Appendix A HRA Stage 1 Screening Tables

Special Areas of Conservation (SACs)

Designated site name:	**Arun Valley**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	4056 Ramshorn snail *Anisus vorticulus* *Anisus vorticulus* occurs across a range of sites in southern and eastern England. The Arun valley is one of the three main population centres for this species in the UK. This SAC includes two of its core sites in the wash lands of the Arun floodplain (Pulborough Brooks and Amberley Wild Brooks SSSIs).	Water Dependent: Yes
Current conservation status (Article 17):	**Inadequate and deteriorating** (range: favourable, population: inadequate and deteriorating, habitat: inadequate and deteriorating, future prospects: inadequate) Main threats: reclamation of land from sea, estuary or marsh; silting up; drying out/accumulation of organic material. Main pressures: abandonment of pastoral systems; landfill, land reclamation and drying out, general; reclamation of land from sea, estuary or marsh; canalisation; other human induced changes in hydraulic conditions; silting up; drying out / accumulation of organic material.	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary advice to support conservation objectives currently unavailable.	
SSSI condition assessment:	Pulborough Brooks SSSI: 100% favourable. Amberley Wild Brooks SSSI: 1.95% favourable, 98.05% unfavourable recovering. Supporting habitat threats/pressures – inappropriate grazing regimes and management of ditches leading to dominance of fewer species, too much growth for bird species, and prominence of mid-late successional features in ditches (rather than mix of early, mid and late).	
Site Improvement Plan (actions that could be impacted by drought management option in bold)	1. **Inappropriate water levels** – Little Ramshorn whirlpool snail – maintain water levels and ditch management by continued implementation of the Water Level Management Plan (Amberley Wild Brooks – no WLMP available for Waltham or Pulborough Brooks). 2. Inappropriate water levels – Little Ramshorn whirlpool snail - investigate likely impacts on the designated features from implementation of the Lower Tidal River Arun Strategy (LTRAS) and find solution to maintain favourable conservation status. 3. **Water pollution** – Little Ramshorn whirlpool snail - Investigate and monitor the impacts of point and diffuse water pollution that enter the site and introduce measures to reduce pollutants. 4. Inappropriate ditch management –Little Ramshorn whirlpool snail - Ecological monitoring of *Anisus vorticulus*	
Potential Effects		
Scheme:	Assessment:	LSEs?
North Arundel	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The North Arundel source is considered to be at sufficient distance so as not to give rise to construction related LSEs. **Operation:** This drought management option involves increased abstraction at the boreholes. The hydrogeology assessment has determined that the south eastern boundary of the drawdown zone is restricted by the River Arun which acts as a hydraulic divide i.e. groundwater converges on this waterbody. The SAC is located to the north, outside the zone of drawdown produced by the abstraction, and upstream of any possible impacts to the Lower River Arun arising from the abstraction (which are in any case assessed as negligible in the hydrogeology assessment). Therefore, no LSEs are anticipated.	No
Pulborough	This drought management option involves various reductions in the MRF on the River Rother, allowing greater surface water abstraction, and the SAC is directly adjacent to the River Arun into which the River Rother drains. The hydrology assessment has identified two reaches; Reach 1 extends from the Pulborough abstraction to the confluence with the River Stor and Reach 2 is the transitional water. Impacts in Reaches 1 and 2 have been identified as negligible for the 10Ml/d MRF reduction in summer and winter, minor for the 20Ml/d reduction in summer and winter, but major and moderate for the 30Ml/d reduction in summer and winter respectively. The reduction in MRF is not linked to the Pulborough groundwater abstraction as this is not subject to the MRF licence condition, and the proposed drought management option does not change any of the licence conditions relating to the Pulborough groundwater abstraction. Through consultation with Natural England in December 2016 to inform the inclusion of this option in Drought Plan 2019, further details about the site and connectivity with the River Arun were discussed. Given the presence of flood banks along the River Arun, there was deemed to be no connectivity between the watercourse and the Arun Valley SAC. It can also be concluded that no impacts to any groundwater supply to the SAC are likely as the licence conditions for this element will not be changed by the drought management option. Some parts of the Waltham Brooks SSSI are in connectivity with the river but this is a small area. According to NVC habitat mapping provided by Sussex Wildlife Trust the habitats closest to the river constitute common and widespread MG6 (*Lolium perenne - Cynosurus cristatus* grassland) and MG9 (*Holcus lanatus - Deschampsia cespitosa* grasslands) communities. Moreover, during a natural drought it is expected that no ditches and drains within the SSSI will be connected to the Arun and standing waters will remain for some time. There will also be a potential groundwater input in several areas which will also provide further habitat.	No

	Therefore, no LSEs are anticipated to occur during implementation of this drought management option. In comments that Natural England provided to Southern Water in 2018 on the Drought Plan 2019 HRA it was noted that '… *should the review of flood bank management in the Arun Valley result in a change to the current hydrological system this must be taken into account in future drought and resilience planning'*. At time of writing the Drought Plan 2022 HRA there is no published information indicating that the role of the flood banks in separating the River Arun from the two SSSIs will change during this Drought Plan period (to 2027).	

Designated site name:	**Ashdown Forest**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	4010 Northern Atlantic wet heaths with *Erica tetralix* 4030 European dry heaths 1166 Great crested newt *Triturus cristatus*	Water Dependency: Yes (all)
Current conservation status (Article 17):	Northern Atlantic wet heaths with *Erica tetralix*: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad but improving). Main pressures: grazing; abandonment of pastoral systems; burning; urbanised areas, human habitation; continuous urbanisation; discontinuous urbanisation; communication networks; energy transport; other forms of transportation and communication; air pollution; drainage; invasion by a species. Main threats: as for pressures but also other pollution or human impacts/activities. European dry heaths: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad but improving). Main pressures: grazing; abandonment of pastoral systems; burning; urbanised areas, human habitation; continuous urbanisation; discontinuous urbanisation; communication networks; energy transport; other forms of transportation and communication; air pollution; invasion by a species. Main threats: grazing; abandonment of pastoral systems; burning; discontinuous urbanisation; other pollution or human impacts/activities; invasion by a species. Great crested newt *Triturus cristatus:* **Inadequate** (range: favourable, population: inadequate deteriorating, habitat: unknown, future prospects: favourable). Main pressures: modification of cultivation practices, fertilisation, urbanised areas and human habitation, pollution to surface waters, biocenotic evolution, succession) Main threats: modification of cultivation practices, use of biocides, hormones and chemicals, fertilisation, mining and quarrying, roads, paths and railroads)	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice to the conservation objectives is currently unavailable.	
SSSI condition assessment:	Ashdown Forest SSSI: 20.37% favourable, 79.22% unfavourable recovering, 0.41% unfavourable declining. Much of the heathland is unfavourable but recovering. Although much of the heather is reduced, there are areas where regeneration is occurring – mostly in isolated pockets. Molinia needs to be grazed in many locations.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Change in land management - wet heathland with cross-leaved heath, European dry heaths - establish appropriate grazing by improving facilities and stocking. 2. Air Pollution: impact of atmospheric nitrogen deposition - wet heathland with cross-leaved heath, European dry heaths - control, reduce and ameliorate atmospheric nitrogen impacts. 3. **Hydrological change** - Wet heathland with cross-leaved heath - Hydrological and botanical survey and analysis is required.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Weir Wood	This drought management option involves reducing the compensation flow released to the River Rother during summer or winter to allow greater water abstraction from the reservoir. The SAC is 0.7km south of the first hydrological reach (River Medway) from Weir Wood reservoir. However, the SAC is crossed by a number of drainage ditches, and from a review of the geology and topography of the area it has been concluded that water from Ashdown Forest drains into the River Medway between Weir Wood reservoir and Withyham. The SAC is therefore not considered to be hydrologically connected to the River Medway, and so no LSEs are anticipated.	No

Designated site name:	**Briddlesford Copses**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	1323 Bechstein`s bat *Myotis bechsteinii* The Briddlesford Copse complex of woodlands represents the most varied, structurally diverse and species-rich cluster of ancient broadleaved woodland on the Isle of Wight and supports an important breeding population of the rare Bechstein's bat *Myotis bechsteinii*. The bats use holes and crevices in mature trees for roosting and the interconnecting woodlands for feeding.	Water Dependent: Yes
Current conservation status (Article 17):	**Inadequate** (Range: favourable, Population: inadequate, Habitat: unknown, future prospects: unknown). Main pressures and threats: use of pesticides; removal of hedges and copses; general forestry management; forestry clearance; removal of undergrowth; removal of dead and dying trees.	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice on the conservation objectives is currently unavailable.	
SSSI condition assessment:	Briddlesford Copse SSSI: 80.5% favourable, 13.6% unfavourable recovering, 5.9% unfavourable declining. The saltmarsh communities appear to be declining in quality as a result of reduced saline influence, due to inappropriate weirs, dams and other structures on the freshwater systems (SSSI units 003 Firestone Copse Creek Edge, 005 Blackbridge Brook, 006 Briddlesford Copse Creek edge, 007 Wootton Mill pond).	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. **Offsite habitat availability/management** – Bechstein's bat – investigate the bats feeding and movement patterns. 2. Forestry and woodland management – Bechstein's bat – investigate the bats' feeding and movement patterns across woodland habitat. 3. Change in land management – Bechstein's bat – conduct a survey of the bats' foraging behaviour. 4. Air Pollution: impact of atmospheric nitrogen deposition – Bechstein's bat - control, reduce and ameliorate atmospheric nitrogen impacts.	
Potential Effects		
Drought management option:	Assessment:	LSEs?
Lukely Brook WSW	**Construction:** A temporary pipeline will need to be laid to discharge the compensation flow. A temporary pipeline will be laid along the river bed with some construction works near Lukely Brook WSW. The construction time is likely to be approximately 1 month. The SAC is considered to be at sufficient distance so as not to be impacted by the temporary construction works. Therefore, no LSEs are anticipated. **Operation:** The SAC is approximately 8km to the north east of the Lukely Brook abstraction, however the hydrogeology assessment has concluded that there could be minor impacts to the Medina Estuary (downstream of Newport) because of a change in freshwater input (by approximately 11%). As part of the Review of Consents work completed by the Environment Agency, two buffer zones were identified; a 7.5km outer buffer zone (based on known home range sizes of barbastelle bats) and a 3.5km inner buffer (based on known home range sizes of Bechstein's bats on the Isle of Wight). The River Medina extends through both the inner and outer buffer zone, therefore further consideration of the potential impacts on the Bechstein's population has been completed, as follows. Within the buffer zones identified in the Review of Consents, each water dependent habitat (i.e. those sensitive to abstractions) and used by the bats was identified. These include habitats such as marshy grassland, swamp and wetlands. Habitats identified in the Review of Consents along the River Medina were not considered to be in direct hydrological connectivity with the watercourse and are therefore unlikely to be affected by changes to flows and levels. It should also be noted that alternative water sources, for foraging, commuting and as a drinking supply, are available to the bat species to use which would not be affected by the drought management option (or any proposed by SWS). The Old Mill Pond and Blackbridge Brook extend through or to the east of the SAC, and Palmer's Brook extends to the west. Therefore, no LSEs from the implementation of the drought management option are anticipated.	No
Eastern Yar	As part of the Review of Consents work completed by the Environment Agency, two buffer zones were identified; a 7.5km outer buffer zone (based on known home range sizes of barbastelle bats) and a 3.5km inner buffer (based on known home range sizes of Bechstein's bats on the Isle of Wight). As the River Medina and Eastern Yar extend through both the inner and outer buffer zone, further consideration of the potential impacts on the Bechstein's population has been completed, as follows. Within the buffer zones identified in the Review of Consents, each water dependent habitat (i.e. those sensitive to abstractions) and used by the bats was identified. These include habitats such as marshy grassland, swamp and wetlands. The Review of Consents concluded that the existing abstraction for the Eastern Yar	No

	augmentation would have no impacts on the qualifying feature as no habitats of direct interest to the bats were located downstream. In addition, the hydrology assessment for the drought management option has concluded negligible effects on the Eastern Yar, therefore no impacts to the associated habitats along this watercourse are considered likely. Habitats identified in the Review of Consents along the River Medina were not considered to be in direct hydrological connectivity with the watercourse and are therefore unlikely to be affected by changes to flows and levels. It should also be noted that alternative water sources, for foraging, commuting and as a drinking supply, are available to the bat species to use which would not be affected by the drought management option (or any proposed by SWS). The Old Mill Pond and Blackbridge Brook extend through or to the east of the SAC, and Palmer's Brook extends to the west. Therefore, no LSEs from implementation of the drought management option are anticipated.	

Designated site name:	**Dungeness**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks **1166 Great crested newt *Triturus cristatus***	Water Dependent: Yes (all) However, only GCN are surface water and groundwater dependent. Annual vegetation of drift lines and perennial vegetation of stony banks are predominantly reliant on coastal processes and have therefore been scoped out.
Current conservation status (Article 17):	Annual vegetation of drift lines: **Bad and deteriorating** (range: unknown, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures: abandonment of pastoral systems; removal of beach materials; walking, horseriding and non-motorised vehicles; motorised vehicles; air pollution; modification of marine currents; sea defence or coast protection works; erosion; other natural processes. Main threats: removal of beach materials; walking, horseriding and nonmotorised vehicles; motorised vehicles; air pollution; erosion; biocenotic evolution; other natural processes. Perennial vegetation of stony banks: **Bad but improving** (range: favourable, area: inadequate and deteriorating, structure and function: bad but improving, future prospects: inadequate but improving). Main pressures: abandonment of pastoral systems; removal of beach materials; walking, horseriding and non-motorised vehicles; motorised vehicles; air pollution; modification of marine currents; sea defence or coast protection works; erosion; other natural processes. Main threats – same as main pressures. Great crested newt: **Inadequate** (range: favourable, population: inadequate deteriorating, habitat: unknown, future prospects: favourable). Main pressures: modification of cultivation practices, fertilisation, urbanised areas and human habitation, pollution to surface waters, biocenotic evolution, succession) Main threats: modification of cultivation practices, use of biocides, hormones and chemicals, fertilisation, mining and quarrying, roads, paths and railroads).	
Conservation objectives (SAC):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice to the conservation objectives is currently unavailable, however reference was made to the Regulation 33 advice available for the European Marine Site[1]	
SSSI condition assessment:	Dungeness, Romney Marsh and Rye Bay SSSI: 67.53% favourable, 31.23% unfavourable recovering, 0.12% unfavourable change, 0.12% unfavourable declining. Beach reprofiling for flood defence management, damage to fossil ridge topography, military training, problems with *Crassula*, scrub encroachment.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Military – Annual vegetation of drift lines, Coastal shingle, vegetation outside the reach of waves, Great crested newt - assess the current impact of fire damage to Perennial Vegetation of Stony Banks (PVSB) habitat and draw together a specific fire plan with an aim to reduce the impact of fires through improved response. 2. Vehicles: illicit – Annual vegetation of drift lines, Coastal shingle, vegetation outside the reach of waves - report off roading incidents, continue to monitor and work with partners. 5. Invasive species – Annual vegetation of drift lines, Coastal shingle vegetation outside the reach of waves, Great crested newt - control of *Crassula* and avoid spread of other non-native invasive species e.g. red valerian. 6. Inappropriate scrub control – Coastal shingle vegetation outside the reach of waves, Great crested newt - control willow growth on edges of wetland waterbodies. 7. Overgrazing – Coastal shingle vegetation outside the reach of waves - control of rabbit grazing. 8. Public access/disturbance – Coastal shingle vegetation outside the reach of waves - visitor access management to reduce disturbance. 9. Direct impact from 3rd party – Annual vegetation of drift lines, Coastal shingle, vegetation outside the reach of waves, Great crested newt - manage unconsented activities such as dumping garden waste, garden encroachment, and erection of structures. 10. Air Pollution: impact of atmospheric nitrogen deposition - Coastal shingle vegetation outside the reach of waves - control, reduce and ameliorate atmospheric nitrogen impacts 11. **Inappropriate water levels** - Great crested newt - review current draft Water Level Management Plan (2010) for 'Walland Marsh Area', which could be expanded to include Denge and Romney Warren. Reviews of the WLMPs across the site including Rye Harbour, Pett Levels (2006) and Dungeness (1998). 14. **Water pollution** - Annual vegetation of drift lines, Coastal shingle, vegetation outside the reach of waves, Great crested newt - investigate whether there is a significant risk to the SPA lakes from diffuse pollution in the area of Greatstone.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Darwell	GCN are water dependent species and likely to be sensitive to changes in water levels. The main populations designated as part of the SAC are found at Lydd Ranges, Dungeness RSPB reserve to Lydd Airport, and Romney Warren. These are unlikely to be impacted by changes to freshwater flows and levels in the R. Rother as they are all further east. GCN are also considered unlikely to be found in the main R. Rother watercourse or habitats immediately adjacent to the river. However, the ditches across the Walland Marsh area do support GCN and therefore the designated metapopulations. Changes in water levels and water quality in these ditches as a result of the implementation of the drought permit could impact the viability of the GCN populations. As such, LSEs are anticipated.	Yes *Stage 2 Appropriate Assessment required.*

[1] Dungeness to Pett Level European marine site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994 (2001). Accessed at http://publications.naturalengland.org.uk/publication/3024706.

	It was confirmed during a meeting with Natural England and Environment Agency in November 2018 that the Denge Marsh Sewer is not supplied by the Royal Military Canal, and therefore will not be subject to any water supply restrictions as a result of the implementation of the drought permit. Therefore, impacts on the remaining qualifying features are not anticipated.	

Designated site name:	**Ebernoe Common**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) **1323 Bechstein's bat *Myotis bechsteinii*** **1308 Barbastelle *Barbastella barbastellus.***	Water Dependent: Atlantic acidophilous beech forests – not water dependent – scoped out. Bechstein's and barbastelle bats - water dependent – scoped in.
Current conservation status (Article 17):	Atlantic acidophilous beech forests: **Bad but improving** (range: favourable, area: inadequate but improving, structure and function: bad but improving, future prospects: favourable). Main pressures: removal of hedges and copses; general Forestry management; planting; artificial planting; replanting; forestry clearance; removal of undergrowth; removal of dead and dying trees; air pollution; biocenotic evolution; invasion by a species; antagonism arising from introduction of species; other forms or mixed forms of interspecific faunal competition; other natural processes. Main threats – same as pressures. Bechstein's bat: **Inadequate** (range: favourable, population: inadequate, habitat: unknown, future prospects: unknown). Main pressures: use of pesticides; removal of hedges and copses; general forestry management; forestry clearance; removal of undergrowth; removal of dead and dying trees. Main threats – same as pressures. Barbastelle bat: **Unknown** (range: favourable, population: unknown, habitat: unknown, future prospects: unknown). Main pressures: use of pesticides; removal of hedges and copses; general forestry management; forestry clearance; removal of undergrowth; removal of dead and dying trees; urbanised areas, human habitation; landfill, land reclamation and drying out, general; infilling of ditches, dykes, ponds, pools, marshes or pits; drainage. Main threats – same as pressures.	
Conservation objectives (SAC):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice to the conservation objectives is currently unavailable.	
SSS condition assessment:	Ebernoe Common SSSI: 99.90% favourable, 0.10% unfavourable recovering. It is unclear why Unit 7 was considered to be unfavourable recovering.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Forestry and woodland management – beech forest, barbastelle and Bechstein's bats – investigate impacts of woodland management. 2. **Offsite habitat availability/ management** – barbastelle and Bechstein's bat – investigate bat movements and requirements. 3. Habitat fragmentation – barbastelle and Bechstein's bats – investigate how this relates to other bat SACs in southern UK. 4. Change in land management – barbastelle bat – investigation of foraging and commuting routes. 5. **Hydrological changes** – Bechstein's bat - investigate hydrology, improve overall hydrological management, and mitigate potential impacts from development. 6. Air Pollution: risk of atmospheric nitrogen deposition - beech forest, barbastelle and Bechstein's - further investigate potential atmospheric nitrogen impacts. 7. Public access/disturbance – Bechstein's bat - investigate present light levels and assess their impact and alleviate if necessary.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Pulborough	The SAC is approximately 9km to the north west of the Pulborough abstraction, and the River Rother is therefore considered to be on the edge of the bats' foraging area. The site is also part of the River Kird catchment which discharges into the River Arun upstream of the Pulborough abstraction providing feeding and drinking opportunities. Therefore, no LSEs are anticipated, as the abstraction will not changes the flows and levels in the River Kird catchment.	No

Designated site name:	**Emer Bog**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	7140 Transition mires and quaking bogs Emer Bog lies in a wet infilled hollow on the developed eastern hinterland of the New Forest. Apart from scattered willow *Salix* scrub, it is largely open, and dominated by bottle sedge *Carex rostrata* and marsh cinquefoil *Potentilla palustris*, with frequent common cottongrass *Eriophorum angustifolium*, and occasional pools with bogbean *Menyanthes trifoliata*. White sedge *Carex curta* and the bog-mosses *Sphagnum fimbriatum* and *S. squarrosum* become common at the edge of the bog, with the rushes *Juncus effusus* and *J. acutiflorus*. There are also patches of common reed *Phragmites australis*. The basin is surrounded by more mature willow *Salix* woodland and open heathland.	Water Dependent: Yes
Current conservation status (Article 17):	**Bad and deteriorating** (range: favourable, area: unknown, structure and function: bad and deteriorating, future prospects: bad). Main pressures and threats: grazing; abandonment of pastoral systems; water pollution; air pollution; other pollution or human impacts/activities; drainage; other human induced changes in hydraulic conditions; other natural processes.	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of the qualifying natural habitat • The structure and function (including typical species) of the qualifying natural habitat • The supporting processes on which the qualifying natural habitat rely. Supplementary Advice to the conservation objectives is currently unavailable.	
SSS Condition assessment:	Baddesley Common SSSI: 31.02% unfavourable-recovering, 68.98% unfavourable-no change. Current management cannot address the issue of the suspected phosphate enrichment which is thought to have led to a reduction in the area of Sphagnum-rich vegetation.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Public access/disturbance – study of site management in context of urban growth and recreational pressure. 2. **Hydrological changes** – hydrological investigation and monitoring. 3. Air Pollution: impact of atmospheric nitrogen deposition - control, reduce and ameliorate atmospheric nitrogen impacts.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Lower Itchen Sources	The SAC is approximately 7km to the west of the Lower Itchen sources and is separated by the Monk's Brook. No hydrological or hydrogeological connectivity exits between the designated site and the abstraction points. Therefore, adverse effects upon qualifying features of the designated site as a result of the proposed drought order are considered highly unlikely and no LSEs are anticipated.	No
Candover Augmentation Scheme	The SAC is located approximately 9km from the River Itchen reaches affected by the drought order at its closest point and at a greater distance from the proposed groundwater abstraction that provides the water for the river augmentation. The proposed scheme and designated site are located in separate WFD groundwater bodies and WFD surface water bodies, with no hydrogeological or hydrological connectivity.. Therefore, adverse effects upon qualifying features of the designated site as a result of the proposed drought order are considered highly unlikely and no LSEs are anticipated.	No

