

**Update on Broadland Flood Alleviation Project and Flood Risk Management
Proposals for the River Chet**

Report by Senior Waterways and Recreation Officer

Summary: This report provides members with a brief update on the progress of the Broadland Flood Alleviation Project (BFAP) and a summary of Broadland Environmental Services (BESL's) proposals for flood risk management works on the south bank of the River Chet between Loddon and Nogdam End.

1 Update on Project Progress

- 1.1 The 20-year Broadland Flood Alleviation Project, which has been running since 2001, is now nearing the end of its construction phase. BESL has completed the majority of the floodbank works in the project area and, apart from the piling removal which has yet to be carried out in various compartments, only Compartments 17 (Postwick Marshes), 19 (Claxton Marshes), 20 (Langley Marshes), 28 phase 2 (Carlton Marshes) and 22 (River Chet) remain to have earthworks completed in them.
- 1.2 As the project moves into its maintenance phase a number of bank crest raising schemes have been carried out over the past year and are programmed for the coming years. These works are required in order to maintain the required service level height for the floodbanks in the BFAP project area as the floodbanks are continually reducing in height due to natural settlement and erosion caused by cattle grazing, pedestrian use and overtopping. These works involve raising the surface of the newly constructed floodbanks using material sourced by widening soke dykes or using dried dredged material from the rivers and do not require planning permission.

2 Background to Flood Risk Management on the River Chet

- 2.1 The majority of the flood risk management works required on the River Chet have been carried out by BESL with schemes completed in Compartment 21 on the true left bank of the river and the downstream section of Compartment 22 between Chet mouth and Nogdam End on the true right bank. The only section of the river where flood risk management works have yet to be carried out is the section of Compartment 22 between Nogdam End and Pye's Mill on the true right bank of the river.
- 2.2 BESL's original intention for the compartment was to setback over 2.5km of the floodbank and remove the piling that provided its erosion protection.

However, initial site investigations carried out by BESL revealed that ground conditions in the compartment were exceptionally poor, to the extent that it would be difficult to construct a setback floodbank of the required height and durability. Additionally BESL identified that there would be difficulties with sourcing the required amount of material for the construction of the floodbank locally.

- 2.3 The Environment Agency (EA) therefore concluded that there were no solutions available that would meet its criteria for justifying the provision of flood risk management structures: namely that they should be technically feasible, sustainable and affordable.
- 2.4 In order to allow further site investigations to be carried out the EA undertook a £100,000 maintenance scheme in the Compartment in 2004/5 to improve the stability of the existing banks. This scheme was intended to extend the life of the banks by approximately 5 years and largely consisted of reprofiling the existing bank without sourcing new material.
- 2.5 Since 2004 officers have had regular discussions with BESL regarding the need for a comprehensive scheme for the compartment which would deal with the failing piling and provide structurally sound banks for the river. Members will be aware that the Environment Agency has also been under pressure from the local community, for some time, to come forward with a comprehensive scheme for this section of the river.

2 The Current Position

- 2.1 BESL has now submitted a planning application for comprehensive flood risk management works in Compartment 22 and the detailed plans for the proposed works are shown in detail on the drawings at appendix 1 to this report.
- 2.2 In summary the proposal is to carry out a limited rollback of the floodbanks in the compartment by constructing a new bank from material sourced from newly dug soke dykes and then, when the new bank has stabilised, to remove the piling which provides the erosion protection in the compartment.
- 2.3 BESL had indicated in early discussions with the Broads Authority that, due to ground conditions, the new bank would provide a lower standard of defence than in other compartments and, in all likelihood, require more frequent crest raising due to predicted high settlement rates. In addition the EA's original intention was to pass on maintenance liability for the new bank to the landowners after construction. The Broads Authority and local communities had some concerns about this approach, particularly as the maintenance of the banks is essential for the integrity of the navigation.
- 2.4 However, officers understand that further site investigations have revealed that it will be possible to build a more robust bank than originally envisaged and members will be pleased to note that the planning application confirms the proposed rollback bank will be constructed to provide the normal standard

of defence and maintain the existing overtopping regime in the river valley. The EA has also confirmed that the new bank will be maintained by BESL until the end of the Broadland Flood Alleviation Project in 2021 alongside all the other Broadland flood defences.

3 Piling Removal

- 3.1 After construction the new bank will need to stabilise before any piling removal can take place and this is likely to take approximately 12 to 18 months. Due to the poor ground conditions in the compartment, BESL is proposing to deal with the piling by cutting off its capping and any rotten timber and then driving it into the riverbed below the depth required in the Sediment Management Strategy Waterway Specification for the River Chet. BESL's soil engineers have calculated that driving the piles rather than extracting them will give the new floodbank additional stability. As this approach has not been used over a large area before officers have agreed with BESL that a trial of the proposed methodology will be carried out and this will be the subject of a condition placed on any planning permission granted for the proposed scheme.

4 Conclusions

- 4.1 Officers welcome the fact that the EA has come forward with a comprehensive flood risk management scheme for the south bank of the River Chet. The proposed scheme will provide structurally sound banks for the River Chet and modelling shows that it will not adversely affect the hydrology of the river or Hardley Flood. The piling removal element of the scheme will also deal with navigation hazards resulting from failing piling which has been the cause of concern for the Authority for some time.
- 4.2 The piling removal element of the proposed scheme will also allow the Authority to programme full channel width dredging in the River Chet. This has not been possible for some time due to the unacceptable risk of dredging operations destabilising the piling and causing bank collapses. Officers are discussing this with BESL with a view to agreeing where dredged material can be stockpiled for use in future bank crest raising works.
- 4.3 In addition, this scheme, in combination with the work the Broads Authority is undertaking to replace the weir at the entrance to Hardley Flood, is likely to result in improved channel depths and tidal flow upstream to Loddon. This will improve operating conditions for the boatyard businesses at Loddon and Chedgrave which is also to be welcomed.

