Minutes

HaskoningDHV UK Ltd.
Industry & Buildings

Present:	Stuart Churchley and Christopher Pater (Historic England (HE)), Sue Raftree (Joint Casualty and Compassionate Centre (JCCC)), Steve Brown (JCCC) Colonel Hermann Hanke (German Embassy (HH)), Shaun Nicholson and Matthew Kinmond (Marine Management Organisation (MMO)) David Morris (MMO; telephone), Louise Tizzard (Wessex Archaeology (LT)), Jack Goodhew (Dover Harbour Board (DHB)), Sharon Higenbottam (DHB, telephone), Elizabeth Jolley (Royal HaskoningDHV (RHDHV), Jess Moran (RHDHV) and Vic Cooper (RHDHV)
Apologies:	
From:	Jessica Moran
Date:	30 November 2016
Location:	2 Abbey Gardens, Great College Street, Westminster, London, SW1P 3NL
Copy:	Adam Pharaoh (RHDHV)
Our reference:	I&BPB2107M001D0.1
Classification:	Open
Enclosures:	Figure 1: A comparison of sediment accretion across the Goodwin Sands using available data from 2009-2015

Subject: **Goodwin Sands Marine Licence Application: Heritage and Archaeology Consultation Meeting**

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Item	Details	Actions
1	**MMO Meeting 29th November** • A meeting between the MMO, DHB and RHDHV was held in Newcastle to discuss preliminary responses to the second consultation period. An update was not necessary as this meeting covered one of the key consultation concerns.	
2	**Monitoring and Contingency** *Update on bathymetric changes* - **RHDHV** presented a new figure (Figure 1 attached) that illustrated the changes in bathymetry and changes in accretion in sand across the Goodwin Sands using UKHO bathymetric data from 2009 and the recent bathymetry survey data acquired by DHB in 2015. Figure 1 illustrates that accretion of sediment has occurred in some areas of the Goodwin Sands. This figure was produced in response to a **HE** comment in the **MMO** consultation response from 5th August 2016 (appended)**,** but has not yet been provided formally to the **MMO**. - **RHDHV** explained that Figure 1 illustrates that sediment accretion is evident in some areas of the proposed dredge area, with slight erosion also identified in the north of the area. Although slight erosion was identified, the pattern of general accretion across parts of the proposed aggregate extraction area based upon the Admiralty Charts is still interpreted to be holding true to historic analysis, showing accumulation over the Goodwin Sands region. There is only bathymetric data for seabed	

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	adjacent to the southern part of the proposed dredge area obtained in 2015 and no comparative dataset has been found to enable temporal or spatial analysis of sedimentary change to be quantified. - **RHDHV** confirmed that Figure 1 was produced following consultation on the Further Environmental Information Report (FEIR) (submitted on 23rd September 2016) and Draft Written Scheme of Investigation (WSI) (submitted on 7th October 2016). *Anticipated contingency measures for inclusion in the Written Scheme of Investigation (WSI)* - **RHDHV** questioned **HE** on what contingency measures **HE** would like to see in the event of changes to bathymetry and/or identification of archaeological anomalies. - **HE** responded that such contingency should be proposed by the developer given their assessment of risk, but suggested that it could be based on a number of factors and the likelihood of the project encountering coherent or dispersed archaeological material. **HE** would expect the WSI prepared for this proposed project to include all necessary provision for the archaeological interpretation of (geophysical surveys). - **RHDHV** confirmed that prescriptive measures would be included in the WSI to detail how subsequent surveys will be conducted so that data generated is suitable for archaeological interpretation and if any previously unknown archaeological sites are identified, they will be assessed if discovered prior to dredging or during any dredging works, should consent be obtained. - **HE** highlighted the difficulty in using historic admiralty charts in offshore areas due to a number of unknowns in the source data employed and geo-rectification using terrestrial features. - **RHDHV** acknowledged the considerations of the accuracy of using historic admiralty charts. **RHDHV** have provided details on the accuracy of this process through the note provided to **HE** and dated 23/11/2016. - **DHB** explained that the proposed dredge area is likely to be reduced, removing areas in the north and north east. This is due to a combination of benthic ecology and marine mammal considerations. This would also remove some of the areas where minimal erosion has been identified from **RHDHV's** recent comparison between 2009 and 2015 bathymetry survey data. An updated proposed dredge zone will be provided to the **MMO.** - **MMO** asked whether **HE** could provide a depth threshold or 'buffer' zone to which dredging can occur tom based on the accretion / erosion rates. Thereby increasing the confidence that only 'new sand' will be removed during the dredging, ensuring the risk to unknown wrecks and military remains is minimised. - **HE** explained that the developer should be able to propose a specific depth of sediment dredging and how survey will be conducted to inform each phase of dredging. - **HH** enquired as to whether there is a standard reference guide for measurements to enable a comparison between the admiralty charts. - **RHDHV** explained that modern data obtained through bathymetric survey is more accurate than historic admiralty charts.	**RHDHV**

