

## Appendix A10.4: Surface Water Indirect Dewatering Assessment

### 1 Introduction

- 1.1.1 This appendix provides an assessment of the expected dewatering impacts on surface water features present within the study area, supporting Chapter 10 (Geology, Soils, Contaminated Land and Groundwater).
- 1.1.1 The magnitude of impact has been derived based on the expected groundwater drawdown at the location of the surface water feature and the size (or volume of flow) of the surface water feature, assuming that a degree of hydraulic conductivity exists between groundwater and the surface water receptor. Sensitivity is based on the ecological sensitivity of that surface water feature.

### 2 Initial Screening

- 2.1.1 The initial screening is based on simple estimates of the zone of influence of dewatering (Sichardt Method) around each excavation considered likely to intercept groundwater, consistent with the approach defined in Chapter 10 (paragraph 10.4.18). The magnitude of impact has been derived based on the expected groundwater drawdown at the location of the surface water feature. It was assumed that a degree of hydraulic conductivity exists between groundwater and the surface water receptor. The significance of impact was derived based on the methodology described in Chapter 10, Section 10.2 (Approach and Methods) The outcome of the initial assessment is presented in Table 1.

**Table 1: Assessment of Cutting Impacts on Surface Water Features**

Cutting ID	Water Feature ID	Sensitivity of Receptor	Magnitude of Impact	Significance of Impact
W6	WF006	Very High	Negligible	Neutral
CS11	WF006	Very High	Negligible	Neutral
FCSA2	WF006	Very High	Negligible	Neutral
SP3	WF006	Very High	Minor	<b>Moderate/Large</b>
SP3	WF016	Medium	Minor	Slight
CS11	WF032	Medium	Negligible	Neutral
CS11	WF033	Medium	Negligible	Neutral
FCSA2	WF039	Medium	Negligible	Neutral
FCSA2	WF040	Medium	Negligible	Neutral
W6	WF042	Medium	Moderate	<b>Moderate</b>
W6	WF045	Medium	Minor	Slight
W6	WF046	Medium	Negligible	Neutral
W6	WF047	Medium	Major	<b>Large</b>
W18	WF047	Medium	Negligible	Neutral
D1	WF047	Medium	Negligible	Neutral
W6	WF049	Medium	Major	<b>Large</b>
CS21	WF049	Medium	Negligible	Neutral
W18	WF049	Medium	Negligible	Neutral
D1	WF040	Medium	Negligible	Neutral
W6	WF050	Medium	Major	<b>Large</b>
CS21	WF050	Medium	Moderate	<b>Moderate</b>
W6	WF052	Medium	Negligible	Slight
CS21	WF052	Medium	Minor	Slight

- 2.1.2 The initial assessment identified potential impacts of Moderate or greater significance to the following surface water features:
- ID 06 – as a result of SP3
  - ID 42 – as a result of W6

- ID 47 – as a result of W6
- ID 49 – as a result of W6
- ID 50 – as a result of W6 and CS21

### **3 Detailed Assessment**

3.1.1 The detailed assessments for each of these cuttings are described below. The assessments consider the specific local circumstances and provide a more refined estimate of the potential magnitude of that impact. They are based on consideration of all available relevant information, primarily available GI and groundwater level monitoring data and the local topography. The significance of impact was then predicted based on the methodology described in Chapter 10, Section 10.2 (Approach and Methods).

#### **Drainage Pond SP3**

3.1.2 Pond SP3 is a 12.6m deep drainage pond to the west of the A9 near the beginning of this section of the proposed scheme. It will be constructed in close proximity to the River Tay, although outside the SEPA 1:200 year flood zone, and will penetrate below the water table.

3.1.3 The pond will be lined to prevent ingress of groundwater during operation and therefore will not create a groundwater drawdown effect in the long term. Any dewatering impacts will therefore occur only during the construction phase, limited in time and magnitude. The pond is also a small feature in comparison to the River Tay and the temporary dewatering effects are expected to be localised and will have negligible impact on the river. Therefore, no significant impact is expected.

#### **Cutting CS21**

3.1.4 Cutting CS21 is an 8.4m deep cut along the eastern edge of the proposed scheme. It will be constructed in permeable sand and gravel deposits which are underlain by low permeability metamorphic bedrock.

