Aberdeen Harbour Maintenance Dredging Works
Method Statement

AHB will engage a dredge contractor to carry out the maintenance dredging works which will comprise of Trailing Suction Hopper Dredging and Bed Levelling operations within Aberdeen Harbour with dredged material disposed of at the licenced Sea Disposal Site CR110.

All works will be carried out in accordance with the requirements of Aberdeen Harbour Board (AHB), Marine Licence conditions and relevant legislation.

Prior to commencement of operations, appropriate risk assessments will be undertaken.

The dredge contractor's Trailing Suction Hopper Dredger (TSHD) will undertake the dredging, transportation and disposal of dredge material and will operate 24 hours per day 7 days per week

The dredge contractor's Bed Levelling vessel will be employed to support the TSHD, levelling off any high spots/ridges left by the TSHD, and will operate 12 hours per day 7 days per week.

In addition to this, the AHB Sea Herald vessel will be used to carry out pre-dredge, interim and post-dredge surveys along with bed levelling operations to further support the contractor's dredging plant and will operate 8 hours per day 5-7 days per week.

The annual maintenance dredging campaign is anticipated to be carried out once a year, however, there have been occasions in the past where a winter dredging campaign has been required due to inundated accretion of material in the Navigation Channel and River Dee caused by severe winter storms.

It is expected that the annual maintenance dredging campaign will typically be carried out in spring each year, after any winter storms, depending on the availability of dredging plant and the duration of the campaign will vary from three to four weeks depending on the dredge volumes required to be removed.

The order of areas to be dredged will be as follows – subject to operational restrictions:-
Priority 1 – Dredge Area B (River Dee)
Priority 2 – Dredge Area C (Tidal Harbour / Telford Dock / Victoria Dock / Upper Dock / Albert Basin)
Priority 3 – Dredge Area A (Navigation Channel)

The following hydrographic surveys will be carried out for each maintenance dredging campaign:-
Pre-dredge survey - to be carried out prior to commencement of dredging operations in order to establish areas and in-situ volumes required to be dredged.

Interim surveys – to be carried out throughout the dredging works to monitor dredging progress.

Post-dredge survey – to be carried out upon completion of the dredging works to show dredge levels achieved and in-situ volumes removed.

Trailing Suction Hopper Dredger (TSHD) General Method Statement:-

Dredging is an excavation activity or operation carried out at least partly underwater with the purpose of gathering up seabed sediments and disposing them at a different location.
The Trailing Suction Hopper Dredger (TSHD) will be the main dredging equipment to be deployed to dredge and dispose of dredge material at areas required to be dredged at Aberdeen Harbour in order to maintain working depths to ensure the safe operation of the port. The TSHD is a vessel that is suited for deep-sea navigation with the ability to load into its own hold, called the hopper, by means of centrifugal pump(s) and suction pipe(s).
TSHDs are not stationary dredgers they are required to sail (trail) during dredging operations.
Each cycle of consecutive operations is called a trip, the sequence of each trip is displayed below and will go on continuously for 24 hours per day 7 days per week until the required dredge volume has been sufficiently removed from all scheduled dredge areas:-

Sequence of TSHD Trip:

1. **Dredging (loading)** (average dredging time per load expected = 1 hour 20 minutes)
2. **Sailing full** (average sailing time per load expected = 30 minutes)
3. **Disposal (unloading)** (average disposal time per load expected = 10 minutes)
4. **Sailing empty** (average sailing time per load expected = 30 minutes)

The average time for one load per trip is expected to be 2 hours 30 minutes depending on accessibility of the area, local conditions (currents, wind, waves, etc), type of material being dredged, marine traffic and any other delays.

1. Dredging (loading):

Once arrived in the required dredge area the TSHD will start dredging, this will mark the start of the dredge trip, loading fill material from the seabed into the hopper (hold).
The TSHD will reduce speed and lower the suction pipe overboard. The draghead at the end of the suction pipe will be kept above the seabed until the scheduled dredging area has been reached. Once near to the desired dredge area, the dredge pumping system will be started whereby the seawater will be taken in. The flow of seawater is created as the draghead is touching the seabed hereafter the loading of the hopper starts. The fill material will be transported by the flow of seawater into the hopper. During this process, the position of the draghead will be controlled both horizontally and vertically to achieve the desired dredge level.
While dredging, the TSHD will sail very slowly at a speed of 1 to 2 knots, depending on the dredge location, surrounding marine activities, sea condition and material being dredged. Due to the speed of the vessel, the draghead will loosen the seabed sediments. This way a mixture of sediments and water will be sucked up into the suction pipe, which will be loaded into the hopper, creating troughs in the seabed at the required dredge level along the sail track. Water-jets in the draghead, can assist in loosening stiff seabed sediments if required, hence optimising the production.

The sailing tracks of the TSHD will be optimised for each load in order to maximise production and minimise manoeuvring time.

The position of the draghead and suction pipe can be checked by the following measurements:

- Measuring the angle from the vessel in combination with the draught and trim of the vessel.
- Measurement devices mounted on the draghead and suction pipe will indicate the angles of the separate portions of the suction pipe.
- Depths of the different portions of the suction pipe will be determined by using pressure readings from specially installed sensors.

A TSHD has a certain load it can carry. This depends on sediment characteristics such as in-situ density, particle size distributions and other parameters. The quantity that can be loaded into the hopper is limited by volume and / or weight, given the TSHD's specifications, or is a result of an optimisation to determine the most economical loading time.

The production of a TSHD and time required for filling up the hopper and the load per trip will vary depending on many factors:- sediment characteristics such as in-situ density, particle size distribution, dredging depth, weather conditions, sailing distance, marine traffic, tides, currents, etc.

2. Sailing Full:

When the hopper is fully loaded, the dredge pumping system will be shut off and the draghead will be raised. The suction pipe will be hoisted and secured on board.