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	Objectives and scope for sidescan sonar survey - **RHDHV** explained that it is important to undertake a pre-dredge survey to identify the most recent changes to the Goodwin Sands, at present a high resolution multi beam survey before and after each dredge phase is recommended. - **RHDHV** would like to understand from **HE** what the objectives are for undertaking a side scan survey in addition to the multi beam survey. - **HE** stated that it was the responsibility of the developer to offer survey objectives on the basis that any dredging would wish to avoid any anomalies that could compromise effective delivery of the project, but it was suggested that a baseline survey buffer of 500m could be employed - **RHDHV** asked **HE** to confirm whether the 2015 baseline survey (which included a side scan sonar survey) that was undertaken to inform the Environmental Impact Assessment (EIA) would form the baseline for this. - **HE** confirmed that the 2015 data would not be treated as a baseline for the pre-dredge survey due to the hydrodynamics and sedimentary changes in the area. **HE** also questioned whether survey data was obtained across all areas of the proposed dredge zone during the 2015 survey. - **RHDHV** confirmed side scan and multibeam bathymetry data was collected across the exploration area during the 2015 survey with additional 1km extended crosslines and perimeter lines 1km from the exploration area. - **HE** further reiterated that full coverage side scan sonar survey will be required at pre-dredge, inclusive of an agreed buffer, which will act as a baseline survey. - **RHDHV** will propose an area for sidescan sonar coverage for agreement and inclusion as part of any pre-dredge survey and as part of any monitoring plan.	**RHDHV**
3	**Magnetometer Survey** *Requirement for magnetometer survey (UXO)* - **RHDHV** explained that the undertaking of a magnetometer survey was previously discussed with **HE** during a telephone conference held on 19th November 2015. **RHDHV** stated with **DHB**, that a magnetometer survey was not needed based on their current understanding of the historic environment**.** An agreement was reached with **HE** that a magnetometer survey would not be necessary as long as measures were put in place: pre-dredge bathymetric survey; further discussion prior to consent regarding monitoring; the use of an on-board archaeologist during the dredging operations to an agreed protocol; and avoidance of known archaeological features**.** In response to the FEIR and Draft WSI, **HE** has requested that a magnetometer survey is now undertaken prior to a licence determination. **RHDHV** would like to understand the reasoning behind **HE's** change in stance and particularly why this survey is required for pre licence decision.	

