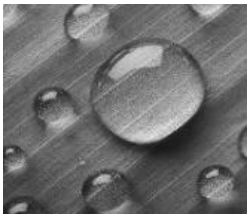

ELEMENTS ENERGY

Plas Farm Hydro Scheme

Flood Risk Assessment

March 2024

Hydropower Consultancy & Development

Document Control

Scheme Name: Plas Farm Hydro
Client Name: Richard Bowen

Client Address: Cilybebyll, Swansea

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Elements Energy Ltd
Tel: 07717811107

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Prepared by:	A.Cropper		
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CONTENTS

1. INTRODUCTION

This document presents a flood risk assessment for the installation and operation of a micro hydro scheme on the unnamed watercourse running down to Plas Farm, Cilybebyll.

2. FLOOD FLOWS

The Low Flows Enterprise Model was used to calculate flows. In summary the 1 in 30 daily average flow at the intake location is 0.021m^3/s and the 1 in 100 average flow is 0.115m^3/s. The 1 in 1000 average flow is 0.222m^3/s. The scheme has been designed with expectation of well above calculated flows as climate change may lead greatly higher and more frequent flood flows, with exceptionally high peak flood flows.

3. FLOOD ZONE

The scheme is located within flood Zone C2. The power house will be located within the flood zone.

The powerhouse location is within the NRW flood Zone C

4. INTAKE WEIR

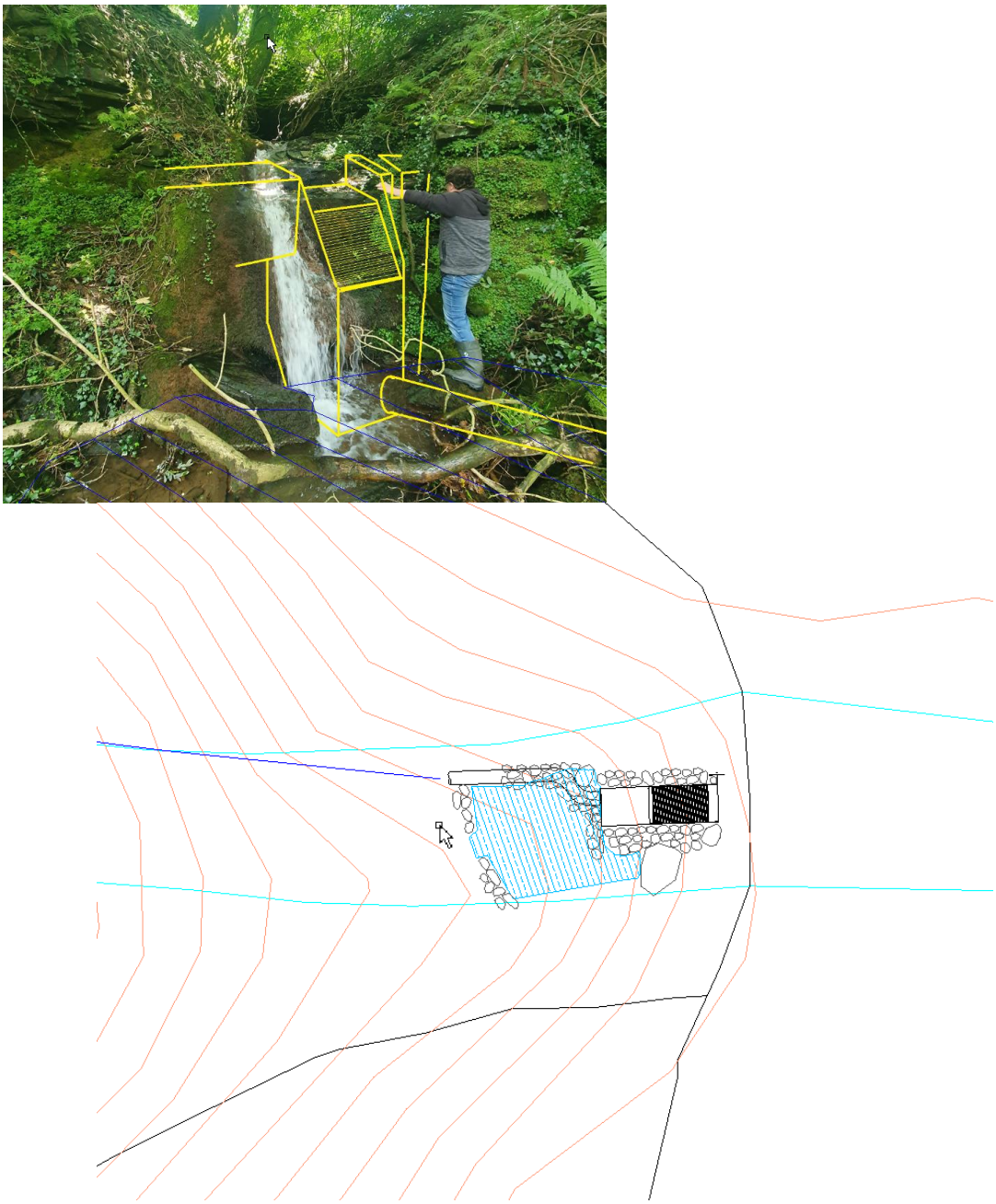
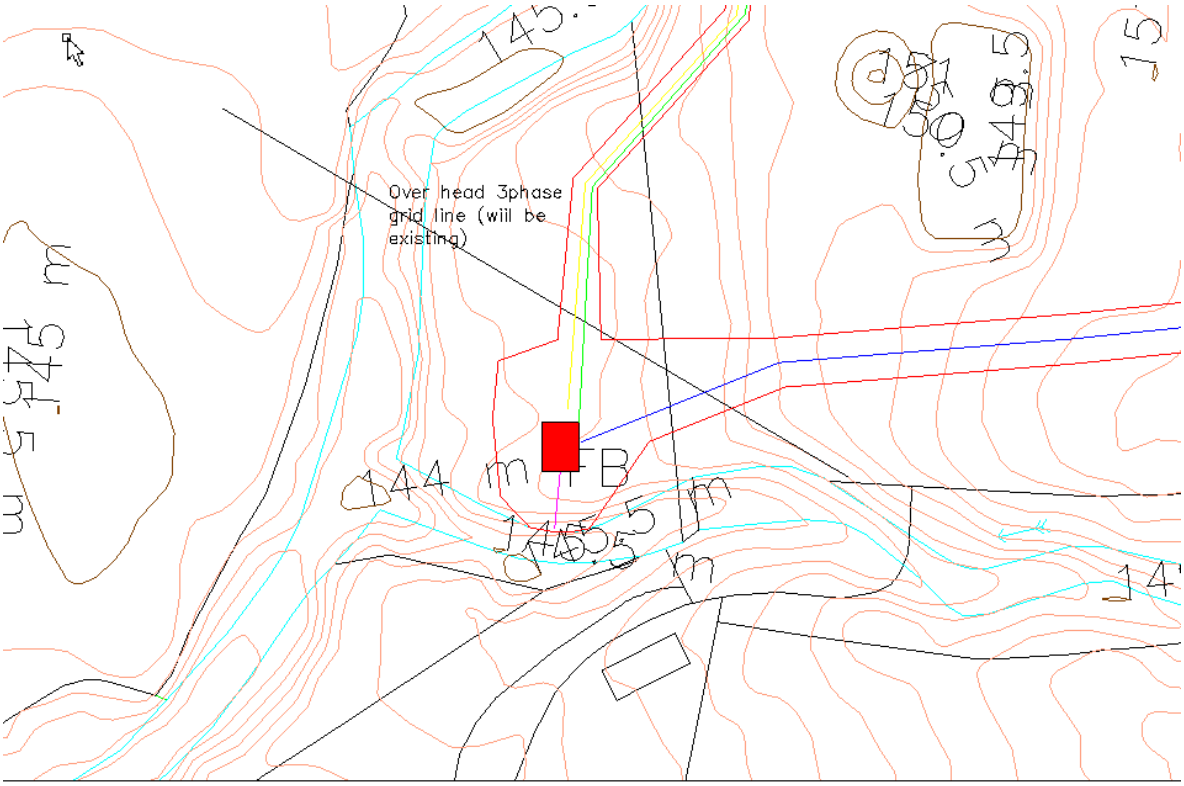