Designated site name:	**Isle of Wight Downs**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	1230 Vegetated sea cliffs of the Atlantic and Baltic coasts **4030 European dry heaths** 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) 1654 Early gentian *Gentianella anglica*	Water Dependent: Vegetated sea cliffs of the Atlantic and Baltic coasts: predominantly marine/coastal – scope out. European dry heaths: low sensitivity – scope in. Semi-natural grasslands: no – scope out. Early gentian: no – scope out.
Current conservation status (Article 17):	• Vegetated sea cliffs of the Atlantic and Baltic coasts: **Bad but improving** (range: favourable, area: favourable, structure and function: bad but improving, future prospects: favourable). • European dry heaths: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad but improving). • Semi – natural dry grasslands and scrubland facies: **Bad but improving** (range: favourable, area: inadequate and deteriorating, structure and function: bad but improving, future prospects: favourable). • Early gentian: **Inadequate** (range: favourable, population: inadequate, habitat: inadequate, future prospects: inadequate).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice on the conservation objectives is currently unavailable.	
SSSI condition assessment:	Compton Down SSSI: 45.4% favourable, 54.5% unfavourable recovering. Headon Warren and West High Down SSSI: 95.2% favourable, 3.7% unfavourable recovering, 1.2% partially destroyed (dwarf shrub heath). Mottistone Down SSSI: 100% unfavourable recovering. Ventnor Down SSSI: 100% unfavourable recovering.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Public access/disturbance – dry grasslands - investigate and reverse sward damage by implementing infrastructure and habitat management. 2. Inappropriate coastal management - vegetated sea cliffs, European dry heaths, dry grasslands and scrublands on chalk or limestone - identify suitable habitat and consider designation (important orchid sites). 3. Air Pollution: risk of atmospheric nitrogen deposition – European dry heaths - determine if harmful effects occur and investigate appropriate measures.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Lukely Brook WSW	**Construction:** A temporary pipeline will need to be laid to discharge the compensation flow. A temporary pipeline will be laid along the river bed with some construction works near Lukely Brook WSW. The construction time is likely to be approximately 1 month. The SAC is considered to be at sufficient distance so as not to be impacted by the temporary construction works. Therefore, no LSEs are anticipated. **Operation:** The SAC is approximately 5.5km to the south west of the proposed groundwater abstraction. The hydrogeological assessment has concluded that the impacts arising from the groundwater abstraction will be confined to the catchment of Lukely Brook and downstream of this. Therefore, the SAC is well outside the zone of influence of the abstraction, and so no LSEs are anticipated.	No
Caul Bourne WSW	The SAC is approximately 1.4km to the south west of the proposed groundwater abstraction. The hydrogeological assessment has concluded that the limit of the drawdown zone from the groundwater abstraction is along the Gault Clay outcrop to the south (just north of Hulverstone) as this formation is an aquitard and will prevent impacts propagating southwards. The European dry heaths are found on the superficial deposits which overlie the chalk just north of the Gault Clay outcrop. The direction of the groundwater flow within the chalk is to the north, and therefore moving away from the SAC. Considering the combination of the geology in the area, which would suggest low connectivity to changes in groundwater levels in the chalk aquifer, and the low sensitivity of European dry heaths to changes in water levels, no LSEs are anticipated.	No
Eastern Yar	The SAC is approximately 8.7km to the south west of the proposed surface water abstraction. The SAC is not reliant on water supply from the River Medina, which could be impacted by the drought management option, and the river flows to the north away from the SAC. Therefore, no LSEs are anticipated.	No

Designated site name:	**Peter's Pit**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	1166 Great crested newt *Triturus cristatus* Peter's Pit is an old chalk quarry situated in the North Downs in north Kent, with large ponds situated amongst grassland, scrub and woodland. The ponds have widely fluctuating water levels and large great crested newt *Triturus cristatus* populations have been recorded breeding here.	Water Dependent: Yes
Current conservation status (Article 17):	**Inadequate** (range: favourable, population: inadequate deteriorating, habitat: unknown, future prospects: favourable). Main pressures: modification of cultivation practices, fertilisation, urbanised areas and human habitation, pollution to surface waters, biocenotic evolution, succession). Main threats: modification of cultivation practices, use of biocides, hormones and chemicals, fertilisation, mining and quarrying, roads, paths and railroads).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice to the conservation objectives is available[2].	
SSSI condition assessment:	This site is in favourable condition, offering good water quality and often good breeding sites for GCN. Newt numbers have fluctuated considerably from 1985 to 2007 but there is nothing to suggest a declining population.	
Site Improvement Plan (actions that could be impacted by drought management option in bold:	No improvement measures required.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Weir Wood	The SAC is located 0.1km east of the River Medway which is affected by the proposed drought management option. However, the hydrology assessment has concluded that the impacts of the proposed reductions in compensation flow, during both summer and winter, will be negligible at the reach between the River Eden confluence with the River Medway, to the River Teise confluence at Yalding. The hydrology in the main river does not affect the groundwater in the pits as there is little or no surface water hydraulic connect between the Medway and Peter's Pit. It is underlain by the North Kent Medway chalk however, so may be confined and sensitive to flow changes in the Medway. The SAC is further downstream than Yalding, and therefore LSEs are not anticipated.	No
River Medway Scheme surface water source	The SAC is located 0.1km east of the River Medway which is affected by the proposed drought management option. The hydrology assessment has concluded that the impacts of the proposed changes in MRF could have major impacts on the freshwater flows and levels in the reach closest to the designated site. However, in the 'European Site Conservation Objectives: Supplementary Advice' on conserving and restoring site features for the SAC, it states that the maintenance of water within the ponds on the site is controlled by groundwater. The ponds are within a quarry which is located on bare chalk, and therefore are reliant on the water table in the chalk aquifer. The hydrology in the main river does not affect the groundwater in the pits as there is little or no surface water hydraulic connect between the Medway and Peter's Pit. It is underlain by the North Kent Medway chalk however, so may be confined and sensitive to flow changes in the Medway. The proposed drought management option will not affect groundwater flows or levels and therefore no LSEs are anticipated.	No

[2] European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Peter's Pit Special Area of Conservation (SAC) (UK0030237). Accessed at http://publications.naturalengland.org.uk/publication/4817478370721792

Designated site name:	**River Itchen**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation 1044 Southern damselfly *Coenagrion mercuriale* 1163 Bullhead *Cottus gobio* 1092 White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* 1096 Brook lamprey *Lampetra planeri* 1106 Atlantic salmon *Salmo salar* 1355 Otter *Lutra*	Water Dependency: Yes (all)
Current conservation status:	Water courses of plain to montane levels: **Bad and deteriorating** (range; favourable, area; inadequate, structure and function; bad and deteriorating, future prospects; bad and deteriorating). Main threats and pressures: use of pesticides; fertilisation; irrigation; leisure, fishing; disposal of household waste; disposal of industrial waste; water pollution; canalisation; modifying structures of inland water courses; silting up; eutrophication; invasion by a species; competition. Southern damselfly: **Inadequate but improving** (range; favourable, population; inadequate, habitat; inadequate but improving, future prospects; favourable). Main threats and pressures: abandonment of pastoral systems; water pollution; landfill, land reclamation and drying out, general; 803 - infilling of ditches, dykes, ponds, pools, marshes or pits; drainage; canalisation; modifying structures of inland water courses; management of water levels). Bullhead: **Unknown** (range; favourable, population; unknown, habitat; unknown, future prospects; unknown). Main threats and pressures: fish and shellfish aquaculture; sand and gravel extraction; water pollution; management of aquatic and bank vegetation for drainage purposes; canalisation; modification of hydrographic functioning, general; modifying structures of inland water courses; management of water levels; erosion; silting up; predation; competition). White-clawed crayfish: **Bad and deteriorating** (range; bad and deteriorating, unknown; bad and deteriorating, habitat; inadequate and deteriorating, future prospects; bad and deteriorating). Main threats and pressures: water pollution; modifying structures of inland water courses; introduction of disease; competition). Brook lamprey: **Inadequate but improving** (range; favourable, population; unknown, habitat; inadequate but improving, future prospects; favourable). Main pressures and threats: bait digging; sand and gravel extraction; water pollution; management of aquatic and bank vegetation for drainage purposes; removal of sediments (mud...); canalisation; modification of hydrographic functioning, general; modifying structures of inland water courses; management of water levels; drying out / accumulation of organic material; eutrophication; acidification; invasion by a species; competition; introduction of disease). Atlantic salmon: **Inadequate** (range; favourable, population; inadequate, habitat; inadequate but improving, future prospects; inadequate). Main pressures and threats: fish and shellfish aquaculture; fixed location fishing; drift-net fishing; leisure fishing; trapping, poisoning, poaching; sand and gravel extraction; water pollution; management of aquatic and bank vegetation for drainage purposes; canalisation; modification of hydrographic functioning, general; modifying structures of inland water courses; management of water levels; silting up; drying out; eutrophication; acidification; parasitism; introduction of disease; genetic pollution; competition). Otter: **Favourable** (range; favourable, population; favourable, habitat; unknown, future prospects; favourable). Main pressures and threats: use of pesticides; fixed location fishing; routes, autoroutes; pollution; water pollution; infilling of ditches, dykes, ponds, pools, marshes or pits; drainage; management of aquatic and bank vegetation for drainage purposes; canalisation; flooding; modification of hydrographic functioning, general; modifying structures of inland water courses; management of water levels).	
Conservation objectives (SAC):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice to the conservation objectives is currently unavailable.	
SSSI condition assessment:	River Itchen SSSI: 6.89% favourable, 59.21% unfavourable-recovering, 27.99% unfavourable-no change, 5.51% unfavourable declining, and 0.39% destroyed. Issues include dominance of species, sward height, inappropriate management and invasion of wetland habitat by scrub and woodland.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. **Water pollution -** Rivers with floating vegetation often dominated by water-crowfoot, Southern damselfly, Whiteclawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead – implement actions from Diffuse Water Pollution plans, Review of Consents, and any identified for waste water treatment. 2. Physical modification - Rivers with floating vegetation often dominated by water-crowfoot, Southern damselfly, Whiteclawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead - Implement River Restoration Strategy. 3. **Siltation -** Rivers with floating vegetation often dominated by water-crowfoot, White-clawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead - implement diffuse water pollution plan actions and River Restoration Strategy actions along with land management advice. 4. Overgrazing - Rivers with floating vegetation often dominated by water-crowfoot, Southern damselfly, Whiteclawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead - establish favourable grazing throughout the floodplain and riparian corridor. 5. **Water abstraction -** Rivers with floating vegetation often dominated by water-crowfoot, Southern damselfly, Whiteclawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead, Otter - reduce water abstraction to sustainable levels. 6. Inappropriate weed control - rivers with floating vegetation often dominated by water-crowfoot - quantify impacts of weed cutting, assess whether a weed management plan is required and liaise with fisheries on appropriate management. 7. **Hydrological changes -** Southern damselfly - investigate causes of floodplain dryness in particular impacts of boreholes but also water level management. 8. **Inappropriate water levels** – Southern damselfly - implement viable Water Level Management Plan projects after appraisal of options. 9. Change in land management - Rivers with floating vegetation often dominated by water-crowfoot, Desmoulin's whorl snail, Southern damselfly, White-clawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead, Otter - monitor HLS compliance with grazing prescriptions, and amend if necessary. 10. Inappropriate cutting/mowing - Rivers with floating vegetation often dominated by water-crowfoot, Southern damselfly, Whiteclawed (or Atlantic stream) crayfish, Brook lamprey, Atlantic salmon, Bullhead - quantify the impacts of fisheries riverbank management and liaise with fisheries on appropriate management, through the River Restoration Strategy. 11**. Invasive species -** White-clawed (or Atlantic stream) crayfish, Atlantic salmon - implement control measures for invasive non-native Species (INNS).	

	12. Undergrazing – southern damselfly - establish favourable grazing via existing local mechanisms and agri-environment agreements and advice. 13. Inappropriate ditch management – Southern damselfly - establish appropriate management of ditches through agri-environment agreements and advice. 14. Inappropriate scrub control – Southern damselfly - manage scrub appropriate for southern damselfly through (amending) agri-environment agreements. 15. Forestry and woodland management - Rivers with floating vegetation often dominated by water-crowfoot - implement the river restoration strategy.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Lower Itchen Sources	The surface water abstraction is on the River Itchen, and the groundwater drawdown zone of influence from abstraction at the groundwater sources also impacts the river, and therefore the qualifying features of the SAC could be impacted. Discussion of how the abstractions could affect each of the qualifying features is provided below. <u>Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Sub-Type 1 Chalk stream Habitat)</u> The macrophyte population and supporting chalk stream habitat could be adversely affected by a reduction in flow that would lower velocities that are critical to the health of the macrophyte communities. The River Itchen macrophyte community has been shown to be impacted by the low flow period 1989 to 1992. Effects could include a reduction in the area and composition of the habitat (e.g. reduction in species structure, abundance or diversity that comprises the habitat over time) and interruption or degradation of the processes that support the habitat. One specific consequence of the lowering of flows would be an increased risk of fine sediment deposition which would be detrimental to the macrophyte habitats. LSEs cannot be ruled out; therefore Stage 2 Appropriate Assessment is required. <u>Southern damselfly *Coenagrion mercuriale*</u> The southern damselfly could be adversely affected because the species occurs on the main river. Other habitats are characterised by ditches flowing through old water meadows, which themselves fall into the category of wet grassland and, where undermanaged, fen. In these habitats there are two key elements that sustain the species. The nature of the ditches is critical, and that includes many abiotic attributes such as water level, water velocity, and water chemistry, and biotic factors such as the structure and composition of emergent and marginal vegetation. Reduction in and/or lowering of levels could therefore impact upon these habitats via affecting the river or by directly affecting the non-river habitats. The terrestrial nature of these habitats also sustains the species both directly during their adult stage and indirectly by affecting the ditch, its physical structure and the water therein. Work on the River Itchen[9] has suggested that larval Southern Damselfly were strongly associated with slow flowing, permanent water habitats in drainage ditches of the lower Itchen valley. Most of these drainage ditches are supplied with water from the main River Itchen via flow control structures. Abstraction could potentially reduce the availability of water in the main channel of the Itchen and therefore limit the supply of water to the drainage ditch habitats inhabited by Southern Damselfly. Effectively abstraction could limit the extent and quality of habitat available to Southern Damselfly. LSEs cannot be ruled out; therefore Stage 2 Appropriate Assessment is required. <u>Atlantic salmon *Salmo salar*</u> Atlantic salmon could be adversely affected because the population in the River Itchen is in a critical condition, numbers being significantly reduced over the last decade. Due to the life-cycle of this species the population is also slow to recover from impacts. Factors thought to be significant in the riverine habitat with respect to salmon movement and survival are diffuse pollution, siltation of the salmon redds, summer low flow with respect to habitat suitability and entry to the river and eutrophication effects. The passage of salmon through the estuary, particularly landwards, is thought to be influenced by river flow and water quality. The triggering of migration upstream from holding areas in lower / estuarine sections is thought to be primarily triggered by higher, flushing flows. Nonetheless, lowering of flows could affect upward passage. LSEs cannot be ruled out; therefore Stage 2 Appropriate Assessment is required. <u>Bullhead *Cottus gobio*, White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, Brook lamprey *Lampetra planeri*, Otter *Lutra lutra*</u> These species were found not to be significantly affected by abstraction licences in the EA RoC Appropriate Assessment were otter, bullhead and brook lamprey. Detailed studies of otter on the River Itchen confirmed the otter population was in favourable condition and their high mobility over tens of kilometres added to their resilience. With regard to bullhead and brook lamprey, surveys have shown that both species occur throughout the catchment but these species are also considered to be relatively resilient to environmental stress and hence unlikely to be adversely affected by the proposed Drought Order. Populations of white-clawed crayfish are restricted to the Upper Itchen tributaries[3] and populations would therefore not be affected by the proposed Drought Order. No LSEs are anticipated in respect of these four species.	Yes *Stage 2 Appropriate Assessment required.*
Test Surface Water Drought Permit and Drought Order	It is considered that potential impacts upon bullhead, white-clawed crayfish, brook lamprey, otter, Southern damselfly and Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation are highly unlikely. Consequently, there are no likely significant effects of the Test Surface Water drought order on these features of the River Itchen SAC. Potential impacts upon the population of Atlantic Salmon associated with the River Itchen SAC have been considered as part of the screening process. It is considered that any impact on salmon from the River Itchen as a result of the Test Surface Water drought order will be marginal. The numbers of Itchen salmon visiting the Test are small so that their impact on recruitment to the Itchen salmon population will be insignificant. If and to the extent that a decrease in flows attributable to abstraction has the effect of reducing salmon migration up the Test, this would have a potential collateral benefit to the Itchen salmon in that	No

[3] Rushbrook (2014) Crayfish Conservation in Hampshire's Chalk Streams.

	decreasing flows in the Test will reduce the attraction of Test freshwater flows relative to the Itchen, rendering the latter more attractive to Itchen fish and reducing further the already small likelihood of strays to the Test. For this reason, no LSE on the River Itchen SAC migrating salmon are anticipated.	
Candover Augmentation Scheme	The effects either during or following use of the drought order on the Candover Stream and associated habitats of importance to the designated SAC features has been assessed. Based on hydrological and hydrogeological modelling of the drought order effects on stream flow and groundwater levels, including the provision of up to 5 Ml/d environmental support flow to the Candover Stream during implementation of the drought order, the screening assessment cannot conclude that there would be no likely significant effects on the designated features of the SAC. There remains some uncertainty with regards to the absolute impact on the river flow regime as a result of the operation of the drought order, in particular the in-combination effects with public water supply groundwater abstractions from the same chalk aquifer on white-clawed crayfish, Southern damselfly and Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. Species that are unlikely to be adversely affected by the Drought Order are otter, Atlantic salmon, bullhead and brook lamprey. Detailed studies of otter on the River Itchen confirmed the otter population was in favourable condition and their high mobility over tens of kilometres added to their resilience. With regard to bullhead and brook lamprey, surveys have shown that both species occur throughout the catchment but these species are also considered to be relatively resilient to environmental stress and hence unlikely to be adversely affected by the proposed Drought Order. The majority of salmon spawning habitat within the SAC occurs in the middle and lower sections of the River Itchen, with almost all spawning taking place downstream of Winchester due particularly to river channel obstructions around Winchester. As a result, the presence of Atlantic salmon in the upper reaches of the Itchen catchment, including the Candover Stream, is likely restricted to lower numbers of individuals.	Yes

Designated site name:	**Sandwich Bay**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	2110 Embryonic shifting dunes 2120 "Shifting dunes along the shoreline with *Ammophila arenaria* (""white dunes"")" 2130 "Fixed coastal dunes with herbaceous vegetation (""grey dunes"")" *Priority feature 2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) 2190 Humid dune slacks	Water Dependent: Yes The qualifying features although identified as being water dependent, are considered to be predominantly influenced by coastal and marine processes. However, Natural England have advised that the features in this area are reliant on some freshwater inputs. As identified in the Site Improvement Plan, the main feature reliant on hydrological changes is the fixed coastal dune with herbaceous vegetation
Current conservation status (Article 17):	Embryonic shifting dunes: **Bad but improving** (range: favourable, area: favourable, structure and function: bad but improving, future prospects: inadequate but improving). Main pressures: removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste; disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; other leisure and tourism impacts; air pollution; sea defence or coast protection works; erosion. Main threats – same as pressures but also includes: submersion. Shifting dune along the shoreline with *Ammophila arenaria*: **Bad** (range: favourable, area: inadequate, structure and function: bad, future prospects: inadequate). Main pressures: removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; sea defence or coast protection works; erosion. Main threats – same as pressures but also includes: submersion. Fixed coastal dunes with herbaceous vegetation (grey dunes): **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures: modification of cultivation practices; grazing; artificial planting; removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste; disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; sea defence or coast protection works; erosion. Main threats – same as pressures but also includes: submersion. Dunes with *Salix repens*: **Bad and deteriorating** (range: favourable, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures: grazing; artificial planting; removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste; disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; management of water levels; sea defence or coast protection works; erosion; drying out. Main threats: grazing; air pollution; management of water levels; erosion; drying out; biocenotic evolution; other natural processes. Humid dune slacks: **Bad and deteriorating** (range: favourable, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures: grazing; artificial planting; removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste; disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; management of water levels; sea defence or coast protection works; erosion; drying out. Main threats: grazing; air pollution; erosion; drying out; submersion; biocenotic evolution; other natural processes.	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats • The structure and function (including typical species) of qualifying natural habitats • The supporting processes on which qualifying natural habitats rely. Supplementary advice to support the conservation objectives is currently unavailable.	
SSSI condition assessment:	Sandwich Bay to Hacklinge marshes SSSI: 50.35% favourable, 46.13% unfavourable recovering, 3.19% unfavourable no change, 0.33% unfavourable declining.	
Site Improvement Plan (actions that could be impacted by drought management option in bold)	1. Changes in species distribution – N/A 2. Invasive species – N/A 3. Public access/disturbance - shifting dunes, shifting dunes with marram, dune grassland – Investigation of disturbance to sand dunes, and wider education and awareness raising. **4. Hydrological changes** – dune grassland - implement identified management actions to address and adapt to changes in water levels affecting sand dune vegetation 5. Air Pollution: impact of atmospheric nitrogen deposition - shifting dunes, shifting dunes with marram, dune grassland, dunes with creeping willow, humid dune slacks - control, reduce and ameliorate atmospheric nitrogen impacts. 6. Water pollution – N/A 7. Fisheries: commercial marine and estuarine - shifting dunes, shifting dunes with marram, dune grassland, dunes with creeping willow, humid dune slacks - Kent and Essex IFCA byelaw implementation 8. Fisheries: commercial marine and estuarine – N/A	
Potential Effects		

Scheme:	Assessment:	LSEs?
Sandwich[4]	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The abstraction is at sufficient distance so as not to give rise to construction related LSEs. **Operation:** Parts of the SAC, including the Stour Estuary, are located at the very edge of the groundwater drawdown zone and therefore could be impacted by increased levels of abstraction due to the drought management option being implemented. The hydrology assessment has concluded that there will be negligible impacts on the Stour Estuary based on the percentage reduction to freshwater flow expected in the North South Stream in the Lydden Valley and the River Little Stour at Q_{95} flow conditions. The combined reduction in freshwater influx to the estuary is estimated as 6.5%, and this is precautionary. The remaining areas of the SAC are on the very periphery of the drawdown zone (around Great Sonar) and therefore unlikely to experience a significant change in groundwater levels, as the hydrogeology assessment has concluded a 1.5 to 0.5m drawdown within 1km of the borehole; the SAC is located approximately 4km to the east. Therefore, no LSEs to the qualifying features are anticipated .	No

[4] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.

