



Cyfoeth Naturiol Cymru
Natural Resources Wales

Water Resources LICENCE TO

ABSTRACT

WATER

Environment Act 1995
Water Resources Act 1991 as amended
by the Water Act 2003
Water Resources (Abstraction and
Impounding) Regulations 2006
Natural Resources Body for Wales (Functions)
Order 2012

IMPORTANT NOTES

Need for safekeeping

This licence is an important document. The permission or right to abstract water may be valuable to your landholding. So -

- **Keep the licence safe, preferably with your deeds etc.**
- **Take careful note of the comments below about “transfer and apportionment” and “death and bankruptcy”.**

This is to ensure that the permission and any rights granted by the licence continue if you need to pass it on to someone else.

If you want to:

- **revoke (cancel) the licence;**
- **vary (change/amend) the licence in any way or**
- **change your contact address (but you continue to hold the licence).**

Please write to us at your local Natural Resources Wales office.

Details of this licence are placed on a register, kept by Natural Resources Wales and open for inspection by the public. The public may also obtain further details about it by virtue of the Environmental Information Information Regulations 2004 (see also Disclosure of Information) except in special cases (for advice please contact us at the address shown on the front page of the licence).

Transfer and apportionment

If you need to pass this licence or any part of it to someone else, you must contact Natural Resources Wales and obtain the appropriate application forms. Temporary licences cannot be transferred or apportioned. The licence holder remains responsible for compliance with the terms of the licence and any charges payable until the licence has been transferred or apportioned.

Death or bankruptcy of the licence holder

If a licence has been ‘vested’ in you, as a result of the death or bankruptcy of the licence holder, please contact Natural Resources Wales in writing, telling us the licence number(s) and the date that the licence vested in you as a personal representative or trustee of the licence holder. This is necessary in order to enable you to subsequently transfer the licence.

‘Vesting’ is the transfer of responsibility and ownership of a licence when an existing licence holder is no longer able to hold the licence either through death or bankruptcy.

You do not have to complete a form, but you must notify us in writing within 15 months of the date of vesting, giving the full names of all personal representatives or trustees and a contact address.

Time limits

Your licence may be subject to a time limit (stated on the front of your licence). All new abstraction licences are legally required to include a time limit. For variations to licences, time limits are added in accordance with our policy.

The duration of a time limit is determined in accordance with our time limiting policy. The time limit is linked to the next or subsequent review of water resources within a Catchment Abstraction Management Strategy (CAMS).

There will be a presumption of renewal providing three tests are met: environmental sustainability is not in question; there is continued justification of need; and water is being used efficiently. Any application for renewal will still be subject to the normal statutory considerations.

If your licence is time limited and you wish to renew it when it expires, you will need to apply for a new licence to replace the existing one. You are advised to submit this application at least three months before it expires. To allow you to give early consideration to this, we will send you a reminder approximately 18 months before the expiry date.

If your licence cannot be renewed, we will endeavour to give at least six years notice. We will also endeavour to give at least six years notice where the licence is likely to be renewed on different terms and will significantly impact upon the use of the licence.

In exceptional circumstances, for example where there are other overriding statutory duties such as the Habitats Regulations, it may not be possible to provide six years notice.

Charges

Unless specifically exempted, we may levy an annual CHARGE for water AUTHORISED to be abstracted by this licence, in accordance with our abstraction charges scheme in force at the time.

The licence may be revoked if charges are not paid.

Quantity and quality of water

You must not abstract more than the quantity specified in the licence.

Natural Resources Wales does not, by issue of this licence or otherwise, in any way guarantee that the source of supply will produce the quantity of water authorised to be abstracted by this licence, nor that the water is fit for its intended use.

The quantity of water authorised for abstraction is given in cubic metres. One cubic metre is approximately 220 gallons.

(The precise conversion is 1 cubic metres = 219.969 gallons).

Source of supply and authorised point of abstraction

You may abstract from the point(s) specified in the licence and from no other points. If you want to add or change the authorised point(s) of abstraction, you must apply to us to vary the licence.

Land on which water is authorised to be used

Where this condition applies, you may only use the water you abstract on the area specified in the licence. You must apply to us to vary the licence if you wish to extend or alter this area or remove it.

Purpose for which water is authorised to be used

You may only use the water for the purpose(s) specified in the licence. You must apply to us to vary the licence if you wish to add to or change the purpose(s).

Offences

Under the Water Resources Act 1991 it is an offence:-

- to abstract water, or cause or permit any other person to abstract water, unless the abstraction is authorised by and in accordance with an abstraction licence, or is subject to an exemption;
 - to do anything to enable abstraction, or to increase abstraction, except in accordance with an abstraction licence or exemption;
 - to fail to comply with the conditions of an abstraction licence.
- Note in particular that it may be a condition of the licence to maintain the meter or other measuring device etc. and failure to do so will be an offence;**
- to interfere with a meter or other device which measures quantities of water abstracted so as to prevent it from measuring correctly;
 - to fail to provide information which we have reasonably required for the purpose of carrying out any of the Natural Resources Wales water resources functions;
 - to knowingly make false statements for the purpose of obtaining a licence or consent or in giving required information.

The requirement for a licence is subject to some exemptions, set out in the Water Resources Act 1991 as amended. If in any doubt as to whether you need a licence, contact us at the address shown at the bottom of the front page of the licence.

Right of appeal

If you are dissatisfied with our decision on your licence application, you may appeal.

If you are in England, you should write to the Secretary of State for the Environment, Food and Rural Affairs, care of The Planning Inspectorate at: Room 4/19 Eagle Wing, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6PN.

If you are in Wales, you should write to Welsh Government care of The Planning Inspectorate at: Crown Buildings, Cathays Park, Cardiff, CF10 3NQ.

You must serve notice of appeal within 28 days of the date of receipt of this licence (although the Secretary of State and The Welsh Government have power to allow a longer period for serving notice of appeal). See Water Resources Act 1991, section 43.

Disclosure of information

Information about this licence is available in the public Register held by Natural Resources Wales. Members of the public are also entitled to ask us for other “environmental information” it holds, including any activities likely to affect “the state of any water” or any “activities or other measures designed to protect it”. That would include the information additional to the licence document e.g. any related agreement or abstraction returns. In certain restricted circumstances it is possible to claim that information should be kept confidential. If you require more information about keeping this information off the public register because it is confidential, please contact us by writing to the address shown on the front page of the licence within 28 days of receiving this licence.

FULL LICENCE TO ABSTRACT WATER

The Natural Resources Body for Wales (hereafter referred to as “NRW”) grants this licence to:-

Rhondda Cynon Taf County Borough Council (“the Licence Holder”)

2 Llys Cadwyn
Taff Street
Pontypridd
CF37 4TH

This licence authorises the Licence Holder to abstract water from the source of supply described in the Schedule of Conditions to this licence and subject to the provisions of that Schedule. The licence commences from the effective date shown below and shall remain in force until the date of expiry shown below.

Signed:



Ashley Lansdown
Permitting Team Leader
Permitting Service
Natural Resources Wales
Welsh Government Offices
Cathays Park
King Edward VII Avenue
Cardiff
CF10 3NQ

Date of issue.....11th September 2025

Date effective.....11th September 2025

Date of expiry.....31 March 2041

This licence should be kept safe and its existence disclosed on any sale of the property to which it relates. Please read the ‘important notes’ on the cover to this licence.

