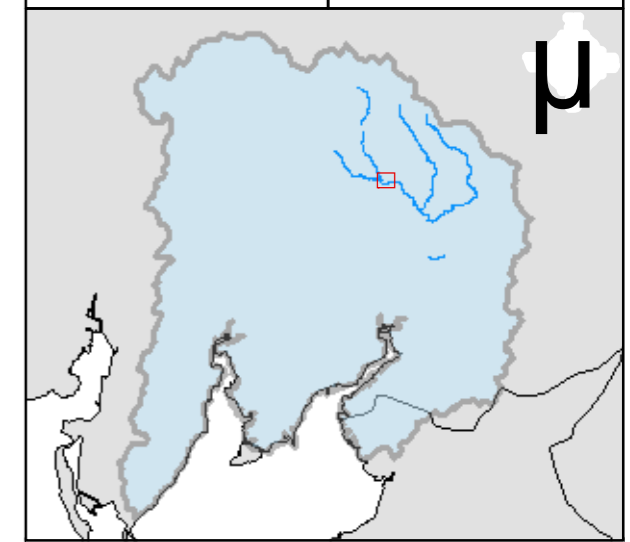


REACH ID: **KEN008(1)** SSSI UNIT: **112**

START: **347250, 498060** END: **349250, 497450**



**Key**

- Proposed New Channel Alignment
- Zone of channel adjustment (where expected)
- Suggested Position of Road
- Flow Direction
- Reach division marker
- Bank erosion

**Structure Type**

- Bank reinforcement
- Footbridge
- Bed reinforcement incl Ford
- Major Weir (ponding)
- Bridge
- Minor Weir (not ponding)
- Culvert
- Waterfall
- Embankment
- Other

0 85 170 340 Metres

Rev.	Purpose	Date	Orig	Chk'd	Rev'd	App'd
0	1st ISSUE	16/01/10	LB	DW	SM	SM

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Project Title  
**SSSI RESTORATION (RIVER KENT)**