Designated site name:	**Solent Maritime**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	**1130 Estuaries** **1320 Spartina swards (*Spartinion maritimae*)** **1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** 1110 Sandbanks which are slightly covered by sea water all the time **1140 Mudflats and sandflats not covered by seawater at low tide** **1150 Coastal lagoons** 1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks 1310 Salicornia and other annuals colonizing mud and sand 2120"Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")" **1016 Desmoulin`s whorl snail *Vertigo moulinsiana*** Water dependent: All habitats are water dependent although predominantly influenced by marine/estuarine processes rather than freshwater. The following have been identified as being sensitive to hydrological changes and therefore will be scoped into the assessment; estuaries, spartina swards, Atlantic salt meadows, mudlfats and sandflats, coastal lagoons, and Desmoulin`s whorl snail (highlighted in bold opposite)
Current conservation status (Article 17):	• Estuaries: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: fish and Shellfish Aquaculture; professional fishing; fixed location fishing; leisure fishing; bait digging; taking / removal of fauna, general; taking / removal of flora, general; hunting, fishing or collecting activities not referred to above; sand and gravel extraction; urbanised areas, human habitation; industrial or commercial areas; discharges; port areas; energy transport; pipe lines; shipping; nautical sports; motorised vehicles; pollution; water pollution; trampling, overuse; landfill, land reclamation and drying out, general; polderisation; reclamation of land from sea, estuary or marsh; infilling of ditches, dykes, ponds, pools, marshes or pits; removal of sediments (mud...); canalisation; flooding; modification of hydrographic functioning, general; modification of marine currents; management of water levels; dumping, depositing of dredged deposits; dykes, embankments, artificial beaches, general; sea defence or coast protection works; erosion; drying out / accumulation of organic material; eutrophication; acidification; invasion by a species; interspecific faunal relations; interspecific floral relations; genetic pollution. • Spartina swards (*Spartinion maritimae*): **Bad and deteriorating** (range: bad and deteriorating, area: bad and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: discharges; water pollution; air pollution; soil pollution; military manoeuvres; reclamation of land from sea, estuary or marsh; drainage; flooding; modification of marine currents; sea defence or coast protection works; erosion; submersion; invasion by a species; competition; • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*): **Bad and deteriorating** (range: favourable, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: grazing; abandonment of pastoral systems; discharges; water pollution; soil pollution; military manoeuvres; reclamation of land from sea, estuary or marsh; drainage; flooding; modification of marine currents; sea defence or coast protection works; erosion; submersion; invasion by a species; competition. • Sandbanks which are slightly covered by sea water all the time: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: fish and shellfish aquaculture; professional fishing; trawling; drift-net fishing; leisure fishing; sand and gravel extraction; exploration and extraction of oil or gas; urbanised areas, human habitation; industrial or commercial areas; discharges; port areas; energy transport; pipe lines; shipping; pollution; water pollution; Modification of hydrographic functioning, general; modification of marine currents; dumping, depositing of dredged deposits; sea defence or coast protection works; erosion; eutrophication; invasion by a species; interspecific faunal relations; other forms or mixed forms of interspecific faunal competition; introduction of disease; genetic pollution; • Mudflats and sandflats not covered by seawater at low tide: **Bad and deteriorating** (range: favourable, area: favourable, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: fish and shellfish aquaculture; professional fishing; fixed location fishing; leisure fishing; bait digging; urbanised areas, human habitation; industrial or commercial areas; discharges; port areas; sport and leisure structures; nautical sports; motorised vehicles; pollution; water pollution; trampling, overuse; dykes, embankments, artificial beaches, general; erosion; eutrophication; invasion by a species; interspecific faunal relations; interspecific floral relations; genetic pollution. • Coastal lagoons: **Inadequate** (range: favourable, area: favourable, structure and function: favourable, future prospects: inadequate). Main pressures and threats: pollution to surface waters, change in biotic conditions, other human intrusions and disturbances, human induced changes in hydraulic conditions, changes in abiotic and biotic conditions. • Annual vegetation of drift lines: **Bad and deteriorating** (range: unknown, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures: abandonment of pastoral systems; removal of beach materials; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; modification of marine currents; sea defence or coast protection works; erosion; other natural processes. Main threats: removal of beach materials; walking, horse-riding and nonmotorised vehicles; motorised vehicles; air pollution; erosion; biocenotic evolution; other natural processes. • Perennial vegetation of stony banks: **Bad but improving** (range: favourable, area: inadequate and deteriorating, structure and function: bad but improving, future prospects: bad but improving). Main pressures: abandonment of pastoral systems; removal of beach materials; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; modification of marine currents; sea defence or coast protection works; erosion; other natural processes. Main threats – same as main pressures. • Salicornia and other annuals colonizing mud and sand: **Bad and deteriorating** (range: favourable, area: inadequate and deteriorating, structure and function: bad and deteriorating, future prospects: bad and deteriorating). Main pressures and threats: discharges; water pollution; air pollution; soil pollution; military manoeuvres; reclamation of land from sea, estuary or marsh; drainage; flooding; modification of marine currents; sea defence or coast protection works; erosion; submersion; invasion by a species; competition. • "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")": **Bad** (range: favourable, area: inadequate, structure and function: bad, future prospects: inadequate). Main pressures: removal of beach materials; urbanised areas, human habitation; industrial or commercial areas; disposal of household waste; disposal of industrial waste; walking, horse-riding and non-motorised vehicles; motorised vehicles; air pollution; sea defence or coast protection works; erosion. Main threats – same as pressures but also includes: submersion.	

	• Desmoulin`s whorl snail *Vertigo moulinsiana*: **unknown** (range: favourable, population: unknown, habitat: unknown, future prospects: favourable). Main threats and pressures: routes, autoroutes; landfill, land reclamation and drying out, general; modification of hydrographic functioning, general; management of water levels; silting up; drying out; submersion; biocenotic evolution.
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary Advice on the conservation objectives is currently unavailable, however reference was made to the Regulation 33 advice available for the European Marine Site[5].
Condition assessment:	Lower Test Valley SSSI: 100% favourable. Medina Estuary SSSI: 100% favourable. Newtown Harbour SSSI: 89.34% favourable, 10.31% unfavourable recovering, 0.35% unfavourable declining. Diffuse pollution affecting littoral sediment is being addressed through the Isle of Wight Catchment Sensitive Farming Project, whilst the unit in unfavourable-declining condition consists of neutral grassland which has been improved and overgrazed. Yar Estuary SSSI: 83.15% favourable, 16.85% unfavourable recovering. Key issues for unfavourable recovering condition include dominance of ragwort, public disturbance issues, overgrazing by rabbits and coastal squeeze.
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Public access/disturbance - annual vegetation of drift lines, coastal shingle vegetation outside the reach of waves - reduce disturbance through access management, awareness raising and wardening. 2. Coastal squeeze - intertidal mudflats and sandflats, glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows - investigate options to create alternative habitat. 3. Fisheries: Commercial marine and estuarine - subtidal sandbanks, intertidal mudflats and sandflats – introduce appropriate management measures. 4. **Water pollution** - estuaries, intertidal mudflats and sandflats, glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows - implement actions in the Diffuse Water Pollution Plan and investigate further pollution. 5. **Changes in species distribution** - glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows, Desmoulin`s whorl snail - investigate the causes of change 6. Climate change – not applicable for SAC qualifying features. 7.**Change to site conditions** - glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows, Desmoulin`s whorl snail – investigate reasons for change in area of saltmarsh in the Solent. 8. **Invasive species** - subtidal sandbanks, intertidal mudflats and sandflats, coastal lagoons, coastal shingle vegetation outside the reach of waves, Atlantic salt meadows - implement the management options to control invasive non-native species (INNS). 9. Direct land take from development - estuaries, intertidal mudflats and sandflats - option appraisal for private coastal defences. 10. Biological resource use – not applicable for SAC qualifying features. 11. **Change in land management** - coastal lagoons, annual vegetation of drift lines, coastal shingle vegetation outside the reach of waves - ensure appropriate ditch management and assess the effects of poorly operating tidal sluices. 12. Inappropriate pest control – not applicable for SAC qualifying features. 13. Air pollution: impact of atmospheric nitrogen deposition - estuaries, coastal lagoons, glasswort and other annuals colonising mud and sand, Atlantic salt meadows, shifting dunes with marram - reduce the impacts of air pollution. 14. **Hydrological changes** - coastal lagoons, cord-grass swards, Atlantic salt meadows, Desmoulin`s whorl snail - review abstraction licenses. 15. Direct impact from third party - estuaries, intertidal mudflats and sandflats, glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows - assess the activities (off roading, uncontrolled grazing and shooting) and their effects. 16. Extraction – non-living resources - subtidal sandbanks, intertidal mudflats and sandflats, glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows - investigate the extent and impact of shingle extraction. 17. Other - subtidal sandbanks, estuaries, intertidal mudflats and sandflats, coastal shingle vegetation outside the reach of waves, glasswort and other annuals colonising mud and sand, cord-grass swards, Atlantic salt meadows, shifting dunes with marram, Desmoulin`s whorl snail - consider/explore boundary change to amend the SAC / SPA designations, to include habitats outside of the existing boundaries.

Potential Effects		
Scheme:	Assessment:	LSEs?
Near Cowes WSW	This source is located at Cowes, approximately 800m west of the River Medina (Solent Maritime SAC). However, the abstraction is sourced from the highly confined Barton Beds, and would be abstracted by a 220m deep well and borehole connected via an adit to another well. Since this is a highly confined aquifer at considerable depth is it reasonable to conclude there is no hydrological link between it and the River Medina.	No
Lukely Brook WSW	**Construction:** A temporary pipeline will need to be laid to discharge the compensation flow. A temporary pipeline will be laid along the river bed with some construction works near Lukely Brook WSW. The construction time is likely to be approximately 1 month. The SAC is considered to be at sufficient distance so as not to be impacted by the temporary construction works (~3km). Therefore, no LSEs are anticipated. **Operation:** The Lukely Brook, on which the MRF controls would be relaxed to allow prolonged groundwater abstraction, discharges into the River Medina which is part of the SAC (at the estuary). The hydrogeology assessment has concluded that abstraction from the chalk aquifer will lower groundwater levels in the immediate vicinity of the	No

[5] Solent European Marine Site comprising: Solent Maritime candidate Special Area of Conservation, Solent and Southampton Water Special Protection Area & Ramsar Site, Chichester and Langstone Harbours Special Protection Area & Ramsar Site, Portsmouth Harbour Special Protection Area & Ramsar Site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Accessed at http://publications.naturalengland.org.uk/publication/3194402.

	pumping station. It will also reduce the volume of chalk groundwater contributing to the Lukely Brook and groundwater flows to the remainder of the Lukely Brook catchment. However, the assessed flow contribution of the Lukely Brook to the Medina Estuary at Q_{95} flows is approximately 11 times lower than the flow contribution to the estuary from the freshwater River Medina. The magnitude of the difference between these two influxes, alongside the proposed compensation flow to the Lukely Brook (2.5 Ml/d from WSW to the Lukely Brook), would lead to only a minor impact on the freshwater influx to the Medina Estuary. This minor impact may result in a slight increase to the flushing time (due to a reduced residual river flow velocity) and an alteration of the mixing characteristics (for which no data are currently available) of the upper estuary, leading to a possible increase in saline intrusion distance and migration of the turbidity maximum. Estuaries As identified in the Regulation 33 information for the European Marine Site, the estuaries feature covers the following sub-features; saltmarsh communities, intertidal mudflat and sandflat communities, intertidal mixed sediment communities, and subtidal communities. Impacts to mudflats and sandflats, and saltmarsh communities have been considered below. As no LSEs have been identified for these sub-features, no LSEs to the estuaries feature are anticipated. Spartina swards The Review of Consents information and Regulation 33 information for the European Marine Site note that freshwater input is not considered to be of principal importance to Spartina (as the species is halophytic). Equally, changes in salinity regimes were not considered to significantly affect the habitat. Therefore, impacts to the Spartina swards resulting from increased abstraction during implementation of the drought management option are considered unlikely, and as such no LSEs are anticipated. Atlantic salt meadows The saltmarsh communities are dominated by halophytic species and as such the requirement for freshwater inputs are not considered to be significant to the lower marsh levels. However, the transitional high marshes will contain a greater variety of plant species which may require freshwater input, although this will be predominantly achieved during winter flooding. The Review of Consents information notes that the areas of saltmarsh in the Medina Estuary are away from the main freshwater inflows, and from a review of the Natural England priority habitat mapping, there is also a band of mudflat habitat seaward of the saltmarsh which would afford some protection. Himalayan balsam has been recorded on the River Medina, upstream of the abstraction point. However, the risk of this spreading during the implementation of the drought management option will be mitigated as necessary, following an assessment of the risk posed. Therefore, given the minor hydrological impacts from groundwater abstraction, and predominance of freshwater flow into the estuary from the River Medina rather than Lukely Brook, impacts to the Atlantic salt meadows resulting from increased abstraction during implementation of the drought management option are considered unlikely, and as such no LSEs are anticipated. Mudflats and sandflats not covered by seawater at low tide As the contribution of flows from Lukely Brook to the Medina Estuary is much less than the flows from the River Medina itself, it is considered unlikely that changes in freshwater inputs from Lukely Brook will significantly alter the mudflat and sandflat habitats. The Review of Consents information identifies that freshwater inputs are not a feature of principal importance for the habitat itself, but more important for the supported invertebrate assemblage. In addition, the Site Improvement Plan does not include mudflats as being affected by hydrological changes (abstraction). The changes likely to occur may alter the macroinvertebrate and macrophyte assemblages but will not cause a long-term change in the habitats themselves. Therefore, no LSEs are anticipated. Coastal lagoons The coastal lagoon feature has been recorded at Newtown Quay, Borrow Dyke in Yarmouth Harbour and Stuart's Pond (at the base of Hurst Spit). Therefore, as this habitat is not considered to be present in the Medina Estuary, no LSEs are anticipated. Desmoulin's whorl snail Upon review of the Regulation 33 information for the European Marine Site, it is understood that the Desmoulin's whorl snail (*Vertigo moulinsiana*) population has only been recorded in one location; historically present in the freshwater fen, swamp and brackish reedbeds at the top of Fishbourne Channel in Chichester Harbour. There are no records to suggest that it is in the Medina Estuary, and therefore no LSEs are anticipated.	
Eastern Yar	The Eastern Yar drought management option relaxes the MRF controls on the River Medina to allow greater abstraction and transfer to the River Yar for abstraction at Sandown. The River Medina forms part of the SAC (downstream of Newport) and the hydrological assessment has identified major impacts due to the drought management option; a 41% reduction in the Q_{95} flow from the preceding reach to the estuarine waters during the summer, and a 5% reduction in Q_{95} flow of the preceding reach to the estuarine waters during the winter (with a 48% reduction in Q_{50} winter flows). The impacts of this to each of the qualifying features is considered in further detail below: Estuaries As identified in the Regulation 33 information for the European Marine Site, the estuaries feature covers the following sub-features; saltmarsh communities, intertidal mudflat and sandflat communities, intertidal mixed sediment communities, and subtidal communities. Impacts to mudflats and sandflats, and saltmarsh communities have been considered below. The screening assessment has indicated a low impact magnitude on the estuary but, adopting a precautionary approach, an Appropriate Assessment of this feature will be carried out. Spartina swards The Review of Consents information and Regulation 33 information for the European Marine Site note that freshwater input is not considered to be of principal importance to *Spartina* (as the species is halophytic). Equally, changes in salinity regimes were not considered to significantly affect the habitat. Therefore, impacts to	Yes *Stage 2 Appropriate Assessment required*

	the *Spartina* swards resulting from increased abstraction during implementation of the drought management option are considered unlikely, and as such no LSEs are anticipated. Atlantic salt meadows The saltmarsh communities are dominated by halophytic species and as such the requirement for freshwater inputs are not considered to be significant to the lower marsh levels. However, the transitional high marshes will contain a greater variety of plant species which may require freshwater input, although this will be predominantly achieved during winter flooding. The Review of Consents information notes that the areas of saltmarsh in the Medina Estuary are away from the main freshwater inflows, and from a review of the Natural England priority habitat mapping, there is also a band of mudflat habitat seaward of the saltmarsh which would afford some protection. Himalayan balsam has been recorded on the River Medina, upstream of the abstraction point. However, the risk of this spreading during the implementation of the drought management option will be mitigated as necessary, following an assessment of the risk posed. Therefore, impacts to the Atlantic salt meadows resulting from increased abstraction during implementation of the drought management option are considered unlikely, but adopting a precautionary approach, an Appropriate Assessment of this feature will be carried out. Mudflats and sandflats not covered by seawater at low tide The Review of Consents information identifies that freshwater inputs are not a feature of principal importance for the habitat itself, but more important for the supported invertebrate assemblage. In addition, the Site Improvement Plan does not include mudflats as being affected by hydrological changes (abstraction). However, mudflats cover the areas seaward of saltmarsh and therefore would be the first habitats to be affected by changes to freshwater inputs resulting from increased abstraction during implementation of the drought management option. The overall importance/sensitivity of the Medina Estuary in the context of the Solent Maritime SAC, when compared to some of the other estuaries (e.g. Newtown Estuary), is considered to be low (as surmised through the Review of Consents and Regulation 33 European Marine Site information). Changes to sediment dynamics and water quality during the 6 months of drought management option implementation could result in short-term accumulations of finer sediments in the upper reaches of the estuary, and an increased risk of algal blooms, resulting in temporary changes to the dominant macroinvertebrates and phytoplankton communities. Himalayan balsam has also been recorded on the River Medina, upstream of the abstraction point. However, the risk of this spreading during the implementation of the drought management option will be mitigated as necessary, following an assessment of the risk posed. Considering the Favourable Condition Tables in the Regulation 33 information for the European Marine Site, the following need to be maintained in the long-term; extent (including changes to sediment budget), topography, nutrient enrichment, sediment characteristics, biotope assemblage. It is acknowledged that the drought management option will change the sediment budget, sediment characteristics and biotope assemblage, however this will be temporary during the 6 month implementation of the drought management option and recovery period, and unlikely to significantly alter the habitat feature in the long term. A number of these characteristics will also have been altered by the baseline natural drought conditions, and therefore the additional impact caused by implementing the drought management option is considered to be low. However, adopting a precautionary approach, an Appropriate Assessment of this feature will be carried out. Coastal lagoons The coastal lagoon feature has been recorded at Newtown Quay, Borrow Dyke in Yarmouth Harbour and Stuart's Pond (at the base of Hurst Spit). Therefore, as this habitat is not considered to be present in the Medina Estuary, no LSEs are anticipated. Desmoulin's whorl snail Upon review of the Regulation 33 information for the European Marine Site, it is understood that the Desmoulin's whorl snail (*Vertigo moulinsiana*) population has only been recorded in one location; historically present in the freshwater fen, swamp and brackish reedbeds at the top of Fishbourne Channel in Chichester Harbour. There are no records to suggest that it is in the Medina Estuary, and therefore no LSEs are anticipated.	
Caul Bourne	The River Caul Bourne, on which the MRF controls would be relaxed to allow prolonged groundwater abstraction, discharges into Shalfeet Creek which is part of the Newtown Estuary, and designated as part of the Solent Maritime SAC. For context, the Environment Agency's Habitats Directive Stage 4 Review of Consents considered Southern Water's Caul Bourne groundwater source and concluded "cannot show no adverse impact". However, the risk to the site was considered to be low, so the Environment Agency took a pragmatic approach by time-limiting the abstraction licences for 12 years, thereby linking them into the Catchment Abstraction Management Strategy (CAMS) cycle and providing time to undertake pertinent technical investigations (Environment Agency, 2008) . The Newtown Estuary is the largest and most complex estuary on the Isle of Wight. It is a bar-built, mesotidal estuary with a tidal range of 2.9 m, and is subject to the unique tidal regime (the double high tide) of the Solent. The estuary is dendritic in form, fed by five waterbodies, four of which (Ningwood Lake, Newton Brook, Clamerkin Brook and Rodge Brook) are minor streams which derive their flow from localised Tertiary gravel aquifers, and surface water from Tertiary clary river beds. As such the freshwater influx from these streams is highly seasonal and known to be much reduced during hydrological summer. The largest freshwater flow input to Newtown Harbour is the Caul Bourne. The hydrogeological assessment of the impacts of the proposed increased abstraction under the drought management option used professional judgement, and information from the Environment Agency's No Deterioration Dataset Assessment and the 2014 Habitats Directive study completed by Atkins on behalf of Southern Water. The assessment concluded that freshwater inflows to Shalfleet Creek from the River Caul Bourne under non-drought order have been estimated to be in the	Yes *Stage 2 Appropriate Assessment required*