Note: References to “the map” are to the map which forms part of this licence.
References to “NRW” are to the Natural Resources Body for Wales or any successor body.

SCHEDULE OF CONDITIONS

1. SOURCE OF SUPPLY

- 1.1 Inland water (lake) known as an un-named (upper) lake on the River Dare at Dare Valley Country Park, Aberdare, Rhondda Cynon Taf.

2. POINT OF ABSTRACTION

- 2.1 At National Grid Reference SN 97752 02790 marked 'Point A' on the map.

MEANS OF ABSTRACTION

3.

- 3.1 Intake works and a gravity feed Penstock pipe of an internal diameter not exceeding 500 millimetres controlled by a gate valve.

4. PURPOSE OF ABSTRACTION

- 4.1 Power production.

5. PERIOD OF ABSTRACTION

- 5.1 All Year.

6. MAXIMUM QUANTITIES OF WATER TO BE ABSTRACTED

- 6.1 20,304 cubic metres per day
5,325,011 cubic metres per year
At an instantaneous rate not exceeding 235 litres per second.

Note: A day means any period of 24 consecutive hours and a year means the 12 month period beginning on 1 April and ending on 31 March.

7. MEANS OF MEASUREMENT OF WATER ABSTRACTED

- 7.1 (i) The Licence Holder shall determine the quantity of water abstracted by reference to the kilowatt-hours generated, as measured by a kilowatt-hours meter multiplied by the conversion factor determined using the calculation checklist attached to this licence.
- (ii) The Licence Holder shall retain supporting documentation relating to details of the methodology and calculations used to convert electricity generated to the quantities abstracted and make them available to NRW on request.

8. RECORDS

- 8.1 (i) The Licence Holder shall record readings of the electrical output and the corresponding quantity of water abstracted at the same time each week, as determined using the calculation checklist attached to this licence or at such other intervals as may be approved by NRW in writing.

- (ii) The Licence Holder shall send to NRW a copy of the records required by (i) above within 28 days after 31 March in each year, and also within 28 days of being so requested in writing by NRW
- (iii) The Licence Holder shall keep all records for at least 6 years, and shall allow NRW to inspect them during all reasonable hours.

9. FURTHER CONDITIONS

9.1 For the purpose of this licence, references to 'hydropower scheme' shall mean all works consisting of modifications to an existing weir to include Coanda screens with 2 millimetre perforations, v-notch plate, 500 millimetre internal diameter gravity feed penstock pipe controlled by a gate valve, chamber, a Crossflow turbine and associated ancillary civil works and tailrace outlet with bar spacing no greater than 10 millimetres.

9.2 The Licence Holder shall construct, operate and maintain the hydropower scheme in accordance with the specifications and plans/drawings:

'Weir Sections and Details 34564-HYD-XX-XX-DR-C-1610', Revision T02, dated 01/08/2025;

Weir General Arrangement Plan 34564-HYD-XX-XX-DR-C-1010', Revision P03, dated 27/05/2025;

'Power House Sections and Details 34564-HYD-XX-XX-DR-C-1620', Revision T02 dated 01/08/2025 and;

'Power House General Arrangement Plan 34564-HYD-XX-XX-DR-C-1020' Revision T02 dated 01/08/2025;

copies of which are appended to this licence, or such minor amendments to those documents that are accepted in writing by NRW prior to the date of commencement of construction.

9.3 The Licence Holder shall, as far as is reasonably practicable, ensure that no water flows through the turbine if the Licence Holder is unable to generate power.

9.4 The Licence Holder shall return all of the water abstracted in pursuance of this licence to the un-named (lower) lake on the River Dare at National Grid Reference SN 98120 02848 marked 'Point Q' on the map.

9.5 (i) No abstraction of water shall take place unless the rate of flow in the River Dare immediately downstream of the authorised point of abstraction, marked as 'Point A' as specified in Condition 2.1, is equal to or greater than 50 litres per second and the abstraction shall not cause the flow immediately downstream of said abstraction point to fall below that rate.

(ii) The quantity of water abstracted shall not exceed 60% of the available flow in the River Dare in excess of 50 litres per second.

9.6 (i) No abstraction shall take place unless the Licence Holder has installed . intake screens with perforations no greater than 2 millimetres to prevent

the entrapment, entrainment or impingement of fish at the point of abstraction.

- (ii) The Licence Holder shall maintain the fish screen in accordance with the manufacturer's specifications and keep records of such maintenance available for inspection.
- 9.7
- (i) No abstraction shall take place unless the Licence Holder has installed a screen with spacing no greater than 10 millimetres to the tailrace outlet to prevent the entrapment, entrainment or impingement of fish.
 - (ii) The Licence Holder shall maintain the screen in accordance with the manufacturer's specifications and keep records of such maintenance available for inspection.
- 9.8
- (i) Prior to abstraction taking place for the purpose of power production, under this licence, the Licence Holder shall construct a fish easement downstream of the weir at National Grid Reference SN 97752 02790 marked 'Point A' on the map in accordance with the plans and specifications to be submitted and approved in writing by NRW.
 - (ii) The Licence Holder shall maintain, repair or replace the fish easement to ensure that it remains effective at all times.
- 9.9
- The Licence Holder shall ensure that during construction works and any subsequent maintenance works to the hydropower scheme, the flow in the River Dare is allowed to pass downstream unchanged in quantity and quality at all times.
- 9.10
- The Licence Holder shall notify NRW in writing within 7 calendar days after the abstraction of water for the purpose of power production first starts.
- 9.11
- The minimum value for the quantity of water authorised to be abstracted under this licence, as referred to in Section 46(2A) Water Resources Act 1991, is 5,325,011 cubic metres per year.

ADDITIONAL INFORMATION

Note: the following information is provided for information only. It does not form part of the licence.

REASONS FOR CONDITIONS

The licence is time-limited to a date to reflect the timing of a future review of the catchment resources availability.

Conditions 7 and 8: the Licence Holder is required to record readings of the electrical output and the corresponding quantity of water abstracted to demonstrate compliance with the conditions of this licence and to provide information on actual water usage for water planning purposes.

Conditions 9.1, 9.2 and 9.10: to ensure the hydropower scheme is constructed, operated and maintained in accordance with the drawing, plan and specifications agreed by NRW during the determination of the licence.

Condition 9.3: to secure the proper and efficient use of water resources.

Condition 9.4: to ensure the abstraction can be classed as non-consumptive.

Conditions 9.5 and 9.9: to ensure a flow is maintained in the watercourse in order to maintain the riverine habitat for the conservation of the flora and fauna, and to ensure that the water environment is not impacted during construction and subsequent maintenance.

Condition 9.6: to prevent the entrapment, entrainment and impingement of fish at the point of abstraction.

Condition 9.7: to prevent the entrapment, entrainment and impingement of fish at the point of discharge.

Condition 9.8: to ensure safe upstream passage for European Bullhead and Brown Trout.

Condition 9.9: to ensure that the water environment is not impacted during construction and subsequent maintenance.

