

MHPT CONSTRUCTION AND MONITORING OF RECHARGE SUCCESSION MANAGEMENT PLAN



Recharge locations

This document is a “how to” guide for the placing of recharge material to protect Mersea Harbour and includes:

1. The contracts to be let.
 2. On site practical work needed.
 3. MMO licence consent conditions.
 4. Issue of legal notifications.
 5. Conditions of licence.
 6. Required pre and post surveys and monitoring.
 7. Critical path overall programme.
 8. Critical path monitoring programme.
- Appendix 1 Cross section of placed material.
Appendix 2 Brushwood retaining fence design.
Appendix 3 Invertebrate survey tender example.
Appendix 4 Crown Estates position.
Appendix 5 Monitoring cost estimate (excludes volunteer costs).
Appendix 6 Placing coordinates (from MMO licence).
Appendix 7 Dredging coordinates (for Harwich).
Appendix 8 Invasive Non Native Species (INNS)

In addition are a number of related files in a discrete folder “Construct and Manage”.

It assumes that Harwich Haven Authority (HHA) have given 6 months notice of start of delivery of material and that MHPT have confirmed with HHA which areas the material is to come from i.e. those with the coarser grade materials that will maximize larger gravels and minimize sands and sediments – see also TYPE OF MATERIAL under MMO Licence Conditions below.

A press/media notice should be prepared and sent to local papers and posted on local notice boards and possibly a public meeting held to inform those interested of what will happen and when during construction and monitoring.

OF GREAT IMPORTANCE IS TO ENSURE THAT THE SKIPPER OF THE DREDGER KNOWS WHERE THE MATERIAL IS TO BE PLACED. It is highly recommended that a member of the MHPT is aboard the boat on the first passage as she approaches Mersea Quarters to point out the placed navigation beacons/withies, the line of each site the material is to be placed, the height the material is to be placed to (double reflector tape already placed at +3.50m ODN on each withy), the quantity to each location and which sites are best for neap or spring tide delivery. (See Appendix 1).

1. CONTRACTS TO BE PREPARED AND TENDERED/LET (asap after HHA give notification)

MOU between MHPT and Environment Agency (EA) for the EA to produce a contract between the EA and HHA for the supply and delivery to Mersea of 98,000 m³ of appropriate material to locations as defined in the MMO licence. **If MHPT (or EA) are contracting HHA then the contract needs to state very clearly that biosecurity measures must be met by the supplier.** The EA will (probably but HHA would prefer direct contract with MHPT) be responsible for paying HHA at the to be agreed rate of £x per m³ (current estimate from HHA is £3.00m³). NB once the material is discharged from the dredger it becomes the responsibility of MHPT. This responsibility includes that MHPT has placed the navigation marker beacons (see below Navigation for Placing Material) to the correct locations.

MOU/contract between MHPT and EA for all pre and post recharge placement monitoring and management for £52k over a 5 year period (see also MHPT/EA Business Case). All monitoring and management will be the responsibility of MHPT.

Tender/contract for provide and place brushwood fencing containment with 70m to Packing Marsh (by Packing Shed Trust?) and 180m to the west of Cob Marsh + nav. beacon (Jim Pullen?). Fencing needs to be in place before recharge commences. (See Appendix 2).

Tender/contract to provide and place navigation marker withies every 50m (18 in total) to centre line of design cross section for length(s) of recharge locations.

Tender/contract for surface elevation (and fixed point photography) pre placement and 5 years post placement and silt deposition – landward of Cob, Old Hall and Tollesbury every 6 months for year 1 then every year for 3 years.

Tender/contract for bathymetric survey immediate post placement then annual for 3 years.

Tender/contract for invertebrate survey once only in August/September 3 years after placement. (See Appendix 3).

MOU between MHPT and RSPB for bird monitoring and bird annual report. Bird overwintering feeding Cobmarsh and Old Hall inside recharge bunds 2 years pre placement and 3 years post. Nesting (all sites) 1 year pre placement on earlier EA recharge and 3 years post on all sites. Roosting post placement (earlier EA and new sites) annually over 3 years.

MOU with oystermen for turbidity monitoring (see 6 below. Required pre and post monitoring for Monitoring/Turbidity) and to ensure that an oysterman is on board the dredger at each cargo delivery. This was the oystermen's request for MMO conditions.

Tender/contract/in house archaeology walk over of the area affected and preparation of the archaeological Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) must be submitted to the MMO **at least** 6 weeks prior to commencement of works.

In-house brushwood fencing condition report monthly for first 3 months and then quarterly for 5 years plus pre and post storm event checks.

Tender/contract (with Carol Reid - carolreid311@btinternet.com) for assimilation of monitoring results into one report for MMO and other regulators.