After loading the dredge contractor will measure the volume of dredge material in the hopper on every trip. The volume will be measured as the sum of the volume of settled solids and the volume of suspended solids. The settled solids will be measured by 1.2t/m^3 density hemisphere soundings from six representative positions in the hopper to obtain the average depth, with the volume of settled solids being obtained by reference to the TSHD's ullage table. The volume of the suspended solids will be measured by taking a mid-liquid representative sample, which will be left to stand in an undisturbed condition for 24 hours, at which point the proportion of settled solids to clear liquid will be measured in the sample jar. This ratio of solids to liquid will be applied to the volume of liquid in the hopper from the load from which the sample was taken.

The TSHD will leave the harbour area and proceed to travel to the Sea Disposal Site CR110. The TSHD will follow the travel route shown on the Transport Plan on the Marine Licence to and from the Sea Disposal Site recording all marine mammal sightings if present or not.

During sailing the hopper will remain closed with watertight bottom doors.

3. Disposal (unloading):

On arrival at the Sea Disposal Site the TSHD will reduce speed to a maximum of approximately 2 knots. Once the TSHD is in the correct location the bottom opening doors of the hopper will then be slowly opened to allow disposal of the dredged material from the hopper. When the hopper is empty, the bottom doors will be closed.

The dredge contractor will ensure that a dedicated watch will be kept by a member of their staff following the general guidance for, and acting in the role of, a MMO. A watch will be undertaken on approach to the Sea Disposal Site and prior to disposal commencing to ensure that no marine mammals are sighted within 200 metres of the authorised disposal area. If marine mammals are observed within this area then disposal operations shall be ceased until the area has been clear for at least 20 minutes. The dredge contractor will ensure that a formal log is maintained, whether or not marine mammals are sighted and the completed logs will be returned to the licensing authority.

4. Sailing empty:

After disposal of the load in the Sea Disposal Site the TSHD will start to sail back towards the harbour for the next load. Arriving back in the harbour to the next dredge area will mark the end of a dredge trip. The sailing time, both full and empty will depend on traffic speed limits, marine traffic, currents, tides, weather conditions, sailing distances, etc.

Bed Levelling Method Statement:-

The bed levelling vessel(s) will be deployed in all areas where the TSHD has dredged and will level off any high spots and ridges left by the TSHD by shifting the material into areas of suitable over depth or troughs created by the dredging operation of the TSHD. The bed levelling vessel(s) will also be deployed in all areas where the TSHD is unable to effectively dredge (for example where it has limited or no manoeuvring area or restricted water depth) and will shift the material to a location where it can be dredged by the TSHD. The bed levelling vessel(s) will also level areas too small to warrant the use of a TSHD.

1. The plough box will be suspended overboard aft of the bed levelling vessel on one or more wires which are guided by one or more sheaves to the winches which vertically control the plough box.

2. The bed levelling vessel will sail to the required dredge area and once on location will lower the plough box to the required dredge level.

3. Once the plough box is set to the required dredge level, the bed levelling vessel will proceed to move forward to shift the seabed material with the plough box, aiming to shift the material at high spots and ridges into areas of suitable over depth or troughs created by the TSHD dredging. The plough box will be lowered in small vertical increments, usually 100mm increments, to gradually shave layers of high spots and ridges down to the required maintained dredge level in order to minimise dispersal of seabed sediments into the water column. When levelling over an area dredged by a TSHD, the bed levelling vessel will sail short tracks perpendicular to the TSHD dredge tracks shifting small layers of the high ridges into the troughs created by the TSHD dredging and will continue to do this for the full length of the TSHD dredge tracks until the required maintained dredge level has been achieved.

4. Once the bed levelling vessel has completed the bed levelling in a dredge area, the plough box will be raised up out of the water and the bed levelling vessel will sail to the next scheduled dredge area. This bed levelling process will continue until the required maintained dredge levels have sufficiently been achieved in all scheduled dredge areas. Interim surveys may highlight the need for further bed levelling works to be carried out in an area where the bed levelling vessel has levelled previously, If this occurs then the bed levelling vessel will return to the area to complete the bed levelling works.

Your ref: D.1/1/1 Aberdeen Harbour
Our ref: KM-1-5/CE/AR/VC
dd: 01224 974131
df:
e: [Redacted]
Date: 14 September 2015

Aberdeen Harbour Board
16 Regent Quay
Aberdeen
AB11 5SS

FAO: I[Redacted]

BIDWELLS

5 Atholl Place
Perth PH1 5NE
t: 01738 630666
f: 01738 627264
bidwells.co.uk

www.thecrownestate.co.uk

Dear Sirs

The Crown Estate
Proposed Maintenance Dredging and Dumping – Aberdeen Harbour

I refer to your letter of 31 July 2015 and would advise that The Crown Estate consents to Aberdeen Harbour Board ("You") carrying out maintenance dredging of material from Aberdeen Harbour Approaches and dumping of material dredged from Aberdeen Harbour and the Harbour Approaches within 0.25 nautical mile radius of the co-ordinates 57° 07.00'N, 002° 00.00'W ("the Dumping Ground"), on the following terms and conditions:-

1. Notwithstanding the dates hereof, this consent will commence on 01 September 2015 and subsist for a period of 5 years until 31 August 2020.

2. Material dredged from the areas detailed above will be deposited at the Dumping Ground. However, not more than 250,000 cubic metres per annum of dredged material will be dumped.

3. All other necessary consents are to be obtained including those of Marine Scotland under the Marine (Scotland) Act 2010. It is also Your responsibility to ascertain whether the proposed works might have an impact on Scheduled Ancient Monuments lying on the seabed or foreshore which are protected under the Ancient Monuments and Archaeological Areas Act 1979, or on historic wrecks designated under the Protection of Wrecks Act 1973. In either case, or in case of doubt, You should consult Historic Scotland, who can provide further information.

4. You are to indemnify The Crown Estate against all costs, claims, demands, proceedings, actions or expenses which may arise as a consequence of the dredging and dumping and/or associated works.

5. In the event that You wish to dump more than the annual authorised amount, You must first notify us in writing to request The Crown Estate's consent to increase the amount of material to be dumped.

6. In the event that You wish to use beneficially any material dredged from the Harbour Approaches (rather than dumping it at the Dumping Ground) You will first notify us in writing at the address shown above and shall pay The Crown Estate a reasonable mineral royalty for all material so used.. No material dredged from the Harbour Approaches (or elsewhere within The Crown Estate ownership) may be used beneficially until a reasonable mineral royalty rate has been agreed.