Condition 9.10: to start NRW's compliance process.

Condition 9.11: to ensure compliance with Section 46(2A) of the Water Resources Act 1991.

IMPORTANT NOTES

Impoundment licence serial number WA/057/0023/0011 has been issued to facilitate the abstraction of water for the hydropower scheme authorised by this abstraction licence.

Condition 9.5: flows will be maintained and controlled by physical means through the design of the impoundment structure authorised by the above numbered licence.

For the purposes of Conditions 9.2 and 9.10, the Licence Holder shall contact:

Senior Officer, People and Places
People and Places South East
Natural Resources Wales
Rivers House
St. Mellons Business Park
Fortran Road
St. Mellons
Cardiff
CF3 0EY

Tel: 0300 065 3000

Email: nrp.southeast@cyfoethnaturiolcymru.gov.uk

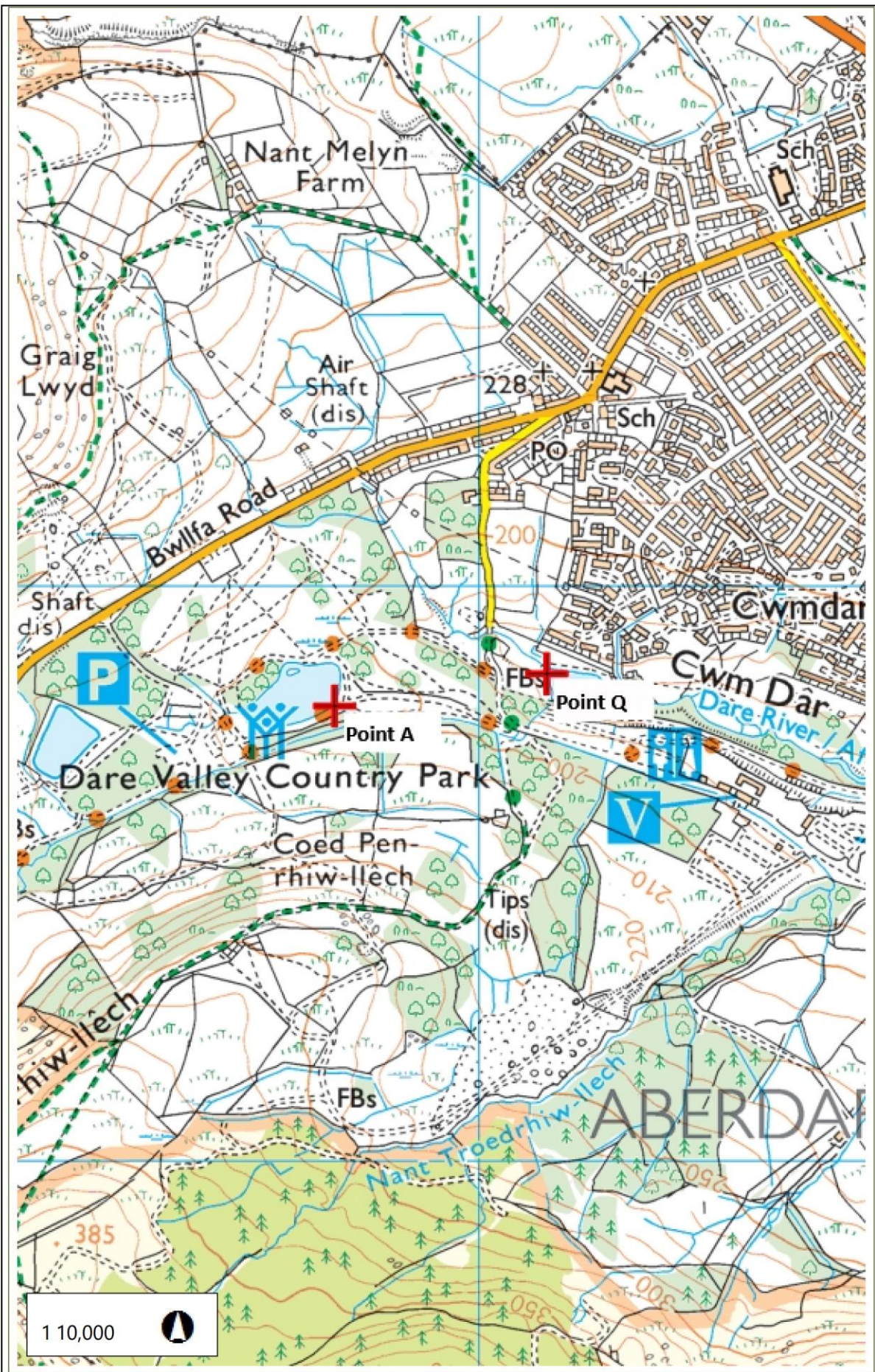
Water efficiency note

The Licence Holder should use water abstracted under the terms of this licence in an efficient manner. NRW may refer to its guidance on water efficiency (or equivalent

guidance) in determining whether water is being used efficiently and may offer advice on any measures considered necessary to meet particular recommendations.

Screening

NRW will have regard to its Screening for Intakes and Outfalls: a Best Practice Guide (or equivalent guidance) in agreeing where, how and what type of fish screens should be installed and together with the results of any monitoring in determining whether the fish screens are properly effective and maintained, and in judging whether it is necessary to require repair or replacement of the fish screens.