	1.38 Ml/d at Q_{95}. Predicted freshwater flow into Shalfleet Creek under the proposed drought order is estimated to 0.77 Ml/d at Q_{95} flow conditions. Freshwater inflows at Q_{95} flows are therefore estimated to be reduced by approximately 0.61Ml/d or 44% as a result of the drought order. However, freshet releases from Calbourne Mill provide continued freshwater input thereby resulting in a moderate impact. The impacts of this to each of the qualifying features is considered in further detail below: Estuaries As identified in the Regulation 33 information for the European Marine Site, the estuaries feature covers the following sub-features; saltmarsh communities, intertidal mudflat and sandflat communities, intertidal mixed sediment communities, and subtidal communities. As it cannot be concluded that there will be no LSEs to the Atlantic saltmarsh and mudflat and sandflat habitats and communities, it cannot be concluded that there will be no LSEs to the overarching estuaries feature. *Spartina* swards There are four species of cordgrass in the UK; *Spartina maritima* small cordgrass, *Spartina alterniflora* smooth cordgrass, *Spartina* x *townsendii* Townsend's cordgrass and *Spartina anglica* common cordgrass. The Solent is of interest as all four species are found there. The Regulation 33 information package for the Solent Maritime SAC notes that small cordgrass (*Spartina maritima*) is in greatest abundance in Newtown Harbour. The Environment Agency's Review of Consents information and Regulation 33 information note that freshwater input is not considered to be of principal importance to *Spartina* (as the species is halophytic). Equally, changes in salinity regimes were not considered to significantly affect the habitat. Common cord-grass (*Spartina anglica*) swards have been identified within the northern end of Shalfeet Creek. The swards form small patches of marsh at the foot of the saltmarsh platforms, with only one significant patch mapped in the 2012 vegetation survey completed for the Monitoring Investigation[4]. This habitat is typically species poor with only a few associated species such as marsh samphire Salicornia sp. The northern location of these patches in Shalfleet Creek is representative of the reliance of the habitat on tidal and marine processes and is less influenced by the freshwater influx. Therefore, impacts to the *Spartina* swards resulting from increased abstraction during implementation of the drought management option are considered unlikely, and as such no LSEs are anticipated. Atlantic salt meadows The Regulation 33 package for the Solent Maritime European Marine Sites notes that Newtown Estuary is of particular conservation interest for its saltmarsh communities. It states that the *"…saltmarshes on these estuaries have a near full range of marsh communities from low marsh on the low shore, to mid and upper marsh and transitions to freshwater reedswamp and alluvial woodland at the limits of tidal inundation*". The Newtown Estuary saltmarshes transition to woodland, grassland and shingle. The Environment Agency Review of Consents work identified that "*freshwater influences on saltmarsh and inter tidal flats are limited in extent but are evident along Shalfleet Creek where the Caul Bourne discharges into the estuary*". Work undertaken by Atkins on behalf of Southern Water between 2012 and 2014, to monitor the impacts of the Caul Bourne abstraction in light of the Review of Consents conclusions included detailed vegetation surveys in Shalfleet Creek (where the River Caul Bourne discharges). This identified a significant saltmarsh platform just south of Shalfleet Mill (approximate NGR: SZ415896). The survey also concluded that there were narrow strips of saltmarsh along Shalfleet Creek which transitioned from freshwater influenced marshes at the head of the creek, with a higher salinity marsh further north into the wider Newtown Estuary complex. The survey also noted that the flora found in Shalfleet Creek was distinct from the other areas of saltmarsh in the estuary. A number of plant species were found to occur only here – wild celery (*Apium graveolens*) and brook weed (*Samolus valerandi*). Parsley water dropwort (*Oenanthe lachenalii*), although found elsewhere in the estuary, was particularly abundant in Shalfleet Creek. The report therefore concluded that *"...the diversity of saltmarsh type and flora in Shalfleet Creek and the transition of saltmarsh types along its length make a significant contribution to the Annex 1 habitat types, Atlantic Saltmeadow and Estuary, for which Newtown Harbour is designated a component of the Solent Maritime SAC*". The report also noted that the transition from south to north, from brackish coastal communities to more saline influenced communities was particularly important. Therefore, with the Shalfleet Creek being reliant on freshwater input, and identified as being mainly freshwater at low flow in the hydrogeology assessment, it cannot be concluded that no LSEs will occur to the saltmarsh habitats; Stage 2 Appropriate Assessment is therefore required. Mudflats and sandflats not covered by seawater at low tide The Regulation 33 package for the Solent Maritime SAC notes that the mudflats at Newtown Harbour are "*...particularly unspoilt, being subject to little human disturbance or pollution*". The mudflat and sandflat area at Newtown Estuary is also known to support important communities of the eelgrass species *Zostera noltii*. Eelgrass beds are nationally rare, and support overwintering waterfowl and spawning, nursery and refuge sites for fish. The Environment Agency's Review of Consents work for the Caul Bourne abstraction licence, concluded that there were important areas where the freshwater and saline water mix, and that this is close to the freshwater inflows from the River Caul Bourne. Changes to sediment dynamics and water quality during the 6 months of drought management option implementation could result in short-term accumulations of finer sediments in the upper reaches of the estuary, and an increased risk of algal blooms, resulting in temporary changes to the dominant macroinvertebrates and phytoplankton communities. On review of the NERC S41 priority habitat mapping, the mudflats extend to the southern limit of Shalfleet Creek. Therefore, although the changes to sediment budget, sediment characteristics and biotope assemblage will be temporary, and will be subject to a level of alteration by the baseline drought conditions, given the known sensitivity of the upper reaches of Shalfleet Creek to freshwater inputs, it cannot be concluded that no LSEs will occur to the mudflat and sandflat habitats; Stage 2 Appropriate Assessment is therefore required.	

	<u>Coastal lagoons</u> The coastal lagoon feature has been recorded at Newtown Quay, and the Regulation 33 information package for the Solent Maritime SAC notes that it is "formed by the remains of an old saltworks, there is no freshwater flow, but seawater enters through a culvert". Given the location of the lagoon within the main Newtown Estuary complex and the dominance of coastal processes here, no LSEs are anticipated. <u>Desmoulin's whorl snail</u> Upon review of the Regulation 33 information for the European Marine Site, it is understood that the Desmoulin's whorl snail (*Vertigo moulinsiana*) population has only been recorded in one location; historically present in the freshwater fen, swamp and brackish reedbeds at the top of Fishbourne Channel in Chichester Harbour. There are no records to suggest that it is in Newtown Estuary, and therefore no LSEs are anticipated.	
Lower Itchen Sources	The proposed drought order will lead to a reduction in river flow to the Itchen estuary due to the reduction of the Hands-off Flow conditions associated with the Lower Itchen sources abstraction licences. However, given the relative magnitude of the flow change compared to the volume of water and the tidal processes of Southampton Water, no likely significant effects are anticipated to the SAC.	No
Test Surface Water Drought Permit and Drought Order	The River Test flows into, and parts of the Lower Test Valley Marshes are partly covered by, the Solent Maritime SAC. The upstream boundary of the Solent Maritime SAC reflects the general upper limit of transitional grassland/saltmarsh communities. Although there are small areas of mud along channels at low tide, Atlantic Salt Meadow (ASM) is the only SAC qualifying feature represented in the Lower Test Marshes component of the SAC and therefore the only qualifying feature that may be affected by the drought order. There is a minor theoretical pathway for low flows due to implementation of the drought order to impact on the Atlantic Salt Meadows. However, during the specific drought baseline conditions under consideration during implementation of the drought order, the marine habitats identified would already have been exposed to drought conditions prior to implementation of the drought order. The operation of the drought order is unlikely to impact Atlantic Salt Meadows more than the prevailing drought conditions due to the dynamic relationship between tidal inundation and the freshwater inputs and the distance of this feature from the point of abstraction. At the end of a drought, when significant rainfall occurs, the recovery of floodplain wetness tends to be rapid and therefore long term negative impacts as a result of the proposed option are unlikely. Taking these considerations into account, the incremental impact of the drought order beyond that of the prevailing drought is unlikely to result in negative impacts upon the favourable conservation status of this qualifying feature of the designated site. Therefore, no LSE is anticipated on the Atlantic Salt Meadow No LSE are anticipated in respect of any of the other features of the Solent Maritime SAC.	No

Designated site name:	**Stodmarsh SAC**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	1016 Desmoulin`s whorl snail *Vertigo moulinsiana* A sizeable population of Desmoulin's whorl snail *Vertigo moulinsiana* lives beside ditches within pasture on the floodplain of the River Stour, where reed sweet-grass *Glyceria maxima*, large sedges *Carex* spp. and sometimes common reed *Phragmites australis* dominate the vegetation. Stodmarsh is a south-eastern outlier of the main swathe of sites and is important in confirming the role of underlying base-rich rock (chalk) as a factor determining this species' distribution.	Water Dependent: Yes
Current conservation status (Article 17):	**Unknown** (Range: favourable, Population: unknown, Habitat: unknown, Future prospects: unknown). Main threats and pressures: routes, autoroutes; landfill, land reclamation and drying out, general; modification of hydrographic functioning, general; management of water levels; silting up; drying out; submersion; biocenotic evolution.	
Conservation objectives (SAC):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of the qualifying species • The distribution of the qualifying species within the site. Supplementary advice to support the conservation objectives is currently unavailable.	
SSSI condition assessment:	Stodmarsh SSSI: 68.12% favourable, 21.49% unfavourable recovering, 10.40% unfavourable no change. Unfavourable recovering due to requirement for active scrub management and restoration of reedbeds. Unit 10 unfavourable no change due to high nutrient levels in the main NNR lake. More research is required to understand hydrological regime and water quality of input sources (Great Stour and Lampen Stream).	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	There are no actions in the SIP relating to Desmoulin's whorl snail.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Sandwich[6]	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The site is considered to be at sufficient distance so as not to give rise to construction related LSEs. **Operation:** The SAC is located approximately 8.3km to the north west of the source. The SAC is outside the groundwater drawdown zone identified in the hydrogeological assessment, and the Little Stour which has been identified as having minor impacts due to changes in flow (~0.3Ml/d) discharges into the River Stour downstream of the SAC. Therefore, no LSEs are anticipated.	No

[6] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.

Designated site name:	**The Mens**	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) The Mens is an extensive area of mature beech Fagus sylvatica woodland rich in lichens, bryophytes, fungi and saproxylic invertebrates, and is one of the largest tracts of Atlantic acidophilous beech forests in the south-eastern part of the habitat's UK range. It is developing a near-natural high forest structure, in response to only limited silvicultural intervention over the 20th century, combined with the effects of natural events such as the 1987 great storm. **1308 Barbastelle *Barbastella barbastellus*** Water Dependent: Atlantic acidophilous beech forests – not water dependent – scoped out. Barbastelle bats - water dependent – scoped in.	
Current conservation status (Article 17):	Atlantic acidophilous beech forests: **Bad but improving** (range: favourable, area: inadequate but improving, structure and function: bad but improving, future prospects: favourable). Main pressures and threats: removal of hedges and copses; general Forestry management; planting; artificial planting; replanting; forestry clearance; removal of undergrowth; removal of dead and dying trees; air pollution; biocenotic evolution; invasion by a species; antagonism arising from introduction of species; other forms or mixed forms of interspecific faunal competition; other natural processes. Barbastelle bat: **Unknown** (range: favourable, population: unknown, habitat: unknown, future prospects: unknown). Main pressures and threats: use of pesticides; removal of hedges and copses; general forestry management; forestry clearance; removal of undergrowth; removal of dead and dying trees; urbanised areas, human habitation; landfill, land reclamation and drying out, general; infilling of ditches, dykes, ponds, pools, marshes or pits; drainage.	
Conservation objectives (SAC):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species • The distribution of qualifying species within the site. Supplementary advice for the conservation objectives is currently unavailable.	
SSSI Condition assessment:	The Mens SSSI: 97.33% favourable, 2.67% unfavourable declining. Unit 09 is unfavourable declining as an appropriate woodland management plan needs to be agreed.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Forestry and woodland management – beech forests and barbastelle bats - restore clear-felled site to broadleaved woodland. 2. Forestry and woodland management – beech forests and barbastelle bats - investigate potential impacts of woodland management. 3. **Habitat connectivity** – barbastelle bats – investigation of bat movements and requirements. 4. Habitat connectivity – barbastelle bats – investigate how this relates to other bat SACs in southern UK. 5. Invasive species – beech forests - remove invasive rhododendron. 6. Change in land management – barbastelle bats - investigation of foraging and bat commuting routes. 4. Air Pollution: risk of atmospheric nitrogen deposition - beech forest and barbastelle bats - further investigate potential atmospheric nitrogen impacts. 7. Public access/disturbance – barbastelle bats - investigate present light levels and assess their impact and alleviate if necessary.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Pulborough	The SAC is located approximately 3.7km upstream from the Pulborough abstraction. Although the section of the River Arun to be affected by the drought management option is likely to be within the range of the bat species, and therefore potentially used for feeding and commuting, other water sources are available in closer proximity, for example the River Kird which part of the SAC lies adjacent to, and the upstream sections of the River Arun. In addition, impacts to the first hydrological reach affected by the Pulborough abstraction have been identified as negligible-minor for summer and winter for the 10Ml/d and 20Ml/d MRF reductions. It is only the 30Ml/d summer and winter MRF reductions that have been identified as having major and moderate impacts respectively, however as already stated, it is considered that there are other watercourses available for use, and therefore no LSEs on the bat populations are anticipated.	No

Special Protection Areas and/or Ramsar

Designated site name:	**Arun Valley**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Over winter; Bewick's Swan *Cygnus columbianus bewickii,* 115 individuals representing at least 1.6% of the wintering population in GB. **Assemblage qualification**: A wetland of international importance. **Article 4.2:** Over winter, the area regularly supports 27,241 individual waterfowl including: Shoveler *Anas clypeata*, Teal *Anas crecca*, Wigeon *Anas penelope*, Bewick's Swan Cygnus *columbianus bewickii*.	**Ramsar criterion 2:** 7 wetland invertebrate species listed in the British Red Data Book as threatened. One of these, *Pseudamnicola confusa*, is considered to be endangered. The site also supports four nationally rare and four nationally scarce plant species. **Ramsar criterion 3:** The ditches intersecting the site have a particularly diverse and rich flora. All five British duckweed *Lemna* species, all five water-cress *Rorippa* species, and all three British water milfoils (*Myriophyllum* species), all but one of the seven British water dropworts (*Oenanthe* species), and two-thirds of the British pondweeds (*Potamogeton* species) can be found on site. **Ramsar criterion 5:** Assemblages of international importance: Species with peak counts in winter: 13774 waterfowl.	Water Dependency: Yes
Current conservation status (Article 12):	Bewick's swan: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient Shoveler: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient Wigeon: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient Teal: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient:		
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary advice to support the conservation objectives is not currently available.		
SSSI condition assessment:	Pulborough Brooks SSSI: 100% favourable. Amberley Wild Brooks SSSI: 1.95% favourable, 98.05% unfavourable recovering. Supporting habitat threats/pressures – inappropriate grazing regimes and management of ditches leading to dominance of fewer species, too much growth for bird species, and prominence of mid-late successional features in ditches (rather than mix of early, mid and late).		
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. **Inappropriate water levels** – Bewick's swan, waterbird assemblage – maintain water levels and ditch management by continued implementation of the Water Level Management Plan (Amberley Wild Brooks – no WLMP available for Waltham or Pulborough Brooks). 2. Inappropriate water levels – Bewick's swan, waterbird assemblage - investigate likely impacts on the designated features from implementation of the Lower Tidal River Arun Strategy (LTRAS) and find solution to maintain favourable conservation status. 3. **Water pollution** – Bewick's swan - Investigate and monitor the impacts of point and diffuse water pollution that enter the site and introduce measures to reduce pollutants. 4. Inappropriate ditch management – Bewick's swan.		
Potential Effects			
Scheme:	Assessment:		LSEs?
North Arundel	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The North Arundel borehole site is considered to be at sufficient distance so as not to give rise to construction related LSEs. **Operation:** This drought management option involves increased abstraction at the boreholes. The SPA and Ramsar are both outside the zone of drawdown produced by the abstraction. In addition, the areas of functional land identified for the qualifying bird species are predominantly located to the east of the River Arun (the Harrow Hill area) or extend further north along the River Rother and further south around Littlehampton, and these are again outside the groundwater drawdown zone which is predominantly to the west of the River Arun. Therefore, no LSEs are anticipated.		No
Pulborough	This drought management option involves various reductions in the MRF on the River Rother, allowing greater surface water abstraction, and the SPA and Ramsar is directly adjacent to the river. The hydrology assessment has identified two reaches; Reach 1 extends from the Pulborough abstraction to the confluence with the River Arun and Reach 2 is the transitional water. Impacts in Reach 1 have been identified as negligible for the 10Ml/d MRF reduction in summer and winter, minor for the 20Ml/d reduction in summer and winter, but major and moderate for the 30Ml/d reduction in summer and winter respectively. A 27% and 24% reduction in Q_{95} flows (30Ml/d MRF reduction), or 18% and 15% (20Ml/d MRF reduction) in the River Arun Reach 2 during summer and winter, respectively, will result in decreased water levels within the main river system and a potential decrease in dissolved oxygen that could result in changes to the macroinvertebrate assemblage. However, due to the embanked nature of the River Arun, impacts on the majority of drainage ditches associated with the SPA are unlikely to arise. During consultation with Natural England for the Drought Plan 2019 HRA (December 2016), the underlying SSSI sites and their connectivity with the River Arun were discussed. It was confirmed that Pulborough Brooks SSSI and Amberley Wildbrooks SSSI were not connected to the River Arun due to the presence of the flood banks along the River Arun. In comments that Natural England provided to Southern Water in 2018 on the Drought Plan 2019 HRA it was noted that '… *should the review of flood bank management in the Arun Valley result in a change to the current hydrological system this must be taken into account in future drought and resilience planning'*. At time of		No

	writing the Drought Plan 2022 HRA there is no published information indicating that the role of the flood banks in separating the River Arun from the two SSSIs will change during this Drought Plan period (to 2027). Some parts of the Waltham Brooks SSSI are in connectivity with the river but this is a small area. According to NVC habitat mapping provided by Sussex Wildlife Trust the habitats closest to the river constitute common and widespread MG6 (*Lolium perenne - Cynosurus cristatus* grassland) and MG9 (*Holcus lanatus - Deschampsia cespitosa* grasslands) communities. Moreover, during a natural drought it is expected that no ditches and drains within the SSSI will be connected to the Arun and standing waters will remain for some time. There will also be a potential groundwater input in several areas which will also provide further habitat. The areas of functional land identified for the qualifying bird species are predominantly located to the east of the River Arun (the Harrow Hill area), or extend further west along the River Rother, and to the south east around Littlehampton. The impacts from the drought management option will not affect these areas, being confined to changes in water levels and flows within the reaches (River Rother to River Arun, and Arun transitional water), and impacts to these have already been discussed above. Therefore, as a result of the managed water levels, flood protection activities, limited impact on functional land, and the baseline of natural drought, the drought management option is not anticipated to have any LSEs.	

