Annex 1 to Appendix S – Cambridge Water Final WRMP 2019

The table below is table 29 in the Cambridge Water draft water resources management plan (WRMP) which we published for public consultation in March 2018:

Option type	Number of unconstrained options
Maintenance of existing groundwater	42
New groundwater	114
New surface water	
Third party water and trades	
Leakage reduction	190
Metering and water efficiency	
Total	346

We have listed the 42 unconstrained '*Maintenance of existing groundwater*' options below:

	Option Unique Identifier	Title	Option Description
1	APM	AP	Maintenance
2	BBR	BB - resilience	Improve resilience as a key source
3	BBM	BB Capital Maintenance	Maintenance
4	BTR	BT - resilience	Improve resilience as a key source
5	BTM	BT Capital Maintenance	Maintenance
6	CR-Moth	CR	N/A - Mothballed
7	DUY	DU - Improved yield	Improve yield
8	DUM	DU Capital Maintenance	Maintenance
9	DXM	DX Capital Maintenance	Maintenance
10	DXGY	DX Grange - improved yield	Improve yield & improve resilience as a key source - Need a second BH at possible satellite location to avoid draw down issue and achieve licence
11	DXGM	DX Grange Capital Maintenance	Maintenance
12	EUR	EU + Shelterhouse corner - resilience	Improve resilience as a key source
13	EUM	EU + Shelterhouse corner Capital Maintenance	Maintenance
14	FD12M	FD 12 Capital Maintenance	Maintenance (Full refurb expected AMP 6)

15	FD36R	FD 36 - Resilience	Improve resilience as a key source + blank off the old well
16	FD36M	FD 36 Capital Maintenance	Maintenance
17	FWM	FW Capital Maintenance	Maintenance - Nitrate removal to be installed AMP6 to allow direct supply to zone if needed - removes blend need with HD and Chishill
18	FUM	FU Capital Maintenance	Maintenance
19	GCM	GC Capital Maintenance	Maintenance
20	GWM	GW Capital Maintenance	Maintenance
21	HDM	HD Capital Maintenance	Maintenance
22	HXGM	HX Grange Capital Maintenance	Maintenance
23	HOY	HO - improved yield	Improve yield
24	HOM	HO Capital Maintenance	Maintenance
25	KG-Moth	KG - mothballed	N/A - Mothballed
26	LIM	LI Capital Maintenance	Maintenance
27	LOB-Moth	LOB - mothballed	N/A - Mothballed
28	LOFR	LOF - Resilience	Improve resilience as a key source
29	LOFM	LOF Capital Maintenance	Maintenance
30	MEM	ME Capital Maintenance	Maintenance
31	MOGM	MOG Capital Maintenance	Maintenance
32	RVR	RV - resilience	Improve resilience
33	RVM	RV Capital Maintenance	Maintenance
34	RU-Decomm	RU - Decomm	N/A - No licence
35	SWMM	SW Mill Capital Maintenance	Maintenance
36	SWM	SW Capital Maintenance	Maintenance
37	StI-Moth	StI - mothballed	N/A - Mothballed
38	WLY	WL - improved yield	Improve yield
39	WLM	WL Capital Maintenance	Maintenance
40	WCLM	WC Capital Maintenance	Maintenance
41	FS-Moth	FS - mothballed	N/A - Mothballed
42	EA-Decom	EA - decommissioned	N/A - No licence

We have listed the 114 unconstrained '*New groundwater, new surface water and third party water and trades'* options below:

	Option ID	**Option name**	**Option summary**
1	CW1A	FS	Existing abstraction from gravels. Mothballed because of crypto risks but with modern treatment these risks should be effectively managed. There are WFD no-deterioration risks and the source is chemically surface water. An option for a larger surface abstraction is covered under option CW46. CW1A & B Minimum treatment needed, inlet straining followed by UV treatment for crypto risk reduction. Chlorination and connection to the supply network. Additional treatment may be needed subject to

			actual water quality data. CW1C - potential economies of scale from larger treatment facility.
2	CW1B	FS	Increase abstraction rate through augmenting River Ouse flows by adjusting abstraction from Offord.
3	CW1C	FS	Link with CW2 and CW4 and create larger storage, abstraction and treatment facility.
4	CW2A	StI Pumping Station	Existing abstraction from gravels would require extensive treatment review and rebuild, plus probably new BH. SSW already owns the site and have network connections. WFD no-deterioration risks. CW2A. Minimum treatment needed, inlet straining followed by UV treatment for crypto risk reduction. Chlorination and connection to the supply network. Additional treatment may be needed subject to actual water quality data.
5	CW2B	StI Pumping Station	Link with CW1 and CW4 and create larger storage, abstraction and treatment facility. This sub-option would require more storage or boosting of the network.
6	CW3A	LOB	Crypto issues led to the mothballing of this asset. New treatment required. Understand that relatively recent use means that it can be recommissioned to RA abstraction without risking WFD no-deterioration. The site is isolated relative to KG and CR. CW3A. Reinstate borehole and associated pumps and pipework. New treatment facility to include UV treatment for crypto risk reduction. Additional treatment may be required subject to water quality. CW3B - potential savings from larger treatment plant. CW3C - crypto treatment still needed.
7	CW3B	LOB	Reinstate borehole and pumps. New raw water pumping station and pipeline to KG BH for treatment.
8	CW3C	LOB	Reinstate borehole and pumps. Partial treatment with blending at Eversden DSR

