Water Resources Management Plan 2024

Technical Appendix X - Investment Model Outputs

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Introduction

X.1 Appendix X provides additional information and summary outputs produced by the WRSE Investment Model (IVM).

X.2 Since the revised draft WRMP24, a new section has been added on option and programme level best value metrics.

X.3 Further IVM run dossiers have also been added covering the additional cost sensitivity runs for Teddington DRA and SESRO.

IVM Run Dossiers

X.4 Each run dossier contains information from the IVM on:

- Metadata – How the run is configured
- Metrics – Information and breakdowns for all the metrics in the categories Cost, Environmental and Social (including Carbon) and Resilience
- Scheme plots – Bubble charts of options by pathway
- Option type utilisation
- Sankey plots
- Hex plots

X.5 Please note that the Metadata, metric information and Hex plots are provided **at regional-level**. The scheme plots, utilisation plots and Sankey plots are at **company-level.**

X.6 There is a dossier for each of the following model runs cited in Section 10:

- Overall Best Value Plan
- Cost-based
  - Adaptive Least Cost Plan (STPR)
- Wider BVP Metric-based
  - Best Environmental and Society Plan
  - Resilience-focused Plan
  - General BVP Uplift Plan
- Sensitivity analysis
  - Demand Management Policy:
    - Company-led Low basket only
    - Government-led hybrid H only
    - Government-led hybrid G only
  - Option availability/capability:

    - No SESRO
    - No SESRO or STT
    - Only SESRO 150Mm^3 available
    - Only SESRO 125Mm^3 available
    - Only SESRO 100Mm^3 available
    - Only SESRO 75Mm^3 available
    - No Teddington DRA
    - Upsize Grand Union Canal transfer to 100 Ml/d
    - Beckton recycling 50 in 2033
    - Beckton recycling 100 in 2033
    - Beckton recycling 150 in 2033
- Drought Resilience policy date changes
    - 1:500 in 2035 (instead of 2040)
    - 1:500 in 2045 (instead of 2040)
    - 1:500 in 2050 (instead of 2040)
    - 1:200 in 2035 (instead of 2030)
- Base Supply Capability
    - Gateway 50 Ml/d
    - Lower Thames Reductions
    - Lower Thames Reductions (mitigated by Tunnel)
    - WBGWS withdrawn in 2040
    - WBGWS withdrawn in 2050
    - ESW Export increased in 2030 (instead of 2035)
- Combinations:
    - Gov-led H + No SESRO
    - Gov-led H + SESRO 125Mm^3
    - Gov-led H + SESRO 100Mm^3
    - Gov-led H + SESRO 75Mm^3
    - Gov-led G + SESRO 150Mm^3
    - Gov-led G + SESRO 125Mm^3
    - Gov-led G + SESRO 100Mm^3
    - Gov-led G + SESRO 75Mm^3
    - Resilience + SESRO 150Mm^3
    - Resilience + SESRO 125Mm^3

- Resilience + SESRO 100Mm^3
- Resilience + SESRO 75Mm^3
- E&S + SESRO 150Mm^3
- E&S + SESRO 125Mm^3
- E&S + SESRO 100Mm^3
- E&S + SESRO 75 Mm^3
- General BVP + SESRO 150Mm^3
- General BVP + SESRO 125Mm^3
- General BVP + SESRO 100Mm^3
- General BVP + SESRO 75Mm^3

– Cost sensitivity

- Teddington DRA OB uplift – 10%, 20%, 50%, 100% and 200% (all options available)
- Teddington DRA OB uplift – 200%, 300%, 400%, 500%, 600% and 700% (strategic alternatives only)
- SESRO OB uplift – 20%, 30%, 40%, 50%, 60%

Interpreting the plots

Option selection plots

X.7 These plots show when an option is first utilised by the model along each of the 9 pathways (shown from 1-9, top to bottom), over the planning period.

X.8 Each dot represents a single scheme, with the dots coloured by type and sized by total capacity (not utilisation, which will vary across the planning period). The focus is on resource development/transfer options. Demand management is not shown.

X.9 An option can only be selected once in each pathway.

X.10 The Severn-Thames transfer is classified as a Direct River Abstraction (red dot), so for example, in the Overall BVP dossier you can see a large red dot in pathways 1 and 4 (representing the unsupported transfer and Netheridge sweetening flow), in 2050 and then further smaller red dots through to the early 2060s as additional support elements are utilised.

Sankey plots

X.11 Sankey plots provide a high-level interpretation of the supply demand balance and the relative volumetric contribution of new options by option type.

X.12 Four time-slices are shown: 2026, 2040, 2050 and 2075.

X.13 The colour-coding is automatic and is not consistent/relevant for this plot type.

X.14 The option types, for clarity, include:

- Loss reduction = Demand management measures

- Change in levels of service = Drought intervention measures (e.g. TUBs and NEUBs)
- Direct River Abstraction includes Teddington DRA and the STT options
- Reclaimed water = Effluent re-use
- Exports includes the Thames to Southern and Thames to Affinity transfers, although it is likely that they would not be an export from 'TW' to either company, but an arrangement based on part-ownership of different assets.

Hex plots

X.15 The hex plots illustrate how water moves into and around the region, and how this will change under the proposals in our draft plan. The hexagons in the plots are either:

- The individual water resource zones (WRZs) in the South East region, and WRZ outside of the region that provide a transfer of water either into or out of the region.
- Zones have been included for investment modelling purposes only, which represent transfer and distribution constraints in the WRSE network.

X.16 Four time-slices are shown: 2026, 2040, 2050 and 2075.

X.17 Each of the plots shows transfers at a particular point in time, under our 1:500 DYAA planning scenario. The thicker the lines between the WRZ, the larger the transfer. The plots demonstrate how increased connectivity within the region, and from other regions, will significantly increase the flow of water that is transferred over time. All of the plots represent the position under our reported pathway – situation 4.

X.18 A key for the abbreviations used in the plots is provided in the table below.

WRZ	Water Company	Zone Name
AZ1	Affinity Water	Misbourne
AZ2		Colne
AZ3		Lee
AZ4		Pinn
AZ5		Stort
AZ6		Wey
AZ7		Dour
PRT	Portsmouth Water	Portsmouth
SES	SES Water	SES
RZ1	South East Water	Tunbridge Wells
RZ2		Haywards Heath
RZ3		Eastbourne
RZ4		Bracknell
RZ5		Farnham
RZ6		Maidstone
RZ7		Cranbrook
RZ8		Ashford
HAZ	Southern Water	Hampshire Andover
HKZ		Hampshire Kingsclere

WRZ	Water Company	Zone Name
HRZ		Hampshire Rural
HSE		Hampshire Southampton East
HSW		Hampshire Southampton West
HWZ		Hampshire Winchester
IOW		Isle of Wight
KME		Kent Medway East
KMW		Kent Medway West
KTZ		Kent Thanet
SBZ		Sussex Brighton
SHZ		Sussex Hasting
SNZ		Sussex North
SWZ		Sussex Worthing
GUI	Thames Water	Guildford
HEN		Henley
KVZ		Kennet Valley
LON		London
SWA		Slough, Wycombe and Aylesbury
SWX		Swindon and Oxfordshire

Zone	Water Company	Zone Name
HON	Modelling purposes only	Honor Oak Junction
HTE		Havant Thicket Exchange
KGV		King George V Junction
OTT		Otterbourne Junction
PWE		Portsmouth Water East
RA4		Raw AZ4 Junction
STR		Strategic Thames Resource
STT		Severn Thames Junction
T2S		Thames to Southern Junction
TWD		Testwood Junction
TWJ		Thames-Weirwood Junction
UTC		Upper Thames Constrained
UTJ		Upper Thames Junction
WLJ		West London Junction
WWD		Weirwood Junction

Table X-1: Hex plot abbreviations

Best Value metrics

X.19 There are eight individual Best Value Plan (BVP) metrics, not including cost and carbon, used to develop the regional plan and our WRMP. These are:

- Environmental:
  - Strategic Environmental Assessment (SEA) benefit
  - SEA dis-benefit

  - Natural Capital
  - Biodiversity Net Gain
- Resilience:
  - Reliability
  - Evolvability
  - Adaptability
- Social
  - Customer option preferences

X.20 Values for each of these metrics are produced at the ***option-level*** (ie. for each individual option that could form part of a solution to forecast deficits).

X.21 The options are then formed into programmes by the investment model and ***programme-level*** totals are calculated for each BVP metric, based on the combination of options that are selected.

X.22 Aggregate best value metrics are calculated for each run by bringing programme-level BVP scores together for the Environmental or Resilience metric categories, or across all categories to produce an overall BVP metric.

Option-level Best Value metrics

X.23 In Table X-2 below we show the option-level best value metric scores.

X.24 In Table X-3 below we show the option-level cost, carbon and electricity values.

X.25 When reviewing the tables and comparing with the WRMP Tables, please note:

- In the BV Metrics table, 100% of the cost/carbon of SESRO is presented. In the WRMP Tables, only the TW portion of that cost (55%) is included.
- In the BV metrics table, only the initial capex and embodied carbon required to construct each option is included. In the WRMP Tables, the cost and carbon associated with replacement of assets over each option's life is included.
- The BV metrics table is inclusive of costs to plan, develop, and acquire land associated with each option. The same is true of the WRMP Tables.
- Where there are resource options which are dependent on specific "system" elements, in the WRMP Tables the system elements are presented as aggregated with the resource option. In the BV metrics table, resource and system elements are presented separately.
- Variable costs, emissions and electricity requirements are presented as an average over 80 years. In most cases variable opex, carbon emissions and electricity do not vary over the planning period and so this has no impact
- Opex stated is inclusive of electricity costs. Operational carbon emissions are not inclusive of emissions from electricity, as variable emissions factors from electricity are included

Programme-level Best Value metrics

X.26 When the WRSE investment model is run, the programme-level best value metric scores for each pathway are calculated by summing up each individual option's BVP metric score, considering the number of years the scheme is selected for.

X.27 Given that many of the metrics are in different units and their assessed values have different orders of magnitude, we normalise the raw scores to allow summations and averages to be calculated. This ensures that the scale of one metric does not dominate the decision-making process for the entire plan as some metric scores are in the thousands and others are in single units. Additionally, some metrics may be monetised whereas others cannot be.

X.28 Runs are grouped together according to the input dataset used in the investment modelling. This means that the pathways and data used to generate the investment plan are consistent and comparable with each other.

X.29 The process for normalising each metric converts each raw score into a normalised score between 0 and 100. For all the runs in a selected group, the minimum raw score for a specific metric and pathway is set as zero and the maximum score for a specific metric and pathway is set to one hundred. The raw value of the metric is then used to derive a score between 0 and 100.

$$Normalised\ value = \frac{(Metric\ value - Minimum\ metric\ value)}{(Maximum\ metric\ value - Minimum\ metric\ value)}$$

X.30 This calculation is undertaken for each metric in each pathway of the plan.

X.31 In table X-4 below we show for each IVM run, the normalised metric scores (average of pathways 1-9) for each of the individual BVP metrics.

Programme-level, aggregated Best Value metrics

X.32 The aggregated metric scores for each run calculated as follows:

$$Env\ and\ Social\ BVP\ Aggregate = \frac{(N\ Nat\ Cap + N\ BING + N\ SEA{+}'ve + N\ SEA{-}'ve + N\ Cust\ Pref)}{5}$$

$$Resilience\ BVP\ Aggregate = \frac{(N\ Evol + N\ Rel + N\ Adapt)}{3}$$

$$Overall\ BVP\ Aggregate = \frac{(N\ Nat\ Cap + N\ BING + N\ SEA{+}'ve + N\ SEA{-}'ve + N\ Cust\ Pref + N\ Evol + N\ Rel + N\ Adapt)}{8}$$

X.33 In the table X-4 we show the aggregated metric scores (average of pathways 1-9) for each IVM run.

X.34 Better performing plans will have higher average scores than poorer performing plans.

Table X-2: Option-level Best Value Metrics

		Environmental					Social	Resilience										
								Reliability							Adaptability		Evolvability		
Option ID	Option Name	SEA Environmental Benefit	SEA Environmental Disbenefit	Natural Capital	Biodiversity Net Gain	Biodiversity Net Gain (above target)	Customer Preference	R1 – Uncertainty of option supply/demand benefit	R3 – Risk of failure of planned service due to other physical hazards	R5 – Catchment/raw water quality risks (incl. climate change)	R6 – Capacity of catchment sources	R7 – Risk of failure of planned service due to exceptional shocks	R8 – Improvements to soil health	A3 – Operational complexity and flexibility	A7 – Customer engagement with demand restrictions	E1 – Scalability and modularity of proposed changes	E2 – Intervention lead times	E3 – Reliance on external bodies to deliver changes
DESALINATION																		
TWU_LON_HI-DES_ALL_CNO_beckton desal 150	Beckton Desalination - 150 Ml/d - Construction	8	-24				1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_CNO_beckton desal 100p1	Beckton Desalination - Phase 1: 100 Ml/d - Construction	8	-24				1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_CNO_beckton desal 50 p1	Beckton Desalination - Phase 1: 50 Ml/d - Construction	4	-24				1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_ALL_beckton desal 50p2a	Beckton Desalination - Phase 2a: 50 Ml/d Enhanced	4	-24				1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_ALL_beckton desal 50p2b	Beckton Desalination - Phase 2b: 50 Ml/d Enhanced	4	-24				1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_ALL_crossnessdesal100p2	Crossness Desalination (Blended) - 100Ml/d Enhanced	8	-22	-140	-126	-141	1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_ALL_crossnessdesal50p2	Crossness Desalination (Blended) - 50Ml/d Enhanced	4	-23	-140	-126	-141	1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_CNO_crossnessdesal100p1	Crossness Desalination (Blended) - Phase 1: 100 Ml/d - Construction	8	-24	-140	-126	-141	1.01	4	2	3		1		1		3	1	2
TWU_LON_HI-DES_ALL_CNO_crossnessdesal50p1	Crossness Desalination (Blended) - Phase 1: 50 Ml/d - Construction	4	-24	-140	-126	-141	1.01	4	2	3		1		1		3	1	2
DIRECT RIVER ABSTRACTION																		
TWU_STT_HI-RAB_RE1_ALL_p3-300-vyrnwy_50	300: Lake Vyrnwy stage 1 (25Mld - 0-25)	0	0	0	0	0	1.12	3	3	2.71		3		2		2	1	3
TWU_STT_HI-RAB_RE1_ALL_p4-300-vyrnwy_75	300: Lake Vyrnwy stage 2 (25Mld - 26-50)	1	-4	-4109	17	0	1.12	3	3	2.71		3		2		2	1	3
TWU_STT_HI-RAB_RE1_ALL_p9-300-vyrnwy_100_b	300: Lake Vyrnwy stage 3 (30Mld - 51-80)																	
TWU_STT_HI-RAB_RE1_ALL_p7-300-vyrnwy_135_b	300: Lake Vyrnwy stage 4 (30Mld - 81-110)	0	0	0	0	0	1.12	3	3	2.71		3		2		2	1	3
TWU_STT_HI-RAB_RE1_ALL_p8-300-vyrnwy_155_b	300: Lake Vyrnwy stage 5 (30Mld - 111-140)	0	0	0	0	0	1.12	3	3	2.71		3		2		2	1	3
TWU_STT_HI-RAB_RE1_ALL_p10-300-vyrnwy_180_b	300: Lake Vyrnwy stage 6 (20Mld - 141-160)																	
TWU_STT_HI-RAB_RE1_ALL_p6-300-shrewsbury_25	300: Lake Vyrnwy stage 7 (20Mld - 161-180)	0	0	0	0	0	1.12	3	3	2.71		3		2		2	1	3
TWU_U7T_HI-RAB_RE1_ALL_p1-300-unsupported	300: Unsupported flow	21	-55	-72908	113	6	1.12	3	3	2.71		3		2		2	5	3
TWU_STT_HI-RAB_RE1_ALL_p3-400-vyrnwy_50	400: Lake Vyrnwy stage 1 (25Mld - 0-25)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p4-400-vyrnwy_75	400: Lake Vyrnwy stage 2 (25Mld - 26-50)	1	-4	-4109	17	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p9-400-vyrnwy_100_b	400: Lake Vyrnwy stage 3 (30Mld - 51-80)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p7-400-vyrnwy_135_b	400: Lake Vyrnwy stage 4 (30Mld - 81-110)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p8-400-vyrnwy_155_b	400: Lake Vyrnwy stage 5 (30Mld - 111-140)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p10-400-vyrnwy_180_b	400: Lake Vyrnwy stage 6 (20Mld - 141-160)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_STT_HI-RAB_RE1_ALL_p6-400-shrewsbury_25	400: Lake Vyrnwy stage 7 (20Mld - 161-180)	0	0	0	0	0	1.12	3	3	2.71		3		2		3	1	3
TWU_U7T_HI-RAB_RE1_ALL_p1-400-unsupported	400: Unsupported flow	21	-55	-72908	113	6	1.12	3	3	2.71		3		2		3	5	3
TWU_STT_HI-RAB_RE1_ALL_p3-500-vyrnwy_50	500: Lake Vyrnwy stage 1 (25Mld - 0-25)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p4-500-vyrnwy_75	500: Lake Vyrnwy stage 2 (25Mld - 26-50)	1	-4	-4109	17	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p9-500-vyrnwy_100_b	500: Lake Vyrnwy stage 3 (30Mld - 51-80)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p7-500-vyrnwy_135_b	500: Lake Vyrnwy stage 4 (30Mld - 81-110)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p8-500-vyrnwy_155_b	500: Lake Vyrnwy stage 5 (30Mld - 111-140)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p10-500-vyrnwy_180_b	500: Lake Vyrnwy stage 6 (20Mld - 141-160)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_STT_HI-RAB_RE1_ALL_p6-500-shrewsbury_25	500: Lake Vyrnwy stage 7 (20Mld - 161-180)	0	0	0	0	0	1.12	3	3	2.71		3		2		4	1	3
TWU_U7T_HI-RAB_RE1_ALL_p1-500-unsupported	500: Unsupported flow	21	-55	-72908	113	6	1.12	3	3	2.71		3		2		4	5	3
TWU_TED_HI-RAB_RE1_CNO_teddington dra 75	Teddington DRA 75 MLD - Construction	18	-15	14300	0		1.12	2	3	2.71		3		2		3	2	1
TWU_TED_HI-RAB_RE1_CNO_teddington dra 50	Teddington DRA 50 MLD - Construction	10	-15	14300	0		1.12	2	3	2.71		3		2		3	2	1
GROUNDWATER																		
TWU_SWX_HI-GRW_ALL_ALL_ashton keynes roc	Ashton Keynes borehole pumps - Removal of Constraints to DO	1	-19				1.17	2	3	3.00		3		3		3	5	3
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	ASR Horton Kirby	3	-15	-39	-7	-8	1.17	1	2	3.00		3		3		4	3	3
TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg	Dapdune Licence Disaggregation	1	-2				1.17	2	3	3.00		3		3		3	5	3

TWU_GUI_HI-GRW_ALL_ALL_dapdune roc	Dapdune Licence Disaggregation	2	-12				1.17	2	3	3.00		3		3		3	4	3
TWU_SWA_HI-GRW_ALL_ALL_datchet do	Datchet Increase DO	1	-14				1.17	2	3	3.00		3		3		3	3	3
TWU_SWA_HI-GRW_ALL_ALL_dorney do	Dorney Increase DO	2	-14				1.17	2	3	3.00		3		3		3	3	3
TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc	East Woodhay borehole pumps Removal of Constraints to DO	1	-5				1.17	2	3	3.00		3		3		3	4	3
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Addington	2	-15				1.17	2	3	3.00		3		3		3	4	3
TWU_LON_HI-GRW_ALL_ALL_honor oak gw	GW – Honor Oak	1	-14				1.17	2	3	3.00		3		3		3	4	3
TWU_LON_HI-GRW_ALL_ALL_honoroak do	Honor Oak Increase DO	2	-12				1.17	2	3	3.00		3		3		3	3	3
TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars	Kidbrooke Aquifer Recharge/Aquifer Storage and Recovery (SLARS1)	2	-19				1.17	1	2	3.00		3		3		4	2	3
TWU_LON_HI-GRW_ALL_ALL_london conchalk	London Confined Chalk (north)	2	-14				1.17	2	3	3.00		3		3		3	3	3
TWU_LON_HI-GRW_ALL_CNO_merton ar	Merton Aquifer Recharge (SLARS3) - Construction	1	-15				1.17	1	2	3.00		3		3		4	2	3
TWU_LON_HI-GRW_ALL_ALL_merton recommission	Merton Recommissioning	2	-12				1.17	2	3	3.00		3		3		3	4	3
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	Mortimer Disused Source (Recommission)	1	-4				1.17	2	3	3.00		3		3		3	4	3
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Moulsford 1	1	-17				1.17	2	3	3.00		3		3		3	4	3
TWU_LON_HI-GRW_ALL_ALL_addington asr	South East London (Addington) Aquifer Storage and Recovery	1	-10				1.17	1	2	3.00		3		2		4	1	2
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Southfleet/Greenhithe (new WTW)	1	-12	-36	-16	-20	1.17	2	3	3.00		3		3		3	3	3
TWU_LON_HI-GRW_ALL_ALL_streatham ar	Streatham Aquifer Recharge (SLARS2)	1	-9				1.17	1	2	3.00		3		3		4	3	3
TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo	Taplow Increase DO	1	-17				1.17	1	3	3.00		3		3		3	3	3
TWU_LON_HI-GRW_ALL_ALL_thames valley asr	Thames Valley Central Aquifer Storage and Recovery	3	-15	-366	-27	-31	1.17	1	2	3.00		3		2		4	1	2
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Woods Farm Increase DO	2	-16	-85	-12	-15	1.17	2	3	3.00		3		3		3	3	3
TWU_LON_HI-TFR_LON_ALL_nrv-groundimprov	New River Head - Ground improvements						1.17	0	0	0.00	0	0	0	0	0	0	0	0
INTER COMPANY TRANSFERS																		
TWU_STT_HI-TFR_STT_ALL_stt-sesro p1	STT-SESRO Link P1	1	-2	0	0	-1	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_STT_HI-TFR_STT_ALL_stt-sesro p2	STT-SESRO Link P2	1	-2	0	0	-1	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_GUI_EF-TFR_REP_ALL_reigatetoguires	Potable Resource for Reigate to Guildford transfer						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_GUI_EF-TFR_REP_ALL_sewtogui res	Potential resource for SEW to Guildford transfer						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_EF-TFR_REP_ALL_cheammertres	Cheam to Merton - London Ring Main						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_SES_ALL_cheam-merton	Cheam to Merton - London Ring Main						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford20	Reigate to Guildford 20Ml/d	1	-13	-1109	-26	-44	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford5	Reigate to Guildford 5Ml/d	1	-13	-1109	-26	-44	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_GUI_HI-TFR_RZ4_ALL_sewtogui	SouthEast Water to Guildford						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_SES_ALL_woodman-epsom p	Woodmansterne WTW to Epsom Downs: 10Ml/d	1	-10	-311	-19	-25	1.17	0	0	0.00	0	0	0	0	0	0	0	0
AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph1	Thames to Affinity Transfer - Conjunctive Use Benefit						1.00	4	4	3.00		3		2		3	3	3
AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph2	Thames to Affinity Transfer - Conjunctive Use Benefit						1.00	4	4	3.00		3		2		3	3	3
INTER ZONAL TRANSFERS																		
TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4	Henley to SWA - 2.4 Ml/d	1	-11	-1152	-9	-14	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_HI-TFR_HEN_ALL_henley-swa5	Henley to SWA – 5 Ml/d	2	-12	-1152	-9	-14	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4	Henley to SWOX – 2.4 Ml/d	2	-9	-5433	-19	-24	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	Henley to SWOX – 5 Ml/d	1	-15	-894	-83	-95	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_EF-TFR_REP_ALL_kennetvresource	Kennet Valley resource						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3	Kennet Valley to SWOX - 2.3 Ml/d	1	-16	-4089	-23	-30	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7	Kennet Valley to SWOX - 6.7 Ml/d	1	-13	-1208	-57	-67	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_EF-TFR_REP_ALL_henleytoswaresource	Potential Henley resource for SWA						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_EF-TFR_REP_ALL_henleytoswoxresource	Potential Henley resource for SWOX						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_EF-TFR_REP_ALL_swoxexportn	SWOX SWA North Export						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KEM_EF-TFR_RE1_ALL_tedd-kempton res	Teddington to Kempton (displacement of water) resource						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	Interzonal transfer (T2ST): Kennet Valley spurt o Speen (10Ml/d)	1	-22	-6	-4	-5	1.17	0	0	0.00	0	0	0	0	0	0	0	0
NETWORK REINFORCEMENT																		
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	Replace New River Head Pump	8	-5				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_EF-TFR_REP_ALL_hontolonres	Potential Resource in Honor Oak for London						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_HON_EF-TFR_REP_ALL_lontohonres	Potential Resource in London to Honor Oak						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_HI-TFR_SWX_ALL_swoxswa48	SWOX to SWA 48 Ml/d (Abingdon WTW to Long Crendon to supply SWA)	4	-16	-1228	-240	-293	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_HI-TFR_SWX_ALL_swoxswa72	SWOX to SWA 72 Ml/d (Abingdon WTW to Long Crendon to supply SWA)	8	-16	-3687	-100	-135	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_CNO_beckton-coppermills	Beckton to Coppermills tunnel (treated) - Construction	8	-21				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_brookps-hoddeson	Brookfield Lane (Cheshunt) PS to Hoddeson SR						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_copperwtw-woodford	Coppermills Tunnel to Woodford						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_coppertofinsparkfmz	Coppermills WTW to Finsbury Park FMZ						1.46	0	0	0.00	0	0	0	0	0	0	0	0

TWU_LON_HI-ROC_NET_CNO_crossness-beckton	Crossness to Beckton tunnel (treated) - Construction	8	-17				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_kemptonwtw-hampton	Kempton WTW to Hampton Shaft						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_kemptonwtw-merton	Kempton WTW to Merton Shaft						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_merton-hampton	Merton Shaft to Hampton 36" FMZ"						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-ROC_NET_CNO_twrm shaft kempton	New shaft on the TWRM at Kempton (NET-TWRM-KEM) - Construction	8	-13				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_barrowhillpump	Replace pump infrastructure at Barrow Hill	4	-3				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_battersea-nunhead	TWRM Battersea Shaft to Nunhead Lower SR						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak	TWRM extension - Coppermills to Honor Oak - Construction	8	-18				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_CNO_hampton-battersea	TWRM extension - Hampton to Battersea - Construction	8	-17				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_twrm ht-coppermills	TWRM level controlled by new header tank and PS at Coppermills WTW	1	-22				1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_parklanetoputneyps	TWRM Park Lane Shaft to Putney Pumping Station						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_streathamtonorwood	TWRM Streatham shaft to Norwood						1.46	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-ROC_NET_ALL_woodford-chigwell	Woodford PS to Chigwell SR						1.46	0	0	0.00	0	0	0	0	0	0	0	0
RAW WATER CONVEYANCE																		
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	Abingdon to Farmoor Reservoir pipeline (CON-RWS-ABI-FMR)	1	-14	-53	-92	-111	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-TFR_WLJ_CNO_qm res-kempton wtw	Additional conveyance from Queen Mary Reservoir to Kempton WTW	9	-13	-588	-6	-8	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_HI-TFR_KGV_ALL_beckton to lockwood	Beckton to Lockwood Tunnel						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_ALL_ch'ford s intake	Chingford South (above Chingford Mill) intake capacity increase	8	-24				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_STT_HI-IMP_STT_CNO_sttcanal300(min)	Cotswold Canal 300 Ml/d (Do Min) - with treatment - Construction						1.03	0	0	0.00		0		0		0	0	0
TWU_LON_HI-TFR_LON_ALL_datchet int-qm	Datchet intake capacity increase with transfer to QM and Wraysbury Reservoirs	4	-20				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_HI-TFR_TED_ALL_teddingtondrated/tlt	Direct River Abstraction - Teddington to Thames Lee Tunnel Shaft 100 MLD						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Dukes Cut to Farmoor	2	-11	0	-65	-78	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_HI-TFR_KGV_ALL_kgv res intake	King George V Reservoir intake capacity increase	8	-22				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_HI-TFR_KGV_ALL_kgv res to bt	King George V Reservoir intake capacity increase	8	-13				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_ALL_littleton int-qm	Littleton intake capacity increase with transfer to Queen Mary	8	-24				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53	Medmenham intake - 53	8	-13	-87	-1	-1	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 80	Medmenham intake - 80	8	-19	-87	-1	-1	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_TED_HI-TFR_TED_ALL_teddingtondramog/ted	Mogden to Teddington outfall 100 Ml/d						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-TFR_WLJ_ALL_lowerthamesintake	New Lower Thames Intake - Surbiton						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney	River Thames to Fobney Transfer	4	-18	-25	-15	-18	1.17	0	0	0.00		0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_CNO_second spine tunnel	Second Spine Tunnel from break tank to Reservoir 5 u/s Coppermills WTW	8	-20				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_CNO_surbiton int-walton	Surbiton intake capacity increase with transfer to Walton inlet channel	8	-16	-38	-1	-2	1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-TFR_WLJ_ALL_teddingqmreservoir	Teddington to QM Reservoir						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_EF-TFR_RE1_ALL_ted/tlt resource	Teddington to TLT Resource						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	TLT extension from Lockwood PS to King George V Reservoir intake						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_CNO_tlt upgrade - roc	TLT upgrade to remove existing constraints to maximise transfer capacity	8	-18				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-TFR_WLJ_ALL_walton-qmreservoir	Walton to QM Reservoir						1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_LON_HI-TFR_LON_CNO_beckton-crossness	Beckton to Crossness transfer - Construction	8	-23				1.17	0	0	0.00	0	0	0	0	0	0	0	0
TWU_WLJ_HI-TFR_WLJ_ALL_reuse mogden/walton	Reuse Mogden to Walton 150 MLD						1.17	0	0	0.00	0	0	0	0	0	0	0	0
RAW WATER PURCHASE																		
TWU_LON_HI-OTH_ALL_ALL_didcot purchase	Didcot Raw Water Purchase						1.00	4	3	3.00		3		2		4	5	4
TWU_WLJ_EF-TFR_RE1_ALL_egham resource	Lower Thames Licence Trade						1.17	0	0	0.00	0	0	0	0	0	0	0	0
RAW WATER TRANSFER																		
TWU_STT_HI-REU_RE1_ALL_p7-300-minworth_115	300: Minworth STW effluent diversion (115Mld) - phase 1	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		2	1	2
TWU_STT_HI-REU_RE1_ALL_p11-300-min_115_p2	300: Minworth STW effluent diversion (115Mld) - phase 2	0	0	0	0	0	1.15	3	2	2.71		3		1		2	1	2
TWU_STT_HI-REU_RE1_ALL_p-300-minworth_all	300: Minworth STW effluent diversion (115Mld) - All	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		2	1	2
TWU_STT_HI-REU_RE1_ALL_p-400-minworth_all	400: Minworth STW effluent diversion (115Mld) - All	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		3	1	2
TWU_STT_HI-REU_RE1_ALL_p11-400-min_115_p2	400: Minworth STW effluent diversion (115Mld) - phase 2	0	0	0	0	0	1.15	3	2	2.71		3		1		3	1	2
TWU_STT_HI-REU_RE1_ALL_p7-400-minworth_115	400: Minworth STW effluent diversion (115Mld) - phase 1	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		3	1	2
TWU_STT_HI-REU_RE1_ALL_p7-500-minworth_115	500: Minworth STW effluent diversion (115Mld) - phase 1	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		4	1	2
TWU_STT_HI-REU_RE1_ALL_p11-500-min_115_p2	500: Minworth STW effluent diversion (115Mld) - phase 2	0	0	0	0	0	1.15	3	2	2.71		3		1		4	1	2
TWU_STT_HI-REU_RE1_ALL_p-500-minworth_all	500: Minworth STW effluent diversion (115Mld) - All	0	-8	-22462	34	2	1.15	3	2	2.71		3		1		4	1	2
TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35	300: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline	0	-4	12472	53	1	1.15	3	2	2.71		2		1		2	1	2
TWU_STT_HI-REU_RE1_ALL_p5-400-neth_p35	400: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline	0	-4	12472	53	1	1.15	3	2	2.71		2		1		3	1	2
TWU_STT_HI-REU_RE1_ALL_p5-500-neth_p35	500: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline	0	-4	12472	53	1	1.15	3	2	2.71		2		1		4	1	2
TWU_SWX_RE-DRP_ALL_ALL_dp-oxford canal-swox	DP-Oxford Canal-SWOX						1.00	1	3	1.43		3		2		2	5	2

TWU_UTC_HI-IMP_UTC_CNO_oxcanal-cropredy	Oxford Canal - Cropredy resource - Construction	3	-33	-1722	-287	-498	1.03	3	2	2.71		2		2		2	2	2
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	3	-33	-11162	-276	-480	1.03	3	2	1.71		2		2		2	2	2
TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon)	Raw Water Transfer Deerhurst to Culham 300 Ml/d (Lon only) - Construction						1.03	0	0	0.00		0		0		0	0	0
TWU_STT_HI-IMP_STT_CNO_sttpipe400(lon)	Raw Water Transfer Deerhurst to Culham 400 Ml/d (Lon only) - Construction						1.03	0	0	0.00		0		0		0	0	0
TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon)	Raw Water Transfer Deerhurst to Culham 500 Ml/d (Lon only) - Construction						1.03	0	0	0.00		0		0		0	0	0
RESERVOIRS																		
TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon)	New Reservoir Abingdon 150 Mm3 - 283 MLD (Lon only) - Construction	50	-52	1533830	1603	1024	1.26	3	4	2.71		4		4		1	1	1
TWU_STR_HI-RSR_RE1_CNO_abingdon30+100p1	New Reservoir Abingdon 30 +100 Mm3 Phase 1 - Construction	46	-52	1283790	2254	1675	1.26	3	4	2.71		4		4		2	1	1
TWU_STR_HI-RSR_RE2_CNO_abingdon30+100p2	New Reservoir Abingdon 30 +100 Mm3 Phase 2 - Construction						1.26	3	4	2.71		4		4		1	1	1
TWU_STR_HI-RSR_RE1_CNO_abingdon80+42p1	New Reservoir Abingdon 80 + 42 Mm3 Phase 1 - Construction	46	-52	1420800	1900	1321	1.26	3	4	2.71		4		4		2	1	1
TWU_STR_HI-RSR_RE2_CNO_abingdon80+42p2	New Reservoir Abingdon 80 + 42 Mm3 Phase 2 - Construction						1.26	3	4	2.71		4		4		1	1	1
TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon)	Reservoir Abingdon 100 (Lon) - Construction	46	-52	1629920	2052	1526	1.26	3	4	2.71		4		4		2	1	1
TWU_STR_HI-RSR_RE1_CNO_abingdon75(lon)	Reservoir Abingdon 75 (Lon) - Construction	46	-52	1662030	2282	1780	1.26	3	4	2.71		4		4		2	1	1
TWU_STR_HI-RSR_RE1_CNO_abingdon125(lon)	Reservoir Abingdon 125 (Lon only) - Construction	46	-52	1576010	1785	1223	1.26	3	4	2.71		4		4		1	1	1
TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon_3	Site 36 - Marsh Gibbon Reservoir 30 Mm3 - Construction	13	-26	-44711	860	742	1.26	3	4	3.43		3		4		2	1	2
TWU_STR_HI-RSR_RE1_CNO_res_marshgibbon_2	Site 36 - Marsh Gibbon Reservoir 50 Mm3 - Construction	13	-26	-105118	1090	863	1.26	3	4	3.43		3		4		2	1	2
TWU_STR_HI-RSR_RE1_CNO_res_marshgibbon_1	Site 36 - Marsh Gibbon Reservoir 75 Mm3 - Construction	17	-26	-65384	3072	2891	1.26	3	4	3.43		3		4		2	1	2
TWU_UTC_HI-RSR_RE1_CNO_res_chinnor_2	Site 41 - Chinnor Reservoir 30Mm3 - Construction	13	-20	-225627	1209	1030	1.26	3	4	3.43		3		4		2	1	2
WATER REUSE																		
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5	Deephams Reuse – 46.5 Ml/d, direct to KGV - Construction	4	-16	-140	-12	-14	1.15	4	2	2.57		1		1		3	2	2
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b	Deephams Reuse – 46.5 Ml/d, to TLT - Construction	4	-17				1.15	4	2	2.57		1		1		3	2	2
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 100	Reuse Beckton 100 MLD - Construction	19	-26	1290	5	1	1.15	4	2	2.57		1		1		3	2	2
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 100 p2	Reuse Beckton 100 MLD Enhanced			1290	5	1	1.15	4	2	2.57		1		1		3	3	2
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 150	Reuse Beckton 150 MLD - Construction	19	-26	1290	5	1	1.15	4	2	2.57		1		1		3	1	2
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 150 p2	Reuse Beckton 150 MLD Enhanced			1290	5	1	1.15	4	2	2.57		1		1		3	3	2
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 50	Reuse Beckton 50 MLD - Construction	19	-26	1290	5	1	1.15	4	2	2.57		1		1		3	2	2
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 50 p2	Reuse Beckton 50 MLD Enhanced			1290	5	1	1.15	4	2	2.57		1		1		3	3	2
TWU_WLJ_HI-REU_RE1_CNO_reuse mogden 100 p1	Reuse Mogden 100 MLD Phase 1 - Construction	18	-26	30212	5	1	1.15	4	2	1.71		1		1		3	1	2
TWU_WLJ_HI-REU_RE2_ALL_reuse mogden 100 p2	Reuse Mogden 100 MLD Phase 2			30212	5	1	1.15	4	2	1.71		1		1		3	3	2
TWU_WLJ_HI-REU_RE1_CNO_reuse mogden 50 p1	Reuse Mogden 50 MLD Phase 1 - Construction	10	-26	30212	5	1	1.15	4	2	1.71		1		1		3	1	2
TWU_WLJ_HI-REU_RE2_ALL_reuse mogden 50 p2	Reuse Mogden 50 MLD Phase 2			30212	5	1	1.15	4	2	1.71		1		1		3	3	2
TWU_WLJ_HI-REU_RE1_ALL_reusemogdenssewer25	Reuse Mogden South Sewer Plant 25 Ml/d						1.15	4	2	1.71		1		1		3	2	2
WATER TREATMENT WORKS																		
TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2	Abingdon WTW Enhanced	1	-12	-1343	-15	-18	1.46	5	3	0.00		3		3		3	3	3
TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2_rep_1	Abingdon WTW Enhanced	1	-12	-1343	-15	-18	1.46	5	3	0.00		3		3		3	3	3
TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1	Abingdon WTW Ph1 - Construction	1	-12	-1343	-15	-18	1.46	5	3	0.00		3		3		3	3	3
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana200	Coppermills WTW - Mecana 200Ml/d	1	-27	0	0	0	2.00	4	3	0.00		2		2		3	2	3
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana480	Coppermills WTW - Mecana 480Ml/d	1	-27	0	0	0	2.00	4	3	0.00		2		2		3	2	3
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana680	Coppermills WTW - Mecana 680Ml/d	1	-27	0	0	0	2.00	4	3	0.00		2		2		3	2	3
TWU_LON_HI-ROC_WT2_ALL_eastlondonwtw100p2	East London WTW - 100 Enhanced	8	-21				1.46	5	3	0.00		3		3		3	2	3
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw100p1	East London WTW - 100 P1 - Construction	8	-21				1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw150	East London WTW - 150 - Construction	8	-21				1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw200	East London WTW - 200 - Construction	8	-21				1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw300	East London WTW - 300 - Construction	8	-21				1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT2_ALL_kemptonwtw100 p2	Kempton - 100 Enhanced	9	-17	-6343	-148	-169	1.46	5	3	0.00		3		3		3	2	3
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1	Kempton - 100 Phase 1 - Construction	9	-17	-797	-136	-152	1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw150	Kempton - 150 - Construction	9	-17	-797	-136	-152	1.46	5	3	0.00		3		3		3	1	3
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw300	Kempton - 300 - Construction	9	-21	-797	-136	-152	1.46	5	3	0.00		3		3		3	1	3
TWU_SWA_HI-ROC_WT2_ALL_medmenhamwtw ph2	Medmenham WTW Enhanced	3	-30	-2341	-16	-21	1.46	5	3	0.00		3		3		3	3	3
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1	Medmenham WTW Ph1 - Construction	3	-30	-2341	-16	-21	1.46	5	3	0.00		3		3		3	3	3
TWU_SWX_HI-ROC_WT2_ALL_radcotwtwenhanced	Radcot WTW Enhanced Phase	1	-13	-1143	-49	-63	1.46	5	3	0.00		3		3		3	3	3
TWU_SWX_HI-ROC_WT1_ALL_radcotwtw	Radcot WTW Phase 1	1	-13	-1300	-18	-28	1.46	5	3	0.00		3		3		3	3	3

Table X-3: Option-level Cost, Carbon and Electricity Values

		Cost				Carbon			Electricity			
Option ID	Option Name	Total Base Capex (£) (inc Costed Risk exc OB)	Total Base Capex (£) (inc OB & costed risk)	Average Fixed Opex (£/y)	Average Variable Opex (£/Ml)	Total Base Embodied Carbon (tCO2e)	Average Fixed Operational Carbon (exc Elec) (tCO2e/y)	Average Variable Operational Carbon (exc Elec) (tCO2e/Ml)	Average Fixed (Normal Grid + REGO) Electricity (kWh/y)	Average Variable (Normal Grid + REGO) Electricity (kWh/Ml)	Average Fixed (Generarted) Electricity (kWh/y)	Average Variable (Generated) Electricity (kWh/Ml)
DESALINATION												
TWU_LON_HI-DES_ALL_CNO_beckton desal 150	Beckton Desalination - 150 Ml/d - Construction	509,456,499	661,479,731	3,653,255	482.83	55,041	472.89	0.17	3,921,554	1,899		
TWU_LON_HI-DES_ALL_CNO_beckton desal 100p1	Beckton Desalination - Phase 1: 100 Ml/d - Construction	366,851,314	474,735,048	2,712,833	492.74	36,144	315.62	0.17	2,686,012	1,948		
TWU_LON_HI-DES_ALL_CNO_beckton desal 50 p1	Beckton Desalination - Phase 1: 50 Ml/d - Construction	222,431,807	287,477,392	1,981,159	496.39	20,731	157.58	0.17	1,342,998	1,968		
TWU_LON_HI-DES_ALL_ALL_beckton desal 50p2a	Beckton Desalination - Phase 2a: 50 Ml/d Enhanced	222,431,806	287,432,588	1,981,159	496.31	20,731	157.58	0.17	1,342,998	1,968		
TWU_LON_HI-DES_ALL_ALL_beckton desal 50p2b	Beckton Desalination - Phase 2b: 50 Ml/d Enhanced	222,431,806	287,432,588	1,981,159	496.31	20,731	157.58	0.17	1,342,998	1,968		
TWU_LON_HI-DES_ALL_ALL_crossnessdesal100p2	Crossness Desalination (Blended) - 100Ml/d Enhanced	378,441,411	500,450,265	2,948,731	507.78	43,250	315.18	0.22	2,667,282	1,978		
TWU_LON_HI-DES_ALL_ALL_crossnessdesal50p2	Crossness Desalination (Blended) - 50Ml/d Enhanced	221,840,823	292,682,829	2,020,887	507.92	23,722	157.58	0.17	1,350,632	2,026		
TWU_LON_HI-DES_ALL_CNO_crossnessdesal100p1	Crossness Desalination (Blended) - Phase 1: 100 Ml/d - Construction	378,441,404	500,450,256	2,948,731	507.78	43,250	315.18	0.22	2,667,282	1,978		
TWU_LON_HI-DES_ALL_CNO_crossnessdesal50p1	Crossness Desalination (Blended) - Phase 1: 50 Ml/d - Construction	221,840,822	292,726,821	2,020,887	508.00	23,722	157.58	0.17	1,350,632	2,026		
DIRECT RIVER ABSTRACTION												
TWU_STT_HI-RAB_RE1_ALL_p3-300-vyrnwy_50	300: Lake Vyrnwy stage 1 (25Mld - 0-25)			1,807,236	200.31		58.45	1.14		1,667		
TWU_STT_HI-RAB_RE1_ALL_p4-300-vyrnwy_75	300: Lake Vyrnwy stage 2 (25Mld - 26-50)	182,886,389	242,252,266	2,857,108	169.70	214,158	278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p9-300-vyrnwy_100_b	300: Lake Vyrnwy stage 3 (30Mld - 51-80)			2,168,683	164.97		278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p7-300-vyrnwy_135_b	300: Lake Vyrnwy stage 4 (30Mld - 81-110)			7,244,358	125.47		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p8-300-vyrnwy_155_b	300: Lake Vyrnwy stage 5 (30Mld - 111-140)			2,804,741	154.20		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p10-300-vyrnwy_180_b	300: Lake Vyrnwy stage 6 (20Mld - 141-160)			8,885,372	598.97		362.67	1.12		1,914		
TWU_STT_HI-RAB_RE1_ALL_p6-300-shrewsbury_25	300: Lake Vyrnwy stage 7 (20Mld - 161-180)			2,265,235	209.79		362.67	1.12		1,914		
TWU_U7T_HI-RAB_RE1_ALL_p1-300-unsupported	300: Unsupported flow											
TWU_STT_HI-RAB_RE1_ALL_p3-400-vyrnwy_50	400: Lake Vyrnwy stage 1 (25Mld - 0-25)			1,807,236	200.31		58.45	1.14		1,667		
TWU_STT_HI-RAB_RE1_ALL_p4-400-vyrnwy_75	400: Lake Vyrnwy stage 2 (25Mld - 26-50)	182,886,389	242,252,266	2,857,108	169.70	214,158	278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p9-400-vyrnwy_100_b	400: Lake Vyrnwy stage 3 (30Mld - 51-80)			2,168,683	164.97		278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p7-400-vyrnwy_135_b	400: Lake Vyrnwy stage 4 (30Mld - 81-110)			7,244,358	125.47		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p8-400-vyrnwy_155_b	400: Lake Vyrnwy stage 5 (30Mld - 111-140)			2,804,741	154.20		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p10-400-vyrnwy_180_b	400: Lake Vyrnwy stage 6 (20Mld - 141-160)			8,885,372	598.97		362.67	1.12		1,914		
TWU_STT_HI-RAB_RE1_ALL_p6-400-shrewsbury_25	400: Lake Vyrnwy stage 7 (20Mld - 161-180)			2,265,235	209.79		362.67	1.12		1,914		
TWU_U7T_HI-RAB_RE1_ALL_p1-400-unsupported	400: Unsupported flow											
TWU_STT_HI-RAB_RE1_ALL_p3-500-vyrnwy_50	500: Lake Vyrnwy stage 1 (25Mld - 0-25)			1,807,236	200.31		58.45	1.14		1,667		
TWU_STT_HI-RAB_RE1_ALL_p4-500-vyrnwy_75	500: Lake Vyrnwy stage 2 (25Mld - 26-50)	182,886,389	242,252,266	2,857,108	169.70	214,158	278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p9-500-vyrnwy_100_b	500: Lake Vyrnwy stage 3 (30Mld - 51-80)			2,168,683	164.97		278.12	1.25		2,267		
TWU_STT_HI-RAB_RE1_ALL_p7-500-vyrnwy_135_b	500: Lake Vyrnwy stage 4 (30Mld - 81-110)			7,244,358	125.47		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p8-500-vyrnwy_155_b	500: Lake Vyrnwy stage 5 (30Mld - 111-140)			2,804,741	154.20		270.54	7.60		2,326		
TWU_STT_HI-RAB_RE1_ALL_p10-500-vyrnwy_180_b	500: Lake Vyrnwy stage 6 (20Mld - 141-160)			8,885,372	598.97		362.67	1.12		1,914		
TWU_STT_HI-RAB_RE1_ALL_p6-500-shrewsbury_25	500: Lake Vyrnwy stage 7 (20Mld - 161-180)			2,265,235	209.79		362.67	1.12		1,914		
TWU_U7T_HI-RAB_RE1_ALL_p1-500-unsupported	500: Unsupported flow											
TWU_TED_HI-RAB_RE1_CNO_teddington dra 75	Teddington DRA 75 MLD - Construction	93,291,782	123,835,075	536,879	158.24	37,973	403.06	0.07	112,255	560		
TWU_TED_HI-RAB_RE1_CNO_teddington dra 50	Teddington DRA 50 MLD - Construction	83,194,600	111,505,720	491,781	152.43	32,910	268.86	0.06	176,453	537		
GROUNDWATER												
TWU_SWX_HI-GRW_ALL_ALL_ashton keynes roc	Ashton Keynes borehole pumps - Removal of Constraints to DO	1,281,710	1,424,113			546						
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	ASR Horton Kirby	11,720,319	16,056,837	124,685	89.83	3,558		0.00	94,989	428		
TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg	Dapdune Licence Disaggregation	2,001	2,235									
TWU_GUI_HI-GRW_ALL_ALL_dapdune roc	Dapdune Licence Disaggregation	6,949,973	7,756,532	35,811	380.78	1,006			30,113	1,568		
TWU_SWA_HI-GRW_ALL_ALL_datchet do	Datchet Increase DO	3,303,712	3,810,128	32,528	75.90	804	0.10	0.00	34,014	366		

TWU_SWA_HI-GRW_ALL_ALL_dorney do	Dorney Increase DO	3,068,835	3,494,871	75,950	62.23	714	0.22	0.00	212,026	239		
TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc	East Woodhay borehole pumps Removal of Constraints to DO	1,505,151	1,668,645	10,971		453						
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Addington	4,494,783	4,994,942	48,953	29.29	880			12,564	133		
TWU_LON_HI-GRW_ALL_ALL_honor oak gw	GW – Honor Oak	10,924,954	12,491,688	146,053	269.17	963			112,577	1,301		
TWU_LON_HI-GRW_ALL_ALL_honoroak do	Honor Oak Increase DO	9,174,435	10,364,670	121,078	332.27	906		0.00	67,346	1,653		
TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars	Kidbrooke Aquifer Recharge/Aquifer Storage and Recovery (SLARS1)	62,483,934	84,228,605	265,785	86.99	10,398		0.04	117,795	292		
TWU_LON_HI-GRW_ALL_ALL_london conchalk	London Confined Chalk (north)	10,239,926	11,769,741	69,995	295.70	1,584	0.03	0.05	51,304	1,335		
TWU_LON_HI-GRW_ALL_CNO_merton ar	Merton Aquifer Recharge (SLARS3) - Construction	32,564,292	44,062,024	200,155	113.16	3,545	10.80	0.01	160,618	465		
TWU_LON_HI-GRW_ALL_ALL_merton recommission	Merton Recommissioning	23,189,068	25,530,716	190,491	197.44	4,736	0.11	0.00	86,636	752		
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	Mortimer Disused Source (Recommission)	12,472,318	13,960,687	140,911	143.62	1,055			133,590	515		
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Moulsford 1	4,632,887	5,332,795	32,857	49.72	986			15,841	217		
TWU_LON_HI-GRW_ALL_ALL_addington asr	South East London (Addington) Aquifer Storage and Recovery	12,622,133	17,289,599	164,984	454.75	2,572			372,014	2,152		
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Southfleet/Greenhithe (new WTW)	19,900,738	22,920,909	175,937	118.71	3,615	2.19	0.01	88,498	436		
TWU_LON_HI-GRW_ALL_ALL_streatham ar	Streatham Aquifer Recharge (SLARS2)	25,490,789	33,540,306	292,065	234.48	4,278			284,490	987		
TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo	Taplow Increase DO	3,649,973	4,156,687	71,484	37.30	806	0.02	0.00	169,643	180		
TWU_LON_HI-GRW_ALL_ALL_thames valley asr	Thames Valley Central Aquifer Storage and Recovery	14,848,446	20,411,554	143,792	405.41	2,939			327,641	1,895		
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Woods Farm Increase DO	3,719,043	4,290,020	42,578	113.01	889	0.44		45,852	523		
TWU_LON_HI-TFR_LON_ALL_nrv-groundimprov	New River Head - Ground improvements	3,743,945	5,391,281	31,240	113.52	2,301		0.00	57,214	523		
INTER COMPANY TRANSFERS												
TWU_STT_HI-TFR_STT_ALL_stt-sesro p1	STT-SESRO Link P1	24,015,258	25,753,664	45,622		4,060						
TWU_STT_HI-TFR_STT_ALL_stt-sesro p2	STT-SESRO Link P2	24,015,258	25,753,664	45,622		4,060						
TWU_GUI_EF-TFR_REP_ALL_reigatetoguires	Potable Resource for Reigate to Guildford transfer				0.01							
TWU_GUI_EF-TFR_REP_ALL_sewtogui res	Potential resource for SEW to Guildford transfer				0.01							
TWU_LON_EF-TFR_REP_ALL_cheammertres	Cheam to Merton - London Ring Main				0.01							
TWU_LON_HI-TFR_SES_ALL_cheam-merton	Cheam to Merton - London Ring Main	24,378,616	35,105,207	77,913	1,038.86	4,396			41,114	188		
TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford20	Reigate to Guildford 20Ml/d	67,947,083	97,843,799	237,568	1,132.94	12,405			187,260	641		
TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford5	Reigate to Guildford 5Ml/d	40,789,088	58,736,287	120,945	1,127.84	7,617			44,647	612		
TWU_GUI_HI-TFR_RZ4_ALL_sewtogui	SouthEast Water to Guildford	6,983,603	8,451,542	72,886	1,041.39	1,490			32,490	223		
TWU_LON_HI-TFR_SES_ALL_woodman-epsom p	Woodmansterne WTW to Epsom Downs: 10Ml/d	4,565,309	6,574,044		65.19	1,295				466		
AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph1	Thames to Affinity Transfer - Conjunctive Use Benefit											
AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph2	Thames to Affinity Transfer - Conjunctive Use Benefit											
INTER ZONAL TRANSFERS												
TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4	Henley to SWA - 2.4 Ml/d	8,371,092	9,878,540	40,912	125.14	1,853		0.02	37,429	531		
TWU_SWA_HI-TFR_HEN_ALL_henley-swa5	Henley to SWA – 5 Ml/d	10,135,579	12,009,788	56,171	113.43	2,568	0.17	0.00	76,985	526		
TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4	Henley to SWOX – 2.4 Ml/d	6,479,156	7,982,327	36,855	313.40	1,293		0.00	38,546	1,477		
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	Henley to SWOX – 5 Ml/d	9,576,207	11,832,321	63,353	300.67	2,684		0.00	78,843	1,462		
TWU_SWX_EF-TFR_REP_ALL_kennetvresource	Kennet Valley resource				0.01							
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3	Kennet Valley to SWOX - 2.3 Ml/d	11,229,891	13,639,568	50,726	573.82	2,637	0.15	0.23	9,746	2,088		
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7	Kennet Valley to SWOX - 6.7 Ml/d	13,070,695	15,754,504	61,806	367.67	3,447	0.09	0.14	21,970	1,359		
TWU_SWA_EF-TFR_REP_ALL_henleytoswaresource	Potential Henley resource for SWA				0.01							
TWU_SWX_EF-TFR_REP_ALL_henleytoswoxresource	Potential Henley resource for SWOX				0.01							
TWU_SWA_EF-TFR_REP_ALL_swoxexportn	SWOX SWA North Export				0.01							
TWU_KEM_EF-TFR_RE1_ALL_tedd-kempton res	Teddington to Kempton (displacement of water) resource				0.01							
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	Interzonal transfer (T2ST): Kennet Valley spurt o Speen (10Ml/d)	8,523,703	10,182,834	13,002	0.01	169						
NETWORK REINFORCEMENT												
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	Replace New River Head Pump	870,972	1,054,389	5,908	82.61	278			3,504,000	400		
TWU_LON_EF-TFR_REP_ALL_hontolonres	Potential Resource in Honor Oak for London				0.01							
TWU_HON_EF-TFR_REP_ALL_lontohonres	Potential Resource in London to Honor Oak				0.01							
TWU_SWA_HI-TFR_SWX_ALL_swoxswa48	SWOX to SWA 48 Ml/d (Abingdon WTW to Long Crendon to supply SWA)	219,047,875	267,322,249	603,925	104.94	44,717			932,888	533		
TWU_SWA_HI-TFR_SWX_ALL_swoxswa72	SWOX to SWA 72 Ml/d (Abingdon WTW to Long Crendon to supply SWA)	245,337,503	299,609,272	716,947	91.03	48,902			1,213,945	462		
TWU_LON_HI-TFR_LON_CNO_beckton-coppermills	Beckton to Coppermills tunnel (treated) - Construction	253,987,714	334,843,458	478,980		45,500						
TWU_LON_HI-ROC_NET_ALL_brookps-hoddeson	Brookfield Lane (Cheshunt) PS to Hoddeson SR	27,168,574	39,122,746	66,274	43.06	4,624				206		
TWU_LON_HI-ROC_NET_ALL_copperwtw-woodford	Coppermills Tunnel to Woodford	28,610,180	41,198,659	312,188	51.34	6,324			716,918	246		
TWU_LON_HI-ROC_NET_ALL_coppertofinsparkfmz	Coppermills WTW to Finsbury Park FMZ	141,837,946	204,246,643	190,308		18,921						
TWU_LON_HI-ROC_NET_CNO_crossness-beckton	Crossness to Beckton tunnel (treated) - Construction	124,656,494	164,431,393	200,587		23,472						
TWU_LON_HI-ROC_NET_ALL_kemptonwtw-hampton	Kempton WTW to Hampton Shaft	27,558,444	45,747,017	50,544		6,897						

TWU_LON_HI-ROC_NET_ALL_kemptonwtw-merton	Kempton WTW to Merton Shaft	298,440,759	495,411,660	610,311	54.35	44,924			567,239	259		
TWU_LON_HI-ROC_NET_ALL_merton-hampton	Merton Shaft to Hampton 36" FMZ"	68,181,323	98,181,105		9.97	11,512						
TWU_WLJ_HI-ROC_NET_CNO_twrm shaft kempton	New shaft on the TWRM at Kempton (NET-TWRM-KEM) - Construction	2,095,121	2,748,919	2,509		987						
TWU_LON_HI-ROC_NET_ALL_barrowhillpump	Replace pump infrastructure at Barrow Hill	703,294	825,556	40,153	58.91	254			175,200	285		
TWU_LON_HI-ROC_NET_ALL_battersea-nunhead	TWRM Battersea Shaft to Nunhead Lower SR	65,873,050	109,349,263	151,440	63.79	14,288				305		
TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak	TWRM extension - Coppermills to Honor Oak - Construction	293,440,381	381,701,107	469,471	0.01	53,963						
TWU_LON_HI-ROC_NET_CNO_hampton-battersea	TWRM extension - Hampton to Battersea - Construction	337,926,286	429,164,113	515,537	0.01	64,310						
TWU_LON_HI-ROC_NET_ALL_twrm ht-coppermills	TWRM level controlled by new header tank and PS at Coppermills WTW	25,719,541	31,744,963	192,659	1.76	9,266			722,700	9		
TWU_LON_HI-ROC_NET_ALL_parklanetoputneyps	TWRM Park Lane Shaft to Putney Pumping Station	63,723,825	105,781,550	80,133	52.13	6,544			21,842	249		
TWU_LON_HI-ROC_NET_ALL_streathamtonorwood	TWRM Streatham shaft to Norwood	18,551,484	26,714,136	99,472	96.83	6,389			135,225	463		
TWU_LON_HI-ROC_NET_ALL_woodford-chigwell	Woodford PS to Chigwell SR	60,532,069	87,166,179	161,639	43.61	9,729			152,249	209		
RAW WATER CONVEYANCE												
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	Abingdon to Farmoor Reservoir pipeline (CON-RWS-ABI-FMR)	45,466,852	55,095,906	165,637	64.33	11,966			317,696	326		
TWU_WLJ_HI-TFR_WLJ_CNO_qm res-kempton wtw	Additional conveyance from Queen Mary Reservoir to Kempton WTW	87,742,106	113,861,478	148,482	1.57	16,329				8		
TWU_KGV_HI-TFR_KGV_ALL_beckton to lockwood	Beckton to Lockwood Tunnel	289,455,931	379,351,525	590,880	18.65	59,132			111,031	90		
TWU_LON_HI-TFR_LON_ALL_ch'ford s intake	Chingford South (above Chingford Mill) intake capacity increase	8,133,199	9,466,983	40,819	24.85	2,374				120		
TWU_STT_HI-IMP_STT_CNO_sttcanal300(min)	Cotswold Canal 300 Ml/d (Do Min) - with treatment - Construction	1,048,206,079	1,424,933,270	3,695,254	356.31	263,262	0.03	0.05	270,335	1,542		
TWU_LON_HI-TFR_LON_ALL_datchet int-qm	Datchet intake increase with transfer to QM and Wraysbury Reservoirs	32,324,711	40,410,748	95,318	8.31	11,887				40		
TWU_KGV_HI-TFR_TED_ALL_teddingtondrated/tlt	Direct River Abstraction - Teddington to TLT Shaft 100 MLD	25,620,580	35,159,302	60,234	28.89	5,590			38,105	21		0.24
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Dukes Cut to Farmoor	18,311,536	21,134,250	114,617	47.30	4,234			131,401	240		
TWU_KGV_HI-TFR_KGV_ALL_kgv res intake	King George V Reservoir intake capacity increase	29,033,248	36,290,714	87,792	6.92	16,857				33		
TWU_KGV_HI-TFR_KGV_ALL_kgv res to bt	King George V Reservoir intake capacity increase	25,568,057	31,980,764	45,283		4,326						
TWU_LON_HI-TFR_LON_ALL_littleton int-qm	Littleton intake capacity increase with transfer to Queen Mary	10,318,613	12,883,823	45,000	8.31	2,468				40		
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53	Medmenham intake - 53	23,783,554	29,642,999	247,613	50.56	6,715			749,184	257		
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 80	Medmenham intake - 80	26,228,763	32,688,672	346,714	50.94	7,618				258		
TWU_TED_HI-TFR_TED_ALL_teddingtondramog/ted	Mogden to Teddington outfall 100 Ml/d	82,998,498	108,145,635	225,307	20.44	16,361			180,032	99		0.53
TWU_WLJ_HI-TFR_WLJ_ALL_lowerthamesintake	New Lower Thames Intake - Surbiton	324,966,209	539,443,908	6,679,809		77,019			792,725	109		
TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney	River Thames to Fobney Transfer	86,456,159	143,517,224	364,793	24.85	12,546			6,938	119		
TWU_LON_HI-TFR_LON_CNO_second spine tunnel	Second Spine Tunnel from break tank to Reservoir 5 u/s Coppermills WTW	96,835,952	134,210,998	135,221		18,506						
TWU_LON_HI-TFR_LON_CNO_surbiton int-walton	Surbiton intake capacity increase with transfer to Walton inlet channel	20,899,878	25,681,542	420,093	12.46	3,232				60		
TWU_WLJ_HI-TFR_WLJ_ALL_teddingqmreservoir	Teddington to QM Reservoir	254,212,775	419,336,673	739,498	50.72	78,269			470,274	125		0.18
TWU_KGV_EF-TFR_RE1_ALL_ted/tlt resource	Teddington to TLT Resource				0.01							
TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res	TLT extension from Lockwood PS to King George V Reservoir intake	216,992,787	280,981,573	635,811	10.11	46,478			623,428	48		
TWU_LON_HI-TFR_LON_CNO_tlt upgrade - roc	TLT upgrade to remove existing constraints to maximise transfer capacity	3,258,150	4,327,601	6,609		2,785						
TWU_WLJ_HI-TFR_WLJ_ALL_walton-qmreservoir	Walton to QM Reservoir	126,653,029	210,244,027	494,684	22.79	43,701			475,635	109		
TWU_LON_HI-TFR_LON_CNO_beckton-crossness	Beckton to Crossness transfer - Construction	108,483,869	143,147,754	181,595		21,333						
TWU_WLJ_HI-TFR_WLJ_ALL_reuse mogden/walton	Reuse Mogden to Walton 150 MLD	280,592,748	357,905,738	549,497		55,546			5,460			
RAW WATER PURCHASE												
TWU_LON_HI-OTH_ALL_ALL_didcot purchase	Didcot Raw Water Purchase			2,252,272								
TWU_WLJ_EF-TFR_RE1_ALL_egham resource	Lower Thames Licence Trade				0.01							
RAW WATER TRANSFER												
TWU_STT_HI-REU_RE1_ALL_p7-300-minworth_115	300: Minworth STW effluent diversion (115Mld) - phase 1			12,261,828	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p11-300-min_115_p2	300: Minworth STW effluent diversion (115Mld) - phase 2			6,162,503	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p-300-minworth_all	300: Minworth STW effluent diversion (115Mld) - All			16,232,521	403.21			0.33		861		
TWU_STT_HI-REU_RE1_ALL_p-400-minworth_all	400: Minworth STW effluent diversion (115Mld) - All			16,232,521	403.21			0.33		861		
TWU_STT_HI-REU_RE1_ALL_p11-400-min_115_p2	400: Minworth STW effluent diversion (115Mld) - phase 2			6,162,503	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p7-400-minworth_115	400: Minworth STW effluent diversion (115Mld) - phase 1			12,261,828	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p7-500-minworth_115	500: Minworth STW effluent diversion (115Mld) - phase 1			12,261,828	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p11-500-min_115_p2	500: Minworth STW effluent diversion (115Mld) - phase 2			6,162,503	508.30			0.35		984		
TWU_STT_HI-REU_RE1_ALL_p-500-minworth_all	500: Minworth STW effluent diversion (115Mld) - All			16,232,521	403.21			0.33		861		
TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35	300: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline			10,356,556	474.30			0.43		1,108		
TWU_STT_HI-REU_RE1_ALL_p5-400-neth_p35	400: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline			10,356,556	474.30			0.43		1,108		
TWU_STT_HI-REU_RE1_ALL_p5-500-neth_p35	500: Netheridge STW effluent diversion (35Mld) - Deerhurst Pipeline			10,356,556	474.30			0.43		1,108		
TWU_SWX_RE-DRP_ALL_ALL_dp-oxford canal-swox	DP-Oxford Canal-SWOX											
TWU_UTC_HI-IMP_UTC_CNO_oxcanal-cropredy	Oxford Canal - Cropredy resource - Construction	23,872,520	56,230,460	312,757	248.67	7,567						
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	25,240,148	59,512,767	312,757	213.44	7,880						

TWU_STT_HI-IMP_STT_CNO_sttpipe300(lon)	Raw Water Transfer Deerhurst to Culham 300 Ml/d (Lon only)	764,735,983	1,040,829,486	2,886,086	260.99	194,051	0.02	0.05	208,991	1,083		
TWU_STT_HI-IMP_STT_CNO_sttpipe400(lon)	Raw Water Transfer Deerhurst to Culham 400 Ml/d (Lon only)	925,957,947	1,257,959,594	3,553,439	259.97	236,399		0.05	278,429	1,078		
TWU_STT_HI-IMP_STT_CNO_sttpipe500(lon)	Raw Water Transfer Deerhurst to Culham 500 Ml/d (Lon only)	1,014,313,036	1,377,455,073	4,064,827	257.94	262,836	0.04	0.05	344,045	1,069		
RESERVOIRS												
TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon)	New Reservoir Abingdon 150 Mm3 - 283 MLD (Lon only) - Construction	1,929,032,569	2,366,750,447	3,859,382	9.40	400,119			1,532,814	88		48.03
TWU_STR_HI-RSR_RE1_CNO_abingdon30+100p1	New Reservoir Abingdon 30 +100 Mm3 Phase 1 - Construction	1,320,606,848	1,620,266,500	2,967,198	8.07	221,008			512,250	62		26.40
TWU_STR_HI-RSR_RE2_CNO_abingdon30+100p2	New Reservoir Abingdon 30 +100 Mm3 Phase 2 - Construction	751,209,637	921,667,044	1,456,757	14.12	218,809			974,034	102		38.02
TWU_STR_HI-RSR_RE1_CNO_abingdon80+42p1	New Reservoir Abingdon 80 + 42 Mm3 Phase 1 - Construction	1,587,060,699	1,947,181,546	3,885,431	8.25	290,298			957,531	71		35.46
TWU_STR_HI-RSR_RE2_CNO_abingdon80+42p2	New Reservoir Abingdon 80 + 42 Mm3 Phase 2 - Construction	473,074,306	580,419,866	516,115	17.73	140,002			456,342	116		35.28
TWU_STR_HI-RSR_RE1_CNO_abingdon100(lon)	Reservoir Abingdon 100 (Lon) - Construction	1,651,069,725	2,025,714,897	3,697,222	8.82	326,769			1,133,111	79		40.78
TWU_STR_HI-RSR_RE1_CNO_abingdon75(lon)	Reservoir Abingdon 75 (Lon) - Construction	1,517,605,180	1,861,965,834	3,589,223	8.30	291,193			921,216	68		31.46
TWU_STR_HI-RSR_RE1_CNO_abingdon125(lon)	Reservoir Abingdon 125 (Lon only) - Construction	1,808,035,708	2,218,298,118	3,788,994	9.01	372,911			1,332,195	83		44.50
TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon_3	Site 36 - Marsh Gibbon Reservoir 30 Mm3 - Construction	1,083,644,342	1,464,354,346	3,123,452	159.91	171,505			2,320,446	778		
TWU_STR_HI-RSR_RE1_CNO_res_marshgibbon_2	Site 36 - Marsh Gibbon Reservoir 50 Mm3 - Construction	1,416,015,872	1,892,919,643	4,026,163	180.51	223,045			3,745,627	878		
TWU_STR_HI-RSR_RE1_CNO_res_marshgibbon_1	Site 36 - Marsh Gibbon Reservoir 75 Mm3 - Construction	1,817,934,550	2,426,455,304	5,089,346	179.10	291,661			5,302,563	872		
TWU_UTC_HI-RSR_RE1_CNO_res_chinnor_2	Site 41 - Chinnor Reservoir 30Mm3 - Construction	1,049,312,471	1,417,981,363	2,985,133	127.92	166,061			2,142,810	610		
WATER REUSE												
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5	Deephams Reuse – 46.5 Ml/d, direct to KGV - Construction	130,737,516	185,187,338	1,945,095	289.61	24,247	126.78	0.19	1,582,233	1,045		
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b	Deephams Reuse – 46.5 Ml/d, to TLT - Construction	120,145,354	169,299,096	1,912,683	288.02	20,884	126.78	0.19	1,575,234	1,037		
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 100	Reuse Beckton 100 MLD - Construction	260,224,246	343,372,863	3,139,017	612.98	46,955	2,007.68	0.24	492,311	2,250		
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 100 p2	Reuse Beckton 100 MLD Enhanced	260,224,239	343,372,854	3,138,996	612.89	46,955	2,007.68	0.24	492,311	2,250		
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 150	Reuse Beckton 150 MLD - Construction	372,023,370	490,369,644	4,193,329	694.01	59,738	3,011.53	0.25	35,477,468	2,617		
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 150 p2	Reuse Beckton 150 MLD Enhanced	372,023,381	490,369,659	4,193,329	694.01	59,738	3,011.53	0.25	35,477,468	2,617		
TWU_KGV_HI-REU_RE1_CNO_reuse beckton 50	Reuse Beckton 50 MLD - Construction	158,998,562	211,312,129	2,178,901	647.14	27,413	1,003.84	0.24	444,860	2,439		
TWU_KGV_HI-REU_RE2_ALL_reuse beckton 50 p2	Reuse Beckton 50 MLD Enhanced	158,998,564	211,312,130	2,178,881	647.03	27,413	1,003.84	0.24	444,860	2,439		
TWU_WLJ_HI-REU_RE1_CNO_reuse mogden 100 p1	Reuse Mogden 100 MLD Phase 1 - Construction	248,156,360	333,852,544	3,789,439	623.67	41,997	2,009.03	0.25	3,670,661	2,286		
TWU_WLJ_HI-REU_RE2_ALL_reuse mogden 100 p2	Reuse Mogden 100 MLD Phase 2	248,156,357	333,852,540	3,789,280	623.57	41,997	2,009.03	0.25	3,670,661	2,286		
TWU_WLJ_HI-REU_RE1_CNO_reuse mogden 50 p1	Reuse Mogden 50 MLD Phase 1 - Construction	152,369,436	205,099,128	2,253,878	698.34	32,802	1,003.84	0.24	882,267	2,687		
TWU_WLJ_HI-REU_RE2_ALL_reuse mogden 50 p2	Reuse Mogden 50 MLD Phase 2	152,369,434	205,099,126	2,253,840	698.22	32,802	1,003.84	0.24	882,267	2,687		
TWU_WLJ_HI-REU_RE1_ALL_reusemogdenssewer25	Reuse Mogden South Sewer Plant 25 Ml/d	217,811,121	294,647,510	2,084,796	755.08	63,630		0.28	463,190	2,821		
WATER TREATMENT WORKS												
TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2	Abingdon WTW Enhanced	58,723,419	67,097,030	345,082	179.77	10,139	345.40	0.12	1,775,963	614		
TWU_SWX_HI-ROC_WT2_ALL_abingdon wtw ph2_rep_1	Abingdon WTW Enhanced	58,723,419	67,097,030	345,082	179.77	10,139	345.40	0.12	1,775,963	614		
TWU_SWX_HI-ROC_WT1_CNO_abingdon wtw ph1	Abingdon WTW Ph1 - Construction	58,723,418	67,097,030	345,082	179.81	10,139	345.40	0.12	1,775,963	614		
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana200	Coppermills WTW - Mecana 200Ml/d	22,885,153	32,954,620	168,433	8.60	5,326			126,548	43		
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana480	Coppermills WTW - Mecana 480Ml/d	31,935,371	45,986,935	307,235	8.60	7,508			303,640	43		
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana680	Coppermills WTW - Mecana 680Ml/d	37,666,744	54,240,111	483,850	8.27	9,006			835,970	42		
TWU_LON_HI-ROC_WT2_ALL_eastlondonwtw100p2	East London WTW - 100 Enhanced	195,737,585	253,449,386	1,095,872	180.45	47,732	2,622.11	0.22	5,612,388	466		
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw100p1	East London WTW - 100 P1 - Construction	195,737,588	253,449,391	1,095,872	180.46	47,732	2,622.11	0.22	5,612,388	466		
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw150	East London WTW - 150 - Construction	248,265,891	321,459,343	2,239,230	163.12	61,305	2,898.12	0.07	8,249,430	457		
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw200	East London WTW - 200 - Construction	285,056,613	369,104,732	1,578,776	163.45	71,259	4,645.72	0.19	9,781,883	406		
TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw300	East London WTW - 300 - Construction	365,264,253	473,042,224	2,018,324	157.13	94,389	6,669.29	0.18	13,950,990	386		
TWU_LON_HI-ROC_WT2_ALL_kemptonwtw100 p2	Kempton - 100 Enhanced	161,722,914	189,337,366	822,245	129.40	27,484	1,425.06	0.12	3,839,175	319		
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1	Kempton - 100 Phase 1 - Construction	161,722,914	189,337,366	822,245	129.40	27,484	1,425.06	0.12	3,839,175	319		
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw150	Kempton - 150 - Construction	183,258,246	214,582,017	1,522,310	94.08	38,428	2,137.51	0.07	3,205,849	177		
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw300	Kempton - 300 - Construction	346,454,422	405,704,685	2,836,899	93.41	87,066	4,275.19	0.07	6,411,698	177		
TWU_SWA_HI-ROC_WT2_ALL_medmenhamwtw ph2	Medmenham WTW Enhanced	89,160,251	107,160,336	506,393	198.02	20,528	345.40	0.12	583,794	728		
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1	Medmenham WTW Ph1 - Construction	89,160,252	107,160,337	506,424	198.05	20,528	345.40	0.12	583,794	728		
TWU_SWX_HI-ROC_WT2_ALL_radcotwtwenhanced	Radcot WTW Enhanced Phase	98,757,352	114,952,553	567,588	152.90	17,563	345.28	0.07	1,448,568	501		
TWU_SWX_HI-ROC_WT1_ALL_radcotwtw	Radcot WTW Phase 1	98,757,352	114,952,553	567,588	152.90	17,563	345.28	0.07	1,448,568	501		

Table X-4: Programme-level individual and aggregate Best Value Metrics

IVM Model Run name	Simple run name	COST (£m)		INDIVIDUAL BVP METRICS (Normalised, Pathway 1-9 Average)								BVP AGGREGATE (Score)		
		Pathway 1-9 Average	Pathway 4	SEA +	SEA -	NATC	BING	Cust. Pref	Relia.	Adapt.	Evol.	E&S	Resil.	Overall BVP
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075	Least Cost (LCP)	17666	19052	74	71	88	67	4	65	74	84	61	75	66
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-envsoc-07_50-v2	Best E&S	17769	19383	85	72	92	88	20	56	63	85	71	68	70
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-resilience-07_50-v2	Best RESIL	17635	19377	84	62	91	87	5	58	69	88	66	72	68
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-bvp-07_50-v2	General BVP uplift	17812	19491	84	81	92	91	20	59	72	89	74	73	73
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075-bvp-07_50-v2	Overall BVP	17963	19255	86	80	90	62	19	76	83	89	67	83	73
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-envsoc-07_50-v3	BVP - E&S SESRO 75	17808	19419	84	80	92	89	19	55	63	84	73	67	71
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-envsoc-07_50-v3	BVP - E&S SESRO 100	17853	19420	85	79	92	81	19	60	68	86	71	71	71
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-envsoc-07_50-v3	BVP - E&S SESRO 125	17957	19357	85	79	91	69	19	68	75	86	69	76	72
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-envsoc-07_50-v3	BVP - E&S SESRO 150	18010	19341	84	81	91	64	19	75	81	87	68	81	73
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-resilience-07_50-v3	BVP - RESIL SESRO 75	17804	19486	82	71	92	87	5	59	69	89	67	72	69
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-resilience-07_50-v3	BVP - RESIL SESRO 100	17851	19428	81	75	91	79	4	62	72	88	66	74	69
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-resilience-07_50-v3	BVP - RESIL SESRO 125	17934	19339	81	76	89	69	4	70	77	88	64	78	69
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-resilience-07_50-v3	BVP - RESIL SESRO150	17978	19317	82	77	87	62	4	76	83	89	62	83	70
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-bvp-07_50-v3	BVP - ALL SESRO 75	17829	19515	85	81	92	91	19	60	71	90	74	74	74
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-bvp-07_50-v3	BVP - ALL SESRO 100	17877	19450	85	79	92	81	19	63	72	89	71	75	73
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-bvp-07_50-v3	BVP - ALL SESRO 125	17959	19362	86	78	91	70	19	69	78	87	69	78	72
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-bvp-07_50-v3	BVP - ALL SESRO 150	17999	19350	85	80	90	64	19	77	82	89	68	83	73
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-ted-dra-2075	No DRA	17919	19264	75	58	82	65	4	63	60	87	57	70	62
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-sesro-2075	No SESRO	17771	19682	62	84	2	27	4	45	41	86	36	57	44
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro75-2075	LCP SESRO 75	17766	19365	72	81	92	88	3	55	62	85	67	68	67
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro100-2075	LCP SESRO 100	17803	19274	72	82	90	80	3	61	68	87	65	72	68
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro125-2075	LCP SESRO 125	17903	19198	71	85	89	71	3	68	75	86	64	76	69
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075	LCP SESRO 150	17759	19052	75	72	87	61	4	72	82	85	60	80	67
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-lon-1in200-2035-2075	1:200 in 2035	17721	19180	71	82	82	68	3	63	66	85	61	72	65
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse50-2033-2075	Force Beckton50	18212	19704	75	56	84	77	4	51	52	82	59	62	60
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse100-2033-2075	Force Beckton100	18296	19942	74	65	85	85	3	50	47	85	62	61	62
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse150-2033-2075	Force Beckton150	18609	20022	74	68	83	72	3	63	56	88	60	69	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-adj-existing-beckton-do-01-2075	Gateway 50	17690	19424	79	60	91	85	5	53	63	83	64	66	65
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybrida-2075	GOV A	19355	22388	91	25	92	31	9	82	69	73	50	75	59
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridb-2075	GOV B	19355	22388	91	25	92	31	9	82	69	73	50	75	59
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridd-2075	GOV D	19046	21577	86	43	95	50	8	81	66	76	56	74	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybride-2075	GOV E	18642	20552	81	59	91	53	6	97	83	86	58	89	69
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridf-2075	GOV F	19294	21574	91	11	93	32	10	87	75	77	47	80	60
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-2075	GOV G	18951	20706	88	24	90	43	8	95	85	84	51	88	65
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro75-2075	GOV G 75	19077	21043	88	24	97	69	9	82	66	88	57	79	65

IVM Model Run name	Simple run name	COST (£m)		INDIVIDUAL BVP METRICS (Normalised, Pathway 1-9 Average)								BVP AGGREGATE (Score)		
		Pathway 1-9 Average	Pathway 4	SEA +	SEA -	NATC	BING	Cust. Pref	Relia.	Adapt.	Evol.	E&S	Resil.	Overall BVP
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro100-2075	GOV G 100	18833	21231	87	23	93	60	9	82	73	84	54	79	64
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro125-2075	GOV G 125	18897	20824	87	23	92	50	9	88	79	82	52	83	64
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro150-2075	GOV G 150	18945	20706	88	23	92	40	9	95	83	83	50	87	64
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro75-2075	GOV H 75	18957	21970	88	34	90	65	9	70	72	76	57	73	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro100-2075	GOV H 100	18920	21831	87	39	88	56	9	73	76	77	56	75	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro125-2075	GOV H 125	18991	21716	88	38	90	45	9	81	82	75	54	79	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro150-2075	GOV H 150	18937	21648	87	44	85	40	9	85	87	75	53	82	64
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-delay5-sesro-2075	GOV H DEL5	19207	22067	81	33	45	29	8	68	64	76	39	69	50
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-excl-sesro-2075	GOV H No SESRO	19339	22659	78	36	1	13	9	61	59	75	27	65	41
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay5-sesro-2075	LCP DEL5	17656	19626	65	76	17	29	4	44	49	84	38	59	46
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-2075	LCP GUC100	17825	19206	71	84	83	73	3	62	67	84	63	71	66
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ltrisks-rts-v2-2075	LTRRTS (No Tunnel)	20128	21828	88	35	82	60	8	81	55	95	55	77	63
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ltrisks-rts-v4-2075	LTRRTS 4 (Inc. Tunnel)	18114	19562	71	81	90	74	4	40	24	64	64	43	56
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-wbgws-2040-2075	No WBGWS 2040	18044	19662	78	74	83	66	4	69	72	88	61	77	67
st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-wbgws-2050-2075	No WBGWS 2050	17910	19539	73	84	82	68	3	66	70	86	62	74	66

IVM RUN DOSSIER

OVERALL BEST VALUE PLAN

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075-bvp-07_50-v2
Description	BVP run with hybrid-c+2 government interventions including only SESRO 150 Mm3. Constrained to 7.5% improvement in worst BVP metrics from least cost run.
Created at	11/07/2023, 13:12:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-sesro150
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 150.
Optimised discount rate	STPR

Metrics

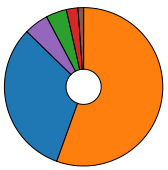
Net present value (Cost)

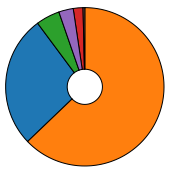
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,618	17,917	17,197	19,255	17,772	16,972	18,132	17,264	16,540	17,963	(£m)
Cost w/o deficit (STPR)	20,618	17,917	17,197	19,255	17,772	16,972	18,132	17,264	16,540	17,963	(£m)
Cost w/ deficit (IGEQ)	31,407	26,288	25,007	28,806	26,042	24,620	26,798	25,165	23,858	26,443	(£m)
Cost w/o deficit (IGEQ)	31,407	26,288	25,007	28,806	26,042	24,620	26,798	25,165	23,858	26,443	(£m)
Cost w/ deficit (LTDR)	22,708	19,566	18,740	21,121	19,401	18,486	19,832	18,824	17,991	19,630	(£m)
Cost w/o deficit (LTDR)	22,708	19,566	18,740	21,121	19,401	18,486	19,832	18,824	17,991	19,630	(£m)

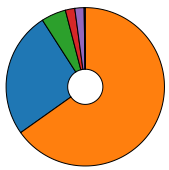
Cost breakdown (STPR)

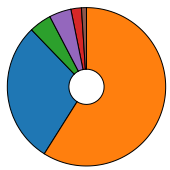
Select Company: Total

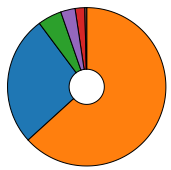
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,553	4,835	4,425	5,555	4,717	4,234	4,884	4,431	3,978	4,846	(£m)
Fixed opex	11,443	11,261	11,208	11,350	11,242	11,185	11,255	11,202	11,143	11,254	(£m)
Fixed operational carbon	878	870	868	877	870	869	872	866	866	871	(£m)
Embedded carbon	488	357	330	415	351	321	370	332	304	363	(£m)
Variable opex	1,022	530	325	862	522	314	651	393	232	539	(£m)
Variable carbon opex	233	65	40	196	69	49	101	40	18	90	(£m)

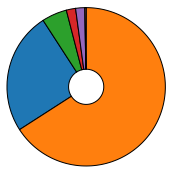
situation1 

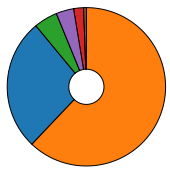
situation2 

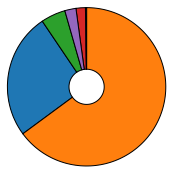
situation3 

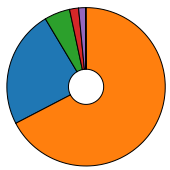
situation4 

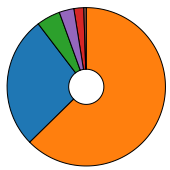
situation5 

situation6 

situation7 

situation8 

situation9 

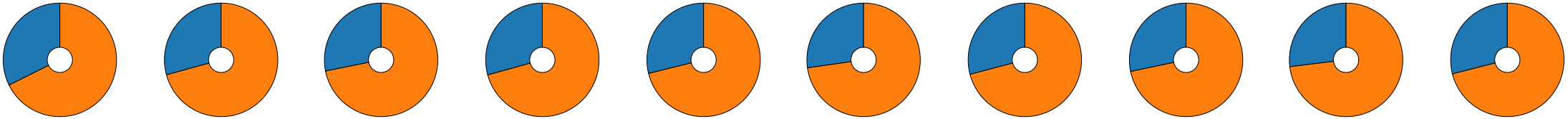
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,123,946	2,185,460	2,011,543	2,591,736	2,151,370	1,947,709	2,287,749	2,022,398	1,834,877	2,239,643	(tonnes)
Operational emissions	6,535,410	5,284,631	5,129,203	6,258,003	5,305,657	5,197,195	5,570,941	5,124,416	4,980,387	5,487,316	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

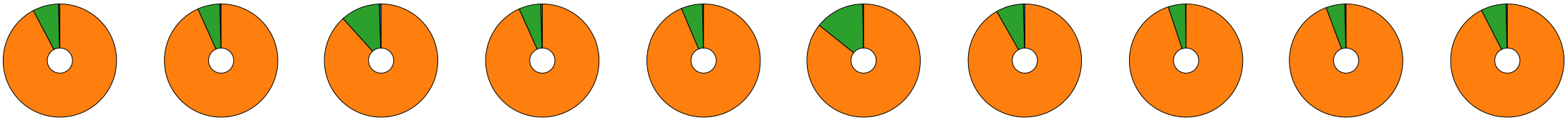


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	103	45	26	94	39	12	61	13	12	45	(GWh)
Grid	22,444	11,103	4,334	18,832	10,925	3,839	13,137	7,900	2,923	10,604	(GWh)
Renewable	1,781	752	547	1,260	707	628	1,121	411	166	819	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	66,691	65,338	65,338	67,933	65,340	65,338	66,722	65,338	65,338	65,931
SEA environmental disbenefit	104,955	77,782	72,756	97,446	78,090	71,933	83,773	70,130	61,721	79,843
Natural capital	82,030,356	81,052,068	81,238,836	81,015,364	81,188,621	81,479,508	81,609,503	81,352,663	81,731,503	81,410,936
Bio-diversity net gain	−202,722	−144,618	−126,255	−199,827	−150,321	−121,902	−150,989	−127,691	−99,097	−147,047

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,704	35,098	34,819	36,555	35,130	34,696	35,269	34,496	33,967	35,193

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.53	29.83	32.49	29.24	29.88	32.68	31.20	34.63	38.61	32.01
R1: Uncertainty of option supply/demand benefit	6.04	5.60	6.03	5.83	5.57	6.07	5.94	6.48	7.21	6.08
R3: Risk of service failure due to other physical hazards	7.00	7.40	8.24	7.03	7.42	8.29	7.71	8.76	10.01	7.98
R4: Availability of additional headroom	6.62	6.96	7.16	6.69	6.98	7.19	7.30	7.66	7.90	7.16
R5: Catchment/raw water quality risks (incl. climate change)	4.07	4.19	4.72	3.81	4.21	4.74	4.33	5.00	5.78	4.54
R6: Capacity of catchment services	0.31	0.00	0.01	0.31	0.00	0.01	0.00	0.01	0.01	0.07
R7: Risk of service failure to other exceptional events	5.37	5.67	6.34	5.46	5.70	6.38	5.92	6.73	7.71	6.14
R8: Soil health	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.03

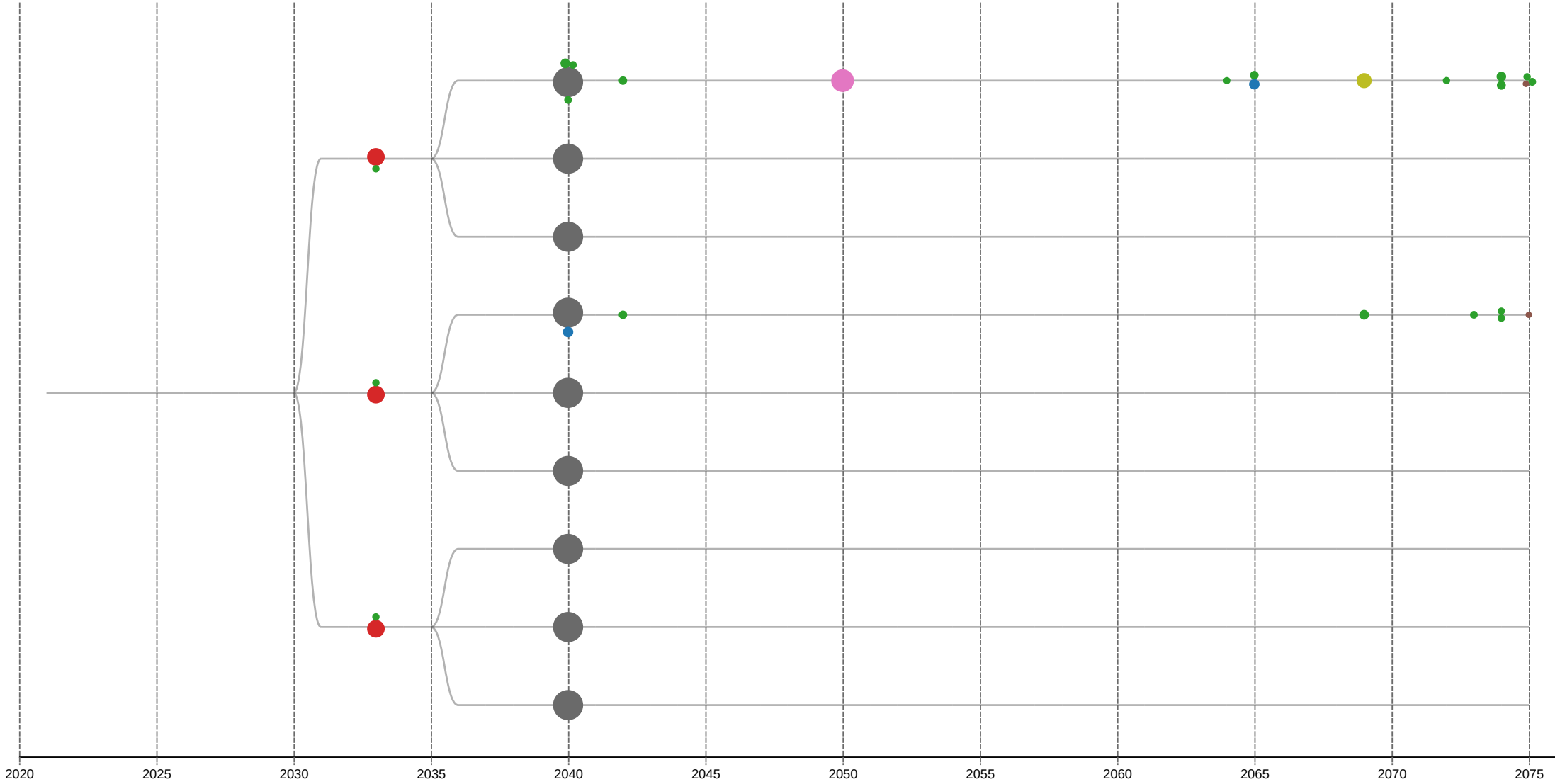
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.33	15.72	17.57	14.39	15.72	17.27	16.15	18.40	20.93	16.72
A3: Operational complexity and flexibility	6.53	7.10	7.96	6.69	7.15	8.04	7.39	8.49	9.76	7.68
A4: WRZ connectivity	7.68	8.59	9.59	7.56	8.55	9.20	8.73	9.88	11.14	8.99
A7: Customer relations support engagement with demand management	0.12	0.03	0.03	0.13	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.65	20.16	22.13	19.63	20.22	22.24	20.81	23.62	26.79	21.70
E1: Scaleability and modularity of proposed changes	8.77	9.42	10.43	8.78	9.46	10.54	9.72	11.15	12.71	10.11
E2: Intervention lead times	4.22	4.24	4.50	4.18	4.25	4.44	4.34	4.78	5.33	4.48
E3: Reliance on external bodies to deliver changes	6.20	6.49	7.19	6.21	6.51	7.25	6.75	7.68	8.75	7.00
E5: Collaborative land management	0.46	0.01	0.01	0.46	0.00	0.01	0.00	0.01	0.01	0.11

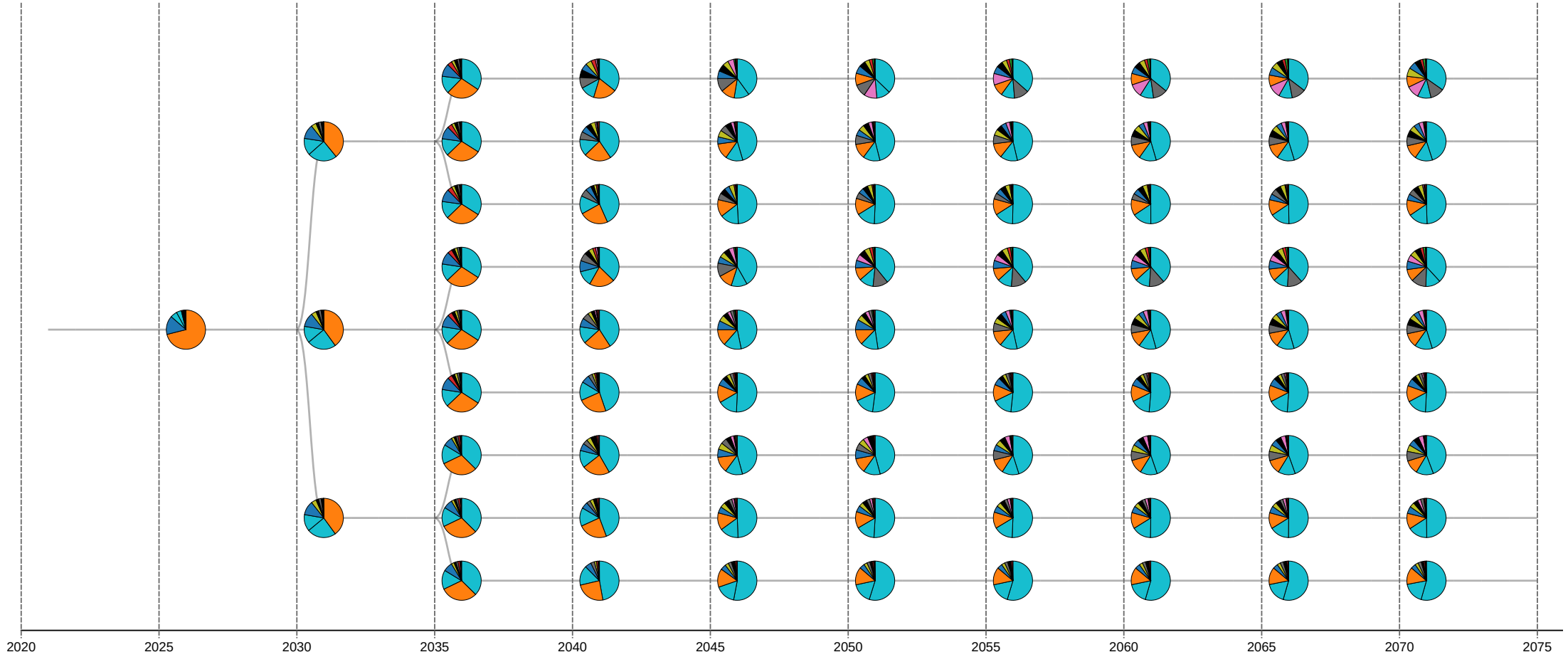
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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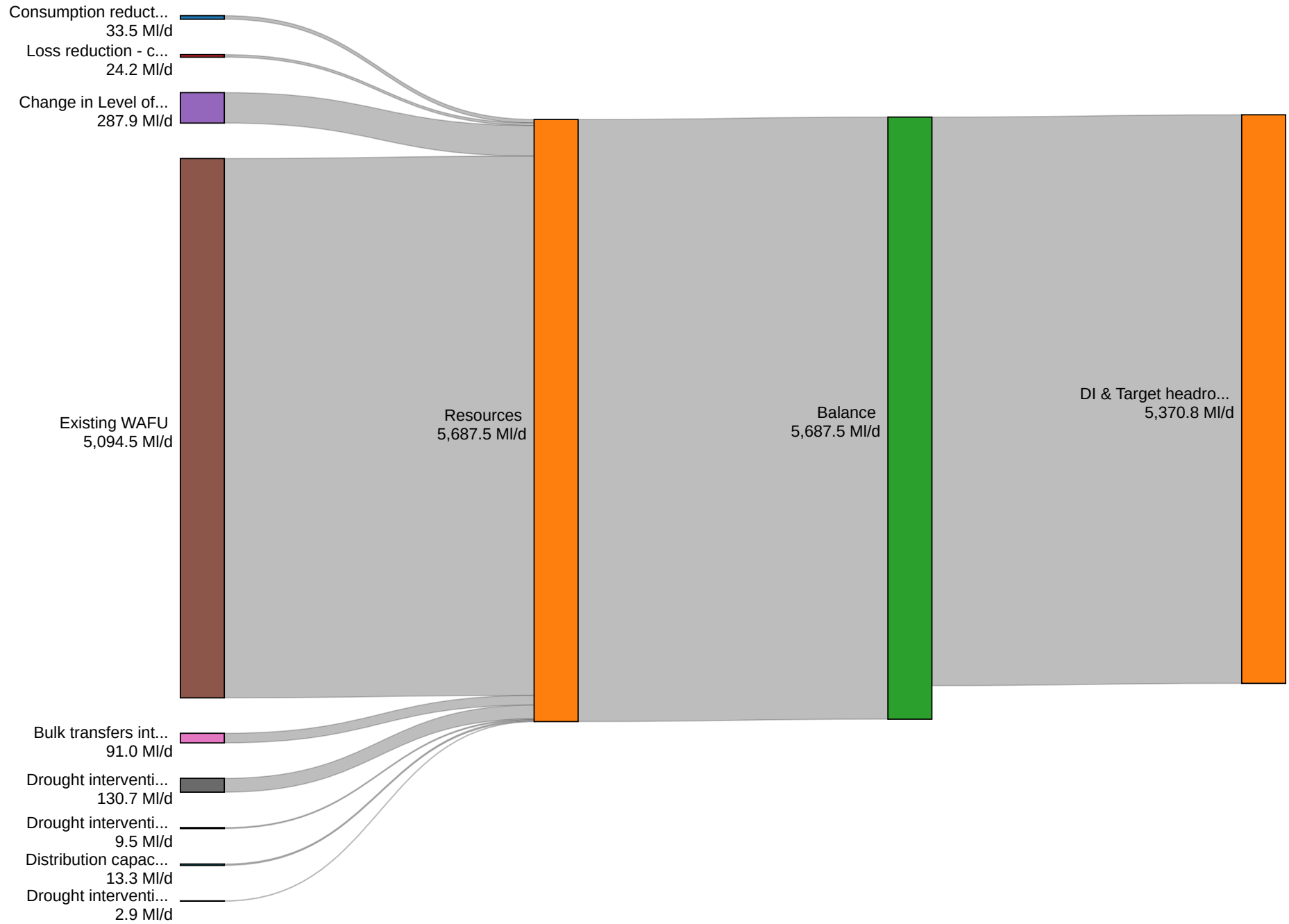
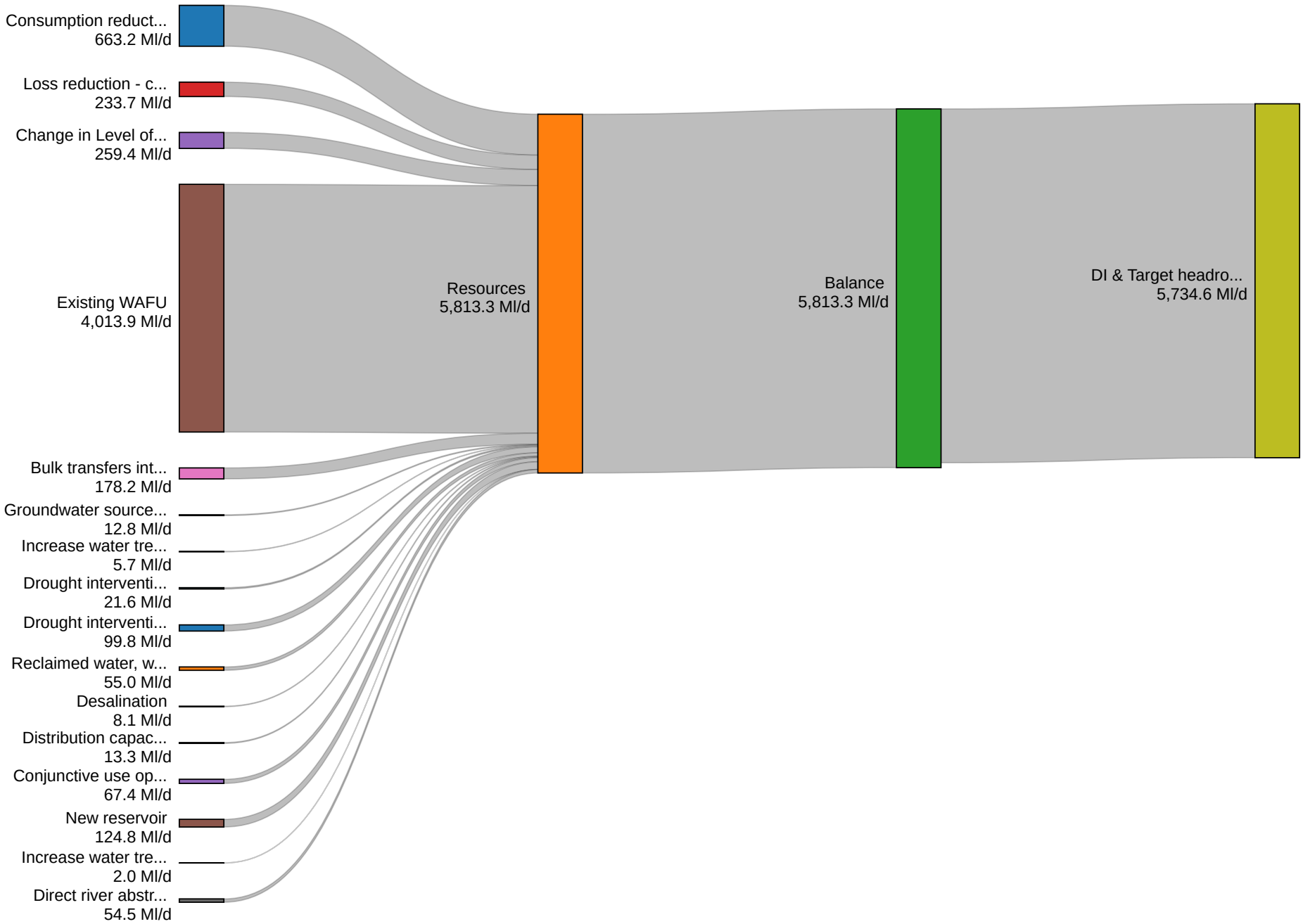
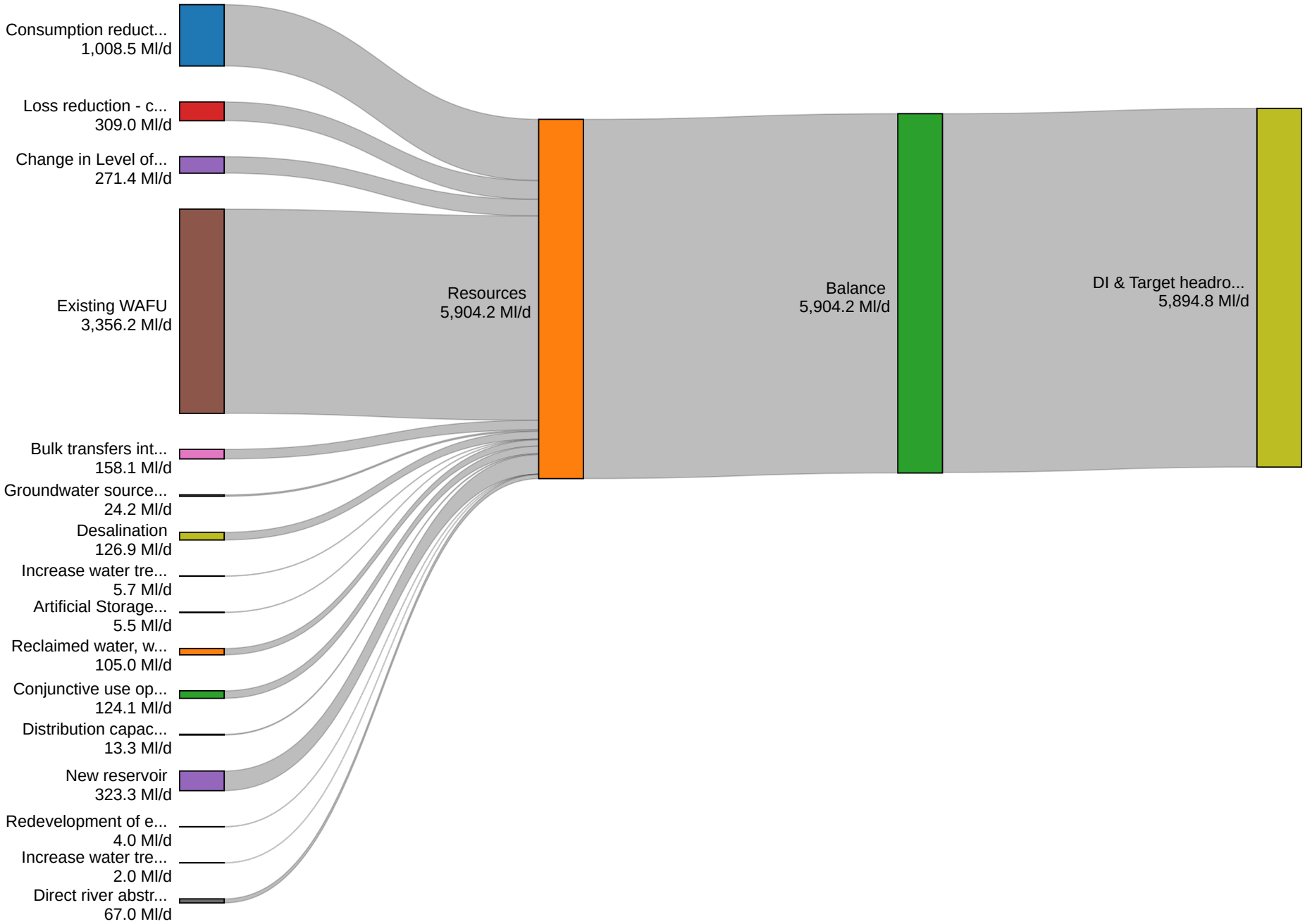
Situation 4 - 2026 (Thames Water)



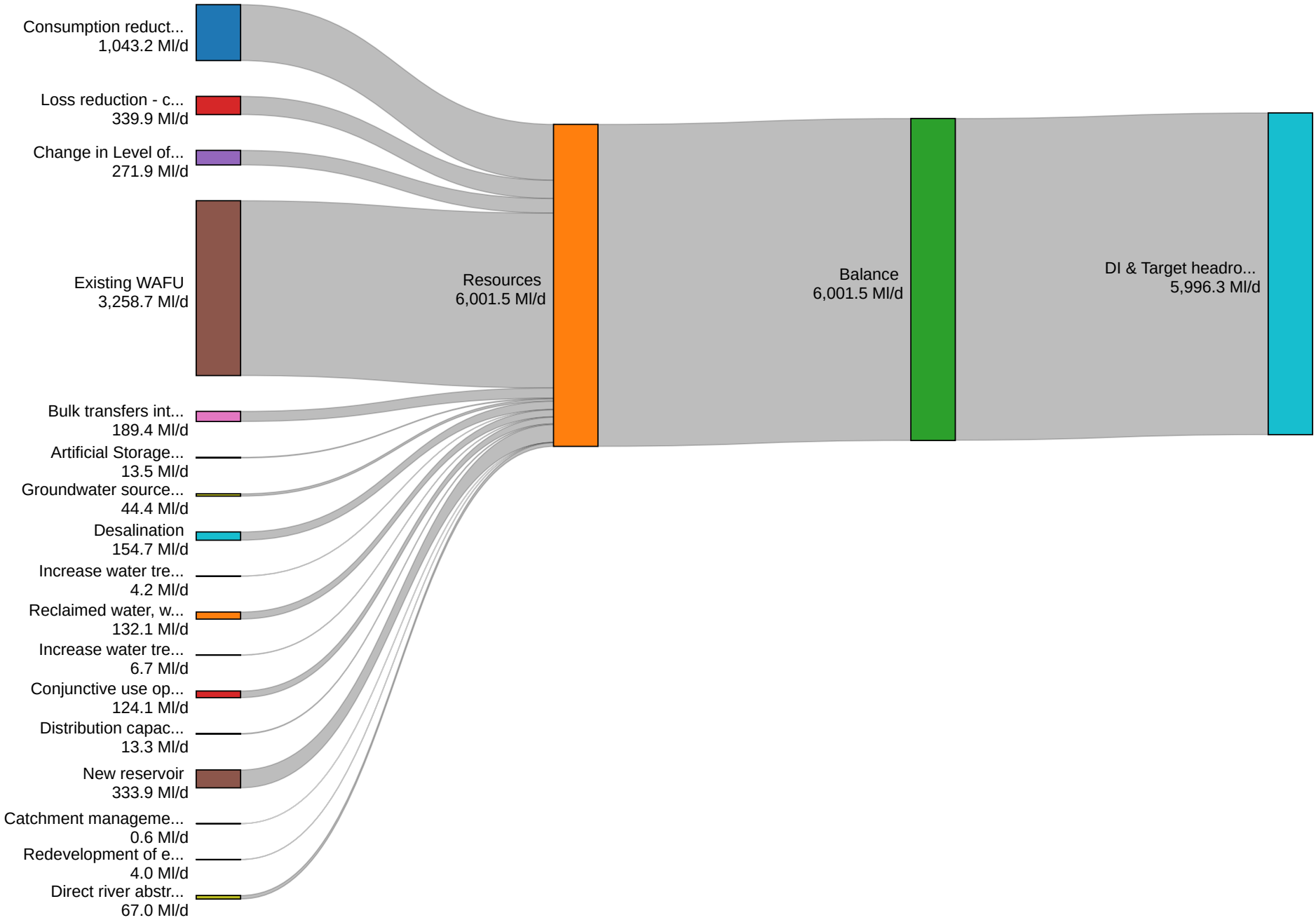
Situation 4 - 2040 (Thames Water)



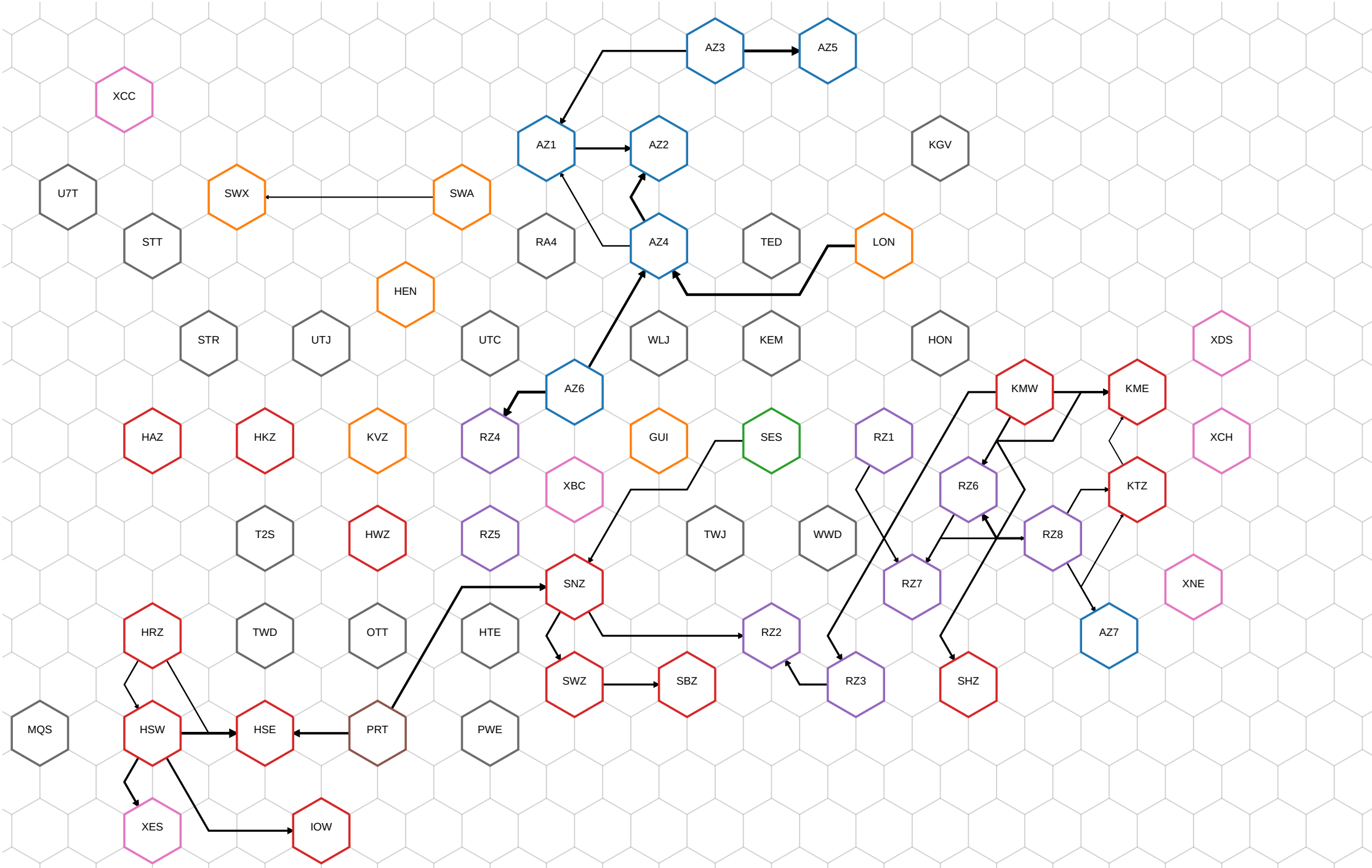
Situation 4 - 2050 (Thames Water)



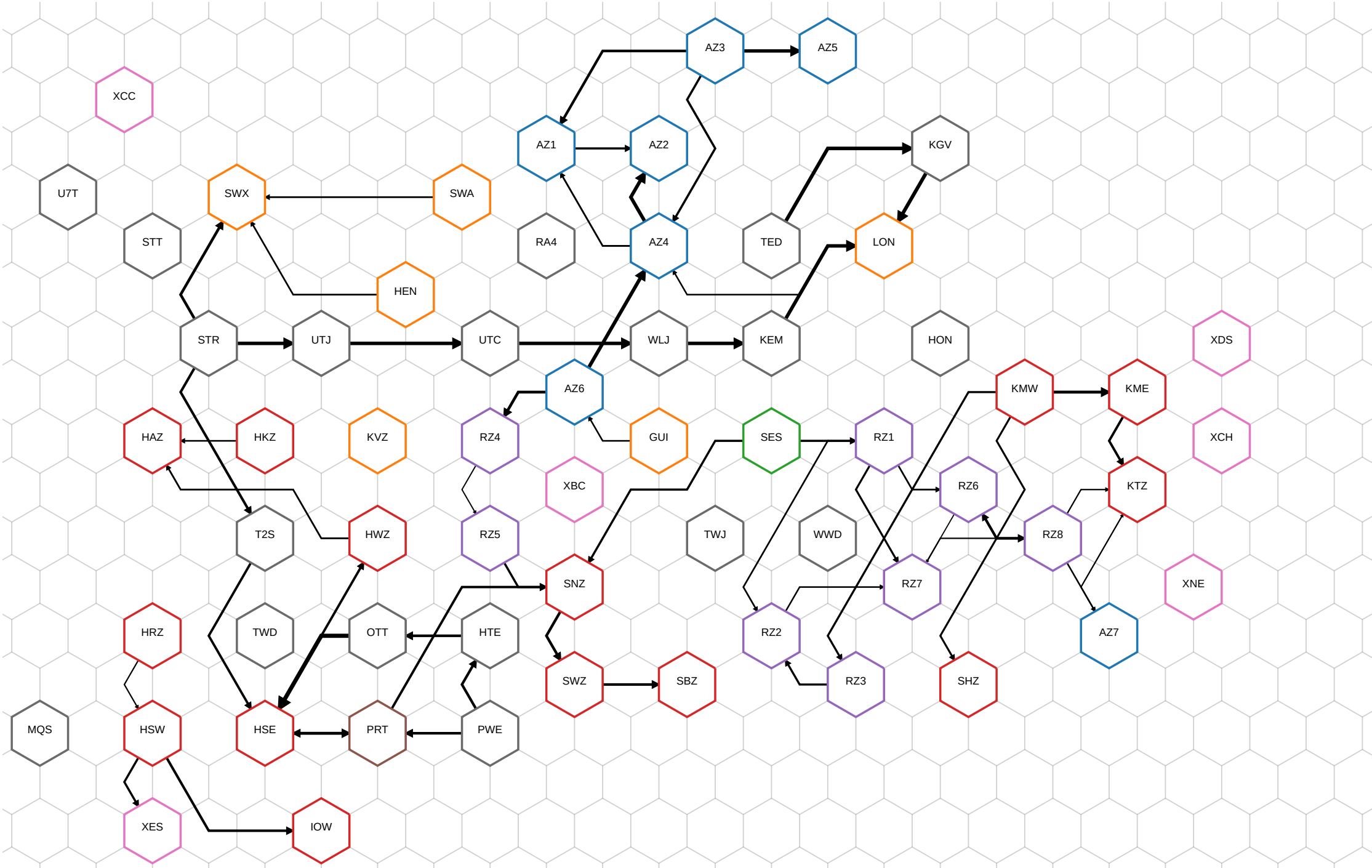
Situation 4 - 2075 (Thames Water)



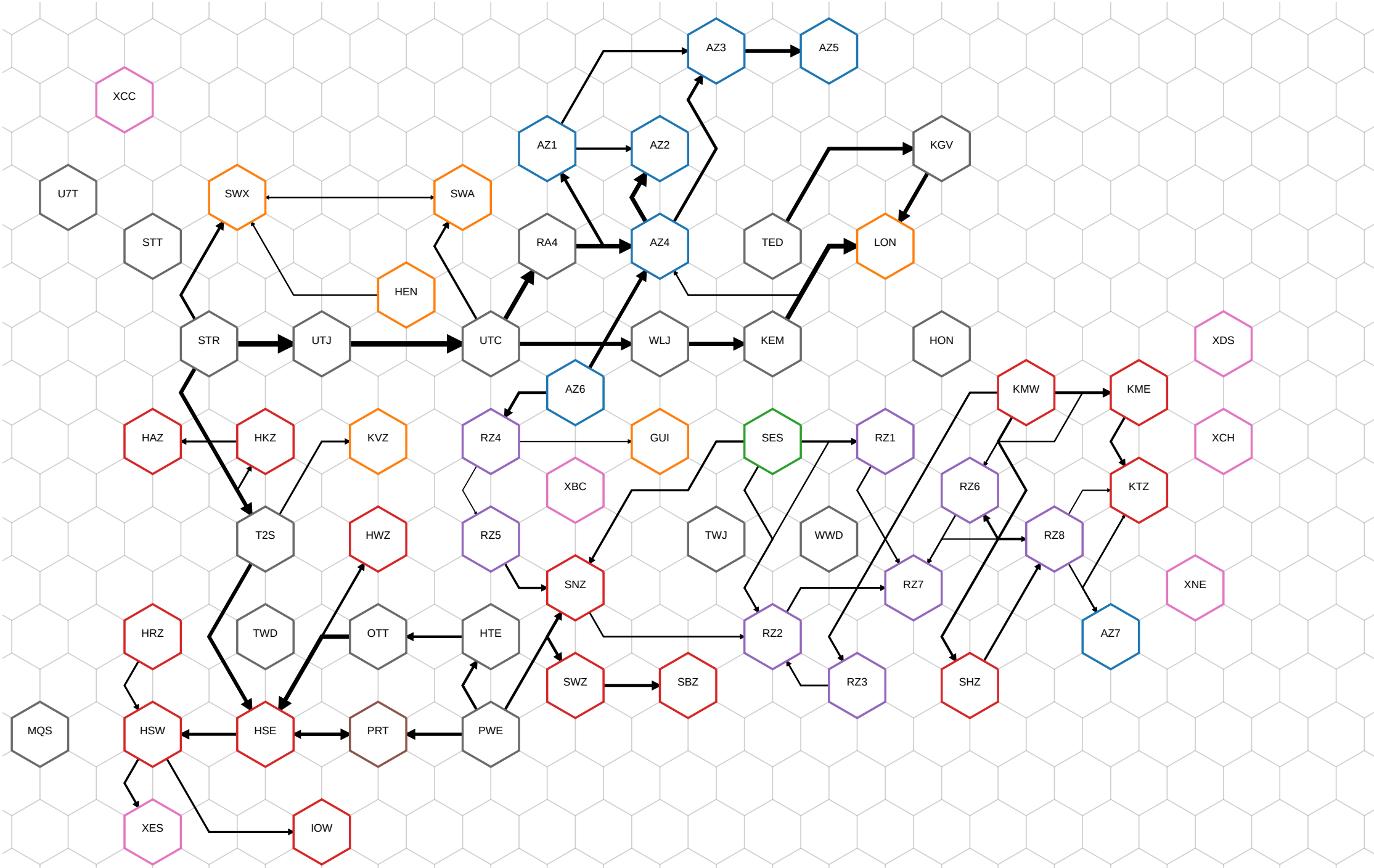
Situation 4 - 2026



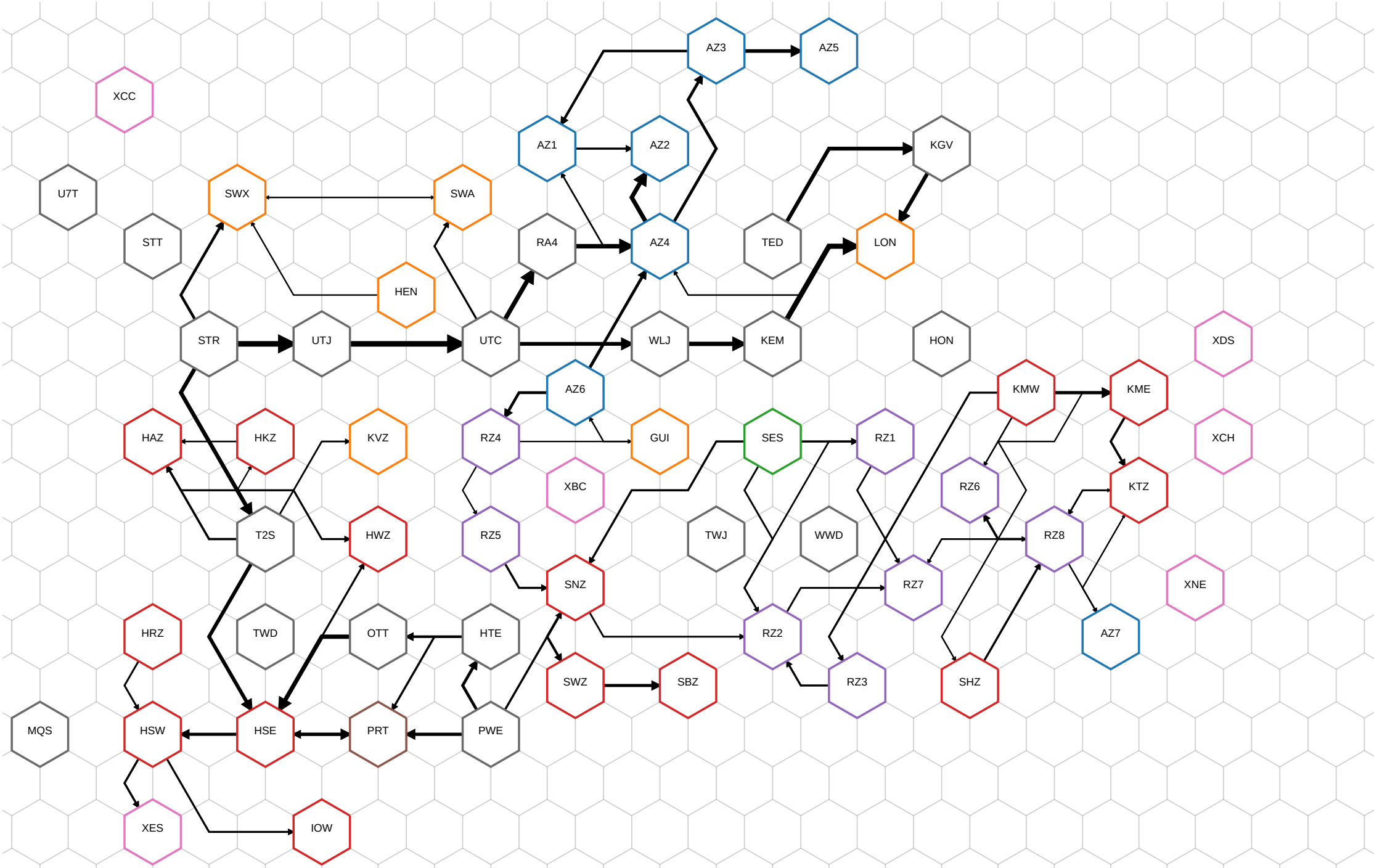
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ADAPTIVE LEAST COST PLAN (STPR)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075
Description	Least cost run with hybrid-c+2 government interventions.
Created at	23/06/2023, 20:08:51
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

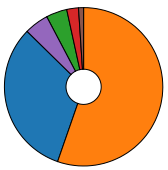
Net present value (Cost)

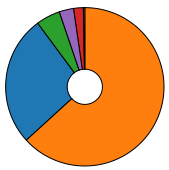
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,533	17,663	16,988	19,052	17,550	16,797	17,600	16,753	16,060	17,666	(£m)
Cost w/o deficit (STPR)	20,533	17,663	16,988	19,052	17,550	16,797	17,600	16,753	16,060	17,666	(£m)
Cost w/ deficit (IGEQ)	31,324	25,882	24,663	28,508	25,690	24,349	25,971	24,375	23,128	25,988	(£m)
Cost w/o deficit (IGEQ)	31,324	25,882	24,663	28,508	25,690	24,349	25,971	24,375	23,128	25,988	(£m)
Cost w/ deficit (LTDR)	22,622	19,283	18,507	20,898	19,155	18,293	19,244	18,260	17,463	19,303	(£m)
Cost w/o deficit (LTDR)	22,622	19,283	18,507	20,898	19,155	18,293	19,244	18,260	17,463	19,303	(£m)

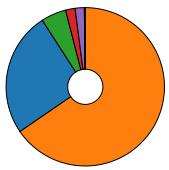
Cost breakdown (STPR)

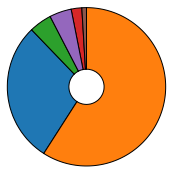
Select Company: Total

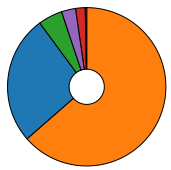
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,576	4,705	4,322	5,475	4,624	4,182	4,502	4,054	3,621	4,673	(£m)
Fixed opex	11,360	11,167	11,116	11,254	11,155	11,099	11,159	11,108	11,048	11,163	(£m)
Fixed operational carbon	880	869	870	877	870	869	871	867	865	871	(£m)
Embedded carbon	493	352	330	414	346	317	340	303	279	353	(£m)
Variable opex	1,014	517	317	853	503	300	637	386	230	528	(£m)
Variable carbon opex	211	53	32	180	53	30	91	36	17	78	(£m)

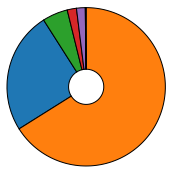
situation1 

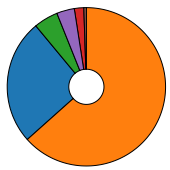
situation2 

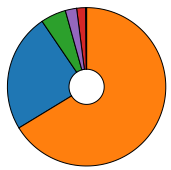
situation3 

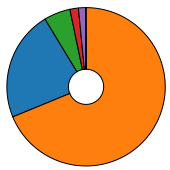
situation4 

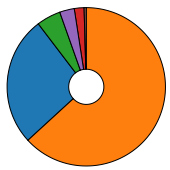
situation5 

situation6 

situation7 

situation8 

situation9 

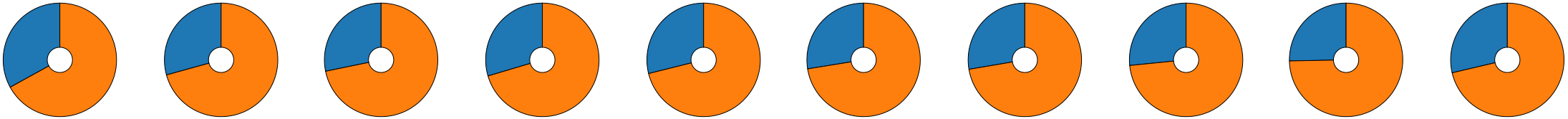
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,162,735	2,156,113	2,004,927	2,589,503	2,118,820	1,929,021	2,107,615	1,846,769	1,685,150	2,177,850	(tonnes)
Operational emissions	6,416,312	5,204,888	5,097,158	6,164,492	5,216,347	5,074,343	5,508,962	5,100,931	4,973,614	5,417,449	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

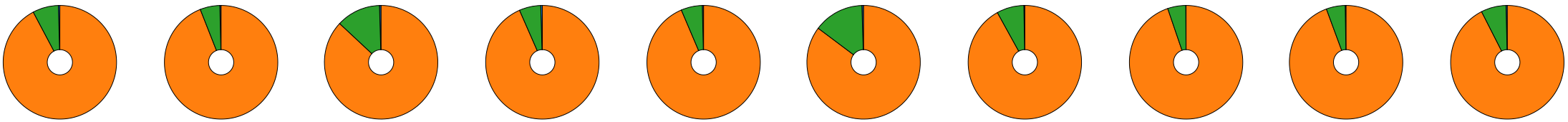


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	23	95	44	22	41	9	8	43	(GWh)
Grid	22,677	11,394	4,242	19,228	11,022	3,899	13,217	7,974	2,892	10,727	(GWh)
Renewable	1,807	681	615	1,262	713	654	1,115	433	165	827	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,276	63,943	63,099	67,149	63,619	62,710	63,882	61,608	60,552	63,982
SEA environmental disbenefit	113,350	81,960	75,599	99,769	79,604	73,499	83,904	70,527	61,680	82,210
Natural capital	81,558,380	77,108,628	79,953,049	75,242,447	77,050,016	79,699,195	80,870,399	81,648,863	84,520,786	79,739,085
Bio-diversity net gain	−218,825	−154,246	−127,650	−204,324	−154,023	−128,380	−124,133	−96,975	−67,921	−141,831

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,935	31,847	31,498	33,042	31,693	31,300	31,706	30,797	30,307	31,792

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.91	29.31	32.12	28.30	29.44	32.25	28.45	31.41	34.89	30.57
R1: Uncertainty of option supply/demand benefit	5.96	5.34	5.83	5.57	5.36	5.85	5.26	5.68	6.27	5.68
R3: Risk of service failure due to other physical hazards	6.96	7.29	8.17	6.91	7.34	8.21	7.00	7.92	9.03	7.65
R4: Availability of additional headroom	6.58	6.92	7.14	6.64	6.94	7.15	7.08	7.44	7.68	7.06
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.77	3.86	4.24	4.79	3.94	4.53	5.24	4.41
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.54	6.21	5.31	5.56	6.24	5.17	5.83	6.67	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

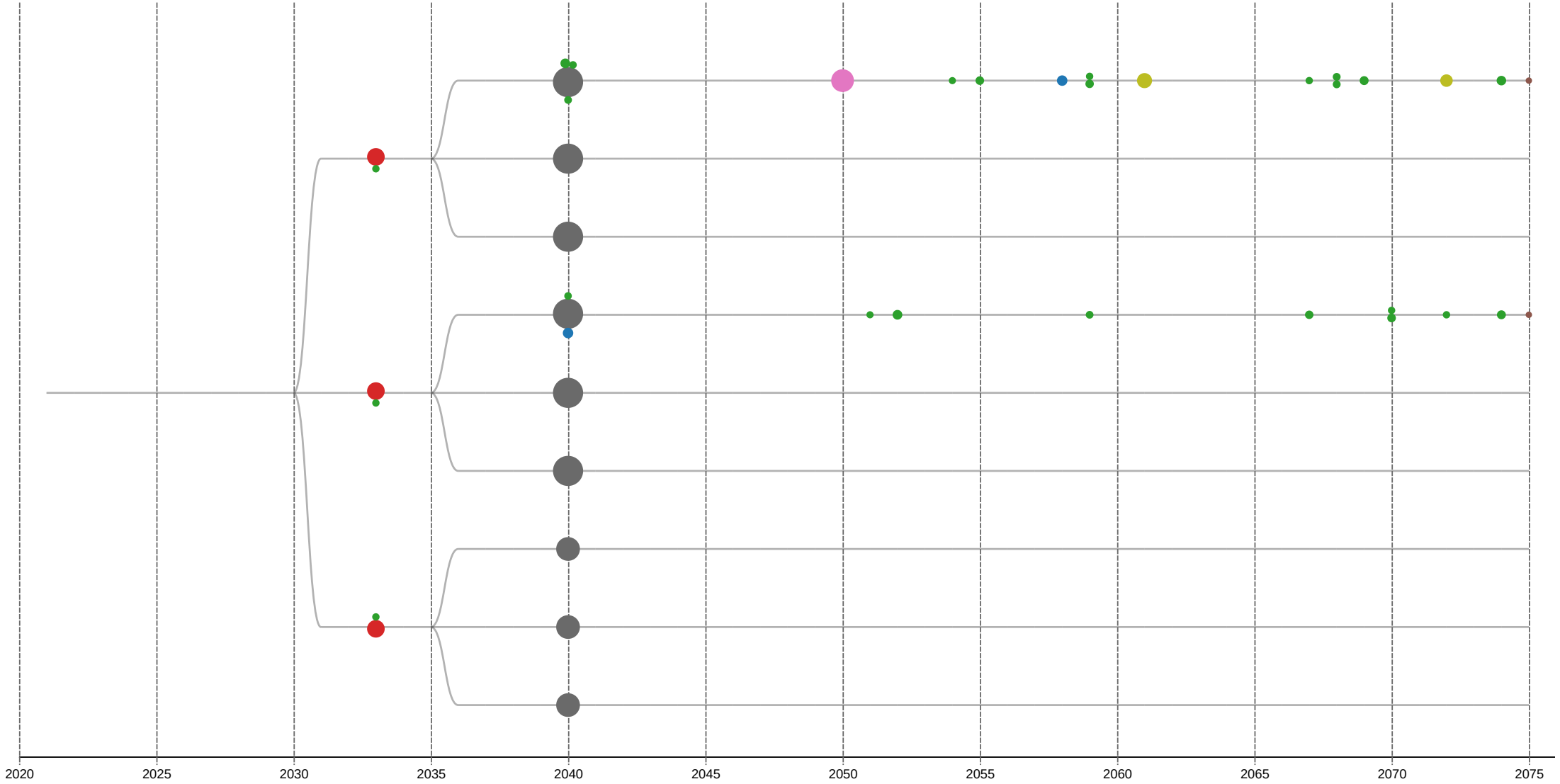
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.61	17.50	14.20	15.66	17.38	15.40	17.51	19.96	16.36
A3: Operational complexity and flexibility	6.49	7.00	7.87	6.59	7.06	7.94	6.68	7.65	8.78	7.34
A4: WRZ connectivity	7.50	8.58	9.60	7.58	8.58	9.41	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.15	19.84	22.05	18.73	19.94	21.99	20.20	22.90	25.93	21.19
E1: Scaleability and modularity of proposed changes	8.78	9.32	10.39	8.67	9.39	10.48	9.67	11.10	12.64	10.05
E2: Intervention lead times	4.20	4.14	4.55	3.97	4.12	4.34	4.04	4.41	4.89	4.29
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.08	6.43	7.17	6.50	7.38	8.40	6.85
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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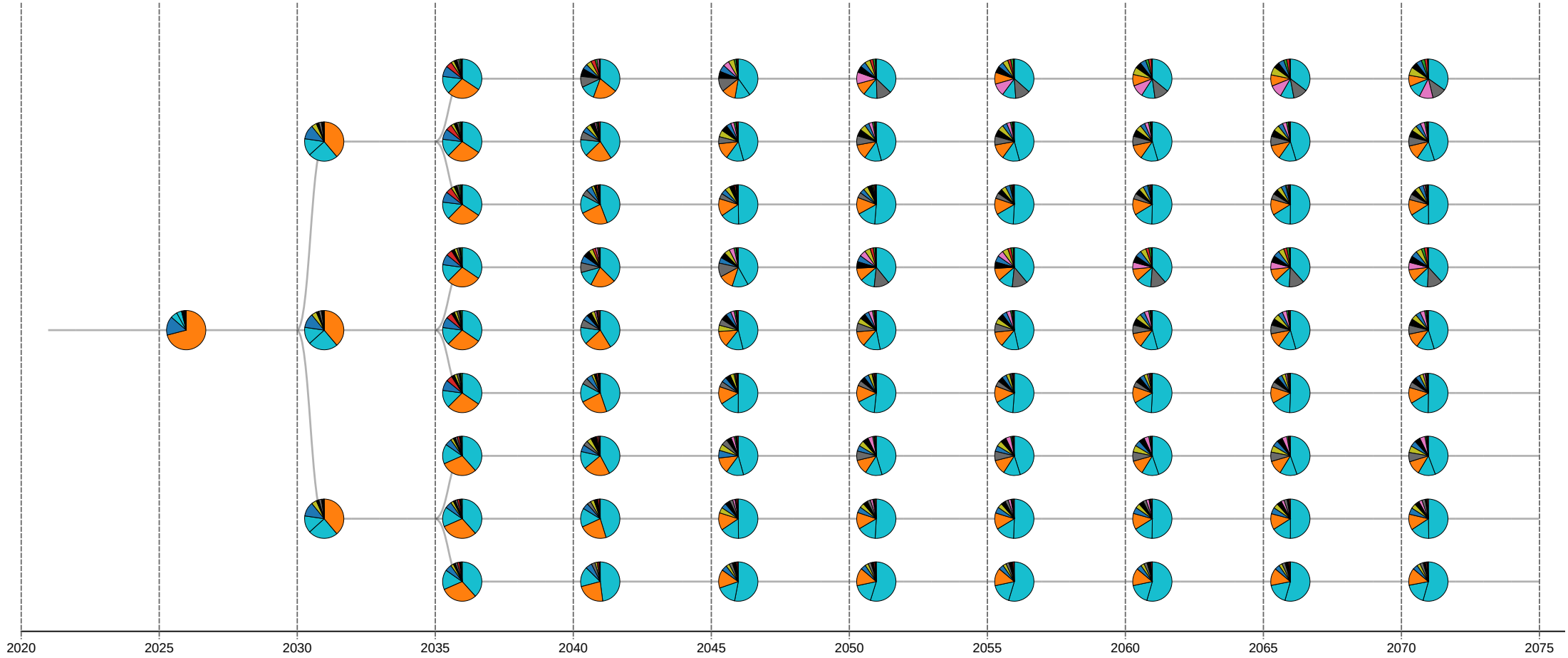
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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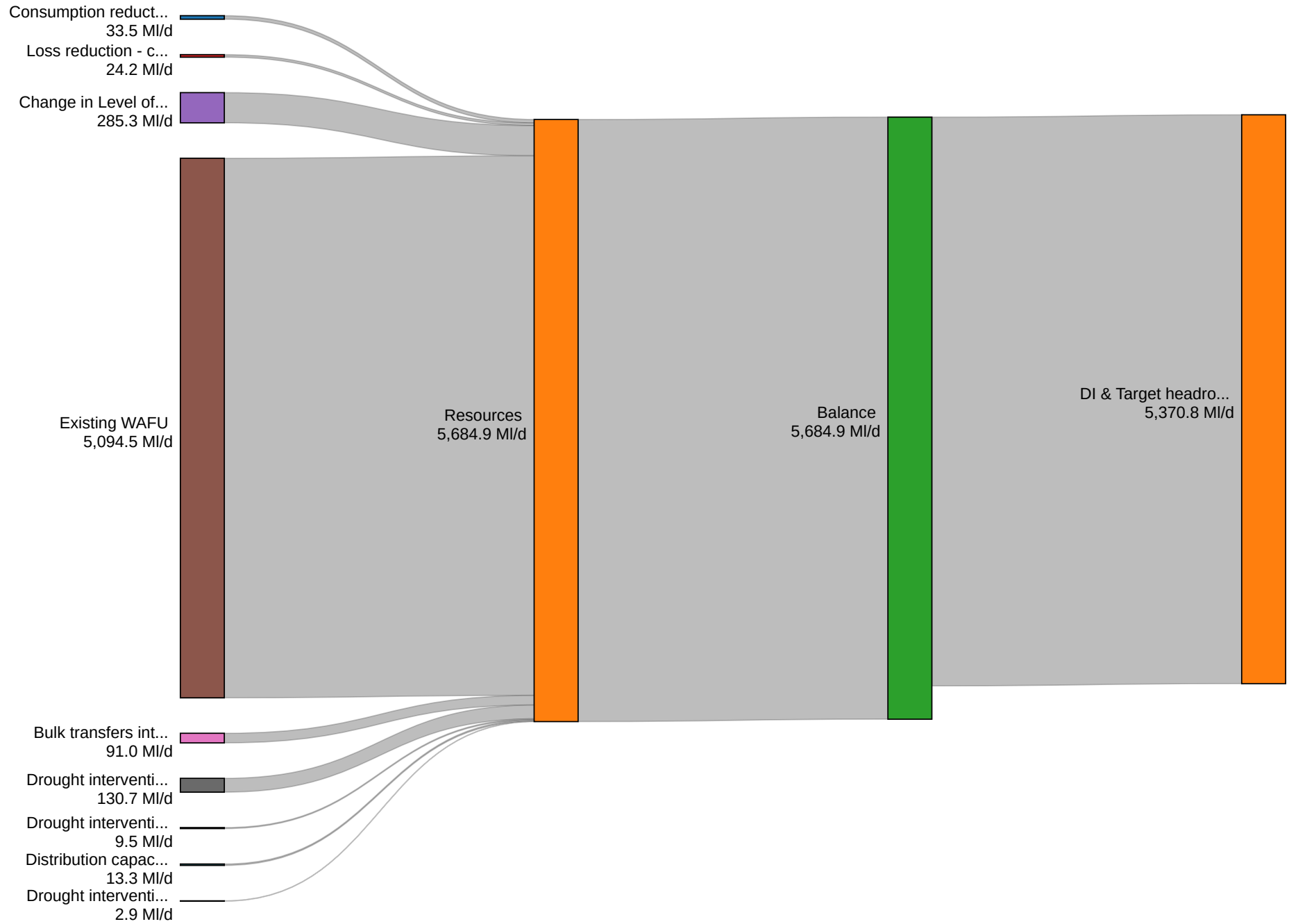
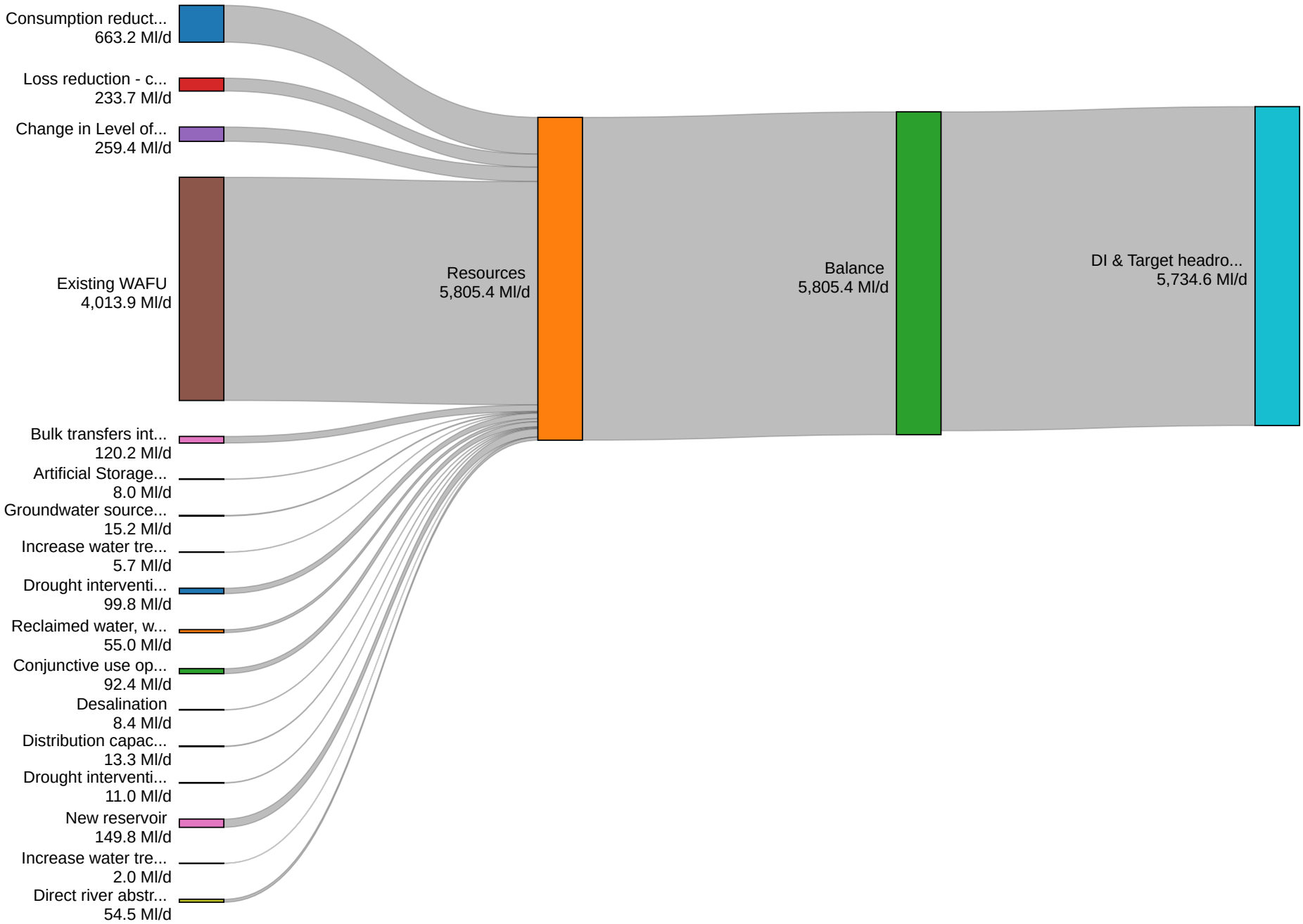
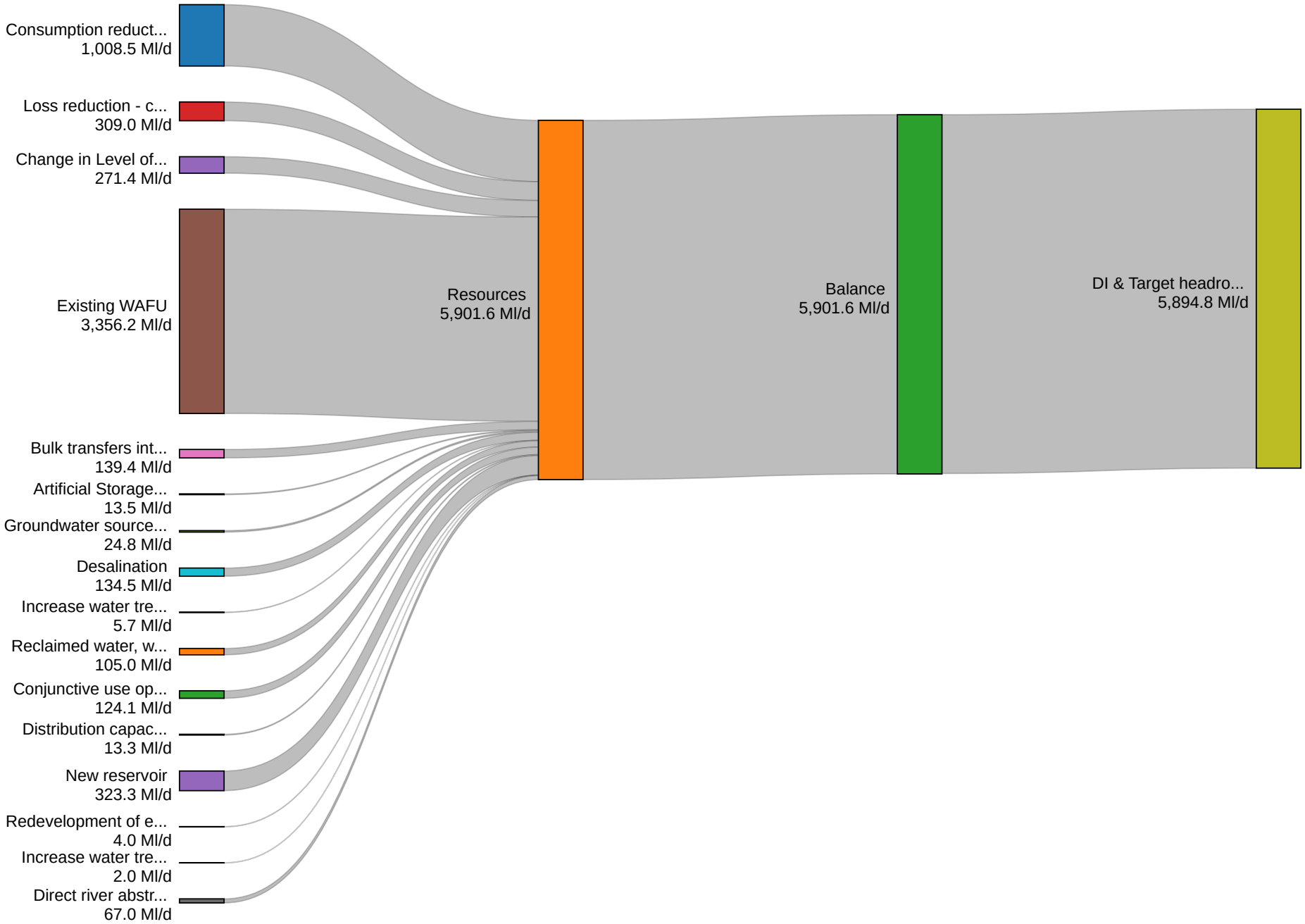
Situation 4 - 2026 (Thames Water)