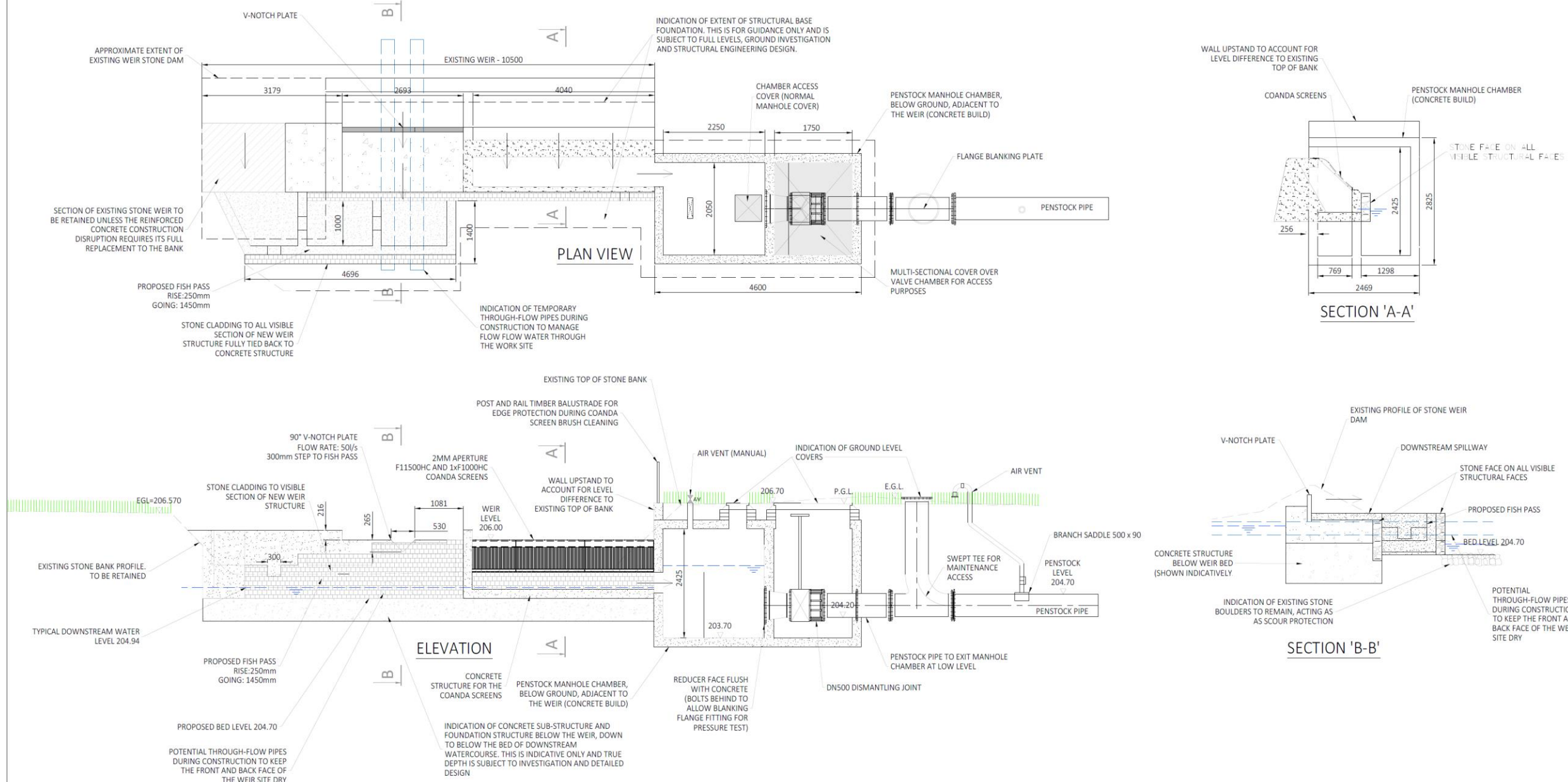



Cyfoeth Naturiol Cymru
 Natural Resources Wales

MAP ACCOMPANYING LICENCE NUMBER / MAP I GYFEILIO TRWYDDED RHIF
 WA/057/0023/0010
 Scale I Graddfa 1:10,000



© Crown Copyright and database rights Ordnance Survey. Natural Resources Wales, 100019741, 2015. © Hawlfraint y Goron a hawl cronfa ddata Arolwg Ordnans. Cyfoeth Naturiol Cymru, 100019741, 2015.



EXAMPLE STONE-FACED CONCRETE WEIR WITH COANDA SCREENS:



WEIR: Micro Hydro, 375kW Cadair Hydro (150m head, 300l/s, pelton turbine), operated by Dragon Hydro www.dragonhydro.com
Photos: Jonathan Bensted

| Rev. | Revision Notes | Date | Drawn By | Checked | Approved |
|------|--|----------|----------|---------|----------|
| T02 | Downstream stone bed retention clarified | 01/08/25 | RB | RB | RB |
| T01 | Fish Pass Amended | 27/06/25 | BRM | RB | RB |
| P03 | V-Notch angle added | 27/05/25 | BRM | RB | RB |
| P02 | Fish Pass Added | 26/03/25 | BRM | RB | RB |
| P01 | First Issue | 27/09/24 | FA | RB | RB |

Hydrock
now
Stantec

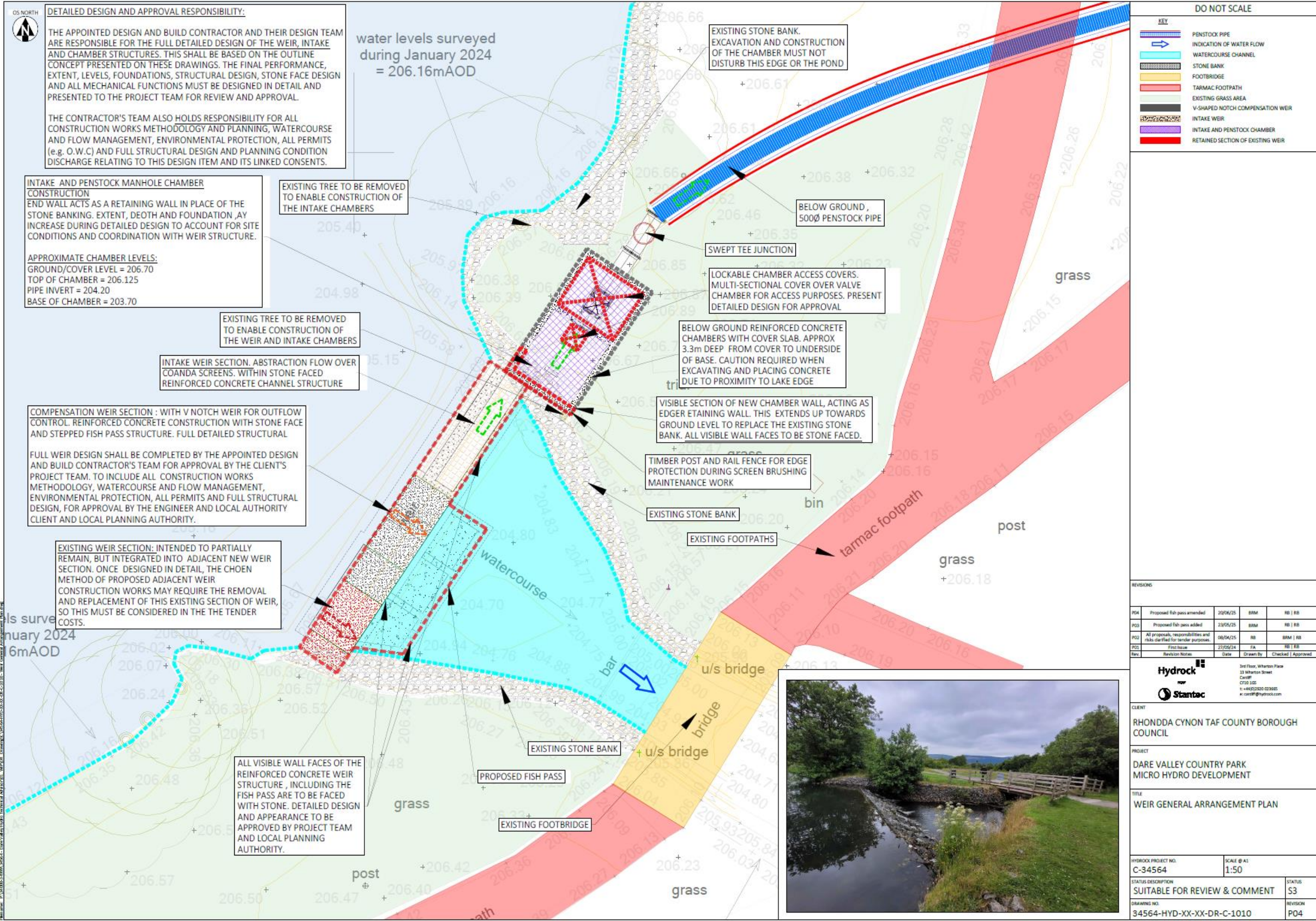
3rd Floor, Wharton Place
13 Wharton Street
Cardiff
CF10 1GS
t: +44(0)2920 023665
e: cardiff@hydrock.com