For further information on The Crown Estate or for guidance on application procedures and relevant contacts please visit: www.thecrownestate.co.uk

7. Material proposed to be used for other purposes, such as beach nourishment or reclamation will be subject to separate agreement to be documented directly with the receiving Authority or organisation who will be responsible for royalty payments to The Crown Estate.

8. Dredging deeper than currently agreed or historically established depths will be considered to be "capital dredging" and will be subject to a separate agreement with The Crown Estate.

9. This consent is subject to the payment of £500 in acknowledgement of The Crown Estate's proprietary rights and interests in the seabed affected by the maintenance dredging and dumping and £30 in respect of plan costs.

Assuming that you are in agreement with the foregoing terms, please sign the Form of Acceptance on the duplicate of this letter and return it to the above address together with your cheque for £530 which should be made payable to The Crown Estate Re Bidwells Account.

[Redacted]

On behalf of The Crown Estate

FORM OF ACCEPTANCE

I, being duly authorised on behalf of Aberdeen Harbour Board, hereby accept and agree to observe the terms and conditions set out in the foregoing consent of which this is a duplicate.

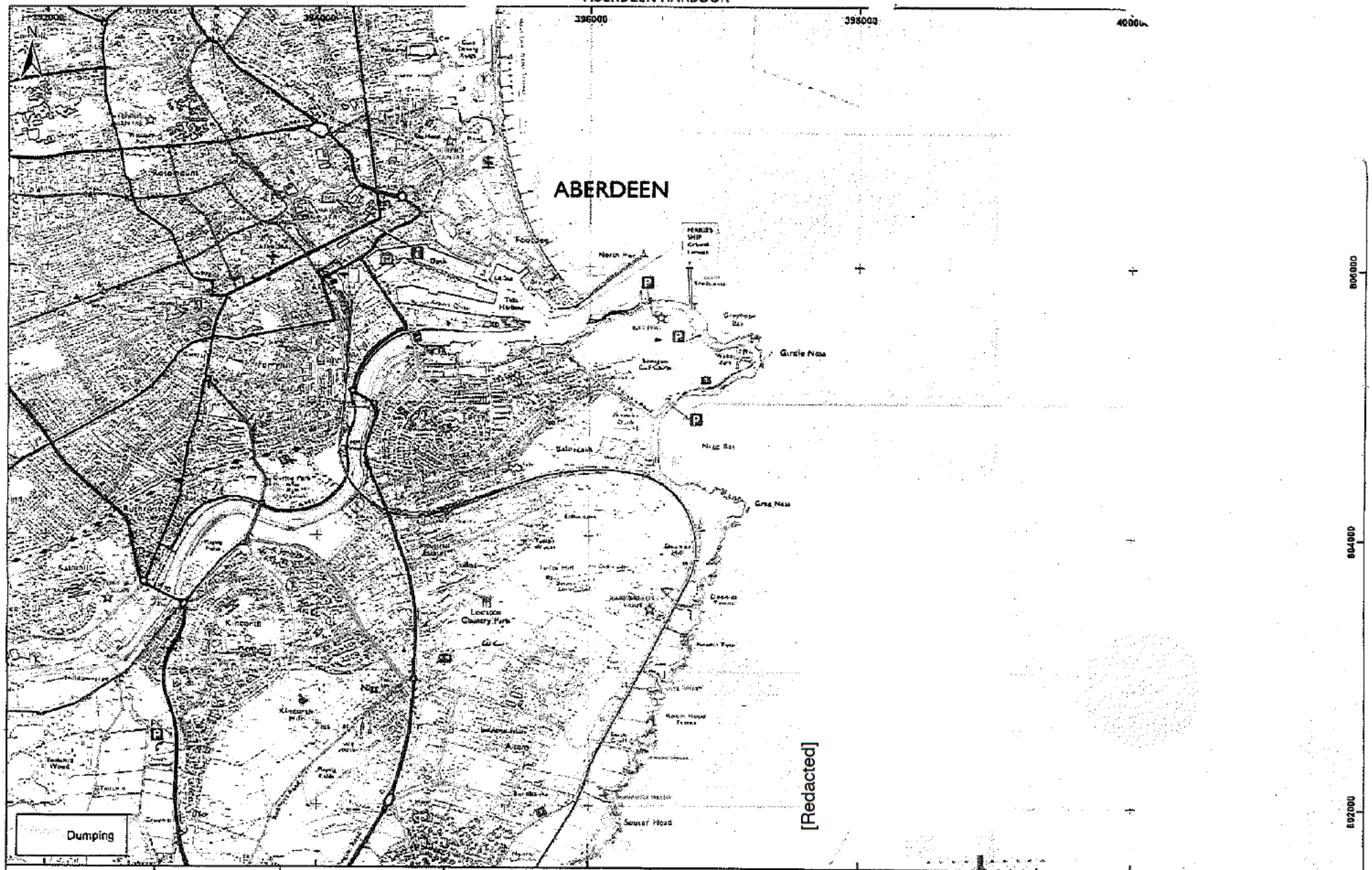
Signed [Redacted] .....
On behalf of Aberdeen Harbour Board

Name in Capitals ..... [Redacted] .....

Designation ..... Engineering Director .....

Date ..... 5/10/15 .....

ABERDEEN HARBOUR



[Redacted]

THE CROWN ESTATE	The Crown Estate 6 Bell's Brae Edinburgh EH4 3BJ	Scale: 1:25,000 Date: 09/09/2015 Author: CG Reference: KN-1-5	Coordinate System: British National Grid Datum: OSGB 1936 0 0.225 0.45 0.9 Kilometers

THIS IS THE PLAN REFERRED TO IN THE FOREGOING CONSENT DATED .

