VALE OF PICKERING CHANNEL MANAGEMENT PILOT PROJECT

cbec, eco-engineering

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Draft Scope of Work

Introduction

The report, The Vale of Pickering Channel Management Assessment and Planning – Phase 1 (Bowles, 2009), was completed in January 2009. This report provided an independent assessment of the existing condition of the main rivers in the Vale of Pickering, with recommendations on how these watercourses could be managed with multi-objective management goals. These goals included flood risk management, agricultural land drainage and ecological biodiversity. Part of the recommendations of this report included pilot vegetation and sediment management projects on certain reaches of the main rivers within the Vale of Pickering. The objectives of these pilot projects are to:

1. Assess the effects of vegetation and sedimentation on water levels in the main rivers within the Vale of Pickering.
2. Assess the effects of maintenance of vegetation and sedimentation of the main rivers within the Vale of Pickering on ecological biodiversity.

Two potential main river reaches have been identified for investigation through the pilot project described here, prioritized as follows:

1. River Hertford/Derwent – From the A64 at Staxton to the confluence with Thornton Beck
2. River Derwent – Rye mouth to Old Malton

It is most likely that this pilot project will initially focus on the River Hertford/Derwent (1) and therefore the bulk of this scope of work is focused on this reach.

Based on recent coordination meetings with the Environment Agency (EA) (York office) and Ryedale District Council, this scope of work has been prepared to provide the tasks required to complete these pilot projects, involving close coordination and collaboration with the EA and Ryedale District Council.

Scope of Work

1 Project management and coordination

This task will include general project management duties and day-to-day coordination with the EA, Ryedale District Council, and other team members. Specifically, this task will include:

- Coordination with client group
- Monthly conference calls with an EA project representative
- Scheduling, project and budget tracking, invoicing and associated project management tasks

2 Historic Channel Analysis

In assessing the geomorphic evolution of the reaches to be investigated it is important to understand the historic conditions within the channel. This evolution will help inform potential pilot channel management actions. Data collection of historic records will be undertaken as described in the following tasks.

2.1 Collect historic cross section records

cbec staff will visit archives at the EA, Yorkshire Water and other relevant sources to investigate the availability of historic data relating to the geomorphic evolution of the River Hertford and the River Derwent. Specifically, we will obtain historic cross section surveys, and other related information that will provide data on how the channels have evolved over time, taking into account past maintenance activities. We will summarize these data in graphic plots of historic cross sections.

2.2 GIS analysis

cbec staff will undertake an historic aerial photography and mapping analysis of the River Hertford and River Derwent in order to ascertain the geomorphic changes over time, including anthropogenic modifications such as channelization and straightening. Readily available information will be obtained from sources such as the EA and Yorkshire Water. These data will be presented in a GIS format.

3 Existing Conditions Assessment

In order to formulate potential channel management pilot projects it will be necessary to assess the existing physical conditions of the River Hertford and the River Derwent through the project reach. For the purposes of this scope of work we have assumed that

the EA will be responsible for associated biological and ecological surveys along the relevant reaches of main river. cbec will primarily be responsible for assessing the physical conditions of these reaches, as follows.

3.1 Cross section surveys

cbec field staff will survey cross sections approximately every 500 metres along the River Hertford and the River Derwent between A64 at Staxton and the confluence with Thornton Beck, using RTK GPS survey equipment. In addition, we will also survey cross sections at the main bridges crossing the river. This represents approximately 40-45 cross sections along the 18km reach of the river. These cross sections will provide an indication of the existing geomorphology within the river, including the existing sedimentation (bed) elevations.