CLIENT
RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

PROJECT
DARE VALLEY COUNTRY PARK MICRO HYDRO DEVELOPMENT

TITLE
WEIR SECTIONS & DETAILS

| | | |
|---|--------------------|-----------------|
| HYDROCK PROJECT NO. C-34564 | SCALE @ A1 1:50 | STATUS S3 |
| STATUS DESCRIPTION SUITABLE FOR REVIEW & COMMENT | | REVISION T02 |
| DRAWING NO. 34564-HYD-XX-XX-DR-C-1610 | | |



DETAILED DESIGN AND APPROVAL RESPONSIBILITY:

THE APPOINTED DESIGN AND BUILD CONTRACTOR AND THEIR DESIGN TEAM ARE RESPONSIBLE FOR THE FULL DETAILED DESIGN OF THE WEIR, INTAKE AND CHAMBER STRUCTURES. THIS SHALL BE BASED ON THE OUTLINE CONCEPT PRESENTED ON THESE DRAWINGS. THE FINAL PERFORMANCE, EXTENT, LEVELS, FOUNDATIONS, STRUCTURAL DESIGN, STONE FACE DESIGN AND ALL MECHANICAL FUNCTIONS MUST BE DESIGNED IN DETAIL AND PRESENTED TO THE PROJECT TEAM FOR REVIEW AND APPROVAL.

THE CONTRACTOR'S TEAM ALSO HOLDS RESPONSIBILITY FOR ALL CONSTRUCTION WORKS METHODOLOGY AND PLANNING, WATERCOURSE AND FLOW MANAGEMENT, ENVIRONMENTAL PROTECTION, ALL PERMITS (e.g. O.W.C) AND FULL STRUCTURAL DESIGN AND PLANNING CONDITION DISCHARGE RELATING TO THIS DESIGN ITEM AND ITS LINKED CONSENTS.

INTAKE AND PENSTOCK MANHOLE CHAMBER CONSTRUCTION

END WALL ACTS AS A RETAINING WALL IN PLACE OF THE STONE BANKING. EXTENT, DEPTH AND FOUNDATION, MAY INCREASE DURING DETAILED DESIGN TO ACCOUNT FOR SITE CONDITIONS AND COORDINATION WITH WEIR STRUCTURE.

APPROXIMATE CHAMBER LEVELS:
 GROUND/COVER LEVEL = 206.70
 TOP OF CHAMBER = 206.125
 PIPE INVERT = 204.20
 BASE OF CHAMBER = 203.70

EXISTING TREE TO BE REMOVED TO ENABLE CONSTRUCTION OF THE INTAKE CHAMBERS

EXISTING TREE TO BE REMOVED TO ENABLE CONSTRUCTION OF THE WEIR AND INTAKE CHAMBERS

INTAKE WEIR SECTION. ABSTRACTION FLOW OVER COANDA SCREENS. WITHIN STONE FACED REINFORCED CONCRETE CHANNEL STRUCTURE

COMPENSATION WEIR SECTION : WITH V NOTCH WEIR FOR OUTFLOW CONTROL. REINFORCED CONCRETE CONSTRUCTION WITH STONE FACE AND STEPPED FISH PASS STRUCTURE. FULL DETAILED STRUCTURAL

FULL WEIR DESIGN SHALL BE COMPLETED BY THE APPOINTED DESIGN AND BUILD CONTRACTOR'S TEAM FOR APPROVAL BY THE CLIENT'S PROJECT TEAM. TO INCLUDE ALL CONSTRUCTION WORKS METHODOLOGY, WATERCOURSE AND FLOW MANAGEMENT, ENVIRONMENTAL PROTECTION, ALL PERMITS AND FULL STRUCTURAL DESIGN, FOR APPROVAL BY THE ENGINEER AND LOCAL AUTHORITY CLIENT AND LOCAL PLANNING AUTHORITY.

EXISTING WEIR SECTION: INTENDED TO PARTIALLY REMAIN, BUT INTEGRATED INTO ADJACENT NEW WEIR SECTION. ONCE DESIGNED IN DETAIL, THE CHOEN METHOD OF PROPOSED ADJACENT WEIR CONSTRUCTION WORKS MAY REQUIRE THE REMOVAL AND REPLACEMENT OF THIS EXISTING SECTION OF WEIR, SO THIS MUST BE CONSIDERED IN THE TENDER COSTS.

ALL VISIBLE WALL FACES OF THE REINFORCED CONCRETE WEIR STRUCTURE, INCLUDING THE FISH PASS ARE TO BE FACED WITH STONE. DETAILED DESIGN AND APPEARANCE TO BE APPROVED BY PROJECT TEAM AND LOCAL PLANNING AUTHORITY.

water levels surveyed during January 2024 = 206.16m AOD

EXISTING STONE BANK. EXCAVATION AND CONSTRUCTION OF THE CHAMBER MUST NOT DISTURB THIS EDGE OR THE POND

BELOW GROUND, 500Ø PENSTOCK PIPE

SWEPT TEE JUNCTION

LOCKABLE CHAMBER ACCESS COVERS. MULTI-SECTIONAL COVER OVER VALVE CHAMBER FOR ACCESS PURPOSES. PRESENT DETAILED DESIGN FOR APPROVAL

BELOW GROUND REINFORCED CONCRETE CHAMBERS WITH COVER SLAB. APPROX 3.3m DEEP FROM COVER TO UNDERSIDE OF BASE. CAUTION REQUIRED WHEN EXCAVATING AND PLACING CONCRETE DUE TO PROXIMITY TO LAKE EDGE

VISIBLE SECTION OF NEW CHAMBER WALL, ACTING AS EDGER ETAINING WALL. THIS EXTENDS UP TOWARDS GROUND LEVEL TO REPLACE THE EXISTING STONE BANK. ALL VISIBLE WALL FACES TO BE STONE FACED.

