP-71-XX-DR-X-7302)
- Permanent Details Sheet 1; 71/MU/0275 (GLAS-ARUP-71-XX-DR-X-7311)
- Permanent Details Sheet 2; 71/MU/0276 (GLAS-ARUP-71-XX-DR-X-7312)
- Permanent Details Sheet 3; 71/MU/0277 (GLAS-ARUP-71-XX-DR-X-7313)

CE-DP03g: Security/ Fencing 71/MU/0272 to 71/MU/0274 (GLAS-ARUP-71-XX-DR-X-7400 series)

Legend

- Work site boundary
- Proposed Embankment
- Proposed Minffordd Compound's Major Contour 0.5m Intervals
- Proposed Minffordd Compound's Minor Contour 0.1m Intervals
- Existing Topographical Major Contour 0.5m Intervals
- Existing Topographical Minor Contour 0.1m Intervals
- Crown/Valley Break Line
- Area excluded from drainage design
- Existing watercourse
- Existing trees and vegetation
- Proposed filter trench
- Proposed carrier pipe
- Proposed herringbone drain
- Proposed Ø450mm inspection chamber (Type D) ICxx
- Proposed Ø1200mm manhole (Type B)
- Proposed Ø1350mm flow control manhole (Type C)
- Assumed location of existing watercourse
- Proposed Gate
- Proposed post & rail fencing

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
Ci) Minffordd CSEC - interaction with live equipment - death by electrocution.
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
For SHE information relevant to decommissioning/demolition refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003

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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
C	23/06/25	BA	JL	GT	Accepted for Construction
B	20/09/24	TSJ	JPV	GT	Accepted for Construction
A	16/08/24	TSJ	JPV	GT	First Issue - For Review

Name of Contractor J MURPHY & SONS	Working Copy	Site Reference
Accepted for Construction - Civils		
AS INSTALLED (Final Verified Copy Awaited)		
	Name	Sign	Date
Contractors Engineer			
Drawing Contains Mark Ups	Yes	No

Dwg Title:
Minffordd CSEC
Drainage
Permanent Layout

Site: Glaslyn Cable Uprating

A1 100% | CAD

Originator Dwg No: GLAS-ARUP-71-XX-DR-X-7301
Originators Proj.Ref: 295280-00
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NG Dwg No: 71/MU/0270
Sheet No: 1
Total No. of Sheets: 1
Issue: C
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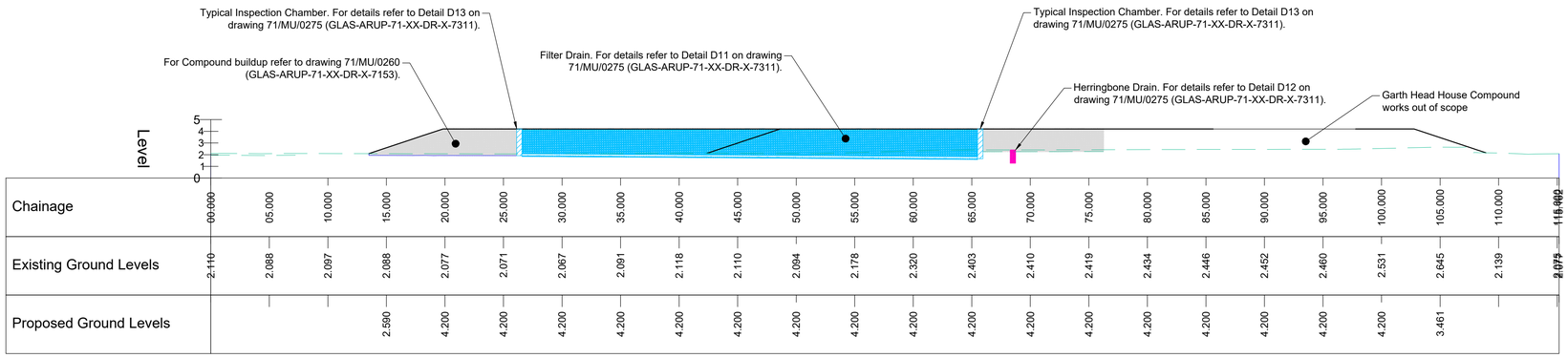

