



# **Norwich Western Link**

## **Environmental Statement**

### **Chapter 12: Road Drainage and the Water Environment**

#### **Appendix 12.4: River Wensum Geomorphology Assessment**

##### **Sub Appendix E – Specific Stream Power**

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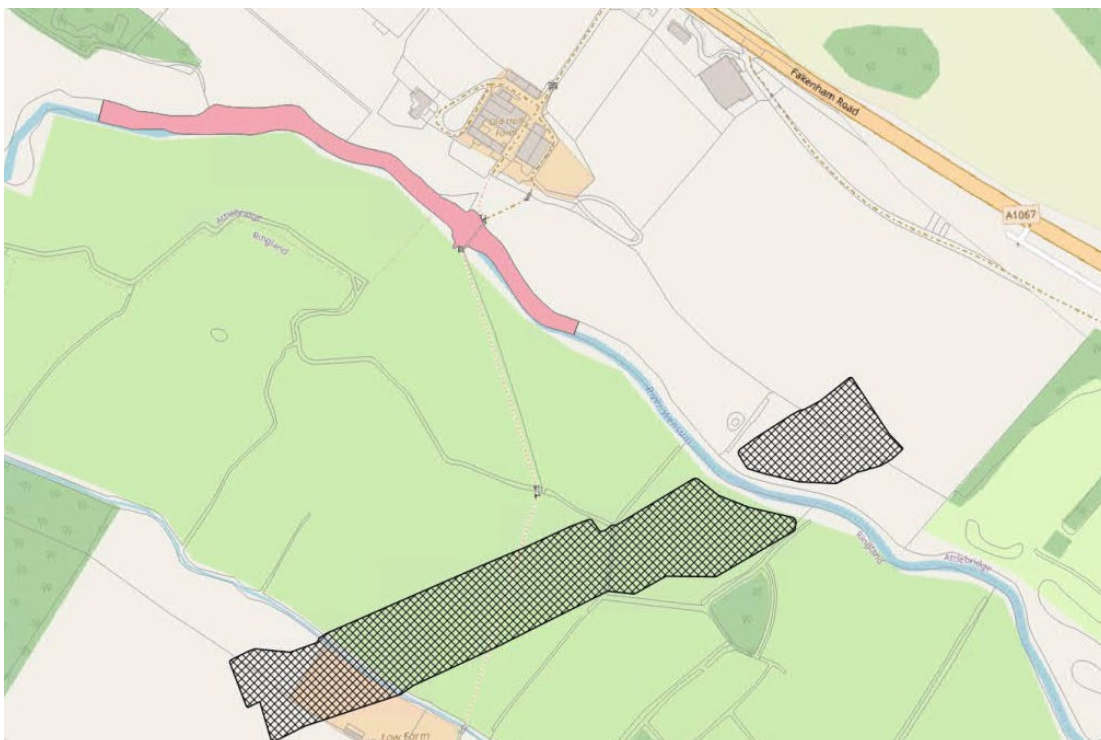


# 1 Appendix E: Specific Stream Power

## 1.1 Introduction

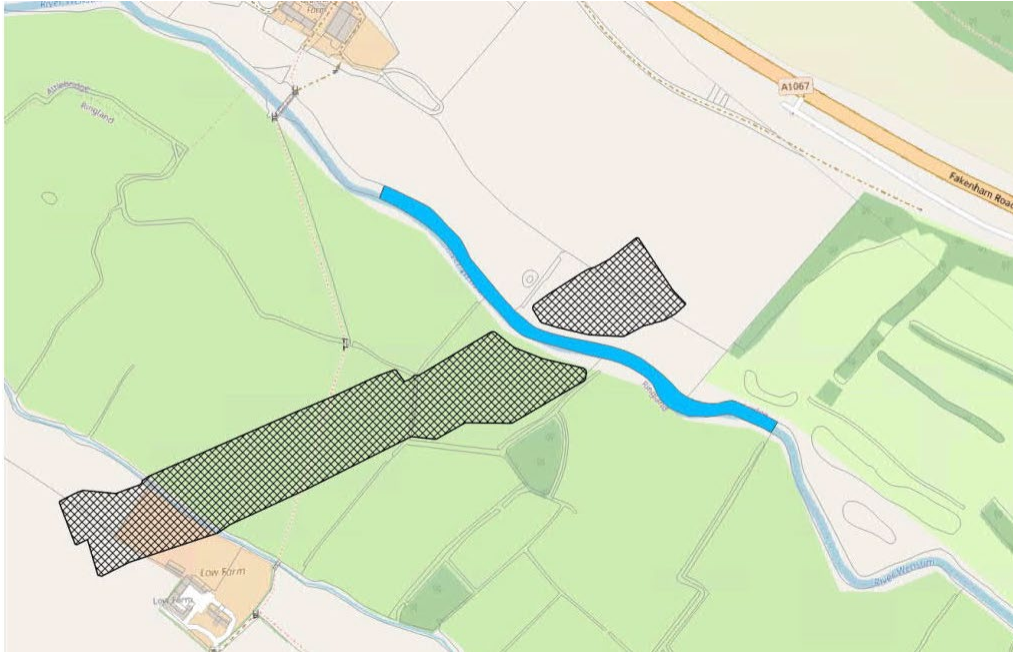
1.1.1 To spatially isolate and capture any possible effect of the Proposed Scheme upon baseline condition, the specific stream power assessment was conducted in three reaches along the River Wensum: (i) upstream (**Figure 1.1**), (ii) at the vicinity (**Figure 1.2**), and (iii) downstream of the Proposed Scheme (**Figure 1.3**). The results of the hydraulic modelling calculations are presented in the section below for each of those reaches considering four flood return intervals (2-year, 20-year, 100-year, and 100-year + climate change).

