Navigation Committee
12 December 2013
Agenda Item No 13

Planning Application with Navigation Implications:
BESL – Piling Driving on River Chet
Report by Senior Waterways and Recreation Officer

Summary: This report provides members with a summary of officers' comments on the Environment Agency's recently submitted planning application for driving piles into the bed of the River Chet adjacent to the recently completed rollback floodbanks in Compartment 22 on the true right bank of the River Chet between Loddon and Nogdam End. Members' views on the report are welcomed.

1 Background

1.1 Members will recall that the completion of the flood defence scheme for the south (true right) bank of the River Chet has been the subject of several reports to the Navigation Committee. The fact that there were no definite proposals for flood defence works in the section of Compartment 22 running from Nogdam End near Chet Mouth to Loddon was the cause of some concern for the local community and the Broads Authority, particularly due to the fact that deteriorating piling in the compartment was a potential navigation hazard and restricted the Authority's ability to programme dredging operations for the River Chet. The Environment Agency (EA) had struggled to design a flood defence scheme for the compartment that met its criteria for the delivery of flood defence schemes: that they should be technically feasible, sustainable and affordable. A maintenance scheme costing £100,000 was undertaken in the compartment by Broadland Environmental Services (BESL) on behalf of the EA in 2004. However, until recently, indications were that the EA would not be able to deliver a completed flood defence scheme for Compartment 22.

1.2 Since the completion of the maintenance scheme, officers regularly discussed the issue of Compartment 22 with the EA and BESL and during 2012 the EA informed the Authority that it was developing proposals for the compartment with a view to submitting a planning application. In January 2013 BESL confirmed that, as further ground investigations carried out by BESL had shown that it would be possible to build a more robust bank than originally envisaged, it would be submitting a planning application for flood defence works in Compartment 22.

1.3 A planning application was duly submitted to the Broads Authority and was considered by the Navigation Committee at its meeting on the 12 of February 2013. The application included the construction of new floodbanks and maintenance works over approximately 4.2km of the compartment and the

removal of approximately 2.8km of redundant and failing piling. At that meeting the Committee was informed that, while constructing the floodbanks in accordance with standard practices, BESL proposed to deal with the piling that needed to be removed by driving it into the river bed rather than extracting it. This change in methodology was proposed as BESL had calculated that driving the piles into the river bed would provide more stability for the proposed rollback banks. While welcoming the fact that the EA had come forward with a comprehensive scheme for Compartment 22, the Committee had some concerns regarding the proposal to drive the piles into the river bed and recommended that a condition be placed on any planning permission granted for the scheme requiring a trial on the proposed pile driving to be carried out to the satisfaction of the Broads Authority prior to planning permission being granted for the bulk of the pile driving works. Planning permission was granted for this scheme in May 2013 and the permission included a condition requiring the undertaking of such a trial.

1.4 The pile driving trial was carried out in October 2013 and the EA has now submitted a part retrospective planning application for the works required to drive the rest of the piling in the compartment. The location of the proposed pile driving works is shown on the drawings at Appendix 1 to this report.

2 The Pile Driving Trial

2.1 The construction works for the new floodbanks in the compartment were completed in October 2013. Officers had agreed sites for the proposed pile driving trial with BESL prior to the commencement of the earthworks for the scheme and in late October BESL contacted the Authority to say that it was happy that the new floodbank had established to the extent that it was ready to drive the selected piles.

2.2 The areas of piling selected for the trial comprised both timber and steel sheet piling and the site selected for the trial was on the south side of the River Chet opposite Hardley Flood. The existing piles were a mixture of steel trench sheets and timber piles, which varied in condition above water level. Officers attended the trial site with BESL in late October to agree the methodology used and to look at the pile driving works taking place.

2.3 The purpose of the trial was to see how the piles reacted to the stresses of being driven into the river bed and whether they could be driven to a sufficient depth to ensure that no remnants of the piling remained above bed level. Some of the piling was in poor condition above water level and officers' main concern was that it might splinter or break when vertical pressure was applied to it.