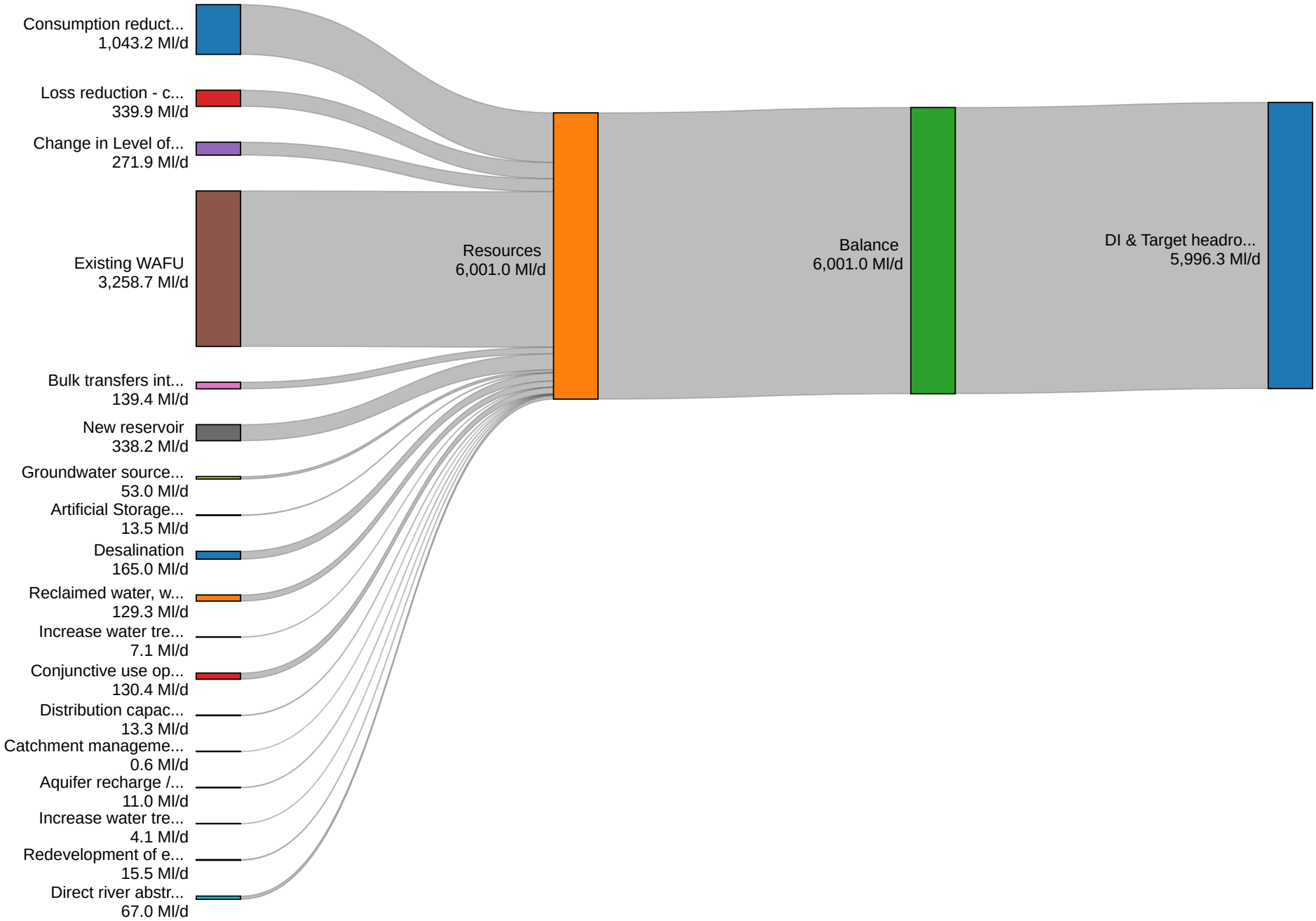
Situation 4 - 2040 (Thames Water)



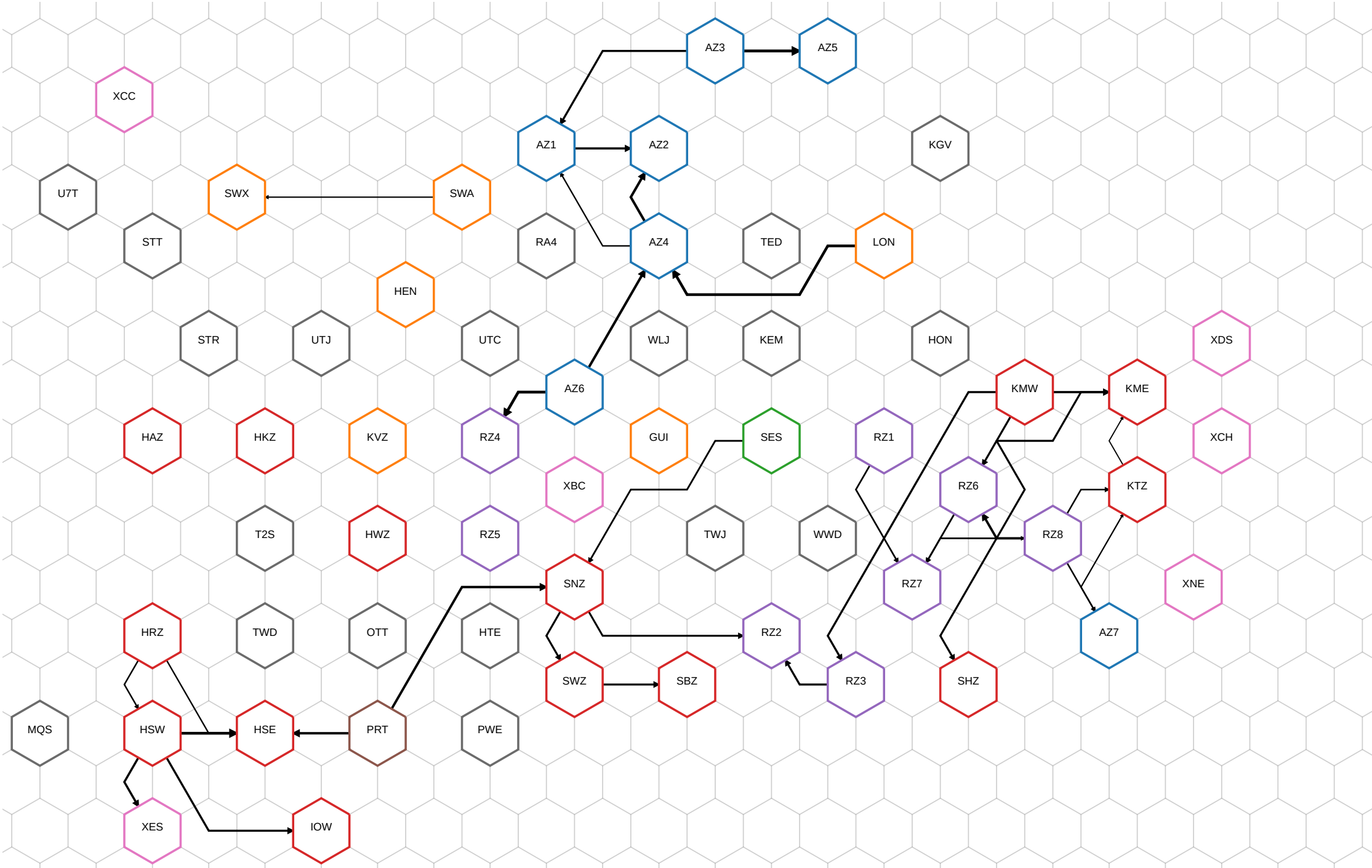
Situation 4 - 2050 (Thames Water)



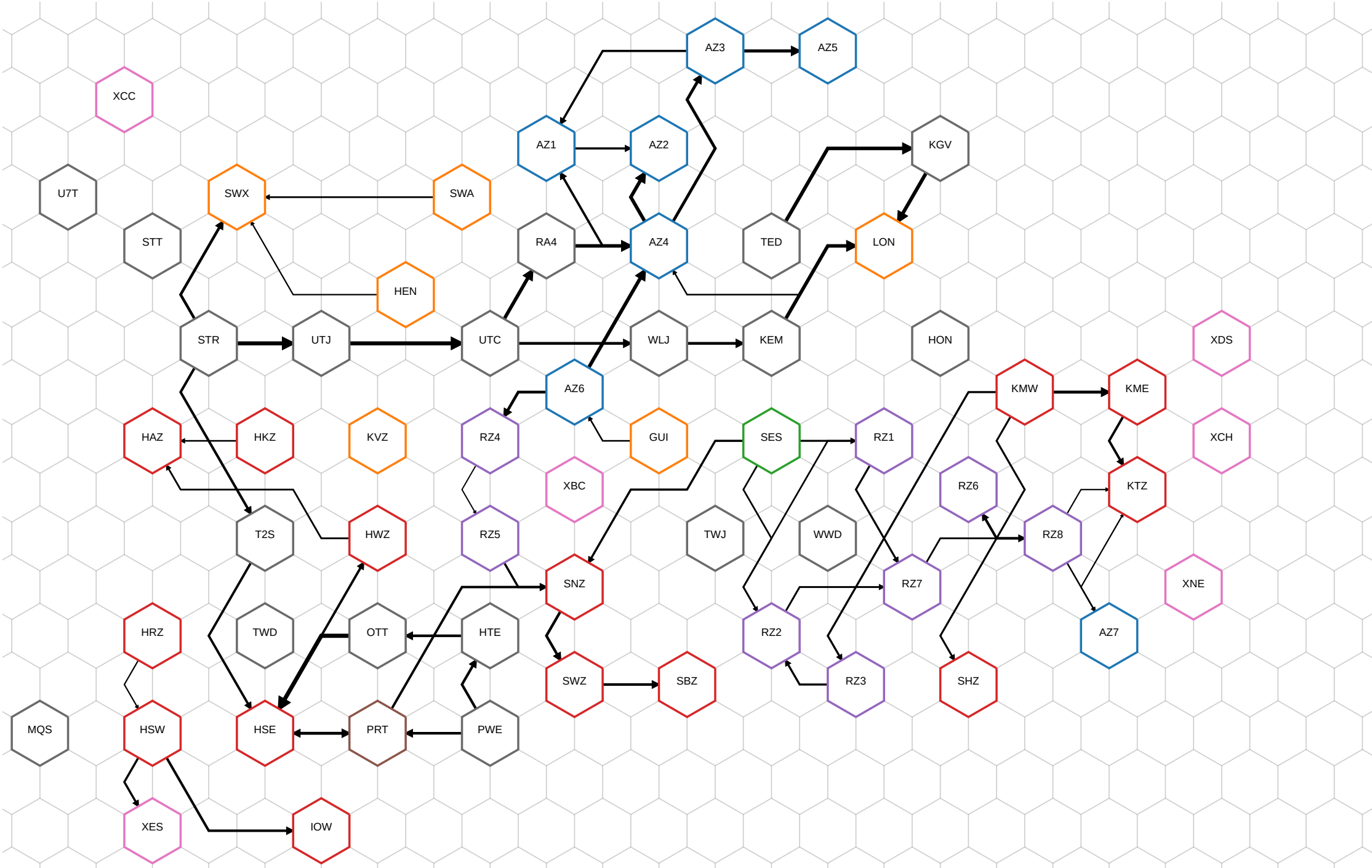
Situation 4 - 2075 (Thames Water)



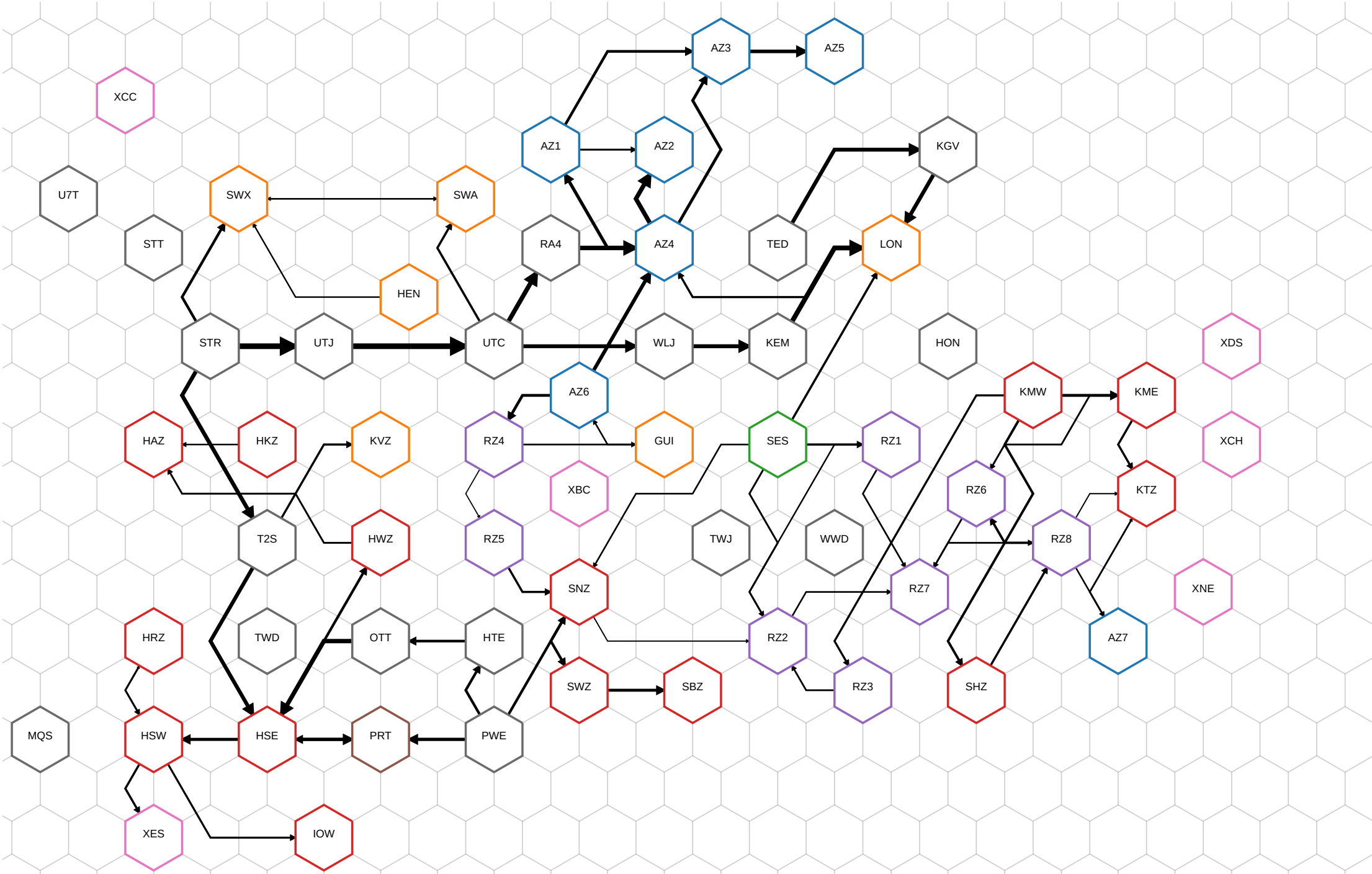
Situation 4 - 2026



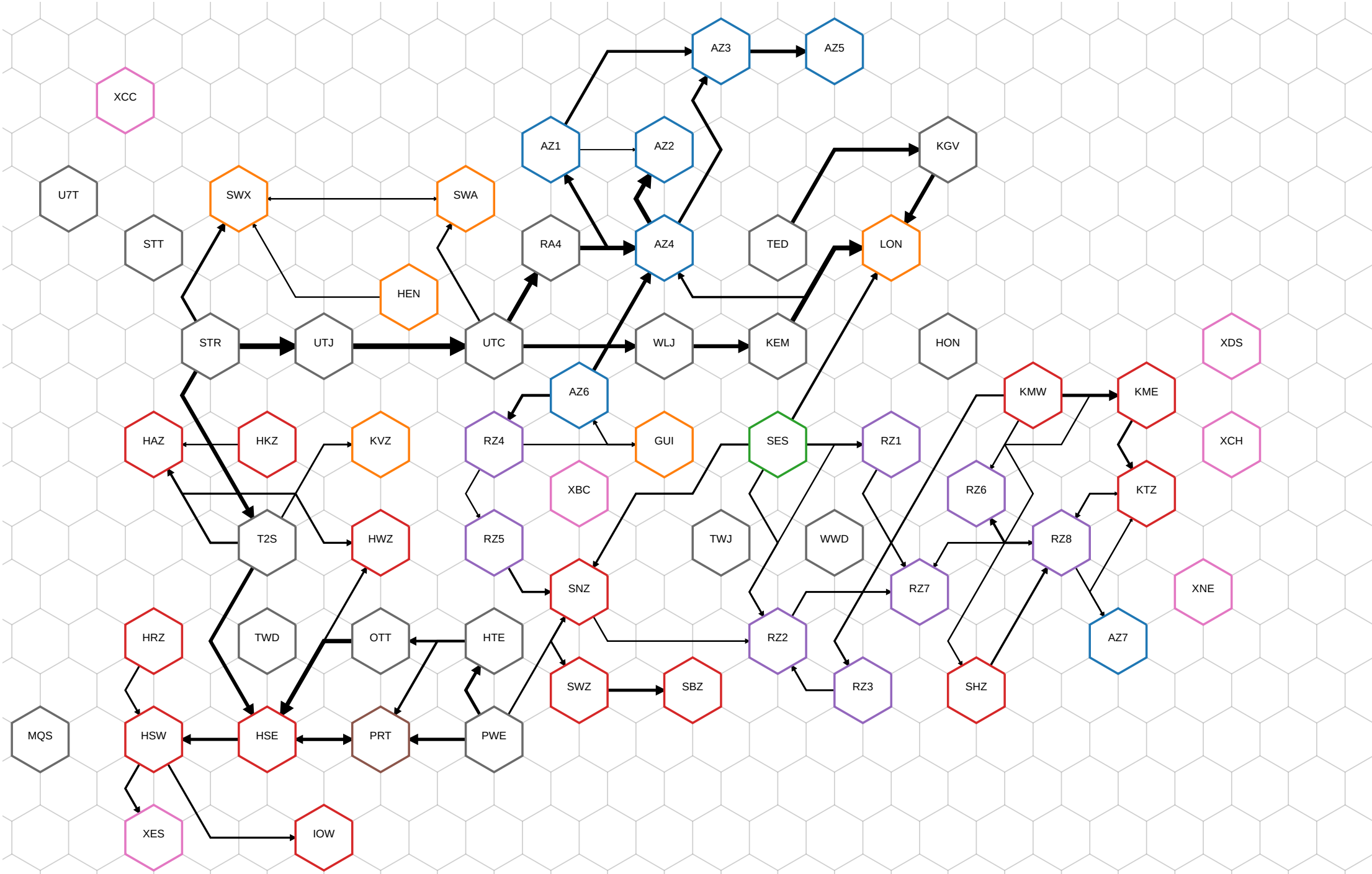
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

BEST ENVIRONMENTAL & SOCIETY PLAN

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-envsoc-07_50-v2
Description	Environmental-social run with hybrid-c+2 government interventions including only GUC 100 Ml/d and SESRO 150 Mm3. Constrained to 7.5% improvement in worst BVP metrics from least cost run.
Created at	06/07/2023, 13:29:45
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

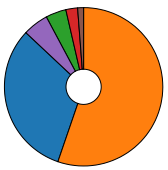
Net present value (Cost)

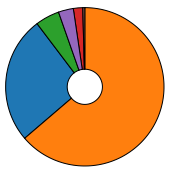
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,931	17,664	16,929	19,383	17,457	16,635	17,787	16,924	16,207	17,769	(£m)
Cost w/o deficit (STPR)	20,931	17,664	16,929	19,383	17,457	16,635	17,787	16,924	16,207	17,769	(£m)
Cost w/ deficit (IGEQ)	32,084	25,908	24,580	29,165	25,574	24,110	26,266	24,637	23,345	26,185	(£m)
Cost w/o deficit (IGEQ)	32,084	25,908	24,580	29,165	25,574	24,110	26,266	24,637	23,345	26,185	(£m)
Cost w/ deficit (LTDR)	23,088	19,288	18,443	21,290	19,056	18,115	19,452	18,448	17,624	19,423	(£m)
Cost w/o deficit (LTDR)	23,088	19,288	18,443	21,290	19,056	18,115	19,452	18,448	17,624	19,423	(£m)

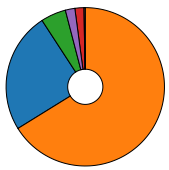
Cost breakdown (STPR)

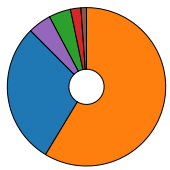
Select Company: Total

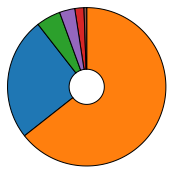
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,642	4,587	4,170	5,600	4,378	3,927	4,526	4,116	3,672	4,624	(£m)
Fixed opex	11,567	11,257	11,204	11,367	11,239	11,182	11,250	11,201	11,139	11,267	(£m)
Fixed operational carbon	878	869	870	873	870	868	871	867	865	870	(£m)
Embedded carbon	502	338	314	411	327	297	344	308	280	347	(£m)
Variable opex	1,090	540	327	915	546	314	669	391	232	558	(£m)
Variable carbon opex	253	73	44	218	96	48	127	41	18	102	(£m)

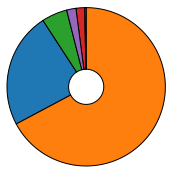
situation1 

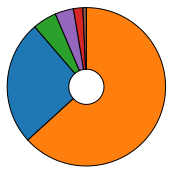
situation2 

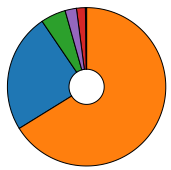
situation3 

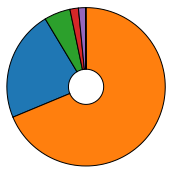
situation4 

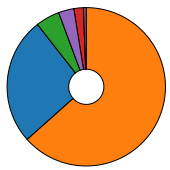
situation5 

situation6 

situation7 

situation8 

situation9 

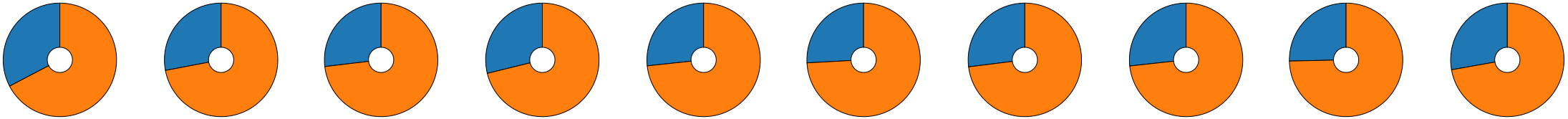
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,234,832	2,067,443	1,901,268	2,582,014	2,001,685	1,804,294	2,126,132	1,872,899	1,690,091	2,142,295	(tonnes)
Operational emissions	6,667,042	5,320,434	5,169,441	6,373,484	5,498,469	5,177,025	5,755,982	5,134,766	4,980,353	5,564,111	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

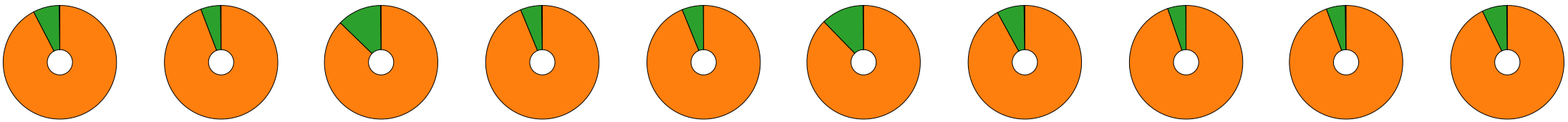


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	46	21	8	46	12	8	34	9	8	21	(GWh)
Grid	22,915	11,376	4,194	19,534	10,944	3,875	13,203	7,956	2,894	10,766	(GWh)
Renewable	1,849	680	606	1,255	706	538	1,115	433	165	816	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	66,230	65,108	65,094	68,530	65,274	65,094	66,237	65,094	65,094	65,751
SEA environmental disbenefit	104,837	81,825	75,682	102,686	79,988	74,025	82,773	70,102	62,511	81,603
Natural capital	85,108,022	81,330,185	84,296,487	82,655,299	81,692,048	84,214,246	81,123,885	81,730,236	84,622,240	82,974,738
Bio-diversity net gain	−166,079	−120,333	−91,865	−172,101	−117,321	−99,790	−116,524	−92,322	−67,332	−115,963

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,750	35,377	35,066	36,736	35,210	34,964	35,248	34,597	34,112	35,340

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.79	27.61	30.08	26.77	27.63	30.04	28.84	31.98	35.54	29.59
R1: Uncertainty of option supply/demand benefit	5.79	5.09	5.51	5.28	5.10	5.49	5.45	5.94	6.57	5.58
R3: Risk of service failure due to other physical hazards	6.63	6.80	7.58	6.41	6.81	7.57	7.07	8.04	9.16	7.34
R4: Availability of additional headroom	6.47	6.80	7.01	6.57	6.82	7.03	7.13	7.49	7.73	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.90	3.82	4.29	3.71	3.80	4.28	3.89	4.50	5.20	4.16
R6: Capacity of catchment services	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00
R7: Risk of service failure to other exceptional events	5.00	5.10	5.69	4.79	5.09	5.67	5.29	6.00	6.87	5.50
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

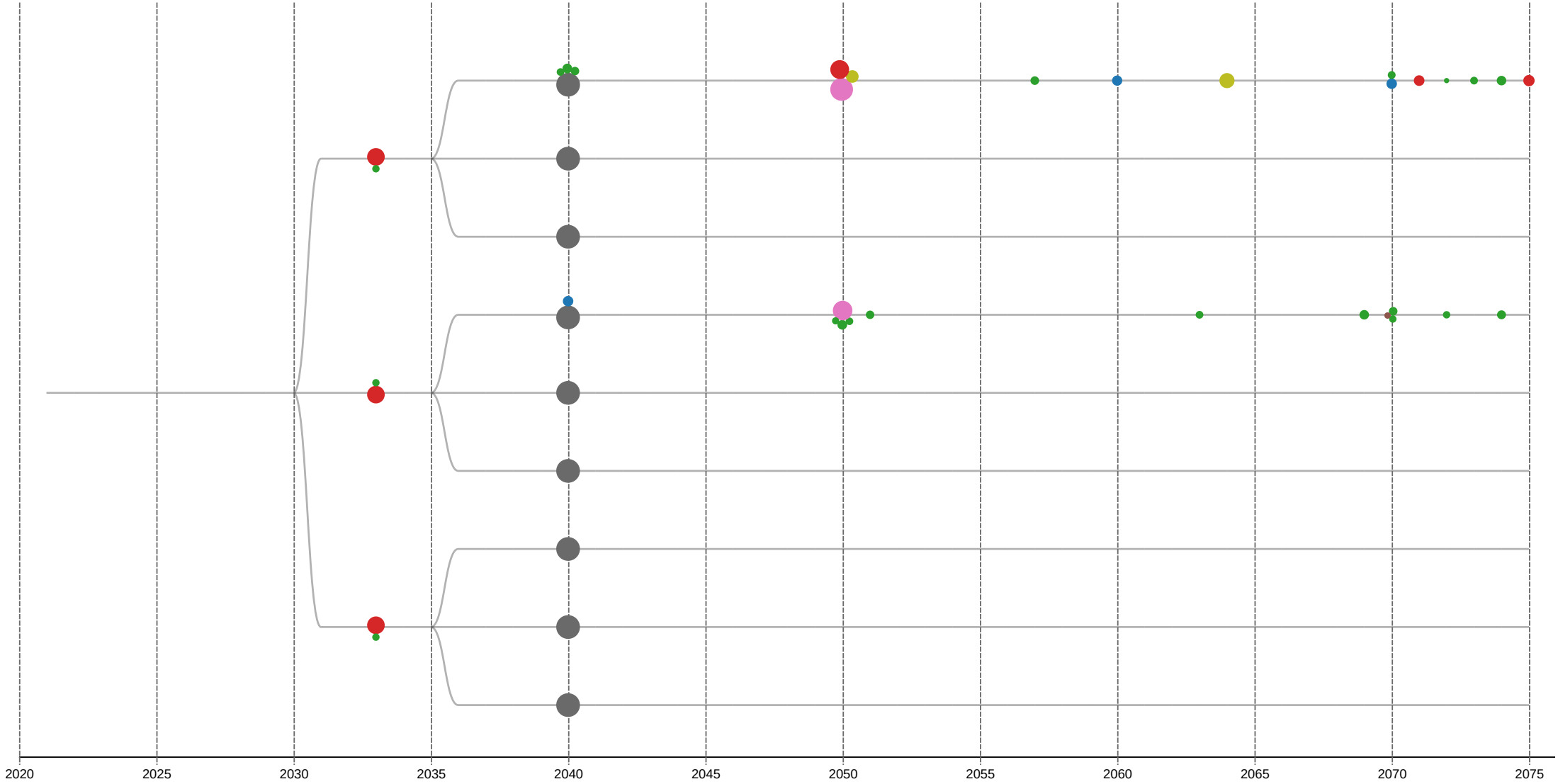
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.54	15.14	16.83	13.64	14.99	16.59	15.45	17.68	20.11	16.00
A3: Operational complexity and flexibility	6.10	6.53	7.32	6.03	6.56	7.33	6.77	7.76	8.91	7.03
A4: WRZ connectivity	7.42	8.59	9.49	7.57	8.41	9.23	8.66	9.89	11.17	8.94
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.28	19.80	21.80	18.72	19.77	21.83	20.43	23.29	26.39	21.26
E1: Scaleability and modularity of proposed changes	8.88	9.43	10.49	8.77	9.48	10.52	9.72	11.18	12.74	10.13
E2: Intervention lead times	4.21	4.03	4.27	3.97	3.93	4.26	4.13	4.60	5.11	4.28
E3: Reliance on external bodies to deliver changes	6.19	6.33	7.03	5.97	6.35	7.04	6.57	7.50	8.53	6.84
E5: Collaborative land management	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01

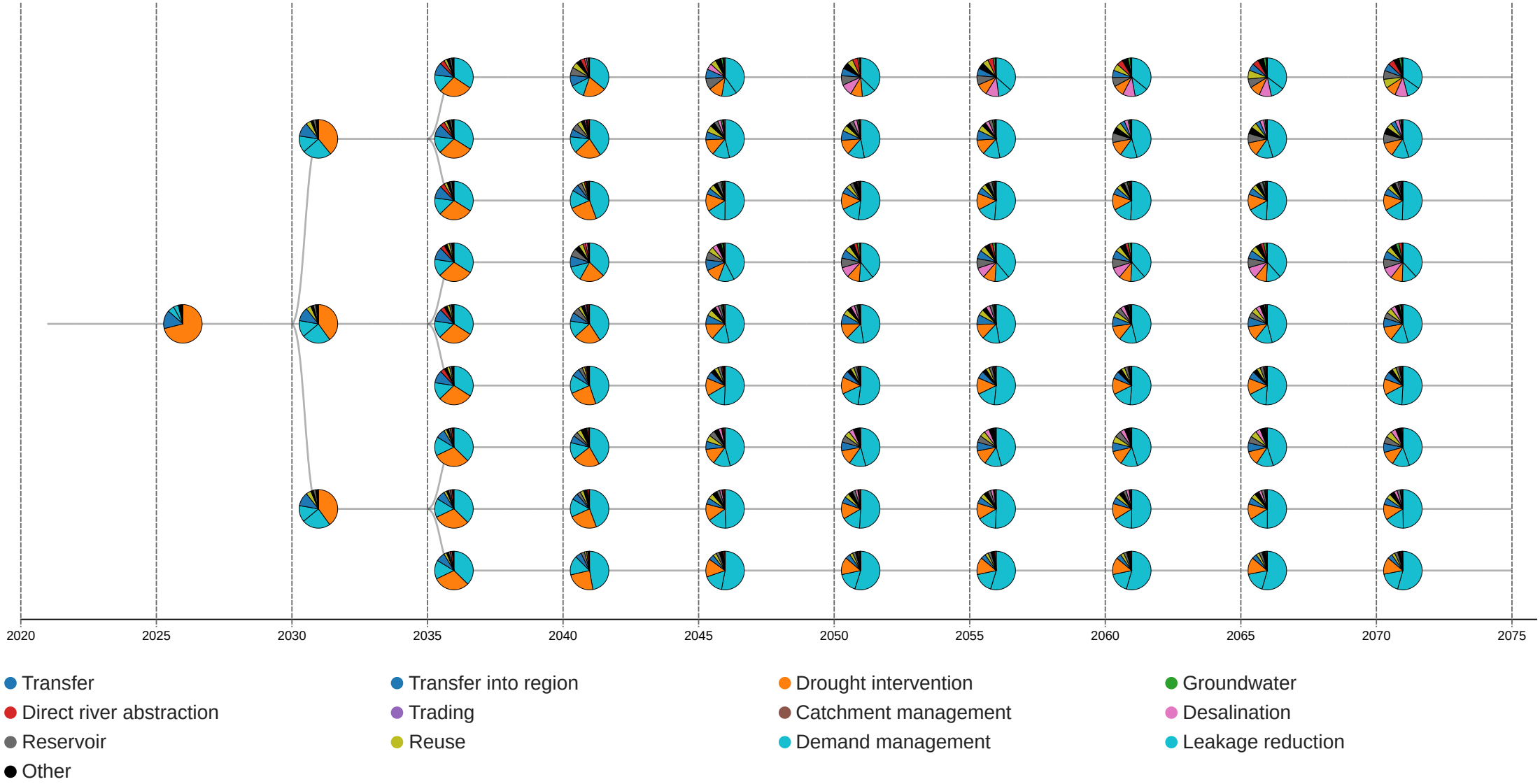
Option Selection (Thames Water)



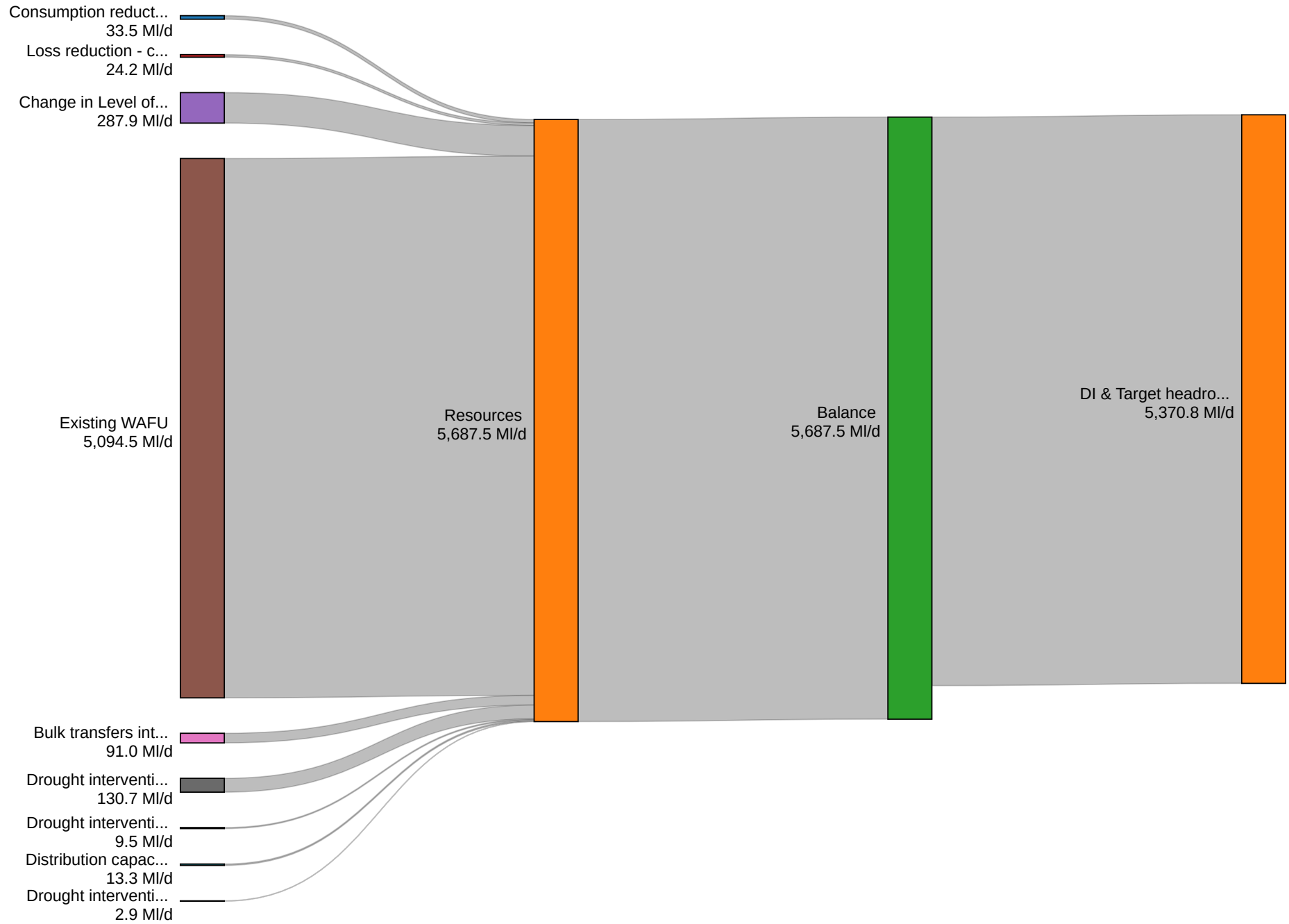
- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

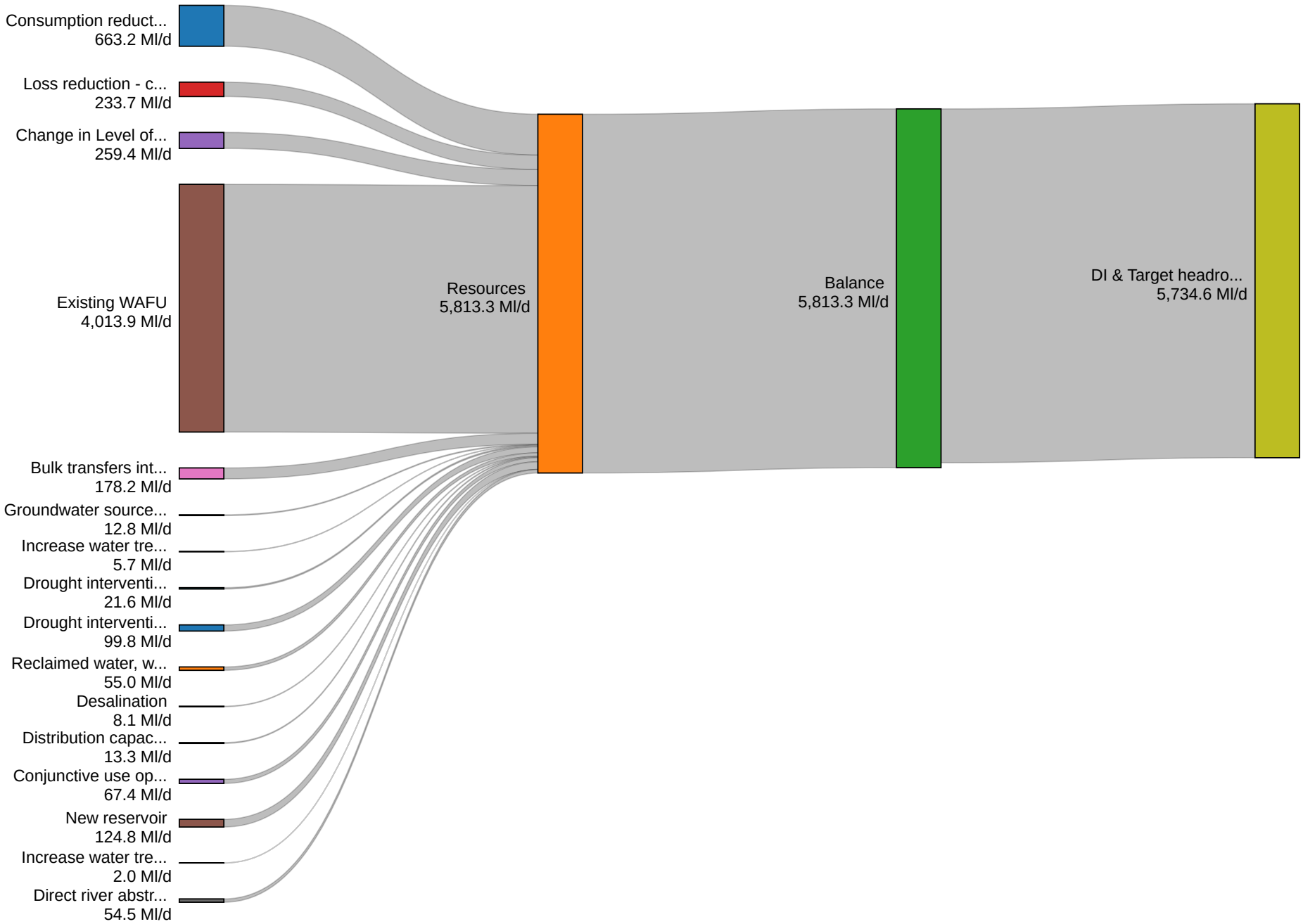
Pie charts show the breakdown of option utilisation by option category.



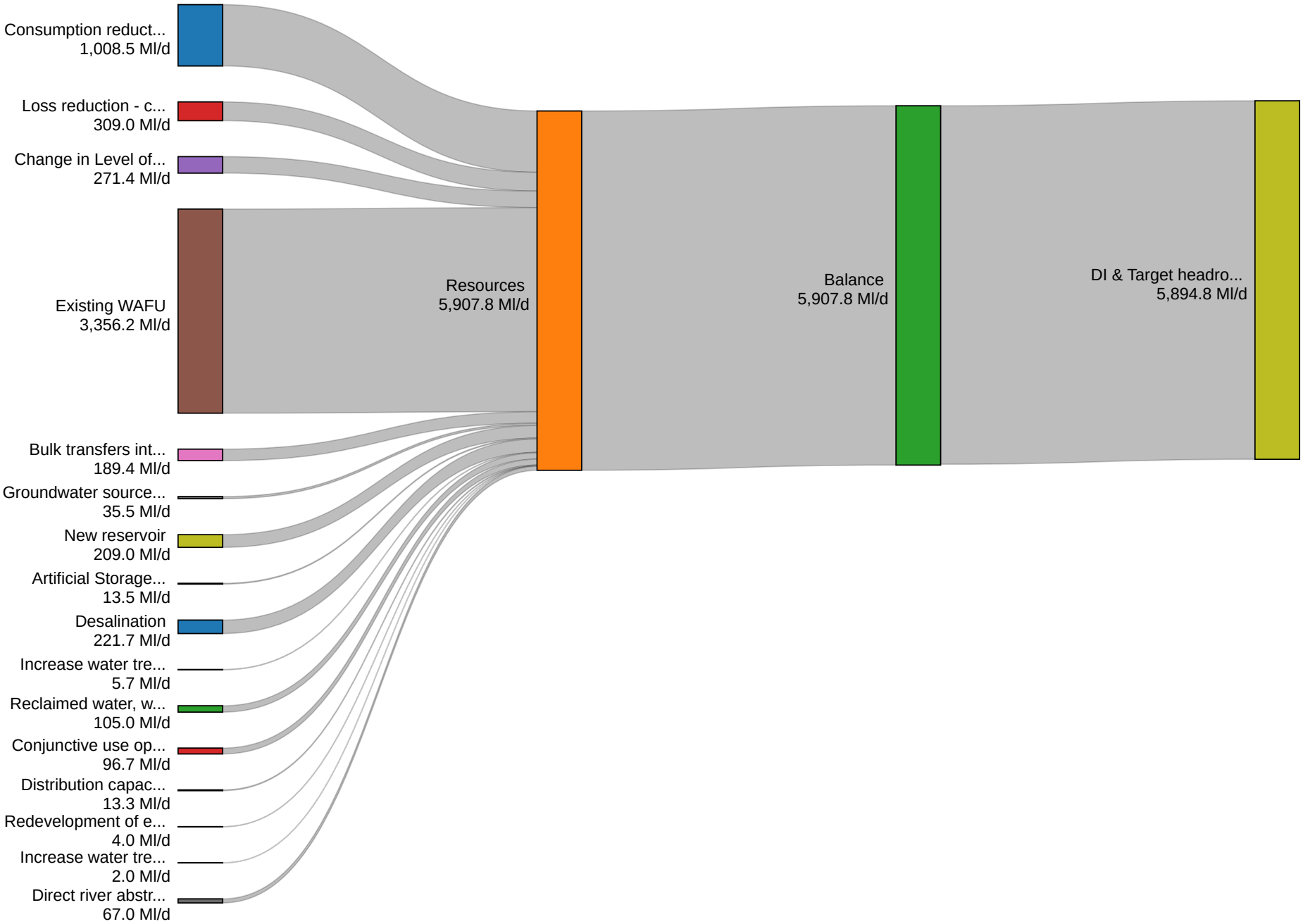
Situation 4 - 2026 (Thames Water)



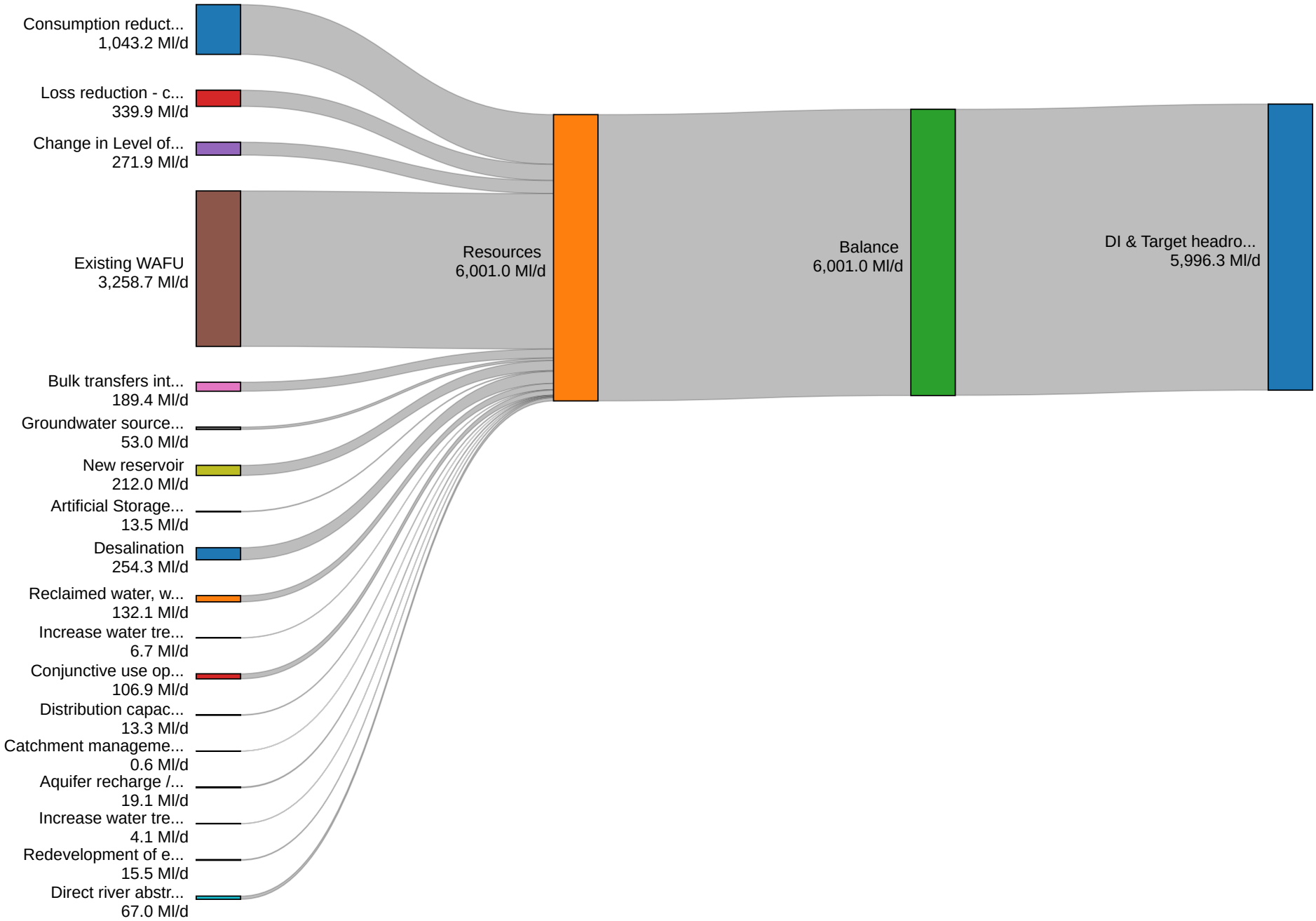
Situation 4 - 2040 (Thames Water)



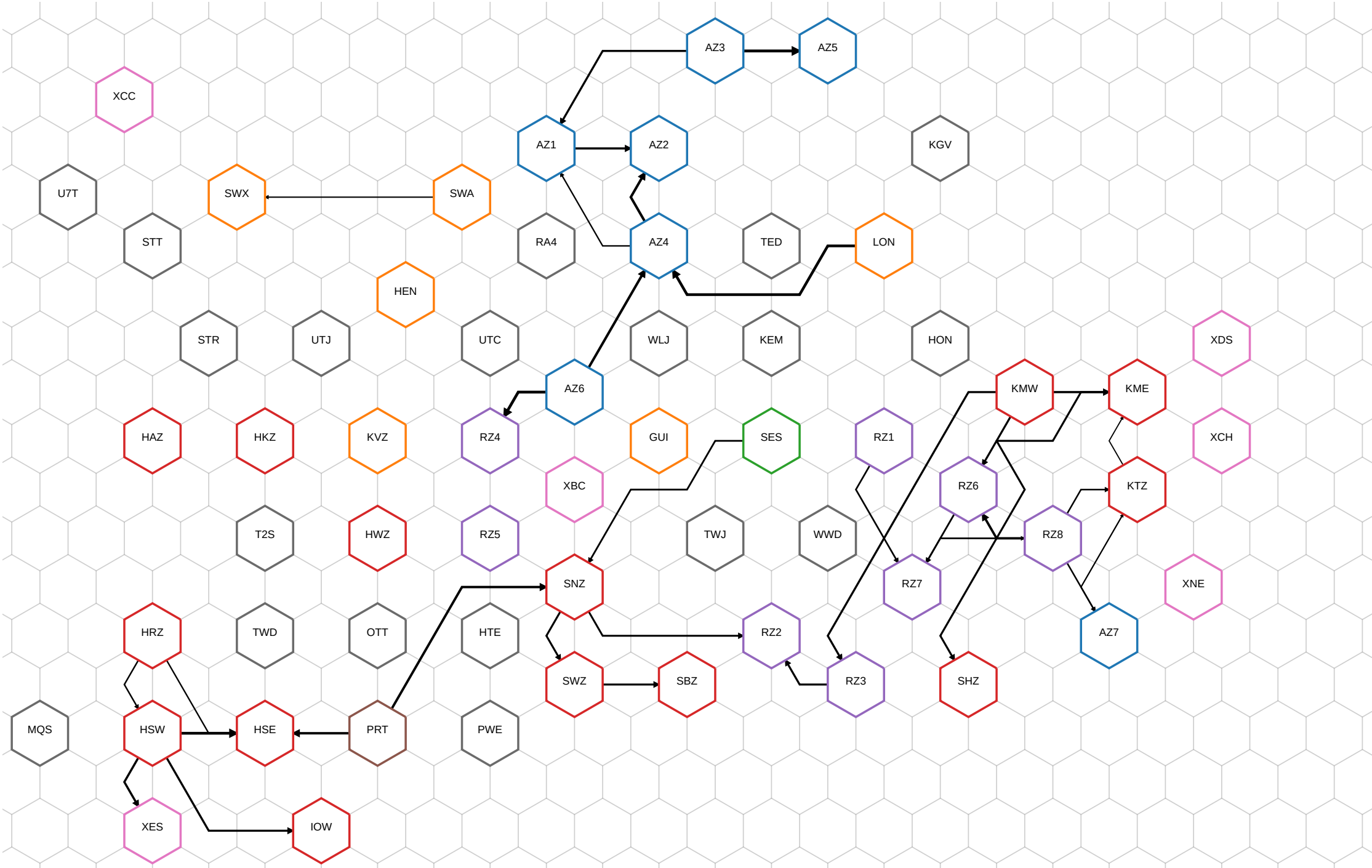
Situation 4 - 2050 (Thames Water)



Situation 4 - 2075 (Thames Water)



Situation 4 - 2026



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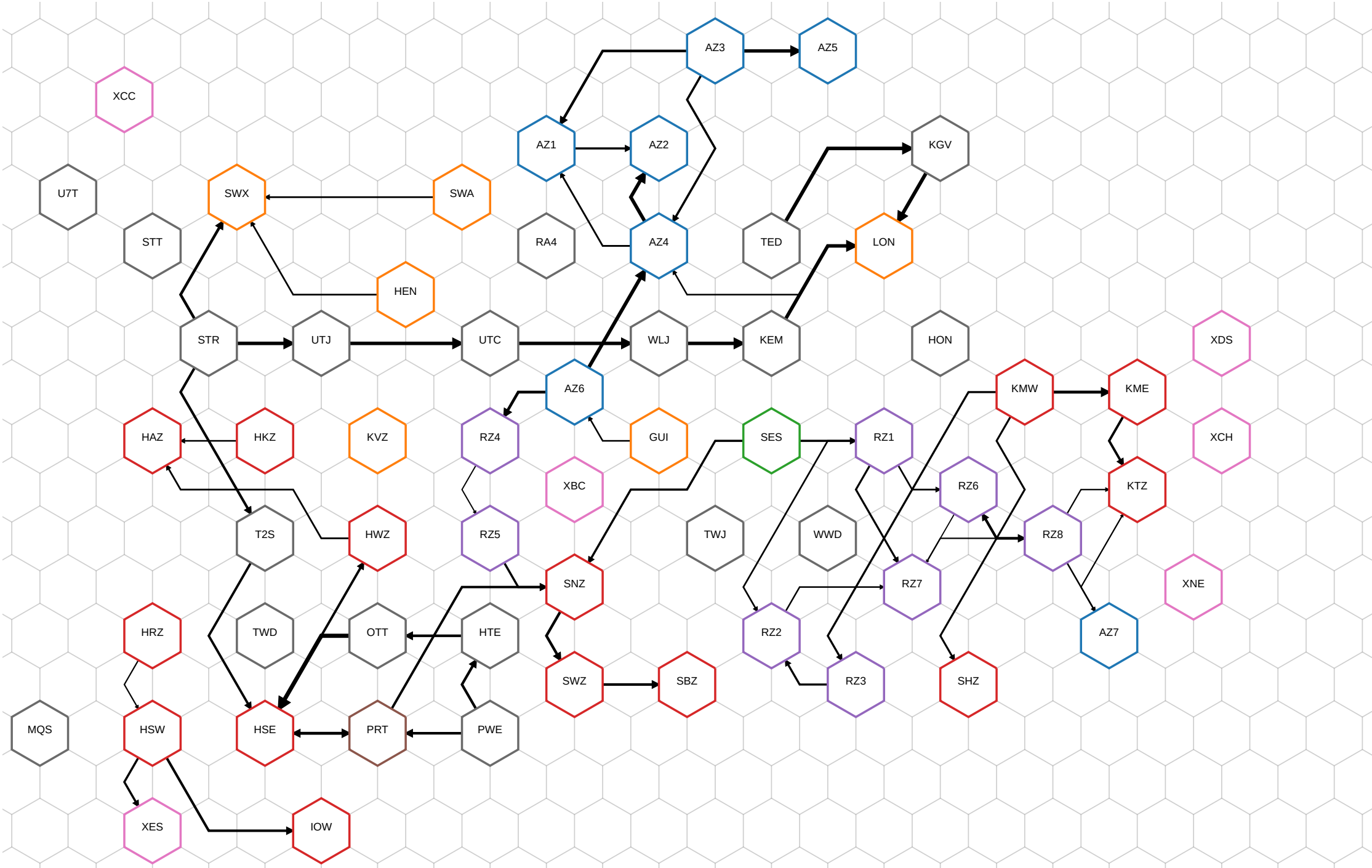

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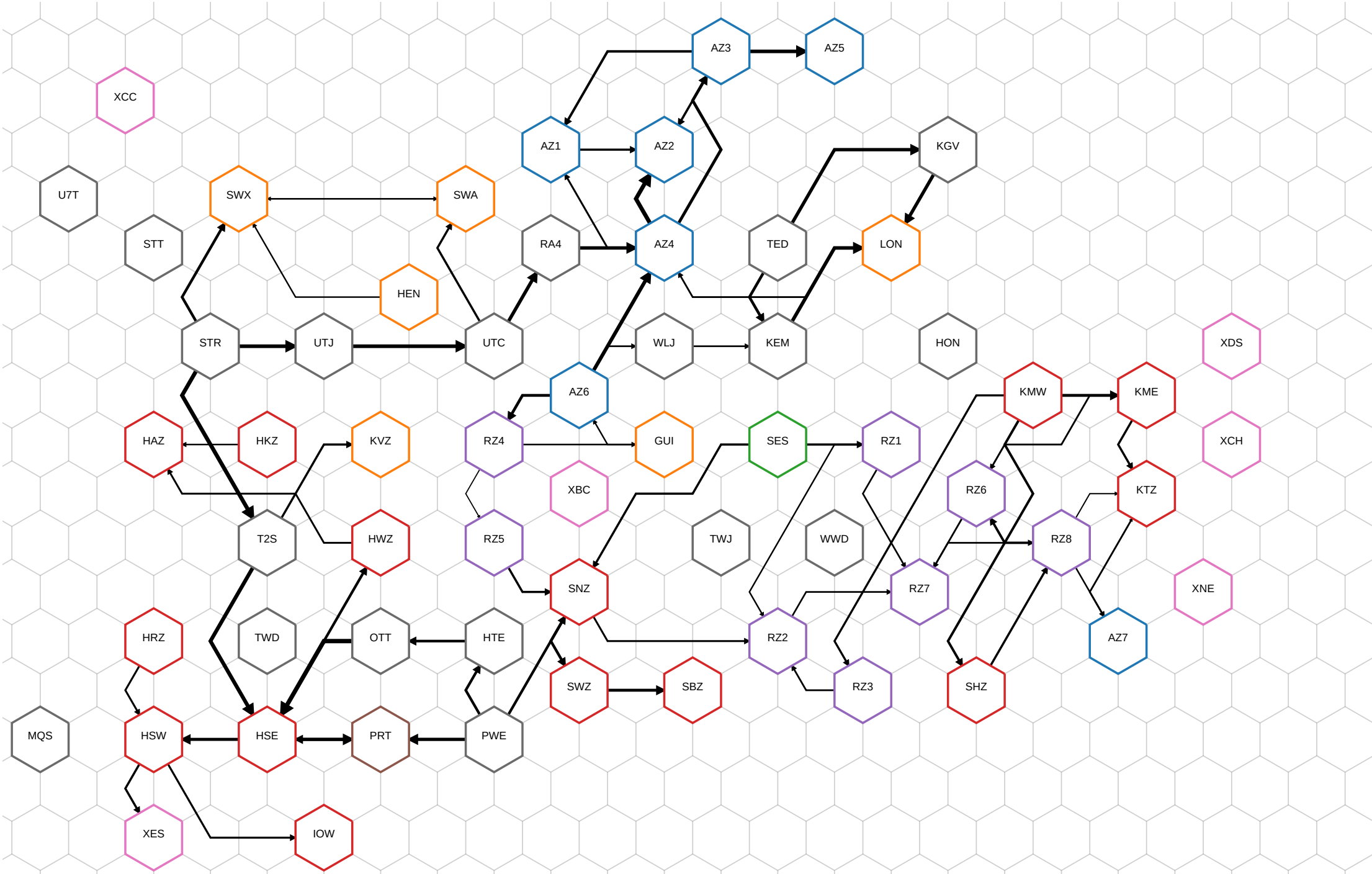

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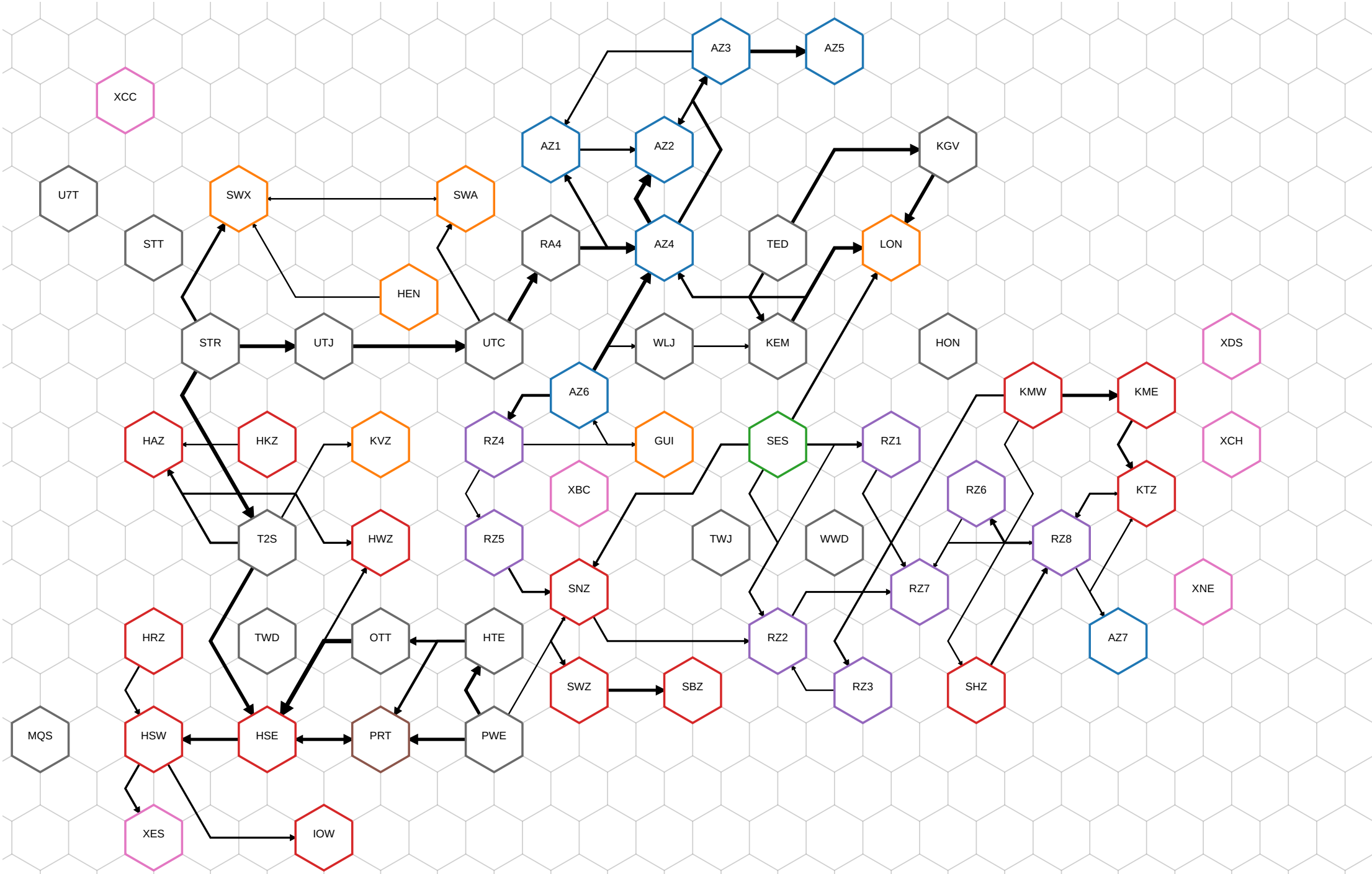


IVM RUN DOSSIER

RESILIENCE-FOCUSED PLAN

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-resilience-07_50-v2
Description	Resilience run with hybrid-c+2 government interventions. Constrained to 7.5% improvement in worst BVP metrics from least cost run.
Created at	06/07/2023, 13:30:31
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

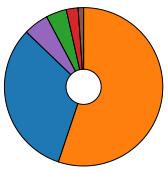
Net present value (Cost)

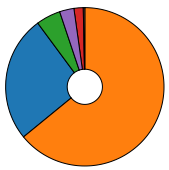
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,852	17,428	16,732	19,377	17,317	16,537	17,621	16,772	16,078	17,635	(£m)
Cost w/o deficit (STPR)	20,852	17,428	16,732	19,377	17,317	16,537	17,621	16,772	16,078	17,635	(£m)
Cost w/ deficit (IGEQ)	32,008	25,534	24,274	29,240	25,345	23,954	26,001	24,403	23,155	25,991	(£m)
Cost w/o deficit (IGEQ)	32,008	25,534	24,274	29,240	25,345	23,954	26,001	24,403	23,155	25,991	(£m)
Cost w/ deficit (LTDR)	23,008	19,025	18,225	21,296	18,900	18,006	19,267	18,280	17,484	19,277	(£m)
Cost w/o deficit (LTDR)	23,008	19,025	18,225	21,296	18,900	18,006	19,267	18,280	17,484	19,277	(£m)

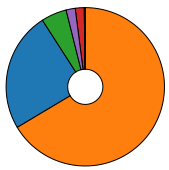
Cost breakdown (STPR)

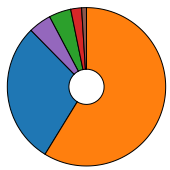
Select Company: Total

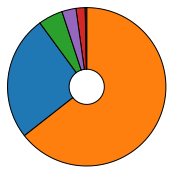
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,676	4,494	4,095	5,595	4,420	3,945	4,519	4,070	3,638	4,606	(£m)
Fixed opex	11,499	11,169	11,115	11,387	11,153	11,097	11,161	11,109	11,049	11,193	(£m)
Fixed operational carbon	880	869	870	877	869	869	872	867	866	871	(£m)
Embedded carbon	503	331	307	429	325	295	341	304	280	346	(£m)
Variable opex	1,064	511	310	897	496	300	635	385	230	536	(£m)
Variable carbon opex	231	54	34	192	53	31	93	37	17	82	(£m)

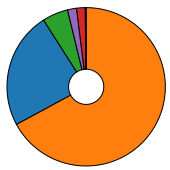
situation1 

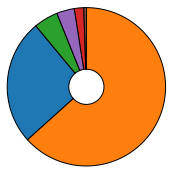
situation2 

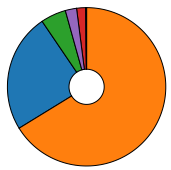
situation3 

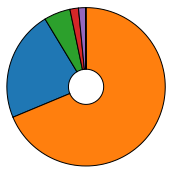
situation4 

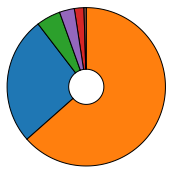
situation5 

situation6 

situation7 

situation8 

situation9 

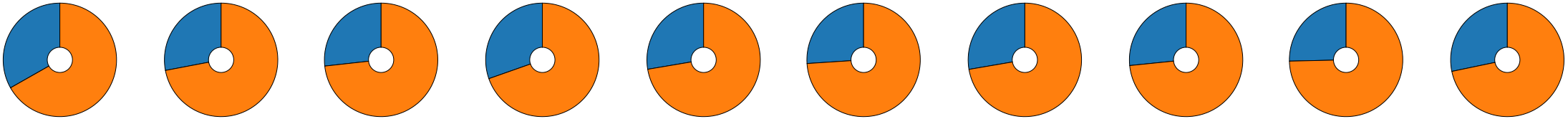
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,257,701	2,027,538	1,867,360	2,725,956	1,993,344	1,790,065	2,114,763	1,851,409	1,689,790	2,146,436	(tonnes)
Operational emissions	6,554,797	5,216,397	5,112,448	6,247,388	5,213,619	5,086,087	5,522,304	5,107,105	4,973,837	5,448,220	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

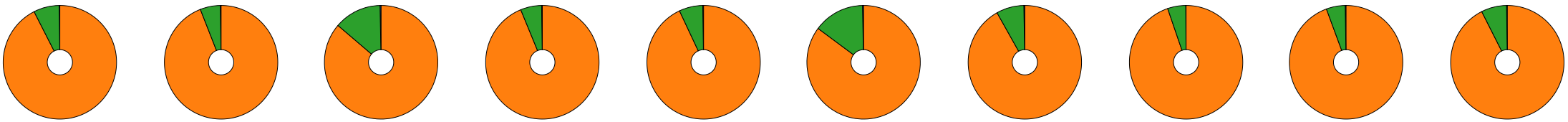


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	46	29	14	41	9	8	26	(GWh)
Grid	22,849	11,192	3,937	19,619	10,560	3,834	13,092	7,948	2,894	10,658	(GWh)
Renewable	1,807	681	615	1,255	765	654	1,122	433	165	833	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,169	65,623	64,006	69,397	65,016	63,789	65,723	63,528	62,472	65,636
SEA environmental disbenefit	115,704	85,635	76,078	104,493	80,318	74,831	85,424	72,421	63,574	84,275
Natural capital	84,358,115	81,291,106	84,135,851	77,815,049	81,338,202	83,885,992	80,965,871	81,728,691	84,600,613	82,235,499
Bio-diversity net gain	−189,408	−121,220	−94,886	−170,954	−114,312	−92,664	−121,041	−93,500	−64,446	−118,048

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,393	32,419	31,823	33,788	32,070	31,600	32,067	31,152	30,662	32,219

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.23	28.13	29.96	28.21	28.12	29.96	28.65	31.63	35.14	29.78
R1: Uncertainty of option supply/demand benefit	5.78	5.11	5.42	5.64	5.06	5.39	5.31	5.73	6.33	5.53
R3: Risk of service failure due to other physical hazards	6.67	6.86	7.58	6.77	6.90	7.59	7.06	7.98	9.10	7.39
R4: Availability of additional headroom	6.46	6.79	7.00	6.52	6.81	7.02	7.10	7.46	7.70	6.98
R5: Catchment/raw water quality risks (incl. climate change)	3.97	3.87	4.36	3.72	3.88	4.37	3.98	4.58	5.29	4.22
R6: Capacity of catchment services	0.27	0.31	0.00	0.31	0.31	0.00	0.00	0.00	0.00	0.13
R7: Risk of service failure to other exceptional events	4.99	5.08	5.60	5.14	5.05	5.59	5.20	5.87	6.72	5.47
R8: Soil health	0.10	0.11	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.05

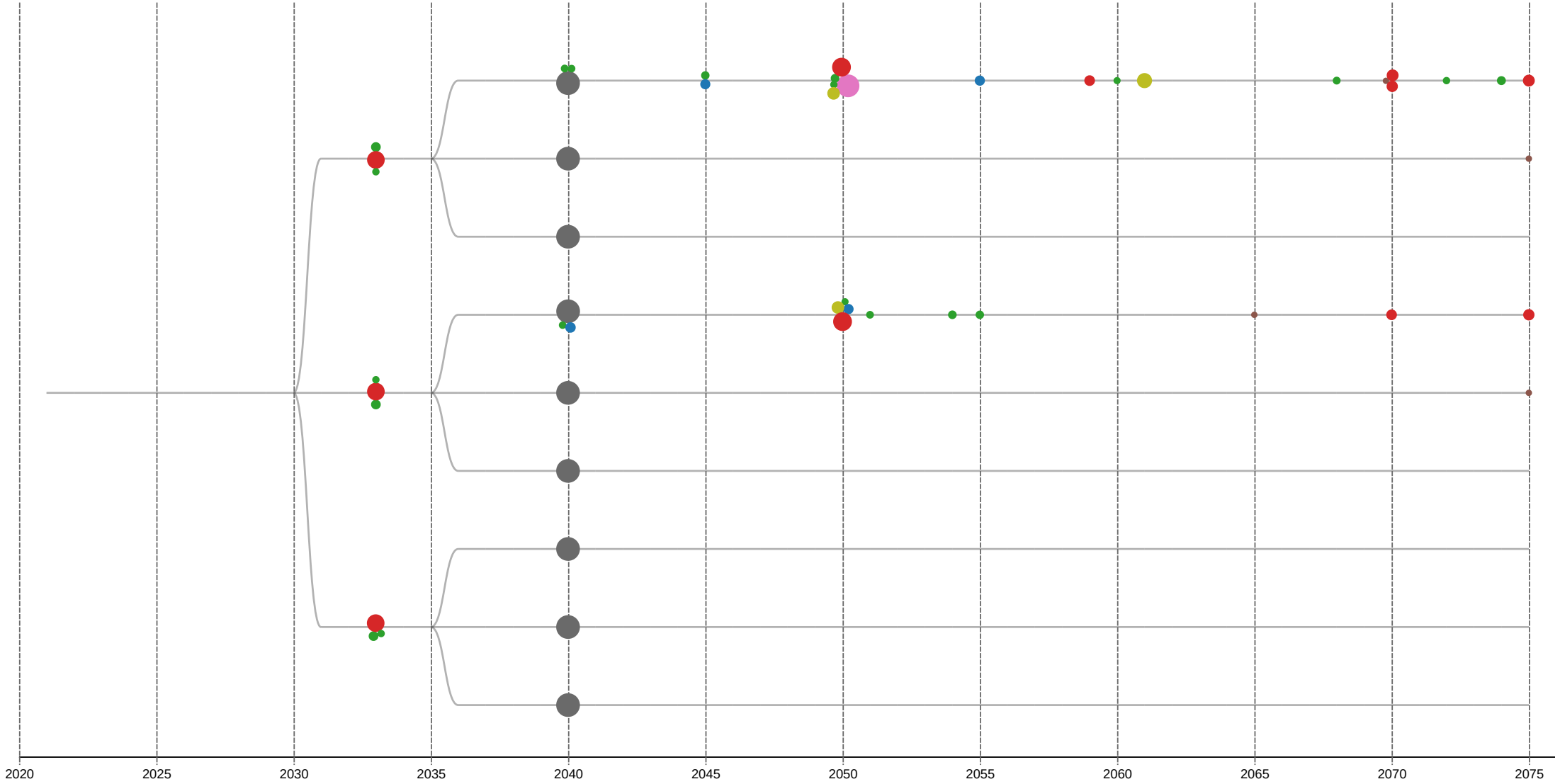
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.14	15.36	16.90	14.08	15.29	16.82	15.52	17.66	20.13	16.21
A3: Operational complexity and flexibility	6.13	6.56	7.29	6.35	6.56	7.32	6.74	7.71	8.85	7.05
A4: WRZ connectivity	7.92	8.67	9.58	7.61	8.61	9.48	8.75	9.92	11.25	9.09
A7: Customer relations support engagement with demand management	0.09	0.13	0.03	0.12	0.13	0.03	0.03	0.03	0.03	0.07

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.78	20.49	21.93	20.05	20.39	21.77	20.29	22.99	26.05	21.53
E1: Scaleability and modularity of proposed changes	8.91	9.47	10.47	8.99	9.51	10.53	9.69	11.12	12.66	10.15
E2: Intervention lead times	4.29	4.18	4.45	4.30	4.05	4.21	4.07	4.45	4.94	4.33
E3: Reliance on external bodies to deliver changes	6.22	6.38	7.02	6.30	6.38	7.03	6.53	7.42	8.45	6.86
E5: Collaborative land management	0.35	0.46	0.00	0.46	0.46	0.00	0.00	0.00	0.00	0.19

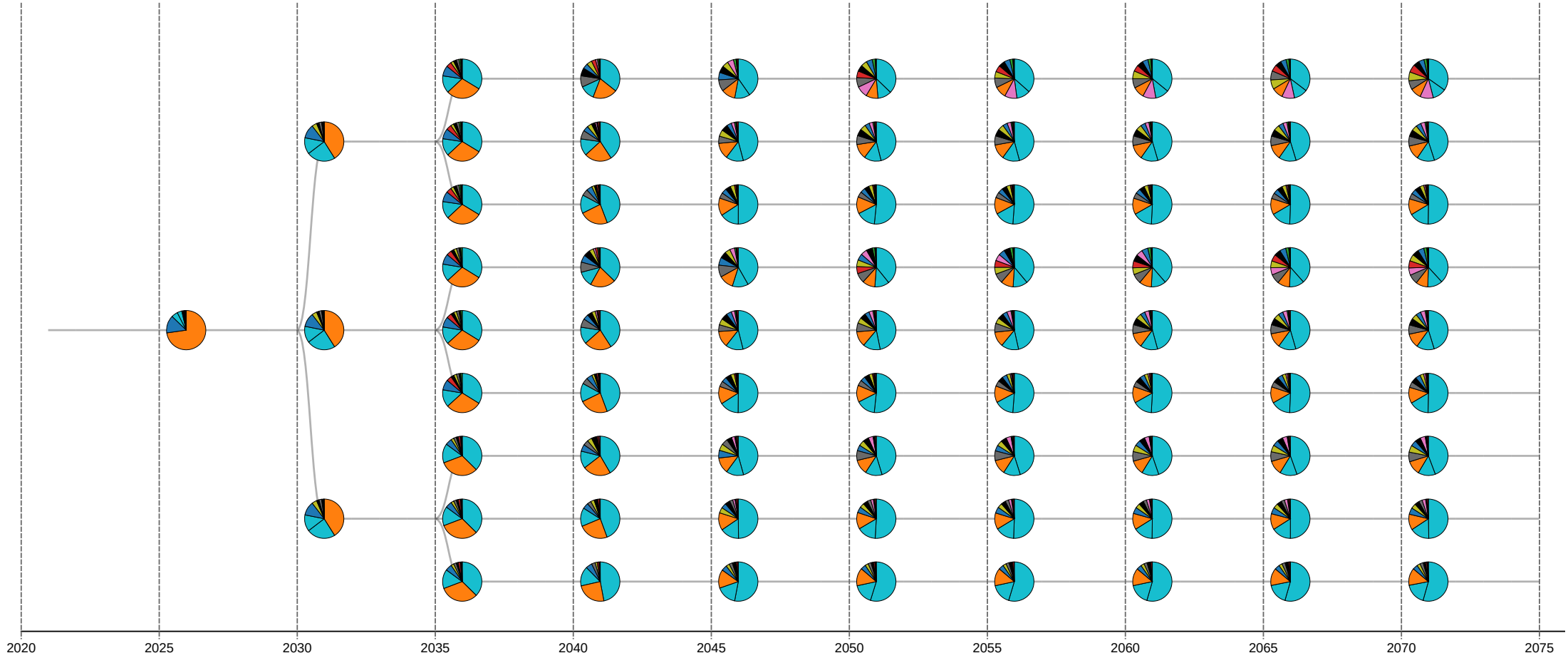
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

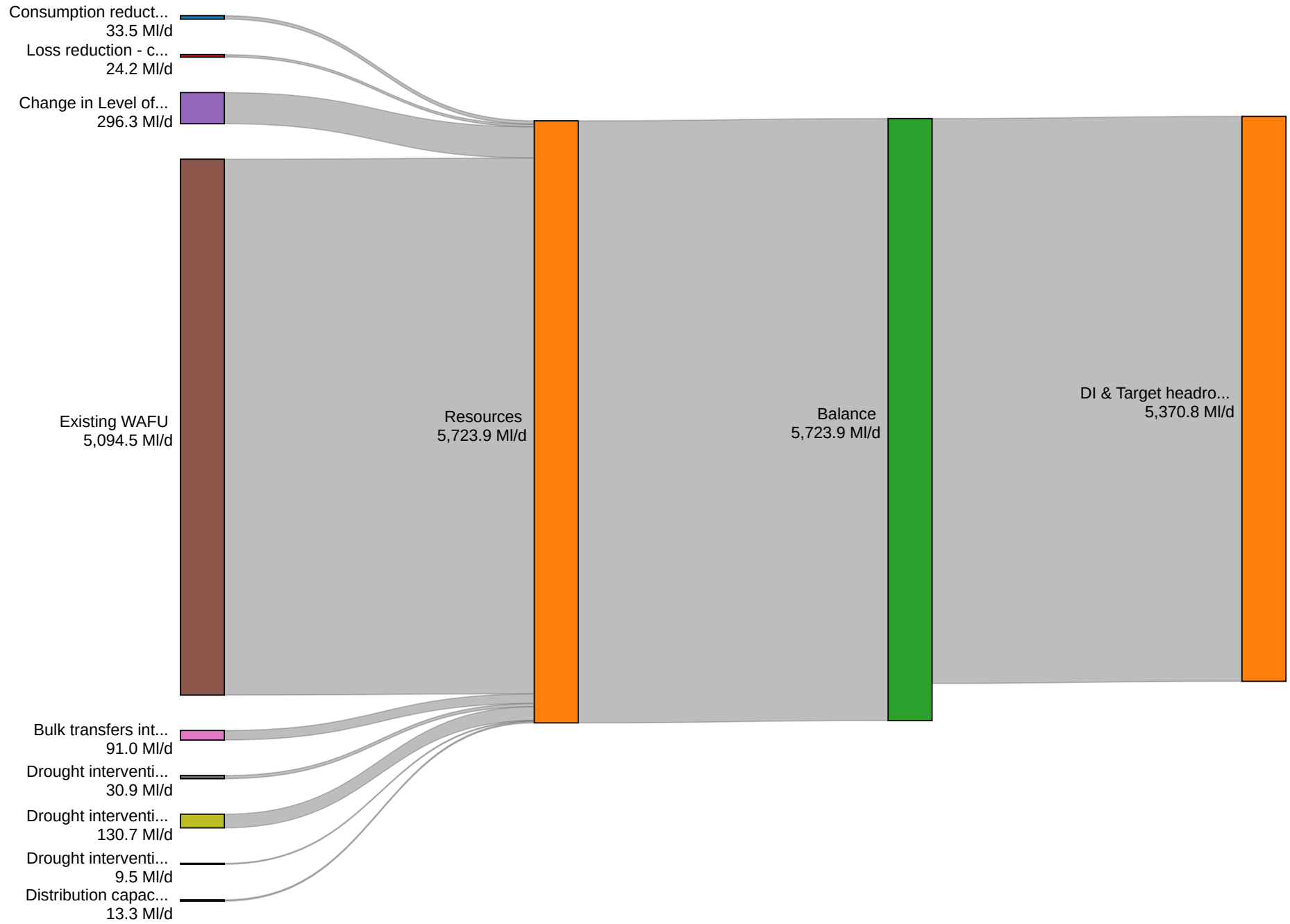
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

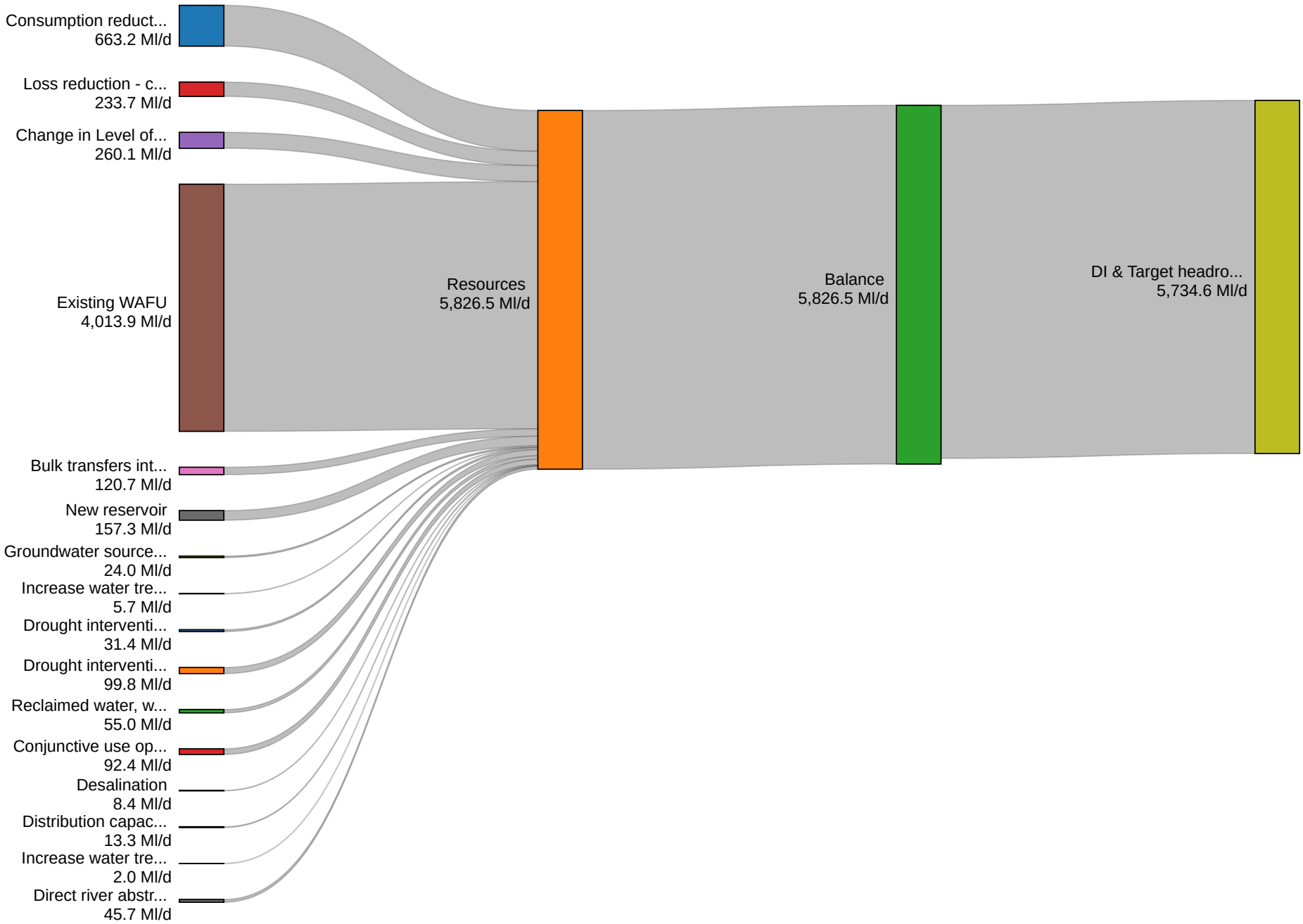


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

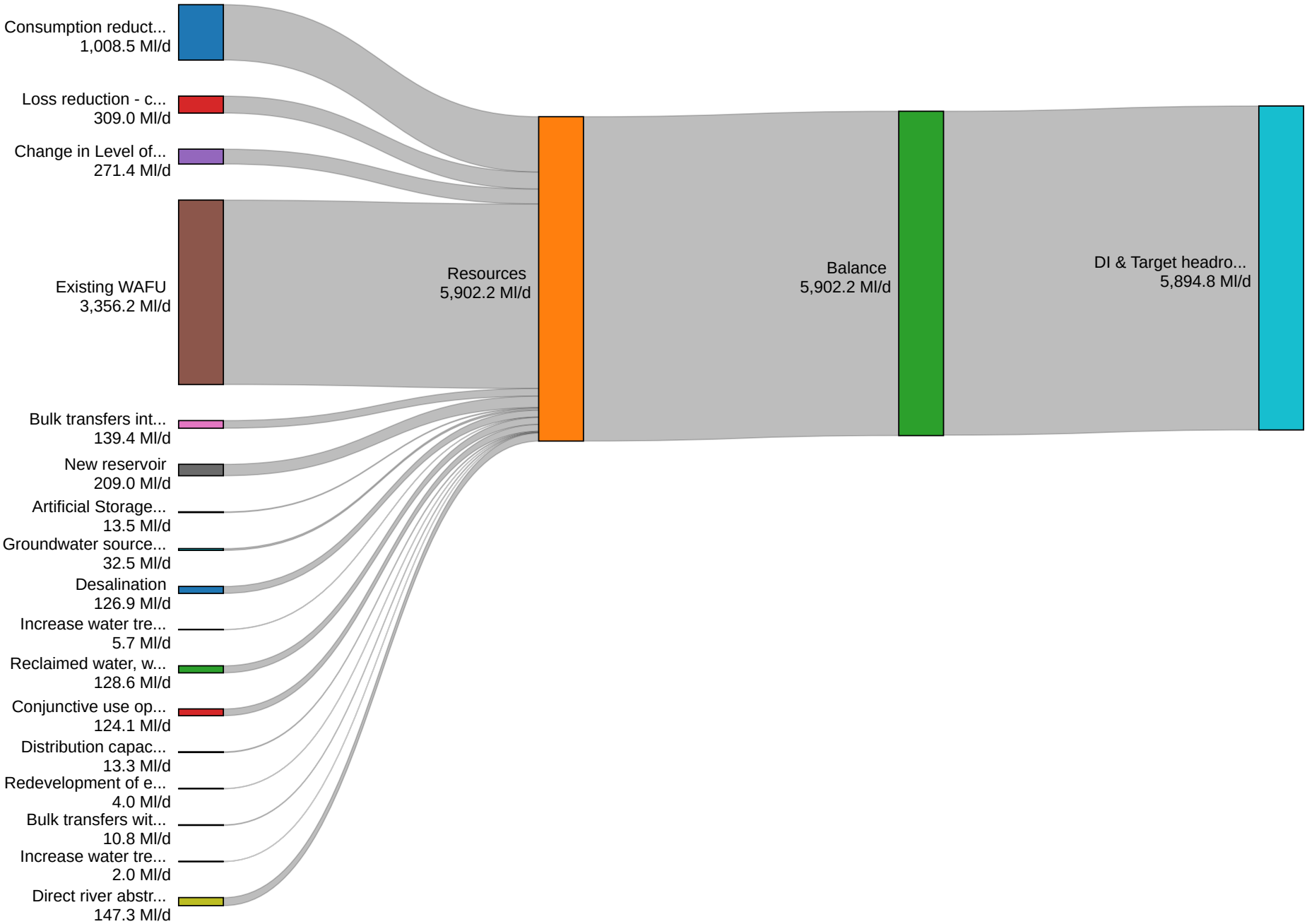
Situation 4 - 2026 (Thames Water)



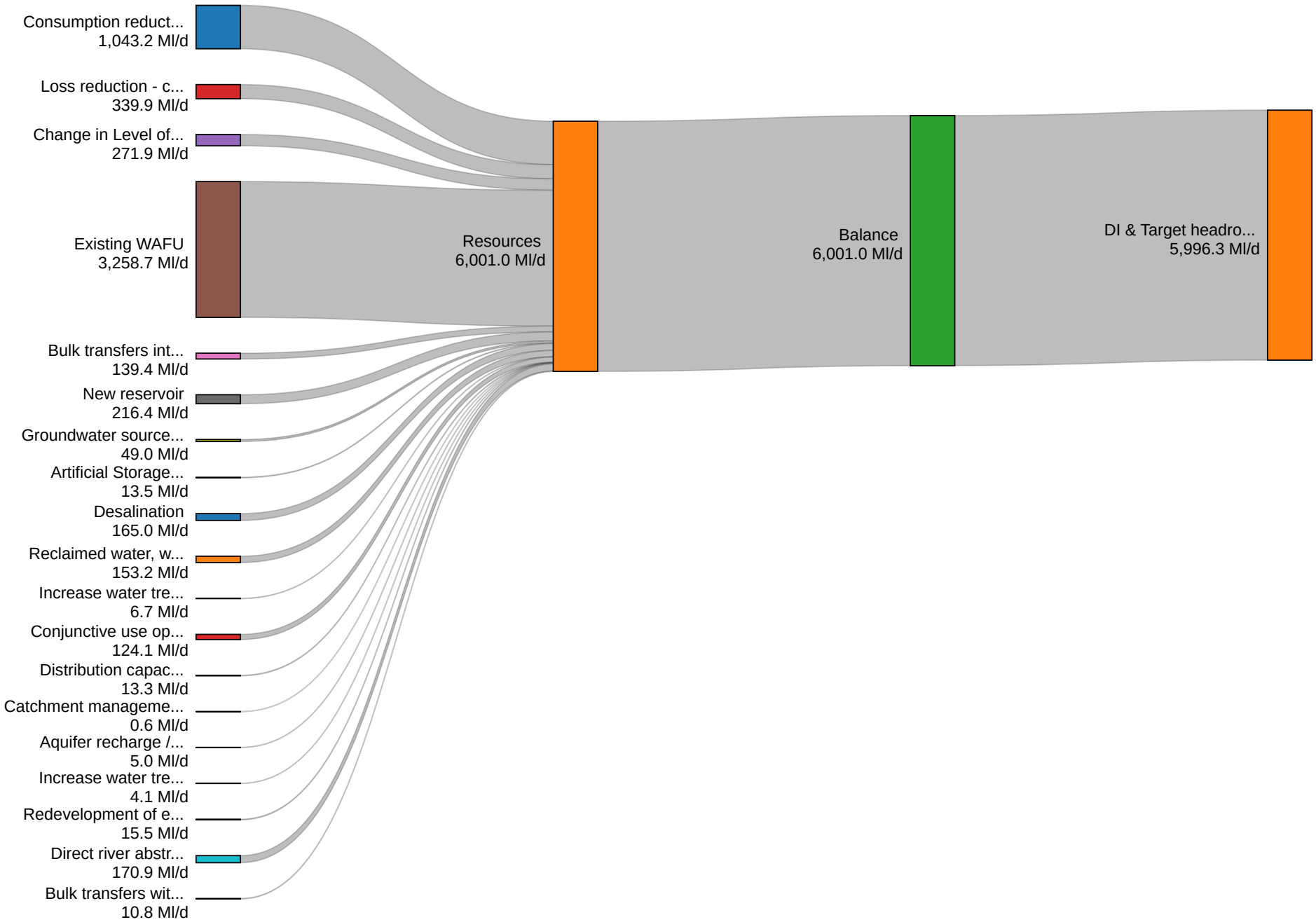
Situation 4 - 2040 (Thames Water)



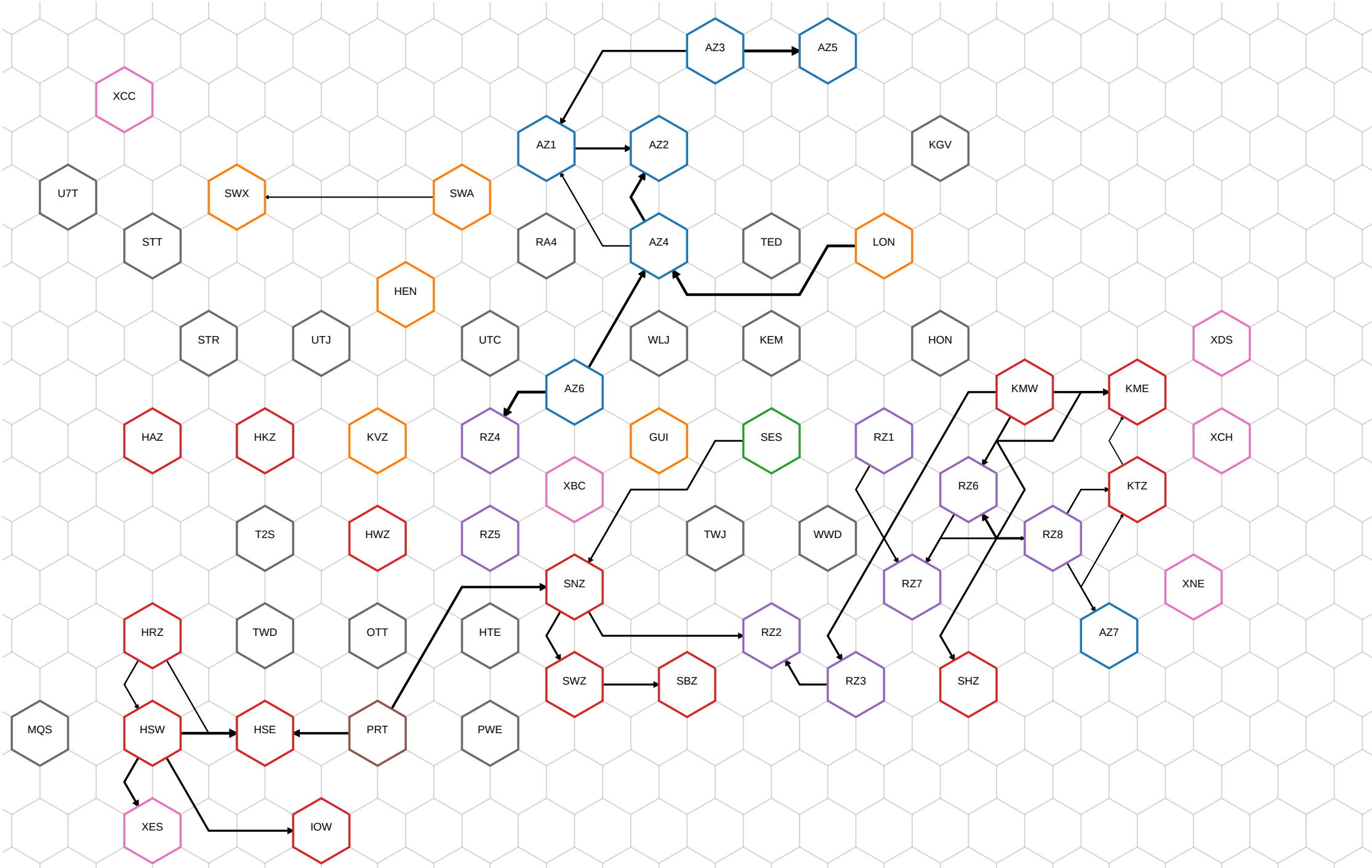
Situation 4 - 2050 (Thames Water)



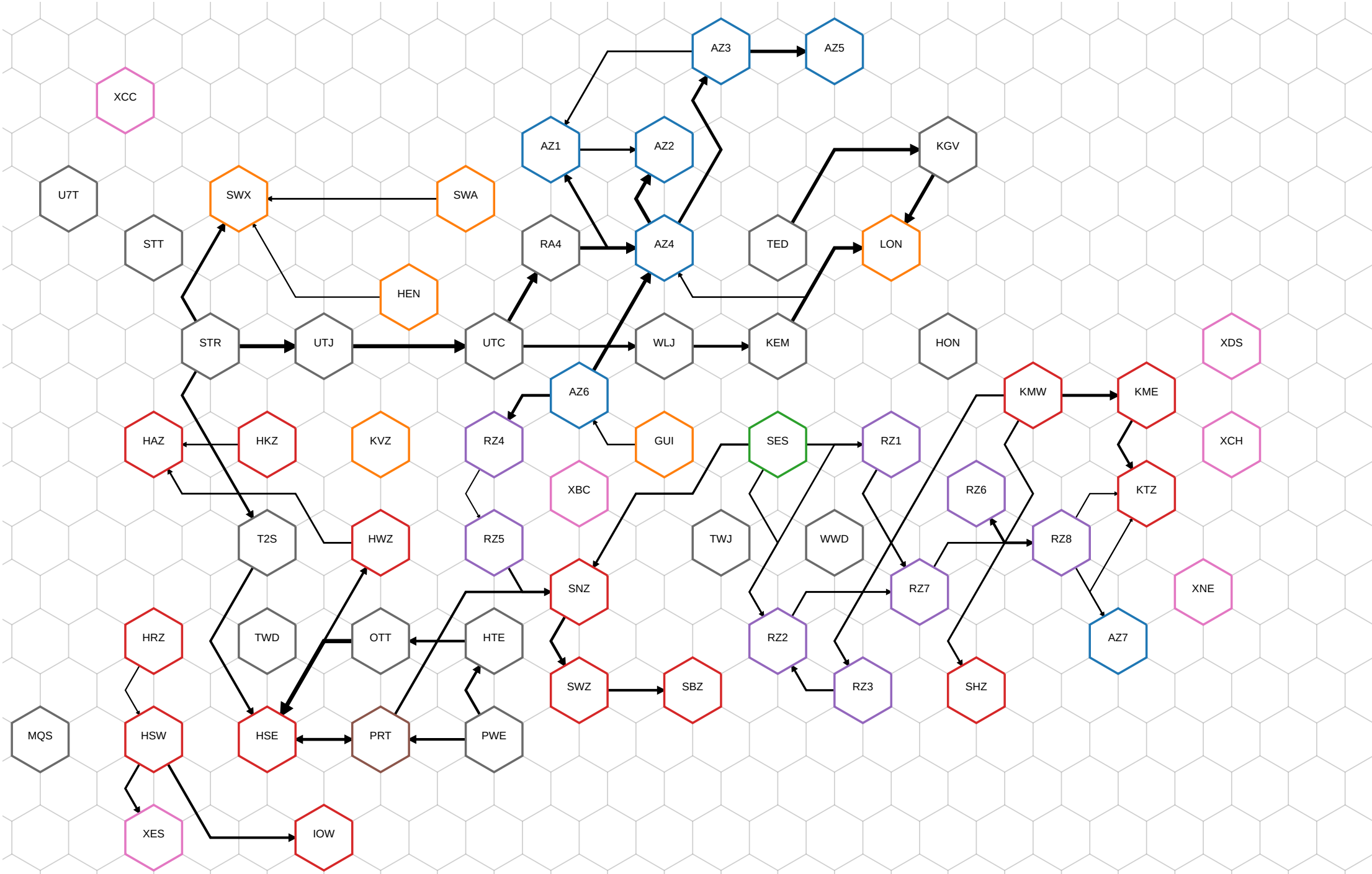
Situation 4 - 2075 (Thames Water)



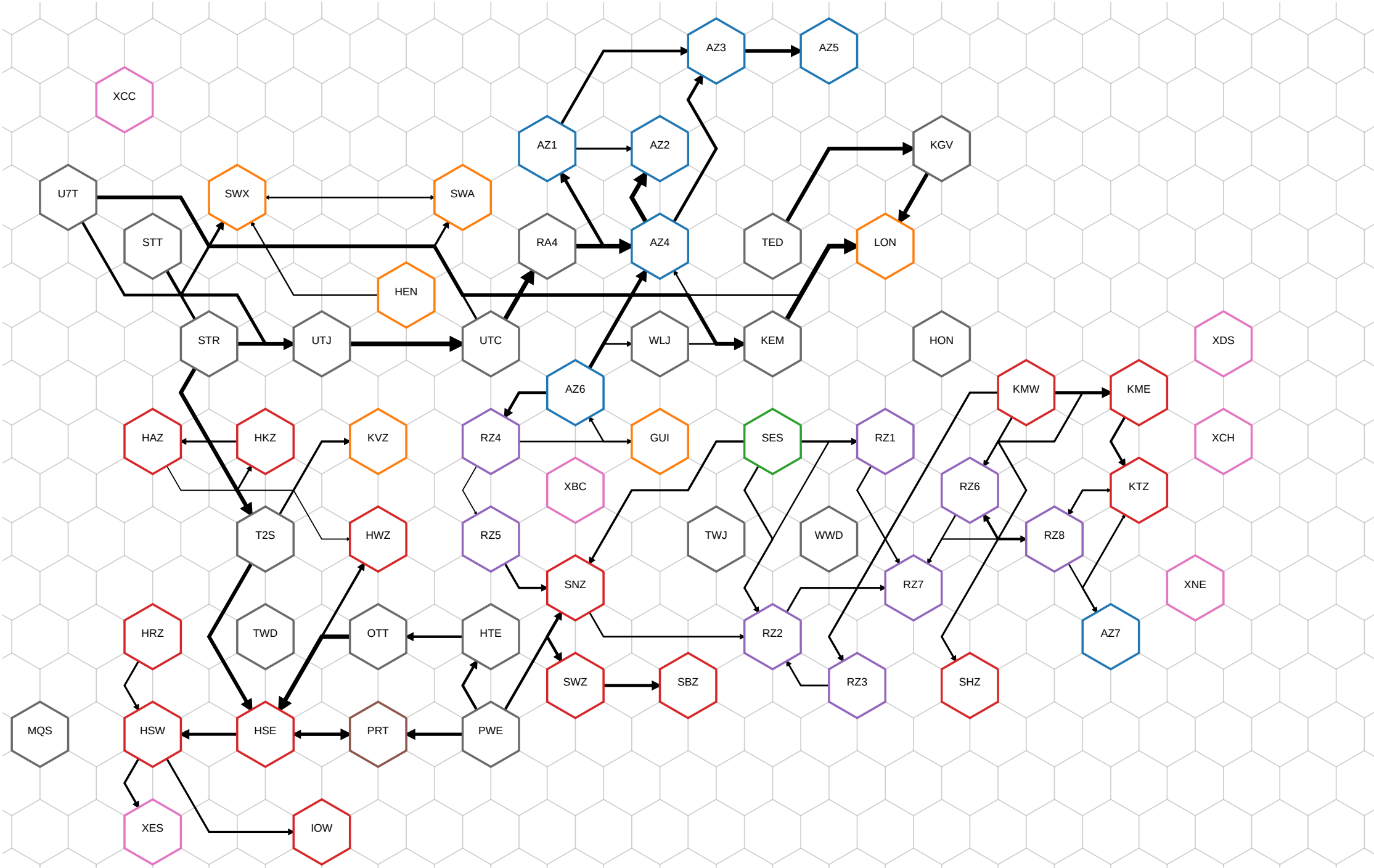
Situation 4 - 2026



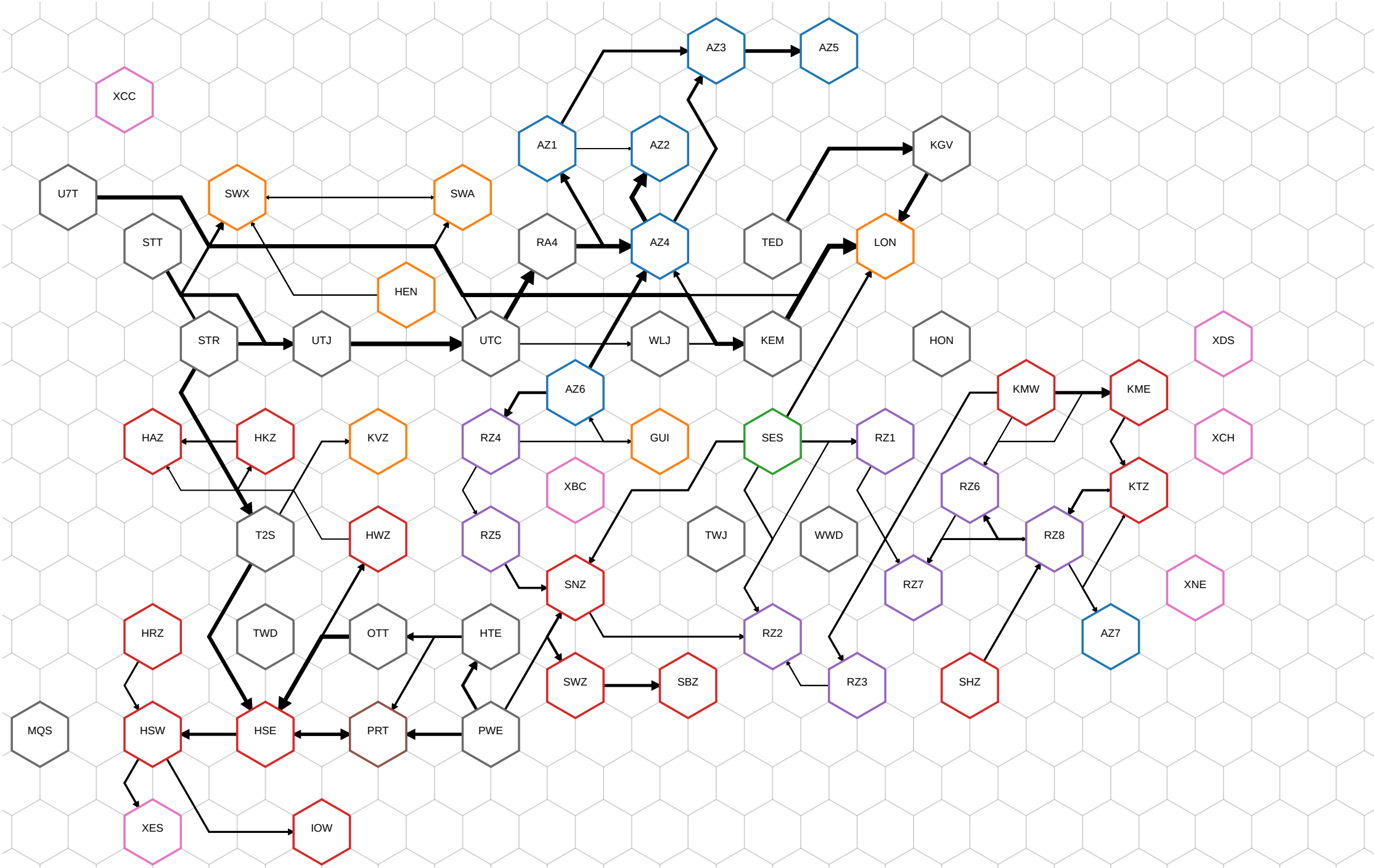
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GENERAL BVP UPLIFT PLAN

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075-bvp-07_50-v2
Description	BVP run with hybrid-c+2 government interventions. Constrained to 7.5% improvement in worst BVP metrics from least cost run.
Created at	06/07/2023, 13:25:31
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

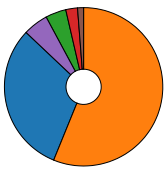
Net present value (Cost)

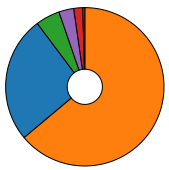
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,874	17,617	16,892	19,491	17,542	16,753	17,858	16,999	16,283	17,812	(£m)
Cost w/o deficit (STPR)	20,874	17,617	16,892	19,491	17,542	16,753	17,858	16,999	16,283	17,812	(£m)
Cost w/ deficit (IGEQ)	32,013	25,824	24,509	29,386	25,687	24,282	26,364	24,752	23,461	26,253	(£m)
Cost w/o deficit (IGEQ)	32,013	25,824	24,509	29,386	25,687	24,282	26,364	24,752	23,461	26,253	(£m)
Cost w/ deficit (LTDR)	23,026	19,234	18,400	21,416	19,147	18,244	19,528	18,531	17,708	19,470	(£m)
Cost w/o deficit (LTDR)	23,026	19,234	18,400	21,416	19,147	18,244	19,528	18,531	17,708	19,470	(£m)

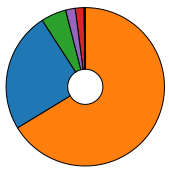
Cost breakdown (STPR)

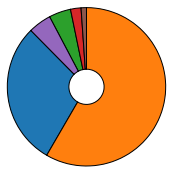
Select Company: Total

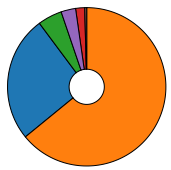
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,447	4,558	4,148	5,697	4,512	4,049	4,634	4,185	3,741	4,663	(£m)
Fixed opex	11,724	11,256	11,201	11,378	11,243	11,187	11,253	11,201	11,139	11,287	(£m)
Fixed operational carbon	882	871	870	873	870	869	871	867	865	871	(£m)
Embedded carbon	500	330	305	418	326	296	347	309	281	346	(£m)
Variable opex	1,065	532	328	912	521	313	651	397	237	551	(£m)
Variable carbon opex	256	71	41	214	70	39	102	41	18	95	(£m)

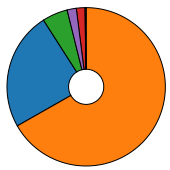
situation1 

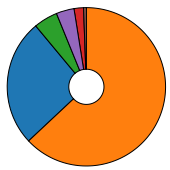
situation2 

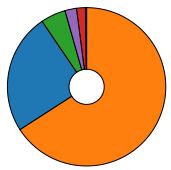
situation3 

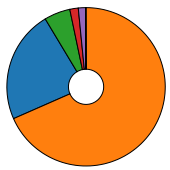
situation4 

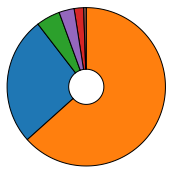
situation5 

situation6 

situation7 

situation8 

situation9 

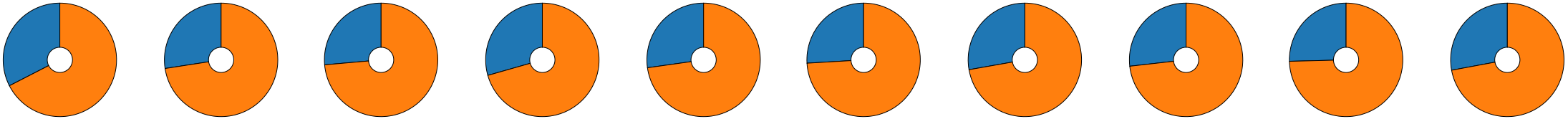
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,239,638	2,017,994	1,848,276	2,646,446	1,992,857	1,796,644	2,144,193	1,879,150	1,696,342	2,140,171	(tonnes)
Operational emissions	6,717,295	5,337,844	5,154,516	6,352,404	5,326,776	5,130,871	5,575,455	5,134,824	4,980,410	5,523,377	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

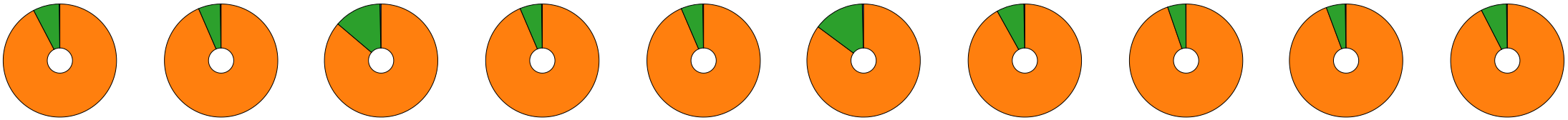


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	31	17	49	29	17	40	9	8	28	(GWh)
Grid	22,384	11,091	4,192	19,285	10,807	3,861	13,145	7,960	2,898	10,625	(GWh)
Renewable	1,805	740	654	1,271	714	655	1,115	434	167	840	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	66,405	65,094	65,094	68,077	65,116	65,094	66,292	65,094	65,094	65,707
SEA environmental disbenefit	104,845	78,718	71,382	103,159	76,153	71,264	82,317	69,386	61,837	79,896
Natural capital	84,043,162	81,480,829	84,182,526	80,890,313	81,374,431	83,918,866	80,975,953	81,730,202	84,622,206	82,579,832
Bio-diversity net gain	−164,856	−110,190	−86,765	−164,462	−112,308	−91,042	−119,182	−92,300	−67,310	−112,046

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,861	35,405	34,878	37,103	35,341	34,976	35,382	34,641	34,201	35,421

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.30	28.16	29.98	28.23	28.15	30.21	28.84	31.90	35.45	29.91
R1: Uncertainty of option supply/demand benefit	5.99	5.21	5.55	5.68	5.14	5.58	5.47	5.93	6.56	5.68
R3: Risk of service failure due to other physical hazards	6.81	6.84	7.55	6.70	6.87	7.62	7.07	8.01	9.13	7.40
R4: Availability of additional headroom	6.41	6.80	7.01	6.57	6.83	7.04	7.13	7.49	7.73	7.00
R5: Catchment/raw water quality risks (incl. climate change)	3.79	3.77	4.23	3.78	3.79	4.28	3.89	4.48	5.18	4.13
R6: Capacity of catchment services	0.00	0.31	0.01	0.31	0.30	0.01	0.00	0.01	0.01	0.11
R7: Risk of service failure to other exceptional events	5.31	5.11	5.64	5.08	5.10	5.69	5.29	5.98	6.84	5.56
R8: Soil health	0.00	0.11	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.04

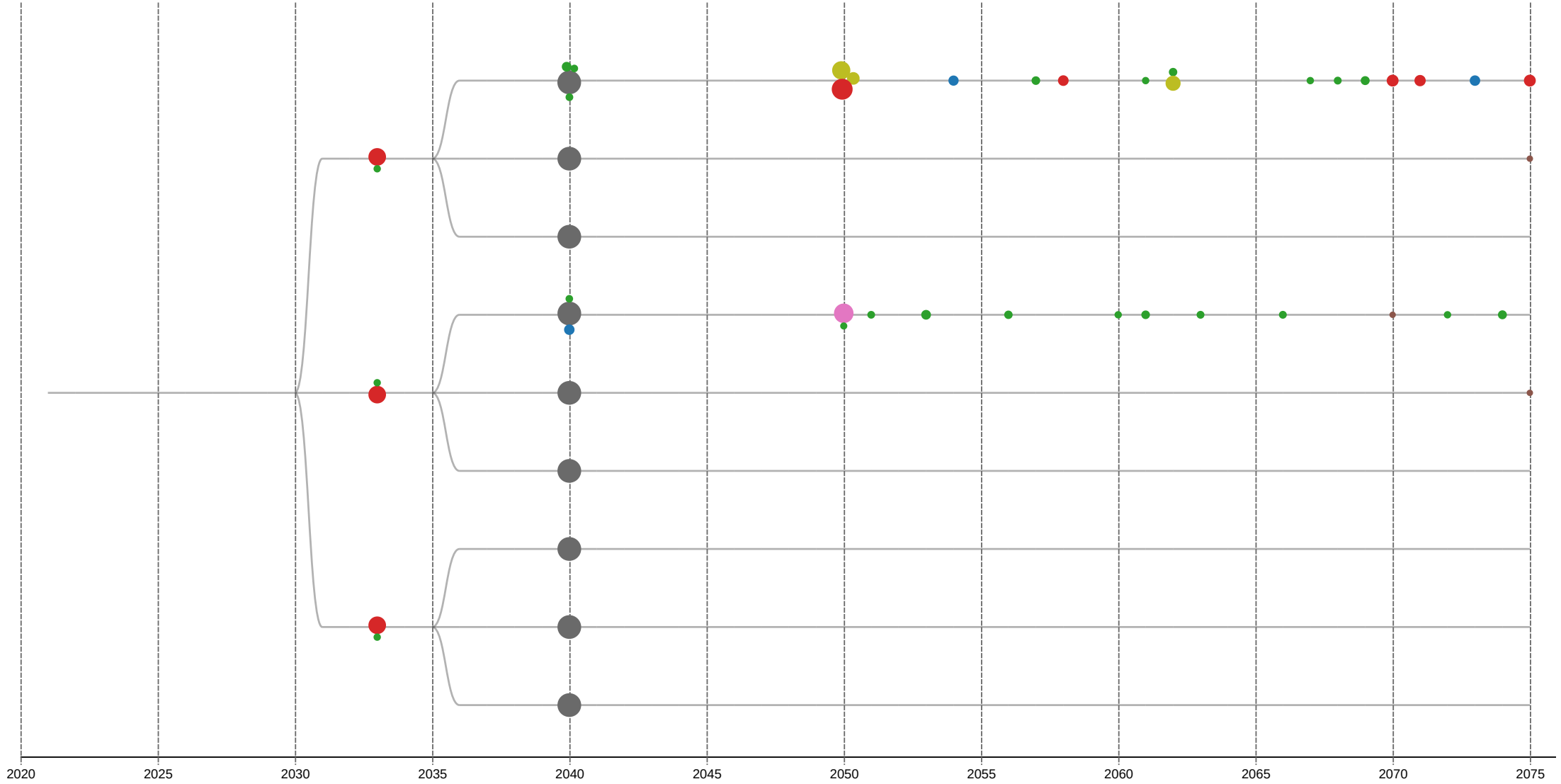
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.86	15.26	16.89	14.12	15.26	16.84	15.56	17.71	20.15	16.29
A3: Operational complexity and flexibility	6.31	6.53	7.26	6.30	6.54	7.34	6.76	7.74	8.88	7.07
A4: WRZ connectivity	8.52	8.59	9.60	7.70	8.59	9.46	8.77	9.94	11.23	9.16
A7: Customer relations support engagement with demand management	0.02	0.13	0.03	0.12	0.13	0.03	0.03	0.03	0.03	0.06

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.80	20.50	21.79	19.83	20.42	22.00	20.46	23.23	26.32	21.60
E1: Scaleability and modularity of proposed changes	9.07	9.47	10.47	9.00	9.49	10.57	9.72	11.16	12.71	10.18
E2: Intervention lead times	4.36	4.20	4.30	4.18	4.12	4.34	4.17	4.59	5.10	4.37
E3: Reliance on external bodies to deliver changes	6.38	6.38	7.02	6.20	6.37	7.08	6.57	7.47	8.51	6.89
E5: Collaborative land management	0.00	0.46	0.01	0.46	0.44	0.01	0.00	0.01	0.01	0.15

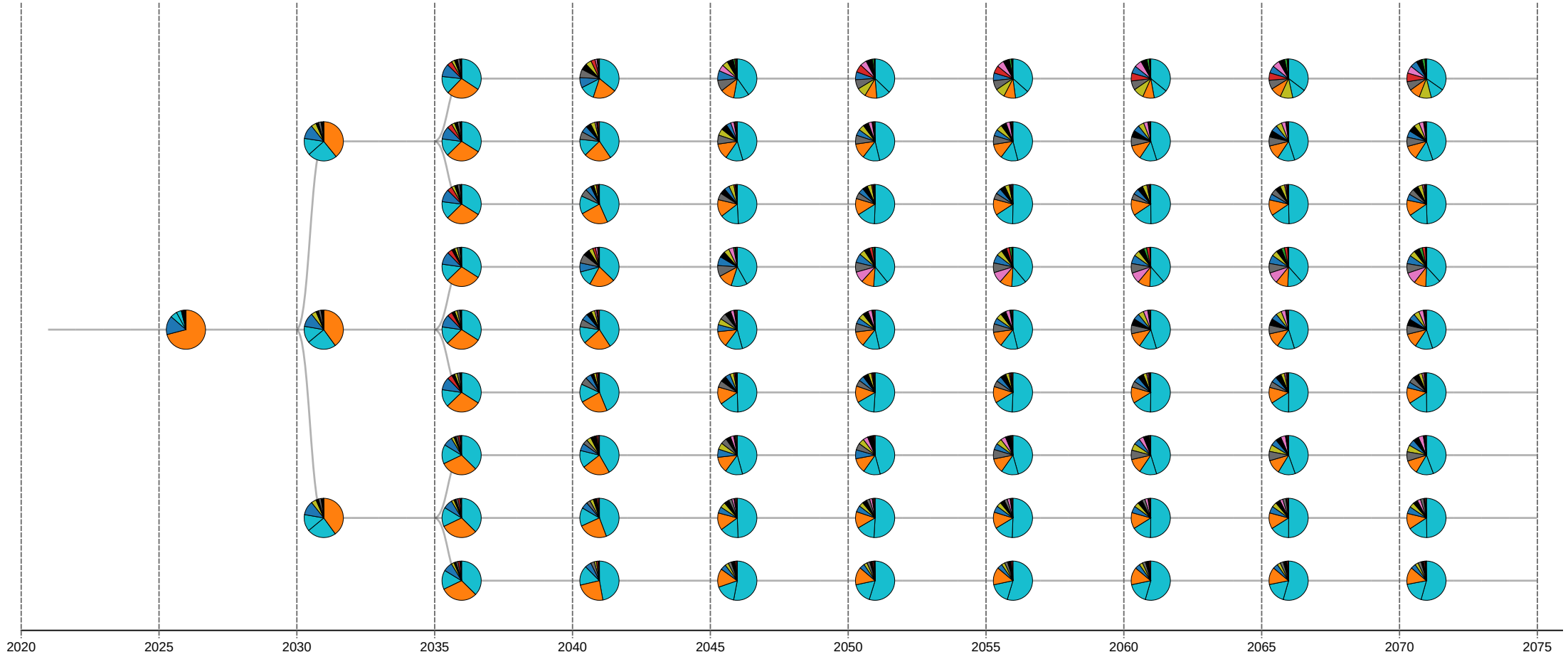
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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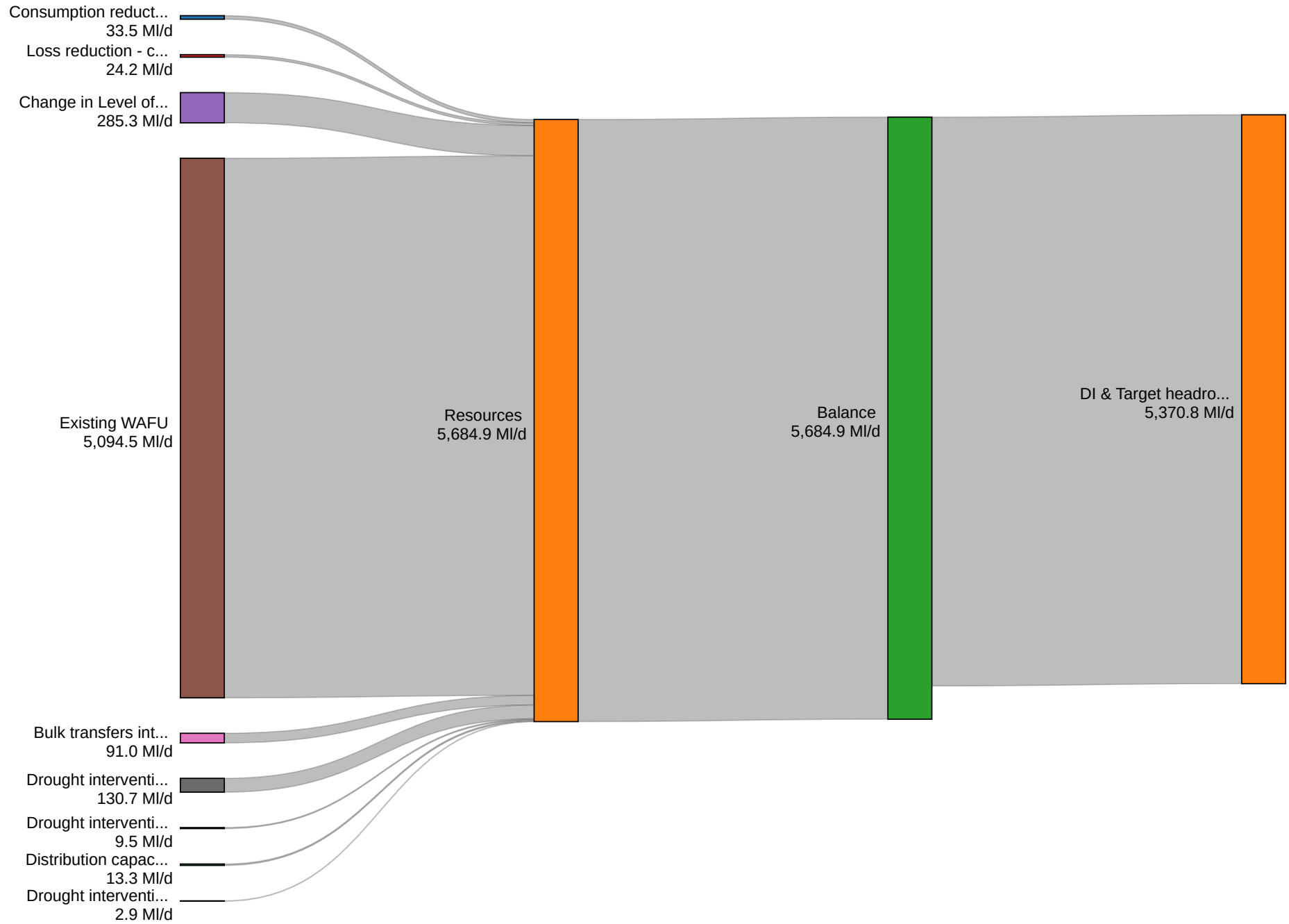
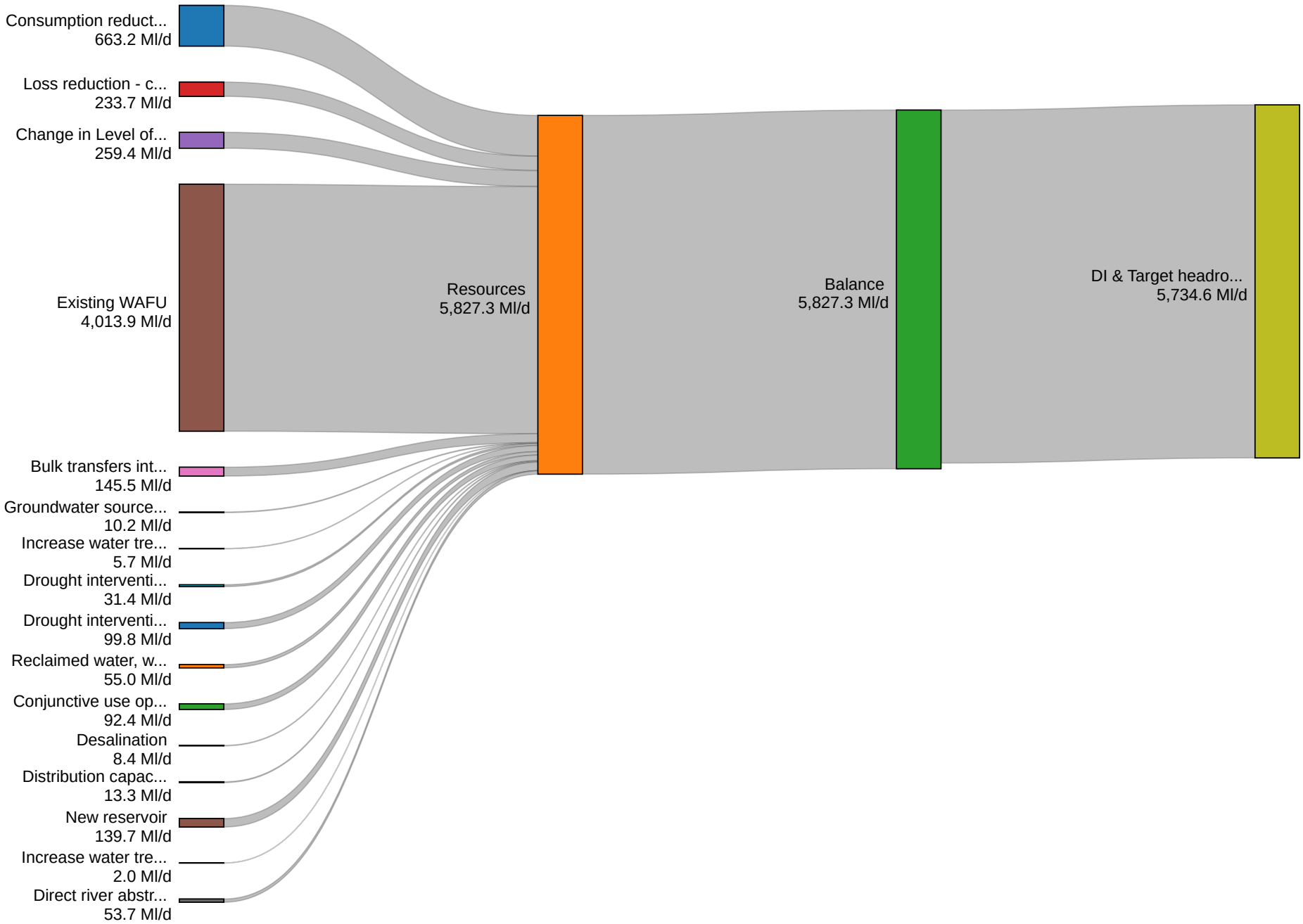
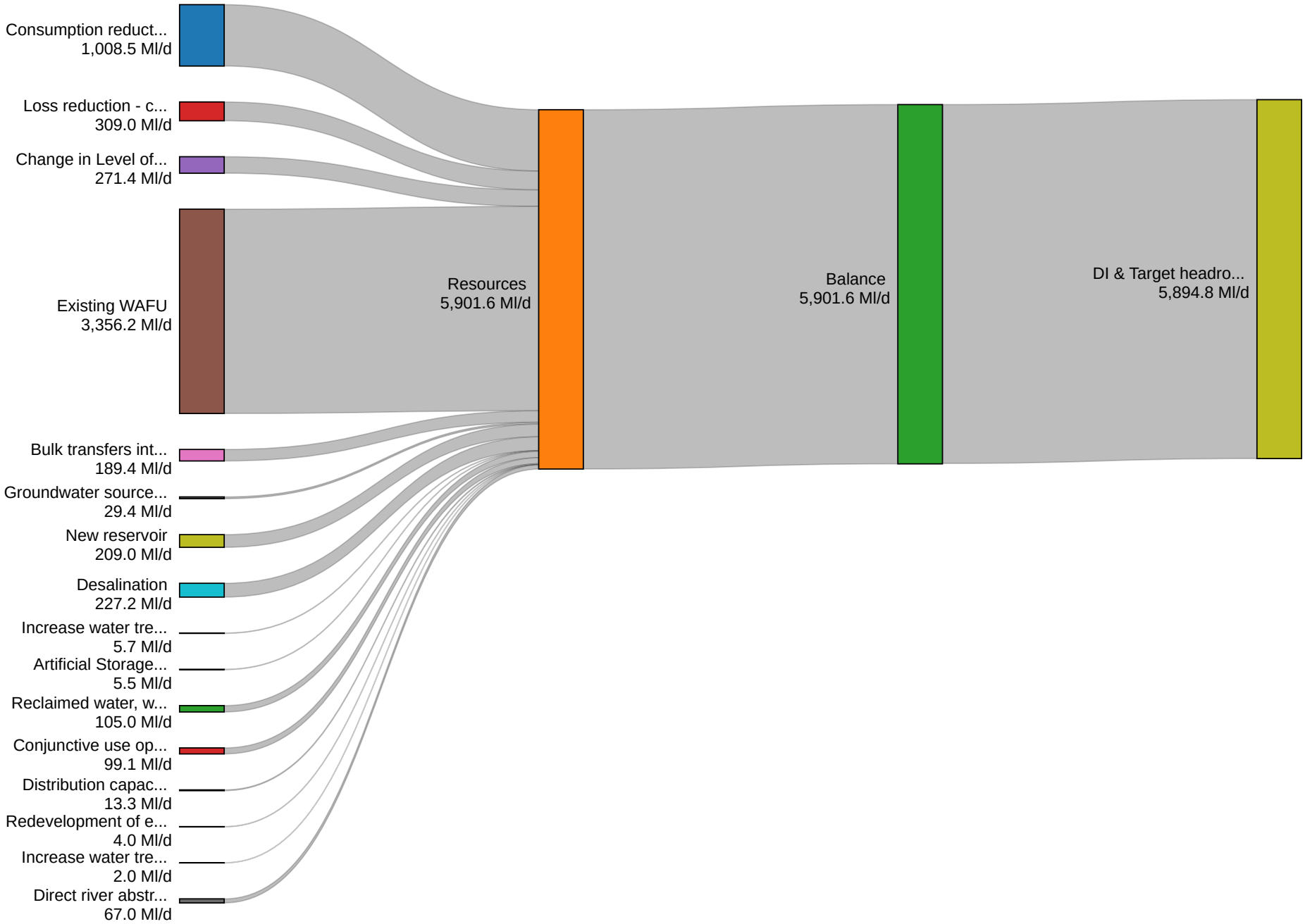
Situation 4 - 2026 (Thames Water)



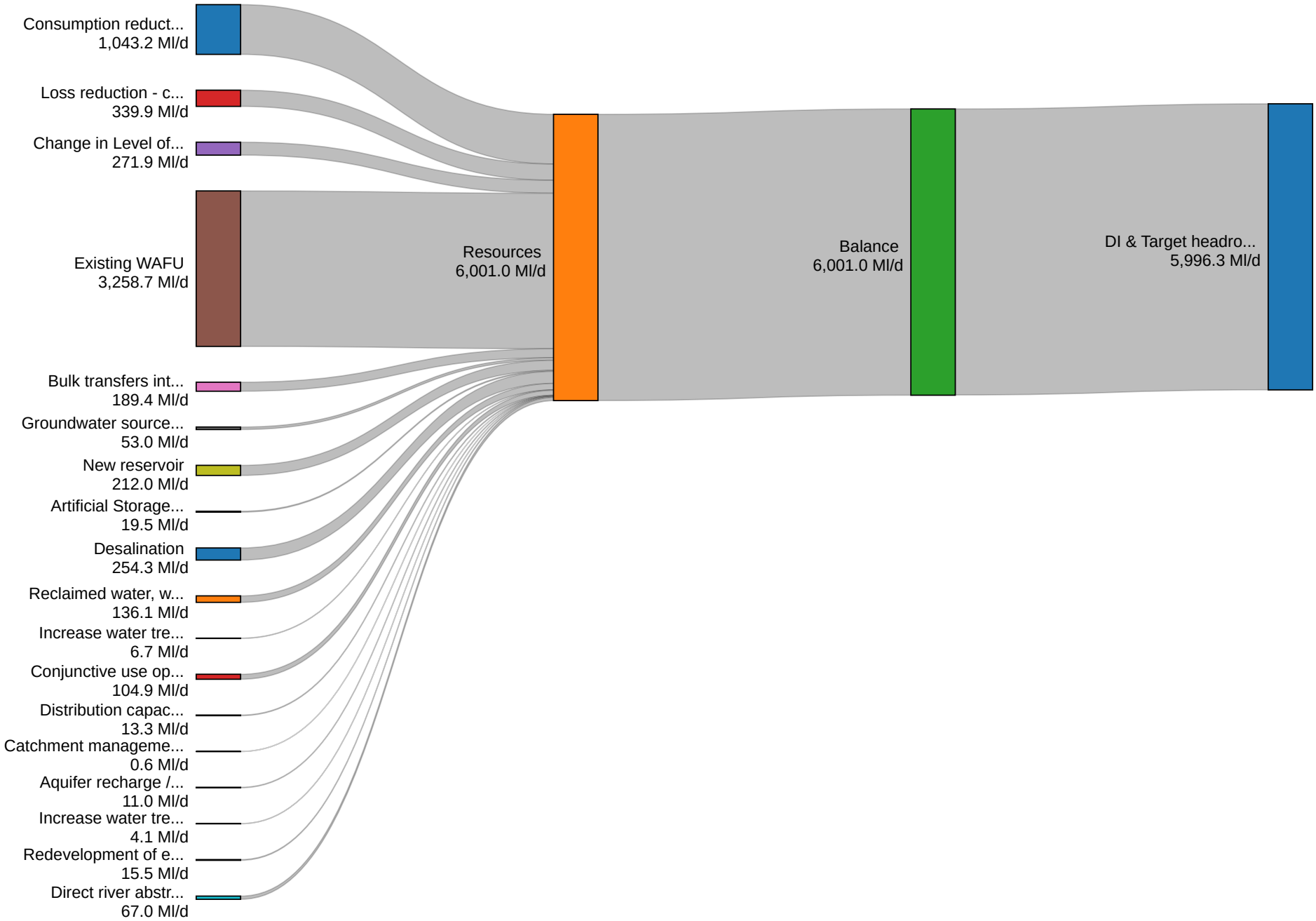
Situation 4 - 2040 (Thames Water)



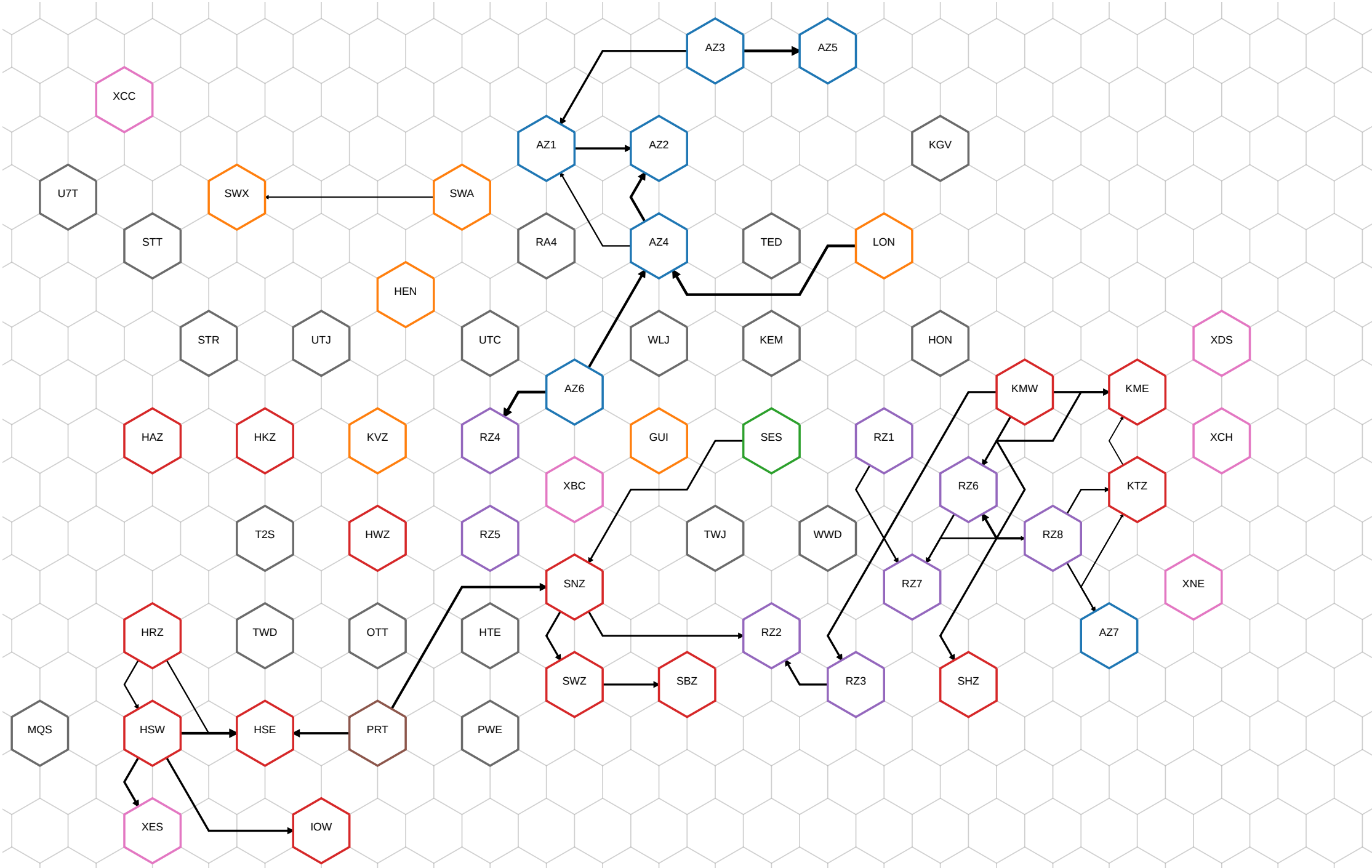
Situation 4 - 2050 (Thames Water)