2. ON SITE PRACTICAL WORK NEEDED – all at least 6 weeks prior to dredger starts work

- Construction of brushwood containment fences to Packing Marsh and Cob Marsh. Latter must have navigation beacon.
- Placing of navigation beacons/withies with marker tape and top black flags.
- Provision of boat and safety gear/equipment for visits to and contact with dredger including phone numbers of dredger skipper and HHA, and possible use of boat for RSPB bird surveys and contractor invertebrate surveys or other regulator/interest groups access.
- Walk over archaeological survey. **Must be complete and submitted to MMO 6 weeks before start.** (It is hoped to complete this in 2019).
- Trial and baseline turbidity monitoring.
- Annual erection of notices NO LANDING BETWEEN 1 APRIL AND 1 AUGUST TO PROTECT NESTING BIRDS (with RSPB).
- The removal or sinking of existing mooring buoys to enable access for the dredger to Packing Marsh.
- All of the above will require a H & S assessment and risk management plan.

3. MHPT - MMO LICENCE CONDITIONS – LICENCE NUMBER L/2018/00131/1

Returns and reports to be submitted through MHPT “workbasket” online.

MMO CONTACTS

Ms Ellie Noble +44 (0)2082 257 929 ellie.noble@marinemanagement.org.uk

Except where otherwise indicated, the main point of contact with the MMO and the address for email and postal returns and correspondence shall be: Marine Management Organisation Lancaster House Hampshire Court Newcastle upon Tyne NE4 7YH Tel:0300 123 1032 Fax:0191 376 2681 Email: marine.consents@marinemanagement.org.uk

Any references to any local MMO officer shall be the relevant officer in the area(s) located at: Marine Management Organisation, Pakefield Road, Lowestoft, Suffolk NR33 0HT Tel: 01502 573149

Local MMO office has also asked for a site visit when works start. Contact Sara.Wordley@marinemanagement.org.uk and phone 01255 50897.

LICENCE FOR

Sand and gravel foreshore recharge to address coastal erosion in the Mersea Harbour area and Tollesbury Wick frontage. Material will be sourced from the planned Harwich Haven Approaches capital dredge. A total of 98,000 cubic metres of material will be transported to the proposal area and distributed to the receptor sites.

LICENCE HOLDER

The licence holder is the person or organisation set out below: Company name The Mersea Harbour Protection Trust Company registration number 1159088

Address 10 Brickhouse Close, West Mersea, Colchester, CO5 8LA Contact within company Mr Richard Taylor Position within company, Trustee.

LICENCE DATES

Licence date Version 1 Licence start date 01 March 2018 Licence end date 31 December 2028 Date of original issue 26 March 2018.

TYPE OF MATERIAL

PSA analysis shows trial pit sites 29, 30, 32 and 68 appear to comprise gravel to sand ratios that are best suited for the recharge project (see ‘Table 3’ below – ref: MHPT Response to queries raised by consultees, advisers and the MMO review of licence application MLA/2016/00386).The licensee is therefore advised to obtain material from these sites to create recharge deposits that are more resilient to wave attack.

Table 3. Gravel to sand ratios in trial pits 29, 30, 32 and 68	
Trial Pit	Gravel to sand ratio
29	4:1
30	5:4
32	3:1
68	11:9

4. ISSUE OF LEGAL NOTIFICATIONS

MMO

Where the conditions of the licence require you to submit returns to us, **you must** ensure these are submitted in accordance with the timescales set out in the licence and via the Marine Case Management System: http://bit.ly/MMO_MCMS.

NATURAL ENGLAND

The licence holder must submit a monitoring report summarising the above to the MMO and Natural England at the end of the first year of the works and every year thereafter until the end of the works. Don't have to notify EA re monitoring.

Notify NE Essex team: Chris.Keeling@naturalengland.org.uk (lead advisor for Blackwater Estuary SSSI) or Rebecca.Korda@naturalengland.org.uk otherwise contact through <https://www.gov.uk/government/organisations/natural-england#org>

ENVIRONMENT AGENCY

There is no need for an EA flood risk activity permit, reference:

: Rumsey, Darren [mailto:darren.rumsey@environment-agency.gov.uk]
Sent: 24 May 2018 14:08
To: carolreid311@btinternet.com
Subject: RE: Environmental permit enquiry re MMO licensed activity - beneficial use of dredgings Mersea Harbour, Essex

Hello Carol,

I have received your email and reviewed the information on the website and confirm there is no requirement for a flood risk activity permit for the proposed works.

If you have any further questions on this matter don't hesitate to ask.

Kind regards

Darren

CROWN ESTATES

The Crown Estate is affected by part of the proposed works and landowner's consent is required. The applicant is requested to contact the Crown Estate's

Managing Agent for the area: Peter Riches of Morley Riches & Ablewhite on 01206 505707, peter@mrallp.co.uk regarding consent to the proposed activity. (See Appendix 4).

LITTLE TERN GROUP

With regard to the timing of the works, we would advise the applicant liaises with the Little Tern Group, who actively monitor the recharge sites for breeding Little Tern. The Little Tern Group have up-to-date records for breeding Little Tern on Cobmarsh Island, Packing Shed Island at Tollesbury Wick and Old Hall Marshes. This data will be very useful for the applicant when planning the timing of the recharge. Contact kieren.alexander@rspb.org.uk

MALDON DISTRICT COUNCIL

The Environmental Health Team of Maldon District Council has advised that once the project starts, they will require contact details of those with direct control for the operations so that any complaints can be addressed promptly. It would also be of assistance for the council to receive regular notifications of the phases of the scheme. The Environmental Health Team can be contacted through the main Maldon District Council portal - 01621 854477, contact@maldon.gov.uk. (Although Colchester BC have no specific requirement it may be politic to notify them).

