

Coastal Squeeze Numbers Clarification

JBA Project
JBA Project Code

Cardiff Coastal Defence Scheme
2019s0183

JBA
consulting

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1 Introduction

1.1 Purpose of this Technical Note

The purpose of this technical note is to clarify the habitat loss estimates, which will be used to inform compensation measures. This follows discussion with NRW Marine Licence Team and Technical Experts at a meeting held 8th December 2021.

The paper sets out the different approaches used to estimate coastal squeeze losses, the level of confidence in these estimations and the set of agreed figures to be taken forward through the consenting process on a precautionary basis. Compensation for these losses would be delivered through the National Habitat Creation Programme (NHCP).

2 Direct habitat loss from defence footprint

Direct habitat losses are attributed to the footprint of permanent works and to the temporary works area (plant movement and site compounds). Appendix A includes maps which show the areas to be lost. The value of these losses are shown in table 2-1.

Table 2-1: Direct habitat losses

	Total	Annex 1 habitat - Mudflats and sandflats not covered by seawater at low tide feature (ha)	Annex 1 habitat - Atlantic Salt Meadows (ha)	Total Annex 1 habitat (ha)	Non-Annex 1 habitat - Other saltmarsh (ha)	Non-Annex 1 habitat - Other Estuarine Feature (existing flood defences and rubble) (ha)
Permanent works (outside SAC)	4.59	1.26	0.87	1.2	0.64	1.82
Permanent Works (within SAC)	3.37	1.09	0.04	1.13	0.04	2.20
Temporary Works (outside SAC)	31.11	6.20	1.58	7.78	1.80	21.52
Temporary Works (inside SAC)	5.67	1.50	0.27	1.77	0.22	3.68

The data shows that **1.13ha** of Annex 1 habitat will be lost within the SAC. This is the figure that will be taken forward to inform compensation requirements.

3 Indirect habitat loss from Coastal Squeeze

3.1 JBA estimation (inundation approach)¹

JBA undertook a calculation of predicted habitat loss from coastal squeeze using an inundation approach. This was based on the method conducted by Black and Veatch (2007) identified in tables 2.2 and 6.18 of the guidance document 'What is Coastal Squeeze'¹.

In summary this identifies any areas where the toe of the proposed defences would prevent habitat migrating back in the future (with sea level rise), working to predicted future MHWS levels (predicted using UKCP18 values for climate change).

Illustrative maps of this approach are included in Appendix B. The results of this calculation are shown in table 3-1. Using this method **1.75 ha** of intertidal habitat is predicted to be lost over the life of the scheme (to 2115).

The confidence in this figure is low, as a result of the inherent uncertainties associated with coastal squeeze calculations that are dependent on climate change predictions.

This value is presented in the JBA HRA for the project.

Table 3-1: Table 3-2: Coastal Squeeze losses estimated through the inundation approach.

Epoch	Coastal Squeeze losses (Intertidal and saltmarsh, ha)
2021	0
2025	1.14
2055	1.29
2105	1.64
2115	1.75

3.2 NRW estimation (modelling approach)

NRW also undertook a calculation of predicted habitat loss from coastal squeeze. However, this used a different approach that relies on modelling. Modelling estimates of total future habitat loss in the Severn Estuary were used to calculate a predicted annual loss per metre of defence.

An estimate of habitat losses attributable to the scheme was obtained by multiplying the total length of proposed defences within the scheme that would front low-lying ground (as areas behind existing high ground would not be available to accommodate future coastal squeeze). Appendix C contains maps which illustrate this approach. (The full approach and calculation are set out in the document 'Rover Way Coastal Squeeze and HRA NRW_April 2021').

Using this method, NRW estimated that a total of **24.59 ha** of intertidal habitat loss would result by 2022 over the length of the scheme – see below:

¹ Environment Agency, 2021. *What is Coastal Squeeze?*. [online] Available at: <https://assets.publishing.service.gov.uk/media/6038fafde90e07055c14049b/FRS17187_What_is_coastal_squeeze_-_report__1_.pdf>.