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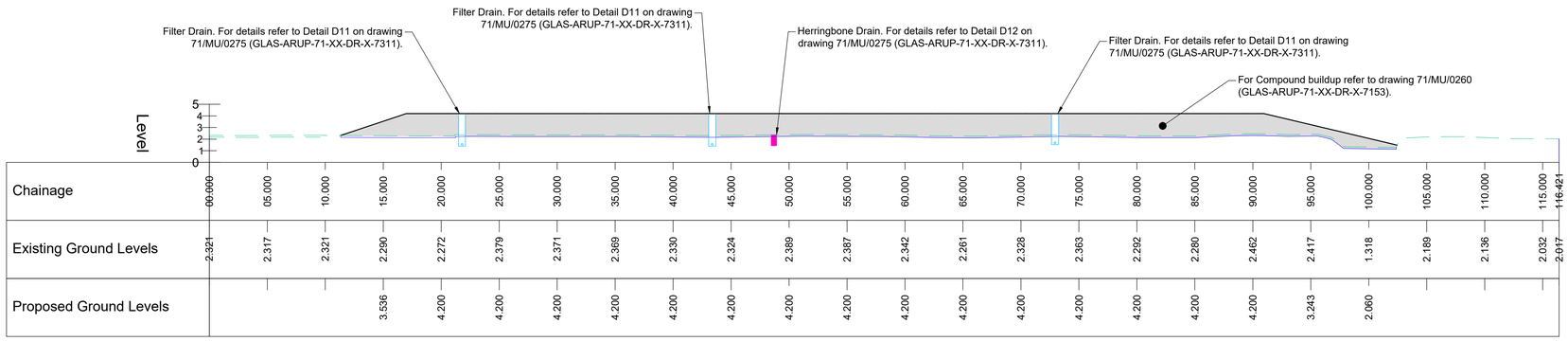

SECTION B1 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 0.000

Notes

1. Do not scale from this drawing.
2. All dimensions in metres unless otherwise stated.
3. Drawing to be printed in colour.
4. All elevations are specified as metres above Ordnance Datum Newyln (mAODN) unless otherwise stated.
5. Existing ground model and utilities information based on survey MGS54157 dated 08/09/23 and undertaken by Murphy Geospatial, with additional data from subsequent GPR survey.
6. The GPR utilities information is to be read in conjunction with the desktop utilities information. Where the GPR utilities information differs from the desktop utilities information, the GPR utilities information prevails.
7. To be read alongside the following drawings:

CE-DP03 Minffordd CSEC
CE-DP03a: Civils Layout 71/MU/0252 to 71/MU/0256 (GLAS-ARUP-71-XX-DR-X-7100 series)
CE-DP03b: Earthworks 71/MU/0257 to 71/MU/0261 (GLAS-ARUP-71-XX-DR-X-7100 series)
CE-DP03c: HV Foundations 71/MU/0262 to 71/MU/0266 (GLAS-ARUP-71-XX-DR-X-7200 series)
CE-DP03d: HV Support Structures 71/MU/0267 to 71/MU/0269 (GLAS-ARUP-71-XX-DR-X-7250 series)
CE-DP03e: Drainage
- Drainage General Arrangement 71/MU/0270 (GLAS-ARUP-71-XX-DR-X-73101)
- Drainage Details 71/MU/0275 to 71/MU/0277 (GLAS-ARUP-71-XX-DR-X-7310 series)
CE-DP03g: Security/ Fencing 71/MU/0272 to 71/MU/0274 (GLAS-ARUP-71-XX-DR-X-7400 series)

Legend

Existing Minffordd Compound Ground Level

Proposed Minffordd Compound Ground Level

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
Ci) Minffordd CSEC - interaction with live equipment - death by electrocution.
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
For SHE information relevant to decommissioning/demolition refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003

0 5 10 Metres
Scale 1:250

This document is issued for the party which commissioned it and for specific purposes connected with the captioned project only. It should not be relied upon by any other party or used for any other purpose.
We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