3.1.5 WF050 is located approximately 30m from the edge of CS21 and approximately 8m above it.

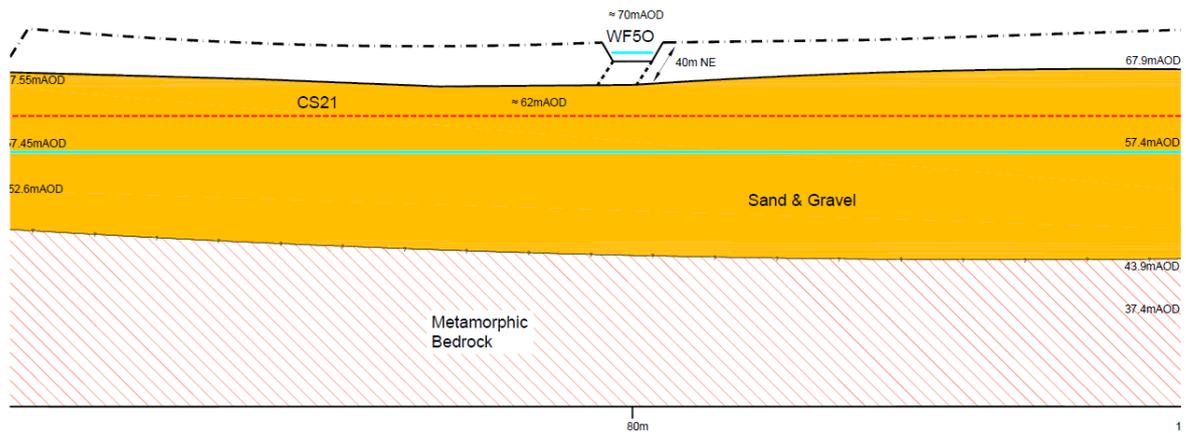
3.1.6 The detailed review of information indicates that the cutting will intercept groundwater only in the north-west half of the cutting, which is sufficiently far from any surface water receptor to not have any significant impact. Diagram 1 shows a schematised section of CS21 between ch7300 and ch7460 which pertains to CS50. Available GI information suggests that groundwater levels are in the region of 57mAOD in this area, with the base of the cutting proposed at circa 62mAOD. Therefore, no impacts are expected on WF050 as a result of the construction of CS21.

**Diagram 1: Cross Section for CS21 – WF50**

**CS21**

**Key**

-  Current Groundwater (Maximum Level)
-  CS21
-  Superficial Deposits
-  Bedrock



**Cutting W6**

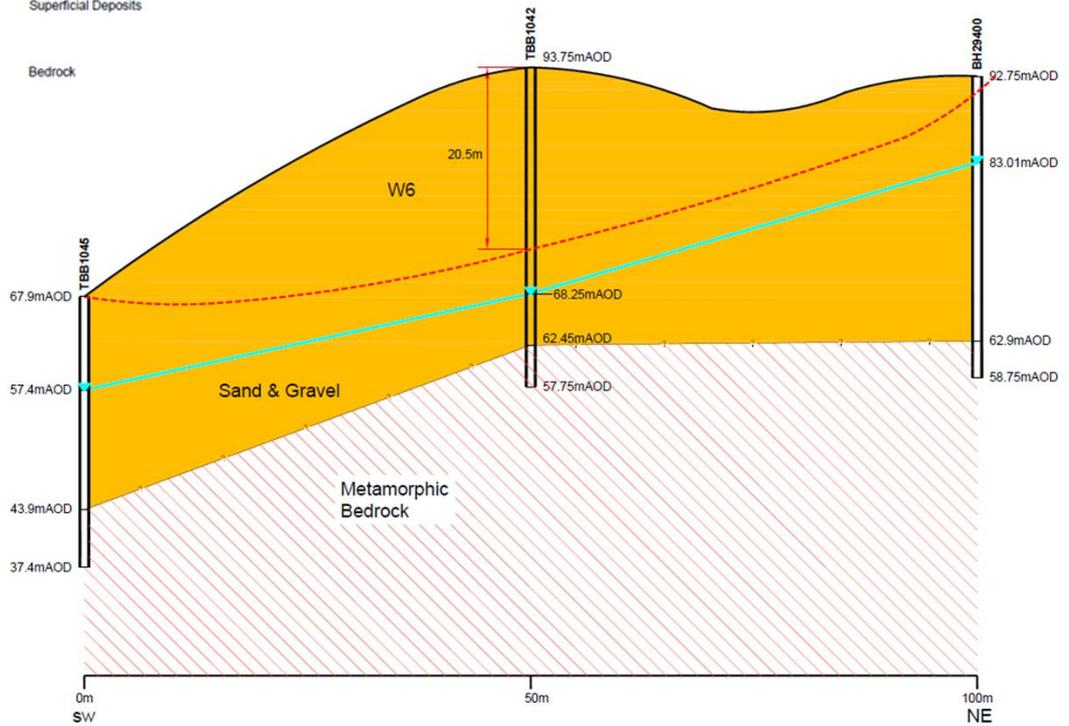
- 3.1.7 Cutting W6 is a 390m long cut, with a maximum depth of 20.5m, that will widen the road platform to the east of the existing A9. It will be excavated in permeable sand and gravel deposits.
- 3.1.8 The following surface water receptors are located in proximity:
  - WF042 is located 325m south-east of the edge of the cutting and is at an elevation of circa 55m AOD;
  - WF047 is approximately 80m south-east of the edge of W6 and is at an elevation of circa 60m AOD;
  - WF049 is located 5m to the south of W6 and is at an elevation of circa 60m AOD;
  - WF050 is 30m north of the cutting and is at an elevation of circa 70m AOD; and
- 3.1.9 While the initial screening suggested that groundwater would be intercepted, this is due to the conservative assumption that the deepest part of the cutting and the location of the interpolated maximum groundwater level coincide. Review of groundwater levels in relation to the cutting depths suggest that groundwater levels should be deeper than the proposed excavation along the full length of the cutting. Potential impacts on WF042, WF047, WF049 & WF050 as a result of dewatering from W6 are considered unlikely.

**Diagram 2: Cross Section for W6**

**W6**

**Key**

-  Current Groundwater (Maximum Level)
-  W6
-  Superficial Deposits
-  Bedrock



**4 Conclusion**

4.1.1 Following detailed assessment, no potential impacts of significance are expected on surface water receptors as a result of indirect dewatering effects.