THE CROWN ESTATE

DATED 20 January & 5 February 2014

GRANT OF RIGHT TO DREDGE

by

THE CROWN ESTATE COMMISSIONERS

in favour of

ABERDEEN HARBOUR BOARD

2014

Subjects: Aberdeen Bay, Aberdeen

Anderson Strathern LLP
1 Rutland Court
Edinburgh
FAS 0208

GRANT OF RIGHT TO DREDGE

Particulars

Grantor	The Crown Estate Commissioners acting in exercise of the powers of The Crown Estate Act 1961
Depositing Site	The seabed within a 0.25 nautical mile radius of the point at 57°07.00'N and 02°00.00'W or such other area as may be agreed with the Grantor from time to time
Dredging Area	The seabed at Aberdeen Bay, Aberdeen extending to approximately 85,060 sq m above the 8m depth contour defined by the following points: Westmost: 396450.110 E 806082.500N Northmost: 396672.200E 806557.600N Eastmost: 396798.800E 806082.600N Southmost: 396666.200E 806022.900N as shown by shaded yellow on the Plan annexed and singed as relative hereto
End Date	8 July 2111
Licensee	Aberdeen Harbour Board, incorporated under the Aberdeen Harbour Confirmation Act 1960 and having their Principal Office at 16 Regent Quay, Aberdeen AB11 5SS
Start Date	9 July 2012
Fee	£14,822.50 (exclusive of VAT)
Accounting Date	each anniversary of the Start Date
Permitted Purpose	Form and maintain a navigation channel and harbour approaches
Rights	The right to carry out an initial dredge of the Dredging Area to a depth of not more than 8 metres below chart datum and to dump up to 58,300 cubic metres of the dredged material at the Depositing Site and thereafter to carryout maintenance dredging of the formed navigational channel and harbour approaches subject to obtaining the Grantor's prior written approval of the site for depositing any material dredged as part of such maintenance dredging

Right to Dredge

1 The Grantor gives the Licensee the right to exercise the Rights in connection with the permitted Purpose and in accordance with and subject to the Conditions which are set out in the Schedule attached.

2 The Licensee accepts these Rights and agrees to comply with all of the Conditions.

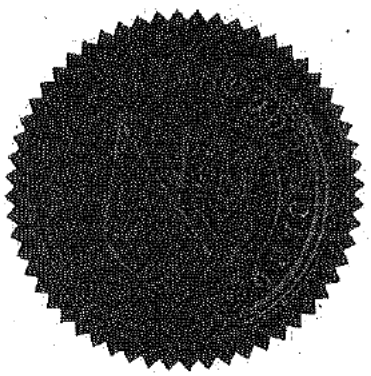
This Right to Dredge comprising this and the preceding page together with the Schedule and the Plan(s) attached are signed as follows:-

Signed by the Licensee
[Redacted]

MEMBER
..~~Director~~

MEMBER
...~~Director~~

...Secretary



At..16 REGENT QUAY ABERDEEN

On 20.01.14

and

Signed on behalf of The Crown Estate Commissioners
[Redacted]

.....Signature

.....Print Name

an authorised signatory

at..6 BELLS BRAE, EDINBURGH

on..5TH FEBRUARY 2014

Before the witness:
[Redacted]

Witness Signature

Witness Name

THE CROWN ESTATE...Witness Address

6 BELLS BRAE

EDINBURGH EH4 3BJ

This is the Schedule containing the Conditions in the Right to Dredge granted by The Crown Estate Commissioners to Aberdeen Harbour Board

1. Introduction

1.1 In the Right to Dredge and this Schedule:

1.1.1 "Conditions" means these conditions in this schedule and "Particulars" means the section with that heading at the start of the Licence;

1.1.2 "the Right to Dredge" means the foregoing Agreement including the Particulars and the Conditions;

1.1.3 words and expressions in the left hand column of the Particulars have the meaning given in right hand column of the Particulars; and

1.1.4 "you" means the Licensee and "us" and or "we" means the Grantor

2. Commencement and Duration

2.1 You shall pay the Fee on the Start Date

2.2 The Right to Dredge begins on the Start Date and continues until the End Date or until brought to an end under Condition 9;

3. Depositing

Subject to Clause 4 the materials dredged will be deposited at the Depositing Site or at such point as may be indicated by Marine Scotland from time to time and may not be deposited elsewhere or used for any purpose whatsoever by you without our prior written consent.

4. Beneficial Use/Royalty Payment

4.1 You shall not deposit or use beneficially any of the materials dredged from the Dredging Area unless with the prior written consent of the Grantor who, for the avoidance of doubt, shall be entitled to charge an agreed Royalty Payment for every tonne of material dredged or removed from the Dredging Area and not dumped at the Depositing Site.

4.2 Such royalty will be agreed between the parties and failing agreement shall be determined on the application of either party by the Valuation Office Agency

4.3 If applicable the agreed or determined Royalty Payment shall be paid by the Licensee yearly, on the Accounting Date in respect of the quantity of material removed during each preceding twelve month period.

4.3 Interest shall be paid by you on any late payment due under this Agreement at 3% above the Barclays Bank plc base rate from time to time from the due date until paid.

4.4 You shall:

(a) within 14 days notify us in writing of the date you start to remove material from the Dredging Area which is not intended to be dumped at the Depositing Site;

(b) deliver to us within ten days after each Accounting Date and at any other times we require, an accurate detailed and legible written account in a format approved by us of the quantity of material removed during the preceding twelve months, or if appropriate, a statement that no material has been removed. If we require you shall have this statement certified by an auditor or verified by a statutory declaration by you or another person acceptable to us; and

(c) keep accurate, detailed and legible written records showing details of the quantity of material removed and produce these to us when required with copies of the relevant records, receipts and vouchers.

5. Reservations

5.1 We retain ownership of all mines, metals, minerals and fossils within the Dredging Area and the right to carry out any activities required to mine these items subject to compensating you for all loss or damage which you sustain as a consequence.

5.2 The Rights are subject to all public rights including navigation and fishing.

6. Statutory Consents

6.1 Before exercising the Rights you must obtain all necessary consents which are required from any government department or agency, local authority or other public, statutory or competent authority to exercise the Rights

6.2 You must fully comply with any statute, regulation or byelaw or the requirements of any government department or agency, local authority, public, statutory or competent authority that may apply to the exercise of the Rights.

