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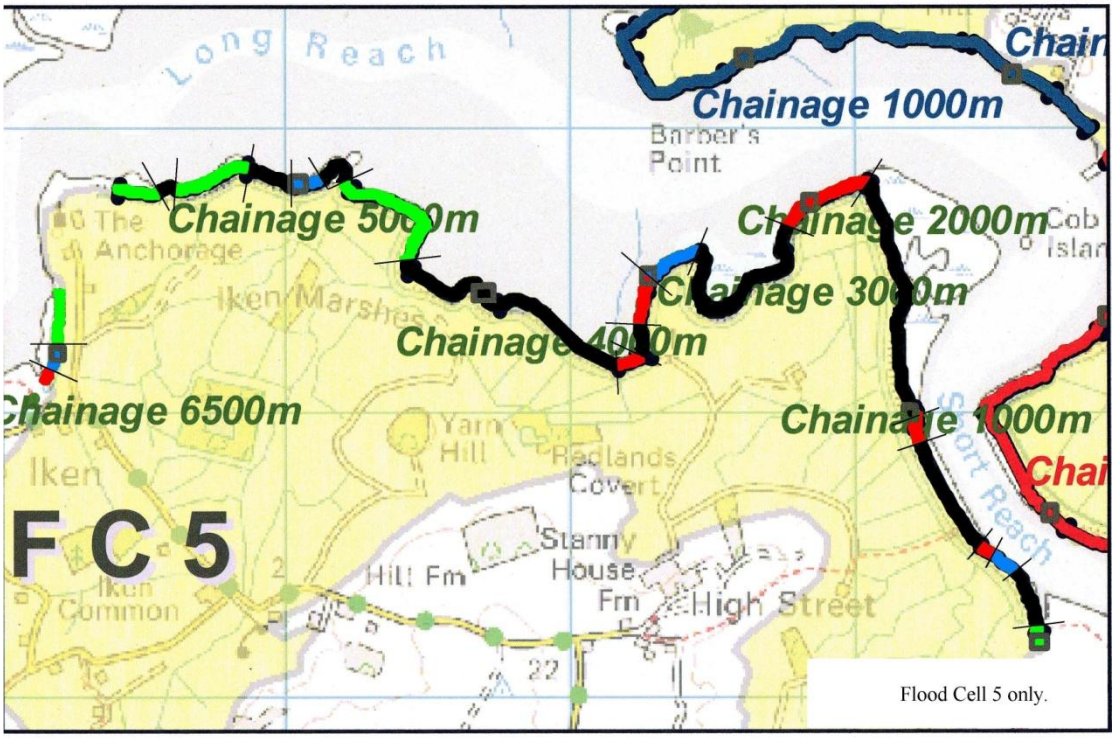
September 25, 2013

AOEP Flood Cell 05 defence upgrade designs.
Survey carried out 16th September 2013.



Introduction.

Measures detailed below and on the enclosed drawings are to provide a design upgrade in the form of providing defence survivability during a 1 : 200 surge event in the year 2050 (as defined by the Environment Agency surge modelling 2011). Where the defence already meets or exceeds this criteria no detail is provided.

With reference to the Environment Agency Flood Cell level and chainage data FC 5 extends from Ch 0 – Ch 6676.

This design report details improvement work required, its position and extent along the flood cell levee or dyke. The detail enclosed is suitable to provide to nominated contractors for costing.

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<u>Increasing height of levees, for all sections less than < 3.13m O.D..</u>

Relevant chainages: 58 – 212, 441 – 883, 991 – 1790, 2127 – 2820, 3173 – 3295, 3360 – 4351, 4777 – 4901, 5016 – 5203, 5456 – 5552.

Raising of crest level to 1 : 200 surge level in 2050, less 300mm, the survivable overtopping depth. **(3.31m O.D.)**

Method: See design sections "Flood Cell 05, design upgrade using bulk filling techniques" 23/09/13, 3 No. A4 drawings detailing works at the chainages above.

