Cyfoeth Naturiol Cymru
Natural Resources Wales

Supporting Guidance Note

Supporting Guidance Note: SGN 2 Geomorphology photosurveys for hydropower developments

We require a geomorphology photosurvey to be submitted with applications for abstraction and impoundment licences for hydropower developments. This guidance note explains what to include within the survey and how to present the photographs from the survey to us.

What is a photo survey?

The photo survey is a simple way for developers to show what the river channel and banks look like where a hydropower scheme is being proposed using a series of photographs. It is intended to be a non- technical document that can be quickly and easily completed by land owners or developers who have access to a camera and have basic IT skills.

The survey will allow NRW staff to understand where the main structures of a scheme are to be sited, what the river reach between these points looks like and whether there are any other natural features relevant to a scheme's impact such as tributary inflows or waterfalls.

The photo survey allows us to advise on geomorphological siting and design requirements early on in the development process and may also assist us to more quickly assess an application by having a better understanding of the development site without the need for a potentially costly and time consuming site visit. It will support the Water Resources licence application process and allow us to advise on Town and Country Planning consultations for hydropower schemes. It may also support proposals to move management zone when flow standards are being determined at pre-application stage i.e. Zone 2 to Zone 3.

When will a photo survey be required?

A photo survey will need to be submitted to us with all pre-application enquiries and formal applications where no pre-application has been completed. Where a developer has already submitted a photo survey to us as part of a pre-application, no further geomorphological survey/assessment will be required to support a formal application unless:

i. Additional geomorphological survey/assessment has been requested by us in our pre-application response or;

ii. where the siting and design of scheme structures has changed since submission of the pre-application photo survey. Where this is the case the photo survey should be updated to reflect design changes to support the formal application. (Note that any survey or siting/design changes will still need approval. In some cases further geomorphological assessment may be required).

What needs to be included in the photo survey report?

The survey report should include the following sections:

1. Basic site information
2. Annotated site map
3. Photographs of the river channel:
   a. *where new structures are proposed*
   b. *upstream of the proposed abstraction and downstream of the proposed outfall*
   c. *along the depleted reach (the river channel between the point of abstraction and the outfall)*
4. Description of other channel features

1. Basic site information

The survey report should include basic site information:

- The address or location of the site with river name if known
- the grid reference and elevation (in mAOD) of the proposed weir crest
- the grid reference and elevation (in mAOD) of the invert for the proposed outfall
- the grid reference and elevation (in mAOD) of the finished floor level for proposed turbine house
- the length and bed slope of the depleted reach (measured down the centre of the channel)

mAOD means ‘metres Above Ordnance Datum’ and is an absolute height measured above a datum representing mean sea level. We ask for levels in mAOD rather than a relative level measured against a local benchmark.

At pre-application stage elevations can be derived from contours on Ordnance Survey 1:10,000 or 1:25,000 scale maps to give an approximate level. More detailed survey for elevations may be required at formal application stage.

Elevations can also be shown in relation to the existing bed / weir, or via photos with the structure drawn on and with an accompanying level in relation to the existing bed / weir.

2. Annotated site map

The site map should show:

- the proposed scheme arrangement i.e. the location of intake weir, penstock route, turbine house and outfall;
- the points where the photographs for the survey were taken and the photo reference number. The numbers should be sequenced logically, ideally from upstream to downstream.
- the location and extent of any channel modifications, existing and proposed structures (temporary and permanent if known at pre-application stage)

An example map is shown in Figure 1.

For larger schemes include a short description (with map location and/or grid references) of any proposed maintenance activities and access points.