5. CONDITIONS OF LICENCE

ALL SITES:

MMO

The licence holder must notify the MMO prior to the commencement of the first instance of any licensed activity. This notice must be received by the MMO no less than five working days before the commencement of that licensed activity.

The licence holder must notify the MMO in writing of any vessel being used to carry on any licensed activity listed in section 4 of this licence on behalf of the licence holder. **Such notification must be received by the MMO no less than 24 hours before the commencement of the licensed activity.** Notification must include the master's name, vessel type, vessel IMO number and vessel owner or operating company. The licence holder must ensure that a copy of this licence and any subsequent revisions or amendments has been read and understood by the masters of any vessel being used to carry on any licensed activity listed in section 4 of this licence, and that a copy of this licence is held on board any such vessel.

Invasive Non Native Species (INNS) – a biosecurity risk assessment must be sent to the MMO 6 weeks before work starts. NB control of INNS rest mainly with HHA (see under Environment Agency below and emails in Appendix 8), but MHPT must survey and report on alien species already in the harbour/Blackwater – See also Appendix 8

It would be helpful if the fishermen and oystermen and leisure users could check mooring buoys and ropes, hulls and piles and report anything unusual (not listed above) because the more we know about what species have already moved in, the better. Also look out for anything unusual on the foreshore or found in the sediment.

ENVIRONMENT AGENCY

AS MAIN FUNDERS FOR THE PLACEMENT THE EA MUST HAVE EARLY NOTICE TO ARRANGE CONTRACTS WITH HHA.

(All dredging activities must adhere to the Environment Agency check-clean-dry code of practice. For information contact the Environment Agency on 03708 506 506, or visit the Great Britain Non-Native Species Secretariat website - [http:// www.nonnativespecies.org/checkcleandry](http://www.nonnativespecies.org/checkcleandry) The licence holder must provide a document to the MMO demonstrating how the activities adhere to this guidance. This document must be submitted to the MMO 6 weeks prior to the commencement of the licenced activities. The licensed activities must not commence until written approval is provided by the MMO. ***(under review and awaiting further guidance)***

ARCHAEOLOGY

An archaeological Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) must be submitted to the MMO **at least 6 weeks before any activity commences**. The licensed activities must not commence until written approval is provided by the MMO. All activities must adhere to the terms of the WSI and PAD.

HM COASTGUARD

The licence holder must ensure that HM Coastguard, in this case nmoccontroller@hmcg.gov.uk , the National Maritime Operations Centre is made aware of the works **prior to commencement**.

NOTICE TO MARINERS

The Licence Holder must ensure that local mariners and fishermen's organisations are made fully aware of the activity through local notice to mariners. The MMO must be sent a copy of the notification within 5 days of issue.

HYDROGRAPHIC OFFICE

The licence holder must notify The Source Data Receipt team, UK Hydrographic Office, Taunton, Somerset, TA1 2DN (Email: sdr@ukho.gov.uk ; Tel: 01823 337900) **of commencement of the licensed activities, no later than 5 working days prior to commencement**. Any changes to the coastline and depths will also need to be sent to the Hydrographic Office when the works are complete. A copy of the notification must be sent to the MMO within one week of the notification being sent.

OYSTERMEN

Oysterman on board dredger for disposal start on the ebb.

NATURAL ENGLAND/RSPB BIRDS

No work if nesting birds. NB depending on programme may require prevention of nesting birds. *TAKE ADVICE OF RSPB.*

See link to Natural England's standing advice on protected species re birds and excerpt below about preventing birds from nesting (standing advice on protected bird species has to be followed whether a condition in the licence or not).

<https://www.gov.uk/guidance/wild-birds-surveys-and-mitigation-for-development-projects>

Mitigation: prevent birds nesting (from NE standing advice)

If you can't change the timing or location of your activity to avoid affecting birds, you can prevent birds from nesting, but only outside the breeding season. Confirm birds aren't using the location with a survey first.

You can prevent birds nesting by using deterrents they can see or hear, eg tapes or flashing lights.

Where birds are displaced or affected by development the success of mitigation should be measured using post-development monitoring.

Where birds are displaced by development, especially Section 41 birds and red and amber listed species, a suitable amount of replacement habitat should be considered.

<http://publications.naturalengland.org.uk/publication/4958719460769792?category=10002>

The licence says:

"The programme of works for the delivery of dredgings for beneficial use will depend on Harwich Haven Authority's dredging time table. If working continuously, the dredger could potentially deliver 2 cargoes per 24 hours. Over the four recharge proposal sites the placement of recharge could be completed in about 12 weeks. However, there may be downtime within the recharge programme depending on the dredge schedule. Downtime will need to be factored into the schedule at times of bird nesting, within or adjacent to the placement site".

No work if very, very cold – see wildfowling bans/NE guidance. 13 consecutive days of freezing weather.

