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Proposed dredge of Faversham Creek Basin: a WFD compliance assessment case study

Jan Brooke

Director

Jan Brooke Environmental Consultant Ltd.



Demonstrating WFD compliance of dredging projects in England

- **Clearing the waters**, Environment Agency's WFD compliance assessment methodology for marine dredging and disposal, developed 2009
- Methodology intended for use by developers and regulators to determine WFD compliance *inter alia* in applying for a 'Marine Licence'
- Revised and updated 2012
- Now being further developed into compliance tool for all types of physical modification in coastal and transitional water bodies



Faversham Creek Basin



- Used regularly by vessels until around 30 years ago
- Little or no freshwater flow
- Tidal creek, but water exchange limited by presence of gates
- Fine sediment has accumulated in Basin over many years, eventually becoming vegetated in places

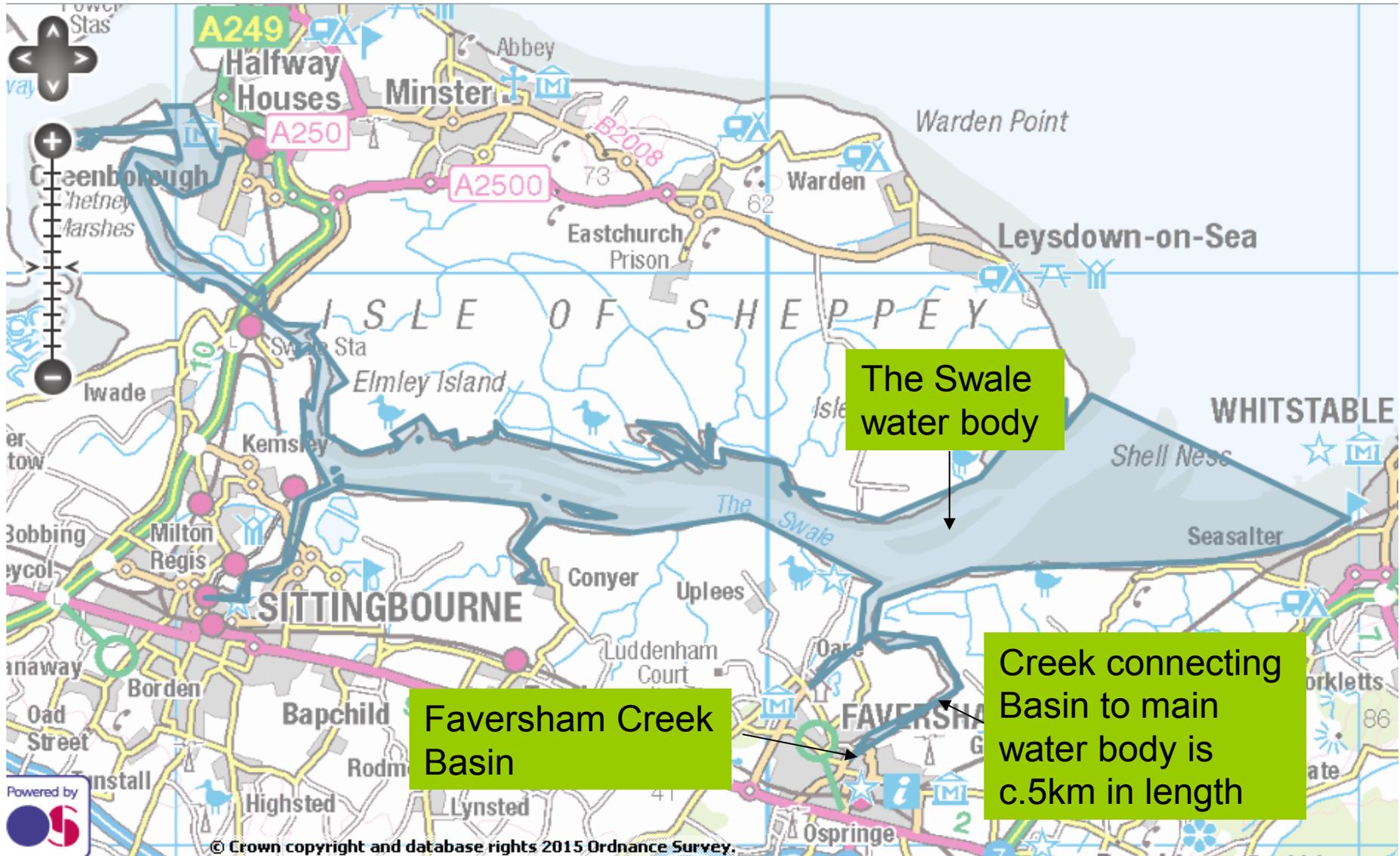


The Swale transitional water body

- Faversham Creek Basin: small part of very large (29km²) transitional water body - The Swale



The Swale



The Swale transitional water body

- Faversham Creek Basin: small part of very large (29km²) transitional water body - The Swale
- Designated heavily modified, but not for navigation
- Several water-dependent protected areas including The Swale Natura site, and Swale East and Swale Central Shellfish Waters
- 2013 data indicate The Swale fails to achieve good ecological status (potential) for dissolved inorganic nitrogen and hydromorphological supporting elements
- Also fails to meet chemical status objectives for mercury, tributyl tin (TBT) and benzo(a)pyrene

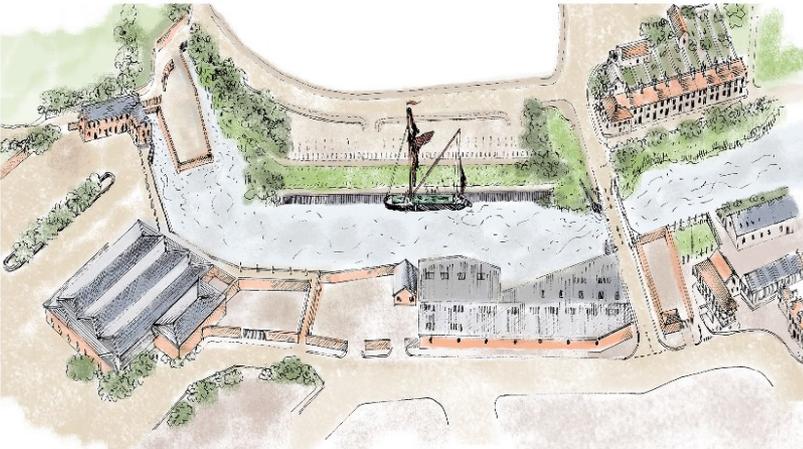
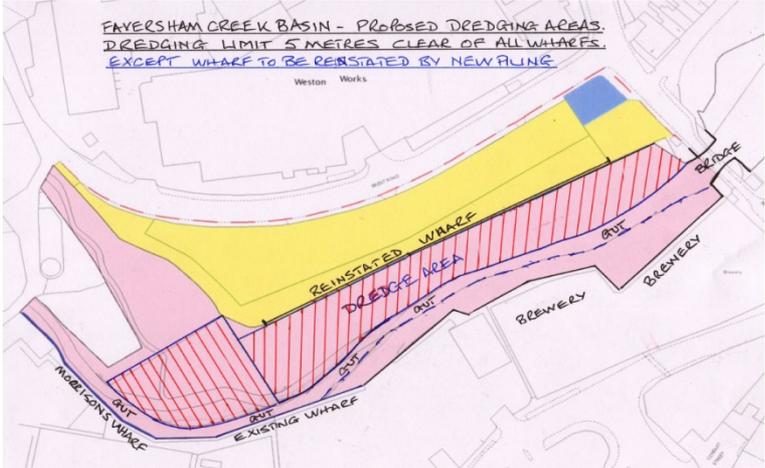