2.4 Prior to attempting to drive the piles, the waling, capping, tie rods and anchor piles were removed by a tracked excavator using a bucket or by an operative using a grinder. The piles were then driven by the tracked excavator working off mats on the crest of the reprofiled floodbank. The excavator first removed any reed and soil to expose the tops of the piles and then, using a bespoke 2.0m long dolly attachment, pushed the piles vertically down into the river

bed. Photograph 1 shows piles being driven by the excavator using the 2.0m boom.

Photograph 1

2.5 As mentioned in paragraph 2.2 both timber and steel piles were driven during the trial. The steel piles were driven individually and the timber piles driven in pairs. In the trial location it was clear that ground conditions allowed the timber piles to be driven to depth successfully with little resistance and without any sign of breakage or splitting. In some cases the steel piles produced some driving resistance but all were successfully driven to depth.

2.6 As regard the long term success of the technique the critical factor is the depth to which the piles are driven. The River Chet is tidal and in some areas a hard material at or above soft bed material could cause localised scour and result in exposed piling and a navigation hazard. BESL's proposal as explained at the trial was to drive the piles so that their tops were at -1.50mOD. This was to be gauged from the existing pile top level (+0.70m OD) by pushing each pile 2.20m past the adjacent piles to a mark on the dolly/excavator arm.

2.7 Mean low water on the River Chet is -0.05mOD and the Broads Authority dredge specification for the river is 1.5m below this (-1.55mOD). Therefore, although dredging will not be undertaken directly at the toe of the bank, officers consider that the top level of the driven piles needs to be lower to

remove the possibility of exposed piles. The suggested depth is -1.80mOD, requiring 2.50m of driving. This was discussed on site and the Halcrow design engineer and Nuttalls' site manager agreed to this proposal. Further, the excavator was easily able to achieve the required depth. Photograph 2 shows the excavator driving timber piles to 2.50m to achieve a pile top level of -1.80mOD

Photograph 2

2.8 Officers consider that a driven top depth of -1.80mOD will be appropriate in most areas, however, it is noted that the bed of the River Chet can be up to 2.5m below mean low water (-2.55mOD) where flow is concentrated, for example, on the outside of bends and close to the inlets to Hardley Flood. This deeper water can be close to the bank particularly where it has been piled. Therefore it is important that the river depth is regularly monitored during the driving operation and if the bed level is found to exceed -1.55mOD officers recommend that the driven depth for the piles should be increased accordingly to at least 250mm below the existing bed level.

3 Broads Authority Officer Comments on the Trial

3.1 Officers consider that the pile driving methodology used by BESL in the trial is successful. There were no problems with the piles being driven to the depth suggested by officers and all capping, waling, tie rods and anchor piles were removed successfully during the operation. However, should planning

permission be granted for the removal of the rest of the piling in the compartment (piling not subject to the trial) officers would suggest that a number of conditions be attached to the permission in order to prevent navigation hazards occurring and enable future dredging operations to be carried out by the Broads Authority, as Navigation Authority, across the full width of the River Chet.

4 Suggested Planning Conditions

4.1 First, and key to the success of the proposed works, it is recommended that a condition should be placed on any planning permission granted by the Authority requiring a BESL to carry out a full survey of the actual bed level of the river in order to establish a baseline for comparison with further surveys and enable appropriate depths for pile driving to be identified. Depending on the results of the survey further conditions should be placed on any planning permission granted requiring piles to be driven to the following depths:

a. where the bed level is above -1.55mOD (BA dredge spec), piles should be driven to a top level of -1.80mOD);

b. where the bed level is below -1.55mOD (possible on outside of bends and close to Hardley Flood inlets), piles should be driven to 250mm below existing bed level.