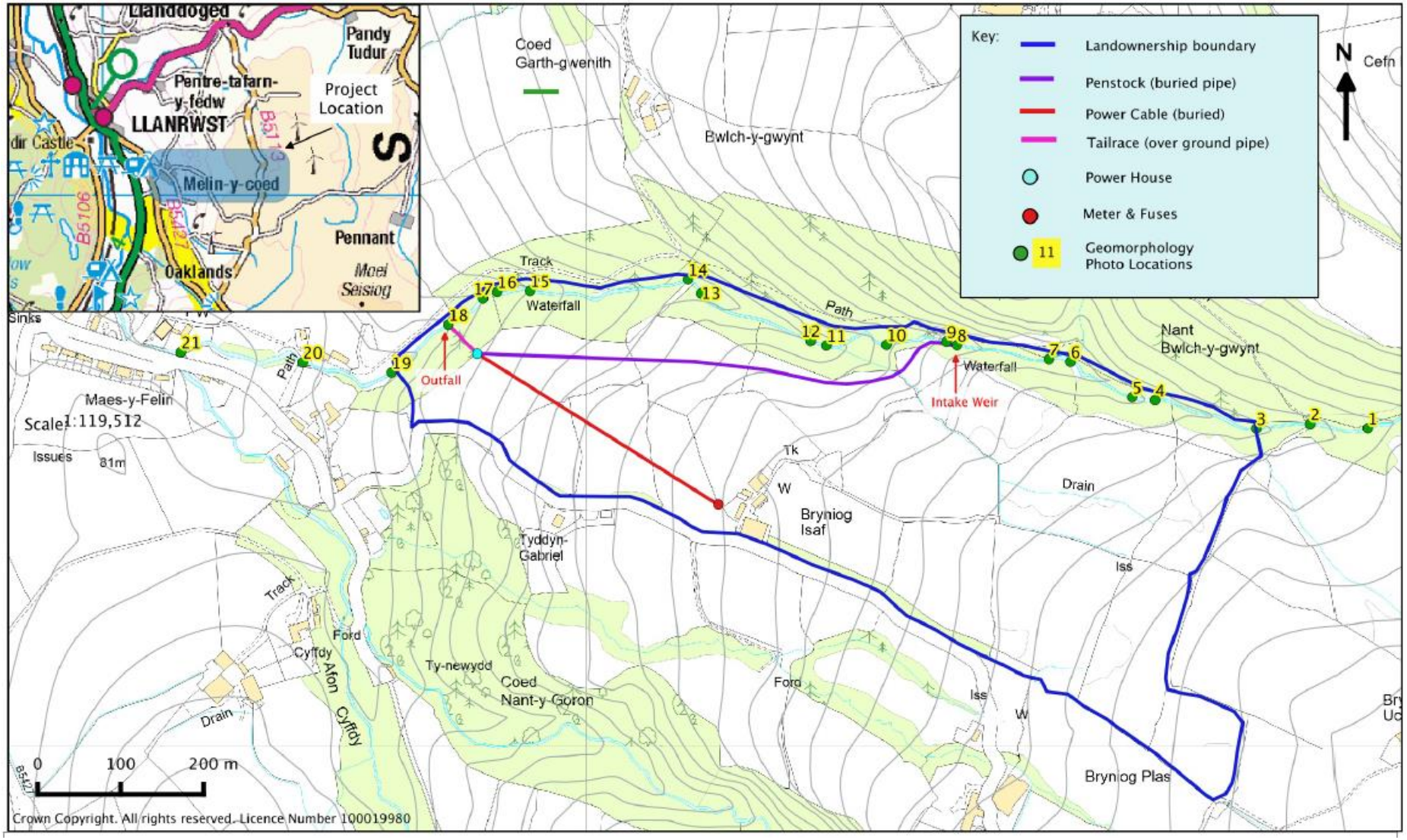

Figure 1. Photo survey map (Courtesy of Greenearth Hydro)

3. Photographs of the river channel

a. Locations of structures

Photographs should be provided showing the locations of new structures (or existing structures that are being altered) that are to be sited in or near the watercourse including:

- the intake weir/structure and any associated works (e.g. wing walls, fish pass, bank protection etc)
- pipelines and river crossings for pipelines
- the turbine house
- the outfall
- bankside access tracks

The photograph showing the location of the intake should include an illustration of the dimensions of any proposed structures including the weir crest level where relevant. This can be achieved by:

- positioning ranging poles/survey staffs in the channel to the required level when the photo is taken (see Photos 1 and 2) or;
- afterwards by annotating a print either digitally (see Figure 2) or;
- annotating a print by hand

Remember to also include a photo of the same location but without the structure dimensions represented on it. Do the same to show the level and extent of any pool that may be created behind the weir.

b. Upstream and downstream reaches

Photographs should show the river reaches upstream of the proposed intake structure and downstream of the proposed outfall. Photographs should preferably be taken at a spacing of 1 per 100m length of river for 500m. These will help us to see if your structures have been sited in the best locations to minimise impact on geomorphology.

c. The depleted reach

This is the river channel between the point of abstraction, any points where the pipeline crosses the watercourse, the turbine house and the outfall for a run-of-river hydro scheme. Photographs should be taken evenly spaced throughout the depleted reach but no fewer than one per 250m.