Faversham Creek Basin Project

- Urban regeneration project to restore navigation to Faversham Creek Basin enabling community enterprise to flourish; bringing alive the Basin's maritime heritage
- Regenerating physical infrastructure will allow access by traditional vessels (e.g. Thames sailing barges) to be repaired at the newly formed shipwright's training school
- Access and mooring of these vessels requires the restoration of navigability to the Basin, notably deepening an area upstream of Brents Swing Bridge



Proposed dredge area



Dredging requirements

- Thames sailing barges draw 1.0 - 2.0m
- Accumulated silt levels therefore need to be reduced by around one metre over 0.4ha; remove 4,000m³
- Small water injection dredger to carry out these works
- Dredger capacity: up to 50m³ per two-hour tide
- Dredging requires a Marine Licence from the Marine Management Organisation
- Marine Licence application must be accompanied by a WFD compliance assessment
- No EIA required (but some local issues...)



Water injection dredger



Applying 'Clearing the waters' (1)

Table 1: Applying the Clearing the Waters 'new projects' process to the proposed dredging in Faversham Creek Basin

WFD parameter; <i>Cycle 2 2013 status where available</i>	Discussion of potential effects on status
<i>Hydromorphological elements supporting the biological elements</i>	
Morphology: depth variation	<p>According to the Clearing the Waters trigger tables, further assessment of the depth variation is required if more than 5% of the water body could be affected by the dredging or disposal.</p> <p>The proposed dredging will result in a local, long-term increase in depth by approximately 1m over part of the Basin. However, this increase will be insignificant at water body level, affecting around 0.014% of the total area. No effects on the WFD ecological status of the Swale water body are therefore anticipated.</p>
Morphology: bed structure, substrate	<p>According to the Clearing the Waters trigger tables, further assessment of the bed sub-elements is required if more than 5% of the water body could be affected by the dredging or disposal.</p> <p>Whilst the proposed dredging will temporarily affect the subtidal structure and substrate locally within the Basin, this will be insignificant at water body level affecting around 0.007% of the total area. Further, the characteristics of the substrate in the area are such that there will be no long-term change. No effects on the ecological status of the Swale water body are therefore anticipated.</p>
Morphology: intertidal zone structure	<p>The Clearing the Waters trigger tables highlight the need for further consideration to be given to dredging taking place within intertidal areas or closer than 10m to mean low water spring tide level. In this regard, it is clear that the proposed dredging will change the intertidal zone structure and substrate locally within the Basin (i.e. the currently vegetated area). This increase will, however, be insignificant at water body level, affecting around 0.007% of the total area.</p> <p>No effects on the ecological status of the Swale water body are therefore anticipated.</p>
Tidal regime: freshwater flow	<p>The Basin comprises the upstream limit of the wider tidal system of the Swale water body. Freshwater flow into the basin (from the Stonebridge Ponds, fed by the Westbrook stream) is extremely limited and is typically only of any significance during periods of high rainfall. The proposed dredging will not adversely affect flow within the basin; indeed a wider and deeper channel may assist with local flood flow conveyance.</p> <p>At water body level, the dredging will have no impact on freshwater flow. No effects on the ecological status of the Swale water body are therefore anticipated.</p>

Tidal regime: wave exposure	<p>The dredging will be carried out within the contained Basin; fetch is extremely limited and no measurable effects on exposure are anticipated, even locally.</p> <p>The proposed dredging will have no effect on wave exposure at water body level and will not affect the WFD ecological status of the Swale water body.</p>
Mitigation measures assessment <i>Moderate</i>	<p>The Swale water body is designated as a heavily modified water body for flood defence but not for navigation reasons. The ecological status (i.e. potential) of HMWBs can sometimes be improved without detriment to the designated use or uses by implementing mitigation measures. Where technically viable and not disproportionately costly mitigation measures are not already in place, the water body is deemed to be failing to meet its potential.</p> <p>The 2014 Medway Swale Estuary operational catchment economic appraisal and environmental assessment at catchment level (Environment Agency, 2014) alludes to various possible mitigation measures, including the removal or easement of barriers to fish migration; improvements to the condition of channel/bed and/or banks and shorelines; and changes to the operation and maintenance of structures.</p> <p>However, according to the Environment Agency (personal communication, 2015) the 2015 river basin management plan will not identify any 'not-in-place' mitigation measures for the Swale water body. This is because none of the measures highlighted as potentially helping to improve the hydromorphology of the water body - and hence contribute to meeting the 'good ecological potential' objective - proved to be cost-beneficial.</p> <p>Insofar as this assessment is concerned, it can therefore be concluded that the proposed dredging will not affect the ability of the Swale water body to meet good ecological potential. If there are no not-in-place measures, the dredging will neither compromise the ability of the water body to meet its objectives in this respect, nor will there be improvement opportunities to which the proposed dredging might contribute.</p>
<i>Physico-chemical elements supporting the biological elements</i> Transparency	<p>Water injection dredging works by mobilising sediment in a density current that moves by gravity until it is dispersed by natural currents. As with any form of agitation dredging, some reduction in transparency is therefore an inevitable consequence of the use of the technique. As material is dispersed, a plume of suspended sediment may be visible depending on the prevailing conditions. However, the nature of the activity (i.e. the mobilisation and dispersion of the material) is such that any effects are both local and temporary.</p> <p>Transparency is a WFD supporting element in the Directive because certain species are sensitive to elevated suspended sediment concentrations. However, there is no evidence to suggest that the</p>

