



ENVIRONMENTAL

OHES Project Reference: 6528



Little Ouse Headwaters Project: River Macrophyte Survey 2013

by OHES on behalf of

Little Ouse Headwaters Project
17th December 2013



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Dear Helen,

Please find our initial results of the river macrophyte survey we conducted on 24th September 2013 in advance of the in-channel restorations works planned for the Little Ouse in October. As confirmed in your email of 23rd September, we conducted the Environment Agency's survey methodology on two sections of the river: by Thelnetham Ford and Webb's Fen. As you have requested, we have not provided an interpretation of our results, but are satisfied that they constitute an effective baseline assessment of the aquatic vegetation. As noted in my email of 25th inst. No uncommon macrophytes were recorded.

Kind regards,



Jonny Stone

Senior Ecologist

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1. METHODOLOGY

Two sections of the River Little Ouse were surveyed using the Environment Agency's Operational Instruction 131_07 ***Surveying Freshwater Macrophytes in Rivers*** as the methodology for the survey. This technique was agreed as an appropriate instrument for establishing the baseline character of sections of the river due to undergo channel restoration works during October 2013. It is a nationally accepted methodology for reporting the presence and abundance of channel macrophytes, and will provide a standardised framework for repeating the survey in the future.

Two 100 metre sections of channel were located in either half of the stretch of river between Thelnetham Ford and the metal footbridge at the east end of Hinderclay Fen, which we estimate as being a distance of c. 2000 metres overall. Each section was located near a suitable access point where vegetation occupying the channel was largely unshaded by bankside trees or woodland.

Following the Operational Instruction, the following baseline data was recorded:

1. Location of the survey sections. One end of each section was tied to a permanent feature for ease of relocation.
2. Potential hazards and fieldwork issues were noted, for future risk assessments.
3. All channel macrophytes were recorded with an estimate of their abundance. If required, voucher specimens would be taken to confirm identification.
4. Standard physical variables of channel character were recorded as specified by the Operational Instruction.
5. A photographic record of the survey sections was produced.

2. RESULTS

2.1 Survey conditions

The survey was carried out on 24th September 2013 in mild, dry conditions following several rainless days. At this time of the year, the river levels are typically low, and flow was negligible.

In advance of the survey, monitoring locations were selected with easy access from Mill Road and Fen Road. As required by the EA's methodology, the survey was double-staffed. In keeping with OHES' safety protocols for working in and near water, staff remained in close contact throughout the survey, and wore or carried appropriate personal and safety equipment. An on-site risk assessment did not reveal any unanticipated hazards, and both bankside and channel were found to be stable. Work within-channel was conducted in a dry suit, carrying a staff for stability. Work from the bank was conducted wearing a life-jacket and carrying a throw-line.

2.2 Establishing survey sections

Two survey sections were established along parts of the River Little Ouse suggested by LOHP as meeting the criteria of being both within the planned area of in-channel restoration works and also being lightly shaded by surrounding vegetation. It is therefore anticipated that both sections will demonstrate the response of channel vegetation to the restoration works.

As shown in Figures 1 and 2, relocatable survey sections have been established beside Parker's Piece close to the road bridge and between Blo'Norton Fen and Webb's Fen. The exact locations of both sections are described in sections 2.3 and 2.4.