Phase 1.
Scrape 100m topsoil from footprint of proposed clay fill and clay borrow. Stockpile adjacent to works.

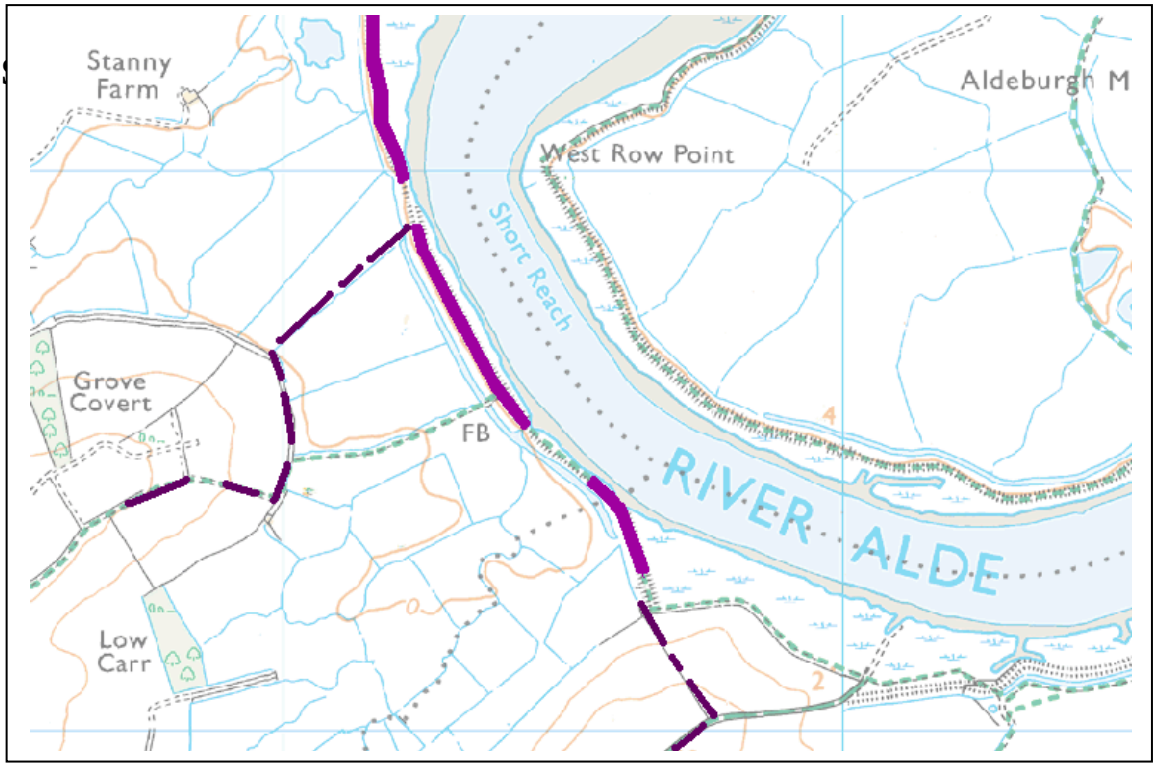
Phase 2.
Dig shallow clay and compact into landward toe of new earthworks, deep clay may need to be stockpiled to dry. All fill to be layered in with loaded plant and trimmed with blade and sheep's foot. Where the backfill width is 3m or greater all plant to run along fill layers parallel to line of bank. Where the backfill width is less than this a self propelled sheeps foot roller should be used. It is recommended for safety reasons that when the crest is being compacted a remote control sheep foot roller is used.

Phase 3.
Complete filling to required crest level and final shaping.

Phase 4.
Place layer of smoothed topsoil to depth of 100mm, hydro seed crest and landward slope.