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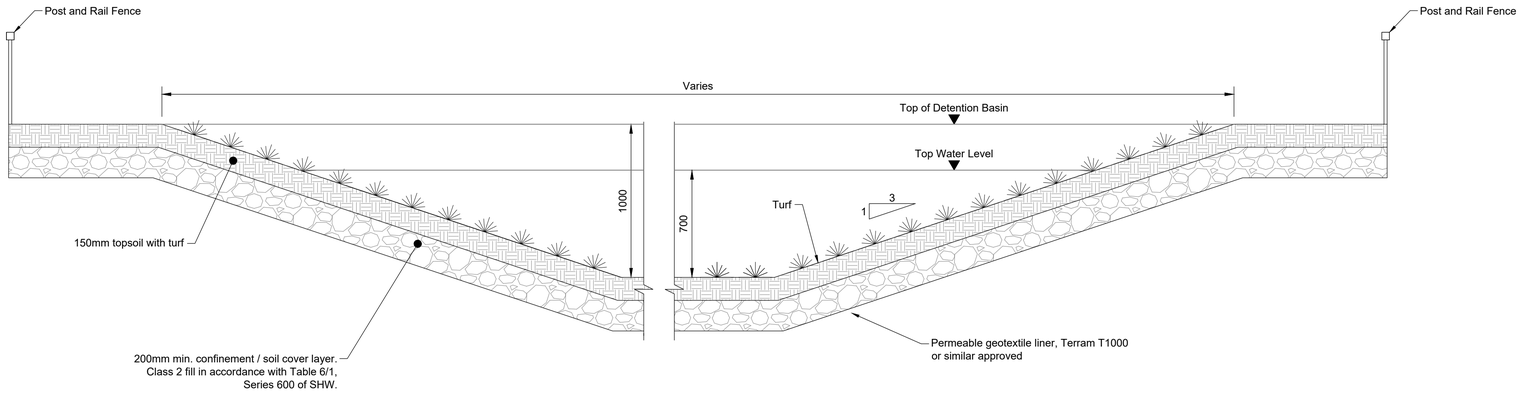
ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
B	20/09/24	TSJ	JPV	GT	Accepted for Construction
A	16/08/24	TSJ	JPV	GT	First Issue - For Review

Name of Contractor J MURPHY & SONS		Working Copy	Site Reference
Accepted for Construction - Civils			
AS INSTALLED (Final Verified Copy Awaited)			
	Name	Sign	Date
Contractors Engineer			
Drawing Contains Mark Ups		Yes	No

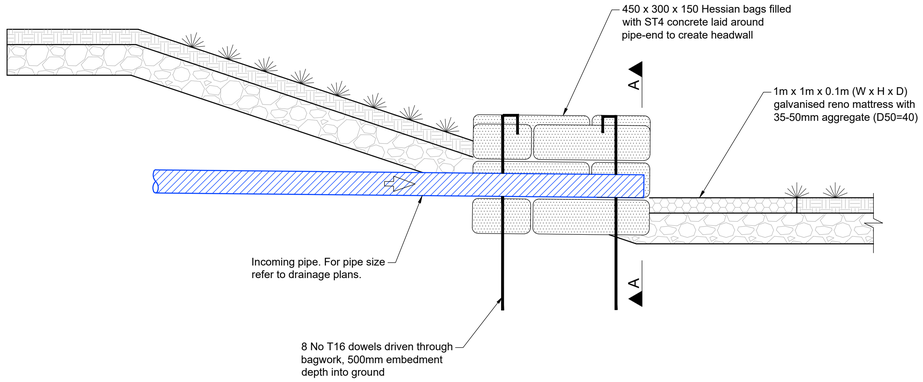
Dwg Title:
Minffordd CSEC
Drainage
Permanent Sections

Site: Glaslyn Cable Uprating		A1 100%	CAD
Originator Dwg No: GLAS-ARUP-71-XX-DR-X-7302	Originators Proj.Ref: 295280-00		
NG Investment No: WS3420853381			
NG Dwg No: 71/MU/0271	Sheet No: 1	Total No. of Sheets 1	Issue: B
Scale: 1:250			