9	CW4A	Ouse Gravel Works	There are a series of old gravel workings in the Great Ouse floodplain. These hold a significant volume of water which could potentially be exploited for water resources purposes. This would be a surface water source. A revision to Ruthamford (WRE option) with potential benefits to the Ouse Washes. CW4A. Minimum treatment pre-settlement, followed by clarification and filtration; UV treatment for crypto risk reduction. Chlorination and connection to the supply network. GAC for taste/odour/pesticides. Additional complex treatment may be required subject to raw water quality data e.g. nitrates solvents etc.
10	CW4B	Ouse Gravel Works	Abstraction from gravel workings into new surface water holding reservoir to be constructed alongside the Great Ouse. New treatment plant and deployment into supply.
11	CW4C	Ouse Gravel Works	There may be various combinations of options for the different gravel workings, which are under different ownership and current use.
12	CW4D	Ouse Gravel Works	Abstraction to storage, accepting losses to gravel which can be abstracted at StI, FS or new gravel source.
13	CW5A	Recommission CR	This is a greensand groundwater source with associated iron/manganese issues and historical ammonia issues. It is licensed but has not been used since 2012 (this means that the EA still includes its operation in its RA abstraction calculations). No WFD no-deterioration issues for RA abstraction. New treatment is required. Combined treatment with CW6 at a single point could be feasible. CW5A. Localised treatment consisting of breakpoint chlorination to remove ammonia followed by dechlorination with Sodium Bisulphite. Onward pumping to CRDSR. Additional treatment may be required subject to water quality. Savings possible from centralised treatment.
14	CW5B	Recommission CR	Pump raw water to centralised treatment with scheme CW6 (KG borehole) which is likely to have similar water quality characteristics.

15	CW6A	Recommission KG	This is a greensand groundwater source with historical ammonia issues. It is licensed but has not been used since 2012 (this means that the EA still includes its operation in its RA abstraction calculations).No WFD no-deterioration issues for RA abstraction. New treatment is required. Combined treatment with CW6 at a single point could be feasible. CW6A. Localised treatment consisting of breakpoint chlorination to remove ammonia followed by dechlorination with Sodium Bisulphite. Onward pumping into supply. Additional treatment may be required subject to water quality. Savings possible from centralised treatment.
16	CW6VB	Recommission KG	Pump raw water to centralised treatment with scheme CW5 (CR borehole) which is likely to have similar water quality characteristics.
17	CW7A	Recommission FD 12	An existing groundwater source which has not been used for some time. Proposal to direct raw water into the existing treatment works. A UV upgrade of the existing works is proposed at the site. CW7A. Establish capacity of treatment at FD36, and network access point. Blending issues for raw nitrate water. Requires refurbishment to implement. CW7B. Establish nature of refurbishment and treatment required and implement. Establish appropriate network access point.
18	CW7B	Recommission FD 12	As CW7A., but with treatment at FD12 to provide resilience to treatment failure and avoid possible capacity issues at FD36. Revise pipework connections into supply network
19	CW7C	Recommission FD 12	As CW7B, but with varied network connection point, into EU main or closer to Cherry Hinton DSR
20	CW8	Optimise WL licence	The source cannot operate to its maximum output due to constraints on the network. Network improvements are therefore proposed so that the source can be used at peak times. Network constraint is at FD. Maybe connect to Thetford part of network The scheme would free up resource by installing new plant and upgrading the main. No WFD no-deterioration issues flagged by the EA. In addition, the EA emphasised that the source is supported by

			the Lodes Granta support scheme (which is subject for renewal in 2018) CW8A. Install infrastructure to resolve network conveyance deficiencies. Provide new treatment as required.
21	CW9	Optimise Western Colville Licence	This option is for an existing groundwater source. A new borehole is required at the site and treatment upgrades are required. No WFD no-deterioration issues flagged by the EA. In addition, the EA emphasised that the source is supported by the Lodes Granta support scheme (which is subject for renewal in 2018) CW9A. New borehole on adjoining site (not closer than 100m). Disinfection plant and on site contact tank.
22	CW10A	Optimise MOG Licence	A significant redesign of the existing MOG groundwater abstraction is required. This may include a new borehole to address capacity issues and an associated upgrade of treatment. May require new main to CR. CW10A. New BH or reline existing BH to limit surface water ingress (assume seasonal nature of nitrates suggests surface water ingress). Nitrate treatment on site may not be possible due to a lack of an effluent disposal route. Nitrate removal would be required or pumping at a higher rate (and potentially to waste). CW10B The proximity of the Affinity boundary means that there may be potential for a trade via the site. It is not preferred location - LOF or further east would be ideal. CW10C The existing borehole is located between the River Rhee augmentation borehole and the river it supports. Under this option, abstraction would be shifted south (away from the river), potentially reducing the volumes required for flow support and potentially allowing increased abstraction for PWS.
23	CW10B	Optimise MOG Licence	Refurbish, including trade from Affinity.
24	CW10C	Optimise MOG Licence	New borehole, further south