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WFD parameter; <i>Cycle 2 2013 status where available</i>	Discussion of potential effects		Tidal regime: wave exposure	The dredging will be carried out within the contained Basin; fetch is extremely limited and no measurable effects on exposure are anticipated, even locally.
<i>Hydromorphological elements supporting the biological elements</i>				
Morphology: depth variation	According to the Clearing the Waters trigger tables of the depth variation is required could be affected by the dredging. The proposed dredging will result in a maximum increase of the depth by approximately 1m over part of the basin. This increase will be insignificant at water body level. No effects on the WFD ecological status of the Swale water body are therefore anticipated.	<p>Depth variation ... this increase will be insignificant at water body level, affecting around 0.014% of the total area. No effects on the WFD ecological status of the Swale water body are therefore anticipated.</p>		The proposed dredging will have no effect on wave exposure at water body level and will not affect the WFD ecological status of the Swale water body.
Morphology: bed structure, substrate	According to the Clearing the Waters trigger tables of the bed sub-elements is required could be affected by the dredging. Whilst the proposed dredging will temporarily affect the subtidal structure and substrate locally within the Basin, this will be insignificant at water body level affecting around 0.007% of the total area. Further, the characteristics of the substrate in the area are such that there will be no long-term change. No effects on the ecological status of the Swale water body are therefore anticipated.			The Swale water body is designated as a heavily modified water body or flood defence but not for navigation reasons. The ecological status (i.e. potential) of HMWBs can sometimes be improved without detriment to the designated use or uses by implementing mitigation measures. Where technically viable and not disproportionately costly mitigation measures are not already in place, the water body is deemed to be failing to meet its potential.
Morphology: intertidal zone structure	The Clearing the Waters trigger tables highlight the need for further consideration to be given to dredging taking place within intertidal areas or closer than 10m to mean low water spring tide level. In this regard, it is clear that the proposed dredging will change the intertidal zone structure and substrate locally within the Basin (i.e. the currently vegetated area). This increase will, however, be insignificant at water body level, affecting around 0.007% of the total area. No effects on the ecological status of the Swale water body are therefore anticipated.			The 2014 Medway Swale Estuary operational catchment economic appraisal and environmental assessment at catchment level (Environment Agency, 2014) alludes to various possible mitigation measures, including the removal or easement of barriers to fish migration; improvements to the condition of channel/bed and/or banks and shorelines; and changes to the operation and maintenance of structures.
Tidal regime: freshwater flow	The Basin comprises the upstream limit of the wider tidal system of the Swale water body. Freshwater flow into the basin (from the Stonebridge Ponds, fed by the Westbrook stream) is extremely limited and is typically only of any significance during periods of high rainfall. The proposed dredging will not adversely affect flow within the basin; indeed a wider and deeper channel may assist with local flood flow conveyance. At water body level, the dredging will have no impact on freshwater flow. No effects on the ecological status of the Swale water body are therefore anticipated.			However, according to the Environment Agency (personal communication, 2015) the 2015 river basin management plan will not identify any 'not-in-place' mitigation measures for the Swale water body. This is because none of the measures highlighted as potentially helping to improve the hydromorphology of the water body - and hence contribute to meeting the 'good ecological potential' objective - proved to be cost-beneficial.
			<i>Physico-chemical elements supporting the biological elements</i> Transparency	Insofar as this assessment is concerned, it can therefore be concluded that the proposed dredging will not affect the ability of the Swale water body to meet good ecological potential. If there are no not-in-place measures, the dredging will neither compromise the ability of the water body to meet its objectives in this respect, nor will there be improvement opportunities to which the proposed dredging might contribute. Water injection dredging works by mobilising sediment in a density current that moves by gravity until it is dispersed by natural currents. As with any form of agitation dredging, some reduction in transparency is therefore an inevitable consequence of the use of the technique. As material is dispersed, a plume of suspended sediment may be visible depending on the prevailing conditions. However, the nature of the activity (i.e. the mobilisation and dispersion of the material) is such that any effects are both local and temporary. Transparency is a WFD supporting element in the Directive because certain species are sensitive to elevated suspended sediment concentrations. However, there is no evidence to suggest that the

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WFD parameter; Cycle 2 2013 <i>status</i> where available	Discussion of potential effects	Tidal regime: wave exposure
<i>Hydromorphological elements supporting the biological elements</i>		The dredging will be carried out within the contained Basin; fetch is extremely limited and no measurable effects on exposure are anticipated, even locally.
Morphology: depth variation	According to the Clearing the Waters process, the depth variation is required to be maintained. The proposed dredging will result in a depth variation of approximately 1m over part of the basin area. No effects on the WFD ecological status are therefore anticipated.	The proposed dredging will have no effect on wave exposure at water body level and will not affect the WFD ecological status of the Swale water body.
Morphology: bed structure, substrate	According to the Clearing the Waters process, the bed sub-elements is required to be maintained. Whilst the proposed dredging will result in a change to the bed structure and substrate locally at water body level affecting the characteristics of the substrate, no long-term change. No effects on the WFD ecological status of the Swale water body are therefore anticipated.	The Swale water body is designated as a heavily modified water body or flood defence but not for navigation reasons. The ecological status (i.e. potential) of HMWBs can sometimes be improved without detriment to the designated use or uses by implementing mitigation measures. Where technically viable and not disproportionately costly mitigation measures are not already in place, the water body is deemed to be failing to meet its potential.
Morphology: intertidal zone structure	The Clearing the Waters process requires consideration to be given to dredging closer than 10m to mean low water. It is clear that the proposed dredging will result in a change to the bed structure and substrate locally within the Basin (i.e. the currently vegetated area). This increase will, however, be insignificant at water body level, affecting around 0.007% of the total area. No effects on the ecological status of the Swale water body are therefore anticipated.	The 2014 Medway Swale Estuary operational catchment economic appraisal and environmental assessment at catchment level (Environment Agency, 2014) alludes to various possible mitigation measures, including the removal or easement of barriers to fish migration; improvements to the condition of channel/bed and/or banks and shorelines; and changes to the operation and maintenance of structures.
Tidal regime: freshwater flow	The Basin comprises the upstream limit of the wider tidal system of the Swale water body. Freshwater flow into the basin (from the Stonebridge Ponds, fed by the Westbrook stream) is extremely limited and is typically only of any significance during periods of high rainfall. The proposed dredging will not adversely affect flow within the basin; indeed a wider and deeper channel may assist with local flood flow conveyance. At water body level, the dredging will have no impact on freshwater flow. No effects on the ecological status of the Swale water body are therefore anticipated.	However, according to the Environment Agency (personal communication, 2015) the 2015 river basin management plan will not identify any 'not-in-place' mitigation measures for the Swale water body. This is because none of the measures highlighted as potentially helping to improve the hydromorphology of the water body - and hence contribute to meeting the 'good ecological potential' objective - proved to be cost-beneficial.
		Insofar as this assessment is concerned, it can therefore be concluded that the proposed dredging will not affect the ability of the Swale water body to meet good ecological potential. If there are no not-in-place measures, the dredging will neither compromise the ability of the water body to meet its objectives in this respect, nor will there be improvement opportunities to which the proposed dredging might contribute.
		<i>Physico-chemical elements supporting the biological elements</i>
		Transparency
		Water injection dredging works by mobilising sediment in a density current that moves by gravity until it is dispersed by natural currents. As with any form of agitation dredging, some reduction in transparency is therefore an inevitable consequence of the use of the technique. As material is dispersed, a plume of suspended sediment may be visible depending on the prevailing conditions. However, the nature of the activity (i.e. the mobilisation and dispersion of the material) is such that any effects are both local and temporary.
		Transparency is a WFD supporting element in the Directive because certain species are sensitive to elevated suspended sediment concentrations. However, there is no evidence to suggest that the

Bed structure ... insignificant at water body level affecting around 0.007% of the total area. Further, the characteristics of the substrate in the area are such that there will be **no long-term change**. No effects on the ecological status of the Swale water body are therefore anticipated.