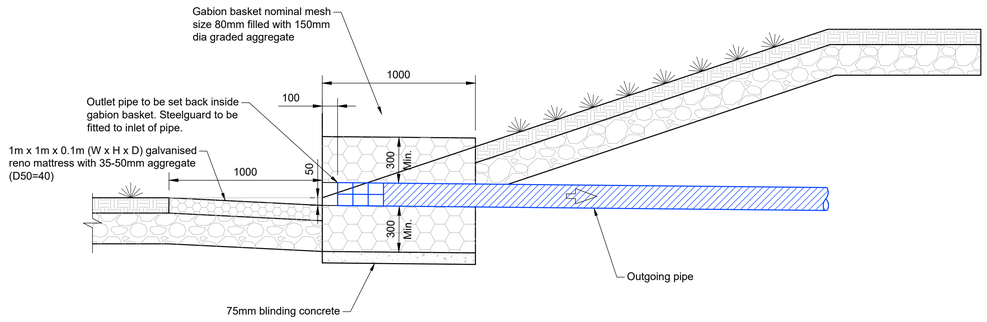
D31: Typical Detention Basin Section

Scale 1:20



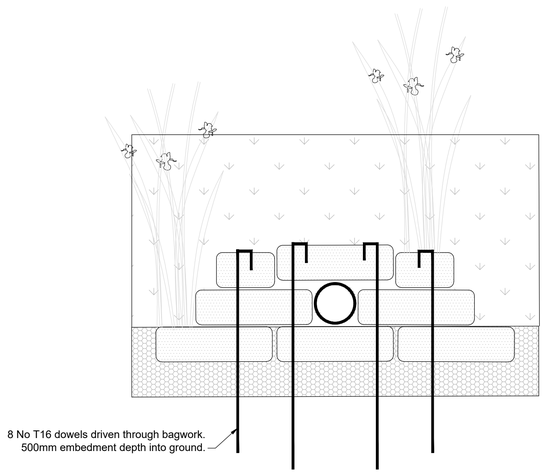
D32: Typical Detention Basin Inlet

Scale 1:20



D33: Typical Detention Basin Outlet

Scale 1:20



Section A

Not to Scale

0 0.1 0.2 0.3 0.4 0.5 1.0 Metres

Scale 1:20

Notes

1. Do not scale from this drawing.
2. All dimensions in millimetres unless otherwise stated.
3. The contractor is responsible for establishing and checking the setting out of all levels and datums.
4. Refer to the specification document GLAS-ARUP-XX-ZZ-SP-C-0001.
5. The Contractor shall be responsible for the stability of the existing structures on the site and must take all necessary precautions to safeguard the stability.
6. Any temporary works including, needling, shoring, strutting and propping shall be the sole responsibility of the contractor.
7. Contractor to refer to HSG47 - avoiding danger from underground services and document GS6 - avoiding danger from overhead electric lines.
8. Highways in vicinity of works to be kept free from mud, debris and dust during the contractors process.
9. The SHW acronym refers to the Manual of Contract Documents for highway works - Volume 1 Specification for highway works.
10. Any unsuitable hard and soft material at or below formation level shall be reported to the engineer prior to commencement of any works and removed and replaced with well compacted 6F5 capping material in accordance with the requirements of series 600 SHW and the project earthworks specification.
11. Topsoil to BS 3882:2015 - Clause 4.1a 'multipurpose' classification and following recommendations of the Pre-entry Soils and Existing Land Drainage Assessment undertaken by ADAS and dated 16/08/23. Refer to earthworks specification for further information regarding stockpiling, placement, etc.
12. The designer takes no responsibility for any utility works / damage to the utilities during the proposed works. The contractor is to make all the necessary searches / investigations to confirm the utility locations on site and avoid damage.
13. The surface water drainage has been designed in accordance with Sewer Sector Guidance Appendix C, the Manual of Contract Documents for Highway Works (MCHW) Volume 3, National Grid Technical Specification TS 2.10.05 - Access Covers/Ducts/Trenches, TS 2.10.09 - Site Drainage and TS 3.10.02 - Materials.
14. For Drainage Plan Drawings, refer to 71/MU/0270 (GLAS-ARUP-71-XX-DR-X-7301).