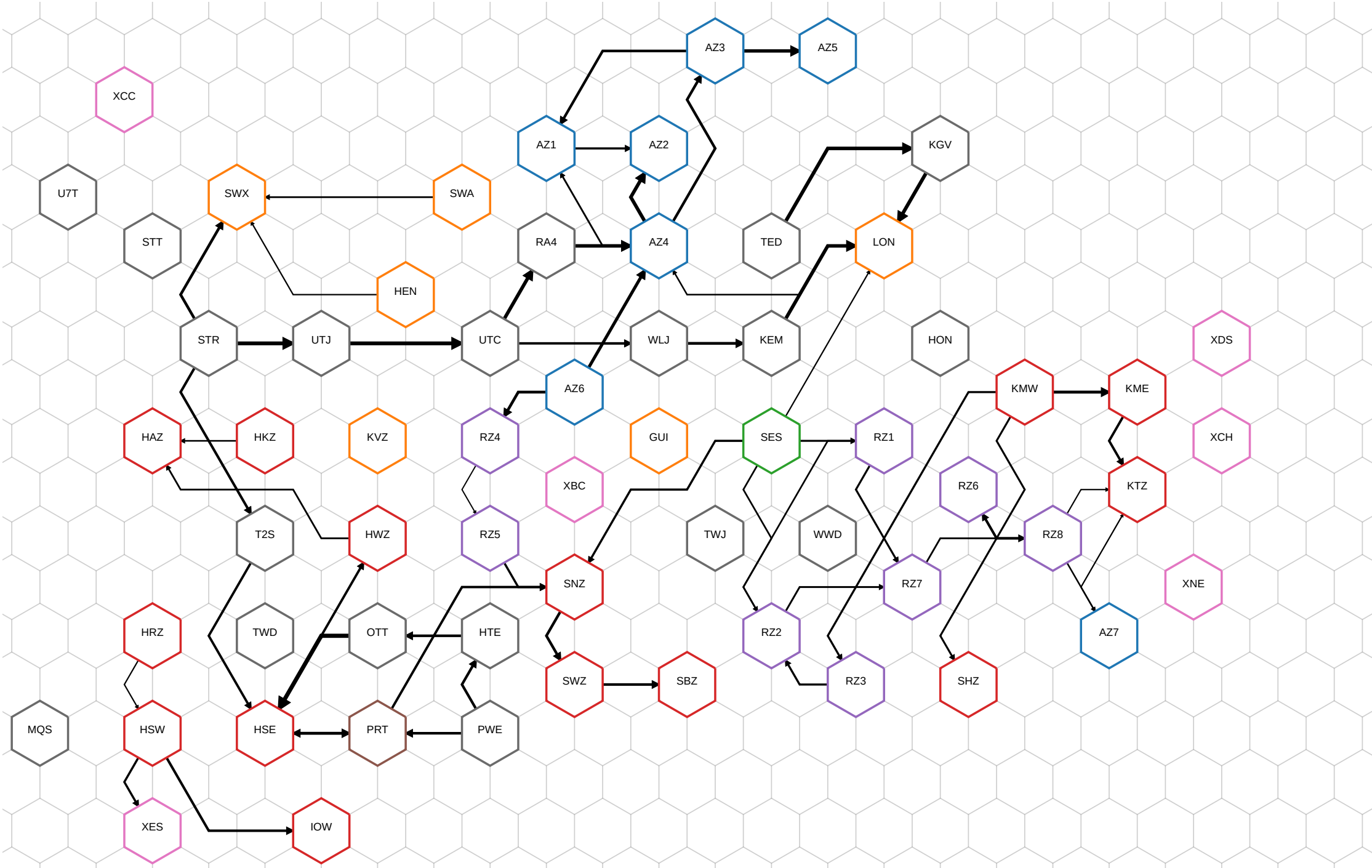
Situation 4 - 2075 (Thames Water)



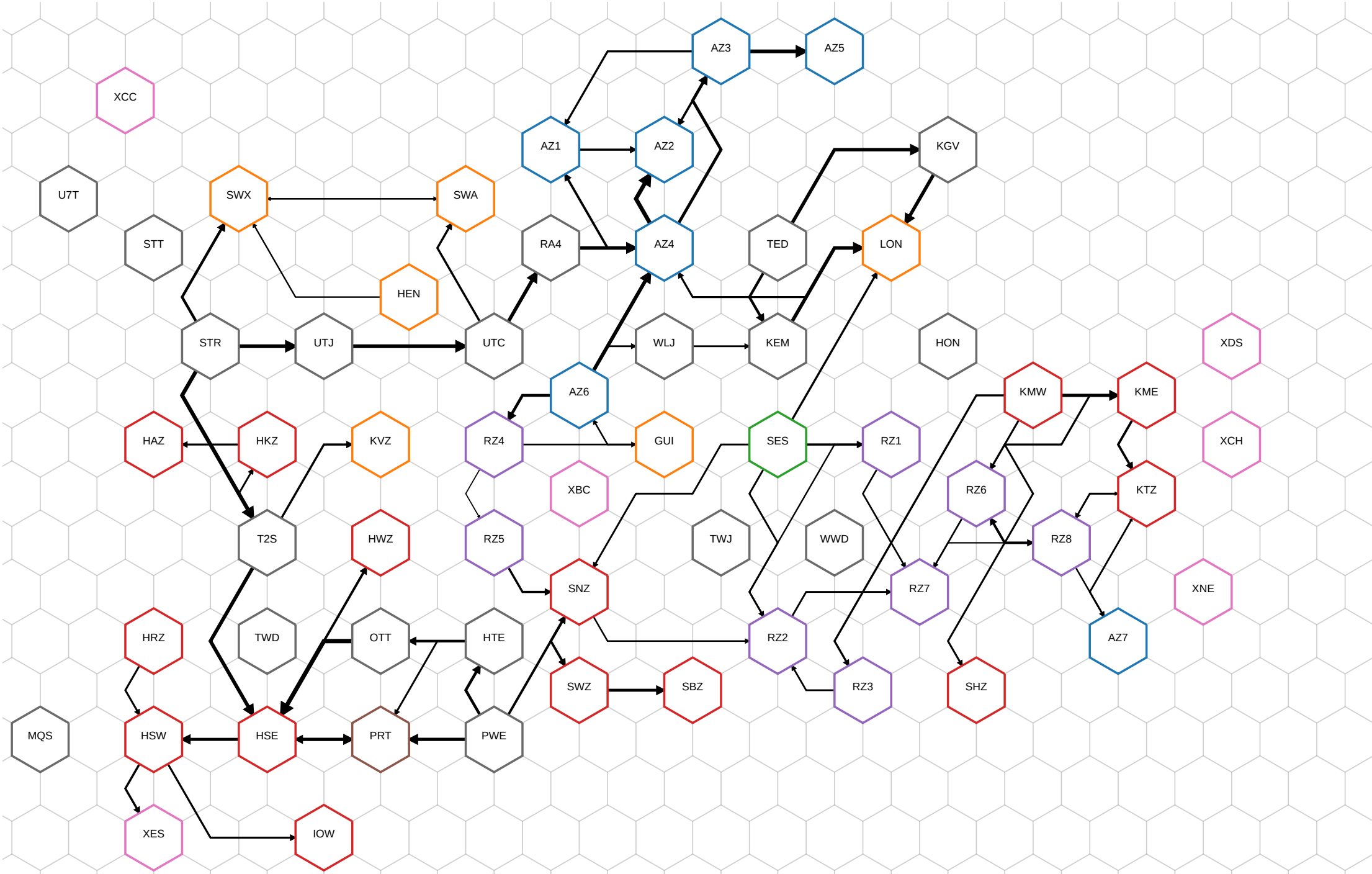
Situation 4 - 2026



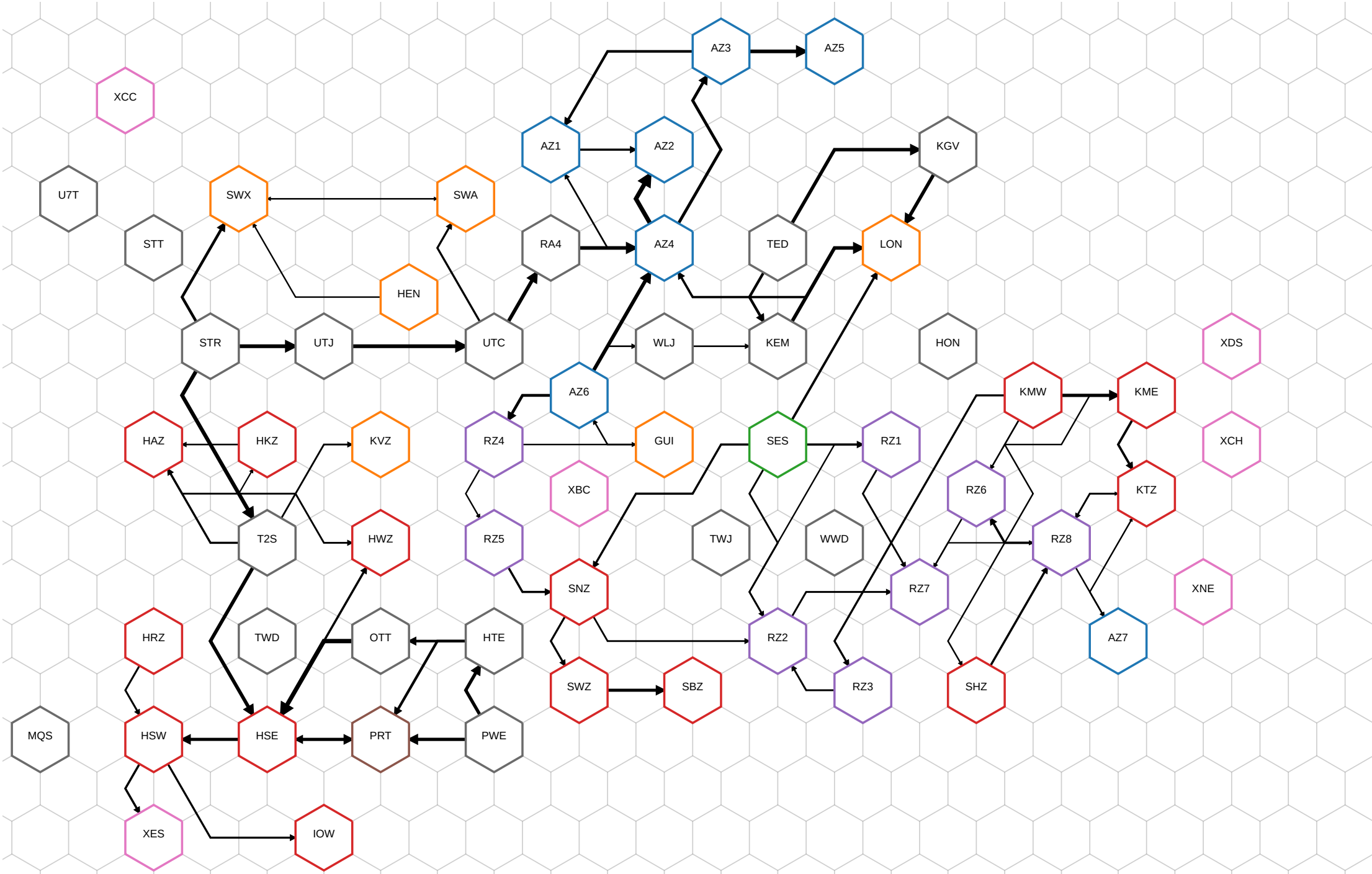
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COMPANY-LED DEMAND MANAGEMENT – LOW SCENARIO

IVM Summary: Thames Water

! This run contained total deficits of 86.5 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 484.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 45.3 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-low-dmp-sew-med-gov-led-2075
Description	Least cost run with hybrid-c+2 government interventions including only low demand management options (except PRT which uses medium) but medium government led C+2 for SEW.
Created at	17/07/2023, 10:04:09
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-low-dmp-sew-med-gov-led
Setting description	No emergency options. Low consumption and leakage baskets. Low DMP options but using SEW medium gov-led as per request.
Optimised discount rate	STPR

Metrics

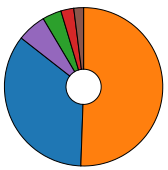
Net present value (Cost)

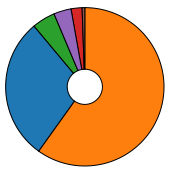
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	12,901,442	109,909	109,152	6,205,917	109,398	108,578	294,598	108,584	107,792	2,228,374	(£m)
Cost w/o deficit (STPR)	21,883	17,900	17,142	20,299	17,388	16,569	18,579	16,574	15,782	18,013	(£m)
Cost w/ deficit (IGEQ)	12,913,578	118,537	117,173	6,216,731	117,702	116,247	304,044	116,320	114,890	2,237,247	(£m)
Cost w/o deficit (IGEQ)	34,019	26,528	25,163	31,113	25,693	24,237	28,025	24,310	22,880	26,885	(£m)
Cost w/ deficit (LTDR)	12,903,780	111,604	110,733	6,208,012	111,030	110,091	296,439	110,108	109,198	2,230,111	(£m)
Cost w/o deficit (LTDR)	24,221	19,594	18,723	22,395	19,020	18,082	20,420	18,099	17,188	19,749	(£m)

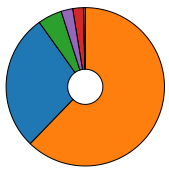
Cost breakdown (STPR)

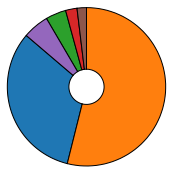
Select Company: Total

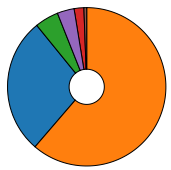
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,661	5,198	4,786	6,564	4,839	4,390	5,419	4,317	3,848	5,225	(£m)
Fixed opex	11,063	10,719	10,666	10,942	10,661	10,609	10,827	10,599	10,535	10,736	(£m)
Fixed operational carbon	855	846	846	850	842	839	843	839	837	844	(£m)
Embedded carbon	575	403	374	474	347	319	396	308	279	386	(£m)
Variable opex	1,292	636	405	1,081	601	353	810	452	256	654	(£m)
Variable carbon opex	436	99	64	389	98	59	284	59	27	168	(£m)

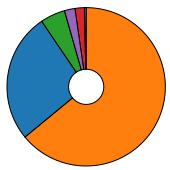
situation1 

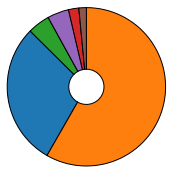
situation2 

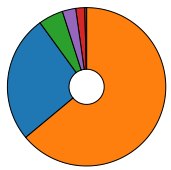
situation3 

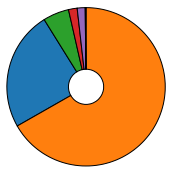
situation4 

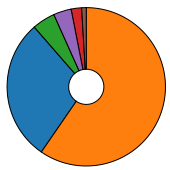
situation5 

situation6 

situation7 

situation8 

situation9 

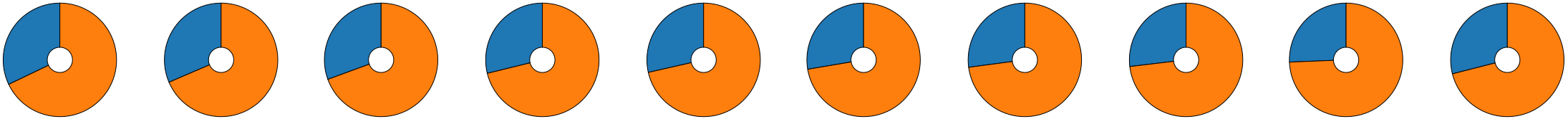
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,688,820	2,463,346	2,272,735	3,015,084	2,128,810	1,939,200	2,485,747	1,871,911	1,679,152	2,393,867	(tonnes)
Operational emissions	7,799,280	5,368,816	5,159,548	7,446,106	5,326,203	5,072,659	6,686,318	5,090,979	4,873,281	5,869,243	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

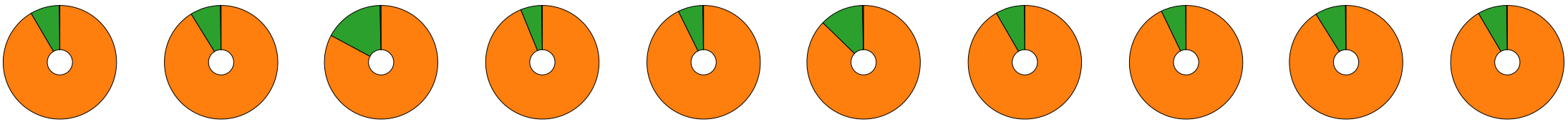


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	50	34	21	48	32	18	22	11	6	27	(GWh)
Grid	25,732	13,032	5,250	22,332	11,908	4,592	15,685	8,615	2,943	12,232	(GWh)
Renewable	2,324	1,229	1,067	1,426	907	652	1,412	653	281	1,106	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	58,360	52,200	51,724	55,867	51,274	50,068	52,032	49,426	48,257	52,134
SEA environmental disbenefit	128,584	92,128	85,963	118,171	93,161	84,975	98,455	80,485	71,355	94,809
Natural capital	85,950,503	89,309,194	89,439,920	81,779,467	81,349,645	84,050,047	62,416,447	64,972,399	67,865,932	78,570,395
Bio-diversity net gain	−214,883	−141,043	−132,545	−186,652	−132,425	−111,427	−149,723	−113,080	−82,373	−140,461

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,302	32,867	32,554	34,661	32,880	32,397	32,967	31,954	31,446	33,003

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.54	28.34	30.96	27.53	26.98	29.32	27.76	29.13	32.14	28.97
R1: Uncertainty of option supply/demand benefit	6.57	6.08	6.64	6.07	5.48	5.92	5.86	5.95	6.51	6.12
R3: Risk of service failure due to other physical hazards	6.59	6.76	7.55	6.43	6.42	7.13	6.51	7.00	7.92	6.92
R4: Availability of additional headroom	6.41	6.70	6.91	6.47	6.69	6.89	6.92	7.23	7.47	6.85
R5: Catchment/raw water quality risks (incl. climate change)	3.69	3.34	3.76	3.40	3.25	3.67	3.33	3.46	3.99	3.54
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.27	5.47	6.12	5.16	5.13	5.71	5.14	5.49	6.25	5.53
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

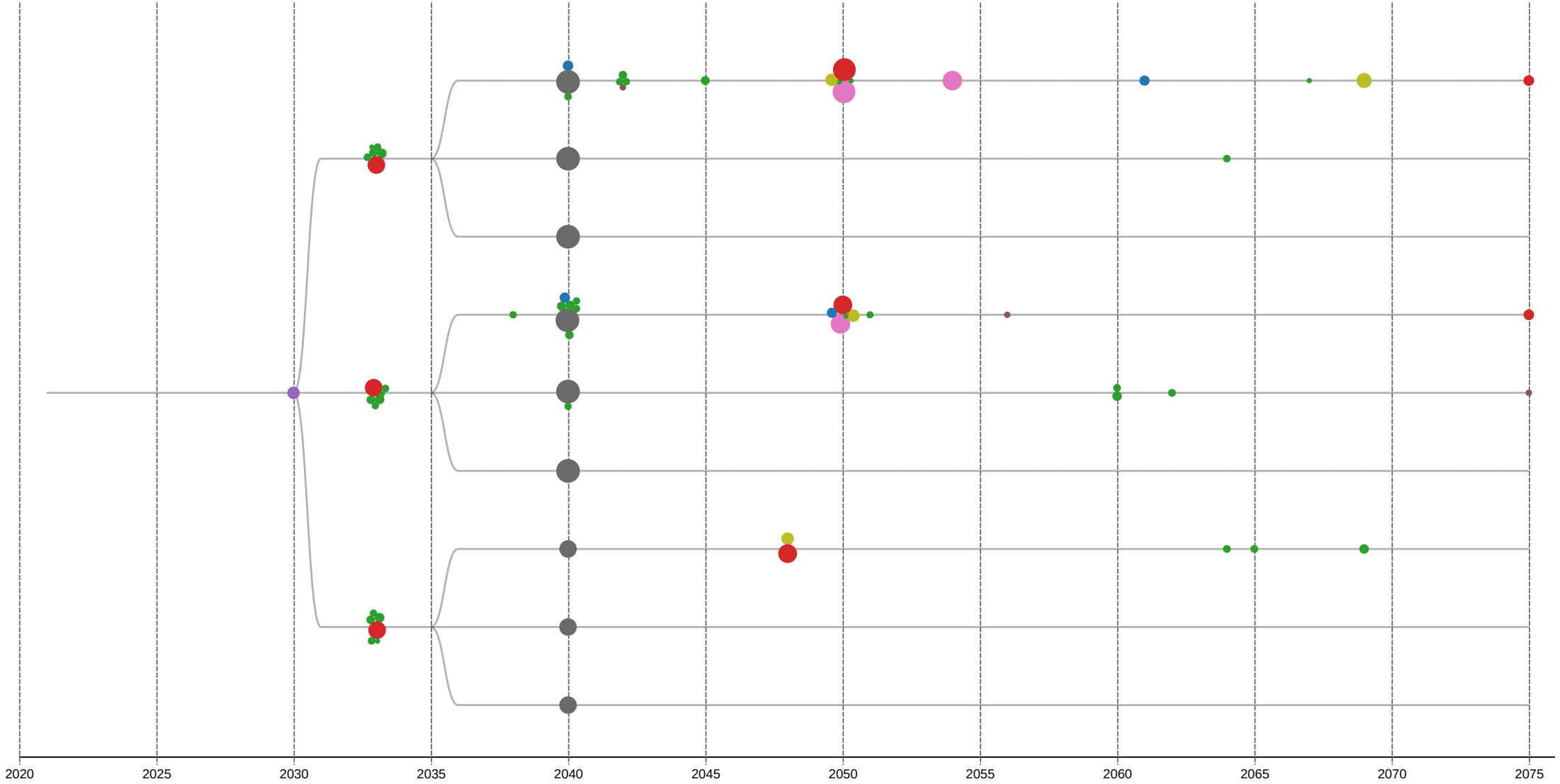
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.41	15.00	16.88	13.58	14.91	16.45	14.69	16.70	18.94	15.62
A3: Operational complexity and flexibility	5.97	6.42	7.20	5.97	6.14	6.86	6.10	6.73	7.69	6.57
A4: WRZ connectivity	7.41	8.55	9.65	7.57	8.74	9.57	8.56	9.94	11.22	9.02
A7: Customer relations support engagement with demand management	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.31	19.39	21.53	18.60	18.68	20.47	19.63	21.08	23.72	20.27
E1: Scaleability and modularity of proposed changes	8.73	8.99	9.99	8.41	8.71	9.63	8.97	9.94	11.24	9.40
E2: Intervention lead times	4.38	4.07	4.50	4.17	3.97	4.21	4.31	4.28	4.73	4.29
E3: Reliance on external bodies to deliver changes	6.19	6.33	7.03	6.01	6.00	6.63	6.35	6.86	7.76	6.57
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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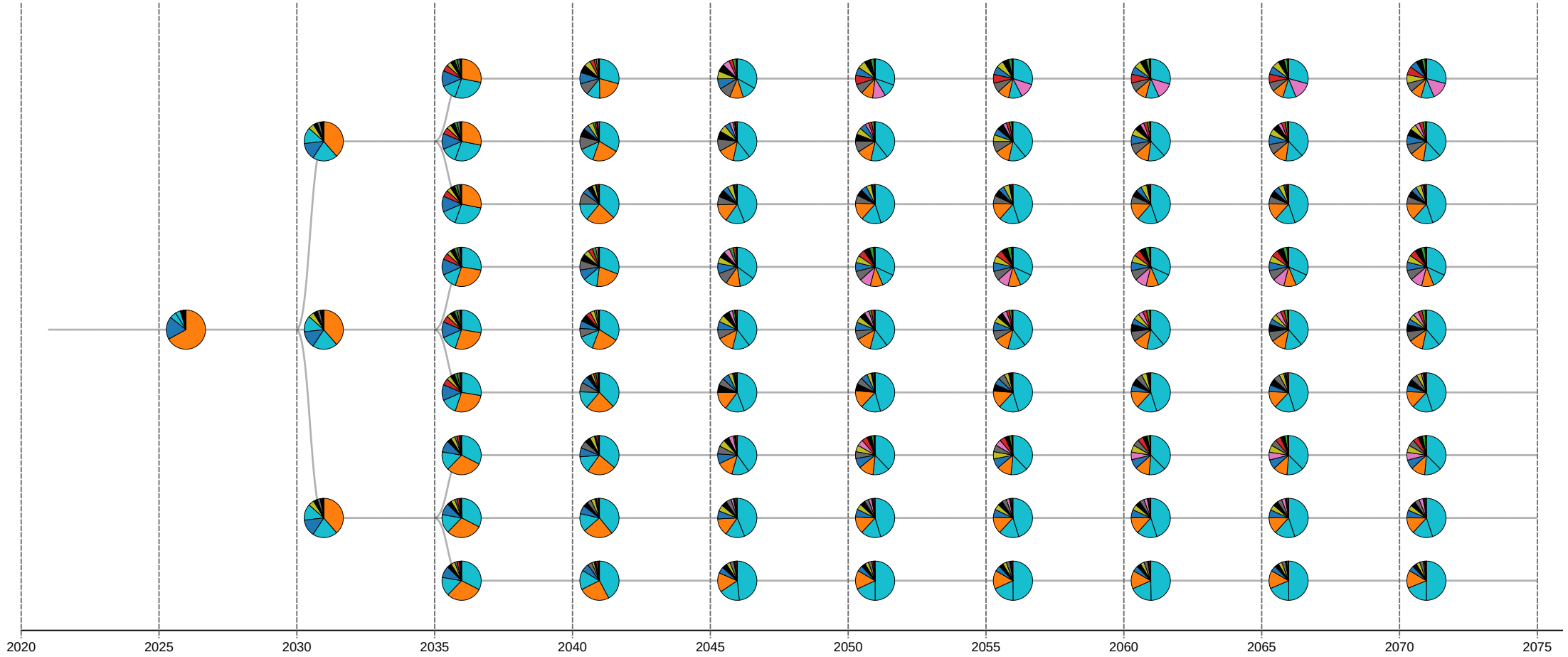
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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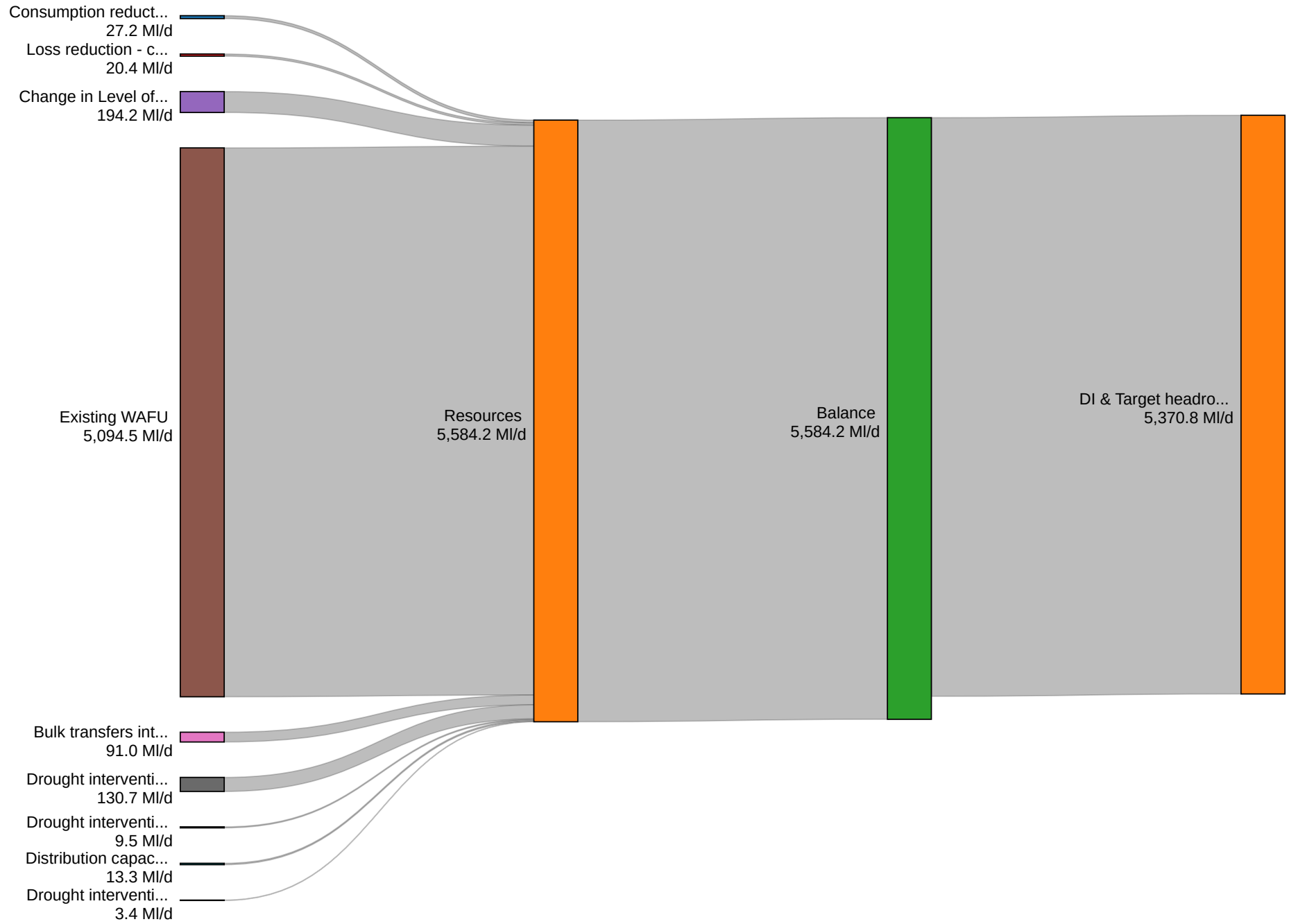
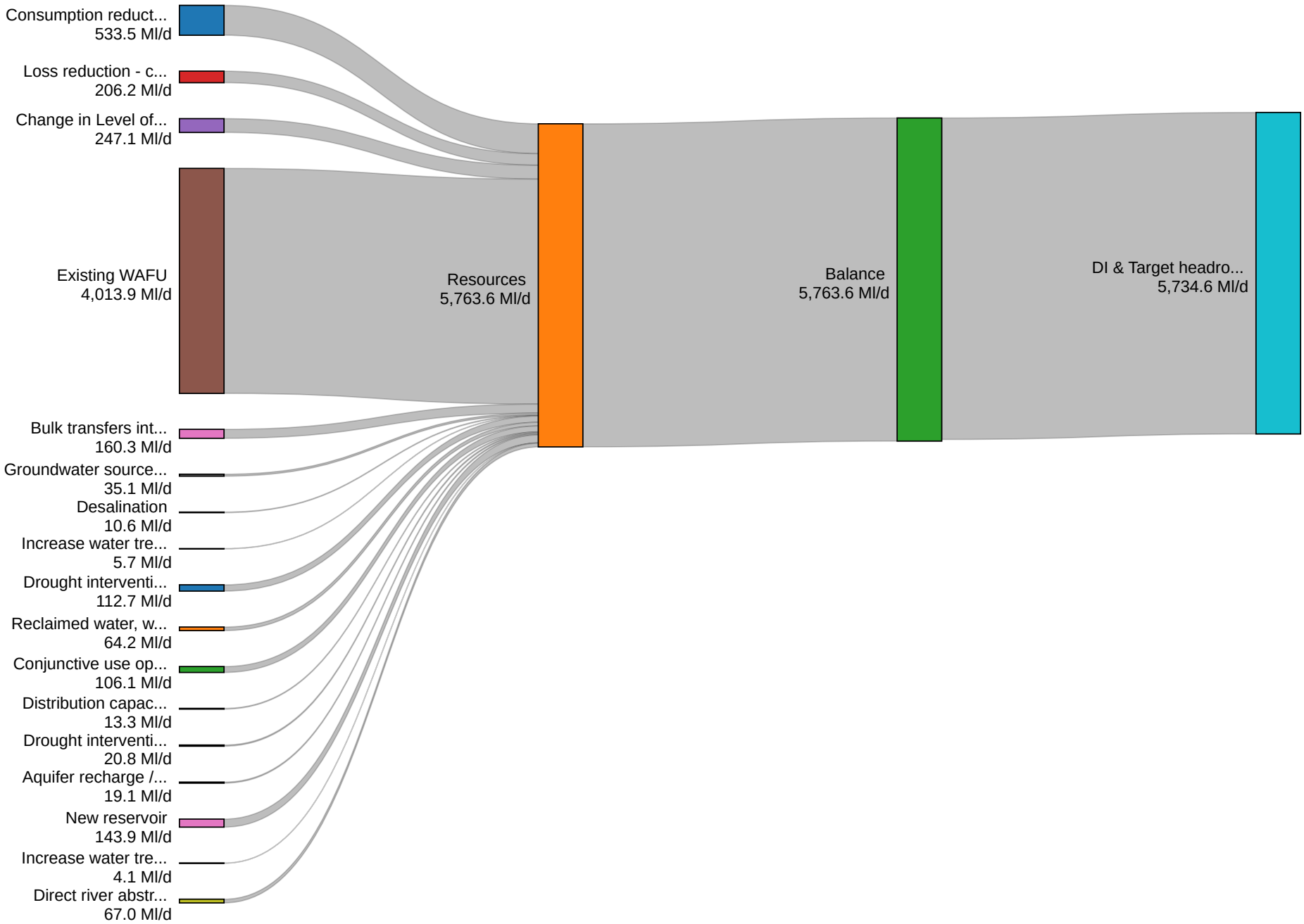
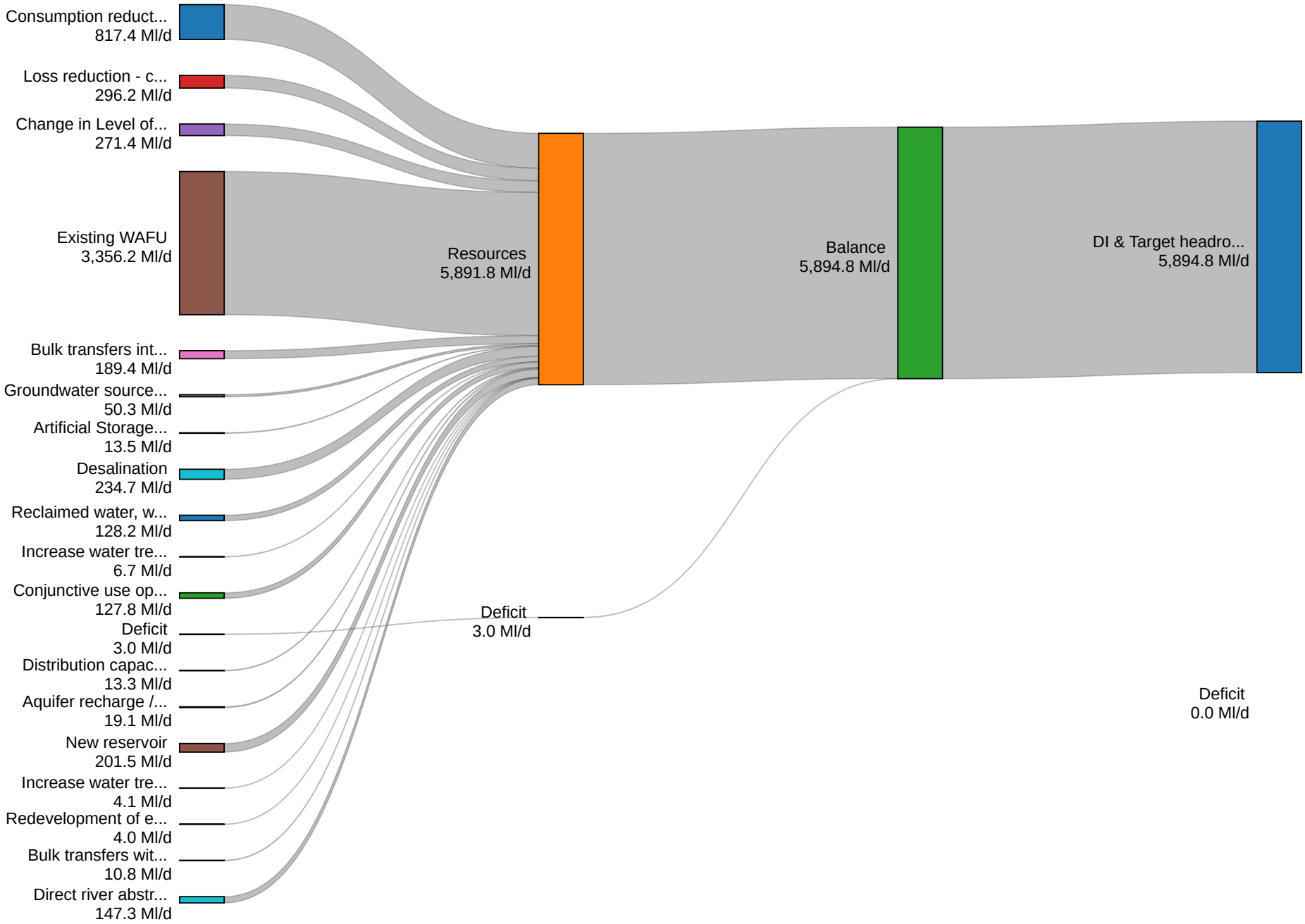
Situation 4 - 2026 (Thames Water)



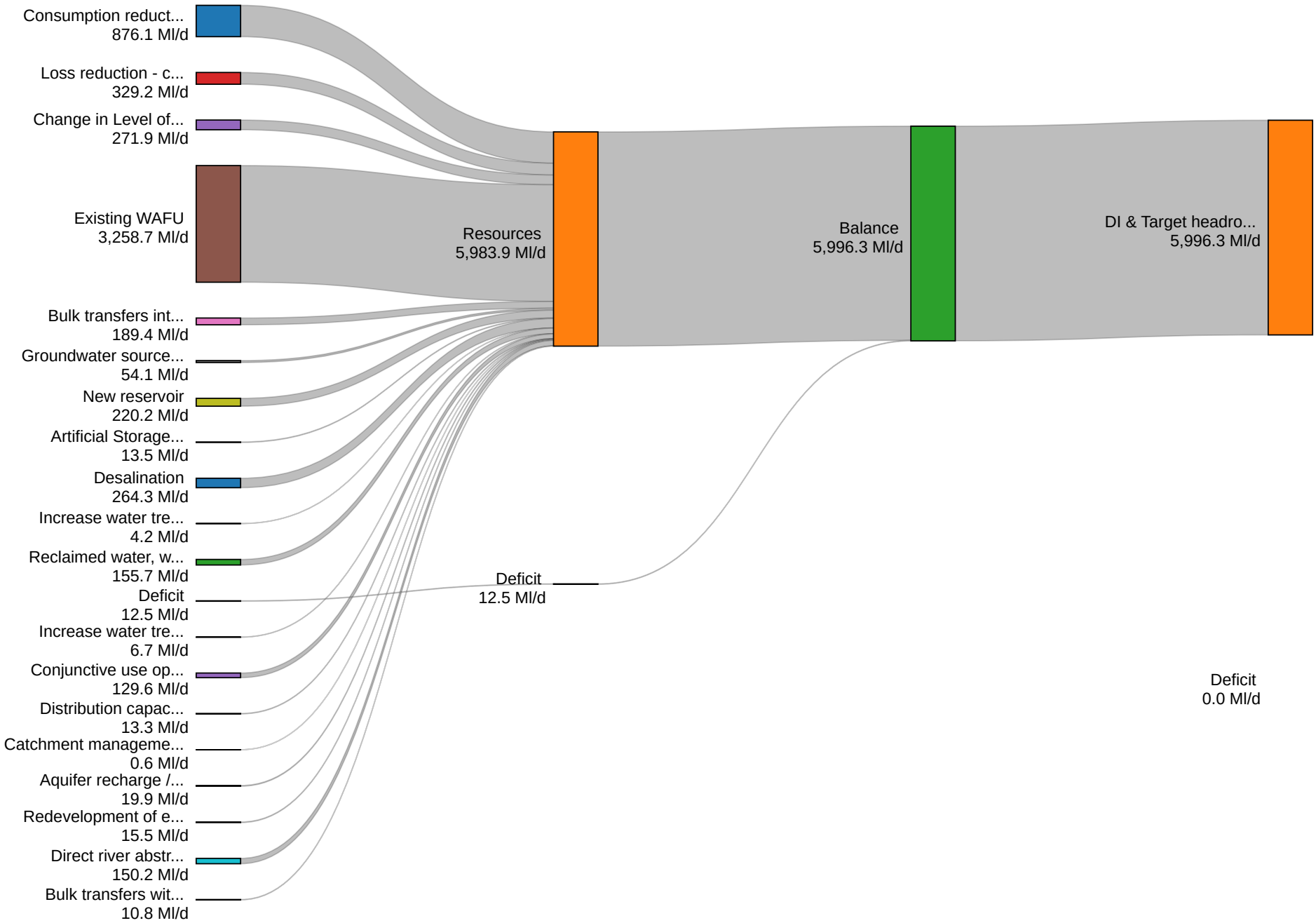
Situation 4 - 2040 (Thames Water)



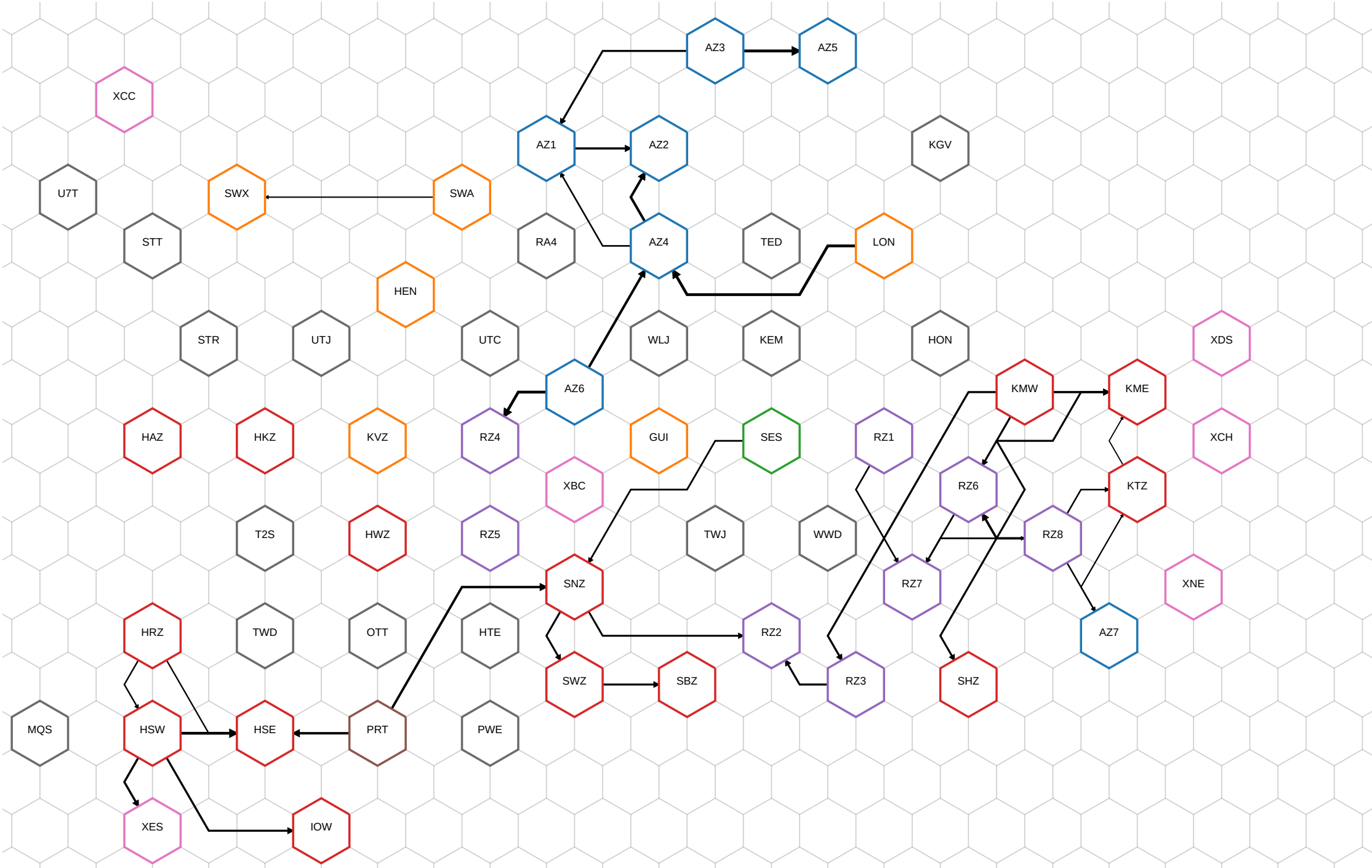
Situation 4 - 2050 (Thames Water)



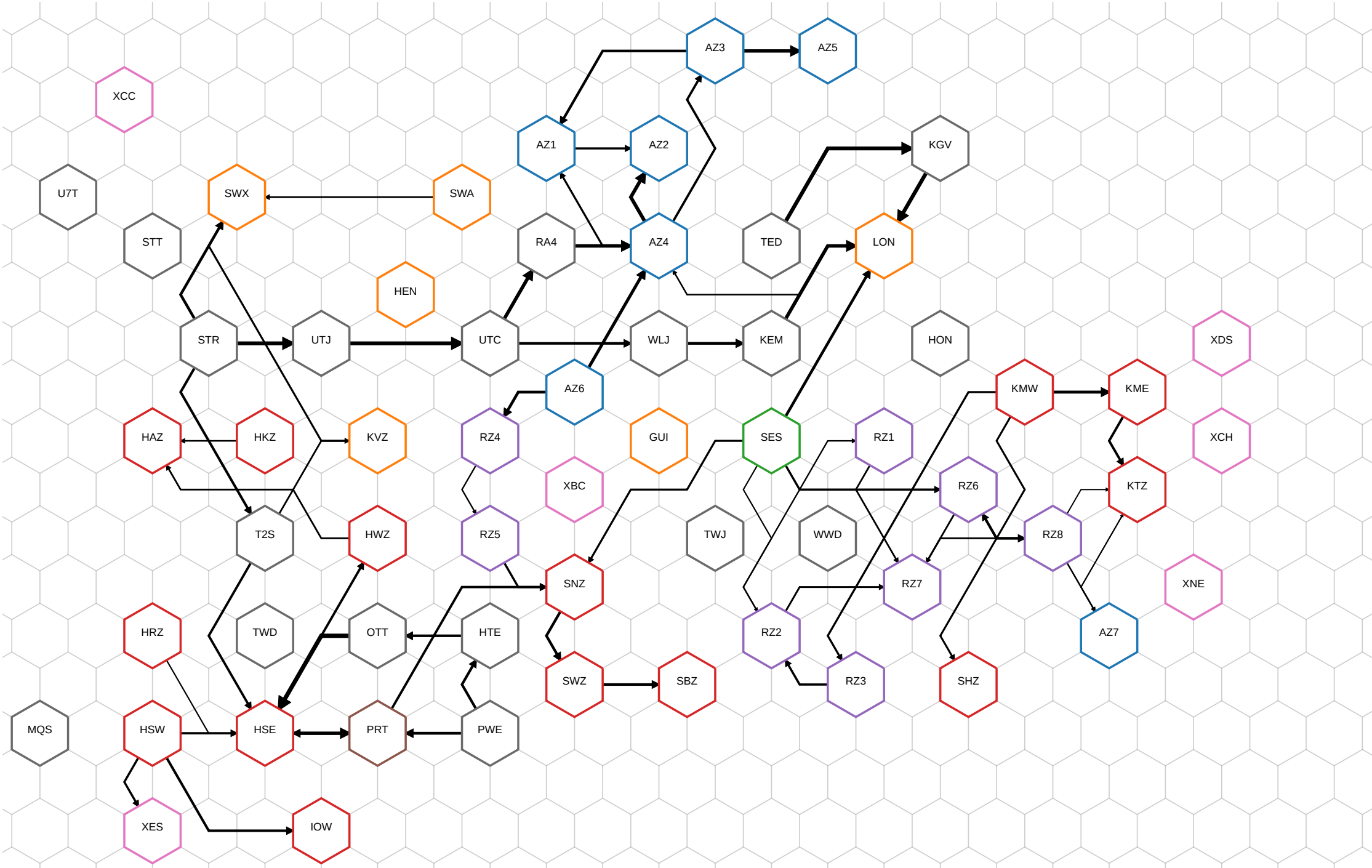
Situation 4 - 2075 (Thames Water)



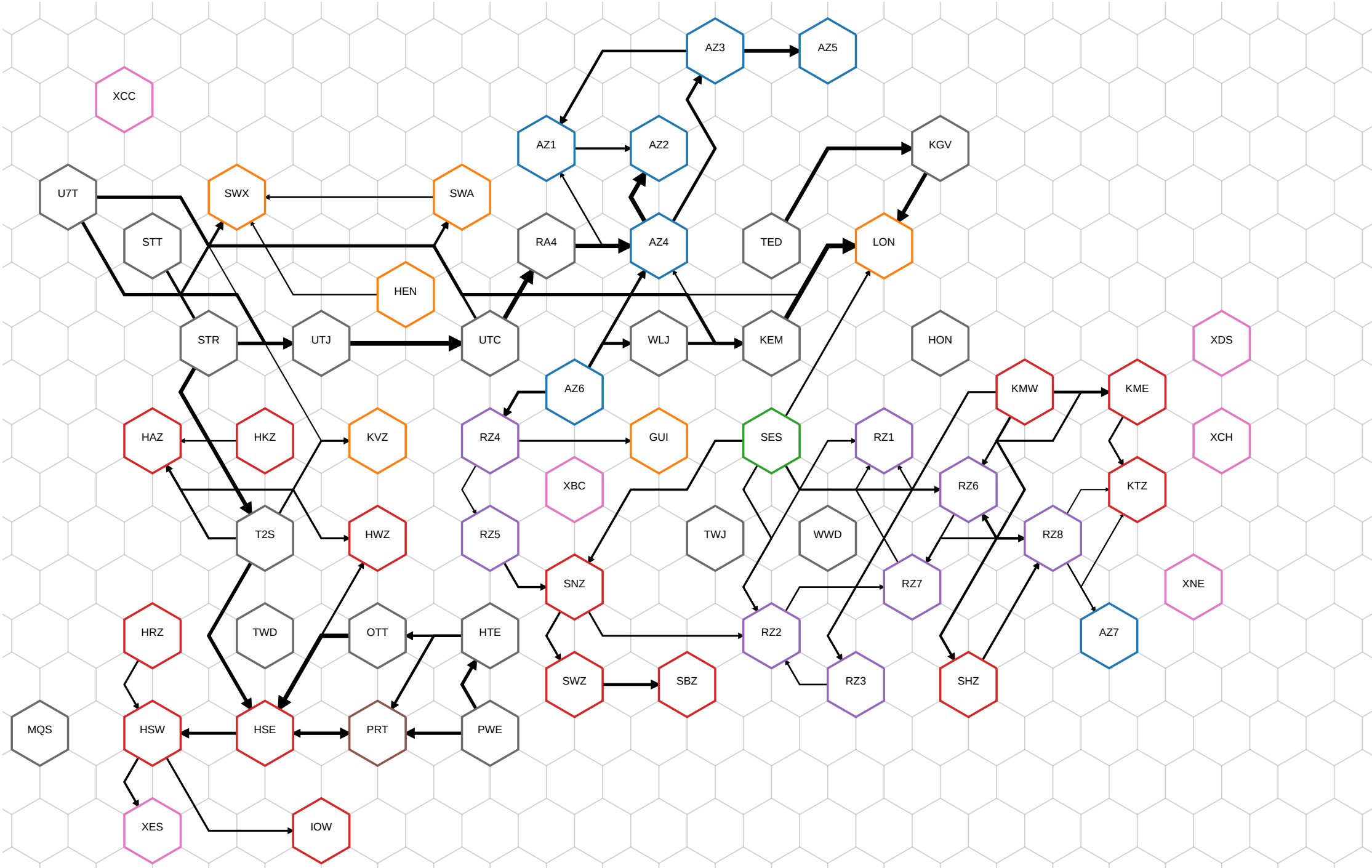
Situation 4 - 2026



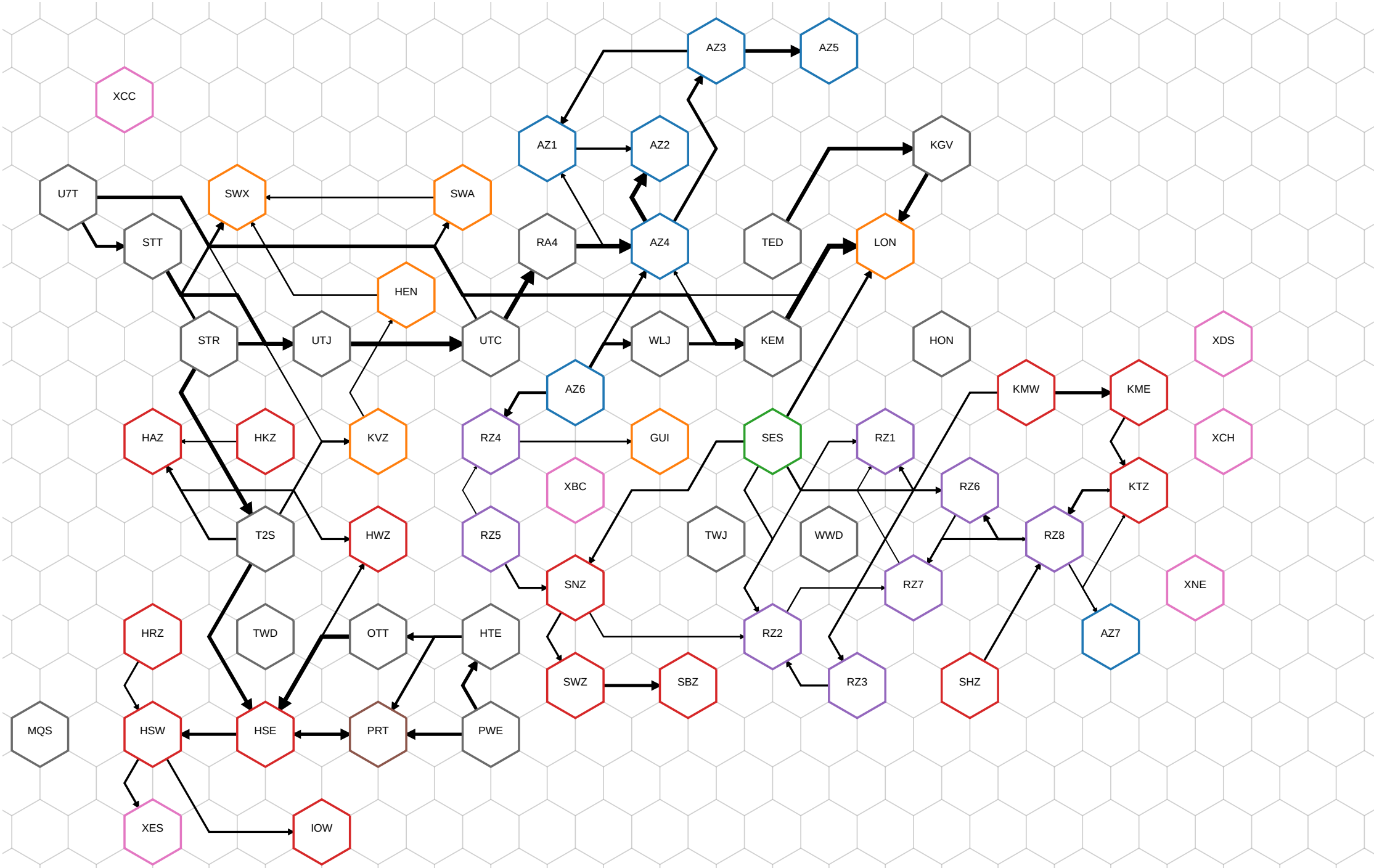
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED SCENARIO G

IVM Summary: Thames Water

! This run contained total deficits of 29.9 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 4.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 23.9 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-2075
Description	Least cost run with hybrid-g government interventions.
Created at	07/07/2023, 09:29:30
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridg
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

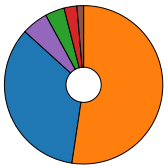
Net present value (Cost)

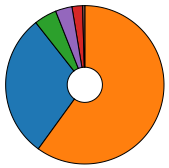
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	4,702,986	1,920,014	1,919,193	921,530	919,520	918,769	518,919	517,974	517,371	1,428,475	(£m)
Cost w/o deficit (STPR)	22,299	18,941	18,120	20,706	18,696	17,945	18,781	17,836	17,234	18,951	(£m)
Cost w/ deficit (IGEQ)	4,714,859	1,928,885	1,927,431	931,975	928,248	926,934	527,887	526,127	525,036	1,437,487	(£m)
Cost w/o deficit (IGEQ)	34,172	27,811	26,357	31,151	27,424	26,110	27,749	25,990	24,898	27,962	(£m)
Cost w/ deficit (LTDR)	4,705,283	1,921,761	1,920,822	923,566	921,239	920,382	520,679	519,584	518,891	1,430,245	(£m)
Cost w/o deficit (LTDR)	24,595	20,688	19,748	22,742	20,415	19,558	20,541	19,447	18,753	20,721	(£m)

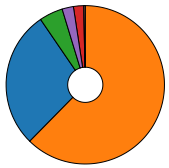
Cost breakdown (STPR)

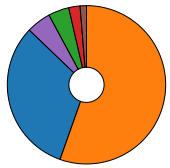
Select Company: Total

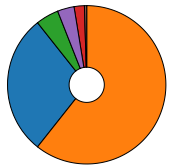
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,661	5,568	5,090	6,572	5,363	4,934	5,292	4,793	4,485	5,529	(£m)
Fixed opex	11,677	11,362	11,301	11,474	11,341	11,283	11,335	11,278	11,237	11,365	(£m)
Fixed operational carbon	884	874	874	883	875	874	872	866	866	874	(£m)
Embedded carbon	584	408	380	479	395	366	393	358	340	411	(£m)
Variable opex	1,190	640	418	1,029	636	424	747	481	280	649	(£m)
Variable carbon opex	303	88	57	269	86	64	143	61	26	122	(£m)

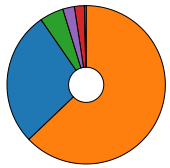
situation1 

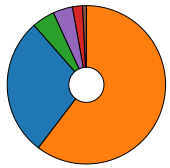
situation2 

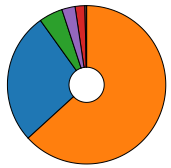
situation3 

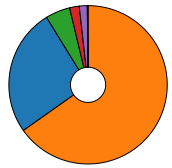
situation4 

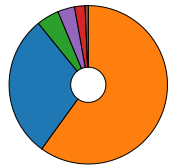
situation5 

situation6 

situation7 

situation8 

situation9 

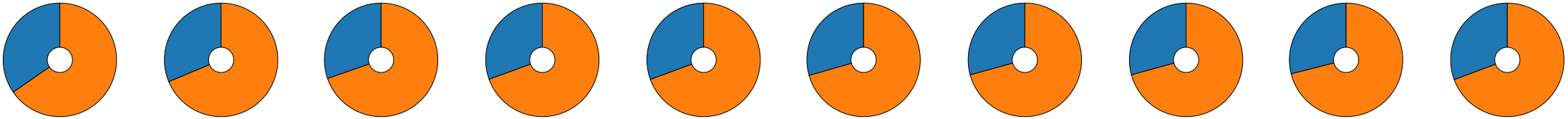
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,729,876	2,483,960	2,294,562	2,986,131	2,404,359	2,216,908	2,413,404	2,165,377	2,047,379	2,526,884	(tonnes)
Operational emissions	7,034,940	5,452,185	5,268,074	6,783,003	5,449,252	5,312,116	5,831,841	5,234,579	5,015,952	5,709,105	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

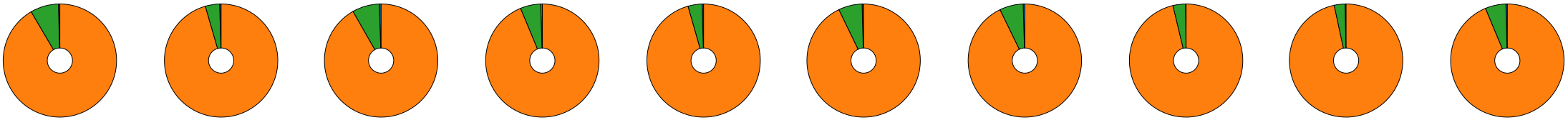


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	111	59	36	112	58	29	80	16	12	57	(GWh)
Grid	24,492	13,561	6,403	21,638	13,770	6,085	15,150	9,705	4,029	12,759	(GWh)
Renewable	2,144	578	539	1,334	580	441	1,095	360	129	800	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,632	66,413	65,729	69,250	66,031	65,168	65,809	63,750	62,803	66,287
SEA environmental disbenefit	125,580	92,928	87,896	112,198	89,300	82,920	91,258	77,368	72,066	92,390
Natural capital	82,571,623	79,182,778	79,424,982	78,752,047	80,316,533	82,970,726	79,695,301	80,682,777	83,448,017	80,782,754
Bio-diversity net gain	−260,257	−181,781	−160,123	−223,135	−165,531	−146,562	−166,736	−128,337	−105,627	−170,899

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,970	32,943	32,666	34,147	32,721	32,300	32,756	31,706	31,297	32,834

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.52	32.31	35.34	30.99	32.42	35.51	32.55	36.05	40.45	34.13
R1: Uncertainty of option supply/demand benefit	6.54	6.11	6.64	6.25	6.12	6.68	5.97	6.42	7.24	6.44
R3: Risk of service failure due to other physical hazards	7.34	7.73	8.57	7.26	7.77	8.67	7.72	8.73	9.97	8.20
R4: Availability of additional headroom	6.51	6.84	7.04	6.60	6.84	7.04	7.15	7.50	7.75	7.03
R5: Catchment/raw water quality risks (incl. climate change)	5.27	5.45	6.16	5.11	5.48	6.17	5.62	6.50	7.53	5.92
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.86	6.18	6.92	5.77	6.21	6.95	6.09	6.90	7.95	6.54
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

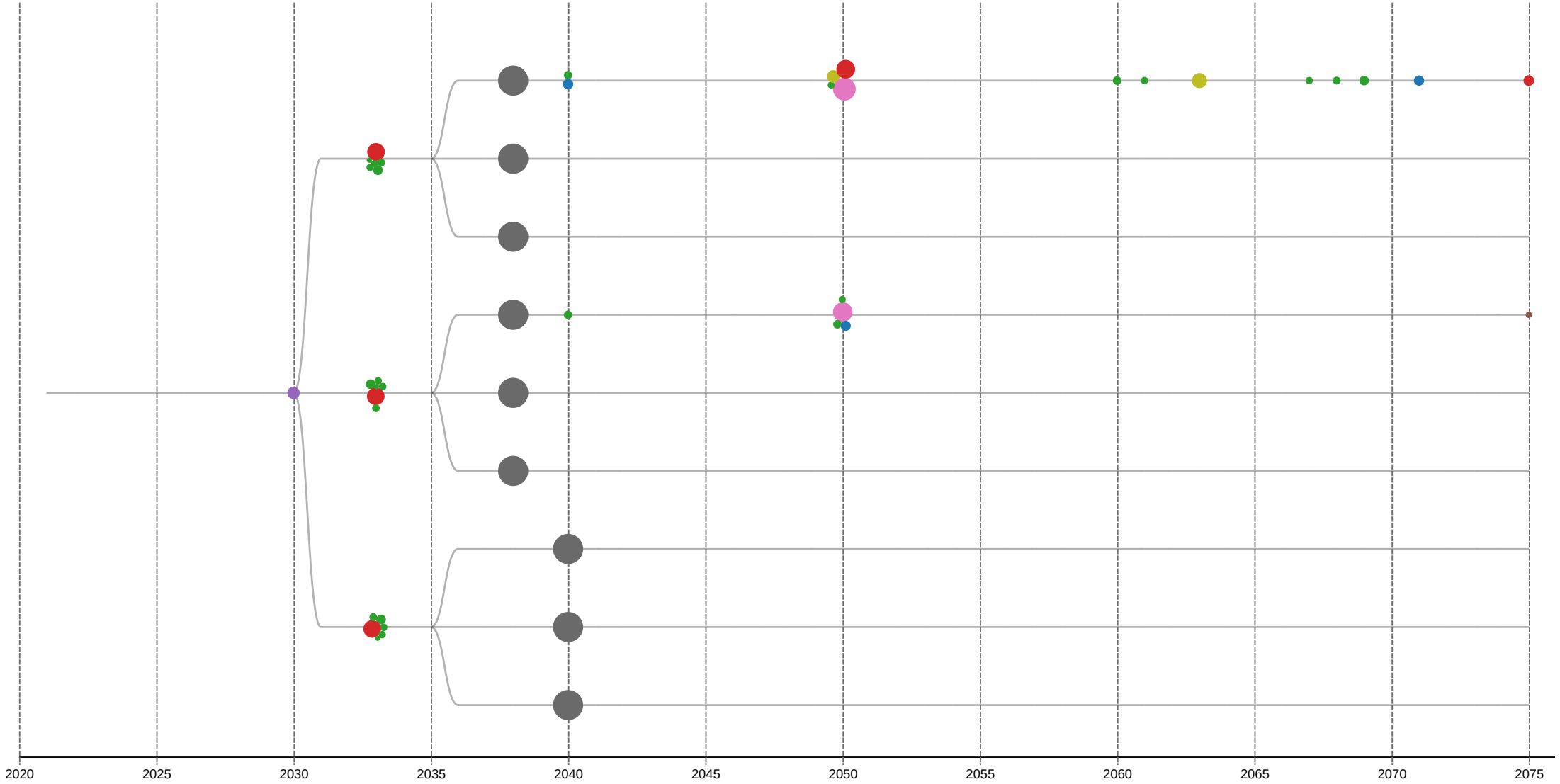
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.50	15.87	17.85	14.34	15.86	17.77	15.89	18.08	20.71	16.76
A3: Operational complexity and flexibility	6.48	7.04	7.89	6.52	7.08	7.95	7.00	7.98	9.21	7.46
A4: WRZ connectivity	7.98	8.79	9.91	7.76	8.73	9.77	8.85	10.05	11.45	9.25
A7: Customer relations support engagement with demand management	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.36	19.90	22.03	18.94	19.99	22.01	20.00	22.35	25.46	21.12
E1: Scaleability and modularity of proposed changes	8.17	8.61	9.55	8.13	8.66	9.62	8.61	9.79	11.21	9.15
E2: Intervention lead times	5.58	5.63	6.22	5.35	5.65	6.08	5.79	6.30	7.09	5.97
E3: Reliance on external bodies to deliver changes	5.60	5.66	6.27	5.45	5.69	6.30	5.60	6.26	7.15	6.00
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

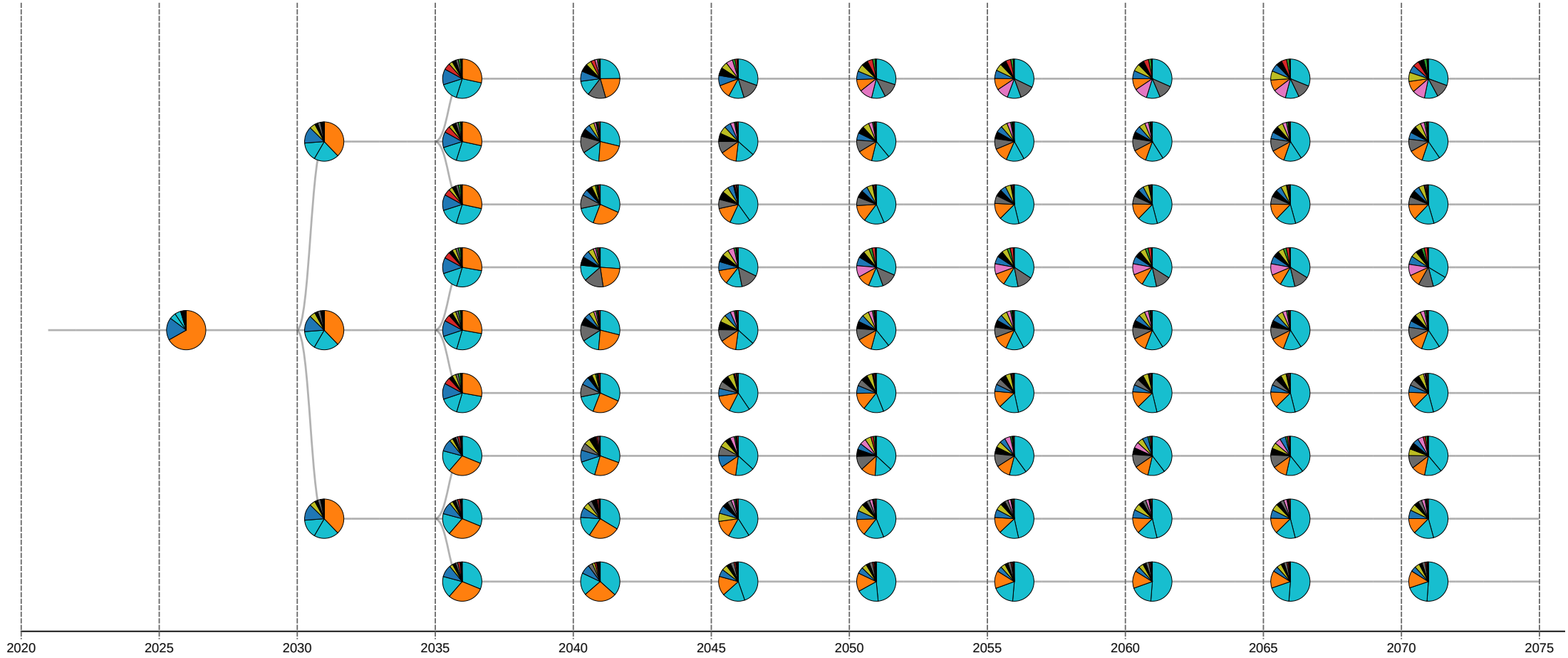
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

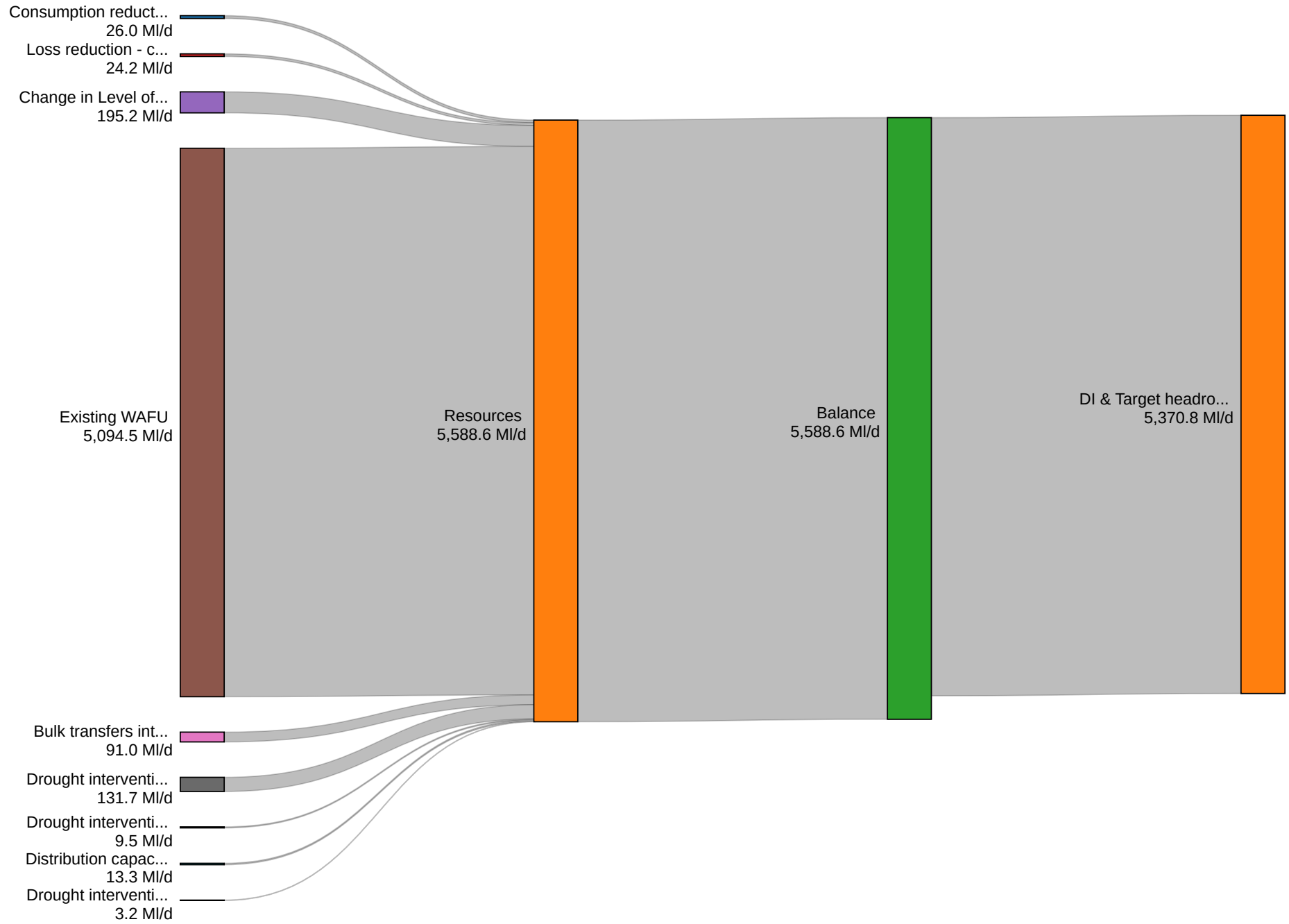
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

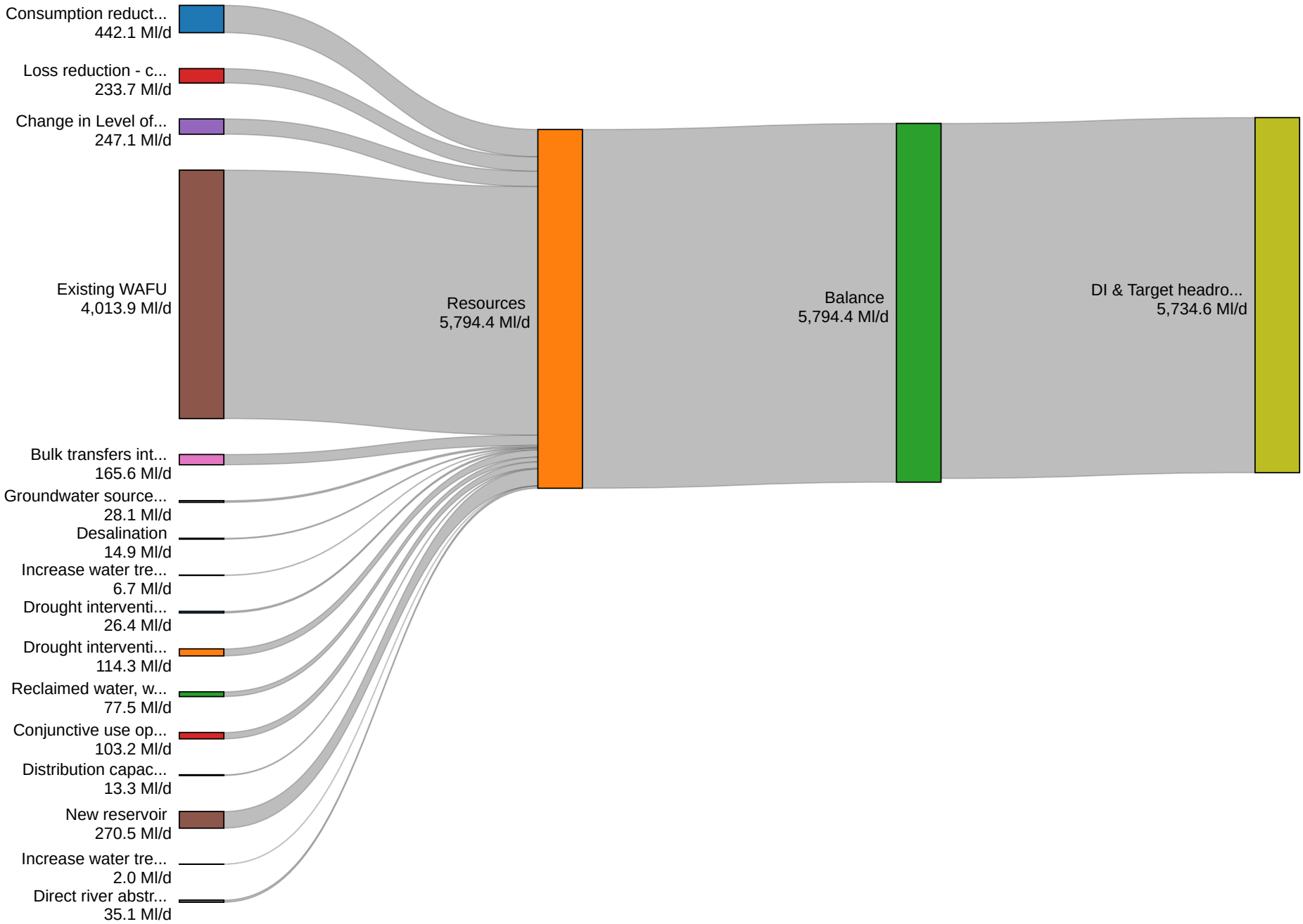


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

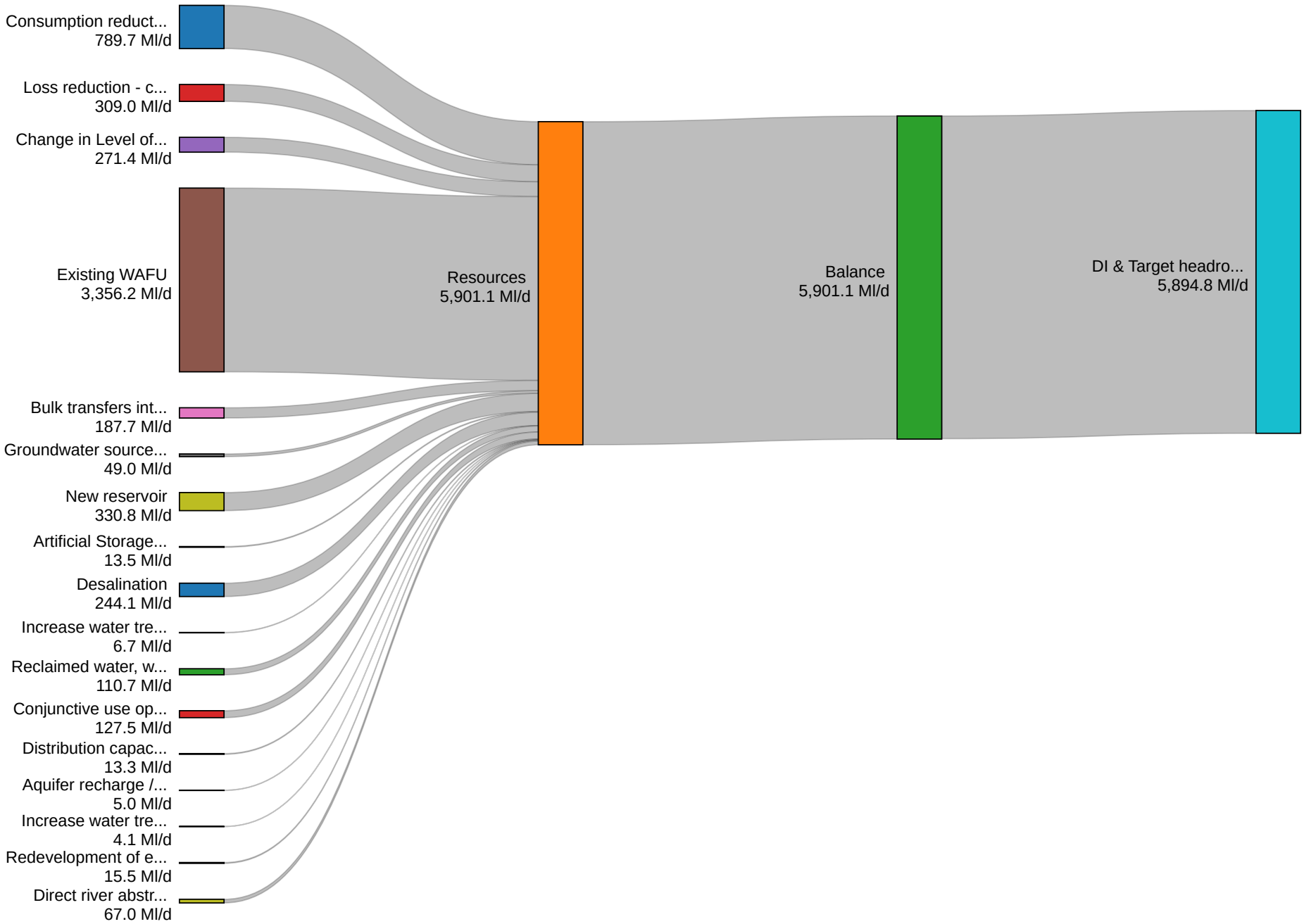
Situation 4 - 2026 (Thames Water)



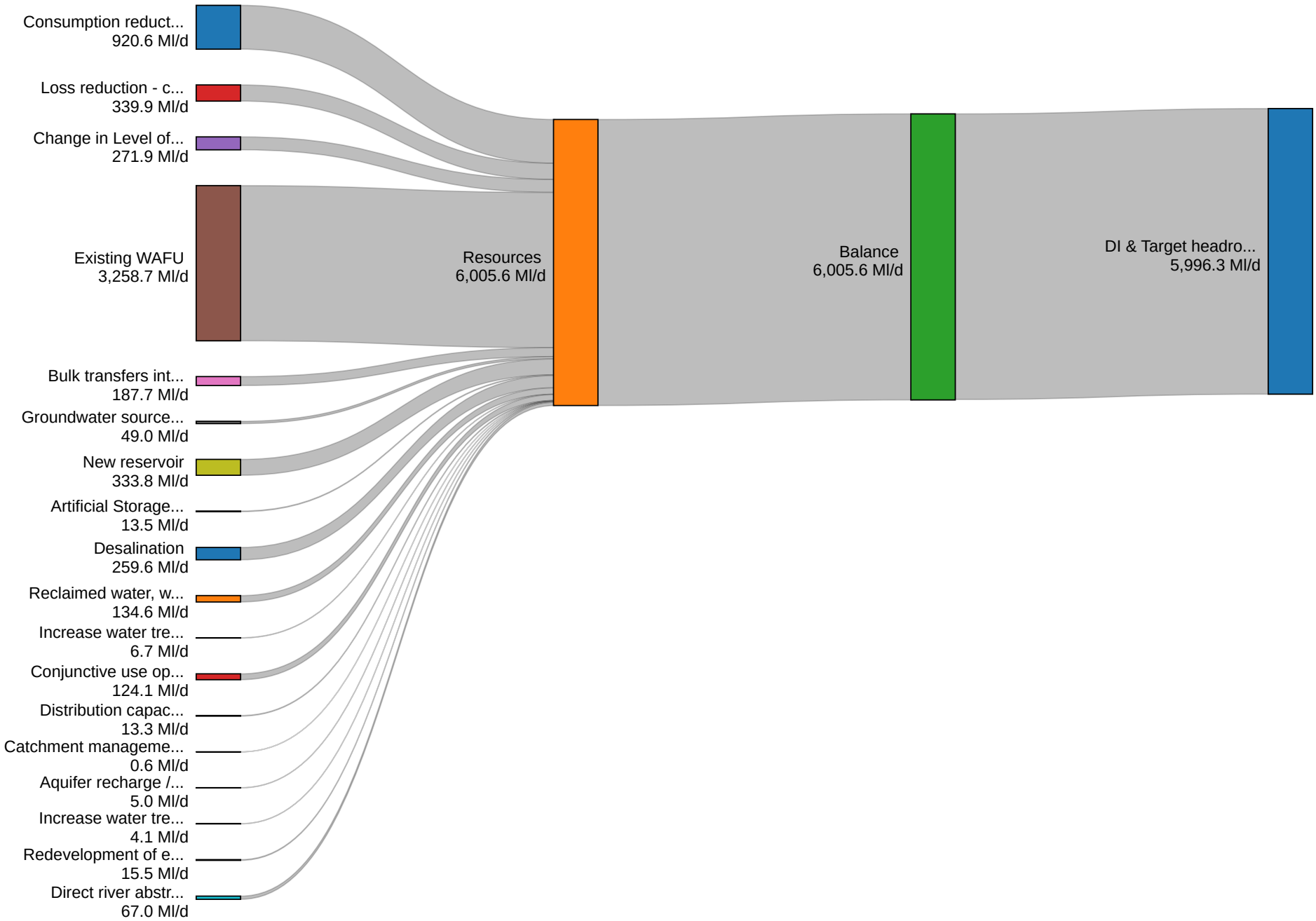
Situation 4 - 2040 (Thames Water)



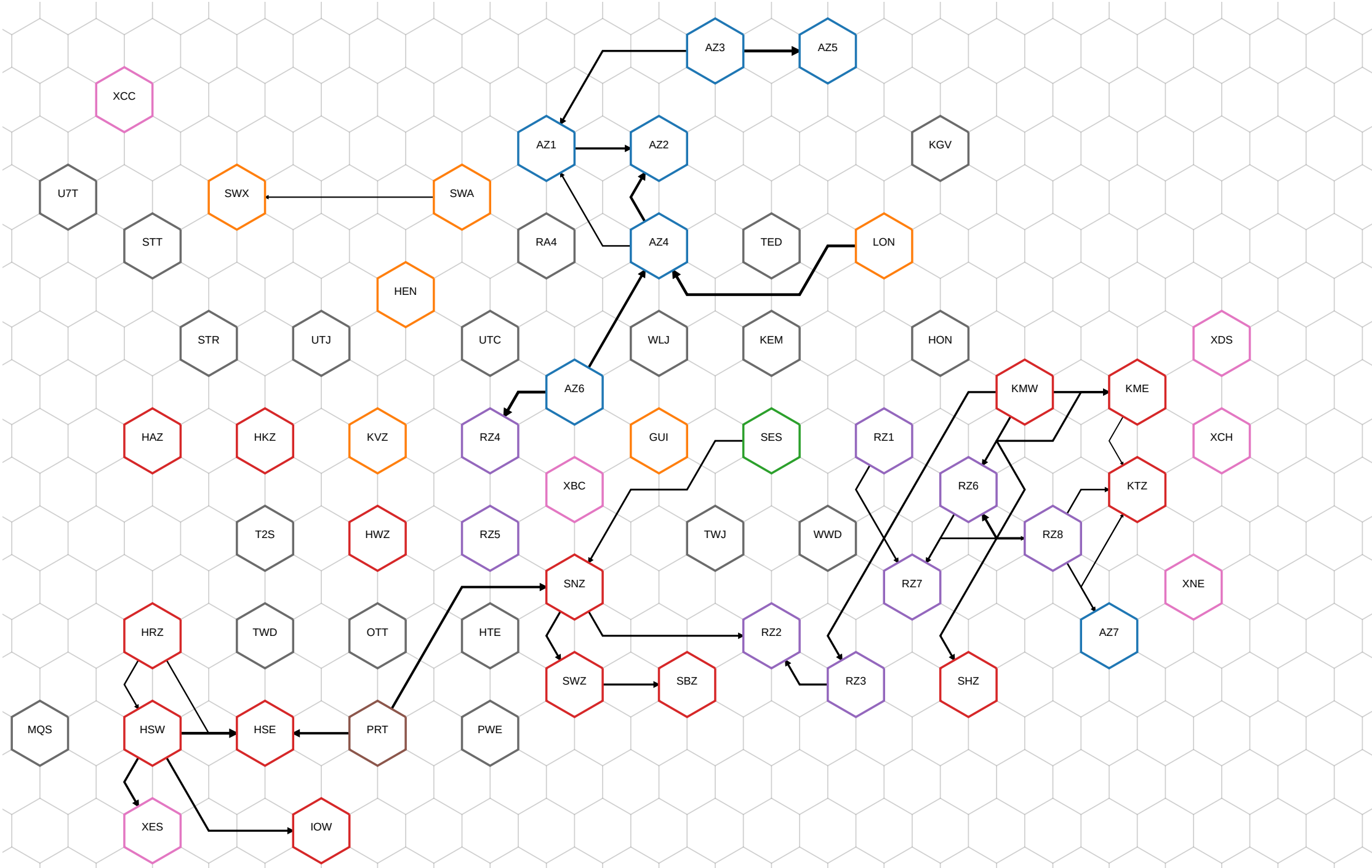
Situation 4 - 2050 (Thames Water)



Situation 4 - 2075 (Thames Water)



Situation 4 - 2026



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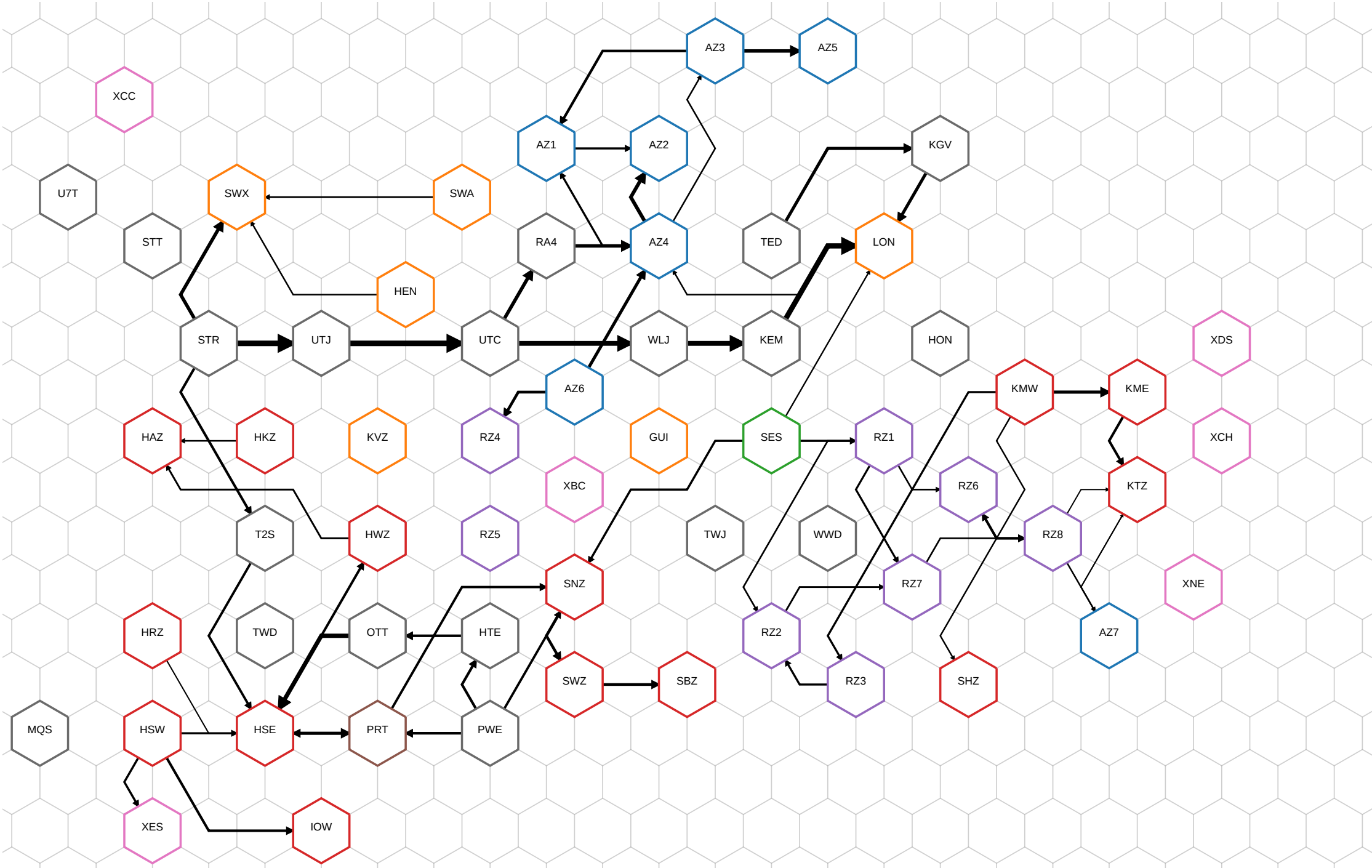
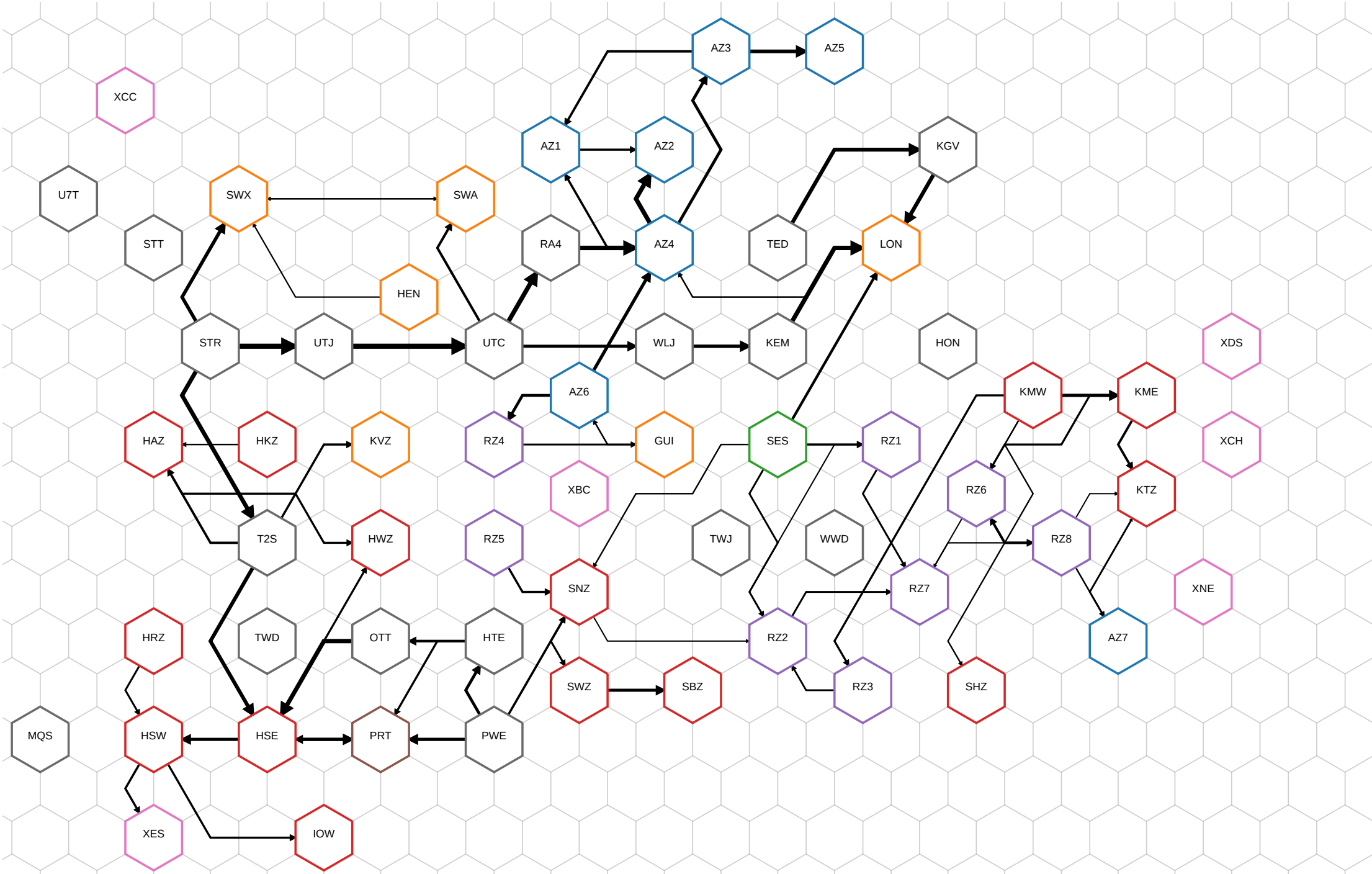
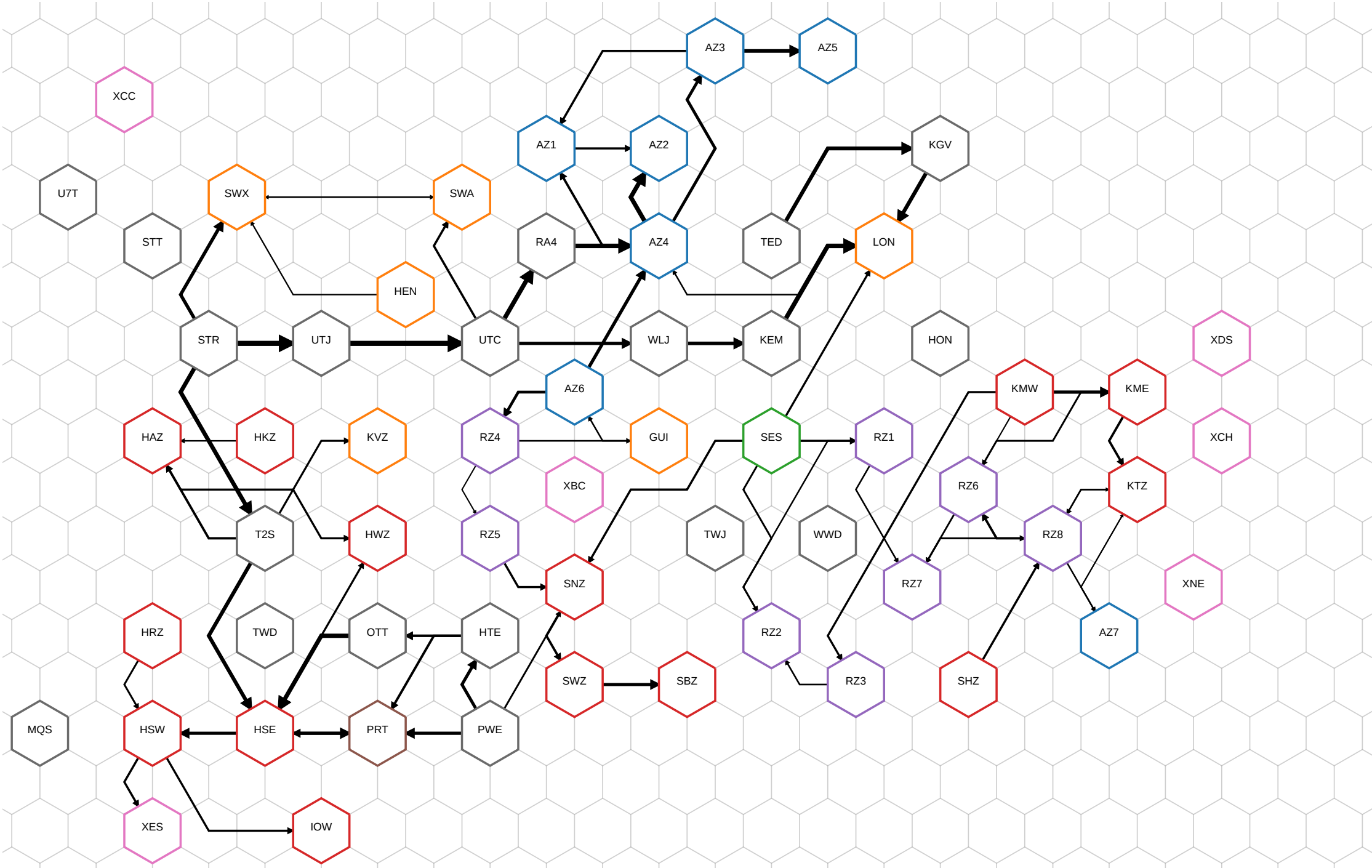


Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED SCENARIO H

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-2075
Description	Least cost run with hybrid-h government interventions with increased capacity of T2S transfer to 200 Ml/d and increased Otterbourne - Gaters Mill transfer to 95 Ml/d. No cost changes to account for the increased capacities have been included. Includes a 6 Ml/d emergency deficit in RZ6 in 2049. Extend Testwood and Candover drought permits to 2040.
Created at	22/08/2023, 14:35:55
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridh-large-sws-prt-transfer-v4
Setting description	Emergency options in RZ6 (2049). Excluding SES low, medium and high DMP baskets. Increase capacity of T2S transfer to 200 Ml/d and expand Otterbourne - Gaters Mill transfer to 95 Ml/d. Extend Testwood and Candover drought permits to 2040.
Optimised discount rate	STPR

Metrics

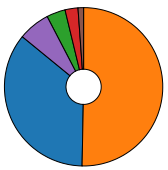
Net present value (Cost)

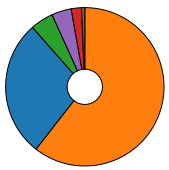
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	23,295	18,655	17,686	21,687	18,558	17,572	18,780	17,526	16,705	18,940	(£m)
Cost w/o deficit (STPR)	23,295	18,655	17,686	21,687	18,558	17,572	18,780	17,526	16,705	18,940	(£m)
Cost w/ deficit (IGEQ)	36,458	27,669	25,913	33,362	27,505	25,726	28,065	25,716	24,222	28,293	(£m)
Cost w/o deficit (IGEQ)	36,458	27,669	25,913	33,362	27,505	25,726	28,065	25,716	24,222	28,293	(£m)
Cost w/ deficit (LTDR)	25,823	20,423	19,308	23,946	20,313	19,181	20,595	19,140	18,194	20,769	(£m)
Cost w/o deficit (LTDR)	25,823	20,423	19,308	23,946	20,313	19,181	20,595	19,140	18,194	20,769	(£m)

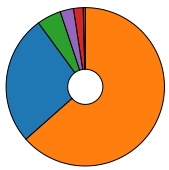
Cost breakdown (STPR)

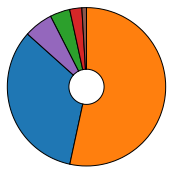
Select Company: Total

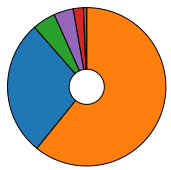
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,294	5,219	4,681	7,209	5,149	4,592	5,192	4,504	4,042	5,431	(£m)
Fixed opex	11,719	11,293	11,225	11,576	11,285	11,213	11,296	11,209	11,149	11,329	(£m)
Fixed operational carbon	897	876	875	887	876	874	877	869	866	877	(£m)
Embedded carbon	615	395	352	536	389	344	398	339	307	408	(£m)
Variable opex	1,506	746	479	1,275	735	477	878	537	301	770	(£m)
Variable carbon opex	264	126	74	204	124	72	140	68	41	124	(£m)

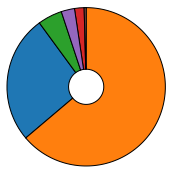
situation1 

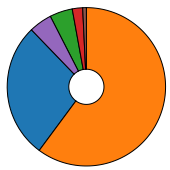
situation2 

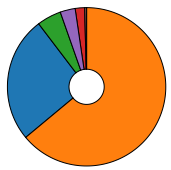
situation3 

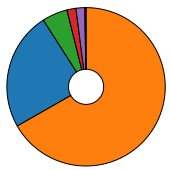
situation4 

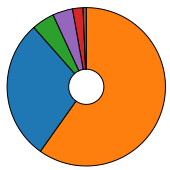
situation5 

situation6 

situation7 

situation8 

situation9 

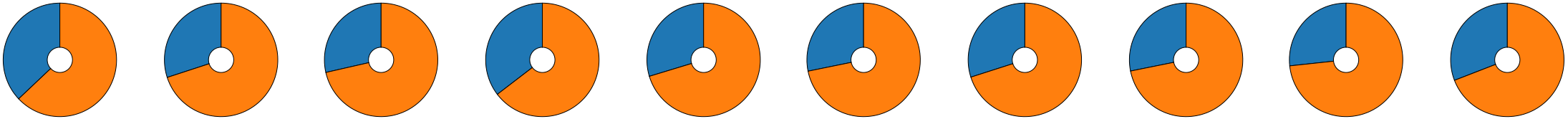
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	4,033,690	2,460,270	2,160,923	3,471,362	2,419,455	2,113,425	2,495,148	2,082,681	1,866,692	2,567,072	(tonnes)
Operational emissions	6,852,519	5,737,395	5,403,814	6,336,301	5,731,350	5,380,993	5,842,509	5,312,516	5,125,923	5,747,036	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

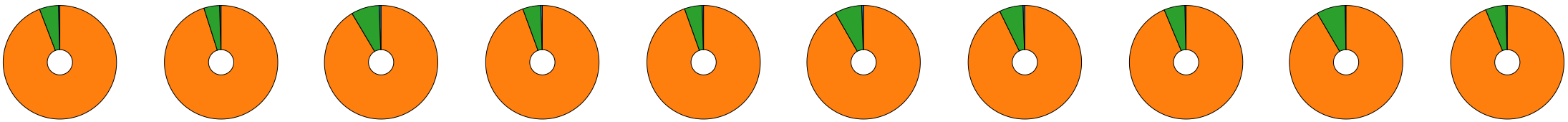


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	137	76	48	136	74	47	109	42	12	76	(GWh)
Grid	31,637	16,228	7,687	27,172	15,641	7,599	18,334	11,168	3,917	15,487	(GWh)
Renewable	1,817	760	671	1,475	828	642	1,331	708	351	954	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	72,317	66,144	65,053	69,343	65,788	64,287	66,170	63,049	61,955	66,012
SEA environmental disbenefit	124,375	89,822	79,137	109,737	86,659	75,267	91,365	72,804	66,332	88,389
Natural capital	78,703,022	75,690,519	76,159,140	73,791,385	76,756,068	79,926,977	76,388,420	77,564,954	80,249,661	77,247,794
Bio-diversity net gain	−246,610	−181,436	−165,678	−216,079	−167,940	−144,360	−179,130	−132,668	−116,340	−172,249

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,227	32,992	32,399	34,322	32,865	32,227	32,949	31,708	31,315	32,889

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.55	30.94	33.46	30.80	31.10	33.54	31.87	34.13	37.71	32.79
R1: Uncertainty of option supply/demand benefit	7.21	6.37	6.85	6.76	6.42	6.85	6.55	6.72	7.32	6.78
R3: Risk of service failure due to other physical hazards	7.10	7.17	7.90	6.98	7.22	7.93	7.35	8.00	9.02	7.63
R4: Availability of additional headroom	6.53	6.78	6.97	6.57	6.79	6.98	7.09	7.43	7.66	6.98
R5: Catchment/raw water quality risks (incl. climate change)	5.06	4.81	5.35	4.88	4.83	5.37	4.96	5.60	6.45	5.26
R6: Capacity of catchment services	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.65	5.80	6.38	5.62	5.82	6.40	5.92	6.39	7.26	6.14
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

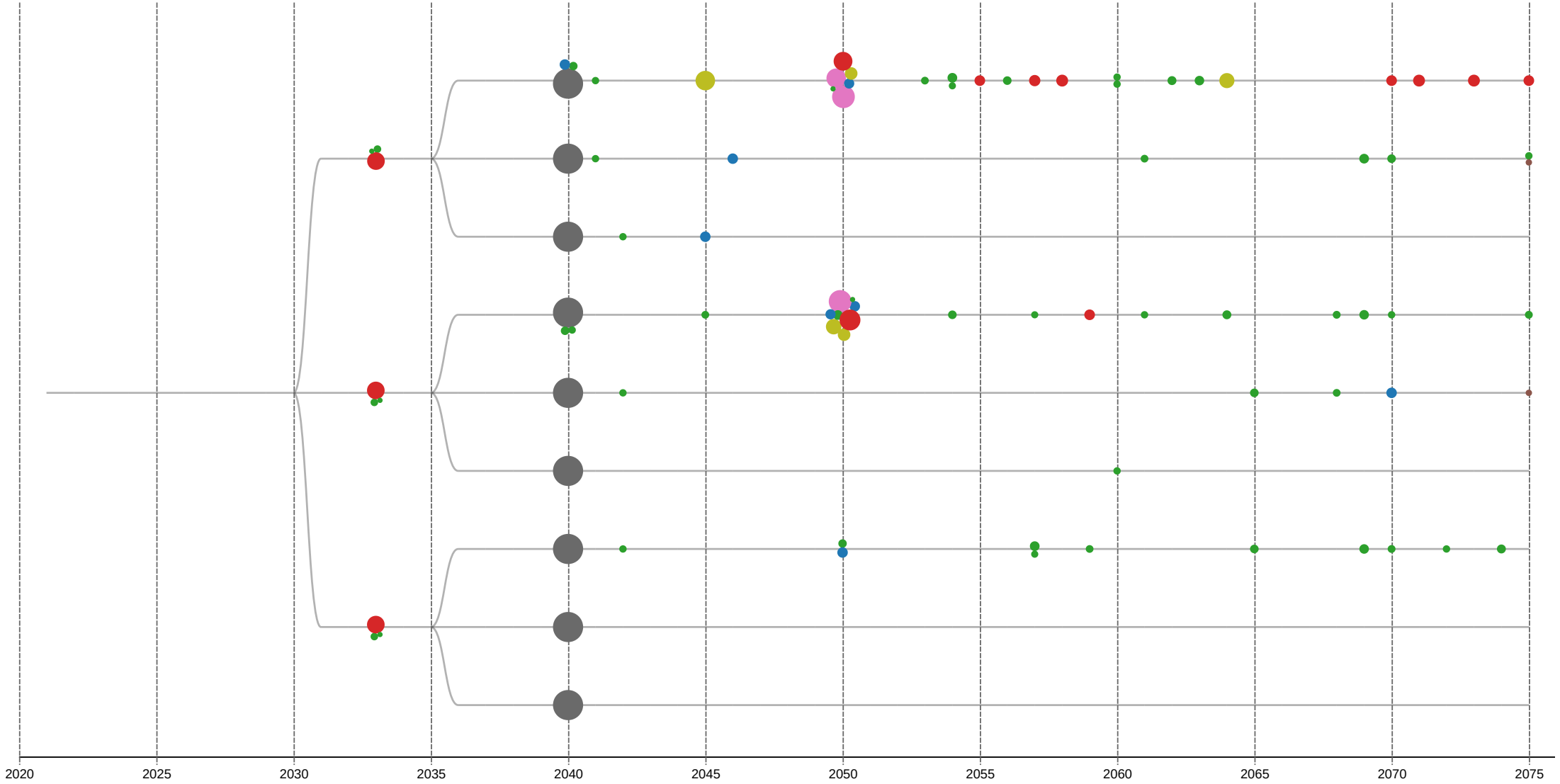
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	15.40	15.84	17.57	14.50	15.95	17.64	16.06	18.19	20.46	16.84
A3: Operational complexity and flexibility	6.31	6.68	7.37	6.29	6.72	7.41	6.82	7.46	8.52	7.07
A4: WRZ connectivity	9.05	9.10	10.15	8.16	9.17	10.18	9.19	10.68	11.89	9.73
A7: Customer relations support engagement with demand management	0.04	0.06	0.05	0.04	0.06	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.30	18.83	20.62	19.04	18.98	20.67	19.38	21.04	23.37	20.14
E1: Scaleability and modularity of proposed changes	8.09	8.05	8.82	7.98	8.13	8.87	8.29	9.08	10.17	8.61
E2: Intervention lead times	5.32	5.05	5.53	5.31	5.07	5.52	5.21	5.67	6.15	5.43
E3: Reliance on external bodies to deliver changes	5.90	5.73	6.26	5.75	5.77	6.28	5.88	6.30	7.05	6.10
E5: Collaborative land management	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

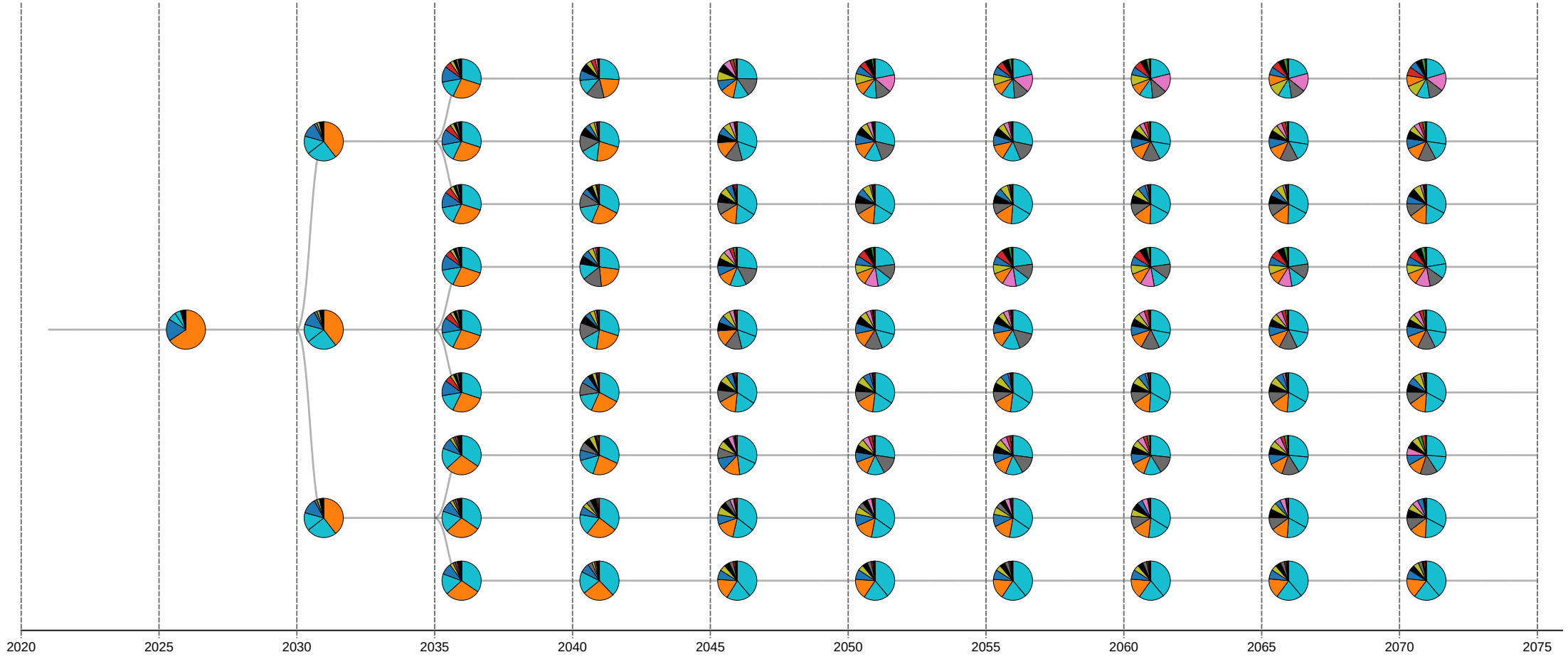
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

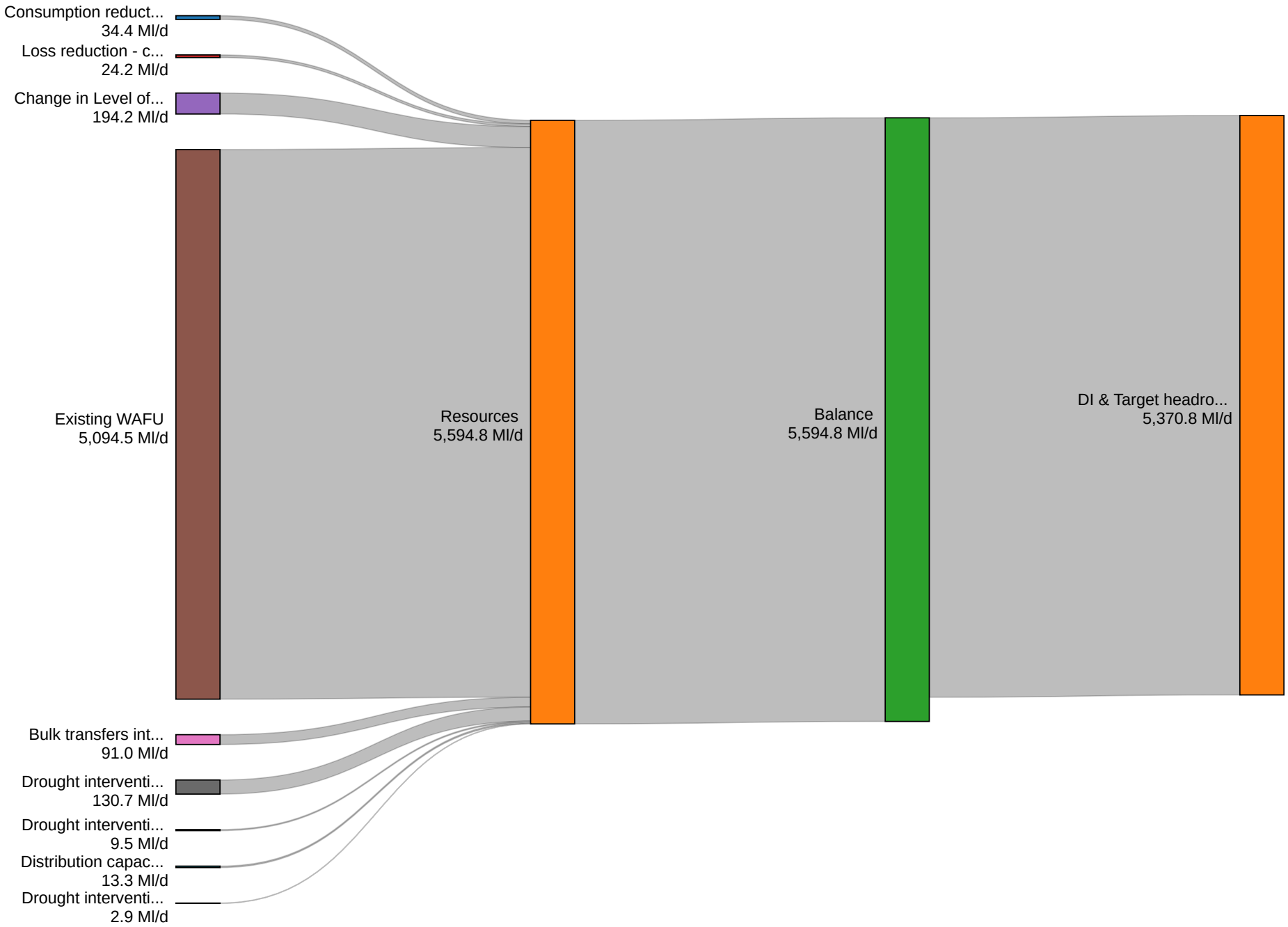
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

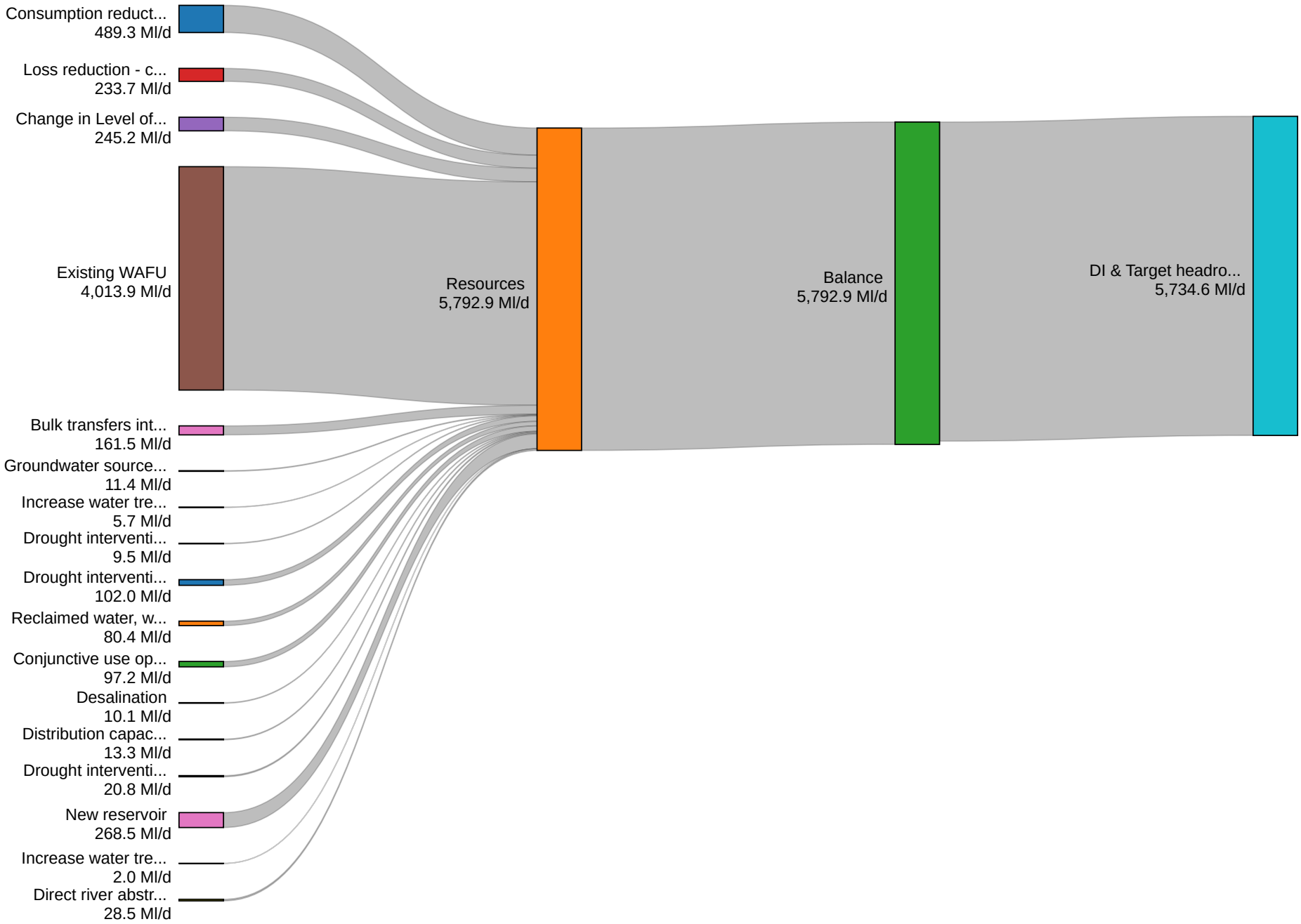


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

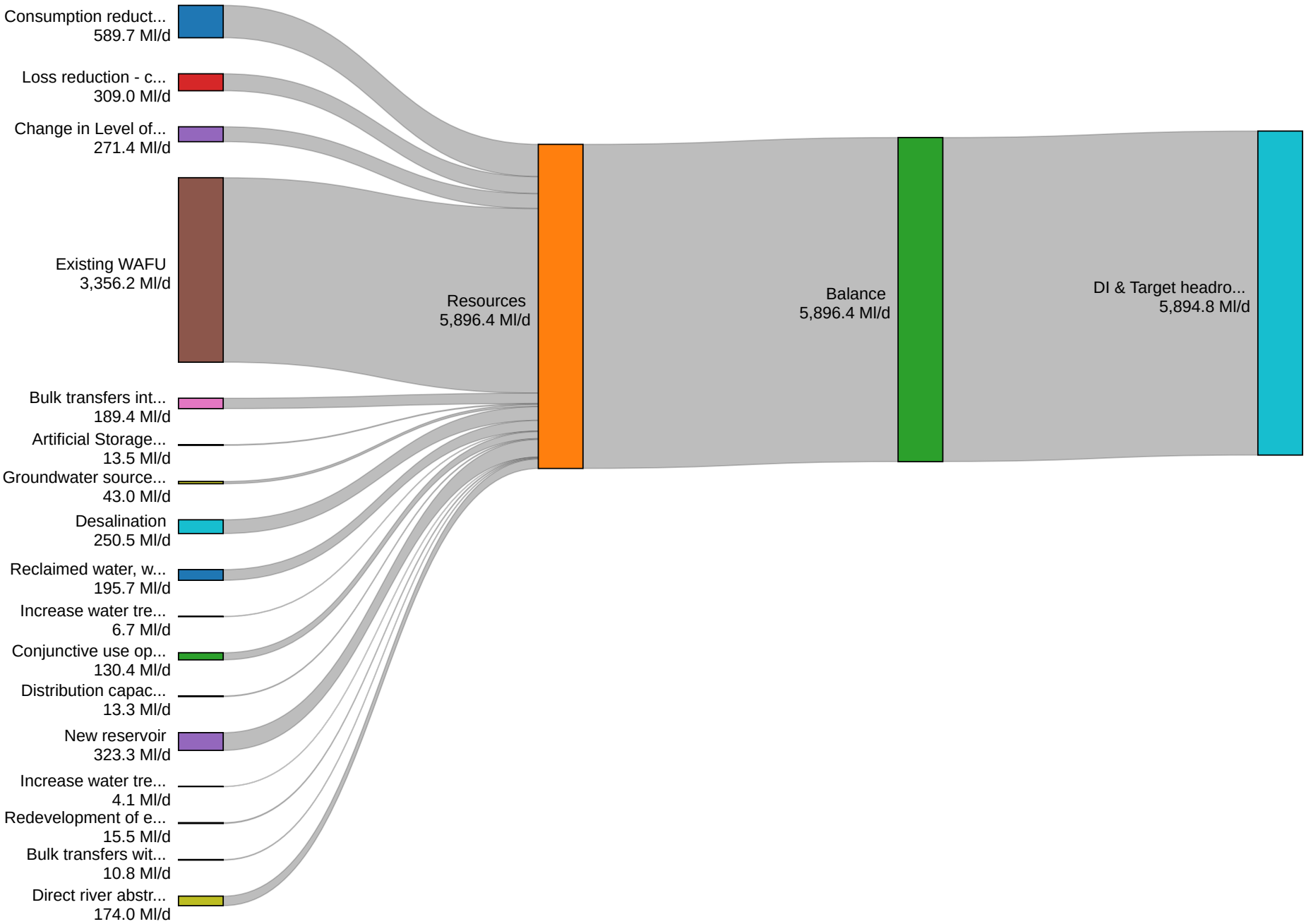
Situation 4 - 2026 (Thames Water)



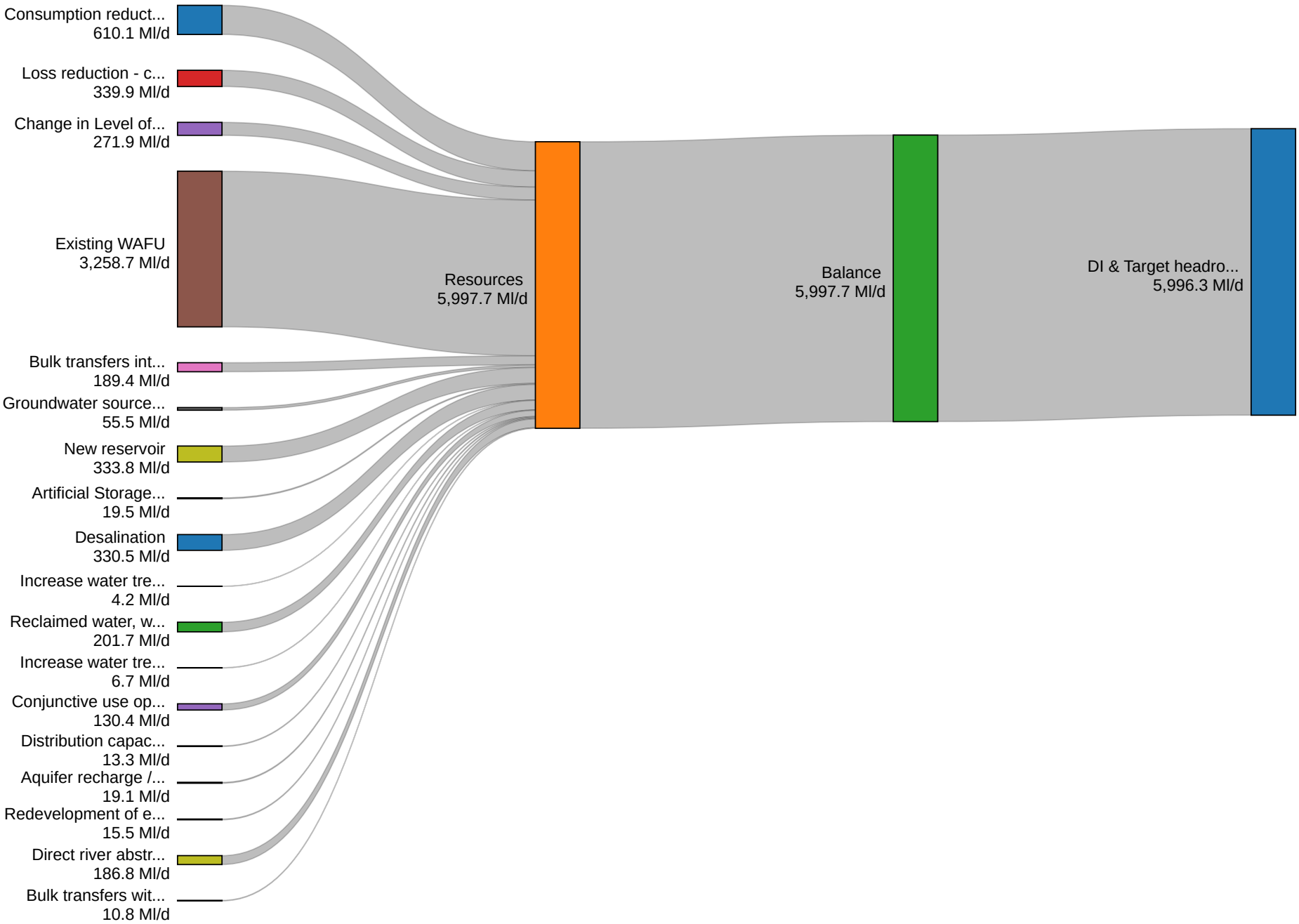
Situation 4 - 2040 (Thames Water)



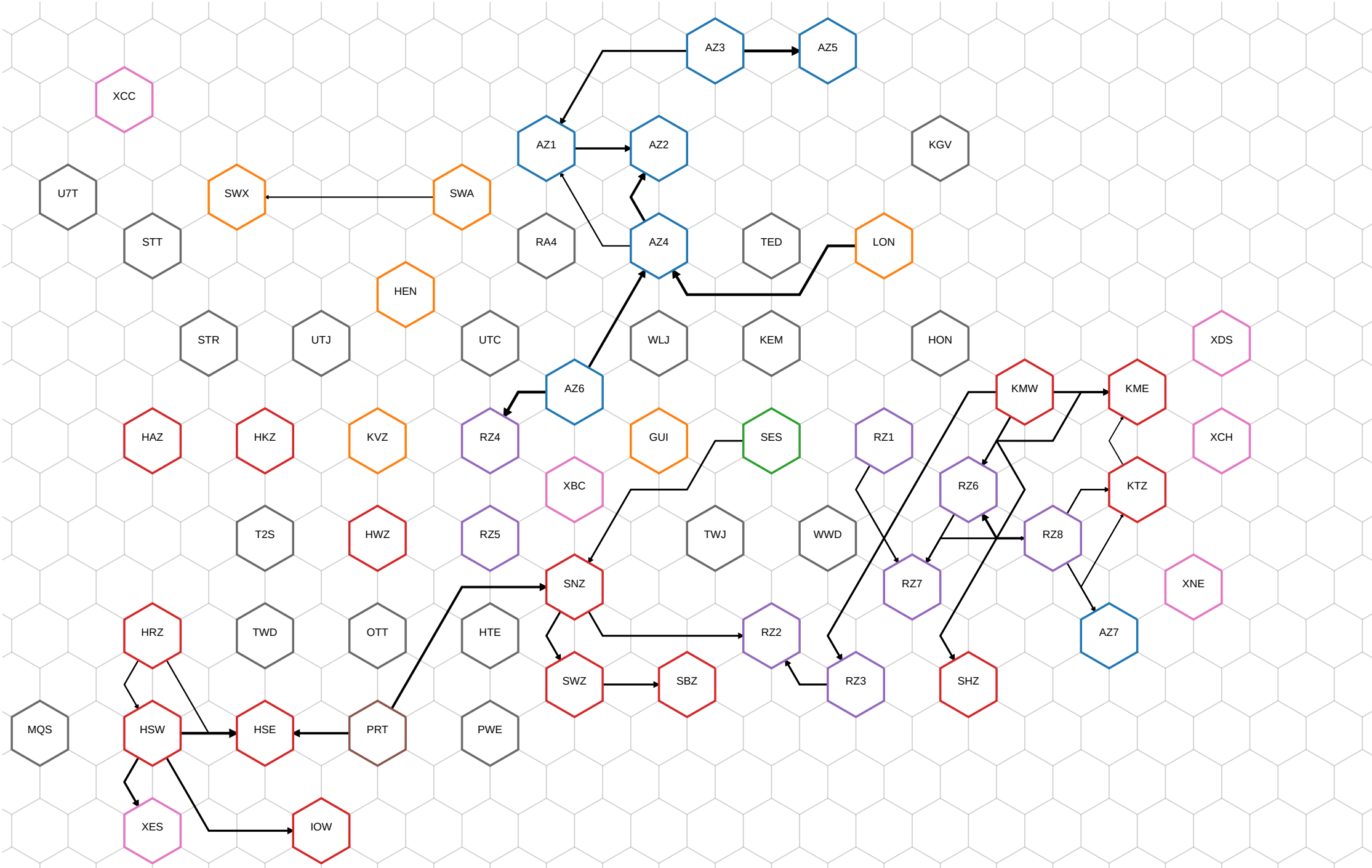
Situation 4 - 2050 (Thames Water)



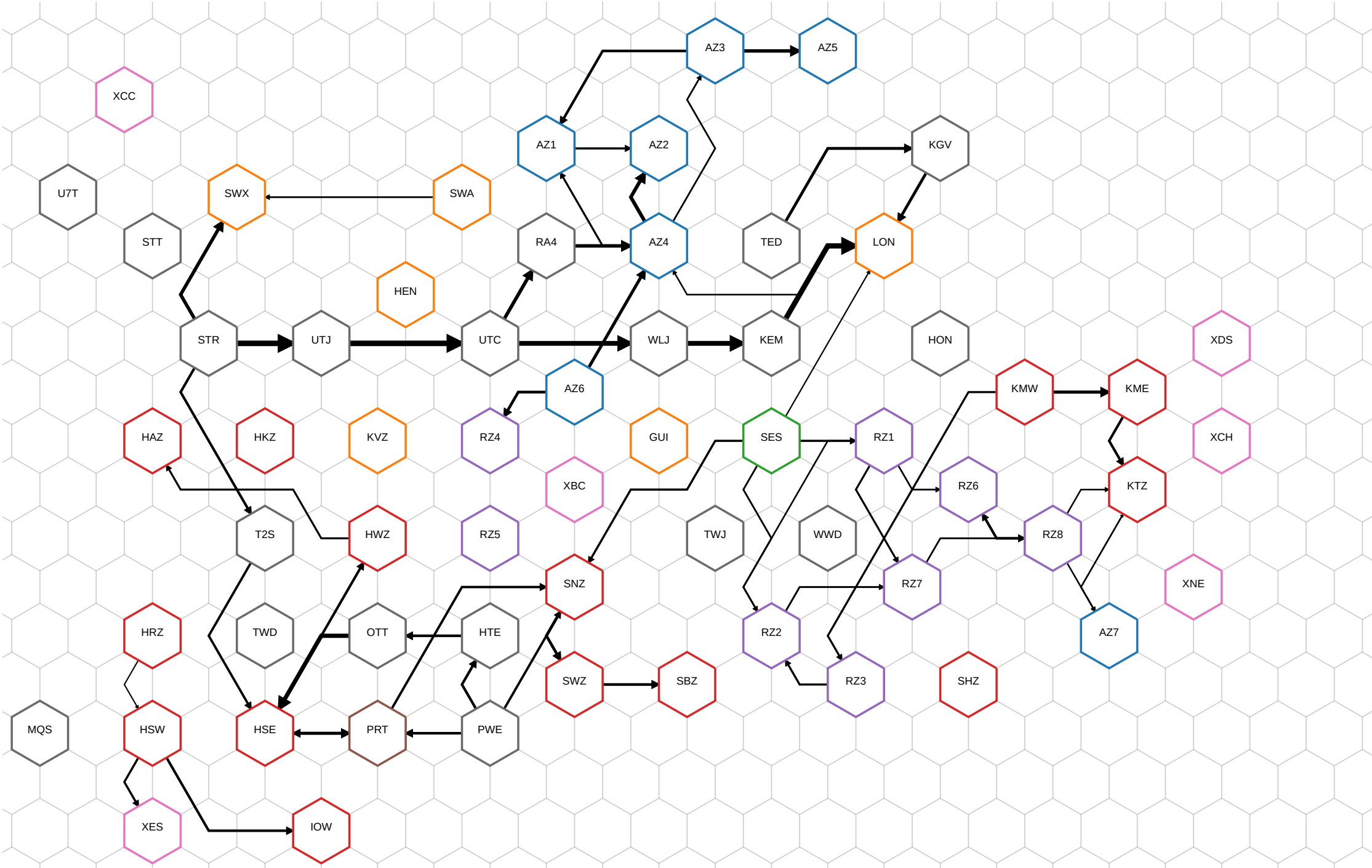
Situation 4 - 2075 (Thames Water)



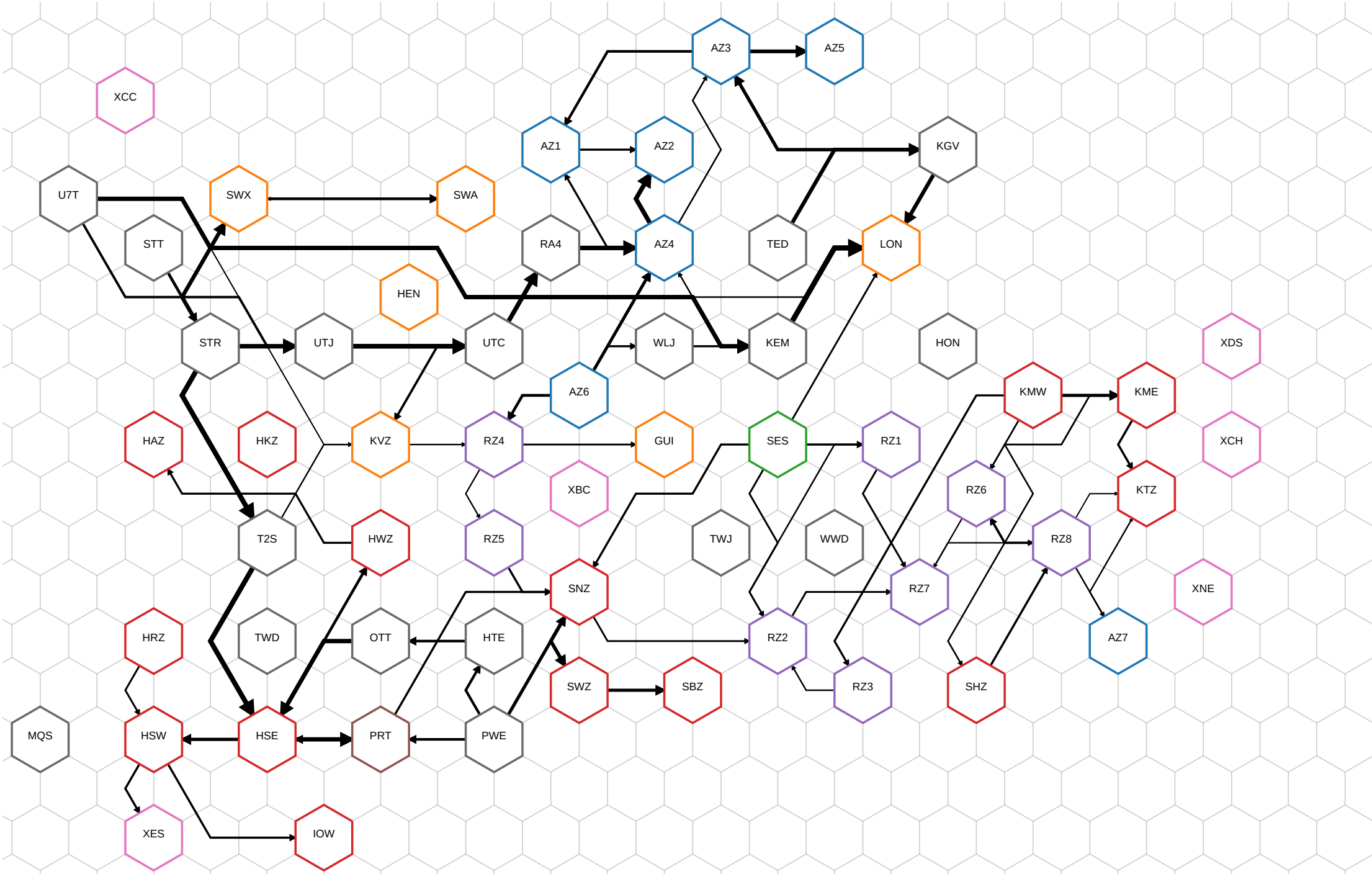
Situation 4 - 2026



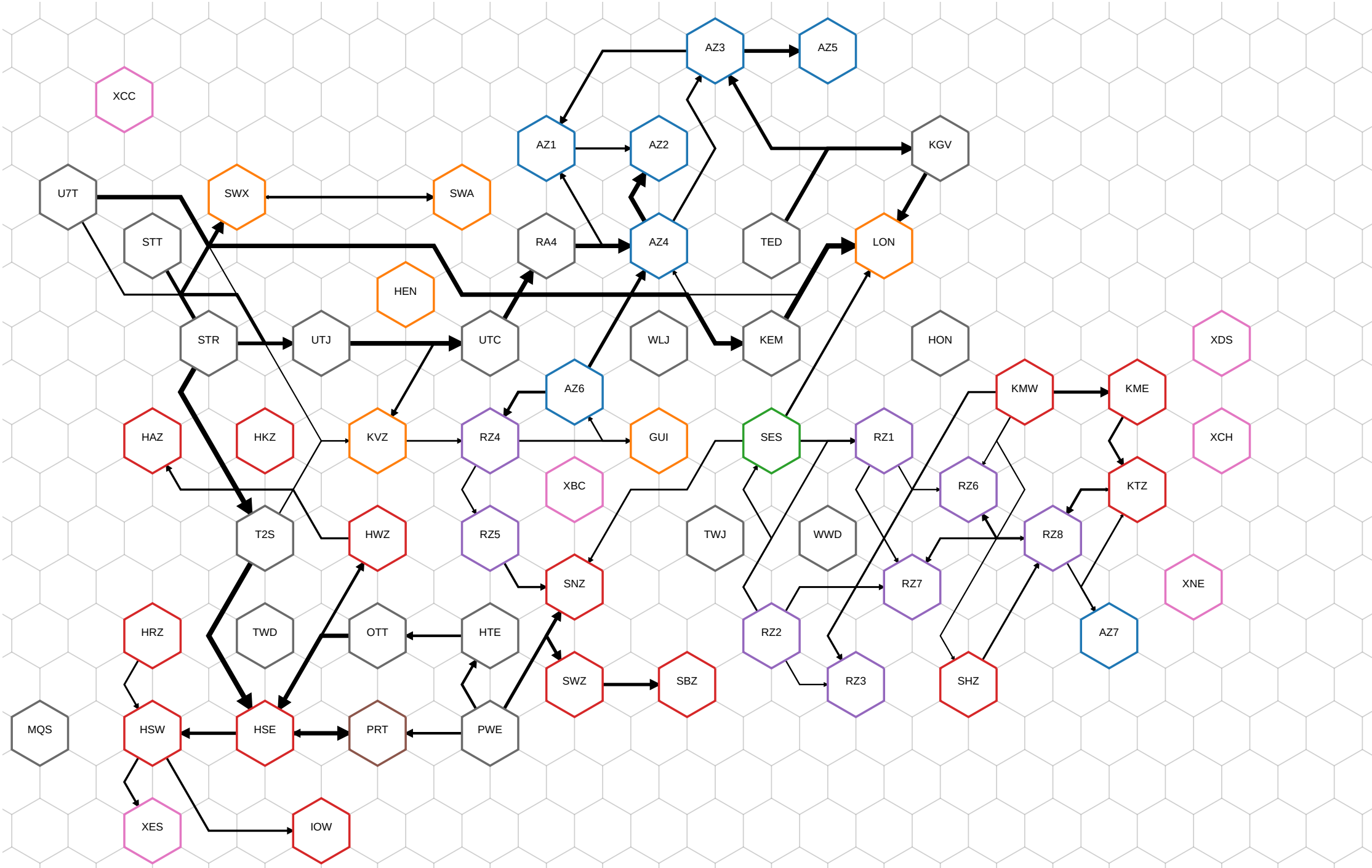
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

NO SESRO

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions excluding SESRO.
Created at	29/06/2023, 05:49:29
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-excl-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants.
Optimised discount rate	STPR

Metrics

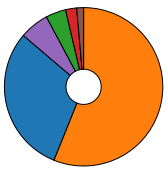
Net present value (Cost)

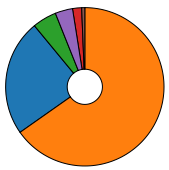
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,239	17,669	16,815	19,682	17,366	16,455	18,165	16,643	15,907	17,771	(£m)
Cost w/o deficit (STPR)	21,239	17,669	16,815	19,682	17,366	16,455	18,165	16,643	15,907	17,771	(£m)
Cost w/ deficit (IGEQ)	32,652	26,035	24,467	29,783	25,545	23,889	27,043	24,257	22,928	26,289	(£m)
Cost w/o deficit (IGEQ)	32,652	26,035	24,467	29,783	25,545	23,889	27,043	24,257	22,928	26,289	(£m)
Cost w/ deficit (LTDR)	23,445	19,314	18,329	21,647	18,975	17,926	19,903	18,147	17,301	19,443	(£m)
Cost w/o deficit (LTDR)	23,445	19,314	18,329	21,647	18,975	17,926	19,903	18,147	17,301	19,443	(£m)