Figure 1. Survey section location: Parker's Piece

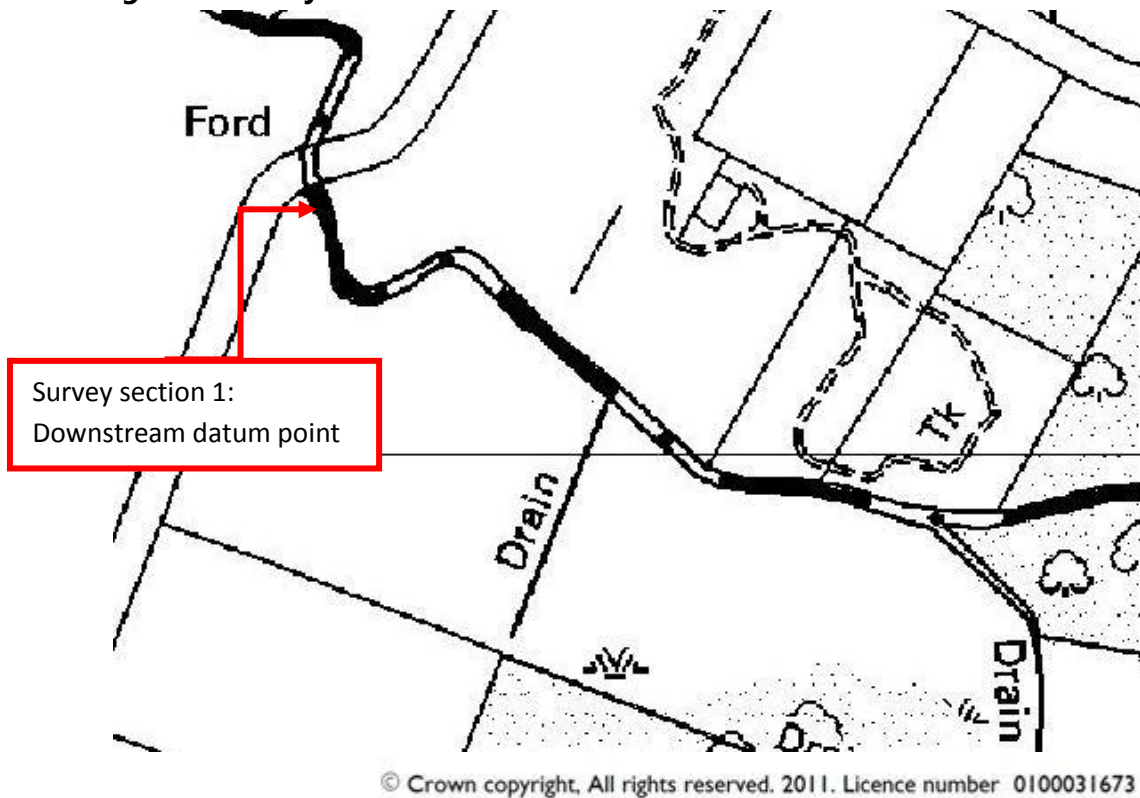
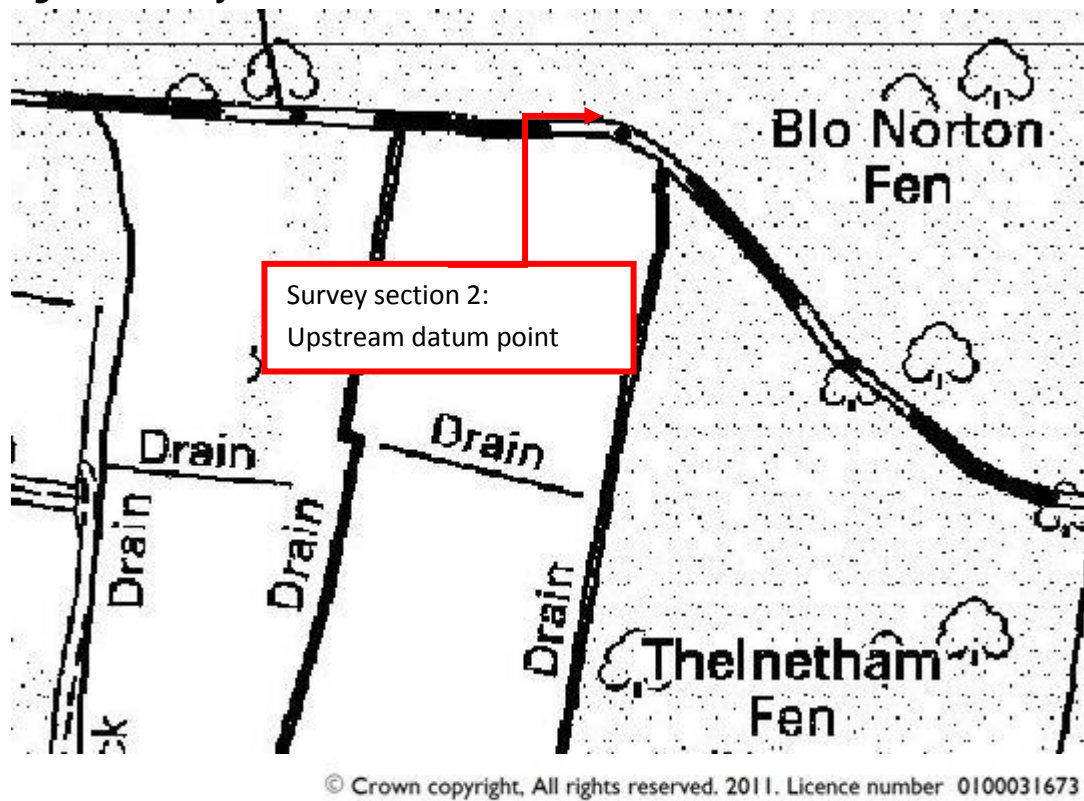


Figure 2. Survey section location: Webb's Fen



2.3 Parker's Piece survey section

2.3.1 Location of survey section

Downstream (fixed) datum point

For relocation, the downstream end of the survey section is established on the top of the river bank, 10 metres east of the bridge railing (Photo 1), measured from the third painted post from the south. As shown in Photo 2, the section boundary is opposite the permanent sculpture installation.