TIMBER POST AND RAIL FENCE FOR EDGE PROTECTION DURING SCREEN BRUSHING MAINTENANCE WORK

EXISTING STONE BANK

EXISTING FOOTPATHS

EXISTING STONE BANK

PROPOSED FISH PASS

EXISTING FOOTBRIDGE

DO NOT SCALE

KEY

- PENSTOCK PIPE
- INDICATION OF WATER FLOW
- WATERCOURSE CHANNEL
- STONE BANK
- FOOTBRIDGE
- TARMAC FOOTPATH
- EXISTING GRASS AREA
- V-SHAPED NOTCH COMPENSATION WEIR
- INTAKE WEIR
- INTAKE AND PENSTOCK CHAMBER
- RETAINED SECTION OF EXISTING WEIR

REVISIONS

| Rev | Revision Notes | Date | Drawn By | Checked | Approved |
|-----|--|----------|----------|---------|----------|
| PSA | Proposed fish pass amended | 20/06/25 | BRM | RB | RB |
| PSB | Proposed fish pass added | 23/05/25 | BRM | RB | RB |
| PSD | All proposals, responsibilities and risks clarified for tender purposes. | 08/04/25 | RB | BRM | RB |
| PSI | First Issue | 27/09/24 | FA | RB | RB |

Hydrock
 3rd Floor, Wharfedale
 13 Wharfedale Street
 Cardiff
 CF10 1JG
 t: +44(0)2920 033005
 e: cardiff@hydrock.com

Stantec

CLIENT
 RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

PROJECT
 DARE VALLEY COUNTRY PARK MICRO HYDRO DEVELOPMENT

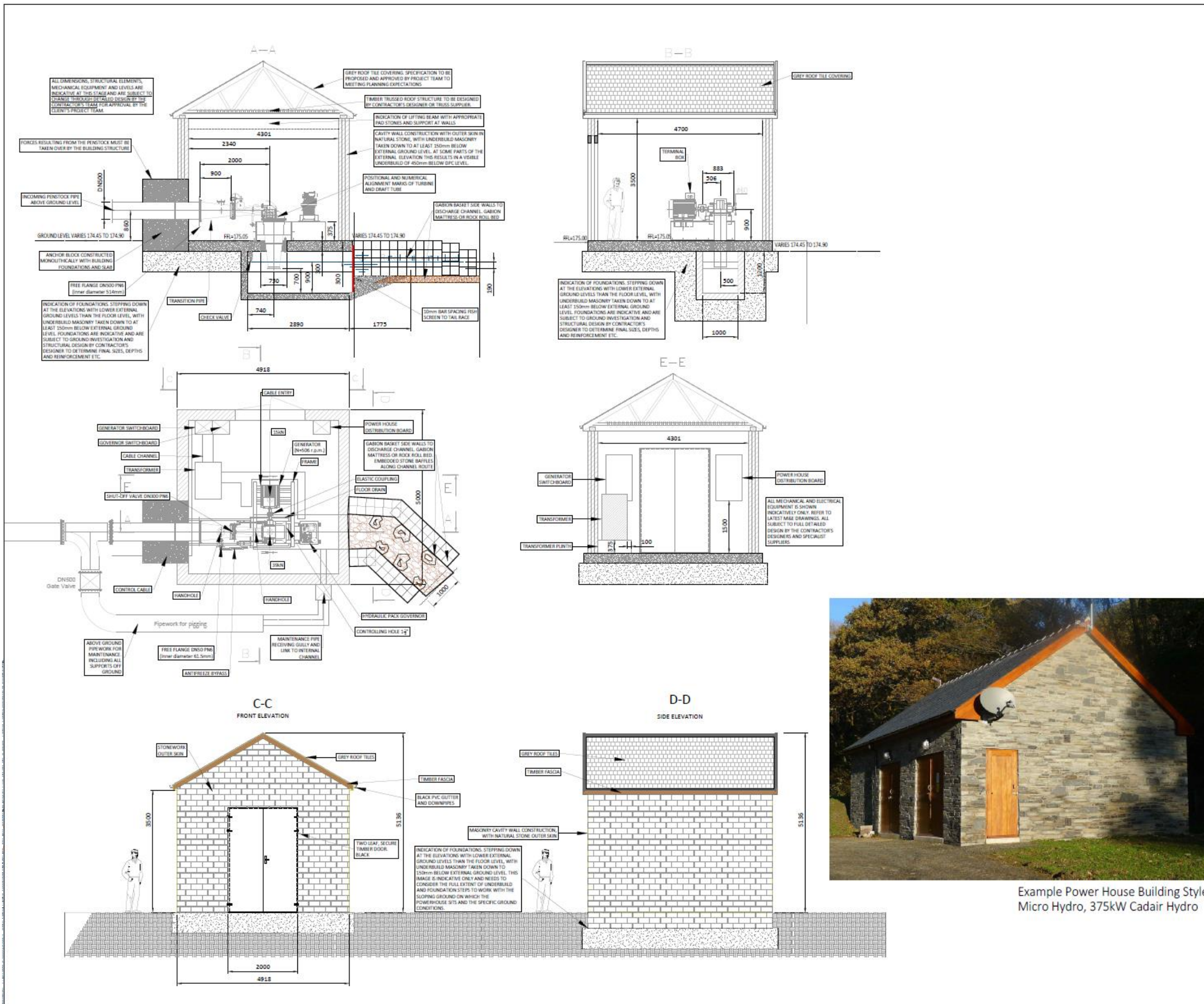
TITLE
 WEIR GENERAL ARRANGEMENT PLAN

HYDROCK PROJECT NO.
 C-34564

SCALE @ A1
 1:50

| STATUS DESCRIPTION | STATUS |
|--|-----------------|
| SUITABLE FOR REVIEW & COMMENT | S3 |
| DRAWING NO. 34564-HYD-XX-XX-DR-C-1010 | REVISION P04 |





Example Power House Building Style Micro Hydro, 375kW Cadair Hydro

REVISIONS

| NO | Description | Date | By | Checked | Approved |
|-----|---|----------|----|---------|----------|
| 101 | Tail race channel amended to a gabion type construction | 01/08/25 | RB | | BBM / RB |
| 102 | Transfer | 02/06/25 | GT | | BBM / RB |
| 103 | Section 1-4 added | 25/03/25 | GT | | BBM / RB |
| 001 | First Issue | 27/09/24 | PA | | BB / RB |