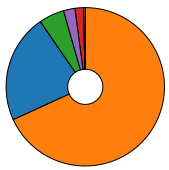
Cost breakdown (STPR)

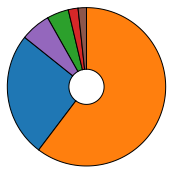
Select Company: Total

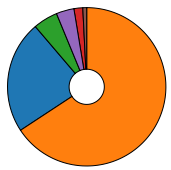
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,402	4,202	3,735	5,003	3,997	3,510	4,219	3,655	3,201	4,214	(£m)
Fixed opex	11,914	11,528	11,465	11,871	11,417	11,328	11,695	11,345	11,282	11,538	(£m)
Fixed operational carbon	880	869	870	880	870	869	872	867	865	871	(£m)
Embedded carbon	481	328	294	392	314	277	329	284	257	328	(£m)
Variable opex	1,265	630	390	1,199	630	393	855	437	273	675	(£m)
Variable carbon opex	297	113	61	336	137	78	196	55	30	145	(£m)

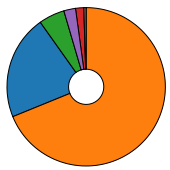
situation1 

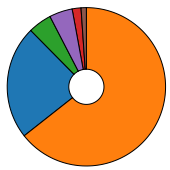
situation2 

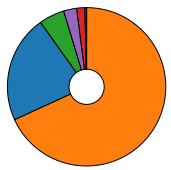
situation3 

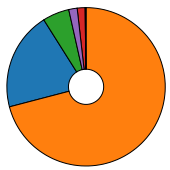
situation4 

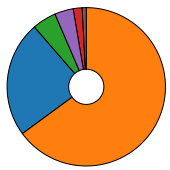
situation5 

situation6 

situation7 

situation8 

situation9 

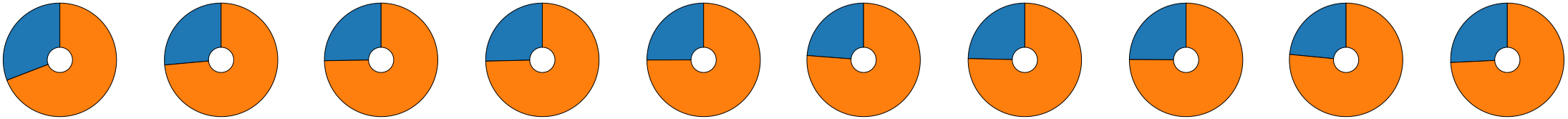
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,103,230	2,014,829	1,784,394	2,466,448	1,932,557	1,681,759	2,039,907	1,735,307	1,549,877	2,034,257	(tonnes)
Operational emissions	6,957,514	5,602,906	5,283,454	7,256,606	5,782,146	5,389,715	6,238,352	5,230,419	5,055,040	5,866,239	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

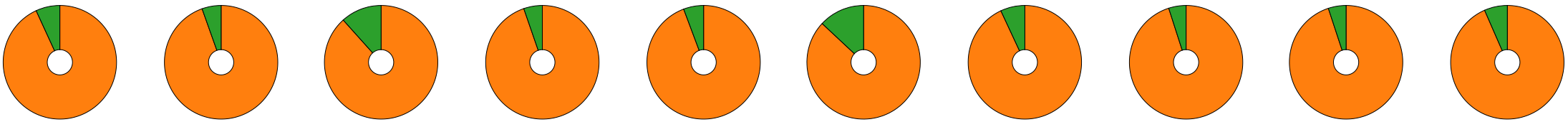


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	0	0	0	0	0	0	0	0	0	0	(GWh)
Grid	24,631	11,831	4,698	22,376	11,784	4,355	15,017	8,310	3,098	11,789	(GWh)
Renewable	1,816	683	619	1,256	715	654	1,121	434	165	829	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	67,599	61,266	60,104	65,210	61,645	60,570	62,188	60,146	58,923	61,961
SEA environmental disbenefit	113,674	80,037	71,273	97,836	77,496	69,442	82,145	68,131	57,817	79,761
Natural capital	8,316,351	6,879,801	10,270,350	3,433,466	6,107,751	8,864,015	4,989,242	6,440,097	9,341,914	7,182,554
Bio-diversity net gain	−240,480	−195,618	−164,133	−242,921	−193,343	−165,668	−198,173	−170,197	−140,647	−190,131

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,227	31,839	31,395	33,225	31,730	31,180	31,948	30,853	30,279	31,853

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.50	26.08	28.17	26.58	26.38	28.57	28.09	29.83	32.95	28.24
R1: Uncertainty of option supply/demand benefit	5.79	4.83	5.17	5.43	4.93	5.29	5.33	5.43	5.95	5.35
R3: Risk of service failure due to other physical hazards	6.49	6.31	6.96	6.31	6.42	7.12	6.73	7.39	8.38	6.90
R4: Availability of additional headroom	6.45	6.69	6.89	6.49	6.71	6.92	7.09	7.38	7.62	6.92
R5: Catchment/raw water quality risks (incl. climate change)	3.87	3.58	3.98	3.54	3.61	4.03	3.94	4.27	4.91	3.97
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.91	4.67	5.16	4.81	4.71	5.20	5.00	5.36	6.09	5.10
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

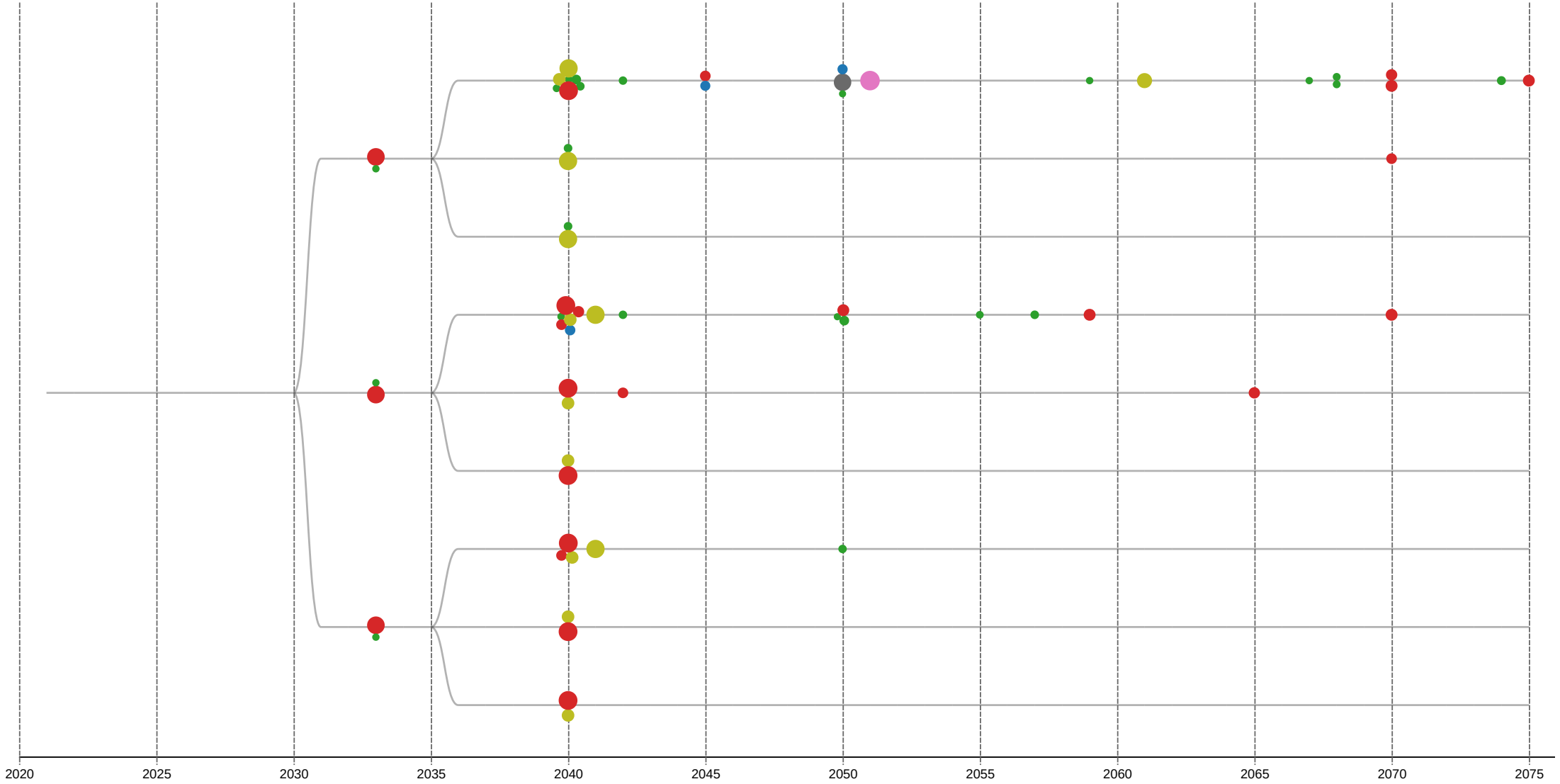
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.12	14.20	15.76	13.27	14.45	15.87	14.68	16.58	18.79	15.19
A3: Operational complexity and flexibility	5.92	5.98	6.63	5.83	6.06	6.75	6.23	6.99	7.99	6.49
A4: WRZ connectivity	7.18	8.19	9.10	7.42	8.36	9.09	8.41	9.55	10.77	8.67
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.64	19.45	21.46	19.37	20.04	22.10	20.89	23.21	26.19	21.37
E1: Scaleability and modularity of proposed changes	8.88	9.27	10.28	8.82	9.36	10.39	9.67	10.88	12.34	9.99
E2: Intervention lead times	4.37	3.84	4.16	4.23	4.18	4.52	4.47	4.85	5.36	4.44
E3: Reliance on external bodies to deliver changes	6.39	6.34	7.01	6.32	6.49	7.19	6.75	7.48	8.49	6.94
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

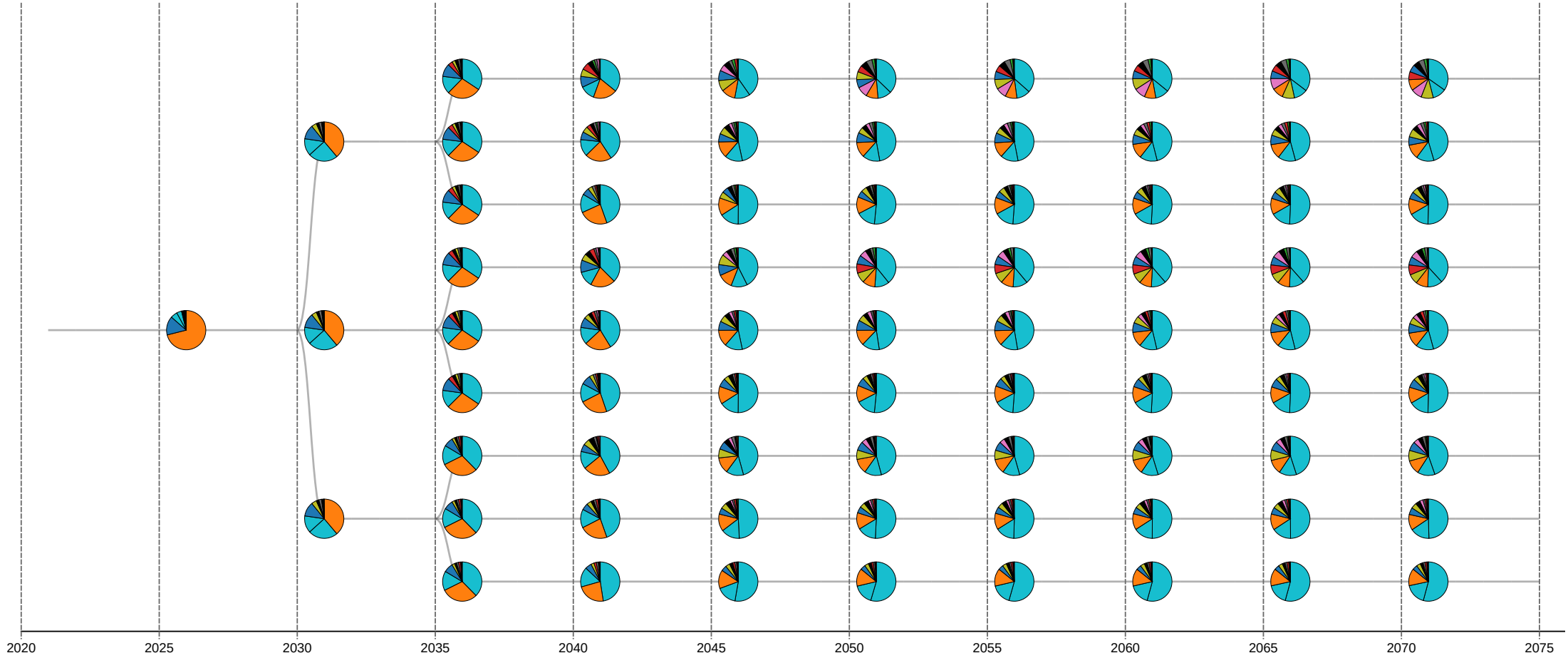
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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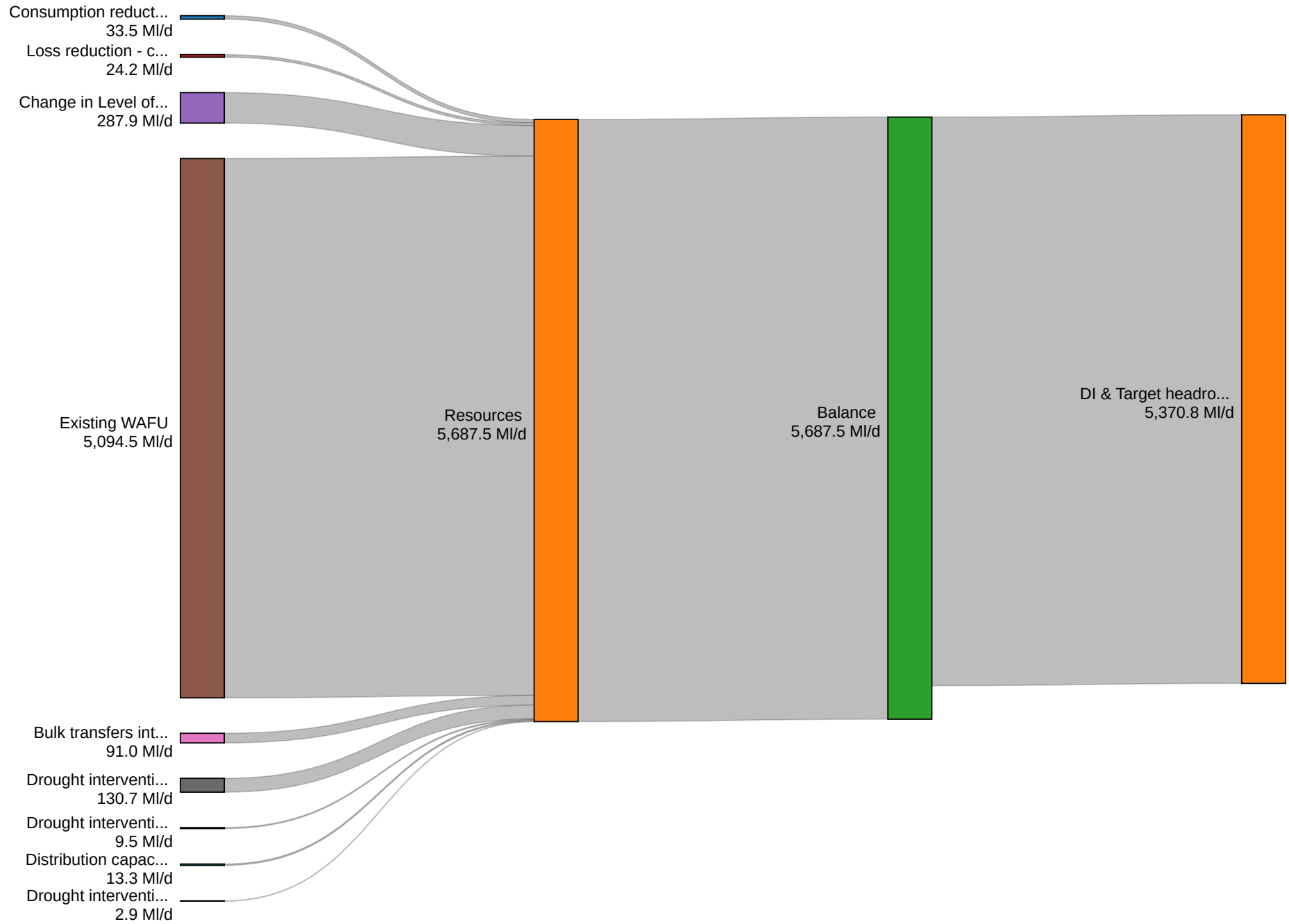
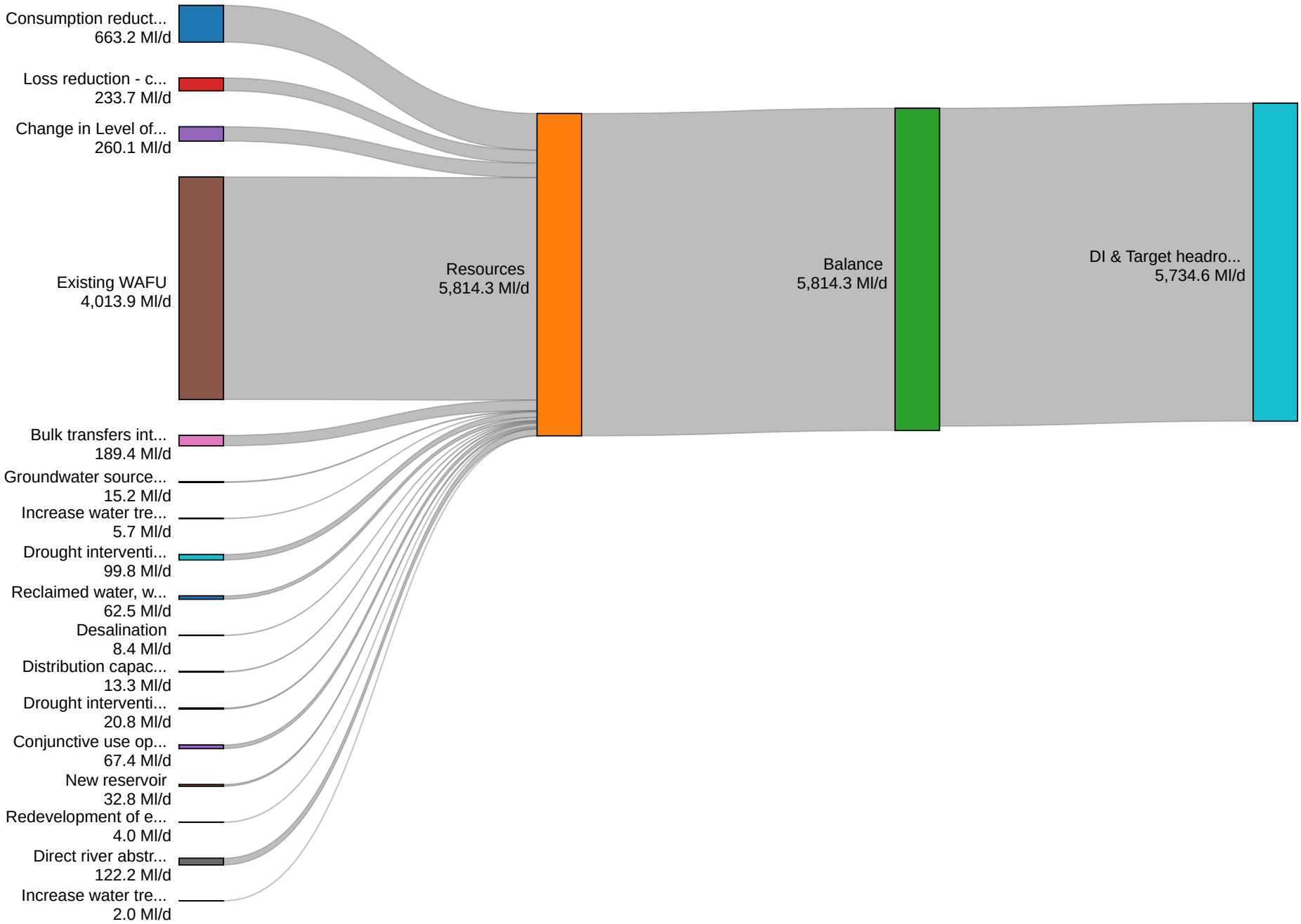
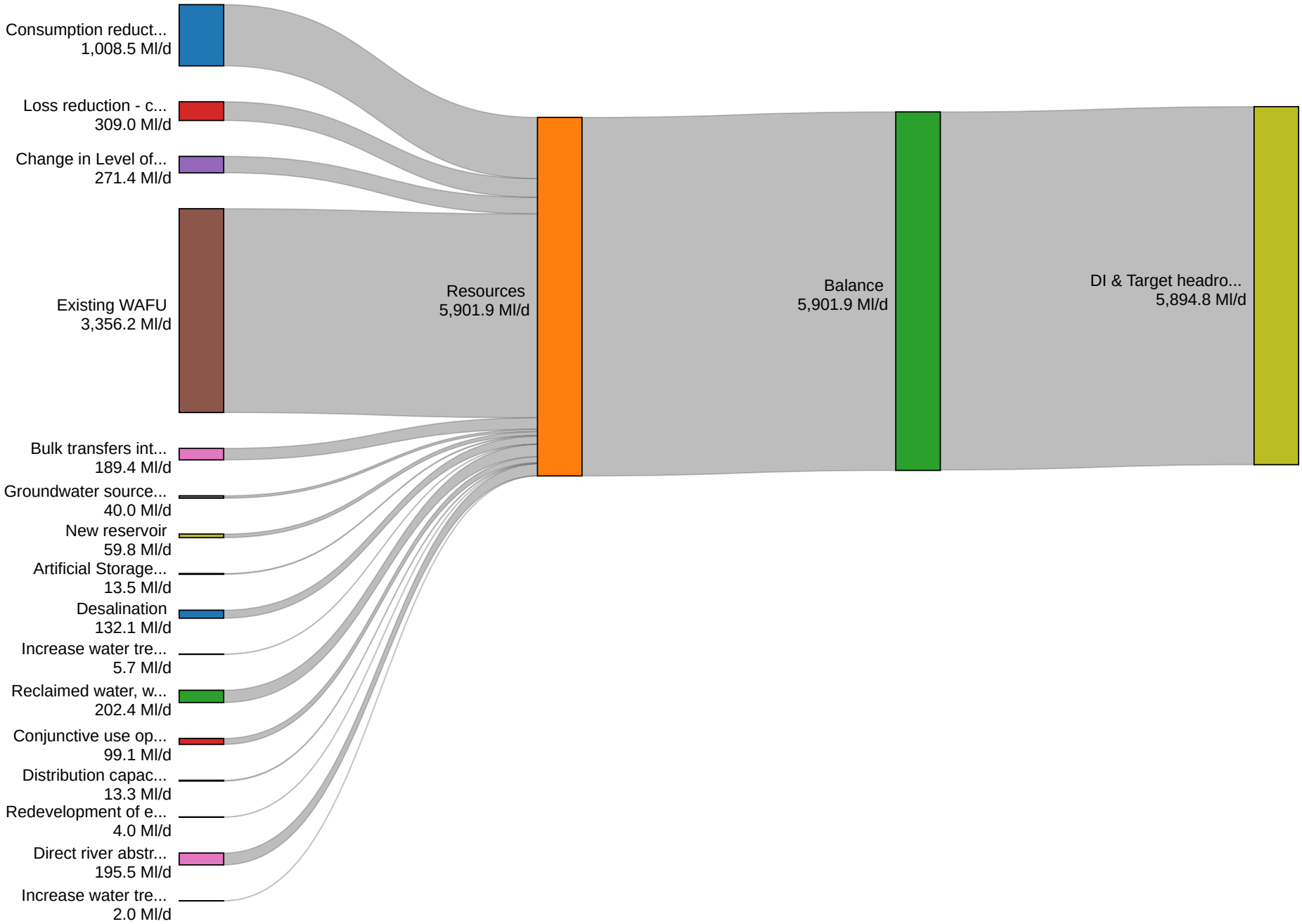
Situation 4 - 2026 (Thames Water)



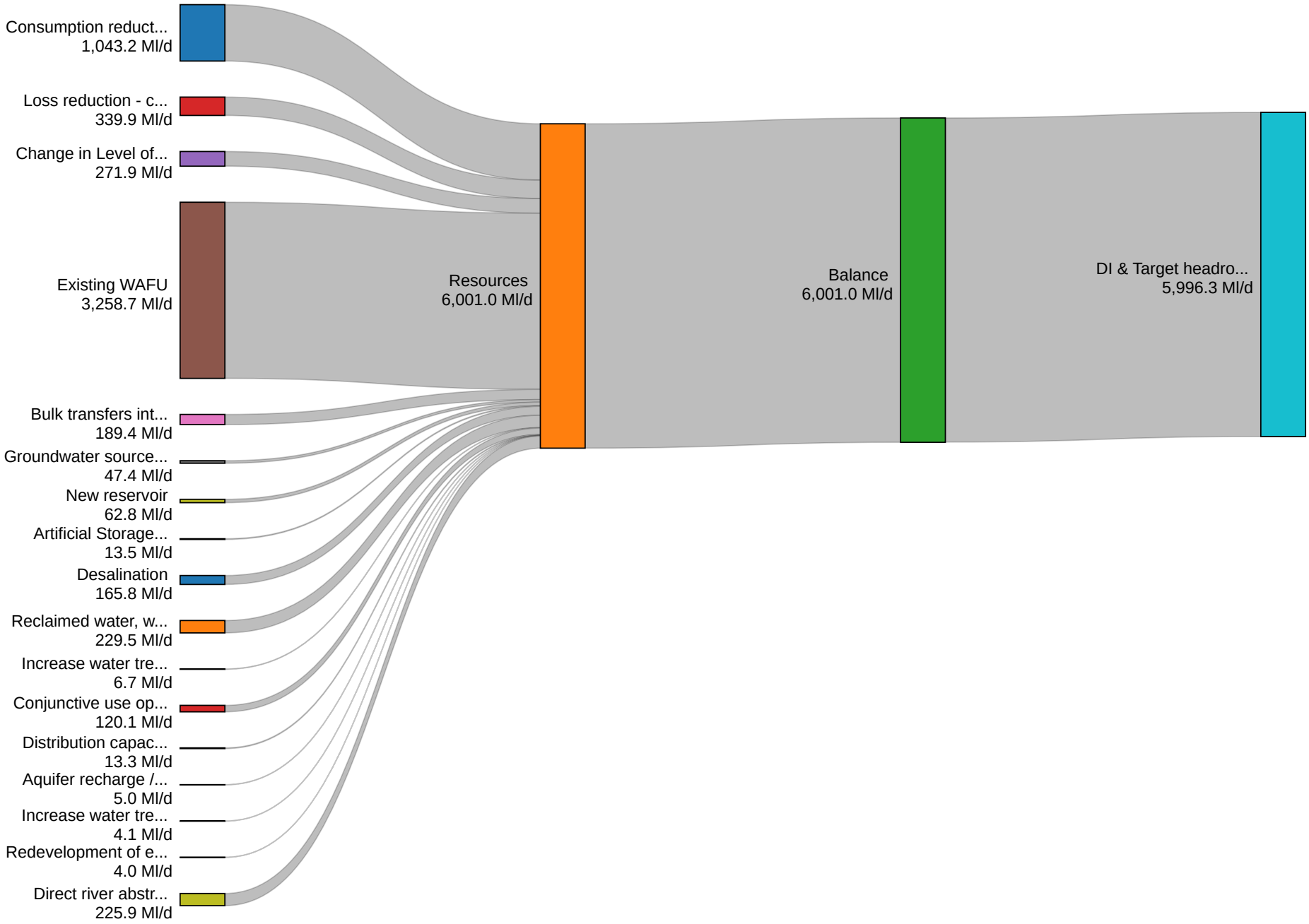
Situation 4 - 2040 (Thames Water)



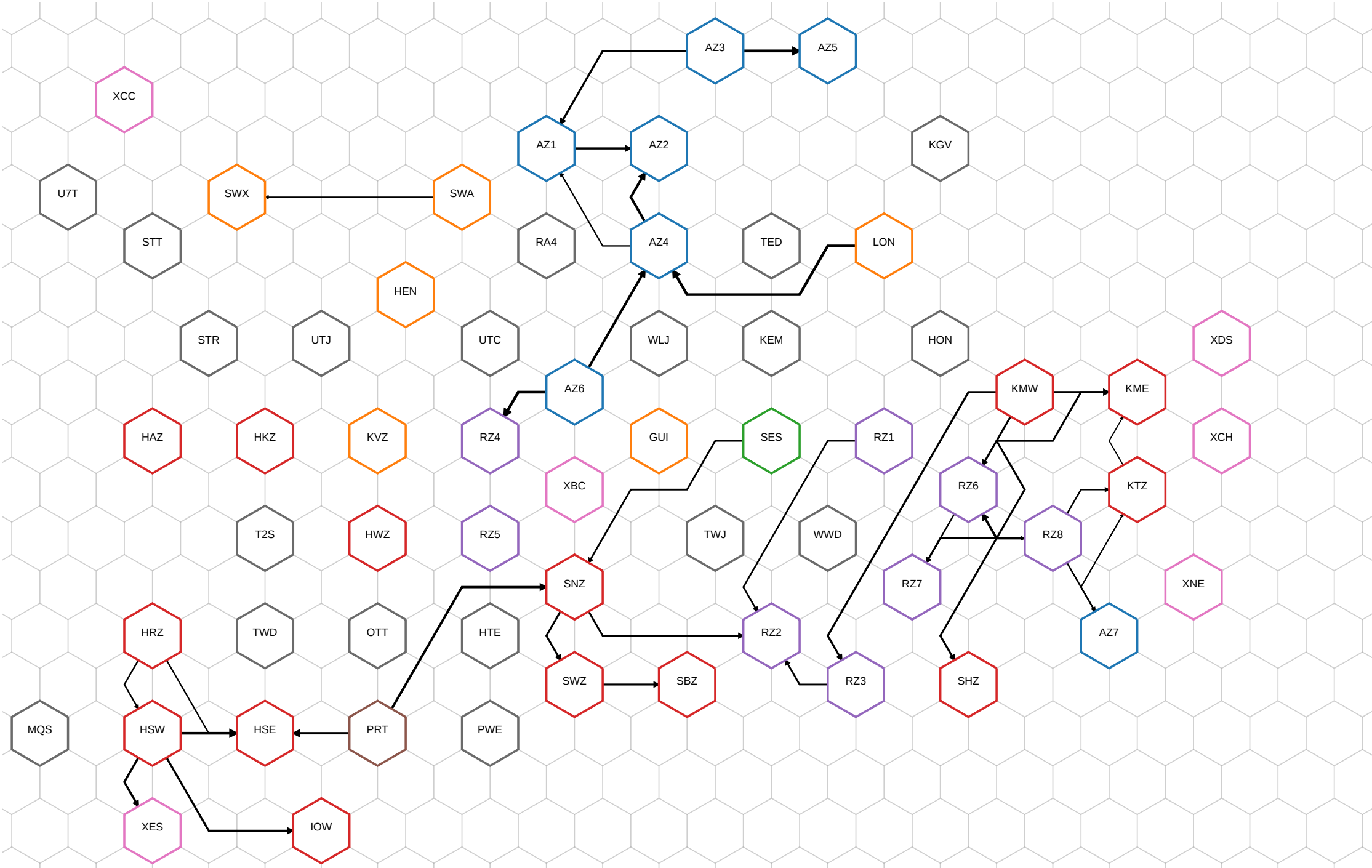
Situation 4 - 2050 (Thames Water)



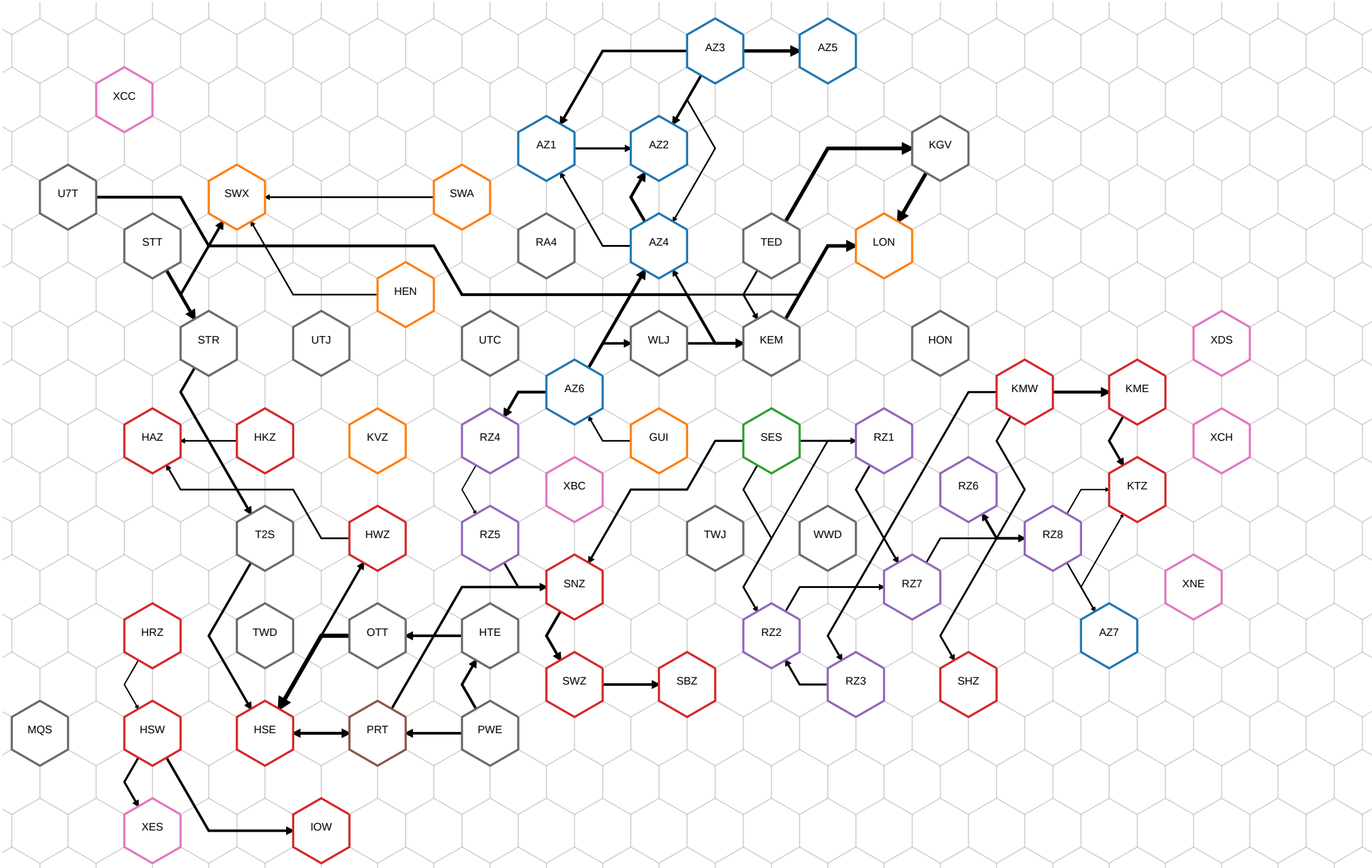
Situation 4 - 2075 (Thames Water)



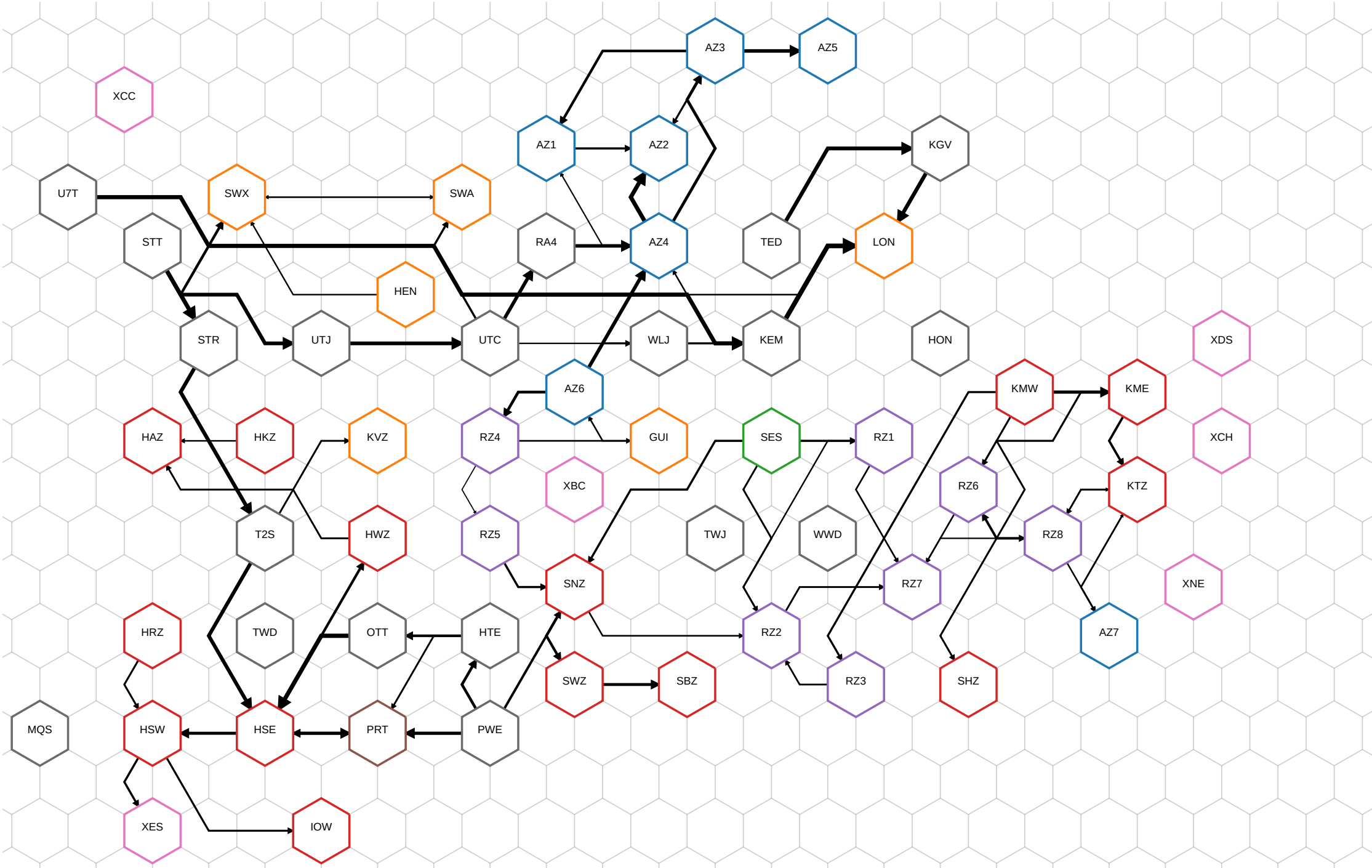
Situation 4 - 2026



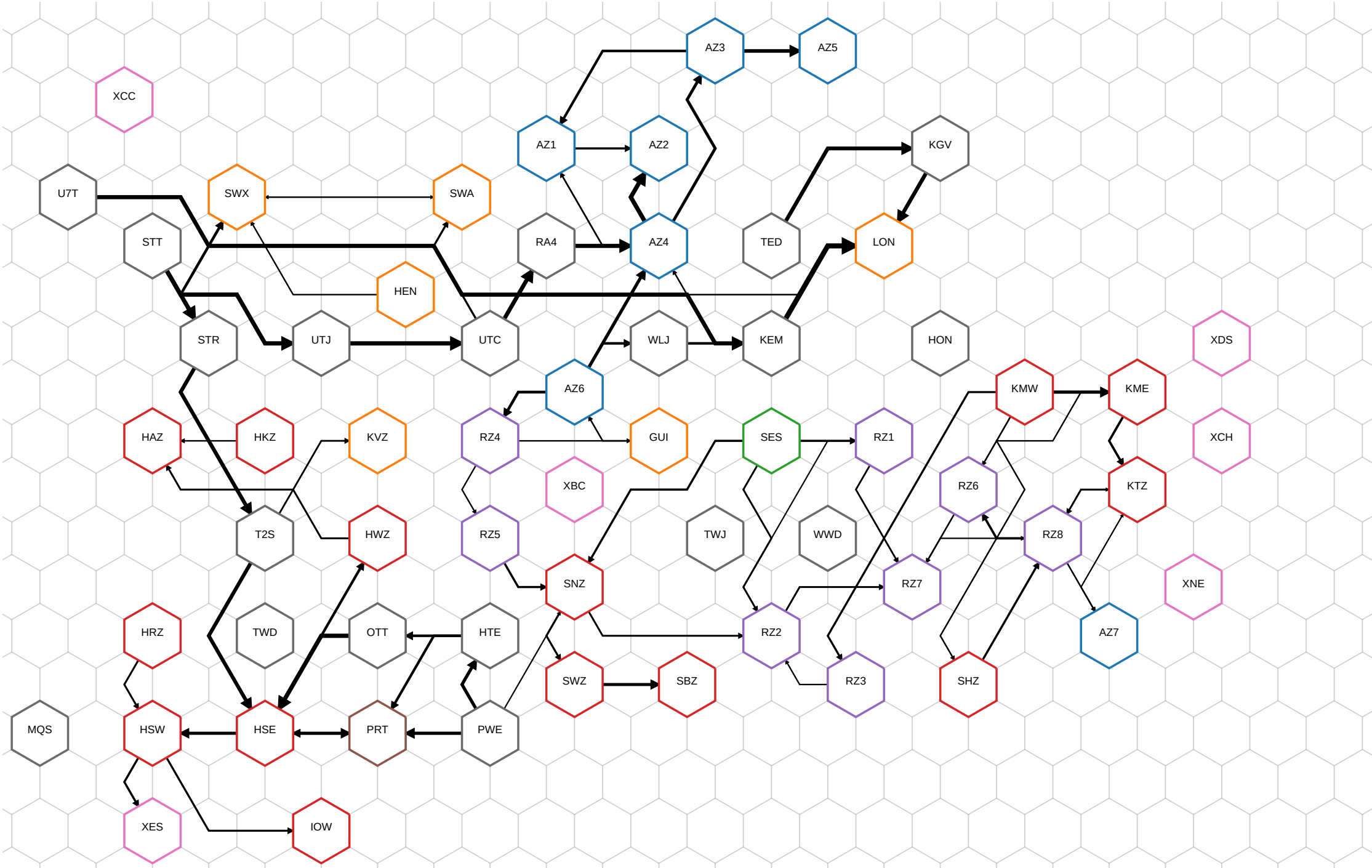
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

NO SESRO NO STT

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-sesro-excl-stt-2075
Description	Least cost run with hybrid-c+2 government interventions excluding SESRO and STT.
Created at	22/08/2023, 12:07:07
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-excl-sesro-excl-stt
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants. Exclude all STT components.
Optimised discount rate	STPR

Metrics

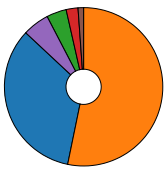
Net present value (Cost)

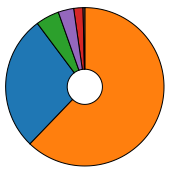
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,613	18,137	17,394	20,002	18,021	17,169	18,007	16,812	16,078	18,137	(£m)
Cost w/o deficit (STPR)	21,613	18,137	17,394	20,002	18,021	17,169	18,007	16,812	16,078	18,137	(£m)
Cost w/ deficit (IGEQ)	33,304	26,671	25,327	30,199	26,488	24,960	26,678	24,459	23,132	26,802	(£m)
Cost w/o deficit (IGEQ)	33,304	26,671	25,327	30,199	26,488	24,960	26,678	24,459	23,132	26,802	(£m)
Cost w/ deficit (LTDR)	23,868	19,817	18,962	21,987	19,688	18,710	19,707	18,323	17,479	19,838	(£m)
Cost w/o deficit (LTDR)	23,868	19,817	18,962	21,987	19,688	18,710	19,707	18,323	17,479	19,838	(£m)

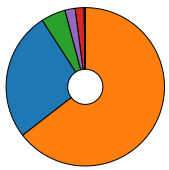
Cost breakdown (STPR)

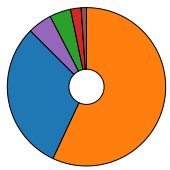
Select Company: Total

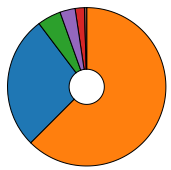
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,290	5,006	4,584	6,108	4,907	4,408	4,676	4,033	3,581	4,955	(£m)
Fixed opex	11,505	11,276	11,221	11,390	11,260	11,200	11,264	11,191	11,128	11,271	(£m)
Fixed operational carbon	883	870	870	873	869	870	870	868	866	871	(£m)
Embedded carbon	522	345	317	430	343	310	336	285	257	349	(£m)
Variable opex	1,170	574	359	985	559	331	692	395	230	588	(£m)
Variable carbon opex	244	65	42	216	83	50	168	42	17	103	(£m)

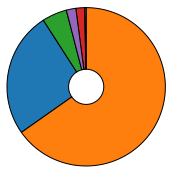
situation1 

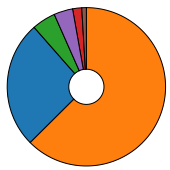
situation2 

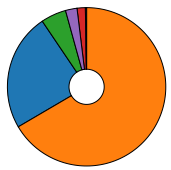
situation3 

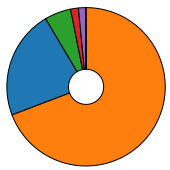
situation4 

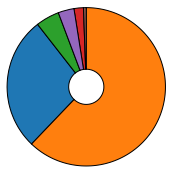
situation5 

situation6 

situation7 

situation8 

situation9 

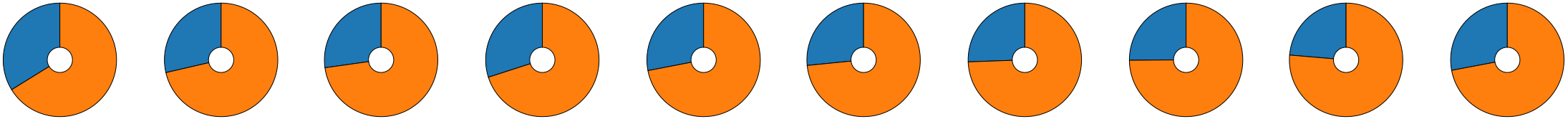
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,391,532	2,118,417	1,928,145	2,719,989	2,103,608	1,885,192	2,078,283	1,726,098	1,540,404	2,165,741	(tonnes)
Operational emissions	6,637,311	5,286,097	5,154,437	6,360,031	5,397,920	5,208,477	6,049,645	5,145,708	4,974,002	5,579,292	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

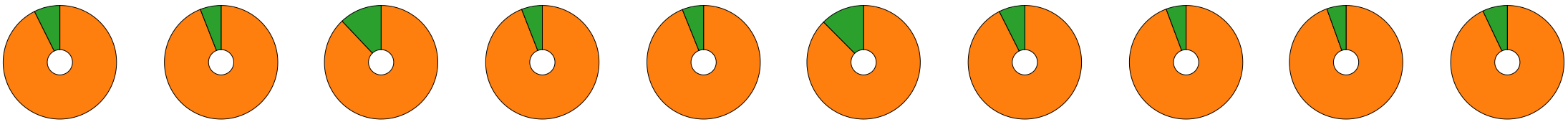


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	0	0	0	0	0	0	0	0	0	0	(GWh)
Grid	24,234	11,857	4,767	19,770	11,362	4,194	14,220	7,894	2,837	11,237	(GWh)
Renewable	1,931	753	655	1,250	738	598	1,142	479	165	857	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	67,703	62,127	61,332	65,499	61,972	60,582	61,904	59,941	58,852	62,212
SEA environmental disbenefit	112,534	76,347	69,864	99,052	75,328	69,258	79,920	66,246	56,923	78,386
Natural capital	6,414,204	5,469,155	8,199,491	3,595,856	5,371,525	8,187,505	5,976,817	6,648,519	9,550,354	6,601,492
Bio-diversity net gain	−122,180	−62,597	−38,806	−117,433	−67,077	−39,535	−178,529	−137,776	−108,215	−96,905

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,094	31,730	31,331	33,183	31,645	31,241	31,771	30,786	30,261	31,782

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.94	27.52	29.99	26.78	27.60	30.00	27.08	29.68	32.83	28.82
R1: Uncertainty of option supply/demand benefit	5.86	5.14	5.55	5.31	5.14	5.51	5.00	5.35	5.85	5.41
R3: Risk of service failure due to other physical hazards	6.64	6.79	7.57	6.43	6.83	7.58	6.58	7.42	8.43	7.14
R4: Availability of additional headroom	6.49	6.80	7.01	6.56	6.82	7.02	7.05	7.38	7.62	6.97
R5: Catchment/raw water quality risks (incl. climate change)	4.12	3.89	4.39	3.83	3.90	4.41	3.75	4.24	4.90	4.16
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.82	4.90	5.46	4.64	4.91	5.48	4.70	5.29	6.03	5.14
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

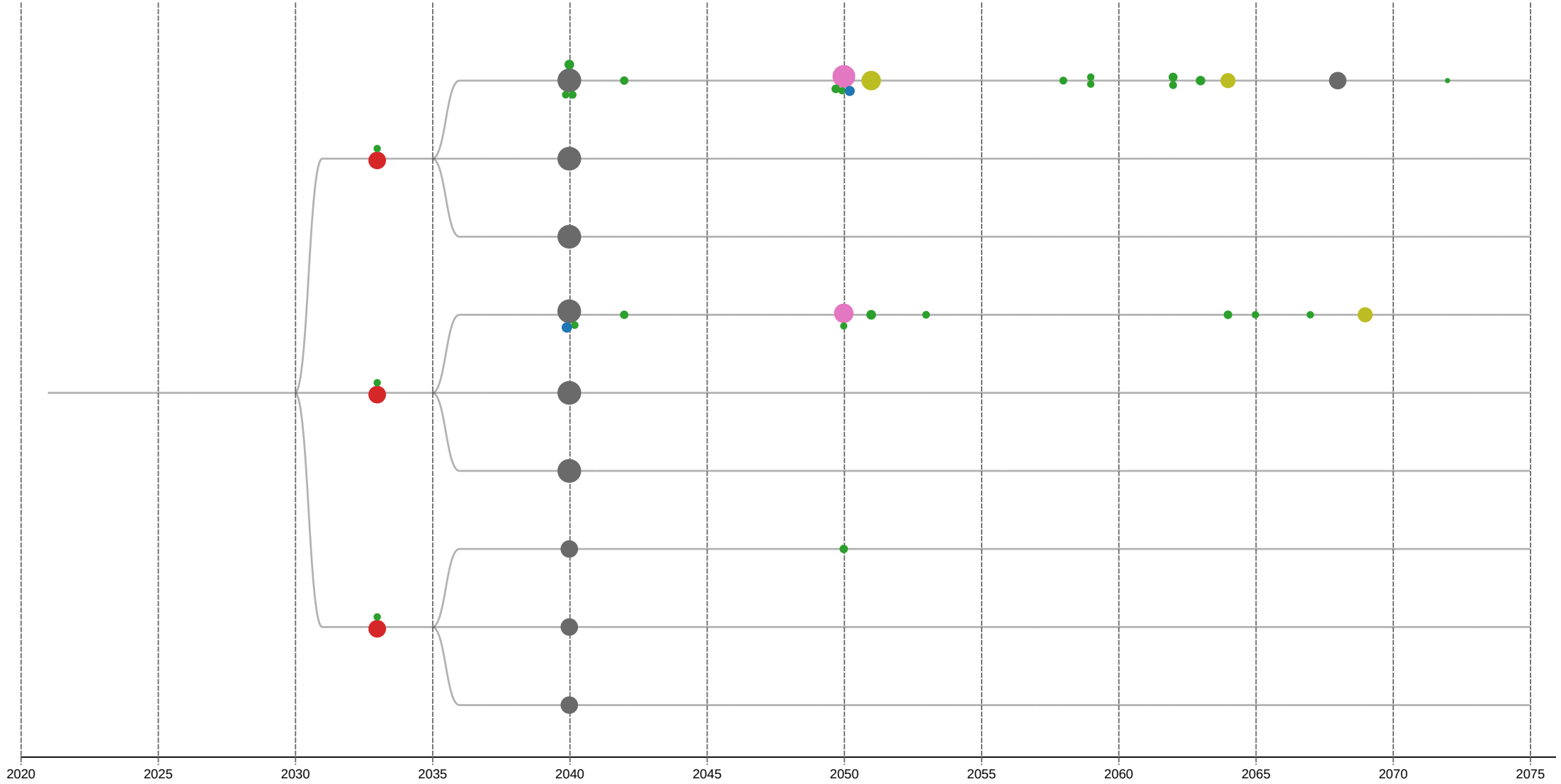
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.67	15.07	16.81	14.22	14.96	16.48	14.76	16.74	19.01	15.75
A3: Operational complexity and flexibility	6.14	6.49	7.28	6.03	6.54	7.33	6.25	7.13	8.17	6.82
A4: WRZ connectivity	7.50	8.54	9.50	8.16	8.39	9.12	8.48	9.58	10.80	8.90
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.61	20.01	22.03	18.85	20.01	22.04	19.95	22.56	25.50	21.17
E1: Scaleability and modularity of proposed changes	8.98	9.43	10.49	8.78	9.50	10.53	9.45	10.81	12.28	10.03
E2: Intervention lead times	4.30	4.07	4.31	3.94	3.96	4.26	4.05	4.43	4.90	4.25
E3: Reliance on external bodies to deliver changes	6.33	6.51	7.23	6.13	6.54	7.25	6.45	7.32	8.32	6.90
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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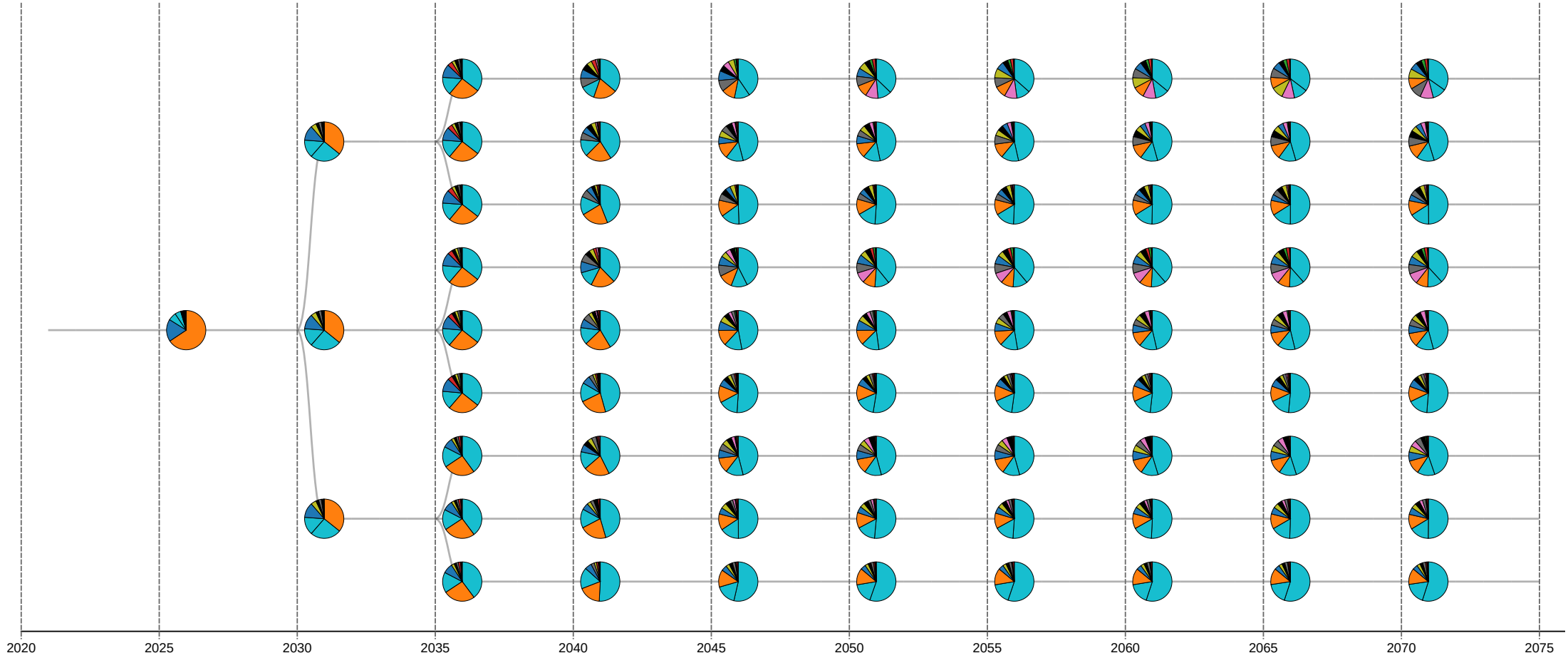
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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- Catchment management
- Desalination
- Reservoir
- Reuse
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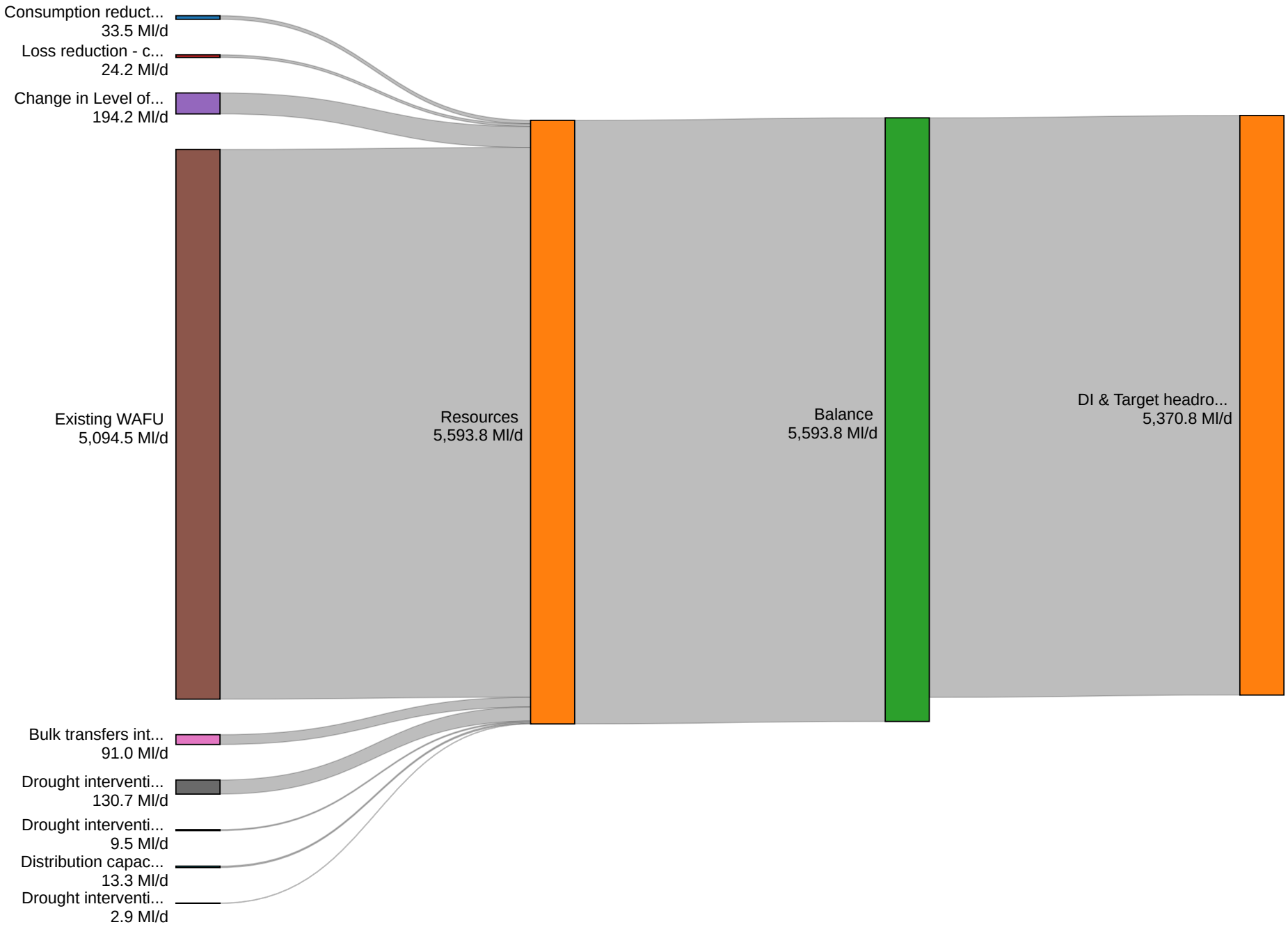
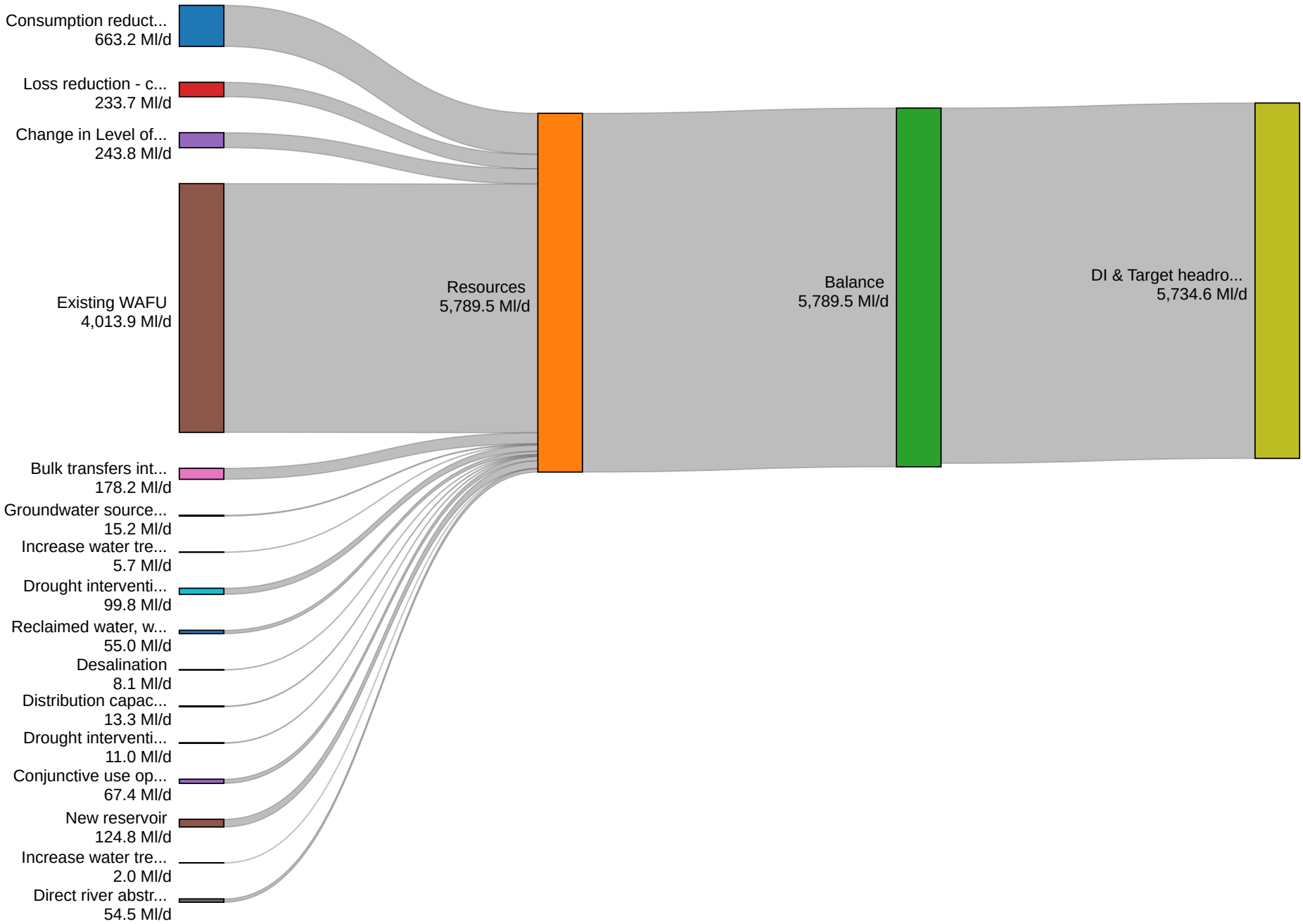
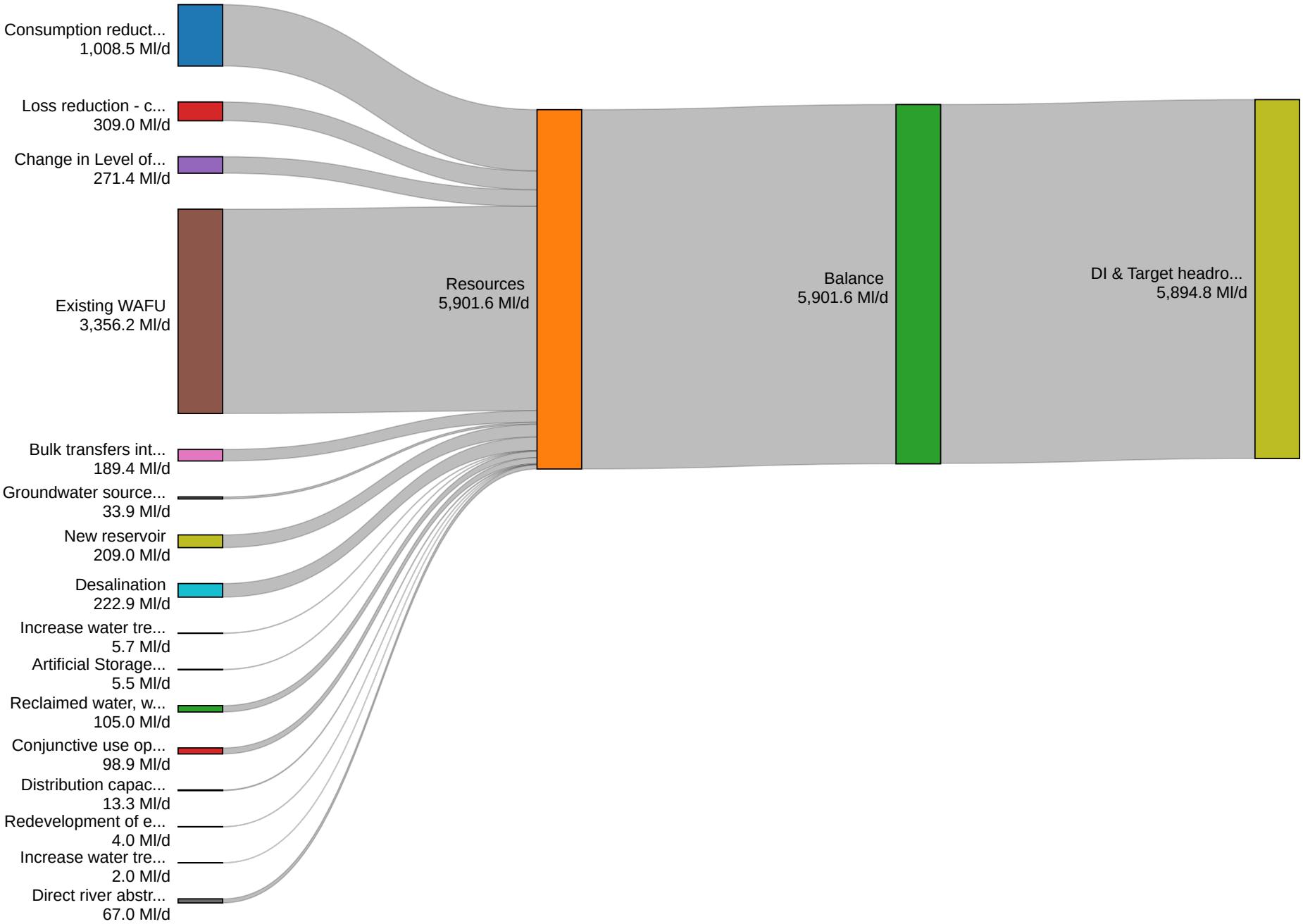
Situation 4 - 2026 (Thames Water)



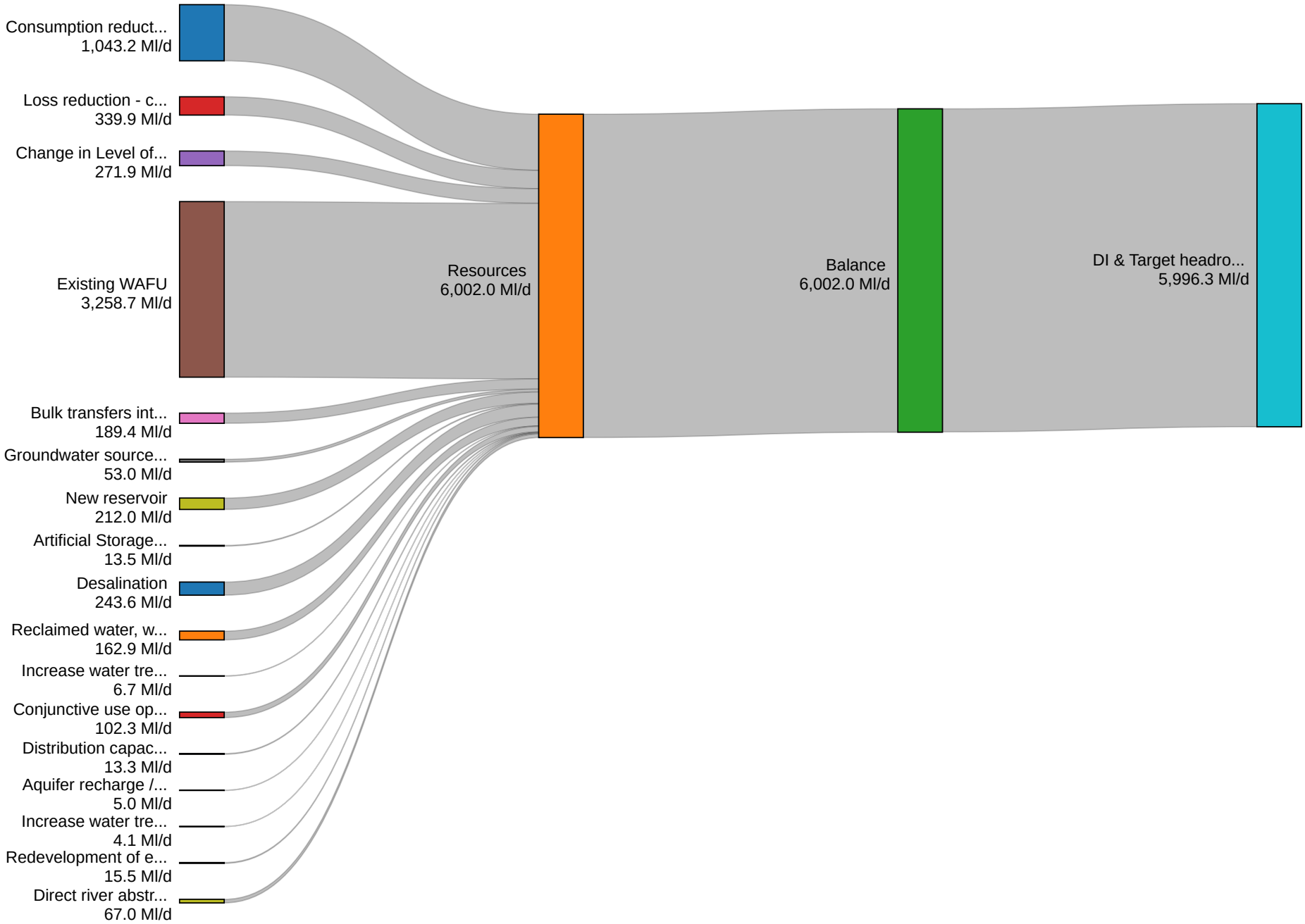
Situation 4 - 2040 (Thames Water)



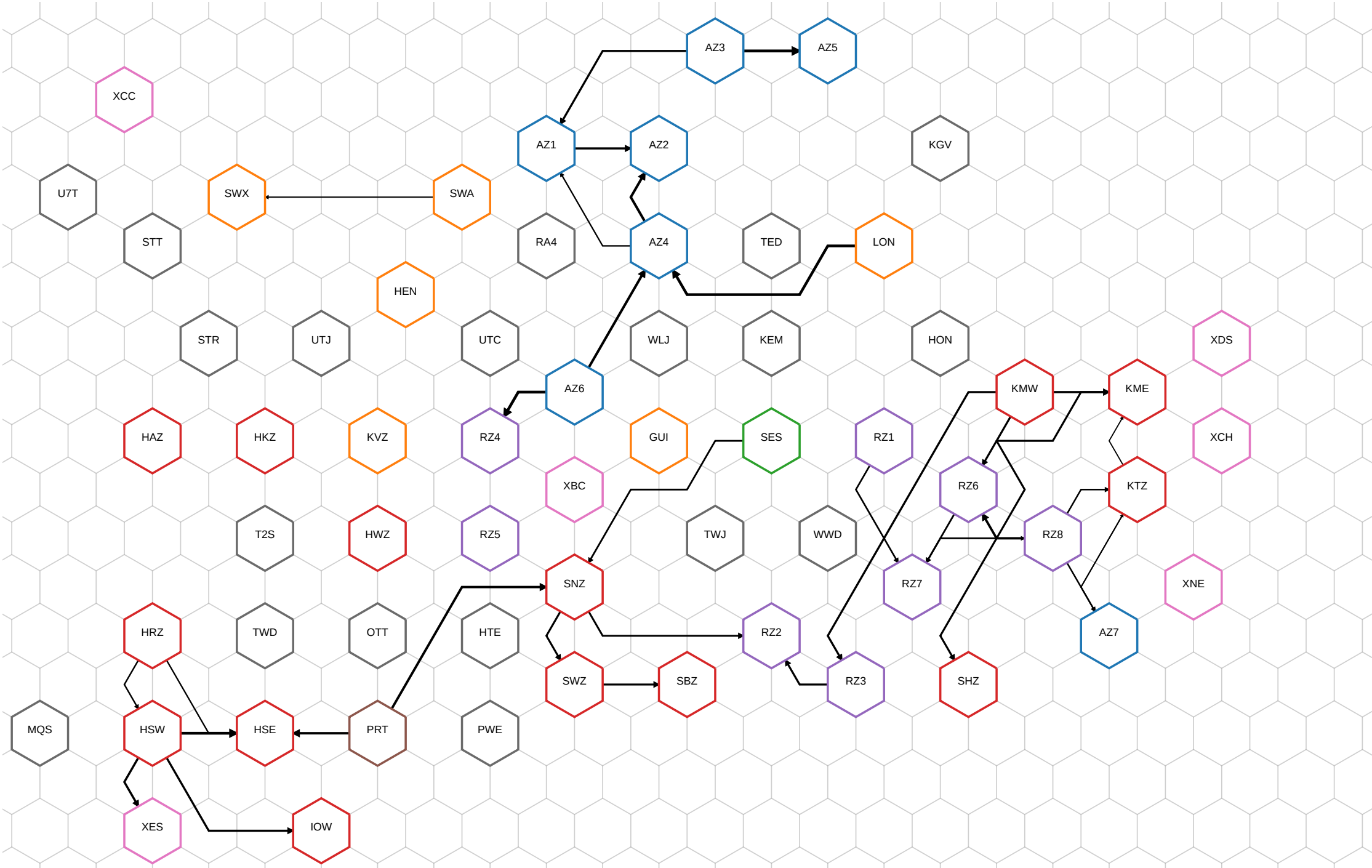
Situation 4 - 2050 (Thames Water)



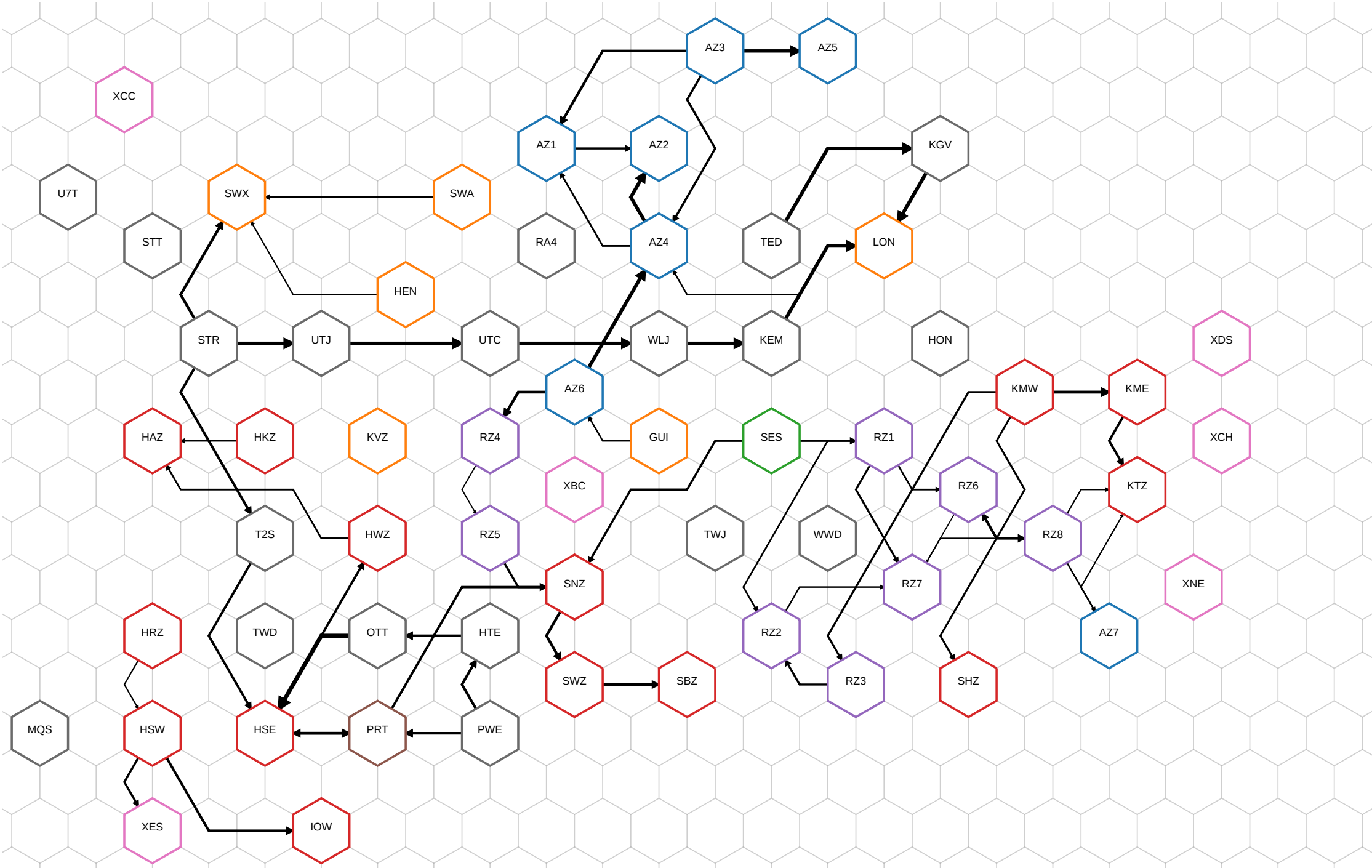
Situation 4 - 2075 (Thames Water)



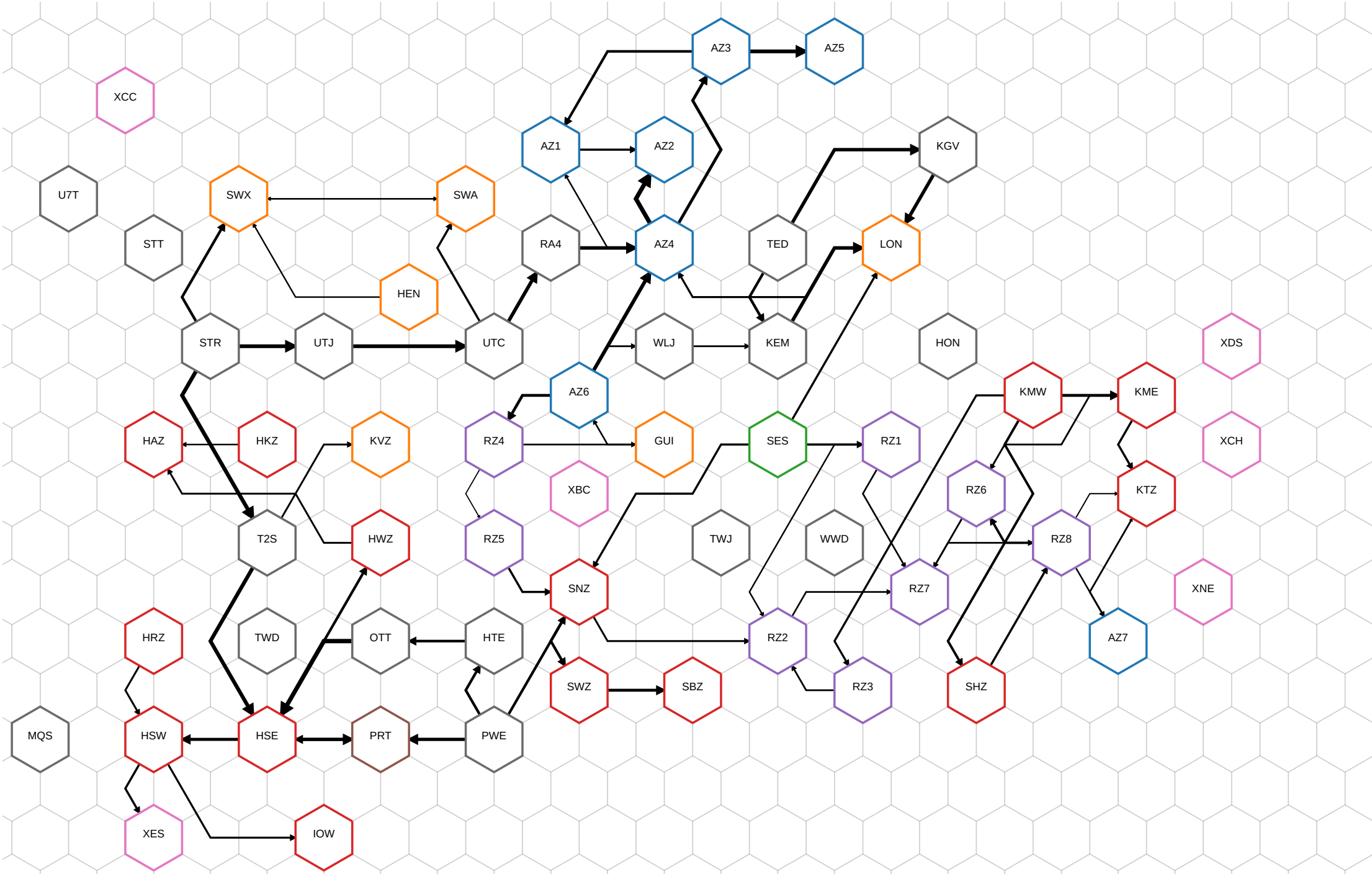
Situation 4 - 2026



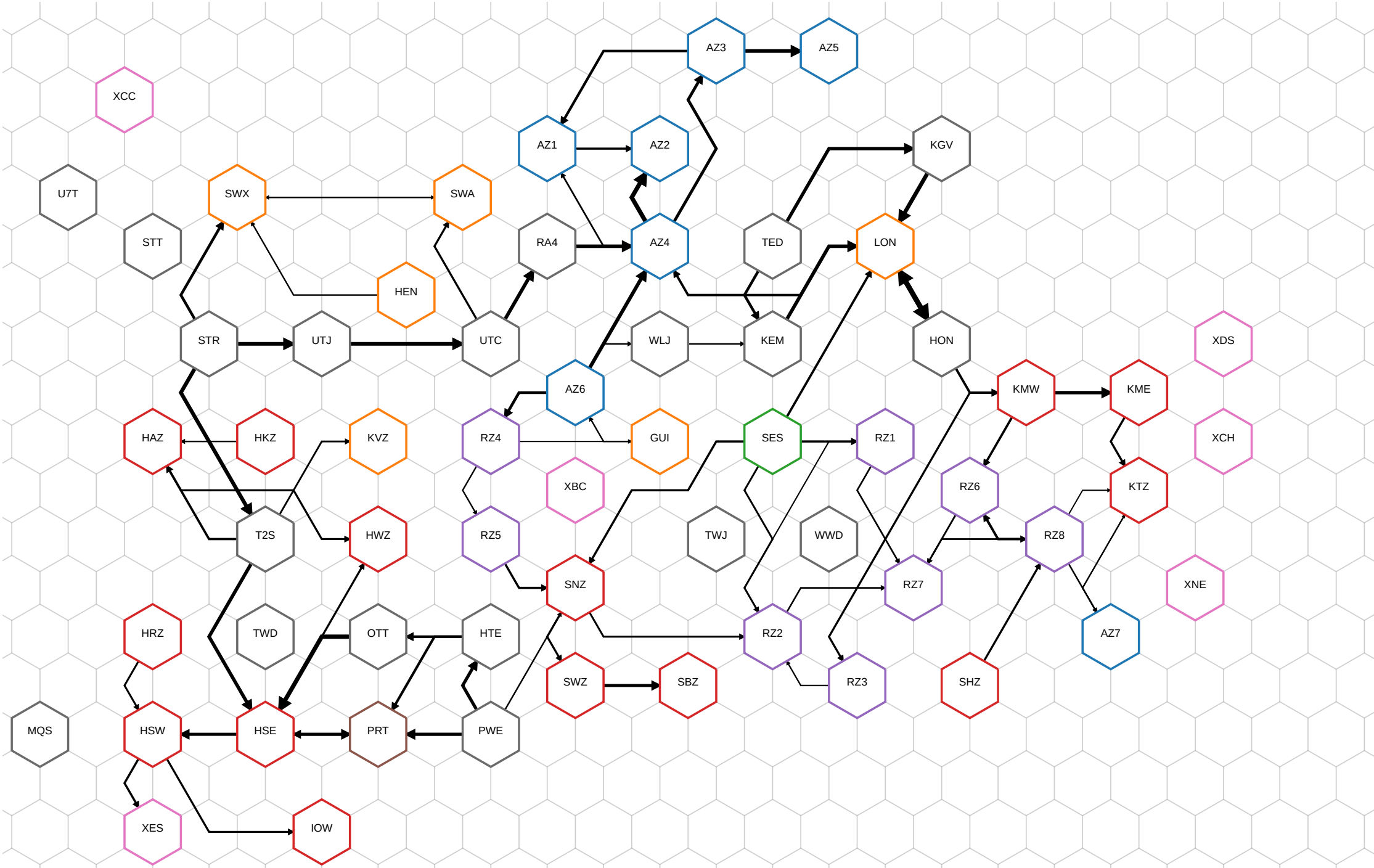
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ONLY SESRO 150Mm^3 AVAILABLE

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075
Description	Least cost run with hybrid-c+2 government interventions including only SESRO 150 Mm3.
Created at	09/07/2023, 19:49:22
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-sesro150
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 150.
Optimised discount rate	STPR

Metrics

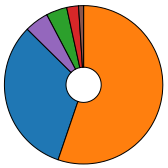
Net present value (Cost)

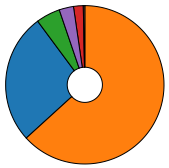
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,572	17,652	17,004	19,052	17,540	16,788	17,868	17,029	16,325	17,759	(£m)
Cost w/o deficit (STPR)	20,572	17,652	17,004	19,052	17,540	16,788	17,868	17,029	16,325	17,759	(£m)
Cost w/ deficit (IGEQ)	31,418	25,865	24,692	28,513	25,673	24,335	26,377	24,799	23,530	26,133	(£m)
Cost w/o deficit (IGEQ)	31,418	25,865	24,692	28,513	25,673	24,335	26,377	24,799	23,530	26,133	(£m)
Cost w/ deficit (LTDR)	22,671	19,271	18,526	20,900	19,143	18,282	19,539	18,564	17,755	19,406	(£m)
Cost w/o deficit (LTDR)	22,671	19,271	18,526	20,900	19,143	18,282	19,539	18,564	17,755	19,406	(£m)

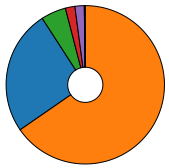
Cost breakdown (STPR)

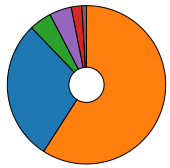
Select Company: Total

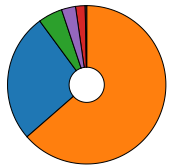
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,619	4,697	4,334	5,475	4,616	4,173	4,743	4,303	3,863	4,758	(£m)
Fixed opex	11,359	11,164	11,115	11,253	11,153	11,097	11,161	11,110	11,049	11,163	(£m)
Fixed operational carbon	880	869	868	877	870	869	872	868	866	871	(£m)
Embedded carbon	495	351	330	414	345	316	363	326	301	360	(£m)
Variable opex	1,007	517	323	852	502	300	637	384	230	528	(£m)
Variable carbon opex	211	55	34	181	54	31	93	37	17	79	(£m)

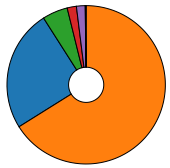
situation1 

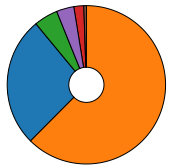
situation2 

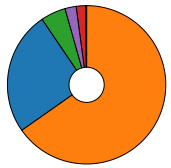
situation3 

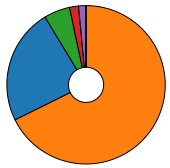
situation4 

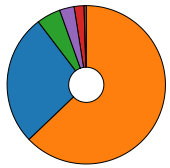
situation5 

situation6 

situation7 

situation8 

situation9 

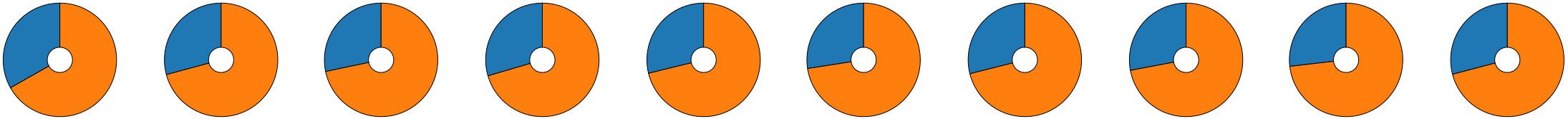
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,187,911	2,150,978	2,008,340	2,589,400	2,113,452	1,923,654	2,248,170	1,987,884	1,823,379	2,225,907	(tonnes)
Operational emissions	6,416,906	5,216,603	5,089,961	6,172,653	5,225,643	5,086,117	5,522,031	5,121,260	4,973,821	5,425,000	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

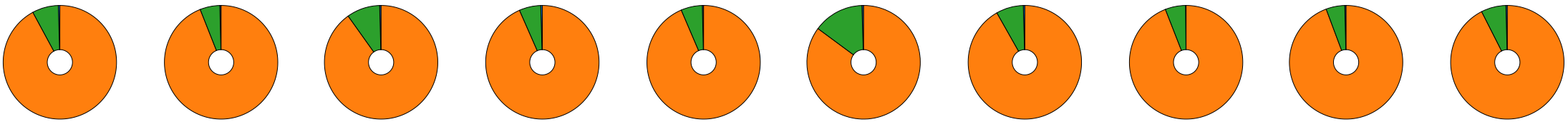


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	44	22	63	13	12	46	(GWh)
Grid	22,143	11,340	4,613	19,157	10,975	3,861	13,171	7,777	2,917	10,662	(GWh)
Renewable	1,795	681	484	1,260	713	654	1,115	479	165	816	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,638	63,945	63,059	67,206	63,620	62,711	64,084	61,837	60,779	64,098
SEA environmental disbenefit	113,516	81,897	74,590	99,970	79,528	73,423	83,452	70,545	61,656	82,064
Natural capital	81,687,050	77,190,026	79,998,023	75,268,234	77,131,522	79,780,701	76,860,677	77,623,381	80,495,322	78,448,326
Bio-diversity net gain	−220,521	−150,043	−121,966	−202,738	−149,655	−124,012	−152,370	−124,859	−95,794	−149,106

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,991	31,817	31,470	33,102	31,688	31,293	31,703	30,805	30,314	31,798

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.97	29.35	32.18	28.34	29.49	32.29	30.73	34.13	37.98	31.49
R1: Uncertainty of option supply/demand benefit	5.97	5.35	5.85	5.58	5.38	5.87	5.74	6.27	6.92	5.88
R3: Risk of service failure due to other physical hazards	6.98	7.31	8.20	6.92	7.36	8.23	7.62	8.68	9.89	7.91
R4: Availability of additional headroom	6.58	6.92	7.14	6.65	6.94	7.15	7.25	7.61	7.85	7.12
R5: Catchment/raw water quality risks (incl. climate change)	4.14	4.23	4.78	3.87	4.24	4.79	4.35	5.03	5.81	4.58
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.30	5.54	6.21	5.31	5.56	6.24	5.77	6.56	7.51	6.00
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

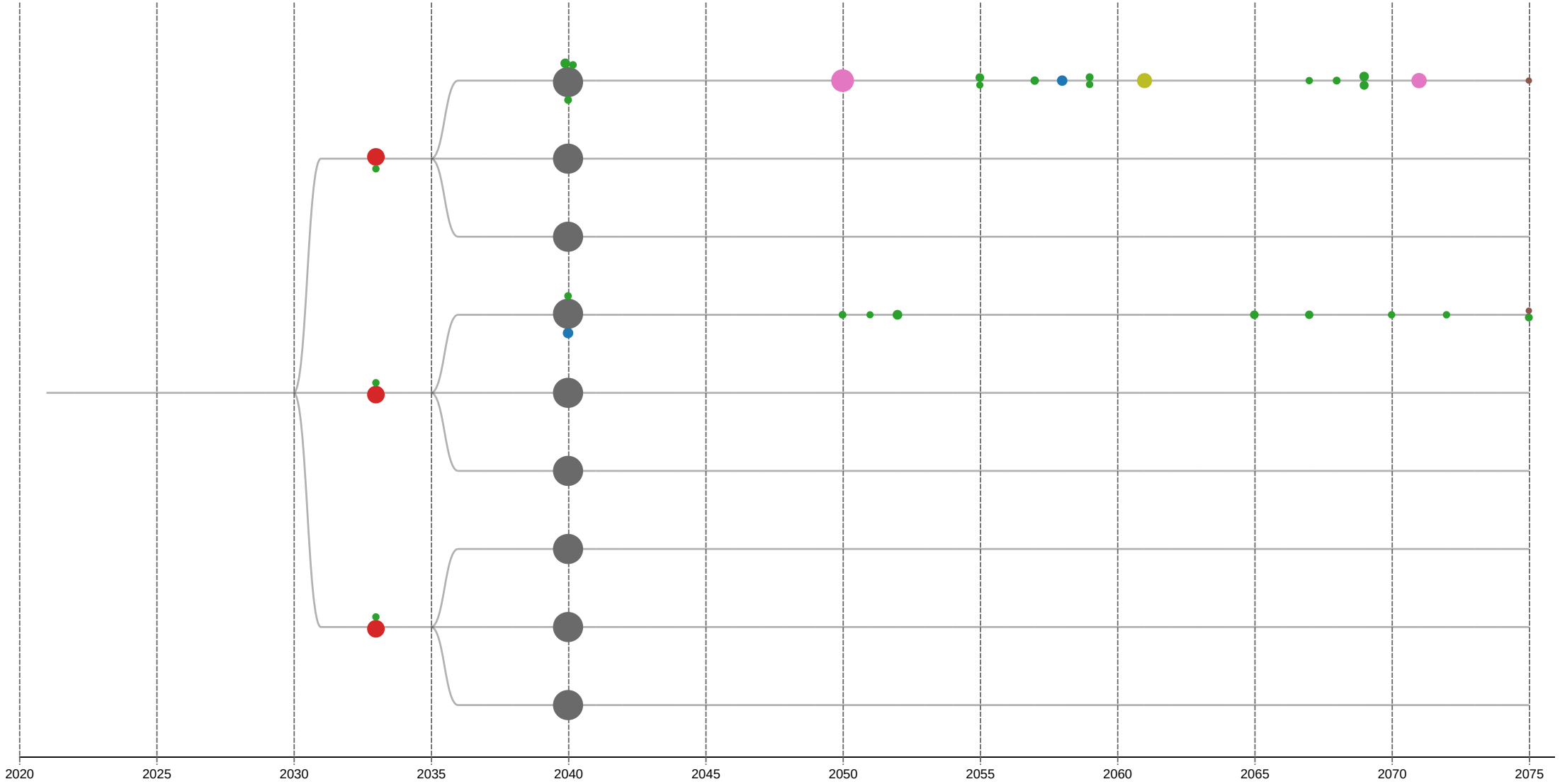
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.43	15.63	17.51	14.21	15.68	17.40	16.02	18.26	20.82	16.66
A3: Operational complexity and flexibility	6.50	7.02	7.89	6.60	7.07	7.96	7.31	8.39	9.64	7.60
A4: WRZ connectivity	7.89	8.58	9.58	7.58	8.58	9.41	8.68	9.83	11.15	9.03
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.16	19.81	22.02	18.75	19.92	21.95	20.45	23.23	26.27	21.29
E1: Scaleability and modularity of proposed changes	8.78	9.29	10.37	8.68	9.38	10.46	9.63	11.06	12.58	10.03
E2: Intervention lead times	4.19	4.13	4.54	3.97	4.11	4.33	4.17	4.59	5.09	4.35
E3: Reliance on external bodies to deliver changes	6.18	6.38	7.12	6.09	6.43	7.16	6.65	7.57	8.61	6.91
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

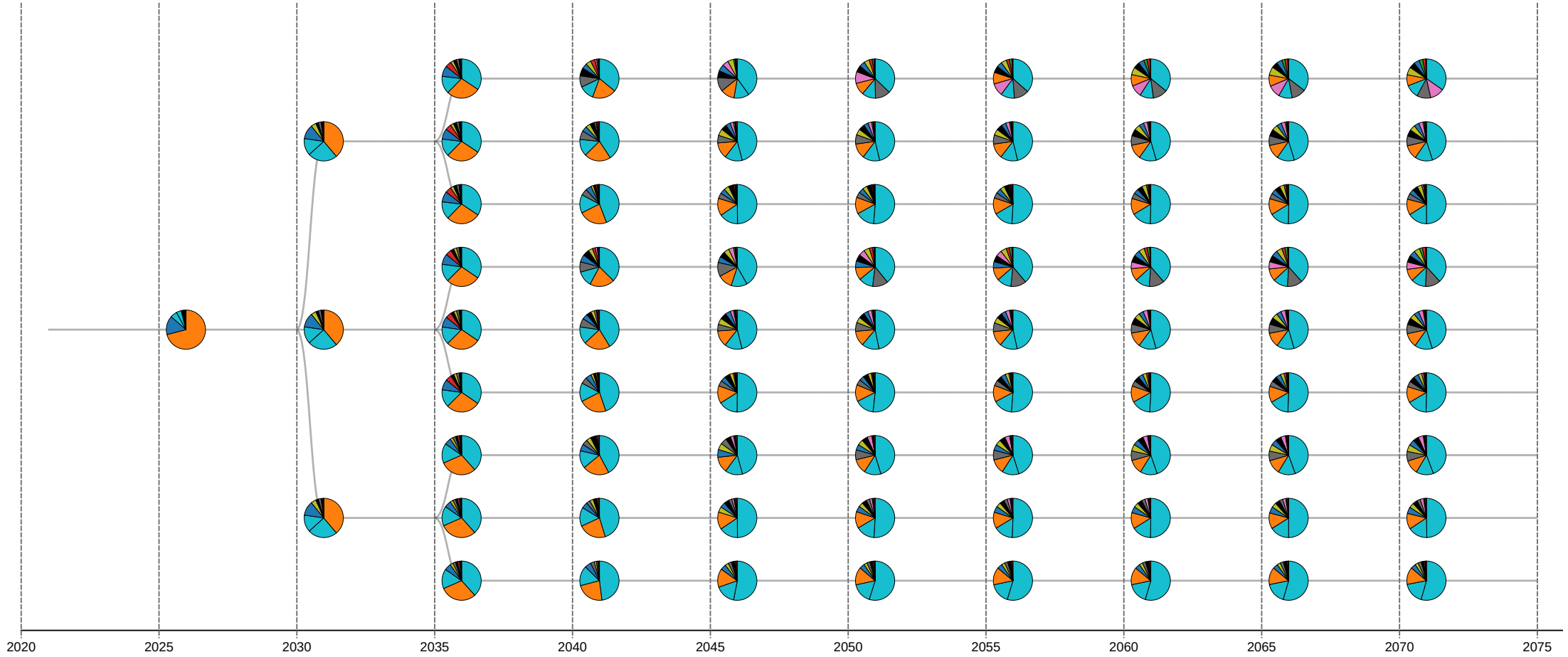
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

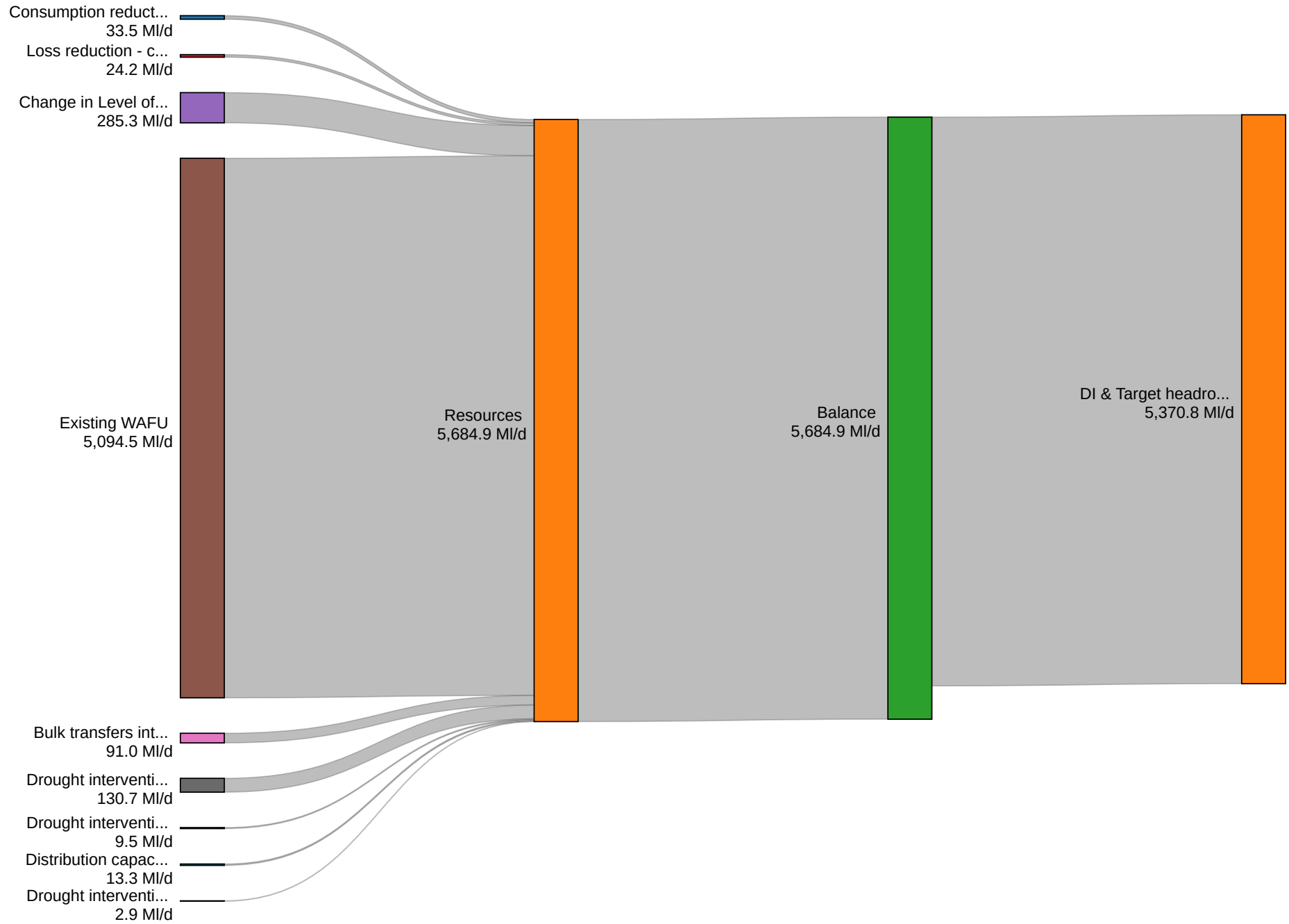
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

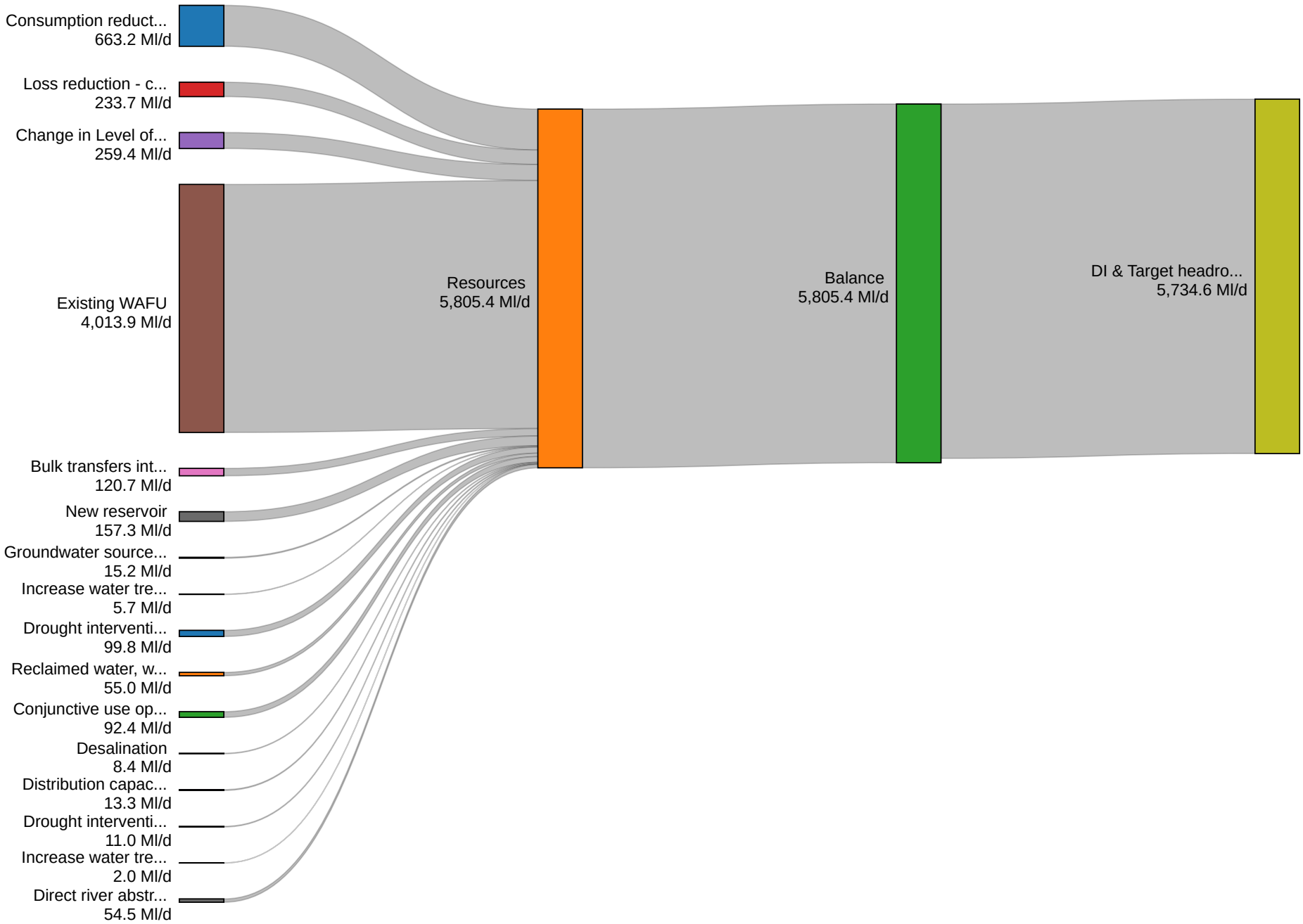


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

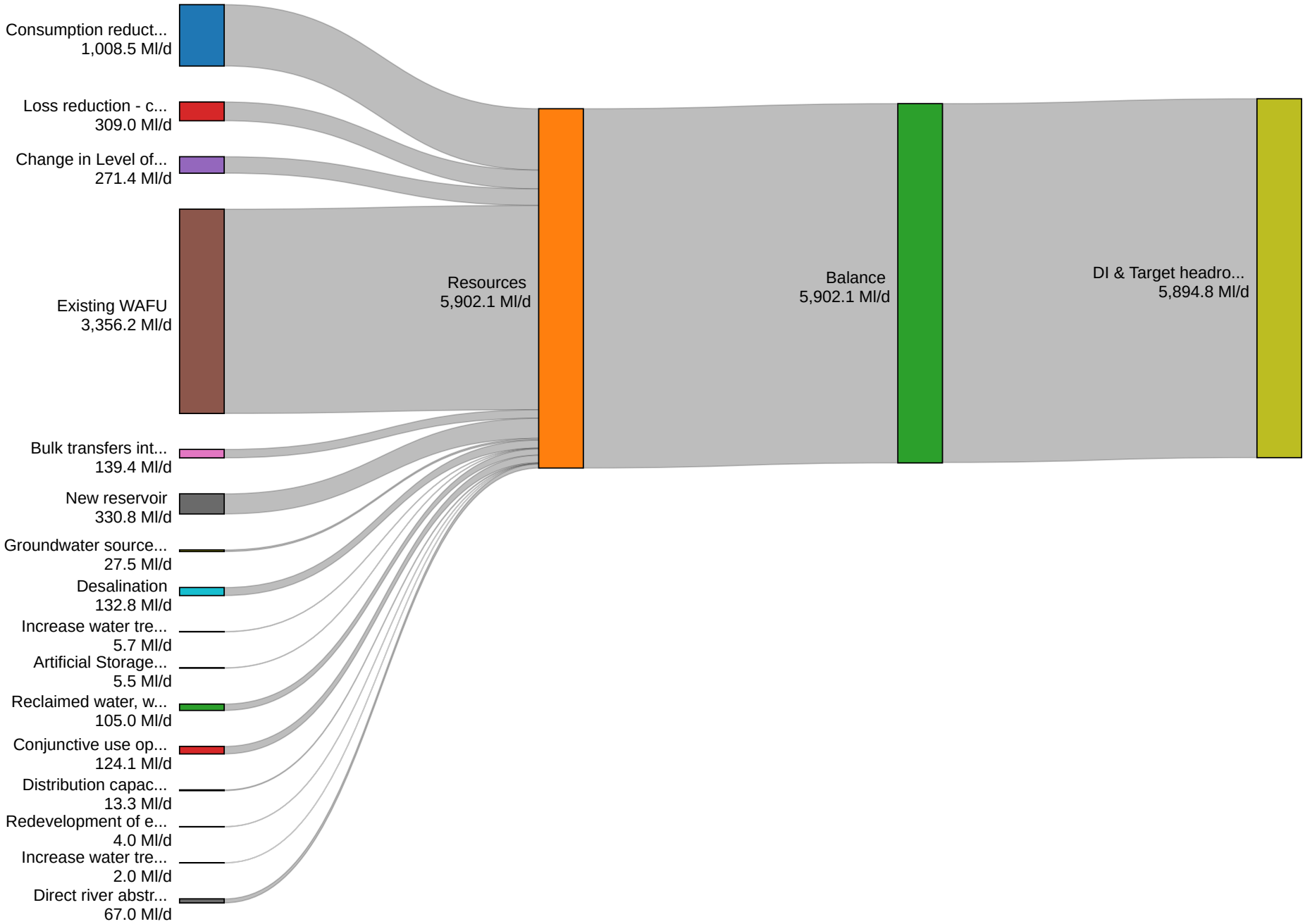
Situation 4 - 2026 (Thames Water)



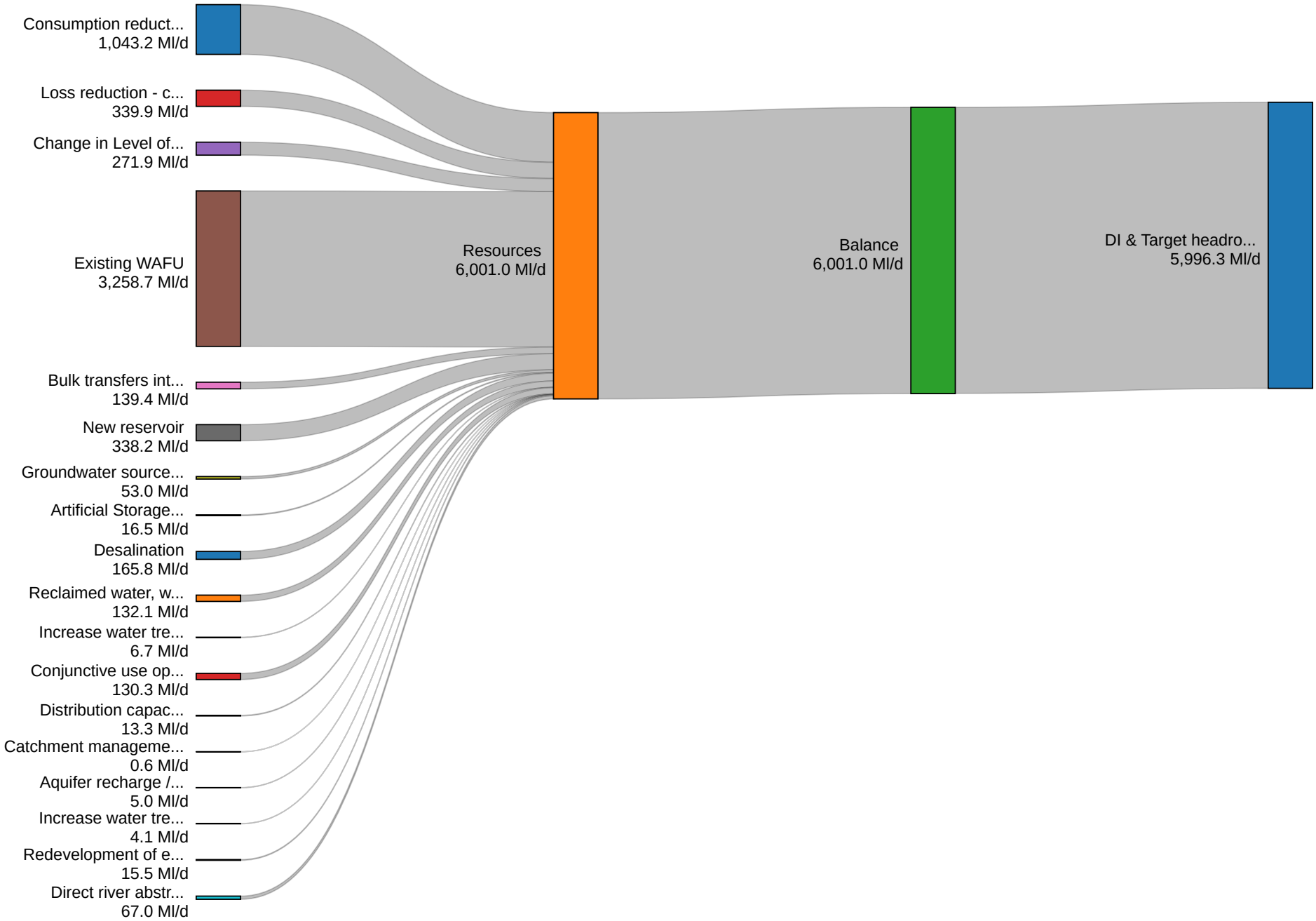
Situation 4 - 2040 (Thames Water)



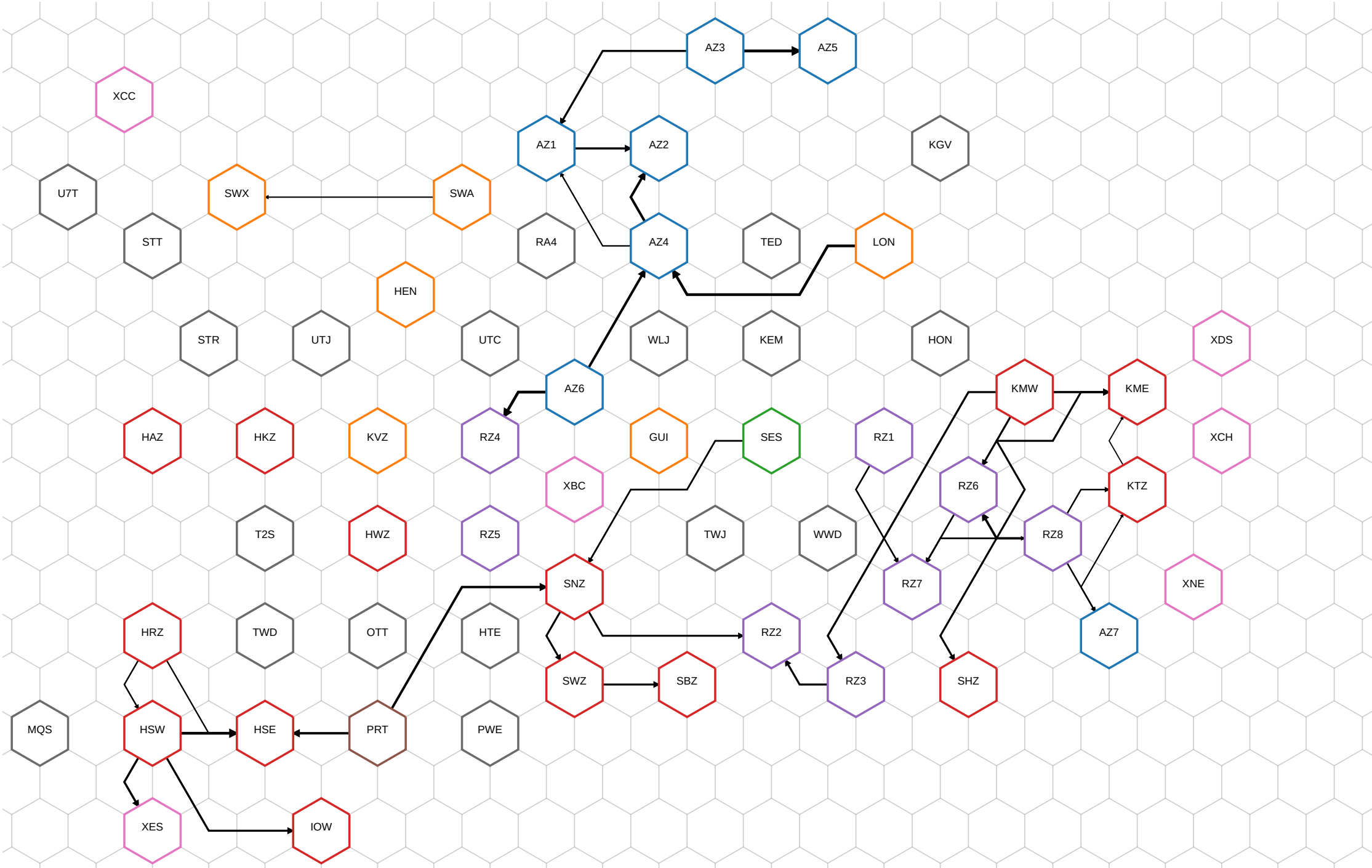
Situation 4 - 2050 (Thames Water)



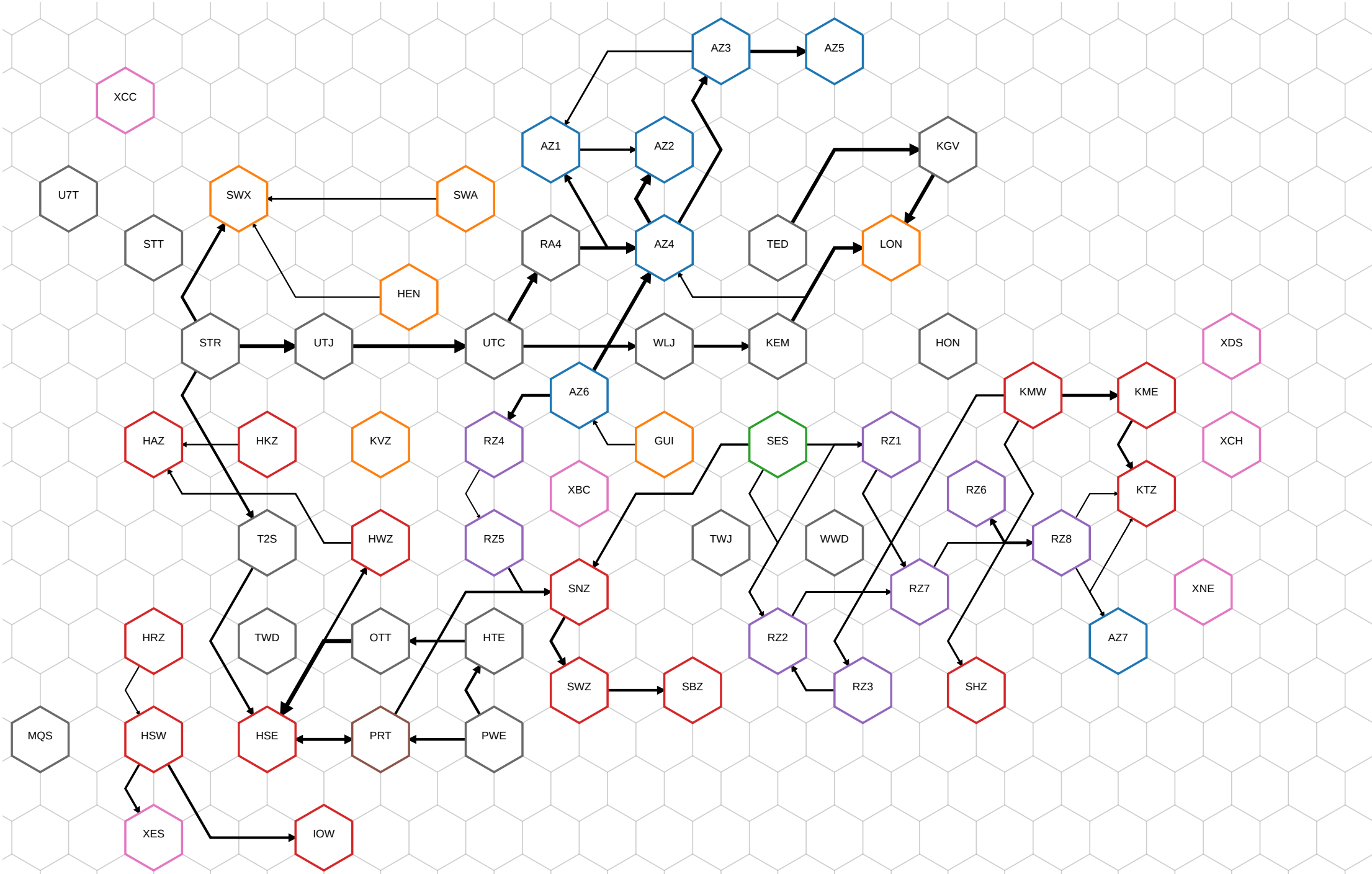
Situation 4 - 2075 (Thames Water)



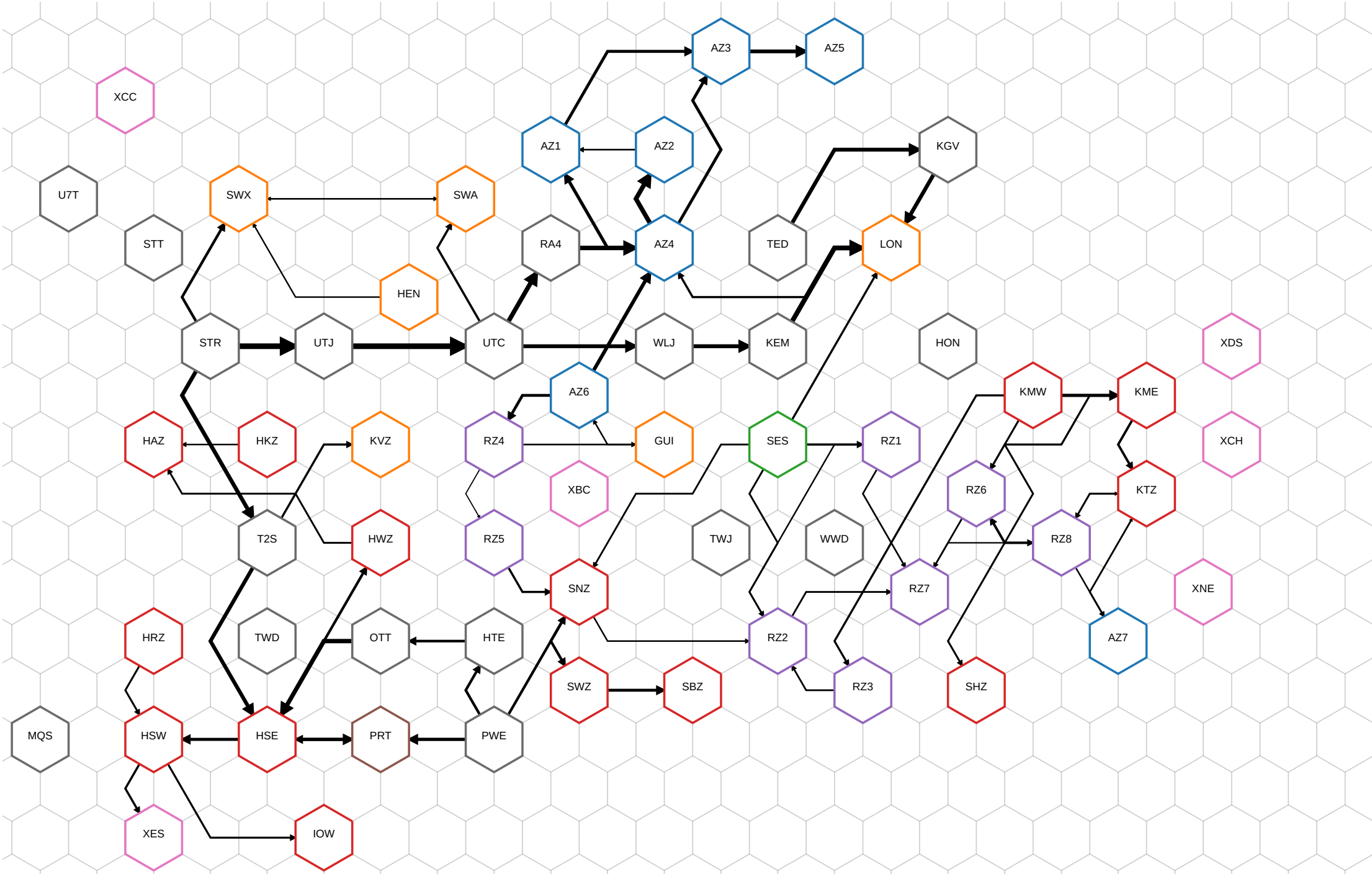
Situation 4 - 2026



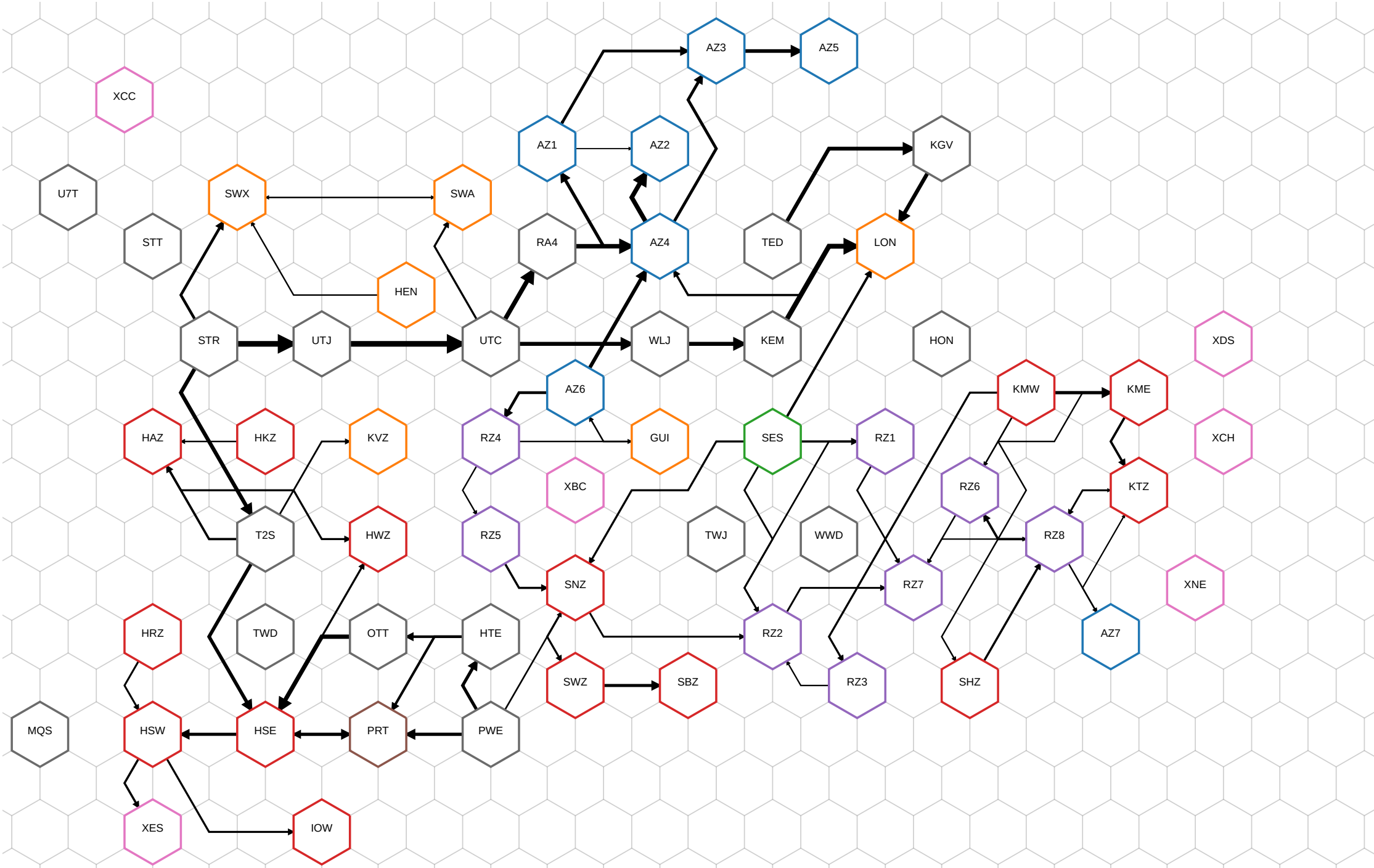
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ONLY SESRO 125Mm^3 AVAILABLE

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro125-2075
Description	Least cost run with hybrid-c+2 government interventions including only SESRO 125 Mm3.
Created at	09/07/2023, 19:49:15
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-sesro125
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 125.
Optimised discount rate	STPR

Metrics

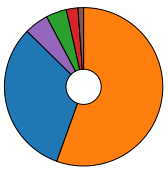
Net present value (Cost)

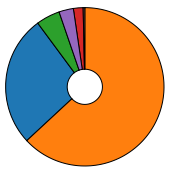
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,624	17,853	17,161	19,198	17,696	16,900	18,044	17,187	16,468	17,903	(£m)
Cost w/o deficit (STPR)	20,624	17,853	17,161	19,198	17,696	16,900	18,044	17,187	16,468	17,903	(£m)
Cost w/ deficit (IGEQ)	31,461	26,175	24,916	28,724	25,914	24,498	26,641	25,034	23,737	26,344	(£m)
Cost w/o deficit (IGEQ)	31,461	26,175	24,916	28,724	25,914	24,498	26,641	25,034	23,737	26,344	(£m)
Cost w/ deficit (LTDR)	22,722	19,493	18,696	21,058	19,316	18,404	19,732	18,737	17,910	19,563	(£m)
Cost w/o deficit (LTDR)	22,722	19,493	18,696	21,058	19,316	18,404	19,732	18,737	17,910	19,563	(£m)

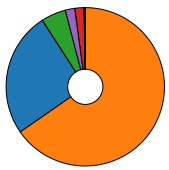
Cost breakdown (STPR)

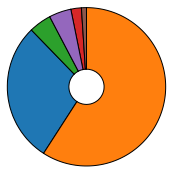
Select Company: Total

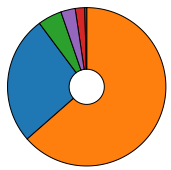
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,571	4,781	4,386	5,496	4,649	4,167	4,809	4,359	3,912	4,792	(£m)
Fixed opex	11,447	11,264	11,212	11,349	11,244	11,185	11,256	11,203	11,142	11,256	(£m)
Fixed operational carbon	875	868	866	877	870	869	872	867	866	870	(£m)
Embedded carbon	488	355	328	413	346	315	361	326	298	359	(£m)
Variable opex	1,008	525	330	866	518	314	648	391	232	537	(£m)
Variable carbon opex	235	60	39	196	69	49	99	41	18	90	(£m)

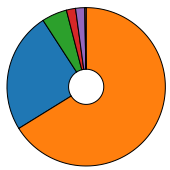
situation1 

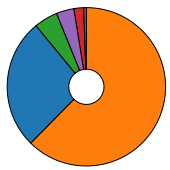
situation2 

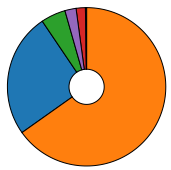
situation3 

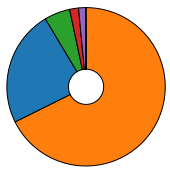
situation4 

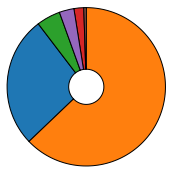
situation5 

situation6 

situation7 

situation8 

situation9 

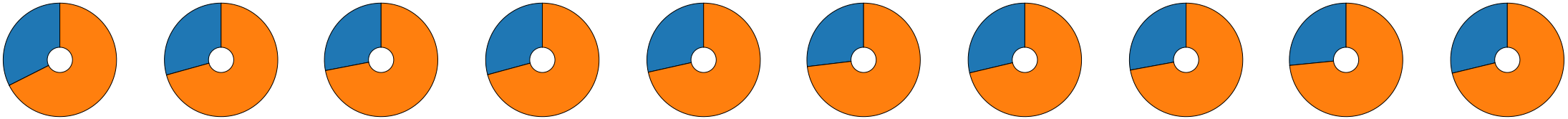
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,131,295	2,172,799	1,991,544	2,583,986	2,113,843	1,912,149	2,233,552	1,985,497	1,801,569	2,214,026	(tonnes)
Operational emissions	6,527,799	5,241,296	5,114,192	6,259,241	5,304,648	5,197,459	5,551,126	5,133,439	4,980,353	5,478,839	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

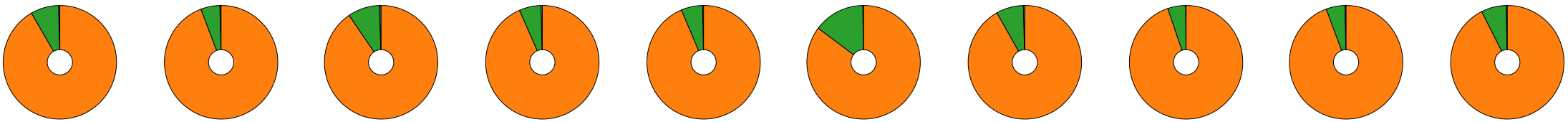


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	91	43	25	85	36	11	66	12	11	42	(GWh)
Grid	21,563	11,307	4,600	19,093	10,970	3,840	13,247	7,971	2,912	10,612	(GWh)
Renewable	1,870	650	461	1,263	713	654	1,115	428	165	813	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,272	63,350	62,389	66,521	63,028	61,858	63,584	61,352	60,254	63,401
SEA environmental disbenefit	109,736	78,540	70,094	97,286	77,250	70,594	81,256	68,555	59,032	79,149
Natural capital	83,882,202	79,261,170	81,987,116	77,437,185	79,104,427	81,922,734	78,787,393	79,532,509	82,437,780	80,483,613
Bio-diversity net gain	−196,329	−138,039	−113,045	−187,850	−139,375	−110,832	−142,270	−116,862	−86,058	−136,740

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,743	31,728	31,220	32,995	31,562	31,076	31,684	30,751	30,219	31,664

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.14	29.09	31.75	28.00	29.14	31.80	30.51	33.72	37.55	31.08
R1: Uncertainty of option supply/demand benefit	5.72	5.43	5.89	5.59	5.42	5.89	5.81	6.30	6.99	5.89
R3: Risk of service failure due to other physical hazards	6.72	7.19	8.03	6.80	7.22	8.06	7.52	8.51	9.72	7.75
R4: Availability of additional headroom	6.58	6.92	7.13	6.63	6.92	7.13	7.24	7.60	7.84	7.11
R5: Catchment/raw water quality risks (incl. climate change)	4.04	4.08	4.59	3.72	4.07	4.58	4.20	4.83	5.58	4.41
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.07	5.47	6.11	5.25	5.50	6.14	5.73	6.48	7.43	5.91
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

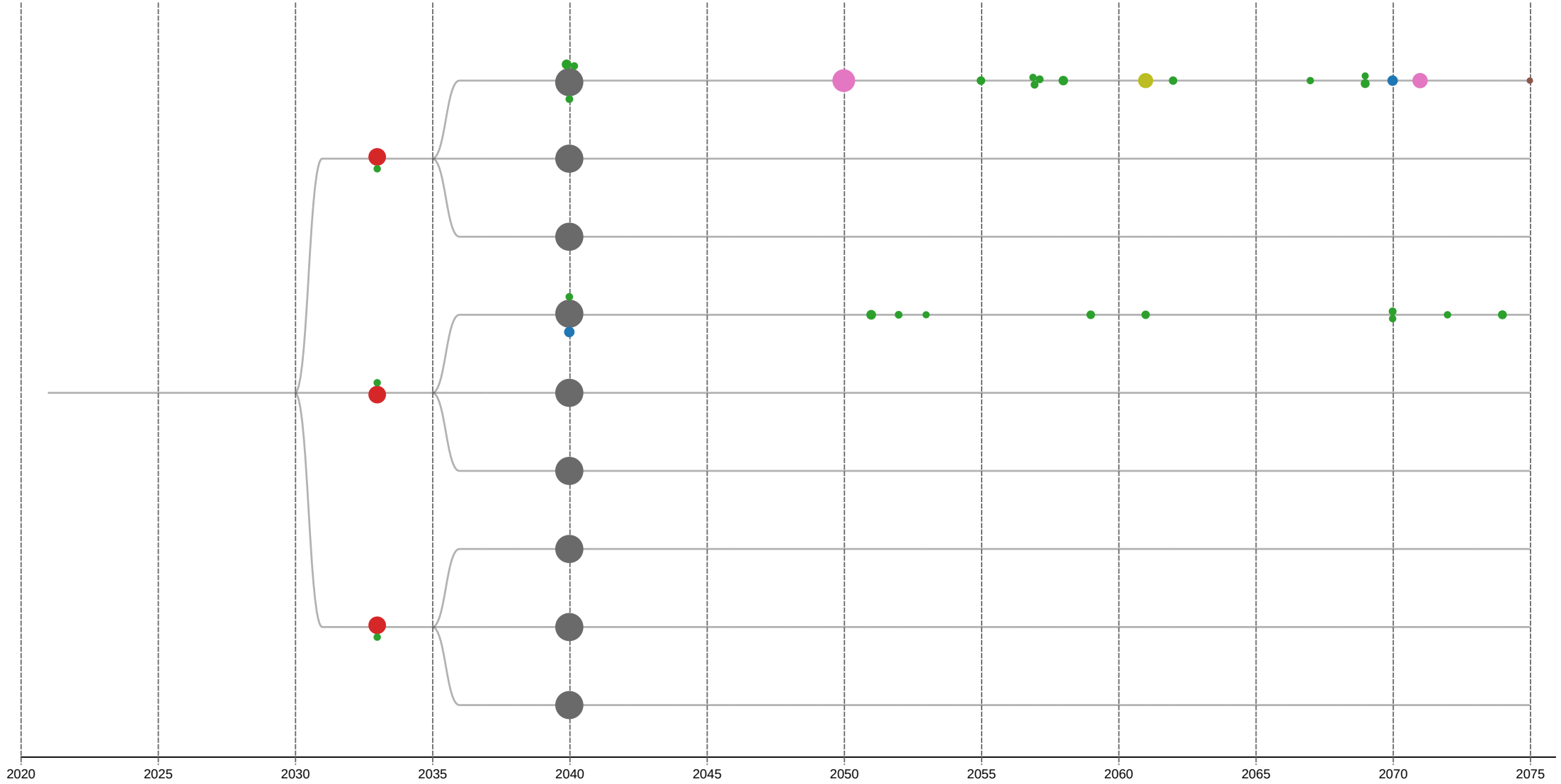
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.06	15.50	17.30	14.01	15.47	16.97	15.94	18.09	20.58	16.44
A3: Operational complexity and flexibility	6.23	6.90	7.73	6.48	6.95	7.80	7.19	8.24	9.47	7.44
A4: WRZ connectivity	7.80	8.57	9.54	7.50	8.50	9.14	8.72	9.82	11.08	8.96
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	18.79	20.01	21.99	18.83	20.07	22.03	20.82	23.42	26.54	21.39
E1: Scaleability and modularity of proposed changes	8.65	9.35	10.40	8.69	9.41	10.48	9.68	11.09	12.63	10.04
E2: Intervention lead times	4.09	4.22	4.45	4.03	4.19	4.37	4.43	4.71	5.24	4.41
E3: Reliance on external bodies to deliver changes	6.04	6.43	7.14	6.11	6.46	7.19	6.71	7.62	8.67	6.93
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

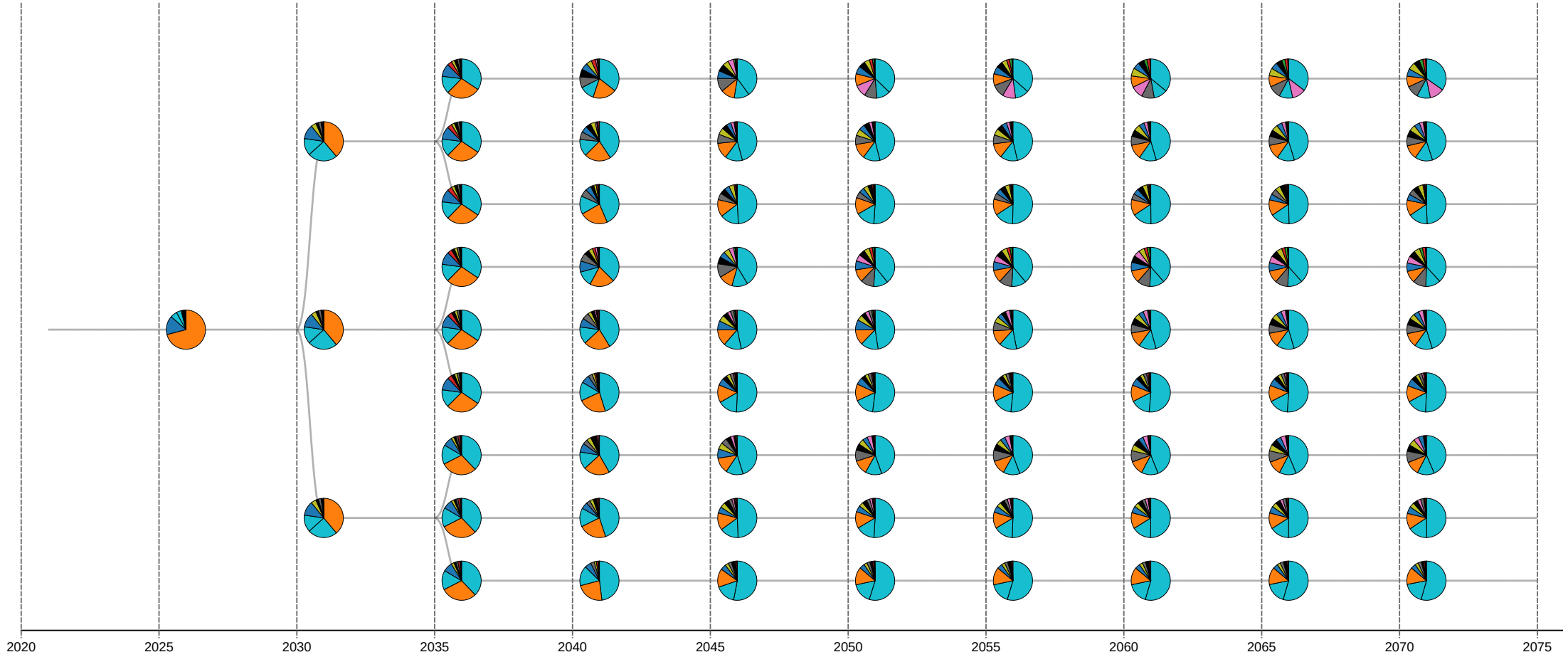
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