This will ensure that, after driving, the tops of the piles will not be immediately below the Broads Authority's Sediment Management Strategy Waterways Specification depth for the river and in areas where the depth exceeds that they will be at reduced risk of being exposed by scouring.

4.2 Officers also recommend that a further condition should be attached to any planning permission granted requiring a scanning sonar survey to be carried out of the bed after the completion of the works to ensure that no pile remnants remain above bed level as this would result in an unacceptable navigation hazard. A scanning sonar survey is considered appropriate as this will provide sufficient detailed imagery of the bed to satisfy officers that there are no hazards caused by the pile driving operation. The condition should also require BESL to provide the survey results to the Broads Authority for joint assessment and to remove any piling remains found by the survey.

4.3 After the bank reprofiling works are completed, if bank height is not sufficient to provide a defined river edge, a condition is needed requiring temporary channel markers to be installed at a specification to be agreed with Broads Authority Officers until vegetation establishes on the new river's edge.

4.4 BESL should also be required to carry out erosion monitoring to the frequency and methodology used for other piling removal planning permissions granted by the Authority.

4.5 Finally officers consider that a condition requiring BESL to provide a method statement of its proposed approach if any sections of piling fail to drive into

the bed successfully. Officers would recommend that, if these circumstances arise, the piling should be extracted using the previously agreed methodology used in other planning permissions for the extraction of piles.

5 Conclusions

5.1 The planning application for the works confirms that the piles will be driven to the depths that officers have recommended in this report. The application also confirms that a baseline hydrographic survey was carried out of the River Chet prior to the trial commencing and a post works survey will be undertaken on completion of the works.

5.2 The application also proposes use of the erosion monitoring programme and trigger levels for the provision of erosion protection and contributions to the Broads Authority's dredging costs that have been previously agreed with officers in relation to other planning permissions granted by the Authority for piling removal works. This is considered to be appropriate in this case although the application indicates that BESL is only proposing to carry out hydrographic surveys of the river bed annually if other surveys indicate that significant erosion is occurring. Officers would recommend that annual surveys be carried out in accordance with the approach agreed in previous planning permissions granted by the Authority

5.3 BESL considered that, following the successful trial, it should continue with the piling removal operation and submit a part retrospective planning application for the pile driving works. This decision was made because BESL felt that it would be a more sustainable approach to the works and minimise disruption to landowners and river users. It also means that BESL will avoid increased costs by demobilising plant and equipment and remobilising the same plant in November 2014. This approach also has the benefit of allowing the Broads Authority to programme dredging operations in the River Chet from autumn 2014 as all the piling will be removed by then.

5.4 The application also confirms that, consequent to discussions between officers and BESL, the scheme will accommodate the deposition of dredged sediment from the River Chet at the rear of the new rollback banks for future use in bank crest raising works. This will allow for the Authority to carry out more cost effective dredging operations in the River Chet and the sustainable reuse of sediment for future floodbank maintenance. Officers welcome this approach.

5.5 Provided that the conditions recommended in this report are attached to any planning permission granted for the works officers intend to support the proposed works in the planning application. Members' comments on this approach are welcomed.

