Catchment	Ouse	Option description and potential effects:
Option 1	Interzonal transfer (SBZ-SWZ): Brighton to Worthing	The tenants-bright p 40 and IZT_BAR_BAL_25 schemes are both limited to construction activities in the waterbodies that they impact. These impacts are assumed to be mitigated through appropriate construction techniques and practices. The LEW groundwater scheme could increase abstraction above RA abstraction in the Brighton Chalk Block GWB. The Adur and Ouse ALS states that the Chalk Block does not contribute significantly to river flow and emerges in tidal sections of the two rivers and therefore is unlikely to create any cumulative impacts on the river water bodies. There may be a cumulative impact on the coastal groundwater bodies, which are the Brighton Chalk Block and Worthing Chalk. Depending on the timing of abstraction from the LEW and SWS_SBZ_EF-TFR_REP_ALL_har2 schemes and the frequency of the transfer of rested groundwater to the Brighton WRZ, there could be a cancelling out of impacts which could reduce the impact that the LEW option has on the groundwater water balance. Further investigation is needed to investigated the impact on the groundwater body and confirm the assumptions on surface-water interactions with the Adur and Ouse.
Option 2	Bulk import (SBZ): SEW to Rottingdean (20Ml/d)	
Option 3	Groundwater (SBZ): Lewes Road (3.5Ml/d)	
Option 4	Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d)	

Catchment	Western Streams	Option description and potential effects:
		In the Operational Catchments associated with the Western Streams, the impacts of the following options are only construction activities and are classified as WFD compliant: SWS_SNZ_HI-REU_RE1_ALL_for20 SWS_SNZ_HI-TFR_PWE_ALL_havant -hardha r 50 Therefore there are no downstream cumulative impacts in the Western Streams Catchment
Option 1	Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)	
Option 2	Bulk import (SNZ): Havant Thicket Reservoir to Pulborough (50Ml/d)	

Catchment	Rother	Option description and potential effects:
		For River Rother, the schemes that only impact the catchments due to construction activities are: brede-kingsn p 10 Therefore there is only one option with any operational activities within the catchment, and no potential for cumulative effects over and above the individual option assessment for WR_PWR_Dar3_CONJU.
Option 1	Bulk import(SHZ): SEW RZ8 to Rye	
Option 2	Recycling (SHZ): Hastings to Darwell (15.3Ml/d)	

Catchment	Stour	Option description and potential effects:
Option 1	Bulk import(SHZ): SEW RZ8 to Rye	In the Operational Catchments associated with the Stour, the impacts of the following options are only constructions activites and are classified as WFD compliant: brede-kingsn p 10 Sel1 SWS_KTZ_HI-TFR_RZ8_ALL_canterb-wingha p 20 SWS_KTZ_HI-TFR_RZ8_ALL_win Therefore there are no cumulative impacts on downstream waterbodies for this the Operational Catchments associated with the Stour,
Option 2	Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d)	
Option 3	Bulk import (KTZ): SEW Canterbury to Near Canterbury (20Ml/d)	
Option 4	Bulk import (KTZ): SEW Kingston to Near Canterbury (2Ml/d)	

Catchment	Brede	Option description and potential effects:
		The brede-kingsn p 10 and WR_PWR_Dar3_CONJU options only impact this operational catchment with construction activities, therefore no cumulative plan level impacts exist for the Brede and Tilllingham
Option 1	Groundwater (SHZ): Reconfigure Rye Wells (1.5Ml/d)	
Option 2	Bulk import(SHZ): SEW RZ8 to Rye	
Option 3	Recycling (SHZ): Hastings to Darwell (15.3Ml/d)	