25	CW11A	Optimise ME Licence	A satellite borehole is required for the existing groundwater abstraction to enable yield to be optimised. WFD no-deterioration a risk. Close to FW RSA site. CW11A. New BH / PS / pipes - connect to existing treatment process. CW11B The existing borehole is located between the River Rhee augmentation borehole and a river it supports. Under this option, abstraction would be shifted south (away from the river), potentially reducing the volumes required for flow support and potentially allowing increased abstraction for PWS.
26	CW11B	Optimise ME Licence	New borehole, further south
27	CW12	Optimise Gt Wilbraham licence	Grid Reference: TL569559 SZ: Cambridge Peak Output (Ml/d): 2.30 Annual Output (Ml/d): 2.20 Plant upgrades. WFD ND assessment Production to spec BH resilience - is this done? Wilbraham River RSA No WFD no-deterioration issues flagged by the EA. In addition, the EA emphasised that the source is supported by the Lodes Granta support scheme (which is subject for renewal in 2018)
28	CW13	Consolidate Greensand Licences (CR)	SZ: CR/ KG Peak Output (Ml/d): >4 Annual Output (Ml/d): ? Consolidate CR and KG licences to single location at CR. May require additional boreholes to achieve increased output. Complete refurbishment of treatment would also be required but assume this would be part of the recommissioning of CR site option CW5. Preliminary discussions with the EA indicated they were not keen (groundwater over abstracted) and will require further discussion. WFD no-deterioration assessment will be required.

29	CW14	Consolidate Greensand Licences (KG)	Location: KG AZ: Bourn Peak Output (Ml/d) : 4 max without significant network upgrade. 5km new main required for yield between 1Mld and 4Mld. Consolidate KG and CR licences to single location at KG. Additional boreholes would be required to obtain the licenced yield. A complete refurbishment of treatment and site wide plant would be required but assume this would be part of site recommissioning option CW6. Preliminary discussions with the EA indicated they were not keen (groundwater over abstracted) and will require further discussion. Significant WFD no-deterioration risk.
30	CW15A	AWS Transfer from Wing WTW (or Grafham)	Location: West SZ: Bluntisham Peak Output (Ml/d): 8-10 Annual Output (Ml/d): ? Trading theory for practice reciprocal option. Would require AWS to find surplus elsewhere. Network reinforcement and WQ issues. WRE option? Could also be from Grafham WTW. Treated water
31	CW15B	AWS Transfer from Wing WTW (or Grafham)	New pipeline link to Grafham Water to enable import of raw water. New treatment works operated by SST.
32	CW15C	AWS Transfer from Wing WTW (or Grafham)	As CW15A. or CW15B. but varying location of connection to the CAM distribution network.
33	CW16a	Transfer/ Trade off with Ely Ouse Essex transfer - Kennett	The Ely Ouse Essex Transfer Scheme is a strategic water resources asset. Location: East SZ: Cambridge Option would be based upon a new main from Kennett pumping station to Waterbeach. Treatment either at Kennett (adding resilience to the Thetford main) or at Waterbeach.
34	NEW CW29	Transfer/ Trade off with Ely Ouse Essex transfer - Kennett	As above DO variation
35	CW16b	Transfer/ Trade off with Ely Ouse Essex transfer - Waterbeach	Location variation
36	NEW CW29A	Transfer/ Trade off with Ely Ouse Essex transfer - Waterbeach	As above DO variation

37	CW17	Affinity Transfer via LOF connection	Location: South SZ: Cambridge/HD Peak Output (Ml/d): 5? Reversal of existing emergency connection. Affinity would need to reinforce network elsewhere and obtain surplus to free up resource. Needs WRE options to enable
38	NEW CW64	Affinity Transfer	Transfer from Haverhill to Shudy Camps
39	NEW CW64a	Affinity Transfer	Transfer from Haverhill to RV/LI
40	NEW CW65	Affinity Transfer	Transfer from Haverhill to Balsham
41	CW18a	Acquire/trade unused licence in the Elveden Estates area -RAW water to EU	Location: Thetford SZ: Cambridge Potential for significant 3rd party licence trade. Feasibility depends on location, distance from existing main and treatment.
42	CW18b	Acquire/trade unused licence in the Elveden Estates area -New Treatment into Thetford main	
43	CW19A	Licence trade at Barrington	Location: Barrington SZ: CR/HD Peak Output (Ml/d): 1.5 Annual Output (Ml/d): 1.0 Explored to some extent, costs for trade1.50m3. BHs would need to be tested for yield and WQ. Trade volumes to be discussed with the EA, WFD ND applied. Potentially new BH required, or could be consolidated to other GS works (CR?) Otherwise site development and network infrastructure required Trade volumes need to be confirmed. Location & treatment issues for yield/volumes
44	CW19B	Licence trade at Barrington	Licence trade with additional site development
45	CW19C	Licence trade at Barrington	Licence trade with abstraction at an existing CW site (e.g. Lors Bridge, CR, KG)
46	CW20a	Trade with AWS GW licences in Thetford area	Location: Thetford SZ: Cambridge Identify Chalk GW licences in vicinity of Thetford works for trade or acquisition. Would probably need AWS to find surplus resource elsewhere. Trade subject to WFD no deterioration assessment but trading supported by CAMS. Assume additional network infrastructure would be required.
47	CW20b	Trade with AWS GW licences in Newmarket area	As above
48	NEW CW63	AWS Transfer /Trade	Ely to Waterbeach