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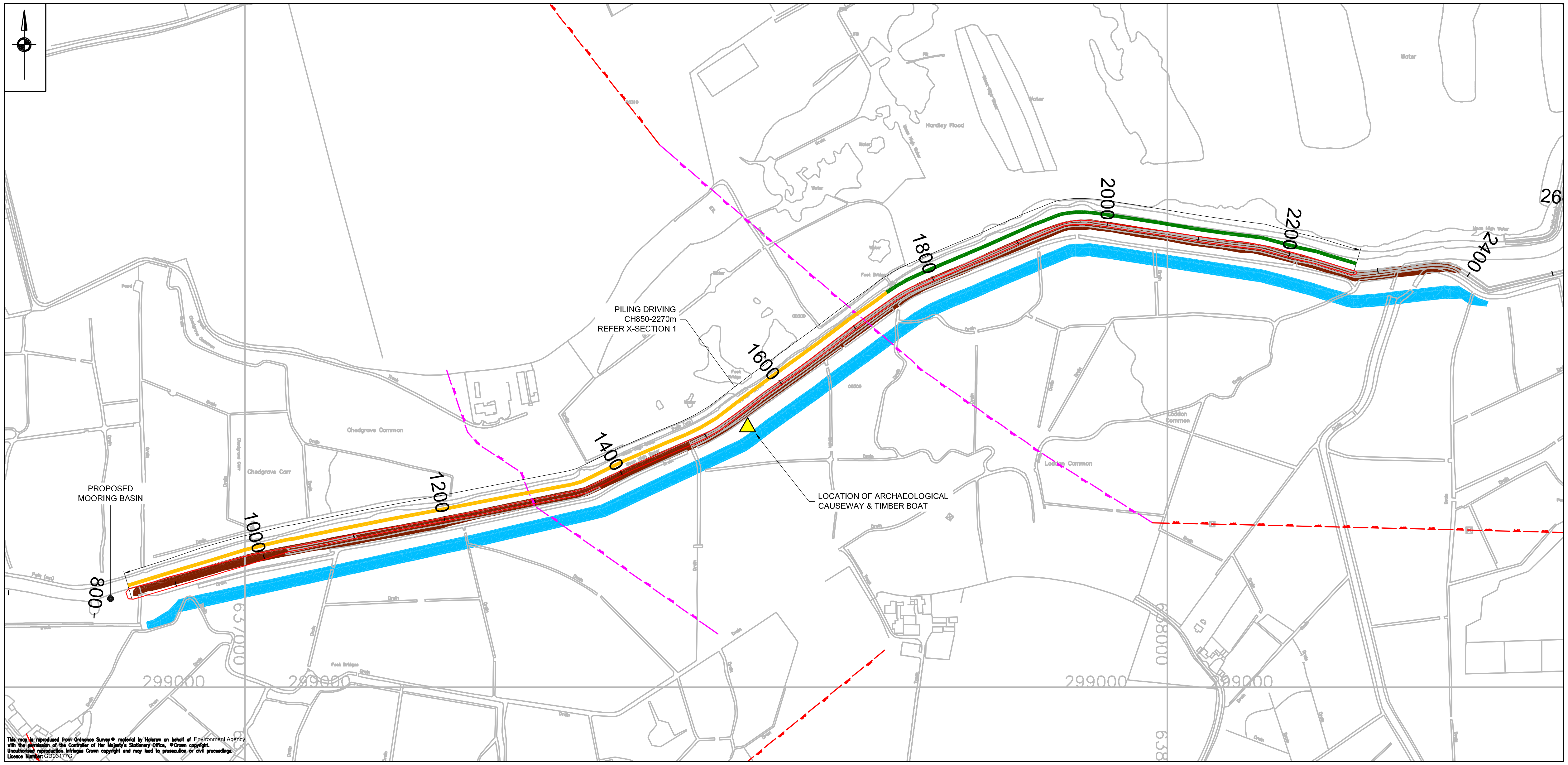
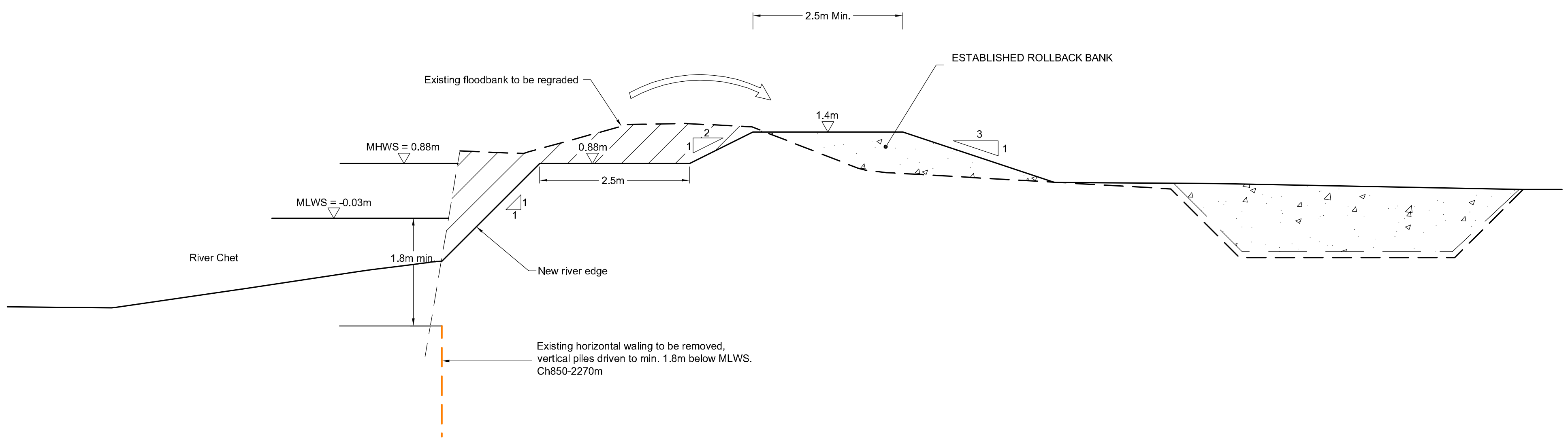
Background papers:	Nil
Author:	Adrian Clarke
Date of report:	1 December 2013
Broads Plan Objectives:	CC3.1
Appendices:	Appendix 1 Detailed drawings of proposals