Author: Adrian Clarke
Date of report: 5 April 2013

Broads Plan Objectives: CC3

Appendices: Appendix 1 Detailed drawings of proposals

APPENDIX 1

- Key :
- COMPARTMENT 22 BOUNDARY
 - EXTENT OF HARDLEY FLOOD
 - PLANNING APPLICATION BOUNDARY
 - EXISTING NOGDAM CROSSWALL
 - MAIN ACCESS ROUTES
 - PEDESTRIAN ONLY ACCESS AND LIMITED VEHICLE PARKING
 - PUBLIC FOOTPATH ROUTE
 - OVERHEAD ELECTRICITY CABLES
 - UNDERGROUND ELECTRICITY CABLES

- Notes:
- OVERHEAD CABLE NOT RECORDED ON SERVICE DRAWINGS, IS SITUATED ALONG FERRY ROAD. GOALPOSTS TO BE INSTALLED FOR VEHICLE ACCESS. GOALPOSTS ALSO REQUIRED EITHER SIDE OF OVERHEAD CABLE AT RIVERSIDE FARM.

- Drawing List:
- 001 - OVERVIEW PLAN
 - 002 - KEY PLAN
 - 003 - DETAILED PLAN & SECTIONS 1 OF 5
 - 004 - DETAILED PLAN & SECTIONS 2 OF 5
 - 005 - DETAILED PLAN & SECTIONS 3 OF 5
 - 006 - DETAILED PLAN & SECTIONS 4 OF 5
 - 007 - DETAILED PLAN & SECTIONS 5 OF 5
 - 008 - PROPOSED MATERIAL SCRAPE LOCATIONS

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Rev	By	Chkd	Appnd	Date	Description

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Project

BROADLAND FLOOD ALLEVIATION PROJECT

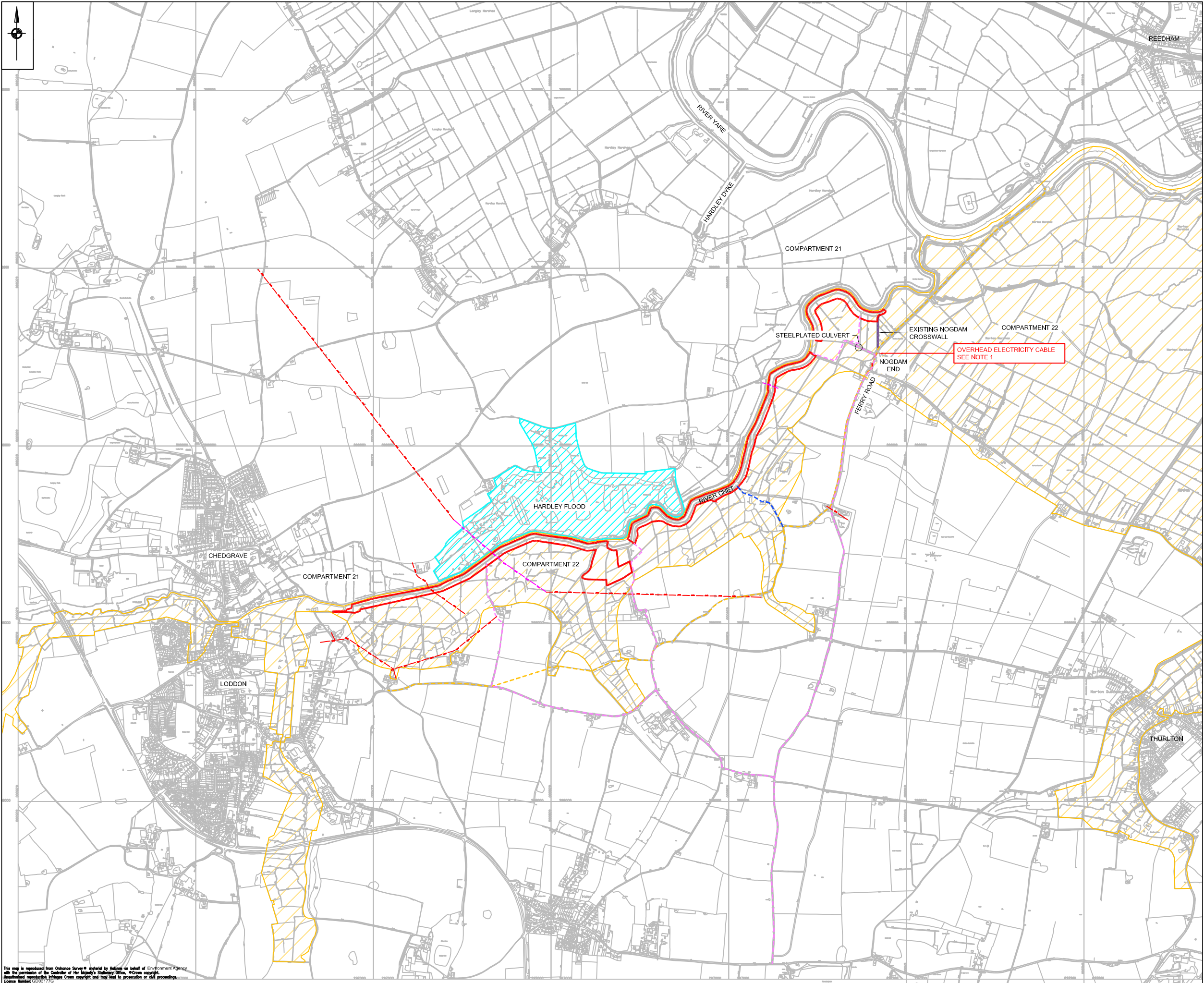
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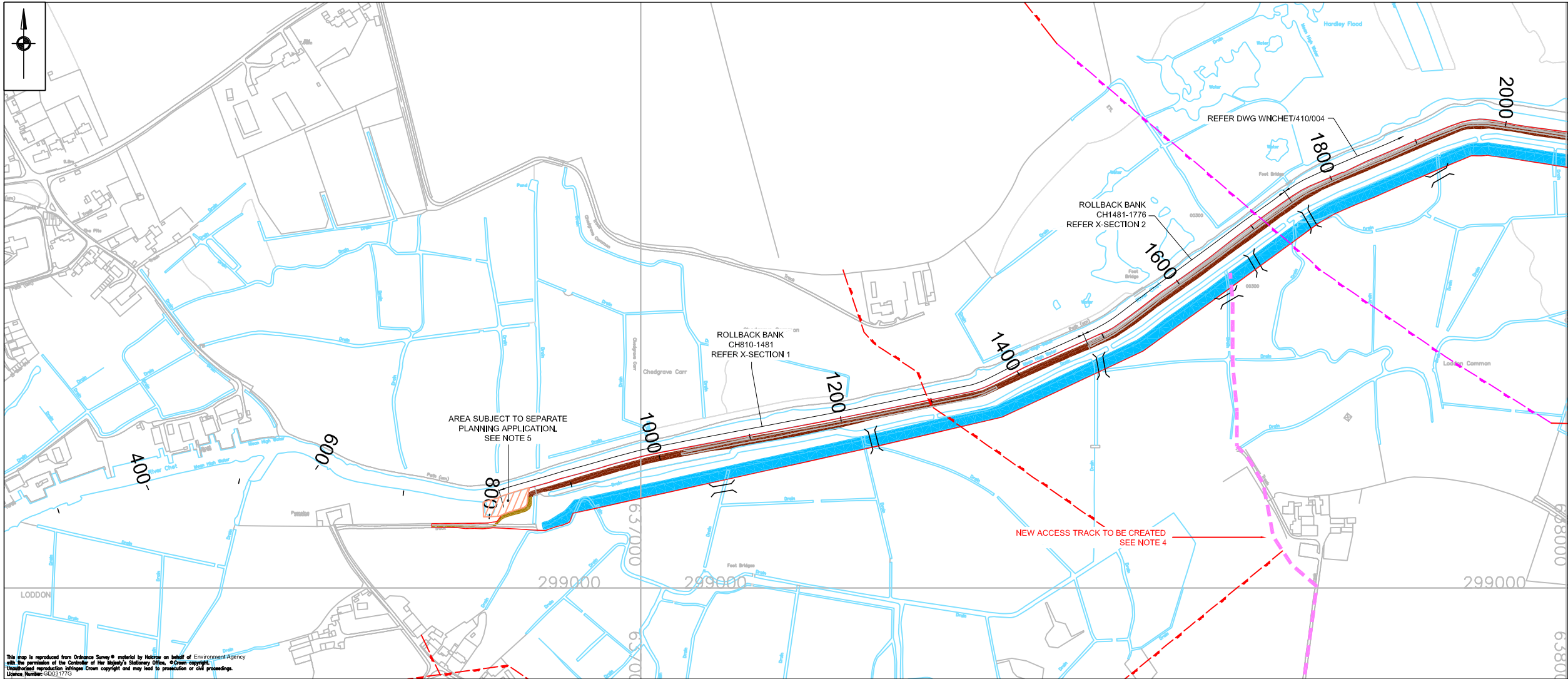
COMPARTMENT 22
RIVER CHET
OVERVIEW PLAN