[No licensed activities shall take place during any periods of severe winter weather prolonged enough to trigger a voluntary or statutory suspension of wildfowling, known as a 'winter wildfowling ban' or 'severe weather alert for the shooting of wildfowl and waders'. Information on when these are in force can be found on both the Joint Nature Conservation Committee \(JNCC\) and The British Association for](#)

[Shooting and Conservation \(BASC\) websites. In the event of a stoppage, work can resume after three days of continuous temperatures over 0 degrees Celsius.](#)

NAVIGATION FOR PLACING MATERIAL

Marker withies every 50m (18 in total) on line of recharge with reflector tape for night time delivery and black flag on top for day time delivery. Have double reflector tape at final placement design height of +3.50m ODN. For Lat/Long coordinates see MMO Licence 3 schedule and Appendix 6 below. ***NB construction will not be precise to cross section as not possible from dredger, so aim for rough approximation.***

QUANTITIES FOR EACH LOCATION

Packing marsh – 5k m³ over 45m . **Brushwood fence 70m long constructed before material placed.**

Cob – 48k m³. Over 410m. **180m brushwood fence.**

Old Hall 40k m³. Over 308m.

Tollesbury Wick 5k m³. Over 45m to eastern end.

6. REQUIRED PRE AND POST MONITORING – see MMO Licence Schedule 8 (Appendix 5 for estimated costs)

Surface elevation (and fixed-point photography) all sites – pre-placement and immediately post placement then every year for 5 years.

Bathymetry all sites– immediately post placement then every year for 3 years.

Silt deposition – landward of Cob, Old Hall and Tollesbury recharge every 6 months for year 1 then every year for 3 years.

Invertebrates all sites – Once only in Aug/Sept for 3 years after placement.

Birds feeding overwintering (**by RSPB**) – Cob and Old Hall inside bunds record on 2 separate occasions between Oct and March over 2 seasons prior to placement + over 3 years after placement.

Bird nesting (**by RSPB**) all sites, all bird species earlier EA recharge sites 1 season prior to recharge + on earlier sites and new recharge sites annually over 3 years after recharge placement in June and July with particular reference to Little Terns.

Bird roosting (**by RSPB**) all new recharge sites and earlier EA recharge post recharge placement annually over 3 years with 2 counts between October and March at high tide.

(Re bird survey: Bird report could refer to the ES and include data provided here about current use of EA recharge - section 5.3.6 breeding birds, Section 5.3.7.3 - high tide roosts. Plus feeding counts were undertaken at Cobmarsh and Old Hall foreshore Section 5.3.7.1i Tables 10 & 11.)

Turbidity **(by oystermen)**– to private oyster beds in harbour creeks and grounds south of Mersea – pre placement -water samples at fixed locations 2 hours after start of ebb during calm and easterlies as baseline. Post early recharge placement only. Discussions with oystermen in annual monitoring reports.

Turbidity monitoring:

Two baseline measurements will be required taking samples in calm and not so calm conditions. Samples will be collected during disposal of the early loads.

Turbidity as a surrogate for considering potential for sedimentation on oyster beds. To assess any increase in turbidity, from an established baseline and the potential for silts to settle on private oyster beds and the free grounds during discharge of early loads. Private oyster beds in the harbour creeks and the grounds south of West Mersea. Water samples will be taken at fixed locations for testing within 2 hours of the start of the ebb tide both during calm conditions and during easterly winds to obtain a baseline. Sampling during the early discharge of material to compare with baseline along with monitoring, by the oystermen, of oyster beds for silt settlement. Any significant increase above baseline levels may require a change to the discharge regime. Recording of discussions with oystermen and mitigation measures employed to be included in the annual report.

See a very simple way of measuring turbidity in water samples, below.

https://www.youtube.com/watch?v=Vk_bEFHA2KQ

Instructions for making a turbidity tube below:

<https://www.youtube.com/watch?v=IxU2fcKk3Jw>

The turbidity unit of measurement is NTU (Nephelometric Turbidity Unit). This is the official unit of measurement to quantify how much light is scattered due to the suspended sediments. The Turbidity Conversion Chart (link below) converts the measured value in cm to NTUs.
<https://extension.usu.edu/utahwaterwatch/monitoring/field-instructions/turbidity/turbiditytube/turbiditytubeconversionchart>

Retention of recharge – Cob and Packing Marsh only – **condition of brushwood fencing to be checked monthly for the first 3 months post placement and quarterly thereafter.** Maintenance and/or extension if required.

7. CRITICAL PATH OVERALL PROGRAMME (start 6 months before recharge starts)

item	Year 1 first half	Year 1 second half	Year 2	Year 3	Year 4	Year 5	Year 6
Inform EA	---						
Press notice/public meeting	-----						
MOU EA/RSPB/oystermen	-----						
Tenders/contracts for fencing, navigation markers, surface elevation, (and fixed point photography) bathy, inverts after year 3 only, archaeology, annual reports	-----	---					
Erect fencing, navigation markers, no landing signs		---					
Notifications to MMO, NE, EA, CE, LTG, MDC, CBC, coastguard, mariners, hydro office, oystermen	---						
Manage recharge material placing		-----					
Monitoring and annual reports	--	-----	-----	-----	-----	-----	-----

8. CRITICAL PATH PROGRAMME MONITORING (starts 2 years before recharge for over wintering feeding birds)

item	Minus 2	Minus 1	Year 1 place	Year 2	Year 3	Year 4	Year 5	Year 6
Surface elevation and fixed point photos			-	-	-	-	-	-
Bathy			-	-	-	-		
Siltation landward			-	-	-	-		

Birds winter feeding Oct & March	-	-	-	-	-	-		
Birds nesting June & July		-	-	-	-	-		
Birds roosting at high tide Oct & March			-	-	-	-		
Turbidity		-	-					
Brushwood fence condition each quarter			-	-	-	-	-	-
Annual report			-	-	-	-	-	-

NB – if MMO accept Year 1 placement as first year of monitoring then ignore year 6. Will depend on time of year recharge placed i.e. if early in year then probably only need to go to Year 5. Bathy and surface elevations need doing ASAP after placement to obtain baseline.