Applying 'Clearing the waters' (1)

Table 1: Applying the Clearing the Waters 'new projects' process to the proposed dredging in Faversham Creek Basin

WFD parameter; Cycle 2 2013 where available	Discussion of potential effects on status
Hydromorph elements supporting the biological elements Morphology: channel variation	<p>Transparency ... WFD assessment concerned with potential non-temporary effects that affect status at water body level. Given small capacity of dredger and local, intermittent and short-term nature of the proposed water injection dredging in context of 29 km² water body, no effect on the status of the Swale water body in respect of transparency is therefore anticipated.</p> <p>At water body level, the dredging will have no impact on freshwater flow. No effects on the ecological status of the Swale water body are therefore anticipated.</p>
Morphology: bank structure, substrate	
Morphology: in-channel zone structure	
Tidal regime: freshwater flow	

Tidal regime: wave exposure	<p>The dredging will be carried out within the contained Basin; fetch is extremely limited and no measurable effects on exposure are anticipated, even locally.</p> <p>The proposed dredging will have no effect on wave exposure at water body level and will not affect the WFD ecological status of the Swale water body.</p>
Mitigation measures assessment <i>Moderate</i>	<p>The Swale water body is designated as a heavily modified water body for flood defence but not for navigation reasons. The ecological status (i.e. potential) of HMWBs can sometimes be improved without detriment to the designated use or uses by implementing mitigation measures. Where technically viable and not disproportionately costly mitigation measures are not already in place, the water body is deemed to be failing to meet its potential.</p> <p>The 2014 Medway Swale Estuary operational catchment economic appraisal and environmental assessment at catchment level (Environment Agency, 2014) alludes to various possible mitigation measures, including the removal or easement of barriers to fish migration; improvements to the condition of channel/bed and/or banks and shorelines; and changes to the operation and maintenance of structures.</p> <p>However, according to the Environment Agency (personal communication, 2015) the 2015 river basin management plan will not identify any 'not-in-place' mitigation measures for the Swale water body. This is because none of the measures highlighted as potentially helping to improve the hydromorphology of the water body - and hence contribute to meeting the 'good ecological potential' objective - proved to be cost-beneficial.</p> <p>Insofar as this assessment is concerned, it can therefore be concluded that the proposed dredging will not affect the ability of the Swale water body to meet good ecological potential. If there are no not-in-place measures, the dredging will neither compromise the ability of the water body to meet its objectives in this respect, nor <u>will there</u> be improvement opportunities to which the proposed dredging might contribute.</p>
Physico-chemical elements supporting the biological elements Transparency	<p>Water injection dredging works by mobilising sediment in a density current that moves by gravity until it is dispersed by natural currents. As with any form of agitation dredging, some reduction in transparency is therefore an inevitable consequence of the use of the technique. As material is dispersed, a plume of suspended sediment may be visible depending on the prevailing conditions. However, the nature of the activity (i.e. the mobilisation and dispersion of the material) is such that any effects are both local and temporary.</p> <p>Transparency is a WFD supporting element in the Directive because certain species are sensitive to elevated suspended sediment concentrations. However, there is no evidence to suggest that the</p>

Applying 'Clearing the waters' (2)

	<p>regular existing use of water injection and agitation techniques for maintenance dredging have any effect on the WFD 'biological quality element' species within the Swale and Medway water bodies. Medway Ports' strategic level WFD compliance assessment (Brooke, 2013) assessed the combined effects of all maintenance dredging activities taking place within the Swale and Medway water bodies. This document, which has been signed-off by the Environment Agency, concludes that the maintenance dredging of up to 8,000m³ annually in the Swale using water injection or other agitation techniques does not adversely affect the WFD status of the water body, including with regard to transparency.</p> <p>Finally, it is important to take into account that the WFD assessment is concerned only with potential non-temporary effects that affect status at water body level. Given the small capacity of the dredger and the local, intermittent and short-term nature of the proposed water injection dredging in the context of the 29km² water body, no effect on the status of the Swale water body in respect of transparency is therefore anticipated.</p>
Thermal conditions	This parameter is screened out by the Clearing the Waters trigger tables (i.e. dredging activities do not typically impact on temperature). The proposed dredging will not therefore affect thermal conditions in the Swale water body.
Oxygenation <i>High</i>	<p>Faversham Creek is a small tidal creek with very shallow water at low tide. These physical characteristics, combined with the various existing pressures in an urban environment, mean that the creek will already experience - and to some extent will be adapted to - variations in oxygen levels. There is no evidence, however, to indicate that existing maintenance dredging activities using water injection and agitation techniques cause or contribute significantly to any local issues experienced.</p> <p>In order to avoid any local downstream accumulation of masses of vegetation and root mat, this material will be removed for disposal to land. Given the small capacity of the water injection dredger to be used and its very limited period of operation (two hours following high tide), no local issues associated with dissolved oxygen levels are anticipated.</p> <p>Further, no mechanism has been identified by which the dredging of such a small area could affect the oxygenation status at the level of the water body (i.e. at the scale of concern to the WFD).</p>
Salinity	This parameter is screened out by the Clearing the Waters trigger tables (i.e. dredging activities do not typically impact on salinity). The proposed dredging will not therefore affect salinity in the Swale water body.
Nutrient conditions <i>Moderate</i>	The Clearing the Waters trigger tables screen out maintenance dredging activities carried out during the 2006-2008 WFD classification period as having no potential effect on water body status. Although the current application is for a capital dredge (in WFD terms), it is important to be aware both that the area to be dredged represents around 0.014% of the total water body area and that the material to be dredged

Oxygenation ... no evidence to indicate water injection dredging causes or contributes to any local issues. However, **to avoid any local downstream accumulation of masses of vegetation and root mat, this will be disposed to land.** Given small capacity of dredger and its limited operation (two hours following high tide) no local issues with dissolved oxygen levels are anticipated. Further, **no mechanism** has been identified by which the dredging of such a small area could **affect the oxygenation status at the level of the water body** (i.e. at the scale of concern to the WFD).