Hydrock
Stantec

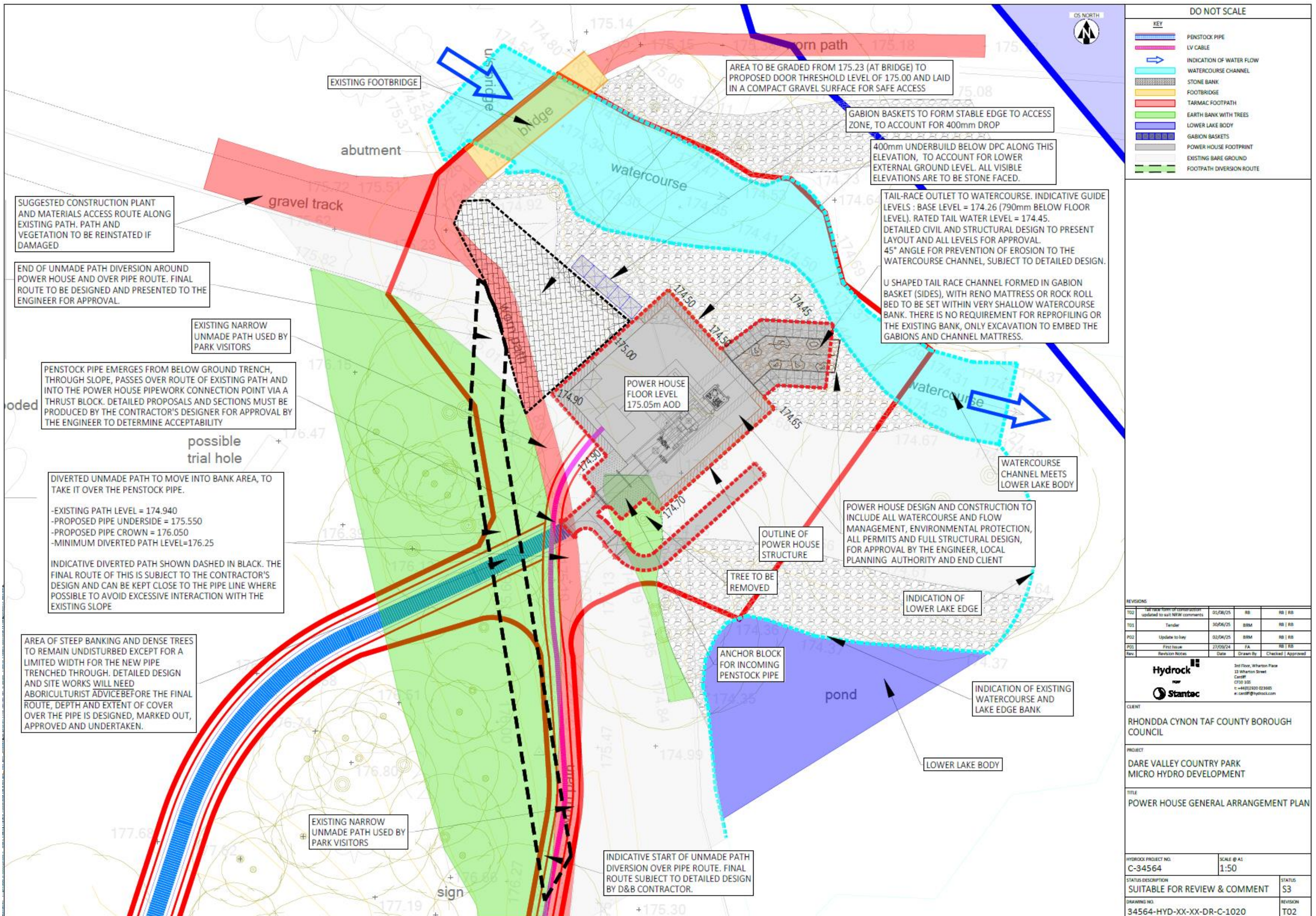
3rd Floor, Wharton Place
23 Wharton Street
Cardiff
CF10 1JG
t: +44(0)1495 033605
e: cardiff@hydrock.com

CLIENT
RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

PROJECT
DARE VALLEY COUNTRY PARK MICRO HYDRO DEVELOPMENT

TITLE
POWER HOUSE SECTIONS & DETAILS

| | |
|---|--------------------|
| HYDROCK PROJECT NO. C-34564 | SCALE @ A1 1:50 |
| STATUS DESCRIPTION SUITABLE FOR REVIEW & COMMENT | STATUS S3 |
| DRAWING NO. 34564-HYD-XX-XX-DR-C-1620 | REVISION TO2 |



DO NOT SCALE

KEY

- PENSTOCK PIPE
- LV CABLE
- INDICATION OF WATER FLOW
- WATERCOURSE CHANNEL
- STONE BANK
- FOOTBRIDGE
- TARMAC FOOTPATH
- EARTH BANK WITH TREES
- LOWER LAKE BODY
- GABION BASKETS
- POWER HOUSE FOOTPRINT
- EXISTING BARE GROUND
- FOOTPATH DIVERSION ROUTE

AREA TO BE GRADED FROM 175.23 (AT BRIDGE) TO PROPOSED DOOR THRESHOLD LEVEL OF 175.00 AND LAID IN A COMPACT GRAVEL SURFACE FOR SAFE ACCESS

GABION BASKETS TO FORM STABLE EDGE TO ACCESS ZONE, TO ACCOUNT FOR 400mm DROP

400mm UNDERBUILD BELOW DPC ALONG THIS ELEVATION, TO ACCOUNT FOR LOWER EXTERNAL GROUND LEVEL. ALL VISIBLE ELEVATIONS ARE TO BE STONE FACED.

TAIL-RACE OUTLET TO WATERCOURSE. INDICATIVE GUIDE LEVELS : BASE LEVEL = 174.26 (790mm BELOW FLOOR LEVEL). RATED TAIL WATER LEVEL = 174.45. DETAILED CIVIL AND STRUCTURAL DESIGN TO PRESENT LAYOUT AND ALL LEVELS FOR APPROVAL. 45° ANGLE FOR PREVENTION OF EROSION TO THE WATERCOURSE CHANNEL, SUBJECT TO DETAILED DESIGN.

U SHAPED TAIL RACE CHANNEL FORMED IN GABION BASKET (SIDES), WITH RENO MATTRESS OR ROCK ROLL BED TO BE SET WITHIN VERY SHALLOW WATERCOURSE BANK. THERE IS NO REQUIREMENT FOR REPROFILING OR THE EXISTING BANK, ONLY EXCAVATION TO EMBED THE GABIONS AND CHANNEL MATTRESS.

SUGGESTED CONSTRUCTION PLANT AND MATERIALS ACCESS ROUTE ALONG EXISTING PATH. PATH AND VEGETATION TO BE REINSTATED IF DAMAGED

END OF UNMADE PATH DIVERSION AROUND POWER HOUSE AND OVER PIPE ROUTE. FINAL ROUTE TO BE DESIGNED AND PRESENTED TO THE ENGINEER FOR APPROVAL.

EXISTING NARROW UNMADE PATH USED BY PARK VISITORS

PENSTOCK PIPE EMERGES FROM BELOW GROUND TRENCH, THROUGH SLOPE, PASSES OVER ROUTE OF EXISTING PATH AND INTO THE POWER HOUSE PIPEWORK CONNECTION POINT VIA A THRUST BLOCK. DETAILED PROPOSALS AND SECTIONS MUST BE PRODUCED BY THE CONTRACTOR'S DESIGNER FOR APPROVAL BY THE ENGINEER TO DETERMINE ACCEPTABILITY

possible trial hole

DIVERTED UNMADE PATH TO MOVE INTO BANK AREA, TO TAKE IT OVER THE PENSTOCK PIPE.

- EXISTING PATH LEVEL = 174.940
- PROPOSED PIPE UNDERSIDE = 175.550
- PROPOSED PIPE CROWN = 176.050
- MINIMUM DIVERTED PATH LEVEL=176.25

INDICATIVE DIVERTED PATH SHOWN DASHED IN BLACK. THE FINAL ROUTE OF THIS IS SUBJECT TO THE CONTRACTOR'S DESIGN AND CAN BE KEPT CLOSE TO THE PIPE LINE WHERE POSSIBLE TO AVOID EXCESSIVE INTERACTION WITH THE EXISTING SLOPE

AREA OF STEEP BANKING AND DENSE TREES TO REMAIN UNDISTURBED EXCEPT FOR A LIMITED WIDTH FOR THE NEW PIPE TRENCHED THROUGH. DETAILED DESIGN AND SITE WORKS WILL NEED ABORICULTURIST ADVICE BEFORE THE FINAL ROUTE, DEPTH AND EXTENT OF COVER OVER THE PIPE IS DESIGNED, MARKED OUT, APPROVED AND UNDERTAKEN.