49	NEW CW26	AWS Transfer /Trade	Ruthamford North to Cambridge Water (formerly known as Kings Delph transfer to Cambridge Supply Zone)
50	CW21	Consolidate other third party Greensand licences with existing licences at CR	AWS licences - consolidate with CR licences
51	CW22	Develop unused commercial boreholes	Trades of existing licensed abstractions where the licence holder has significant recent actual abstraction but intends to cease (or has recently ceased) Peak Output (Ml/d): <2 Annual Output (Ml/d): <2 Identify unused commercial boreholes. Location and proximity to existing network/treatment works to be assessed. Trade volumes/cost and WRD ND considerations. Opportunities unlikely
52	CW23	Other Licence Trading	Peak Output (Ml/d): 1.5 Annual Output (Ml/d): 1.7 Identification of opportunities required. Location and proximity to existing network/treatment works to be assessed. Trade volumes/cost and WRD ND considerations. Few opportunities, and high cost/low yield, but maybe a few opportunities.
53	CW24A	Upper Stour Reservoir	Reservoir on the Upper Stour with water sourced from the Great Ouse. Potential beneficiaries are E&SW, plus AWS, THW, CW, Thames Region Direct water users in Essex. Storage capacities could range from 20-100m^3x10^6, with yields between 49-146tcmd. Costs between £46-122m.
54	CW24B	Upper Stour Reservoir with water sourced from Great Ouse - Sub option with smaller DO output	As above - variation on DO
55	CW25	Great Fen/Mid-Level Commission transfer option	A transfer of surface water from the Nene catchment/MLC into the network at Ramsey. This option would tie into the Great Fen Project.
56	CW26	Great Fen/Mid-Level Commission Ruthamford transfer option	A transfer of surface water from the Nene catchment/MLC into the network at Ramsey. This option would tie into the Great Fen Project but would source its water from the AWS Ruthamford.

57	CW27a	Adopt GOGS boreholes for public water supply	The Great Ouse Groundwater Scheme (GOGS) is an Environment Agency owned asset which supplements flows in the Ely Ouse and its tributaries. In doing so, it partially facilitates the operation of the Ely Ouse Essex Transfer Scheme. The scheme has never been fully utilised and its use could be optimised to provide more effective use of water resources. A transfer of surface water from the Nene catchment/MLC into the network at Ramsey. This option would tie into the Great Fen Project but would source its water from the AWS Ruthamford. (a) Optimise use of GOGS to support flows
58	CW27b	Adopt GOGS boreholes for public water supply	Consolidate GOGS licences with PWS licences to manage sustainability/no-deterioration issues
59	CW27c	Adopt GOGS boreholes for public water supply	Surface abstraction downstream of Thetford
60	CW28	Ely Ouse Essex Transfer reversal with Essex desal and Abberton (shared with ESW)	0
61	CW29	Ely Ouse Essex Transfer reversal from Abberton	25 mile pipeline from Abberton to Wixoe
62	CW30a	Ely Ouse Essex Transfer with new res (shared with AWS) FELTWELL	A new reservoir is being explored for WRE in West Norfolk. The proximity of this site to the Cut-off Channel may present an opportunity for supplying CWC via the EOETS. Large scale WRE option and an extension of CW16. Feltwell res
63	CW30b	Ely Ouse Essex Transfer with new res (shared with AWS) OTHER LOCATION (DENVER)	As above. other locations (e.g. Denver)
64	NEW CW30a	Ely Ouse Essex Transfer with new res (shared with AWS) – Sub option with Smaller DO	As above. DO variation
65	NEW CW33	AWS Ely RZ resource trade	Ely RZ resource trade (formerly Adopt Beck Row and feed into Cambridge Supply Zone)
66	CW31a	Abstraction from Ely Ouse, no reservoir	Abstract high flows from Ely Ouse north of Waterbeach. Connect to existing network at Waterbeach. Would require new abstraction and treatment infrastructure and extension of existing network. Abstraction would be limited to high