Drawn by: L MERSEY Date: 12/02/13
Checked by: J NORRIS Date: 13/02/13
Approved by: K MARSH Date: 13/02/13

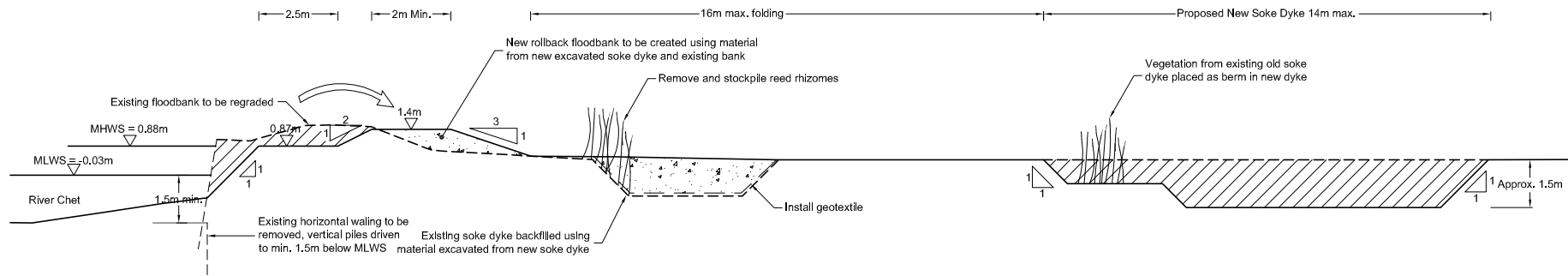
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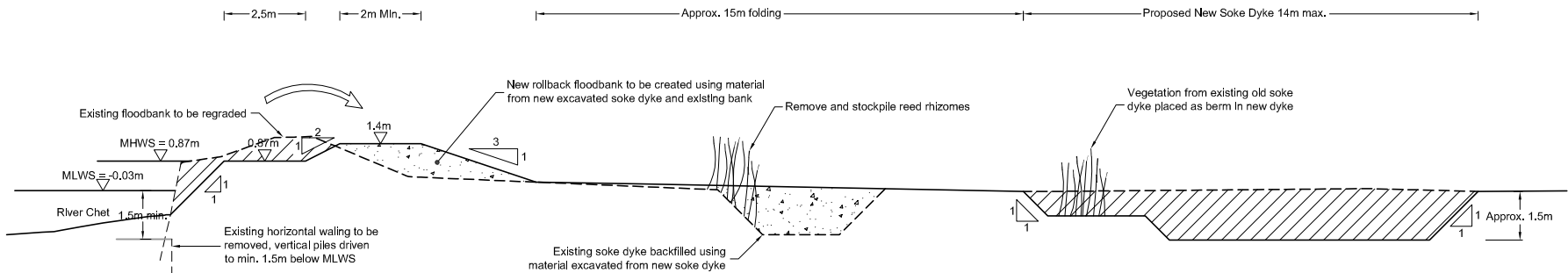