Operational Catchments	Tesie, Beult, Medway Middle and Medway Upper, Medway Lower and Medway Swale Estuary	Option description and potential effects:
Option 1	Interzonal transfer (KME-KTZ): KME-KTZ bi-directional (15.8Ml/d)	In these Operational Catchments associated with the Medway, including the Medway Swale Estuary, the impacts of the following options are only construction activities and are classified as WFD compliant: brede-kingsn p 10 FWKHAM Sel1 The cumulative assessment for Waterbody GB106040018500 (Bewl) assessed the impacts of the SWS_KMW_HI-RSR_RE1_ALL_rab1 and SWR_PWR_Bew3_CONJU schemes. The potential reduction in reservoir spill into the Bewl river WB due to the operation of the SWS_KMW_HI-RSR_RE1_ALL_rab1 scheme requires quantification so that the impact on downstream waterbodies and Medway can be understood. The WR_PWR_Bew3_CONJU scheme will also result in the reduction in discharge from Tonbridge WwTW into another Medway waterbody, GB106040018182, which may reduce water available particularly in low flows. These two schemes affect the Mid Medway and Teise rivers which converge north of the Teston Gauging Station, The 2013 ALS shows that the majority of the Medway catchment has mostly no water available for Q50 to Q95, with restricted water available at Q30. The available details on these schemes are not sufficient to understand the combined impact of a reduction in high flows and low flows on the downstream waterbodies and therefore this requires further assessment. The remaining schemes that have operational and construction impacts in the operational catchment that could be assessed for cumulative impacts are: SWS_KME_HI-DES_ALL_ALL_ios20 SWS_KMW_HI-REU_RE1_ALL_ecc18 SWS_KME_HI-REU_RE1_ALL_sit8 SWS_KME_HI-GRW_ALL_ALL_nw_gwa_win_eastn These schemes are more than 50km downstream of the Bewl, Teise and Mid Medway waterbodies and therefore are unlikely to have cumulative impacts with the previous schemes. The discharge of treated effluent into Eccles Lake will not have downstream impacts because the lake is a raw water storage reservoir and therefore has no regular releases downstream. The reduction in discharge into the Medway tidal reach is beyond the extent of freshwater discharges and therefore should not be incorporated in to resource availability. The Sittingbourne Industrial reuse scheme would reduce the current discharge of industrial treated effluent into Milton Creek shortly upstream of the Swale SPA by 7.5 Ml/d. The Swale is a Transitional waterbody whose hydrological regime does not support good due to water industry surface water abstraction and the ALS states there is no water available from Q50 to Q95. This reduction of discharge to Milton Creek shortly upstream of the Swale, may lead to a reduction in freshwater flows to the estuary. The stage 2 assessment conclusion was potentially non WFD compliant (low confidence) without further assessment of the sensitivty of the estuaries to a reduction in freshwater flows. The Isle of Sheppy desalination scheme may impact water quality and affect biological habitats in both the Swale and Medway Estuary Transitional Water bodies through the discharge of hypersaline water. The discharge points are located The stage 2 assessment concluded the scheme was potentially non WFD compliant (low confidence) and water quality modelling would be required to understand the impact of the discharge. It is unlikely that there are potential cumulative impacts on the Medway Estuary and Swale Estuary of these two schemes becuase any impact due to the reduction in discharge to the Swale is likely to be too dispersed to impact the Medway Estuary. The Recommission Gravesend option would increase RA groundwater abstraction in the North Kent Medway Chalk, with potential resultant impacts on flows to Ebsfleet river water body. These are separate water bodies that flow directly to the Thames Middle, not in to the Medway or Swale.
Option 2	Asset enhancement (KMW): Remove network constraint at Longfield (13Ml/d)	
Option 4	Desalination (KME): Isle of Sheppey 20 Ml/d	
Option 5	Recycling (KME): Sittingbourne industrial water reuse (7.5Ml/d)	
Option 6	Recycling (KMW): Medway WTW to lake (14Ml/d)	
Option 7	Storage (SHZ): Raising Bewl Reservoir 0.4m (3Ml/d)	
Option 8	Recycling (SHZ): Tonbridge to Bewl (5.7Ml/d)	
Option 9	Bulk import(SHZ): SEW RZ8 to Rye	
Option 10	Groundwater (KME): Recommission Gravesend (2.7Ml/d)	