Chainages	**Length**
58 - 212	154
441 - 883	442
991 - 1790	799
2127 – 2820	693
3173 – 3295	122
3360 – 4351	991
4777 – 4901	124
5016 – 5203	187
5456 – 5552	96

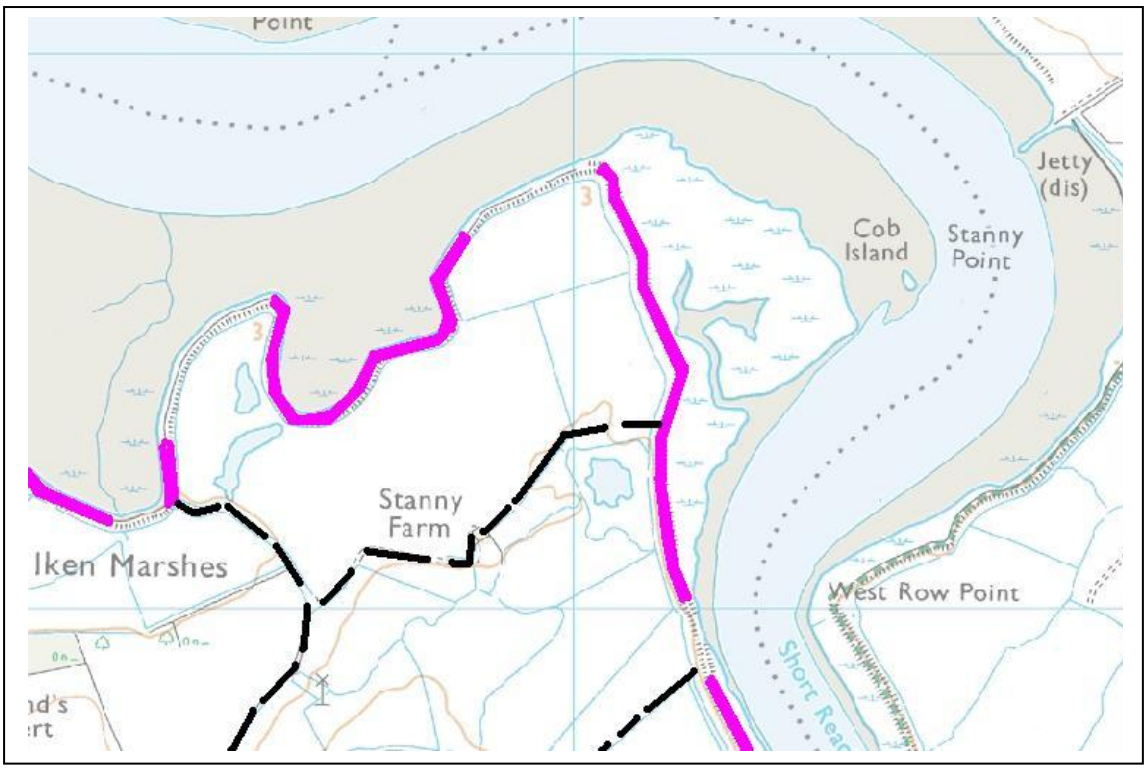
Total = 3,608m



The purple lines denotes the extent of the works. The dashed black lines are possible access routes.