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	- **HE** responded that the original survey platform should have offered all available survey techniques and that there is still the potential for significant unidentified finds. Due to the potential for buried archaeology, a magnetometer survey is the best means to identify where these finds are. A magnetometer survey will also identify any additional area for mitigation / exclusion zones. **HE** believes there is a clear rationale for this. - **RHDHV** highlighted that the likelihood for metallic wrecks in this area is very low; the presence of coherent aircraft is also low due to the accumulation of sediment across the proposed dredge area in recent years. **RHDHV** recognise that a magnetometer survey would identify ferrous objects on and under up to 2m of sand. **RHDHV** noted that it is, however, not possible to distinguish between historic and modern debris using this type of survey. - **RHDHV** asked what the implications would be if anomalies were identified during this survey and further questioned whether it would be more useful to undertake the magnetometer survey closer to dredging (due to changing hydrodynamic conditions) than in advance of the licence decision? - **HE** suggested that seabed developments would wish to have a clear understanding about the risk of encountering anomalies that might jeopardise the intended project and that typically other seabed projects are required to undertake a full suite of surveys, including magnetometer and **HE** would expect the same for this project. - **RHDHV** stated that defining anomalies cannot be done prior to magnetometer survey. This will need to be undertaken when results from the survey are available - **HE** further explained that a large number of shipwrecks have sunk across the Goodwin Sands in the last 200 years which was acknowledged in the EIA, although given the high number of potential losses additional information was deemed necessary (i.e. magnetometer survey) by **HE**. - **RHDHV** explained that the decision not to undertake a magnetometer survey was based on the principle that they are not commonly undertaken for dredging projects in low risk locations (and when they are undertaken, this is done on a case-by-case basis depending on likelihood of encountering historic environment features or UXO through early consultation with **MMO** *and* **HE**). In addition, exclusion zones have been proposed around anomalies, for which archaeological potential is unknown**,** identified in the 2015 geophysical data and the addition of magnetometer data would not further reduce the risk. - **HE** explained that identified gaps in information provided led to the decision that a magnetometer survey would be required. - **RHDHV** stated that the EIA focused on the fact that the likelihood of archaeological (wreck/aircraft) material being present across the Goodwin Sands is very high. However, due to **RHDHV's** interpretation of recent accumulation of sand to depths of over 10m in places, using historic admiralty charts, the risk of encountering coherent wrecks is reduced. The risk of encountering isolated artefacts within the body of mobile sediments remains but due to this interpreted accumulation of sediment, the data obtained during a magnetometer survey would likely be modern debris. - **HE** stated that a magnetometer survey should provide further information that should enable anomalies with archaeological potential to be	

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	identifiable and appropriate mitigation put in place. - **DHB** enquired as to why **HE** do not view it more beneficial to undertake the magnetometer survey closer to the dredging programme, to ensure an accurate, up to date data set. - **HE** responded that given the dynamic nature of the Goodwin Sands a magnetometer survey was necessary now to determine potential of encountering archaeological materials, the position of larger anomalies within the sand might not change position; only the height of the sand above the anomalies might change. - **LT** stated that the 2015 geophysical data identified anomalies where little sand has accumulated. A magnetometer survey will only identify anomalies in up to 2m of sediment. - **HE** highlighted that there is still some level of ambiguity of what the anomalies identified during a magnetometer surveys are, but that corroboration with other survey data should enable professional judgement to determine if of archaeological interest. - **DHB** asked **HE** whether if an anomaly was identified, would it stay in place, taking into consideration the hydrodynamic conditions. - **HE** responded that if the anomaly was large enough, it would remain in place. - **DHB** further questioned whether it is worthwhile undertaking surveys in areas of recently accumulated sediment. - **HE** responded that the assessment conducted for the proposed dredging programme should not be solely reliant on one source of historic survey information. - *Referring back to the figure discussed during Session 1* – **HE** enquired as to whether comparative bathymetric data was used for the whole of the proposed dredge area? **HE** also asked whether it is correct to suggest that patterns of accumulation within the southern part of proposed dredge area have been based on assumption. - **RHDHV** confirmed that UKHO bathymetric data from 2009 and **DHB**'s 2015 bathymetric survey data has been used to create this figure and that data wasn't available for the southern part of the proposed dredge area. Patterns of accumulation within this part are, therefore, currently based on assumption which will be validated through undertaking pre-dredge surveys. - **MMO** asked whether the 2015 survey contained the full suite of surveys. - **RHDHV** confirmed that the 2015 bathymetric survey included multibeam, side scan and sub-bottom profiler survey. No magnetometer survey was undertaken. - **HH** asked whether the UK Royal Navy have undertaken any magnetometer surveys across this area. - **JCCC (SB)** responded that there may be data available but this would need to be confirmed following further investigation. **SB** to enquire and respond to **RHDHV**. - **MMO** asked whether the UK Royal Navy magnetometer survey data would satisfy **HE**'s requirements, if it was available. - **HE** responded that this would be subject to whether the data was fit for purpose. It would likely be useful to contribute to baseline understanding. - **RHDHV** asked whether if we are able to locate MOD magnetometer survey	**SB (JCCC)**