All bird monitoring by RSPB. All turbidity monitoring by oystermem. Brushwood fence condition by MHPT volunteers. All other monitoring by contractors. Annual report by consultant Carol Reid.

APPENDIX 1 Recharge cross section for placing.

NB The dredger cannot discharge/place to precise cross sections, only approximate. Do not worry about this as natural wave action will move and shape the material.

MLWN - 1.3M ODN. MHWST +2.8M ODN. HAT +3.3M ODN.

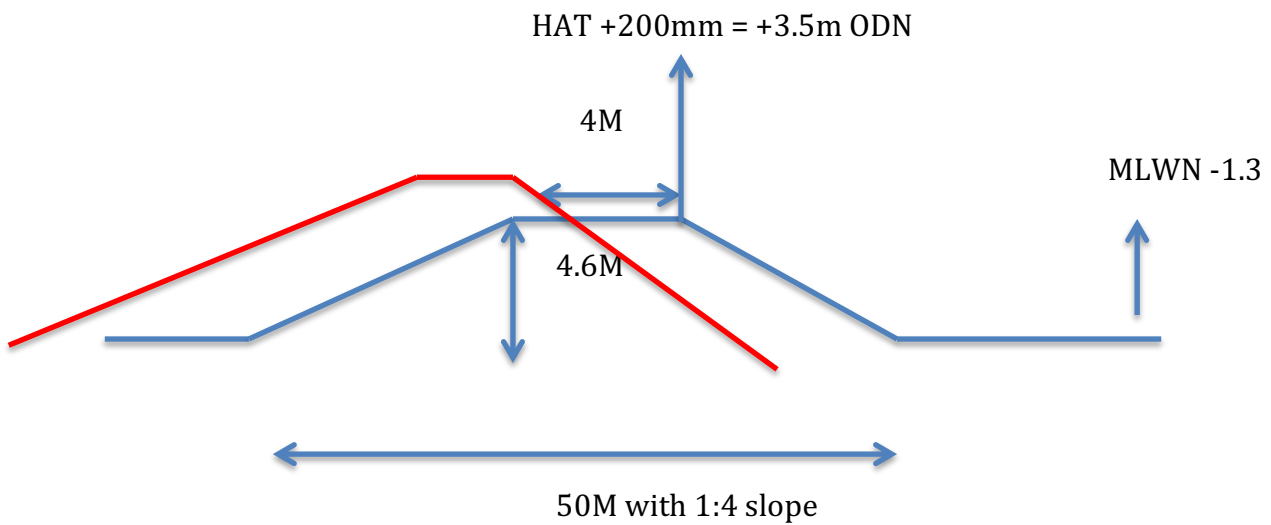
COB MARSH LENGTH 410M + INCLUDING shore connector to west
OLD HALL LENGTH 308M

PACKING MARSH LENGTH 45M
TOLLESBURY WICK 45M TO EAST END + top up existing low spots

VOLUME PER M LENGTH FROM C/S 1 BELOW = 128M³

COB = 48K M³
OLD HALL = 40K M³
PACKING MARSH = 5K M³
TOLLESBURY WICK = 5K M³ to east end
TOTAL 98K M³

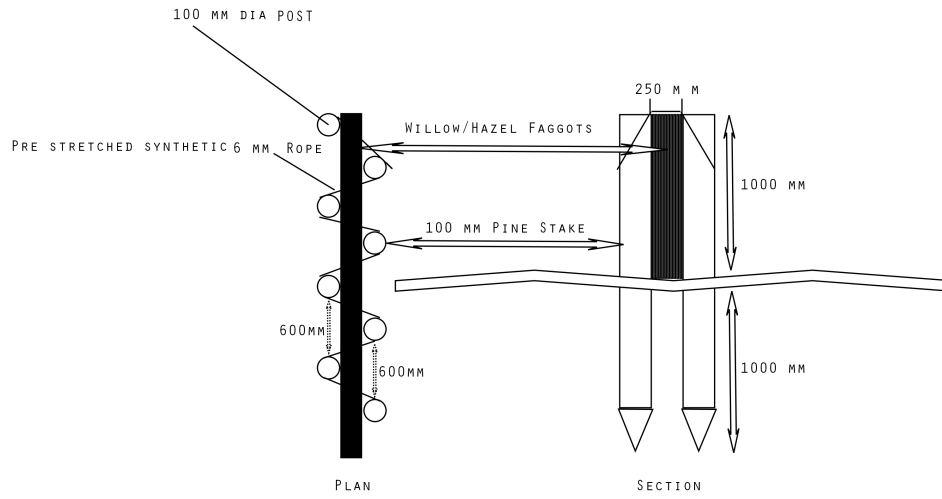
TYPICAL C/S 1



FINAL DESIGN– Post placement expected changes depending on onshore episodic storms