nce dredging

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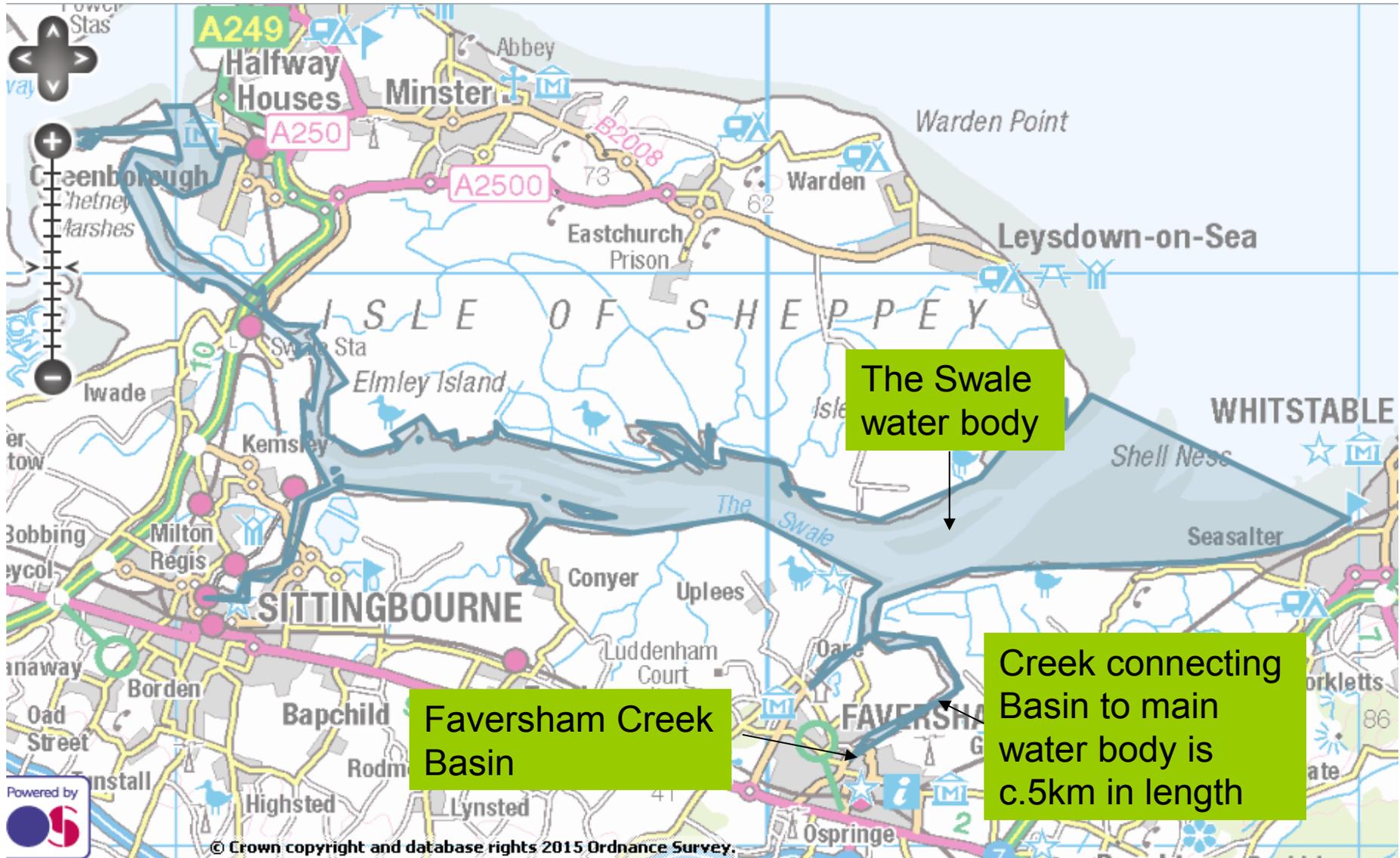
dredged from iments in the edge Protocol e assessment dies are both certain metals f existing data is undertaken . In particular aw specifically ironment' i.e. ded by water it.

to be dredged nsed for both therefore be not affect the sific pollutants

Waters trigger hytoplankton). status of this

deration must at involves the within 10m of ea of intertidal

The Swale



Applying 'Clearing the waters' (2)

Specific pollutants ... material to be dredged is characteristic of sediments in wider system. According to 2013 WFD strategic level compliance assessment, the Swale is **characterised** by sediment with **slightly elevated levels of certain metals** and polyaromatic hydrocarbons, including in so-called 'receiving environment' i.e. areas where suspended sediments might be expected to deposit. Therefore **concluded** that proposed water injection dredging will **not affect the status of the Swale water body** insofar as relevant specific pollutants are concerned.

current applications for a capital dredge (in WFD terms), it is important to be aware both that the area to be dredged represents around 0.014% of the total water body area and that the material to be dredged

	<p>is consistent with that already licensed for maintenance dredging elsewhere in the waterbody.</p> <p>Taking this into account (and even allowing for the possibility that nutrient levels in the Basin sediment are for some reason locally higher than in other parts of the system), no mechanism has been identified by which the dredging of such a small area could affect the nutrient status at the level of the water body (i.e. the scale of concern to the WFD).</p>
Specific (synthetic and non-synthetic) pollutants <i>High</i>	<p>The Clearing the Waters methodology accepts the issue by the Marine Management Organisation of a Marine Licence for disposal at sea as a 'proxy' for demonstrating that the disposal will not cause a detrimental effect on the status of the (local) aquatic environment. Insofar as water injection dredging is concerned, both the MMD and Port of Sheerness Ltd. apply the same principle in issuing their respective dredging licences. Where sediment quality is below CEFAS Action Level 1 (or, depending on local characteristics, between Action Level 1 and Action Level 2) it is concluded that the relocation of the sediment through water injection or agitation dredging will not pose an unacceptable risk to the marine environment. More information on the CEFAS Action Levels and the weight-of-evidence approach adopted in their application can be found at http://www.cefass.defra.gov.uk/media/562541/cefass%20action%20levels.pdf.</p> <p>Table 2 below demonstrates that the material to be dredged from Favesham Creek Basin is entirely characteristic of sediments in the wider Swale system. According to the Maintenance Dredge Protocol (ABPmer, 2012) and the WFD strategic level compliance assessment (Brooke, 2013), the Swale and the Medway water bodies are both characterised by sediment with slightly elevated levels of certain metals and PAHs (polyaromatic hydrocarbons). A 2012 review of existing data together with a programme of new sampling and analysis undertaken by Port of Sheerness Ltd. (PoSL) informed this conclusion. In particular the data collection exercise undertaken for this PoSL review specifically tested samples taken from the so-called 'receiving environment' i.e. areas representative of where the sediments suspended by water injection or agitation dredging might be expected to deposit.</p> <p>Sediments with the same chemical 'signature' as those to be dredged from Favesham Creek Basin are already regularly licensed for both water injection dredging and for disposal to sea. It can therefore be concluded that the proposed water injection dredging will not affect the status of the Swale water body insofar as relevant specific pollutants are concerned.</p>
<i>Biological elements</i>	
Phytoplankton <i>High</i>	<p>This parameter is screened out using the Clearing the Waters trigger tables (i.e. dredging activities do not typically impact on phytoplankton). The proposed dredging will not therefore impact on the status of this quality element in the Swale water body.</p>
Other aquatic flora (e.g. saltmarsh and seaweed) <i>Good</i>	<p>According to the Clearing the Waters trigger tables, consideration must be given to the potential effect of any dredging activity that involves the direct removal of an inter-tidal area or is taking place within 10m of MLWS. As the proposed dredge will remove a small area of intertidal</p>