GPS National Grid Reference (NGR)	TM 01204 79113
GIS [UK Grid Reference Finder.com] NGR	(6)01209 (2)79104

Photo 1



Photo 2



Picture files provided separately

Upstream datum point

The upstream end of the 100 metre survey section was measured along the top of the southern bank.

The upstream end should be relocated by measuring along the top of the bank from the downstream datum point. As established, the datum point is on the river bend (Photo 4) approximately opposite to the point where the fenceline on the opposite bank meets the river (Photo 3). As indicated in Photo 3, the section was temporarily marked by a pole located c.3 metres south of the hawthorn bush and c.9 metres northwest of the first oak along the bank in an upstream direction.

GPS NGR	TM 01269 79080
GIS [UK Grid Reference Finder.com] NGR	(6)01272 (2)79078

Photo 3



Photo 4



Picture files provided separately

Associated bankside vegetation

Vegetation on both banks falls broadly into the *Epilobium-Urtica-Galium-Phragmites* fen defined by Haslam (1965)¹; this corresponds to the S26 *Phragmites australis-Urtica dioica* fen in the National Vegetation Classification (NVC). On the southern bank, the western part of the survey section has a grassy structure and is perhaps closest to the *Arrhenatherum elatius* sub-community (S26b). Further upstream, nettle and reed tend to dominate as the species-poor *Filipendula ulmaria* sub-community (S26a). On the northern bank, reed is much less prevalent, and nettle is often accompanied by Great Willowherb in the *Urtica dioica-Cirsium arvense* sub-community of the *Epilobium hirsutum* community (OV26e), which Haslam (1965) regarded as a drier form of her *Epilobium-Urtica-Galium-Phragmites* fen.

Other observations

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2.3.2 Macrophyte survey results

Field results for this section are given in Table 1. The table presents the results of an assessment of each 10 metre sub-section of the 100 metre section, which are ordered from the downstream end (sub-section 10) to the upstream end (sub-section 1). For each section, channel dimensions, amount of shading, and the presence and cover of macrophytes are given. At each section, an oblique photograph was taken to show the general appearance of channel vegetation (Photos 5-14).

¹ Haslam S.M. (1965) Ecological studies in Breck fens. I. Vegetation in relation to habitat. *Journal of Ecology*, **53**, 599-619.

The channel floor is composed of a variable thickness of soft silty clay, typically over a firm sandy clay at depth. Movement within the channel churned the clay into suspension. The undisturbed water column was brown-grey in colour at the time of survey, with poor clarity.

The channel dimensions were found to be quite variable, ranging from 4.7-9.3 m in width; this is a consequence of the presence of a submerged berm at the foot of the bunded banks within the section. It is not clear whether the berm is an engineered shelf, or the remnants of an undredged channel floor. Notwithstanding, channel depths were recorded between 0.48-1.40 m, with the deeper part of the channel varying from 0.85-1.40 m.

As shown in Photos 10-14 and 5-9, the section supports two main vegetation stands. The upstream part is dominated by a tall stand of Common Reed *Phragmites australis* that can be referred to the eponymous sub-community of S4 *Phragmites australis* reed-swamp (S24a) in the NVC. In this part of the section, unshaded water was absent and no other species was recorded as emergent or aquatic by the survey, though Common Duckweed *Lemna minor* fronds are likely to be washed through the vegetation during periods of appreciable flow. There is little shading from bankside shrubs, but by this stage of the growing season the tall eutrophic fen vegetation on both banks adds to the shading effect of the reed swamp.

Downstream of the river bend in the centre of the section, reedswamp is replaced by patchy stands of the emergent Branched Bur-reed *Sparganium erectum*. This is the mono-dominant S14a *Sparganium erectum* swamp community in the NVC. Although forming a more-or-less continuous ribbon along this part of the section, this swamp is prevented from choking the entire channel by a sinuous flowpath of moving water. The rhizome structure of the bur-reed is known to be quite fragile in flowing water (e.g. CEH 2004²), and the growth of the stand may be controlled by pruning of extension growth during periods of significant flows.