APPENDIX 2 Brushwood fence design

TYPICAL DETAIL OF BRUSHWOOD GROUYNE (POLDER)



Example:

THE MERSEA HARBOUR PROTECTION TRUST

Jane Dixon (Trust Secretary)
154A Coast Road
West Mersea
Essex
CO5 8NX
01206 384257
Email: janedixonis@gmail.com

Charlotte Newberry BSc (Hons)
Marine Operations Manager
Thomson Ecology Ltd
Compass House
Surrey Research Park
Guildford GU2 7AG

11 July 2015

Dear Charlotte

Request for quotation for laboratory analysis of intertidal sediment core samples

Further to our telephone conversation on 10 July, we would be grateful if you could provide a quote for the work outlined below. I have also attached a description of the fieldwork we propose to undertake.

As I said on the phone, we might expect to collect a maximum of 30 intertidal sediment core samples for infauna analysis and 30 core samples for PSA.

We would require:

- Identification to species level, where critical to allow biotope determination, but to family level where this is less critical.
- Abundance data from the core samples and a description of methodology for sorting, treating and identifying species.
- Particle size analysis of sediment samples.
- A description of the sediment cores with information on % of silt, sand and gravel.
- It might also be helpful if you could provide a quote for the following options: i) data analysis ii) providing an indication of possible biotope type for each sample (without undertaking detailed data analysis).

Item	Cost
Identification to species level or family, as standard, per core sample	
PSA per sample	
Hire of 0.5mm sieve	
Hire of 0.01m ² core sampler	
Supply of industrial denatured alcohol	
Approx cost of courier for delivery of IDA and equipment	
Approx cost of courier for collection of samples	
Report preparation	
Indication of biotope type (to include in report)	
Cost of undertaking analysis of data (to include in report)	

Total cost	
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It would also be helpful if you could give an indication of turnaround times.

Thanks for your advice on the phone to prepare this. Please get back to me if you have any queries.

Yours sincerely



Carol Reid
Consultant ecologist for the Mersea Harbour Protection Trust

APPENDIX 4 Crown Estates Position

CROWN ESTATES POSITION ON RECHARGE

Email of 4 December 2014

Mark – it depends if these changes are transient or become permanent. Generally what we do prior to any recharge or realignment scheme is record the existing mhw boundary. If there are changes following a mad-made intervention and that do not fit the previous pattern, we will regard the change as a direct consequence of the intervention and rely on the earlier recorded boundary.

Peter Riches



Tel: 01206 505707 www.mrallp.co.uk Kings Court, Newcom
Morley Riches & Ablewhite manages the tidal land of The Crown E
London on behalf of Carter Jonas www.thecrow

APPENDIX 5 Monitoring cost estimate

MMO/NE CONSENT REQUIREMENT

NB all costs as estimated by specialist contractor and consultant and based on previous costs for similar work to same locations as part of the ES/EIA process already undertaken.

Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
Post placement invert survey			10			10
Post consent charges from MMO for "work on licence at £122.00 hour"	0.80	0.80	0.80	0.80	0.80	4
Digital surface modelling for changes above ODN and spatial redistribution (2 surveys in year1 pre and ASAP post placement)	6	2.25	2.25	2.25	2.25	15
Bathymetry changes below ODN and spatial redistribution	2.25	2.25	2.25	2.25		9
Silt deposition to measure accretion landward of recharge	0.50	1	0.50	0.50	0.50	3
Turbidity changes within oyster grounds	2					2
Report writing of monitoring results for regulators	0.80	0.80	0.80	0.80	0.80	4
Provision of materials for control structures	3				2	5
Total	15.35	7.10	16.60	6.60	6.35	52

APPENDIX 6 Placing coordinates

Packing Marsh North 51°46.4193'N 00°53.7285'E 51°46.4006'N 00°53.7251'E 51°46.4035'N 00°53.7319'E 51°46.4157'N 00°53.7414'E

Cobmarsh north-west 51°46.3089'N 00°53.8832'E 51°46.3038'N 00°53.8638'E

Packing Marsh Island 51°46.3945'N 00°53.7487'E 51°46.3978'N 00°53.7056'E 51°46.3658'N 00°53.6966'E 51°46.3635'N 00°53.7419'E 51°46.3945'N 00°53.7487'E

Cobmarsh Island 51°46.1883'N 00°54.1172'E 51°46.2135'N 00°54.0984'E 51°46.2046'N 00°54.0854'E 51°46.2013'N 00°54.0535'E 51°46.2148'N 00°53.9958'E 51°46.2451'N 00°53.9206'E 51°46.2603'N 00°53.8842'E 51°46.2936'N 00°53.8895'E 51°46.3050'N 00°53.8670'E 51°46.2475'N 00°53.8566'E 51°46.2125'N 00°53.9257'E 51°46.1881'N 00°53.9917'E 51°46.1731'N 00°54.0576'E 51°46.1883'N 00°54.1172'E