Faversham Creek Basin sediment quality data

Substance	Sample 1	Sample 2	Action Level 1	Action Level 2*	Range from recent sampling in Swale
Heavy metals					
Arsenic	21.70	18.10	20.00	100.00	11.00 – 30.90
Cadmium	0.47	0.40	0.40	5.00	0.10 – 1.00
Chromium	69.19	60.59	40.00	400.00	26.00 – 203.00
Copper	65.15	54.75	40.00	400.00	34.00 – 215.00
Lead	88.39	74.01	50.00	500.00	31.00 – 480.00
Mercury	0.53	0.41	0.30	3.00	0.23 – 2.30
Nickel	43.07	35.73	20.00	200.00	20.00 – 99.00
Zinc	206.23	175.28	130.00	800.00	114.00 – 330.00
Organic pollutants					
TBT	0.057	0.055	0.100	1.000	0.005 – 0.040
DBT	0.024	<LOD	0.100	1.000	0.006 – 0.028
<u>Polyaromatic Hydrocarbons (PAH)</u>					
<u>Acenaphthene</u>	0.024	0.025	0.100	0.0889	0.009 – 0.148
<u>Acenaphthylene</u>	0.027	0.028	0.100	0.1280	0.013 – 0.151
<u>Anthracene</u>	0.054	0.060	0.100	0.2450	0.017 – 0.801
<u>Benzo(a)anthracene</u>	0.275	0.287	0.100	0.6930	0.065 – 1.380
<u>Benzo(a)fluoranthene</u>			0.100	-	
<u>Benzo(a)pyrene</u>	0.403	0.431	0.100	0.7630	0.050 – 1.620
<u>Benzo(g,h,i)perylene</u>	0.354	0.355	0.100	-	0.050 – 0.818
<u>Benzo(g)perylene</u>			0.100	-	
<u>Benzo(k)fluoranthene</u>	0.265	0.274	0.100	-	0.049 – 0.842
<u>C1-Napthalene</u>	0.165	0.190	0.100	-	

Applying 'Clearing the waters' (3)

	<p>habitat, RH-DHV was asked to prepare an ecological Technical Note to inform this WFD compliance assessment.</p> <p>The Technical Note (RH-DHV, 2015) confirms that the proposed dredging will cause the loss of approximately 0.2 ha of low diversity habitat with a superabundance of sedge. This loss represents 0.007% of the overall area of the Swale water body (or 0.003% of the area of marsh covered by the relevant SSSI designation). In this regard, the area is not considered to be a key part of the marsh habitat within the estuary.</p> <p>The Technical Note further highlights that the area to be dredged is of low diversity, is located in a heavily urbanised and disturbed environment, and is already fragmented.</p> <p>It can therefore be concluded that the proposed dredging will not affect the status of aquatic flora at the level of the Swale water body (i.e. the scale of concern to the WFD).</p>
Benthic invertebrate fauna	<p>The proposed dredging will cause the loss of approximately 0.2ha of disturbed, low diversity intertidal habitat (see above), and will temporarily affect benthic invertebrates within a further 0.2ha as a result of the channel deepening: this is considered to be a local impact (affecting in total around 0.014% of the water body).</p> <p>No mechanism has been identified by which the dredging of such a small area could affect the status of this biological quality element at the level of the water body (i.e. the scale of concern to the WFD)</p>
Fish	<p>There is no evidence, anecdotal or otherwise, to indicate that Faversham Creek Basin is of particular importance for fish. Indeed, the physical characteristics of the Basin make it very unlikely that the area is of even local significance: not only are the Basin's properties affected by the presence of the gates, but there is very limited freshwater flow into the basin other than during periods of high rainfall. Further, there is considerable debris in the channel, and at low water there are no obvious places of refuge (i.e. no seagrass and, apart from the presence of ephemeral algae (<i>Ulva intestinalis</i>), no other vegetation on the mudflats or in the channel) (RH-DHV, 2015). Local observations support expert opinion that the Basin may be used during the summer months by small numbers of juvenile flatfish. However, as dredging is intended to take place from September to March inclusive, these individuals will not be affected.</p> <p>Fish are mobile species and are thus able to move away from unfavourable conditions (e.g. sediment plumes). The removal of the vegetation along with the top layer of silt prior to commencing water injection dredging will mitigate the potential for any local downstream issues associated with oxygen levels or microbiological contamination. Significant local impacts on any fish present in the Creek or the Basin are not therefore anticipated.</p> <p>At water body level, no mechanism has been identified whereby the proposed dredging could affect the status of this biological quality element. As such, it can be concluded that there will be no effect on the WFD status of the Swale water body insofar as fish are concerned.</p>

Other aquatic flora ... ecological Technical Note confirms dredging will cause loss of 0.2 ha of **low diversity** habitat with a superabundance of sedge ... **0.007% of the overall area of the Swale water body** (or 0.003% of the area of marsh covered by the relevant SSSI designation) ... not a key part of marsh habitat within estuary. Note also highlights that area is located in a heavily urbanised and **disturbed environment, already fragmented** ... therefore concluded that dredging will not affect status of aquatic flora at the level of the water body (i.e. the scale of concern to the WFD).

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Faversham Creek Basin ... in summer ... and in winter



Loss of 0.2 ha of low diversity habitat
with a superabundance of sedge ...



Sedge monoculture



- Sedge (80%)
- Some creeping grasses
- Limited Sea Aster growing on creek edge of sedge bed



Applying 'Clearing the waters' (3)

	<p>habitat, RH-DHV was asked to prepare an ecological Technical Note to inform this WFD compliance assessment.</p> <p>The Technical Note (RH-DHV, 2015) confirms that the proposed dredging will cause the loss of approximately 0.2 ha of low diversity habitat with a superabundance of sedge. This loss represents 0.007% of the overall area of the Swale water body (or 0.003% of the area of marsh covered by the relevant SSSI designation). In this regard, the area is not considered to be a key part of the marsh habitat within the estuary.</p> <p>The Technical Note further highlights that the area to be dredged is of low diversity, is located in a heavily urbanised and disturbed environment, and is already fragmented.</p> <p>It can therefore be concluded that the proposed dredging will not affect the status of aquatic flora at the level of the Swale water body (i.e. the scale of concern to the WFD).</p>
Benthic invertebrate fauna	<p>The proposed dredging will cause the loss of approximately 0.2ha of disturbed, low diversity intertidal habitat (see above), and will temporarily affect benthic invertebrates within a further 0.2ha as a result of the channel deepening: this is considered to be a local impact (affecting in total around 0.014% of the water body).</p> <p>No mechanism has been identified by which the dredging of such a small area could affect the status of this biological quality element at the level of the water body (i.e. the scale of concern to the WFD)</p>
Fish	<p>There is no evidence, anecdotal or otherwise, to indicate that Faversham Creek Basin is of particular importance for fish. Indeed, the physical characteristics of the Basin make it very unlikely that the area is of even local significance: not only are the Basin's properties affected by the presence of the gates, but there is very limited freshwater flow into the basin other than during periods of high rainfall. Further, there is considerable debris in the channel, and at low water there are no obvious places of refuge (i.e. no seagrass and, apart from the presence of ephemeral algae (<i>Ulva intestinalis</i>), no other vegetation on the mudflats or in the channel) (RH-DHV, 2015). Local observations support expert opinion that the Basin may be used during the summer months by small numbers of juvenile flatfish. However, as dredging is intended to take place from September to March inclusive, these individuals will not be affected.</p> <p>Fish are mobile species and are thus able to move away from unfavourable conditions (e.g. sediment plumes). The removal of the vegetation along with the top layer of silt prior to commencing water injection dredging will mitigate the potential for any local downstream issues associated with oxygen levels or microbiological contamination. Significant local impacts on any fish present in the Creek or the Basin are not therefore anticipated.</p> <p>At water body level, no mechanism has been identified whereby the proposed dredging could affect the status of this biological quality element. As such, it can be concluded that there will be no effect on the WFD status of the Swale water body insofar as fish are concerned.</p>

Other aquatic flora ... ecological Technical Note confirms dredging will cause loss of 0.2 ha of low diversity habitat with a superabundance of sedge ... 0.007% of the overall area of the Swale water body (or 0.003% of the area of marsh covered by the relevant SSSI designation) ... not a key part of marsh habitat within estuary. Note also highlights that area is of low diversity, located in a heavily urbanised and disturbed environment, already fragmented ... therefore concluded that **dredging will not affect status of aquatic flora at the level of the water body** (i.e. the scale of concern to the WFD).