Drawing Title  
**KENT REACH RESTORATION PLAN**

Drawing Status  
**1st ISSUE**

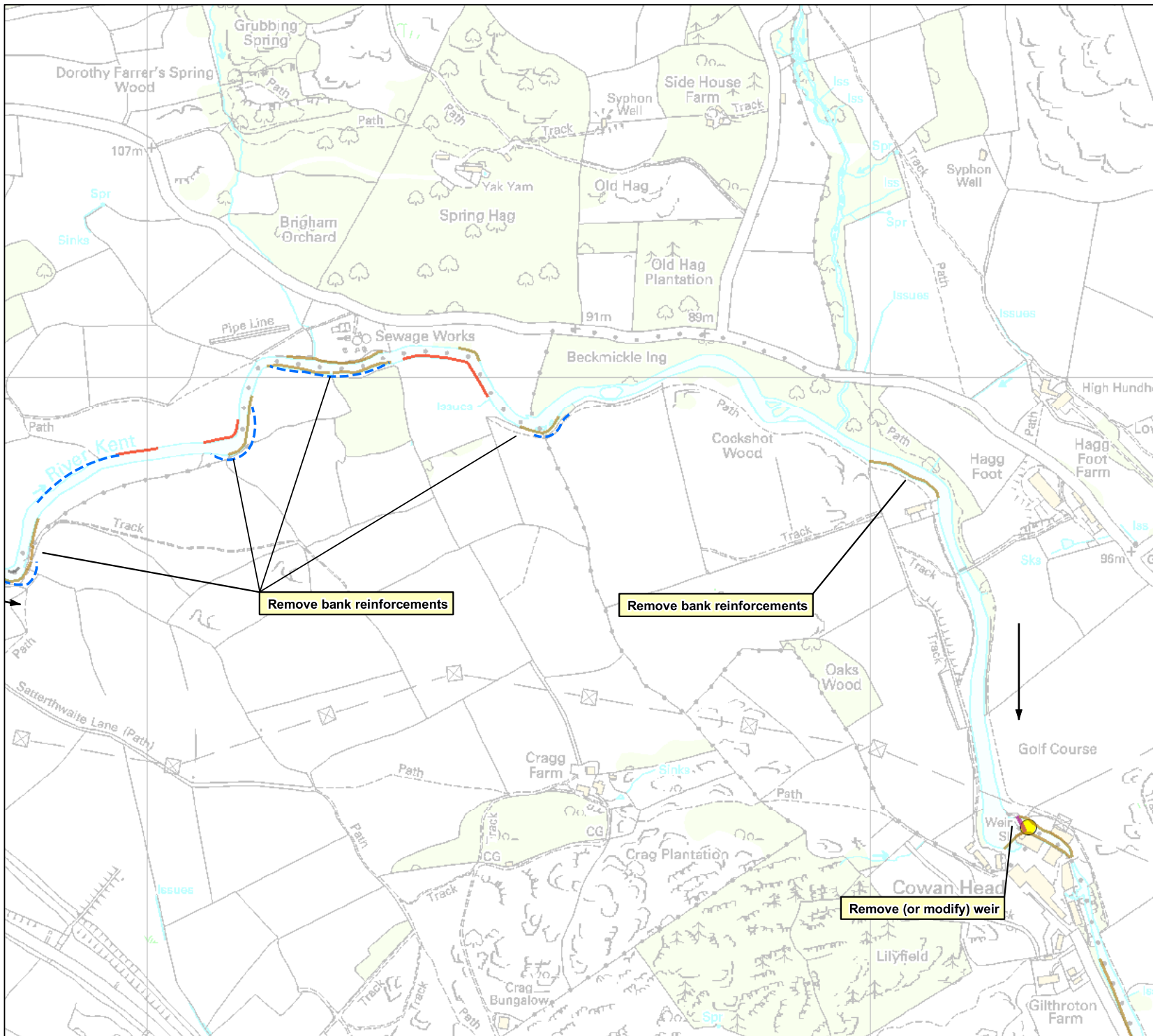
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Jacobs No. | B1284600

Client No. | -

Drawing  
**B1284600/KEN008(1)**

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REACH ID:	<b>KEN008(2)</b>	SSSI UNIT:	<b>112</b>
START:	<b>347250, 498060</b>	END:	<b>349250, 497450</b>

**Key**

- Proposed New Channel Alignment
- Zone of channel adjustment (where expected)
- Suggested Position of Road
- Flow Direction
- Reach division marker
- Bank erosion

**Structure Type**

- Bank reinforcement
- Footbridge
- Bed reinforcement incl Ford
- Major Weir (ponding)
- Bridge
- Minor Weir (not ponding)
- Culvert
- Waterfall
- Embankment
- Other

0 85 170 340 Metres

Rev.	Purpose	Date	Orig	Chk'd	Rev'd	App'd
0	1st ISSUE	16/01/10	LB	DW	SM	SM

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Project Title  
**SSSI RESTORATION (RIVER KENT)**

