

Guidance

Principles of Engineering Drawings: Infrastructure Projects

September 2021



1 Background

Engineering drawings will be included in permits to control engineering works undertaken as part of large infrastructure projects. The drawings must adhere to the following principles to:

- a) Ensure protection of the water environment;
- b) Deliver a fair, proportionate and transparent permitting approach for operators; and
- c) Deliver a degree of flexibility (where appropriate) for both operators and SEPA.

2 Drawing Principles

Drawings referenced in permits must:

1. Only capture environmental essentials for each activity.

- a. The environmental essentials listed in Section 5 are the key hydromorphological components that if altered could cause a significant impact in the water environment.
- b. Drawings must not include features that are not related to protection of the water environment or do not have any hydromorphological bearing e.g.
 - i. Fences
 - ii. Landscape features and/or structures that aren't regulated by SEPA

2. Include a level of agreed design flexibility based upon the site-specific constraints and design opportunities.

- a. This is in recognition that the final build can sometimes vary slightly from the initial design without causing additional environmental impact. SEPA will assess the degree of flexibility proposed by the applicant and agree an

acceptable level of flexibility upon consideration of the complexity of the works and environmental risk.

- b. Any agreed degree of design flexibility (in the form of a maximum value, minimum value, or a range for an environmental essential) should be captured within the drawing. For example:
 - i. Maximum culvert length of 30m;
 - ii. Channel width of 2.3 – 2.5 m;
- c. In addition, it is recognised that in some cases it may be possible for the final build **location** to vary slightly from the initial location where there are no knock-on consequences to the design of the works. To account for this a larger authorised area than is required for the footprint of the activity will be permitted, where possible. This authorised area will be controlled in the permit. The process for defining the authorised area and the interaction with the drawings is set out in Section 4.

3. Be easy to understand and ensure the environmental essentials are clear

- a. Key features and measurements must be labelled (e.g. culvert inlet, culvert outlet, culvert length, culvert width, etc.) to allow for easy identification and to reduce the likelihood of misinterpretation.
- b. Drawings must not contain additional detail (e.g. photographs, cross-referencing of other documents / plans).

4. Not contain statements / notes that are a condition

- a. As the drawing is a legally binding extension of the permit, any statements or notes within the drawings that are a condition (e.g. “*All works must be supervised by a trained hydromorphologist*”) would also become legally binding requirements.
- b. Including statements or notes that are a condition within the drawing, rather than permit itself, would lead to a loss of transparency and clarity.
- c. Therefore, any conditions controlling engineering works will be captured within the permit itself.

3 Drawing Convention

1. Drawings and associated text must be suitably sized to allow for easy reading in print form.
2. Drawings must retain all pertinent information when converted from electronic to print form (e.g. all layers of a drawing must be retained and clearly displayed).
3. Drawings must utilise a common naming convention that captures the following: drawing name, reference number, date and revision number.

4 Authorised Area

As set out above, it may be possible for the final build location of engineering works to vary slightly from the initial location where there are no knock-on consequences to the design of the works. To account for this, a larger authorised area than is required for the footprint of the engineering works will be permitted. Where there are no other constraints, the boundary of the Land Made Available (LMA) will be used to define the authorised area. Examples of constraints that may require a tightening of the authorised area from the LMA boundary include:

- Where statutory designations (e.g. Special Areas of Conservation, Sites of Special Scientific Interest, etc.) overlap with the LMA boundary.
- Where the watercourse itself changes (i.e. at a confluence where it changes from a tributary to a main watercourse)
- Where there is a significant change in river typology.

The wider authorised area permits additional flexibility for the final build location (illustrated by the blue outlined box in Figure 1) to adjust from the initially planned location (orange shaded box in Figure 1) without requiring a permit variation. This will in turn deliver time and resource savings to both the operator and SEPA.