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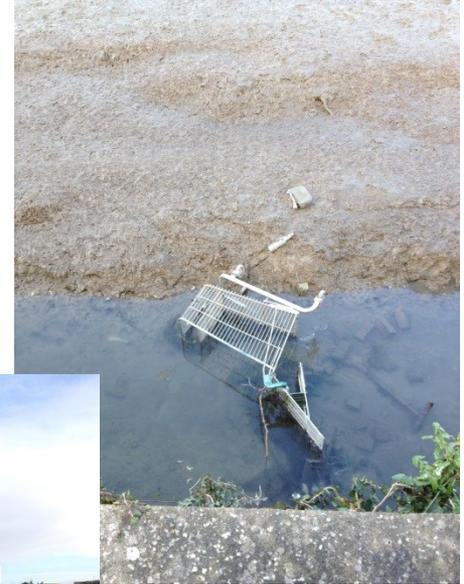
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Faversham Creek Basin fish habitat?



Applying 'Clearing the waters' (3)

Priority (hazardous) substances
 ... Sediments with **same chemical 'signature'** already regularly licensed for both water injection dredging and disposal to sea ... can therefore be concluded that proposed dredging will not affect the **chemical status** of the Swale water body

Benthic invertebrate fauna	No mechanism has been identified by which the dredging of such a small area could affect the status of this biological quality element at the level of the water body (i.e. the scale of concern to the WFD)
Fish	<p>There is no evidence, anecdotal or otherwise, to indicate that Faversham Creek Basin is of particular importance for fish. Indeed, the physical characteristics of the Basin make it very unlikely that the area is of even local significance: not only are the Basin's properties affected by the presence of the gates, but there is very limited freshwater flow into the basin other than during periods of high rainfall. Further, there is considerable debris in the channel, and at low water there are no obvious places of refuge (i.e. no seagrass and, apart from the presence of ephemeral algae (<i>Ulva intestinalis</i>), no other vegetation on the mudflats or in the channel) (RH-DHV, 2015). Local observations support expert opinion that the Basin may be used during the summer months by small numbers of juvenile flatfish. However, as dredging is intended to take place from September to March inclusive, these individuals will not be affected.</p> <p>Fish are mobile species and are thus able to move away from unfavourable conditions (e.g. sediment plumes). The removal of the vegetation along with the top layer of silt prior to commencing water injection dredging will mitigate the potential for any local downstream issues associated with oxygen levels or microbiological contamination. Significant local impacts on any fish present in the Creek or the Basin are not therefore anticipated.</p> <p>At water body level, no mechanism has been identified whereby the proposed dredging could affect the status of this biological quality element. As such, it can be concluded that there will be no effect on the WFD status of the Swale water body insofar as fish are concerned.</p>

Chemical status (see full list in Annex 1)	
Priority Substances <i>Good</i> and Priority Hazardous Substances <i>Fail</i>	<p>The Clearing the Waters methodology accepts the issue of a Marine Licence for disposal at sea as a 'proxy' for demonstrating that the disposal will not cause a detrimental effect on the status of the (local) aquatic environment. Insofar as water injection dredging is concerned, both the MMO and Port of Sheerness Ltd. apply the same principle in issuing their respective dredging licences. Where sediment quality is below Action Level 1 (or, depending on local characteristics, between Action Level 1 and Action Level 2) it is concluded that the relocation of the sediment through water injection or agitation dredging will not pose an unacceptable risk to the marine environment.</p> <p>Table 2 demonstrates that the material to be dredged from Faversham Creek Basin is entirely characteristic of sediments in the wider Swale system. According to the Maintenance Dredge Protocol (ABPmer, 2012) and the WFD strategic level compliance assessment (Brooke, 2013), the Swale and the Medway water bodies are both characterised by sediment with slightly elevated levels of certain metals and PAHs (polyaromatic hydrocarbons). A 2012 review of existing data together with a programme of new sampling and analysis undertaken by Port of Sheerness Ltd. informed this conclusion. In particular the data collection exercise specifically tested samples taken from the so-called 'receiving environment' i.e. areas representative of where the sediments suspended by water injection or agitation dredging might be expected to deposit.</p> <p>Sediments with the same chemical 'signature' as those to be dredged from Faversham Creek Basin are already regularly licensed for both water injection dredging and for disposal to sea. Taking all of this information into account, it can therefore be concluded that the proposed water injection dredging will not affect the chemical status of the Swale water body.</p>
EU protected areas Birds and Habitats Directives	<p>The proposed dredging will take place within 1km of a European designated site and thus requires consideration in line with the Clearing the Waters guidance. In this regard, however, it is also important to note both the physical characteristics of the Basin and its ecological value. To this end, the RH-DHV Technical Note (2015) confirms that:</p> <ul style="list-style-type: none"> - the part of Faversham Creek where the dredging is proposed is not included within the nearby Special Protection Area and Ramsar site (The Swale) which protects breeding and wintering birds and their supporting mudflat, saltmarsh and grazing marsh habitats; - this part of Faversham Creek is also outside the boundary of The Swale Site of Special Scientific Interest, protected for its grazing marsh habitat; - the area to be dredged is not considered to be a key part of the marsh habitat within the estuary. This is <i>inter alia</i> because it is a small scale, relatively recent feature which has developed in a highly urbanised environment over the last 20 or so years; - the main species present on the site (sedge, most likely sea club rush which was classified as superabundant using the

Applying 'Clearing the waters' (3)

Protected areas ... not in Special Protection Area; outside Site of Special Scientific Interest; not key part of marsh habitat in estuary; main species (sedge) classified as superabundant; not of conservation significance; site unlikely to support other species (nesting birds or water voles) because high level of disturbance. Loss of 0.2ha of sedge / temporary disturbance of 0.2ha of mudflat not expected to have direct effect on SPA status. Indirect effects on Natura site unlikely because sediments are characteristic of wider water body and vegetation is to be removed prior to dredging. Conclusion: **neither water-dependent features nor wider interest of SPA likely to be affected by dredging.**

element. As such, it can be concluded that there will be no effect on the WFD status of the Swale water body insofar as fish are concerned.