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	could this help inform the marine licence application? - **HE** responded that any MOD data could help inform the application. - **RHDHV** enquired as to why, if the information is available, why can it not be a licence of the condition to undertake a magnetometer survey? Would it be possible to ensure that the condition clearly stipulates that that any licence would be retracted if surveys identify a number of coherent anomalies following the provision of a full suite of survey data? - **MMO** stated that they have the power within the MCAA 2009 to vary, suspend and revoke a marine licence should new information come to light. Due to the uncertainties that exist, however, a magnetometer survey would be required before the application could be progressed. - **RHDHV** questioned whether the data obtained from a magnetometer survey would still be valid to inform licence decision if collected pre-decision. - **HE** stated that a full suite of surveys would be required particularly for high risk projects. - **DHB** highlighted that this is very useful to know and would have welcomed the identification of this requirement earlier on in the EIA process.	
4	**Potential Impact to Wrecks and Aircraft** *Wrecks and aircraft losses in and around Goodwin Sands* *Potential for encountering in situ wrecks and aircraft within target aggregate* *Identification and definition of high risk areas following pre-dredge survey* *Proposed mitigation (Written Scheme of Investigation)* - **JCCC (SR)** stated that it is important to ensure that the proposed dredge area does not contain any war graves. Unfortunately due to lack of information, the location of all war graves across the Goodwin Sands is not known. All of the known war graves are documented. - **HH** highlighted that the German government do not hold a list of graves and/or wrecks with the pinpoint location. If a sea grave is identified, there is an international MOU that would allow a sea grave to be moved in the interest of safety and/or security only. - **RHDHV** stated that as detailed in the EIA, 2 points outside of the proposed dredge area (to the north) have been identified as the wreck of an American bomber aircraft. An arbitrary position for the loss of the military submarine U12 is located to the south east of the proposed dredge area. - **RHDHV** further explained that the EIA looked at all reported losses, of which none were recorded within the proposed dredge area nor within a further 2km search area around the proposed site. It is important to note that this is not likely to be representative of the whole Goodwin Sands area. There is likelihood that some small parts may be present, however the potential for in-situ coherent remains is very small due to the time that has passed and the accumulation of sediment. - **RHDHV** highlighted that according to data from The Kent Battle of Britain Museum, 62 military aircraft losses across the Goodwin Sands area are recorded (losses recorded between May – November 1940), none of which	

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	were identified in the proposed dredge area during the EIA surveys. **DHB** has consulted with the Battle of Britain museum to determine the location and title of these losses. - **RHDHV** stated that the 62 recorded losses are located "in and around the Goodwin Sands" area, which is a much greater area compared to that of the proposed dredge area. For example, the proposed dredge area (3.9km²) is 1.41% of the area of the recommended MCZ (276.91km²) which encompasses the Goodwin Sands. The risk of encountering losses is, therefore, considered to be small, compared to the wider Goodwin Sands. In addition, it is assumed, based on historic navigation chart comparison that sediment accumulation has occurred within the proposed dredge area. - **RHDHV** asked whether the **JCCC** had any specific questions on this data? - **JCCC (SR)** responded that they are unsure where many aircrafts came down over the Goodwin Sands due to lack of information. Their concern is that where these aircraft did come down, the site could be a potential war grave. If undertaking further surveys would help identify this they would support this. - **RHDHV** stated that the WSI has applied the same approach as widely used by the aggregate dredging industry. If an aircraft part is identified during dredging operations, a temporary exclusion zone would be put in place and the area would be further investigated. Previous experience highlights the difficulty in pin pointing the exact location of aircraft sites. The FEIR and WSI included provision for additional exclusion zones and these have been taken into account when considering the aggregate available for dredging. - **JCCC (SR)** questioned what would be done if a wreck and / or aircraft is found and what the possibility would actually be of finding either a wreck and / or an aircraft. How would it be determined if the presence is 'likely'. JCCC/MOD would like assurance that appropriate actions will be taken if a wreck / aircraft site is identified. - **LT** responded that a review of the area would be undertaken. This would involve undertaking the necessary surveys and analysing the data to identify any anomalies. This is then followed by a process to determine which anomalies are likely to be manmade and which would be natural. A professional opinion on which anomalies are likely to be archaeological sites is then provided. Geophysical surveys are not able to determine exactly what the anomaly is. - **JCCC (SR)** asked how many anomalies had been identified within the proposed dredge area. - **LT** stated that 6 anomalies and 1 recorded wreck had been recorded within the proposed dredge area. Over the entire Goodwin Sands exploration survey area, 27 anomalies have been recorded. The anomalies recorded in the proposed dredge area are located on the southern tail, on the edge of the bank where the chalk bedrock is covered with a thin veneer of sediment. - **JCCC (SR)** asked whether additional surveys would identify further anomalies. - **LT** stated that if a magnetometer survey was undertaken it would identify anomalies that contain ferrous material. It would, therefore enhance the	