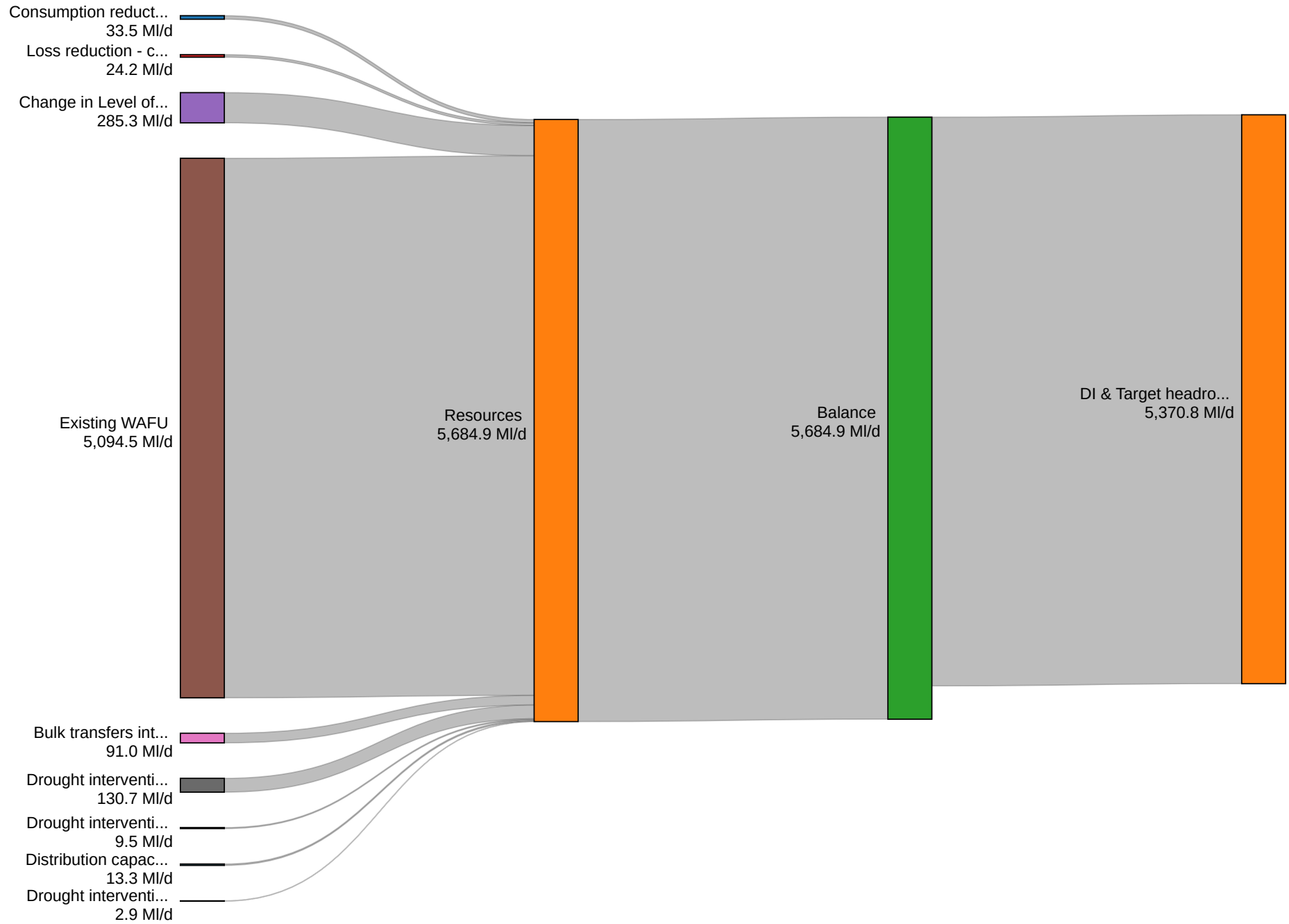
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

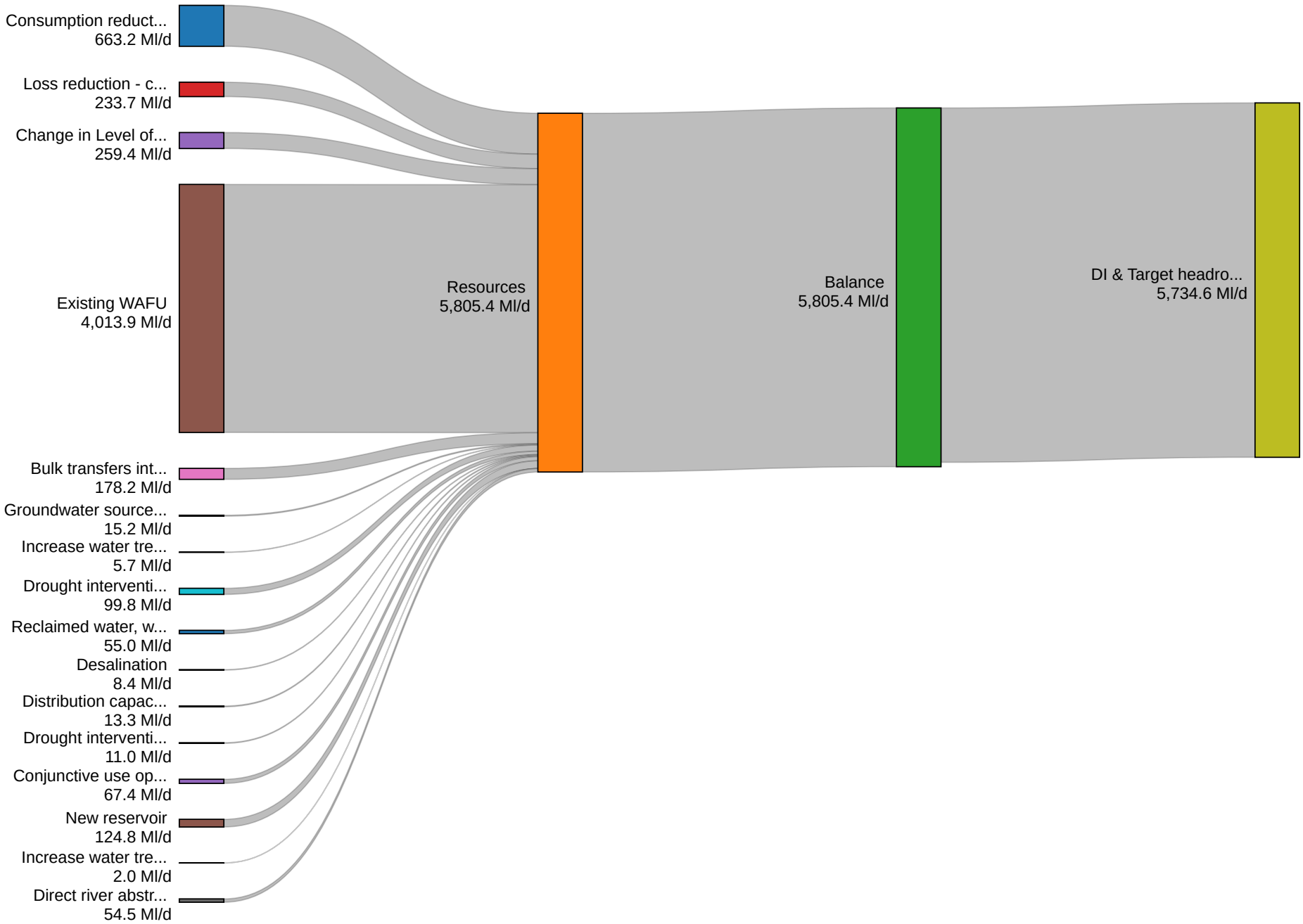


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

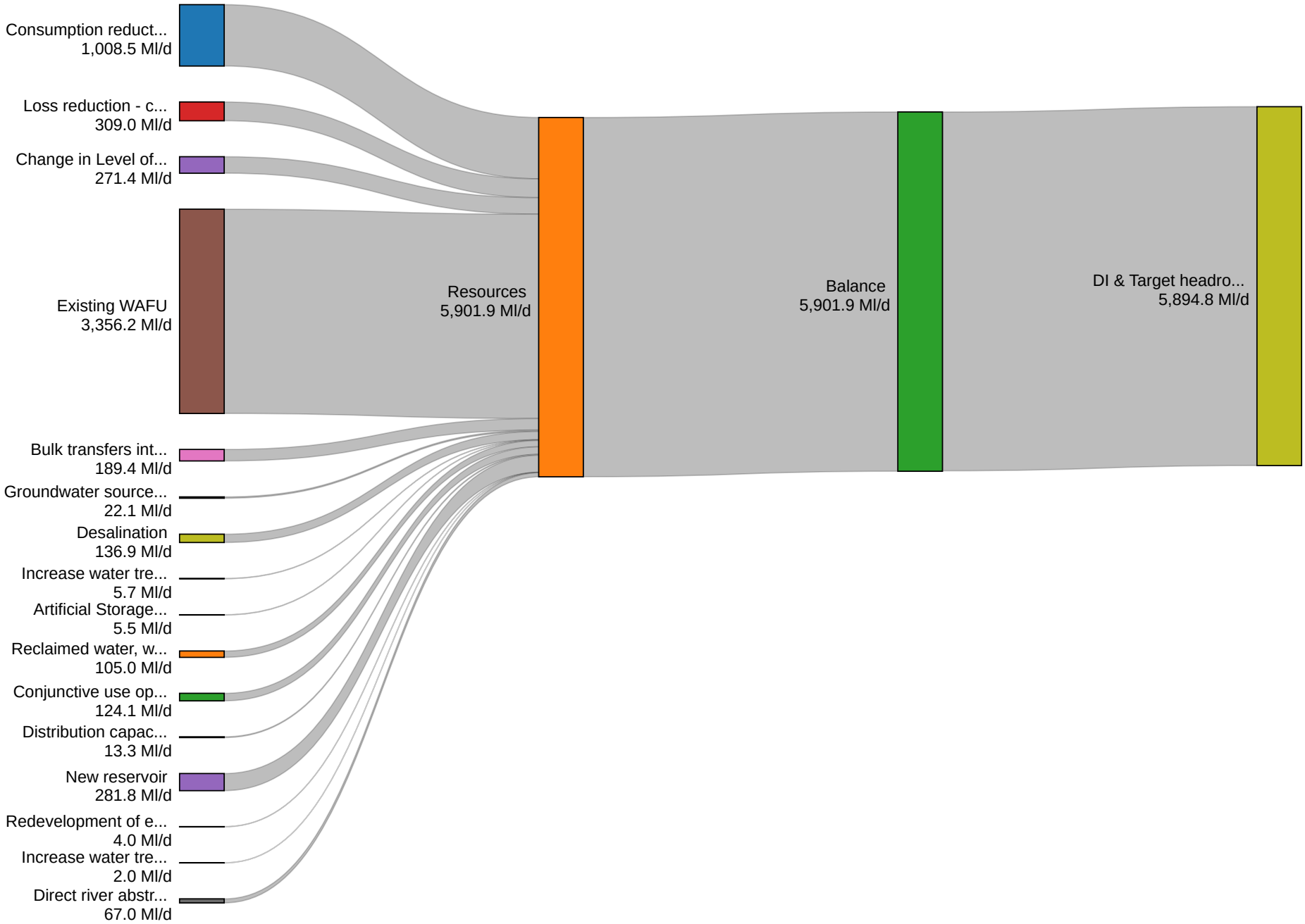
Situation 4 - 2026 (Thames Water)



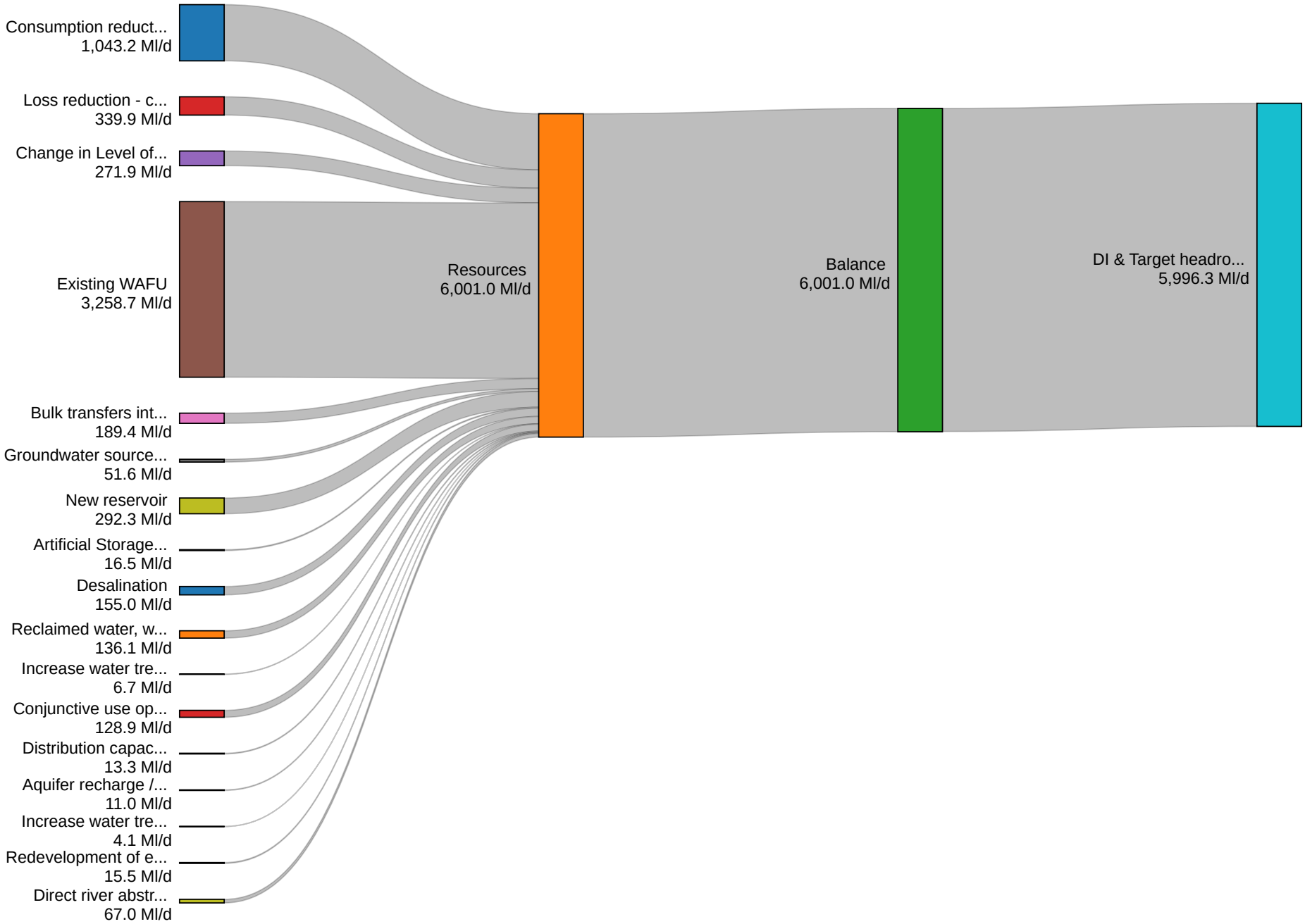
Situation 4 - 2040 (Thames Water)



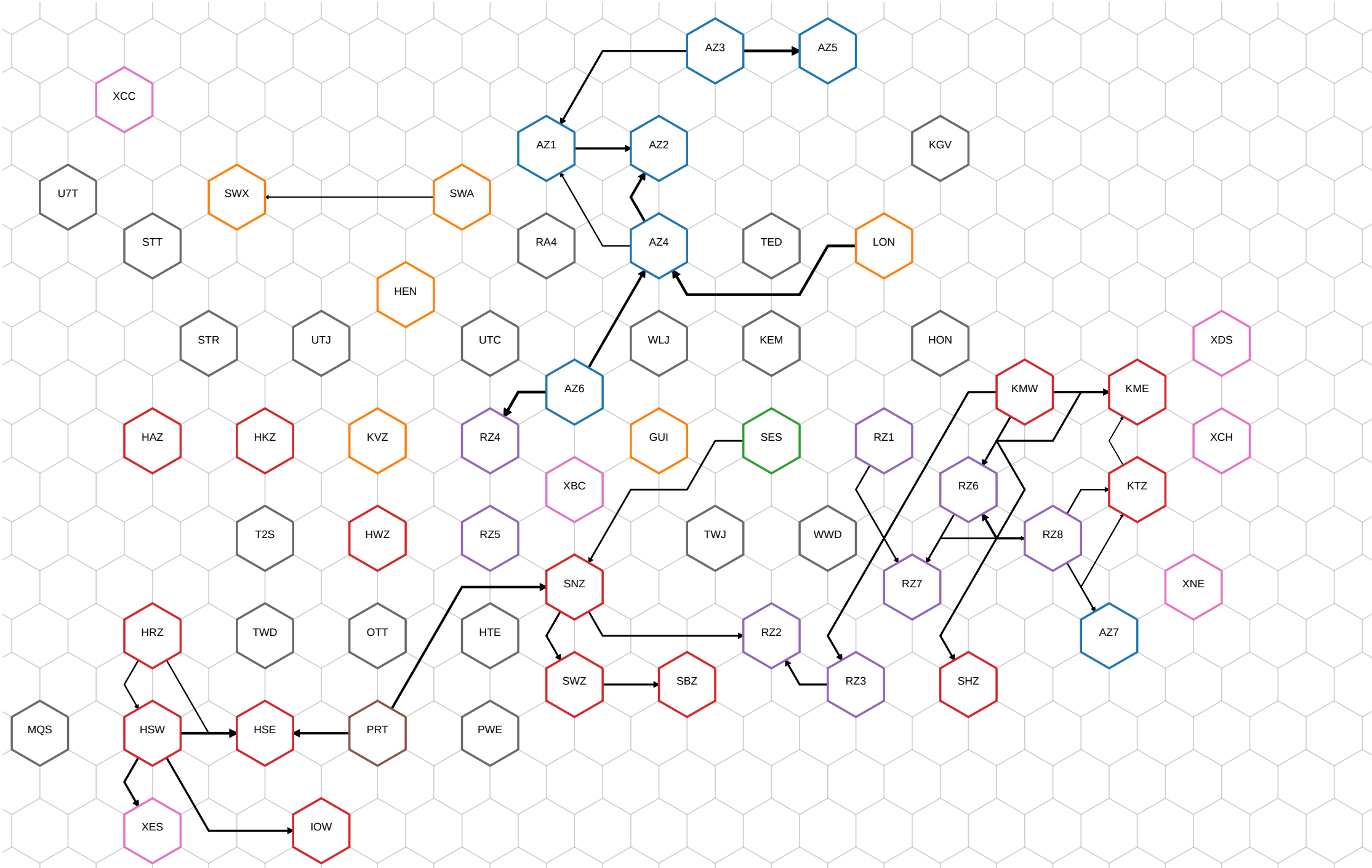
Situation 4 - 2050 (Thames Water)



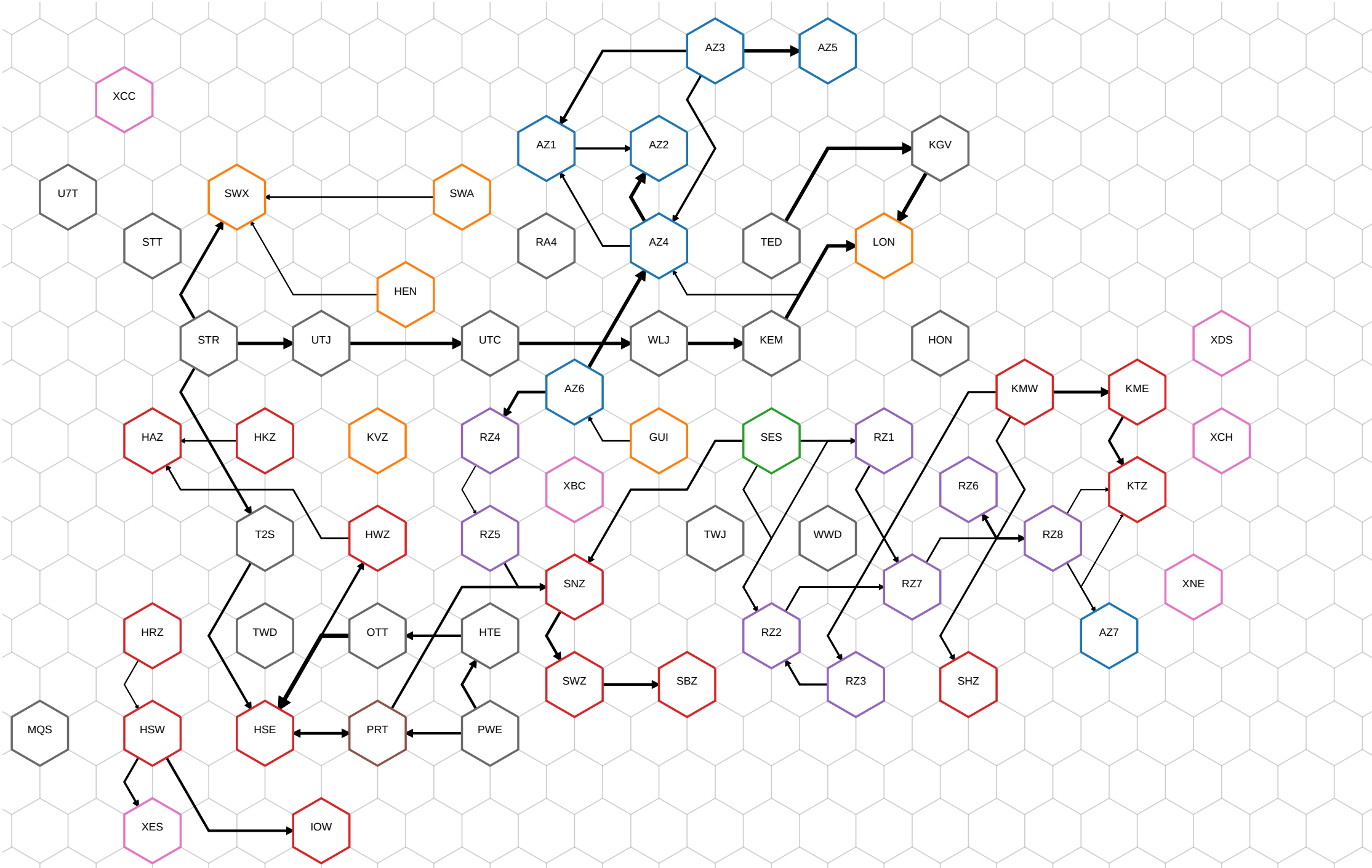
Situation 4 - 2075 (Thames Water)



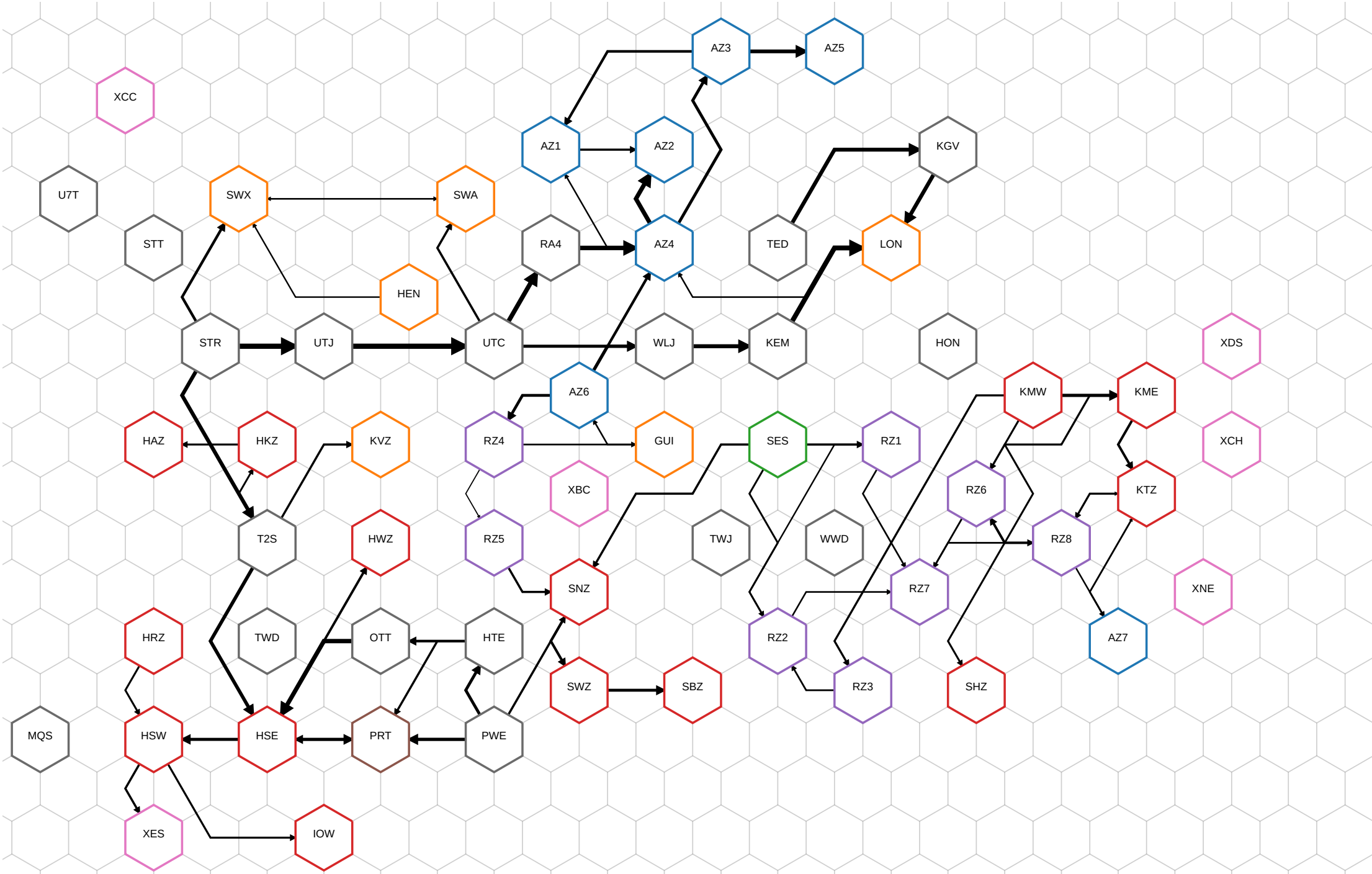
Situation 4 - 2026



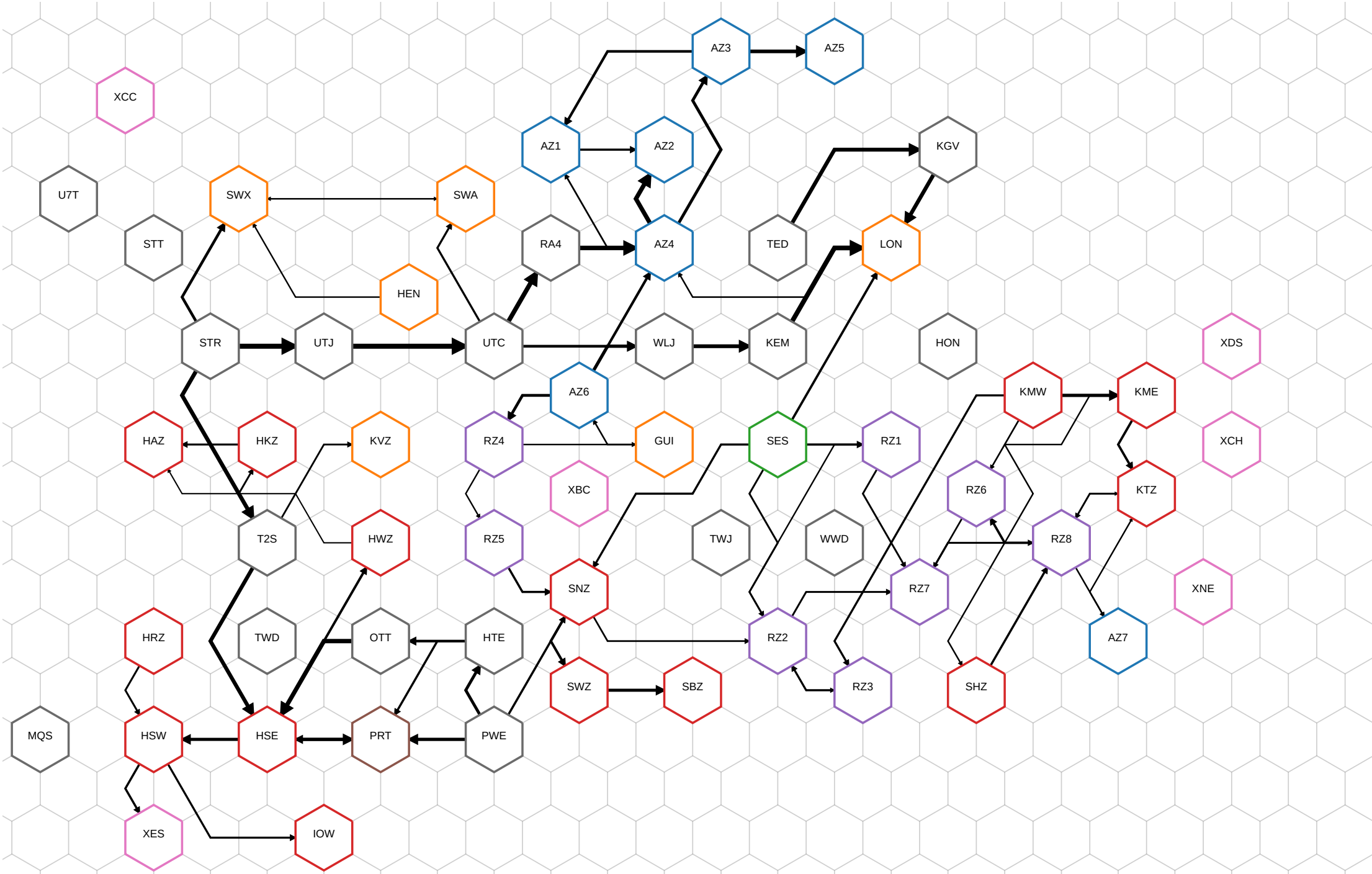
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ONLY SESRO 100Mm^3 AVAILABLE

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro100-2075
Description	Least cost run with hybrid-c+2 government interventions including only SESRO 100 Mm3.
Created at	09/07/2023, 19:49:07
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-sesro100
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 100.
Optimised discount rate	STPR

Metrics

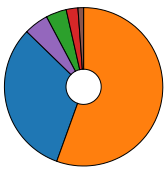
Net present value (Cost)

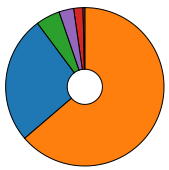
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,730	17,663	16,957	19,274	17,568	16,756	17,906	17,046	16,330	17,803	(£m)
Cost w/o deficit (STPR)	20,730	17,663	16,957	19,274	17,568	16,756	17,906	17,046	16,330	17,803	(£m)
Cost w/ deficit (IGEQ)	31,757	25,895	24,619	28,944	25,735	24,292	26,448	24,832	23,540	26,229	(£m)
Cost w/o deficit (IGEQ)	31,757	25,895	24,619	28,944	25,735	24,292	26,448	24,832	23,540	26,229	(£m)
Cost w/ deficit (LTDR)	22,861	19,285	18,473	21,160	19,178	18,248	19,583	18,585	17,761	19,459	(£m)
Cost w/o deficit (LTDR)	22,861	19,285	18,473	21,160	19,178	18,248	19,583	18,585	17,761	19,459	(£m)

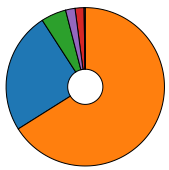
Cost breakdown (STPR)

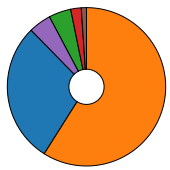
Select Company: Total

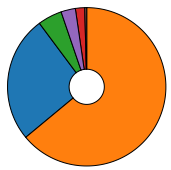
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,584	4,609	4,206	5,536	4,539	4,037	4,667	4,231	3,787	4,688	(£m)
Fixed opex	11,506	11,255	11,203	11,364	11,240	11,183	11,253	11,202	11,141	11,261	(£m)
Fixed operational carbon	876	869	870	877	870	869	871	867	866	870	(£m)
Embedded carbon	496	338	312	415	335	304	352	314	287	350	(£m)
Variable opex	1,031	528	326	880	516	314	653	391	232	541	(£m)
Variable carbon opex	237	64	41	203	69	49	108	41	18	92	(£m)

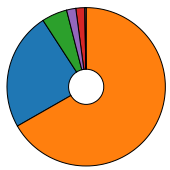
situation1 

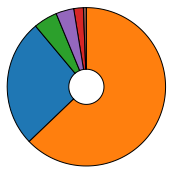
situation2 

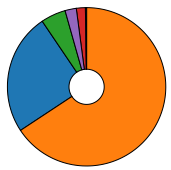
situation3 

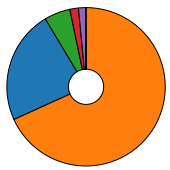
situation4 

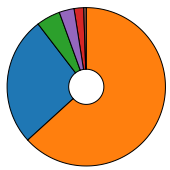
situation5 

situation6 

situation7 

situation8 

situation9 

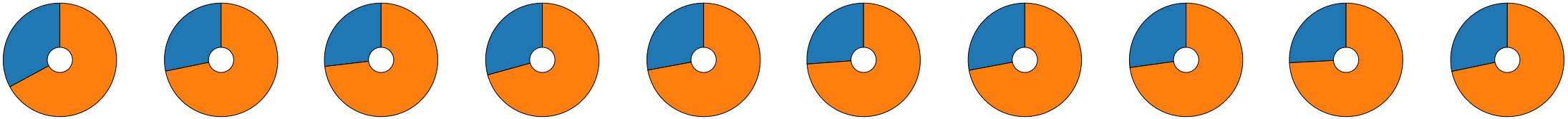
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,205,350	2,069,804	1,892,252	2,612,381	2,054,095	1,843,238	2,179,047	1,916,045	1,733,237	2,167,272	(tonnes)
Operational emissions	6,547,721	5,270,610	5,154,408	6,309,238	5,307,129	5,197,277	5,616,616	5,134,766	4,980,353	5,502,013	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

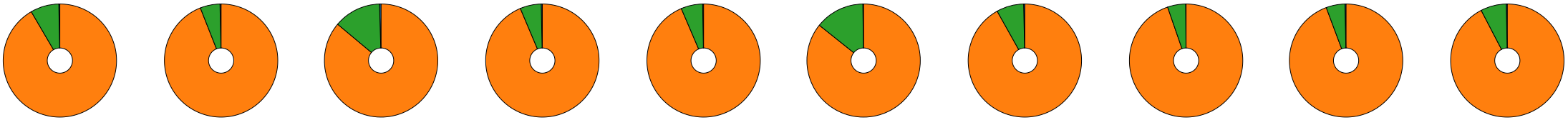


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	72	39	23	69	33	10	50	11	10	35	(GWh)
Grid	22,109	11,341	4,194	19,532	10,757	3,831	13,192	7,966	2,904	10,647	(GWh)
Renewable	1,958	681	655	1,255	706	628	1,115	433	165	844	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,667	63,427	62,622	67,014	63,033	61,925	63,567	61,365	60,278	63,544
SEA environmental disbenefit	112,359	78,944	71,657	100,581	76,097	71,111	81,641	68,309	59,028	79,970
Natural capital	83,722,727	79,901,622	82,782,713	78,170,977	80,067,437	82,784,283	79,597,339	80,331,994	83,233,810	81,176,989
Bio-diversity net gain	−199,305	−128,481	−97,944	−182,146	−122,820	−98,439	−129,901	−103,499	−73,949	−126,276

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,965	31,711	31,285	33,159	31,631	31,134	31,634	30,755	30,234	31,723

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.91	28.06	30.72	27.73	28.32	30.82	29.49	32.68	36.35	30.23
R1: Uncertainty of option supply/demand benefit	5.74	5.20	5.69	5.61	5.25	5.69	5.59	6.09	6.74	5.73
R3: Risk of service failure due to other physical hazards	6.66	6.93	7.76	6.72	7.04	7.79	7.25	8.23	9.39	7.53
R4: Availability of additional headroom	6.51	6.83	7.05	6.58	6.86	7.07	7.17	7.53	7.77	7.04
R5: Catchment/raw water quality risks (incl. climate change)	3.97	3.88	4.37	3.69	3.91	4.39	4.01	4.63	5.36	4.25
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.04	5.22	5.85	5.13	5.26	5.88	5.47	6.20	7.10	5.68
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

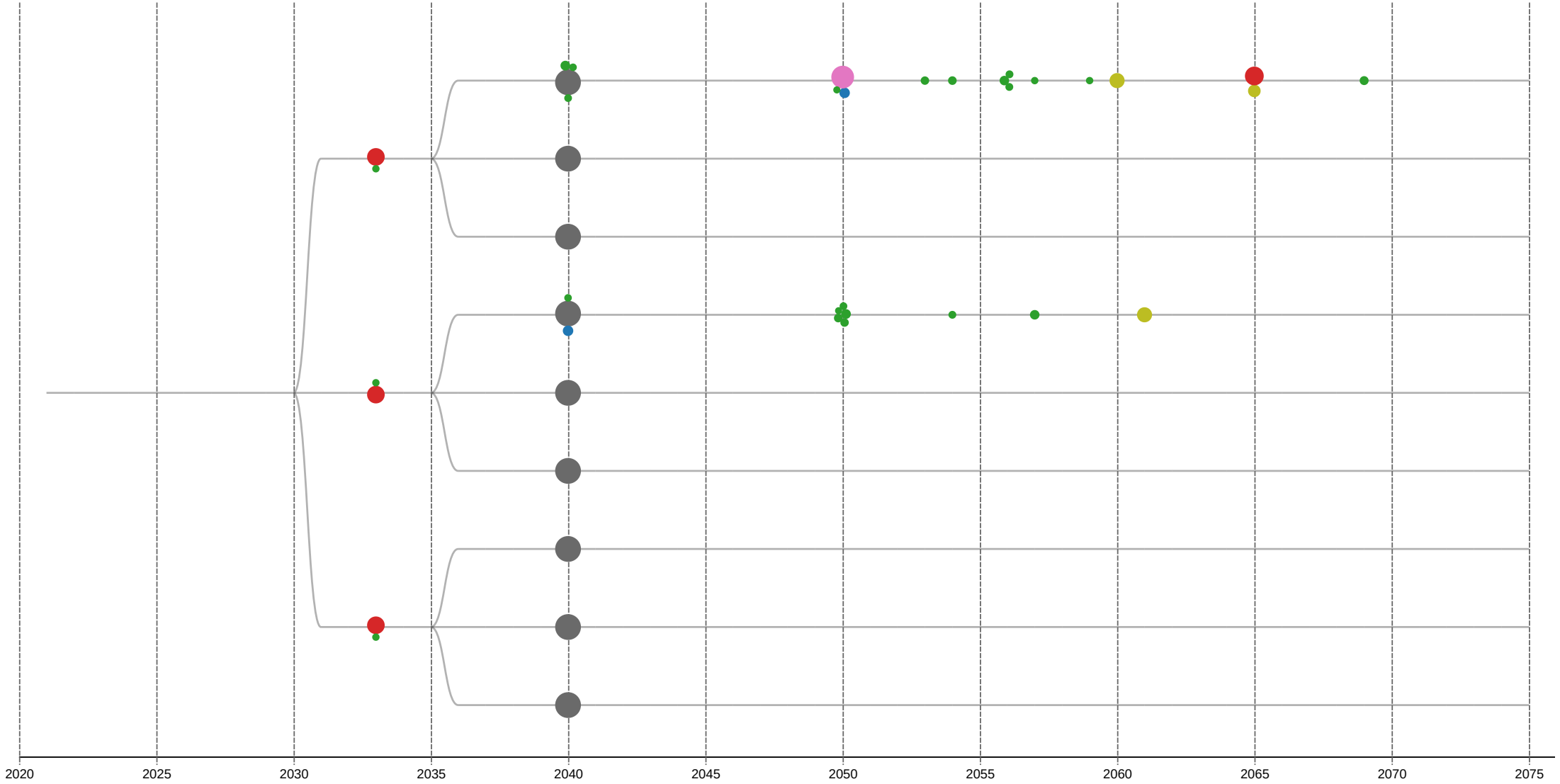
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.66	15.23	17.03	13.91	15.20	16.70	15.62	17.80	20.26	16.16
A3: Operational complexity and flexibility	6.16	6.65	7.47	6.37	6.71	7.53	6.94	7.96	9.14	7.21
A4: WRZ connectivity	7.47	8.56	9.53	7.51	8.46	9.14	8.65	9.82	11.08	8.91
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.29	19.93	22.02	19.24	20.09	22.07	20.64	23.47	26.60	21.48
E1: Scaleability and modularity of proposed changes	8.88	9.47	10.58	8.97	9.57	10.65	9.82	11.28	12.85	10.23
E2: Intervention lead times	4.28	4.12	4.36	4.10	4.12	4.30	4.21	4.64	5.16	4.36
E3: Reliance on external bodies to deliver changes	6.13	6.35	7.08	6.17	6.41	7.12	6.62	7.54	8.59	6.89
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

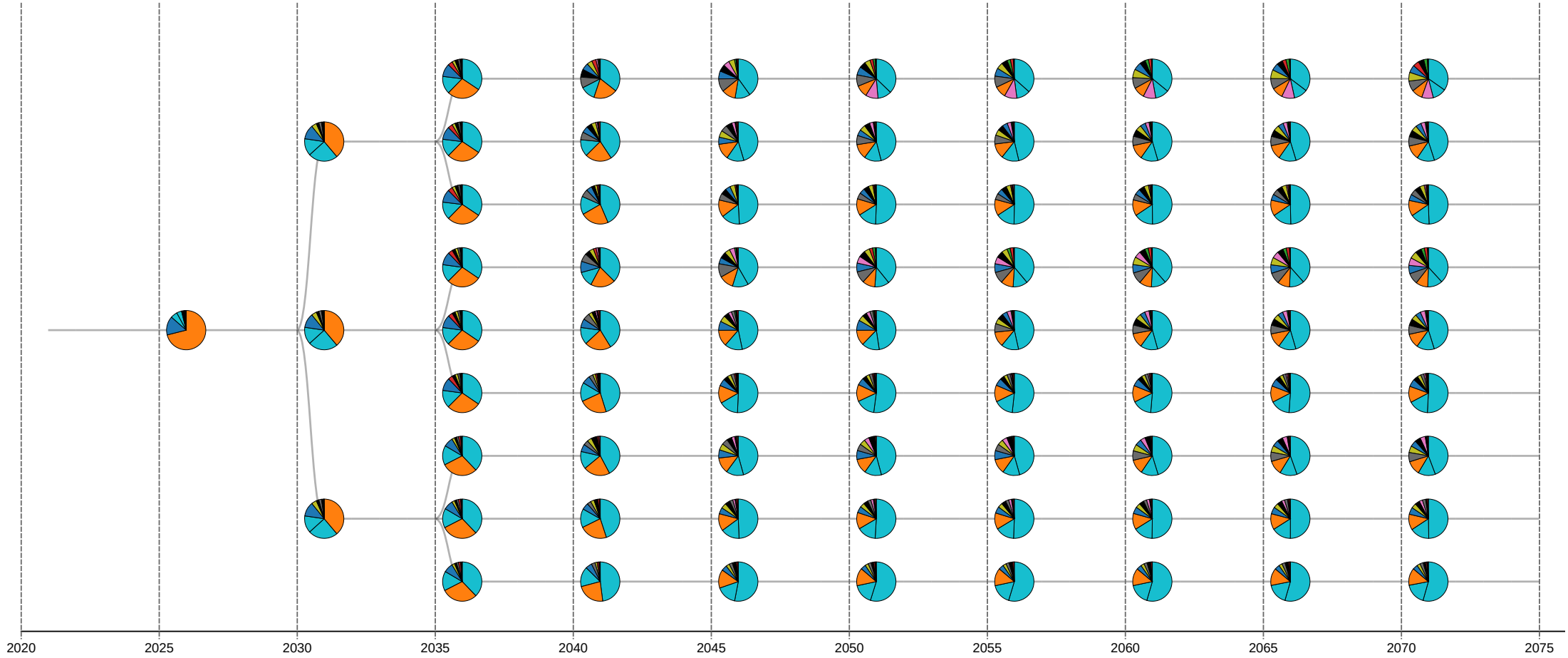
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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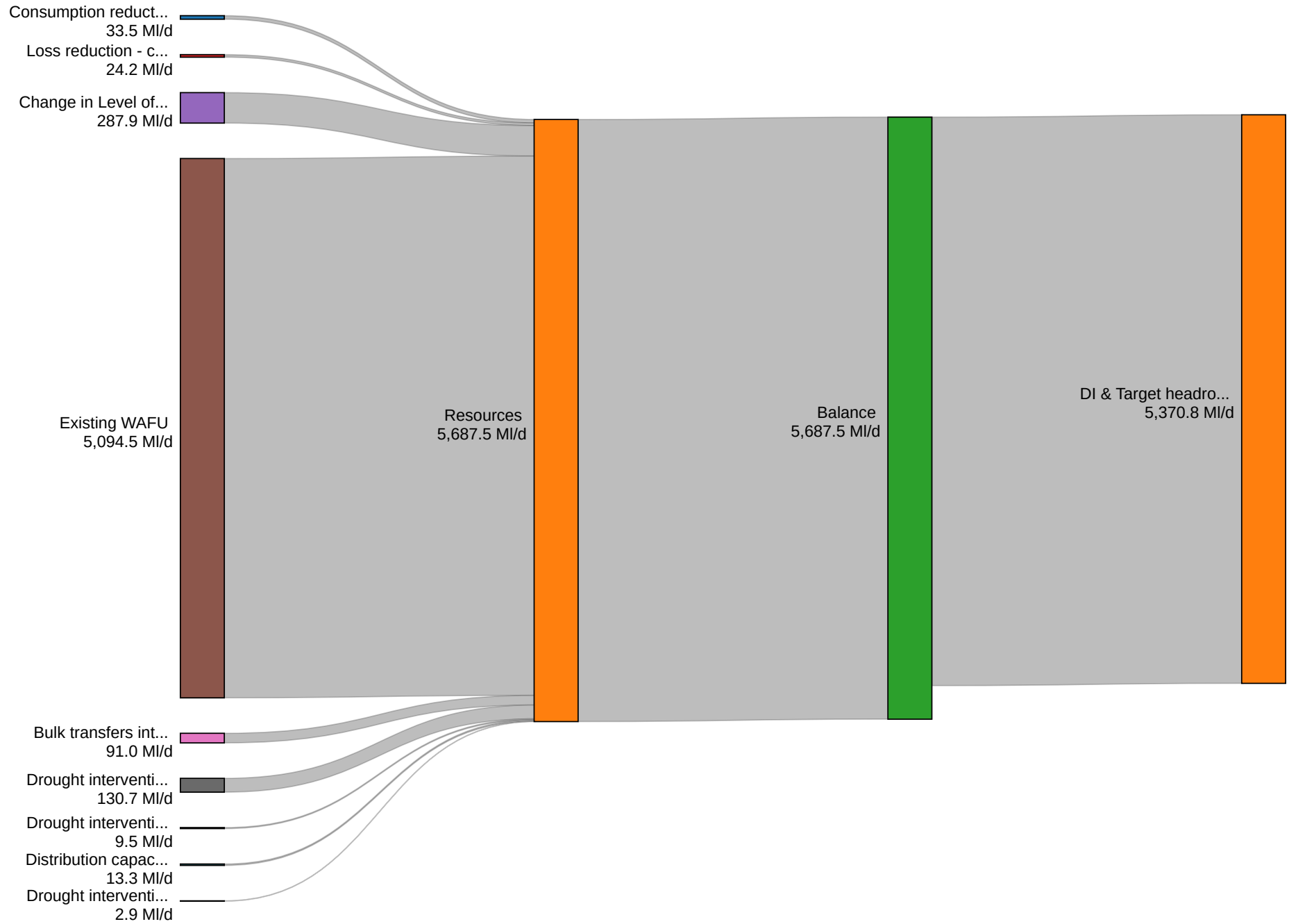
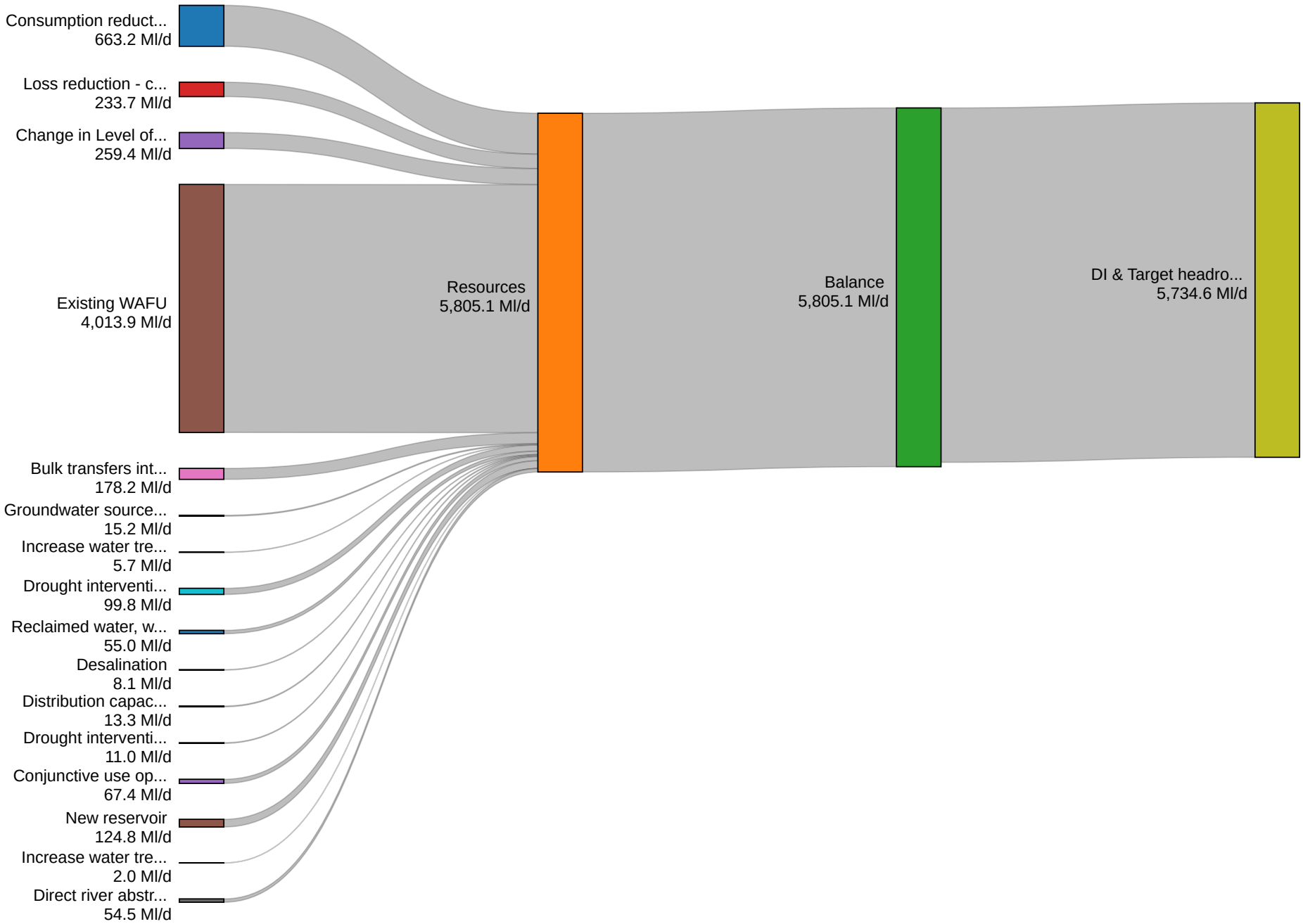
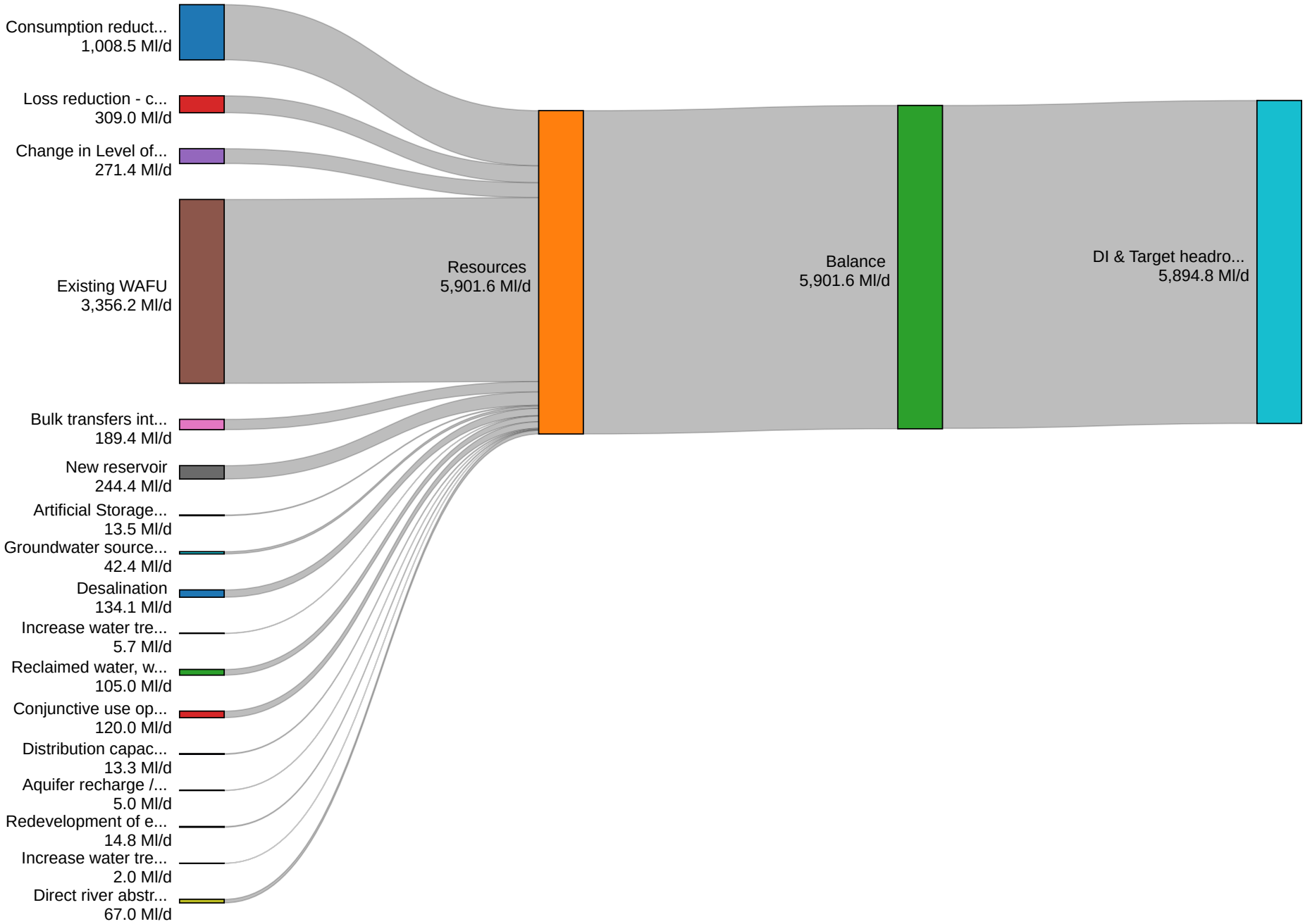
Situation 4 - 2026 (Thames Water)



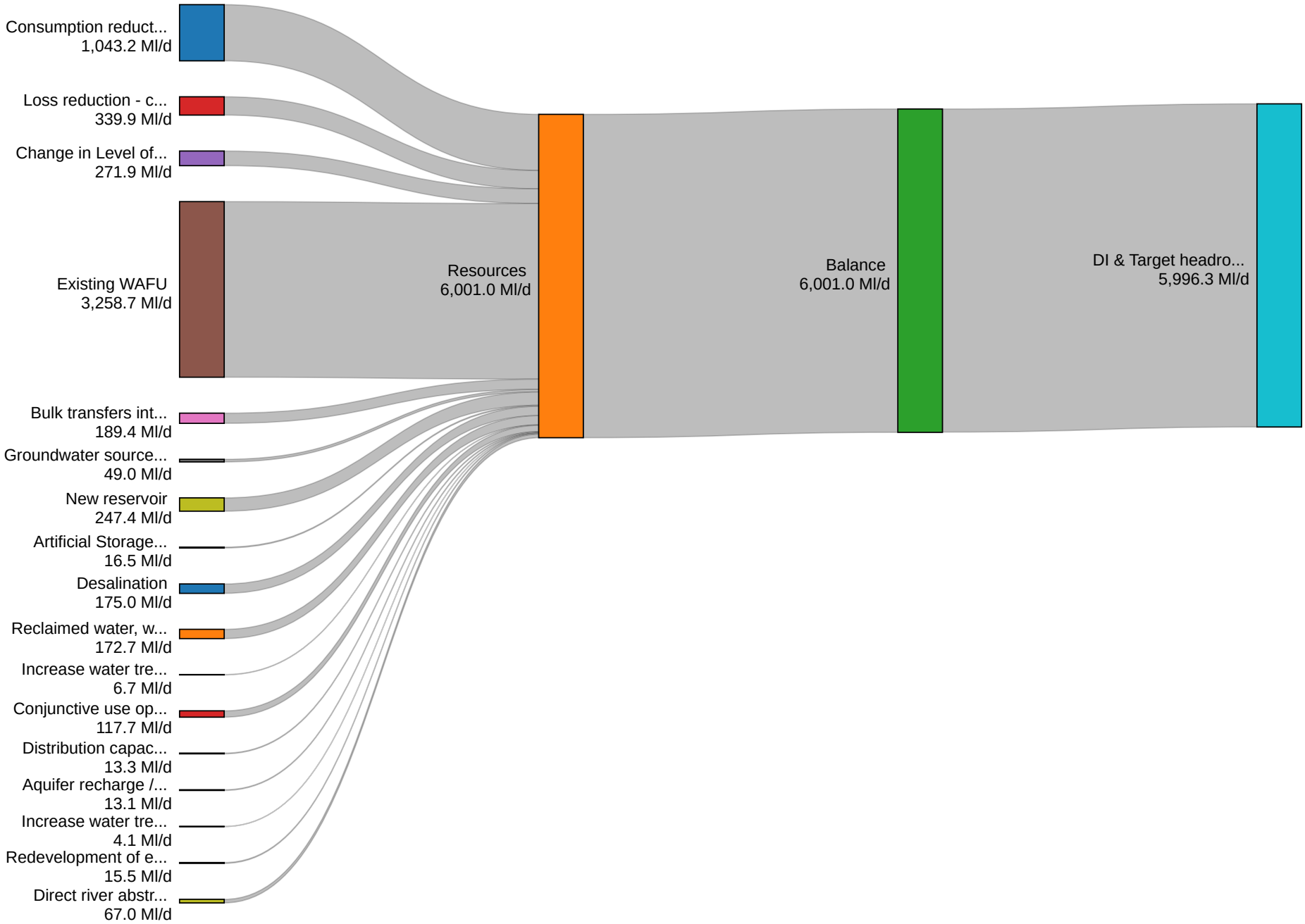
Situation 4 - 2040 (Thames Water)



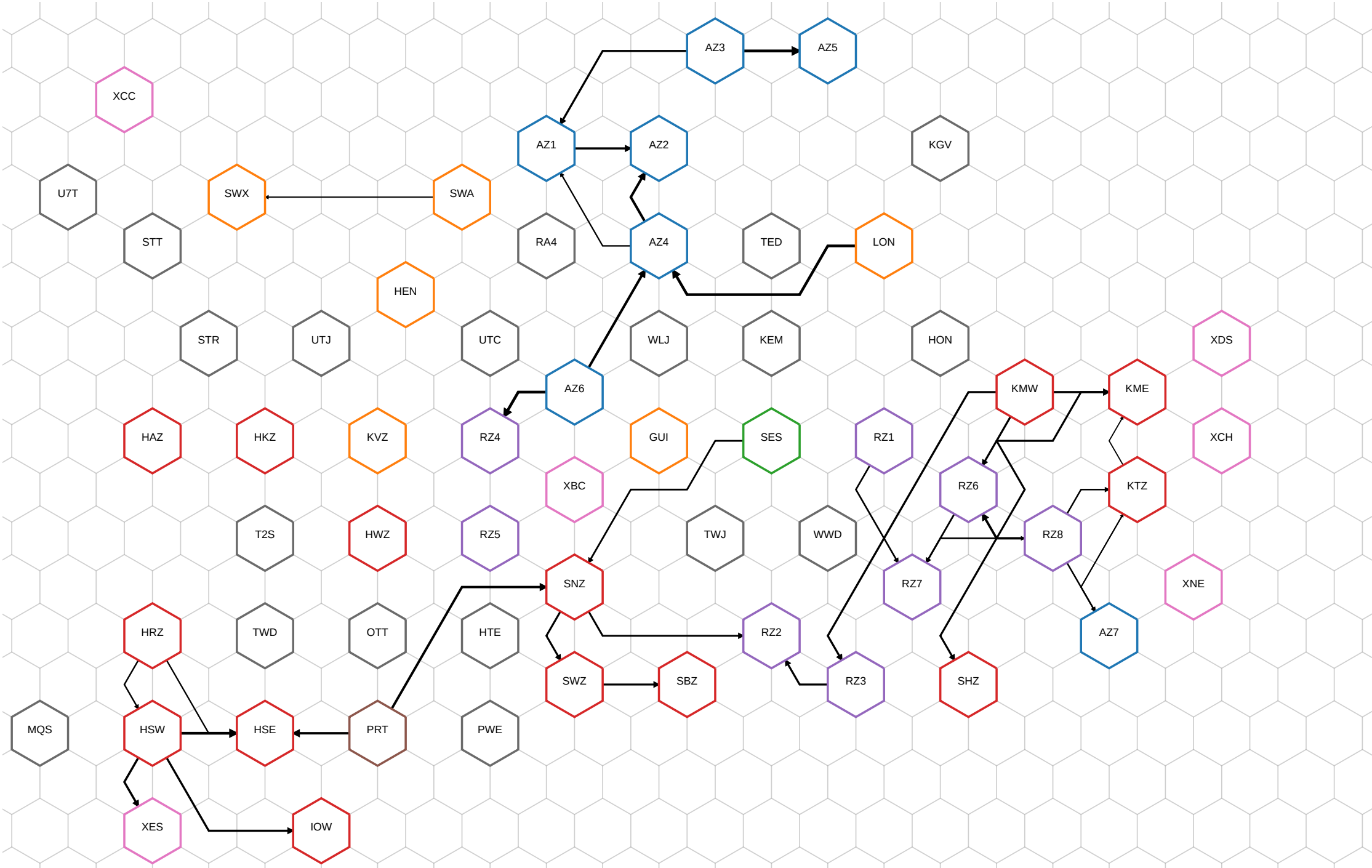
Situation 4 - 2050 (Thames Water)



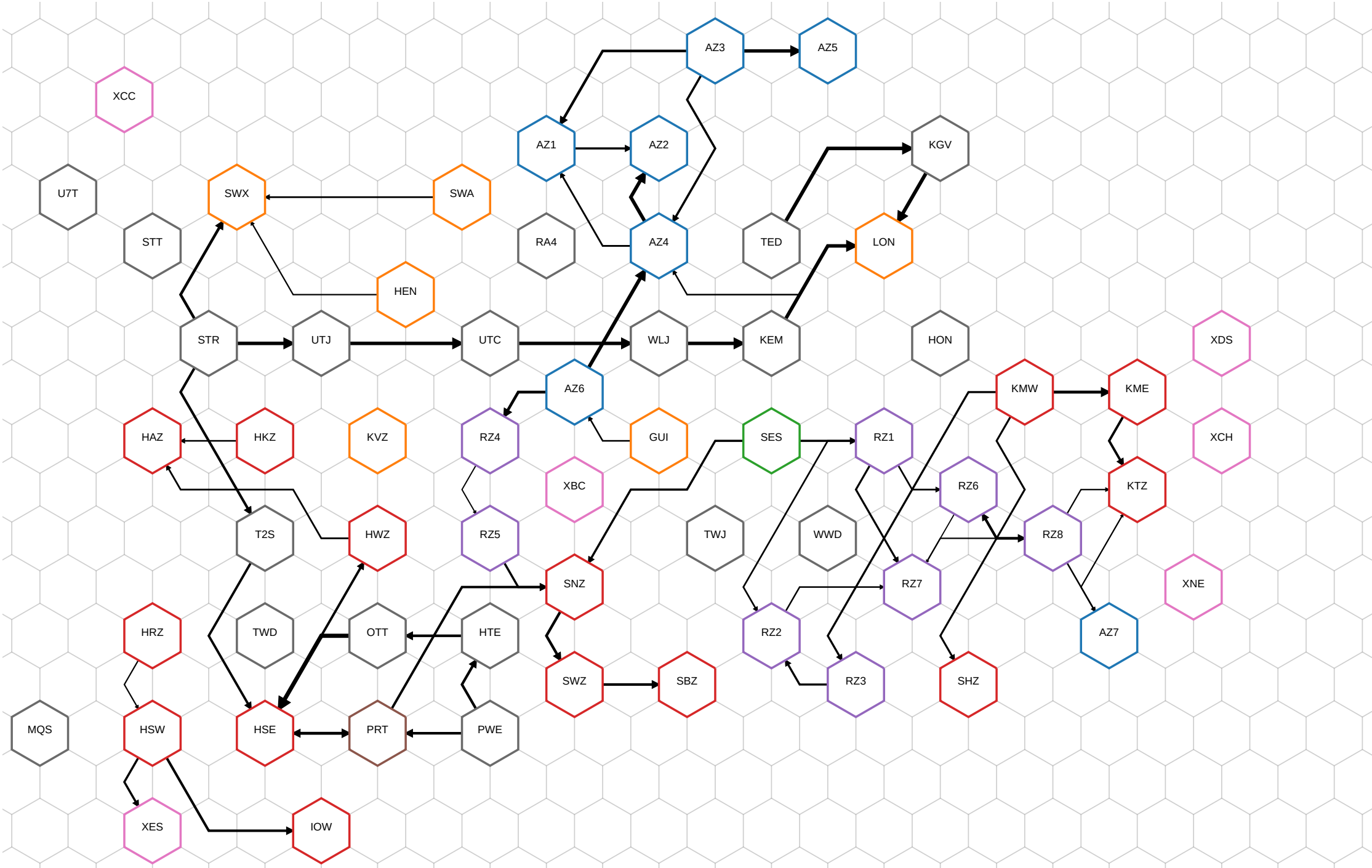
Situation 4 - 2075 (Thames Water)



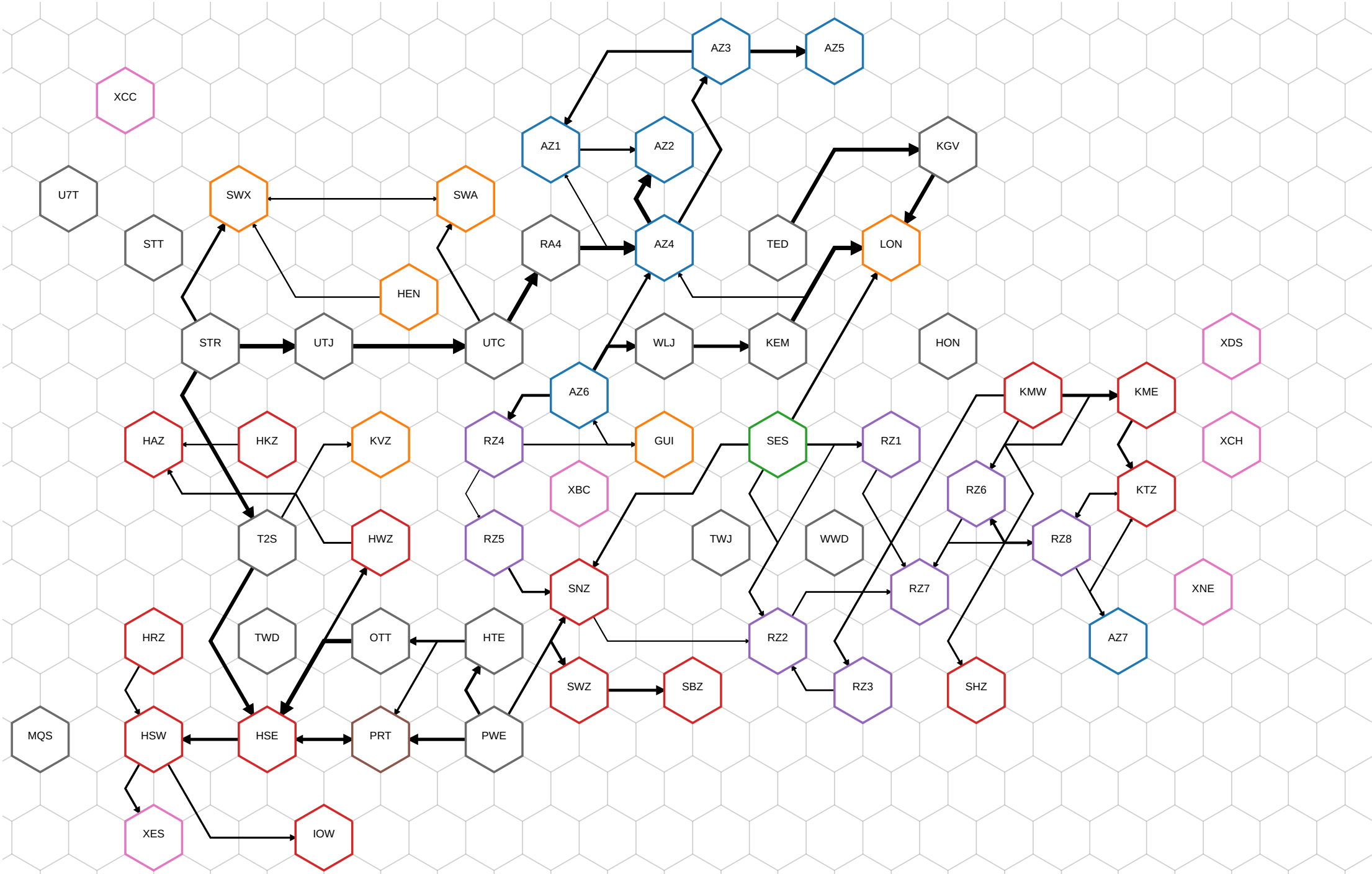
Situation 4 - 2026



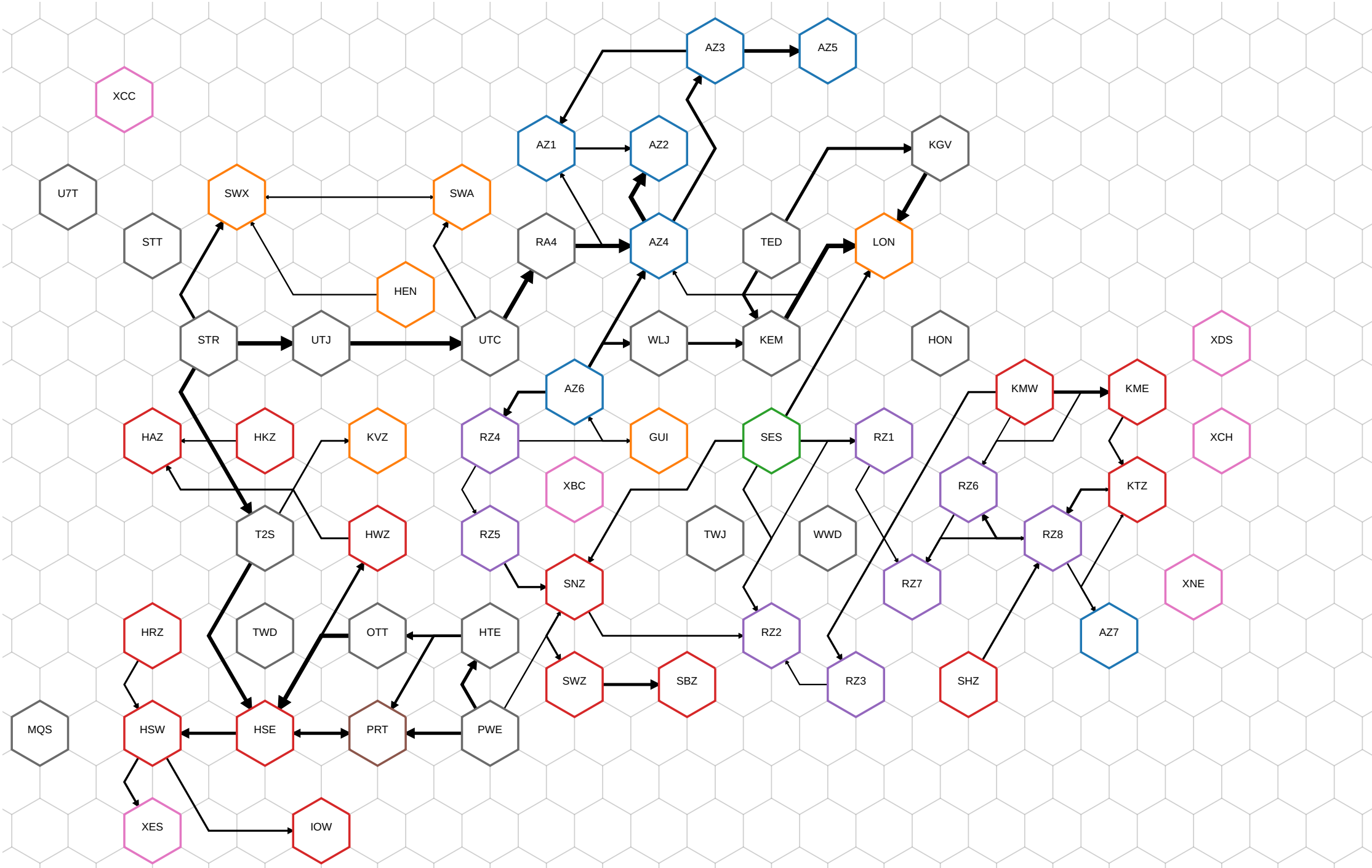
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ONLY SESRO 75Mm^3 AVAILABLE

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro75-2075
Description	Least cost run with hybrid-c+2 government interventions including only SESRO 75 Mm3.
Created at	09/07/2023, 19:49:00
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-sesro75
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 75.
Optimised discount rate	STPR

Metrics

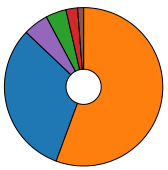
Net present value (Cost)

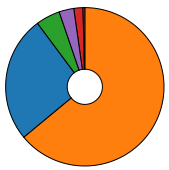
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,809	17,587	16,909	19,365	17,482	16,690	17,829	16,971	16,254	17,766	(£m)
Cost w/o deficit (STPR)	20,809	17,587	16,909	19,365	17,482	16,690	17,829	16,971	16,254	17,766	(£m)
Cost w/ deficit (IGEQ)	31,896	25,773	24,548	29,122	25,597	24,195	26,323	24,711	23,419	26,176	(£m)
Cost w/o deficit (IGEQ)	31,896	25,773	24,548	29,122	25,597	24,195	26,323	24,711	23,419	26,176	(£m)
Cost w/ deficit (LTDR)	22,953	19,200	18,421	21,267	19,082	18,175	19,497	18,500	17,676	19,419	(£m)
Cost w/o deficit (LTDR)	22,953	19,200	18,421	21,267	19,082	18,175	19,497	18,500	17,676	19,419	(£m)

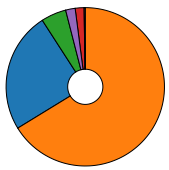
Cost breakdown (STPR)

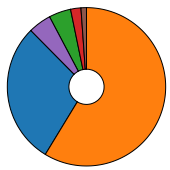
Select Company: Total

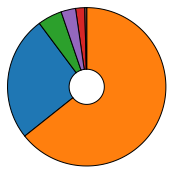
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,547	4,541	4,163	5,595	4,457	3,981	4,611	4,164	3,719	4,642	(£m)
Fixed opex	11,575	11,253	11,203	11,368	11,242	11,182	11,253	11,201	11,139	11,268	(£m)
Fixed operational carbon	879	869	868	873	870	868	871	867	865	870	(£m)
Embedded carbon	494	331	306	409	327	297	346	308	280	344	(£m)
Variable opex	1,062	528	328	904	518	314	646	391	232	547	(£m)
Variable carbon opex	252	64	40	216	69	48	102	41	18	95	(£m)

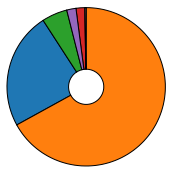
situation1 

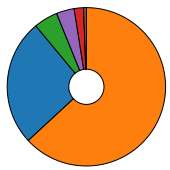
situation2 

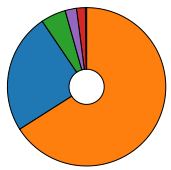
situation3 

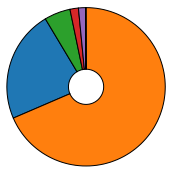
situation4 

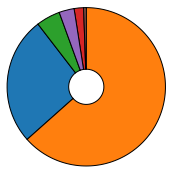
situation5 

situation6 

situation7 

situation8 

situation9 

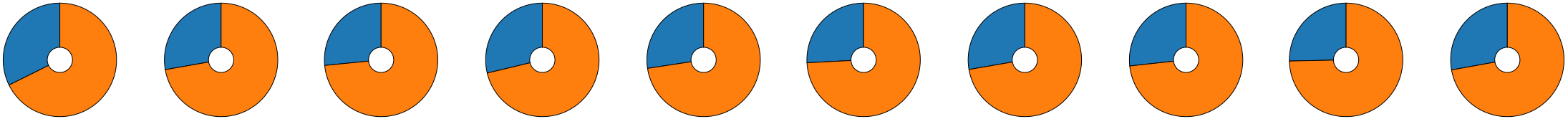
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,190,544	2,026,124	1,859,011	2,568,093	2,001,816	1,801,492	2,138,040	1,872,374	1,689,566	2,127,451	(tonnes)
Operational emissions	6,681,499	5,271,294	5,136,573	6,366,776	5,305,461	5,176,512	5,573,796	5,134,766	4,980,353	5,514,114	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

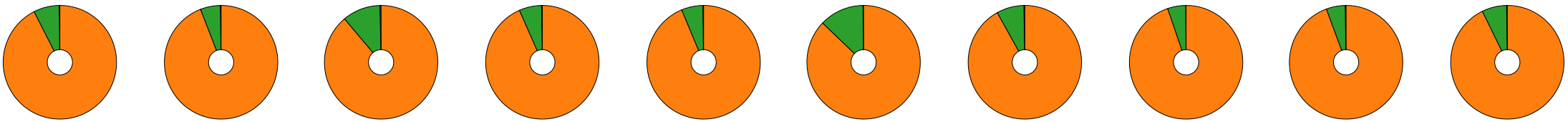


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	47	30	17	47	26	8	40	9	8	26	(GWh)
Grid	22,629	11,325	4,390	19,209	10,943	3,857	13,163	7,956	2,894	10,707	(GWh)
Renewable	1,784	681	534	1,314	712	562	1,115	433	165	811	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,298	63,425	62,504	66,373	63,107	62,165	63,621	61,365	60,278	63,571
SEA environmental disbenefit	112,799	78,935	71,409	99,156	77,341	73,355	81,755	68,309	59,028	80,232
Natural capital	84,168,449	81,314,462	84,188,961	79,672,258	81,313,117	84,026,495	80,975,187	81,744,834	84,646,650	82,450,046
Bio-diversity net gain	−187,050	−117,349	−89,129	−161,377	−116,214	−98,132	−119,369	−92,367	−62,817	−115,978

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,005	31,704	31,271	33,008	31,617	31,190	31,661	30,755	30,234	31,716

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.77	27.45	30.01	26.74	27.63	30.00	28.90	31.95	35.51	29.55
R1: Uncertainty of option supply/demand benefit	5.78	5.07	5.53	5.29	5.12	5.48	5.48	5.94	6.57	5.58
R3: Risk of service failure due to other physical hazards	6.64	6.76	7.57	6.41	6.82	7.56	7.09	8.03	9.16	7.34
R4: Availability of additional headroom	6.45	6.79	7.01	6.56	6.81	7.02	7.13	7.48	7.72	7.00
R5: Catchment/raw water quality risks (incl. climate change)	3.83	3.77	4.24	3.70	3.79	4.27	3.91	4.50	5.20	4.13
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.07	5.06	5.65	4.78	5.09	5.67	5.30	6.00	6.87	5.50
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

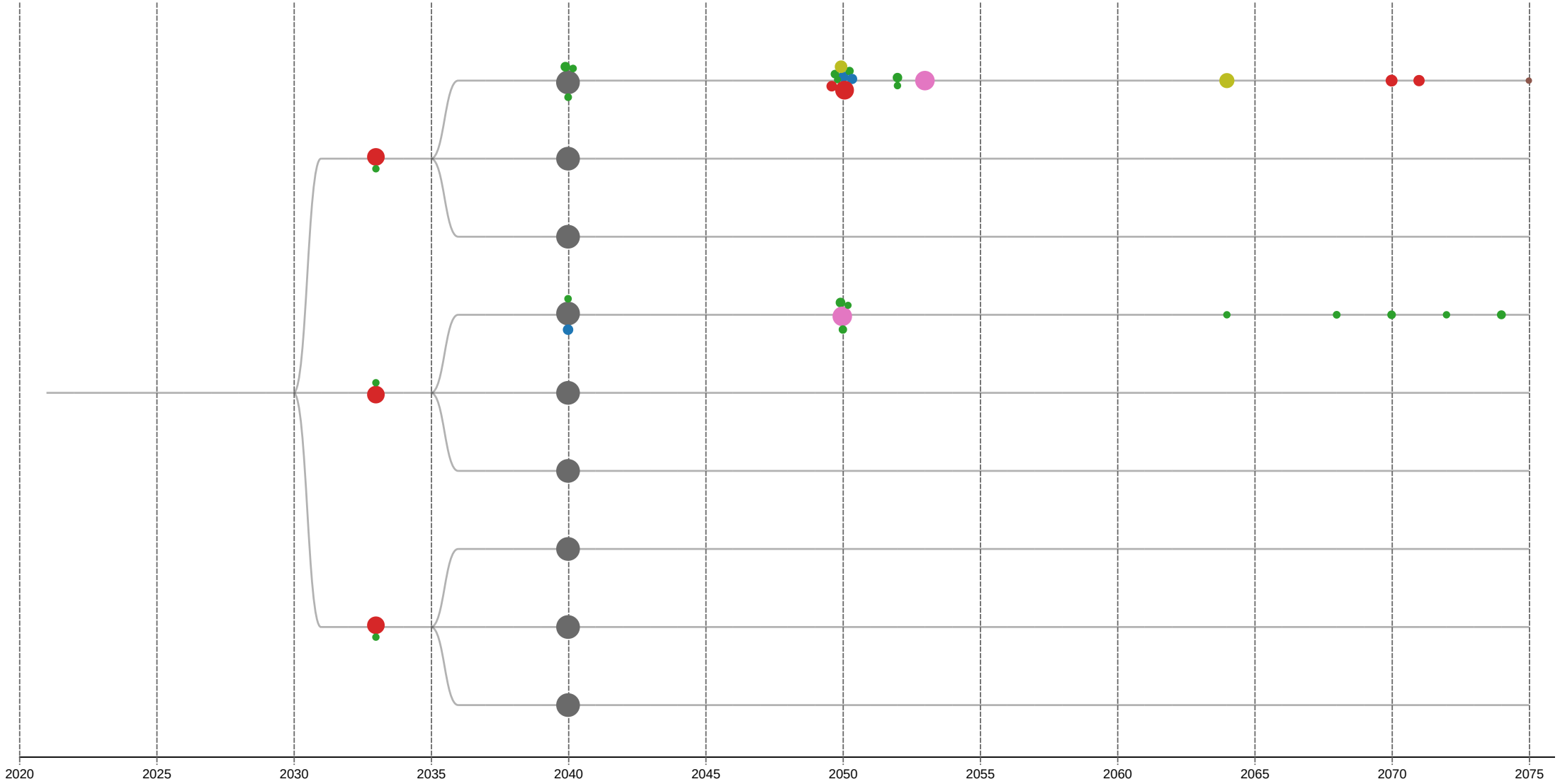
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.59	15.07	16.85	13.59	15.07	16.53	15.47	17.60	20.02	15.98
A3: Operational complexity and flexibility	6.17	6.48	7.28	6.02	6.54	7.33	6.78	7.76	8.91	7.03
A4: WRZ connectivity	7.39	8.56	9.54	7.54	8.50	9.17	8.67	9.82	11.08	8.92
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.39	19.76	21.82	18.65	19.93	21.79	20.50	23.27	26.36	21.28
E1: Scaleability and modularity of proposed changes	8.87	9.38	10.47	8.77	9.48	10.51	9.74	11.18	12.74	10.13
E2: Intervention lead times	4.29	4.08	4.33	3.92	4.09	4.24	4.18	4.59	5.10	4.31
E3: Reliance on external bodies to deliver changes	6.23	6.30	7.02	5.97	6.36	7.04	6.59	7.49	8.53	6.84
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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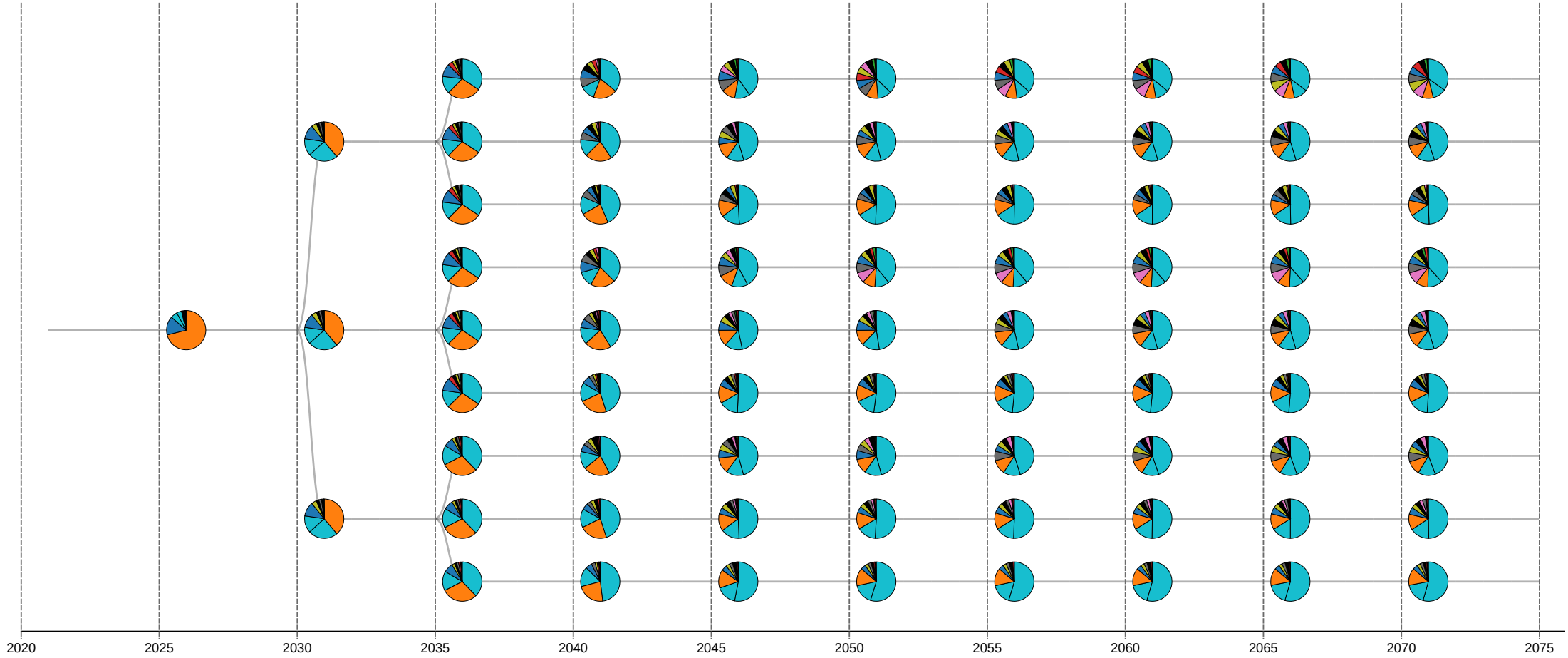
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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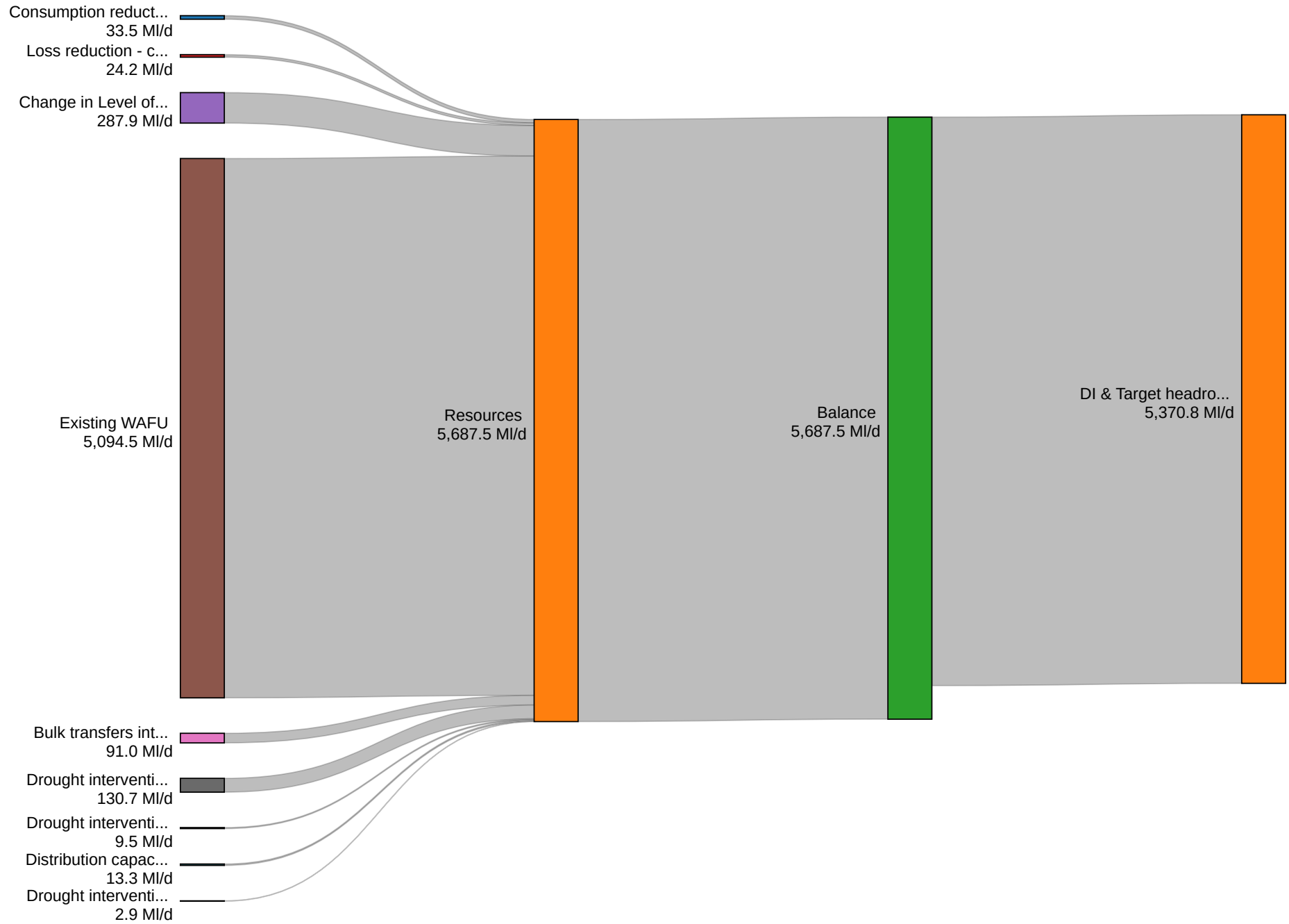
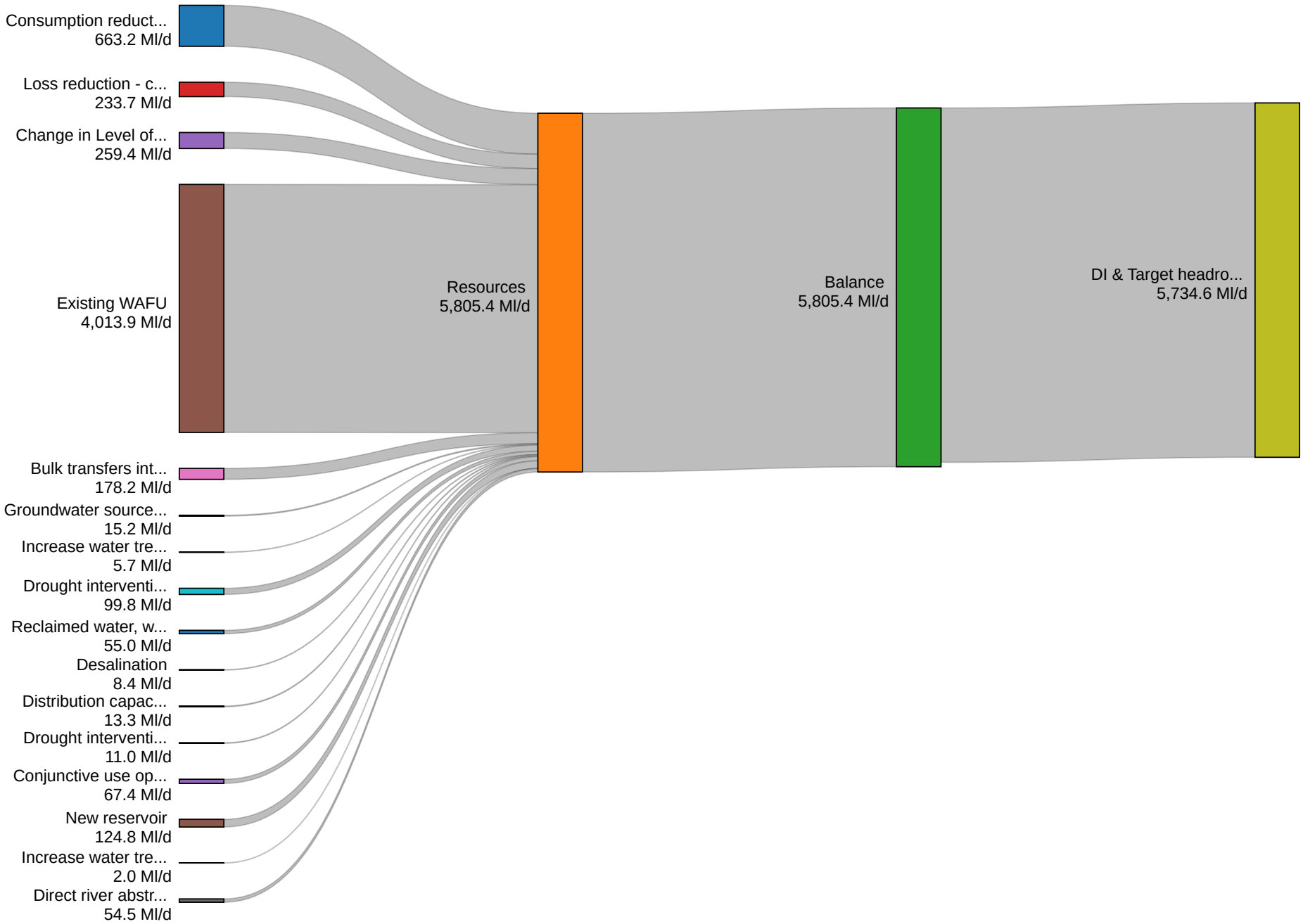
- Other

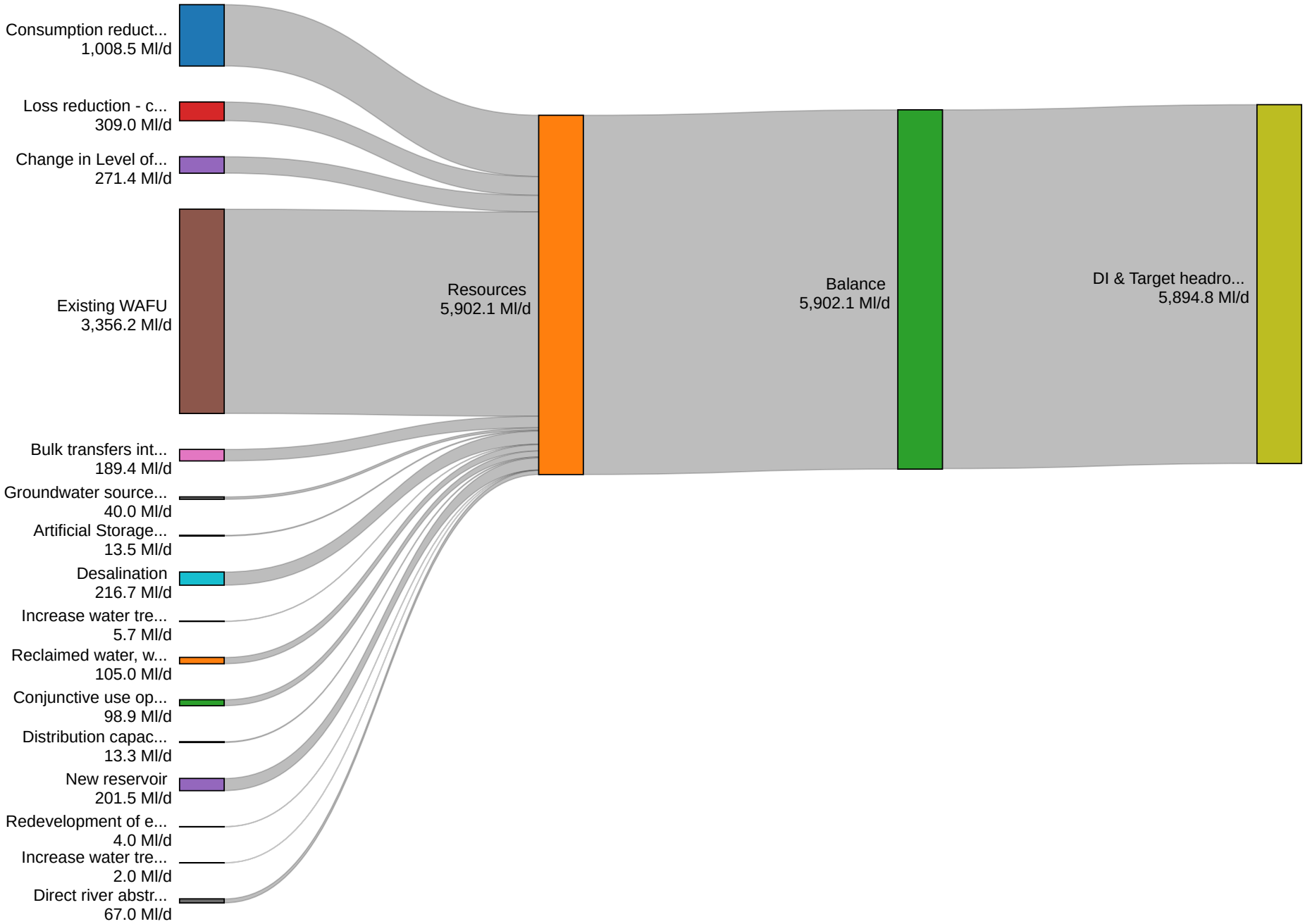
Situation 4 - 2026 (Thames Water)



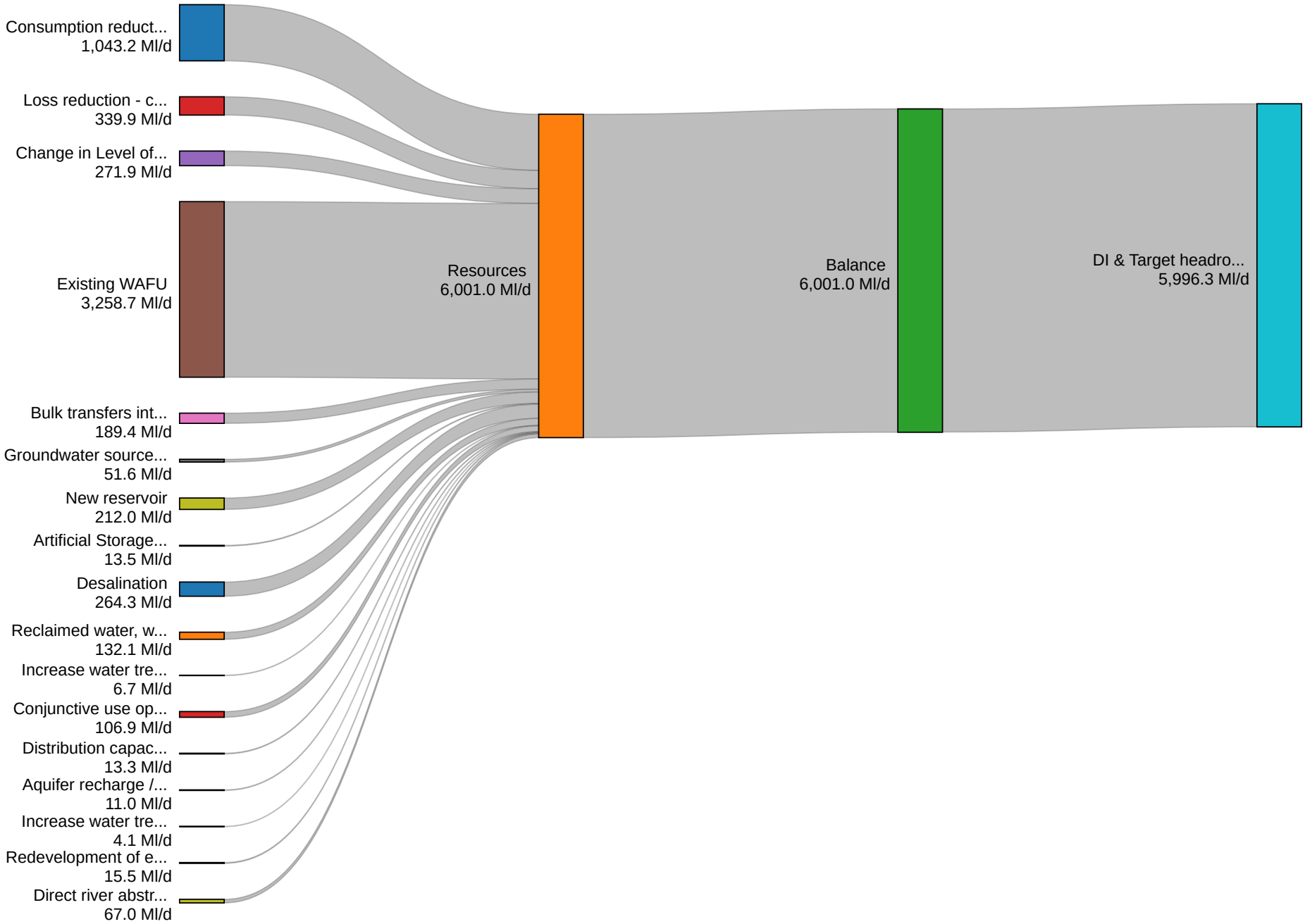
Situation 4 - 2040 (Thames Water)



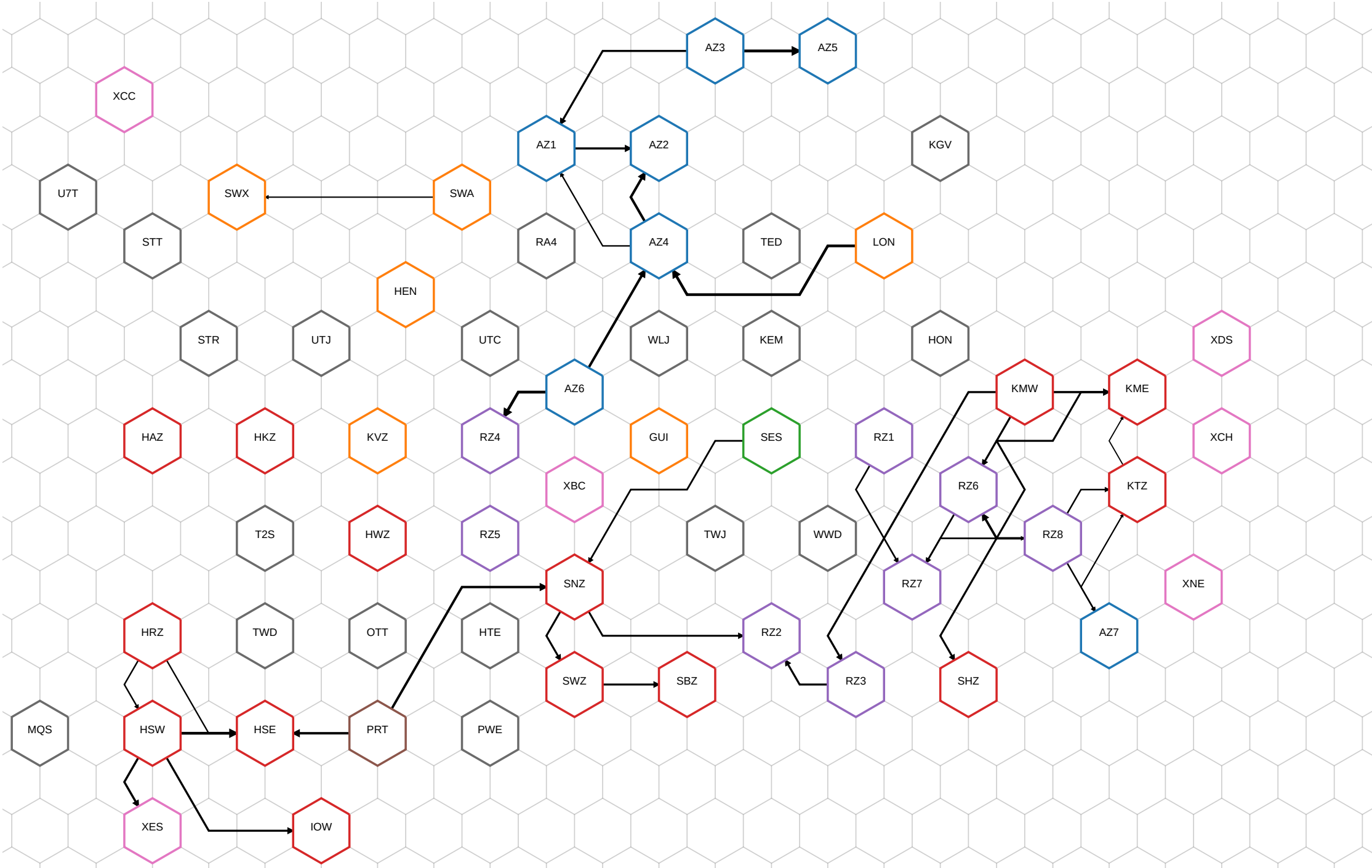
Situation 4 - 2050 (Thames Water)



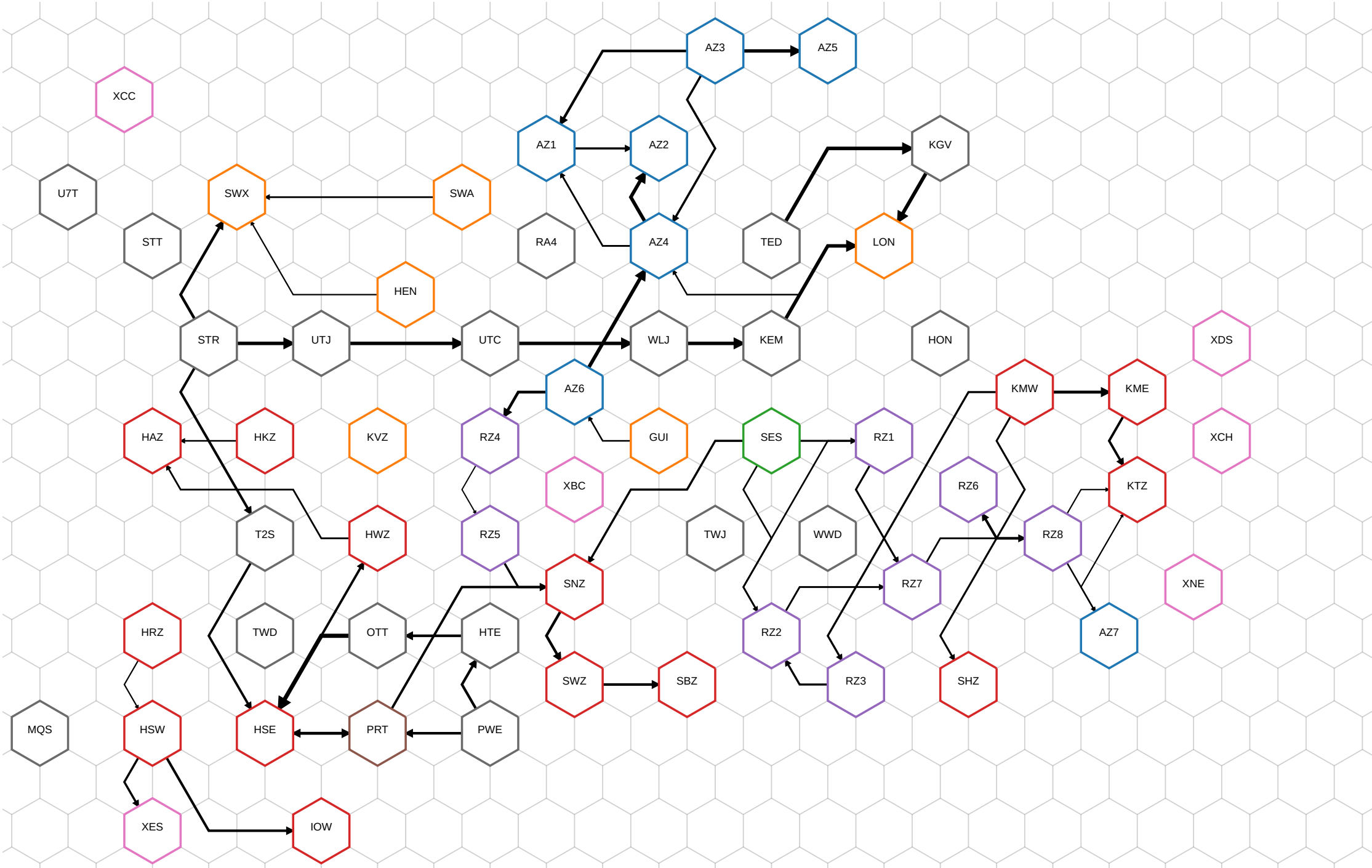
Situation 4 - 2075 (Thames Water)



Situation 4 - 2026



Situation 4 - 2040



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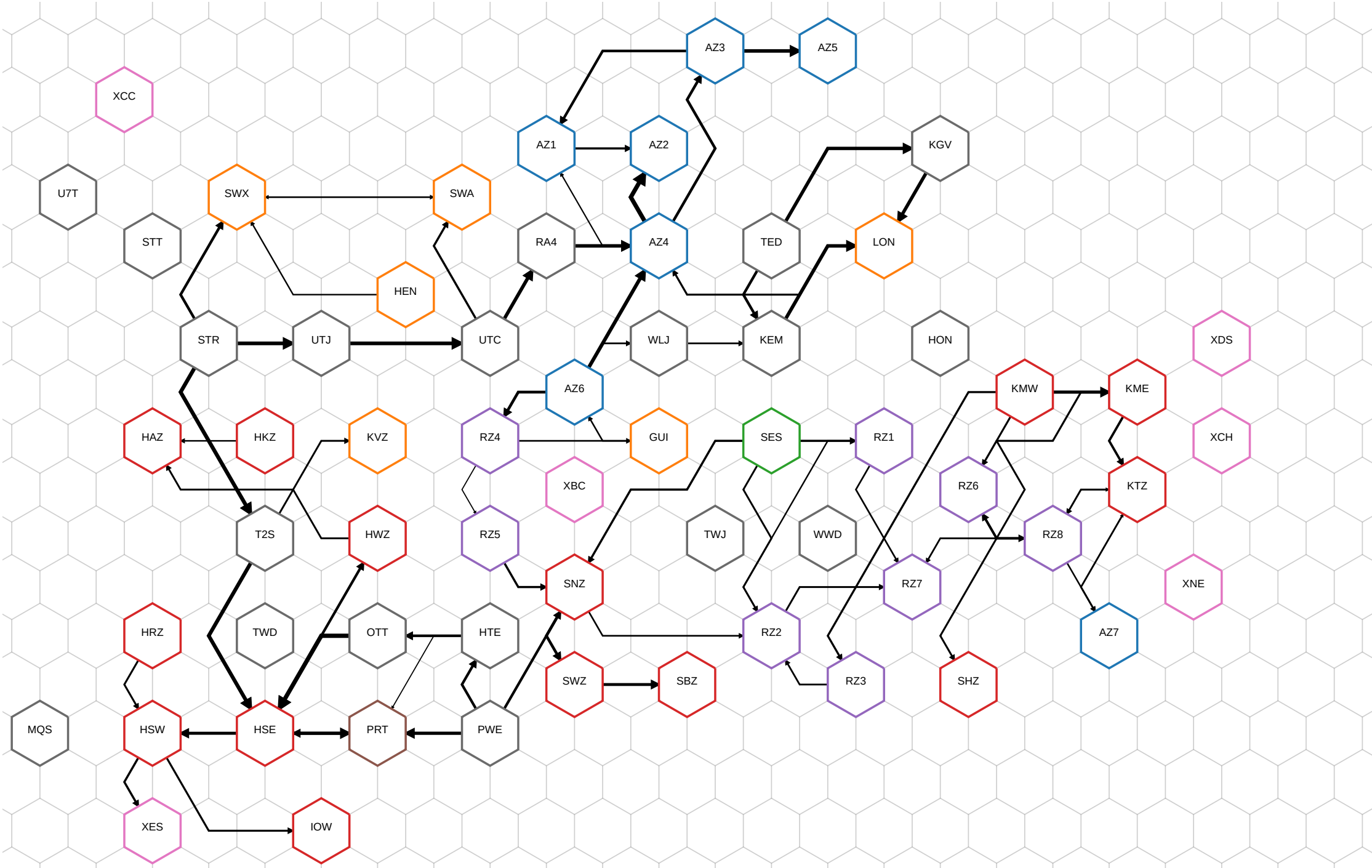
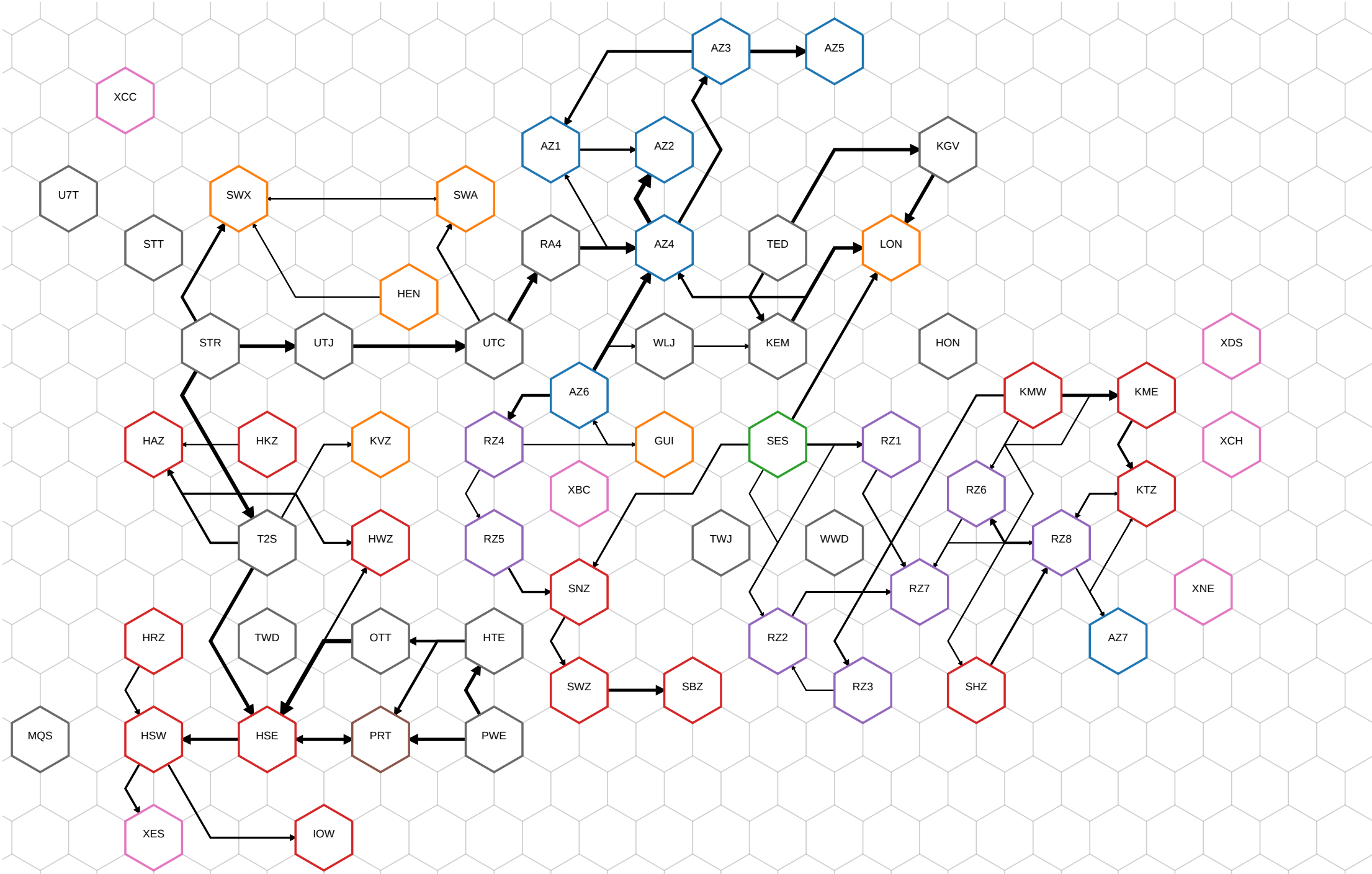


Situation 4 - 2075



IVM RUN DOSSIER

NO TEDDINGTON DRA

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions excluding Teddington DRA.
Created at	28/06/2023, 10:45:04
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-excl-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Excludes Teddington DRA.
Optimised discount rate	STPR

Metrics

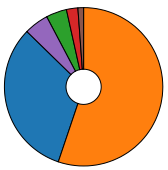
Net present value (Cost)

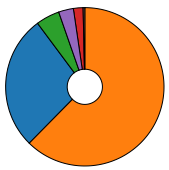
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,768	18,078	17,394	19,264	17,772	16,971	18,003	16,865	16,157	17,919	(£m)
Cost w/o deficit (STPR)	20,768	18,078	17,394	19,264	17,772	16,971	18,003	16,865	16,157	17,919	(£m)
Cost w/ deficit (IGEQ)	31,677	26,548	25,306	28,825	26,030	24,609	26,669	24,532	23,257	26,384	(£m)
Cost w/o deficit (IGEQ)	31,677	26,548	25,306	28,825	26,030	24,609	26,669	24,532	23,257	26,384	(£m)
Cost w/ deficit (LTDR)	22,880	19,746	18,958	21,131	19,399	18,483	19,701	18,380	17,567	19,583	(£m)
Cost w/o deficit (LTDR)	22,880	19,746	18,958	21,131	19,399	18,483	19,701	18,380	17,567	19,583	(£m)

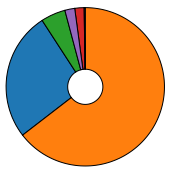
Cost breakdown (STPR)

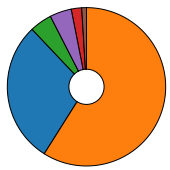
Select Company: Total

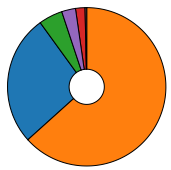
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,671	4,960	4,573	5,583	4,743	4,257	4,721	4,104	3,660	4,808	(£m)
Fixed opex	11,459	11,277	11,226	11,357	11,256	11,196	11,277	11,203	11,142	11,266	(£m)
Fixed operational carbon	880	874	873	875	867	867	868	864	863	870	(£m)
Embedded carbon	484	357	332	412	345	314	334	287	260	347	(£m)
Variable opex	1,035	547	350	851	502	298	645	374	219	535	(£m)
Variable carbon opex	239	63	39	187	60	39	159	32	14	93	(£m)

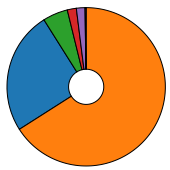
situation1 

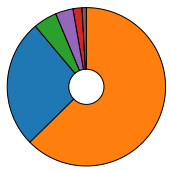
situation2 

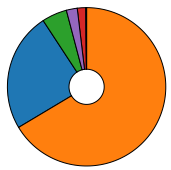
situation3 

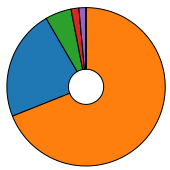
situation4 

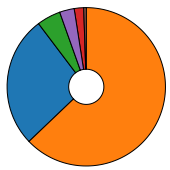
situation5 

situation6 

situation7 

situation8 

situation9 

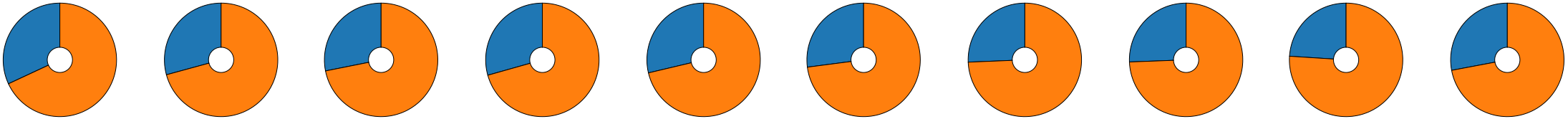
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,095,916	2,189,714	2,020,464	2,574,372	2,105,662	1,901,568	2,061,817	1,740,872	1,558,064	2,138,717	(tonnes)
Operational emissions	6,600,323	5,300,070	5,161,368	6,191,120	5,233,821	5,126,677	5,977,867	5,061,164	4,939,818	5,510,248	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

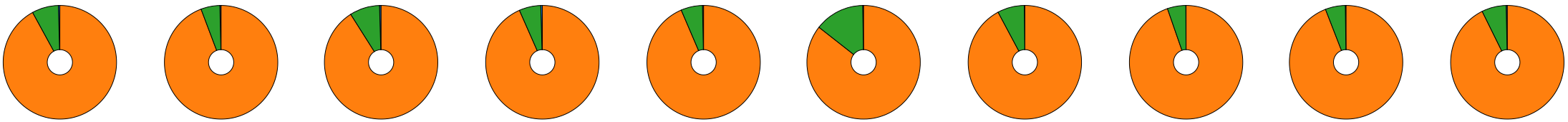


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	103	45	26	93	38	11	21	7	6	39	(GWh)
Grid	22,566	11,894	5,157	19,127	10,869	3,772	13,651	7,817	2,729	10,843	(GWh)
Renewable	1,853	681	485	1,264	713	625	1,138	433	165	817	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,088	64,778	63,687	66,834	63,374	62,209	63,960	61,921	60,834	64,076
SEA environmental disbenefit	113,519	85,486	77,573	100,680	82,385	76,366	88,786	73,800	64,519	84,790
Natural capital	81,687,539	77,158,746	80,037,207	75,553,168	77,193,203	79,997,733	64,472,651	65,083,317	67,985,133	74,352,077
Bio-diversity net gain	−220,014	−160,660	−130,014	−197,779	−153,202	−127,036	−141,336	−101,914	−72,364	−144,924

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,813	32,015	31,531	33,109	31,820	31,373	31,994	31,044	30,523	31,914

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.03	30.46	33.34	28.19	29.43	32.09	27.10	29.74	32.96	30.26
R1: Uncertainty of option supply/demand benefit	6.17	5.98	6.54	5.66	5.48	5.92	5.13	5.48	6.04	5.82
R3: Risk of service failure due to other physical hazards	6.96	7.56	8.47	6.84	7.29	8.12	6.57	7.41	8.43	7.52
R4: Availability of additional headroom	6.57	6.92	7.13	6.65	6.94	7.14	7.01	7.35	7.59	7.03
R5: Catchment/raw water quality risks (incl. climate change)	4.00	4.11	4.62	3.75	4.13	4.65	3.60	4.09	4.72	4.19
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.33	5.89	6.59	5.29	5.60	6.25	4.79	5.41	6.18	5.70
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

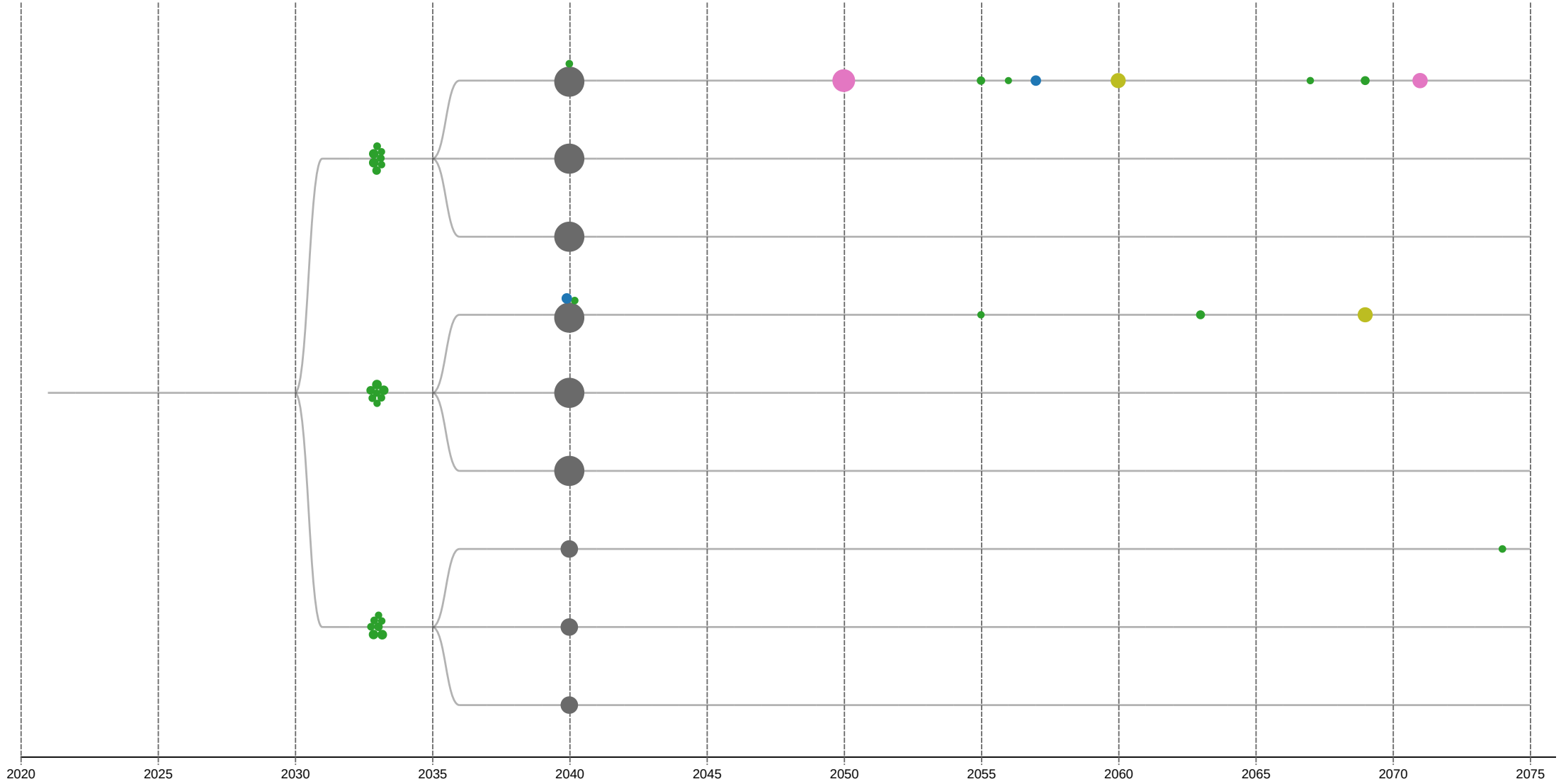
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.67	15.58	17.41	13.82	15.28	16.77	14.61	16.67	18.94	15.86
A3: Operational complexity and flexibility	6.56	7.38	8.29	6.58	7.11	7.99	6.34	7.25	8.32	7.31
A4: WRZ connectivity	7.09	8.17	9.09	7.21	8.14	8.75	8.24	9.39	10.59	8.52
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.29	20.77	22.91	18.86	20.15	22.10	20.09	22.74	25.75	21.41
E1: Scaleability and modularity of proposed changes	8.81	9.62	10.72	8.65	9.39	10.43	9.51	10.87	12.37	10.04
E2: Intervention lead times	4.17	4.30	4.57	4.03	4.20	4.39	4.04	4.43	4.91	4.34
E3: Reliance on external bodies to deliver changes	6.31	6.84	7.61	6.18	6.56	7.29	6.55	7.44	8.47	7.03
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

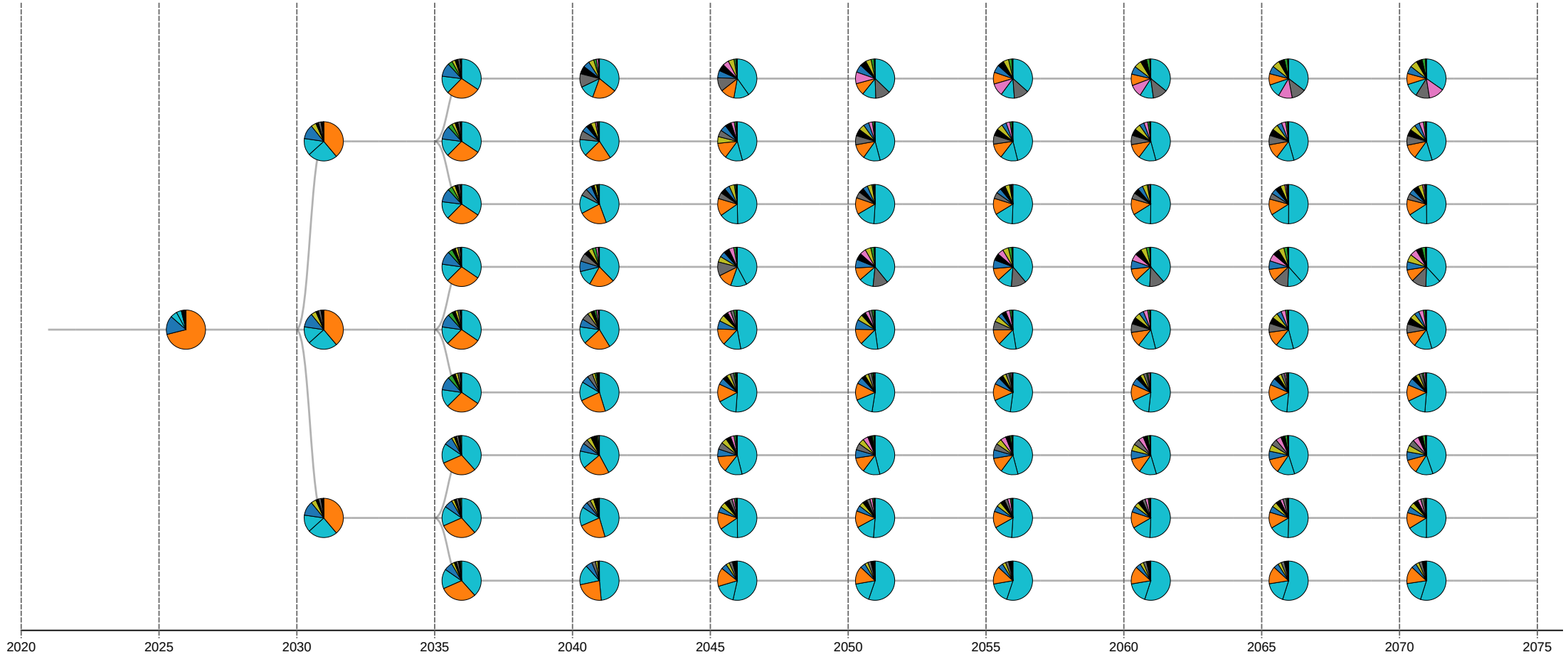
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

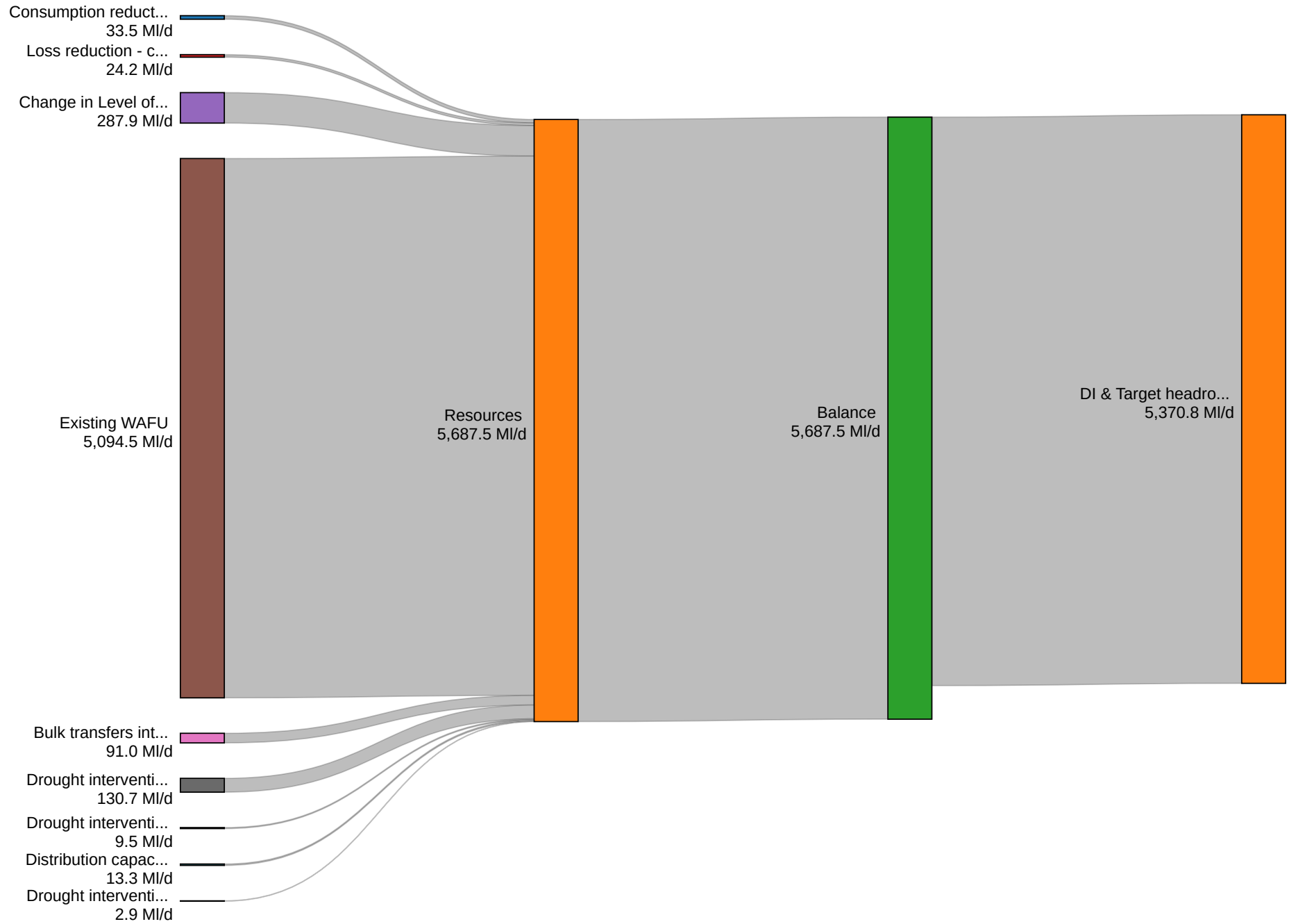
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

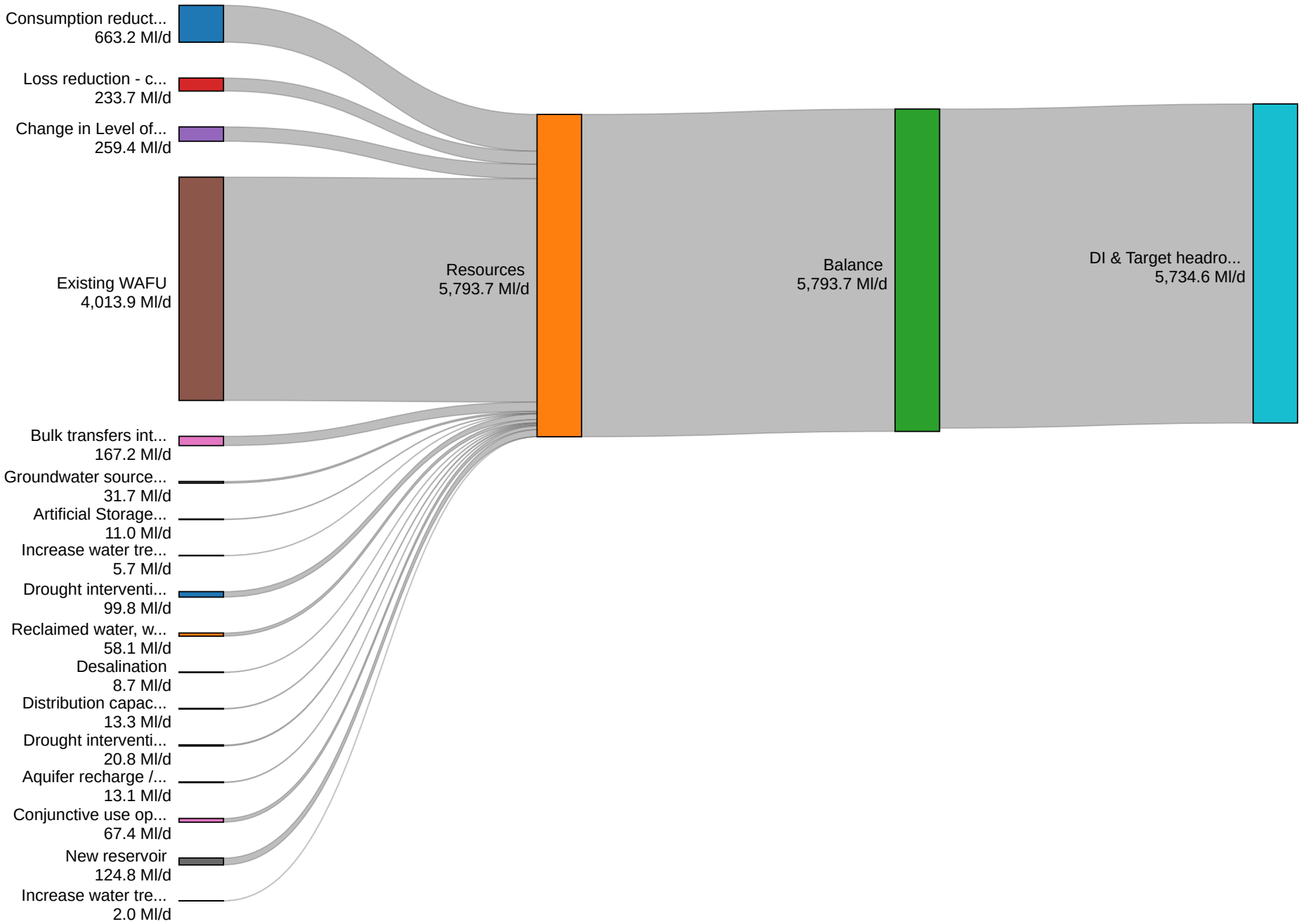


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

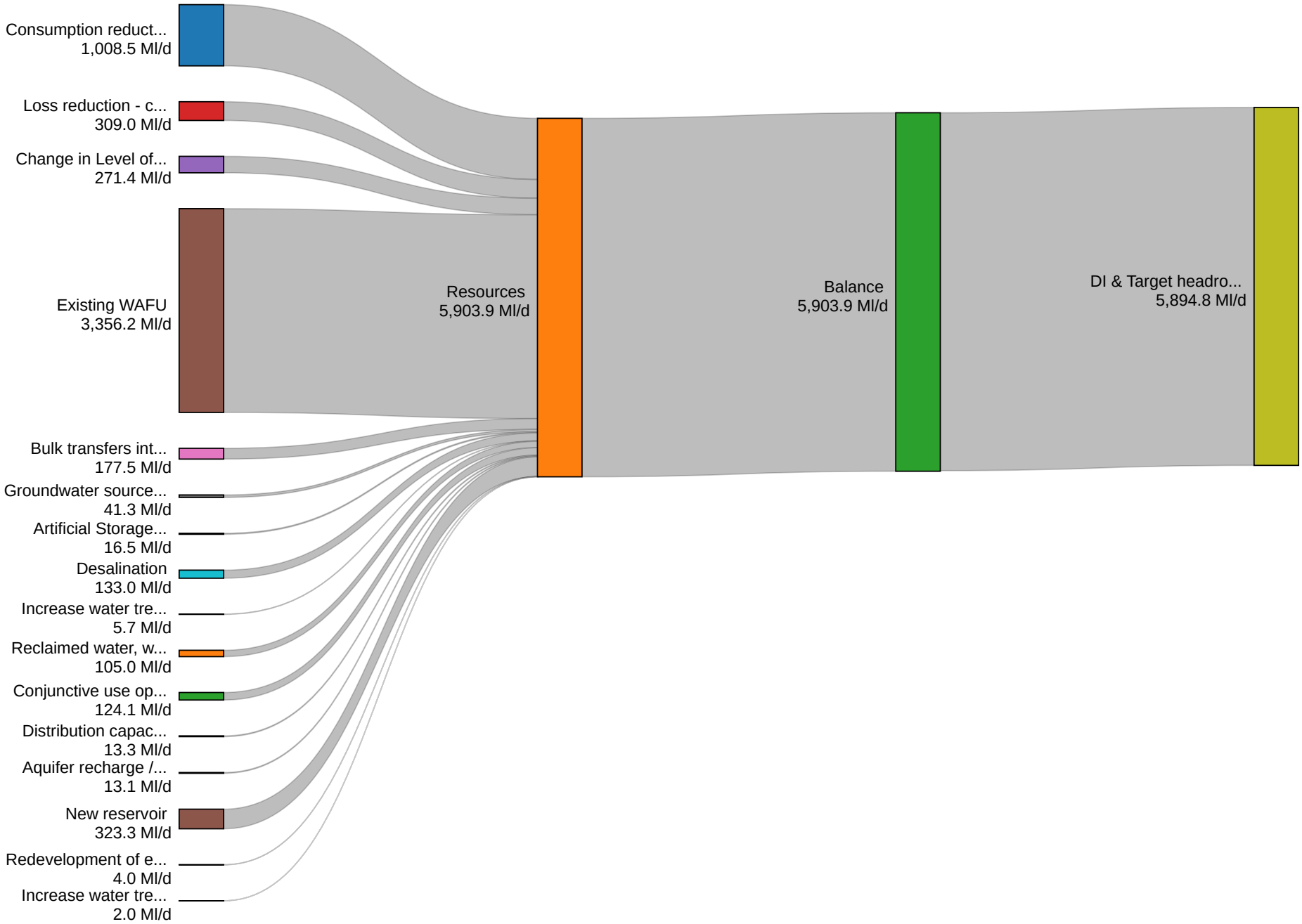
Situation 4 - 2026 (Thames Water)



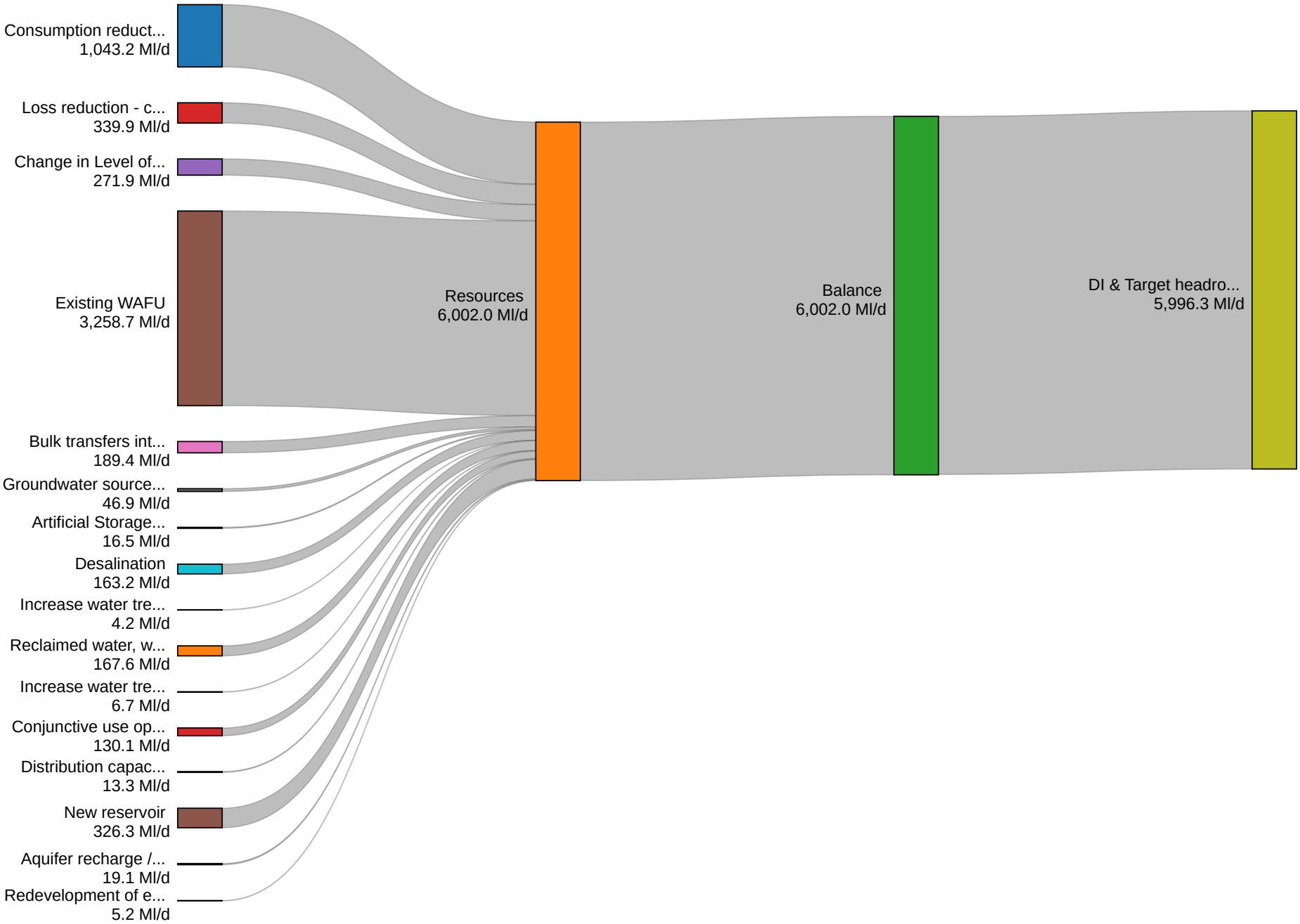
Situation 4 - 2040 (Thames Water)