PLAN OF WORKS
SCALE 1:2500



TYPICAL X-SECTION 1
ROLLBACK BANK Ch810-1481m
SCALE 1:100



TYPICAL X-SECTION 2
ROLLBACK BANK Ch1481-1776m
SCALE 1:100

Key:

- ROLLBACK BANK
- NEW SOKE DYKE
- CULVERTED CROSSINGS
- PLANNING APPLICATION BOUNDARY
- MAIN ACCESS ROUTES
- OVERHEAD ELECTRICITY CABLES
- UNDERGROUND ELECTRICITY CABLES

Notes:

- NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
- ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
- ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
- GOALPOSTS TO BE SETUP EITHER SIDE OF OVERHEAD ELECTRICITY CABLES AT RIVERSIDE FARM.
- SEPARATE PLANNING APPLICATION FOR PROPOSED NEW MOORINGS OFF PYES MILL TO BE SUBMITTED BY JOHN JENKINS ARCHITECTURAL DESIGN LIMITED. DRAWING NUMBERS 746/01 & 746/02.
- LOCATION OF MARKER POSTS TO BE AGREED WITH B.A. OFFICERS.

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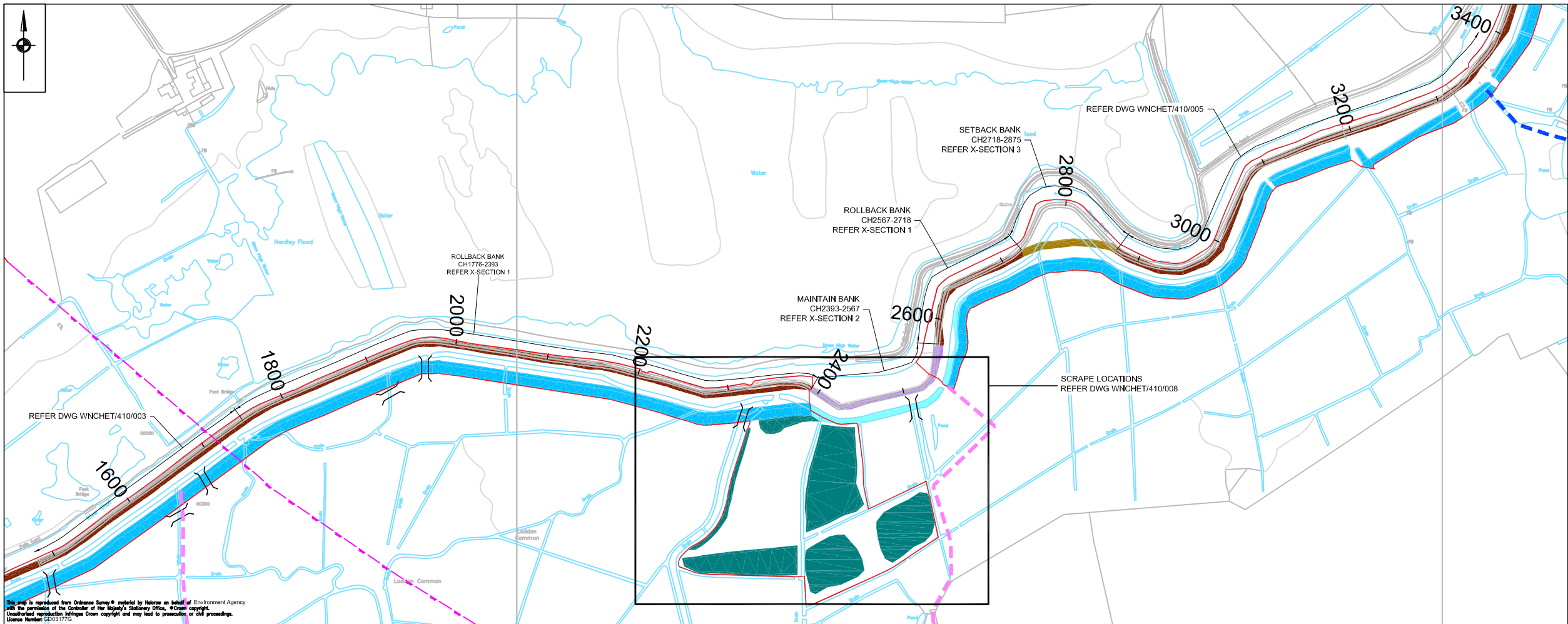
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Drawing COMPARTMENT 22 RIVER CHET DETAILED PLAN SHEET 1 OF 5	
Drawn by: L MERSEY	Date: 12/02/13
Checked by: J NORRIS	Date: 13/02/13
Approved by: K MARSH	Date: 13/02/13
Drawing No. WNCHET/410/003	Revision 0
Drawing Scale: AS SHOWN AT A1	

Drawn by: L MERSEY
Checked by: J NORRIS
Approved by: K MARSH
Drawing No.: WNCHET/410/003
Revision: 0
User and Plot Date: 14/2/2013 - 10:2 am