EXISTING NARROW UNMADE PATH USED BY PARK VISITORS

sign

INDICATIVE START OF UNMADE PATH DIVERSION OVER PIPE ROUTE. FINAL ROUTE SUBJECT TO DETAILED DESIGN BY D&B CONTRACTOR.

POWER HOUSE DESIGN AND CONSTRUCTION TO INCLUDE ALL WATERCOURSE AND FLOW MANAGEMENT, ENVIRONMENTAL PROTECTION, ALL PERMITS AND FULL STRUCTURAL DESIGN, FOR APPROVAL BY THE ENGINEER, LOCAL PLANNING AUTHORITY AND END CLIENT

OUTLINE OF POWER HOUSE STRUCTURE

TREE TO BE REMOVED

ANCHOR BLOCK FOR INCOMING PENSTOCK PIPE

WATERCOURSE CHANNEL MEETS LOWER LAKE BODY

INDICATION OF LOWER LAKE EDGE

pond

INDICATION OF EXISTING WATERCOURSE AND LAKE EDGE BANK

LOWER LAKE BODY

REVISIONS

| NO | Description | Date | Drawn By | Checked | Approved |
|-----|--|----------|----------|---------|----------|
| T02 | Final issue of construction updated to suit NRW comments | 01/06/25 | RB | | RB |
| T01 | Tender | 30/06/25 | BBM | | RB |
| P02 | Update to lay | 02/04/25 | BBM | | RB |
| P01 | First Issue | 27/09/24 | JA | | RB |

Hydrock
Stantec

3rd Floor, Wharfedale Place
13 Wharfedale Street
Cardiff
CF10 1DE
t: +44(0)2920 023900
e: cardiff@hydrock.com

CLIENT
RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

PROJECT
DARE VALLEY COUNTRY PARK
MICRO HYDRO DEVELOPMENT

TITLE
POWER HOUSE GENERAL ARRANGEMENT PLAN

| | |
|---|--------------------|
| HYDROCK PROJECT NO. C-34564 | SCALE @ AS 1:50 |
| STATUS DESCRIPTION SUITABLE FOR REVIEW & COMMENT | STATUS S3 |
| DRAWING NO. 34564-HYD-XX-XX-DR-C-1020 | REVISION T02 |

Calculation Checklist

This checklist shall be used to record the site data and calculate the Hydro Abstraction Factor for the site (HAF_{site}) to allow conversion of electrical output to quantities abstracted. **The HAF_{site} is the amount of water used in m^3 per kWh generated for any period.**

| Site Data | |
|--|--|
| Site name | |
| Address | |
| Licence serial No. | |
| Contact name | |
| Contact telephone | |
| Contact email | |
| Turbine manufacturer | |
| Turbine type | |
| Turbine serial no. | |
| Number of jets <small>(where relevant)</small> | |
| | |

| Performance Data | | |
|---|-------|-----------------------------------|
| Parameter | Value | How was the parameter determined? |
| Net operating head of the system at maximum power output ($H_{n(Pmax)}$) in metres | | |
| Turbine/water wheel efficiency at maximum power output ($e_{turbine/water\ wheel(Pmax)}$) | | |
| Transmission system efficiency at maximum power output ($e_{transmission(Pmax)}$) | | |
| Generator efficiency at maximum power output ($e_{generator(Pmax)}$) | | |

Calculation of overall system efficiency of the rotating parts of the hydro system, at maximum power output ($e_{system(Pmax)}$)

$$e_{system(Pmax)} = e_{turbine/water\ wheel(Pmax)} \times e_{transmission(Pmax)} \times e_{generator(Pmax)}$$

$$= \boxed{} \times \boxed{} \times \boxed{}$$

$$e_{system(Pmax)} = \boxed{}$$

Calculation of HAF_{site}

HAF_{site} = Hydro Abstraction Factor for the site in question

$$= 366.972 / (H_{n(Pmax)} \times e_{system(Pmax)})$$

$$= 366.972 / (\boxed{} \times \boxed{})$$

$$= \boxed{} \quad (\mathbf{m^3/kWh})$$

Where:

$H_{n(Pmax)}$ = net head at max. power.

366.972 = a constant in order to bring the final HAF into the correct unit of $m^3/kWhr$ (it is arrived at by dividing the number of seconds in an hour (3600) by gravity ($9.81\ m/s^2$))

The volume of water abstracted for any period (V_{period}) can then be calculated by simply multiplying the HAF_{site} by the number of kiloWatt hours generated thus:

$$V_{period} (m^3) = kWh_{period} (kWh) \times HAF_{site} (m^3/kWh)$$

See example:

(kWh is a measure of energy, whilst kW is a measure of power: at full efficiency, a 50 kW

turbine will produce 50 kWh of energy in one hour, 100 kWh in two hours, 150 kWh in three hours etc.).

| Performance Data | | |
|---|-------|-----------------------------------|
| Parameter | Value | How was the parameter determined? |
| Net operating head of the system at maximum power output ($H_{n(Pmax)}$) in metres | 150 | Site survey |
| Turbine/water wheel efficiency at maximum power output ($e_{turbine/water\ wheel(Pmax)}$) | 0.9 | From manufacturer |
| Transmission system efficiency at maximum power output ($e_{transmission(Pmax)}$) | 0.85 | From manufacturer |
| Generator efficiency at maximum power output ($e_{generator(Pmax)}$) | 0.85 | From manufacturer |

Calculation of overall system efficiency of the rotating parts of the hydro system, at maximum power output ($e_{system(Pmax)}$)

$$e_{system(Pmax)} = e_{turbine/water\ wheel(Pmax)} \times e_{transmission(Pmax)} \times e_{generator(Pmax)}$$

$$= \boxed{0.9} \times \boxed{0.85} \times \boxed{0.85}$$

$$e_{system(Pmax)} = \boxed{0.65}$$

Calculation of HAF_{site}

HAF_{site} = Hydro Abstraction Factor for the site in question

$$= 366.972 / (H_{n(Pmax)} \times e_{system(Pmax)})$$

$$= 366.972 / (\boxed{150} \times \boxed{0.65})$$

$$= \boxed{3.764} \quad (\text{m}^3/\text{kWh})$$

The volume of water abstracted for any period (V_{period}) can then be calculated by simply multiplying the HAF_{site} by the number of kiloWatt hours generated thus:

$$V_{period} (\text{m}^3) = \text{kWh}_{period} (\text{kWh}) \times HAF_{site} (\text{m}^3/\text{kWh})$$

If, for example your total export of electricity for the period was 68400 kWh, then you would have abstracted a total volume of water of:

$$V_{period} (\text{m}^3) = 68400 \text{ kWh} \times 3.764 \text{ m}^3/\text{kWh} = 257457.6 \text{ m}^3$$

**Would you like to find out more about us,
or about your environment?**

**Then call us on
0300 065 3000 (Mon-Fri 9-5)**

**email
enquiries@naturalresourceswales.gov.uk**

**or visit our website
www.naturalresourceswales.gov.uk**

**incident hotline 0300 065 3000 (24hrs)
floodline 0345 988 1188**



Environment first: This publication is printed on paper made from 100 per cent previously used waste. By-products from making the pulp and paper are used for composting and fertiliser, for making cement and for generating energy.