Drawing Title  
**KENT REACH RESTORATION PLAN**

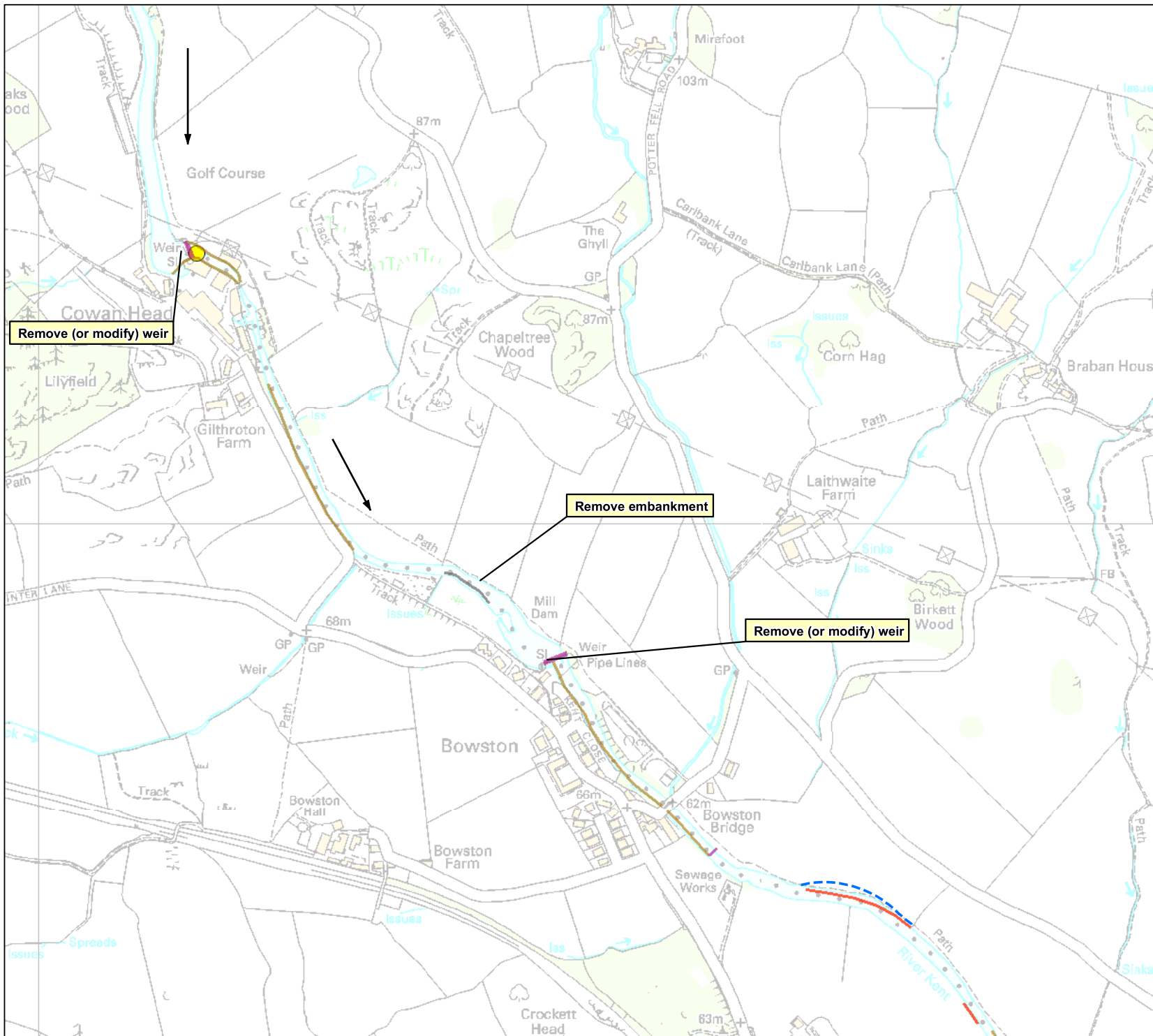
Drawing Status  
**1st ISSUE**

Scale	1:5,000 @ A3	DO NOT SCALE
Jacobs No.	B1284600	
Client No.	-	

Drawing  
**B1284600/KEN008(2)**

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<b>Catchment</b>	Kent	<b>River</b>	River Kent
<b>Reach</b>	KEN008	<b>SSSI Unit</b>	112
<b>Upstream NGR</b>	347250 498060	<b>Downstream NGR</b>	349250 497450
<b>Reach length</b>	3.1 km	<b>Restoration Category</b>	<b>Major Restoration</b>
<b>Geomorphology</b>			
<b>Current State (Pre-restoration)</b>		<b>Benefit (Post-restoration)</b>	
<ul style="list-style-type: none"> <li>• Cobble, gravel river with natural planform</li> <li>• Banks are reinforced and embanked in places (18% and 5% of total bank length respectively)</li> <li>• Some bedrock unmodified sections</li> <li>• Major weir at Cowan Head interrupting sediment transfer and ponded flow</li> <li>• Semi-continuous riparian zone</li> </ul>		<ul style="list-style-type: none"> <li>• Removal or modification of weir will improve natural functioning</li> <li>• Fewer bank reinforcements will promote more lateral adjustment and sediment sourcing and deposition of gravels</li> </ul>	
<b>Ecology</b>			
<b>Current State (Pre-restoration)</b>		<b>Benefit (Post-restoration)</b>	
<ul style="list-style-type: none"> <li>• Major weir at downstream end of reach with fish pass</li> <li>• Very isolated salmon spawning (1%) and fry habitats (1%)</li> <li>• Widespread bullhead (66%) habitat</li> <li>• High flows obscuring bed with patches of coarse gravel, cobble and bedrock observed</li> </ul>		<ul style="list-style-type: none"> <li>• Removal of bank protection will lead to an increase in naturalised bank profiles and improve marginal habitats</li> <li>• Despite limited channel adjustment removal of bank reinforcement may create deeper areas on existing meander bends increasing potential fry habitat (5-10%)</li> <li>• Removal/modification of weir will improve fish migration into the upper catchment</li> </ul>	