			flows due to licensing/water availability but could be supplemented with transfer from Ruthamford. Requires the reconfiguration of the network but this is feasible.
67	CW31b	Abstraction from Ely Ouse, no reservoir	abstraction at high flows, supplemented with Ruthamford transfer
68	CW32A	Abstraction from Ely Ouse, with reservoir	Abstract high flows from Ely Ouse north of Waterbeach with storage reservoir (potential sub-options). May require the revised operation of Hermitage Lock to allow larger flows into the Ely Ouse from the Great Ouse. Connect to existing network at Waterbeach. Would require new abstraction and treatment infrastructure and extension of existing network as well as storage reservoir. Abstraction would be limited to high flows due to licensing/water availability but could be supplemented with transfer from Ruthamford (i.e. via the Great Ouse and Hermitage Lock). Storage reservoir could be located to provide benefits to Wicken Fen (if controlled releases are made).
69	CW32B	Abstraction from Ely Ouse, with reservoir	Including wider environmental benefits OLD CW11
70	CW32C	Abstraction from Ely Ouse, with reservoir	Supported by AWS transfer OLD CW12
71	CW32D	Abstraction from Ely Ouse, with reservoir	Supported by AWS transfer and wider environmental benefits OLD CW13
72	CW33	Deep confined groundwater	Avoiding surface no-deterioration issues
73	CW34a	Effluent reuse working with AWS (Milton)	Use flow from Milton WWTW as a source - Direct input from Milton to WTW
74	CW34b	Effluent reuse working with AWS (Milton)	Use flow from Milton WWTW as a source - Abstraction at Waterbeach from Cam
75	CW35a	Site-scale greywater reuse (Northstowe)	Site-scale greywater reuse scheme incorporated into large scale development. Needs to be identified and included at design and planning stage.
76	CW35b	Site-scale greywater reuse (Denny St Francis) Waterbeach	Site-scale greywater reuse scheme incorporated into large scale development. Needs to be identified and included at design and planning stage.
77	CW36a	Site-scale rainwater harvesting (Northstowe or similar growth)	Site-scale rainwater harvesting scheme incorporated into large scale development. Needs to be included at design and planning stage.

78	CW36a	Site-scale rainwater harvesting (Denny St Francis)	Site-scale rainwater harvesting scheme incorporated into large scale development. Needs to be included at design and planning stage.
79	CW37A	Brownshill abstraction (with/without Grafham) and reservoir	An existing (unused) licensed abstraction from the Great Ouse at Brownshill Staunch. Currently held by AWS under the same licence as the Offord intake to supply Grafham Water. Under this option, this aspect of the licence would transfer to Cambridge Water. Its operation could be linked to revised operation of the Offord intake (essentially a transfer from Grafham) to ensure that existing flow constraints are not breached. Alternatively it could be operated independently (would have to be at high flows but this could benefit the Ouse Washes if it reduced the frequency of flooding). Its operation could be as a direct intake to a new WTW or to fill a reservoir in the vicinity of Needingworth/EA. Abstraction treatment supply
80	CW37B	Brownshill abstraction (with/without Grafham) and reservoir	Transfer abstraction treatment supply
81	CW37C	Brownshill abstraction (with/without Grafham) and reservoir	abstraction storage treatment supply
82	CW37D	Brownshill abstraction (with/without Grafham) and reservoir	transfer abstraction storage treatment supply
83	CW38	Grafham via FS	The FS abstraction and WTW is in close proximity to the River Ouse. If recommissioned as a groundwater abstraction, FS could be used as a means of transferring raw water from 'Grafham', through revised operation of the Offord intake to ensure that existing flow constraints are not breached.
84	CW39a	New raised reservoir on Great Ouse Small Res with WTW	Any option delivered under CW4 would is likely to leak to the underlying gravels. In addition, their location in the floodplain means that they would be inundated under high flows. The construction of a raised reservoir would avoid these problem but would not be as attractive for conjunctive use (e.g. skimming high flows for the protection of the Ouse Washes). Requires the reconfiguration of the network but this is feasible.
85	CW39b	New raised reservoir on Great Ouse Large Res with WTW	Any option delivered under CW4 would is likely to leak to the underlying gravels. In addition, their location in the floodplain means that they would be inundated under high flows.