Within the Bur-reed stands, and particularly extending from shallow silts into the unshaded river flowpath, small patches of submerged Fool's Water-cress *Apium nodiflorum* form the main features of a thin scatter of marginal species, including also occasional Lesser Water-parsnip *Berula erecta* and Water Forget-me-not *Myosotis scorpioides*.

² http://www.ceh.ac.uk/sci_programmes/documents/branchedbur_reed.pdf Accessed 25th September 2013

Parker's Piece survey section – Channel species recorded

<i>Apium nodiflorum</i>	Fool's Water-cress
<i>Berula erecta</i>	Lesser Water-parsnip
<i>Carex acutiformis</i>	Lesser Pond-sedge
<i>Callitriche stagnalis</i> agg.	Water-starwort
<i>Glyceria maxima</i>	Reed Sweet-grass
<i>Lemna minor</i>	Common Duckweed
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Phragmites australis</i>	Common Reed
<i>Sparganium erectum</i>	Branched Bur-reed

No macroalgae, bryophytes or aquatic lichens were evident.

Species notes:

Apium/Berula. These two species were typically found as conjoined mats, typically with Fool's Water-cress appearing to be the most frequent species.

Water-starwort. This aggregate group cannot be separated reliably without fruits; the leaf-shape of a specimen taken from the single aquatic mat found in the survey area corresponds to Various-leaved Water-starwort *Callitriche platycarpa*.

Table 1. Standard sketch map for Section 1. Parker's Piece

Section 1 - Parker's Piece		Direction of flow ↑			
From downstream					
Sub-section	10				<i>Sparganium</i> 70%
Distance (m)	90-100				<i>Lemna</i> 1%
Shading (%)	0				
Channel width (m)	5.3				
Depths (m)		0.54	0.85	0.73	
Channel position		Left	Centre	Right	
Sub-section	9				<i>Sparganium</i> 70%
Distance (m)	80-90				<i>Apium/Berula</i> 1%
Shading (%)	0				<i>Carex acutiformis</i> 0%
Channel width (m)	5.1				
Depths (m)		0.55	0.89	0.93	
Channel position		Left	Centre	Right	
Sub-section	8				<i>Sparganium</i> 80%
Distance (m)	70-80				<i>Lemna</i> 1%
Shading (%)	0				<i>Apium/Berula</i> 1%
Channel width (m)	4.7				
Depths (m)		0.48	0.77	0.92	
Channel position		Left	Centre	Right	
Sub-section	7				<i>Sparganium</i> 40%
Distance (m)	60-70				<i>Apium/Berula</i> 1%
Shading (%)	0				<i>Glyceria</i> 1%
Channel width (m)	6.1				<i>Callitriche</i> 1%
Depths (m)		0.76	1.07	1.06	
Channel position		Left	Centre	Right	
Sub-section	6				<i>Phragmites</i> 30%
Distance (m)	50-60				<i>Sparganium</i> 40%
Shading (%)	40				
Channel width (m)	6.7				
Depths (m)		0.81	1.08	0.86	
Channel position		Left	Centre	Right	

Section 1 - Parker's Piece

Direction
of flow ↑

From downstream

Sub-section	5				<i>Phragmites 70%</i>
Distance (m)	40-50				
Shading (%)	40				
Channel width (m)	7.1				
Depths (m)		1.15	0.93	0.73	
Channel position		Left	Centre	Right	
Sub-section	4				<i>Phragmites 90%</i>
Distance (m)	30-40				
Shading (%)	15				
Channel width (m)	7.3				
Depths (m)		1.4	1.38	0.67	
Channel position		Left	Centre	Right	
Sub-section	3				<i>Phragmites 100%</i>
Distance (m)	20-30				
Shading (%)	0				
Channel width (m)	9.3				
Depths (m)		1.40	0.68	0.77	
Channel position		Left	Centre	Right	
Sub-section	2				<i>Phragmites 100%</i>
Distance (m)	10-20				
Shading (%)	0				
Channel width (m)	9.2				
Depths (m)		1.17	1.06	0.69	
Channel position		Left	Centre	Right	
Sub-section	1				<i>Phragmites 100%</i>
Distance (m)	0-10				
Shading (%)	0				
Channel width (m)	9.1				
Depths (m)		0.72	1.14	0.75	
Channel position		Left	Centre	Right	