7. Liabilities

You shall indemnify us against all actions, proceedings, claims, demands, costs and expenses in consequence of the exercise by you of the Rights which shall include any claims arising from interference with the free passage of migratory fish.

8. VAT

All payments referred to in this Agreement are exclusive of value added tax which shall be payable in addition if applicable.

9. Arrears

If any payment by you is overdue by one month we shall be entitled to bring this Agreement to an end by giving you written notice. After this Agreement has come to an end under Condition 2 or this Condition 9 you will still be liable to us for any

breach of any of the Conditions that have occurred before the Agreement has come to an end and for your continuing obligations in terms of Condition 7.

10. Miscellaneous Conditions

10.1 In the Agreement and the Conditions:-

(a) Any obligation on you not to do something (or to that effect) includes an obligation not to permit any other person to contravene that obligation;

(b) Where you are more than one person your obligations are joint and several obligations;

(c) Any word which is singular includes the plural and vice versa and words of any gender includes every gender;

(d) You shall comply with any Additional Obligations that apply;

(e) "Person" includes corporate bodies; and

(f) The headings are for reference only and do not affect how these conditions are to be interpreted.

10.2 Any notice we are to give you under these Conditions is valid if it is sent to the address in the Particulars or any other address you have previously given to us in writing. Any notice you are to give us under these conditions is valid if sent to The Crown Estate, 6 Bell's Brae, Edinburgh EH4 3BJ or any other address we given to you in writing.

10.3 Any person or party who is not a party to this Agreement does not have rights to enforce the terms of this Agreement;

10.4 By signing the Agreement you agree that we give no express or implied assurance that the location of the Dredging Area or the Depositing Site are suitable for the exercise of the Rights or that any necessary consents for the exercise of the Rights will be given and what conditions is any may be attached to any such necessary consents, all of which you accept are at your risk.

11 Costs

You will pay to us the costs we incur in connection with entering into the Agreement, and also any request you make to us for consent or approval in terms of the Agreement including:

(a) any Stamp Duty Land Tax payable because of the grant of the Rights;

(b) our legal costs and expenses;

(c) any valuation agents costs in relation to the negotiation of the fee payable under this Agreement and the calculation of any Royalty payment due in terms of Condition 4.

12 Complete Contract

This Agreement including these Conditions comprise all of the terms of the contract between you and us.

13. Consent to Registration

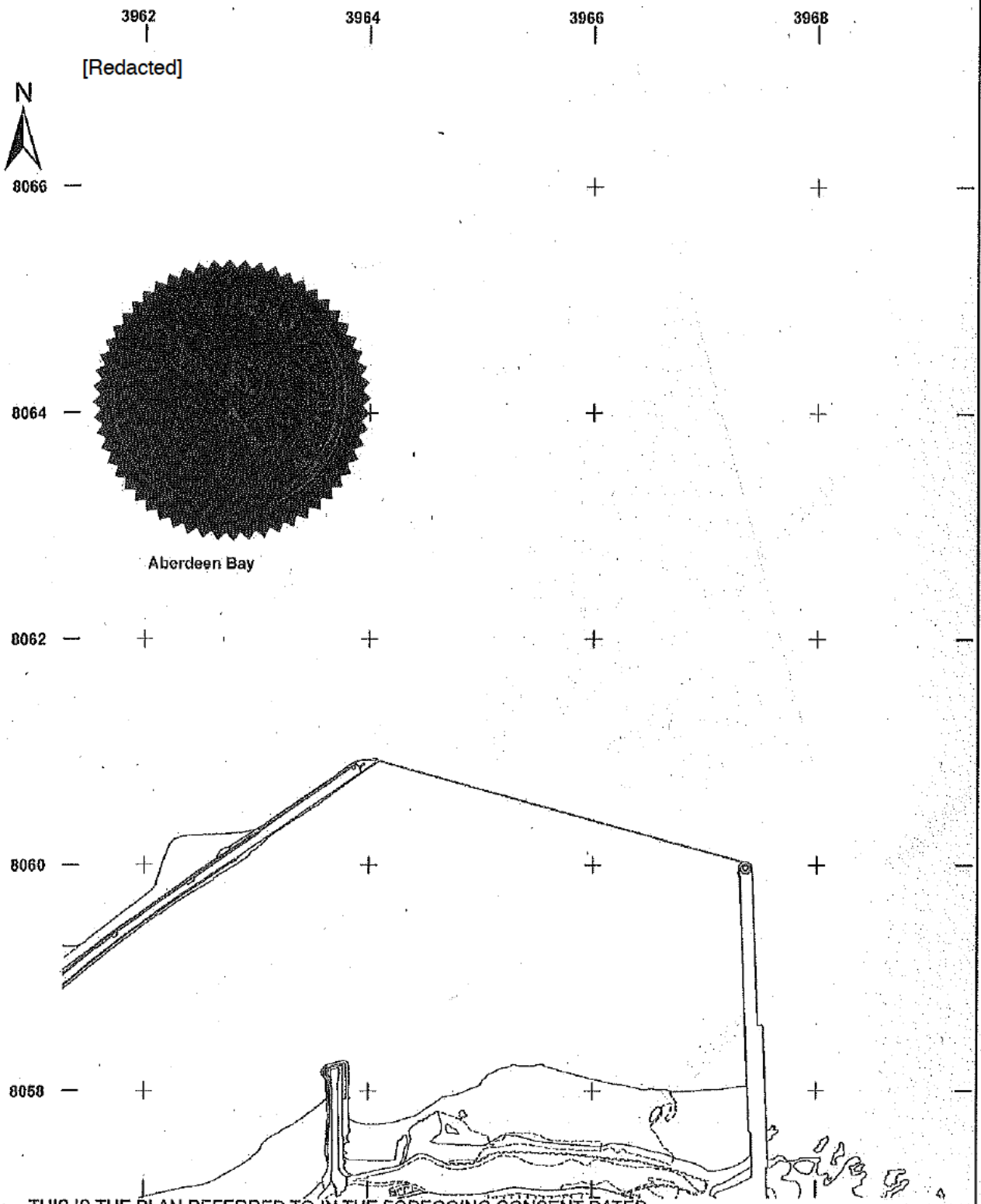
You and we both consent to registration of this Agreement for preservation and execution