3.2 Fluvial Audit

The River Hartford/Derwent between A64 at Staxton to the confluence with Thornton Beck (a channel length of approximately 18 km) will be surveyed (assuming unhindered access to the river banks) for fluvial audit (Sear et al. 1995). The audit will identify the spatial distribution of channel morphological characteristics at the scale of the river reach (e.g., pool-riffle, plane bed etc; ~5-10 channel widths in length) and morphological units (e.g., pools, riffles, runs, glides etc; ~1-5 channel widths in length). The survey will also identify sources of sediment supply (e.g. tributaries, bank erosion, within-channel storage, hill-slopes) and other features that indicate geomorphic regime (e.g., appearance of bar features, encroachment of vegetation into the channel) and the dynamic character of the channel (e.g., spatial age structure of vegetation within the riparian corridor). The position of river engineering structures (e.g., bank protection, weirs, groynes etc) that influence natural fluvial processes will be recorded and their relative impact qualitatively assessed. The location and distribution of reach type, morphological units, sediment sources and other features will be recorded using a hand-held Global Positioning System (GPS) and visualised in a spatial data-base and GIS environment. The relative supply rates from sediment sources will be qualitatively determined and used to develop a reach scale sediment budget for the river.

3.3 Water level monitoring

Twelve (12) continuously recording water level gauges (pressure transducers) at key locations along the reach between A64 at Staxton and the confluence with Thornton Beck will be deployed by cbec staff. These gauges will record the variation of water levels through the summer and winter months for approximately one year prior to implementation of the pilot management projects. On-going maintenance of these gauges is provided in Tasks 6 and 7.

3.4 Sediment sampling and analysis

cbec staff will collect up to 15 sediment grab samples from the bed of the River Hertford and the River Derwent through the project reach. The sediment samples will be analyzed at a laboratory for particle size distribution. The purpose of this task is to characterize the existing channel sediments which will be used in hydraulic analysis in the next task.

3.5 Hydraulic modeling analysis

A one-dimensional model (HEC-RAS) will be constructed for the project reach. This model will represent the existing conditions hydraulics for the project reach. Hydrology will be provided by the EA based on actual events recorded in the River Hertford and the River Derwent. The model will be constructed from channel cross sections collected in Task 3.1. The model will be calibrated and validated to measured water levels recorded through this effort and historically by the EA. The purpose of this model will be to provide an analysis tool for project design purposes to assess the benefits and impacts of potential channel management concepts developed in Task 4.

4 Formulate Pilot Projects

Through close collaboration with the EA, cbec staff will develop potential channel management project strategies to be implemented through the project reach. This project would assess the benefits of these strategies to water level management and biodiversity. These could likely include:

- Groynes/structures placed in the channel to divert flows to the centre of the channel, thus increasing sediment transport capacity of the channel and reducing sediment accretion in the channel.
- Sedimentation traps in the form of excavation of the channel bed through certain short sections of channel. The purpose of these would be to capture sediment transported through the reach. The sediment traps would need periodic excavation to maintain their efficacy. This project would determine the frequency at which the traps should be excavated.
- Vegetation and weed removal from the banks and bed of the channel. This project would determine the frequency and extent of vegetation management.

The hydraulic model constructed as described in Task 3.5 will be used to help formulate project concept designs. Concept designs for channel management strategies as outlined above will be produced for implementation by the EA Operations staff, as outline in Task 5.

cbec will deliver the concept report to the EA, Ryedale District Council and Scarborough Council electronically, via e-mail, ftp, or DVD.

5 Implement Pilot Projects

EA Operations staff will be responsible for implementation of the channel management strategies as outlined in Task 4.

5.1 Supervise and manage implementation of projects by EA

cbec will provide on-site management and supervision required to implement the project channel management strategies, as outlined in Task 4. We have assumed that EA biodiversity staff will be responsible for ecological supervision of the implementation of the channel management strategies.

6 Monitor Performance of Pilot Projects

Once implemented, the channel management strategies will be monitored for a period of two years. This task covers the monitoring of the strategies for Year 2. We have assumed that EA biodiversity staff will be responsible for ecological monitoring of the channel management strategies.

6.1 Cross Section Monitoring and Analysis

Channel cross sections will be surveyed immediately after implementation of the channel management strategies, and approximately one year after implementation. Comparison between existing cross sections and those surveyed immediately after implementation of the management strategies will be made to verify the extent of channel modification. Cross sections surveyed one year after implementation will determine the changes in geomorphology (cross sectional geometry) over this period of time, as a result of likely sediment accretion or deposition.

6.2 Water level monitoring

On-going monitoring of the water level recorders established in Task 3.3 will be undertaken in order to determine the benefits of the channel management strategies on water level management.