Catchment	Thames Lower	Option description and potential effects:
		In the Operational Catchments associated with the Thames Lower, the impacts of the following options are only constructions activites and are classified as WFD compliant: SWS_SNZ_HI-TFR_SES_ALL_outwood-turner p 10 SES rezone ext The increased abstraction SWS_HKZ_HI-ROC_ALL_ALL_ewo is assumed to be not have an impact on the overlying surface waterbody because the groundwater source abstracts from the underlying chalk aquifer that is confined by the London Clay. Therefore no SWS option is anticipated to have a cumulative impact on the Lower Thames or it's tributaries.
Option 1	Bulk import (SNZ): SES re-zoning (4Ml/d)	
Option 2	Groundwater (HKZ): Remove constraints at Newbury to increase yield (1.2Ml/d)	
Option 3	Bulk import (SNZ): SES to SNZ (10Ml/d)	

Catchment	Arun	Option description and potential effects:
Option 1	Bulk import (SNZ): SEW RZ5 to Pulborough	In the Operational Catchments associated with the River Arun, the impacts of the following options involve only construction activities: SWS_SNZ_HI-TFR_RZ5_ALL_tilmore-hardha p 10 The remaining schemes have operational and construction impacts in the operational catchment and could be assessed for cumulative impacts: SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju SWS_SNZ_HI-REU_RE1_ALL_for20 SWS_SNZ_HI-ROC_RE1_ALL_hsb-rcm BR_Rog BR_Smo The reduction of the discharge of treated effluent into the Arun, due to the transfer of the discharge to Church farm reservoir in option SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju, was considered compliant (low conf) after stage 2 assessment. This is because the river is discharge rich and a reduction in discharge may improve water quality. The Littlehampton recycling scheme, in contrast, was considered potentially non-compliant due to potential physico-chemical impacts from the addition of further nutrient loading to the Western Rother. However, the scheme would also add additional water to the river, which may be beneficial. The three options involving groundwater abstraction have the potential to reduce river flows in the Western Rother and other tributaries, and subsequently downstream in the tidal Arun, and have all been identified as being potentially non-compliant. Two of these sources are currently subject to a WINEP investigation, the outcome of which could potentially alter the conclusions of this assessment. The effects of reduced flows associated with these options would be offset by the Littlehampton recycling scheme, if all were to be operated together (although the balance of losses and gains cannot be reliably quantified from the level of evidence available). The cumulative impacts could alter the magnitude of potential impact in the catchment compared to individual options, which will require further assessment to fully understand.
Option 2	Recycling (SNZ): Horsham WTW with storage at Pulborough (11.5 Ml/d)	
Option 3	Recycling (SNZ): Littlehampton WTW with river discharge (15Ml/d)	
Option 4	Groundwater (SNZ): New borehole at Petworth (4Ml/d)	
Option 5	Groundwater (SNZ): Petersfield refurbishment (1.6Ml/d)	
Option 6	Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d)	