<b>Constraints and Key Issues</b>			
<ul style="list-style-type: none"> <li>• Weir removal will lead to major channel adjustment, the impacts of which will need to be considered carefully</li> <li>• Some bank reinforcement will have to remain to safeguard properties, infrastructure and the sewage works</li> </ul>			
<b>Assumptions and Limitations</b>			
<p><b>Riparian Zone Management</b>  Unless otherwise indicated, the riparian zone should be fenced off along both banks of the river to enable the riparian zone to recover through natural vegetation colonisation. The fence should be placed a minimum of 5 metres from the bank top along straight sections of channel and on the inside of bends. Around the outside bank of bends in the river the fence should be sited a minimum of 10 metres from the bank top.</p> <p><b>Channel adjustment</b>  Zone of channel adjustment is based on professional judgement and field interpretation only with no site specific detailed assessment.</p>			



REACH ID: <b>KEN009(1)</b>	SSSI UNIT: <b>112</b>	
START: <b>349250, 497450</b>	END: <b>351689, 494392</b>	

**Key**

- Proposed New Channel Alignment
- - - Zone of channel adjustment (where expected)
- - - Suggested Position of Road
- Flow Direction
- Reach division marker
- Bank erosion

**Structure Type**

- Bank reinforcement
- Footbridge
- Bed reinforcement incl Ford
- Major Weir (ponding)
- Bridge
- Minor Weir (not ponding)
- Culvert
- Waterfall
- Embankment
- Other

Rev.	Purpose	Date	Orig	Chk'd	Rev'd	App'd
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Project Title