			The construction of a raised reservoir would avoid these problem but would not be as attractive for conjunctive use (e.g. skimming high flows for the protection of the Ouse Washes). Requires the reconfiguration of the network but this is feasible.
86	CW40a	Transfer from west (AWS) to Caxton Gibbet	Transfer of potable water from AWS to CW. This would address the demand requirements of the A428 corridor. The network is small to the west of Caxton Gibbet roundabout but an additional 6Ml/d could be accommodated to the east of the roundabout without upgrading the network. Different water quality between the import and the existing network means that the area may need to be rezoned. Huntngdon to StI
87	CW40b	Transfer from west (AWS) to Caxton Gibbet	Potton to Gamlingay
88	CW40c	Transfer from west (AWS) to Caxton Gibbet	St Neots to Papworth Everard
89	CW41a	Third party gravel option (East / South east)	New surface water abstraction from either Cambridge Lakes (former Chalk workings) or Barnwell Lakes (former Clay pit) - Cambridge lakes/ Coldhams Rd
90	CW41b	Third party gravel option (East / South east)	New surface water abstraction from either Cambridge Lakes (former Chalk workings) or Barnwell Lakes (former Clay pit) - Barnwell lakes
91	CW42	Denver desalination with storage reservoir	Abstraction from the tidal Great Ouse with desalination plant at Denver. Abstract from incoming tide to avoid impacts of reducing freshwater flow to the estuary. Use of storage reservoir. Connection with network would require additional infrastructure. Could have additional benefits for EOTS.
92	CW43	Denver desalination (direct connection)	Abstraction from the tidal Great Ouse with desalination plant at Denver. Abstract from incoming tide to avoid impacts of reducing freshwater flow to the estuary. Treated water supplied through direct connection with network but would require additional infrastructure to connect. Could have additional benefits for EOTS.
93	CW44	New groundwater source	New groundwater abstraction
94	CW45	FS/StI river intake	A new surface water abstraction (under a new licence), working in combination with options at FS (CW1) and/or StI (CW2). This option could make use of water in the Great Ouse (currently shown as 'water available' for CAMS) or by revising the abstraction at Offord in liaison with AWS. A revision

			to Ruthamford (WRE option) with potential benefits to the Ouse Washes.
95	CW46	Offord intake	A revision to the Offord licence (AWS) with raw water pumped to CW for treatment and supply. A revision to Ruthamford (WRE option).
96	CW47	Raw water reservoir in 'A428 corridor'	Significant growth is underway and planned for the A428 corridor and this option would help meet this demand.
97	CW48	Treated water reservoir in 'A428 corridor'	Significant growth is underway and planned for the A428 corridor and this option would help meet this demand.
98	CW49	Lodes Granta boreholes	The Lodes Granta supports surface water environmental features in the vicinity of a suite of CWC sources. This option would optimise the use of these licences to maximise yield whilst meeting required levels of environmental protection.
99	CW50	New option - Grafham raising	
100	CW51	New option - string of high flow winter reservoirs	Variation on CW32 options,
101	CW52	WRZ reconfiguration to incorporate Newmarket, swap north to AWS	does not create new supply, movement of customer base
102	CW53	ASR using Ouse gravels	
103	CW54	River CAM abstraction & treatment works	
104	CW55	AWS import from Swaffham/Newmarket	
105	CW56	New chalk groundwater abstraction - exploration	
106	CW57	New greensand groundwater abstraction - exploration	
107	CW58	Sea tankering UK (Scotland)	
108	CW59	Sea tankering EU (Norway)	
109	CW60	Iceberg tow	
110	CW61	Revoke bulk transfers to AWS	
111	CW62	Revoke bulk transfers to Affinity	

112	CW63	Revoke bulk transfer to Snailwell	
113	CW64	Agricultural sector raw water trade(s)	
114	CW65	Agricultural sector trade including treatment	

We have listed the 190 unconstrained '*Leakage reduction, Metering and water efficiency*' options below:

	Option number	Option type	Option Name
1	1	Leakage	Mains Replacement
2	2	Target water efficiency to other abstractors	
3	3	Direct abstraction	Targeted information concerning the benefits of trickle irrigation compared to spray irrigation.
4	4	Direct abstraction	Targeted water efficiency information to other abstractors
5	5	Leakage	Advice and information on leakage detection and fixing techniques (Agriculture)
6	7	Leakage	Advice and information on leakage detection and fixing techniques (Household Customers)
7	8	Leakage	In house awareness campaign to reduce internal losses
8	9	Leakage	Incentives and gamification for customer leakage reporting
9	11	Investigate and lobby for improved regulatory incentives for reducing leakage	Leakage
10	12	Charging only above a defined 'subsistence' level of use	
11	13	Tariffs	Check tariff already not offered
12	14	Tariffs	Check tariff already not offered
13	15	Increasing volumetric charges for metered customers	
14	16	Introducing daily peak/off peak tariffs for at least some seasons	

15	17	Changes to existing measured tariffs. (Introducing summer/winter or other seasonal tariffs)	
16	18	Introduction of rising volumetric charges - rising block tariff.	
17	19	Household water efficiency programme (company led, self install)	
18	20	Household water efficiency programme (company led, plumber installed)	
19	21	Household water efficiency programme (partnering approach, home visit)	
20	22A	Non HH water efficiency programme (company led, self install)	
21	22b	Non HH water efficiency programme (company led, self install)	
22	23A	Non HH water efficiency programme (company led, site visit with installation)	
23	23b	Non HH water efficiency programme (company led, site visit with installation)	
24	24	Water efficiency	Non-household water efficiency programme (Partnering approach, site visit)
25	26	Metering	Meter all households within a water stressed area
26	27	Metering	Meter all households where a meter or meter box already exists.
27	28	Meter all households with an outside tap, swimming pools, hot tubs, sprinklers.	
28	29	Meter all remaining industrial premises	We can do this via the retailer - we would not treating them preferentially
29	30	Metering	Meter all sprinkler/hosepipe users
30	31	Meter all remaining currently unmetered swimming pool owners	
31	32	Leakage	Combined into B-L183
32	33	Leakage	Combined into B-L183