View south from Ch. 212

View north from Ch. 800



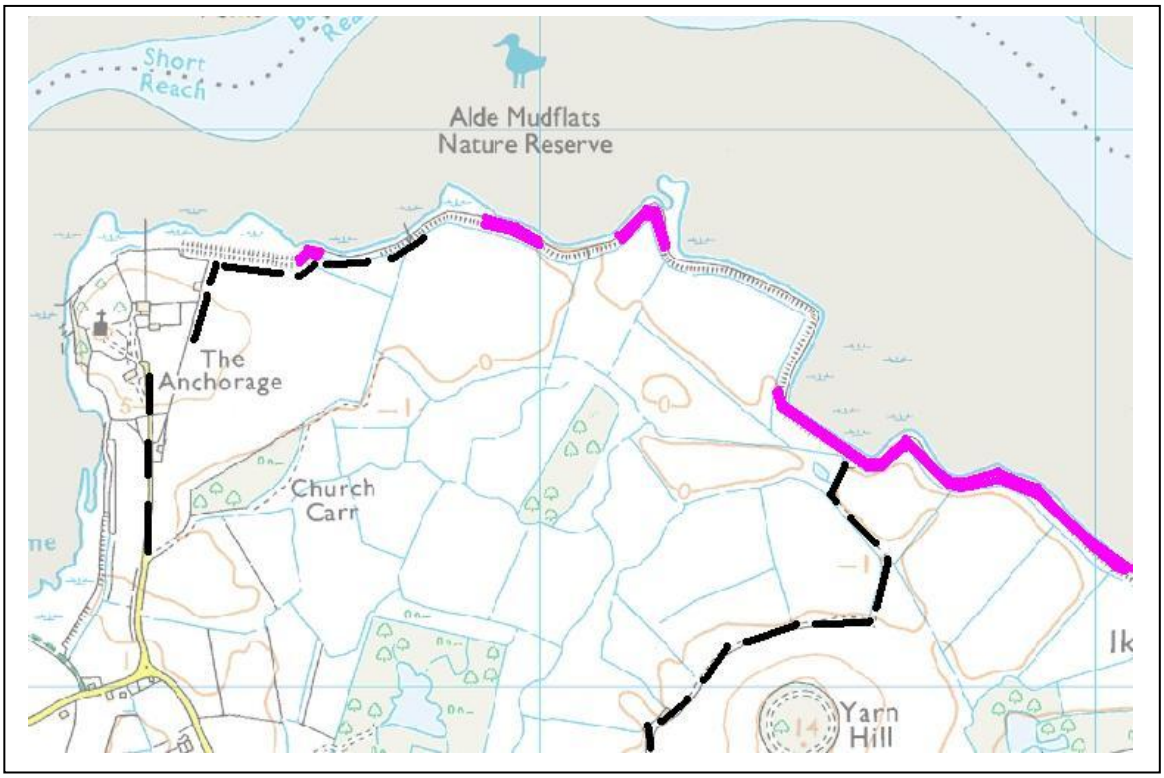
The purple lines denotes the extent of the works. The dashed black lines are possible access routes.

View north west from Ch. 1400.

View south west from Ch. 1400.

View looking west from Ch. 2400.

View looking north from Ch. 2500 showing heavily vegetated embankment, with reeds and trees, fabric of defence badly cracked as a result.



The purple lines denotes the extent of the works. The dashed black lines are possible access routes.

Derelict sluice Ch. 4050

View north east from Ch. 4150.

Access ramp adjacent to decoy, looking north west from Ch. 4150.

View looking north west from Ch.4800, showing point at which bank heightening has previously stopped. This is also easily identified by the heavily reeded clay borrow areas behind the high wall sections.

View north showing clay borrow pond restricting working area behind low wall at Ch. 4900.

<u>Turf reinforcement and bank strengthening, for all sections higher than 3.13m O.D. and lower than 3.31m O.D..</u>

Relevant chainages: 883 – 991, 1790 – 2127, 2820 – 3173, 3295 – 3360, 4901 – 5016, 6470 – 6676.

Crest level at or above 1 : 200 surge level in 2050, less 500mm, the survivable overtopping depth when turf armoured and bank anchored.