**SSSI RESTORATION (RIVER KENT)**

Drawing Title

**KENT REACH RESTORATION PLAN**

Drawing Status

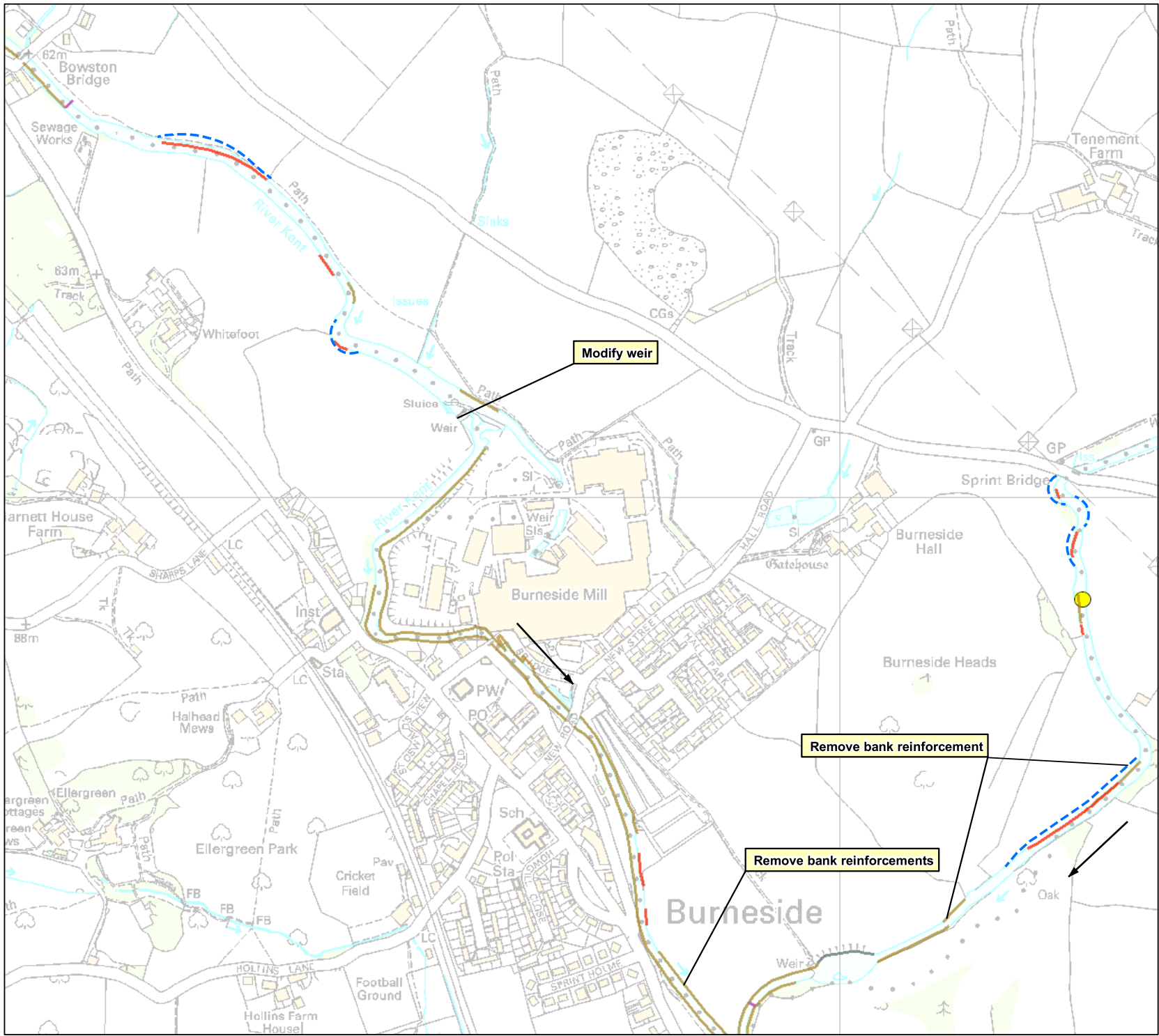
**1st ISSUE**

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Client No.	-	

Drawing

**B1284600/KEN009(1)**

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REACH ID:	<b>KEN009(2)</b>	SSSI UNIT:	<b>112</b>
START:	<b>349250, 497450</b>	END:	<b>351689, 494392</b>

**Key**

- Proposed New Channel Alignment
- Zone of channel adjustment (where expected)
- Suggested Position of Road
- Flow Direction
- Reach division marker
- Bank erosion
- Bank reinforcement
- Footbridge
- Bed reinforcement incl Ford
- Major Weir (ponding)
- Bridge
- Minor Weir (not ponding)
- Culvert
- Waterfall
- Embankment
- Other

Rev.	Purpose	Date	Orig	Chk'd	Rev'd	App'd
0	1st ISSUE	16/01/10	LB	DW	SM	SM

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Project Title  
**SSSI RESTORATION (RIVER KENT)**