33	34	Leakage	Combined into B-L183
34	*35*	*Meters in unmetered boundary boxes (ghost metering)*	
35	36	Special tariff for customers who use external appliances (sprinklers, hosepipe, outside tap, hot tubs, jet washers)	
36	37	Special tariff for outside taps	
37	38	Special tariff for sprinkler users	
38	39	Special tariff for swimming pool owners	
39	40	Introducing lower charges for major customers with significant storage	
40	41	Introduce improved incentives to reduce SPL	
41	42	Tariffs	This option is excluded as it is unlikely to deliver any water efficiency savings
42	43	Introducing 'interruptible' industrial supplies	
43	44	Introducing spot pricing for selected customers	
44	45	Leakage	Advanced technologies for precise and accurate leak location - acoustics
45	46	Leakage	Advanced technologies for precise and accurate leak location - in-pipe devices
46	47	Leakage	Advanced technologies for precise and accurate leak location - tracer gases
47	48	Leakage	Analysis of social media for leak notification
48	49	Leakage	Appropriate incentives for leakage staff
49	50	Leakage	Benchmark ALC performance against other companies
50	51	Leakage	Better DMAs
51	52	Better engagement to increase optant rate to identify cspl	Leakage
52	53	Leakage	Better estimates/measurement of USPL (underground supply pipe losses)
53	54	Better mapping and register of underground assets	Leakage

54	55	Leakage	Better signage on repairs
55	56	Better training development succession planning	Leakage
56	57	Better trunk mains monitoring	Leakage
57	58	Leakage	Better understand rates and mechanisms of repeat failures on the same assets
58	59	Better understanding of HH night use/ LNU dynamic calculation	Leakage
59	60	Better understanding of non HH water use and night use	Leakage
60	61	Leakage	Classification of existing DMAs for appropriate ALC action
61	62	Leakage	Develop appropriate seasonal response strategies
62	63	Develop improved leakage data collection & analysis	Leakage
63	64	Develop predictive pipe aging model	Leakage
64	65	Develop metrics and monitoring to quantify SR leakage	Leakage
65	66	Leakage	Installation of district meters
66	67	Leakage	Horizon scanning of leakage developments
67	68	Leakage	Identify the causal factors for bursts and leakage
68	69	Identify most effective model for F&F resources	Leakage
69	70	Improve DMA meters through audit, quantification of MUR, replacement, correct sizing etc.	Leakage
70	71	Leakage	Improved analytics to detect leak breakouts
71	72	Leakage	Improved data visualisation of leaks
72	73	Increase F&F budget by X%	Leakage
73	74	Instant access to flow data for inspectors	Leakage
74	75	Leakage	Knowledge sharing
75	76	Leakage	Leak reporting app with pictures and GPS functionality
76	77	Monthly reconciliation of TIF and MNF	Leakage

77	78	Permanent noise and other monitoring	Leakage
78	79	Leakage	Quantify minor TIF components
79	*80*	*Real time network modelling at DMA level*	Leakage
80	81	Leakage	Remote sensing technologies - aircraft-based
81	82	Leakage	Remote sensing technologies - ground-based
82	83	Leakage	Remote sensing technologies - satellite-based
83	84	Leakage	Set appropriate leakage targets for each DMA
84	85	Leakage	Single feed DMAs only
85	86	Smart pipes	Leakage
86	87	Leakage	Deployment of permanent noise loggers
87	88	Use of meters for sub monitoring/ step testing	Leakage
88	89	Adoption of keyhole repair techniques	Leakage
89	90	Leakage	Be more operationally efficient
90	91	Leakage	Increasing find and fix leakage control activity on communication pipes.
91	92	Leakage	Increasing find and fix leakage control activity on distribution mains.
92	93	Increasing F&F leakage control activity on trunk mains and distribution mains	Leakage
93	94	Find better leaks - evaluate leaks and prioritise their repair	Leakage
94	95	Leakage	Decreasing the time taken to fixing reported leaks
95	96	Improve quality of repairs	Leakage
96	97	Leakage	Increase no dig pipe installation
97	98	Leakage	Leakage driven asset renewal
98	99	Leakage	Make joints leak free - Quality/Make joints leak free - product development
99	100	Leakage	Measuring ALC performance
100	101	Leakage	Minimise joints
101	102	Leakage	Non-breaking pipes
102	103	Prepare deliver and manage leakage strategy	Leakage
103	104	Repair more quickly	Leakage
104	105	Leakage	Self-healing pipes
105	106	Leakage	Stop slip lining