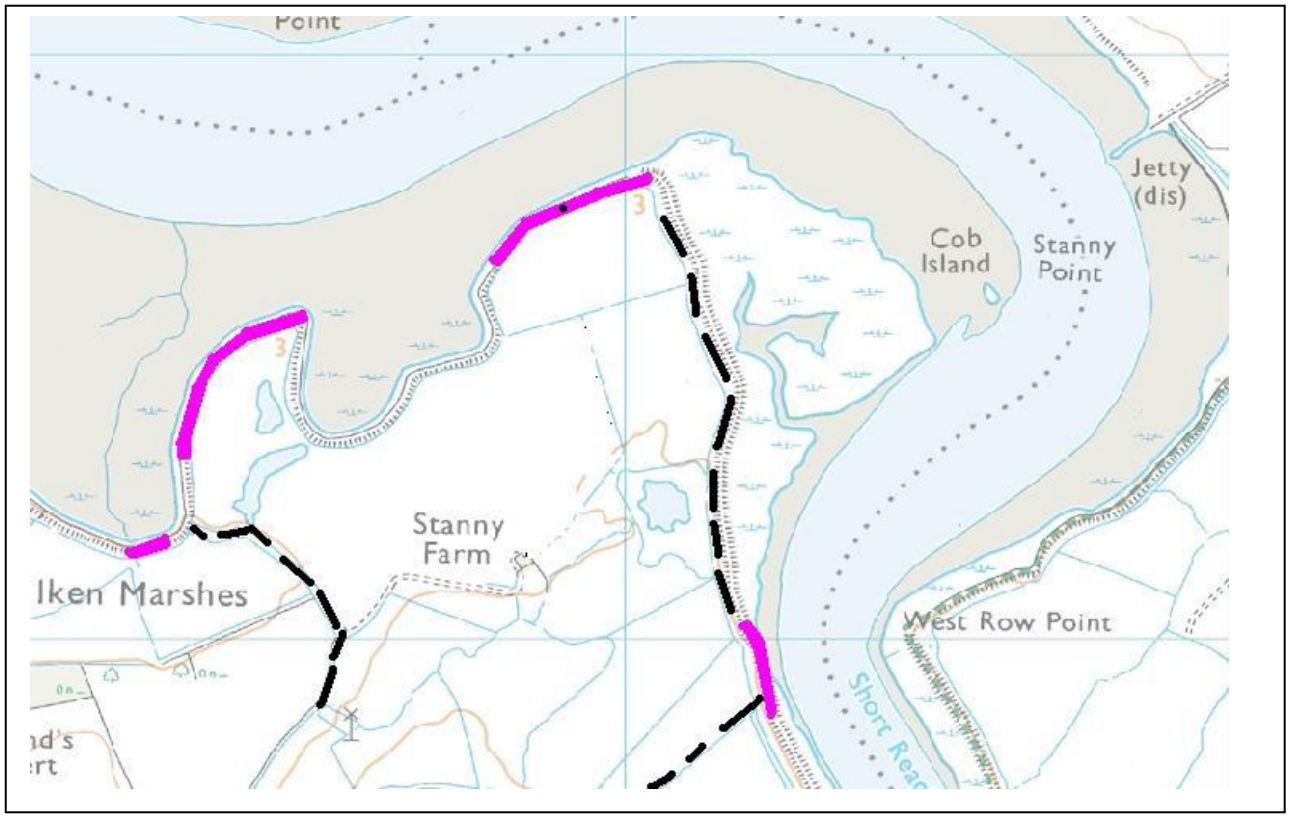
Method: See enclosed design sections **"Flood Cell 05, design upgrade using turf reinforcement mesh and earth anchors."** 21/9/13. A4 drawings detailing works at the chainages above.

Phase one.
Cut grass very short on landward bank, crest and 0.5m of seaward bank, collect all cuttings and pile adjacent to borrow ditch.

Phase two.
Lay double twist galvanised UPVC coated mesh (see Specification) from top of seaward bank across crest and down landward bank into anchor trench. Join all edges with Spenax stainless steel rings at 200mm centres. Compact arisings into trench to secure mesh.

Phase three.
Install mechanical anchors (see Specification), two rows at 2m horizontal centres, as shown in design sketch. Profile tight to ground all meshed areas not in contact with ground, allow two U pins/m.