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION ⚠
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
For SHE information relevant to decommissioning/demolition refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003

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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
B	20/09/24	TSJ	JPV	GT	Accepted for Construction
A	16/08/24	TSJ	JPV	GT	First Issue - For Review

Name of Contractor J MURPHY & SONS	Working Copy	Site Reference
Accepted for Construction - Civils		
AS INSTALLED (Final Verified Copy Awaited)		
	Name	Sign	Date
Contractors Engineer			
Drawing Contains Mark Ups	Yes	No

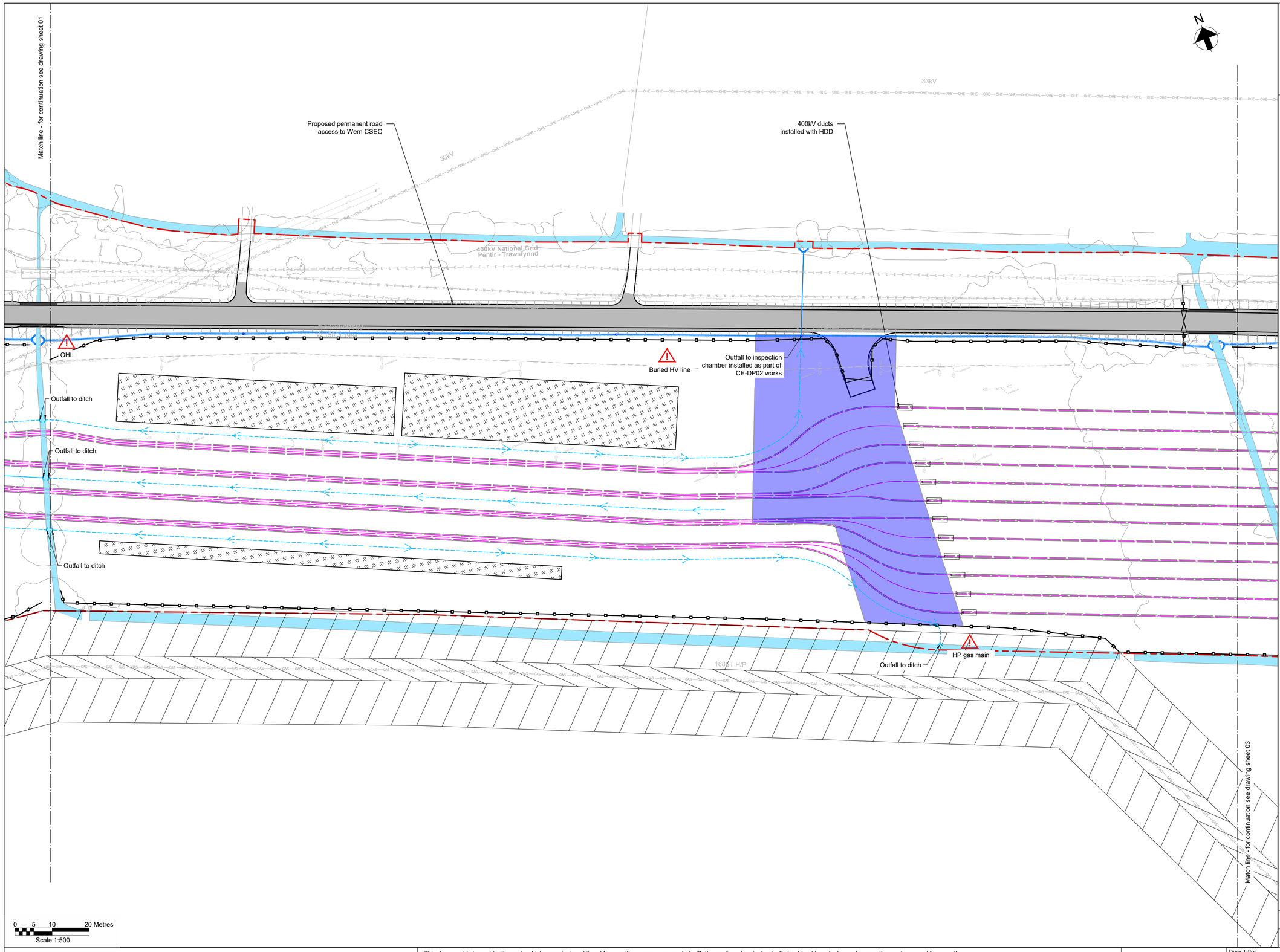
Dwg Title:
Minffordd CSEC
Drainage
Permanent Details Sheet 3