6.3 Progress Report

cbec will produce a progress report at the end of Year 2 of the project to document the

findings of the project to date. We will deliver this report to the EA, Ryedale District Council and Scarborough Council electronically, via e-mail, ftp, or DVD.

6.4 Progress meetings with EA, IDB, Natural England and other Stakeholders

cbec staff will attend progress meeting with the EA, IDB, Ryedale District Council, Scarborough Council, Natural England and other stakeholders to present the progress of the channel management pilot project.

7 Monitor Performance of Pilot Projects

The channel management strategies will be monitored for a period of two years. This task covers the monitoring of the strategies for Year 3 (two years after implementation).

7.1 Cross Section Monitoring and Analysis

Channel cross sections will be surveyed approximately two years after implementation of the channel management strategies. Comparison with existing cross sections, those surveyed immediately after implementation of the management strategies, and those surveyed one year after implementation will determine the changes in geomorphology (cross sectional geometry) over this period of time, as a result of likely sediment accretion or deposition.

7.2 Water level monitoring

On-going monitoring of the water level recorders established in Task 3.3 will be undertaken in order to determine the benefits of the channel management strategies on water level management over time.

7.3 Progress Report

cbec will produce a progress report at the end of Year 3 of the project to document the findings of the project to date. We will deliver this report to the EA, Ryedale District Council and Scarborough Council electronically, via e-mail, ftp, or DVD.

7.4 Final Report

Based on one set of collated comments obtained from the EA and other stakeholders, cbec will produce a final project concept design, implementation and monitoring report for submission to the EA, Ryedale District Council and Scarborough Borough Council. We will deliver this electronically, via e-mail, ftp, or DVD.

7.5 Progress meetings with EA, IDB, Natural England and other Stakeholders

cbec staff will attend one final reporting meeting with the EA, IDB, Ryedale District Council, Scarborough Council, Natural England and other stakeholders to present the findings of the channel management pilot project.

Budget Estimate

A detailed budget estimate is attached following this. A summary and suggested cost-share arrangement is as follows:

Year	Total Cost	EA Cost Share	RDC Cost Share	IDB Cost Share	SBC Cost Share
1	£31,840 + £5,700 = £37,540	£10,000	£15,000	£6,000	£6,540
2	£21,840 + £2,300 = £24,140	£10,000	£8,000	£4,000	£2,140
3	£16,560 + £2,300 = £18,860	£10,000	£5,000	£3,860	£0
Total	**£70,240 + £10,300 = £80,540**	**£30,000**	**£28,000**	**£12,860**	**£7,790**

Notes:
EA = Environment Agency
RDC = Ryedale District Council
IDB = Internal Drainage Board
SBC = Scarborough Borough Council

Project Name: **Channel Management Pilot Project**

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ESTIMATED PROJECT BUDGET SUMMARY

Staff Labor

YEAR 1			**£**	**31,840.00**
1	**Project management and coordination**	£1,840.00		
2	**Historic Channel Analysis**			
2.1	Collect historic cross section records	£2,000.00		
2.2	GIS analysis	£2,440.00		
3	**Existing Conditions Assessment**			
3.1	Cross section surveys	£6,700.00		
3.2	Fluvial audit	£5,240.00		
3.3	Water level monitoring	£2,800.00		
3.4	Sediment sampling and analysis	£1,340.00		
3.5	Hydraulic modeling analysis	£4,880.00		
4	**Formulate Pilot Projects**			
4.1	Conceptual design of up to two pilot reaches	£4,600.00		
	YEAR 2		**£**	**21,840.00**
5	**Implement Pilot Projects**			
5.1	Supervise and manage implementation of projects by EA	£4,880.00		
6	**Monitor Performance of Pilot Projects**			
6.1	Cross section monitoring and analysis	£10,480.00		
6.2	Water level monitoring	£2,800.00		
6.3	Progress report	£1,840.00		
6.4	Progress meetings with EA, IDB, Natural England and other Stakeholders	£1,840.00		
	YEAR 3		**£**	**16,560.00**
7	**Monitor Performance of Pilot Projects**			
7.1	Cross section monitoring and analysis	£5,480.00		
7.2	Water level monitoring	£2,800.00		
7.3	Progress report	£1,840.00		
7.4	Final Report	£4,600.00		
7.5	Progress meetings with EA, IDB, Natural England and other Stakeholders	£1,840.00		
		£ 70,240.00	£	70,240.00
Reimbursable Expenses:			£	10,300.00
Sub-Consultant(s) Fees & Expenses:			£	-
TOTAL ESTIMATED PROJECT BUDGET			**£**	**80,540.00**