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	Period:	3/22-12/24	25-54	55-2104	2105-3/22		
FRM Asset	Length	Epoch 1 CSQ	Epoch 2 CSQ	Epoch 3 CSQ	2105-2122		
Asset 11	33.00	-0.032	-0.43	-0.60	-0.21		
Asset 12	606.00	-0.595	-7.84	-11.07	-3.82		
Total	639.00	-0.63	-8.26	-11.67	-4.03	-24.59 Ha	

3.3 Summary

A wide range of possible habitat losses due to coastal squeeze using the two different approaches, from **1.75 ha** (using the inundation method – based on scheme life to 2115 to **24.59 ha** (using the NRW modelling approach – to 20122). Note the JBA value increases to **2.15 ha** (rather than 1.75 ha) when calculated to the same end date of 2122 to allow a like for like comparison.

The confidence in the values predicted using both assessment approaches is considered to be low given the inherent uncertainties associated with coastal squeeze calculations when assessing a scheme so far into the future.

4 Habitat loss figures to be brought forward for mitigation measures

Due to the low confidence in both of the presented methodologies, it has been agreed that on a precautionary basis that the higher value obtained for future intertidal habitat losses be used as obtained using the NRW modelling approach.

The area required for compensation for indirect losses as a result of coastal squeeze is therefore **24.59 ha**.

In combination with the direct footprint losses (1.13 ha), the total area of intertidal habitat required through compensation is **25.72 ha**.

It has been agreed that this will be delivered through the NHCP.

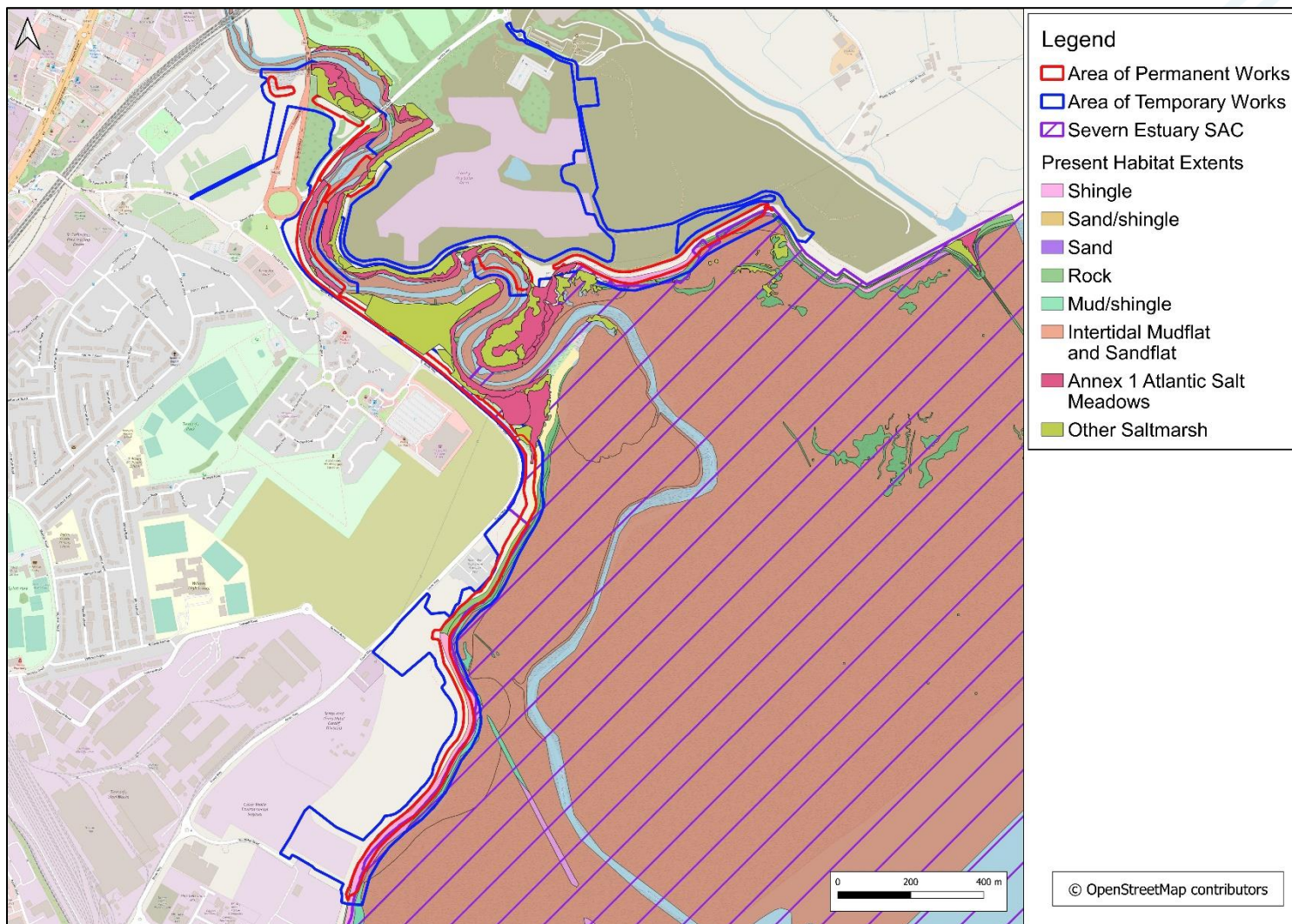
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5 Appendix A