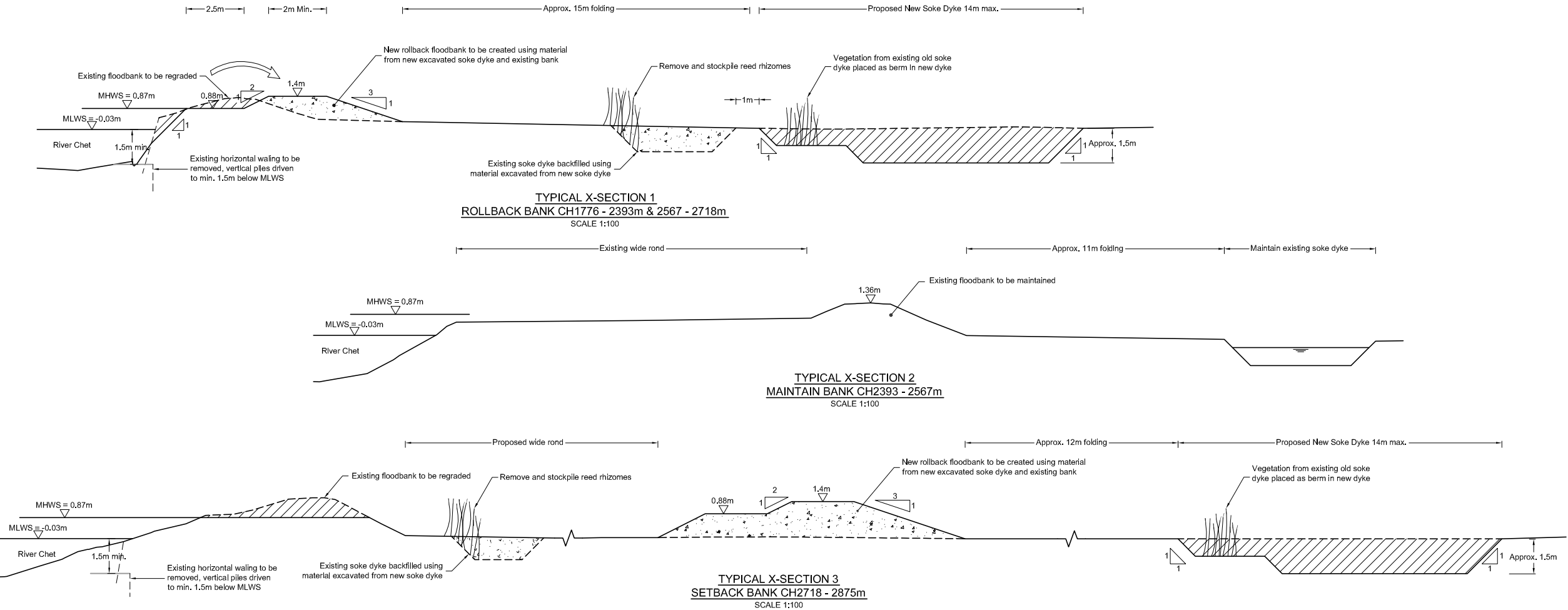


PLAN OF WORKS
SCALE 1:2500

- Key:
- ROLLBACK BANK
 - SETBACK BANK
 - NEW SOKE DYKE
 - EXISTING SOKE DYKE
 - MAINTAIN BANK
 - SCRAPE LOCATIONS AND MATERIAL SOURCING (SEE NOTE 4)
 - CULVERTED CROSSINGS
 - PLANNING APPLICATION BOUNDARY
 - OVERHEAD ELECTRICITY CABLES
 - UNDERGROUND ELECTRICITY CABLES
 - MAIN ACCESS ROUTES
 - PEDESTRIAN ACCESS ONLY

- Notes:
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 - LOCATION OF MARKER POSTS TO BE AGREED WITH B.A. OFFICERS.

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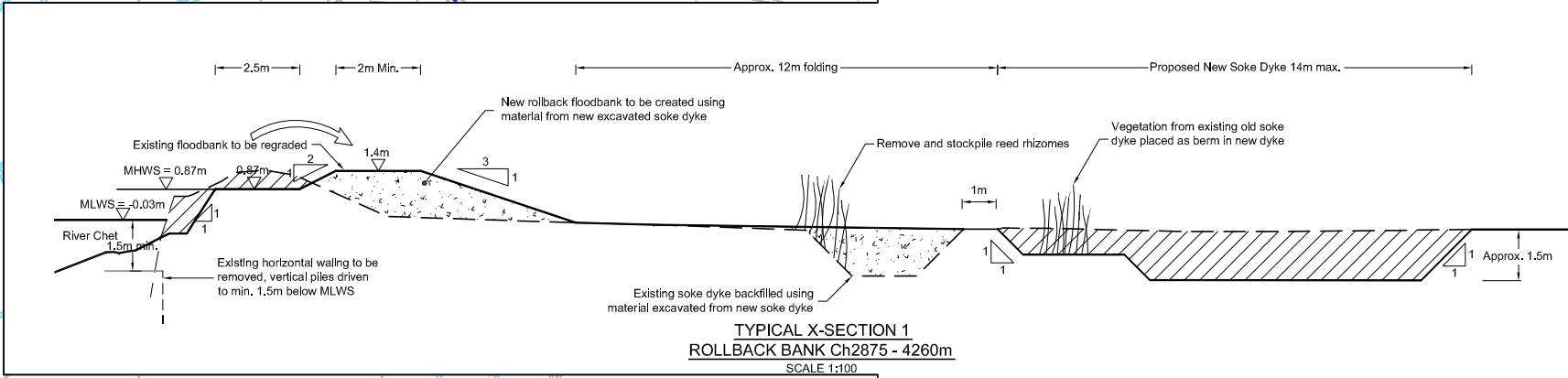
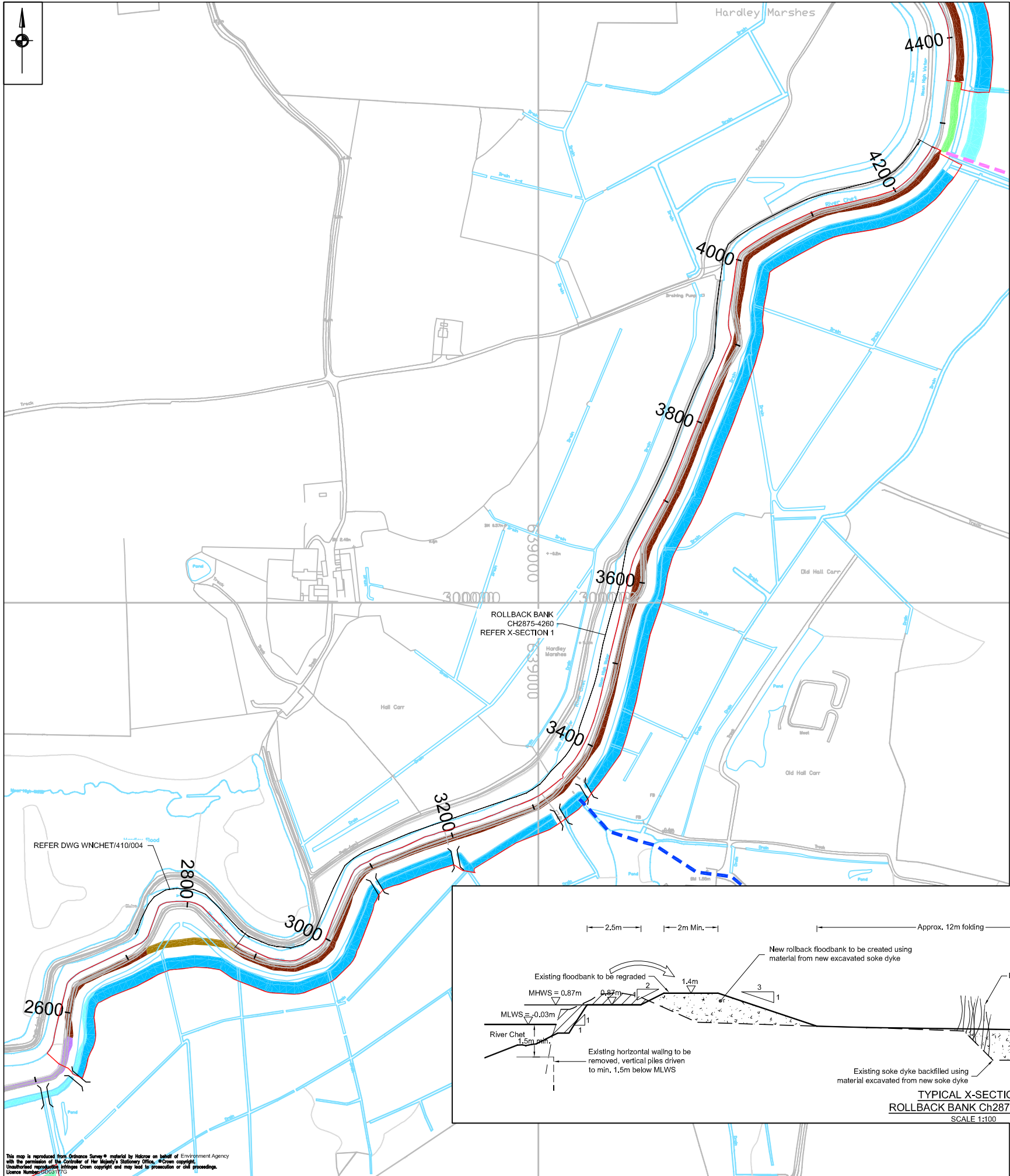
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RIVER CHET
DETAILED PLAN
SHEET 2 OF 5**