Project: Channel Management Pilot Project

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ESTIMATED LABOR FEES

NO.	TASK NAME / DESCRIPTION	Principal	Sr. Associate	Field Assistant	Sub-Total Labor Hours per Task	Sub-Total Labor Fee per Task	Task Total
		£60	**£55**	**£12**	£0		
	YEAR 1						**£31,840.00**
1	**Project management and coordination**	16	16		32	1,840	
2	**Historic Channel Analysis**				-	-	
2.1	Collect historic cross section records	4	32		36	2,000	
2.2	GIS analysis	4	40		44	2,440	
3	**Existing Conditions Assessment**				-	-	
3.1	Cross section surveys	8	100	60	168	6,700	
3.2	Fluvial audit	4	80	50	134	5,240	
3.3	Water level monitoring	4	40	30	74	2,800	
3.4	Sediment sampling and analysis	4	20		24	1,340	
3.5	Hydraulic modeling analysis	8	80		88	4,880	
4	**Formulate Pilot Projects**				-	-	
4.1	Conceptual design of up to two pilot reaches	40	40		80	4,600	
	YEAR 2						**£ 21,840.00**
5	**Implement Pilot Projects**				-	-	
5.1	Supervise and manage implementation of projects by EA	8	80		88	4,880	
6	**Monitor Performance of Pilot Projects**				-	-	
6.1	Cross section monitoring and analysis	8	160	100	268	10,480	
6.2	Water level monitoring	4	40	30	74	2,800	
6.3	Progress report	16	16		32	1,840	
6.4	Progress meetings with EA, IDB, Natural England and other Stakeholders	16	16		32	1,840	
	YEAR 3				-	-	**£ 16,560.00**
7	**Monitor Performance of Pilot Projects**				-	-	
7.1	Cross section monitoring and analysis	8	80	50	138	5,480	
7.2	Water level monitoring	4	40	30	74	2,800	
7.3	Progress report	16	16		32	1,840	
7.4	Final Report	40	40		80	4,600	
7.5	Progress meetings with EA, IDB, Natural England and other Stakeholders	16	16		32	1,840	
Subtotal Labor Hours		228	952	350	**1,530**		Check:
TOTAL ESTIMATED LABOR FEES						**£ 70,240.00**	£ 70,240.00

***Unless expressly provided for within the contract, rates are subject to increase annually on January 1 of each year beginning in 2009.**

ESTIMATED REIMBURSABLE EXPENSES BUDGET

	Mileage	1,000	miles @	0.300	per mile	£300.00	
	Airfare	0	trip(s) @	-	per trip	£0.00	
	Car Rental	21	day(s) @	75.00	per day	£1,575.00	
*	Lodging & Meals	0	day(s) @	-	per day	£0.00	
	Misc. travel expenses		day(s) @		per day	£0.00	
	Per diem	0	day(s) @	40.00	per day	£0.00	
**	Copying / Reproduction					£50.00	
	Parking					£0.00	
	Courier / Delivery (Allowance)					£50.00	
***	Field Equipment Rental						
	Field vehicle	0	day(s) @	100.00	per day	£0.00	
	Total station	0	day(s) @	150.00	per day	£0.00	
	RTK GPS	12	day(s) @	300.00	per day	£3,600.00	
	Stage recorders	12	number@	200.00	each	£2,400.00	
	Sediment samples (lab work)	15		100.00	per	£1,500.00	
	Misc. Supplies / Expenses (Allowance)					£50.00	
	Computer Lcense Lease (M21)		hrs. @		per hour	£0.00	
	Archiving / Documentation (Allowance)					£50.00	
	Sub-Total Reimbursable Expenses						£ 9,575.00
	Administrative Charge						£ 725.00
TOTAL ESTIMATED REIMBURSABLE EXPENSES							**£ 10,300.00**