Designated site name:	**Ashdown Forest**	
Designation type: (SAC, SPA, Ramsar):	SPA	
Qualifying features:	**Article 4.1:** During the breeding season; Dartford Warbler *Sylvia undata*, 29 pairs representing at least 1.8% of the breeding population in GB, Nightjar *Caprimulgus europaeus*, 35 pairs representing at least 1.0% of the breeding population in Great Britain.	Water Dependent: Yes.
Current conservation status (Article 12 sufficiency of SPA suite):	Dartford warbler: Population numbers: Sufficient, Range coverage: Insufficient in the north of the expanding range, Ecological sufficiency: Sufficient. Nightjar: Population numbers: Sufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient.	
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary Advice to the conservation objectives is currently unavailable.	
SSSI condition assessment:	Ashdown Forest SSSI: 20.37% favourable, 79.22% unfavourable recovering, 0.41% unfavourable declining. Much of the heathland is unfavourable but recovering. Although much of the heather is reduced, there are areas where regeneration is occurring – mostly in isolated pockets. Molinia needs to be grazed in many locations.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Change in land management - wet heathland with cross-leaved heath, European dry heaths - establish appropriate grazing by improving facilities and stocking. 2. Air Pollution: impact of atmospheric nitrogen deposition - wet heathland with cross-leaved heath, European dry heaths - control, reduce and ameliorate atmospheric nitrogen impacts. 3. Public access/disturbance - European nightjar, Dartford Warbler - advice and education programme aimed at dog walkers. 4. **Hydrological change** - Wet heathland with cross-leaved heath - Hydrological and botanical survey and analysis is required.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Weir Wood	This drought management option involves reducing the compensation flow released to the River Rother during summer or winter to allow greater water abstraction from the reservoir. The SPA is 0.7km south of the first hydrological reach from Weir Wood reservoir. However, the SPA is crossed by a number of drainage ditches that discharge into the River Medway between Weir Wood reservoir and Withyham. The SPA is therefore considered to be upstream of the impacts to flows and levels in the River Rother, and so no LSEs are anticipated.	No

Designated site name:	**Dungeness, Romney Marsh and Rye Bay**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Bewick's swan *Cygnus columbianus bewickii* 155 individuals 1.9% GB population - wintering, Bittern *Botaurus stellaris* 5 individuals 5.0% GB population - wintering, Hen harrier *Circus cyaneus* 11 individuals 1.5% GB population - wintering, Golden plover *Pluvialis apricaria* 4,050 individuals 1.6% GB population - wintering, Ruff *Philomachus pugnax* 51 individuals 7.3% GB population - wintering, Aquatic warbler *Acrocephalus paludicola* 2 individuals 6.1% GB population - passage, Marsh harrier *Circus aeruginosus* 4 females – breeding 2.0% GB population, Avocet *Recurvirostra avosetta* 31 pairs – breeding 3.5% GB population, Mediterranean gull *Larus melanocephalus* 56 pairs – breeding 52.2% GB population, Sandwich tern *Sterna sandvicensis* 350 pairs – breeding 3.3% GB population, Common tern *Sterna hirundo* 273 pairs – breeding 2.7% GB population, Little tern *Sterna albifrons* 35 pairs – breeding 1.5% GB population. **Article 4.2:** Shoveler *Anas clypeata* 485 individuals – wintering 1.2% NW & C Europe (nonbreeding) **Assemblage qualification:** In the non-breeding season, the area is regularly used by 34,625 individual waterbirds, including (but not limited to) Bewick's swan *Cygnus columbianus bewickii,* European white-fronted goose *Anser albifrons*, wigeon *Anas penelope*, gadwall *A. strepera*, shoveler *A. clypeata*, pochard *Aythya ferina*, little grebe *Tachybaptus ruficollis*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, bittern *Botaurus stellaris*, coot *Fulica atra*, golden plover *Pluvialis apricaria*, lapwing *Vanellus*, sanderling *Calidris alba*, ruff *Philomachus pugnax*, whimbrel *Numenius phaeopus* and common sandpiper *Actitis hypoleucos*.	**Ramsar criterion 1:** Annual vegetation of drift lines and the coastal fringes of perennial vegetation of stony banks Natural shingle wetlands: saline lagoons, freshwater pits and basin fens **Ramsar criterion 2:** The site consists of a complex network of wetland habitats including saltmarsh, natural freshwater pits, fens, ponds, gravel pits, and grazing marsh and ditches. They support rich and diverse assemblages of bryophytes, vascular plants and invertebrates that are rare, threatened, listed as priority species in the UK Biodiversity Action Plan (BAP) or specially protected under the Wildlife and Countryside Act 1981. Important areas for these assemblages include the gravel pits, ditches and shingle wetlands at Dungeness and Rye Harbour, the grazing marsh and ditches of Walland Marsh, Dengemarsh and Pett Level, ponds throughout the site, the Royal Military Canal, and the saltmarshes of the River Rother. Threatened ecological communities: bryophytes, vascular plants, invertebrates. The site is of international importance for nine individual wetland species: • greater water-parsnip *Sium latifolium*, Warne's thread-moss *Bryum warneum*, water vole *Arvicola amphibious*, aquatic warbler *Acrocephalus paludicola*, great crested newt *Triturus cristatus*, medicinal leech *Hirudo medicinalis*, marsh mallow moth *Hydraecia osseola hucherardi*, De Folin's lagoon snail *Caecum amoricum*. **Ramsar criterion 5:** In the non-breeding season, the site regularly supports 34,957 individual waterbirds. **Ramsar criterion 6:** Mute swan *Cygnus olor* 348 individuals – wintering 1.1% of GB population, Shoveler *Anas clypeata* 485 individuals – wintering 1.2% NW & C Europe population.	Water Dependent: Yes
Current conservation status (Article 12 - sufficiency of SPA suite)	• Bewick's swan: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Bittern: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient. • Hen harrier: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient. • Golden plover: Population numbers: Sufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient. • Ruff: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Aquatic warbler: Population numbers: Insufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Marsh harrier: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Avocet: Population numbers: Insufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient. • Mediterranean gull: Population numbers: Insufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient • Sandwich tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Common tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Little tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Shoveler: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • White-fronted goose: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Wigeon: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Gadwall: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Pochard: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient. • Little grebe: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient. • Great crested grebe: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Cormorant: Population numbers: Insufficient, Range coverage: Insufficient – south-western Britain, East Anglia and SW Scotland, Ecological sufficiency: Sufficient • Coot: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Golden plover: Population numbers: Sufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Lapwing: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient. • Sanderling: Population numbers: Sufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient. • Ruff: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient. • Whimbrel: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient. • Common sandpiper: not recorded.		

Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary Advice to the conservation objectives is currently unavailable, however reference has been made to the Regulation 33 advice available[7].	
SSSI condition assessment:	Dungeness, Romney Marsh and Rye Bay SSSI: 67.53% favourable, 31.23% unfavourable recovering, 0.12% unfavourable change, 0.12% unfavourable declining. Beach reprofiling for flood defence management, damage to fossil ridge topography, military training, problems with *Crassula*, scrub encroachment.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Military – Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - assess the current impact of fire damage to Perennial Vegetation of Stony Banks (PVSB) habitat and draw together a specific fire plan with an aim to reduce the impact of fires through improved response. 2. Vehicles: illicit – Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - report off roading incidents, continue to monitor and work with partners. 3. Predation - avocet, Mediterranean gull, sandwich tern, common tern, little tern - Investigate and implement further control of predators. 4. **Changes in species distribution** - Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - Bird surveys to understand bird species movement across the whole area. 5. **Invasive species** – Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - control of Crassula and avoid spread of other non-native invasive species e.g. red valerian. 6. Inappropriate scrub control – not applicable for SPA features. 7. Overgrazing – not applicable for SPA features. 8. Public access/disturbance – Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - visitor access management to reduce disturbance. 9. Direct impact from 3rd party – Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - manage unconsented activities such as dumping garden waste, garden encroachment, and erection of structures. 10. Air Pollution: impact of atmospheric nitrogen deposition – not applicable for SPA features 11. **Inappropriate water levels** - Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - review current draft Water Level Management Plan (2010) for 'Walland Marsh Area', which could be expanded to include Denge and Romney Warren. Reviews of the WLMPs across the site including Rye Harbour, Pett Levels (2006) and Dungeness (1998). 12. **Inappropriate ditch management** - Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - Joint site management plan for coordinated approach to ditch management 13. Coastal squeeze - avocet, golden plover, ruff, waterbird assemblage - review the Shoreline Management Plan to better understand coastal squeeze issues 14. **Water pollution** - Bewick's swan, shoveler, Mediterranean gull, common tern, little tern - investigate whether there is a significant risk to the SPA lakes from diffuse pollution in the area of Greatstone. 15. Fisheries: commercial marine and estuarine - Bewick's swan, shoveler, Mediterranean gull, common tern, little - Introduce appropriate management measures and ensure compliance with existing bye-laws.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Darwell (exclusively; percentage reductions in flows in river relevant reaches are for Darwell only).	**Qualifying Features Screened In and Out:** SPA: **All bird species** are susceptible to changes in water levels and changes in salinity gradients which could reduce the amount of watercourse available to bird populations, and availability of prey. The use of areas of land associated with the ditch network supplied by the Royal Military Canal also needs to be investigated. Further assessment is provided below. Ramsar: *Criterion 1:* • Annual vegetation of drift lines – predominantly influenced by coastal processes rather than changes in freshwater flow and levels. Drought option will not alter groundwater levels associated with deep rooted species including prostate blackthorn and holly wood. It was confirmed during a meeting with Natural England and Environment Agency in November 2018 that the Denge Marsh Sewer is not supplied by the Royal Military Canal, and therefore will not be subject to any water supply restrictions as a result of the implementation of the drought permit. Similarly, the mapping of the ditch network provided by the Environment Agency shows no connection between the Royal Military Canal and the ditches on the Lydd Ranges. The last sewer in the system to be connected to the Royal Military Canal is Jury's Gut. Therefore, no LSEs are anticipated. • Coastal fringes of perennial vegetation of stony banks - predominantly influenced by coastal processes rather than changes in freshwater flow and levels. Therefore, no LSEs anticipated. Natural shingle wetlands: saline lagoons and basin fens - this habitat is found within the Dungeness RSPB reserve and Lydd Ranges. As the Royal Military Canal does not feed any of the sewer network within the Dungeness RSPB reserve and Lydd Ranges, the habitats are not considered likely to be impacted by the drought permit or order. No LSEs are anticipated. *Criterion 2:* • The site consists of a complex network of wetland habitats including saltmarsh, natural freshwater pits, fens, ponds, gravel pits, and grazing marsh and ditches. They support rich and diverse assemblages of bryophytes, vascular plants and invertebrates that are rare, threatened, listed as priority species in the UK Biodiversity Action Plan (BAP) or specially protected under the Wildlife and Countryside Act 1981. Important areas for these assemblages include the gravel pits, ditches and shingle wetlands at Dungeness and Rye Harbour, **the grazing marsh and ditches of Walland Marsh**, Dengemarsh and Pett Level, ponds throughout the site, **the Royal Military Canal**, and the saltmarshes of the River Rother - the features highlighted in bold will be taken forward to the Appropriate Assessment. As stated above, the Royal Military Canal does not feed any of the sewer network within the Dungeness RSPB reserve and Lydd Ranges. Those	Yes *Stage 2 Appropriate Assessment required*

[7] Solent European Marine Site comprising: Solent Maritime candidate Special Area of Conservation, Solent and Southampton Water Special Protection Area & Ramsar Site, Chichester and Langstone Harbours Special Protection Area & Ramsar Site, Portsmouth Harbour Special Protection Area & Ramsar Site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Accessed at http://publications.naturalengland.org.uk/publication/3194402.

	sewers supplied by the Royal Military Canal and adjacent areas which could be affected are; Jury's Gut, Guldeford Sewer and the East Guldeford Levels, White Kemp Sewer and Walland Marsh, Five Watering Sewer and Fairfield, and The Dowels. • Bryophytes (Bryum species) – they occur on wet sand beside large freshwater gravel pits and small pools in Dungeness RSPB Reserve therefore unlikely to be impacted by changes to freshwater flows and levels on R. Rother. No LSEs are anticipated. • Vascular plants (sea barley *Hordeium marinum*, Borrer's saltmarsh grass *Puccinellia fasciculate* and slender hare's-ear *Bupleurum tenuissimum* and the near threatened sea-heath *Frankenia laevis* - associated with saltmarsh which could be affected by changes to freshwater flows and levels on River Rother. • **Grazing marshes support the nationally rare (and critically endangered) sharp-leaved pondweed *Potamogeton acutifolius* and at least six nationally scarce species, including the vulnerable divided sedge *Carex divisa* and rootless duckweed *Wolffia arrhizal*** - associated with the ditch network supplied by the Royal Military Canal and therefore could be impacted by drought option and a reduction in water levels. • **Invertebrates (reed beetles *Donacia*, snail-killing flies (*Sciomyzidae*) and soldier flies (*Stratiomyidae*)** – some species associated with grazing marsh and ditch network therefore could be impacted by drought option and reduction in water levels. • Criterion 2 species (those highlighted in bold will be taken forward into the Appropriate Assessment); ▪ **greater water-parsnip *Sium latifolium*** - associated with ditch network, and found in Walland Marsh, therefore could be impacted by drought option and reduction in water levels. ▪ Warne's thread-moss *Bryum warneum* - a colonist on wet sand beside the margins of freshwater gravel pits in Dungeness RSPB Reserve. As the Royal Military Canal does not feed any of the sewer network within the Dungeness RSPB reserve the species will not be impacted by the drought option. ▪ **water vole *Arvicola amphibious*** - densest and most persistent population occurs between East Guldeford and Jury's Gut, and population centre also present at Walland Marsh. Breeding success and population viability largely dependent on summer water levels. ▪ aquatic warbler *Acrocephalus paludicola* - only present on Pett Levels area of SPA and Ramsar therefore will not be impacted by Darwell drought option. ▪ **great crested newt *Triturus cristatus*** - population centres are at Dungeness RSPB reserve and Romney Warren, neither of which are supplied with water by the Royal Military Canal, and therefore will not be affected by the Darwell drought option. However, supporting populations may be present in ditch network, and therefore breeding success and survival could be affected by the drought option. ▪ **medicinal leech *hirudo medicinalis*** - although present within the ditch networks between Dungeness and Rye, adult leeches are capable of surviving desiccation by burrowing into mud at the base of ponds and ditches. However, the drought option could affect the breeding season where medicinal leech leave the water to lay eggs on vegetation, in damp humid conditions. The eggs need to develop in humid conditions and the hatchlings return to water nearby. The breeding season occurs between June and August and therefore increased desiccation of the ditches and marginal vegetation as a result of the drought order could affect the breeding success. ▪ ground beetle *Omophron limbatum* - species living in burrows in sand at the margins of freshwater, where it is active at dusk and at night. Surveys to support the SSSI condition assessment have only recorded the species on the Dungeness RSPB reserve. As the Royal Military Canal does not feed any of the sewer network within the Dungeness RSPB reserve the species will not be impacted by the drought option. ▪ **marsh mallow moth *Hydraecia osseola*** - marsh mallow moth is associated with the nationally scarce marsh-mallow *Althaea officinalis*, which is the larval food plant. The population is centred at Walland Marsh, comprising three discrete colonies at Moneypenny Farm near Rye, Old Cheyne Court near Brookland, and Woodruff's Farm, Fairfield. As the marsh-mallow plant grows on ditch margins and requires its roots to be damp, a reduction in water levels could lead to desiccation and loss of plant stands. ▪ De Folin's lagoon snail *Caecum amoricum* – only located in the saline lagoons seaward of Lydd Ranges. As the Royal Military Canal does not supply water to any of the sewer networks within the Dungeness RSPB reserve and adjacent area the species will not be impacted by the drought option. • The site regularly supports 1% of the individuals in the populations of the following species under Criterion 6: **mute swan *Cygnus olor*** and **shoveler *Anas clypeata***. Further assessment for these species is provided below as they could be affected by changes in freshwater flows and levels in the River Rother. **Assessment:** The hydrology assessment for the summer drought option and reductions of flows by 19% and 8%, in respect to the Q95 and Q99 flows within Reach 4 for the summer MRF reduction (reduced by 18.5Ml/d). This would also have impacts on Reach 5 (Scots Float to Rye Harbour) with a reduction of freshwater inputs. The winter Darwell drought management option for the maintenance of MRF at 4.545Ml/d and an increase in daily licence from 56.8 to 70Ml/d to capture more water under high flow events would result in a flow reduction of between 0% and 11%, in respect to the Q95 and Q50 flows within Reach 4 (Hexden Channel to Scots Float). A quantitative assessment of the impacts to the Royal Military Canal and wider Walland Marsh has not been completed due to insufficient data. However, if the summer MRF reduction is implemented following a dry winter, it is likely that this would reduce the amount of water, and time over which water could be pumped into the marsh system via Iden Lock. The pumping normally commences in April and extends until approximately July when a critical level is reached on the River Rother (0.8mAOD) and pumping ceases. Implementation of the Drought Order from June (summer option) will reduce the timeframe over which pumping into the marsh system can occur, as the 0.8mAOD limit will be reached more quickly with both operating. There is currently no information on how frequently 0.8mAOD is reached or a comparable flow at Iden Lock (data is available for Scots Float although low levels are not necessarily as a result of reduced water supply, but will be affected by seasonal operations for flooding, land drainage and rainfall events, tides, and navigational purposes), therefore the reduction in pumping time or likely change in levels cannot be quantified. However, with a reduction in the overall pumping time (considered to be in the magnitude of days), the levels of water will be lower and management of water in key areas will be required earlier in the season. Extremities are likely to be subject to managed retreat of water sooner, and therefore areas supplied by Jury's Gut and Guildeford Sewer are likely to be susceptible to an increased risk of desiccation and water quality issues. If the 0.8mAOD level is not reached during the implementation of the summer MRF reduction, this will occur during the winter MRF reduction which will be applied between October and February (assuming it is required). This is likely to have less of an impact on water levels in the marsh system as pumping will have occurred between June and September to build up a reserve of water. However, it could delay any recommencement of pumping, although this is likely to be needed less as the autumn and winter are approached and flood risk becomes more of an issue for the management of water levels.	

	Impacts to wetlands: All the habitats and species highlighted in bold above for the Ramsar designation could be impacted by the drought option and will therefore be taken forward into the Appropriate Assessment for consideration. Further consideration has been given to habitat preferences of the SPA and Ramsar qualifying bird species to determine whether Likely Significant Effects arise and therefore whether further assessment is required. Natural England supplied a GIS layer of Functionally Connected Land (FCL) Impact Risk Zones (IRZ) surrounding the Dungeness, Romney Marsh and Rye Bay SPA which is sub-divided into two zones; IRZ1 is a core area where there is evidence/high probability of use by SPA bird species, and IRZ2 which buffers the core zone to include additional suitable habitat[8]. Reach 2 is the River Rother from the Udiam flow gauging station to the confluence with Kent Ditch, and this extends through IRZ2, whilst Reach 3 Kent Ditch to the confluence with the Hexden Channel extends through IRZ1. The wider ditch network across Walland Marsh, supplied by the Royal Military Canal, is within IRZ1. The hydrology assessment for the Darwell drought management option has identified a reduction in flows of between 0% and up to 20% in respect of Q50, for the winter MRF in Reach 1 and a reduction in flows by 34% and 14% in respect to the Q_{95} and Q_{99} flows for the summer MRF reduction (reduced by 18.5Ml/d). This is classified as a negligible and moderate hydrological impact respectively. For Reach 4, reductions in flows by up to 11% 28%, in respect to the Q_{50} flows for the winter MRF reduction (reduced by 13.2Ml/d) are estimated, whilst reductions in flows by 19% and 8%, in respect to the Q_{95} and Q_{99} flows for the summer MRF reduction (reduced by 18.5Ml/d) are estimated. This is classified as a negligible and negligible hydrological impact respectively. The impacts resulting from a reduction in pumping from the River Rother into the Royal Military Canal cannot be quantified due to a lack of data, however the extremities are likely to be subject to managed retreat of water sooner, and therefore the affected areas are likely to be; Jury's Gut, Guldeford Sewer and the East Guldeford Levels, White Kemp Sewer and Walland Marsh, Five Watering Sewer and Fairfield, and The Dowels. *Nesting* Of the qualifying bird species, the following are present during the breeding season when the drought management option could be implemented; marsh harrier, avocet, Mediterranean gull, sandwich tern, common tern and little tern. The Regulation 33 package of information for the European Marine Site[9] notes that nesting habitats for common tern are on the shallow sloping islands in the flooded gravel pits at Dungeness, whilst little tern nest on areas of bare and sparsely vegetated shingle. Mediterranean gull typically nest on marshy grassland, in areas with short and medium swards of vegetation. At the time of writing the Regulation 33 European Marine Site information, sandwich tern, marsh harrier and avocet had not been included as qualifying features. From a literature review, the nesting preferences of these species has been established. Sandwich tern, in other SPAs (e.g. Solent and Southampton Water SPA) have been found to use coastal shingle and sand habitats to nest. Marsh harrier breed predominantly in marsh habitats, typically reedbeds (*Phragmites communis*) and rarely in salt-marsh and cereals, using the same reedbeds on a yearly basis[10]. Avocet are ground nesting birds using shallow scrapes in mud or sparse vegetation. Therefore, considering the information above, the following species could nest offsite in the functional land; Mediterranean gull and marsh harrier. The NERC S41 habitat mapping shows that the predominant habitat type along the River Rother is coastal and floodplain grazing marsh, with some areas of good qualify semi-improved grassland. Coastal and floodplain grazing marsh is defined as "*periodically inundated pasture or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds; although they may abut with fen and reed swamp communities*". It is assumed that the marshes will be inundated during high flow events when river banks overtop and these processes will not be impacted by the drought order (particularly when set against a baseline of natural drought conditions). The Brede valley and the Rother valley wetlands inside but also outside the designated sites provide functional habitat for roosting and feeding that is particularly important for birds in dry conditions. Given the potential reduction in water levels across the wider ditch system as a result of the drought option changing the pumping regime at Iden Lock, LSEs to Mediterranean gull and marsh harrier cannot be ruled out, and therefore further assessment is required. *Roosting* A number of the wintering bird species rely on flooded grasslands for feeding and roosting during the winter months. Therefore, the drought option could delay and/or reduce the winter flooding as a result of lowered water levels in the immediate vicinity where ditch levels have been lowered over the spring and/or summer months: ▪ **Bewick's swan** *Cygnus columbianus bewickii* - favours coastal and farmland habitat. Feeds on crop / wet grassland vegetation in open fields during the day and also feeds on sea weed / algae of estuary waters.	

[8] Issued by M. Knight and S. Middlehurst via Huddle (December 2016). Note the FCL IRZs were prepared to consider the wider area requirements for Bewick's swan, white-fronted goose, golden plover and lapwing. However, consideration of these zones by all SPA species has been completed.
[9] English Nature (2001) Dungeness to Pett Level European marine site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.
[10] JNCC The status of UK SPAs in the 2000s: the Third Network Review.

	▪ **Bittern** *Botaurus stellaris* - favours large reed beds of wetland habitats, largely coastal areas. Reed bed structure must contain open water and reed/water edge. Open water connected to wider hydrology is important to encourage fish populations for feeding. Bitterns occupy a range of 2ha during breeding, with nest built in wet edge reed bed structure. The drought option could reduce the prey available during wintering months due to recovery lag from implementation of drought option in spring and/or summer and reduced breeding success of prey due to stress of drought conditions. The habitat available for roosting may be in poorer condition. ▪ **Hen harrier** *Circus cyaneus* - known to feed along embankment of River Rother and therefore likely to feed across Walland Marshes and Royal Military Canal. The drought option could reduce the prey available during wintering months due to recovery lag from implementation of drought option in spring and/or summer and reduced breeding success of prey due to stress of drought conditions. The habitat available for roosting may be in poorer condition. ▪ **Golden plover** *Pluvialis apricaria* - often gathers in large numbers on farmland and coastal flats during the winter and is known to use Walland Marsh close to Old Cheyne Court (SSSI condition assessment). ▪ **Ruff** *Philomachus pugnax* - feeds in shallow water around lakes / wetland areas near the coast, predominantly feeding on frogs, small fish and insects. Prefers estuaries and wet grassland areas in winter. ▪ Aquatic warbler *Acrocephalus paludicola* - only present on Pett Levels area of SPA and Ramsar therefore will not be impacted by Darwell drought option. ▪ **Shoveler** *Anas clypeata* - use shallow wetlands with submerged vegetation during breeding season. Outside breeding season will forage in saltmarsh, estuaries, lakes, flooded fields and marshland. Predominantly feed on small insects and plant matter sifted from water. *Feeding and foraging* The reduction in water levels across the ditch system could not only affect feeding patterns during the breeding season but could also alter availability of prey for those species occurring over the winter period. Mediterranean gull will feed on numerous prey species found within a range of intertidal and non-intertidal habitats, although during the breeding season the reliance on freshwater habitats increases. Common terns feed inland on the flooded gravel pits at Dungeness. Shallow coastal waters in the intertidal area are important for all three species, whilst invertebrates associated with sandflats and mudflats are also important for Mediterranean gulls. Sandwich tern and avocet predominantly feed over open water, estuaries and mudflats, however marsh harrier, Bewick's swan, bittern, hen harrier, golden plover, ruff and shoveler all feed in wetland habitats. It is therefore considered that all the species with the exception of the terns and avocet, could be affected by changes to water levels in the grazing marsh along the River Rother and in the wider ditch network, and therefore further assessment is required. *Waterbird assemblage:* Article 4.2 and Ramsar criterion 5 cover the waterbird assemblage which includes, but are not limited to, the following species: **European white fronted goose** *Anser albifrons albifrons*, **mute swan** *Cygnus olor*, wigeon *Anas Penelope*, **gadwall** *Anas strepera*, pochard *Aythya ferina*, **little grebe** *Tachybaptus ruficollis*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, **coot** *Fulica atra*, **lapwing** *Vanellus vanellus*, sanderling *Calidris alba*, whimbrel *Numenius phaeopus*, common sandpiper *Actitis hypoleucos*. Those species in bold have a habitat preference that could be impacted by the drought option i.e. use of lowland flooded marsh or slow moving water. However, the whole assemblage will be considered as this will include common species not listed in the citations. LSEs are therefore anticipated and therefore further assessment is required. <u>Estuarine impacts:</u> Within the estuarine Reach 5, there is the potential for a decrease in freshwater inputs, although the lower section of this reach is most likely to be influenced by marine and tidal processes rather than the freshwater flow. The hydrology assessment has identified major impacts to this reach during the spring and minor impacts during the summer if the drought order were to be implemented. It is understood that during the summer and dry springs that freshwater influx from the River Rother is stopped from entering the estuary at Scots Float (small volumes will still enter estuary), instead the flow is diverted to Romney Marsh for irrigation purposes[11]. Therefore, no LSEs are anticipated on the SPA and Ramsar features associated with the transitional water due to implementation of the drought management option with the exception of common tern. A reduction in the intermittent freshwater low flows passing through Scots Float into the upper estuary could affect the distribution and abundance of fish species required during the breeding season. Therefore, further assessment is required for this species.	