Catchment	River Adur	Option description and potential effects:
Option 1	Recycling (SNZ): Horsham with storage at Pulborough (6.8Ml/d)	In this Operational Catchment associated with the River Adur and Western Rother the impacts of the following options are only construction activities: tenants-bright p 40 SWS_SWZ_HI-TFR_SNZ_ALL_hardham-tenant p 60 SWS_SNZ_HI-REU_RE1_ALL_env_cu_chu2_conju SWS_SWZ_HI-LRE_ALL_ALL_har1 SWS_SBZ_EF-TFR_REP_ALL_har2 res The remaining schemes have operational and construction impacts in the operational catchment and can be assessed for cumulative impacts. The River Adur Offline Reservoir is a pumped storage reservoir with a max 30 Ml/d surface water abstraction from the eastern River Adur. The ALS shows there is water available at Q95, Q70, Q50, Q30 in the eastern Adur and streams are discharge rich and therefore abstraction may not breach the EFI. However, a reduction in flows during low flows could potentially result in a deterioration in physico-chemical status of the Adur East river water body (GB107041012900) which discharges directly into the Adur Transitional water body. Reinstating West Chiltington groundwater abstraction has the potential to reduce flows in Lancing Brook, in the western Adur catchment (this is in the scope of a current WINEP investigation). Along with the Adur offline reservoir option, the combined use of the two would result in reduced flows in to the tidal Adur. The Lewes Road groundwater scheme could increase abstraction above RA abstraction in the Brighton Chalk Block GWB. The Adur and Ouse ALS states that the Chalk Block does not contribute significantly to river flow and emerges in tidal sections of the two rivers and therefore is unlikely to contribute any cumulative impacts on the river water bodies. The cumulative impacts could alter the magnitude of potential impact in the tidal Arun compared to individual options, but remain unlikely to affect the status of the transitional water body. Other options are unlikely to have a cumulative effect beyond the extent of the individual options.
Option 2	Storage (SNZ): River Adur Offline Reservoir (19.5Ml/d)	
Option 3	Treatment capacity (SWZ): Pulborough winter transfer stage 1 (2Ml/d)	
Option 4	Interzonal transfer (SWZ-SBZ): Pulborough winter transfer stage 2 (4Ml/d)	
Option 5	Interzonal transfer (SNZ-SWZ): Pulborough to Worthing	
Option 6	Interzonal transfer (SBZ-SWZ): Brighton to Worthing	
Option 7	Groundwater (SBZ): Lewes Road (3.5Ml/d)	
Option 8	Groundwater (SNZ): Reinstate West Chiltington (3.1Ml/d)	

Catchment	Test	Option description and potential effects:
Option 1	Bulk import (HAZ): T2ST to Andover	In the Operational Catchments associated with the River Test, the impacts of the following options are only construction activities and are classified as WFD compliant: cul to and pot SWS_HAZ_HI-TFR_HWZ_ALL_oan1 SWS_HAZ_HI-TFR_HWZ_ALL_oan2 SWS_HAZ_HI-TFR_HWZ_ALL_oan3 The remaining options that could have operational impacts on the Test and its tributaries are: Test Surface Water MAR, Romsey new boreholes, Kings Somborne and Chilbolton recommissioning. The stage 2 screening of the reinstated/replaced groundwater sources (all of which would operate within their current licence quantities), concludes compliance (low conf.) with WFD assessment since the restricted water availability on the Test only applies to the downstream river and a HOF exists to protect the downstream waterbody. The impact on the groundwater body is also assessed as Compliant (low conf.) The downstream protection means that this conclusion should not change even if multiple of these options are implemented together. The stage 2 screening of the **Test Surface Water** MAR scheme concluded that the scheme was Compliant (low.conf) since there are no WFD Surface waterbody or GWDTE receptors in connectivity with the confined aquifer and the scheme is designed to balance water availability. The four groundwater schemes will abstract from the same groundwater body however, since the MAR scheme is designed to balance the recharge and abstraction of the groundwater body there should be no long or short term impact on the WFD status from this scheme. Therefore, it is unikely there will be any cumulative impact on WFD status for this groundwater body due to these four schemes. It assumed that the abstraction license conditions for the MAR scheme will be designed in such a way to prevent deterioration of the groundwater body. Therefore there are no cumulative operational impacts anticipated for the River Test or its tributaries.
Option 2	Interzonal transfer (HWZ-HAZ): Winchester to Andover bi-directional (15Ml/d)	
Option 3	Interzonal transfer (HAZ-HKZ): Andover to Kingsclere bi-directional	
Option 4	Interzonal transfer (HSE-HWZ): Lower itchen WSW to Yew Hill bi-directional (74Ml/d)	
Option 5	Groundwater: Test MAR (5.5Ml/d)	
Option 6	Groundwater (HRZ): New boreholes at Romsey (4.8Ml/d)	
Option 7	Groundwater (HRZ): Remove constraints at Kings Sombourne (2.5Ml/d)	
Option 8	Groundwater (HAZ): Recommission Chilbolton (0.5Ml/d)	