<i>Chemical status (see full list in Annex 1)</i>	
Priority Substances <i>Good</i> and Priority Hazardous Substances <i>Fail</i>	<p>The Clearing the Waters methodology accepts the issue of a Marine Licence for disposal at sea as a 'proxy' for demonstrating that the disposal will not cause a detrimental effect on the status of the (local) aquatic environment. Insofar as water injection dredging is concerned, both the MMO and Port of Sheerness Ltd. apply the same principle in issuing their respective dredging licences. Where sediment quality is below Action Level 1 (or, depending on local characteristics, between Action Level 1 and Action Level 2) it is concluded that the relocation of the sediment through water injection or agitation dredging will not pose an unacceptable risk to the marine environment.</p> <p>Table 2 demonstrates that the material to be dredged from Faversham Creek Basin is entirely characteristic of sediments in the wider Swale system. According to the Maintenance Dredge Protocol (ABPmer, 2012) and the WFD strategic level compliance assessment (Brooke, 2013), the Swale and the Medway water bodies are both characterised by sediment with slightly elevated levels of certain metals and PAHs (polycyclic aromatic hydrocarbons). A 2012 review of existing data together with a programme of new sampling and analysis undertaken by Port of Sheerness Ltd. informed this conclusion. In particular the data collection exercise specifically tested samples taken from the so-called 'receiving environment' i.e. areas representative of where the sediments suspended by water injection or agitation dredging might be expected to deposit.</p> <p>Sediments with the same chemical 'signature' as those to be dredged from Faversham Creek Basin are already regularly licensed for both water injection dredging and for disposal to sea. Taking all of this information into account, it can therefore be concluded that the proposed water injection dredging will not affect the chemical status of the Swale water body.</p>
<i>EU protected areas</i> Birds and Habitats Directives	<p>The proposed dredging will take place within 1km of a European designated site and thus requires consideration in line with the Clearing the Waters guidance. In this regard, however, it is also important to note both the physical characteristics of the Basin and its ecological value. To this end, the RH-DHV Technical Note (2015) confirms that:</p> <ul style="list-style-type: none"> - the part of Faversham Creek where the dredging is proposed is not included within the nearby Special Protection Area and Ramsar site (The Swale) which protects breeding and wintering birds and their supporting mudflat, saltmarsh and grazing marsh habitats; - this part of Faversham Creek is also outside the boundary of The Swale Site of Special Scientific Interest, protected for its grazing marsh habitat; - the area to be dredged is not considered to be a key part of the marsh habitat within the estuary. This is <i>inter alia</i> because it is a small scale, relatively recent feature which has developed in a highly urbanised environment over the last 20 or so years; - the main species present on the site (sedge, most likely sea club rush which was classified as superabundant using the

Applying 'Clearing the waters' (4)

SACFOR scale) is not recognised as a species of conservation significance through any designation of priority habitat or species classifications; and
 - the site is unlikely to support other species such as nesting

Shellfish Waters ... Two main concerns: smothering of shellfish beds; microbiological contamination. Small capacity of dredger means only small quantities dredged and only at high water on spring tides. No issues therefore expected. Microbiological contamination: Swale East regularly fails to meet SWD objectives. Five combined sewer overflows enter Creek; not uncommon to be used >20 times per year. Cumulative levels of bacteria in sediments nor persistence in surface sediment well understood, so precautionary mitigation (remove surface sediment only with long reach excavator before water injection dredging). **Outcome no detrimental effects on Shellfish Waters Directive objectives anticipated.**

	<p>Although the currently proposed dredging in Faversham Creek Basin was not explicitly addressed, all the existing maintenance dredging in the Swale uses the same or similar techniques (i.e. water injection or agitation dredging) to those that will be used in the Basin, and the quantity to be dredged is of a comparable magnitude.</p> <p>No detrimental effects on the status of the currently proposed MCZ are therefore anticipated.</p>
Shellfish Waters Directive	<p>Faversham Creek, including the Basin, lie within the designated Swale East Shellfish Water.</p> <p>The two main potential concerns with regard to water injection dredging or any other form of agitation dredging and shellfish are smothering of shellfish beds and the risk of microbiological contamination.</p> <p>Insofar as potential smothering is concerned, the size of the dredger is relevant. The capacity of the dredger means that only relatively small quantities can be dredged at any one time. Further, the dredging of the Basin will only take place around high water at spring tides, when the tidal range is considerable (i.e. 5.8m – 6.3m) and when sediment is most likely to disperse quickly. Dredging will then cease until conditions are conducive again on the next spring tide cycle. Given the small quantities involved on each 'mini-campaign' and the need to dredge at times of maximum potential dispersal, no issues with smothering are expected - either locally within the Creek or in the wider Swale water body.</p> <p>In terms of microbiological contamination, it is important to note that the Swale East Shellfish Waters regularly fail to meet their SWD objectives. A high level analysis undertaken as part of the strategic level WFD compliance assessment undertaken by Port of Sheerness Ltd. (Brooke, 2013) explored the potential for a relationship between the occurrence of these failures and dredging activity. This analysis did not identify any potential causal link (i.e. there was no obvious correlation between dredging activity in the Swale water body and the observed microbiological failures).</p> <p>Notwithstanding this, the Environment Agency (personal communication, 2015) advise that there are five combined sewer overflows or other potential sources of bacterial (microbiological) contamination entering the Creek, and that it is not uncommon for these to be used in excess of 20 times per year. Neither cumulative levels of bacteria of sewage origin within sediments, nor their potential persistence within the surface sediment, are very well understood. It is not therefore possible to be sure whether the dredging of the surface sediments (i.e. the most recently deposited sediment in which faecal bacteria might accumulate or persist) could potentially increase levels in the water column sufficient to contribute to a shellfish flesh failure.</p> <p>As a result of this uncertainty, it has been agreed with the Environment Agency that reasonable (i.e. proportionate) efforts should be made to reduce any risk.</p> <p>It was originally intended to carry out all the dredging of the mudflat using water injection dredging. However, following discussions with the</p>

'Aim to improve' objective

- No practicable (technically feasible and not disproportionately costly) options that could improve failing parameters (dissolved inorganic nitrogen, mercury, TBT and benzo(a)pyrene) were identified
- Currently no cost-beneficial not-in-place mitigation measures identified for inclusion in the 2015 RBMP: contribution to delivery of mitigation measures therefore not currently possible



Effects of future operations in dredged Basin

- No mechanism for an effect of future operations in dredged area on water body status identified
- Commercial and recreational vessels already regularly use the Swale transitional water body; no evidence that navigation contributes to existing failures
- Also assumed that:
 - future maintenance dredging will be assessed via Medway Ports' updated Maintenance Dredge Protocol and strategic WFD compliance assessment, and
 - any necessary constraints or mitigation measures will be included as licence conditions.



Overall conclusion

- Taking into account water body size, the nature and scale of the proposed activity, and the implementation of the proposed mitigation measures to minimise the potential implications for the Shellfish Waters [and to avoid any local issues associated with the downstream transport of vegetation] the proposed dredging in Faversham Creek Basin will have no effect on the WFD status of the Swale transitional water body
- No effects on adjacent water bodies are anticipated
- The activity is therefore WFD-compliant and no further WFD assessment is required



Thanks for listening!



jan@janbrooke.co.uk





For info or further questions on this presentation, please contact:

Massimo Marra
JASPERS Networking and Competence Center
Senior Officer
ph: +352 4379 85007
m.marra@eib.org

www.jaspersnetwork.org

jaspersnetwork@eib.org