Old Hall 51°45.9176'N 00°53.5980'E 51°45.9397'N 00°53.5841'E 51°45.9044'N 00°53.4768'E 51°45.8518'N 00°53.3518'E 51°45.8286'N 00°53.3699'E 51°45.8789'N 00°53.4918'E 51°45.9176'N 00°53.5980'E

Tollesbury Wick 51°45.3234'N 00°52.9477'E 51°45.3234'N 00°52.9477'E 51°45.2421'N 00°52.8036'E 51°45.1655'N 00°52.6341'E 51°45.1401'N 00°52.6550'E 51°45.2013'N 00°52.7865'E 51°45.2298'N 00°52.8474'E 51°45.2975'N 00°52.9708'E 51°45.3234'N 00°52.9477'E

APPENDIX 7 Harwich Haven Authority approaches dredge 51°57.8668'N

01°16.7539'E 51°57.8665'N 01°16.7537'E 51°57.7562'N 01°16.9160'E 51°57.5482'N 01°17.3314'E 51°57.2210'N 01°17.7013'E 51°57.1848'N 01°17.7424'E 51°57.0778'N 01°17.8638'E 51°56.8889'N 01°18.2691'E 51°56.4704'N 01°18.4880'E 51°55.7151'N 01°18.5389'E 51°55.3973'N 01°18.9362'E 51°55.3454'N 01°19.5695'E 51°55.4362'N 01°21.0479'E 51°55.6630'N 01°22.8560'E 51°55.9142'N 01°27.3229'E 51°56.2298'N 01°30.4808'E 51°55.7598'N 01°32.5681'E 51°54.4958'N 01°33.4781'E 51°52.2053'N 01°33.1402'E 51°52.7138'N 01°33.9738'E 51°53.7896'N 01°33.9152'E 51°54.7538'N 01°34.2246'E 51°56.1761'N 01°33.2060'E 51°56.7603'N 01°30.6620'E 51°56.1329'N 01°27.0595'E 51°55.8749'N 01°22.4870'E 51°55.6457'N 01°20.9692'E 51°55.5507'N 01°19.7523'E 51°55.6206'N 01°19.2093'E 51°55.8864'N 01°18.8728'E 51°56.2065'N 01°18.8728'E 51°56.5315'N 01°19.0280'E 51°56.5192'N 01°18.9703'E 51°57.0648'N 01°18.6660'E 51°57.2567'N 01°18.4708'E 51°57.3702'N 01°18.2137'E 51°57.6560'N 01°17.5673'E 51°57.9656'N 01°16.8668'E 51°57.8668'N 01°16.7539'E

APPENDIX 8 Invasive Non Native Species (INNS)

Comparison of invasive non-native species (INNS) found in the Stour and Orwell Estuaries (ref: Thomson unico marine, 2016: Distribution of Marine Invasive Species in Harwich Haven (20102015) for Harwich Haven Authority Project No.: G-HWH-101-001 surveyed between 2010 - 2014) with species known to be present in the Blackwater Estuary.

Species	Found in Stour and Orwell	Found in Black water	Threat status		Reference notes
			Not considered to adversely impact native species/habitats/ commercial interests	Considered to adversely impact native species/habitats/ commercial interests	
<i>Ammothea hilgendorfi</i> (sea spider)	√ Stour estuary only	√	√	-	http://jncc.defra.gov.uk/page-1703 https://species.nbnatlas.org/species/NBNSY S0000179052
<i>Austrominius modestus</i> (Australasian barnacle)	√	√	-	√	Found on Cobmarsh Island foreshore during MHPT marine biotope survey – see Section 5.3.10 of Mersea Harbour Protection Trust recharge ES https://species.nbnatlas.org/species/NHMSY S0021006592
<i>Crepidula fornicata</i> (slipper limpet)	√	√	-	√	MMO guidance on slipper limpet: 'The release of slipper limpets to the sea is an offence and must be avoided in order to protect shellfish beds that are currently free of this species.' https://www.gov.uk/government/news/slipper-limpets-not-permitted-to-be-used-as-bait-or-disposed-at-sea https://species.nbnatlas.org/search/?q=crepidula+fornicata
<i>Ensis americanus</i> (<i>directus</i>) (American jack knife clam)	√	√	√	-	http://jncc.defra.gov.uk/page-1716 https://species.nbnatlas.org/species/NHMSY S0020826368
<i>Eusarsiella zostericola</i> (American ostracod)	√	√	√	-	This species was introduced unintentionally in association with the importation of American oysters (<i>C. virginica</i>) in the late 1870s. <i>E. zostericola</i> has a low rate of dispersal as juvenile stages are non-dispersive, although adults are capable of swimming. There are no known effects of this species on the environment or commercial interests (Thomson unico marine (2016)). http://jncc.defra.gov.uk/page-1707
<i>Grandidierella japonica</i> (Asian amphipod)	√	X	√	-	https://issuu.com/suffolknaturalistsociety/docs/tsns42j see page 52 about its spread https://species.nbnatlas.org/search/?q=Grandidierella+japonica
<i>Mya arenaria</i> (soft-shelled clam/sand gaper)	√	√	√	-	https://species.nbnatlas.org/species/NHMSY S0021054648#overview
<i>Petricola pholadiformis</i> (American paddock)	√	√	√	-	https://species.nbnatlas.org/species/NHMSY S0021006626#overview
<i>Ruditapes philippinarum</i> (Manila clam)	√	√	√	-	https://species.nbnatlas.org/species/NHMSY S0020745807
<i>Sargassum muticum</i> (wireweed)	√	√	-	√	Recorded in a trawl survey off the shore from Landguard Point in 2012 (Thomson unico marine, 2016). https://species.nbnatlas.org/species/NHMSY S0021058667
<i>Styela clava</i> (leathery sea squirt)	√	√	-	√	The leathery sea squirt was recorded in surveys within the Stour and Orwell estuaries in 2011 and 2012, at Landguard Point in 2012, and within a trawl survey undertaken at Felixstowe in 2011 (Thomson