Chainages	**Length**
883 – 991	108
1790 – 2127	337
2820 - 3173	343
3295 - 3360	65
4901 – 5016	115
6470 – 6676	206
	Total = 1,174m

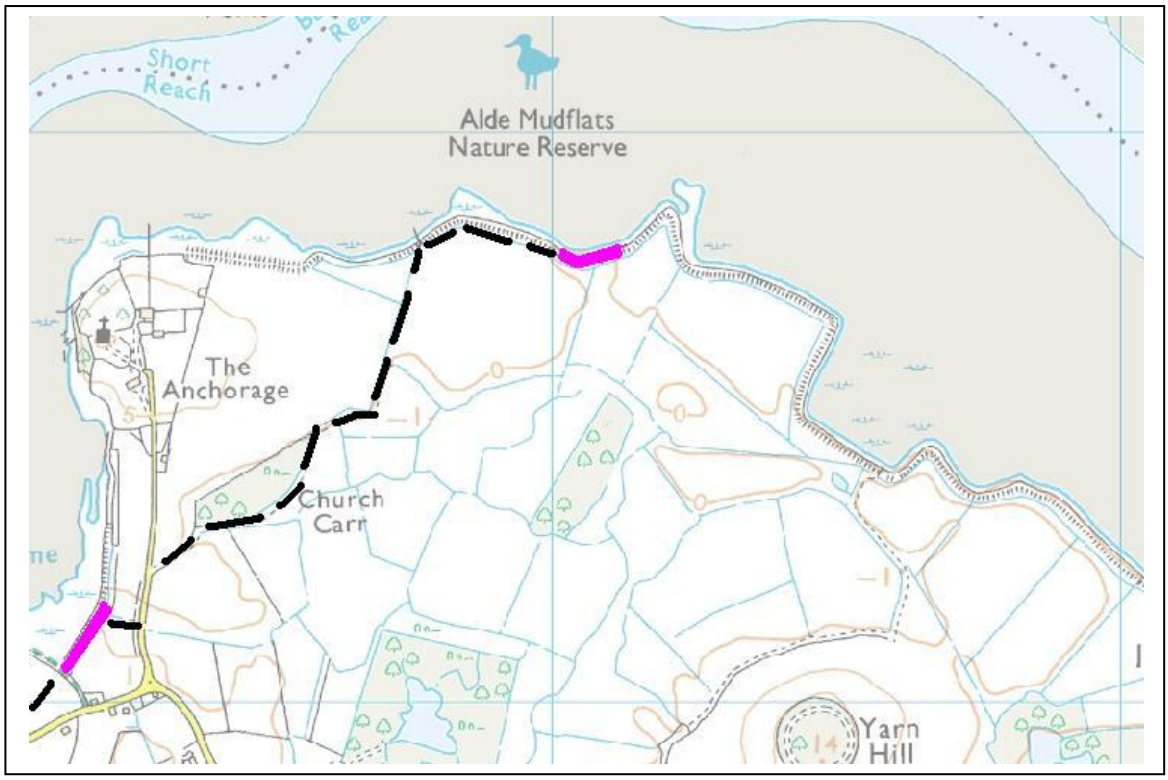


The purple lines denotes the extent of the works. The dashed black lines are possible access routes.

View north from Ch. 1000.

View west from Ch. 1800.

View west from Ch. 2800.



The purple lines denotes the extent of the works. The dashed black lines are possible access routes.

View north from Ch. 6650.

Turf reinforcement and bank strengthening with earth anchors and Armorflex blocks. For sections between +3.13m O.D. and 3.31m O.D. along the line of a public footpath.

Relevant chainage: 212 – 441

Crest level at or above 1 : 200 surge level in 2050, less 585mm, the survivable overtopping depth when turf armoured and bank anchored and crest raised with 85mm thick Armorflex blocks.

Method: See design section **"Flood Cell 05, design upgrade using Amorflex blocks, turf reinforcement mesh and anchors." 21/09/2013. A4 drawing for the above chainage.**

Phase one.
Cut levee grass along crest and landward bank very short.

Phase two.
Lay double twist galvanised UPVC coated mesh (see Specification) down from crest to landward toe of embankment. Join all edges with Spenax stainless steel rings at 200mm centres.