APPENDIX 1



PLAN OF PILE DRIVING WORKS
SCALE 1:2500



TYPICAL X-SECTION 1 THROUGH PILING DRIVING WORKS
SCALE 1:50

Key:

- ROLLBACK BANK
- NEW SOKE DYKE
- PILING DRIVING TRIAL AREA (COMPLETE MID NOV. 2013)
- PILING DRIVING PHASE 1 (MID NOV. → DEC. 2013)
- PILING DRIVING PHASE 2 (JAN. 2014 → EASTER 2014)
- PLANNING BOUNDARY

Notes:

1. NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.

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Project

BROADLAND FLOOD ALLEVIATION PROJECT

Drawing

COMPARTMENT 22 CHET
PILE DRIVING
DETAILED PLAN
1 OF 3

Drawn by: L MERSEY Date: 20/11/13
Checked by: J NORRIS Date: 21/11/13
Approved by: K MARSH Date: 21/11/13

Drawing No. WNCHET/420/003 — Revision 0

Drawing Scale: AS SHOWN AT A1

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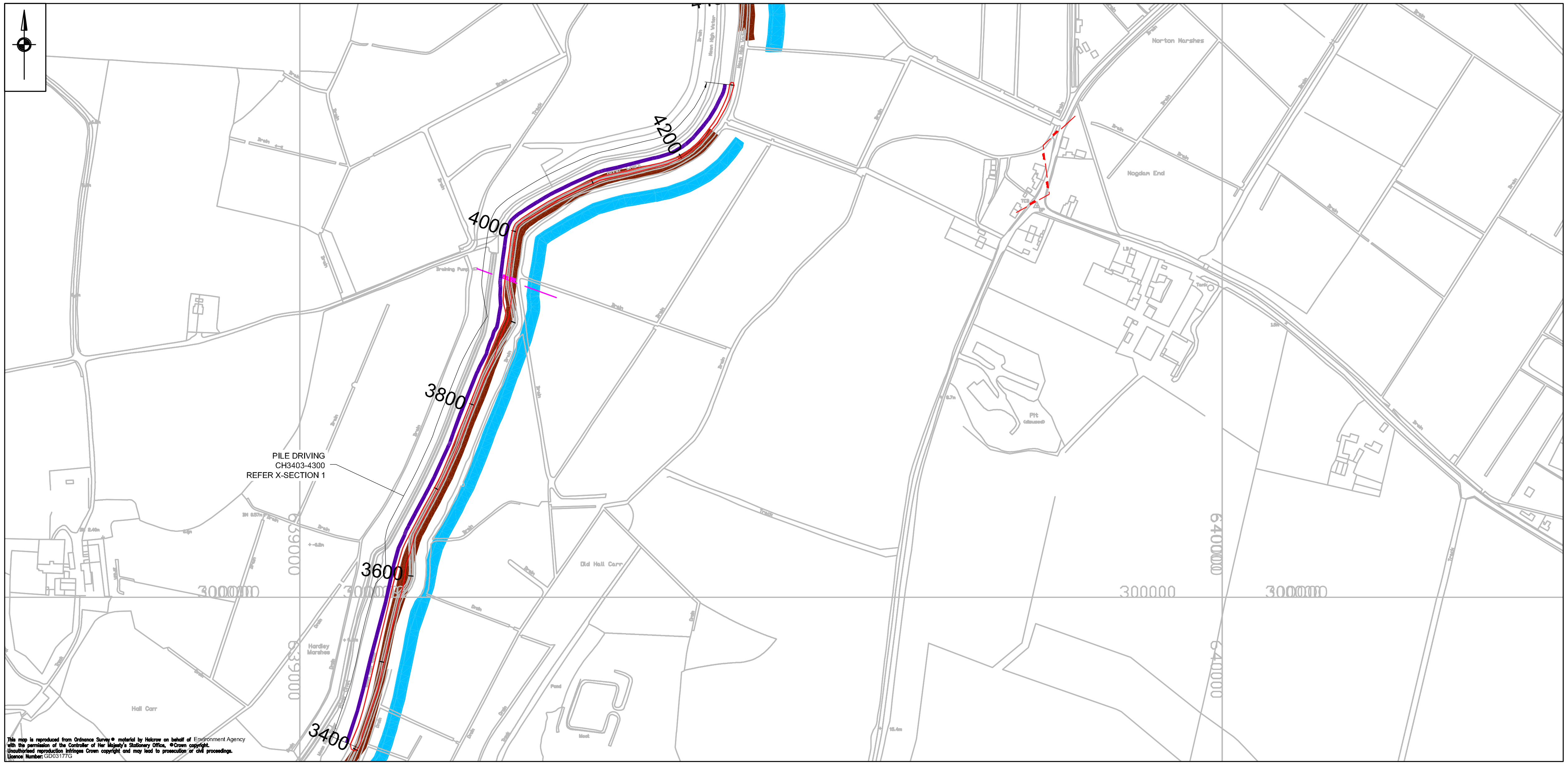