106	107	Use technologies for repairing pipes from the inside	Leakage
107	108	Metering	all new properties already required to install meter
108	109	Metering	all new properties already required to install meter
109	110	Metering	all new properties already required to install meter
110	111	Metering on change of ownership	
111	112	Refinement of customer usage trending	
112	113	Smart metering of all households (scored on the basis of doing a trial)	
113	114	Metering	Water only company. Severn Trent Water is in charge of Sewerage. Option require further information - very unlikely to record sewage flow
114	115	Metering	Water only company. Severn Trent Water is in charge of Sewerage. Option require further information - very unlikely to record sewage flow
115	116a	Improving the enforcement of water regulations	
116	116b	Improving the enforcement of water regulations	
117	117	Water regulations	
118	118	Water efficiency	
119	119	Encouraging and advice on rainwater harvesting in new build households	
120	120	Subsidised water butts for customers	
121	121	Rain water harvesting (RWH)	Water Butts (The company subsidy)
122	122	RWH	Replacement of potable supply with sea water
123	123	RWH	Dual supply in coastal developments
124	124	Encouraging and advice on rainwater harvesting in new build non-households	
125	125	RWH	Installation of rainwater harvesting in existing households
126	126	RWH	Installation of rainwater harvesting in existing non-households

127	127	Improvements to step testing to drive efficiency	Leakage
128	*128*	*Increase pressure for leak detection*	Leakage
129	129	Optimise pressure management / robust real time pressure management	Leakage
130	130	Pressure bursting discs Pressure control valves	Leakage
131	131	Leakage	Additional Pressure Management
132	132	Explore PRV noise reduction methods	Leakage
133	133	Grey water reuse (GWR)	Treated greywater reuse in existing households.
134	134	Treated greywater reuse in new households.	
135	135	GWR	Untreated greywater reuse in commercial/public sector buildings
136	136	GWR	Untreated greywater reuse in new households
137	137	GWR	Untreated greywater reuse in existing households
138	138	GWR	Untreated greywater reuse in industrial buildings
139	139	GWR	Dual supply with greywater
140	140	GWR	Water only company
141	142	Water efficiency	Targeted water efficiency advice for designers of hot water systems, taps and water using appliances
142	143	Water efficiency	Targeted water efficiency advice for household customers
143	146	Water efficiency	Targeted water efficiency advice for public sector customers
144	145	Labelling water consumption of appliances	
145	147	Water efficiency	Targeted water efficiency advice for purchasers of water using appliances
146	148	Water efficiency	Targeted water efficiency advice for recreation facilities
147	149	Water efficiency	
148	150	Water efficient white goods	
149	151	Water efficiency	Appliance exchange programmes
150	152	Water efficiency	
151	153	Cistern displacement devices	

152	154	Water efficiency	Subsidy to appliance manufacturers
153	155	Water efficiency	Subsidy to customers that purchase water efficient appliances
154	156	Water efficiency	Composting toilets
155	157A	Dual flush toilets (social housing)	
156	157b	Dual flush toilets (private sector landlords)	
157	158	Water efficiency	Encouraging or requiring greater use of water saving technology in new or existing buildings:
158	159	Water efficiency	Fitting new toilets
159	160	Water efficiency	Fitting of showers
160	161	Water efficiency	Fitting 'people detectors'
161	162	Water efficiency	Flush controllers for urinals
162	163	Water efficiency	Limited purchase or use of instantaneous water heaters/boilers
163	164	Water efficiency	Limiting purchase/use of 'power showers'
164	165	Water efficiency	Low flow showerheads
165	166	Water efficiency	Low flush toilets
166	170	Water efficiency	Shallow trap toilets
167	171	Water efficiency	Spray taps
168	172	Water efficiency	Timing devices
169	172	Water efficiency	Timing devices
170	173	Water efficiency	Trigger nozzles for hoses
171	174	Water efficiency	Waterless urinals
172	175	Develop procedure for abandoned mains	Leakage
173	176	Improve interdepartmental information sharing	Leakage
174	177	Reduce	Leakage
175	178	Raw water and WTW leakage reduction	Leakage
176	179	Metering	Meter all Wastewater TW
177	180	Leakage driven asset renewal above baseline	Leakage
178	181	ALC targeting improvements	Leakage
179	182	Reduce leaks on new assets	Leakage
180	183	Review and strengthen current CSPL reduction programme	Leakage

181	184	Incentives and gamification for customer leakage reporting	Leakage
182	185	Improved DMAs	Leakage
183	186	Improved leakage detection and location techniques	Leakage
184	187	Improved productivity of ALC processes	Leakage
185	188	Remote sensing	Leakage
186	193	Internally plumbed Rainwater Tanks (IPRWT) on all new builds/ developments.	
187	200	Partnership with retailers for more efficient white goods	
188	203	Discounted tariff	
189	204	Treated greywater reuse in new non households.	
190	205	Quality of new developments	