Photo 1. Using a survey staff to illustrate the intended crest level for a proposed intake weir. (Photo NRW)

Photo 2. Using a ranging pole to illustrate the intended cross section at which a weir is proposed. (Photo NRW)

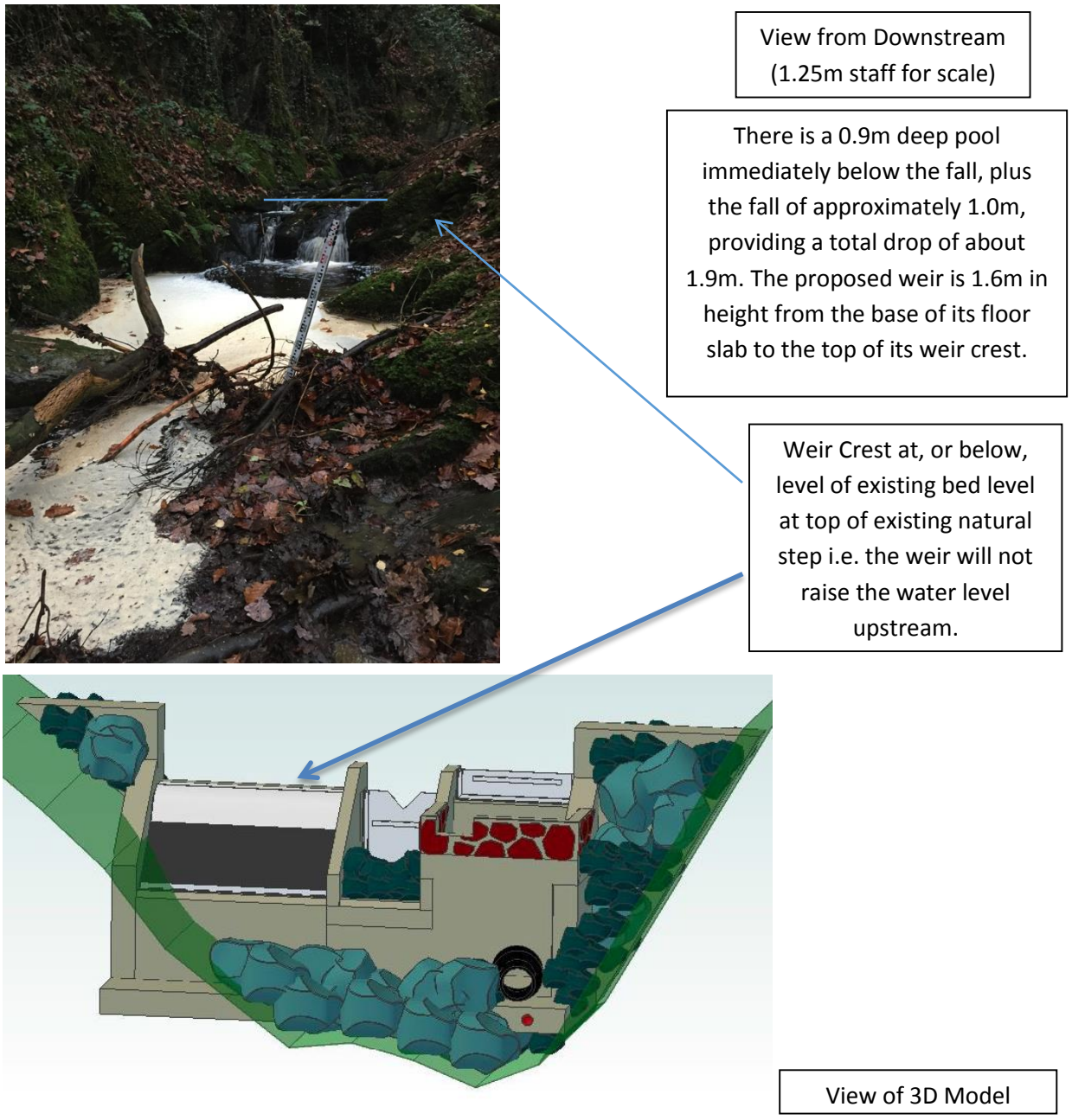

Figure 2 Showing use of digital design image and annotation of reach photograph. (Image Courtesy of Greenearth Hydro)

4. Other channel features

We also wish to see photographs of any significant channel features where present that are not clearly shown within other photographs. These include inflowing tributaries, culverts, crossing points or natural channel features such as waterfalls, cascades, pools and large areas of erosion or deposition, bankside collapse or bedrock (Photo 3).