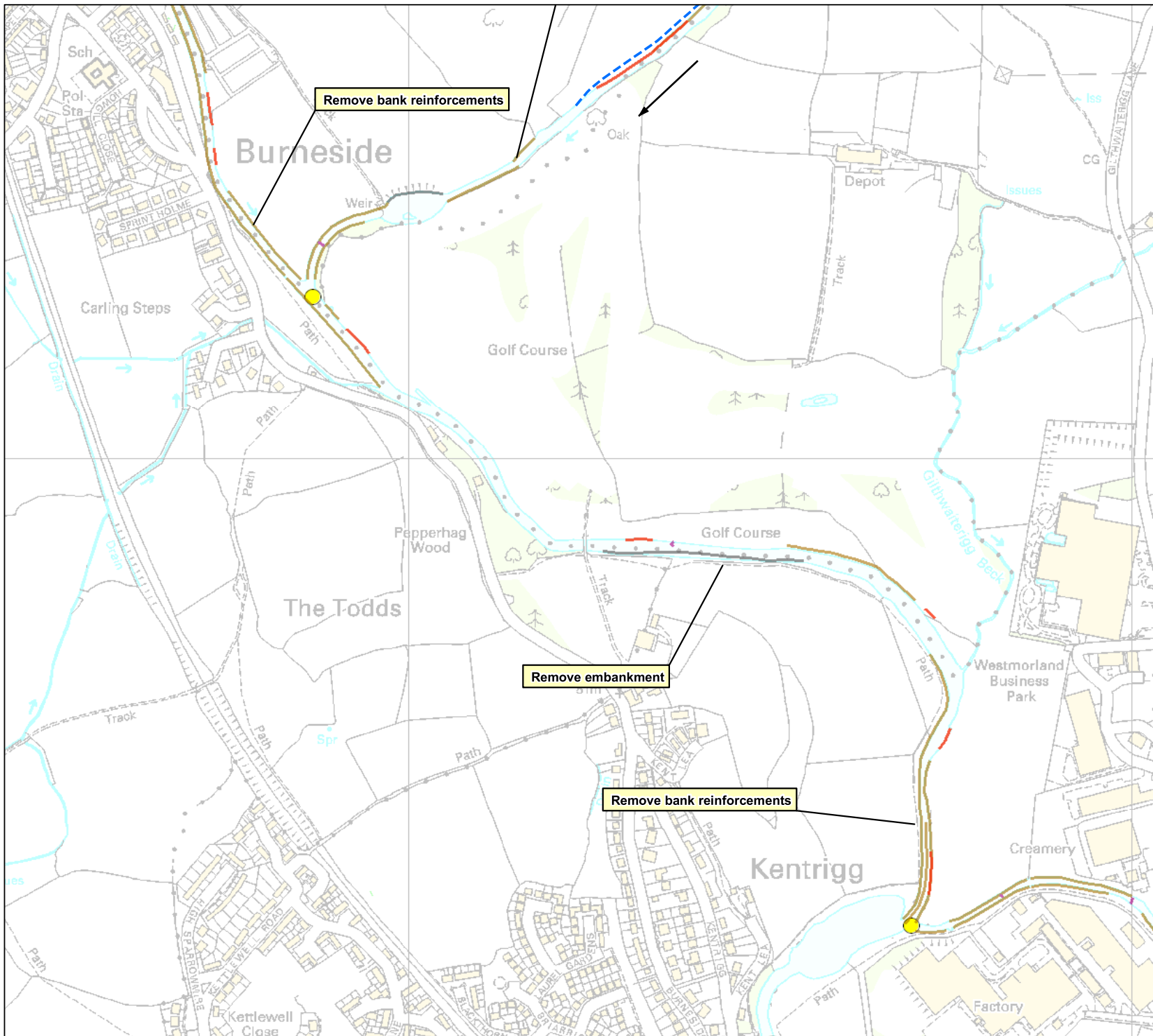
Drawing Title  
**KENT REACH RESTORATION PLAN**

Drawing Status  
**1st ISSUE**

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Jacobs No.	B1284600	
Client No.	-	

Drawing  
**B1284600/KEN009(2)**

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REACH ID:	<b>KEN009(3)</b>	SSSI UNIT:	<b>112</b>
START:	<b>349250, 497450</b>	END:	<b>351689, 494392</b>