Site: Glaslyn Cable Uprating	A1 100%	CAD
Originator Dwg No: GLAS-ARUP-71-XX-DR-X-7313	Originators Proj.Ref: 295280-00	
NG Investment No: WS3420853381		
NG Dwg No: 71/MU/0277	Sheet No: 1 / Total No. of Sheets 1	Issue: B
Scale: As Shown		

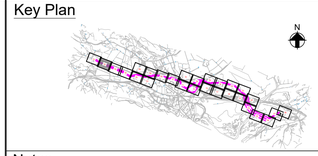
ARUP

Job number	295280
Date	19 August 2025

Appendix C – Cable Route HVC DP01



Key Plan



Notes

1. Do not scale from this drawing.
2. Drawing to be printed in colour.
3. All dimensions in metres unless otherwise stated.
4. All levels are in meters Above Ordnance Datum (mAOD)
5. Existing ground model and utilities information based on survey MGS54157 dated 08/09/23 and undertaken by Murphy Geospatial, with additional data from subsequent GPR.
6. The GPR utilities information is to be read in conjunction with the desktop utilities information. Where the GPR utilities information differs from the desktop utilities information, the GPR utilities information prevails.
7. Flood protection levels are based on version ER27 of the Porthmadog Fluvial Hydraulic Model by NRW.
8. 400kV cable ducts and ancillary equipment are installed in open cut trench unless otherwise noted.

6. Refer also to the following drawings in HVC-DP01 package:
   - General Notes and Legends: 70/MU/0552
   - Access Roads: 70/MU/0893 to 70/MU/0978
   - Existing Layouts: 70/MU/0583 to 70/MU/0610
   - Site Clearance : 70/MU/0626 to 70/MU/0639
   - Fencing Layouts: 70/MU/0995 to 70/MU/0997
   - Fencing Details: 70/MU/0995 to 70/MU/0997
   - Compound Layouts: 70/MU/0979 to 70/MU/0991
   - Compound Details: 70/MU/0992 to 70/MU/0994
   - Temporary Drainage Details: 70/MU/0978

Legend

- Work Site Boundary
- Proposed Temporary Access Road And Embankment (1:3 Slope Unless Noted Otherwise)
- Proposed Permanent Access Road and Embankment (1:3 Slope Unless Noted Otherwise)
- Proposed Underground Cable Route and Joint Bay
- Proposed Raised Compound and HDD Working Areas
- Indicative Stockpiles
- Temporary HDD Working Area
- Temporary Working Area For Joint Bay Installation
- 15m Wide Gas Exclusion Zone
- Existing Watercourse
- Existing Trees and Vegetation
- Proposed Temporary Fin Drain
- Proposed Temporary Fin Drain Headwall
- Proposed Temporary Filter Trench
- Proposed Temporary Filter Trench Headwall
- Proposed Temporary Culvert
- Proposed Permanent Drainage (CE-DP02)
- Proposed Fencing

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION ⚠
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
For SHE information relevant to decommissioning/demolition refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003

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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
C	28/02/25	JD	MJ	SS	Third Issue - For Review
B	06/12/24	TSJ	JPV	SS	Second Issue - For Review
A	04/09/24	TSJ	JPV	SS	First Issue - For Review

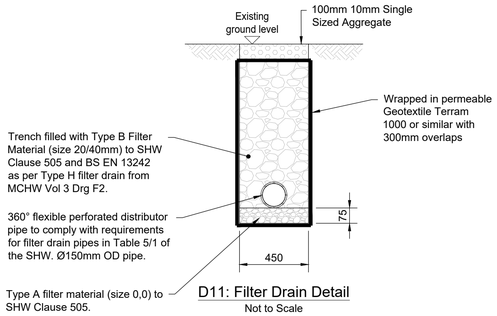
J MURPHY & SONS

Preliminary

Dwg Title: General Arrangement Sheet 2

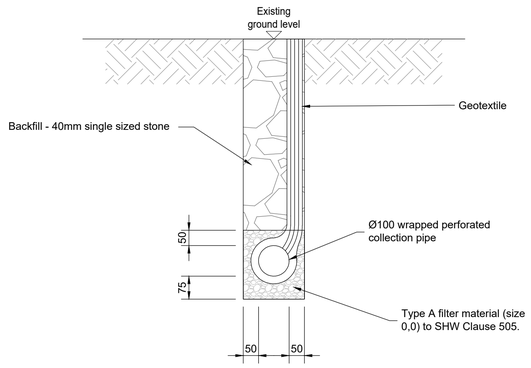
Site: Glaslyn Cable Uprating | A1 100% | CAD