Figure 1 **Authorised Area – Change in Engineering Works Location**

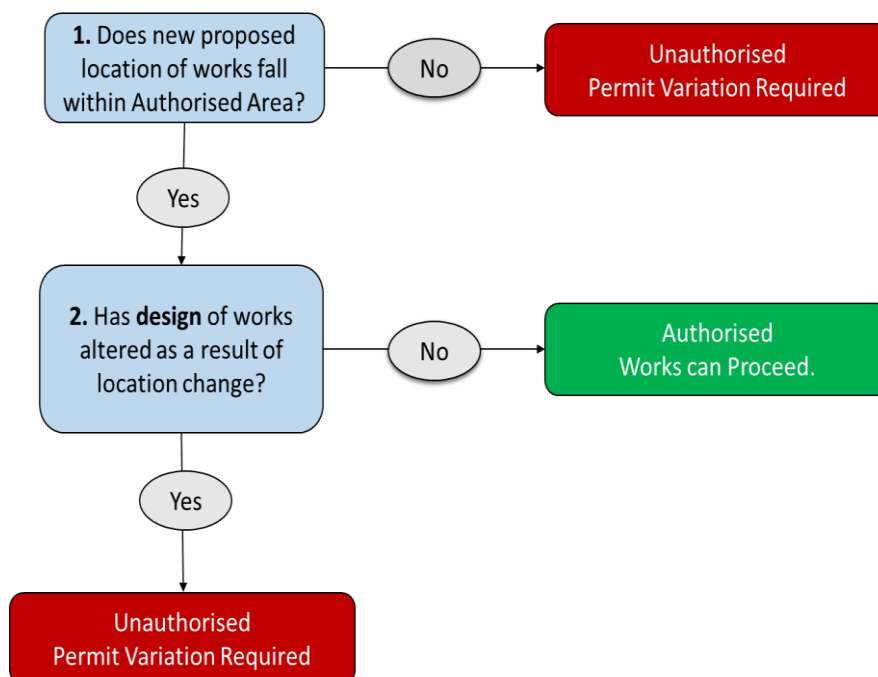


However, to allow works to proceed without a permit variation the **design** of the engineering works must not:

- a) Alter beyond the limits of the drawing as specified in the permit (see Section 4.1);
and / or
- b) Alter the arrangement / relative position of overlapping / contiguous works (see Section 4.2).

Figure 2 sets out under what circumstances a permit variation is required:

Figure 2 Authorised Area / Drawing Interaction Flow Chart



4.1 Alterations to Drawing

If the design is altered beyond the limits of the drawing, a permit variation is required to allow an assessment of the proposed design modifications, and the new drawing to be correctly referenced in the permit. Examples of such design changes include:

- a) An extension to the proposed culvert length or change in gradient beyond the limits of the drawing;
- b) The addition of further bank / bed protection;
- c) Modifications to the length, planform or long profile of any proposed realignment.

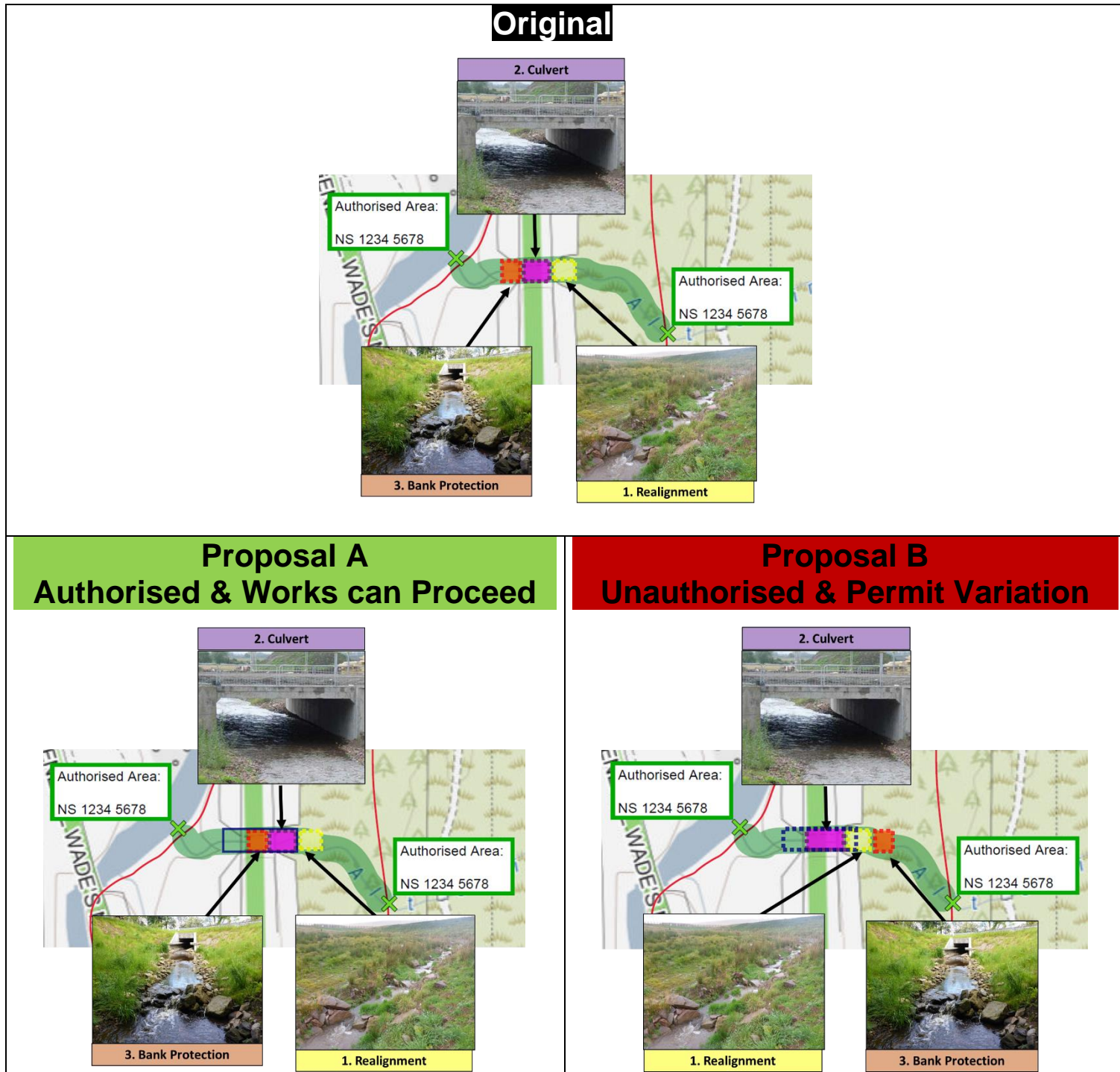
4.2 Alterations to Design - Arrangement / Position