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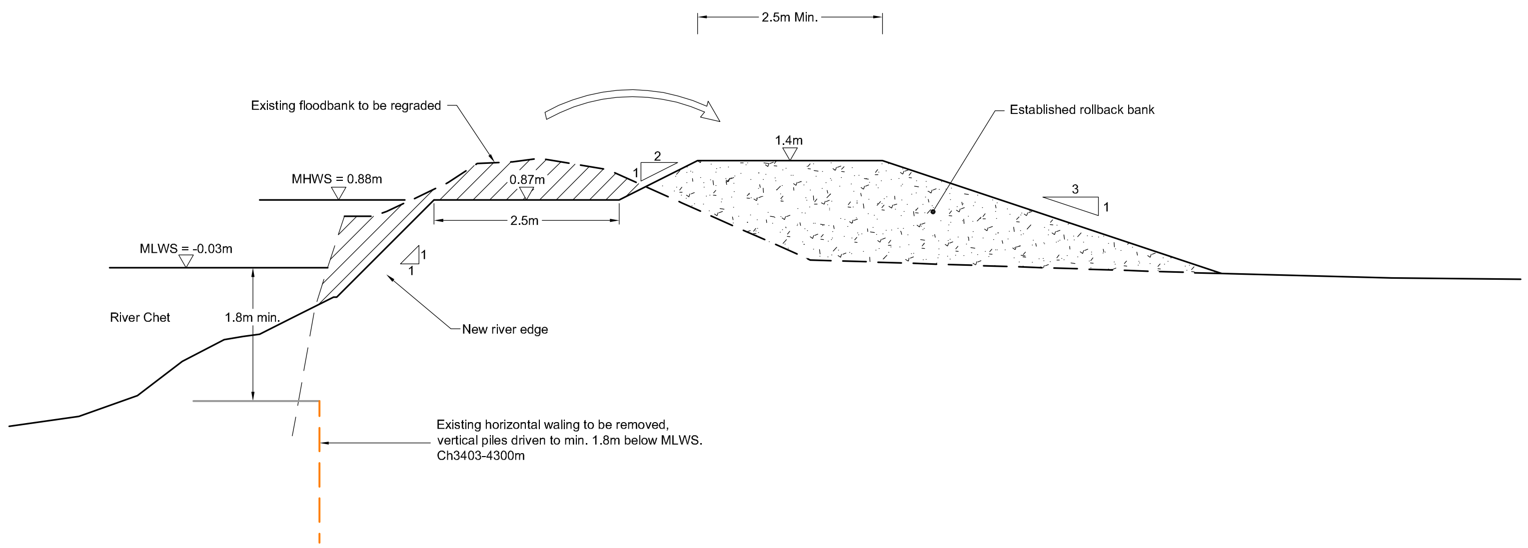

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Checked by: J NORRIS Date: 21/11/13