Originator Dwg No: GLAS-ARUP-70-XX-DR-X-0102
NG Investment No: WS3420853381
NG Dwg No: 70/MU/0555
Originators Proj.Ref: 295280-00
Sheet No: 2 | Total No. of Sheets: 28 | Issue: C
Scale: 1:500



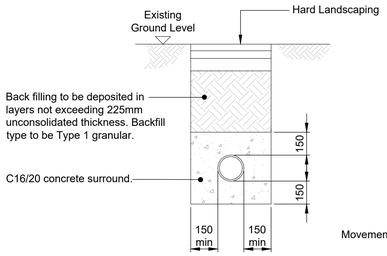
D11: Filter Drain Detail

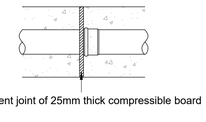
Not to Scale



D12: Fin Drain Detail

Not to Scale





D13: Class Z Pipe Surround (Concrete Encasement)

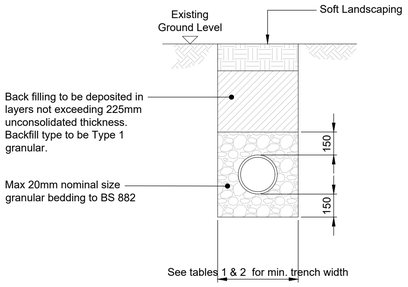
Pipe to be concrete encased where cover is less than 1.2m below road.

Flexible joints at every pipe joint at not greater than 8m centres.

TABLE 1

DN	Minimum trench width (OD + x)		
	Supported trench	Unsupported trench	
		# > 60°	# < 60°
less 225	OD + 400	OD + 400	OD + 400
225 to 350	OD + 500	OD + 500	OD + 400
350 to 700	OD + 700	OD + 700	OD + 400
700 to 1200	OD + 850	OD + 850	OD + 400
greater 1200	OD + 1000	OD + 1000	OD + 400

Minimum Trench Width In Relation To Normal Size DN



D14: Type S Pipe Bedding

1:20

TABLE 2

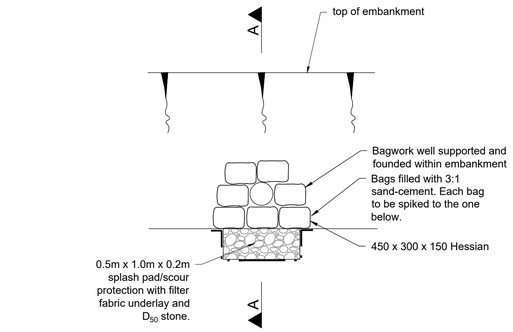
Trench depth	Minimum trench width
less 1000	No min. width required
1000 to 1750	800
1750 to 4000	900
greater 4000	1000

The minimum trench width shall be the greater of the values taken from tables 1 & 2.