Un-reduced images are provided in electronic form

Photo 5 – Sub-section 10



Photo 6 – Sub-section 9



Photo 7 – Sub-section 8



Photo 8 – Sub-section 7



Photo 9 – Sub-section 6



Photo 10 – Sub-section 5



Un-reduced images are provided in electronic form

Photo 11 – Sub-section 4



Photo 12 – Sub-section 3



Photo 13 – Sub-section 2



Photo 14 – Sub-section 1



2.4 Webb's Fen survey section

2.4.2 Location of survey section

Upstream (fixed) datum point

Written description: For relocation, the upstream end of the survey section is established on the top of the river bank in a direct line extending from the eastern edge of the boardwalk entering Blo'Norton Fen (Photo 5).

GPS National Grid Reference (NGR) TM 01839 78968

GIS [UK Grid Reference Finder.com] NGR (6)01835 (2)78971

Photo 15



Picture files provided separately

Downstream datum point

The downstream end of the 100 metre survey section was measured along the top of the northern bank.

Written description: The downstream end of the survey section should be relocated by measuring along the top of the bank from the upstream datum point, following the sinuous curve of the riverside path along its southern edge. As established, the downstream datum point is c.13 metres east of the multi-stemmed alder on the bank.

GPS NGR

TM 01741 78983

GIS [UK Grid Reference Finder.com] NGR (6)01744 (2)78979

Associated bankside vegetation

Vegetation on both banks falls broadly into the *Epilobium-Urtica-Galium-Phragmites* fen defined by Haslam (1965); this corresponds to the S26 *Phragmites australis-Urtica dioica* fen in the National Vegetation Classification. Although occasional fen species, including *Lythrum salicaria*, and species of water margins such as *Myosotis scorpioides* and *Apium nodiflorum*, are present, the bankside vegetation is typically dominated by bulky and heavily shading stands of reed and nettle, and can be accommodated within the species-poor *Filipendula ulmaria* sub-community (S26a).

Other observations

Evidence for water vole in the form of small lawns, occasional short, cut stems, and more extensive latrines were observed on the northern bank at c.TM 01812 78981.

2.4.2 Macrophyte survey results

Field results for this section are given in Table 2. The table presents the results of an assessment of each 10 metre sub-section of the 100 metre section, which are ordered from the downstream end (sub-section 10) to the upstream end (sub-section 1). For each section, channel dimensions, amount of shading, and the presence and cover of macrophytes are given. At each section, an oblique photograph was taken to show the general appearance of channel vegetation (Photos 16-25).

The channel floor is composed of a variable thickness of stable, soft silty sand. Movement within the channel churned the substrate into suspension locally; the undisturbed water column was brown-grey in colour at the time of survey, with fair water clarity.

The channel dimensions were found to vary between 3.85-6.15 m in width, widening towards the downstream end. Variation in the widths of the sub-sections were due either to localised protuberances of the base of the bank, or to short, regraded sections of the south bank, which had been reprofiled by 'pulling back' the toeslope of the bank.

Channel depths were recorded near the banks and in the centre of the channel and varied from 0.65-1.40 m; in seven of the ten sub-sections, the deeper line lay near the centre of the channel, varying from 0.72-1.40 mm

As shown in Photos 16-25, the section supports two main vegetation stands, but in several sub-sections, the two dominants (Branched Bur-reed and Common Reed) intergrade. Where one of these emergent species is dominant, stands may be referred to either the S4a *Phragmites* reedswamp or the S14a *Sparganium* swamp, as noted in section 2.3.2. No other species is more than occasional, and the flora is restricted to the floating Lemnid Common Duckweed and a scatter of fen or marginal species.

Webb's Fen survey section - Channel species recorded

<i>Apium nodiflorum</i>	Fool's-water-cress
<i>Berula erecta</i>	Lesser Water-parsnip
<i>Callitriche stagnalis</i> agg.	Water-starwort
<i>Carex acutiformis</i>	Lesser Pond-sedge
<i>Convolvulus arvensis</i>	Field Bindweed
<i>Glyceria maxima</i>	Reed Sweet-grass
<i>Lemna minor</i>	Common Duckweed
<i>Lythrum salicaria</i>	Purple Loosestrife
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Phragmites australis</i>	Common Reed
<i>Potamogeton natans</i>	Broad-leaved Pondweed
<i>Solanum dulcamara</i>	Bittersweet
<i>Sparganium erectum</i>	Branched Bur-reed

No macroalgae, bryophytes or aquatic lichens were evident.