Drawn by: L MERSEY Date: 12/02/13
Checked by: J NORRIS Date: 13/02/13
Approved by: K MARSH Date: 13/02/13

Drawing No. **WNCHET/410/004** Revision **0**

Drawing Scale: AS SHOWN AT A1

Drawing No. WNCHET/410/004
User and Plot Date
User: J. Norris
Plot Date: 14/2/2013 10:2 am



PLAN OF WORKS
SCALE 1:2500

Key:

- ROLLBACK BANK
- SETBACK BANK
- NEW SOKE DYKE
- MAINTAIN BANK
- NEWLY EXCAVATED SOKE DYKE
- RECENTLY SETBACK BANK
- CULVERTED CROSSINGS
- PLANNING APPLICATION BOUNDARY
- MAIN ACCESS ROUTES
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BROADLAND FLOOD ALLEVIATION PROJECT

Drawing

COMPARTMENT 22
RIVER CHET
DETAILED PLAN
SHEET 3 OF 5

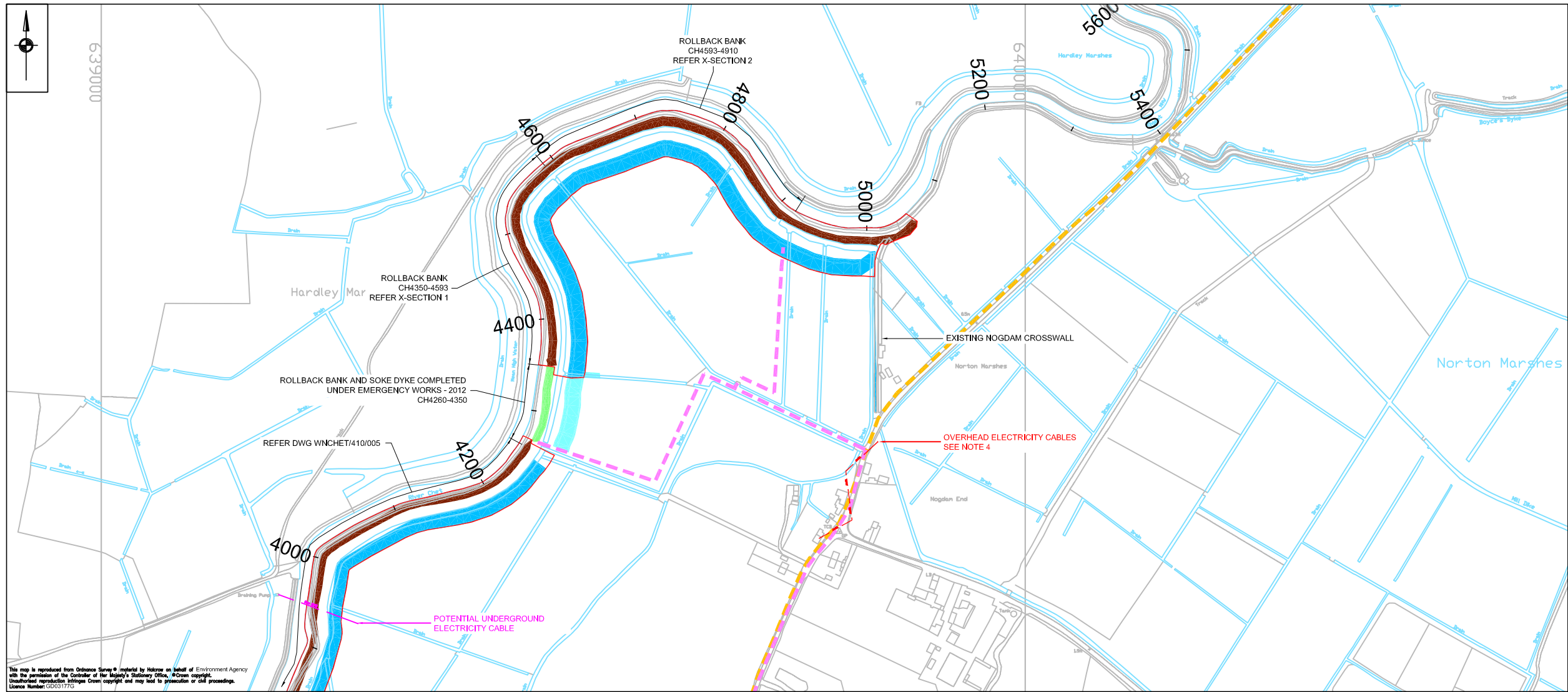
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Revision 0