Minimum Trench Width In Relation To Trench Depth

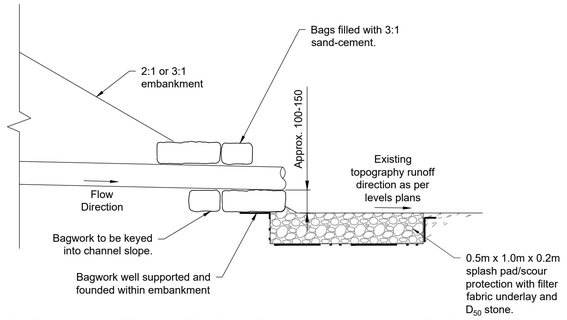
0 0.1 0.2 0.3 0.4 0.5 1.0 Metres

Scale 1:20



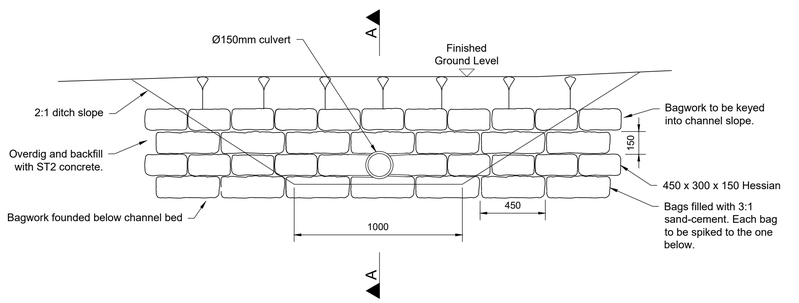
D15: Temporary Outfall - Fin Drain Bagwork Headwall Elevation Detail

1:20



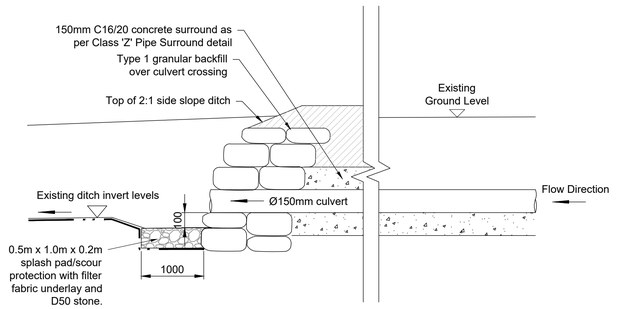
D16: Section A-A: Through Fin Drain Bagwork Headwall and Outfall

1:20



D17: Culvert Outlet - Filter Trench Bagwork Headwall Elevation Detail

1:20



D18: Section A-A: Through Filter Trench Bagwork Headwall and Culvert

1:20

Notes

1. Do not scale from this drawing.
2. All dimensions in millimetres unless otherwise stated.
3. The contractor is responsible for establishing and checking the setting out of all levels and datums.
4. Refer to the specification document GLAS-ARUP-XX-ZZ-SP-C-0001.
5. The Contractor shall be responsible for the stability of the existing structures on the site and must take all necessary precautions to safeguard the stability.
6. Any temporary works including, needling, shoring, strutting and propping shall be the sole responsibility of the contractor.
7. Contractor to refer to HSG47 - avoiding danger from underground services and document GS6 - avoiding danger from overhead electric lines.
8. Highways in vicinity of works to be kept free from mud, debris and dust during the contractors process.
9. The SHW acronym refers to the Manual of Contract Documents for highway works - Volume 1 Specification for highway works.
10. Any unsuitable hard and soft material at or below formation level shall be reported to the engineer prior to commencement of any works and removed and replaced with well compacted 6F5 capping material in accordance with the requirements of series 600 SHW and the project earthworks specification.
11. Topsoil to BS 3882:2015 - Clause 4.1a 'multipurpose' classification and following recommendations of the Pre-entry Soils and Existing Land Drainage Assessment undertaken by ADAS and dated 16/08/23. Refer to earthworks specification for further information regarding stockpiling, placement, etc.
12. The designer takes no responsibility for any utility works / damage to the utilities during the proposed works. The contractor is to make all the necessary searches / investigations to confirm the utility locations on site and avoid damage.
13. For General Arrangement Drawings, refer to GLAS-ARUP-70-XX-DR-X-0101-0128.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazard/risks normally associated with the types of work detailed on this drawing note the following:
CONSTRUCTION
For SHE information relevant to construction refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
OPERATION / MAINTENANCE
For SHE information relevant to operation/maintenance refer to CDM Risk Register: GLAS-ARUP-ZZ-XX-RG-X-0003
DECOMMISSIONING / DEMOLITION
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ISSUE	DATE	DRAWN	CHECKED	APPROVED	REMARKS
A	04/09/24	TSJ	JPV	GT	First Issue - For Review

J MURPHY & SONS

Preliminary

Dwg Title: Temporary Drainage Details Sheet 1

Site: Glaslyn Cable Uprating

A1 100% | CAD

Originator Dwg No: GLAS-ARUP-70-XX-DR-X-2001

NG Investment No: WS3420853381

NG Dwg No: 70/MU/0978

Originators Proj.Ref: 295280-00

Scale: As Shown

Sheet No: 1 | Total No. of Sheets 1 | Issue: A