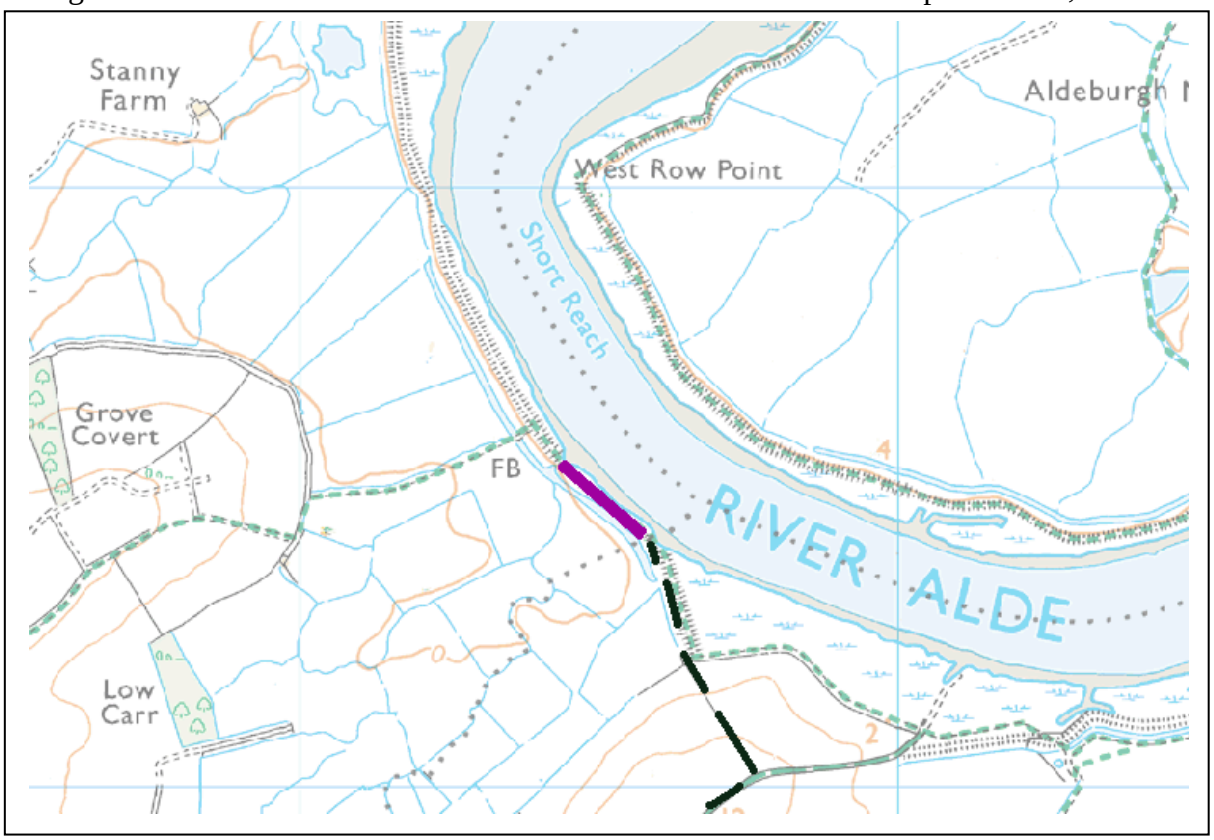
Phase three.
Install mechanical anchors (see Specification), two rows at 2m horizontal centres, as shown in design sketch.

Phase four.
Profile all meshed areas not in contact with ground, allow two U pins/m.

Phase five.
Place Amorflex 140 in two rows, pinning each landward block with rebar pin 500mm long, terminate 20mm below block surface.

Phase six.
Work turf/topsoil mix, taken from tow, into blocks and surround.

Chainage	**Length**
212 – 441	229m



View north west from Ch. 212 showing existing footpath.

Andrew Hawes