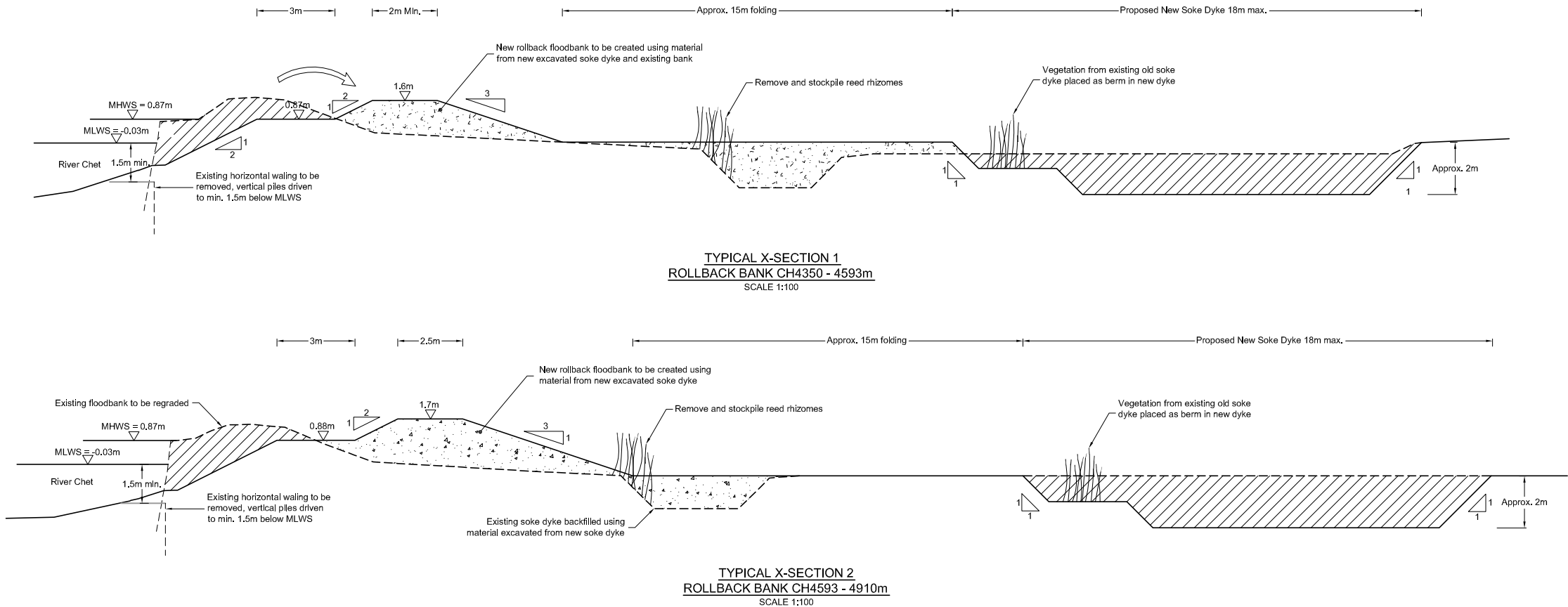
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Drawing Title: Broadland Flood Alleviation Project - River Chet
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PLAN OF WORKS
SCALE 1:2500



- Key:
- ROLLBACK BANK
 - NEW SOKE DYKE
 - NEWLY EXCAVATED SOKE DYKE
 - RECENT ROLLBACK BANK
 - CULVERTED CROSSINGS
 - PLANNING APPLICATION BOUNDARY
 - MAIN ACCESS ROUTES
 - PUBLIC FOOTPATH ROUTE
 - OVERHEAD ELECTRICITY CABLES

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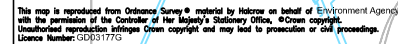
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BROADLAND FLOOD ALLEVIATION PROJECT

Drawing	
COMPARTMENT 22 RIVER CHET DETAILED PLAN SHEET 4 OF 5	
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Checked by: J NORRIS	Date: 13/02/13
Approved by: K MARSH	Date: 13/02/13
Drawing No.	Revision
WNCHET/410/006	0
Drawing Scale: AS SHOWN AT A1	

Drawing No. WNCHET/410/006
Drawing Title: Broadland Flood Alleviation Project - Planning
User and Plot Date: 14/2/2013 - 10:2 am



Key:

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	NEWLY EXCAVATED SOKE DYKE
	RECENT ROLLBACK BANK
	PLANNING APPLICATION BOUNDARY
	MAIN ACCESS ROUTES
	PUBLIC FOOTPATH ROUTE
	OVERHEAD ELECTRICITY CABLES