[Redacted]

..... For and on behalf of The Crown Estate Commissioners	For and on behalf of the Licensee

CITY OF ABERDEEN

THE CROWN ESTATE



THIS IS THE PLAN REFERRED TO IN THE FOREGOING CONSENT DATED

[Redacted]

ORDNANCE SURVEY REFERENCE : NJ 90 NE

KN-1-5

Dredging
8.0 m below Chart Datum
Shown YELLOW

The Crown Estate
6 Bell's Brae
Edinburgh EH4 3BJ

10-July-2012

SCALE 1:5,000

Aberdeen Harbour Board: Disposal of Maintenance Dredged Material

Marine Licence Application: Continuation sheet

Question 6(h): Potential impacts the works may have (including details of areas of concern e.g designated conservation and shellfish harvesting areas) and proposed mitigation in response to potential impacts

1. Introduction

Maintenance dredging will take place within the River Dee Special Area of Conservation (SAC), which is designated for its populations of Atlantic salmon, freshwater pearl mussel and otter. The offshore disposal site is outwith any protected areas. Bottlenose dolphin population from the Moray Firth SAC occur regularly in and around Aberdeen Harbour.

This document describes the potential impacts of the works and the mitigation measures that will be in place to minimise impacts.

2. Atlantic salmon

Atlantic salmon migrate to and from the River Dee and surrounding east coast catchments as part of their life cycle. Adult salmon return to their native rivers to spawn; they may return to the River Dee throughout the year, with the lowest numbers thought to occur during the winter months (December – March inclusive) (Dee District Salmon Fishery Board (DDSFB), 2015; Aberdeen Harbour Board, 2015). Young salmon, known as smolt, generally migrate downstream between February and July (DDSFB, 2015).

Recent River Dee smolt tracking work undertaken by the DDSFB in 2016 has demonstrated that 26% of tagged smolts died in the river upstream of the harbour, with no mortality in the harbour. Smolts were found to move quickly in tidal and estuarine waters, assisted by tidal flows. Additional tagging has been carried out in 2017 and will continue to 2018.

The potential effects on Atlantic salmon are described below.

2.1 Underwater noise

During the dredging process, underwater noise will be generated by the dredging vessel's engines and suction pump. The areas to be dredged are busy operational harbour berths and navigation channels that are subject to daily vessel movements. The underwater noise generated by one additional vessel is negligible. At the disposal site, the discharge of material offshore through bottom-opening doors does not generate significant levels of underwater noise. Any temporary increase in underwater noise levels is not predicted to have a significant effect on Atlantic salmon.

2.2 Water quality

2.2.1 Increased suspended sediment concentrations

The trailer suction hopper dredger and the plough dredger inevitably disturb silts and sands on the riverbed at the location of the draghead. The strong pumps ensure that the majority of material is sucked into the pipe: by minimising the loss of material at the source, dredging efficiency is maximised. The plough dredger slowly drags material within the dredge areas from shallower 'high spots' to deeper water to allow it to be dredged by the trailer suction hopper dredger. The suspension of

sediments during the dredging process is no worse than the localised disturbance created by vessels manoeuvring within the harbour on a daily basis.

The dredging process is not continuous: the average dredging time to fill the hopper is 1 hour 20 minutes, followed by 1 hour 10 minutes cycle time to the disposal site (30 minutes each way to motor to the site, and 10 minutes to discharge). Additional delays to avoid interactions with other vessels are common, e.g. the dredger returning from the disposal site may be instructed by Vessel Traffic Services to wait outside the harbour to allow other vessels to enter/leave. A localised and non-continuous increase in suspended sediment concentration is not anticipated to affect the migration of adult salmon or smolts.

The previous marine licence for disposal of dredged material (Ref: 05483/17/0) contained a condition stating that disposal operations should be carried out to allow a period of 7 continuous days for the emigration of smolts between disposal operations of substances or objects from Area E and Areas A and B (shown on Figure 1). For the current application, this drawing has been simplified so that it more accurately reflects the three main dredging areas: A Navigation Channel; B River Dee; and C Berths and Docks, as shown on Figure 2.

In recent years the duration of the maintenance dredging and disposal campaign has reduced, as shown in Table 1, predominantly due to an increase in the size of the dredging vessel. [It should be noted that the disposal volumes in 2017 were significantly lower than previous years due to mild weather conditions.] The harbour must remain operational during dredging, so the dredging programme must be reactive to vessel operational requirements to access berths, internal vessel movements, and vessels entering and leaving the harbour. Achieving any period of time when no dredging is undertaken in Areas A and B cannot be achieved without the dredger sitting idle at significant expense. As there is no evidence that the annual maintenance dredging campaign in Aberdeen Harbour affects the migration of adult salmon or smolts, seasonal or timing restrictions are not considered necessary. As described above, the dredging process is not continuous and there are frequently periods of several hours of no dredging: over the last three years the percentage of time spent dredging relative to the overall duration of the campaign was 60% in 2017, 35% in 2016 and 48% in 2015.

Year	Dredger name and hopper size	Number of hours dredging	Total campaign duration (days)
2017	Boskalis Shoalway 4,500 m^3	86	6
2016	Boskalis Shoalway 4,500 m^3	201	15
2015	UK Dredging Marlin 3,000 m^3	232	20