					unico marine, 2016) https://species.nbnatlas.org/species/NBNSY_S0000178204
<ul style="list-style-type: none"> The majority of species in the table are also found at the confluence of the Stour and Orwell estuaries and at the mouth with the North Sea, offshore from Landguard Point. Exceptions to this are <i>M. arenaria</i>, <i>A. hilgendorfi</i>, <i>G. japonica</i> and <i>R. philippinarum</i> which have only been found within the estuaries. Only two species were recorded in the Inner Gabbard East surveys: <i>M. arenaria</i> and <i>E. americanus</i>. The Inner Gabbard East surveys were carried out approximately 35 km offshore from Harwich Haven in an area dominated by sediments with no hard structures to promote settlement of other species. Both these species burrow into sediments and can be found in very high densities. All of these species are likely to have been transported to the HHA area through shipping traffic, either as part of fouling communities on ship's hulls or within ballast water. However many species are also thought to have been introduced to European and British waters unintentionally with commercial introductions of oysters and may have dispersed further once settled. Note: none of the species listed in the table are considered to be alert species and the Non-native Species Secretariat have not developed Action Plans to help coordinate a nation-wide response. 					Thomson unico 2016.

It would be helpful if the fishermen and oystermen and leisure users could check mooring buoys and ropes, hulls and piles and report anything unusual (that has not been recorded to date in the Blackwater – see table above) because the more we know about what species have already moved in, the better. Also look out for anything unusual on the foreshore or found in the sediment.

But particularly look out for the following species alert issued as part of GB rapid response protocol:

Carpet sea squirt – *Didemnum vexillum* (of particular concern). No records for Blackwater at present.

Refer to <http://www.nonnativespecies.org/alerts/index.cfm> - these are the species alerts.

<https://www.gov.uk/government/news/slipper-limpets-not-permitted-to-be-used-as-bait-or-disposed-at-sea>

Emails regarding INNS:

From HHA John Brien Harbour Engineer to Carol Reid:

It would seem that some level of INNS assessment is likely to be required for your or any beneficial disposal proposal. It would therefore seem likely that we will have to do at least something to cover this risk.

At this stage, I would be a little reluctant to commit us to some specific survey requirement. There would also be little point in doing it a significant time before the material might be dredged, as I guess they will be seeking recent data.

I think we would be OK with you saying that HHA will undertake appropriate survey and assessment in due course to ensure that key INNS are not present in the dredge areas. (Just bear in mind that if they are – we won't be able to do anything about it and the disposal simply won't happen!)

Email 24/3/19 from Carol Reid

Richard and Mark

Attach invoice for recent work on biosecurity measures. I mentioned that HHA had not considered this and John Brien agreed to follow up with their consultants, Royal Haskoning. If MHPT (or EA) are contracting HHA then the contract needs to state very clearly that biosecurity measures must be met by the supplier. The MMO licence condition below refers to the check/clean/dry code, which is wholly inappropriate for the recharge work. Hopefully, the information sought to satisfy the licence condition for disposal will come in the form of a biosecurity risk assessment carried out by Royal Haskoning covering the dredger itself and the recharge material for onward journey to disposal sites – to Mersea and to offshore sites. I imagine, this will also have to be a condition of the HHA licence and we will wait to hear back from John Brien about how this is being tackled. Note that there is a lead-in time for MMO to be satisfied that this condition is met.

Mark, I didn't get a chance to go through the Succession Management Plan last week, had invoices to get out and job to complete. Next week looks a little less congested so I will be looking at this. I intend to go through this carefully – I'm sure it's all there but it is as well to be reassured. I will add recent response from John Brien re biosecurity.

'All dredging activities must adhere to the Environment Agency check-clean-dry code of practice. For information contact the Environment Agency on 03708 506 506, or visit the Great Britain Non-Native Species Secretariat website - <http://www.nonnativespecies.org/checkcleandry>

The licence holder must provide a document to the MMO demonstrating how the activities adhere to this guidance. This document must be submitted to the MMO 6 weeks prior to the commencement of the licenced activities. The licensed activities must not commence until written approval is provided by the MMO.

Reason:

To minimise the introduction, and restrict the spread, of invasive non-native species which may occur through dredging activities.'

Carol