Approved by: K MARSH Date: 21/11/13

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Drawing Scale: AS SHOWN AT A1

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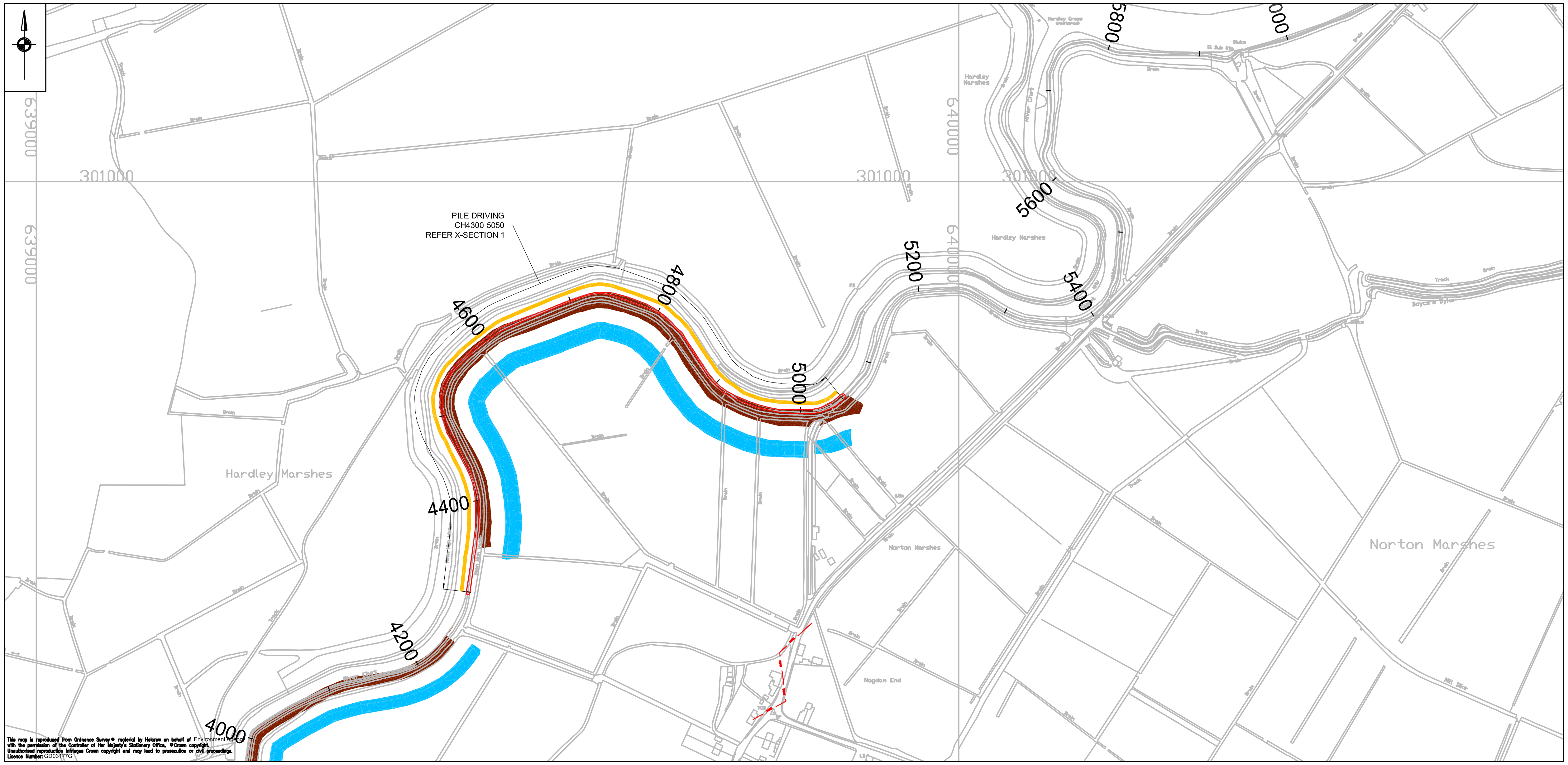