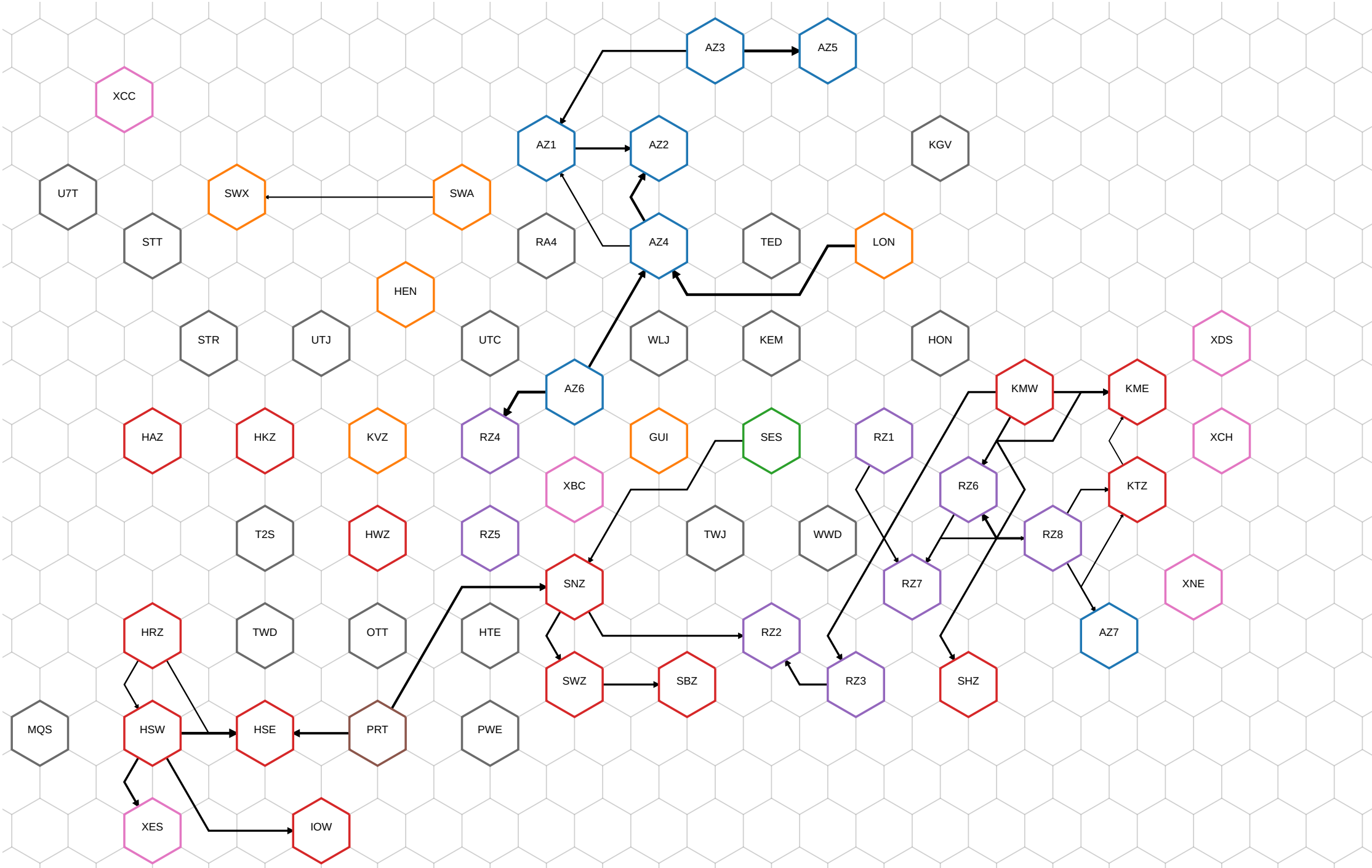
Situation 4 - 2050 (Thames Water)



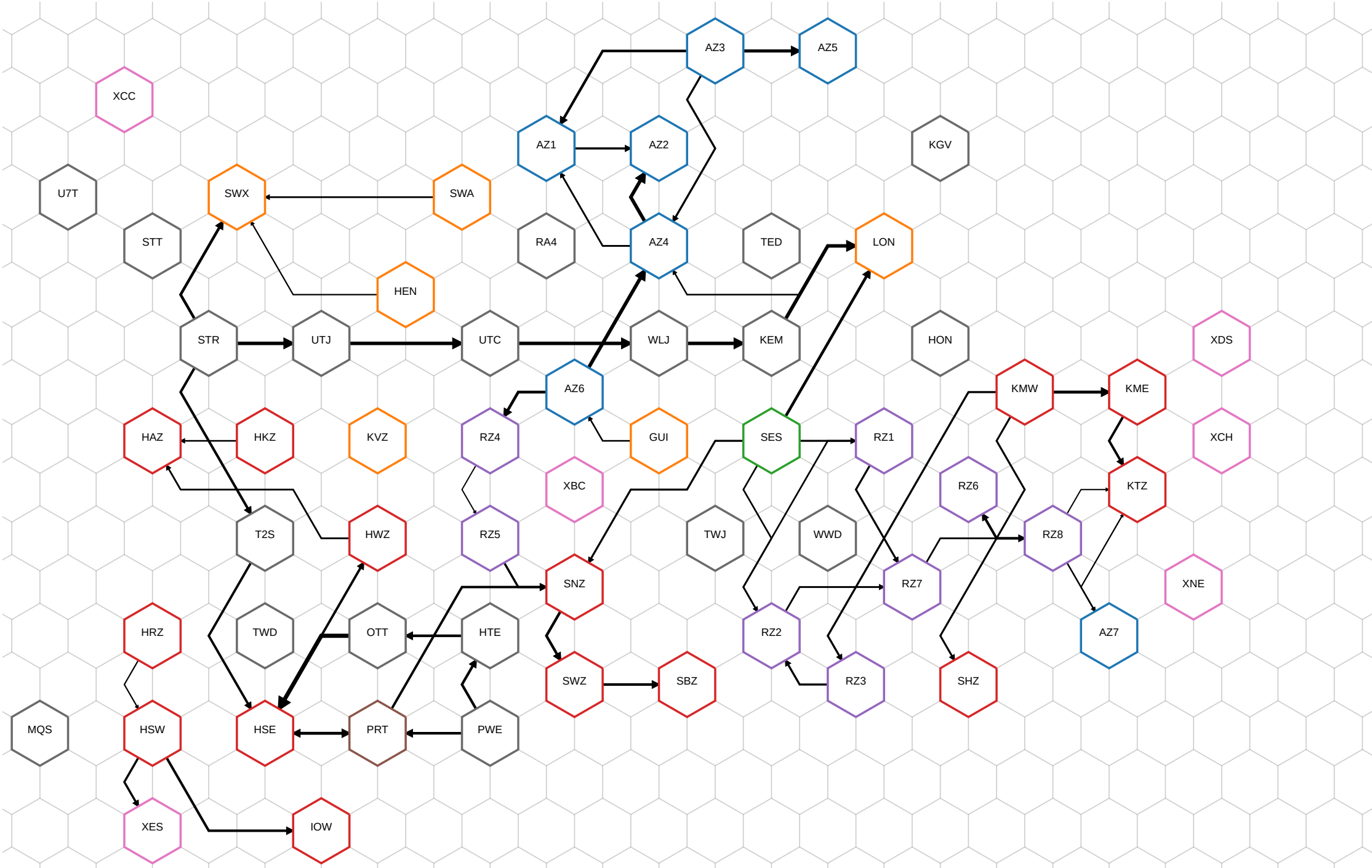
Situation 4 - 2075 (Thames Water)



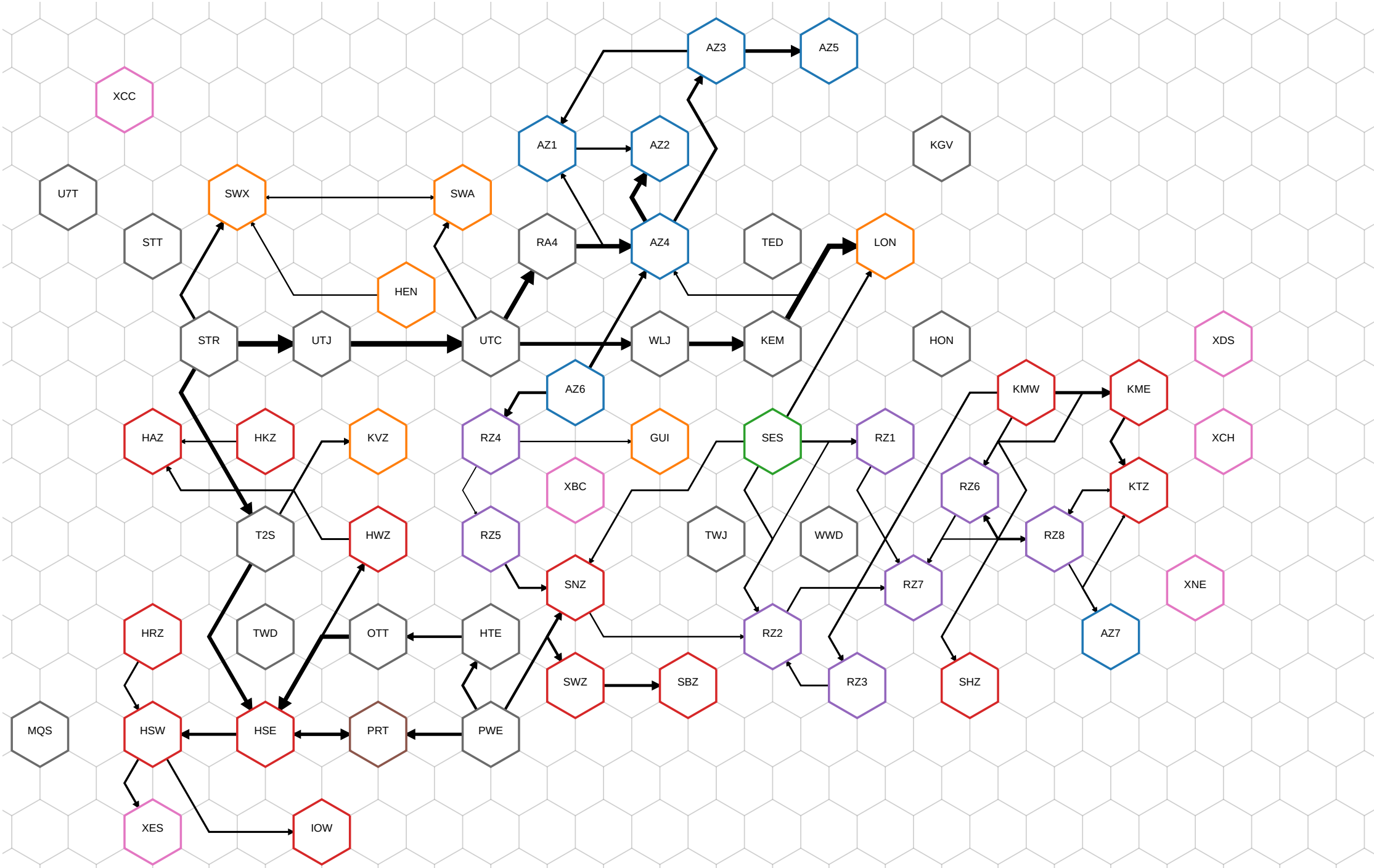
Situation 4 - 2026



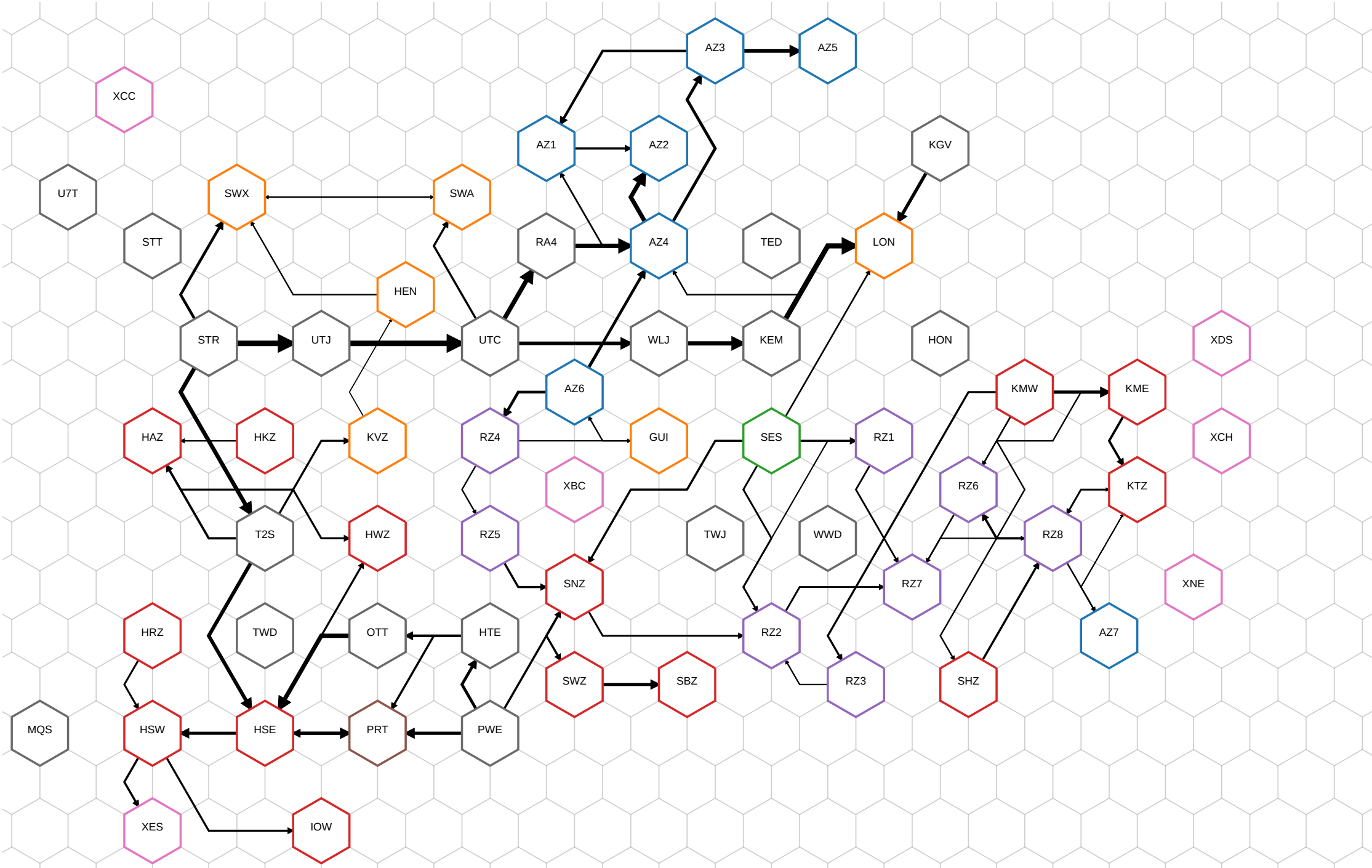
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

UPSIZE GRAND UNION CANAL TO 100Ml/d

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-2075
Description	Least cost run with hybrid-c+2 government interventions including only GUC 100 Ml/d.
Created at	22/06/2023, 20:42:01
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100.
Optimised discount rate	STPR

Metrics

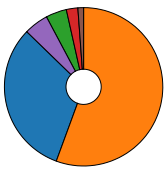
Net present value (Cost)

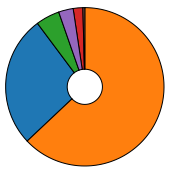
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,566	17,875	17,161	19,206	17,702	16,903	18,006	16,860	16,146	17,825	(£m)
Cost w/o deficit (STPR)	20,566	17,875	17,161	19,206	17,702	16,903	18,006	16,860	16,146	17,825	(£m)
Cost w/ deficit (IGEQ)	31,304	26,210	24,920	28,734	25,925	24,506	26,680	24,529	23,242	26,228	(£m)
Cost w/o deficit (IGEQ)	31,304	26,210	24,920	28,734	25,925	24,506	26,680	24,529	23,242	26,228	(£m)
Cost w/ deficit (LTDR)	22,648	19,517	18,696	21,067	19,323	18,408	19,706	18,376	17,555	19,477	(£m)
Cost w/o deficit (LTDR)	22,648	19,517	18,696	21,067	19,323	18,408	19,706	18,376	17,555	19,477	(£m)

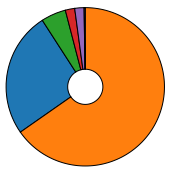
Cost breakdown (STPR)

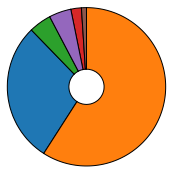
Select Company: Total

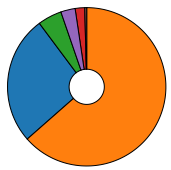
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,510	4,794	4,390	5,506	4,653	4,168	4,694	4,077	3,633	4,714	(£m)
Fixed opex	11,436	11,256	11,205	11,347	11,245	11,185	11,267	11,193	11,132	11,252	(£m)
Fixed operational carbon	878	869	870	877	870	870	870	867	865	871	(£m)
Embedded carbon	483	353	328	415	346	316	340	294	267	349	(£m)
Variable opex	1,021	533	326	866	519	315	663	389	231	540	(£m)
Variable carbon opex	238	70	41	196	70	50	171	40	18	99	(£m)

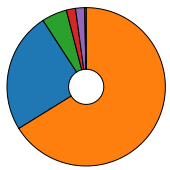
situation1 

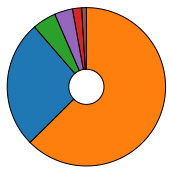
situation2 

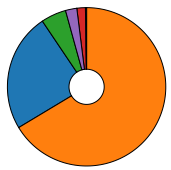
situation3 

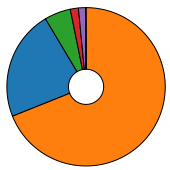
situation4 

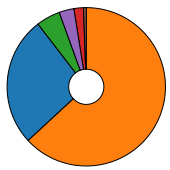
situation5 

situation6 

situation7 

situation8 

situation9 

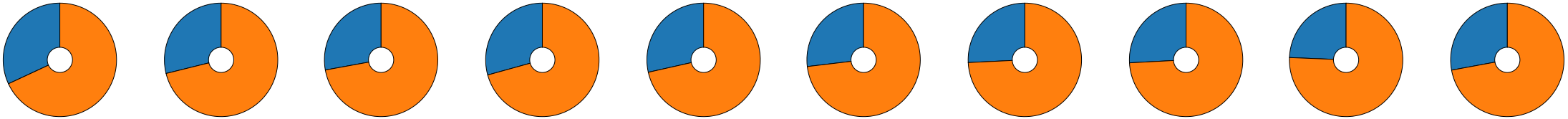
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,081,568	2,156,063	1,992,715	2,594,157	2,118,042	1,913,948	2,106,313	1,785,368	1,602,560	2,150,081	(tonnes)
Operational emissions	6,571,907	5,314,553	5,157,957	6,260,436	5,310,233	5,205,454	6,071,355	5,125,486	4,979,014	5,555,155	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

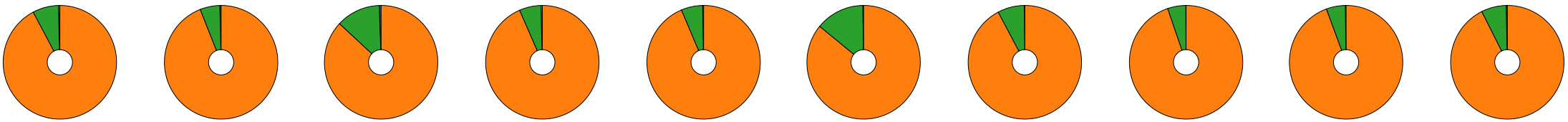


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	103	45	26	85	35	11	21	7	6	38	(GWh)
Grid	22,337	11,396	4,277	19,155	10,962	3,870	13,741	7,939	2,878	10,728	(GWh)
Renewable	1,781	681	619	1,261	713	625	1,138	433	165	824	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,515	63,551	62,688	66,539	63,015	61,850	63,330	61,291	60,204	63,443
SEA environmental disbenefit	109,015	78,542	71,683	97,200	77,217	71,198	83,233	68,247	58,966	79,478
Natural capital	81,887,549	77,234,492	80,088,601	77,452,821	79,110,259	81,914,790	64,491,608	65,102,274	68,004,090	75,031,832
Bio-diversity net gain	−207,955	−149,142	−119,042	−185,990	−139,275	−113,109	−136,409	−96,987	−67,437	−135,038

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,692	31,651	31,253	32,962	31,570	31,113	31,676	30,730	30,209	31,651

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.91	29.62	32.43	28.05	29.12	31.71	27.51	30.22	33.51	30.12
R1: Uncertainty of option supply/demand benefit	5.97	5.52	6.03	5.62	5.43	5.86	5.22	5.60	6.17	5.71
R3: Risk of service failure due to other physical hazards	6.95	7.35	8.22	6.81	7.22	8.03	6.69	7.55	8.60	7.49
R4: Availability of additional headroom	6.62	6.95	7.16	6.63	6.92	7.12	7.04	7.38	7.62	7.05
R5: Catchment/raw water quality risks (incl. climate change)	4.06	4.16	4.69	3.72	4.06	4.57	3.67	4.17	4.82	4.21
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.33	5.64	6.32	5.25	5.49	6.13	4.88	5.52	6.31	5.65
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

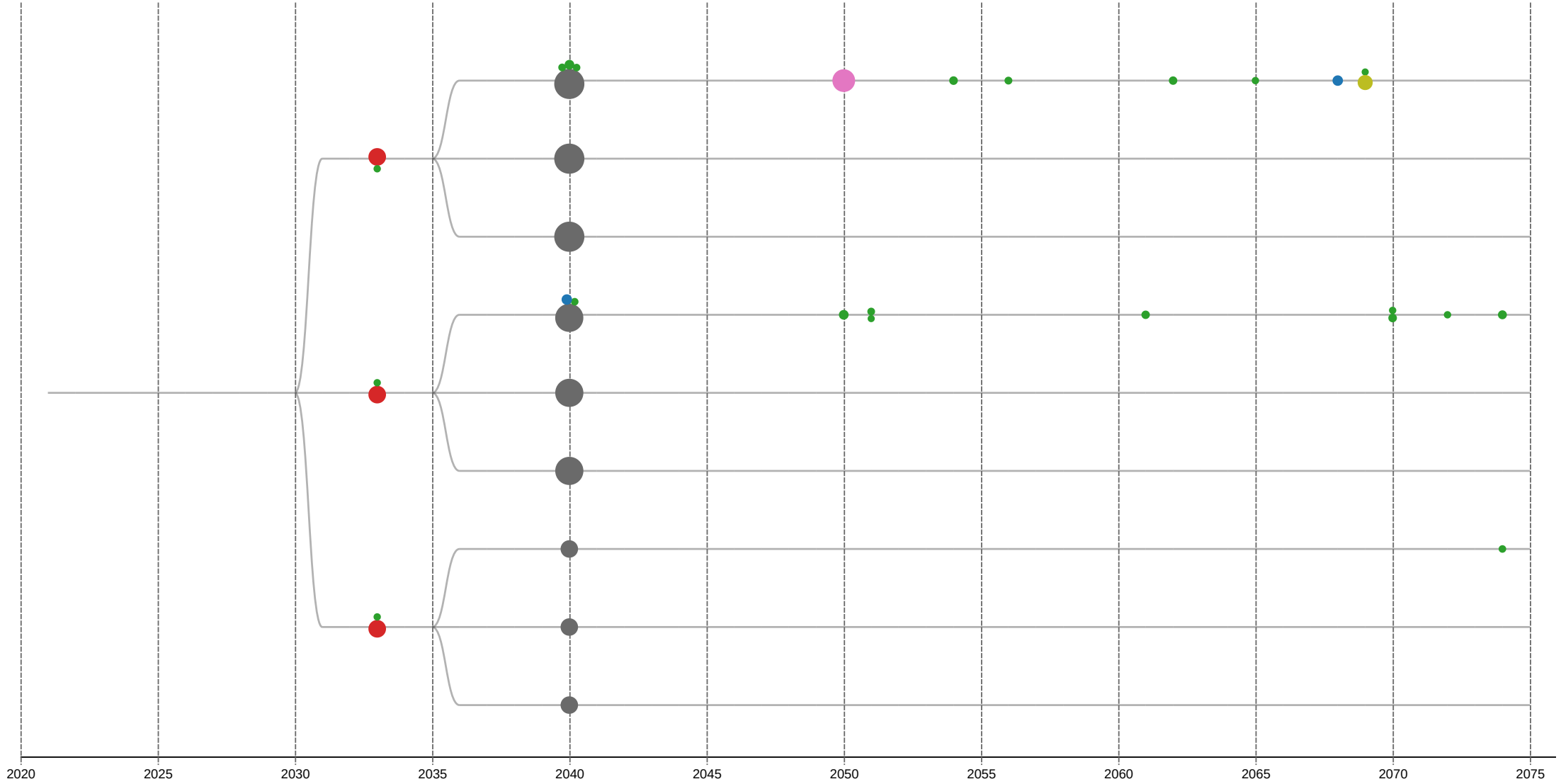
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.90	15.63	17.50	14.05	15.46	16.97	14.98	17.12	19.46	16.12
A3: Operational complexity and flexibility	6.49	7.07	7.94	6.49	6.94	7.78	6.36	7.28	8.35	7.19
A4: WRZ connectivity	7.39	8.53	9.53	7.54	8.49	9.15	8.59	9.82	11.08	8.90
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.05	20.02	22.09	18.87	20.05	21.97	20.13	22.78	25.80	21.20
E1: Scaleability and modularity of proposed changes	8.73	9.35	10.42	8.70	9.40	10.44	9.57	10.94	12.45	10.00
E2: Intervention lead times	4.17	4.22	4.49	4.05	4.19	4.38	4.08	4.48	4.96	4.34
E3: Reliance on external bodies to deliver changes	6.15	6.44	7.18	6.12	6.46	7.16	6.49	7.37	8.38	6.86
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

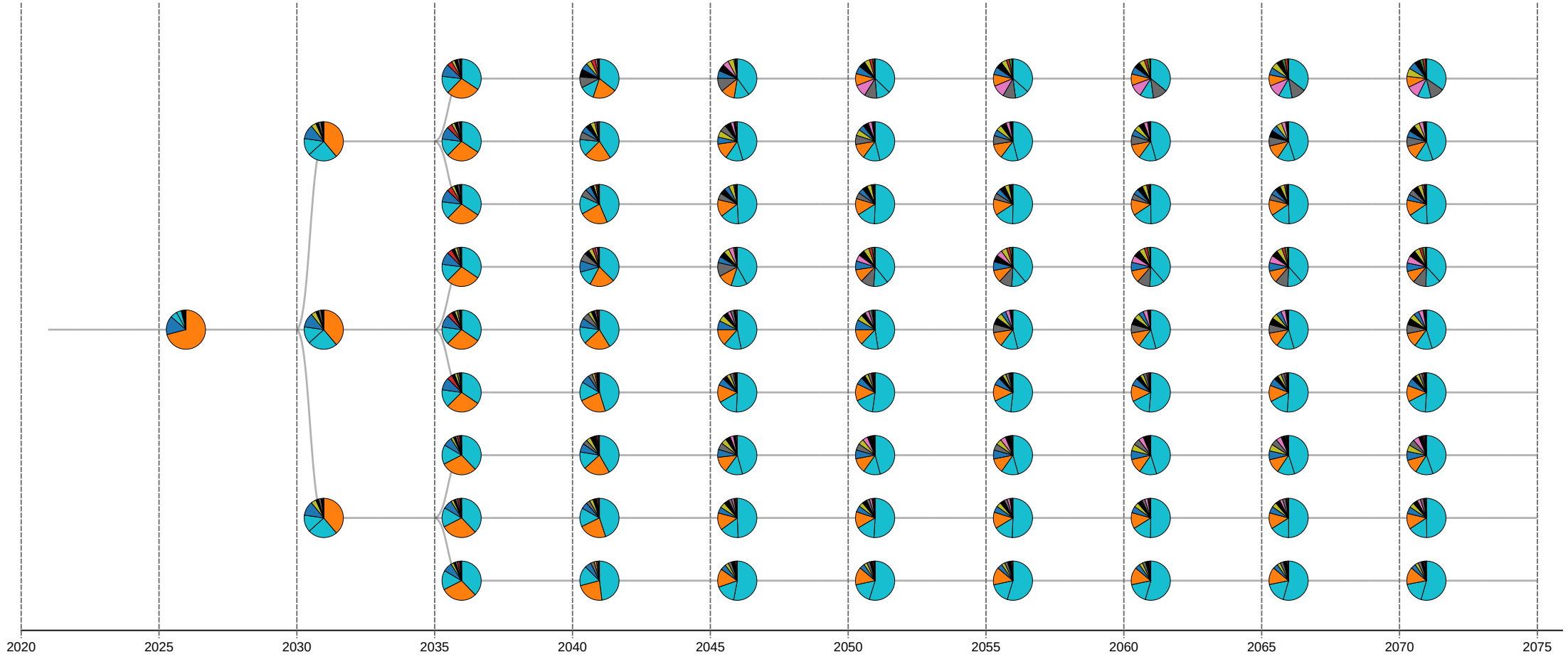
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

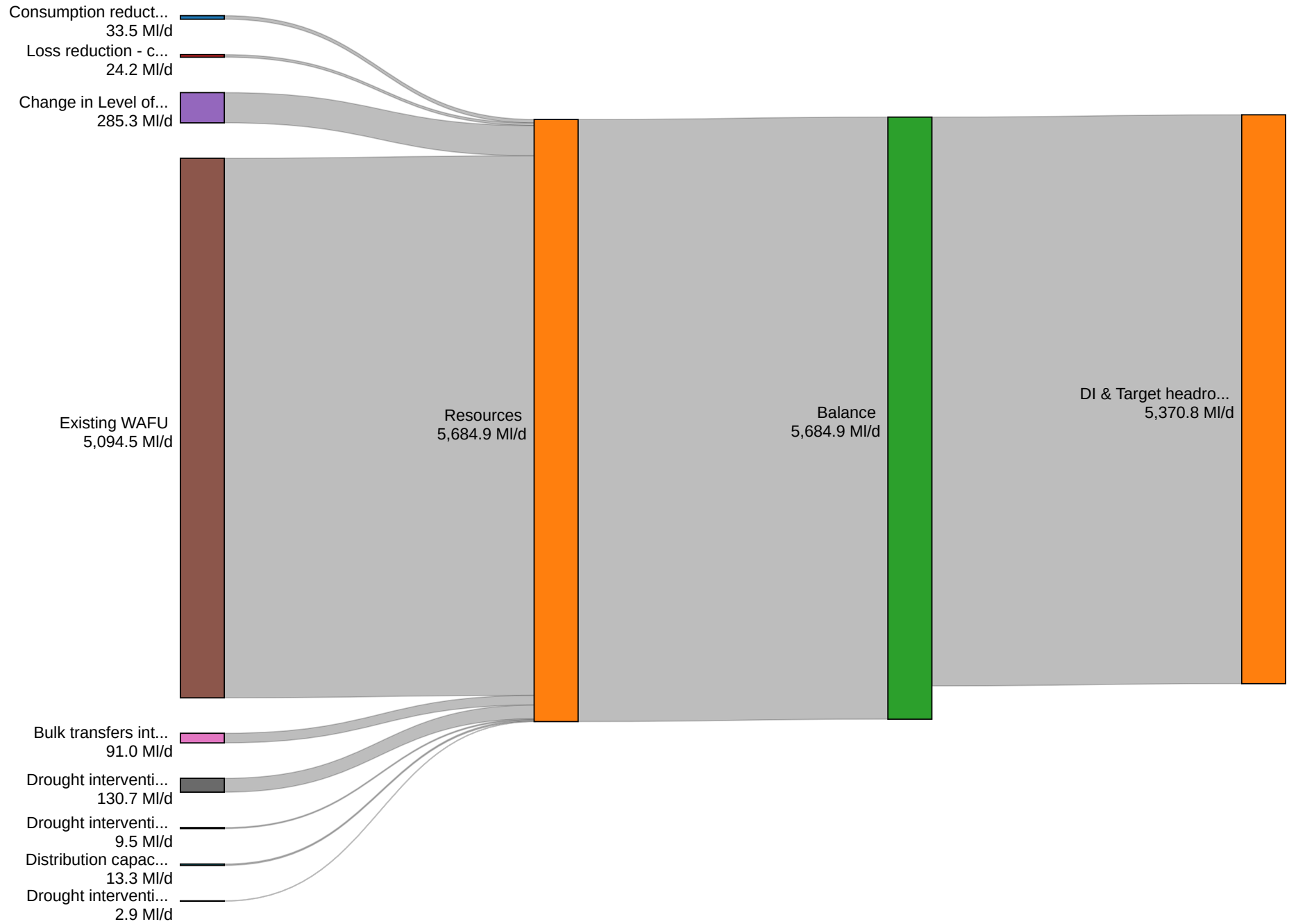
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

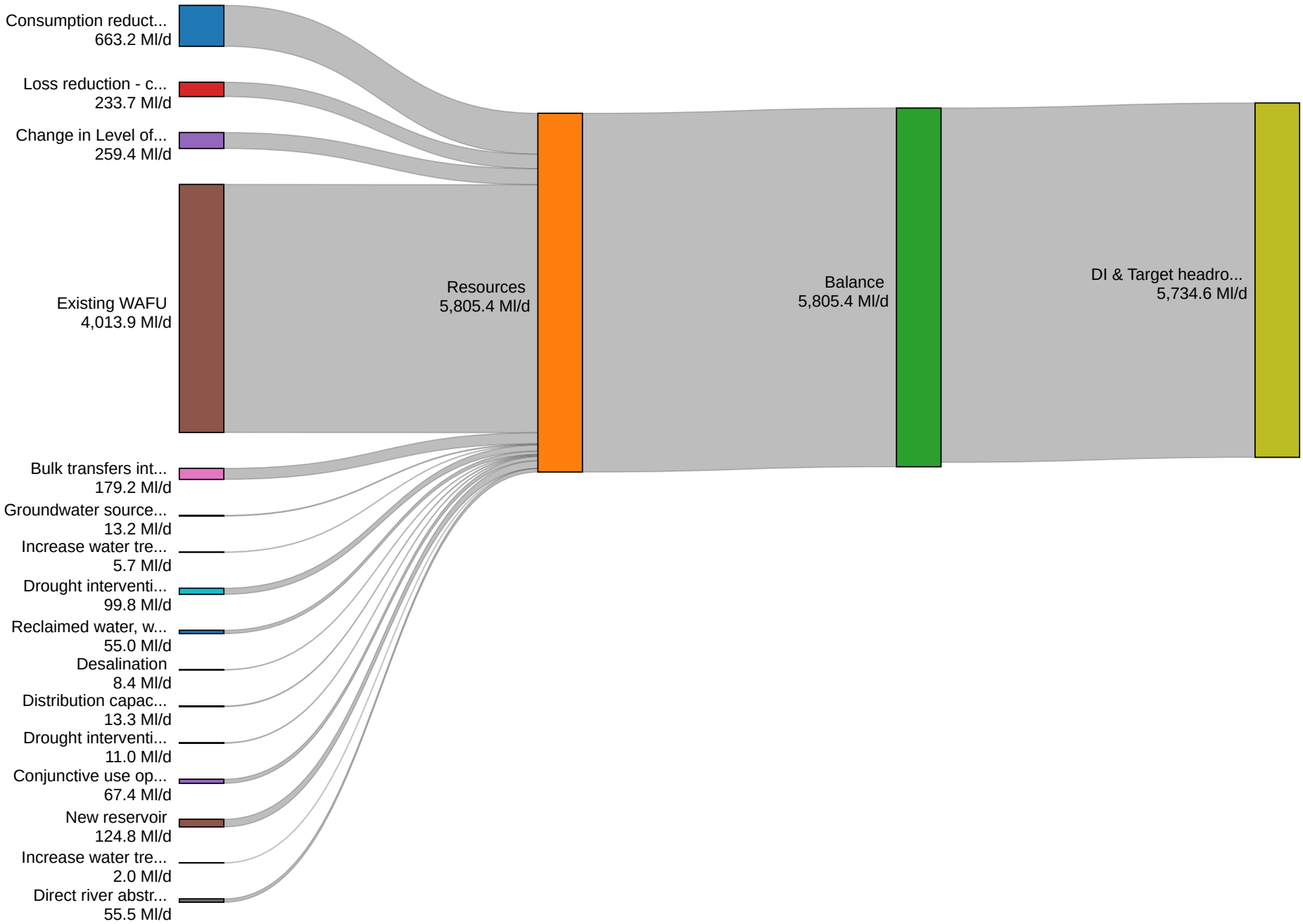


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

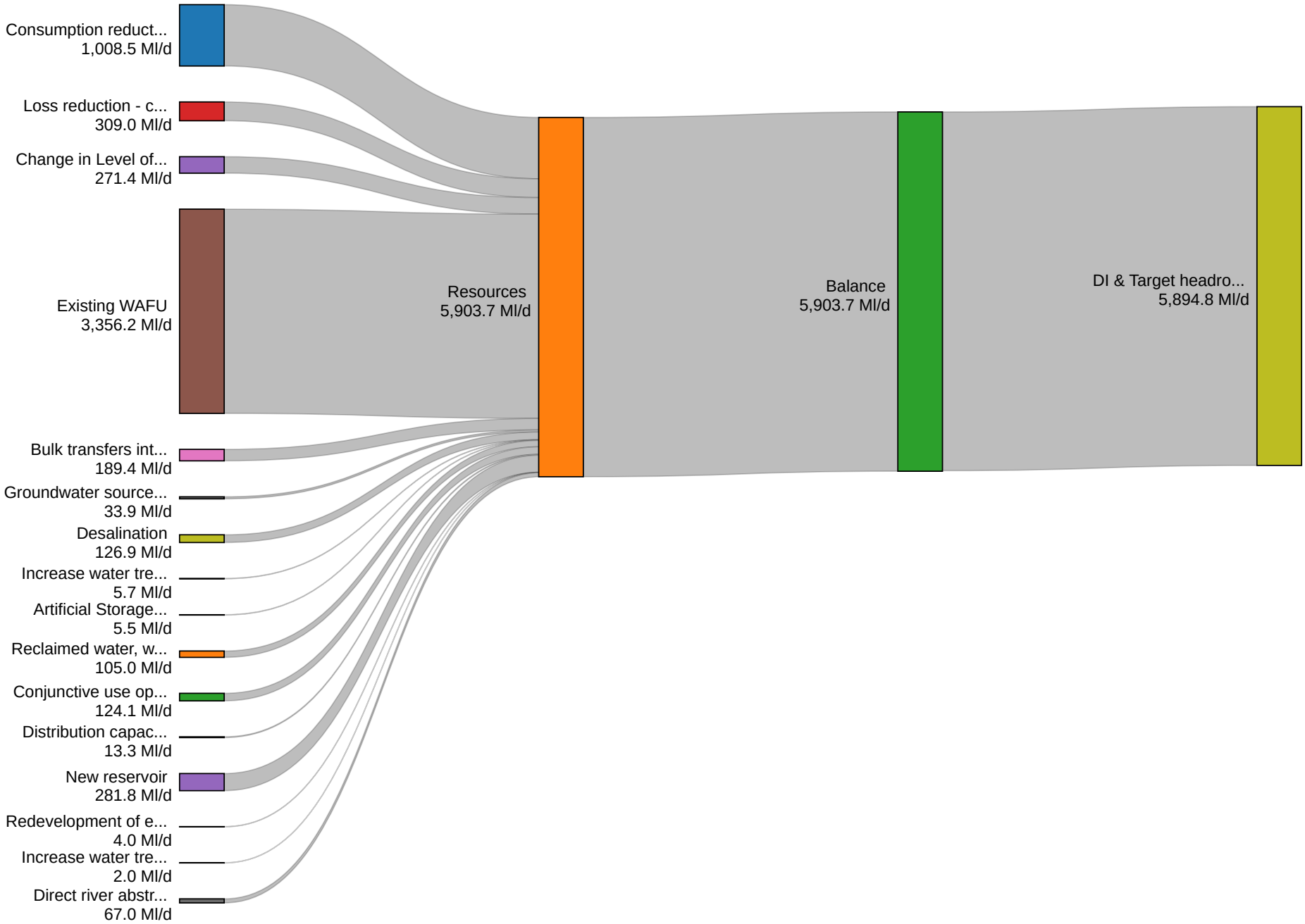
Situation 4 - 2026 (Thames Water)



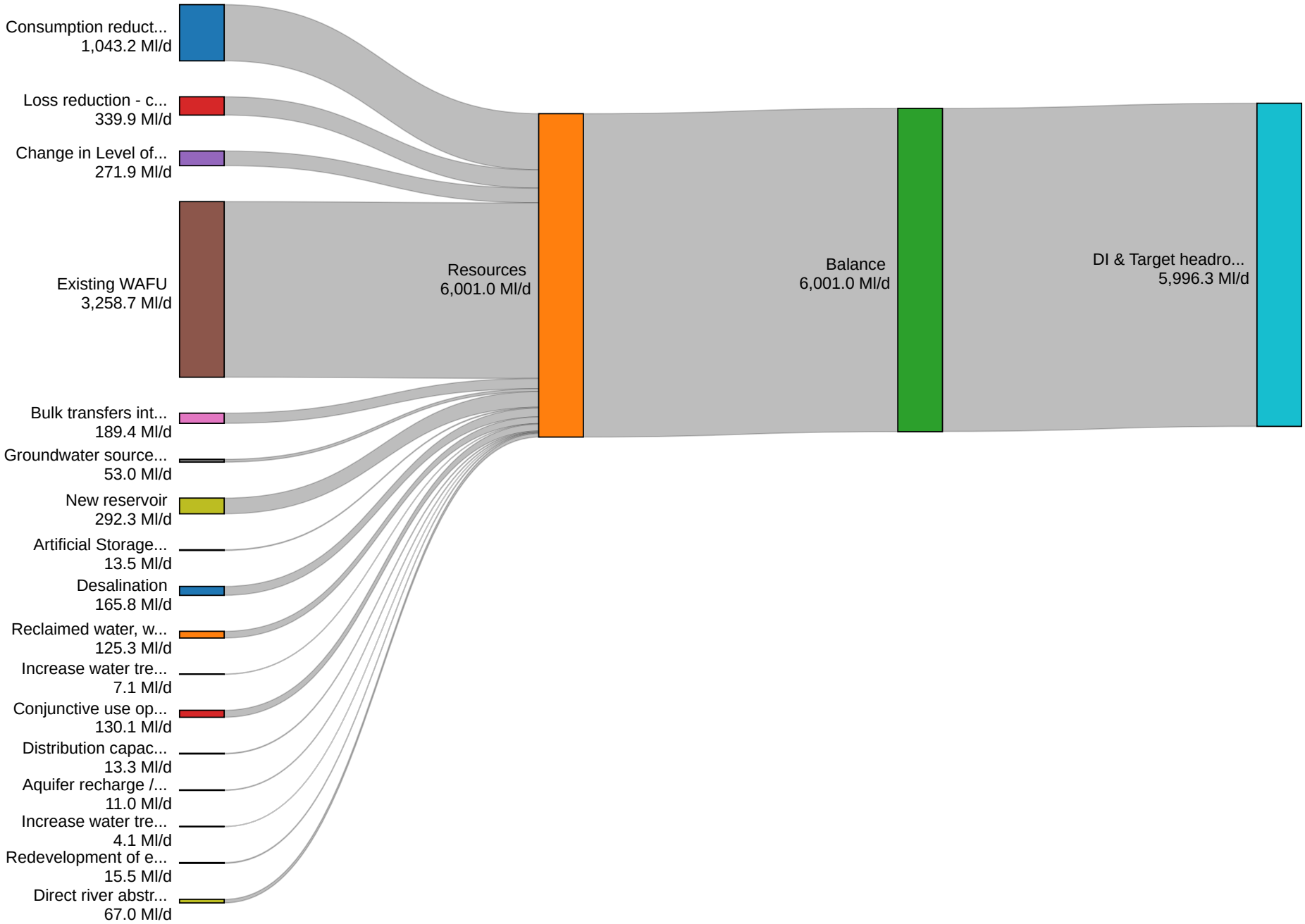
Situation 4 - 2040 (Thames Water)



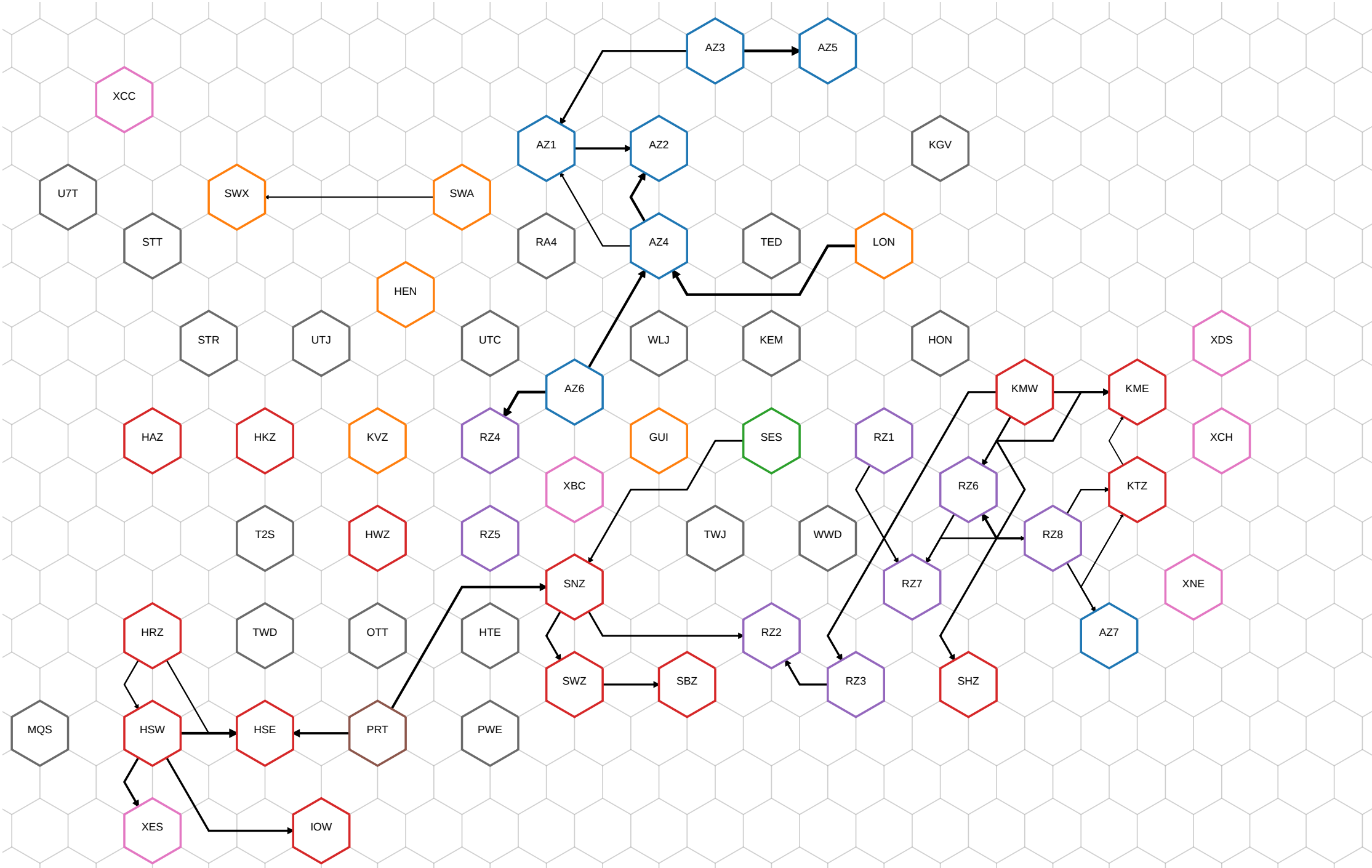
Situation 4 - 2050 (Thames Water)



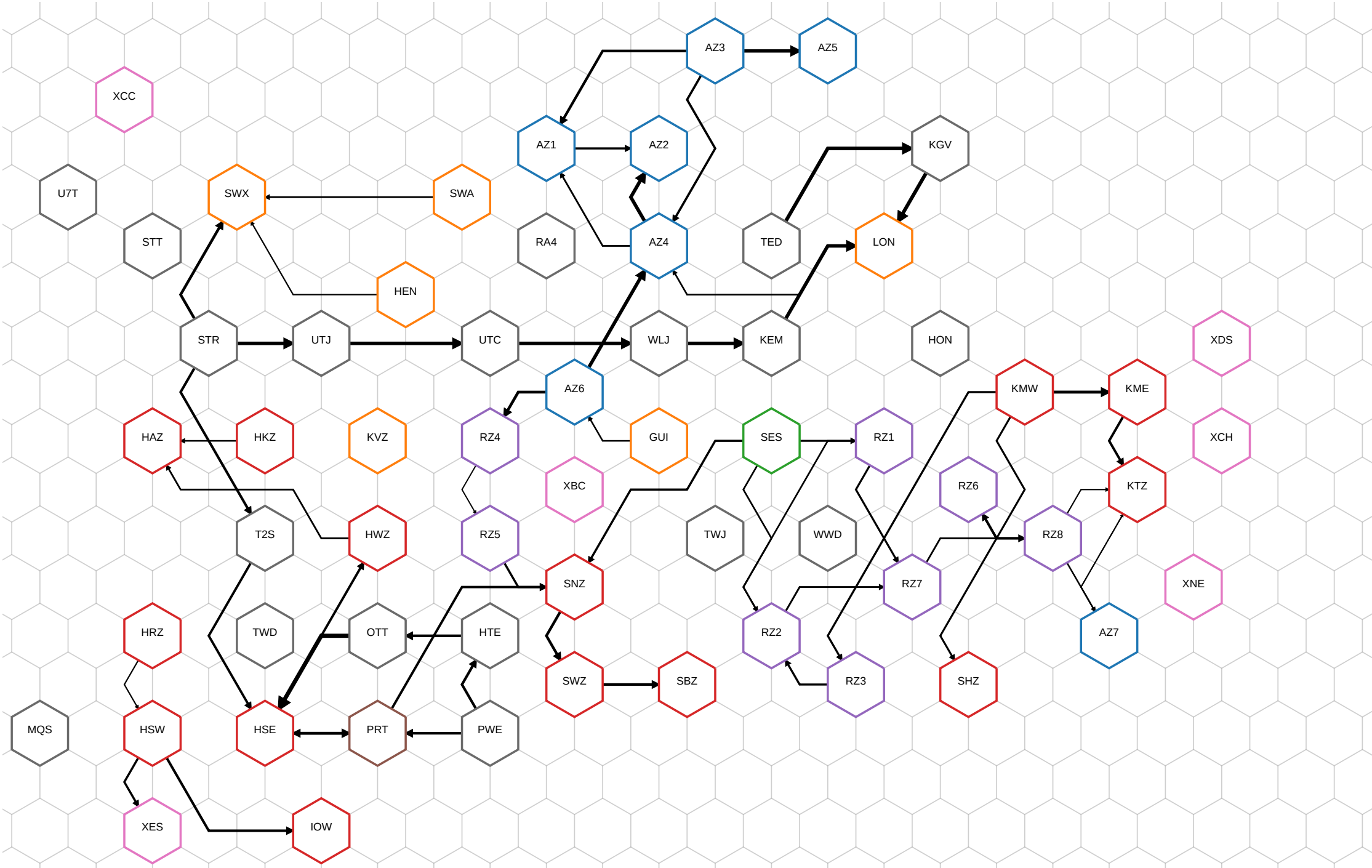
Situation 4 - 2075 (Thames Water)



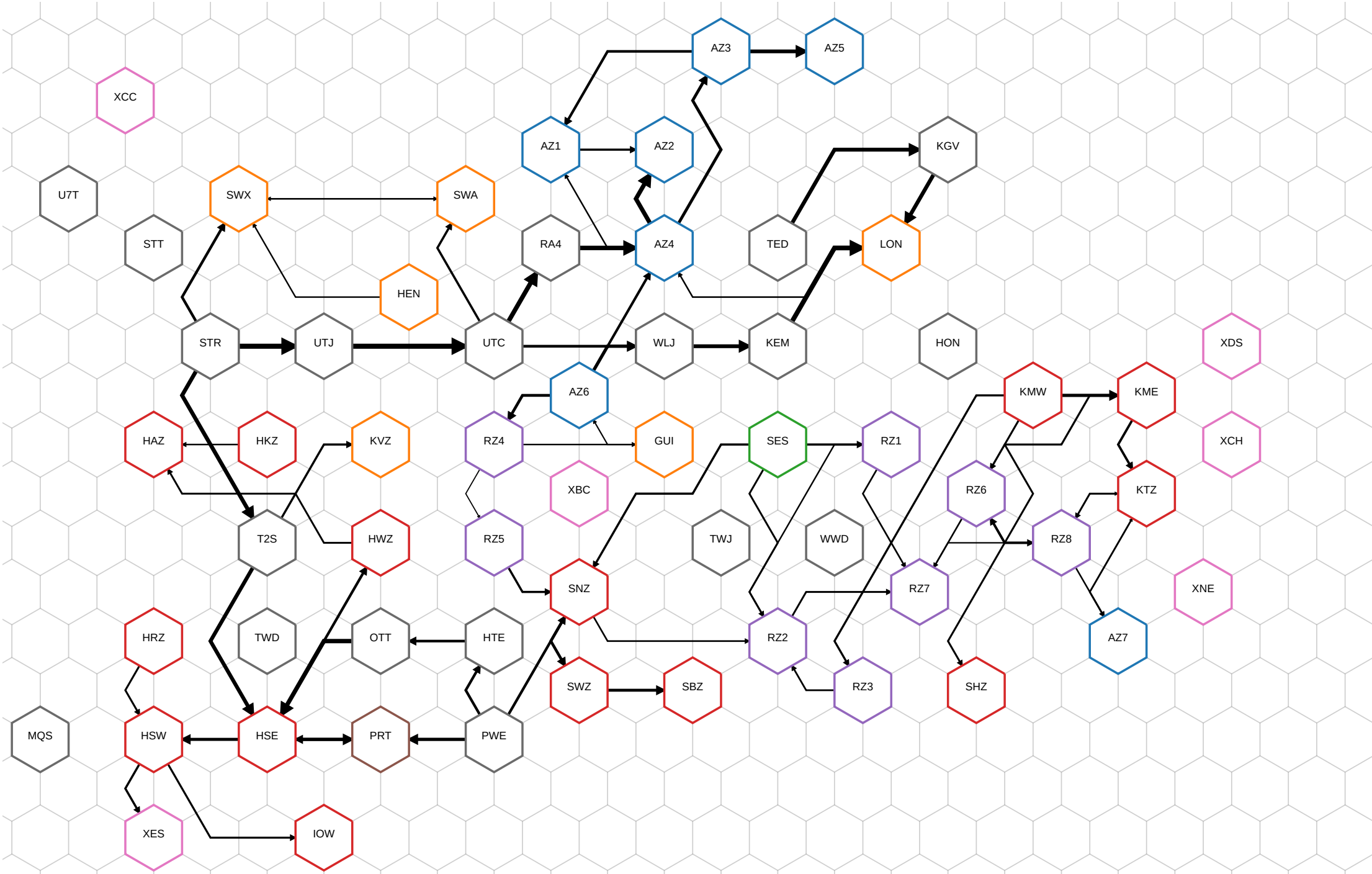
Situation 4 - 2026



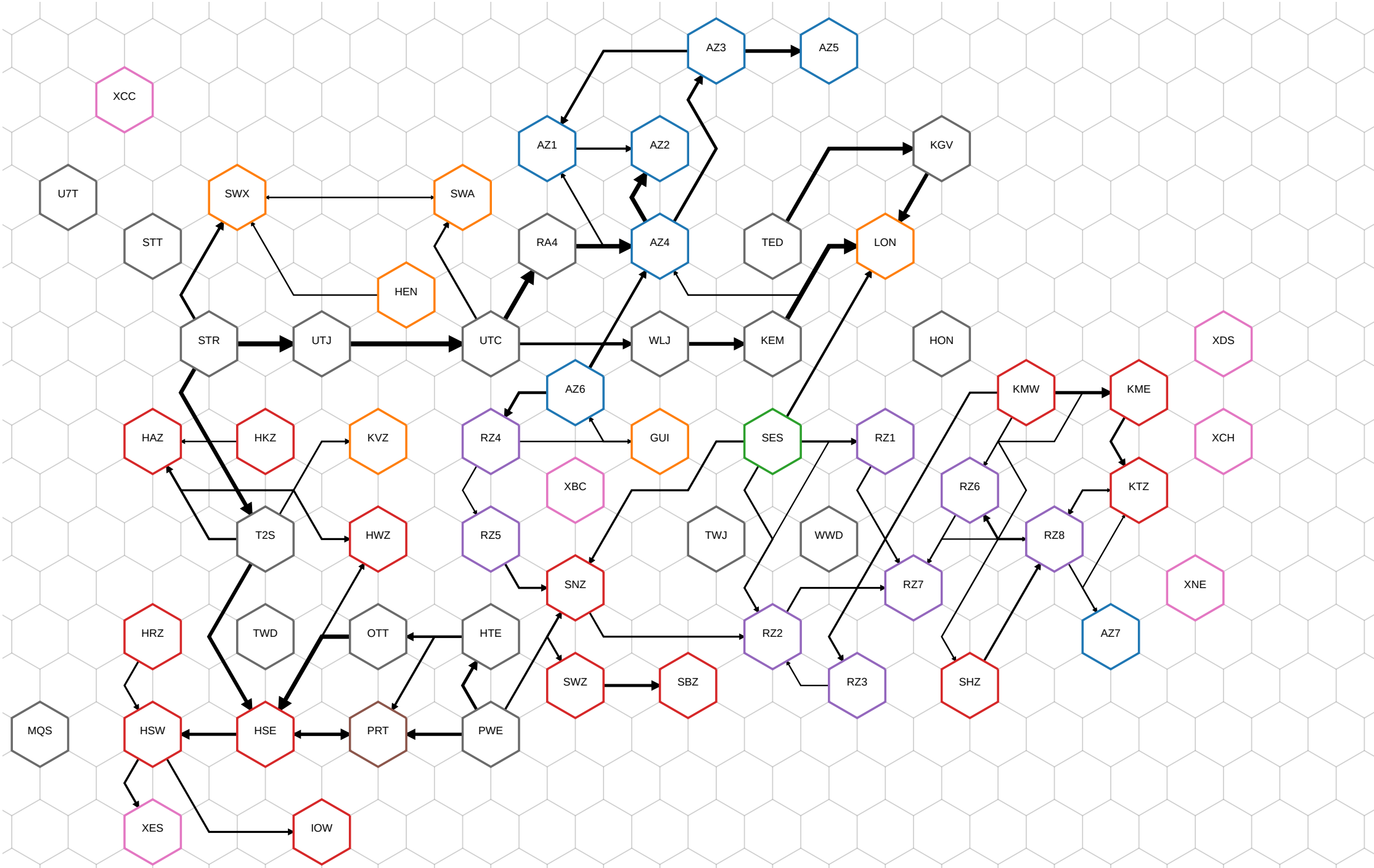
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

BECKTON RECYCLING 50 IN 2033

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse50-2033-2075
Description	Least cost run with hybrid-c+2 government interventions forcing the selection of Beckton Reuse 50 Ml/d to be operational in 2033.
Created at	03/07/2023, 12:03:16
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-force-beckton-reuse50-2033
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Force Beckton Reuse 50 Ml/d to be operational in 2033 (selected 2029).
Optimised discount rate	STPR

Metrics

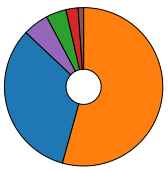
Net present value (Cost)

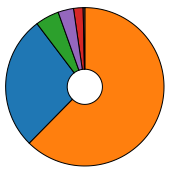
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,283	17,979	17,306	19,704	18,087	17,332	18,428	17,240	16,548	18,212	(£m)
Cost w/o deficit (STPR)	21,283	17,979	17,306	19,704	18,087	17,332	18,428	17,240	16,548	18,212	(£m)
Cost w/ deficit (IGEQ)	32,637	26,359	25,145	29,536	26,498	25,156	27,330	25,101	23,857	26,847	(£m)
Cost w/o deficit (IGEQ)	32,637	26,359	25,145	29,536	26,498	25,156	27,330	25,101	23,857	26,847	(£m)
Cost w/ deficit (LTDR)	23,477	19,630	18,857	21,623	19,745	18,880	20,173	18,793	17,999	19,908	(£m)
Cost w/o deficit (LTDR)	23,477	19,630	18,857	21,623	19,745	18,880	20,173	18,793	17,999	19,908	(£m)

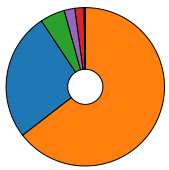
Cost breakdown (STPR)

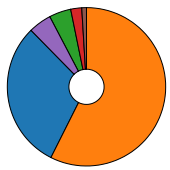
Select Company: Total

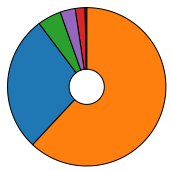
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,964	4,911	4,528	5,958	5,028	4,579	5,114	4,425	3,992	5,056	(£m)
Fixed opex	11,556	11,214	11,163	11,312	11,205	11,149	11,229	11,152	11,092	11,230	(£m)
Fixed operational carbon	888	873	874	882	874	874	874	871	870	875	(£m)
Embedded carbon	528	352	329	442	364	335	361	312	288	368	(£m)
Variable opex	1,110	569	370	921	556	356	698	438	284	589	(£m)
Variable carbon opex	236	61	41	189	60	39	152	42	23	93	(£m)

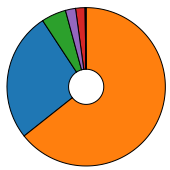
situation1 

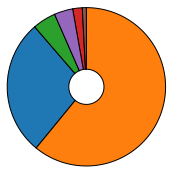
situation2 

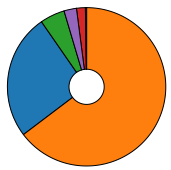
situation3 

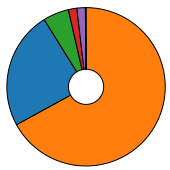
situation4 

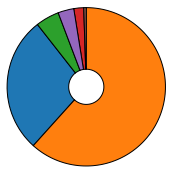
situation5 

situation6 

situation7 

situation8 

situation9 

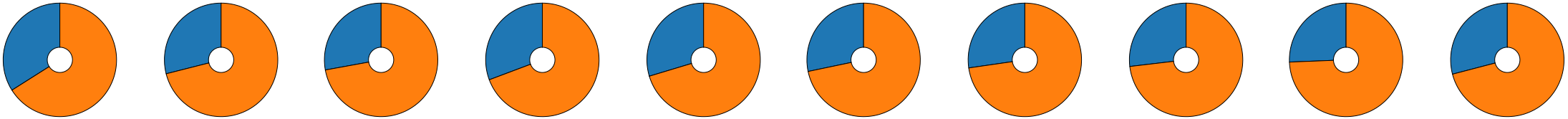
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,412,696	2,151,035	1,999,849	2,772,458	2,227,575	2,034,305	2,236,246	1,896,228	1,734,609	2,273,889	(tonnes)
Operational emissions	6,633,204	5,279,696	5,177,930	6,255,402	5,285,733	5,158,876	5,961,677	5,162,189	5,035,625	5,550,037	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

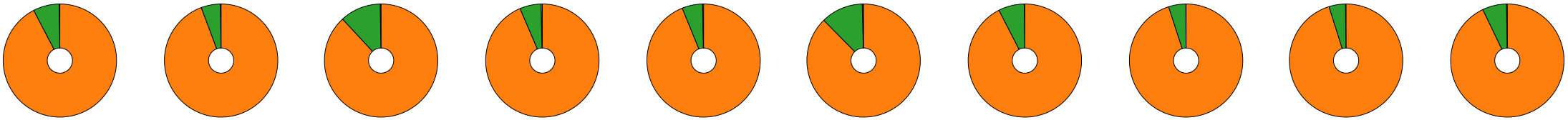


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	87	40	20	21	7	6	30	(GWh)
Grid	23,350	11,787	4,657	19,728	11,404	4,368	14,208	8,403	3,350	11,250	(GWh)
Renewable	1,877	681	614	1,270	706	598	1,138	433	165	831	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,869	63,885	63,041	67,308	63,603	62,636	63,979	61,697	60,641	64,073
SEA environmental disbenefit	117,832	84,611	78,250	102,921	82,773	77,111	88,979	73,319	64,472	85,585
Natural capital	84,182,092	81,348,117	84,192,537	77,189,985	79,147,511	81,793,230	64,321,450	65,140,407	68,012,329	76,147,518
Bio-diversity net gain	−198,223	−118,589	−91,993	−196,564	−141,085	−116,694	−142,401	−97,851	−68,797	−130,244

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,358	31,942	31,616	33,326	31,861	31,531	31,960	30,953	30,463	32,001

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.64	26.92	29.42	27.84	28.50	31.12	26.86	29.45	32.63	28.93
R1: Uncertainty of option supply/demand benefit	5.74	4.98	5.43	5.57	5.32	5.76	5.10	5.45	6.00	5.49
R3: Risk of service failure due to other physical hazards	6.62	6.61	7.40	6.76	7.05	7.87	6.52	7.34	8.36	7.17
R4: Availability of additional headroom	6.40	6.75	6.96	6.60	6.87	7.08	6.98	7.32	7.56	6.95
R5: Catchment/raw water quality risks (incl. climate change)	3.91	3.78	4.27	3.81	4.06	4.59	3.66	4.16	4.81	4.12
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.96	4.79	5.36	5.10	5.20	5.82	4.59	5.17	5.90	5.21
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

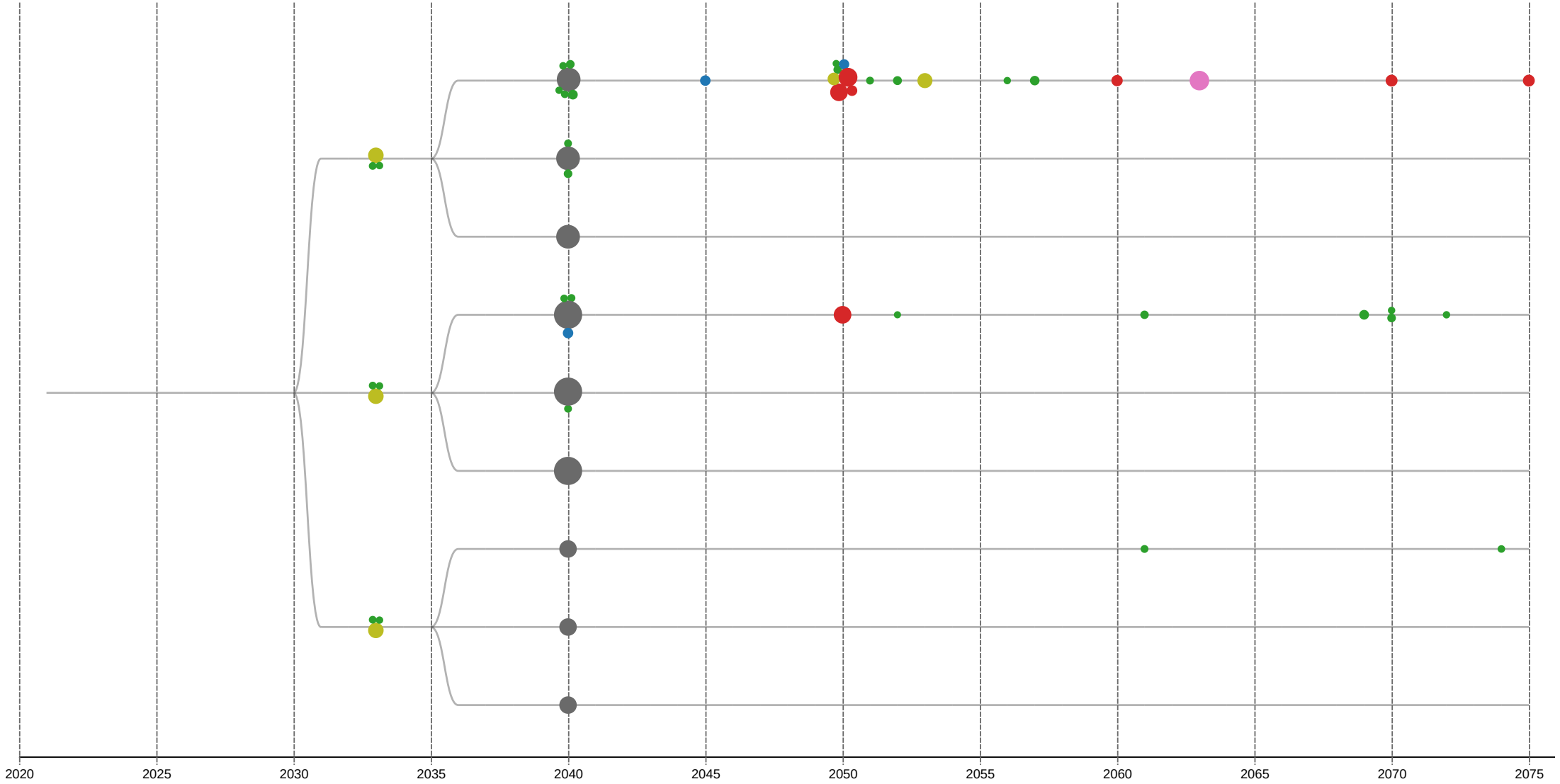
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.57	14.58	16.33	13.90	15.04	16.68	14.57	16.54	18.83	15.56
A3: Operational complexity and flexibility	6.12	6.35	7.13	6.41	6.79	7.63	6.21	7.10	8.14	6.88
A4: WRZ connectivity	7.43	8.20	9.17	7.46	8.22	9.01	8.33	9.41	10.66	8.65
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.52	19.56	21.73	18.75	19.76	21.74	19.84	22.38	25.34	20.96
E1: Scaleability and modularity of proposed changes	8.89	9.29	10.36	8.69	9.28	10.33	9.44	10.79	12.28	9.93
E2: Intervention lead times	4.39	3.97	4.35	3.96	4.04	4.26	3.94	4.26	4.71	4.21
E3: Reliance on external bodies to deliver changes	6.24	6.30	7.02	6.10	6.43	7.16	6.46	7.34	8.34	6.82
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

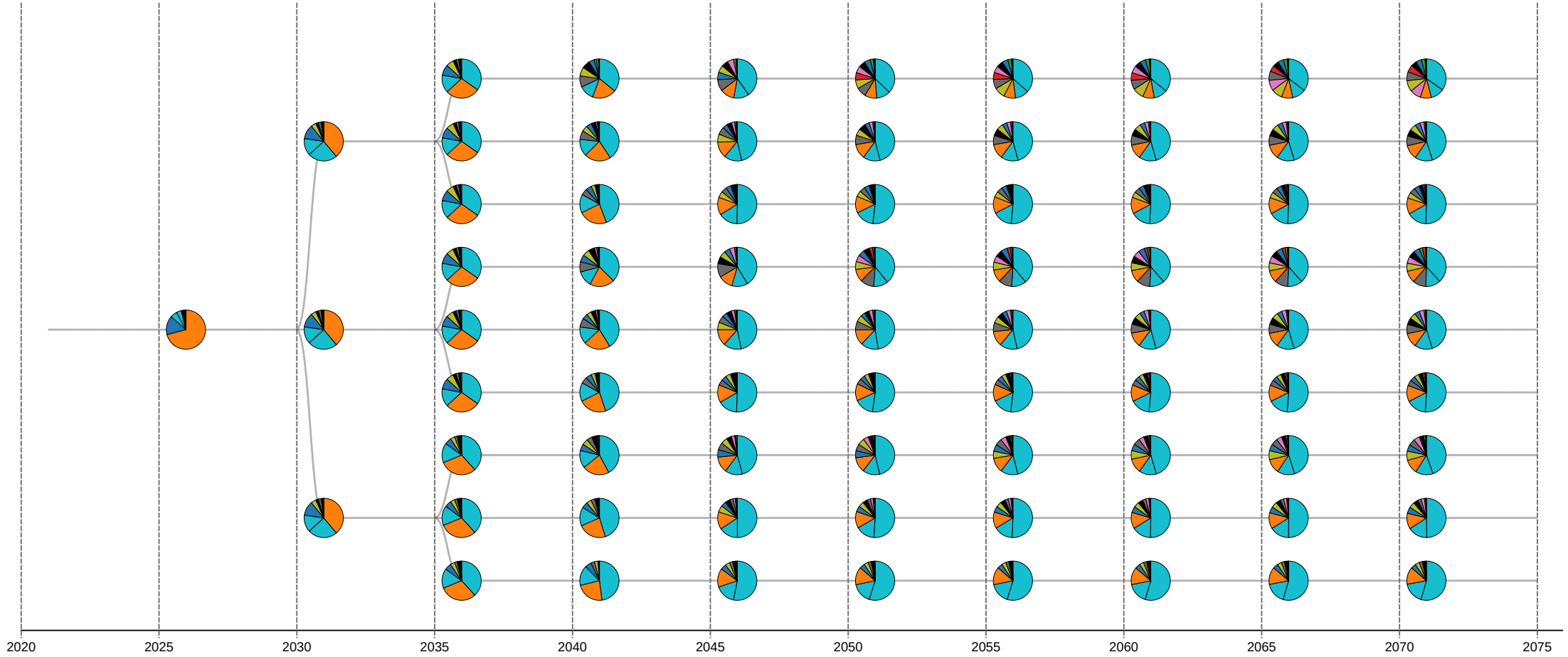
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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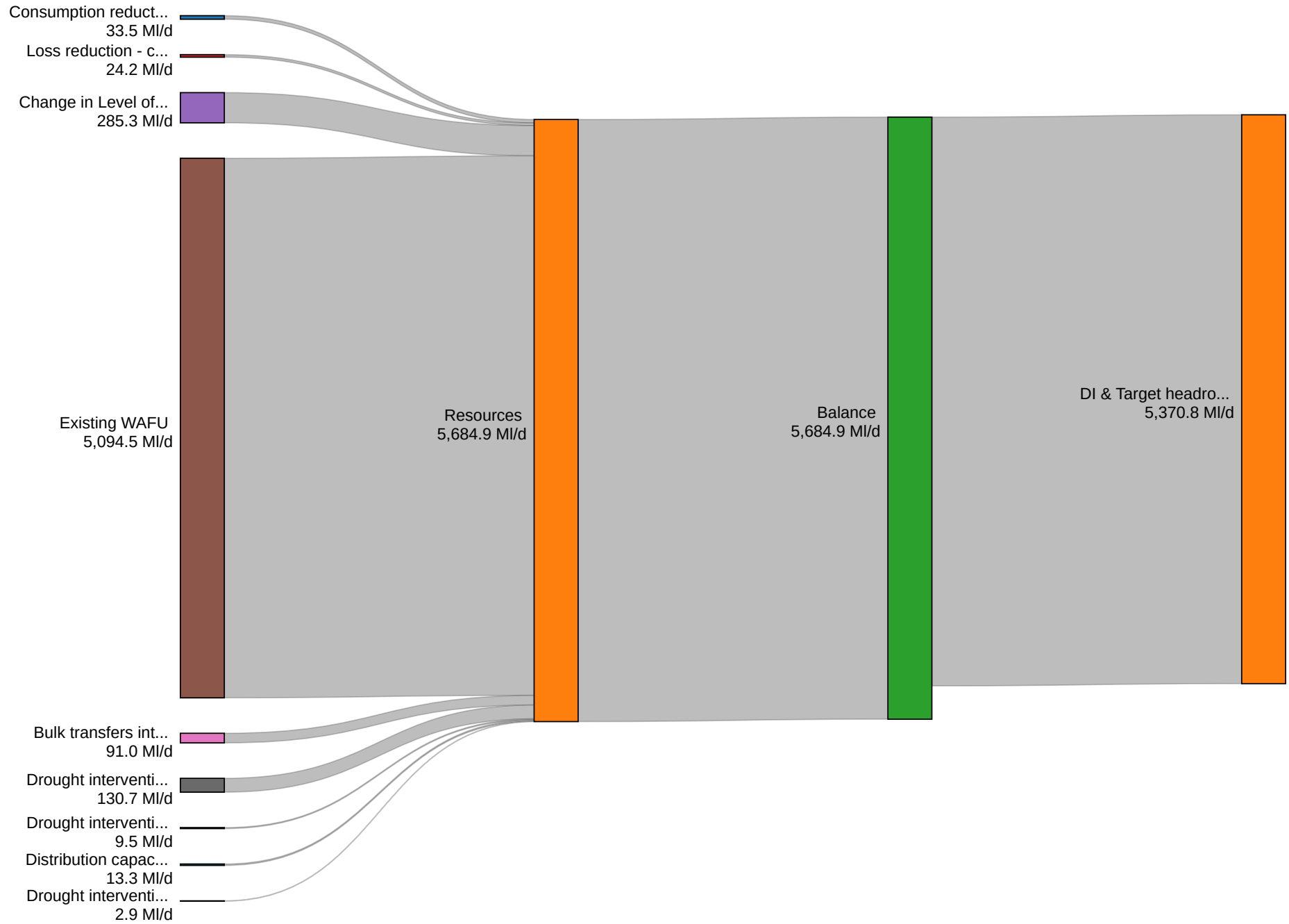
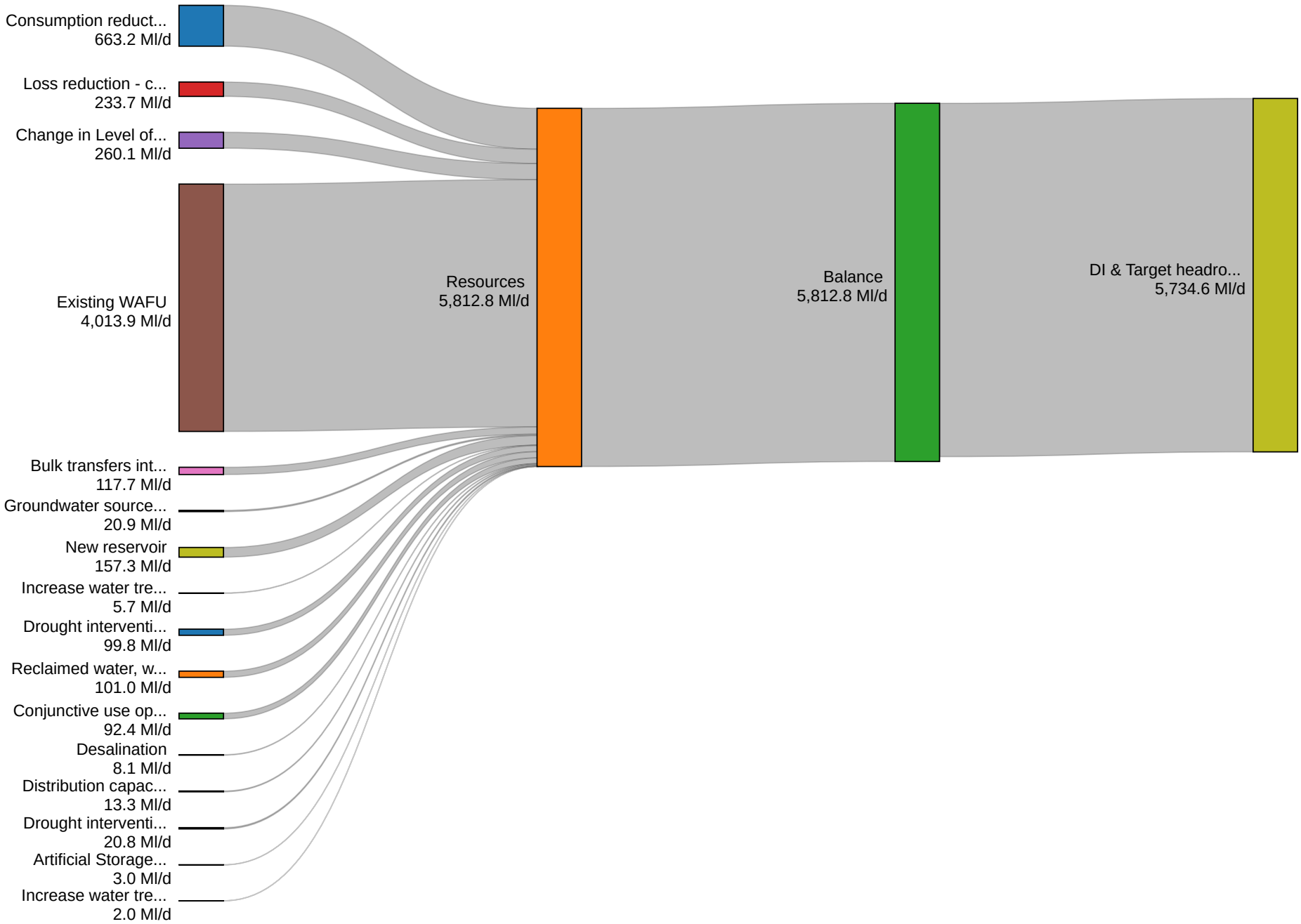
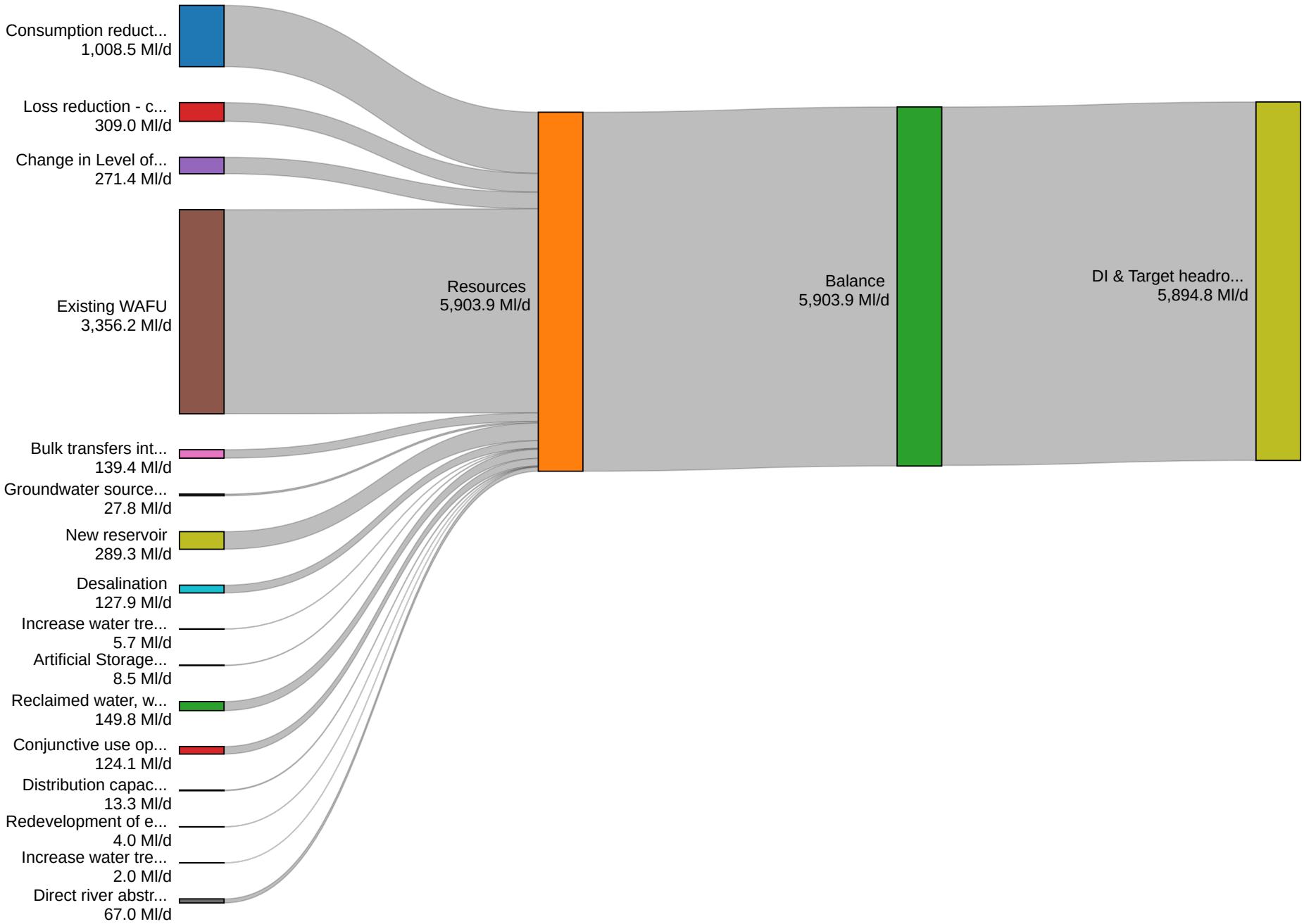
Situation 4 - 2026 (Thames Water)



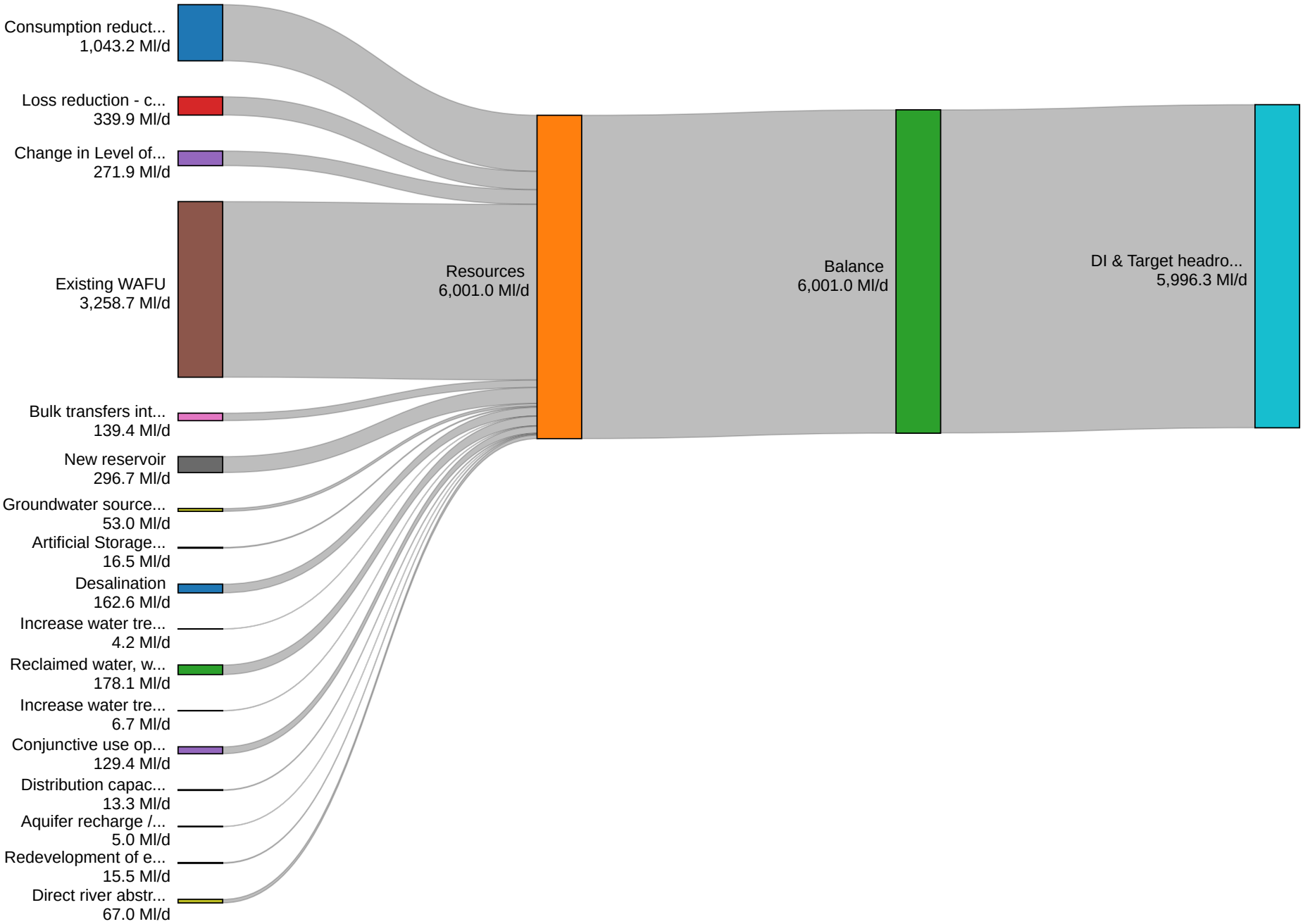
Situation 4 - 2040 (Thames Water)



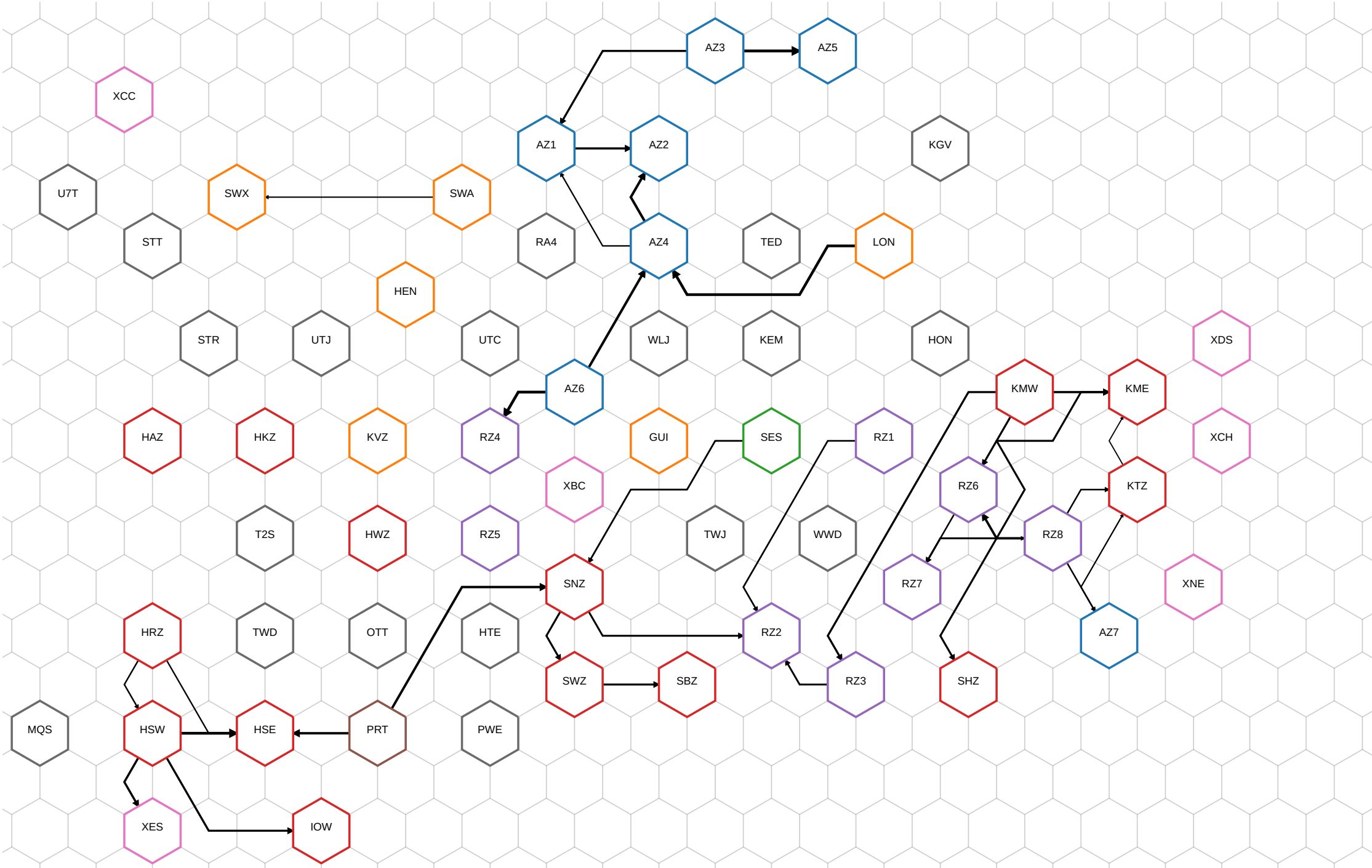
Situation 4 - 2050 (Thames Water)



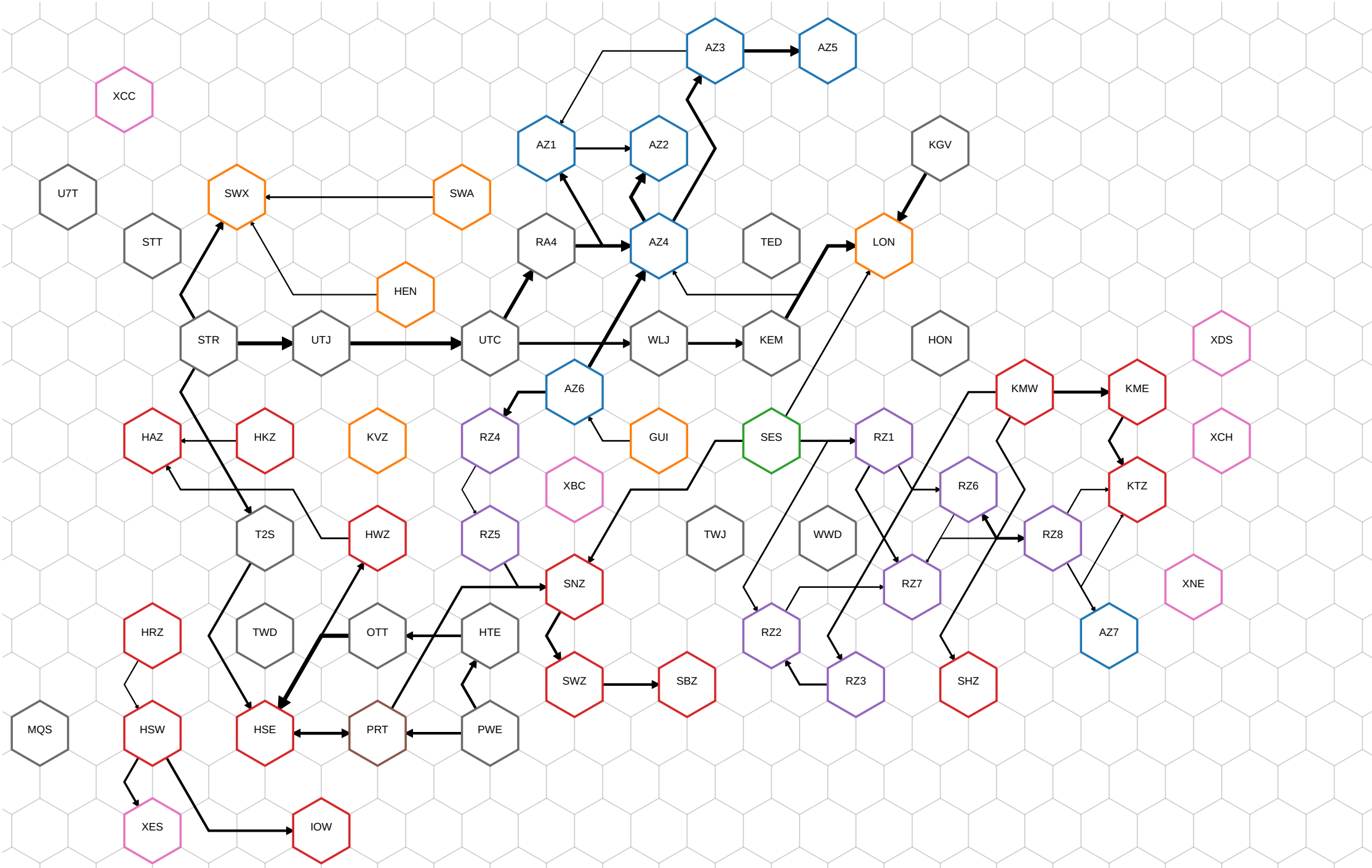
Situation 4 - 2075 (Thames Water)



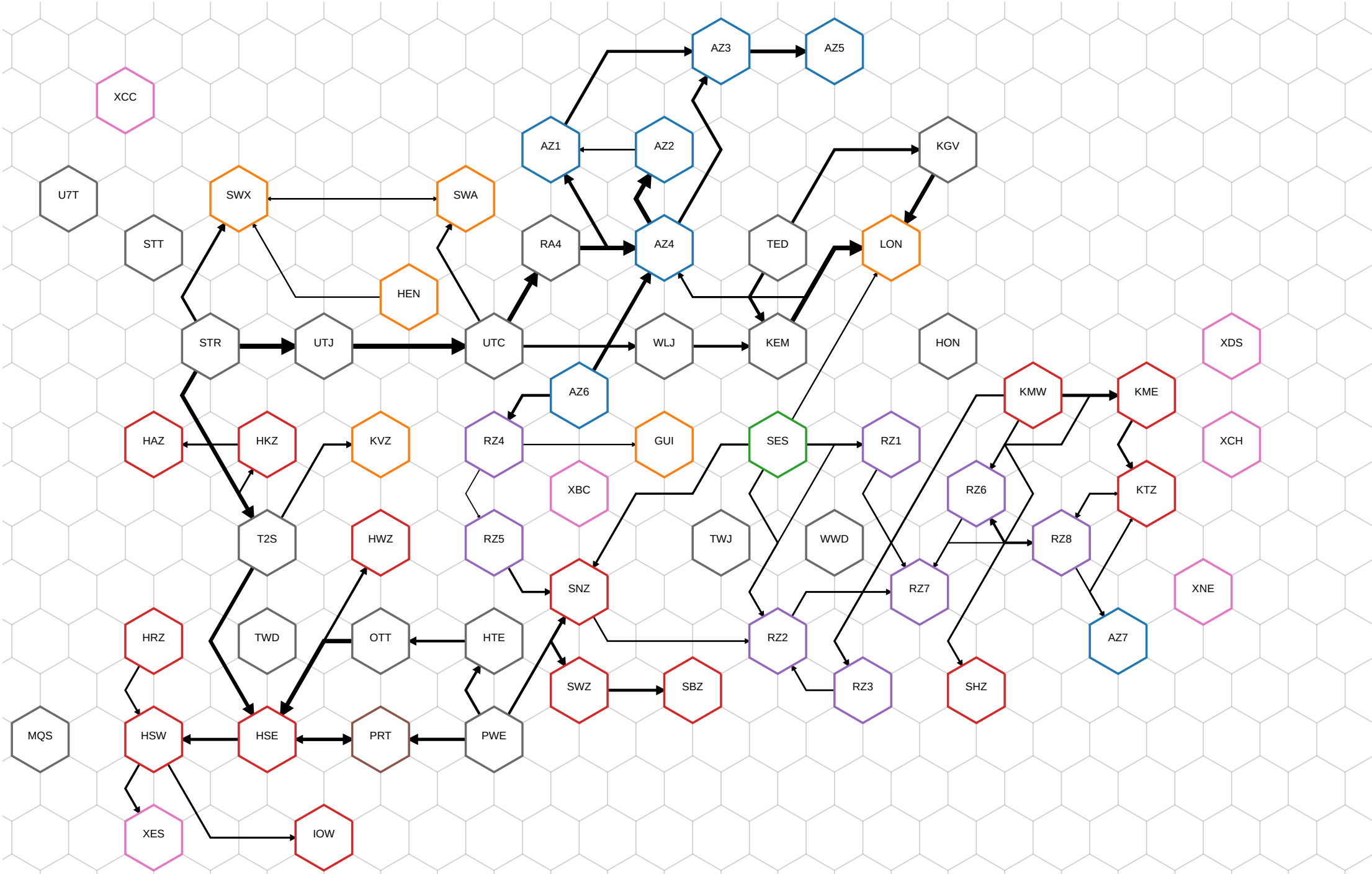
Situation 4 - 2026



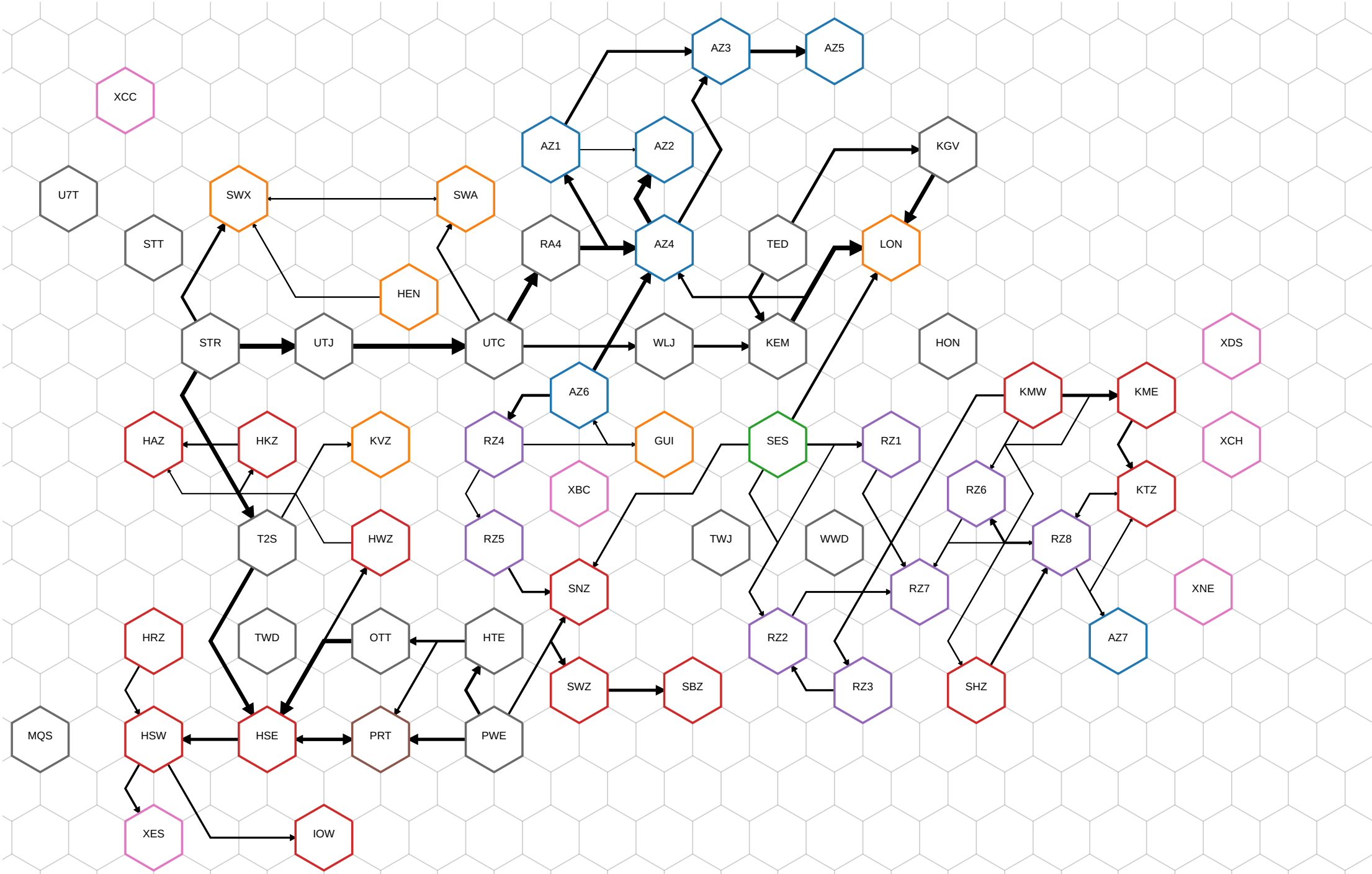
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

BECKTON RECYCLING 100 IN 2033

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse100-2033-2075
Description	Least cost run with hybrid-c+2 government interventions forcing the selection of Beckton Reuse 100 Ml/d to be operational in 2033.
Created at	08/07/2023, 01:40:01
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-force-beckton-reuse100-2033
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Force Beckton Reuse 100 Ml/d to be operational in 2033 (selected 2029).
Optimised discount rate	STPR

Metrics

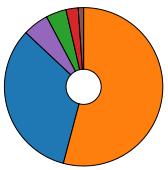
Net present value (Cost)

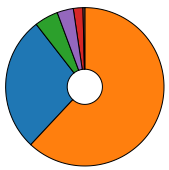
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,308	18,119	17,452	19,942	18,011	17,254	18,545	17,363	16,670	18,296	(£m)
Cost w/o deficit (STPR)	21,308	18,119	17,452	19,942	18,011	17,254	18,545	17,363	16,670	18,296	(£m)
Cost w/ deficit (IGEQ)	32,628	26,581	25,376	30,014	26,397	25,050	27,511	25,296	24,048	26,989	(£m)
Cost w/o deficit (IGEQ)	32,628	26,581	25,376	30,014	26,397	25,050	27,511	25,296	24,048	26,989	(£m)
Cost w/ deficit (LTDR)	23,497	19,786	19,019	21,905	19,664	18,796	20,301	18,930	18,133	20,003	(£m)
Cost w/o deficit (LTDR)	23,497	19,786	19,019	21,905	19,664	18,796	20,301	18,930	18,133	20,003	(£m)

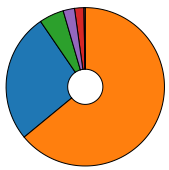
Cost breakdown (STPR)

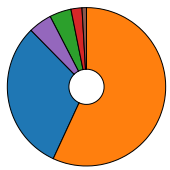
Select Company: Total

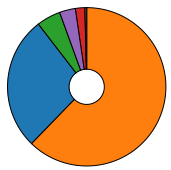
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,007	4,989	4,611	6,132	4,917	4,466	5,179	4,490	4,057	5,094	(£m)
Fixed opex	11,530	11,225	11,175	11,346	11,214	11,158	11,238	11,162	11,102	11,239	(£m)
Fixed operational carbon	891	879	881	885	880	880	881	877	876	881	(£m)
Embedded carbon	529	356	334	447	351	321	365	316	292	368	(£m)
Variable opex	1,119	601	403	951	584	384	723	469	313	616	(£m)
Variable carbon opex	232	68	48	182	66	44	158	49	30	97	(£m)

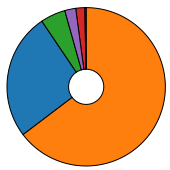
situation1 

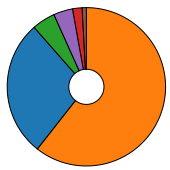
situation2 

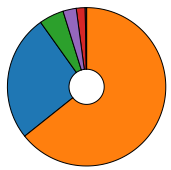
situation3 

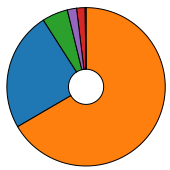
situation4 

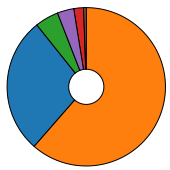
situation5 

situation6 

situation7 

situation8 

situation9 

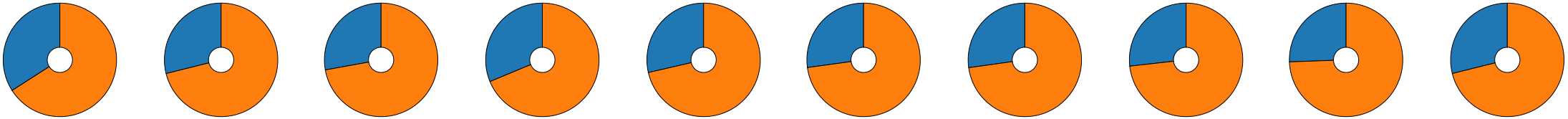
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,417,667	2,178,747	2,030,218	2,821,687	2,146,048	1,951,655	2,260,539	1,920,521	1,758,902	2,276,220	(tonnes)
Operational emissions	6,613,454	5,363,609	5,261,584	6,209,386	5,359,520	5,232,298	6,045,433	5,252,721	5,119,453	5,606,384	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

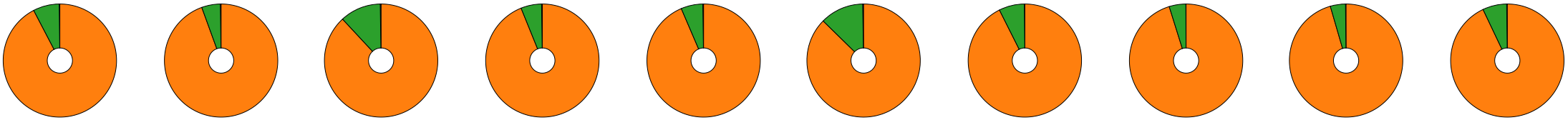


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	49	29	14	21	7	6	24	(GWh)
Grid	23,276	12,090	4,947	20,200	11,526	4,612	14,501	8,705	3,652	11,501	(GWh)
Renewable	1,876	681	655	1,269	765	654	1,138	433	165	848	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,870	63,716	62,939	67,336	63,466	62,483	63,889	61,607	60,551	63,984
SEA environmental disbenefit	116,605	82,554	75,659	104,185	80,006	74,093	86,833	71,173	62,326	83,715
Natural capital	84,265,694	81,366,523	84,220,613	79,426,287	81,307,892	83,957,090	64,338,272	65,157,228	68,029,151	76,896,528
Bio-diversity net gain	−196,693	−116,881	−86,792	−172,354	−116,669	−91,015	−141,021	−96,471	−67,417	−120,590

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,132	31,709	31,371	33,248	31,547	31,189	31,704	30,697	30,207	31,756

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.85	27.34	29.98	26.65	27.52	30.00	27.29	29.96	33.22	28.87
R1: Uncertainty of option supply/demand benefit	5.83	5.18	5.69	5.29	5.24	5.67	5.29	5.68	6.26	5.57
R3: Risk of service failure due to other physical hazards	6.65	6.69	7.50	6.36	6.74	7.52	6.60	7.44	8.46	7.11
R4: Availability of additional headroom	6.43	6.79	7.01	6.56	6.81	7.02	7.03	7.37	7.61	6.96
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.88	4.38	3.79	3.89	4.39	3.77	4.29	4.95	4.15
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.80	5.39	4.64	4.83	5.40	4.61	5.20	5.93	5.09
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

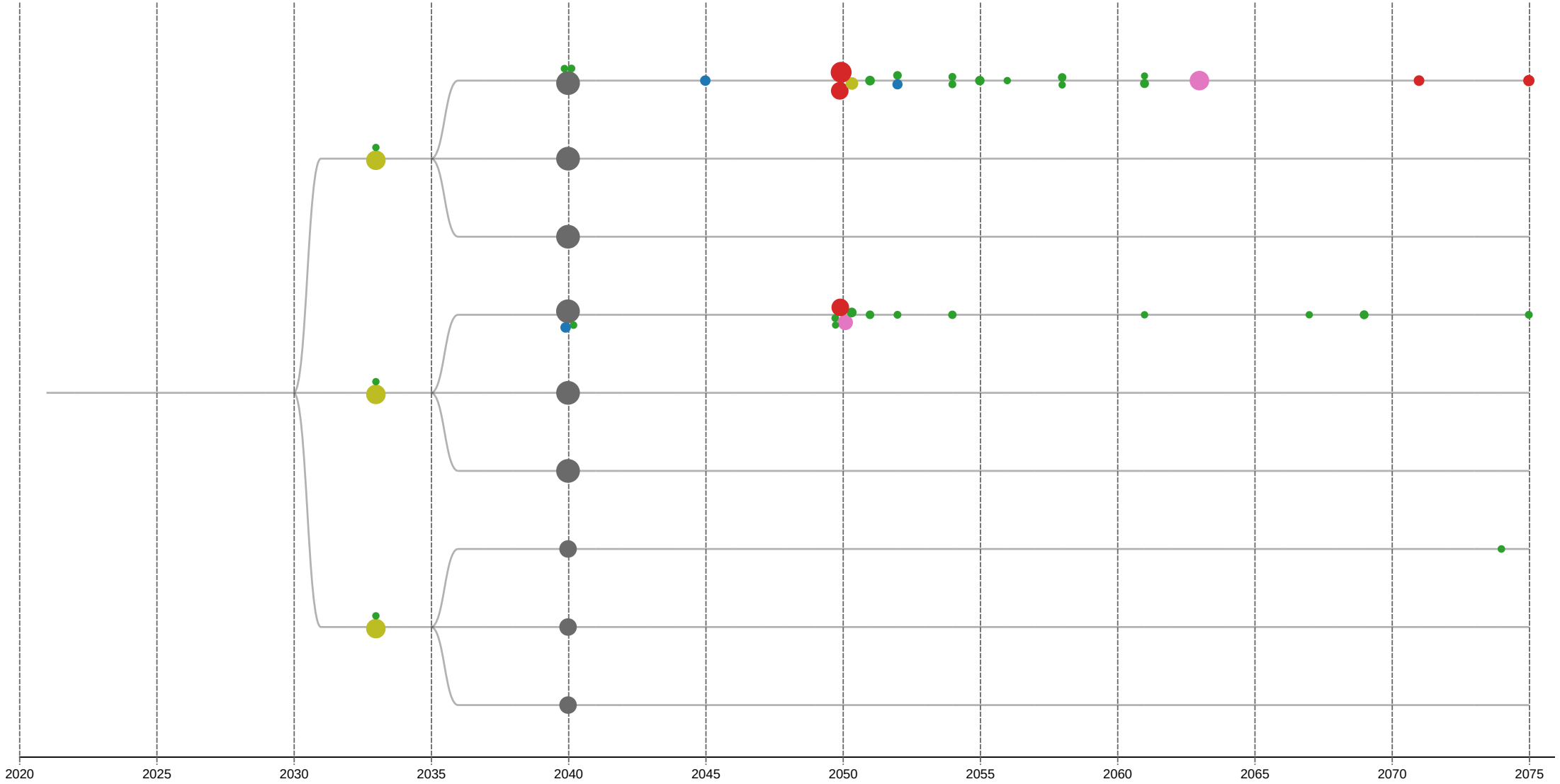
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.57	14.56	16.31	13.56	14.61	16.18	14.53	16.49	18.78	15.40
A3: Operational complexity and flexibility	6.13	6.37	7.17	5.95	6.42	7.21	6.24	7.13	8.18	6.76
A4: WRZ connectivity	7.42	8.17	9.11	7.58	8.16	8.94	8.27	9.33	10.57	8.62
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.72	19.81	22.06	18.74	19.94	21.95	20.11	22.71	25.72	21.20
E1: Scaleability and modularity of proposed changes	9.01	9.40	10.52	8.81	9.51	10.58	9.57	10.94	12.45	10.09
E2: Intervention lead times	4.43	4.04	4.42	3.96	4.01	4.22	4.01	4.35	4.81	4.25
E3: Reliance on external bodies to deliver changes	6.28	6.37	7.12	5.98	6.43	7.15	6.54	7.43	8.45	6.86
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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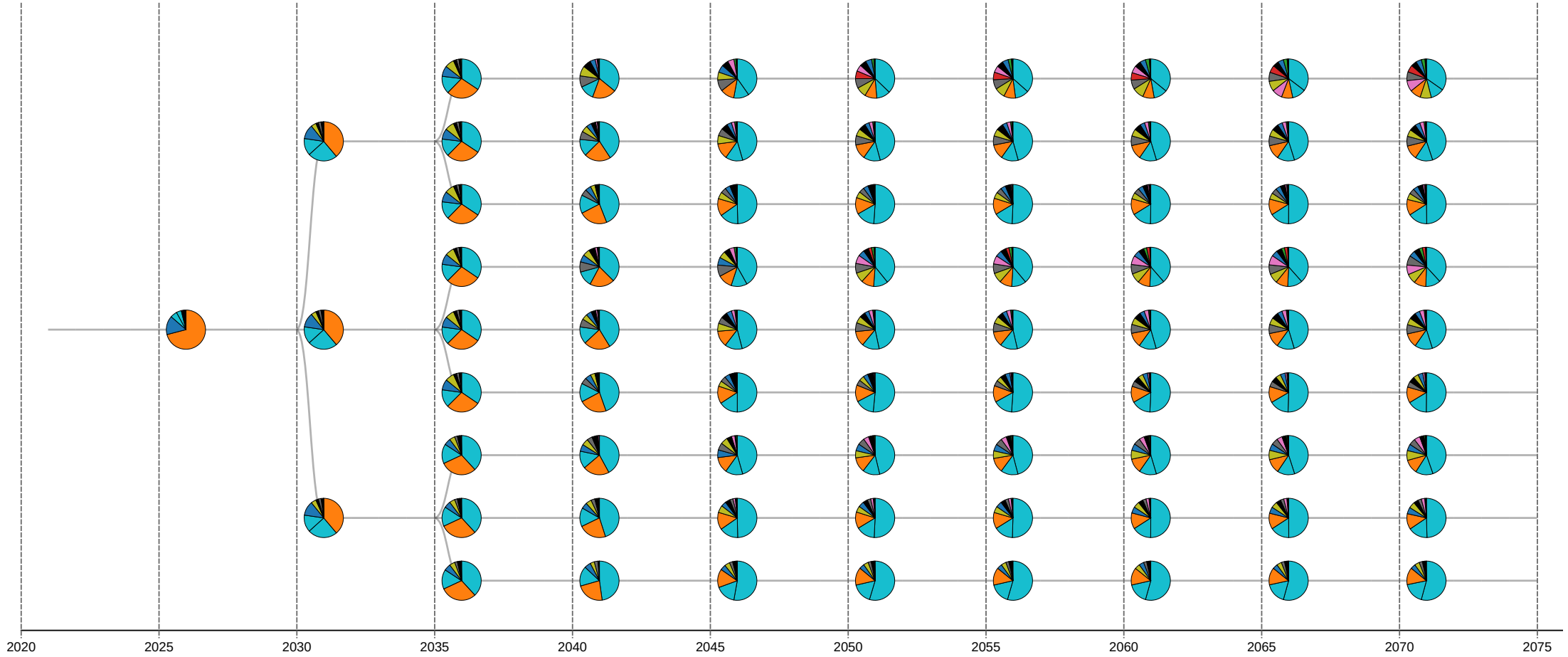
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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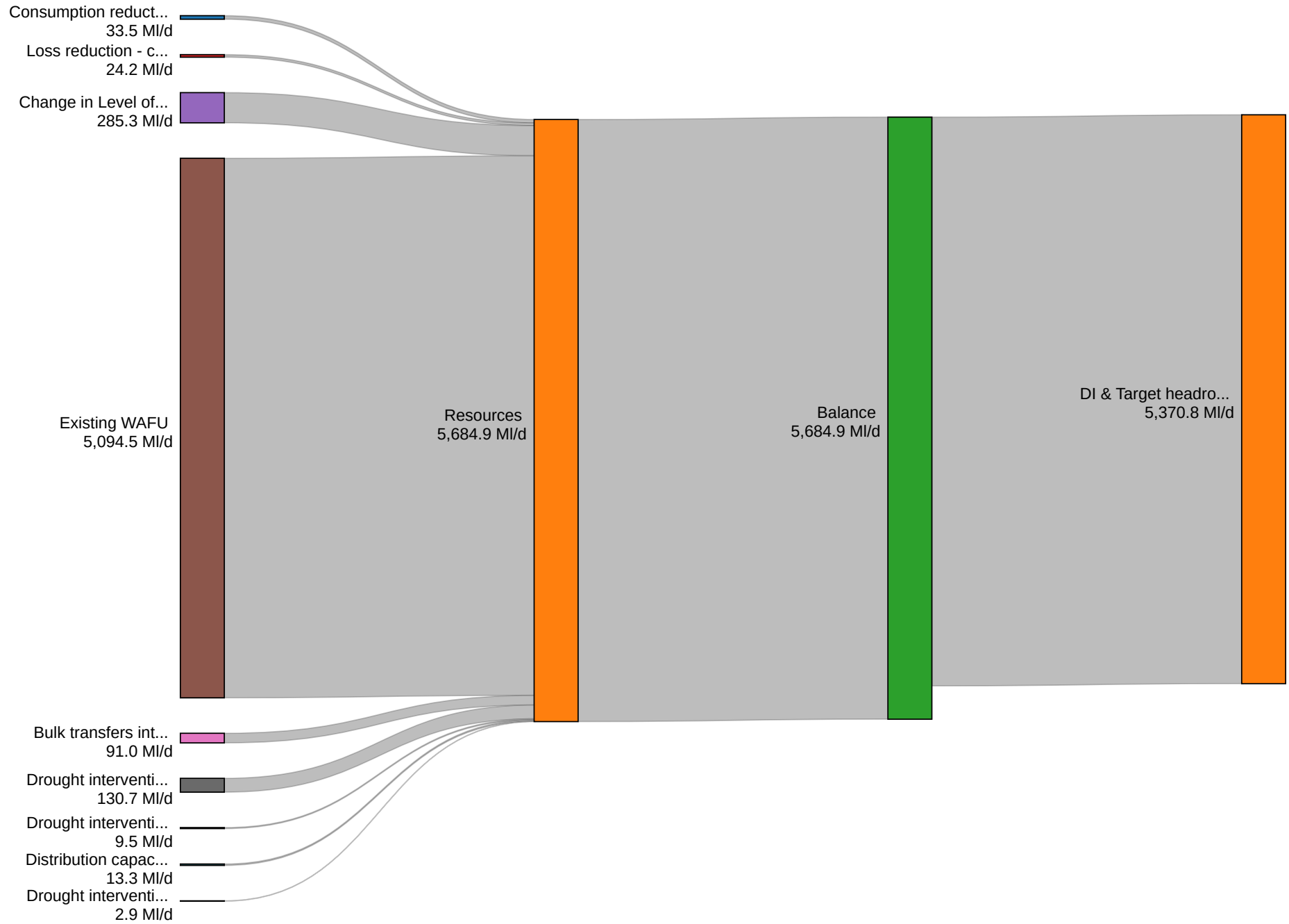
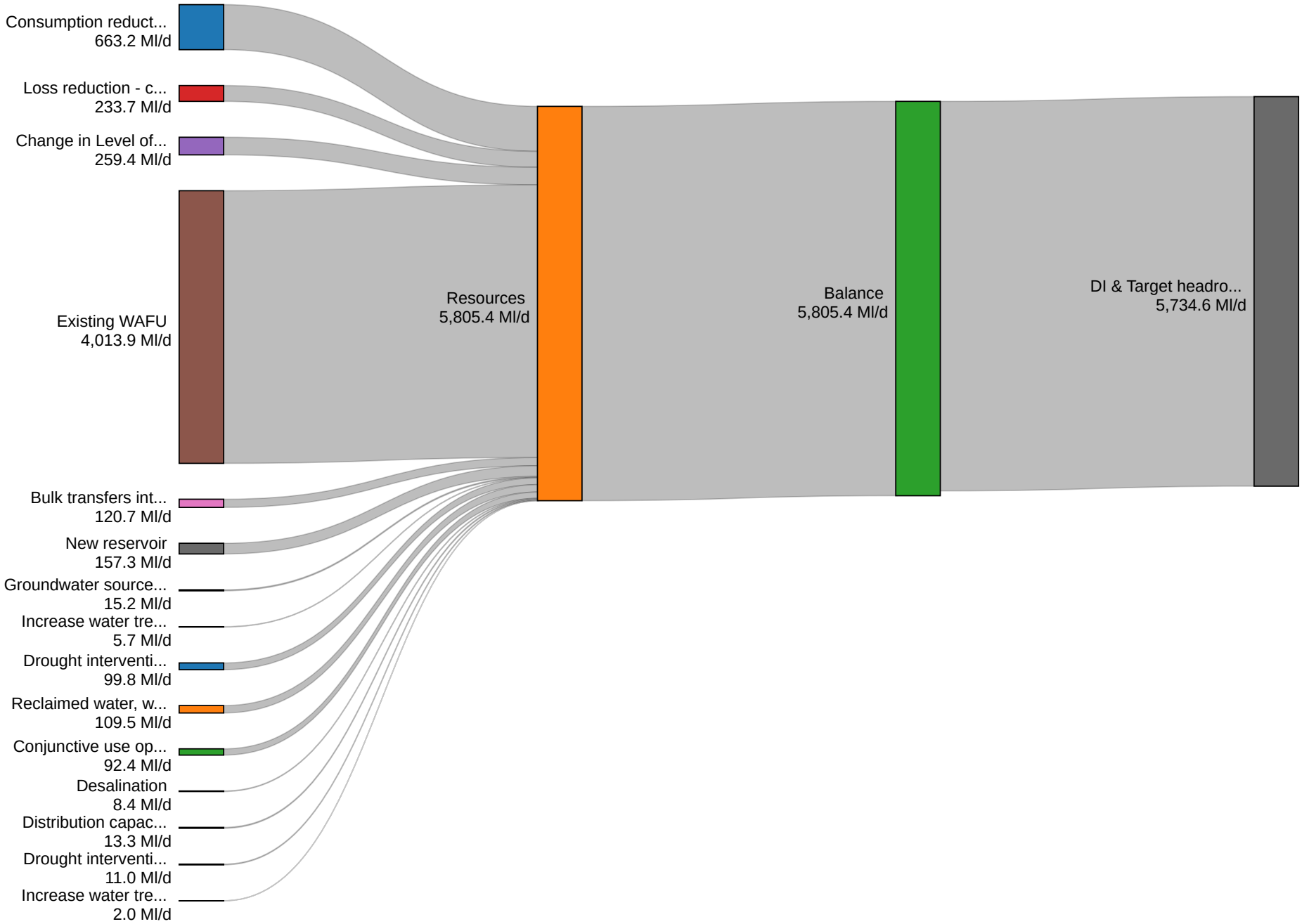
- Other

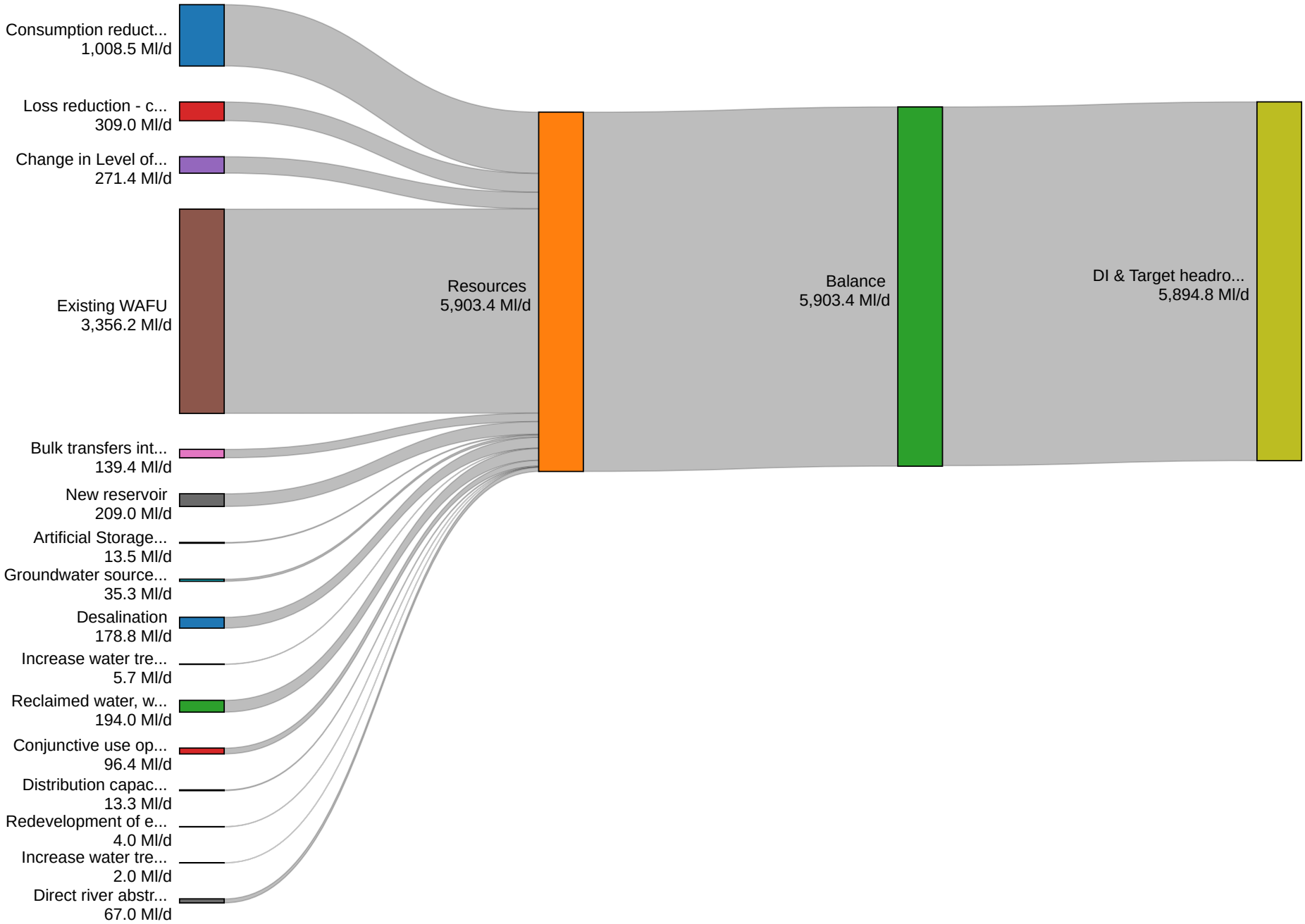
Situation 4 - 2026 (Thames Water)



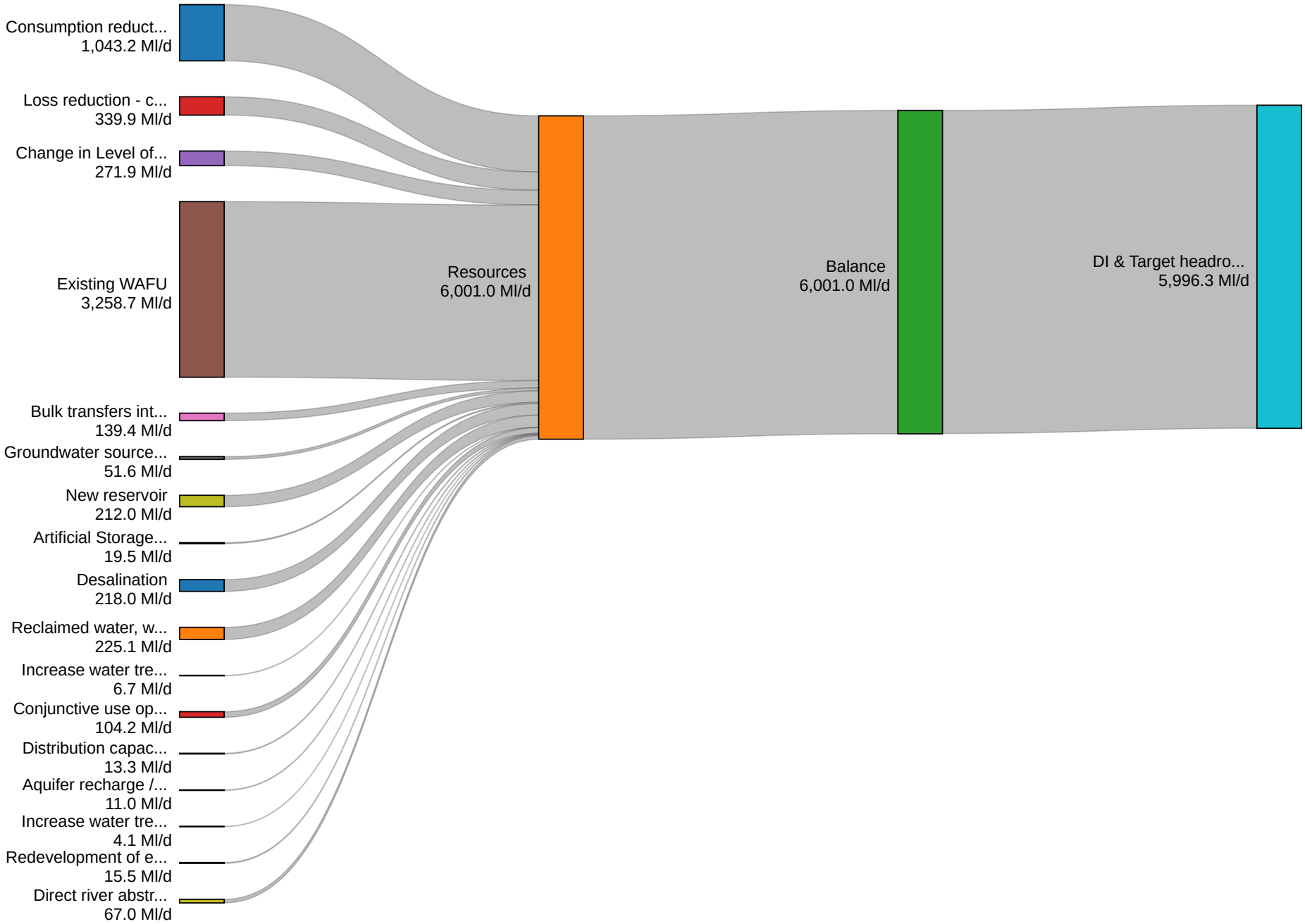
Situation 4 - 2040 (Thames Water)



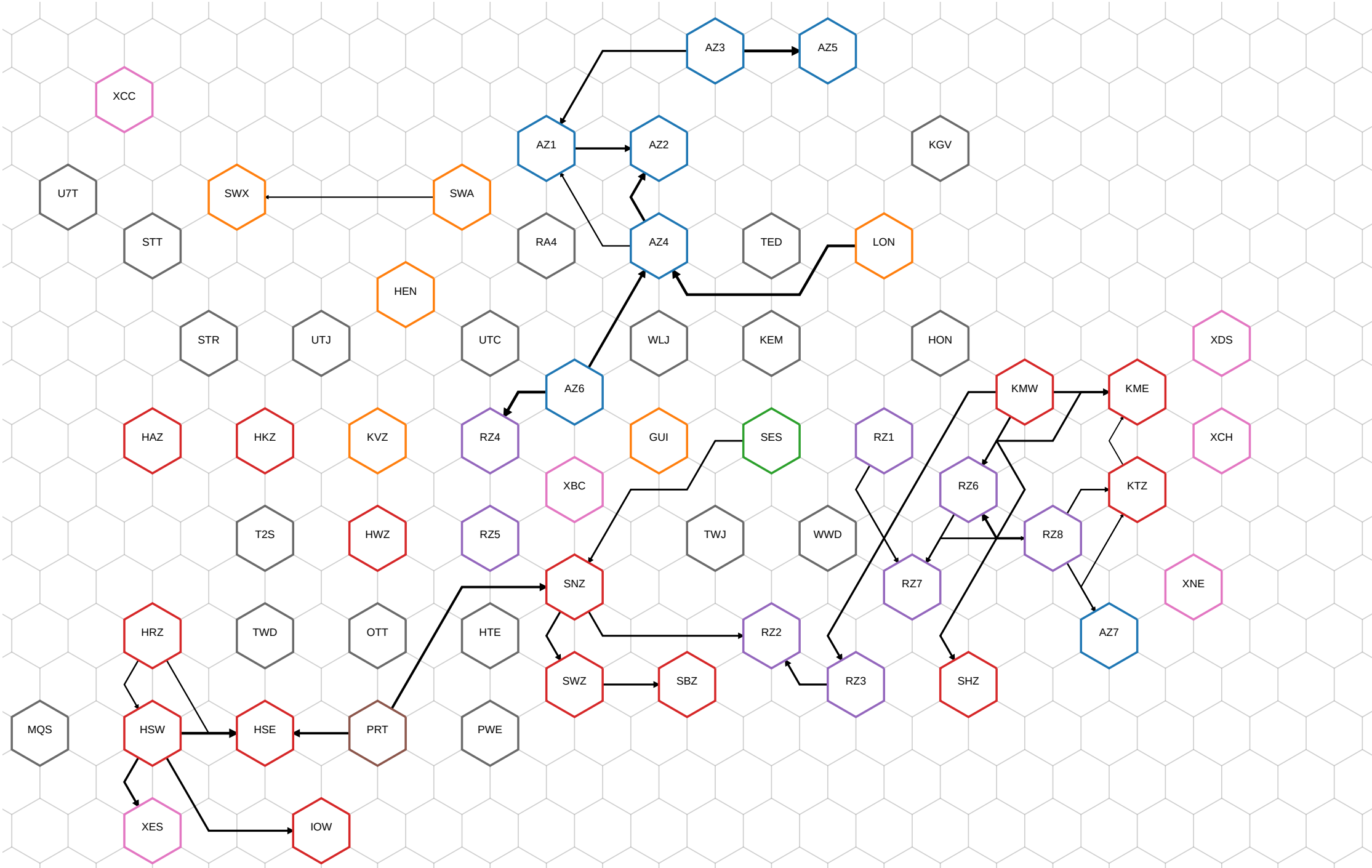
Situation 4 - 2050 (Thames Water)



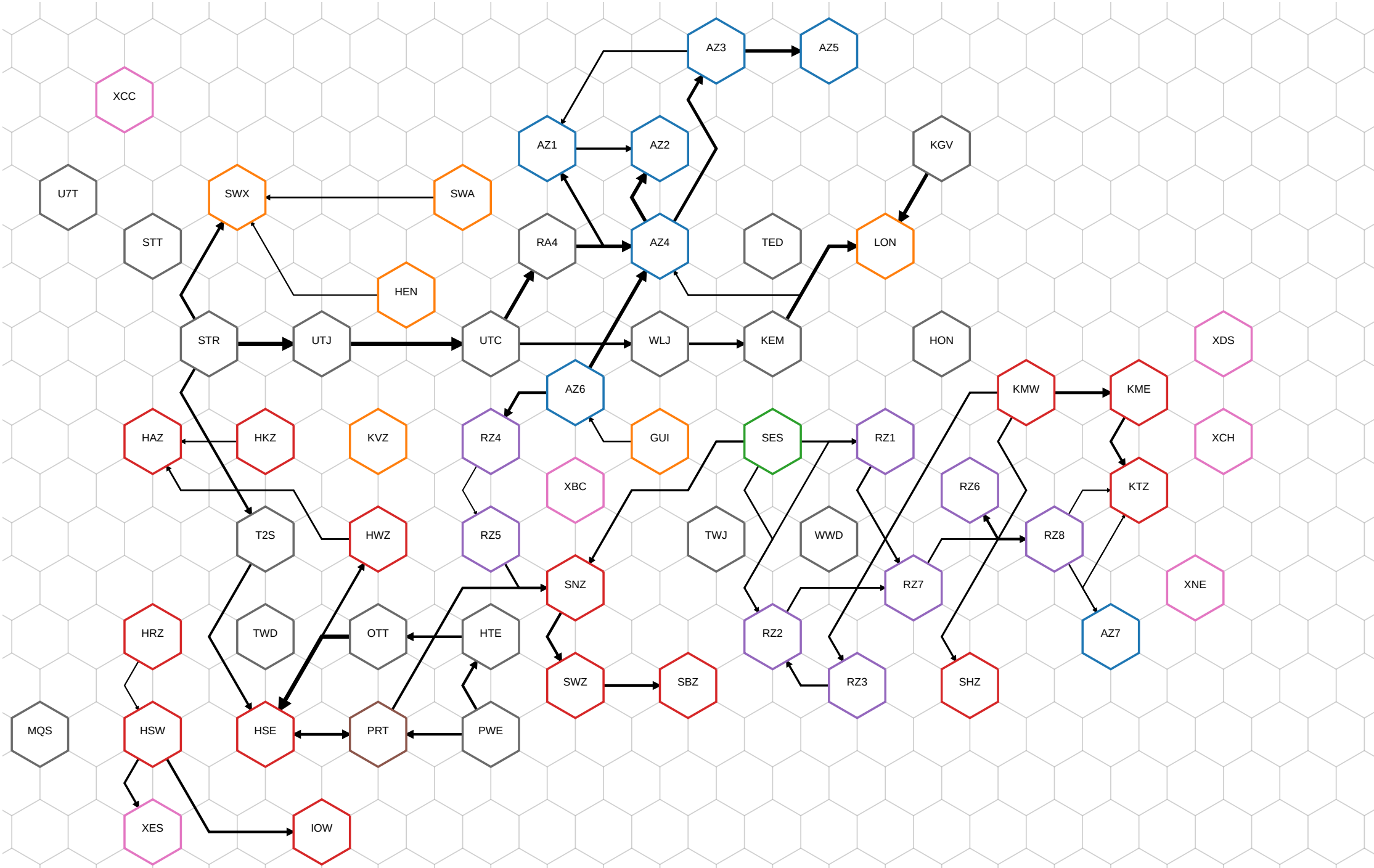
Situation 4 - 2075 (Thames Water)



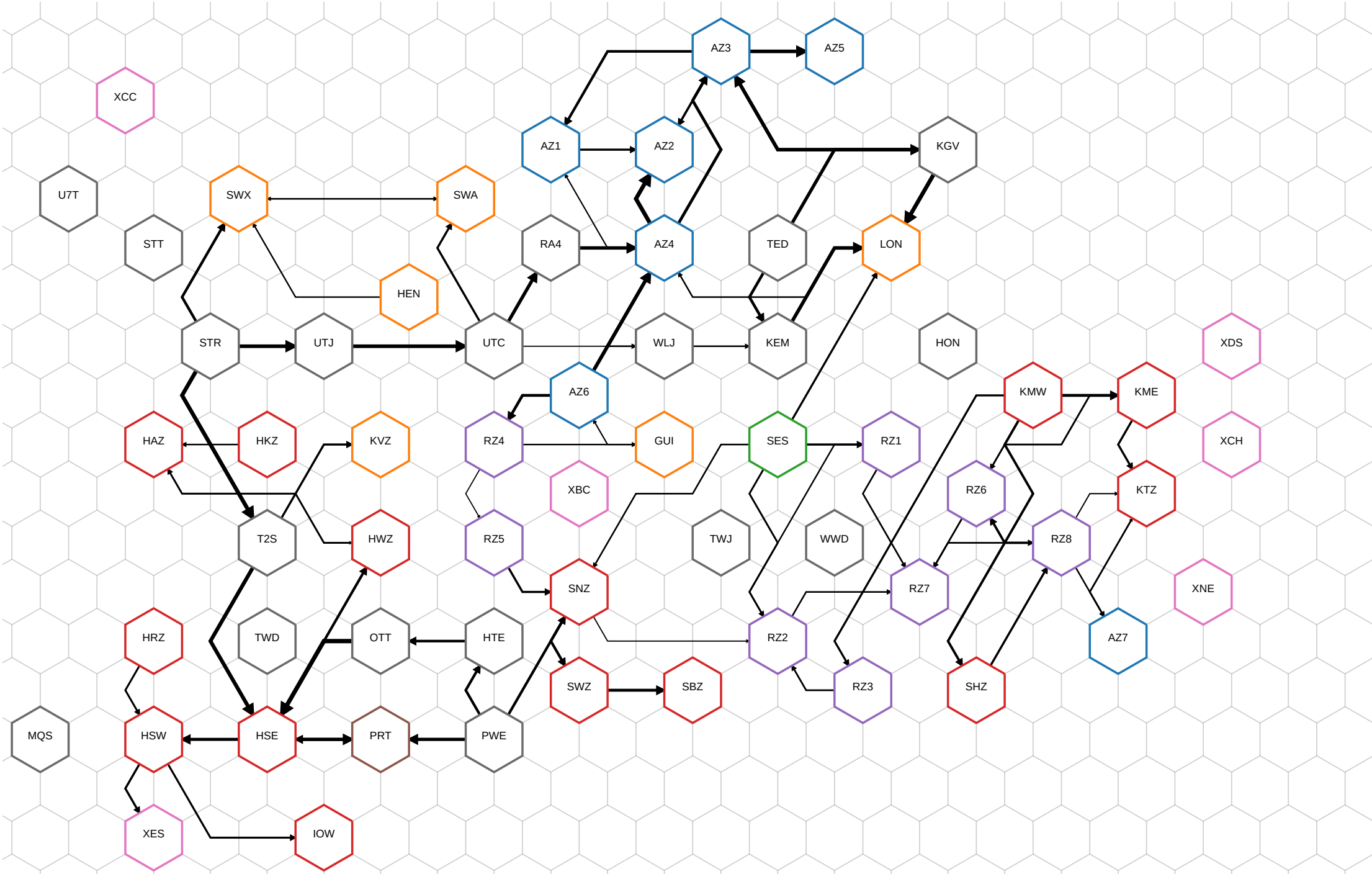
Situation 4 - 2026



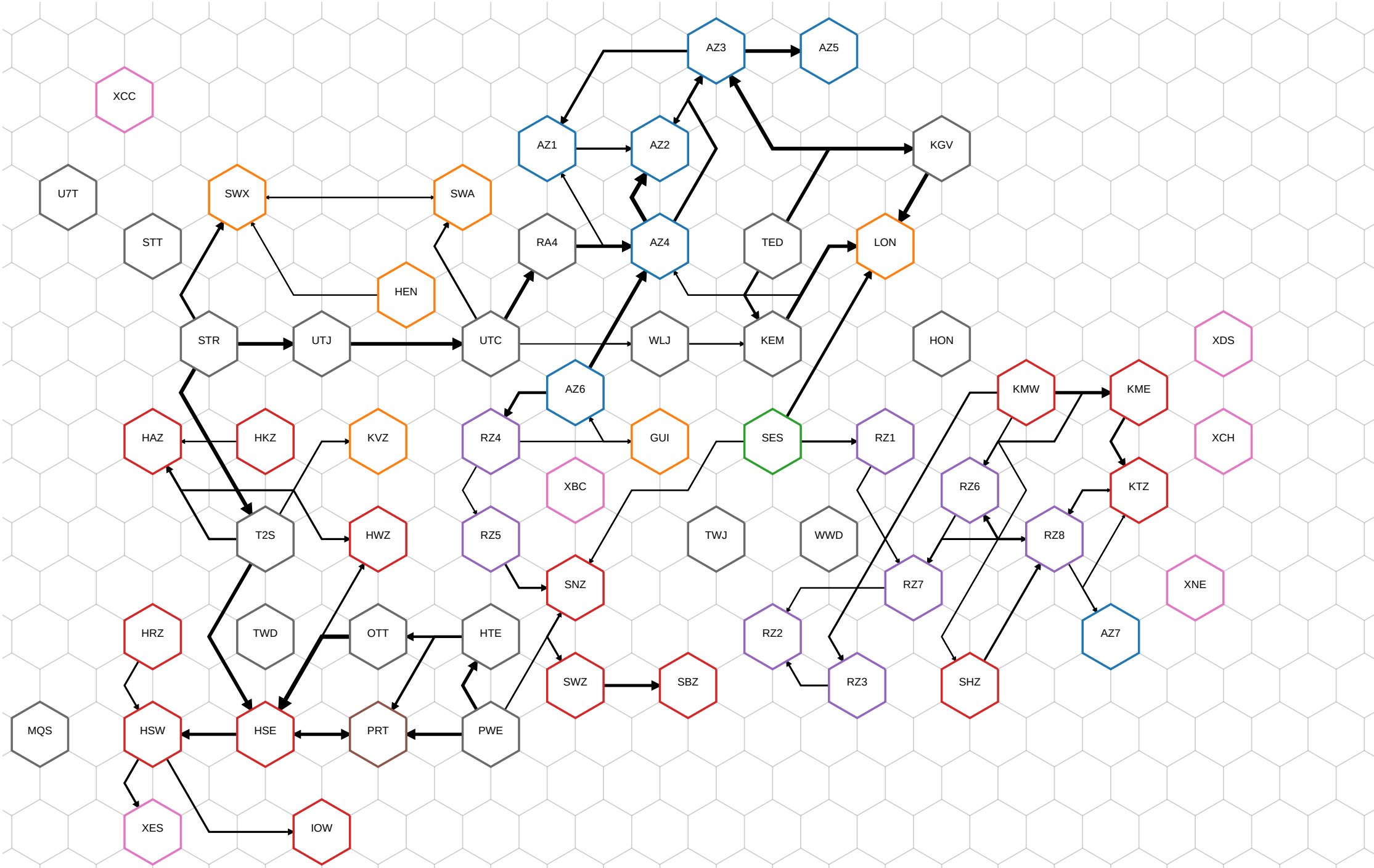
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