Map showing JBA calculations of direct habitat loss

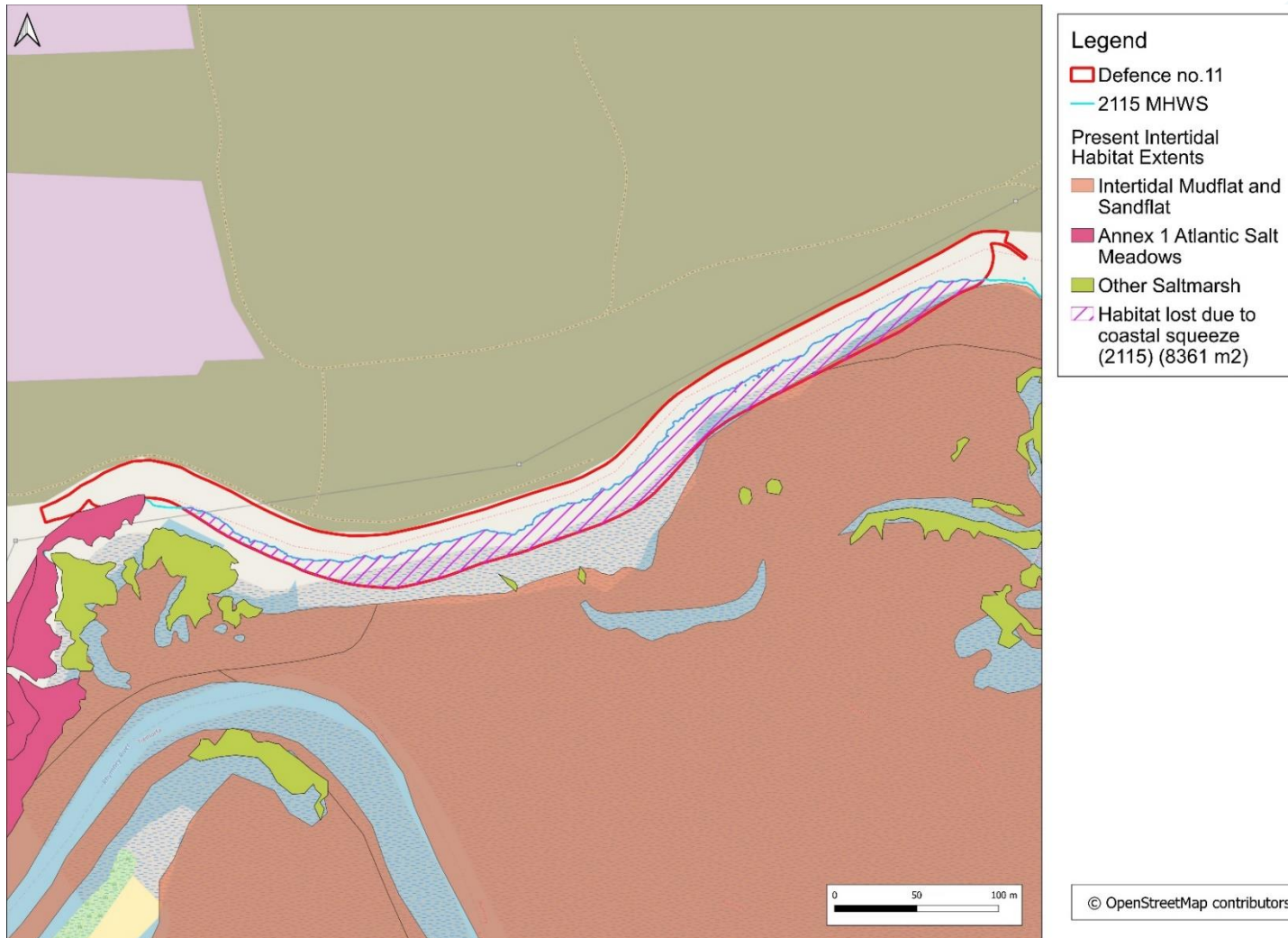
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6 Appendix B