Figure 2 & 3: Intake layout (note there is no ponding on upstream side of weir due to being on the face of a large waterfall.

The new weir is to have an elevation (i.e. crest level of Coanda screen) of 205 mAOD. The wing walls joining the northeast and southwest banks are both to be at an elevation of 205.1 mAOD. These levels allow flood flows to pass over within the bounds of the weir

without causing any increased flood risk upstream of the weir. Backfilling of bed material immediately upstream of the intake weir will further offset the risk of a build-up of flood waters behind the structure.

5. POWER HOUSE



The turbine house floor level is 147.5mOAD which is 3.5m above the watercourse up adjacent but above the banks of the watercourse. Here is sufficient to be above even an unprecedented flood, but close enough to warrant the measures to ensure that the powerhouse floor can receive flood water.

6. FLOOD PROTECTION

The intake structure can be completely submerged without adverse effect. The structure has a very low profile and is structurally reinforced to ensure that high waters will not cause damage to the structure or the integrity of the weir.

Flood protection for the turbine house will be provided by the use of flood resistant construction methods and materials. The floor is entirely concrete and building materials for the turbine house walls comprise of breeze blocks, only clad in timber. The turbine house floor drains at its lowest point into a drain which is discharged to the river via the turbine outflow pipe. The floor level of the turbine house will be 147.5 mAOD. Surface water from the roof is collected by gutters and discharged into a french drain running

around the PH perimeter that isn't buried. This then discharges via a separate pipe from the outfall to the watercourse.

All electrical equipment is to be a minimum of 1m above floor level and as per standard design the control system shuts down automatically during an electrical malfunction.

7. FLOOD RISK FROM THE PROPOSAL

The intake weir only impounds a negligible volume of water, therefore a failure of the structure would not cause any flooding what so ever. A pipe burst would not cause flooding as the volume of the intake and pipe is designed around a flow of just 0.024 m3/s the close proximity of the pipeline would mean that pipe burst would discharge back to the watercourse and the volume would not be any greater than that abstracted from the watercourse itself so downstream flood would not be possible.

8. CONCLUSION

Given the above information, the development of the proposed scheme at Plas Farm is unlikely to alter flood risks in any manner, and the systems is designed appropriately given the new age of climate change related flood risk.