Photo 3. Showing historical culvert (Photo: Greenearth Hydro)

Please state in the survey report if restricted access has prevented you from being able to take all the photographs to the standards required above. This may include for example no permission to access to land upstream of your proposed intake or difficulties in accessing ravines.

How to take and present your photographs:

The photographs of the river channel need to include enough detail for us to see the sediment type, river banks, bed material and surrounding land use for each section. It may be possible to include these features within a well composed, good quality photograph at each point providing that they can be clearly seen within the picture. (See Photo 4)

Photo 4. Photo of river reach showing left and right banks and bed substrate. Note survey staff used for scale (Photo: Greenearth Hydro)

Alternatively additional photos (one looking down at the substrate, one left bank, one right bank) may be taken at each position.

Include an object for scale in each photograph. You could use a survey staff, ranging poles or metre rule to indicate channel width and depth or the height of waterfalls. Rulers, notebooks and pens placed on emergent substrate are useful for pictures of sediment. (Photo 5)

Photo 5. Photograph showing sediments and bed material with ranging pole for scale (Photo: NRW)

How to present this information to us

Photographs should be numbered, grid referenced, given a descriptive heading (e.g. looking upstream/downstream, looking north, north east etc.) and with locations indexed on the accompanying map of the site (e.g. a numbered dot of where the photograph was taken with an arrow showing the direction of photograph).

This allows us to know where you have taken the photographs so we can understand the characteristics and features of the river channel in which you wish to develop your scheme.

The photosurvey is a non-technical report. We do not require any additional technical geomorphological interpretation or comment other than that necessary to reference photos or provide a description of location and site context.

The survey information will need to be collated into a report before it can be submitted to us. The simplest way to do this is to place digital photographs into an MS Word document (or similar software) and annotate/index them within the report. The report may be converted to paper document format (pdf) for convenience.

Completed reports are likely to result in large file sizes. We are happy to receive the reports by e-mail where possible. They can be sent to our Permit Receipt Centre at permitreceiptcentre@naturalresourceswales.gov.uk. Alternatively the reports should be copied to CD or data stick and submitted to our Permit Receipt Centre with your application forms. In some instances you may be able to reduce the resolution of your photographs to reduce file size providing that they still clearly show the features of the river channel.

We cannot accept large numbers of uncollated photographs.

Photosurvey checklist

Use this checklist to see if you have included all the information relevant to your site.

Basic site information	Have you included your basic site information and does it include:	
	Address or location of the site?	
	River name if known?	
	Grid references and elevations (mAOD) of intake?	
	Grid references and elevations (mAOD) of the turbine house?	
	Grid references and elevations (mAOD) of outfall?	
	Length & gradient of depleted reach?	
Annotated map	Have you included your annotated map and does it include?	
	the proposed scheme arrangement (i.e. the location of intake weir, penstock route, turbine house and outfall)?	
	the points where the photographs for the survey were taken and the photo reference number?	
	the location and extent of any bankside modifications and structures (if applicable)?	
Photographs: Structure siting	Have you included a photo of the intake structure location?	
	Have you included an object in your photograph of the intake location to illustrate the levels and extents of the intake weir/structure?	
	Have you included a photo of the pipeline route where it is in or near the watercourse?	
	Have you included a photo of the turbine house location?	

	Have you included a photo of the outfall location?	
	Have you included a photo of bankside access tracks? (where applicable)	
Photographs: Upstream and downstream	Have you included photos of the river reaches *upstream* of the point of abstraction?	
	Have you included photos of the river reaches *downstream* of the outfall?	
Photographs: Depleted reach	Have you included photos taken evenly spaced along the depleted reach and at no greater than 250m intervals?	
Photographs: Other channel features	Are there any of the following features and if so have you included photos of them? • Inflowing tributaries	
	• Culverts & bridges	
	• Cascades and waterfalls	
	• Pools	
	• Areas of erosion and deposition	
	• Other features	
Photograph composition	At each photo point do your photographs show:	
	• Sediment type?	
	• River bed material?	
	• Left and right banks?	
	• Floodplain/Surrounding land use?	
Scale	Have you included a survey staff, ranging pole, tape or similar in your photographs to illustrate scale?	
Referencing	Are your photographs clearly referenced?	