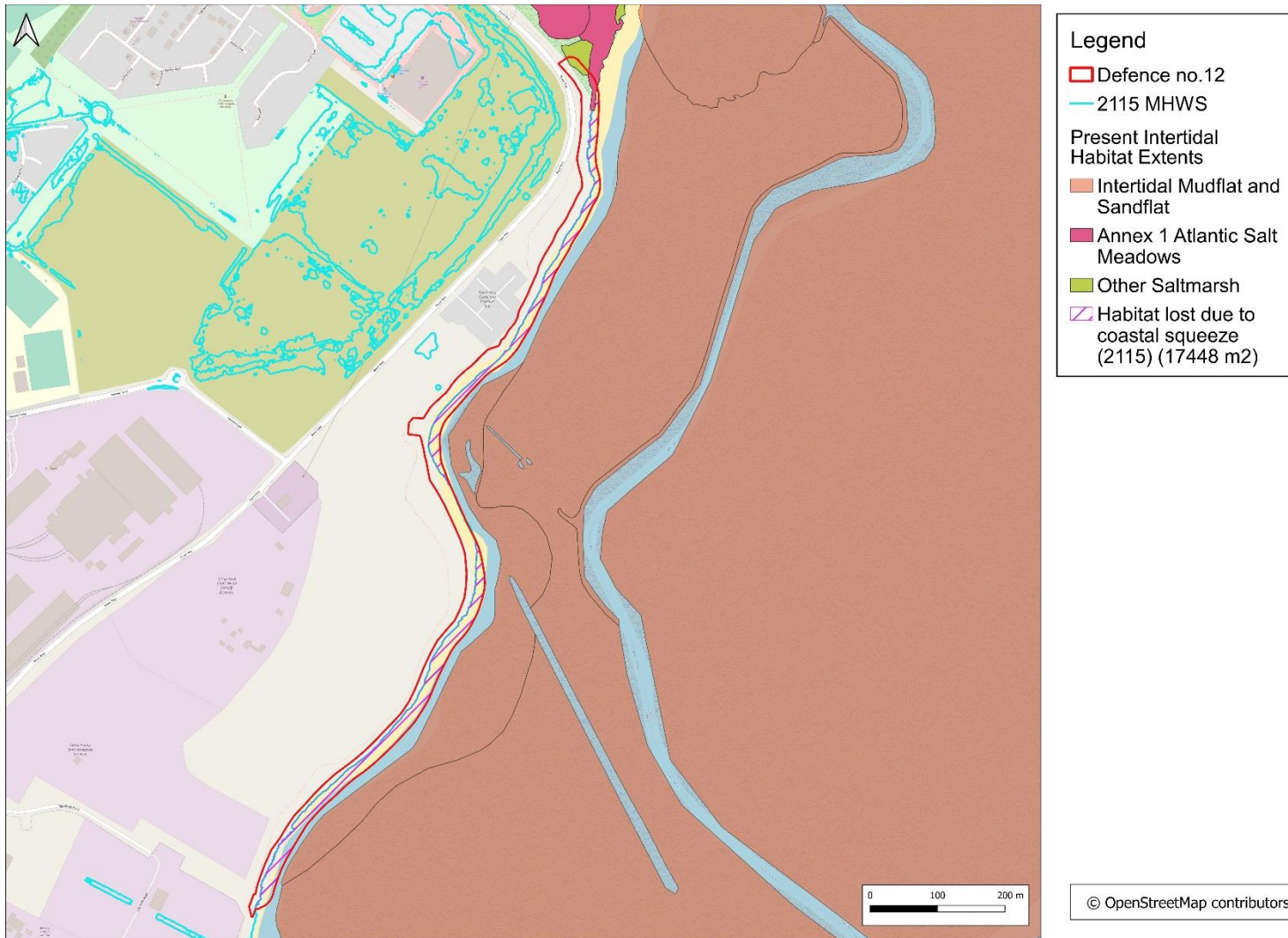
Map showing JBA estimations of habitat lost due to coastal squeeze at defence no.11 by 2115.