**Figure 1.1 – Reach upstream of the proposed scheme. The hashed area corresponds to the temporary works platform required to construct the viaduct over the River Wensum**





**Figure 1.2 – Reach at the vicinity of the proposed scheme. The hashed area corresponds to the temporary works platform required to construct the viaduct over the River Wensum**



**Figure 1.3 – Reach downstream of the proposed scheme. The hashed area corresponds to the temporary works platform required to construct the viaduct over the River Wensum**





## Results

- 1.1.2 The specific stream power ( $W/m^2$ ) estimated for the River Wensum are shown in **Table 1.1**, **Table 1.2**, **Table 1.3**, and **Table 1.4**. In addition, unit flow ( $m^2/s$ ), water level elevation (mAOD), water level slope (m/m), and reach length (m), which are required to calculate the specific stream power, are also provided.

**Table 1.1 – Specific stream power estimated for 2 year flood events**

Scenario	Baseline (Upstream reach)	Construction (Upstream reach)	Operation (Upstream reach)	Baseline (Middle reach)	Construction (Middle reach)	Operation (Middle reach)	Baseline (Lower reach)	Construction (Lower reach)	Operation (Lower reach)
Unit flow (m <sup>2</sup> /s)	0.5	0.4	0.5	0.5	0.9	0.5	0.4	0.5	0.4
Upstream water level (mAOD)	9.6	9.7	9.6	9.5	9.6	9.5	9.4	9.4	9.4
Upstream water level (mAOD)	9.5	9.6	9.5	9.4	9.4	9.4	9.3	9.3	9.3
Length of reach (m)	427.0	427.0	427.0	394	394	394	529	529	529
Water level slope (m/m)	0.0003	0.0001	0.0003	0.0002	0.0006	0.0002	0.0001	0.0001	0.0001
Specific stream power (W/m <sup>2</sup> )	1.6	0.5	1.7	1.2	5.2	1.1	0.4	0.6	0.4

**Table 1.2 – Specific stream power estimated for 20 year flood events**

Scenario	Baseline (Upstream reach)	Construction (Upstream reach)	Operation (Upstream reach)	Baseline (Middle reach)	Construction (Middle reach)	Operation (Middle reach)	Baseline (Lower reach)	Construction (Lower reach)	Operation (Lower reach)
Unit flow (m <sup>2</sup> /s)	0.4	0.4	0.4	0.6	1.4	0.6	0.4	0.5	0.4
Upstream water level (mAOD)	9.7	10.0	9.7	9.7	10.0	9.7	9.6	9.6	9.6
Upstream water level (mAOD)	9.7	10.0	9.7	9.6	9.6	9.6	9.5	9.6	9.5
Length of reach (m)	427.0	427.0	427.0	394	394	394	529	529	529
Water level slope (m/m)	0.0002	0.0001	0.0001	0.0002	0.0009	0.0002	0.0001	0.0001	0.0001
Specific stream power (W/m <sup>2</sup> )	0.7	0.4	0.5	1.0	12.3	0.9	0.4	0.7	0.4

**Table 1.3 – Specific stream power estimated for 100 year flood events**

Scenario	Baseline (Upstream reach)	Construction (Upstream reach)	Operation (Upstream reach)	Baseline (Middle reach)	Construction (Middle reach)	Operation (Middle reach)	Baseline (Lower reach)	Construction (Lower reach)	Operation (Lower reach)
Unit flow (m <sup>2</sup> /s)	0.5	0.5	0.4	0.6	1.7	0.6	0.5	0.6	0.5
Upstream water level (mAOD)	9.8	10.2	9.8	9.8	10.1	9.8	9.7	9.7	9.7
Upstream water level (mAOD)	9.8	10.1	9.8	9.7	9.7	9.7	9.6	9.7	9.6
Length of reach (m)	427.0	427.0	427.0	394	394	394	529	529	529
Water level slope (m/m)	0.0002	0.0001	0.0001	0.0002	0.0011	0.0001	0.0001	0.0001	0.0001
Specific stream power (W/m <sup>2</sup> )	0.9	0.5	0.6	1.0	19.1	0.9	0.4	0.8	0.4

**Table 1.4 – Specific stream power estimated for 100 year + climate change flood events**

Scenario	Baseline (Upstream reach)	Construction (Upstream reach)	Operation (Upstream reach)	Baseline (Middle reach)	Construction (Middle reach)	Operation (Middle reach)	Baseline (Lower reach)	Construction (Lower reach)	Operation (Lower reach)
Unit flow (m <sup>2</sup> /s)	0.6	0.6	0.5	0.6	2.0	0.6	0.5	0.6	0.5
Upstream water level (mAOD)	9.9	10.3	9.9	9.8	10.3	9.8	9.8	9.8	9.8
Upstream water level (mAOD)	9.8	10.3	9.8	9.8	9.8	9.8	9.7	9.7	9.7
Length of reach (m)	427.0	427.0	427.0	394	394	394	529	529	529
Water level slope (m/m)	0.0002	0.0001	0.0001	0.0002	0.0014	0.0001	0.0001	0.0002	0.0001
Specific stream power (W/m <sup>2</sup> )	1.1	0.6	0.7	1.1	26.1	0.9	0.5	1.0	0.5