Table 1: Timing of maintenance dredging activity 2015 - 2017

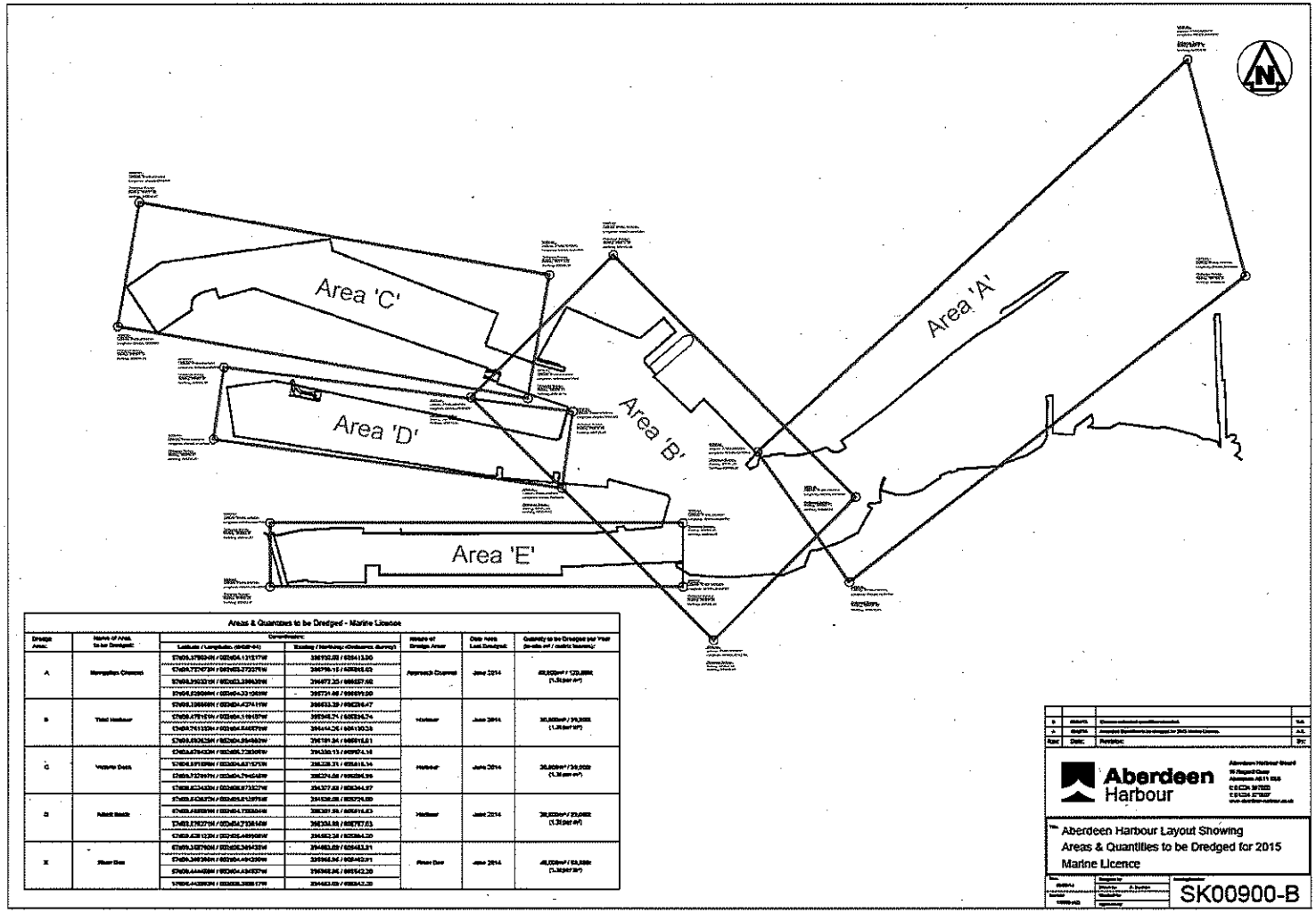


Figure 1: Dredge areas for 2015 – 2017

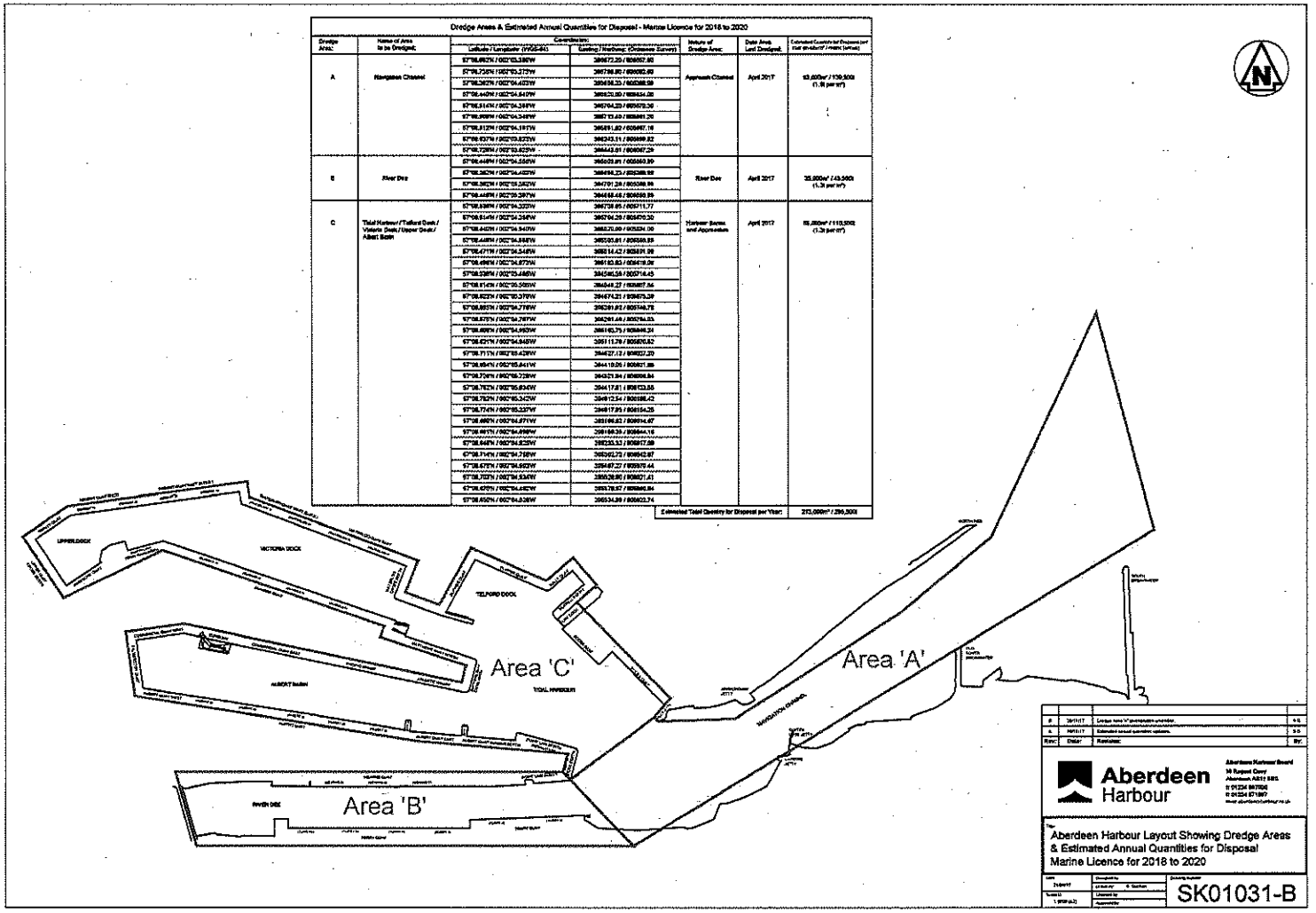


Figure 2: Dredge areas for 2018 – 2020

2.2.2 Chemical water quality

In October 2017, 10 surface grab samples were collected from the areas to be dredged, as agreed with Marine Scotland. Sediment samples were analysed for the Marine Scotland suite of parameters. A summary of the results is presented in this section and the full report is provided with the marine licence application.

The results have been compared to the Marine Scotland Revised Action Levels, which are used to determine the contaminant loading of the material and its suitability for disposal at sea. Levels of some heavy metals (cadmium, copper, lead and zinc) were elevated above Marine Scotland Revised Action Level 1 in four of the samples analysed. In all cases the levels were well below Action Level 2.

Levels of polychlorinated biphenyls and tributyl tin were below Action Level 1 in all samples.

Levels of polycyclic aromatic hydrocarbons (PAHs) were elevated above Action Level 1 in nine of the samples analysed; however, levels did not exceed (and in many cases were lower than) the PAH levels observed in the samples collected for the previous marine licence application for disposal (2015 – 2017). PAH levels are within those expected from the Aberdeen Harbour area and do not preclude the material from disposal at sea.

Based on the results of the sediment sampling, the material to be dredged is considered to be suitable for disposal at sea. The effects on Atlantic salmon resulting from contaminants in the water column is negligible. Sampling and testing of material within the hopper will be carried out during the dredging campaign, in accordance with Marine Scotland's requirements.

2.3 Illumination

The dredging vessel(s) will be lit according to navigational and health and safety legal requirements. Light spillage into the river/marine environment will be minimal. Disturbance caused by lighting is not expected.

2.4 Habitat loss

There will be no permanent habitat loss, as the dredging will maintain depths within existing berths and navigation channels.

3 Freshwater pearl

Salmon populations in the River Dee share a close relationship with the Dee freshwater pearl mussel and act as host during the mussel's larval stages in upstream river environments. As significant effects on the salmon population are not anticipated, indirect effects on the freshwater pearl mussel populations are not expected.

3. Marine mammals

In their advice on the previous application for disposal at sea in 2015, Scottish Natural Heritage (SNH) carried out an appraisal of the integrity of the Moray Firth SAC bottlenose dolphin population. SNH's view was that the maintenance dredging and disposal operations will not adversely affect the integrity of the SAC, considering the following factors:

- A study of dolphins at Aberdeen Harbour found that higher intensities of dredging caused the dolphins to spend less time in the harbour