If the arrangement / relative position of overlapping / contiguous engineering works is altered, a permit variation is required to allow an assessment of the proposed changes.

Where the arrangement / relative position of overlapping / contiguous engineering works is not altered, and all the works collectively shift upstream or downstream maintaining their original arrangement / relative position, and this does not result in alteration of the design no permit variation is required.

Figure 3 provides an example under what circumstances a permit variation is not (Proposal A) and is (Proposal B) required.

Figure 3 Engineering Works Arrangement / Relative Position



5 Environmental Essentials

Environmental Essential		Activity							
		Culverting	Bridging	Bank Protection / Re-profiling	Bed Reinforcement	Realignment / Diversion	Embankment / Floodwall	Pipe / Cable Crossing	Sediment Management
STRUCTURE									
1.	Type of structure	✓	✓	✓ Material used Location of each component	✓ Material used	X	✓	X	X
2.	Structure Dimensions	✓ Length Width Height	✓ Length of abutments Width and length of in-channel piers	✓ Length Height of each component	✓ Length Lateral Extent	X	✓ Length Crest level	✓ Longitudinal length	✓ Area Location
3.	Gradient	✓	X	X	X	X	X	X	X
4.	Burial depth of structure beneath bed surface	✓	X	X	●	X	X	✓	X
5.	Number of in-channel piers	X	✓	X	X	X	X	X	X
6.	Position and orientation of in-channel piers	X	✓	X	X	X	X	X	X
7.	Set-back distance	X	● Abutments from bank toe	X	X	X	✓ Alignment of embankment / floodwall from channel	X	X

Environmental Essential		Activity							
		Culverting	Bridging	Bank Protection / Re-profiling	Bed Reinforcement	Realignment / Diversion	Embankment / Floodwall	Pipe / Cable Crossing	Sediment Management
8.	Measures to maintain fish passage	●	X	X	X	X	X	X	X
9.	Measures to minimise or mitigate excess energy	●	X	X	X	X	X	X	X
10.	Measures to retain bed material	●	X	X	X	X	X	X	X
CHANNEL									
11.	Channel cross-section(s)	X	X	X	X	✓ (Dimensions)	X	X	X
12.	Channel Planform	X	X	X	X	✓	X	X	X
13.	Low flow channel	● Width Depth	X	X	X	X	X	X	X
14.	Length of realignment / diversion	X	X	X	X	✓	X	X	X
BED									
15.	Bed material size, shape, placement & origin	✓	X	X	● Cover Material	✓	X	X	X
16.	Depth (thickness) of bed material	✓	X	X	● Cover Material	X	X	✓ (Cover Material)	X
17.	Bedform ¹	X	X	X	X	✓	X	X	X

¹ This is the form and features of the channel bed e.g. pools, riffles, runs, glides, step-pools, cascade, alluvial bars, plane bed.

Environmental Essential		Activity							
		Culverting	Bridging	Bank Protection / Re-profiling	Bed Reinforcement	Realignment / Diversion	Embankment / Floodwall	Pipe / Cable Crossing	Sediment Management
18.	Bed long profile	X	X	X	X	✓ (Incl. changes in gradient and how ties in to existing channel)	X	X	X
19.	Basal level of sediment removed	X	X	X	X	X	X	X	✓
BANK									
20.	Bank Affected (Left / Right ²)	X	X	✓	X	X	✓	X	X
21.	Slope of protected & un-protected sections	X	X	✓	X	X	X	X	X
22.	Bank material where not reinforced	X	X	X	X	✓	X	X	X

Key	
✓	Fundamental for activity – must be captured.
●	Where site specific conditions / design necessitate
X	Not necessary for activity – do not capture.

² Left and right are defined as if looking downstream.

For information on accessing this document in an alternative format or language please contact SEPA by email at equalities@sepa.org.uk

If you are a user of British Sign Language (BSL) the Contact Scotland BSL service gives you access to an online interpreter enabling you to communicate with us using sign language.

<http://contactscotland-bsl.org/>

www.sepa.org.uk

Strathallan House, Castle Business Park, Stirling, FK9 4TZ