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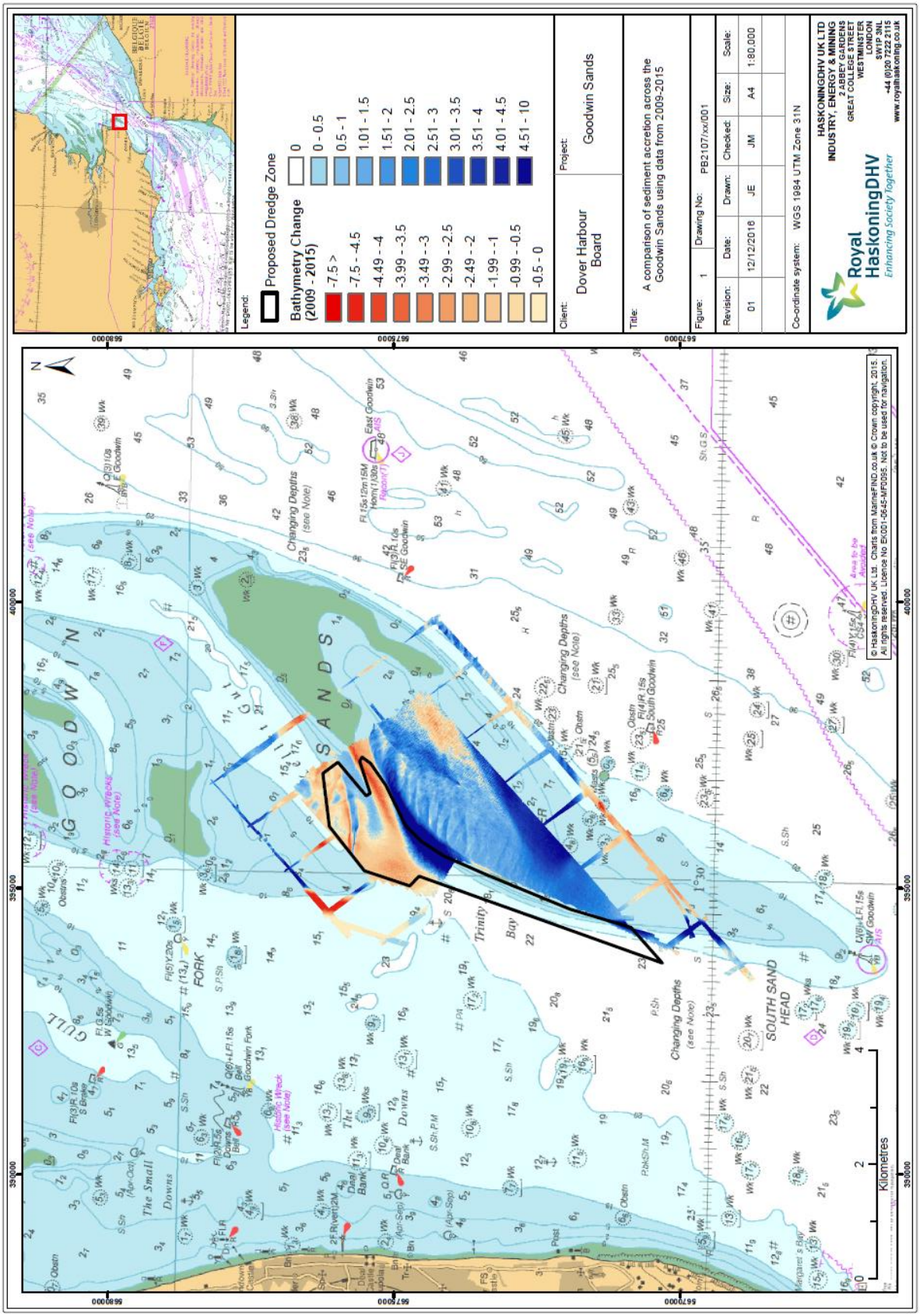
	data that is currently held. A magnetometer survey is able to identify anomalies that are buried within 2m of sediment; side scan sonar does not provide information on what is beneath the sediment. A magnetometer survey would record a response for composite ferrous materials within aircraft components if present, particularly engines but it would not be possible to distinguish this magnetic response from other ferrous sources, such as modern debris. - **JCCC** support **HE's** decision in relation to the requirement for the magnetometer survey.	
5	**Agreed Outcomes and Points of Action** *Identification of areas of agreement and required actions* 1. ***Action - RHDHV*** to include further information within the WSI in regards to managing the risk in the event that previously unknown finds are discovered during dredging activities, should consent be obtained. 2. A side scan sonar survey will form part of pre-dredge survey accompanied with high resolution multibeam bathymetry. The survey area and scope will be agreed with **MMO** and **HE,** it will likely include an agreed reduced survey area (as discussed during Item 2 of meeting) with a buffer zone**.** 3. A side scan sonar survey accompanied with high resolution multibeam bathymetry will be undertaken as part of the post dredge survey should consent be obtained and will focus on areas that have been dredged, including a buffer. 