BECKTON RECYCLING 150 IN 2033

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-force-beckton-reuse150-2033-2075
Description	Least cost run with hybrid-c+2 government interventions forcing the selection of Beckton Reuse 150 Ml/d to be operational in 2033.
Created at	18/07/2023, 12:17:01
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-force-beckton-reuse150-2033
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Force Beckton Reuse 150 Ml/d to be operational in 2033 (selected 2028).
Optimised discount rate	STPR

Metrics

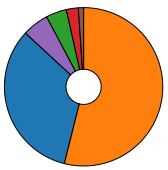
Net present value (Cost)

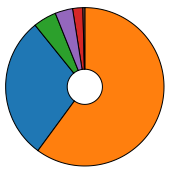
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,169	18,730	18,048	20,022	18,383	17,659	18,843	17,661	16,966	18,609	(£m)
Cost w/o deficit (STPR)	21,169	18,730	18,048	20,022	18,383	17,659	18,843	17,661	16,966	18,609	(£m)
Cost w/ deficit (IGEQ)	32,160	27,510	26,284	30,042	26,971	25,684	27,957	25,755	24,502	27,429	(£m)
Cost w/o deficit (IGEQ)	32,160	27,510	26,284	30,042	26,971	25,684	27,957	25,755	24,502	27,429	(£m)
Cost w/ deficit (LTDR)	23,300	20,459	19,675	21,977	20,074	19,245	20,629	19,259	18,460	20,342	(£m)
Cost w/o deficit (LTDR)	23,300	20,459	19,675	21,977	20,074	19,245	20,629	19,259	18,460	20,342	(£m)

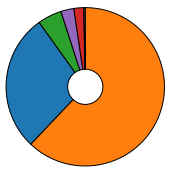
Cost breakdown (STPR)

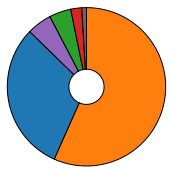
Select Company: Total

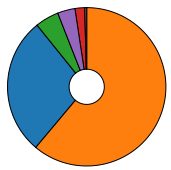
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,980	5,454	5,063	6,130	5,166	4,741	5,362	4,674	4,238	5,312	(£m)
Fixed opex	11,411	11,254	11,202	11,345	11,234	11,181	11,259	11,180	11,121	11,243	(£m)
Fixed operational carbon	899	886	886	898	889	888	891	885	885	889	(£m)
Embedded carbon	518	392	368	445	365	337	376	324	299	380	(£m)
Variable opex	1,136	671	475	1,012	655	459	796	541	385	681	(£m)
Variable carbon opex	224	74	54	193	74	53	160	58	38	103	(£m)

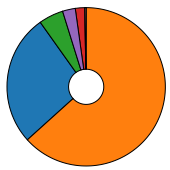
situation1 

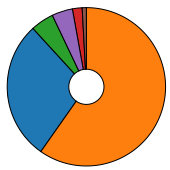
situation2 

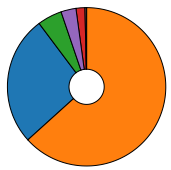
situation3 

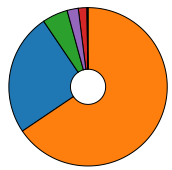
situation4 

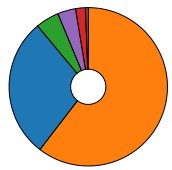
situation5 

situation6 

situation7 

situation8 

situation9 

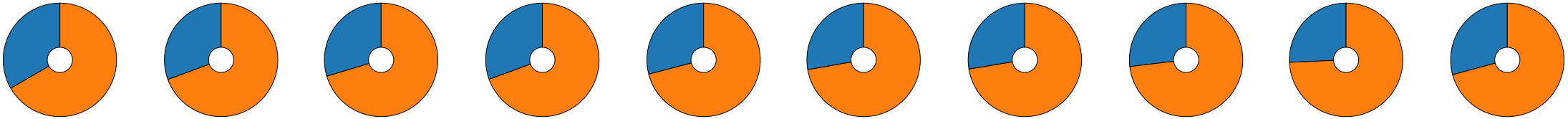
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,299,421	2,395,746	2,240,486	2,797,411	2,233,553	2,046,708	2,326,331	1,963,142	1,802,712	2,345,057	(tonnes)
Operational emissions	6,600,125	5,426,803	5,316,105	6,355,494	5,453,062	5,324,451	6,098,723	5,341,025	5,213,981	5,681,085	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

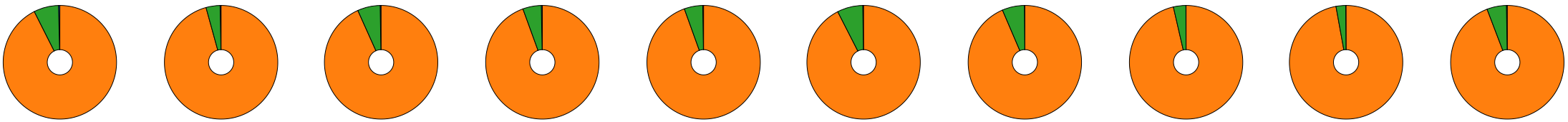


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	106	44	21	72	37	18	21	7	6	37	(GWh)
Grid	25,014	14,366	7,306	22,285	13,718	7,048	16,782	10,979	5,830	13,703	(GWh)
Renewable	1,907	600	506	1,243	764	556	1,138	404	165	809	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,404	63,821	63,160	67,227	63,527	62,378	64,076	61,639	60,562	63,977
SEA environmental disbenefit	113,219	81,248	75,983	99,219	80,129	73,676	87,664	71,358	62,359	82,762
Natural capital	81,881,151	77,259,202	80,021,856	77,986,481	79,894,824	82,544,522	64,281,803	65,025,704	68,029,151	75,213,855
Bio-diversity net gain	−209,378	−155,255	−131,132	−181,876	−127,893	−100,902	−145,191	−103,012	−67,419	−135,784

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,931	31,707	31,419	33,029	31,569	31,181	31,659	30,711	30,211	31,713

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.20	30.14	33.02	27.89	28.65	31.29	28.14	30.58	33.94	30.32
R1: Uncertainty of option supply/demand benefit	6.11	5.84	6.38	5.74	5.56	6.04	5.62	5.91	6.54	5.97
R3: Risk of service failure due to other physical hazards	7.00	7.39	8.27	6.71	7.00	7.83	6.77	7.55	8.60	7.46
R4: Availability of additional headroom	6.63	7.01	7.22	6.62	6.91	7.11	7.09	7.42	7.66	7.08
R5: Catchment/raw water quality risks (incl. climate change)	4.18	4.45	5.03	3.86	4.13	4.67	3.93	4.44	5.13	4.42
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.28	5.45	6.11	4.96	5.04	5.64	4.74	5.25	6.00	5.39
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

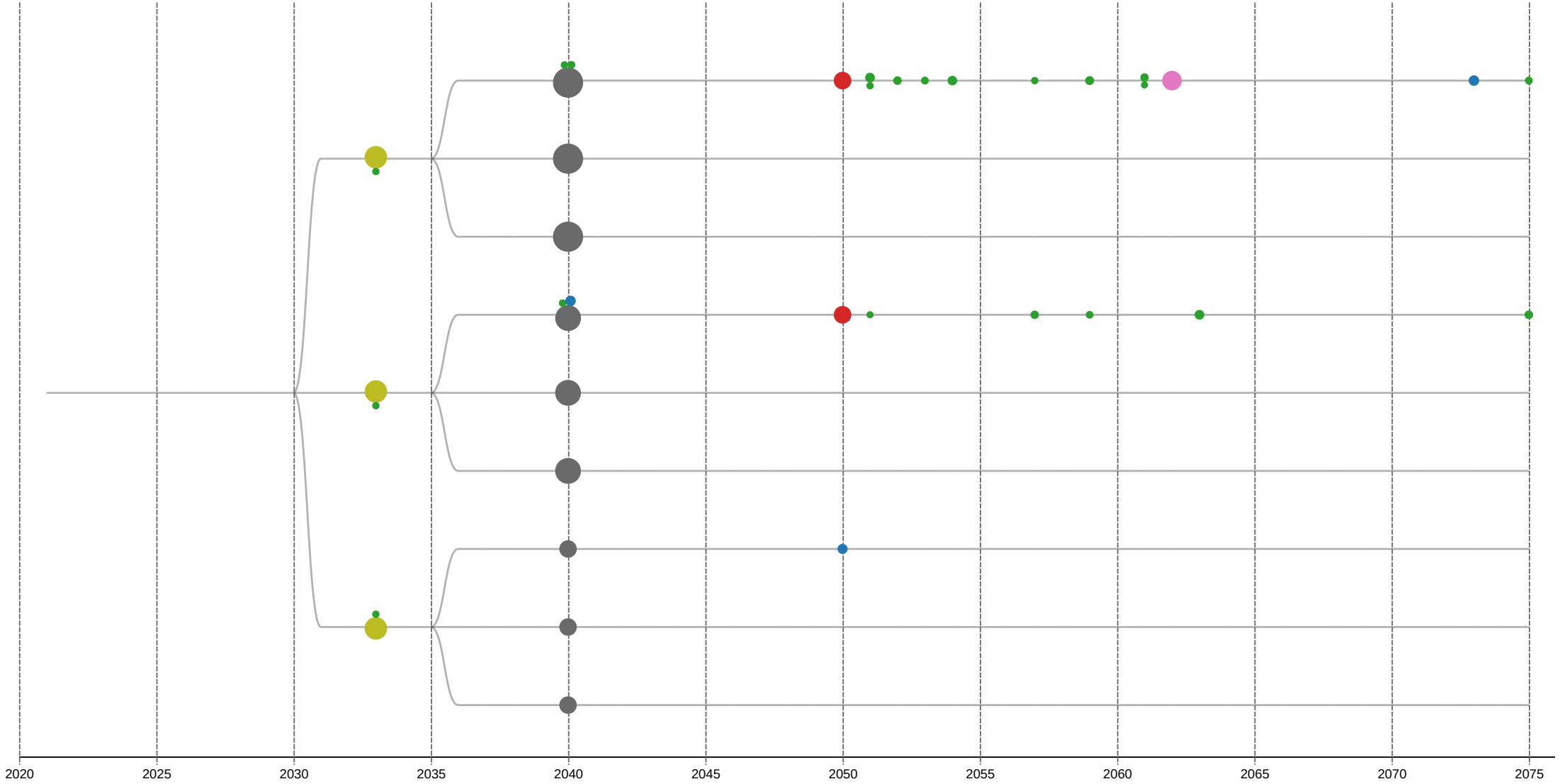
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.96	15.23	17.06	13.86	14.83	16.42	14.67	16.55	18.85	15.71
A3: Operational complexity and flexibility	6.50	7.02	7.89	6.27	6.64	7.46	6.36	7.19	8.25	7.06
A4: WRZ connectivity	7.43	8.18	9.14	7.57	8.16	8.93	8.28	9.33	10.57	8.62
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.30	20.30	22.54	19.20	20.30	22.37	20.55	22.93	25.99	21.50
E1: Scaleability and modularity of proposed changes	8.86	9.54	10.63	9.05	9.74	10.84	9.80	11.11	12.66	10.25
E2: Intervention lead times	4.19	4.13	4.53	3.96	3.99	4.23	4.03	4.27	4.73	4.23
E3: Reliance on external bodies to deliver changes	6.25	6.63	7.38	6.20	6.57	7.31	6.72	7.55	8.59	7.02
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

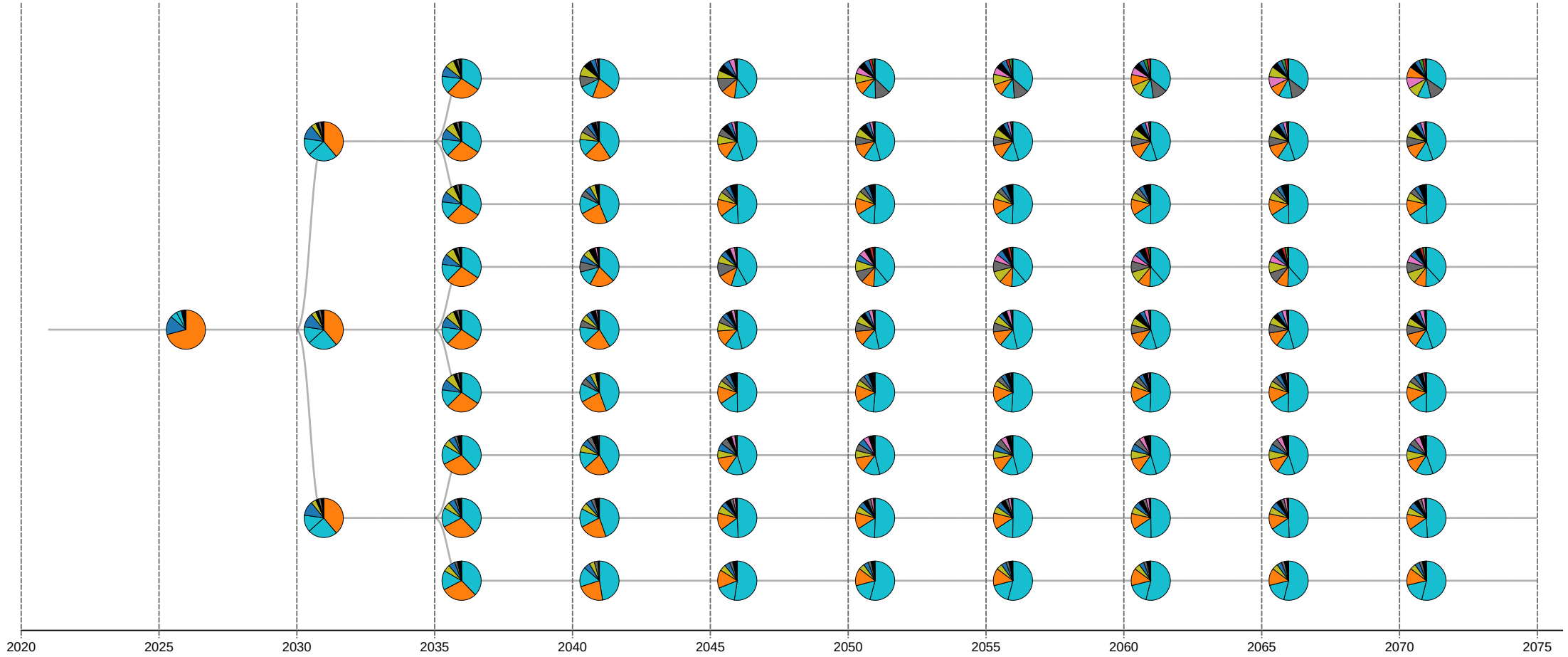
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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- Groundwater
- Direct river abstraction
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- Catchment management
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- Reservoir
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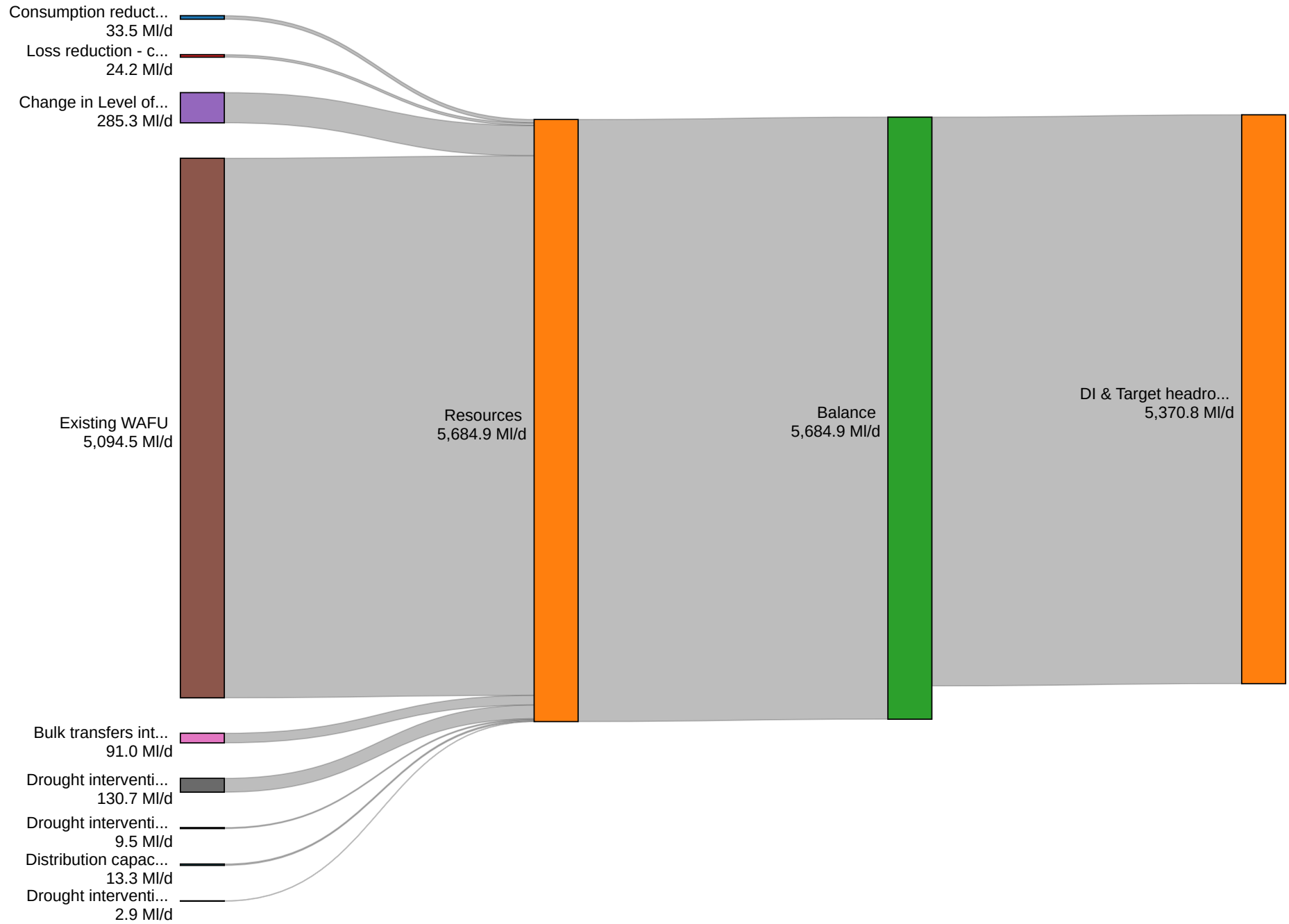
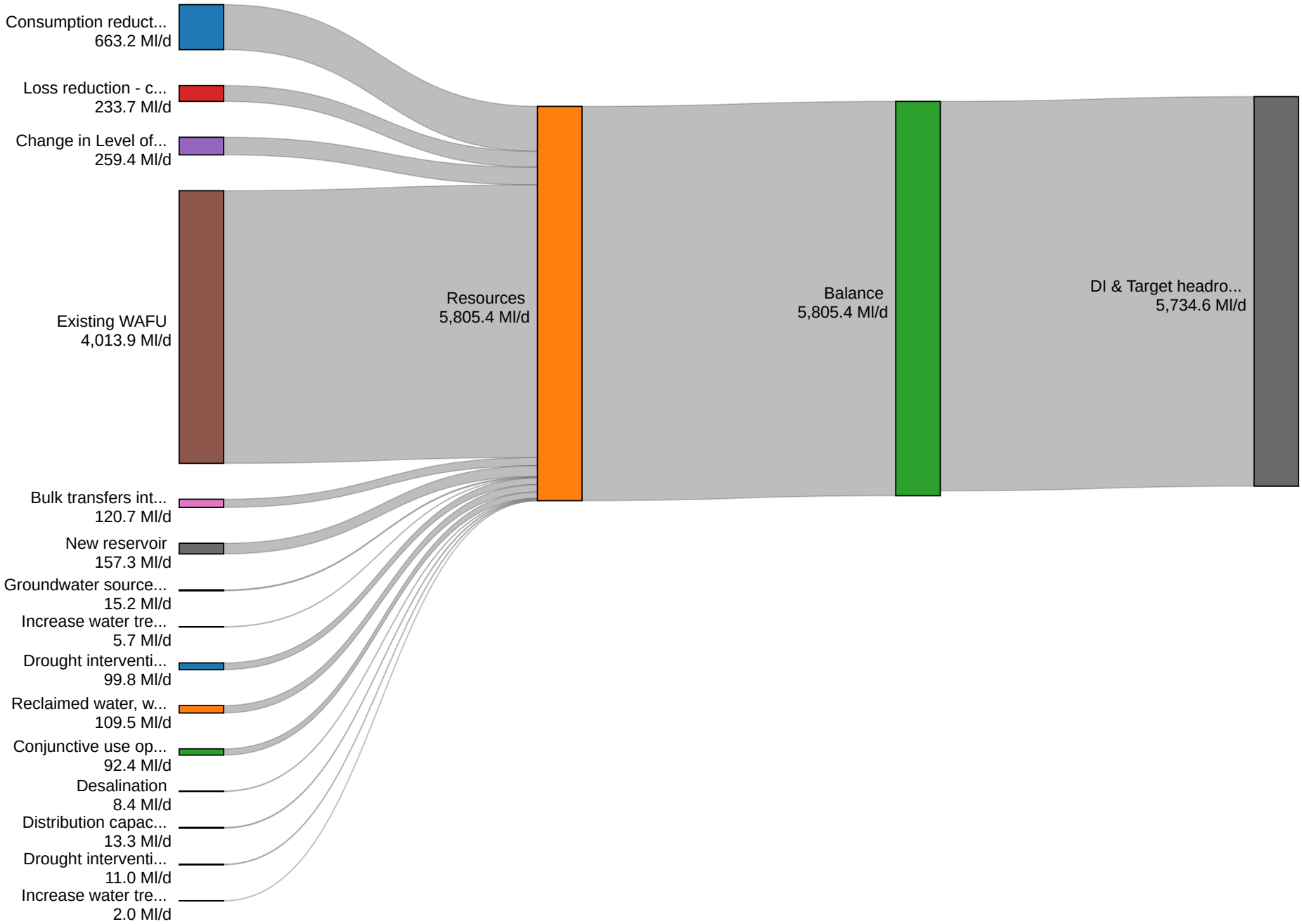
- Demand management
- Leakage reduction
- Other

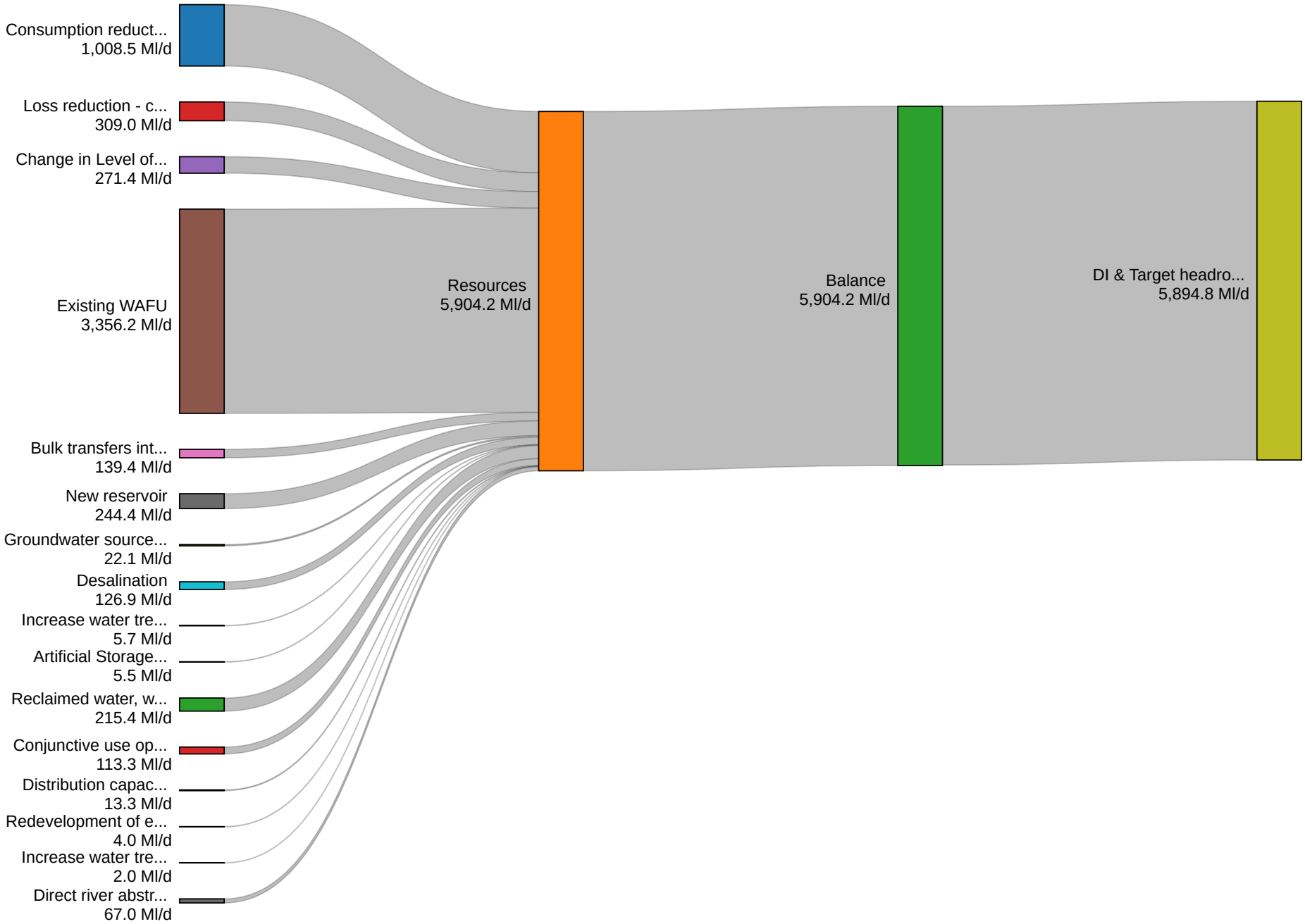
Situation 4 - 2026 (Thames Water)



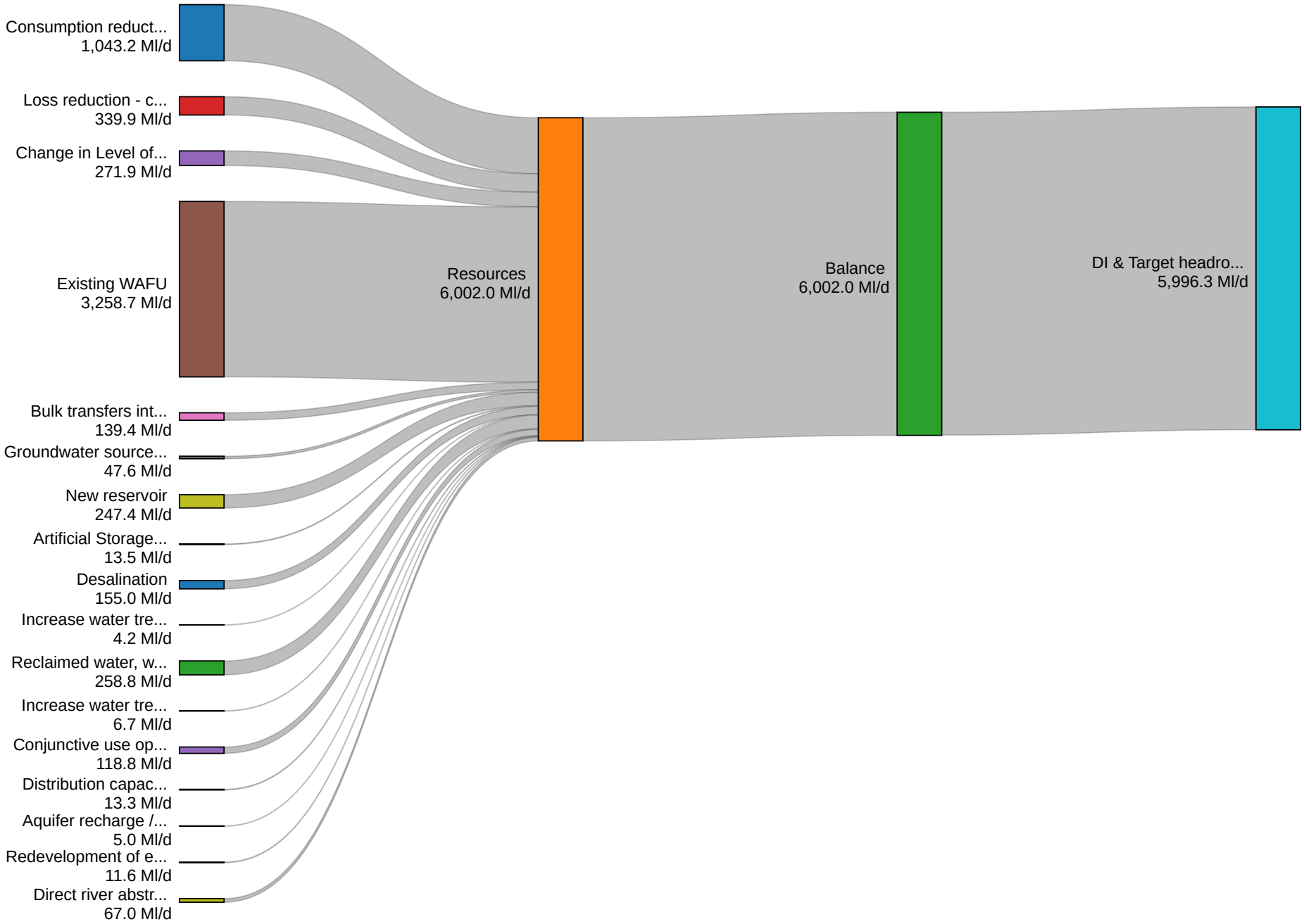
Situation 4 - 2040 (Thames Water)



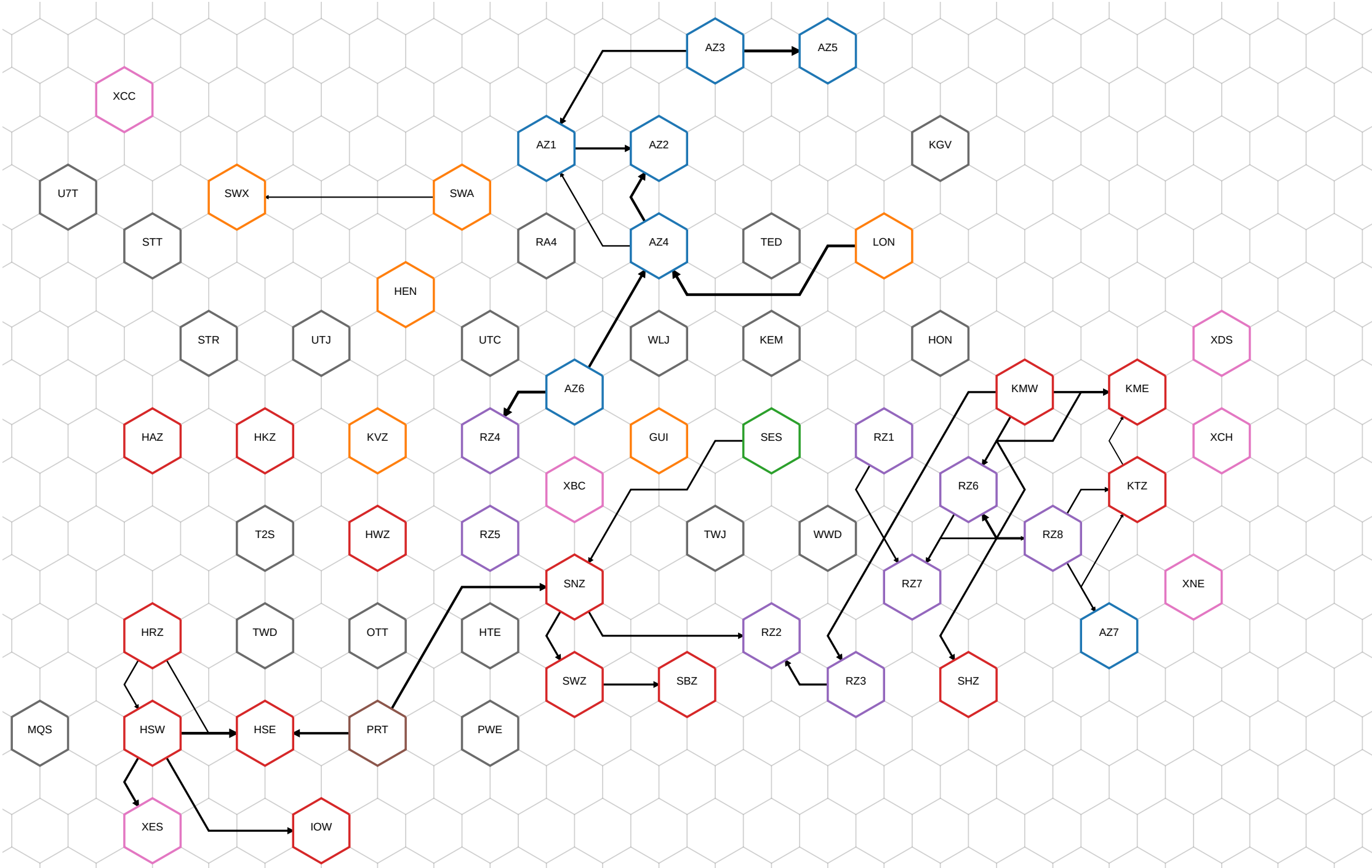
Situation 4 - 2050 (Thames Water)



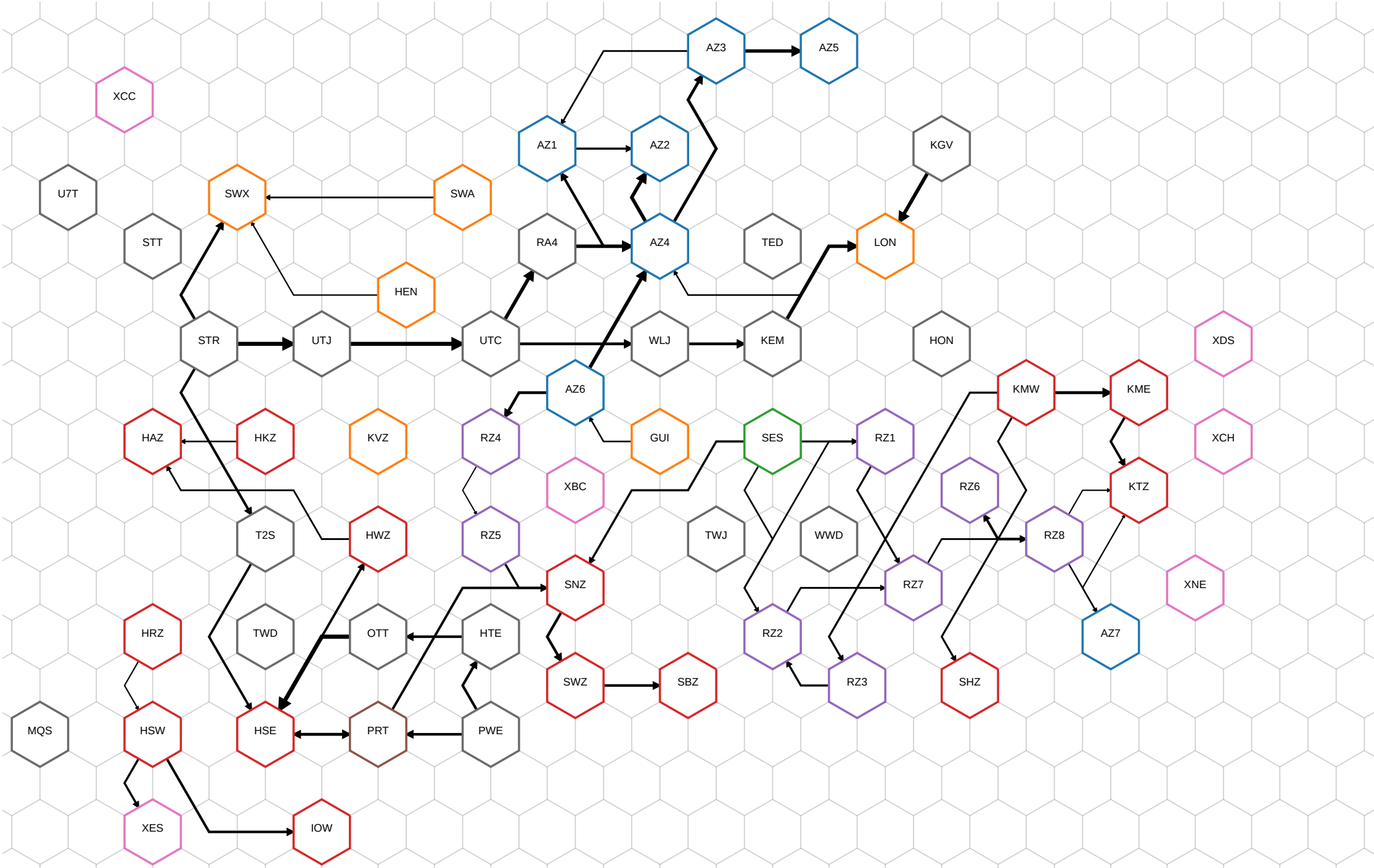
Situation 4 - 2075 (Thames Water)



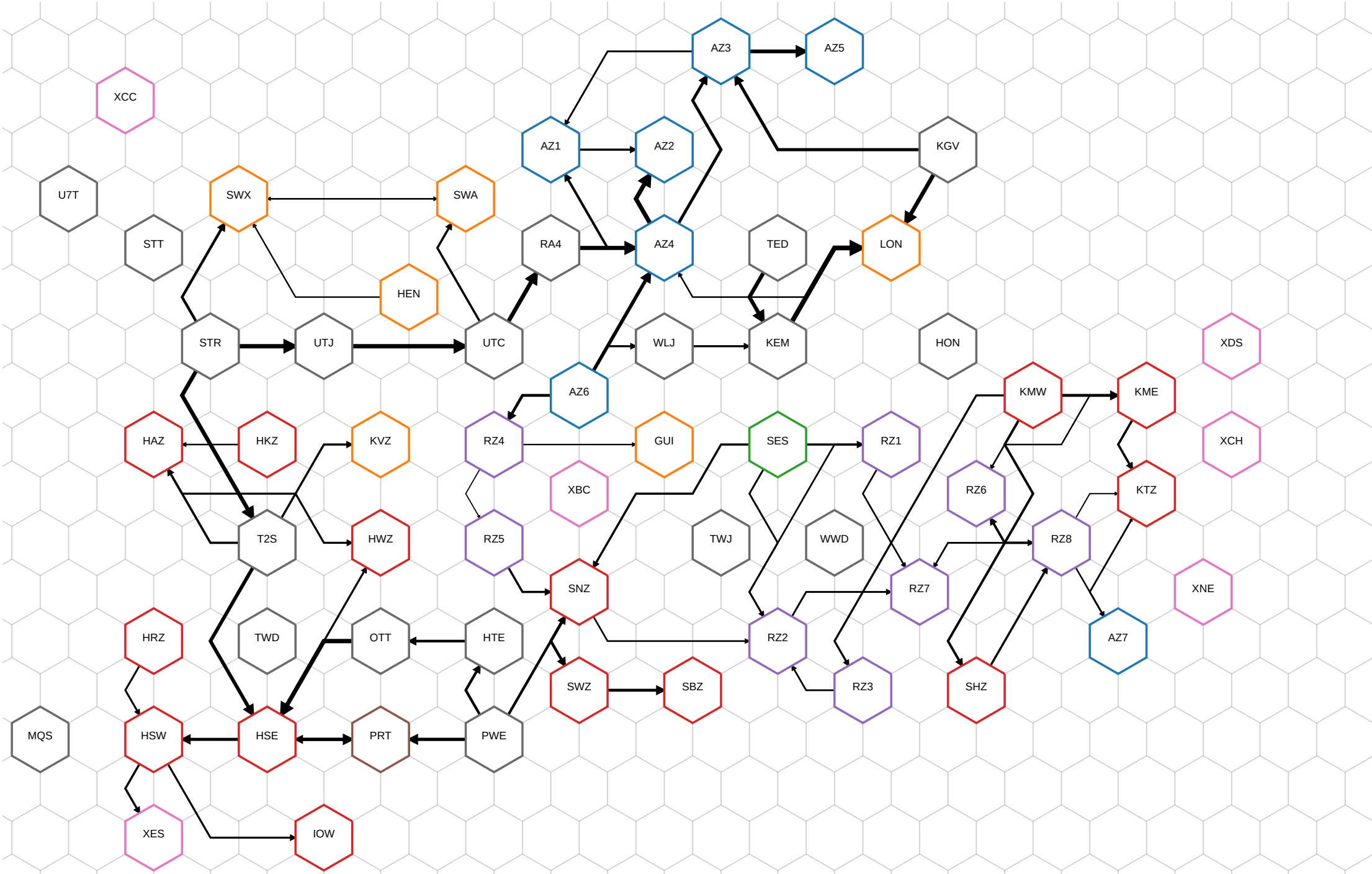
Situation 4 - 2026



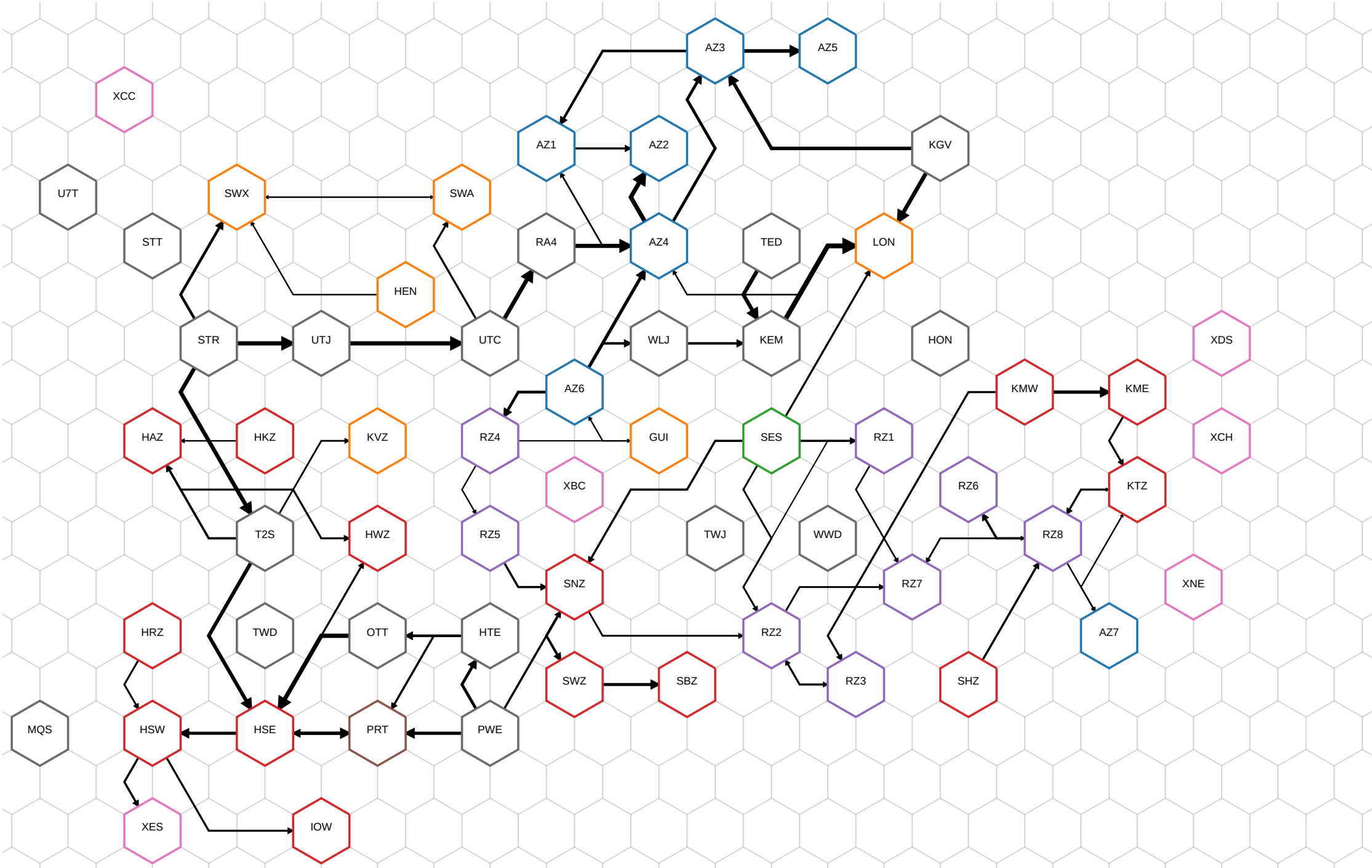
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

1:500 DROUGHT RESILIENCE IN 2035

IVM Summary: Thames Water

! This run contained total deficits of 6.5 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid2035-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-drpo-v4-2075
Description	Least cost run with hybrid-c+2 government interventions with 1in500 achieved in 2035 and extending drought options to 2036 (i.e. use "v4" of the drought options).
Created at	22/08/2023, 11:10:58
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-drpo-v4
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Use v4 of drought permits and orders (end in 2036).
Optimised discount rate	STPR

Metrics

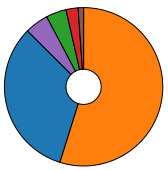
Net present value (Cost)

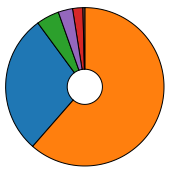
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	421,371	418,801	418,039	419,988	418,528	417,755	18,569	17,722	17,035	285,312	(£m)
Cost w/o deficit (STPR)	21,170	18,600	17,838	19,871	18,411	17,638	18,569	17,722	17,035	18,539	(£m)
Cost w/ deficit (IGEQ)	432,350	427,443	426,061	429,755	427,051	425,673	27,366	25,767	24,528	293,999	(£m)
Cost w/o deficit (IGEQ)	32,150	27,242	25,860	29,638	26,934	25,556	27,366	25,767	24,528	27,227	(£m)
Cost w/ deficit (LTDR)	423,498	420,503	419,626	421,897	420,207	419,321	20,295	19,311	18,521	287,020	(£m)
Cost w/o deficit (LTDR)	23,298	20,302	19,425	21,780	20,090	19,204	20,295	19,311	18,521	20,247	(£m)

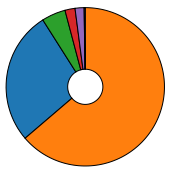
Cost breakdown (STPR)

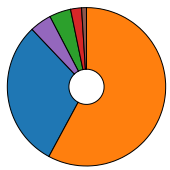
Select Company: Total

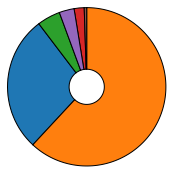
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,910	5,295	4,863	5,972	5,110	4,683	5,111	4,696	4,273	5,213	(£m)
Fixed opex	11,607	11,427	11,370	11,499	11,398	11,339	11,410	11,357	11,298	11,412	(£m)
Fixed operational carbon	879	869	870	877	870	869	872	867	866	871	(£m)
Embedded carbon	524	392	366	444	379	351	390	357	330	393	(£m)
Variable opex	1,016	545	328	880	561	343	671	411	249	556	(£m)
Variable carbon opex	234	72	41	198	93	52	115	35	18	95	(£m)

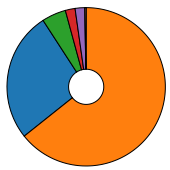
situation1 

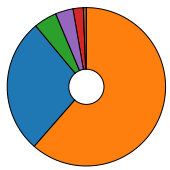
situation2 

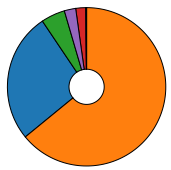
situation3 

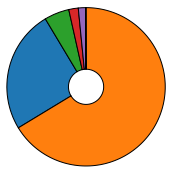
situation4 

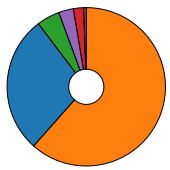
situation5 

situation6 

situation7 

situation8 

situation9 

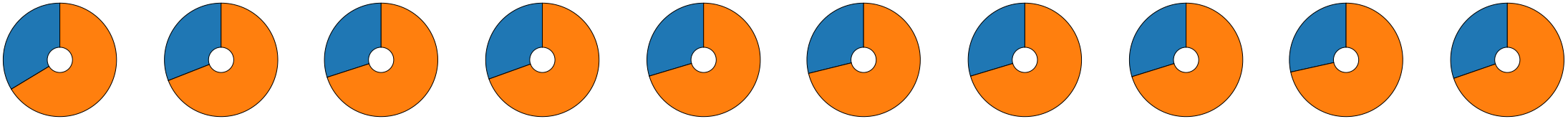
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,316,425	2,379,259	2,203,777	2,746,205	2,301,267	2,112,741	2,391,106	2,159,838	1,980,883	2,399,056	(tonnes)
Operational emissions	6,543,240	5,308,522	5,150,566	6,262,510	5,468,517	5,213,532	5,675,788	5,090,368	4,980,596	5,521,515	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

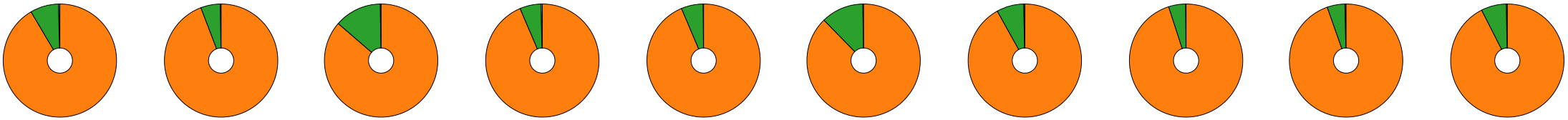


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	101	33	12	89	19	12	51	13	12	38	(GWh)
Grid	21,949	11,517	4,101	19,379	11,175	4,318	13,398	8,379	3,181	10,822	(GWh)
Renewable	1,931	676	636	1,239	741	596	1,125	426	170	838	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,263	65,428	64,601	67,330	64,444	63,743	65,144	63,230	62,223	65,156
SEA environmental disbenefit	118,874	88,815	82,378	102,534	86,376	80,164	87,693	73,427	65,640	87,322
Natural capital	84,727,042	80,185,049	82,993,408	78,409,979	80,065,720	82,795,300	79,789,733	81,621,978	83,253,897	81,538,012
Bio-diversity net gain	−225,570	−149,431	−133,383	−208,101	−165,104	−142,270	−154,148	−126,974	−100,445	−156,158

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,611	32,637	32,257	33,453	32,287	31,960	32,314	31,361	31,038	32,435

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.31	30.57	33.41	29.07	30.60	33.47	31.50	35.05	39.15	32.46
R1: Uncertainty of option supply/demand benefit	6.05	5.70	6.20	5.78	5.68	6.17	5.98	6.54	7.29	6.15
R3: Risk of service failure due to other physical hazards	7.06	7.57	8.47	7.08	7.60	8.49	7.79	8.87	10.15	8.12
R4: Availability of additional headroom	6.62	7.01	7.22	6.74	7.04	7.24	7.32	7.68	7.93	7.20
R5: Catchment/raw water quality risks (incl. climate change)	4.06	4.38	4.92	3.94	4.38	4.96	4.40	5.10	5.91	4.67
R6: Capacity of catchment services	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.51	5.90	6.59	5.54	5.90	6.61	6.01	6.85	7.87	6.31
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

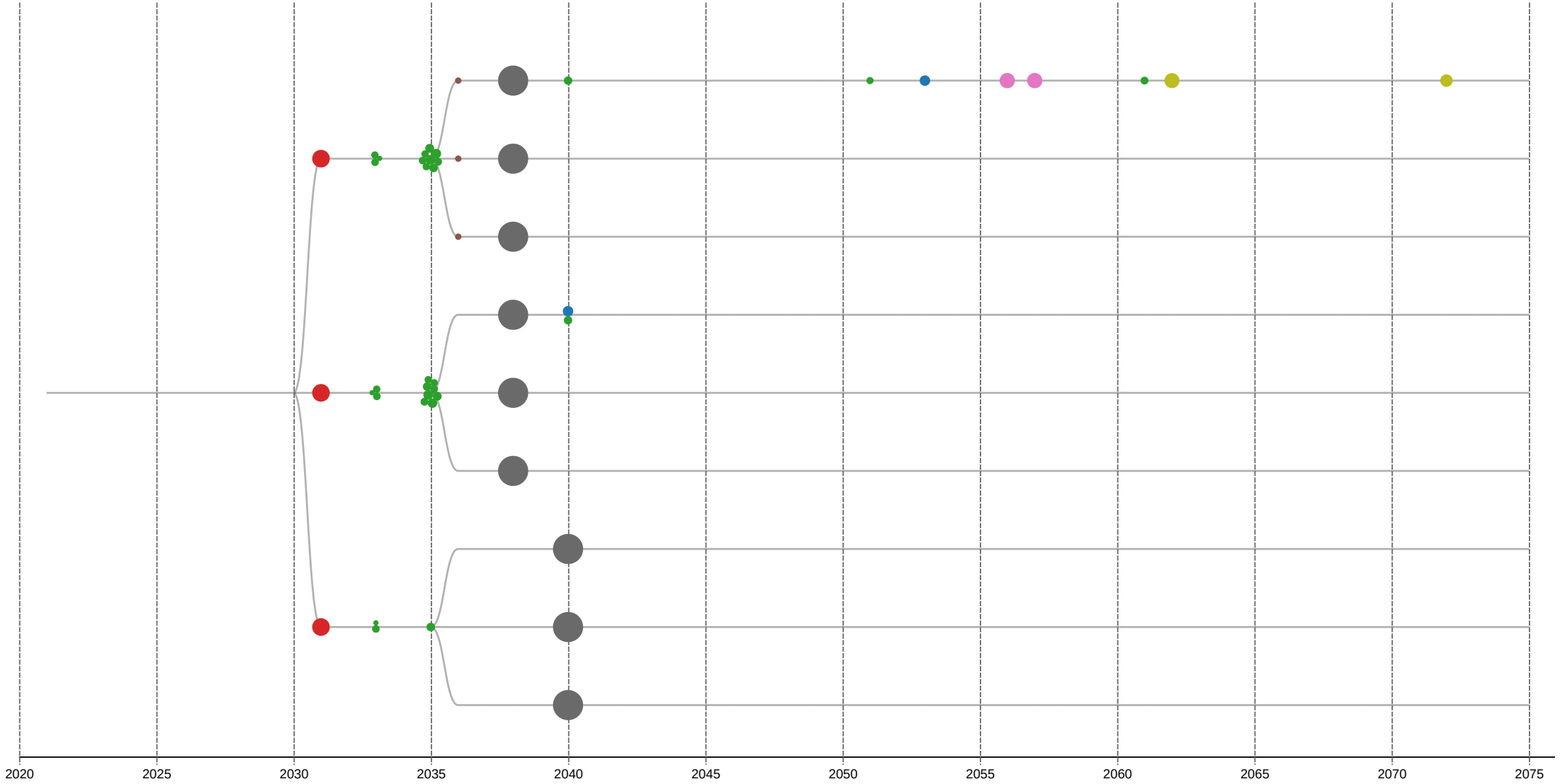
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.15	15.91	17.71	14.31	15.79	17.70	16.20	18.73	21.40	16.88
A3: Operational complexity and flexibility	6.66	7.33	8.23	6.78	7.36	8.27	7.49	8.61	9.91	7.85
A4: WRZ connectivity	7.45	8.54	9.45	7.51	8.41	9.40	8.68	10.08	11.45	9.00
A7: Customer relations support engagement with demand management	0.03	0.04	0.04	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.42	20.64	22.74	19.23	20.58	22.81	20.95	23.86	27.10	21.93
E1: Scaleability and modularity of proposed changes	8.86	9.65	10.74	8.87	9.70	10.79	9.83	11.29	12.88	10.29
E2: Intervention lead times	4.28	4.31	4.57	4.10	4.19	4.58	4.32	4.82	5.37	4.50
E3: Reliance on external bodies to deliver changes	6.28	6.67	7.42	6.25	6.69	7.44	6.81	7.76	8.85	7.13
E5: Collaborative land management	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

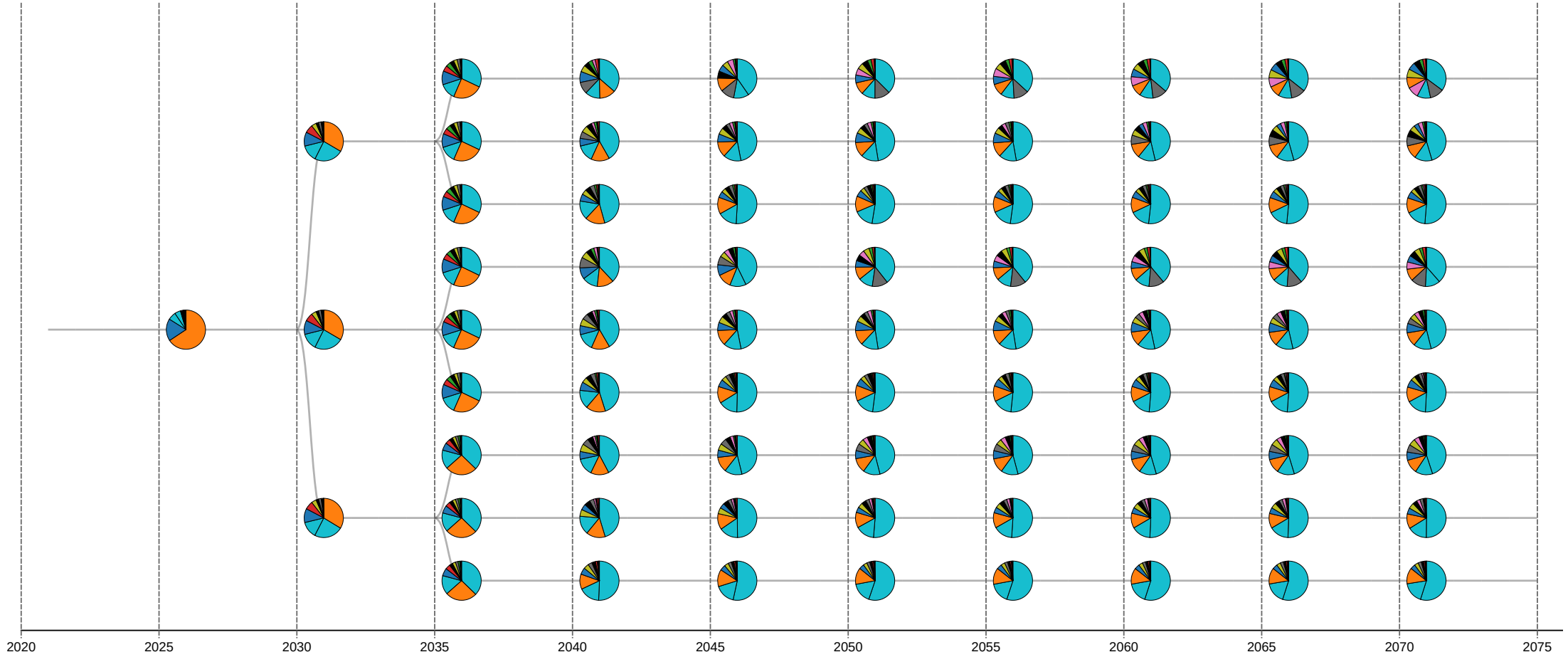
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

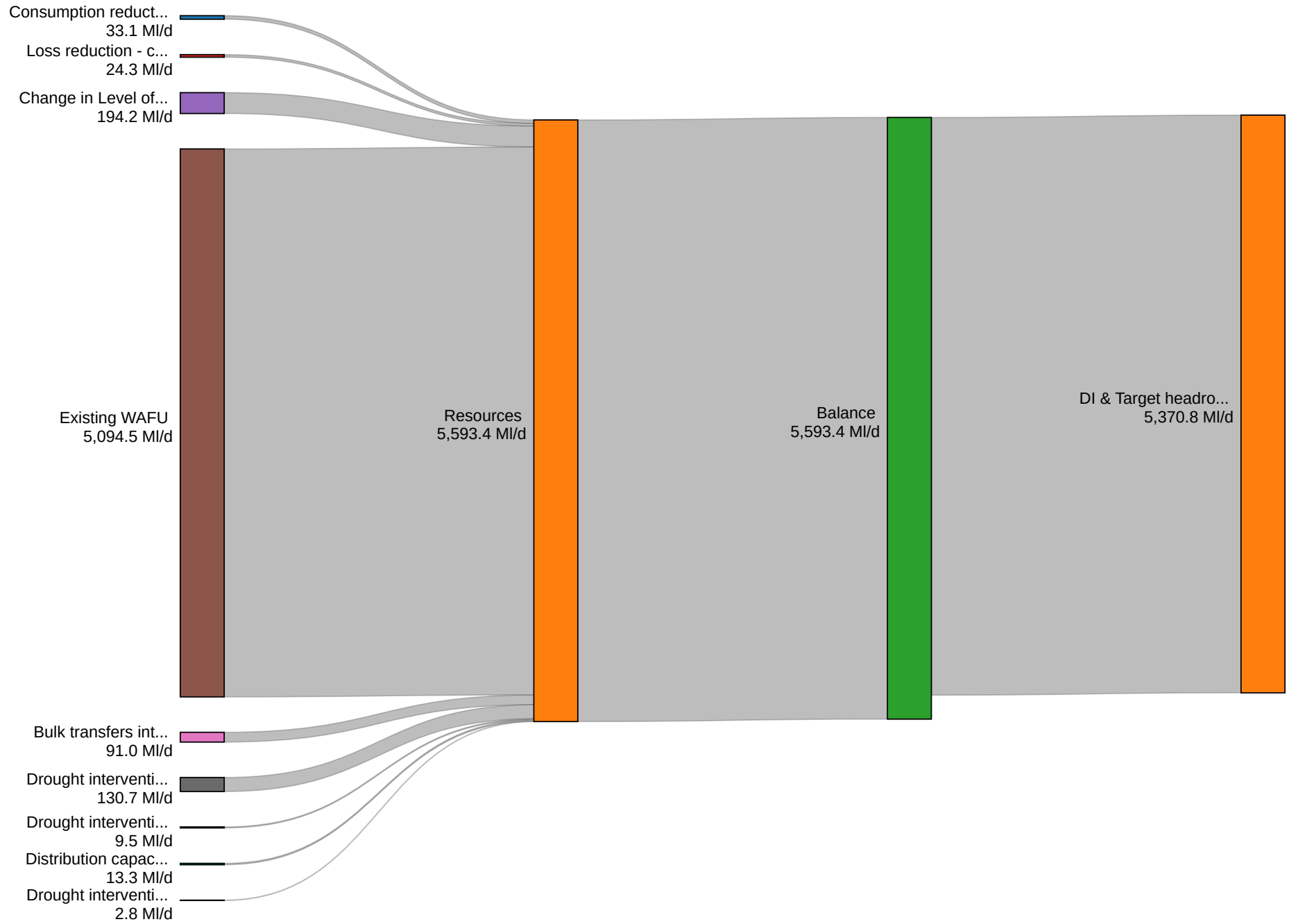
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

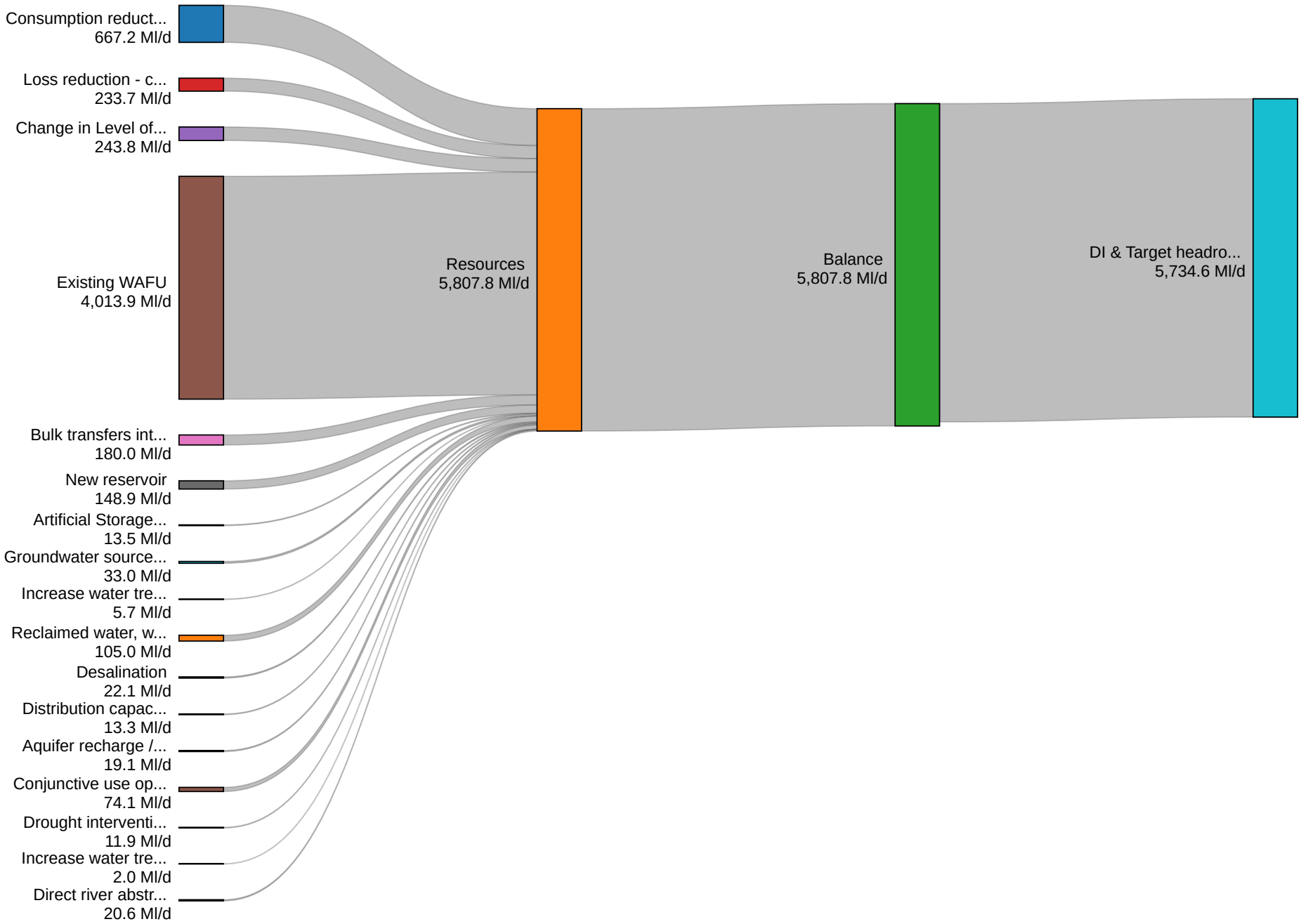


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

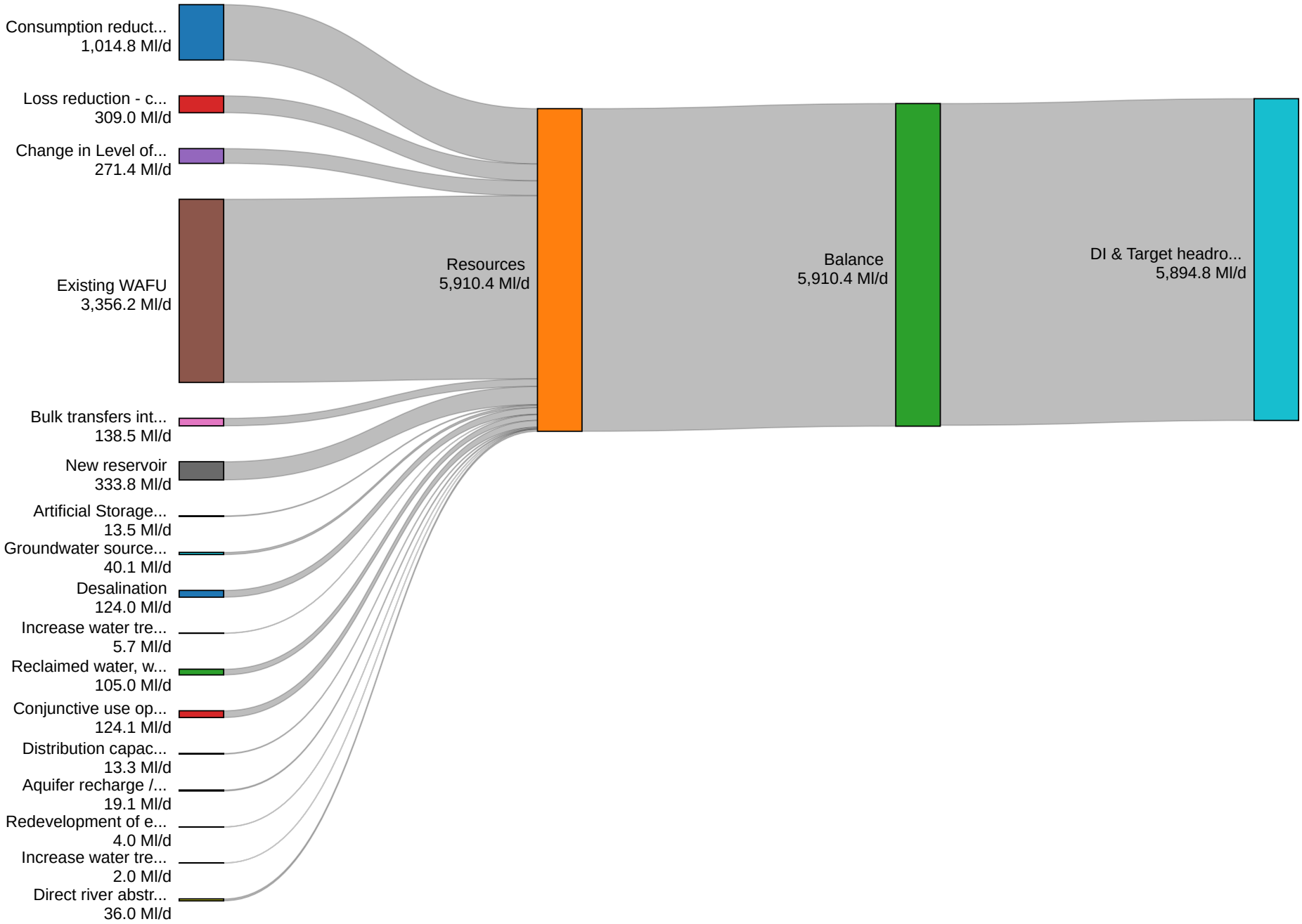
Situation 4 - 2026 (Thames Water)



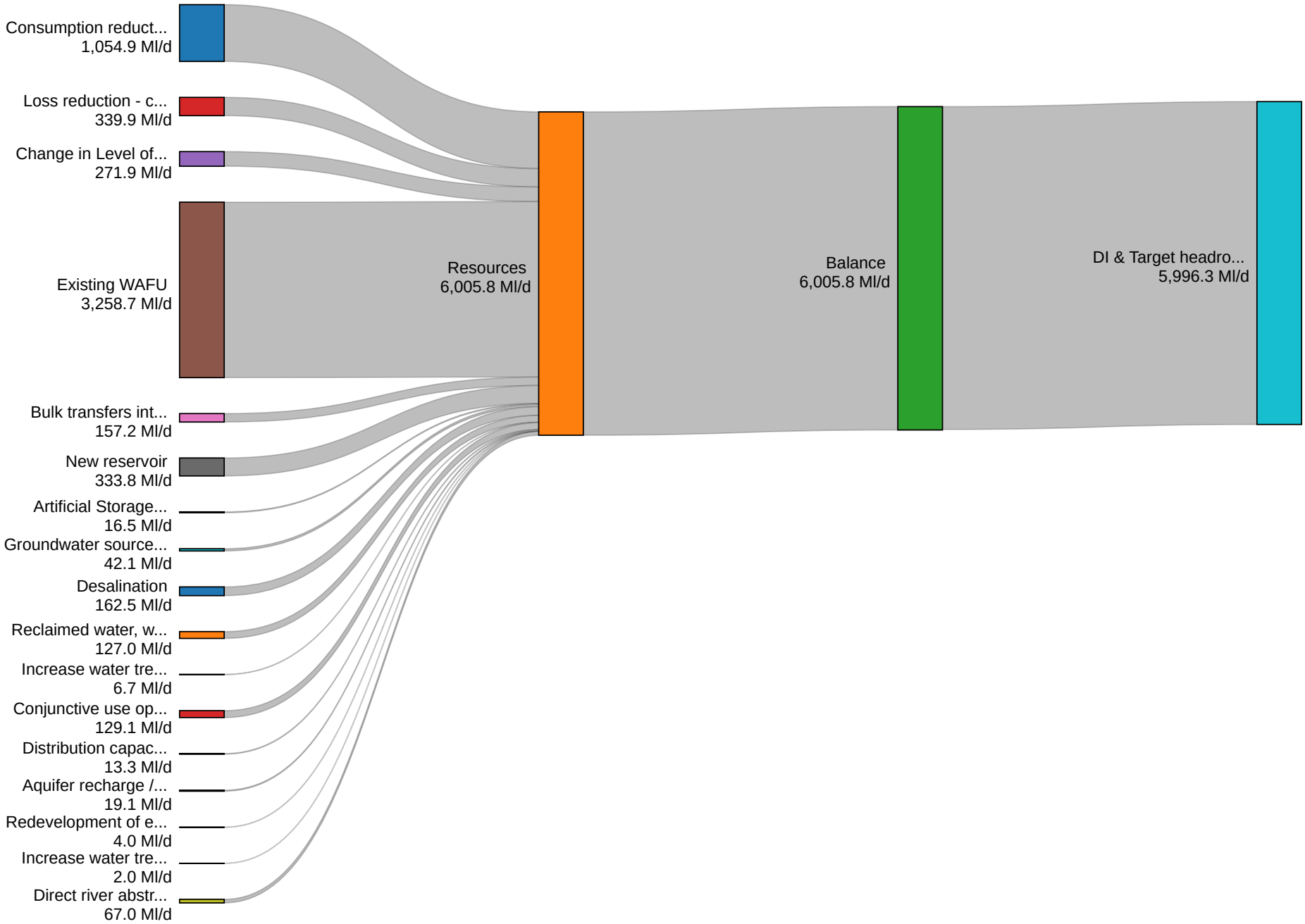
Situation 4 - 2040 (Thames Water)



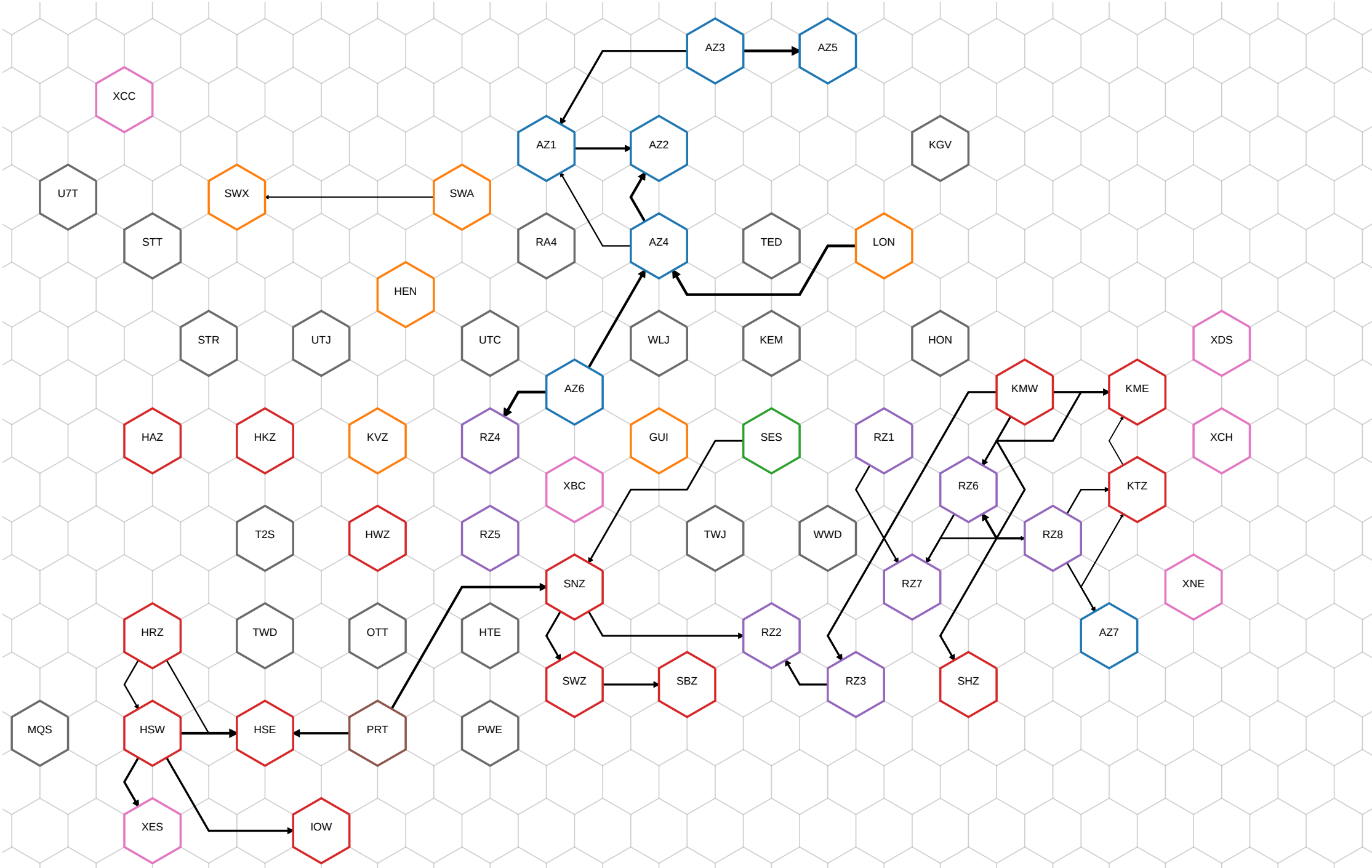
Situation 4 - 2050 (Thames Water)



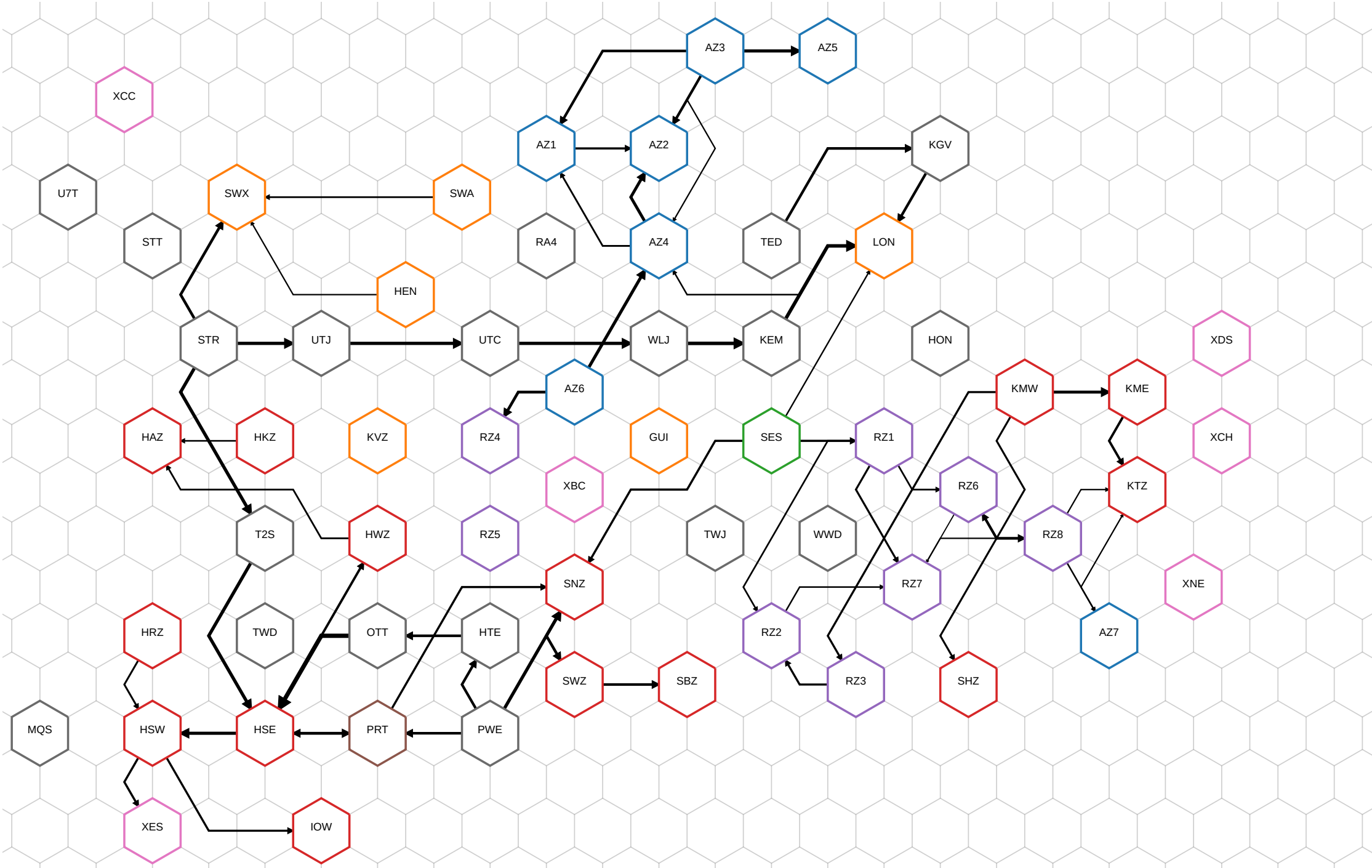
Situation 4 - 2075 (Thames Water)



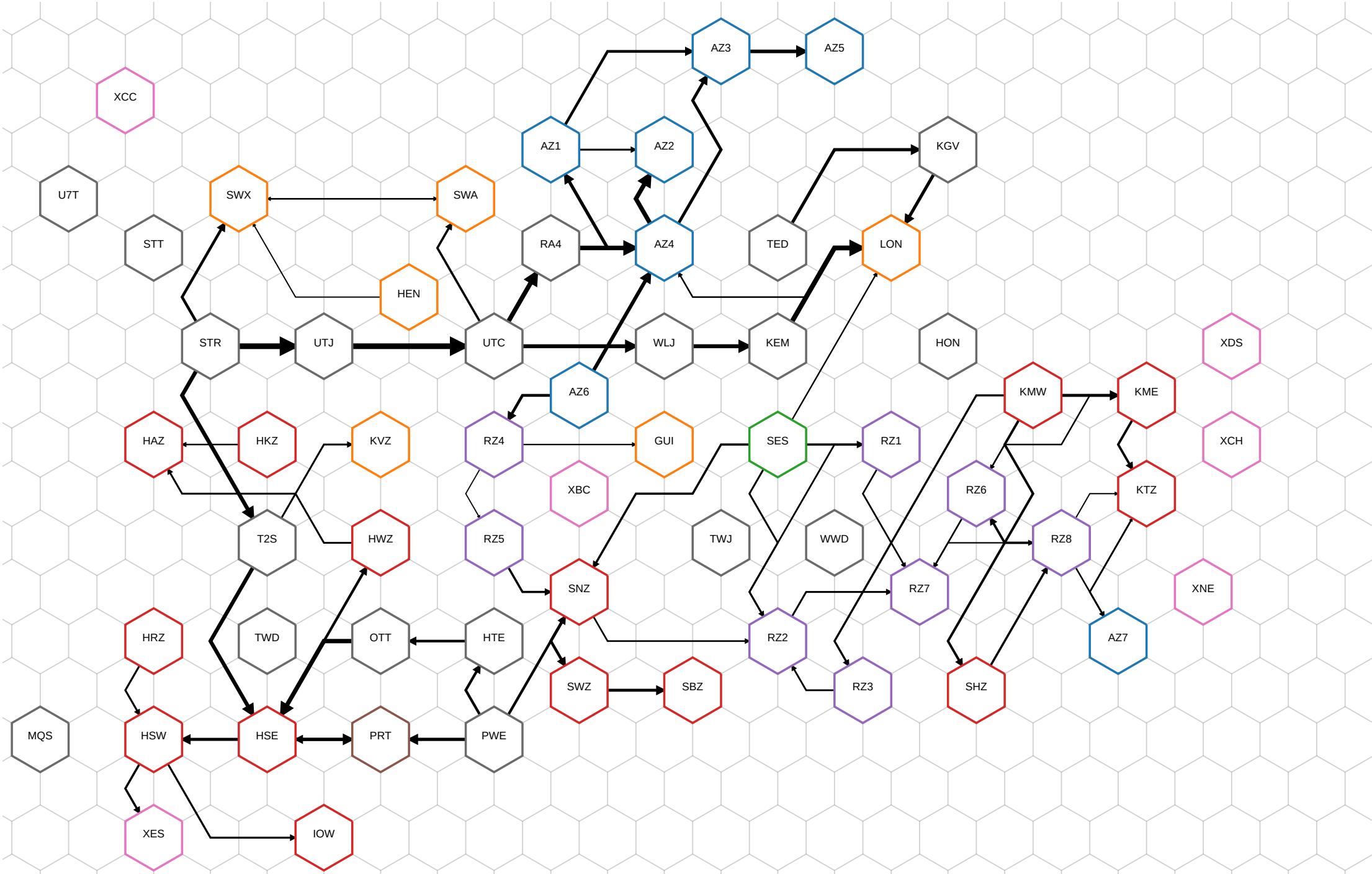
Situation 4 - 2026



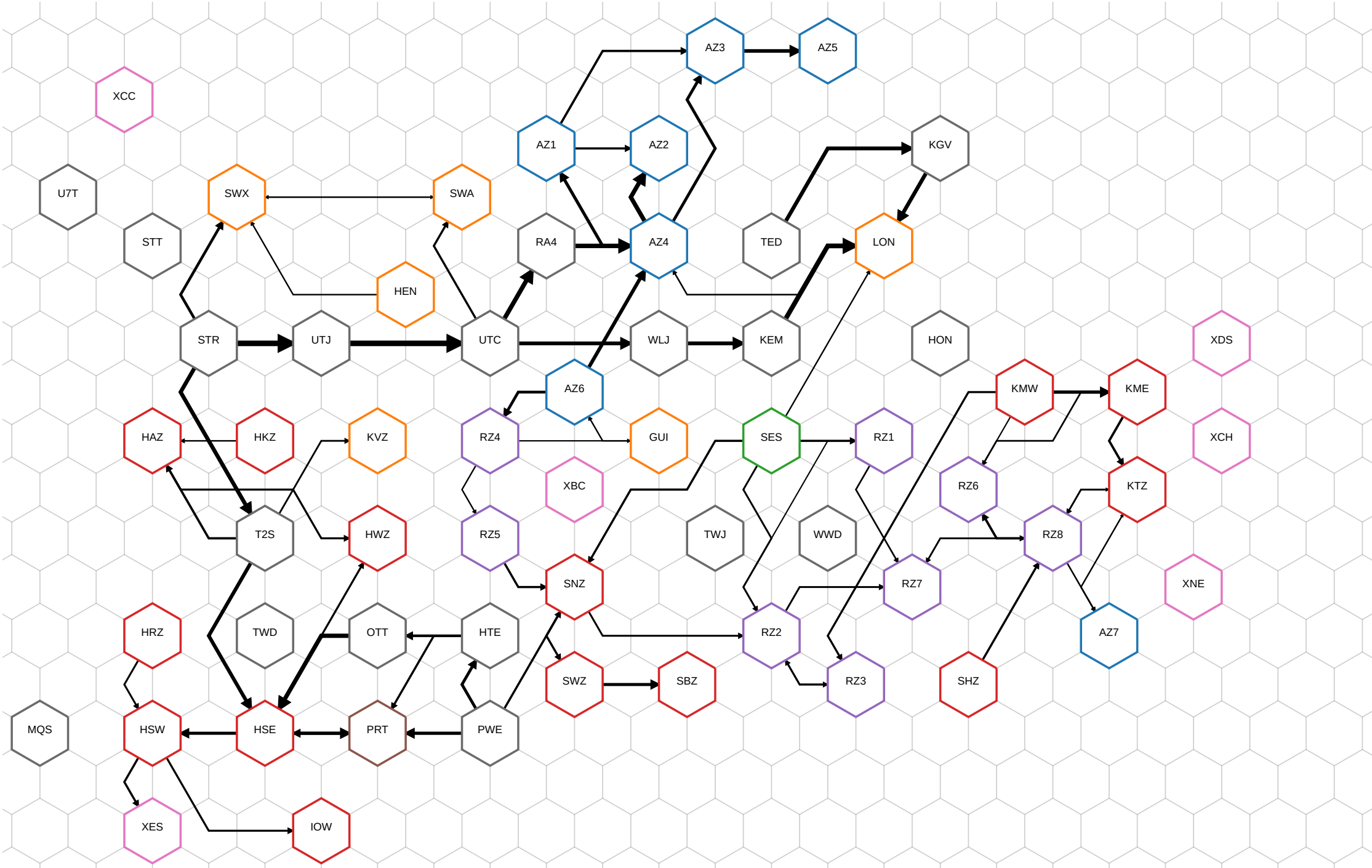
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

1:500 DROUGHT RESILIENCE IN 2045

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid2045-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075
Description	Least cost run with hybrid-c+2 government interventions with 1in500 achieved in 2045.
Created at	25/07/2023, 13:21:07
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

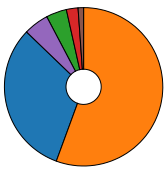
Net present value (Cost)

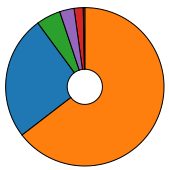
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,906	17,487	16,804	19,448	17,382	16,630	17,744	16,882	16,173	17,717	(£m)
Cost w/o deficit (STPR)	20,906	17,487	16,804	19,448	17,382	16,630	17,744	16,882	16,173	17,717	(£m)
Cost w/ deficit (IGEQ)	32,038	25,581	24,349	29,287	25,395	24,062	26,162	24,536	23,264	26,075	(£m)
Cost w/o deficit (IGEQ)	32,038	25,581	24,349	29,287	25,395	24,062	26,162	24,536	23,264	26,075	(£m)
Cost w/ deficit (LTDR)	23,059	19,083	18,298	21,365	18,962	18,102	19,397	18,395	17,581	19,360	(£m)
Cost w/o deficit (LTDR)	23,059	19,083	18,298	21,365	18,962	18,102	19,397	18,395	17,581	19,360	(£m)

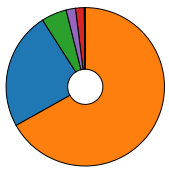
Cost breakdown (STPR)

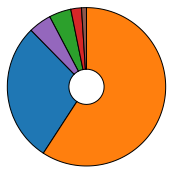
Select Company: Total

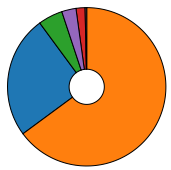
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,604	4,431	4,042	5,540	4,348	3,909	4,509	4,051	3,605	4,560	(£m)
Fixed opex	11,624	11,290	11,239	11,508	11,279	11,223	11,289	11,236	11,177	11,318	(£m)
Fixed operational carbon	881	869	869	877	871	870	872	867	866	871	(£m)
Embedded carbon	498	327	303	423	322	293	341	304	277	343	(£m)
Variable opex	1,067	514	317	903	506	303	640	387	232	541	(£m)
Variable carbon opex	234	55	34	196	57	33	95	37	17	84	(£m)

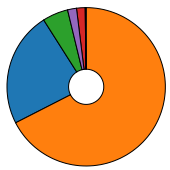
situation1 

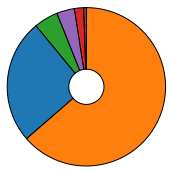
situation2 

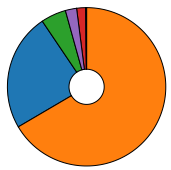
situation3 

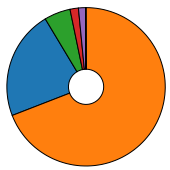
situation4 

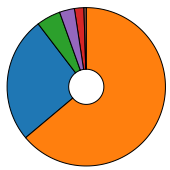
situation5 

situation6 

situation7 

situation8 

situation9 

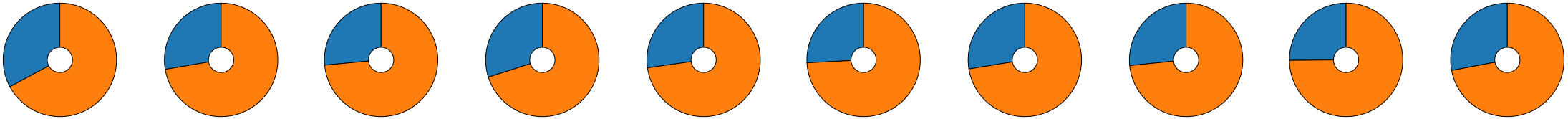
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,219,135	1,998,541	1,837,227	2,681,623	1,964,815	1,775,020	2,107,213	1,852,842	1,671,002	2,123,046	(tonnes)
Operational emissions	6,578,549	5,222,330	5,098,466	6,278,119	5,247,880	5,097,065	5,535,478	5,109,417	4,975,650	5,460,328	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

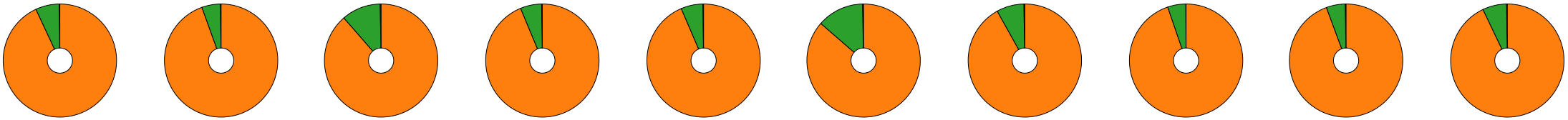


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	46	28	14	41	9	8	26	(GWh)
Grid	23,176	11,367	4,236	19,482	10,958	3,862	13,169	7,955	2,904	10,790	(GWh)
Renewable	1,678	634	532	1,255	727	594	1,118	433	166	793	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,681	63,959	63,265	67,493	63,374	62,543	64,622	62,498	61,291	64,303
SEA environmental disbenefit	112,484	81,225	75,527	100,444	77,407	72,836	84,200	69,074	60,372	81,508
Natural capital	84,566,551	81,376,693	84,196,942	78,116,497	81,515,582	84,145,118	80,949,547	81,835,448	84,598,756	82,366,793
Bio-diversity net gain	−189,016	−113,629	−89,202	−167,102	−108,843	−89,713	−119,480	−91,797	−60,800	−114,398

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,921	31,820	31,470	33,247	31,594	31,322	31,803	30,833	30,316	31,814

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.78	27.24	29.73	27.07	27.34	29.80	28.57	31.52	35.05	29.35
R1: Uncertainty of option supply/demand benefit	5.76	4.92	5.33	5.35	4.95	5.34	5.29	5.70	6.31	5.44
R3: Risk of service failure due to other physical hazards	6.66	6.75	7.54	6.58	6.78	7.56	7.05	7.97	9.10	7.33
R4: Availability of additional headroom	6.44	6.78	6.99	6.50	6.80	7.00	7.10	7.46	7.70	6.97
R5: Catchment/raw water quality risks (incl. climate change)	3.94	3.83	4.32	3.67	3.83	4.33	3.94	4.53	5.25	4.18
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.96	5.55	4.96	4.98	5.57	5.19	5.85	6.70	5.42
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

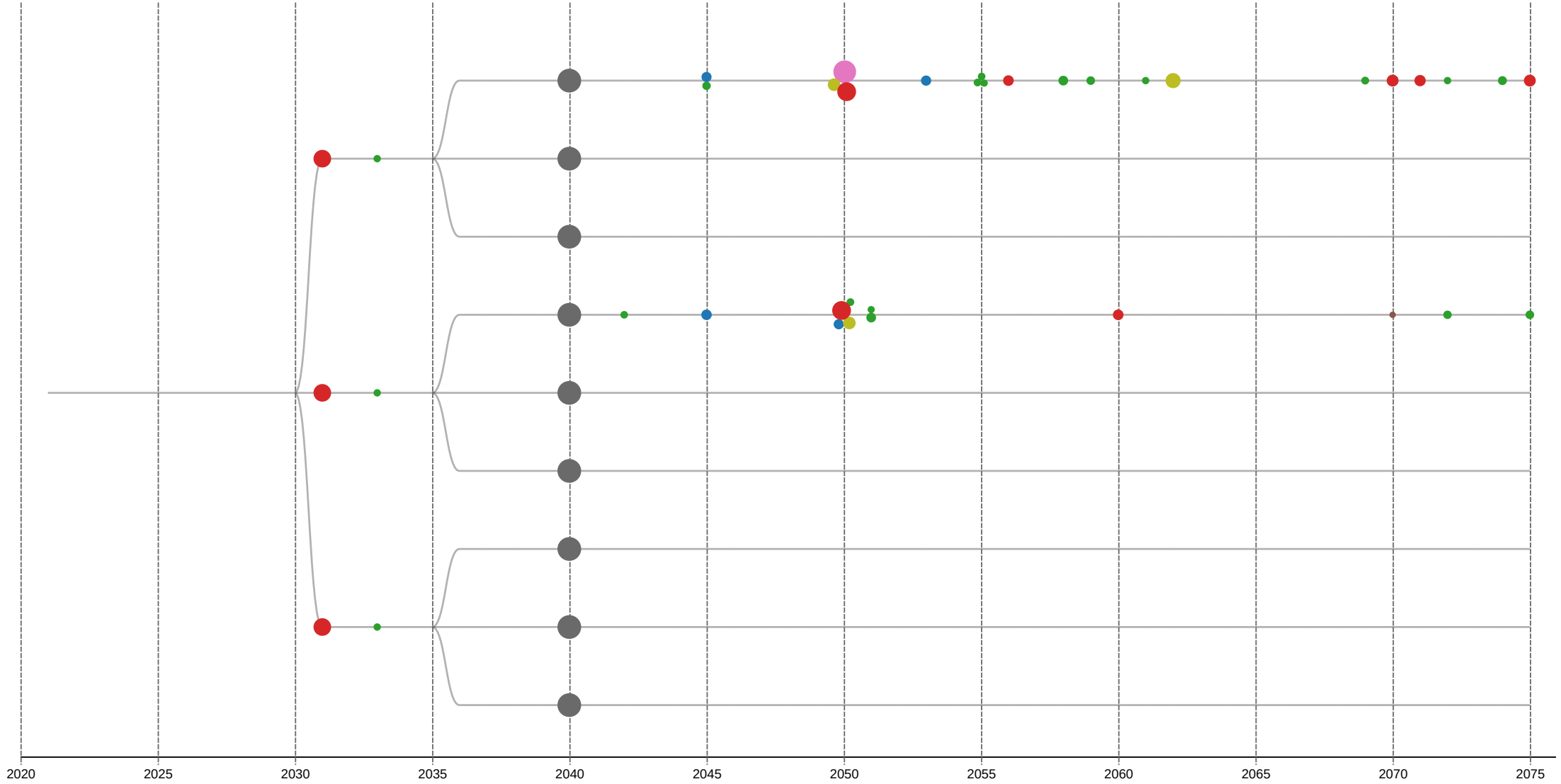
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.01	16.81	13.82	15.08	16.74	15.45	17.62	19.85	16.00
A3: Operational complexity and flexibility	6.13	6.46	7.25	6.19	6.50	7.30	6.73	7.69	8.84	7.01
A4: WRZ connectivity	7.49	8.53	9.53	7.59	8.55	9.41	8.69	9.90	10.97	8.96
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.43	19.63	21.76	19.01	19.73	21.70	20.25	22.94	26.01	21.16
E1: Scaleability and modularity of proposed changes	8.92	9.37	10.43	8.82	9.45	10.51	9.70	11.12	12.68	10.11
E2: Intervention lead times	4.29	4.00	4.36	4.06	3.97	4.18	4.03	4.41	4.89	4.24
E3: Reliance on external bodies to deliver changes	6.22	6.27	6.97	6.13	6.31	7.01	6.52	7.41	8.44	6.81
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

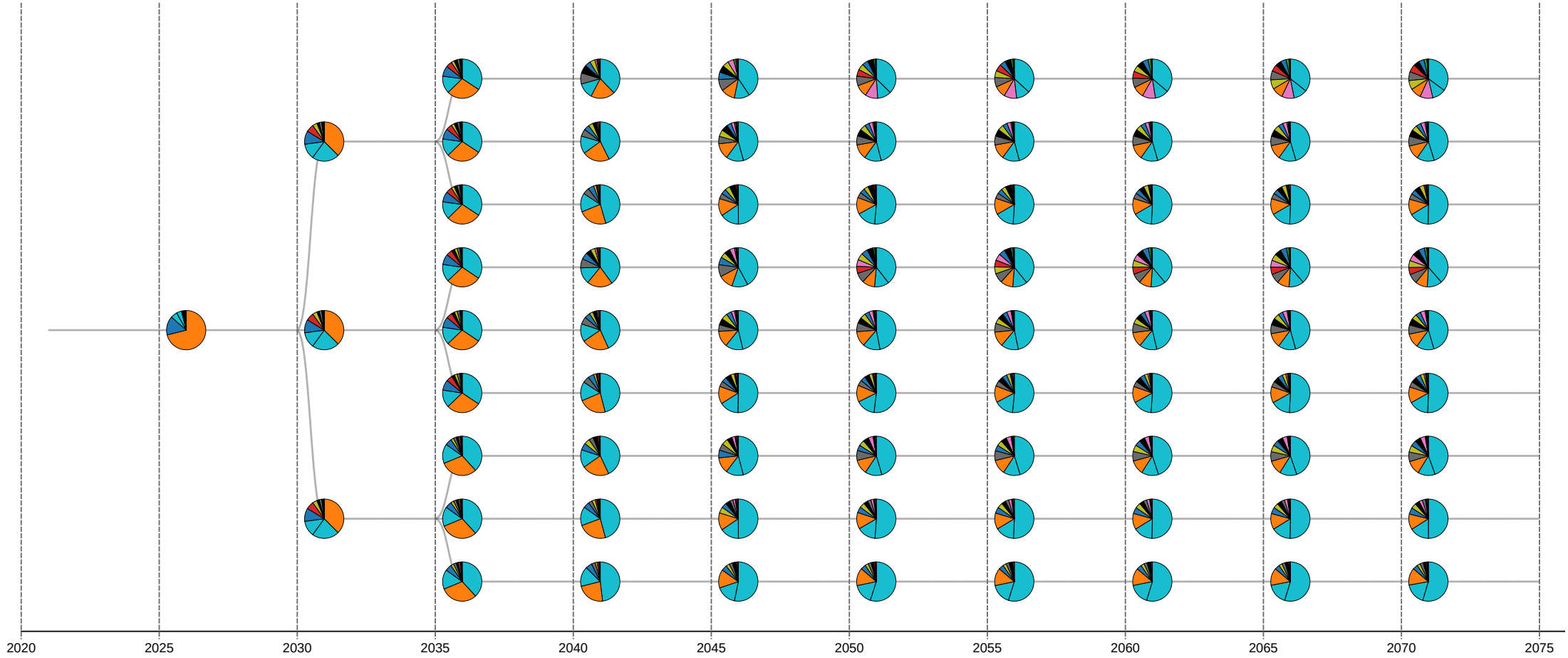
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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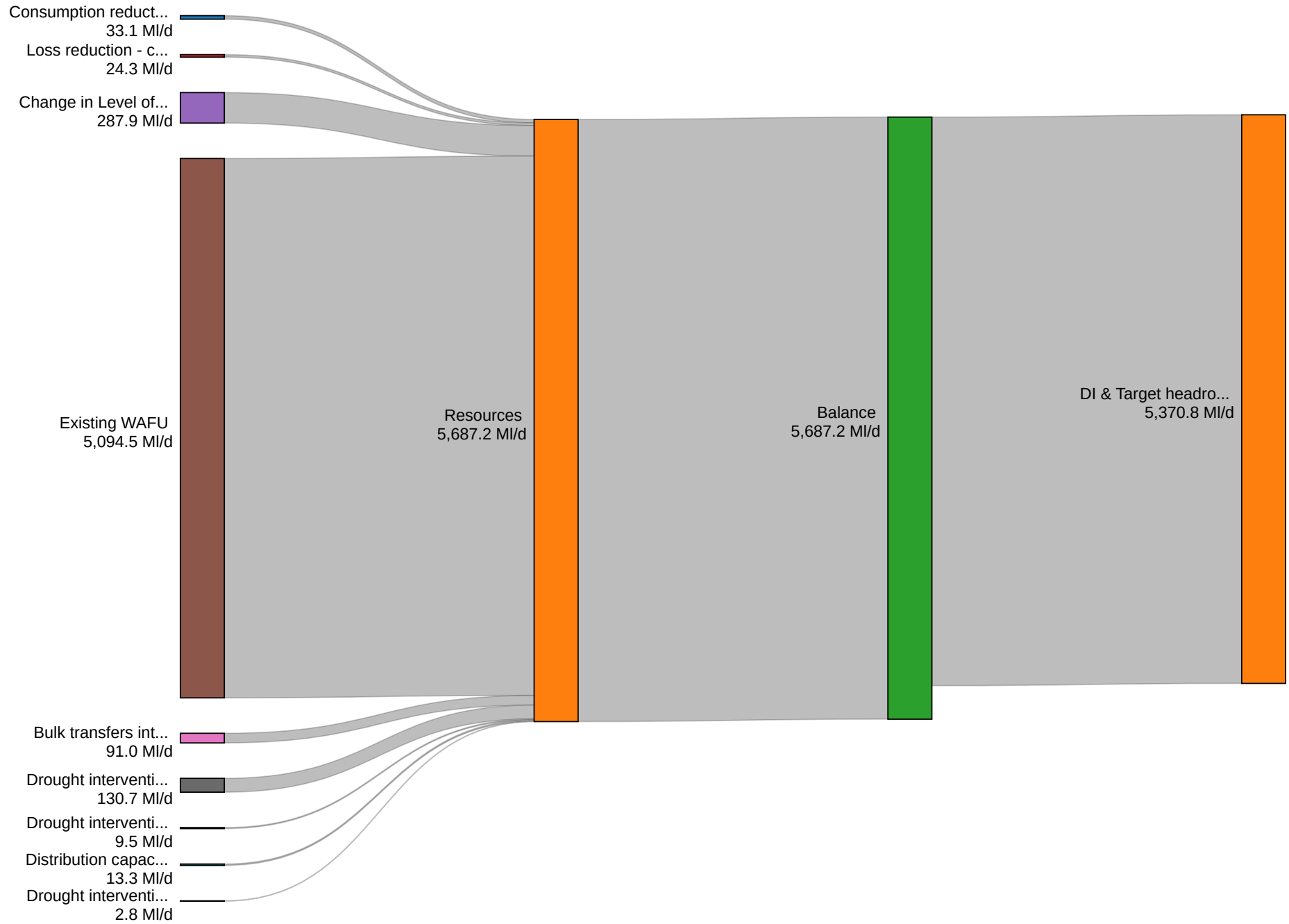
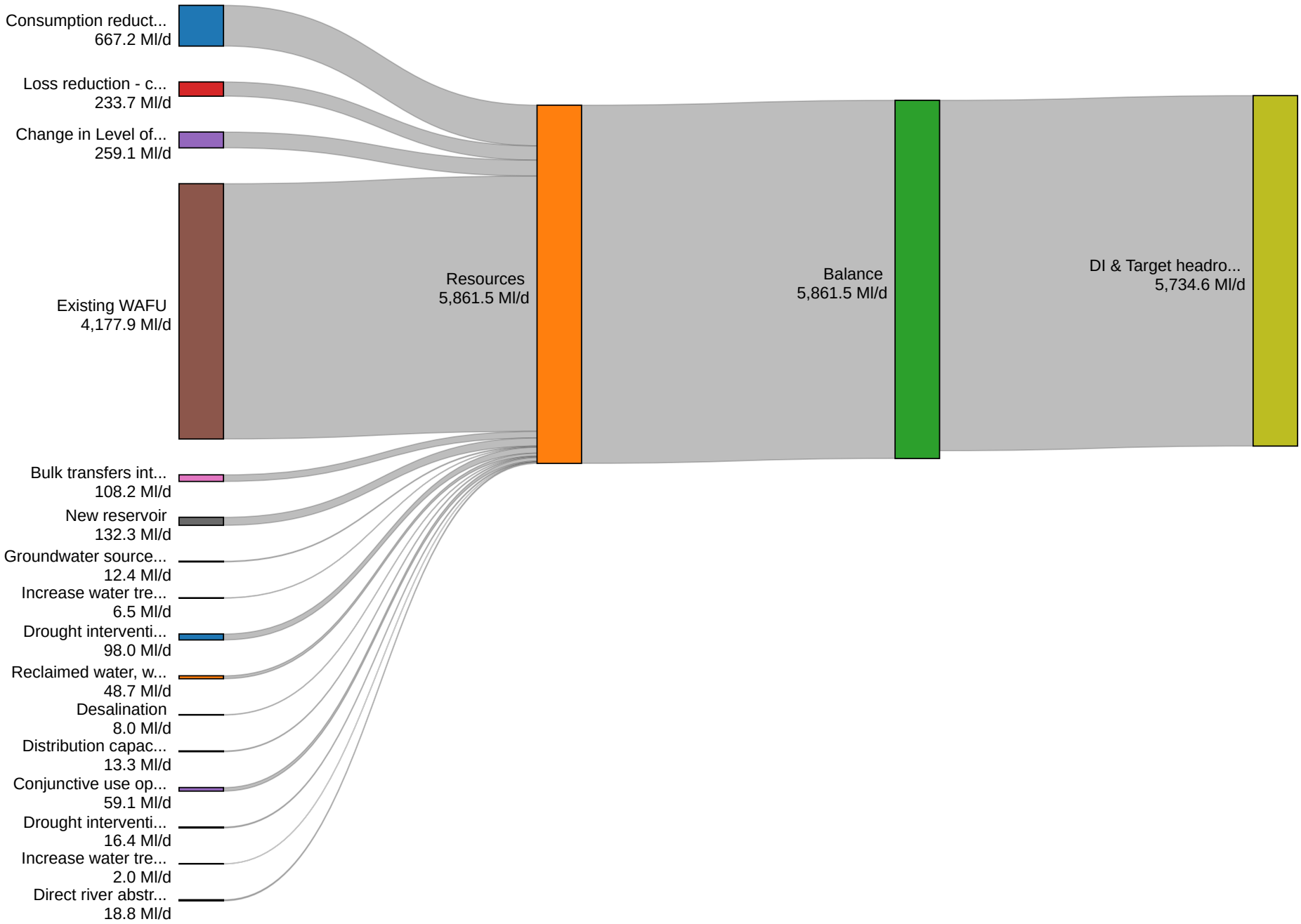
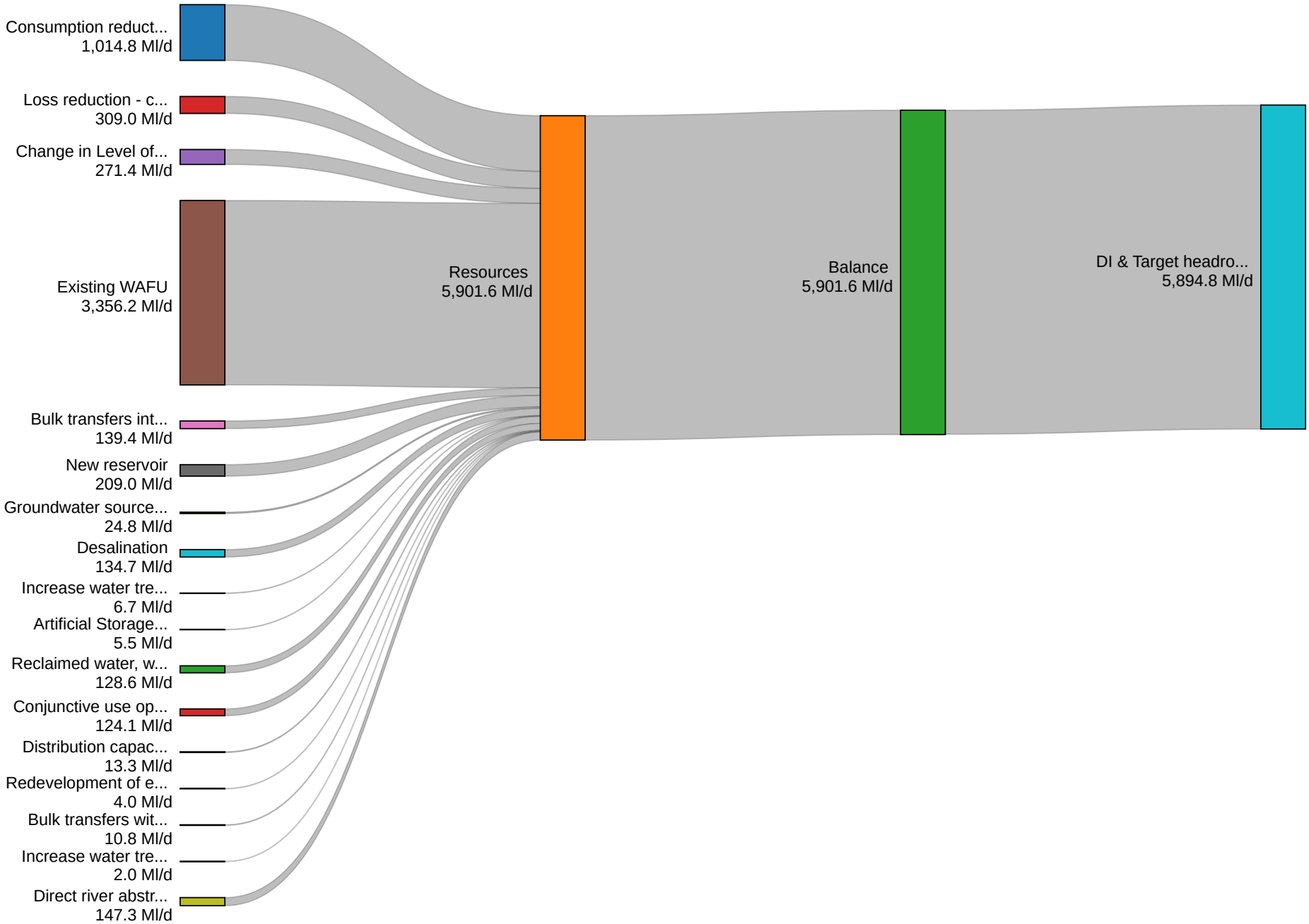
Situation 4 - 2026 (Thames Water)



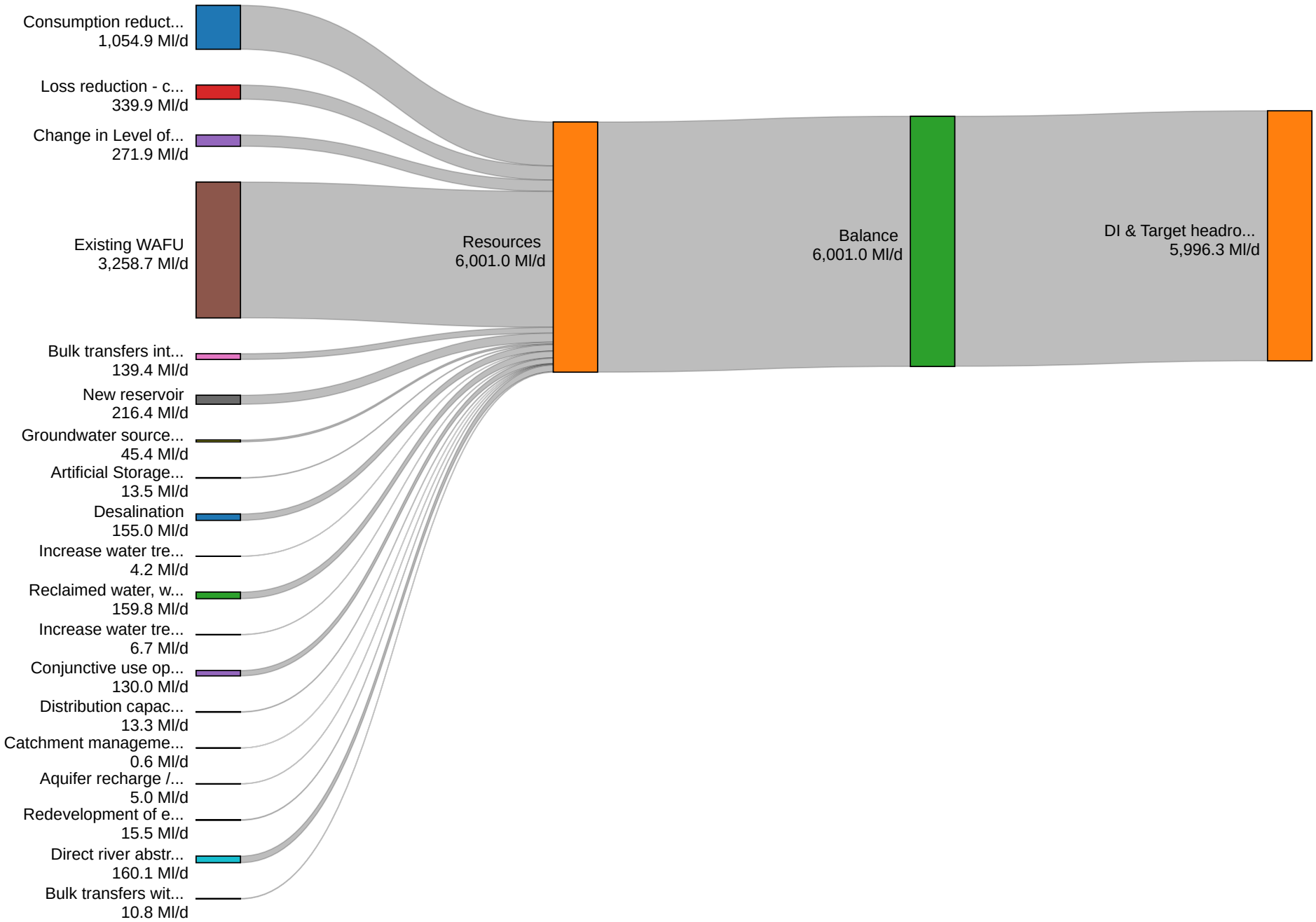
Situation 4 - 2040 (Thames Water)



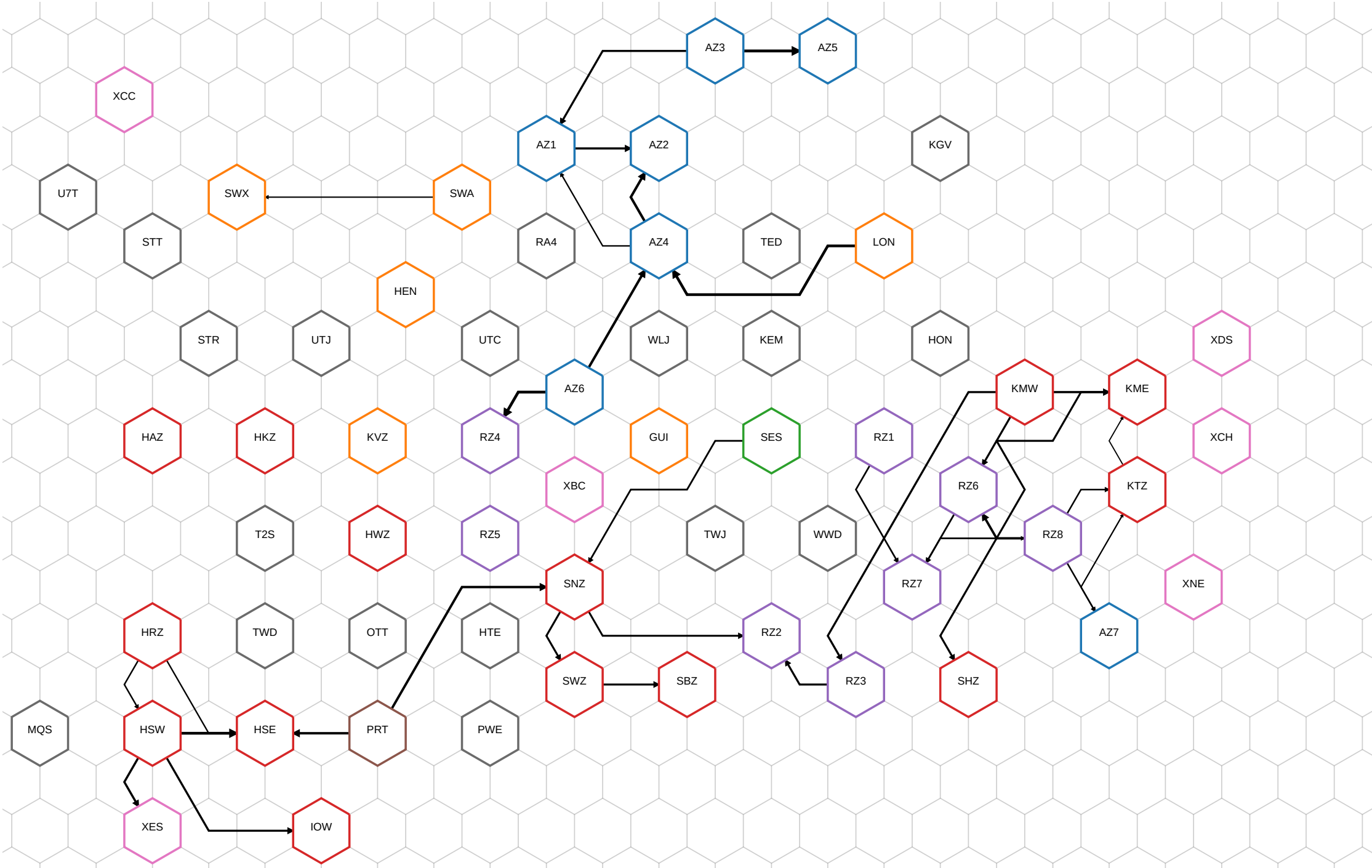
Situation 4 - 2050 (Thames Water)



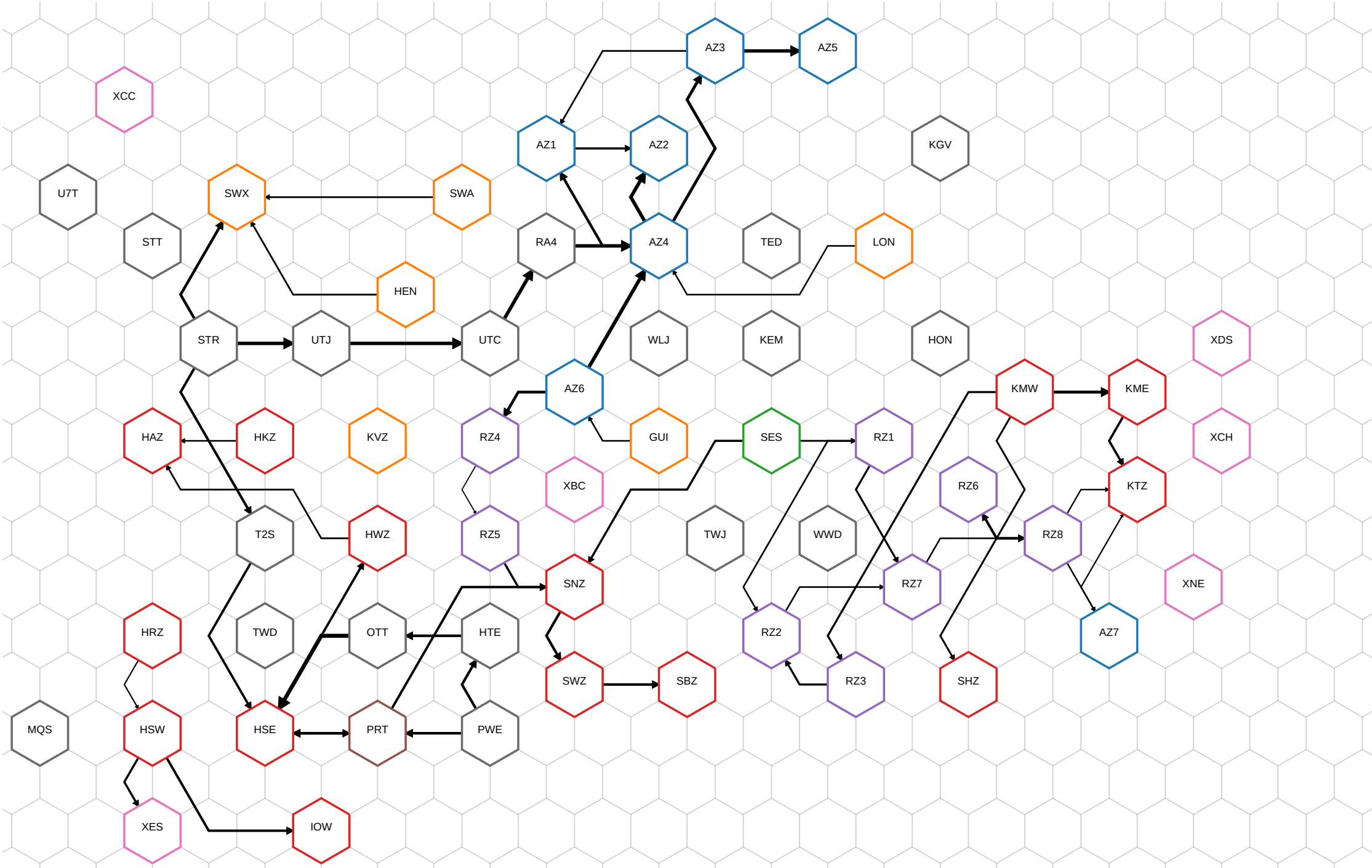
Situation 4 - 2075 (Thames Water)



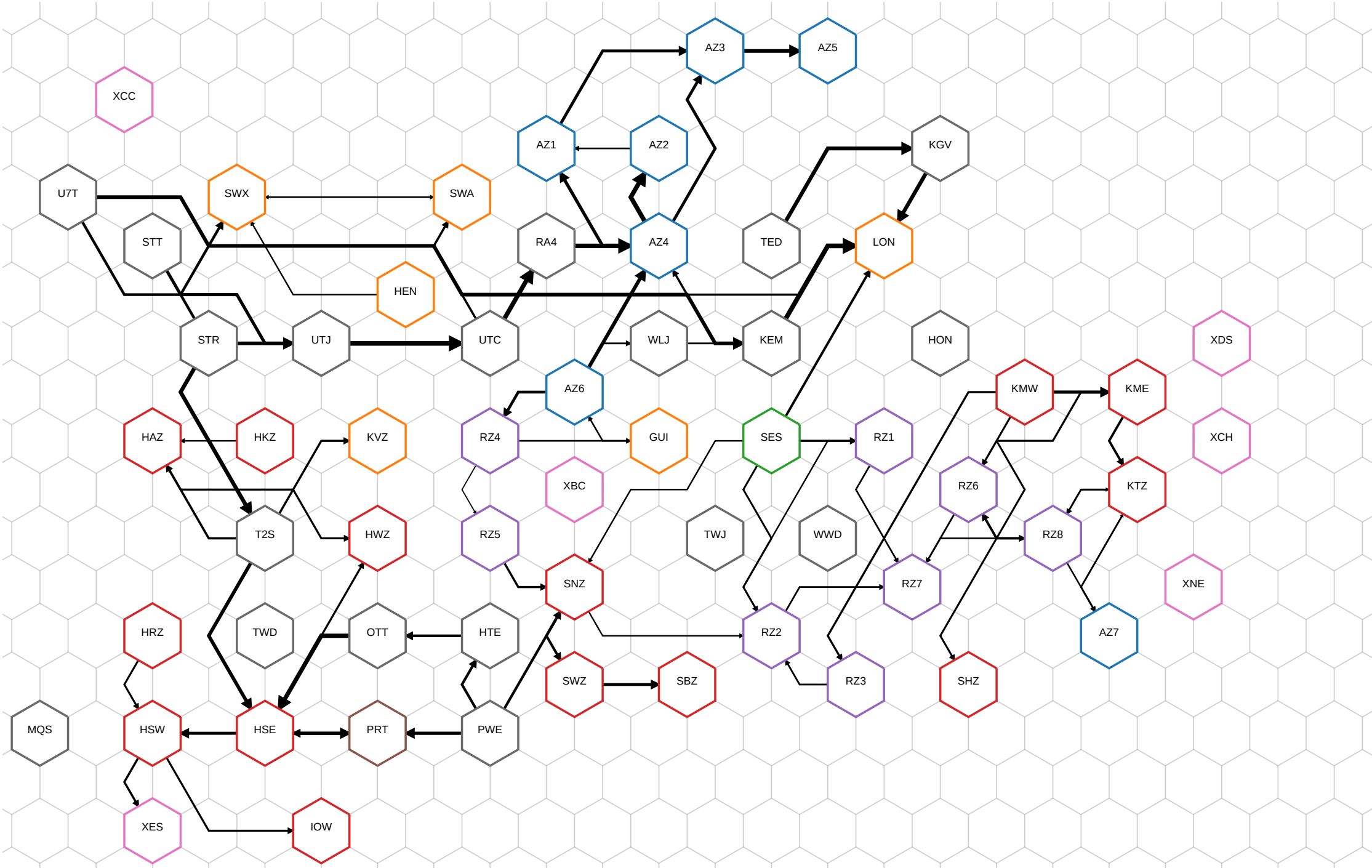
Situation 4 - 2026



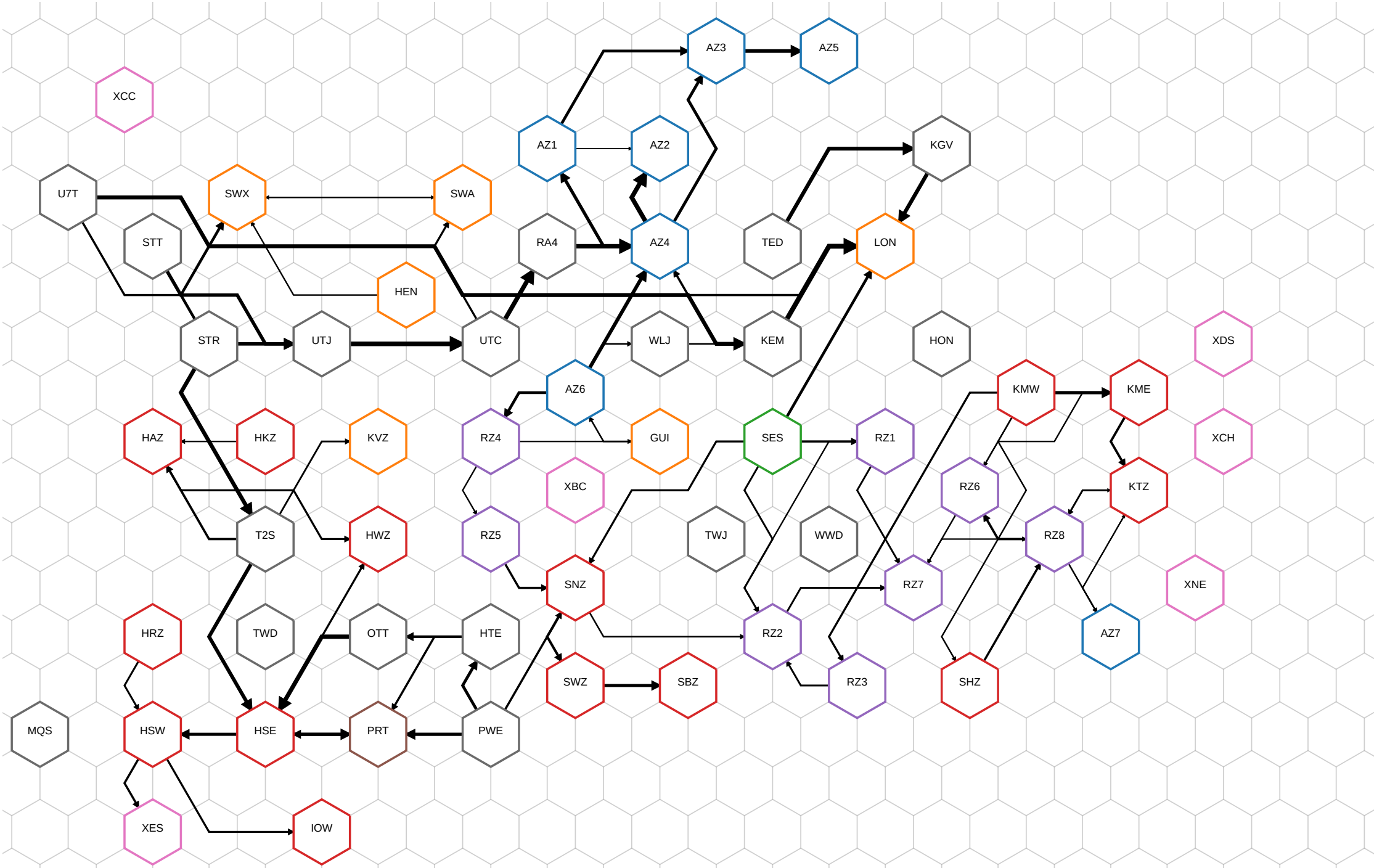
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

1:500 DROUGHT RESILIENCE IN 2050

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid2050-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-2075
Description	Least cost run with hybrid-c+2 government interventions with 1in500 achieved in 2050.
Created at	25/07/2023, 13:21:15
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets.
Optimised discount rate	STPR

Metrics

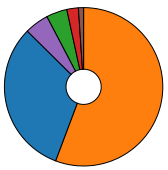
Net present value (Cost)

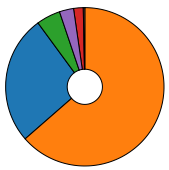
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,607	17,764	17,088	19,213	17,663	16,915	17,742	16,859	16,151	17,778	(£m)
Cost w/o deficit (STPR)	20,607	17,764	17,088	19,213	17,663	16,915	17,742	16,859	16,151	17,778	(£m)
Cost w/ deficit (IGEQ)	31,407	26,002	24,777	28,752	25,828	24,511	26,162	24,502	23,226	26,130	(£m)
Cost w/o deficit (IGEQ)	31,407	26,002	24,777	28,752	25,828	24,511	26,162	24,502	23,226	26,130	(£m)
Cost w/ deficit (LTDR)	22,698	19,388	18,610	21,075	19,273	18,418	19,395	18,370	17,556	19,420	(£m)
Cost w/o deficit (LTDR)	22,698	19,388	18,610	21,075	19,273	18,418	19,395	18,370	17,556	19,420	(£m)

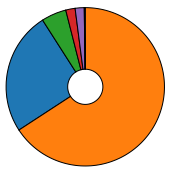
Cost breakdown (STPR)

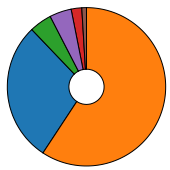
Select Company: Total

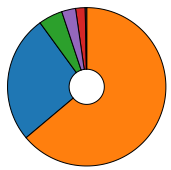
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,531	4,681	4,296	5,495	4,611	4,172	4,505	4,032	3,585	4,657	(£m)
Fixed opex	11,483	11,294	11,244	11,386	11,282	11,226	11,289	11,236	11,175	11,291	(£m)
Fixed operational carbon	880	869	870	877	869	868	872	867	866	871	(£m)
Embedded carbon	487	350	327	416	347	317	340	301	275	351	(£m)
Variable opex	1,011	514	316	855	501	302	641	386	232	529	(£m)
Variable carbon opex	215	55	35	183	54	30	95	37	17	80	(£m)

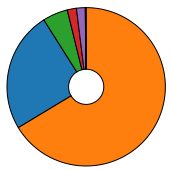
situation1 

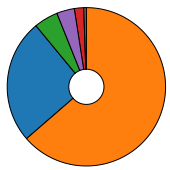
situation2 

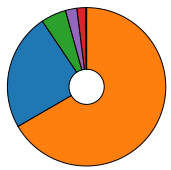
situation3 

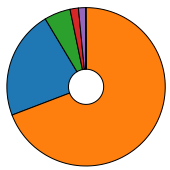
situation4 

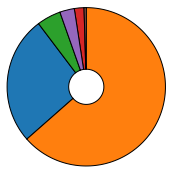
situation5 

situation6 

situation7 

situation8 

situation9 

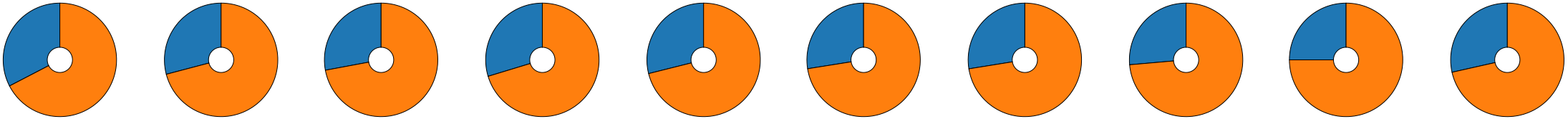
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,121,020	2,142,161	1,982,964	2,610,735	2,120,898	1,922,487	2,102,879	1,830,714	1,658,685	2,165,838	(tonnes)
Operational emissions	6,450,590	5,221,750	5,116,397	6,184,393	5,218,677	5,067,434	5,536,190	5,108,386	4,975,626	5,431,049	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

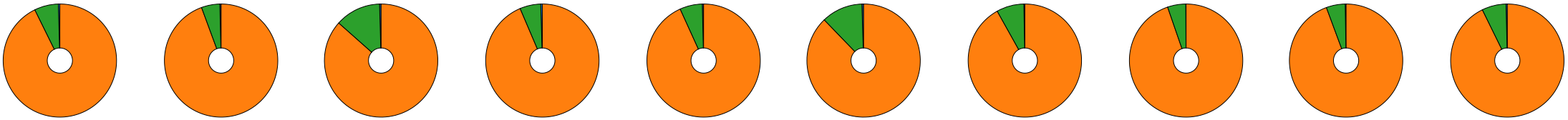


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	43	22	41	9	8	43	(GWh)
Grid	22,632	11,395	4,185	19,423	10,792	3,961	13,176	7,927	2,898	10,710	(GWh)
Renewable	1,672	634	628	1,235	741	529	1,120	434	166	795	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,333	64,060	63,182	66,997	63,477	62,857	64,687	62,339	61,135	64,230
SEA environmental disbenefit	109,995	81,134	73,331	99,912	77,329	74,243	85,279	69,773	59,805	81,200
Natural capital	81,361,370	77,269,903	80,152,625	75,509,425	77,394,849	79,890,639	80,874,482	81,694,766	84,568,691	79,857,417
Bio-diversity net gain	−211,004	−145,790	−113,237	−205,946	−146,483	−133,787	−121,344	−90,444	−58,051	−136,232

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,656	31,773	31,344	33,012	31,544	31,359	31,864	30,831	30,270	31,739

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.94	29.49	32.40	28.36	29.67	32.31	28.69	31.62	35.12	30.73
R1: Uncertainty of option supply/demand benefit	5.96	5.38	5.92	5.57	5.43	5.83	5.32	5.73	6.32	5.72
R3: Risk of service failure due to other physical hazards	6.97	7.36	8.27	6.94	7.42	8.25	7.08	8.00	9.11	7.71
R4: Availability of additional headroom	6.58	6.95	7.17	6.66	6.97	7.17	7.11	7.47	7.71	7.09
R5: Catchment/raw water quality risks (incl. climate change)	4.13	4.24	4.79	3.87	4.25	4.80	3.97	4.55	5.26	4.43
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.57	6.26	5.32	5.60	6.26	5.21	5.87	6.71	5.79
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