[11] Yates, B. 2012. Rye Harbour Nature Reserve Management Plan 2012-2021. Prepared for the management committee of Rye Harbour Nature Reserve.

Designated site name:	**Medway Estuary and Marshes**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** During the breeding season; Avocet *Recurvirostra avosetta*, 28 pairs representing at least 4.7% of the breeding population in GB, Little Tern *Sterna albifrons*, 28 pairs representing at least 1.2% of the breeding population in GB. Over winter; Avocet *Recurvirostra avosetta*, 314 individuals representing at least 24.7% of the wintering population in GB. **Article 4.2:** On passage; Ringed Plover *Charadrius hiaticula*, 1,337 individuals representing at least 2.7% of the Europe/Northern Africa - wintering population. Over winter; Black-tailed Godwit *Limosa limosa islandica*, 957 individuals representing at least 1.4% of the wintering Iceland - breeding population, Dark-bellied Brent Goose *Branta bernicla bernicla*, 3,205 individuals representing at least 1.1% of the wintering Western Siberia/Western Europe population, Dunlin *Calidris alpina alpina*, 25,936 individuals representing at least 1.9% of the wintering Northern Siberia/Europe/Western Africa population , Grey Plover *Pluvialis squatarola*, 3,406 individuals representing at least 2.3% of the wintering Eastern Atlantic - wintering population, Pintail *Anas acuta,* 697 individuals representing at least 1.2% of the wintering Northwestern Europe population, Redshank *Tringa totanus*, 3,690 individuals representing at least 2.5% of the wintering Eastern Atlantic - wintering population, Ringed Plover *Charadrius hiaticula*, 768 individuals representing at least 1.5% of the wintering Europe/Northern Africa - wintering population, Shelduck *Tadorna tadorna*, 4,465 individuals representing at least 1.5% of the wintering Northwestern Europe population. **Assemblage qualification: A wetland of international importance.** Over winter, the area regularly supports 65,274 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Little Grebe *Tachybaptus ruficollis*, Dark-bellied Brent Goose *Branta bernicla bernicla*, Shelduck *Tadorna tadorna*, Pintail *Anas acuta*, Ringed Plover *Charadrius hiaticula*, Grey Plover *Pluvialis squatarola*, Dunlin *Calidris alpina alpina*, Avocet *Recurvirostra avosetta*, Redshank *Tringa totanus*, Curlew *Numenius arquata*, Great Crested Grebe *Podiceps cristatus*, Cormorant *Phalacrocorax carbo*, Wigeon *Anas penelope*, Teal *Anas crecca*, Oystercatcher *Haematopus ostralegus*, Lapwing *Vanellus vanellus*, Black-tailed Godwit *Limosa limosa islandica*, Whimbrel *Numenius phaeopus*.	**Ramsar criterion 2:** The site supports a number of species of rare plants and animals. The site holds several nationally scarce plants, including sea barley *Hordeum marinum*, curved hard-grass *Parapholis incurva*, annual beard-grass *Polypogon monspeliensis*, Borrer's saltmarsh-grass *Puccinellia fasciculata*, slender hare`s-ear *Bupleurum tenuissimum*, sea clover *Trifolium squamosum*, saltmarsh goose-foot *Chenopodium chenopodioides*, golden samphire *Inula crithmoides*, perennial glasswort *Sarcocornia perenni*s and one-flowered glasswort *Salicornia pusilla*. A total of at least twelve BRDB species of wetland invertebrates have been recorded on the site. A significant number of non-wetland BRDB. **Ramsar criterion 5:** Assemblages of international importance: Species with peak counts in winter: 47637 waterfowl. **Ramsar criterion 6**: Species with peak counts in spring/autumn: Grey plover, *Pluvialis squatarola*, E Atlantic/W Africa –wintering 3103 individuals, representing an average of 1.2% of the population, Common redshank, *Tringa totanus totanus*, 3709 individuals, representing an average of 1.4% of the population. Species with peak counts in winter: Dark-bellied brent goose, *Branta bernicla bernicla*, 2575 individuals, representing an average of 1.1% of the population, Common shelduck, *Tadorna tadorna*, NW Europe 2627 individuals, representing an average of 3.3% of the GB population, Northern pintail , *Anas acuta*, NW Europe 1118 individuals, representing an average of 1.8% of the population, Ringed plover , *Charadrius hiaticula,* Europe/Northwest Africa 540 individuals, representing an average of 1.6% of the GB population Red knot , *Calidris canutus islandica*, W & Southern Africa (wintering) 3021 individuals, representing an average of 1% of the GB population, Dunlin , *Calidris alpina alpina*, W Siberia/W Europe 8263 individuals, representing an average of 1.4% of the GB population.	Water Dependency: Yes
Current conservation status (Article 12 – sufficiency of SPA suite):	• Avocet: Population numbers: Insufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient • Little tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Ringed plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Black-tailed godwit: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Dark bellied brent geese: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: insufficient • Dunlin: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Grey plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Pintail: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Redshank: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Shelduck: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Little grebe: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Curlew: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Great crested grebe: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Cormorant: Population numbers: Insufficient, Range coverage: Insufficient – south-western Britain, East Anglia and SW Scotland, Ecological sufficiency: Sufficient • Wigeon: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Teal: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Oystercatcher: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient (although needs are poorly understood) • Lapwing: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Whimbrel: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Knot: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient		

Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site. Supplementary Advice to the conservation objectives is not available, however reference has been made to the Regulation 33 advice available for the European Marine Site[12].	
SSSI condition assessment:	Medway Estuary and Marshes SSSI: 99.28% unfavourable – recovering, 0.24% unfavourable – no change, 0.47% destroyed. The unfavourable-no change assessment was ascertained because of under grazing and inappropriate ditch management and an area of mudflats was destroyed due to development of a car part at Sheerness Docks.	
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Coastal squeeze - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - implement the South East Habitat Creation Programme. 2. Public access/disturbance - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - investigate sources of disturbance within the SPAs to inform management. **3. Invasive species** -Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Establish the baseline of Carpet sea squirt and Pacific Oyster distribution. **4. Changes in species distributions** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigation to identify cause of the decline in SPA birds 5. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigate fishing activity, and mechanisms for regulating it. **6. Invasive species** - Breeding bird assemblage, Waterbird assemblage - investigate the impact of freshwater invasives on SPA birds. **7. Invasive species** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank - Investigate the impact of Spartina anglica on native saltmarsh and birds. 8. Vehicles: illicit - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Collate and report incidences of illicit vehicle use. 9. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Introduce appropriate management as required, and ensure compliance with bye-laws. 10. Air Pollution: risk of atmospheric nitrogen deposition - Hen Harrier, Little Tern, Seabird assemblage - control, reduce and ameliorate atmospheric nitrogen impacts.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Faversham sources[13]	The SPA and Ramsar are approximately 10km to the north west of the three groundwater abstraction boreholes and therefore is outside the zone of drawdown. Natural England supplied a GIS layer of Functionally Connected Land (FCL) Impact Risk Zones (IRZ) surrounding the North Kent Marshes (encompassing the Medway Estuary and Marshes SPA) which is sub-divided into two zones; IRZ1 is a core area where there is evidence/high probability of use by SPA bird species, and IRZ2 which buffers the core zone to include additional suitable habitat[14]. This predominantly includes areas around Halstow Marshes, St Mary's Marshes and the Isle of Sheppey. These areas are also outside the groundwater drawdown zone and so are unlikely to be impacted by increased abstraction. No LSEs are anticipated.	No
Weir Wood	The SPA and Ramsar are located downstream from Weir Wood reservoir. The hydrology assessment that has been completed for the removal of compensation flows in summer and winter and the impacts to the flows and levels in the River Medway are deemed as negligible at the confluence of the River Eden with the River Teise at Yalding, which is some distance upstream from the SPA and Ramsar. Therefore, no LSEs are anticipated.	No
River Medway Scheme surface water source	The SPA and Ramsar are located downstream from the River Medway Scheme regulation reservoir. There are four sequential options for River Medway Scheme: 1. Reduction in the MRF to 150Ml/d at Teston (Nov-April) and retaining the release factor as 1:1, this would be implemented in the 2nd dry winter. 2. Reduction in the MRF to 150Ml/d at Teston (Nov-April) and altering the release factor to 1:0, this would be implemented in the 3rd dry winter. 3. Reduction in the MRF to 275Ml/d at Teston (May to Aug) and altering the release factor to 1:0, this would be implemented in the summer following the 3rd dry winter. 4. Remove the MRF – Springfield abstraction allowed without any reservoir regulation releases, this would be implemented the following autumn. The hydrology assessment has assessed the impacts to flows and levels within the River Medway transitional water moderate for all options (33% reduction in Q_{95} influx into the Medway Estuary under Option 1, 33% reduction in Q_{95} influx into the Medway Estuary under Option 2, 21% in Q_{95} influx into the Medway Estuary under Option 3, and 27% reduction in Q_{95} influx into the Medway Estuary under Option 4). This represents a significant reduction in freshwater inflow to the Medway Estuary which will be	No

[12] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012031&SiteNameDisplay=Medway+Estuary+and+Marshes+SPA

[13] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.

[14] Issued by M. Knight and S. Middlehurst via Huddle (December 2016). Note the FCL IRZs were prepared to consider the wider area requirements for Bewick's swan, white-fronted goose, golden plover and lapwing. However, consideration of these zones by all SPA species has been completed.

	most pronounced in the upper estuary, upstream of Hoo Ness, as the estuary width narrows considerably at this point, with the waterbody likely to become more fluvially dominated. Given the duration of the proposed options, the salinity regime and the mixing characteristics of the estuary may be slightly and temporarily altered in light of reduced freshwater influx. Specifically, an upstream migration of the saline intrusion distance, and therefore the turbidity maximum, could result alongside an increase in the flushing time of the estuary - which may have implications for water quality (specifically nutrient inputs during summer months). Changes to sediment dynamics and water quality during the six months of drought management option implementation could result in short-term accumulations of finer sediments in the upper reaches of the estuary, and an increased risk of algal blooms, resulting in temporary changes to the dominant macroinvertebrates and phytoplankton communities. A reduction to the wetted width of the main channel at low water could also occur in the extreme upstream reaches of the estuary. The western extent of the SPA and Ramsar starts at approximately Hoo Ness and extends eastwards to the Thames Estuary. The predominant supporting habitats within this area (from NERC priority habitat mapping) are mudflats, with some areas of coastal saltmarsh. However, the majority of the latter is located in the lower reaches of the estuary. Natural England supplied a GIS layer of Functionally Connected Land (FCL) Impact Risk Zones (IRZ) surrounding the North Kent Marshes (encompassing the Medway Estuary and Marshes SPA) which is sub-divided into two zones; IRZ1 is a core area where there is evidence/high probability of use by SPA bird species, and IRZ2 which buffers the core zone to include additional suitable habitat[15]. This predominantly includes areas around Halstow Marshes, St Mary's Marshes and the Isle of Sheppey. These areas will not be directly affected by reduced freshwater inputs to the River Medway. It is acknowledged that the drought management option could change the sediment budget, sediment characteristics and biotope assemblage, however these impacts will be predominantly in the upper reach of the estuary between Allington and Hoo Ness and are likely to be less significant downstream of Hoo Ness as the tidal processes become more dominant. A number of these characteristics will also have been altered by the baseline natural drought conditions. Therefore, LSEs to the SPA and Ramsar features are not anticipated.	

[15] Issued by M. Knight and S. Middlehurst via Huddle (December 2016). Note the FCL IRZs were prepared to consider the wider area requirements for Bewick's swan, white-fronted goose, golden plover and lapwing. However, consideration of these zones by all SPA species has been completed.

Designated site name:	**Solent and Southampton Water**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1**: During the breeding season**;** Common Tern *Sterna hirundo*, 267 pairs representing at least 2.2% of the breeding population in Great Britain; Little Tern *Sterna albifrons*, 49 pairs representing at least 2.0% of the breeding population in Great Britain; Mediterranean Gull *Larus melanocephalus*, 2 pairs representing at least 20.0% of the breeding population in Great Britain; Roseate Tern *Sterna dougallii*, 2 pairs representing at least 3.3% of the breeding population in Great Britain; Sandwich Tern *Sterna sandvicensis*, 231 pairs representing at least 1.7% of the breeding population in Great Britain. **Article 4.2:** Over winter; Black-tailed Godwit *Limosa limosa islandica*, 1,125 individuals representing at least 1.6% of the wintering Iceland - breeding population; Dark-bellied Brent Goose *Branta bernicla bernicla*, 7,506 individuals representing at least 2.5% of the wintering Western Siberia/Western Europe population; Ringed Plover *Charadrius hiaticula*, 552 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population; Teal *Anas crecca*, 4,400 individuals representing at least 1.1% of the wintering Northwestern Europe population. **Assemblage qualification: A wetland of international importance.** Over winter, the area regularly supports 53,948 individual waterfowl including: Gadwall *Anas strepera*, Teal *Anas crecca*, Ringed Plover *Charadrius hiaticula*, Black-tailed Godwit *Limosa limosa islandica*, Little Grebe *Tachybaptus ruficollis*, Great Crested Grebe *Podiceps cristatus*, Cormorant *Phalacrocorax carbo*, Dark-bellied Brent Goose *Branta bernicla bernicla*, Wigeon *Anas penelope*, Redshank *Tringa totanus*, Pintail *Anas acuta*, Shoveler *Anas clypeata*, Red-breasted Merganser *Mergus serrator*, Grey Plover *Pluvialis squatarola*, Lapwing *Vanellus vanellus*, Dunlin *Calidris alpina alpina*, Curlew *Numenius arquata*, Shelduck *Tadorna tadorna*.	**Ramsar criterion 1:** The site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs. **Ramsar criterion 2:** Important assemblage of rare plants and invertebrates. At least 33 BRDB invertebrates and at least eight BRDB Book plants are represented on site. **Ramsar criterion 5:** Assemblages of international importance: Species with peak counts in winter: 51343 waterfowl. **Ramsar criterion 6:** Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: Ringed plover, *Charadrius hiaticula*, Europe/Northwest Africa 397 individuals, representing an average of 1.2% of the GB population Species with peak counts in winter: Dark-bellied brent goose, *Branta bernicla bernicla*, 6456 individuals, representing an average of 3% of the population, Eurasian teal, *Anas crecca*, NW Europe 5514 individuals, representing an average of 1.3% of the population, Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1240 individuals, representing an average of 3.5% of the population	Water Dependent: Yes
Current conservation status (Article 12):	• Mediterranean gull: Population: Insufficient, Range coverage: Insufficient, especially in northern parts of the range. Ecological sufficiency: Sufficient • Sandwich tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Common tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Little tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Roseate tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Dark bellied brent geese: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: insufficient • Teal: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Ringed plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Black-tailed godwit: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient		
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying feature • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary Advice to the conservation objectives is not currently available, however Regulation 33 advice is available[16].		
SSSI condition assessment:			
Site Improvement Plan:	1. Public access/disturbance - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Reduce disturbance through access management, awareness raising and wardening. 2. Coastal squeeze - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Investigate options to create alternative habitat. 3. Fisheries: commercial marine and estuarine - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Introduce appropriate management measures where required and ensure compliance.		

[16] Solent European Marine Site comprising: Solent Maritime candidate Special Area of Conservation, Solent and Southampton Water Special Protection Area & Ramsar Site, Chichester and Langstone Harbours Special Protection Area & Ramsar Site, Portsmouth Harbour Special Protection Area & Ramsar Site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Accessed at http://publications.naturalengland.org.uk/publication/3194402.

	4. **Water pollution** - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Implement actions in the Diffuse Water Pollution Plan and investigate further pollution. 5. **Changes in species distribution** - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Investigate the causes of change. 6. Climate change - Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern - Investigate the effects of climate change. 7. **Change to site conditions** - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Investigate the reasons for change. 8. **Invasive species** - Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern - Implement the management options to control invasive non-native species (INNS). 9. Direct land take from development – N/A. 10. Biological resource use - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Appropriate egg collection licensing. 11. **Change in land management** - Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Ensure appropriate ditch management, and assess the effects of tidal sluice operation. 12. Inappropriate pest control - Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Increase control of foxes. 13. Air Pollution: impact of atmospheric nitrogen deposition - Dark-bellied Brent Goose, Wigeon, Pintail, Black-tailed Godwit, Curlew, Common greenshank, Sandwich Tern, Roseate Tern, Common Tern, Little Tern - Reduce the impacts of air pollution. 14. Hydrological changes – N/A 15. Direct impact from 3rd party - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Assess the activities and their effects. 16. Extraction-non-living resources – N/A. 17. Other (change boundary of SAC and SPA) - Little Egret, Dark-bellied Brent Goose, Common shelduck, Wigeon, Eurasian teal, Pintail, Shoveler, Red-breasted Merganser, Ringed Plover, Grey Plover, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Common redshank, Turnstone, Mediterranean Gull, Sandwich Tern, Roseate Tern, Common Tern, Little Tern, Waterbird assemblage - Consider/explore boundary change to amend the SAC / SPA designations, to include habitats outside of the existing boundaries.
Potential Effects	

Scheme:	Assessment:	LSEs?
Lukely Brook	**Construction:** A temporary pipeline will need to be laid to discharge the compensation flow. A temporary pipeline will be laid along the river bed with some construction works near Lukely Brook WSW. The construction time is likely to be approximately 1 month. The SPA and Ramsar are considered to be at sufficient distance (~3km) so as not to be impacted by the temporary construction works. Therefore, no LSEs are anticipated. **Operation:** The Lukely Brook, on which the MRF controls would be relaxed to allow prolonged groundwater abstraction, discharges into the River Medina which is part of the SAC (at the estuary). The hydrogeology assessment has concluded that abstraction from the chalk aquifer will lower groundwater levels in the immediate vicinity of the pumping station. It will also reduce the volume of chalk groundwater contributing to the Lukely Brook and groundwater flows to the remainder of the Lukely Brook catchment. However, the assessed flow contribution of the Lukely Brook to the Medina estuary at Q_{95} flows as approximately 11 times lower than the flow contribution to the estuary from the freshwater River Medina. The magnitude of the difference between these two influxes, alongside the proposed compensation flow to the Lukely Brook, would lead to only a minor impact on the freshwater influx to the Medina estuary. This minor impact may result in a slight increase to the flushing time (due to a reduced residual river flow velocity) and an alteration of the mixing characteristics (for which no data are currently available) of the upper estuary, leading to a possible increase in saline intrusion distance and migration of the turbidity maximum. Given the low contribution of flow from Lukely Brook to the Medina Estuary in comparison to the River Medina, the area of groundwater drawdown influence finishing approximately 0.5km upstream of the designated sites, and no impacts having been identified to the SAC features, no impacts are anticipated on the SPA or Ramsar features.	No
Eastern Yar	The Eastern Yar drought management option relaxes the MRF controls on the River Medina to allow greater abstraction and transfer to the River Yar for abstraction at Sandown. The River Medina forms part of the SAC (downstream of Newport) and the hydrological assessment has identified major impacts due to the drought management option; a 41% reduction in the Q95 flow from the preceding reach to the estuarine waters during the summer, and a 48% reduction in Q95 flow of the preceding reach to the estuarine waters during the winter. The impacts of this to each of the qualifying features is considered in further detail below: **SPA:** Article 4.1 species (breeding): *Nesting* The Regulation 33 information states that little, sandwich and common tern all nest on coastal shingle and sand habitat. Roseate terns nest on shingle islands above or below vegetation, whilst Mediterranean gulls nest in short and medium swards of vegetation. As no impacts to these types of habitats have been identified (see Solent Maritime SAC), it is concluded that the availability of habitats for nesting will not be impacted. Therefore, no LSEs are anticipated. *Feeding*	Yes *Stage 2 Appropriate Assessment required*