4. **DHB** will undertake magnetometer survey as soon as possible, following the **MMO**'s confirmation that a magnetometer survey is required before a licence determination can be made, MMO confirmed requirement by email to Jack Goodhew on 1/12/2016 5. ***Action – LT and RHDHV*** will provide a magnetometer survey scope to be agreed with **MMO** and **HE**, with the **JCCC** also kept informed. 6. ***Action – JCCC (SB)*** will determine whether any **MOD** magnetometer survey data is available. Depending on the availability and value of any available data, further discussion will be had with the **MMO** and **HE** as to whether this data would stand as pre-decision information. 7. **JCCC** will take lead from **HE** to inform their decision. 8. ***Action – RHDHV*** to forward all relevant information from Draft WSI to **JCCC**. 9. Until the pre-dredge survey has been undertaken, **RHDHV** will be relying on existing and historic chart data in order to extend analysis of accumulation / erosion across the proposed dredge area to the southern tail.	


Legend:
Proposed Dredge Zone
Bathymetry Change (2009 - 2015)
0
0 - 0.5
0.5 - 1
1.01 - 1.5
1.51 - 2
2.01 - 2.5
2.51 - 3
3.01 - 3.5
3.51 - 4
4.01 - 4.5
4.51 - 10
-7.5 >
-7.5 - -4.5
-4.49 - -4
-3.99 - -3.5
-3.49 - -3
-2.99 - -2.5
-2.49 - -2
-1.99 - -1
-0.99 - -0.5
-0.5 - 0
Client: Dover Harbour Board
Project: Goodwin Sands
Title: A comparison of sediment accretion across the Goodwin Sands using data from 2009-2015
Figure: 1
Drawing No: PB2107/xx/001
Revision: 01
Date: 12/12/2016
Drawn: JE
Checked: JM
Size: A4
Scale: 1:80,000
Co-ordinate system: WGS 1984 UTM Zone 31N
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GULL
FORK
Trinity Bay
SOUTH SAND HEAD
The Small Downs
The Downs
Kilometres
0
2
4
N