**Key**

- Proposed New Channel Alignment
- Zone of channel adjustment (where expected)
- Suggested Position of Road
- Flow Direction
- Reach division marker
- Bank erosion

**Structure Type**

- Bank reinforcement
- Bed reinforcement incl Ford
- Bridge
- Culvert
- Embankment
- Footbridge
- Major Weir (ponding)
- Minor Weir (not ponding)
- Waterfall
- Other

0 85 170 340 Metres

Rev.	Purpose	Date	Orig	Chk'd	Rev'd	App'd
0	1st ISSUE	16/01/10	LB	DW	SM	SM

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Client: Environment Agency, NATURAL ENGLAND

Project Title: **SSSI RESTORATION (RIVER KENT)**

Drawing Title: **KENT REACH RESTORATION PLAN**

Drawing Status: **1st ISSUE**

Scale	1:5,000 @ A3	DO NOT SCALE
Jacobs No.	B1284600	
Client No.	-	

Drawing: **B1284600/KEN009(3)**

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<b>Catchment</b>	Kent	<b>River</b>	River Kent
<b>Reach</b>	KEN009	<b>SSSI Unit</b>	112
<b>Upstream NGR</b>	349250 497450	<b>Downstream NGR</b>	351689 494392
<b>Reach length</b>	4.7 km	<b>Restoration Category</b>	<b>Major Restoration</b>
<b>Geomorphology</b>			
<b>Current State (Pre-restoration)</b>		<b>Benefit (Post-restoration)</b>	
<ul style="list-style-type: none"> <li>The channel has been modified through the use of weirs and mills and in the vicinity of urban development</li> <li>Bank protection totals approximately 40% of total bank length, some reinforcement is failing</li> <li>Weirs at Bowston and Burneside disrupt sediment transfer and pond flow</li> <li>More natural channel downstream of Burneside showing erosion and deposition features</li> </ul>		<ul style="list-style-type: none"> <li>Natural recovery can be assisted where bank reinforcements can be removed</li> <li>Removal or modification of the weirs will aid sediment transfer and improve flow diversity upstream</li> </ul>	
<b>Ecology</b>			
<b>Current State (Pre-restoration)</b>		<b>Benefit (Post-restoration)</b>	
<ul style="list-style-type: none"> <li>High run flows (49%) obscuring bed composition</li> <li>Emergent vegetation observed in marginal stands along watercourse</li> <li>Large numbers of fry seen in slack behind downstream cobble point bar</li> <li>Suitable habitat for salmon parr (20%), bullhead (56%) and crayfish (52%) with very isolated substrates supporting salmon spawning (1%)</li> </ul>		<ul style="list-style-type: none"> <li>Removal of bank protection will lead to an increase in naturalised bank profiles and improve marginal habitats for crayfish (20% increase in suitable habitat)</li> <li>Minimal channel adjustment post restoration will not significantly increase in-channel habitat suitability</li> <li>Assessment of fish pass success may identify improvements that open up the upper catchment under a greater variety of flow conditions</li> </ul>	
<b>Constraints and Key Issues</b>			
<ul style="list-style-type: none"> <li>Modification or removal of major weirs will lead to channel adjustment and the impacts need to be carefully considered.</li> <li>Allowing lateral adjustment may result in land use issues.</li> <li>Infrastructure and properties need to be protected (urban constraints).</li> </ul>			
<b>Assumptions and Limitations</b>			
<p><b>Riparian Zone Management</b>  Unless otherwise indicated, the riparian zone should be fenced off along both banks of the river to enable the riparian zone to recover through natural vegetation colonisation. The fence should be placed a minimum of 5 metres from the bank top along straight sections of channel and on the inside of bends. Around the outside bank of bends in the river the fence should be sited a minimum of 10 metres from the bank top.</p> <p><b>Channel adjustment</b>  Zone of channel adjustment is based on professional judgement and field interpretation only with no site specific detailed assessment.</p>			