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Map showing JBA estimations of habitat lost due to coastal squeeze at defence no.12 by 2115.

7 Appendix C – NRW Coastal Squeeze Calculation – modelling approach



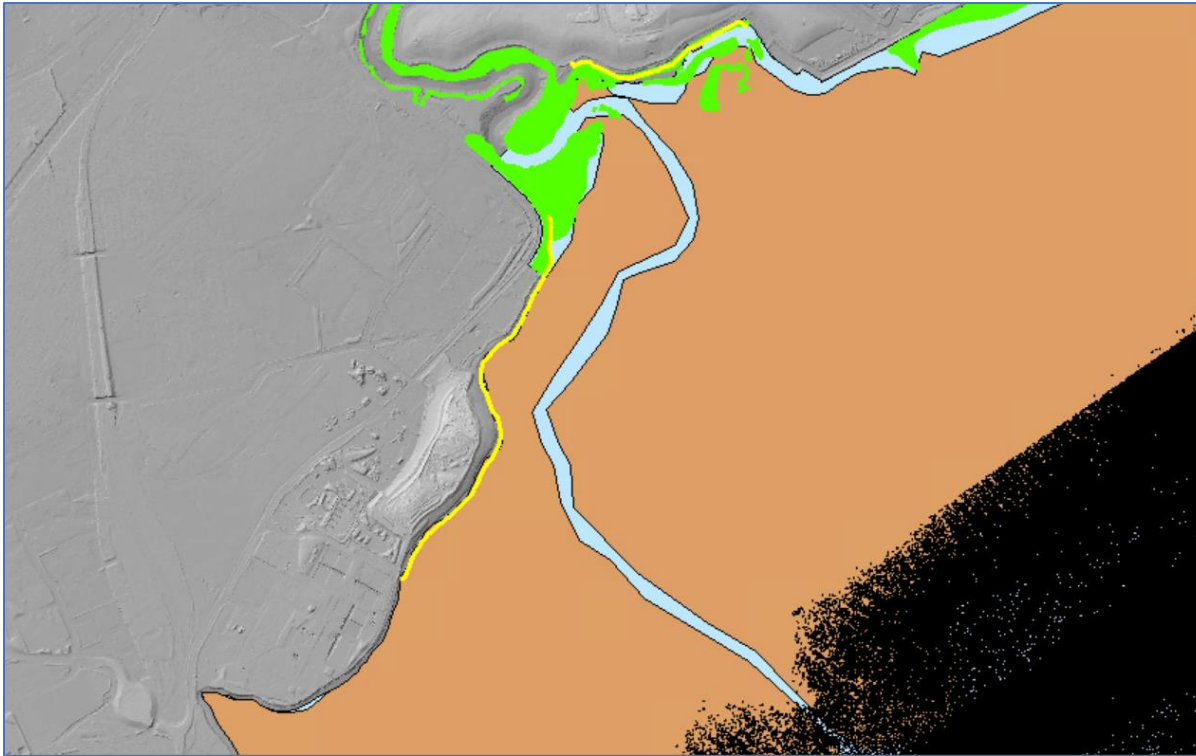
Map showing higher ground behind the coastal defences nos. 11 and 12, as part of the NRW coastal squeeze calculation method.

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Map showing the receptors to coastal squeeze as part of the NRW coastal squeeze calculation method.

- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
Feature_Name
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Salicornia and other annuals colonising mud and sand
Feature_Name
- Salicornia and other annuals colonising mud and sand
- Marine Reg37 Severn Estuary reef points
- Marine Reg37 Severn Estuary sandbanks
- Marine Reg37 Severn Estuary Mudflats and sandflats
- Marine Reg37 Severn Estuary estuaries

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