	As discussed in the Solent Maritime SAC assessment, it is the mudflats and sandflats that could be subject to change as a result of the drought management option. The Environment Agency's Review of Consents for the SPA notes that none of the tern species are highly reliant on this habitat for feeding. However, the Regulation 33 information notes that Mediterranean gulls feed on intertidal sediments, although they do not use just one habitat type for feeding (will also feed in shallow coastal waters). During the breeding season, they increase their dependence on freshwater habitats and therefore could be impacted by the drought management option. Therefore, assuming a precautionary approach, LSEs could arise from implementation of the drought management option and further assessment is required. Article 4.2 species (overwintering): *Roosting* The Regulation 33 information states that the following bird species are reliant on saltmarsh habitat for roosting grounds; dark-bellied brent goose and teal. As the assessment of this habitat type under the Solent Maritime SAC concluded negligible impacts, it is considered unlikely that there will be any change in habitat availability for the overwintering species. Ringed plover predominantly use shingle and stony shores, whilst black tailed godwit favour wetland/marshy grassland. It is considered unlikely that there will be any change in the availability of these habitats as a result of the drought management option, therefore no LSEs are anticipated. *Feeding* The mudflats and sandflats provide important feeding grounds for dark-bellied brent goose (also feed on saltmarsh), black-tailed godwit and ringed plover, and therefore could be impacted by the drought management option. As teal predominantly feed on the saltmarsh habitat, changes to the availability of prey are considered unlikely. Therefore, assuming a precautionary approach, LSEs could arise to populations of dark-bellied brent goose, black-tailed godwit and ringed plover, from the implementation of the drought management option and further assessment is required. Article 4.2 Assemblage qualification (overwinter) The impacts for black-tailed godwit, ringed plover, dark-bellied brent goose and teal are discussed above. Of the species making up the bird assemblage, the Environment Agency Review of Consents information suggests that the following species are sensitive to freshwater inputs; redshank, shelduck, wigeon, pintail and grey plover. *Roosting* The mudflat habitat provides important roosting areas, although the Medina Estuary is considered to be of minor importance; the main locations utilised by the bird species are Chichester and Langstone Harbours. Shingle habitats in these locations are also utilised. It is considered unlikely that the drought management option will affect the availability of overwinter roosting sites given the predominant use of other habitat types or other areas within the SPA. No LSEs are anticipated. *Feeding* The following species predominantly feed on habitats other than mudflats (e.g. saltmarsh, shallow coastal waters) and should therefore not be impacted by the drought management option; curlew, red-breasted merganser, gadwall, grebe species, cormorant, and shoveler. Those species which feed on mudflats, and therefore could experience a change in prey abundance or composition are; shelduck, redshank (also feeds on saltmarsh), grey plover, wigeon (also feeds on saltmarsh), pintail, and dunlin. Assuming a precautionary approach, LSEs could arise from implementation of the drought management option, therefore further assessment is required. **Ramsar:** Criterion 1 The impact on the various habitats associated with the Ramsar site has been discussed in detail as part of the Solent Maritime SAC assessment. The only habitat that will potentially be impacted by the reduction in freshwater flow will be the mudflat/sandflat habitat, and therefore the overall estuaries feature. However, the level of impact is not considered to give rise to LSEs. Criterion 2 Of the eight BRDB plants cited (*Eleocharis parvula*, *Geranium purpureum forsteri, Lotus angustissimus*, *Ludwigia palustris*, *Orobanche purpurea, Lamprothamnium papulosum*, *Spartina maritima Zostera marina*), all are found in habitats either not considered to be sensitive to changes in freshwater input or have been assessed under the Solent Maritime SAC as not likely to be impacted by the drought management option. Therefore, no LSEs are anticipated. Of the 33 BRDB invertebrates cited (*Allomelita pellucida, Gammarus insensibilis Nematostella vectensis, Arctosa fulvolineata, Aulonia albimana, Anisodactylus poeciloides, Anthonomus rufus, Baris analis, Berosus spinosus, Cantharis fusca, Drypta dentata, Leptura fulva, Meligethes bidentatus, Paracymus aeneus, Staphylinus caesareus, Aphrosylus mitis, Atylotus latistriatus, Dorycera graminum, Haematopoda grandis, Hippobosca equina, Linnaemya comta, Stratiomys longicornis, Syntormon mikii, Tetanocera freyi, Villa circumdata, Trachysphaera lobata, Paludinella littorina, Truncatellina cylindrica, Andrena alfkenella, Acleris lorquiniana, Elachista littoricola, Melissoblaptes zelleri, Platytes alpinella, Psamathrocrita argentella, Armandia cirrhosa*), only one species is associated with mudflats and sandflats, with the remainder being associated with habitats unlikely to be impacted by the drought management option (coastal waters, saltmarsh, saline pools). The species associated with mudflats and sandflats is the lagoon sandworm (*Armandia cirrhosa*) however this has only been recorded in three locations in Dorset and Hampshire, and not in the Medina Estuary, no LSEs are anticipated. Criterion 6 The majority of wildfowl and wader assemblage has been assessed as part of the Solent and Southampton Water SPA as above. A number of additional species are listed in the Ramsar citation; black headed gull (*Larus ridibundus*), little egret (*Egretta garzetta*), spotted redshank (*Tringa erythropus*), common greenshank (*Tringa nebularia*), Slavonian grebe (*Podiceps auritus*), black necked grebe (*Podiceps nigricollis nigricollis*) and water rail (*Rallus aquaticus*). No impacts to the habitats available for nesting or overwintering are considered likely, however changes in prey abundance and composition on the mudflats could impact little egret and water rail. Therefore, for the majority of these species no LSEs are anticipated, but assuming a precautionary approach LSEs may occur to populations of little egret and water rail and therefore further assessment is required.	
Caul Bourne	The River Caul Bourne, on which the MRF controls would be relaxed to allow prolonged groundwater abstraction, discharges into Shalfeet Creek which is part of the Newtown Estuary, and designated as part of the Solent Maritime SAC.	Yes

	For context, the Environment Agency's Habitats Directive Stage 4 Review of Consents considered Southern Water's Caul Bourne groundwater source and concluded "cannot show no adverse impact". However, the risk to the site was considered to be low, so the Environment Agency took a pragmatic approach by time-limiting the abstraction licences for 12 years, thereby linking them into the Catchment Abstraction Management Strategy (CAMS) cycle and providing time to undertake pertinent technical investigations (Environment Agency, 2008) . The Newtown Estuary is the largest and most complex estuary on the Isle of Wight. It is a bar-built, mesotidal estuary with a tidal range of 2.9 m, and is subject to the unique tidal regime (the double high tide) of the Solent. The estuary is dendritic in form, fed by five waterbodies, four of which (Ningwood Lake, Newton Brook, Clamerkin Brook and Rodge Brook) are minor streams which derive their flow from localised Tertiary gravel aquifers, and surface water from Tertiary clary river beds. As such the freshwater influx from these streams is highly seasonal and known to be much reduced during hydrological summer. The largest freshwater flow input to Newtown Harbour is the Caul Bourne. The hydrogeological assessment of the impacts of the proposed increased abstraction under the drought management option used professional judgement, and information from the Environment Agency's No Deterioration Dataset Assessment and the 2014 Habitats Directive study completed by Atkins on behalf of Southern Water. The assessment concluded that freshwater inflows to Shalfleet Creek from the River Caul Bourne under non-drought order have been estimated to be in the 1.38 Ml/d at Q_{95}. Predicted freshwater flow into Shalfleet Creek under the proposed drought order is estimated to 0.77 Ml/d at Q_{95} flow conditions. Freshwater inflows at Q_{95} flows are therefore estimated to be reduced by approximately 0.61Ml/d or 44% as a result of the drought order, however because of freshet releases from Calbourne Mill, the resulting impact is mitigated somewhat and the significance considered to be moderate. The impacts of this to each of the qualifying features is considered in further detail below: **SPA:** Article 4.1 species (breeding): *Nesting* The Regulation 33 information states that little, sandwich and common tern all nest on coastal shingle and sand habitat, and roseate terns nest on shingle islands above or below vegetation. It is noted that Mediterranean gulls nest on the saltmarsh habitats at Newtown Harbour. Therefore, as LSEs could not be ruled out under the Solent Maritime SAC, it is concluded on a precautionary basis that availability of habitat Mediterranean gull may be impacted, and therefore a Stage 2 Appropriate Assessment is required. *Feeding* As discussed in the Solent Maritime SAC assessment, it is the saltmarshes and mudflats and sandflats that could be subject to change as a result of the drought management option. The Environment Agency's Review of Consents for the SPA notes that none of the tern species are highly reliant on this habitat for feeding. However, the Regulation 33 information notes that Mediterranean gulls feed on intertidal sediments, although they do not use just one habitat type for feeding (will also feed in shallow coastal waters). During the breeding season, they increase their dependence on freshwater habitats and therefore could be impacted by the drought management option. Therefore, assuming a precautionary approach, LSEs could arise from implementation of the drought management option and further assessment is required. Article 4.2 species (overwintering): *Roosting* The Regulation 33 information states that the following bird species are reliant on saltmarsh habitat for roosting grounds; dark-bellied brent goose and teal. As the assessment of this habitat type under the Solent Maritime SAC cannot conclude no LSEs to this habitat further assessment is required. Ringed plover predominantly use shingle and stony shores, whilst black tailed godwit favour wetland/marshy grassland, therefore no LSEs to these species are anticipated. *Feeding* The saltmarsh, mudflats and sandflats provide important feeding grounds for dark-bellied brent goose (also feed on saltmarsh), black-tailed godwit and ringed plover, and teal, and could be impacted by the drought management option. Therefore, assuming a precautionary approach, LSEs could arise to populations of dark-bellied brent goose, black-tailed godwit, ringed plover and teal, from the implementation of the drought management option and further assessment is required. Article 4.2 Assemblage qualification (overwinter) The impacts for black-tailed godwit, ringed plover, dark-bellied brent goose and teal are discussed above. Of the species making up the bird assemblage, the Environment Agency Review of Consents information suggests that the following species are sensitive to freshwater inputs; redshank, shelduck, wigeon, pintail and grey plover. *Roosting* The saltmarsh and mudflat habitats provide important roosting areas, although Newtown Estuary is considered to be of minor importance; the main locations utilised by the bird species are Chichester and Langstone Harbours. Shingle habitats in these locations are also utilised. It is considered unlikely that the drought management option will affect the availability of overwinter roosting sites given the predominant use of other habitat types or other areas within the SPA. No LSEs are anticipated. *Feeding* The following species predominantly feed on habitats other than mudflats (e.g. shallow coastal waters) and should therefore not be impacted by the drought management option; red-breasted merganser, gadwall, grebe species, cormorant, and shoveler. Those species which feed on saltmarsh and mudflats, and therefore could experience a change in prey abundance or composition are; curlew, shelduck, redshank, grey plover, wigeon, pintail, and dunlin. Assuming a precautionary approach, LSEs could arise from implementation of the drought management option, therefore further assessment is required. **Ramsar:** Criterion 1	*Stage 2 Appropriate Assessment required*

	The impact on the various habitats associated with the Ramsar site has been discussed in detail as part of the Solent Maritime SAC assessment. The habitats that will potentially be impacted by the reduction in freshwater flow are the mudflat/sandflats and saltmarsh habitats, and therefore the overall estuaries feature. Given the sensitivity of Shalfleet Creek, LSEs are anticipated and further assessment is required. Criterion 2 Of the eight BRDB plants cited (*Eleocharis parvula*, *Geranium purpureum forsteri, Lotus angustissimus*, *Ludwigia palustris*, *Orobanche purpurea, Lamprothamnium papulosum*, *Spartina maritima Zostera marina*), all are found in habitats either not considered to be sensitive to changes in freshwater input or have been assessed under the Solent Maritime SAC as not likely to be impacted by the drought management option, with the exception of dwarf spike-rush (*Eleocharis parvula*). However, the vegetation survey completed in 2012 did not record this species within Shalfleet Creek, and the Regulation 33 information package for the European Marine Site suggests this is found in the North Solent and Southampton Water. Therefore, no LSEs are anticipated. Of the 33 BRDB invertebrates cited (*Allomelita pellucida, Gammarus insensibilis Nematostella vectensis, Arctosa fulvolineata, Aulonia albimana, Anisodactylus poeciloides, Anthonomus rufus, Baris analis, Berosus spinosus, Cantharis fusca, Drypta dentata, Leptura fulva, Meligethes bidentatus, Paracymus aeneus, Staphylinus caesareus, Aphrosylus mitis, Atylotus latistriatus, Dorycera graminum, Haematopoda grandis, Hippobosca equina, Linnaemya comta, Stratiomys longicornis, Syntormon mikii, Tetanocera freyi, Villa circumdata, Trachysphaera lobata, Paludinella littorina, Truncatellina cylindrica, Andrena alfkenella, Acleris lorquiniana, Elachista littoricola, Melissoblaptes zelleri, Platytes alpinella, Psamathrocrita argentella, Armandia cirrhosa*), six could potentially be impacted by the drought management option because of the associated impacts to the saltmarsh and mudflat habitats: • *Anisodactylus poeciloides* • *Berosus spinosus* • *Paracymus aeneus* • *Atylotus latistriatus* • *Acleris lorguiniana* • *Armandia cirrhosa* The lagoon sandworm (*Armandia cirrhosa*) has only been recorded in three locations in Dorset and Hampshire, and not in Shalfleet Creek, therefore no LSEs are anticipated to this species. An invertebrate survey was completed of Shalfleet Creek in 2012 by Aquilina Environmental Quality for the 2014 Habitats Directive Monitoring Investigation. The survey results suggest a normal estuarine community, characteristic of littoral mud or sandy mud. However, the survey was limited to benthic coring and therefore not all the species listed above would have been recorded by this method, assuming they were present. From the information available through the Environmental Assessment Report process supporting the Drought Plan, and that available in the Regulation 33 information, Review of Consents, and 2014 Habitats Monitoring Investigation, it is not clear whether the remaining species are present or likely to be absent from Shalfleet Creek. Therefore, assuming a precautionary approach, LSEs are anticipated and further assessment is required. Criterion 6 The majority of wildfowl and wader assemblage has been assessed as part of the Solent and Southampton Water SPA as above. A number of additional species are listed in the Ramsar citation; black headed gull (*Larus ridibundus*), little egret (*Egretta garzetta*), spotted redshank (*Tringa erythropus*), common greenshank (*Tringa nebularia*), Slavonian grebe (*Podiceps auritus*), black necked grebe (*Podiceps nigricollis nigricollis*) and water rail (*Rallus aquaticus*). No impacts to the habitats available for nesting or overwintering are considered likely, however changes in prey abundance and composition on the saltmarshes and mudflats could impact spotted redshank, common greenshank, little egret and water rail. Therefore, for the majority of these species no LSEs are anticipated, but assuming a precautionary approach LSEs may occur to populations of spotted redshank, common greenshank, little egret and water rail and therefore further assessment is required.	
Lower Itchen Sources	The proposed drought order will lead to a reduction in river flow to the Itchen estuary due to the reduction of the Hands-off Flow conditions associated with the Lower Itchen sources abstraction licences. However, given the relative magnitude of the flow change compared to the volume of water and the tidal processes of Southampton Water, no likely significant effects are anticipated to the SPA or Ramsar site. Therefore no LSEs are anticipated on any of the qualifying features, as summarised in further detail below: **SPA:** The following bird species are unlikely be impacted by the drought order as they are not reliant on the mudflats for nesting/roosting or feeding; tern species, teal, gadwall, grebe species, cormorant, shoveler, red-breasted merganser. As the area of mudflats is small, and there are larger and more prominent areas within the Solent used by species associated with mudflats (as discussed in the Regulation 33 information), no impacts to nesting/roosting or feeding are anticipated on Mediterranean gull, black tailed godwit, dark bellied brent goose, ringed plover, shelduck, redshank grey plover, wigeon, pintail and dunlin. **Ramsar:** Criterion 1 As mentioned, the predominant habitat of the Ramsar found within the River Itchen is mudflat/sandflats. Therefore, no LSEs are anticipated on the following qualifying features; saline lagoons, saltmarshes, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs. The integrity of the mudflat/sandflat habitat is not considered to be impacted given the location of the habitat within the tidal section of the River Itchen and low importance of freshwater input in maintaining the habitat itself. Criterion 2 Only one of the species listed utilises the mudflat and sandflat habitat; lagoon sandworm (*Armandia cirrhosa*). However, as the species has only been recorded in three locations across Dorset and Hampshire, and not in the River Itchen, no impacts are anticipated.	No

	Criterion 5 and 6 Given the known nesting and roosting habitat preferences of the species, i.e. not restricted to mudflats and sandflats, no impacts are considered likely. For those species which feed on mudflats and sandflats; black tailed godwit, dark-bellied brent goose, ringed plover, shelduck, redshank, grey plover, wigeon, pintail, dunlin, little egret and water rail, potential impacts to prey abundance and composition resulting from the drought management option is unlikely to impact the bird species given the small area of mudflat habitat found on the River Itchen, and wider expanses in the unaffected Southampton Water that could be used by the bird species. Therefore, no LSEs are anticipated.	
Test Surface Water Drought Permit and Drought Order	The River Test flows into Southampton Water and therefore the SPA and Ramsar Site. **SPA:** Although there is a minor theoretical pathway for impact on bird species which form qualifying features of the designated site, the operation of the drought order is unlikely to impact breeding, feeding and overwintering success of such species significantly more than the prevailing drought conditions. The breeding, feeding and overwintering resource is already likely to be impacted by the drought conditions, therefore the distance of the abstraction from the SPA and the dynamic nature of the habitats through tidal inundation, in addition to other freshwater inputs mitigating flows, indicates that the abstraction is unlikely to have a significant impact on the favourable conservation status of the qualifying features of this SPA during operation of the proposed option. At the end of a drought, when significant rainfall occurs, the recovery of floodplain wetness tends to be rapid, therefore no long-term negative impacts upon habitats which support qualifying features of the site are likely. Taking these considerations into account, the incremental impact of the drought order beyond that of the prevailing drought is not anticipated to result in LSE. **Ramsar:** There is a minor theoretical pathway for the impact of low river flows, the bird species and assemblages of overwintering birds, floral species and wetland habitats which form qualifying features of the designated site under Criterion 1-6. However, it is considered that such qualifying features would have been exposed to severe drought conditions prior to implementation of the drought order. Operation of the scheme during prevailing drought conditions is therefore unlikely to impact upon the favourable conservation status of qualifying features of the designated site significantly more than the prevailing drought conditions. The large buffering effect of marine and tidal water volumes are likely to mask any impacts of the freshwater flows from the Test. Taking these considerations into account, the incremental impact of the drought order beyond that of the prevailing drought is not anticipated to result in LSE.	No

Designated site name:	**Stodmarsh**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Over winter; Bittern *Botaurus stellaris*, 2 individuals representing at least 2.0% of the wintering population in GB, Hen Harrier *Circus cyaneus*, 9 individuals representing at least 1.2% of the wintering population in GB. **Article 4.2:** 1% GB breeding population of gadwall *Anas strepera*, and 7% of GB breeding population of bearded tit *Panunus biarnicus*. Nationally important wintering populations of the following migratory species; gadwall *Anas strepera* 1.2% of GB wintering population, shoveler *Anas clypeata* 1.8% of GB wintering population and bearded tit *Panunus biarnicus* 1.5-2.5% of GB wintering population. **Assemblage qualification: A wetland of international importance.** Breeding; great crested grebe *Podiceps cristatus*, lapwing *Vanellus vanellus*, redshank *Tringa tetanus*, snipe *Gallinago gallinago*, grasshopper warbler *Locustella luscinioides*, sedge warbler *Acrocephalus schoenobaenus*, reed warbler *Acrocephalus scirpaceus*. Over winter; white fronted goose *Anser ablifrons*, wigeon *Anas penelope*, mallard *Anas platyrhynchos*, pochard *Aythya ferina*, tufted duck *Anas fuligula*, water rail *Rallus aquaticus*, lapwing *Vanellus vanellus*, snipe *Gallinago gallinago*.	**Ramsar criterion 2:** Six BRDB wetland invertebrates. Two nationally rare plants, and five nationally scarce species. A diverse assemblage of rare wetland birds. Species regularly supported during the breeding season: Gadwall, *Anas strepera strepera*, NW Europe 6 pairs, representing an average of 1% of the GB population. Species with peak counts in spring/autumn: Gadwall, *Anas strepera* strepera, NW Europe 267 individuals, representing an average of 1.5% of the GB population. Species with peak counts in winter: Great bittern, *Botaurus stellaris stellaris*, W Europe, NW Africa 2 individuals, representing an average of 2% of the GB population, Northern shoveler, *Anas clypeata*, NW & C Europe 274 individuals, representing an average of 1.8% of the GB population, Hen harrier, *Circus cyaneus*, Europe 9 individuals, representing an average of 1.2% of the GB population.	Water Dependency: Yes
Current conservation status (Article 12 – sufficiency of SPA suite):	• Bittern: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Hen harrier: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Gadwall: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Bearded tit: Not reported. • Shoveler: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Great crested grebe: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Lapwing: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Redshank: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Snipe: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Grasshopper warbler: not reported. • Sedge warbler: not reported. • Reed warbler: not reported. • White fronted goose: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Wigeon: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Mallard: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Pochard: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Tufted duck: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Water rail: not reported.		
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary advice to the conservation objectives is currently unavailable.		
SSSI Condition assessment:	Stodmarsh SSSI: 68.12% favourable, 21.49% unfavourable recovering, 10.40% unfavourable no change. Unfavourable recovering due to requirement for active scrub management and restoration of reedbeds. Unit 10 unfavourable no change due to high nutrient levels in the main NNR lake. More research is required to understand hydrological regime and water quality of input sources (Great Stour and Lampen Stream).		
Site Improvement Plan:	1. Water pollution – bittern, gadwall - nutrient investigation and sluice and river wall repairs. 2. Invasive species – bittern, gadwall, shoveler, hen harrier, breeding bird assemblage, waterbird assemblage - monitor and develop a control programme for Crassula. 3. Inappropriate scrub control - bittern, gadwall, shoveler, hen harrier, breeding bird assemblage, waterbird assemblage - one-hit removal of scrub from reedbed. 4. Air Pollution: impact of atmospheric nitrogen deposition - bittern, gadwall, shoveler, hen harrier, breeding bird assemblage, waterbird assemblage - control, reduce and ameliorate atmospheric nitrogen impacts.		
Potential Effects			
Scheme:	Assessment:		LSEs?