Species notes:

Water-starwort. This aggregate group cannot be separated reliably without fruits; the leaf-shape of a specimen taken from the survey area corresponds to Various-leaved Water-starwort *Callitriche platycarpa*.

Table 2. Standard sketch map for Section 2. Webb's Fen

Section 2. – Webb's Fen		Direction of flow ↑			
From downstream					
Sub-section	10				<i>Sparganium</i> 50%
Distance (m)	90-100				<i>Phragmites</i> 40%
Shading (%)	0				<i>Lemna</i> 2%
Channel width (m)	6.15				<i>Apium nodiflorum</i> 1%
Depths (m)		0.75	0.84	0.79	
Channel position		Left	Centre	Right	
Sub-section	9				<i>Sparganium</i> 80%
Distance (m)	80-90				<i>Lemna</i> 2%
Shading (%)	0				<i>Phragmites</i> 1%
Channel width (m)	5.90				<i>Solanum</i> 1%
Depths (m)		0.72	0.71	0.66	
Channel position		Left	Centre	Right	
Sub-section	8				<i>Sparganium</i> 80%
Distance (m)	70-80				<i>Lemna</i> 5%
Shading (%)	0				<i>Phragmites</i> 1%
Channel width (m)	5.70				
Depths (m)		0.80	1.10	0.65	
Channel position		Left	Centre	Right	
Sub-section	7				<i>Phragmites</i> 60%
Distance (m)	60-70				<i>Sparganium</i> 30%
Shading (%)	0				<i>Lemna</i> 5%
Channel width (m)	5.10				<i>Apium nodiflorum</i> 1%
Depths (m)		0.80	1.15	0.86	
Channel position		Left	Centre	Right	
Sub-section	6				<i>Phragmites</i> 80%
Distance (m)	50-60				<i>Sparganium</i> 10%
Shading (%)	0				<i>Lemna</i> 5%
Channel width (m)	5.10				<i>Convolvulus</i> 1%
Depths (m)		1.24	1.40	1.09	<i>Apium nodiflorum</i> 1%
Channel position		Left	Centre	Right	

Section 2. Webb's Fen

Direction
of flow ↑

Sub-section	5				<i>Phragmites</i> 70%
Distance (m)	40-50				<i>Sparganium</i> 5%
Shading (%)	0				<i>Lemna</i> 1%
Channel width (m)	5.10				<i>Potamogeton natans</i> 0%
Depths (m)		1.10	1.22	0.70	
Channel position		Left	Centre	Right	
Sub-section	4				<i>Phragmites</i> 70%
Distance (m)	30-40				<i>Sparganium</i> 1%
Shading (%)	0				<i>Lemna</i> 1%
Channel width (m)	3.85				
Depths (m)		0.93	0.88	0.96	
Channel position		Left	Centre	Right	
Sub-section	3				<i>Phragmites</i> 80%
Distance (m)	20-30				<i>Lemna</i> 5%
Shading (%)	0				
Channel width (m)	4.05				
Depths (m)		0.85	1.20	0.85	
Channel position		Left	Centre	Right	
Sub-section	2				<i>Phragmites</i> 90%
Distance (m)	10-20				<i>Lemna</i> 5%
Shading (%)	0				<i>Lythrum</i> 1%
Channel width (m)	5.5				<i>Sparganium</i> 1%
Depths (m)		0.73	0.90	1.18	<i>Myosotis</i> 1%
Channel position		Left	Centre	Right	
Sub-section	1				<i>Sparganium</i> 90%
Distance (m)	0-10				<i>Phragmites</i> 20%
Shading (%)	0				<i>Lemna</i> 2%
Channel width (m)	4.75				<i>Berula</i> 1%
Depths (m)		0.90	1.10	0.66	<i>Myosotis</i> 1%
Channel position		Left	Centre	Right	

Un-reduced images are provided in electronic form

Photo 16 – Sub-section 10



Photo 17 – Sub-section 9



Photo 18 – Sub-section 8



Photo 19 – Sub-section 7



Photo 20 – Sub-section 6



Photo 21 – Sub-section 5



Un-reduced images are provided in electronic form

Photo 22 – Sub-section 4



Photo 23 – Sub-section 3



Photo 24 – Sub-section 2



Photo 25 – Sub-section 1