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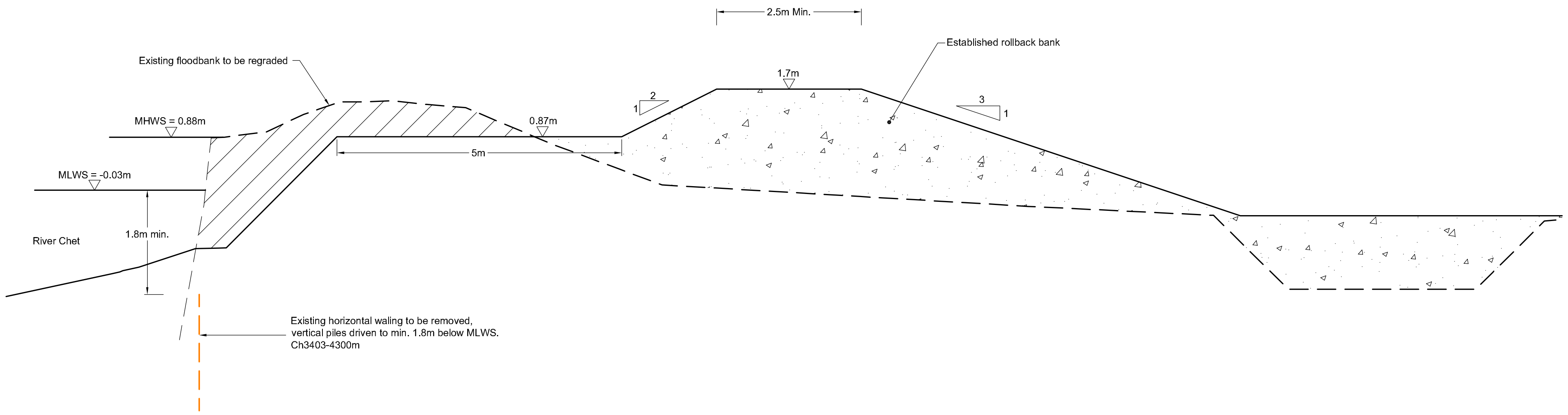

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