Sandwich[17]	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The site is at sufficient distance so as not to give rise to construction related LSEs. **Operation:** The SPA and Ramsar is located approximately 8.3km to the north west of the abstraction site. The SPA and Ramsar is in a separate hydrological catchment to the abstraction, being separated by two rivers; Little Stour and WIngham River and is outside the groundwater drawdown zone. Natural England supplied a GIS layer of Functionally Connected Land (FCL) Impact Risk Zones (IRZ) surrounding the Thanet Coast, Sandwich Bay and Stodmarsh SPA which is sub-divided into two zones; IRZ1 is a core area where there is evidence/high probability of use by SPA bird species, and IRZ2 which buffers the core zone to include additional suitable habitat[18]. The groundwater drawdown zone of influence encompasses the Ash Levels ditch network complex that fall outside the SPA itself, but within the functional land area. The hydrogeology assessment has concluded that the Ash Level drainage ditch complex is hydraulically disconnected from the chalk by low permeability superficial deposits, therefore no impacts have been identified. Therefore, no LSEs are anticipated.	No

[17] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.

[18] Issued by M. Knight and S. Middlehurst via Huddle (December 2016). Note the FCL IRZs were prepared to consider the wider area requirements for Bewick's swan, white-fronted goose, golden plover and lapwing. However, consideration of these zones by all SPA species has been completed.

Designated site name:	**Thames Estuary and Marshes**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Over winter; Avocet *Recurvirostra avosetta*, 276 individuals representing at least 21.7% of the wintering population in GB, hen harrier *Circus cyaneus*, 7 individuals representing at least 0.9% of the wintering population in GB. On passage; Ringed Plover *Charadrius hiaticula*, 559 individuals representing at least 1.1% of the Europe/Northern Africa - wintering population. Over winter; Ringed Plover *Charadrius hiaticula*, 541 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population. **Assemblage qualification: A wetland of international importance.** The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Over winter, the area regularly supports 33,433 individual waterfowl including: Redshank *Tringa totanus*, Black-tailed Godwit *Limosa limosa islandica*, Dunlin *Calidris alpina alpina*, Lapwing *Vanellus vanellus*, Grey Plover *Pluvialis squatarola*, Shoveler *Anas clypeata*, Pintail *Anas acuta*, Gadwall *Anas strepera*, Shelduck *Tadorna tadorna*, White-fronted Goose *Anser albifrons albifrons*, Little Grebe *Tachybaptus ruficollis*, Ringed Plover *Charadrius hiaticula*, Avocet *Recurvirostra avosetta*, Whimbrel *Numenius phaeopus*.	**Ramsar criterion 2:** The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates. **Ramsar criterion 5:** Assemblages of international importance: Species with peak counts in winter: 45118 waterfowl. **Ramsar criterion 6** – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: Ringed plover, *Charadrius hiaticula,* Europe/Northwest Africa 595 individuals, representing an average of 1.8% of the GB population, Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1640 individuals, representing an average of 4.6% of the population. Species with peak counts in winter: Grey plover, *Pluvialis squatarola*, E Atlantic/W Africa –wintering 1643 individuals, representing an average of 3.1% of the GB population, Red knot, *Calidris canutus islandica*, W & Southern Africa (wintering) 7279 individuals, representing an average of 1.6% of the population, Dunlin, *Calidris alpina alpina*, W Siberia/W Europe 15171 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3), Common redshank, *Tringa totanus totanus*, 1178 individuals, representing an average of 1% of the GB population.	Water Dependency: Yes
Current conservation status (Article 12 – sufficiency of SPA suite):	• Avocet: Population numbers: Insufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient • Hen harrier: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Ringed plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Redshank: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Lapwing: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Black-tailed godwit: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Grey plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Dunlin: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Shoveler: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Pintail: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Gadwall: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Shelduck: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • White fronted goose: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Little grebe: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Whimbrel: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Knot: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient		
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary advice to the conservation objectives is available as part of the European Marine Site supplementary advice[19].		
SSSI condition assessment:	Mucking Flats and Marshes SSSI: 94.13% favourable, 5.87% unfavourable-recovering. Unfavourable due to lack of deeper winter wet areas for brackish wetland. South Thames Estuary and Marshes: 95.28% favourable, 2.35% unfavourable recovering, 0.59% no change, 1.79% unfavourable declining.		

[19] English Nature (2001) Thames Estuary European marine site: English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.

Site Improvement Plan (actions that could be impacted by drought management option in bold):	1 Coastal squeeze - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - implement the South East Habitat Creation Programme. 2. Public access/disturbance - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - investigate sources of disturbance within the SPAs to inform management. **3. Invasive species** -Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Establish the baseline of Carpet sea squirt and Pacific Oyster distribution. **4. Changes in species distributions** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigation to identify cause of the decline in SPA birds 5. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigate fishing activity, and mechanisms for regulating it. **6. Invasive species** - Breeding bird assemblage, Waterbird assemblage - investigate the impact of freshwater invasives on SPA birds. **7. Invasive species** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank - Investigate the impact of Spartina anglica on native saltmarsh and birds. 8. Vehicles: illicit - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Collate and report incidences of illicit vehicle use. 9. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Introduce appropriate management as required, and ensure compliance with bye-laws. 10. Air Pollution: risk of atmospheric nitrogen deposition - Hen Harrier, Little Tern, Seabird assemblage - control, reduce and ameliorate atmospheric nitrogen impacts.	
Potential Effects		
Scheme:	Assessment:	LSEs?
Weir Wood	The Weir Wood drought management option affects the River Medway waterbody, and therefore as the Thames Estuary and Marshes SPA and Ramsar are upstream from the R. Medway estuary, no LSEs are anticipated.	No
River Medway Scheme surface water source	The drought management option affects the River Medway waterbody, and therefore as the Thames Estuary and Marshes SPA and Ramsar are upstream from the R. Medway estuary, no LSEs are anticipated.	No

Designated site name:	**Thanet Coast and Sandwich Bay**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Little tern *Sterna albifrons* 1% of GB breeding population, golden plover *Pluvialis apricaria* 1% of GB wintering population. **Article 4.2:** Over winter; Turnstone *Arenaria interpres*, 940 individuals representing at least 1.3% of the wintering Western Palearctic - wintering population.	**Ramsar criterion 2:** Supports 15 BRDB wetland invertebrates. **Ramsar criterion 6**: Species with peak counts in winter: Ruddy turnstone, *Arenaria interpres interpres*, NE Canada, Greenland/W Europe & NW Africa 1007 individuals, representing an average of 1% of the population.	Water Dependency: Yes
Current conservation status (Article 12 – sufficiency of SPA suite):	• Turnstone: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Little tern: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Golden plover: Population numbers: Sufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient		
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary advice to the conservation objectives is currently unavailable.		
SSSI condition assessment:	Sandwich Bay to Hacklinge marshes SSSI: 50.35% favourable, 46.13% unfavourable recovering, 3.19% unfavourable no change, 0.33% unfavourable declining.		
Site Improvement Plan (actions that could be impacted by drought management option in bold)::	**1. Changes in species distribution** – turnstone, little tern - investigate cause of SPA species decline. **2. Invasive species** – turnstone - continued invasive non-native species control and monitoring. 3. Public access/disturbance - golden plover, turnstone, little tern - Investigation of disturbance to sand dunes, and wider education and awareness raising. 4. Hydrological changes – N/A 5. Air Pollution: impact of atmospheric nitrogen deposition – N/A **6. Water pollution** – turnstone - collate and review existing water quality information. 7. Fisheries: commercial marine and estuarine - golden plover, turnstone, little tern - Kent and Essex IFCA byelaw implementation 8. Fisheries: commercial marine and estuarine – N/A.		
Potential Effects			
Scheme:	Assessment:		LSEs?
Sandwich[20]	**Construction:** A larger pump will be required to allow the drought management option to operate. This will involve lifting out the old pump and replacing with a new pump with greater capacity. No excavation works are required and the works will be completed within ~1 week. The site is considered to be at sufficient distance so as not to give rise to construction related LSEs. **Operation:** Parts of the SPA and Ramsar are located within the groundwater drawdown zone and therefore could be impacted by increased levels of abstraction due to the drought management option being implemented. These are discussed further below. <u>Estuarine area of SPA and Ramsar</u> The hydrology assessment has concluded that there will be negligible impacts on the Stour Estuary based on the percentage reduction to freshwater flow expected in the North South Stream in the Lydden Valley and the River Little Stour at Q_{95} flow conditions. The combined reduction in freshwater influx to the estuary is estimated as 6.5%, and this is precautionary. <u>Wetland Area of SPA</u> Lydden Valley, through which the North and South Stream extends, has areas designated for qualifying features of the SPA. Through the completion of the high level hydrogeological assessment and using information from the Environment Agency's No Deterioration Dataset (NDD) Assessment, the following conclusions on the likely impacts to the North and South Stream have been made. The Environment Agency's NDD dataset has been extrapolated to estimate the predicted impact from the drought management option. This has concluded that for the North and South Stream, implementation of the drought management option would differ very little from the fully licensed abstraction scenario; 1 percentage		No

[20] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.

	point21. However, these impacts may be underestimated. Therefore, on a precautionary basis the hydrological impacts to the North and South Stream in the Lydden Valley have been assessed as being minor, whilst at Eastry there are no impacts to the South Stream but flows in the North Stream could be impacted by reduced baseflow as a result of increased groundwater level drawdown. This could prolong recovery of flows in the stream following cessation of the drought. The assessment has also concluded that the impacts of the groundwater drawdown will be 1.5 to 0.5m drawdown within 1km of the abstraction. Those areas of the SPA which might be impacted are considered to be limited to the areas of improved grassland to the immediate east of the North and South Stream in the Lydden Valley, specifically the confluence at Roaring Gutter. Of the three qualifying species, only European golden plover is understood to forage within the improved grassland habitat which may be impacted by a reduction in freshwater flow to the North and South stream. This species inhabits lowland fields in winter, and feeds primarily on terrestrial invertebrates such as worms and beetles. As the habitat is not directly reliant on flow within the North and South Stream, the reduction of this flow will impact indirectly on this species, through potential changes to the aquatic invertebrate assemblage, resulting in a potential shift in feeding pattern to terrestrial invertebrates in this area. However, as golden plover is highly mobile and only a small area of the SPA likely to experience minor impacts, no LSEs are anticipated. <u>SPA Functional Land</u> Natural England supplied a GIS layer of Functionally Connected Land (FCL) Impact Risk Zones (IRZ) surrounding the Thanet Coast and Sandwich Bay SPA which is sub-divided into two zones; IRZ1 is a core area where there is evidence/high probability of use by SPA bird species, and IRZ2 which buffers the core zone to include additional suitable habitat[22]. The groundwater drawdown zone of influence encompasses the Ash Levels ditch network complex that fall outside the SPA itself, but within the functional land area. The hydrogeology assessment has concluded that the Ash Level drainage ditch complex is hydraulically disconnected from the chalk by low permeability superficial deposits, therefore no impacts have been identified. <u>Wetland Area of Ramsar</u> The North and South Streams (both the Lydden Valley and Eastry reaches) and The Delf are included in the Ramsar designation. These waterbodies extend through Hacklinge and Lydden Valley, with the North-South stream discharging into the River Stour at Broad Salts, also designated as part of the Ramsar site. The site includes a number of wetland habitats (collectively known as the Hacklinge Marshes) which are considered within the radius of influence of the proposed drought order (although not the drawdown on the chalk aquifer itself which has been assessed as within 1km of the abstraction borehole), specifically located in the vicinity of Hacklinge, these include; the Ham Fen and Ham Fen fields, Northbourne Fen and Northbourne Fen fields. Criterion 2 of the Ramsar Designation states that the wetland habitat within the Ramsar Site supports 15 red Data Book species of wetland invertebrate. Of these species, listed above, three species are listed as endangered: *Lixus vilis*, *Stigmella repentiella*, *Bagous nodulosus*. Two species listed as vulnerable: the moth *Deltote bankiana*, the dancefly *Poecilobothrus ducalis*. Ten of these species are listed as rare: *Emblethis verasci*, *Pionosomus varius*, *Nabis brevis*, *Euheptaulacus sus*, *Melanotus punctolineatus*, *Pelosia muscerda*, the only British population of *Eluma purpurescens*, *Ectemnius ruficornis*, *Alysson lunicornis*, *Orthotylus rubidus*. From a review of the habitats maps provided with the Favourable Condition Tables for the underlying SSSI, the main habitat types in the Lydden Marshes area of the Ramsar are neutral and improved grassland, dissected by an extensive ditch network. Downstream of Hacklinge, water is pumped via the Roaring Gutter Dyke into the ditch network. Reduced freshwater flow could result in minor reductions to wetted width and depth in the stream channels, which will temporarily exclude some habitat features from the channel and reduce the habitat available to macroinvertebrate species. This impact will be more pronounced in shallower sections. Furthermore, the geomorphology assessment indicated a high risk of sedimentation. This may result in further temporary loss of favourable habitat features within the channel thus altering invertebrate community structure within the channel. It is not understood how the pumping regime to the Roaring Gutter Dyke may alter during a natural drought, and whether this would have ceased before the drought management option is implemented thereby restricting the impacts of the drought management option to the main channel. However, the impacts to the hydrology have been identified as minor, and given the short-term small-scale change, and context of the natural drought, no LSEs are anticipated on the invertebrate assemblage. The Ramsar is also designated for overwintering ruddy turnstone (as is the SPA). Turnstones feed predominantly in coastal habitats including rocky shores and intertidal mudflats, and roost in areas of sand and shingle[23]. Therefore, no LSEs are anticipated from the implementation of the drought management option.	

[21] For comparison only, water bodies are regarded as non-compliant band 1 with a 25% change from the EFI.
[22] Issued by M. Knight and S. Middlehurst via Huddle (December 2016). Note the FCL IRZs were prepared to consider the wider area requirements for Bewick's swan, white-fronted goose, golden plover and lapwing. However, consideration of these zones by all SPA species has been completed.
[23] English Nature (2000) North East Kent European marine sites comprising: Thanet Coast candidate Special Area of Conservation (cSAC), Thanet Coast and Sandwich Bay Special Protection Area (SPA), Sandwich Bay candidate Special Area of Conservation (cSAC) English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

Designated site name:	**The Swale**		
Designation type: (SAC, SPA, Ramsar):	SPA and Ramsar		
Qualifying features:	**Article 4.1:** Avocet *Recurvirostra avosetta*, 103 pairs representing at least 17.5% of the breeding population in GB, Marsh Harrier *Circus aeruginosus*, 24 pairs representing at least 15.0% of the breeding population in GB, Mediterranean Gull *Larus melanocephalus*, 12 pairs representing at least 120.0% of the breeding population in GB. Avocet *Recurvirostra avosetta*, 89 individuals representing at least 7.0% of the wintering population in GB, Bar-tailed Godwit *Limosa lapponica*, 542 individuals representing at least 1.0% of the wintering population in GB, Golden Plover *Pluvialis apricaria*, 2,862 individuals representing at least 1.1% of the wintering population in GB, Hen Harrier *Circus cyaneus*, 23 individuals representing at least 3.1% of the wintering population in GB. **Article 4.2:** Ringed Plover *Charadrius hiaticula*, 683 individuals representing at least 1.4% of the Europe/ Northern Africa - wintering population, Black-tailed Godwit *Limosa limosa islandica*, 1,755 individuals representing at least 2.5% of the wintering Iceland - breeding population, Grey Plover *Pluvialis squatarola*, 2,021 individuals representing at least 1.3% of the wintering Eastern Atlantic - wintering population, Knot *Calidris canutus*, 5,582 individuals representing at least 1.6% of the wintering Northeastern Canada/Greenland/Iceland/ Northwestern Europe population, Pintail *Anas acuta*, 966 individuals representing at least 1.6% of the wintering Northwestern Europe population, Redshank *Tringa totanus*, 1,640 individuals representing at least 1.1% of the wintering Eastern Atlantic - wintering population, Shoveler *Anas clypeata*, 471 individuals representing at least 1.2% of the wintering Northwestern/Central Europe population. **Assemblage qualification:** Over winter, the area regularly supports 65,390 individual waterfowl including: White-fronted Goose *Anser albifrons albifrons*, Golden Plover *Pluvialis apricaria*, Bar-tailed Godwit *Limosa lapponica*, Pintail *Anas acuta*, Shoveler *Anas clypeata*, Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Black-tailed Godwit *Limosa limosa islandica*, Redshank *Tringa totanus*, Avocet *Recurvirostra avosetta*, Cormorant *Phalacrocorax carbo*, Curlew *Numenius arquata*, Dark-bellied Brent Goose *Branta bernicla bernicla*, Shelduck *Tadorna tadorna*, Wigeon *Anas penelope*, Gadwall *Anas strepera*, Teal *Anas crecca*, Oystercatcher *Haematopus ostralegus*, Lapwing *Vanellus vanellus*, Dunlin *Calidris alpina alpina*, Little Grebe *Tachybaptus ruficollis*.	**Ramsar criterion 2:** The site supports nationally scarce plants and at least seven BRDB invertebrates. **Ramsar criterion 5:** Assemblages of international importance: Species with peak counts in winter: 77501 waterfowl. **Ramsar criterion 6**: – Species with peak counts in spring/autumn: Common redshank , *Tringa totanus totanus*, 1712 individuals, representing an average of 1.4% of the GB population Species with peak counts in winter: Dark-bellied brent goose, *Branta bernicla bernicla*,1633 individuals, representing an average of 1.6% of the GB population, Grey plover, *Pluvialis squatarola*, E Atlantic/W Africa –wintering 2098 individuals, representing an average of 3.9% of the GB population	Water Dependency: Yes
Current conservation status (Article 12 – sufficiency of SPA suite):	• Avocet: Population numbers: Insufficient, Range coverage: Insufficient, especially in northern parts of the range, Ecological sufficiency: Sufficient • Marsh harrier: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Mediterranean gull: Population: Insufficient, Range coverage: Insufficient, especially in northern parts of the range. Ecological sufficiency: Sufficient • Bar-tailed godwit: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Golden plover: Population numbers: Sufficient, Range coverage: Insufficient, Ecological sufficiency**:** Insufficient • Hen harrier: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Ringed plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Black-tailed godwit: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Grey plover: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Knot: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Pintail: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Redshank: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Sufficient • Shoveler: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • White fronted goose: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Cormorant: Population numbers: Insufficient, Range coverage: Insufficient – south-western Britain, East Anglia and SW Scotland, Ecological sufficiency: Sufficient • Curlew: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient • Dark bellied brent geese: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: insufficient • Shelduck: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Wigeon: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Gadwall: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Teal: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient • Oystercatcher: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Sufficient (although needs are poorly understood) • Lapwing: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient		

	• Dunlin: Population numbers: Sufficient, Range coverage: Sufficient, Ecological sufficiency: Insufficient • Little grebe: Population numbers: Insufficient, Range coverage: Insufficient, Ecological sufficiency: Insufficient
Conservation objectives (SPA):	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site. Supplementary advice to the conservation objectives is available as part of the European Marine Site supplementary advice[24].
SSSI condition assessment:	The Swale SSSI: 97.83% favourable, 2.17% unfavourable – no change. Reasons for unfavourable condition include overgrazing, inappropriate ditch management, and inappropriate scrub control.
Site Improvement Plan (actions that could be impacted by drought management option in bold):	1. Coastal squeeze - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - implement the South East Habitat Creation Programme. 2. Public access/disturbance - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - investigate sources of disturbance within the SPAs to inform management. **3. Invasive species** -Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Establish the baseline of Carpet sea squirt and Pacific Oyster distribution. **4. Changes in species distributions** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigation to identify cause of the decline in SPA birds. 5. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Investigate fishing activity, and mechanisms for regulating it. **6. Invasive species** - Breeding bird assemblage, Waterbird assemblage - investigate the impact of freshwater invasives on SPA birds. **7. Invasive species** - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank - Investigate the impact of Spartina anglica on native saltmarsh and birds. 8. Vehicles: illicit - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Collate and report incidences of illicit vehicle use. 9. Fisheries: Commercial marine and estuarine - Dark-bellied Brent Goose, Common shelduck, Pintail, Shoveler, Marsh Harrier, Hen Harrier, Avocet, Ringed Plover, Golden Plover, Grey Plover, Red knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Common redshank, Mediterranean Gull, Little Tern, Breeding bird assemblage, Waterbird assemblage - Introduce appropriate management as required, and ensure compliance with bye-laws. 10. Air Pollution: risk of atmospheric nitrogen deposition - Hen Harrier, Little Tern, Seabird assemblage - control, reduce and ameliorate atmospheric nitrogen impacts.

Potential Effects		
Scheme:	Assessment:	LSEs?
Faversham sources[25]	The hydrogeology assessment has included the southern edge of The Swale within the groundwater zone of influence as there could be impacts on the supporting baseflow and spring flow (Chalk/Thanet formation spring line) to the estuarine creeks. However, The Swale is a strongly tidally influenced main estuary system. The limited freshwater input to the estuary is from the numerous creeks on the mainland southern shore known to be fed by ephemeral springs. Using information from the Environment Agency's No Deterioration Dataset (NDD) Assessment, it can be concluded that there is a general assumption that the chalk aquifer will be disconnected from the overlying surface waterbodies due to lowered groundwater levels from normal abstraction (under normal licence limits) during the summer, prior to any drought management option being implemented. As such, it is understood that the ephemeral streams which feed the major creeks will be disconnected from the aquifer, and therefore concluded that the additional abstraction for the drought management option will not significantly reduce the freshwater influx to Swale Estuary from these waterbodies. Flow recovery could be delayed following cessation of the drought due to the drought management option, thereby prolonging the period of low to negligible flow contribution from these streams to the estuary. However, this may result in very minor changes in the nutrient balance of the upper creeks. Therefore, given the minor hydrogeological impacts identified, and the extent of the designated site and it's predominantly tidal system, LSEs are not anticipated.	No
River Medway Scheme	The reduction in MRFs on the River Medway and changes to the reservoir regulation releases are likely to result in major impacts on the River Medway and moderate impacts to the Medway Estuary in the upper reaches. However, The Swale SPA and Ramsar is part of a separate creek system (Horse Reach) and approximately 4km inland from the main estuary. Therefore, no LSEs are anticipated as changes to flow and levels on the River Medway will not affect this system.	No

[24] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012011&SiteNameDisplay=The+Swale+SPA
[25] We have removed the Sandwich and Faversham drought permits from this table. We have done this because we have recently varied these abstraction licences so that there would no longer be a benefit from these drought permits.