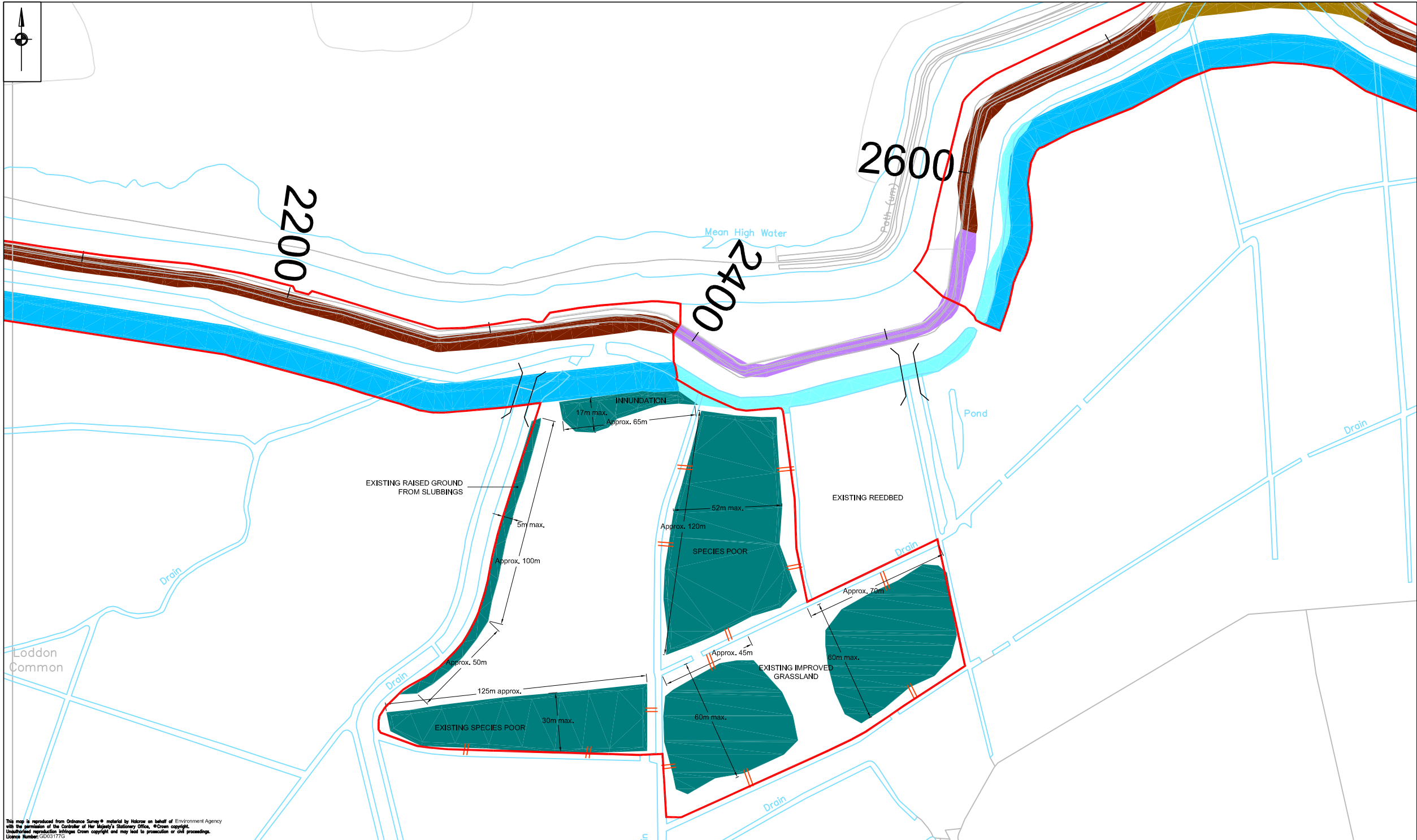
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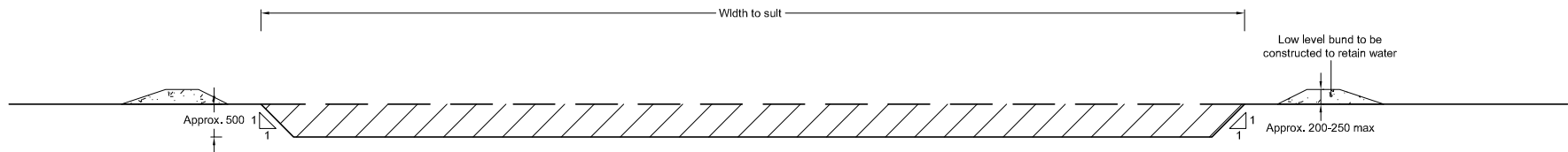


Drawing Scale: AS SHOWN AT A1

User and Plot Date : lylemersey : 14:2:2013 - 10:2 am



PLAN OF PROPOSED SCRAPES
SCALE 1:1000



TYPICAL X-SECTION THROUGH SCRAPE
SCALE 1:50

- Key:
- ROLLBACK BANK
 - SETBACK BANK
 - NEW SOKE DYKE
 - EXISTING SOKE DYKE
 - MAINTAIN BANK
 - SCRAPE LOCATIONS AND MATERIAL SOURCING (SEE NOTE 4)
 - DRAIN LINKS TO INTERNAL DYKES
 - PLANNING APPLICATION BOUNDARY

- Notes:
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 - FIELDS IDENTIFIED BY RAVENINGHAM ESTATE FOR MATERIAL SOURCING SCRAPES.
 - LOCATIONS WHERE MATERIAL COULD BE SOURCED TO CREATE SCRAPES AND/OR REEDBED WITHOUT AFFECTING AREAS OF BOTANICAL INTEREST.

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Drawing
**COMPARTMENT 22
RIVER CHET
PROPOSED SCRAPE LOCATIONS
(ALTERNATIVE MATERIAL
SOURCING)**

Drawn by: L. MERSEY Date: 12/02/13
Checked by: J. NORRIS Date: 13/02/13
Approved by: K. MARSH Date: 13/02/13

Drawing No. WNCHE/410/008
Revision 0

Drawing Scale: AS SHOWN AT A1

Drawing No. WNCHE/410/008
Drawing Title: COMPARTMENT 22 RIVER CHET PROPOSED SCRAPE LOCATIONS (ALTERNATIVE MATERIAL SOURCING)
User and Plot Date: 14/2/2013 10:2 am