- Dredging has been carried out regularly at Aberdeen Harbour during its long history whilst use of the area by bottlenose dolphins is relatively recent. There is no apparent decline in the use of Aberdeen Harbour by bottlenose dolphins. The dolphins may increase their use of other

foraging areas while dredging is carried out or forage at times that dredging does not take place.

- Offshore disposal when cetaceans are close by could cause direct disturbance and/or injury. Whilst the risk of direct injury or death might be small, the vulnerable status of the Moray Firth population means that the loss or injury of even one animal would be significant to the whole population.

SNH recommended the following conditions are included in the marine licence:

- A dedicated watch will be kept by a trained Marine Mammal Observer (MMO) or someone else following the general guidance for and acting in the role of a MMO. No offshore disposal should take place if marine mammals are observed within 200 m of the disposal site in the 20 minutes prior to disposal. If marine mammals are observed within this area then disposal will be stopped until the area has been clear for at least 20 minutes.
- A formal log will be maintained whether or not marine mammals are sighted and the completed logs will be returned to Marine Scotland.

There have been no changes to the maintenance dredging and disposal campaign since the previous application that would affect the advice given by SNH, so it is concluded that impacts on marine mammals will be minimal and that maintenance dredging and disposal operations will not adversely affect the integrity of the Moray Firth SAC.

4 Cumulative impacts

4.1 Aberdeen Harbour Expansion Project

The works will be on-going at the same time as the construction of the Aberdeen Harbour Expansion Project (AHEP) in Nigg Bay south of the existing harbour.

Marine construction for the expansion project commenced in May 2017 and will be complete by June 2020. There will, therefore, be a temporal overall between the two projects. As the maintenance dredging has been on-going for many years, the Environmental Statement for the AHEP has considered the cumulative effects in the relevant chapters, including Chapters 10 (Nature Conservation), 13 (Fish and Shellfish), 15 (Marine Mammals) and Volume 4 (Habitats Regulations Assessment). The cumulative effects were deemed to be acceptable and a marine licence was granted for the AHEP.

4. Conclusion

There are no significant impacts predicted during the proposed maintenance dredging and offshore disposal, either alone or in combination with other projects, subject to the mitigation measures proposed in this document.

5 References

Aberdeen Harbour Board (2015) Aberdeen Harbour Expansion Project Environmental Statement.

Dee District Salmon Fishery Board (2016) Smolt migration through the lower Dee and inner harbour. October 2016. http://www.riverdee.org.uk/f/articles/Smolt-tracking-2016-report.pdf [accessed by 14th November 2017].

Dee District Salmon Fishery Board (2015) Letter to Marine Scotland dated 17th December 2015. Consultation response to the Aberdeen Harbour Expansion Project Environmental Statement.