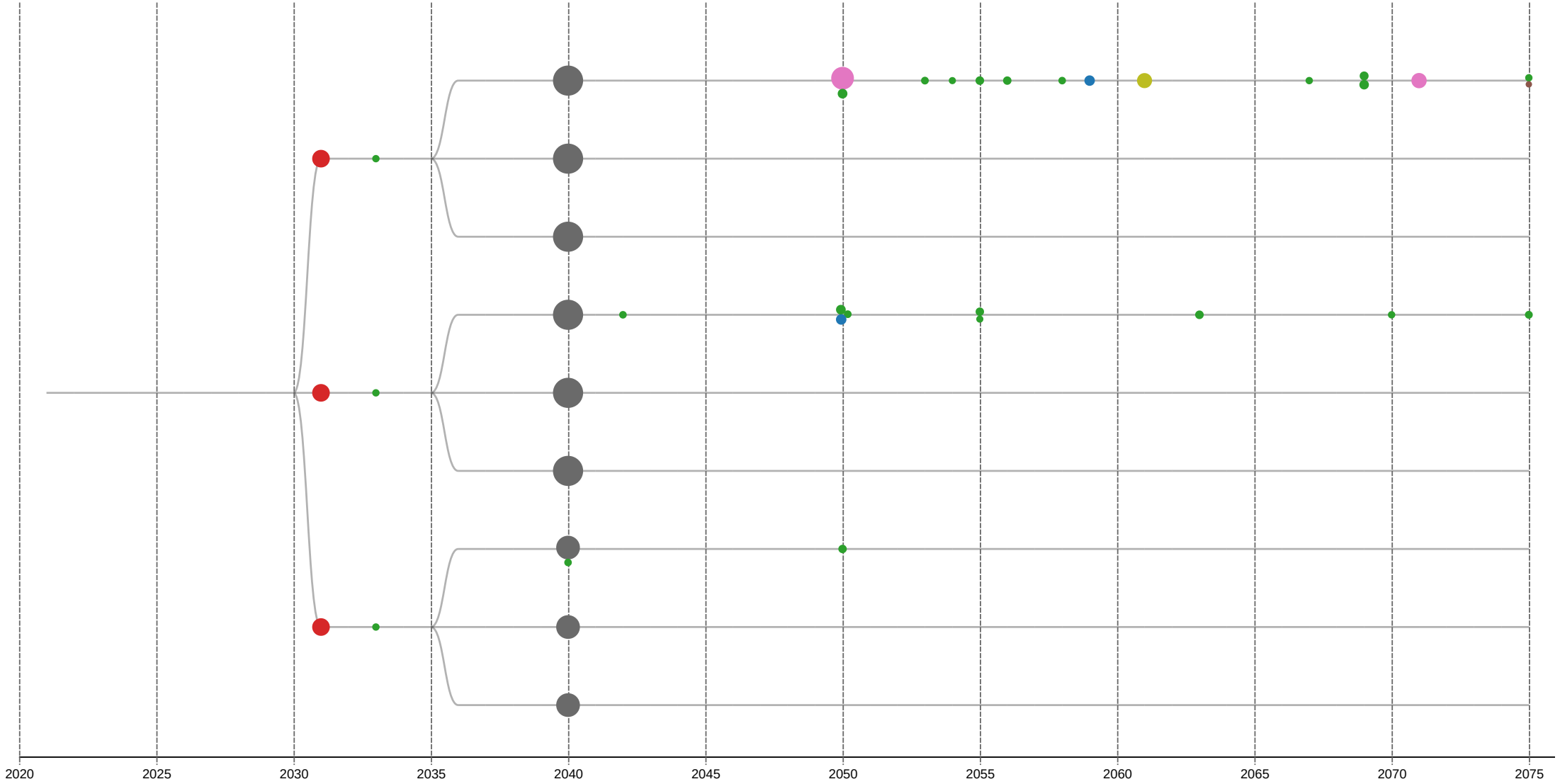
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.64	17.50	14.27	15.75	17.47	15.46	17.50	19.83	16.38
A3: Operational complexity and flexibility	6.51	7.07	7.96	6.61	7.12	7.99	6.76	7.72	8.86	7.40
A4: WRZ connectivity	7.48	8.54	9.52	7.63	8.60	9.45	8.67	9.75	10.93	8.95
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.15	19.94	22.22	18.84	20.06	22.00	20.35	23.01	26.06	21.29
E1: Scaleability and modularity of proposed changes	8.80	9.36	10.47	8.71	9.46	10.48	9.73	11.16	12.71	10.10
E2: Intervention lead times	4.16	4.15	4.55	4.02	4.13	4.35	4.06	4.42	4.90	4.30
E3: Reliance on external bodies to deliver changes	6.18	6.43	7.19	6.11	6.48	7.18	6.55	7.43	8.46	6.89
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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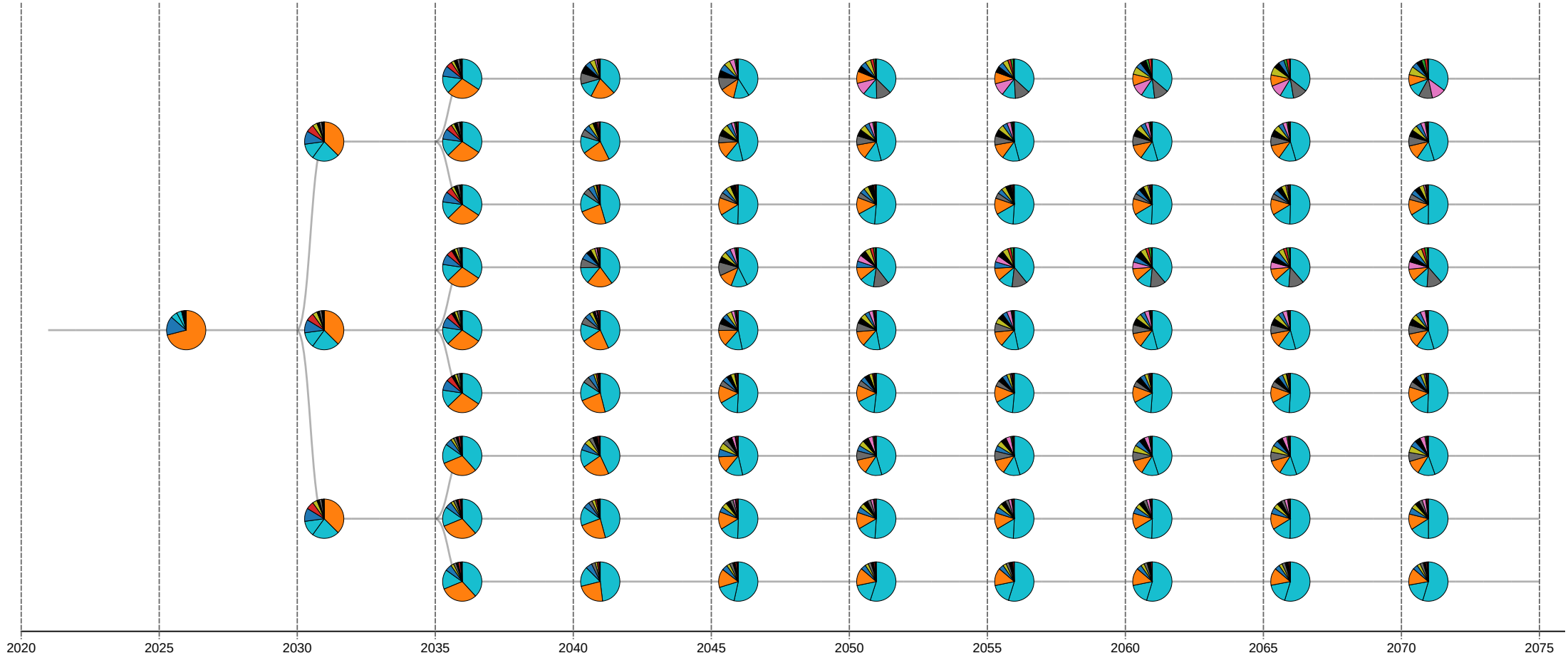
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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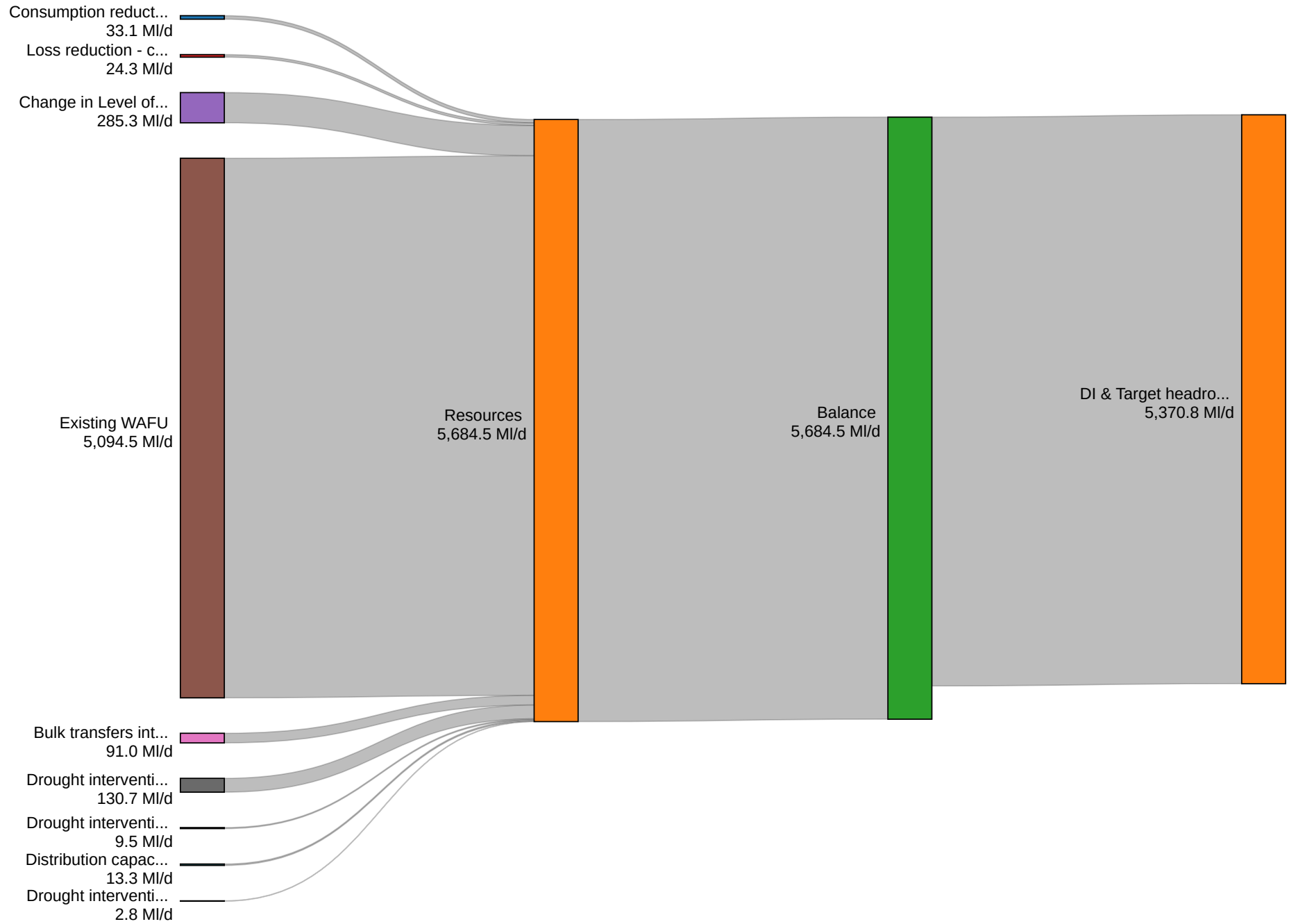
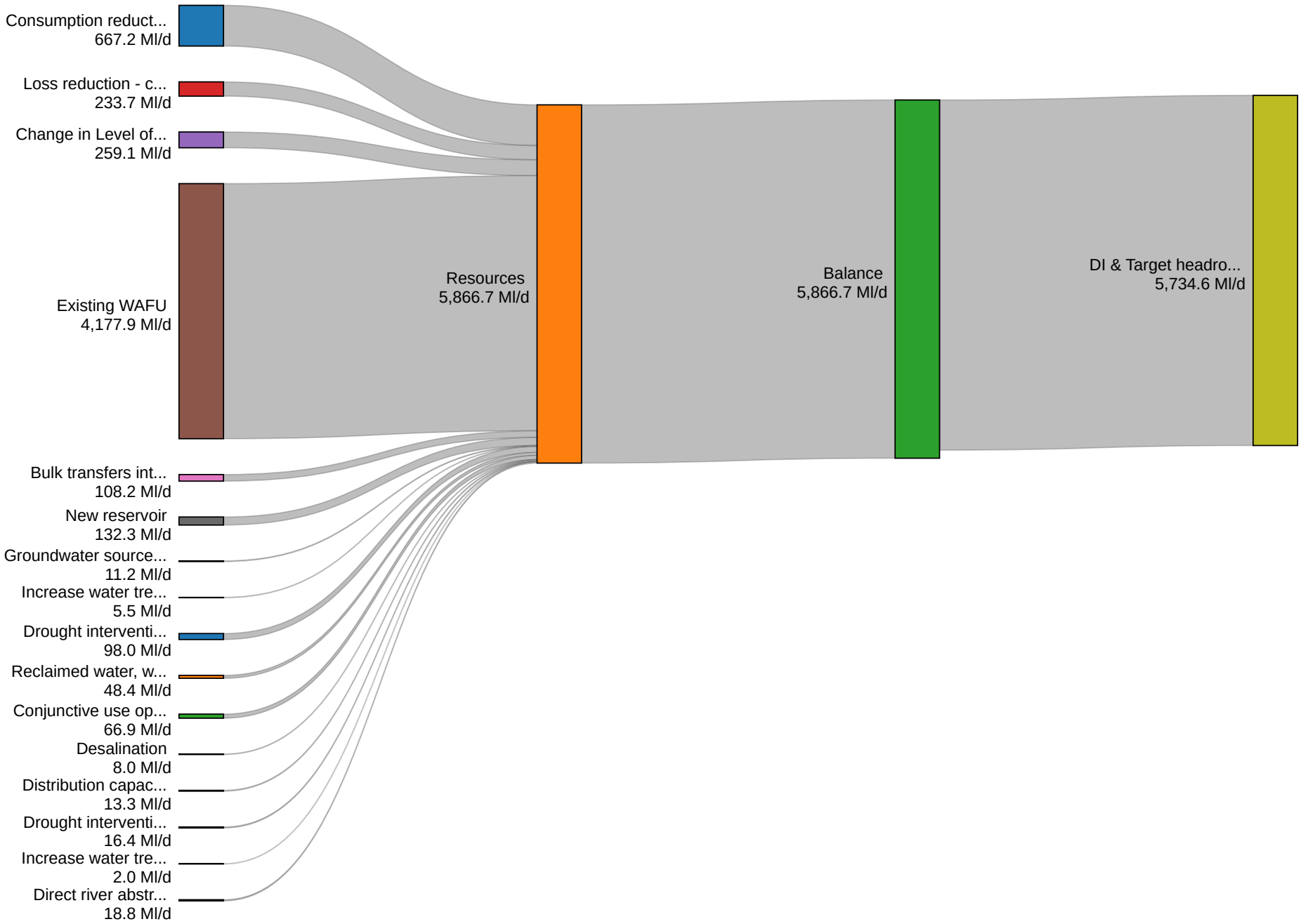
- Other

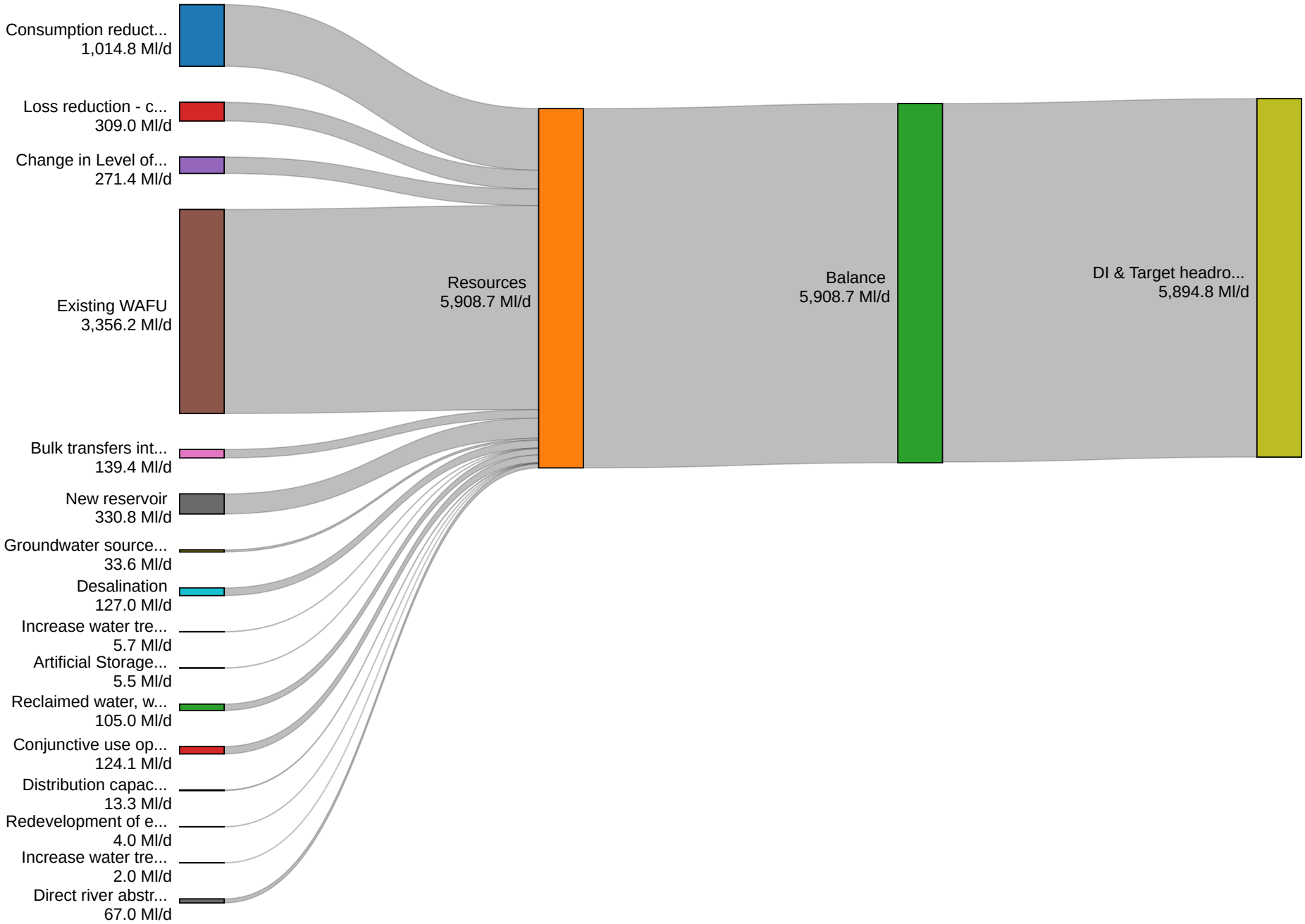
Situation 4 - 2026 (Thames Water)



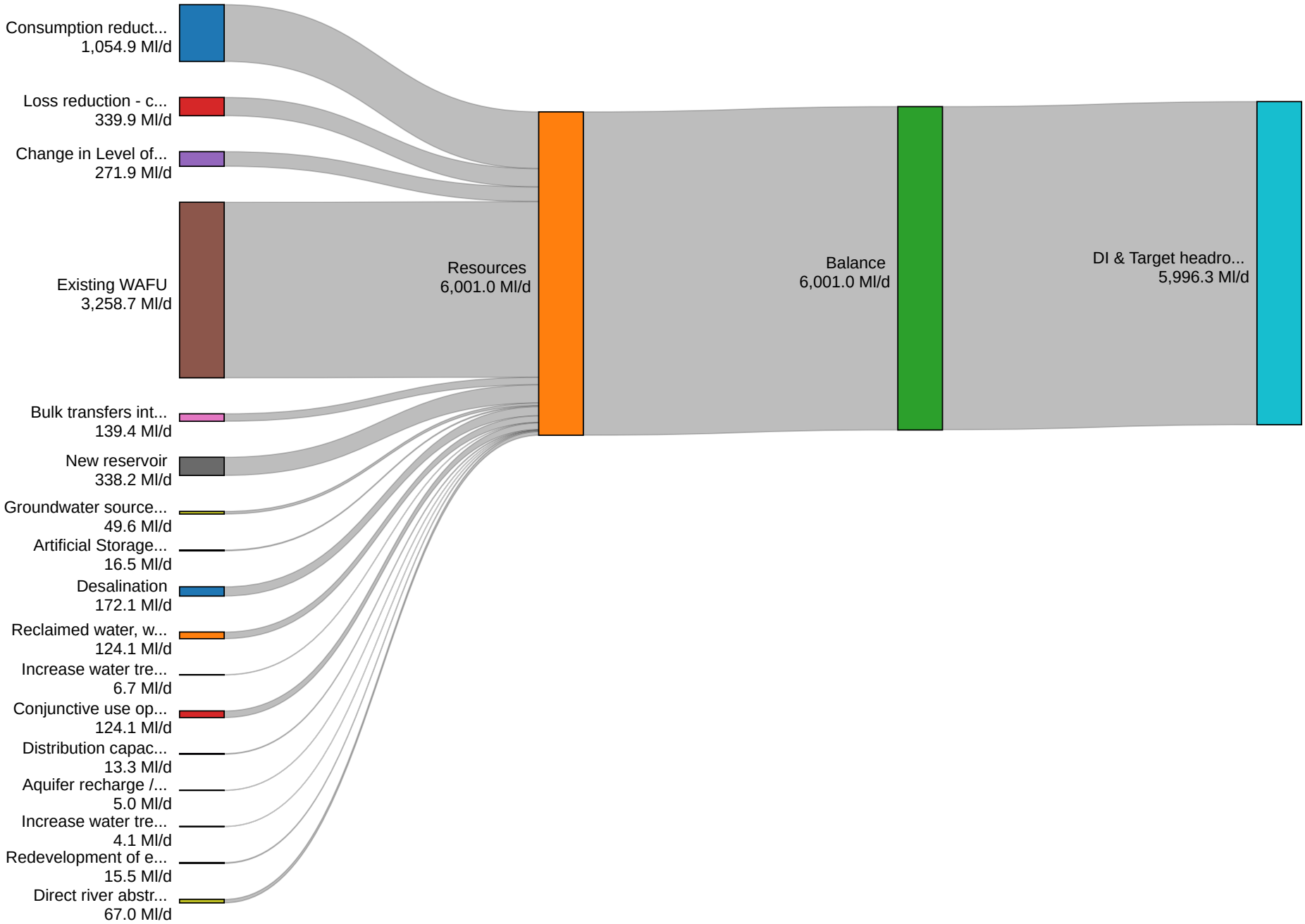
Situation 4 - 2040 (Thames Water)



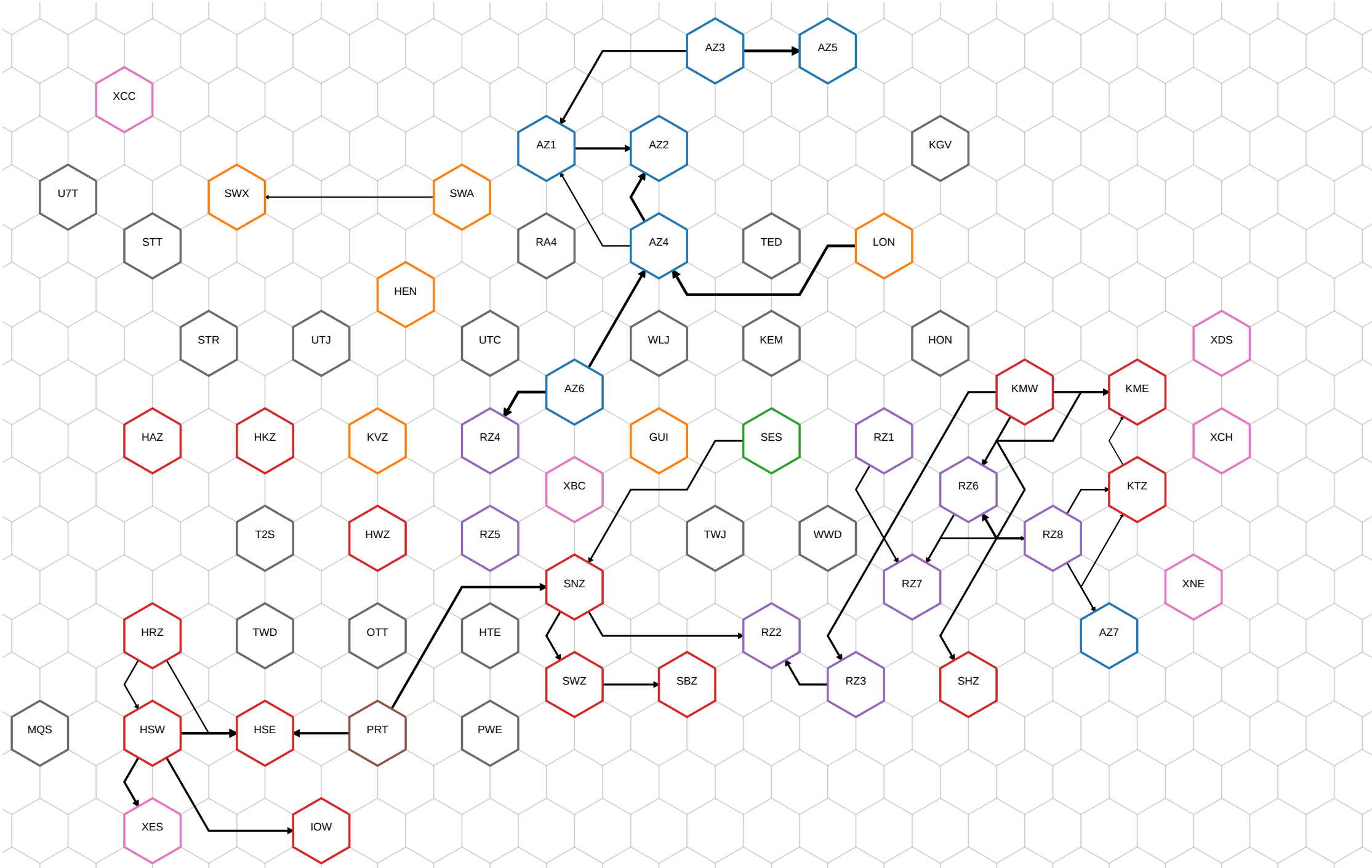
Situation 4 - 2050 (Thames Water)



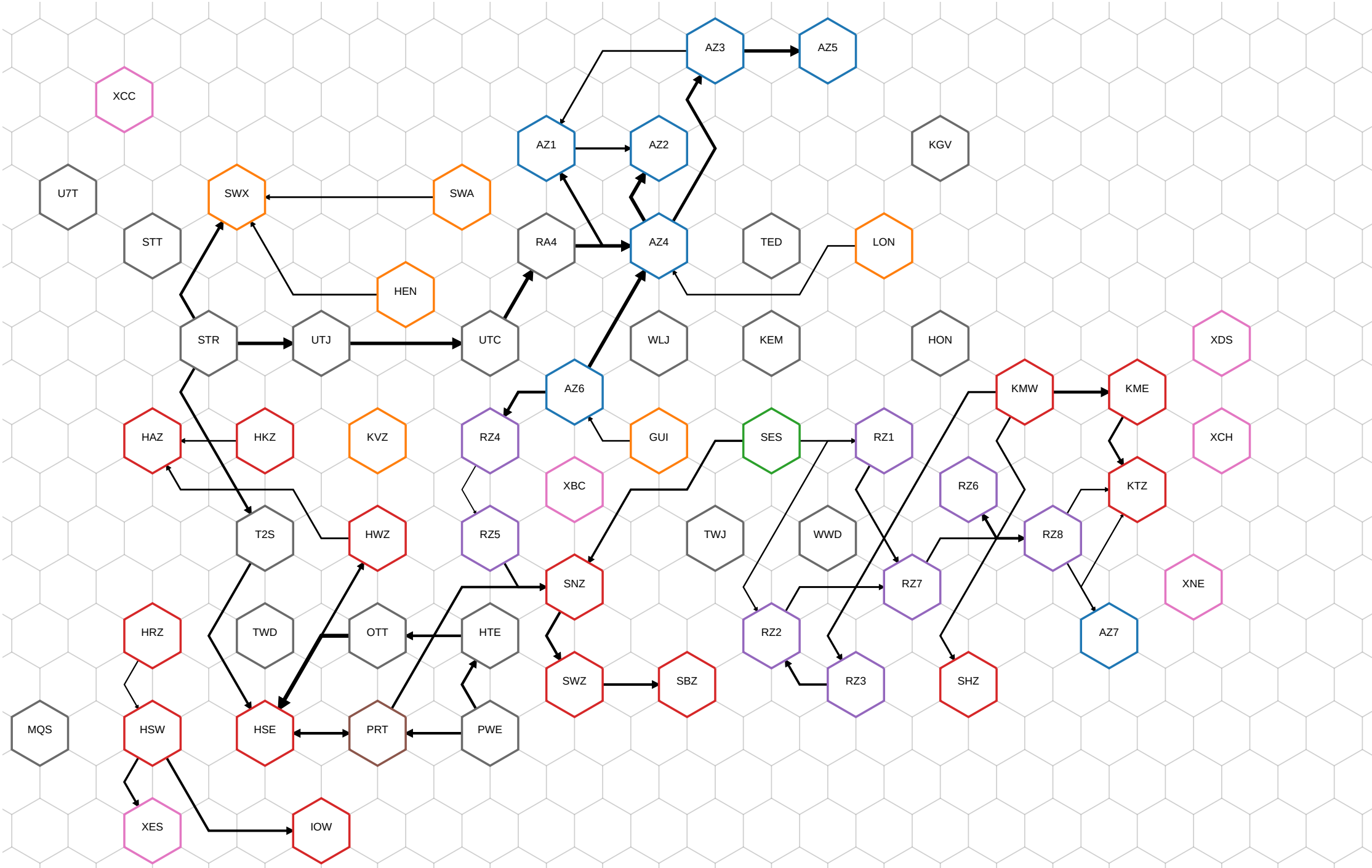
Situation 4 - 2075 (Thames Water)



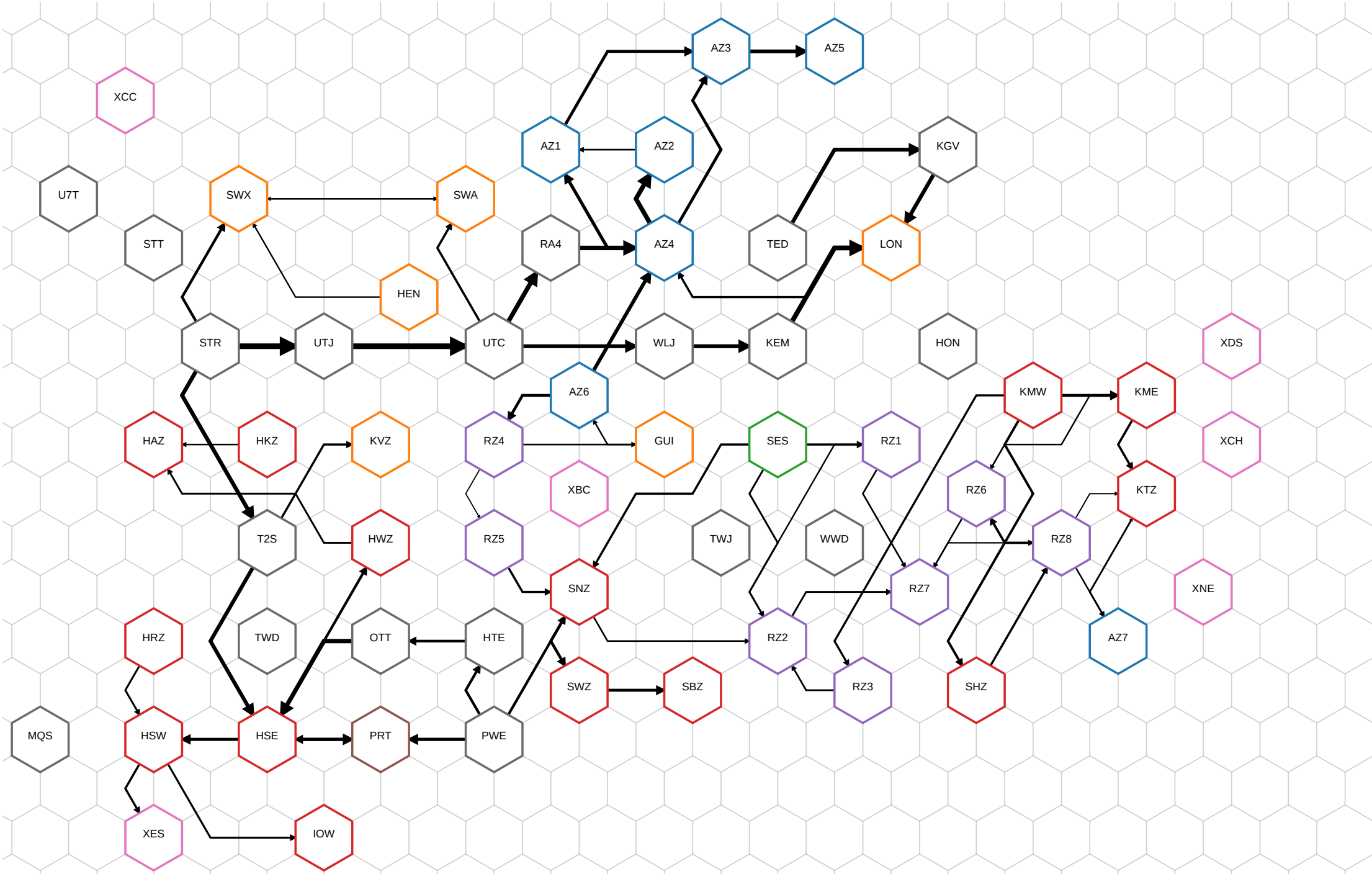
Situation 4 - 2026



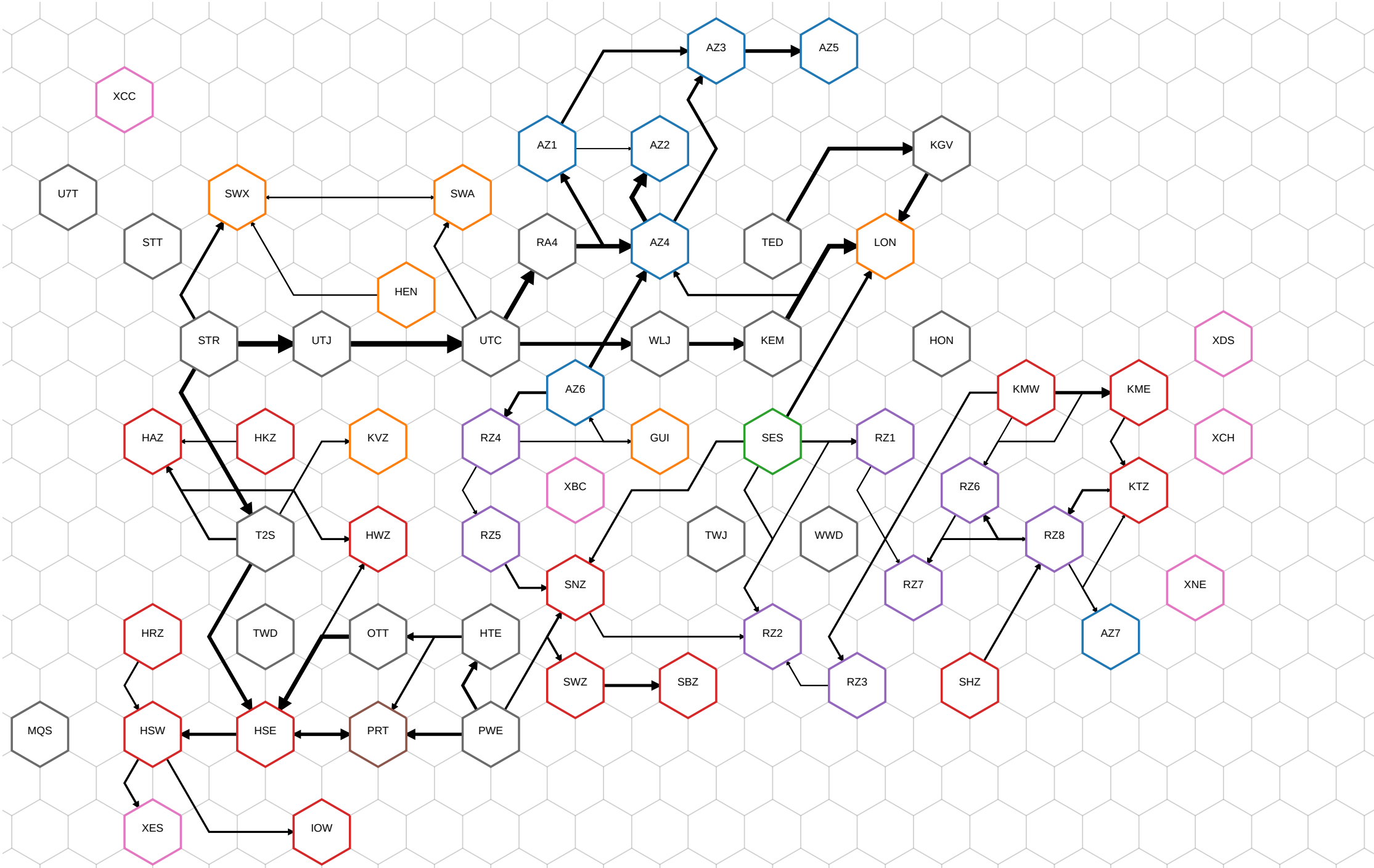
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

1:200 DROUGHT RESILIENCE IN 2035

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-lon-1in200-2035-2075
Description	Least cost run with hybrid-c+2 government interventions with delayed LON 1in200 resilience to 2035/36.
Created at	25/07/2023, 16:30:32
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-lon-1in200-2035
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. London 1in200 resilience change delayed to 2035 (DO increased by 116.23 Ml/d).
Optimised discount rate	STPR

Metrics

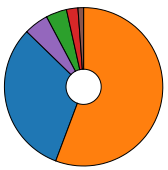
Net present value (Cost)

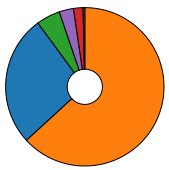
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,521	17,817	17,103	19,180	17,750	16,955	17,732	16,572	15,859	17,721	(£m)
Cost w/o deficit (STPR)	20,521	17,817	17,103	19,180	17,750	16,955	17,732	16,572	15,859	17,721	(£m)
Cost w/ deficit (IGEQ)	31,271	26,147	24,859	28,702	26,043	24,631	26,274	24,090	22,803	26,091	(£m)
Cost w/o deficit (IGEQ)	31,271	26,147	24,859	28,702	26,043	24,631	26,274	24,090	22,803	26,091	(£m)
Cost w/ deficit (LTDR)	22,605	19,458	18,637	21,041	19,384	18,474	19,406	18,058	17,239	19,367	(£m)
Cost w/o deficit (LTDR)	22,605	19,458	18,637	21,041	19,384	18,474	19,406	18,058	17,239	19,367	(£m)

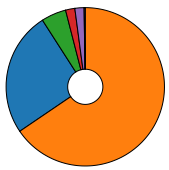
Cost breakdown (STPR)

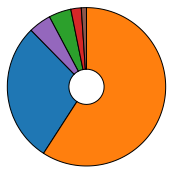
Select Company: Total

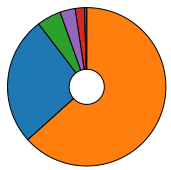
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,473	4,763	4,346	5,474	4,665	4,175	4,469	3,852	3,412	4,626	(£m)
Fixed opex	11,435	11,255	11,203	11,340	11,243	11,183	11,256	11,177	11,117	11,245	(£m)
Fixed operational carbon	878	867	869	878	875	874	869	864	863	871	(£m)
Embedded carbon	480	351	324	408	340	306	319	270	243	338	(£m)
Variable opex	1,021	518	320	879	549	352	649	371	209	541	(£m)
Variable carbon opex	234	62	41	202	78	66	170	38	15	101	(£m)

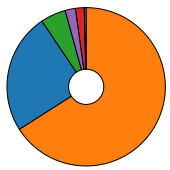
situation1 

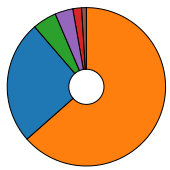
situation2 

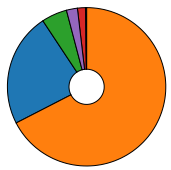
situation3 

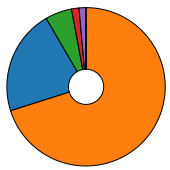
situation4 

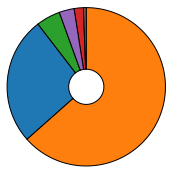
situation5 

situation6 

situation7 

situation8 

situation9 

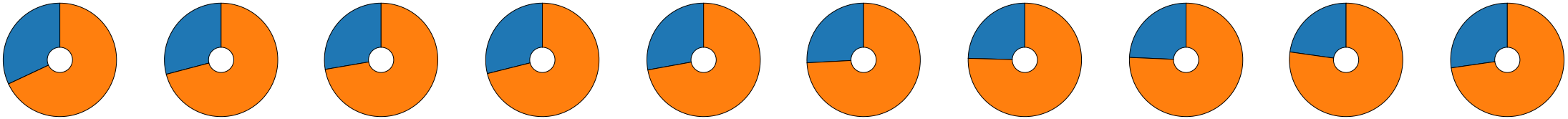
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,075,322	2,156,029	1,972,539	2,559,350	2,083,952	1,859,951	1,975,768	1,637,982	1,457,819	2,086,524	(tonnes)
Operational emissions	6,544,778	5,253,694	5,150,303	6,296,917	5,399,821	5,341,882	6,063,421	5,097,800	4,943,404	5,565,780	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

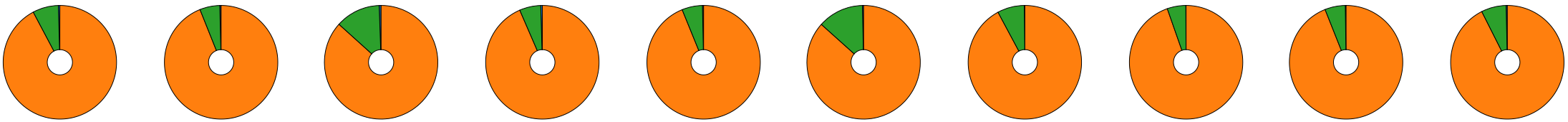


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	103	45	26	95	41	17	21	7	6	40	(GWh)
Grid	22,403	11,223	4,194	19,277	11,445	4,341	13,597	7,748	2,668	10,766	(GWh)
Renewable	1,785	681	619	1,250	713	654	1,137	434	165	826	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,486	63,538	62,655	66,453	63,785	62,619	63,316	60,772	59,805	63,492
SEA environmental disbenefit	109,420	80,151	72,884	94,520	78,274	71,317	84,889	67,943	58,842	79,804
Natural capital	81,838,252	77,213,852	80,095,717	75,553,727	77,256,999	80,098,357	64,476,176	66,397,818	68,070,959	74,555,762
Bio-diversity net gain	−210,827	−151,606	−119,903	−197,575	−154,373	−125,454	−142,477	−96,639	−67,524	−140,709

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,772	31,826	31,375	32,727	31,567	31,051	31,475	30,497	29,991	31,587

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.06	29.54	32.31	28.58	30.34	33.18	27.11	29.36	32.53	30.22
R1: Uncertainty of option supply/demand benefit	6.02	5.50	6.00	5.79	6.00	6.54	5.22	5.43	5.98	5.83
R3: Risk of service failure due to other physical hazards	6.98	7.32	8.19	6.96	7.56	8.44	6.59	7.33	8.34	7.52
R4: Availability of additional headroom	6.66	6.98	7.19	6.68	6.96	7.17	7.03	7.37	7.61	7.07
R5: Catchment/raw water quality risks (incl. climate change)	4.05	4.13	4.65	3.74	4.01	4.51	3.51	3.95	4.56	4.12
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.34	5.61	6.27	5.39	5.82	6.51	4.76	5.28	6.03	5.67
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

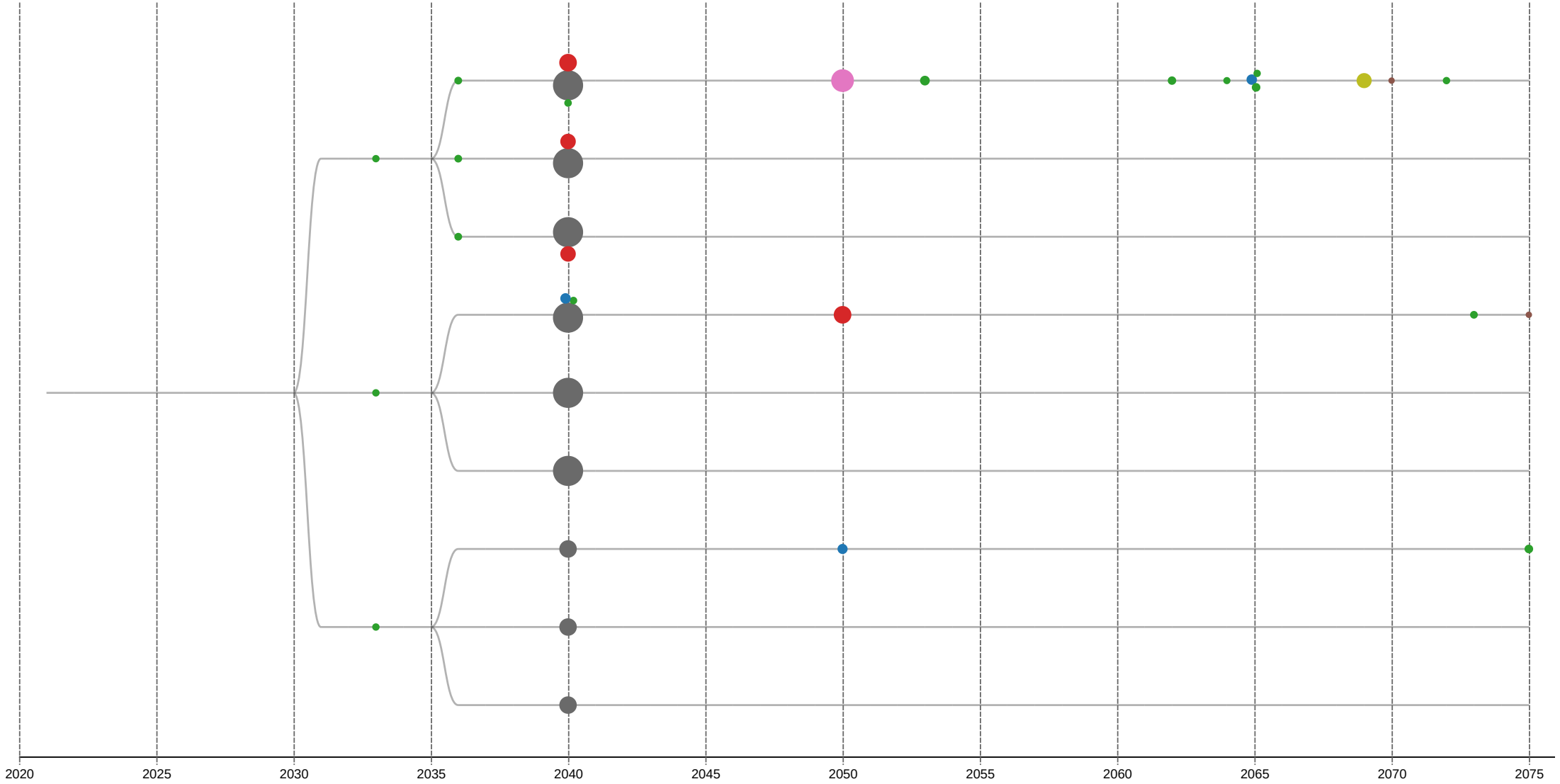
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.01	15.74	17.59	14.15	15.61	17.10	14.66	16.56	18.87	16.03
A3: Operational complexity and flexibility	6.52	7.07	7.94	6.66	7.36	8.27	6.34	7.15	8.20	7.28
A4: WRZ connectivity	7.45	8.64	9.62	7.46	8.22	8.79	8.29	9.38	10.63	8.72
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.19	20.03	22.09	18.97	20.63	22.68	20.06	22.40	25.38	21.27
E1: Scaleability and modularity of proposed changes	8.76	9.34	10.40	8.73	9.61	10.70	9.48	10.74	12.23	10.00
E2: Intervention lead times	4.23	4.21	4.47	4.04	4.21	4.40	4.03	4.32	4.79	4.30
E3: Reliance on external bodies to deliver changes	6.19	6.48	7.21	6.19	6.81	7.58	6.55	7.34	8.36	6.97
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

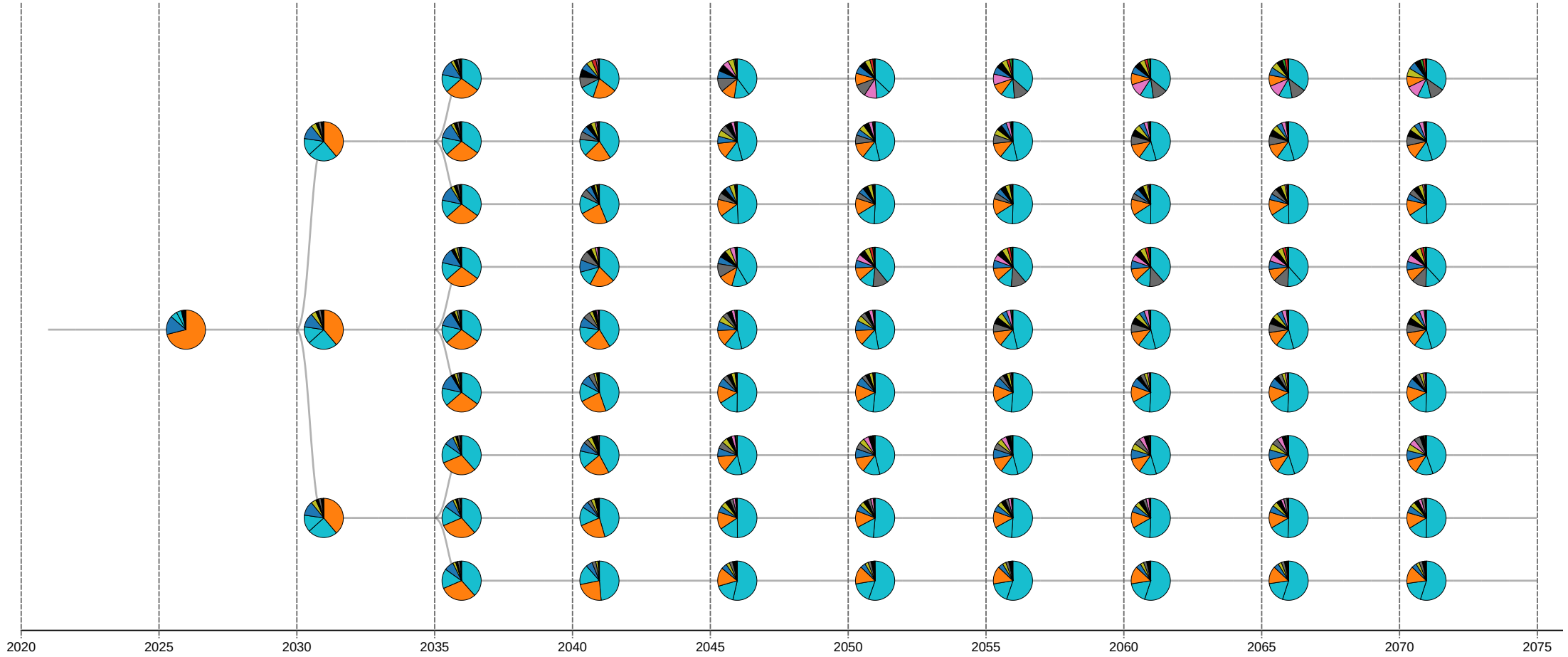
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

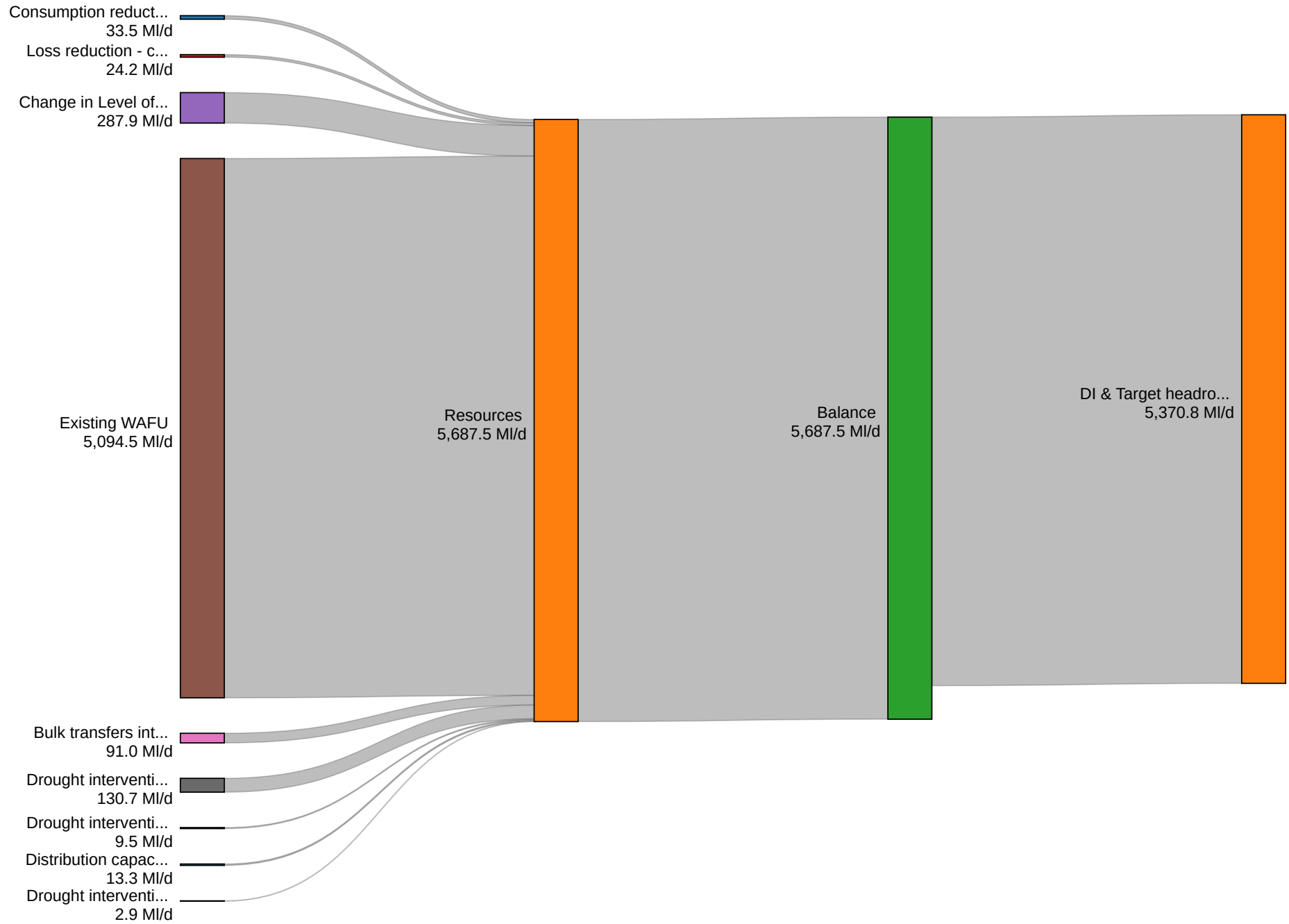
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

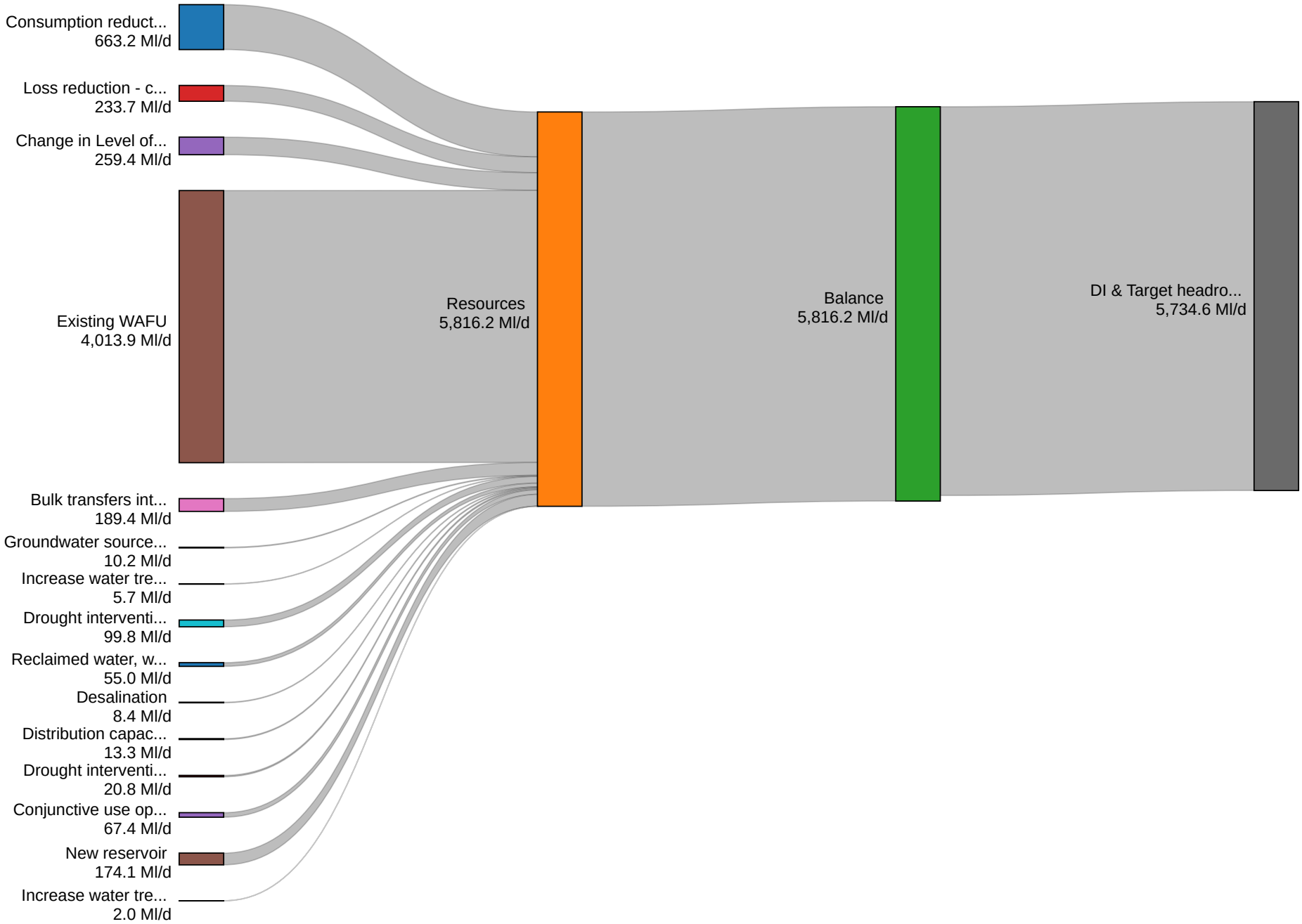


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

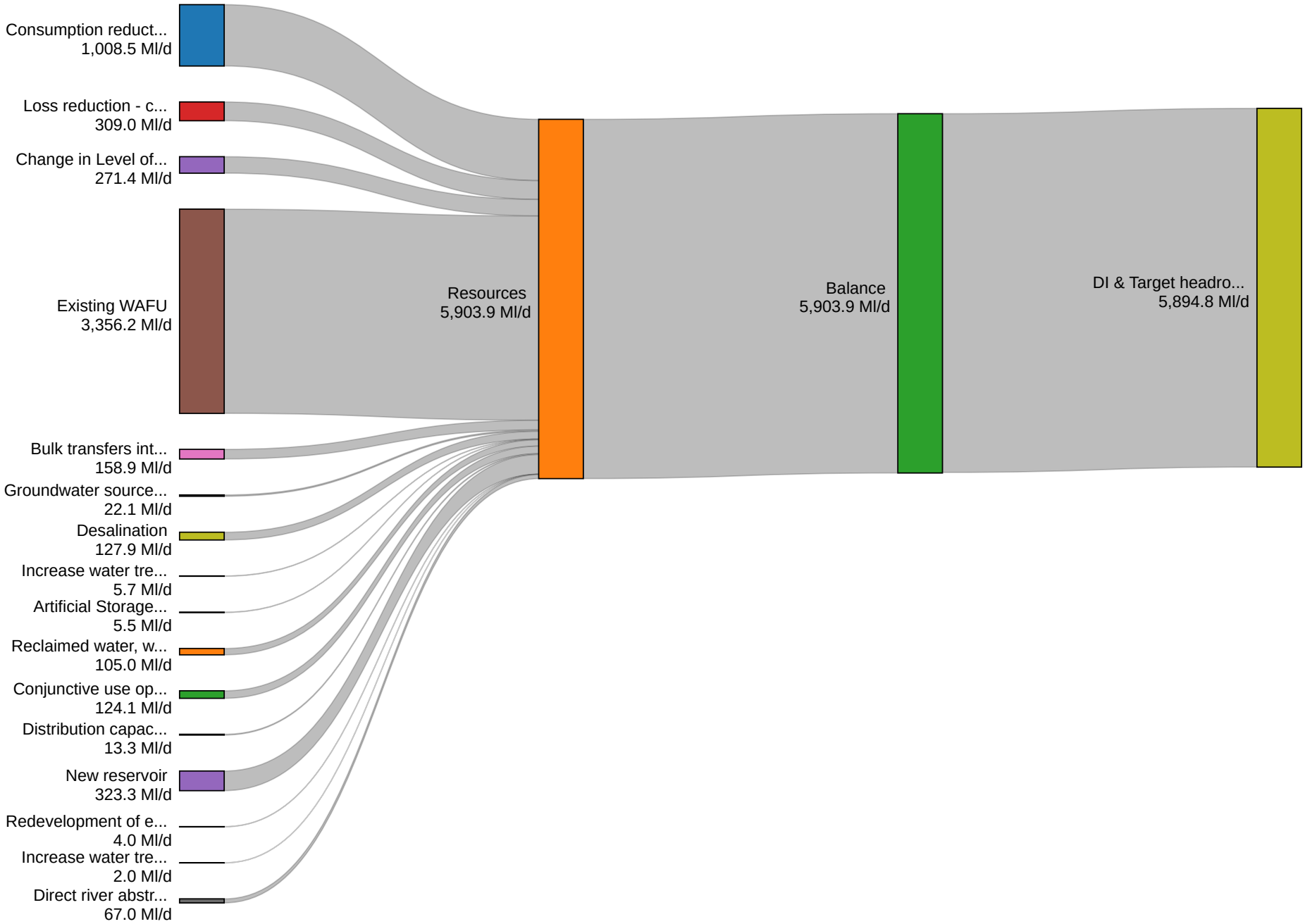
Situation 4 - 2026 (Thames Water)



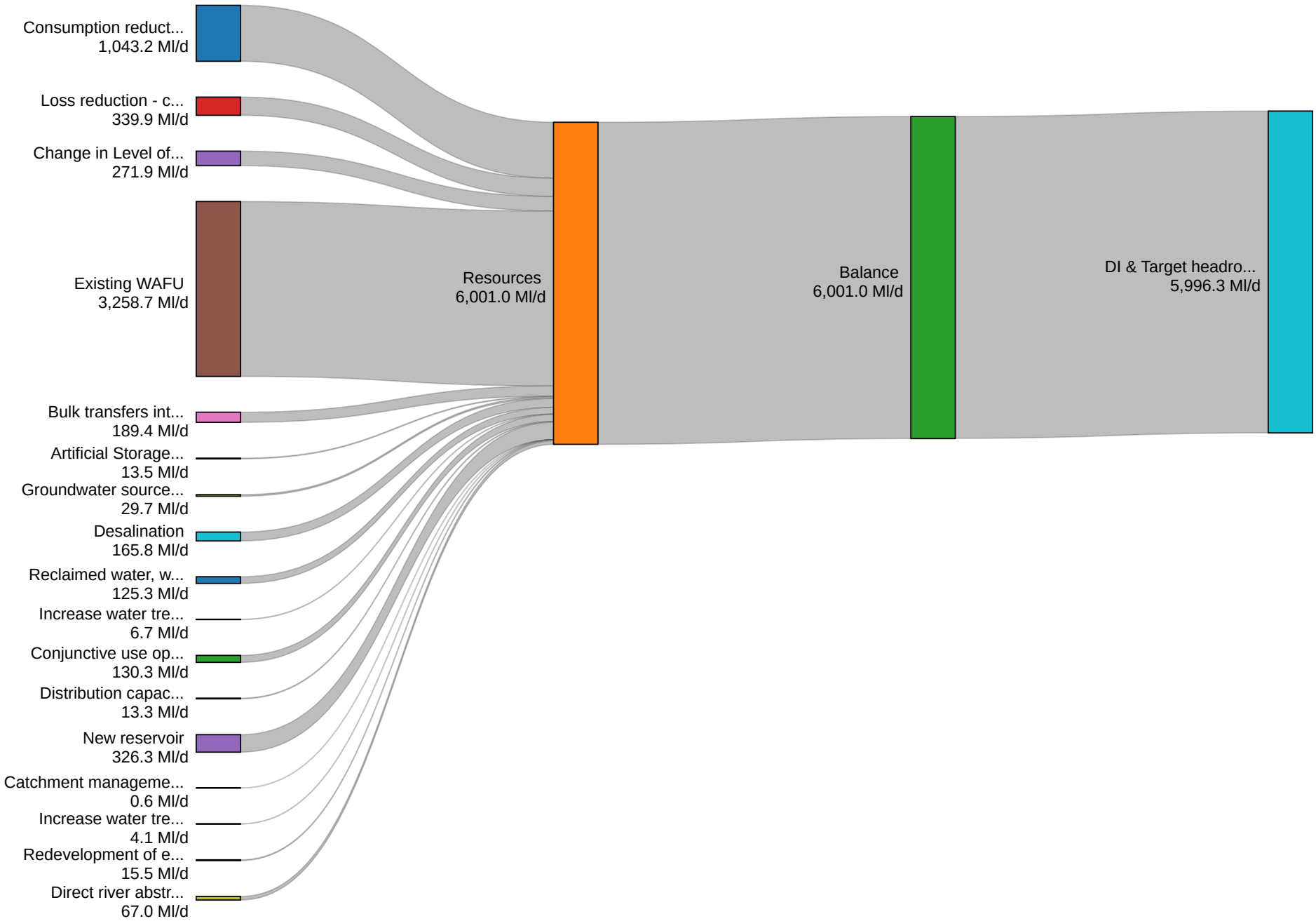
Situation 4 - 2040 (Thames Water)



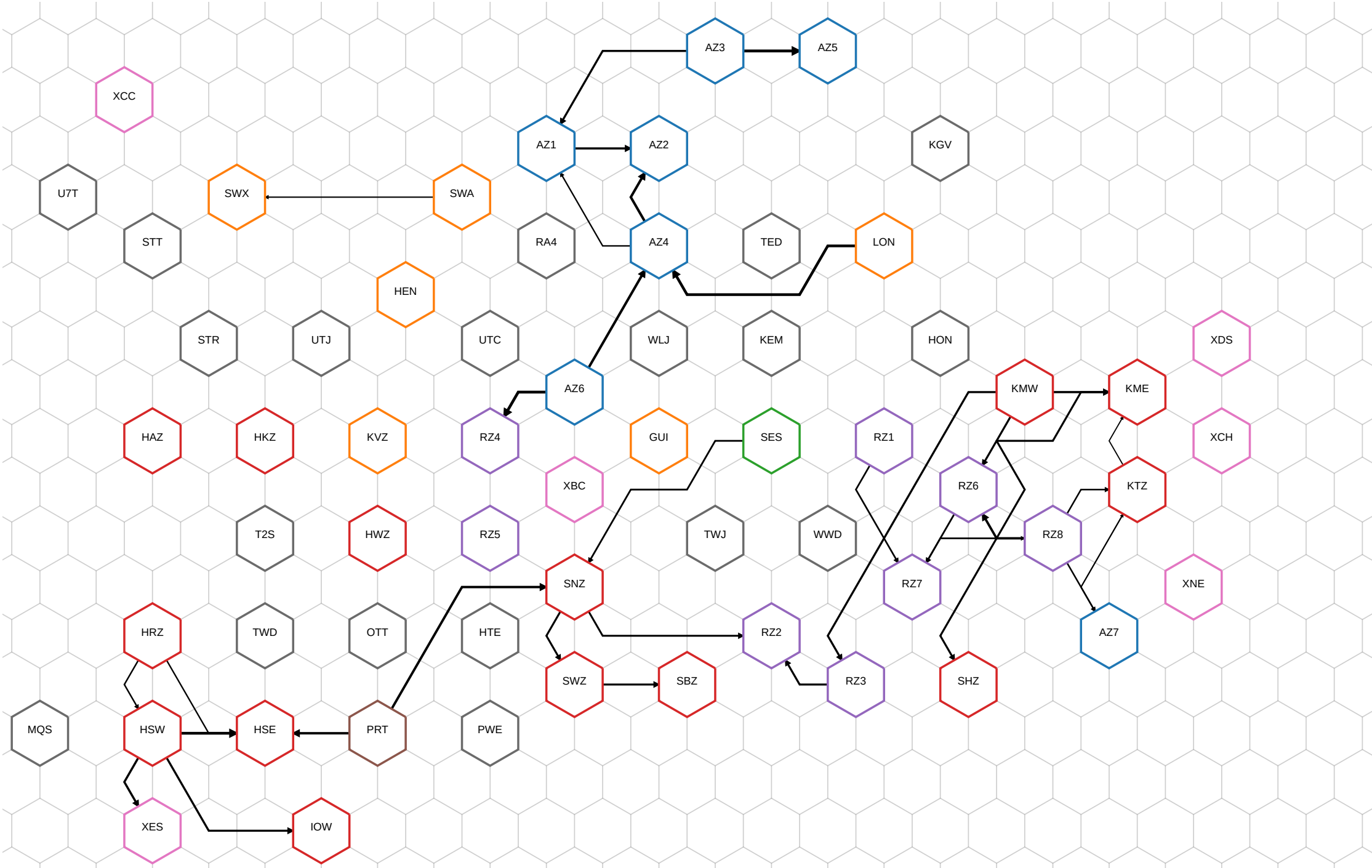
Situation 4 - 2050 (Thames Water)



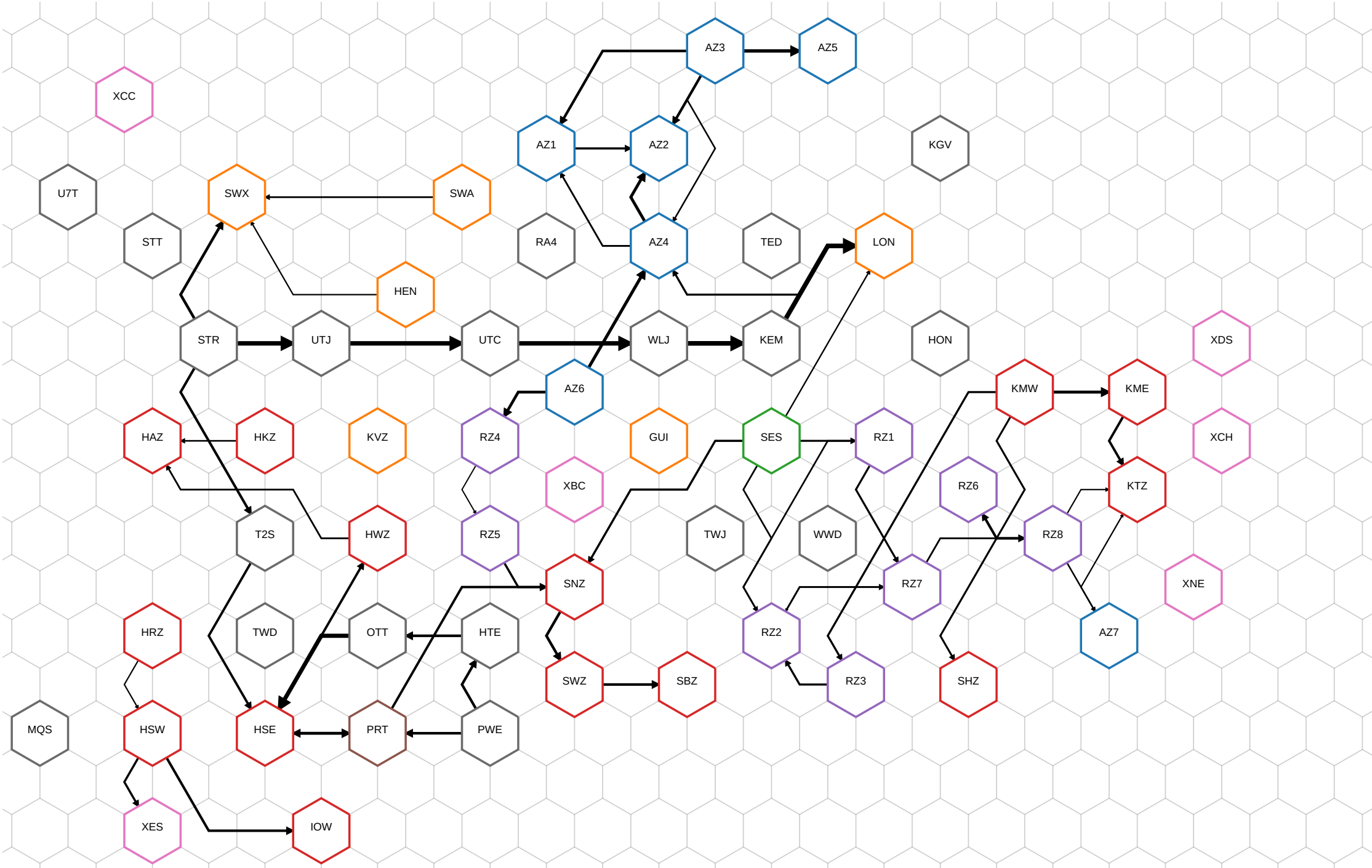
Situation 4 - 2075 (Thames Water)



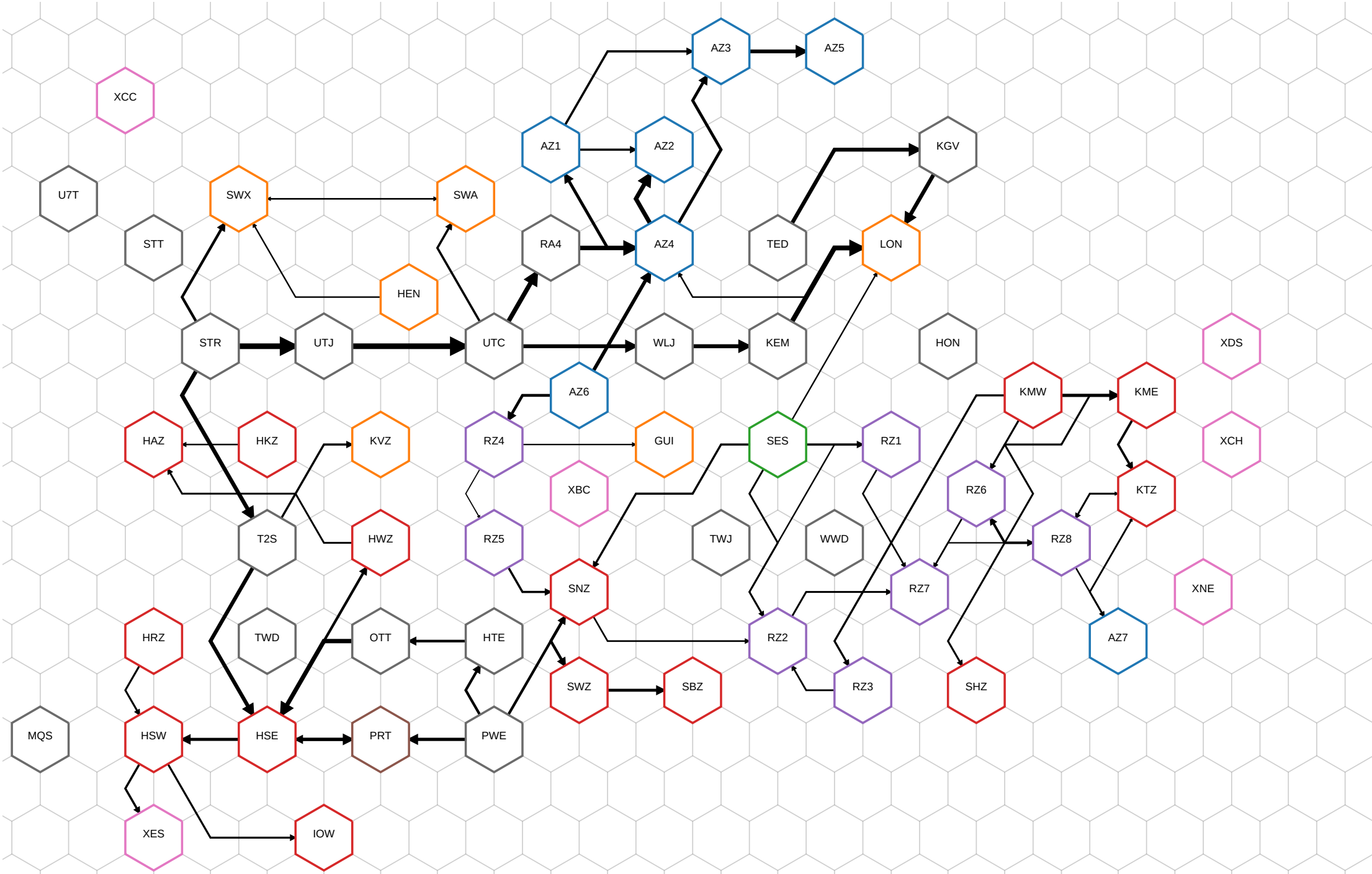
Situation 4 - 2026



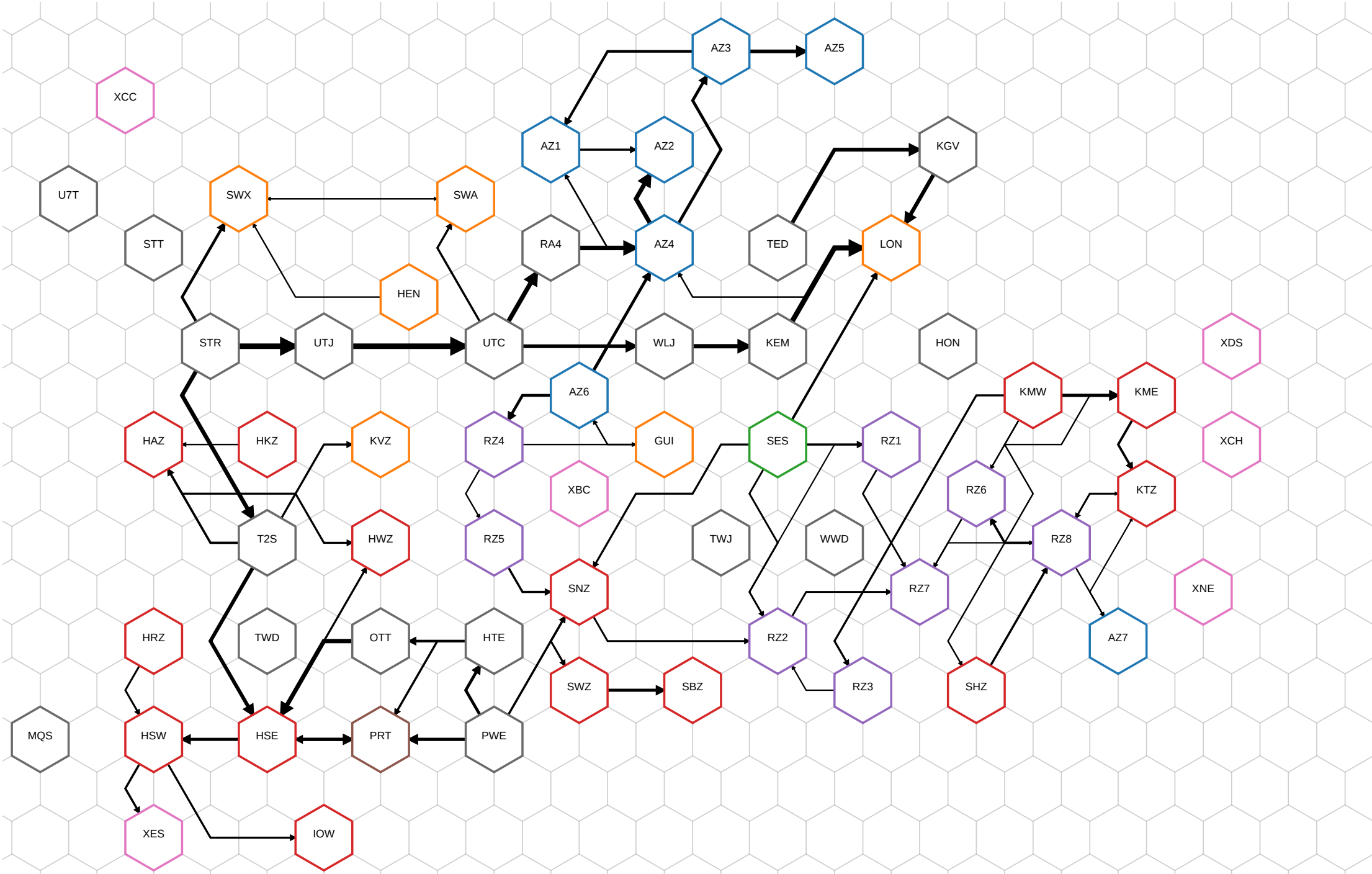
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GATEWAY 50 Ml/d

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-adj-existing-beckton-do-01-2075
Description	Least cost run with hybrid-c+2 government interventions with LON DO reduced by 20 Ml/d to represent a permanent 50 Ml/d write-down from Beckton.
Created at	26/07/2023, 12:25:06
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-adj-existing-beckton-do-01
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Reduced LON DO by 20 Ml/d to represent a permanent 50 Ml/d write-down from Beckton.
Optimised discount rate	STPR

Metrics

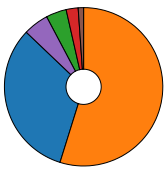
Net present value (Cost)

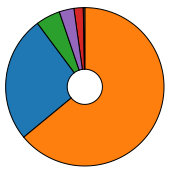
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,990	17,444	16,777	19,424	17,344	16,599	17,674	16,826	16,135	17,690	(£m)
Cost w/o deficit (STPR)	20,990	17,444	16,777	19,424	17,344	16,599	17,674	16,826	16,135	17,690	(£m)
Cost w/ deficit (IGEQ)	32,235	25,550	24,344	29,306	25,376	24,064	26,085	24,487	23,243	26,077	(£m)
Cost w/o deficit (IGEQ)	32,235	25,550	24,344	29,306	25,376	24,064	26,085	24,487	23,243	26,077	(£m)
Cost w/ deficit (LTDR)	23,163	19,042	18,275	21,348	18,928	18,077	19,326	18,340	17,546	19,338	(£m)
Cost w/o deficit (LTDR)	23,163	19,042	18,275	21,348	18,928	18,077	19,326	18,340	17,546	19,338	(£m)

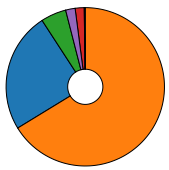
Cost breakdown (STPR)

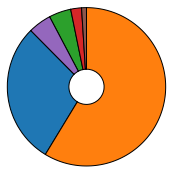
Select Company: Total

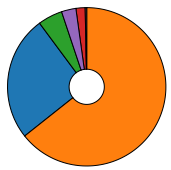
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,780	4,497	4,119	5,611	4,427	3,993	4,558	4,110	3,677	4,641	(£m)
Fixed opex	11,505	11,168	11,118	11,401	11,156	11,102	11,166	11,114	11,054	11,198	(£m)
Fixed operational carbon	880	869	870	878	870	868	872	867	866	871	(£m)
Embedded carbon	514	332	310	429	327	298	344	307	283	349	(£m)
Variable opex	1,081	523	324	912	511	308	643	393	239	548	(£m)
Variable carbon opex	230	55	35	194	54	30	92	35	17	82	(£m)

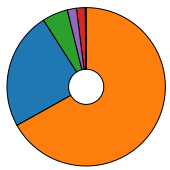
situation1 

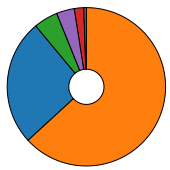
situation2 

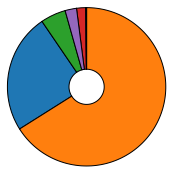
situation3 

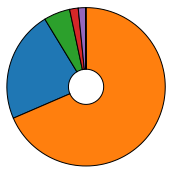
situation4 

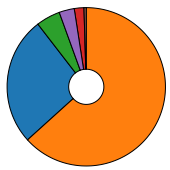
situation5 

situation6 

situation7 

situation8 

situation9 

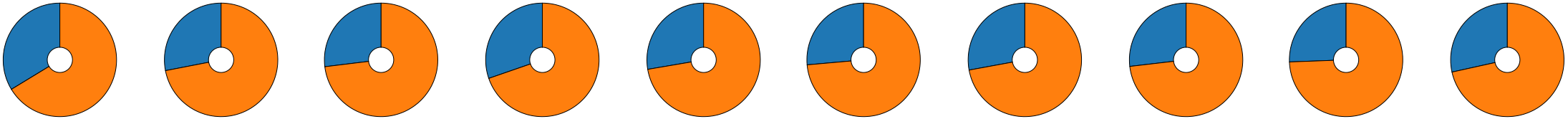
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,328,663	2,033,942	1,885,412	2,722,045	1,999,002	1,816,381	2,132,459	1,871,613	1,709,994	2,166,612	(tonnes)
Operational emissions	6,551,383	5,217,178	5,115,102	6,264,034	5,223,915	5,062,578	5,514,845	5,099,975	4,973,411	5,446,936	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

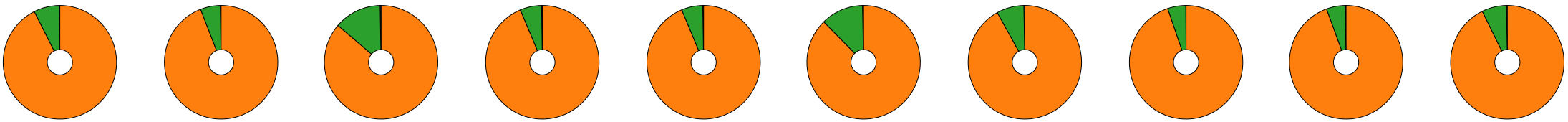


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	46	28	14	41	9	8	26	(GWh)
Grid	23,219	11,332	4,189	19,541	10,920	3,884	13,170	7,967	2,913	10,793	(GWh)
Renewable	1,816	681	655	1,277	706	536	1,115	433	165	821	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,067	64,299	63,522	68,166	63,971	63,179	65,000	62,726	61,670	64,733
SEA environmental disbenefit	116,366	83,433	76,538	104,495	81,543	77,260	86,043	72,666	63,819	84,685
Natural capital	84,444,188	81,278,698	84,132,788	77,785,726	81,286,962	83,791,200	80,935,083	81,713,548	84,585,470	82,217,074
Bio-diversity net gain	−197,035	−119,345	−89,256	−172,506	−118,600	−102,726	−121,145	−93,987	−64,933	−119,948

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,296	32,098	31,738	33,619	32,015	31,721	32,076	31,160	30,670	32,155

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.86	27.07	29.67	27.01	27.19	29.59	28.39	31.34	34.80	29.21
R1: Uncertainty of option supply/demand benefit	5.79	4.89	5.36	5.35	4.93	5.29	5.27	5.69	6.27	5.43
R3: Risk of service failure due to other physical hazards	6.67	6.69	7.51	6.56	6.74	7.49	6.99	7.91	9.01	7.29
R4: Availability of additional headroom	6.40	6.72	6.94	6.45	6.74	6.94	7.04	7.39	7.63	6.92
R5: Catchment/raw water quality risks (incl. climate change)	3.98	3.83	4.32	3.69	3.84	4.33	3.94	4.53	5.23	4.19
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.01	4.94	5.54	4.96	4.96	5.53	5.15	5.82	6.65	5.39
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

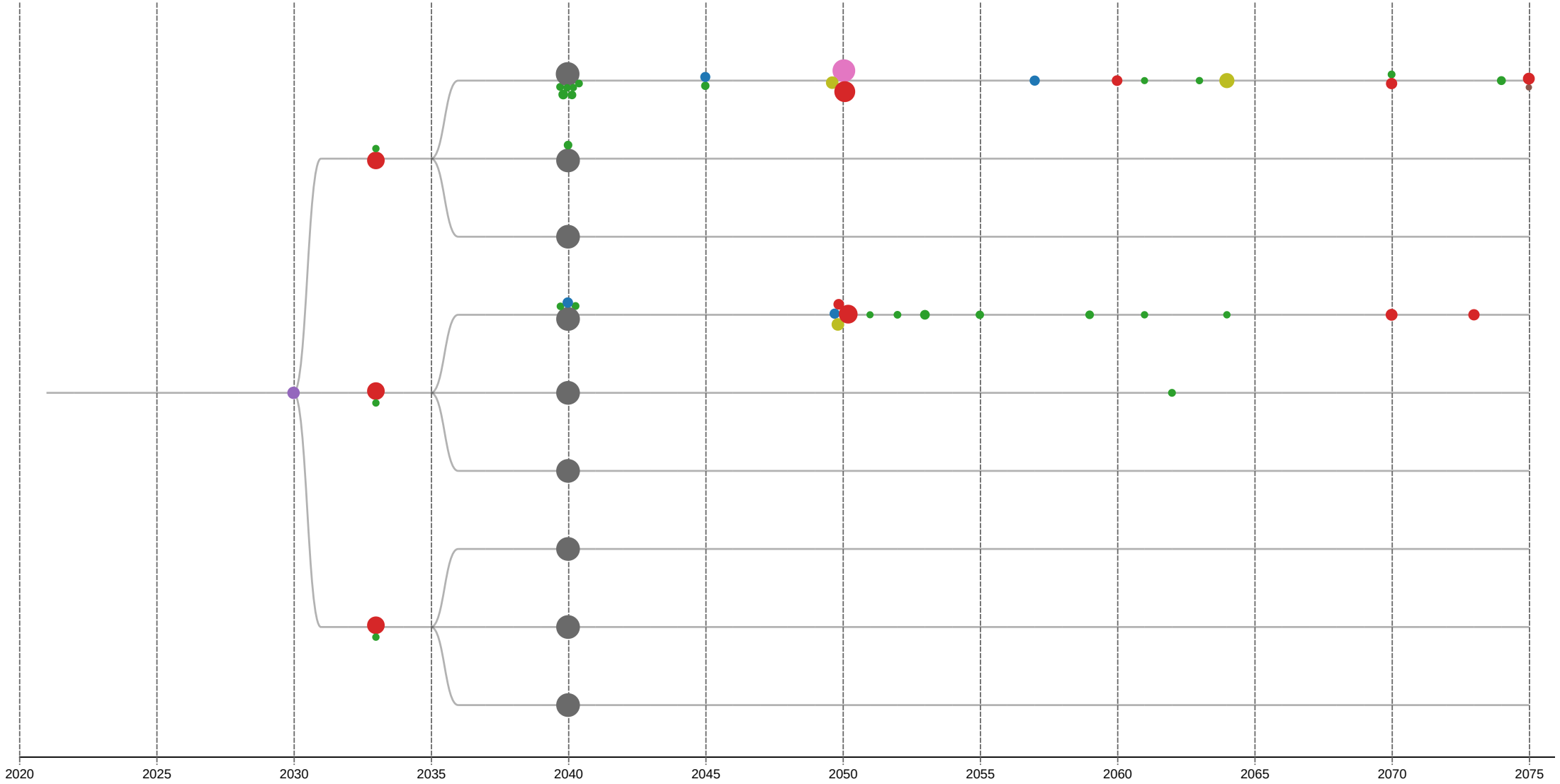
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.00	16.80	13.72	15.07	16.71	15.40	17.51	19.95	15.98
A3: Operational complexity and flexibility	6.13	6.41	7.21	6.17	6.45	7.24	6.68	7.63	8.76	6.97
A4: WRZ connectivity	7.49	8.56	9.56	7.53	8.59	9.44	8.69	9.84	11.16	8.99
A7: Customer relations support engagement with demand management	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.60	19.51	21.71	18.96	19.59	21.50	20.10	22.77	25.78	21.06
E1: Scaleability and modularity of proposed changes	8.98	9.30	10.41	8.78	9.38	10.41	9.62	11.03	12.56	10.05
E2: Intervention lead times	4.37	3.98	4.35	4.07	3.96	4.15	4.01	4.39	4.86	4.24
E3: Reliance on external bodies to deliver changes	6.24	6.22	6.95	6.11	6.26	6.94	6.47	7.35	8.36	6.77
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

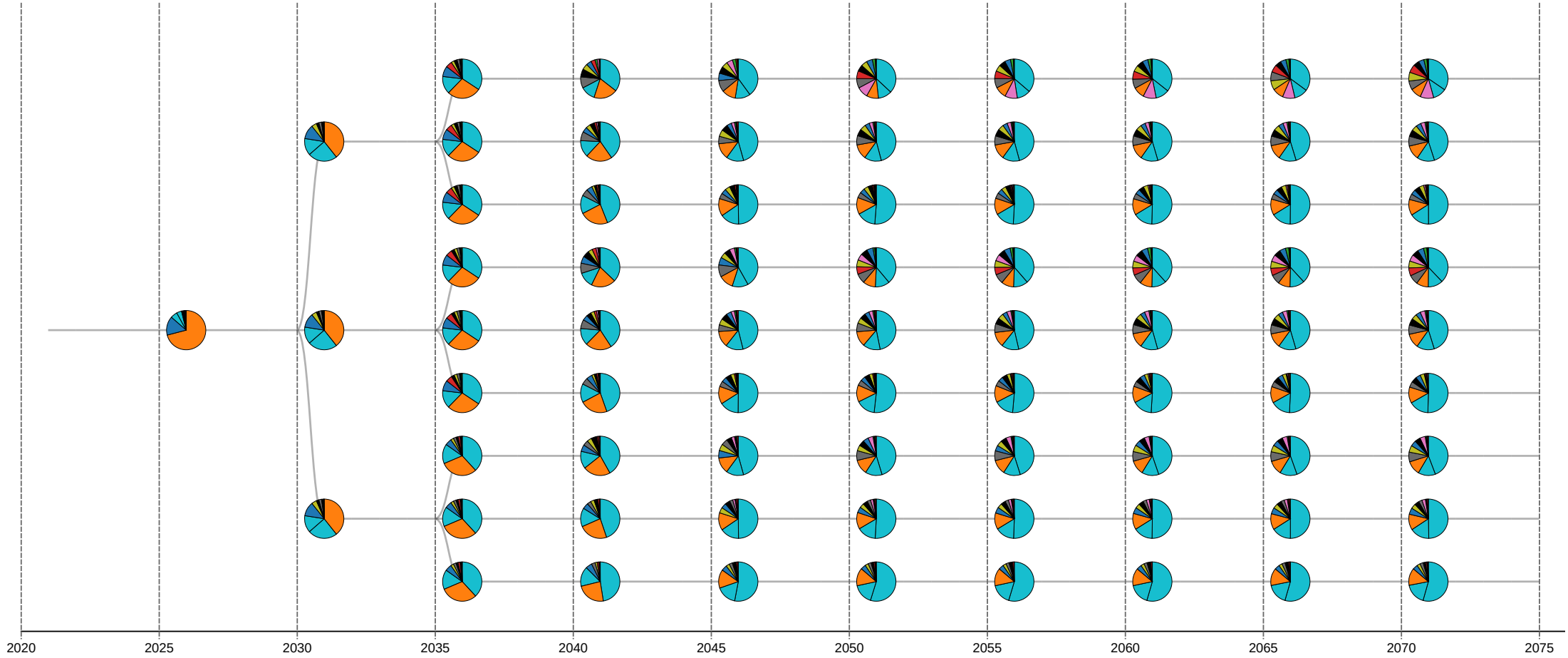
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

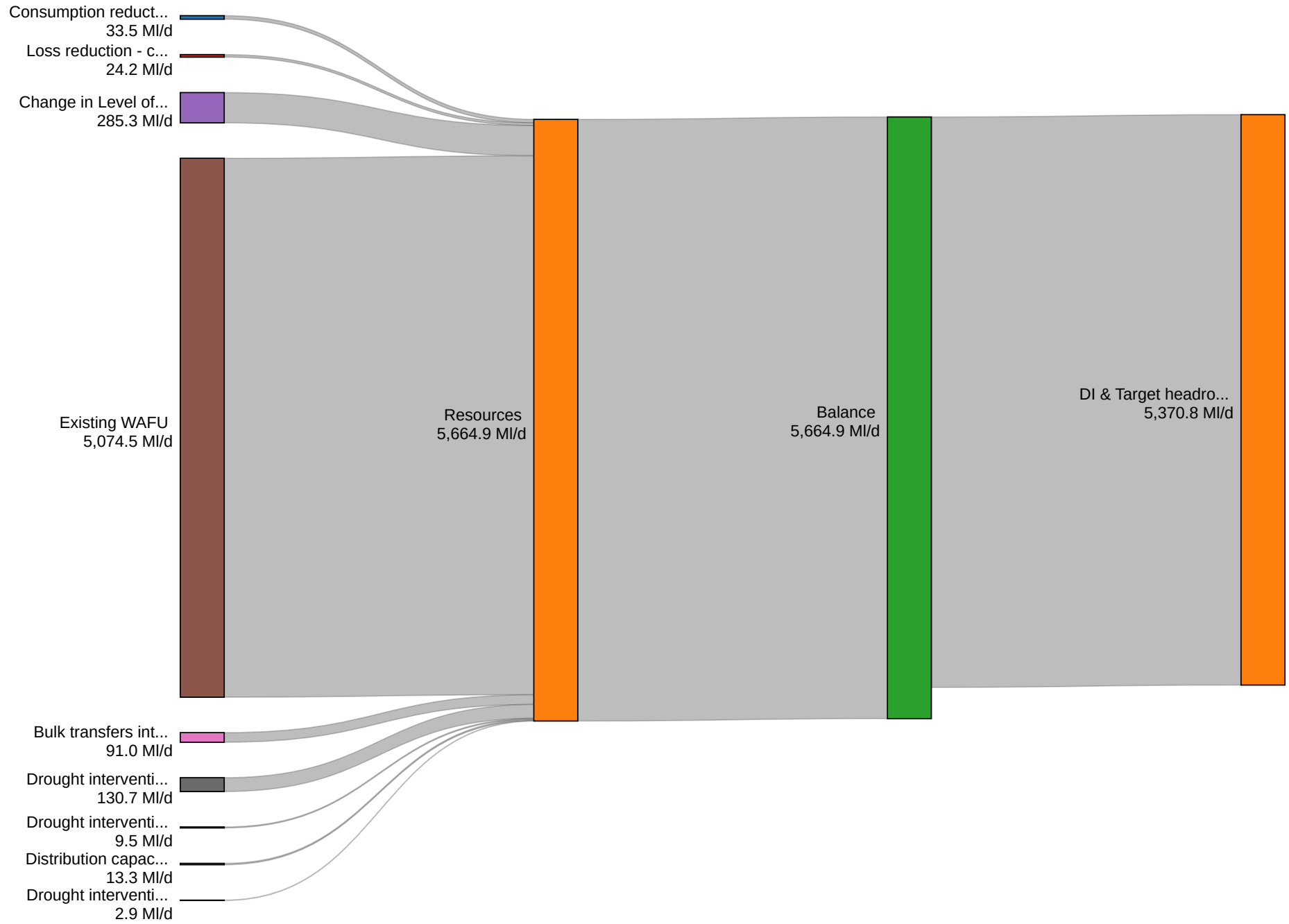
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

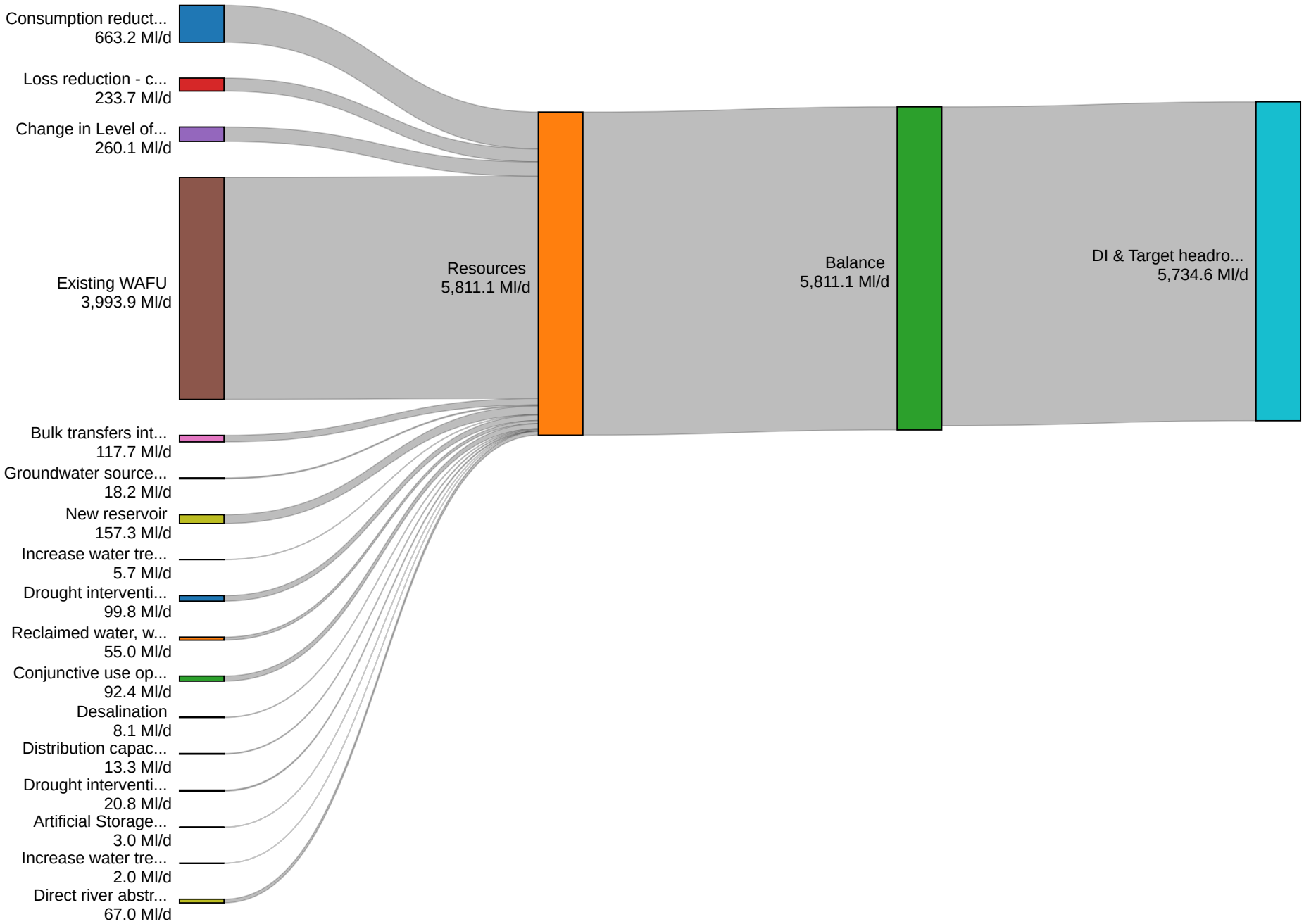


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

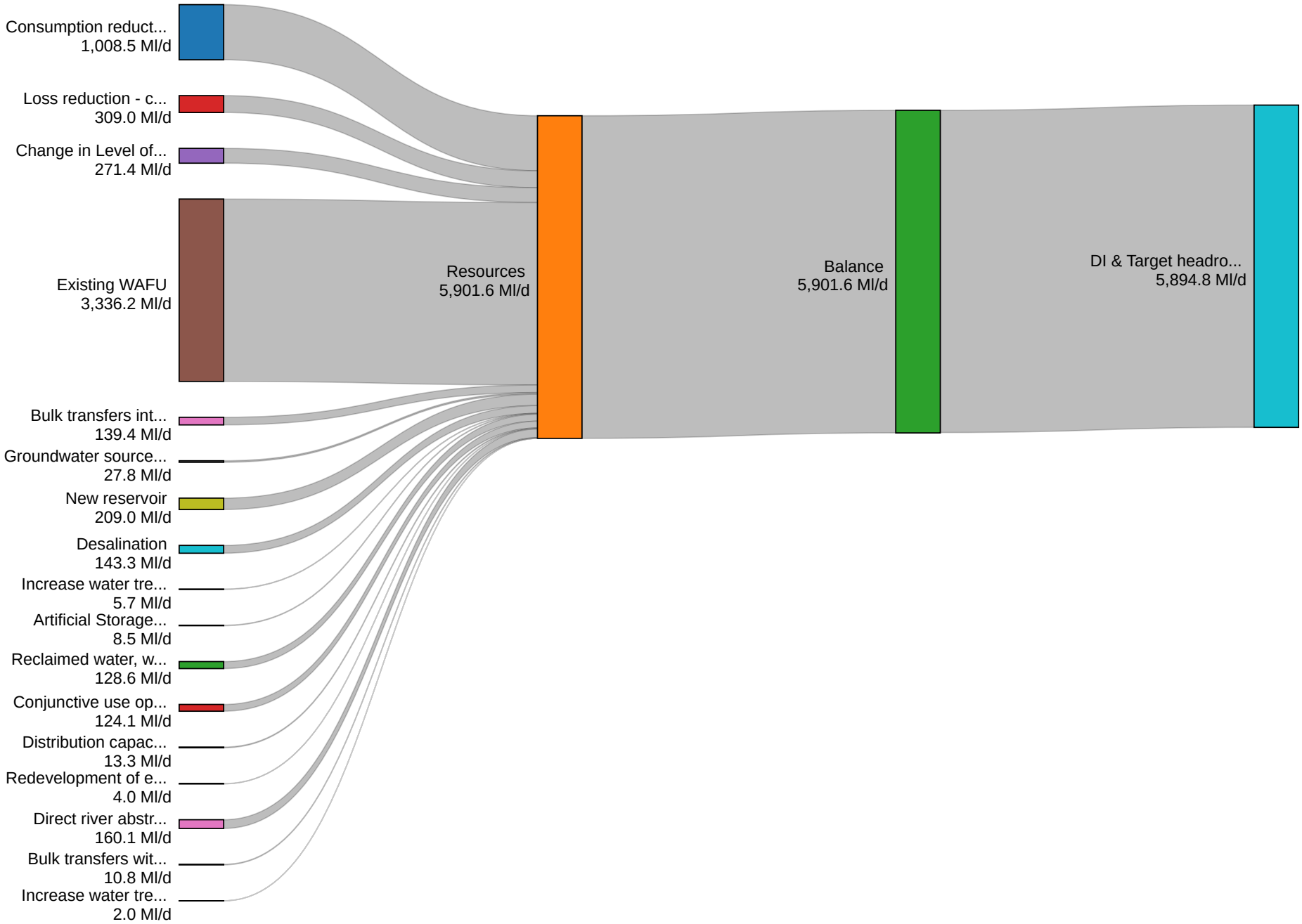
Situation 4 - 2026 (Thames Water)



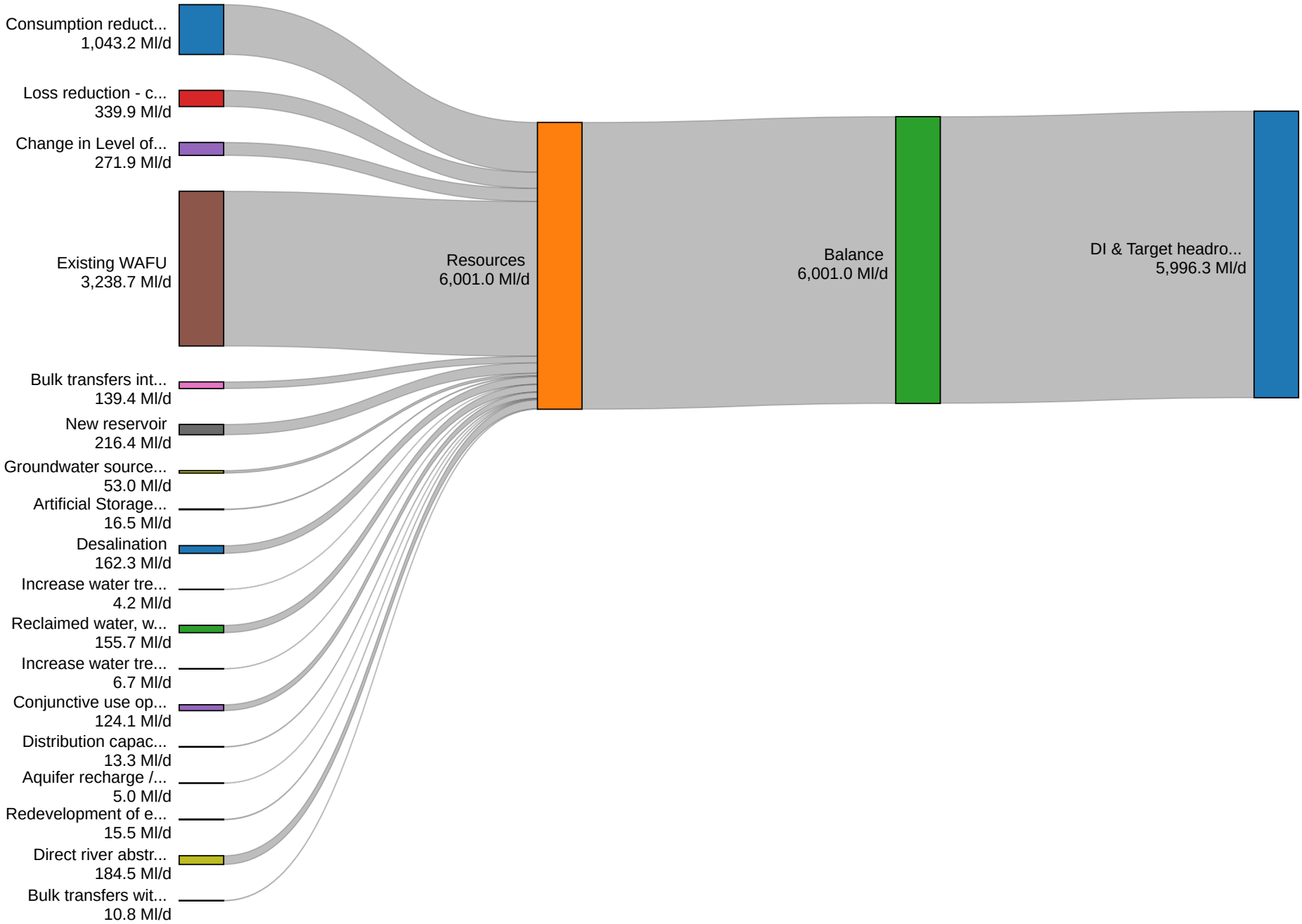
Situation 4 - 2040 (Thames Water)



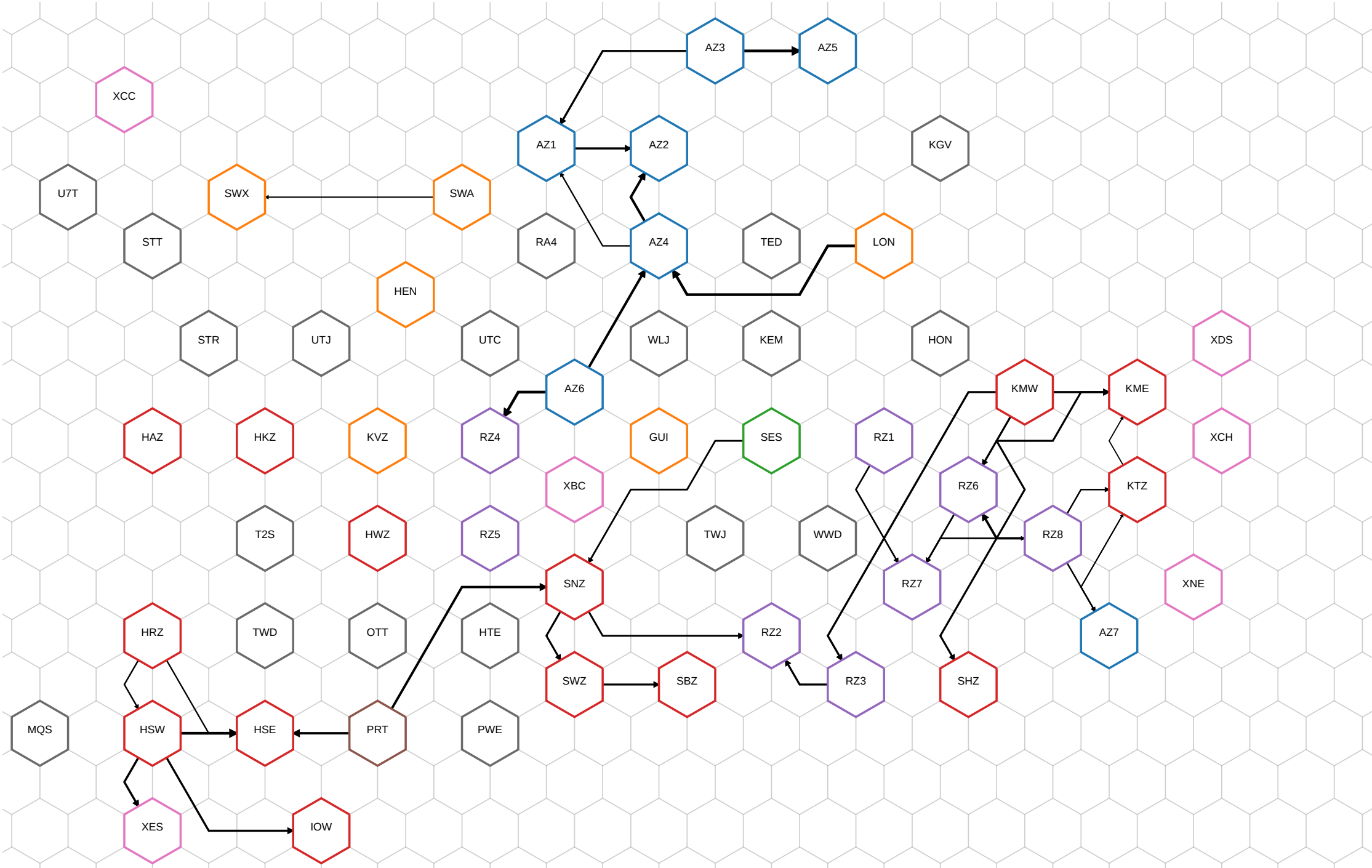
Situation 4 - 2050 (Thames Water)



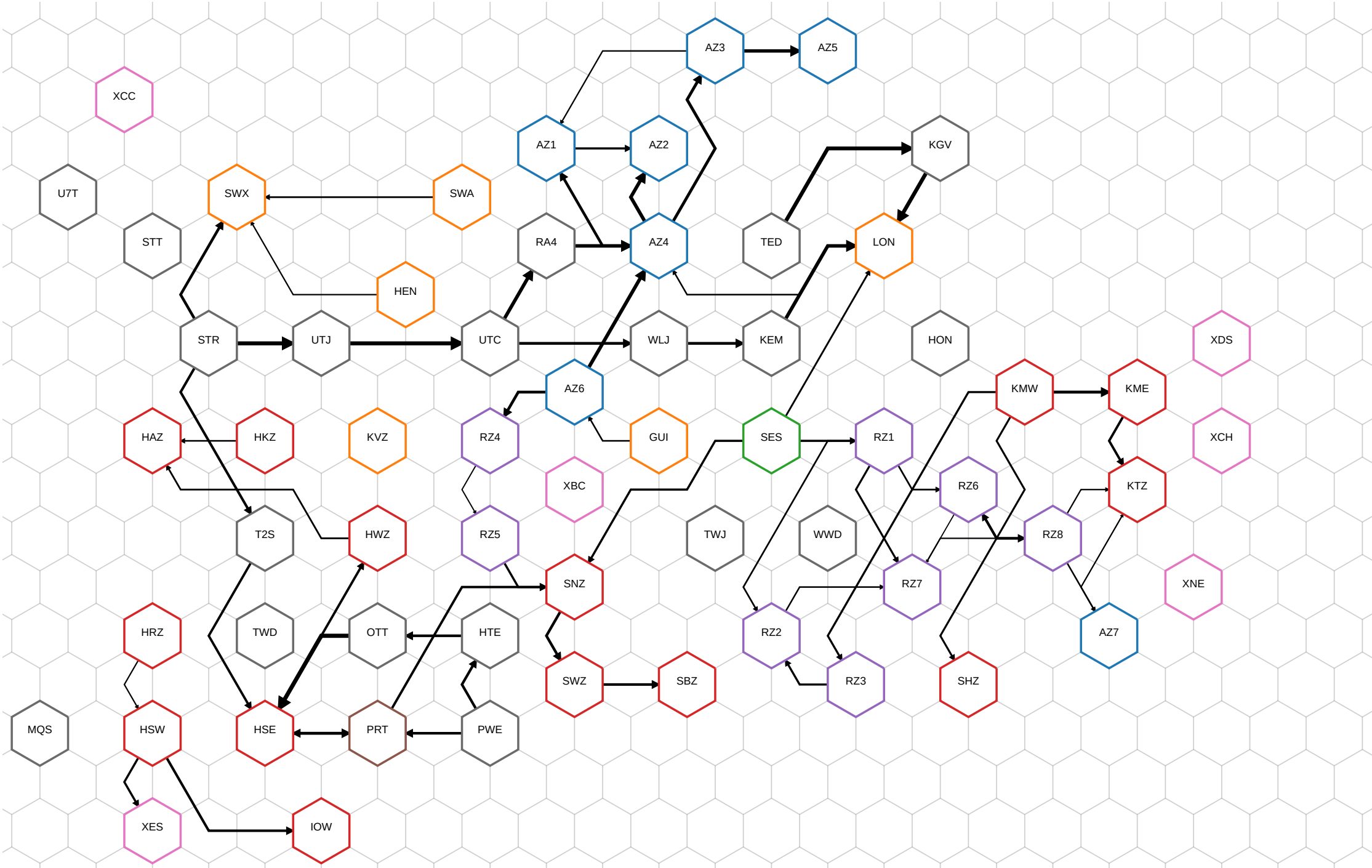
Situation 4 - 2075 (Thames Water)



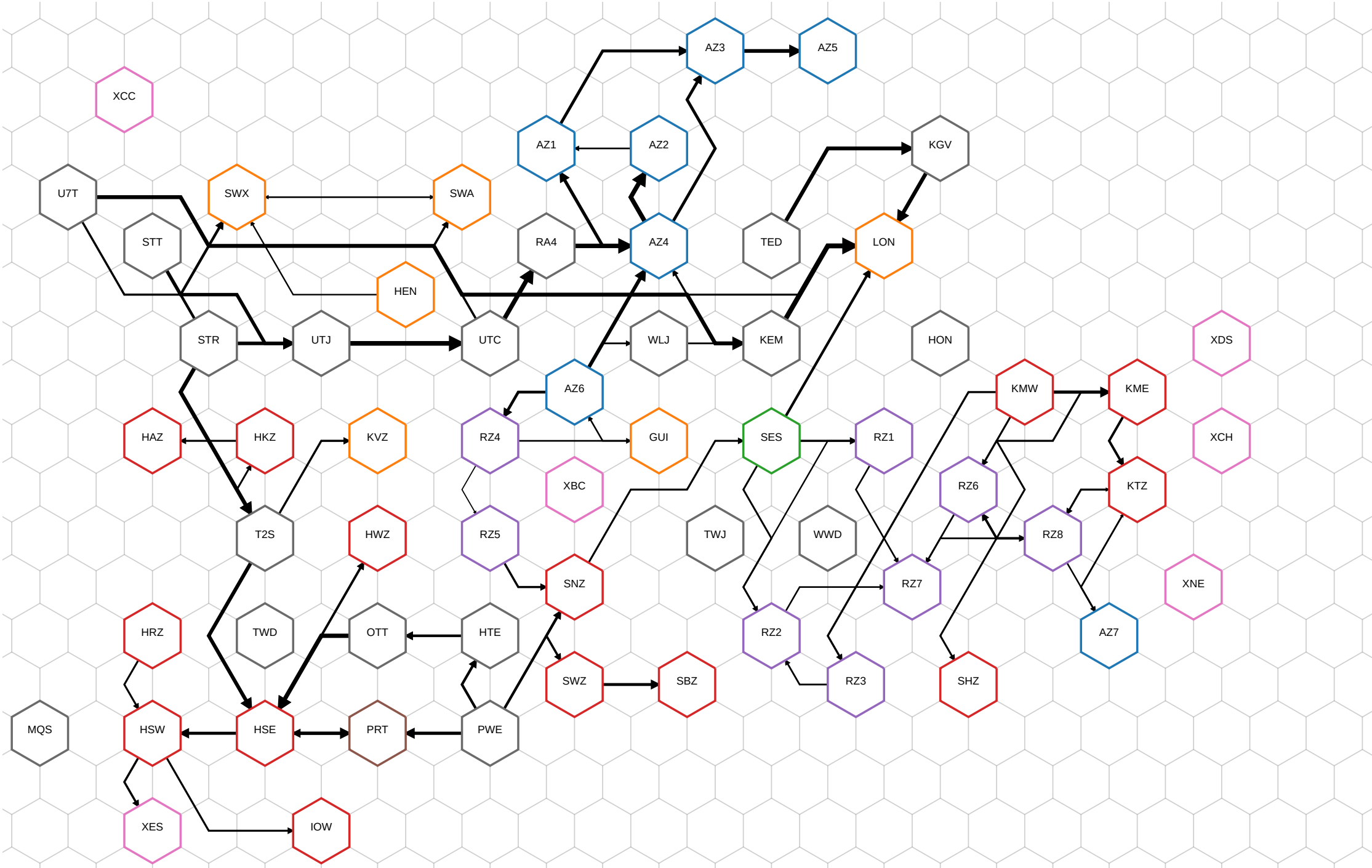
Situation 4 - 2026



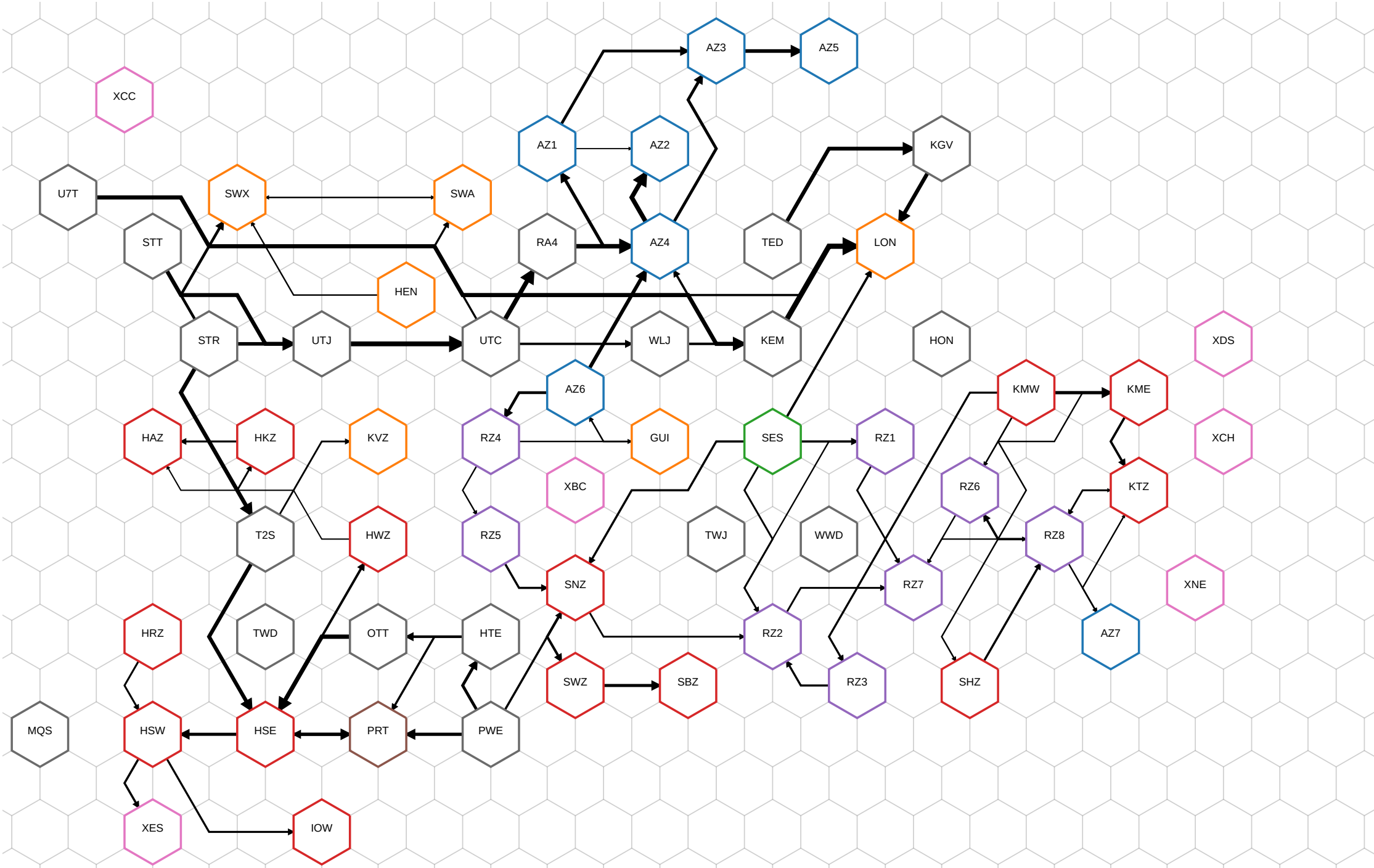
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

LOWER THAMES REDUCTIONS

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ltrisks-rts-v2-2075
Description	Least cost run with hybrid-c+2 government interventions including baseline DO allowance for Lower Thames Risks (150 Ml/d from 2026) and River Thames Scheme (86 Ml/d from 2030) in LON. Includes emergency options to elimnate the deficits caused by these reducations until 2034
Created at	19/07/2023, 11:11:35
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ltrisks-rts-v2
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Includes DO reduction due to Lower Thames risks. Includes LON DO reduction of 80 Ml/d due to River Thames Scheme (RTS). Includes emergency options to eliminate the deficits caused by these reductions until 2034.
Optimised discount rate	STPR

Metrics

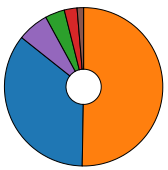
Net present value (Cost)

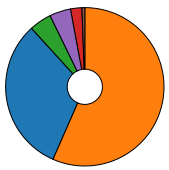
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	23,114	20,189	19,452	21,828	20,072	19,283	20,089	18,914	18,206	20,128	(£m)
Cost w/o deficit (STPR)	23,114	20,189	19,452	21,828	20,072	19,283	20,089	18,914	18,206	20,128	(£m)
Cost w/ deficit (IGEQ)	35,387	29,811	28,476	32,903	29,614	28,218	29,906	27,696	26,419	29,825	(£m)
Cost w/o deficit (IGEQ)	35,387	29,811	28,476	32,903	29,614	28,218	29,906	27,696	26,419	29,825	(£m)
Cost w/ deficit (LTDR)	25,487	22,079	21,231	23,985	21,947	21,044	22,009	20,644	19,831	22,029	(£m)
Cost w/o deficit (LTDR)	25,487	22,079	21,231	23,985	21,947	21,044	22,009	20,644	19,831	22,029	(£m)

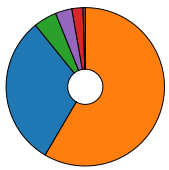
Cost breakdown (STPR)

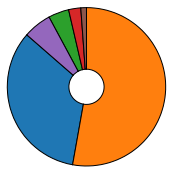
Select Company: Total

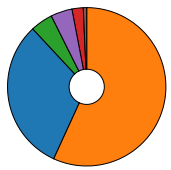
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,185	6,392	5,978	7,333	6,268	5,836	6,147	5,523	5,086	6,305	(£m)
Fixed opex	11,622	11,422	11,369	11,527	11,409	11,354	11,430	11,348	11,290	11,419	(£m)
Fixed operational carbon	929	916	918	921	917	915	912	906	906	915	(£m)
Embedded carbon	601	470	446	542	464	433	448	396	372	464	(£m)
Variable opex	1,471	869	652	1,254	876	650	956	665	502	877	(£m)
Variable carbon opex	306	118	89	251	138	96	197	75	51	147	(£m)

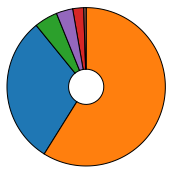
situation1 

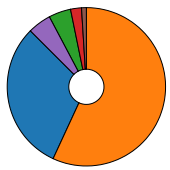
situation2 

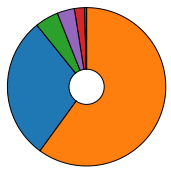
situation3 

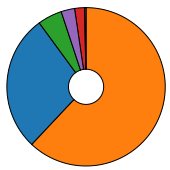
situation4 

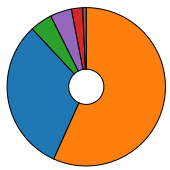
situation5 

situation6 

situation7 

situation8 

situation9 

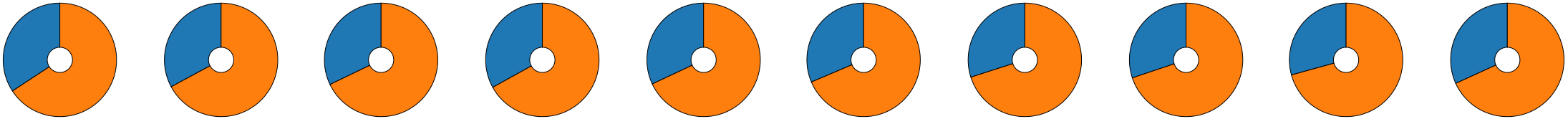
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,821,867	2,882,223	2,717,969	3,388,123	2,844,129	2,637,546	2,768,486	2,410,393	2,248,711	2,857,716	(tonnes)
Operational emissions	7,336,850	5,889,452	5,738,780	6,863,096	6,047,079	5,766,801	6,481,853	5,587,373	5,428,758	6,126,671	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

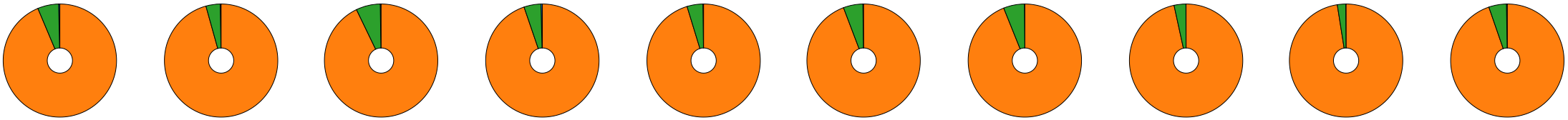


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	109	44	24	103	33	19	22	8	6	41	(GWh)
Grid	28,273	16,072	8,813	24,367	15,593	8,648	17,950	11,839	6,735	15,366	(GWh)
Renewable	1,804	681	655	1,243	739	510	1,140	411	165	816	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,756	66,455	65,502	69,426	66,060	65,226	66,319	63,740	62,760	66,249
SEA environmental disbenefit	118,155	89,509	82,361	108,358	87,214	82,063	94,167	77,684	68,300	89,757
Natural capital	81,363,372	77,185,334	80,167,728	75,535,721	77,325,167	79,977,793	64,339,843	66,259,587	67,916,343	74,452,321
Bio-diversity net gain	−228,637	−160,879	−128,590	−208,092	−158,183	−138,540	−148,881	−106,667	−74,227	−150,300

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,717	32,805	32,336	34,080	32,620	32,357	32,881	31,912	31,391	32,789

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.79	31.51	34.30	29.81	31.72	34.48	29.99	33.05	36.79	32.38
R1: Uncertainty of option supply/demand benefit	6.85	6.84	7.47	6.66	6.92	7.48	6.55	7.08	7.89	7.08
R3: Risk of service failure due to other physical hazards	7.09	7.74	8.57	7.19	7.80	8.62	7.29	8.23	9.36	7.99
R4: Availability of additional headroom	6.25	6.58	6.80	6.33	6.61	6.81	6.66	7.00	7.24	6.70
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.25	4.72	3.99	4.26	4.77	4.01	4.58	5.27	4.44
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.49	6.10	6.75	5.63	6.14	6.80	5.47	6.16	7.03	6.18
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

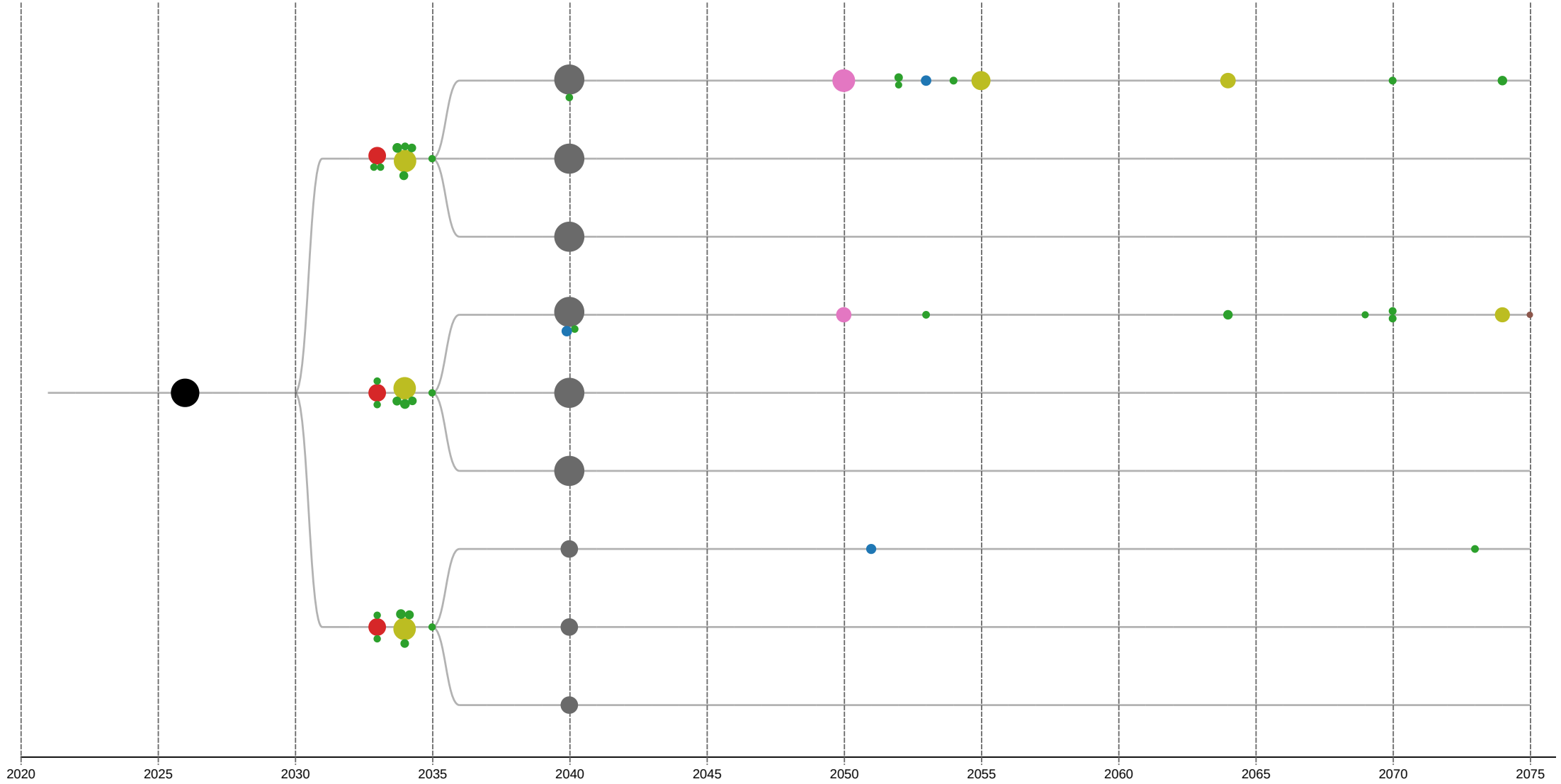
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.12	15.00	16.48	13.56	14.98	16.40	15.07	17.11	19.47	15.69
A3: Operational complexity and flexibility	6.54	7.39	8.21	6.76	7.46	8.28	6.88	7.84	8.97	7.59
A4: WRZ connectivity	6.55	7.58	8.24	6.77	7.49	8.09	8.17	9.24	10.47	8.07
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.49	20.94	22.90	19.55	21.01	23.04	21.66	24.45	27.68	22.30
E1: Scaleability and modularity of proposed changes	8.91	9.76	10.77	9.02	9.86	10.84	10.23	11.70	13.31	10.49
E2: Intervention lead times	4.17	4.21	4.44	4.06	4.12	4.46	4.30	4.66	5.18	4.40
E3: Reliance on external bodies to deliver changes	6.41	6.97	7.69	6.47	7.03	7.73	7.13	8.09	9.20	7.41
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

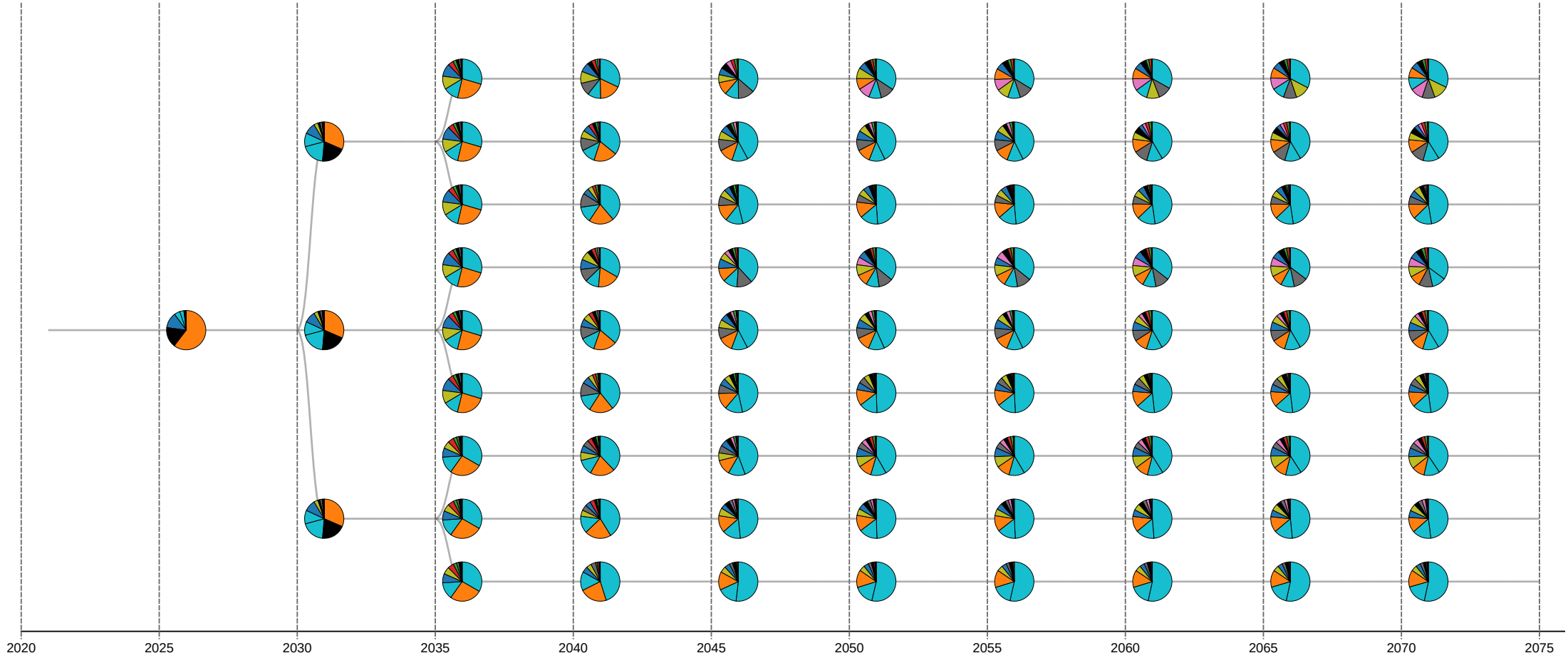
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
- Transfer into region
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- Groundwater
- Direct river abstraction
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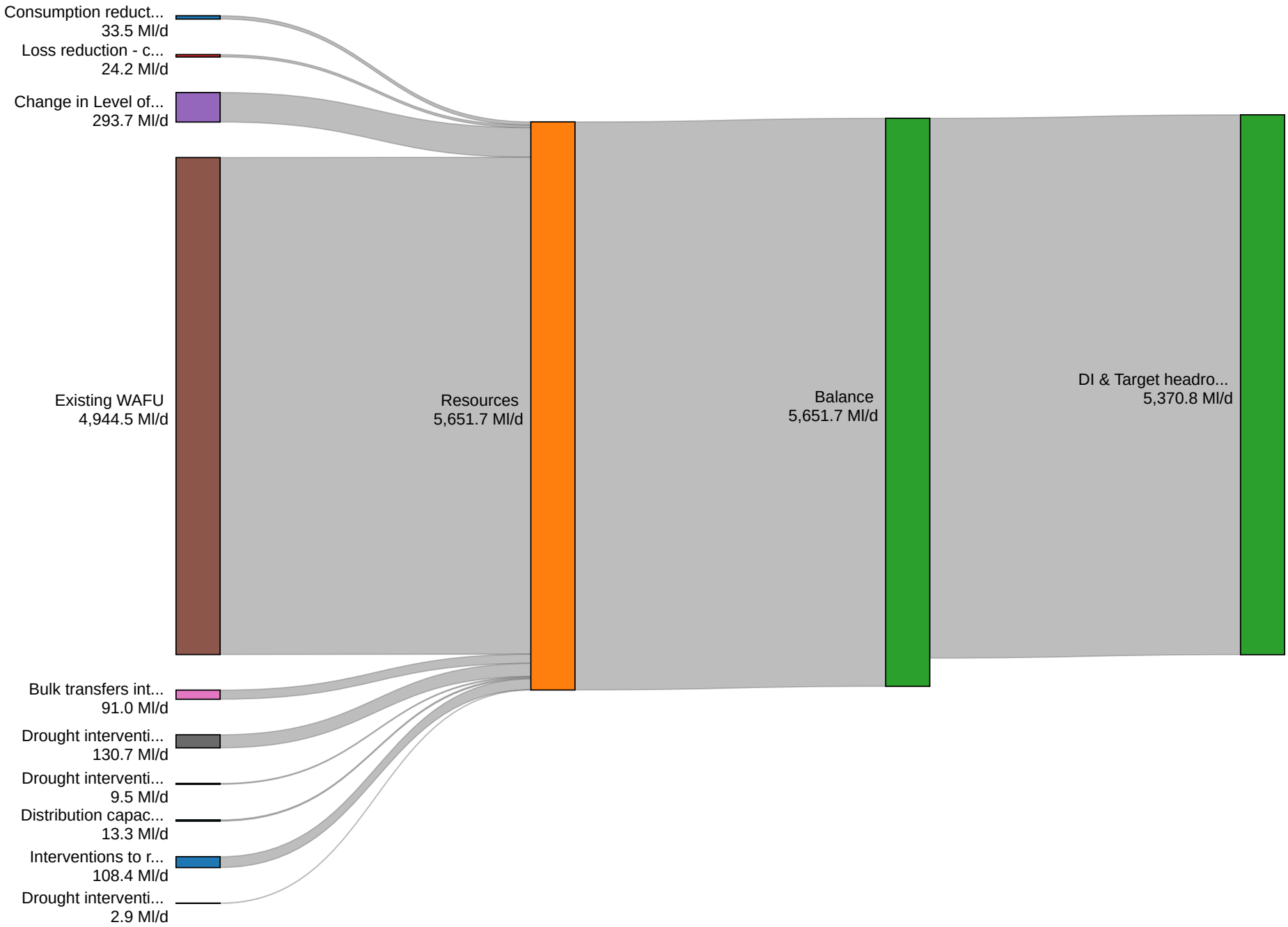
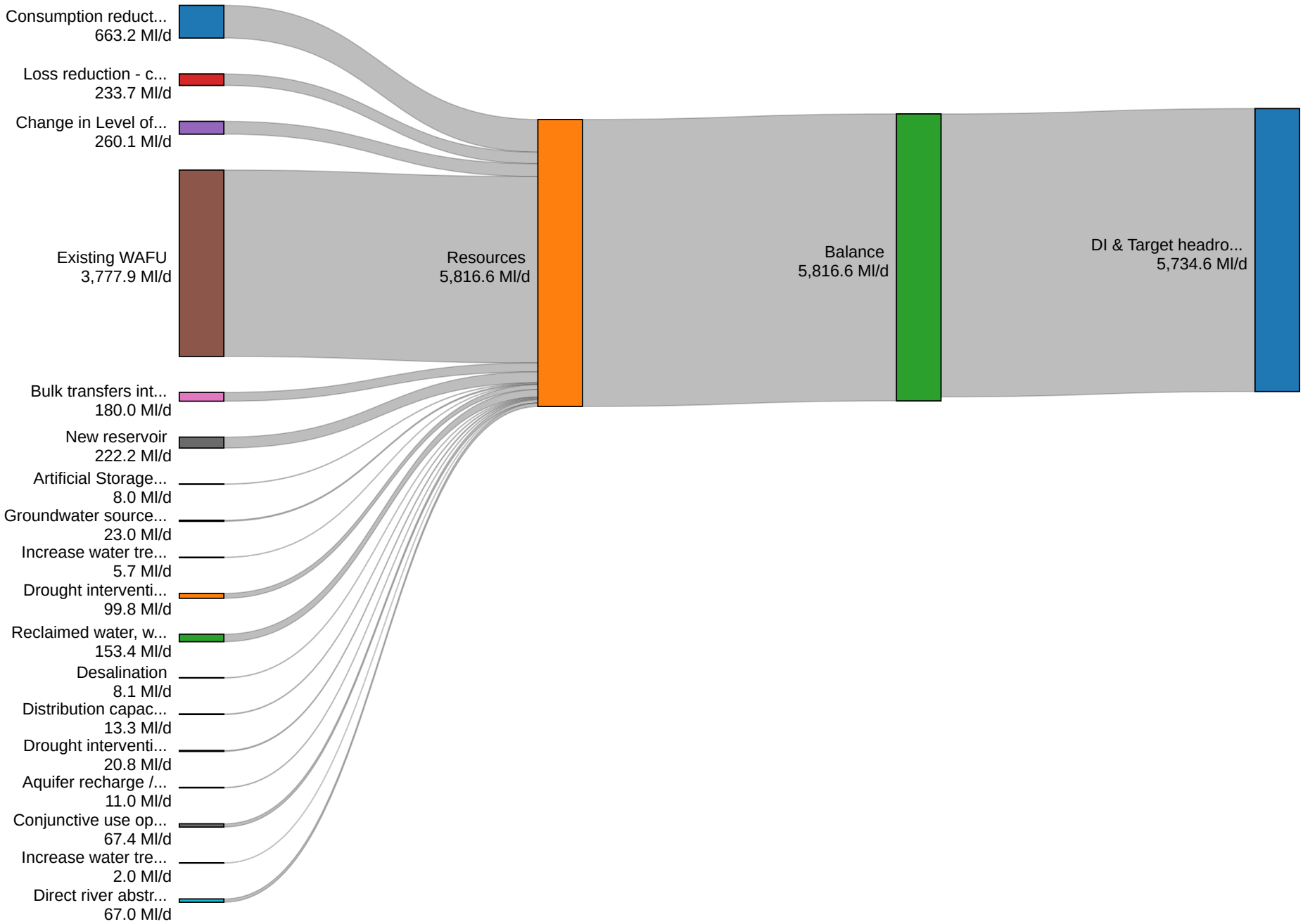
- Other

Situation 4 - 2026 (Thames Water)



Situation 4 - 2040 (Thames Water)



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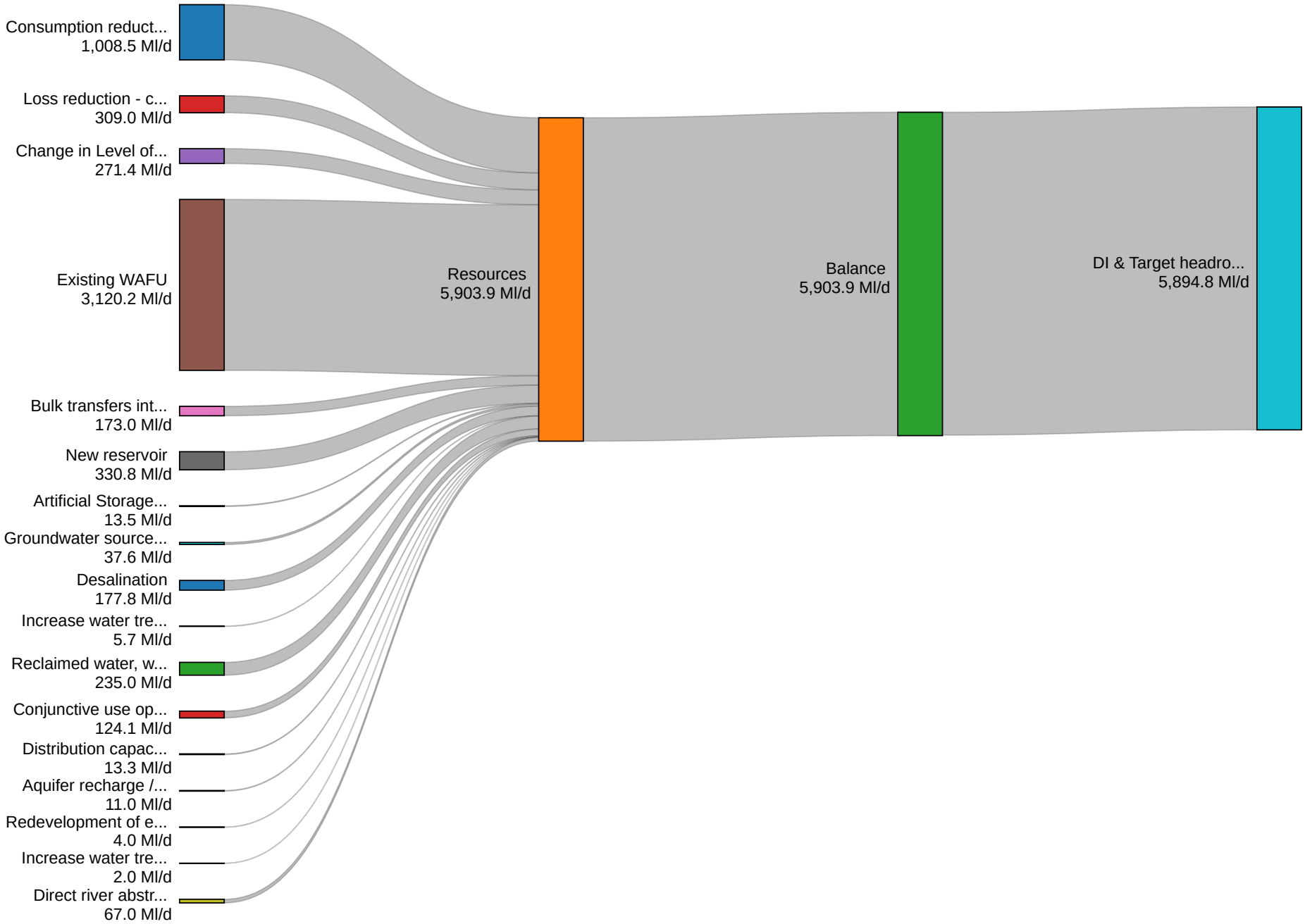
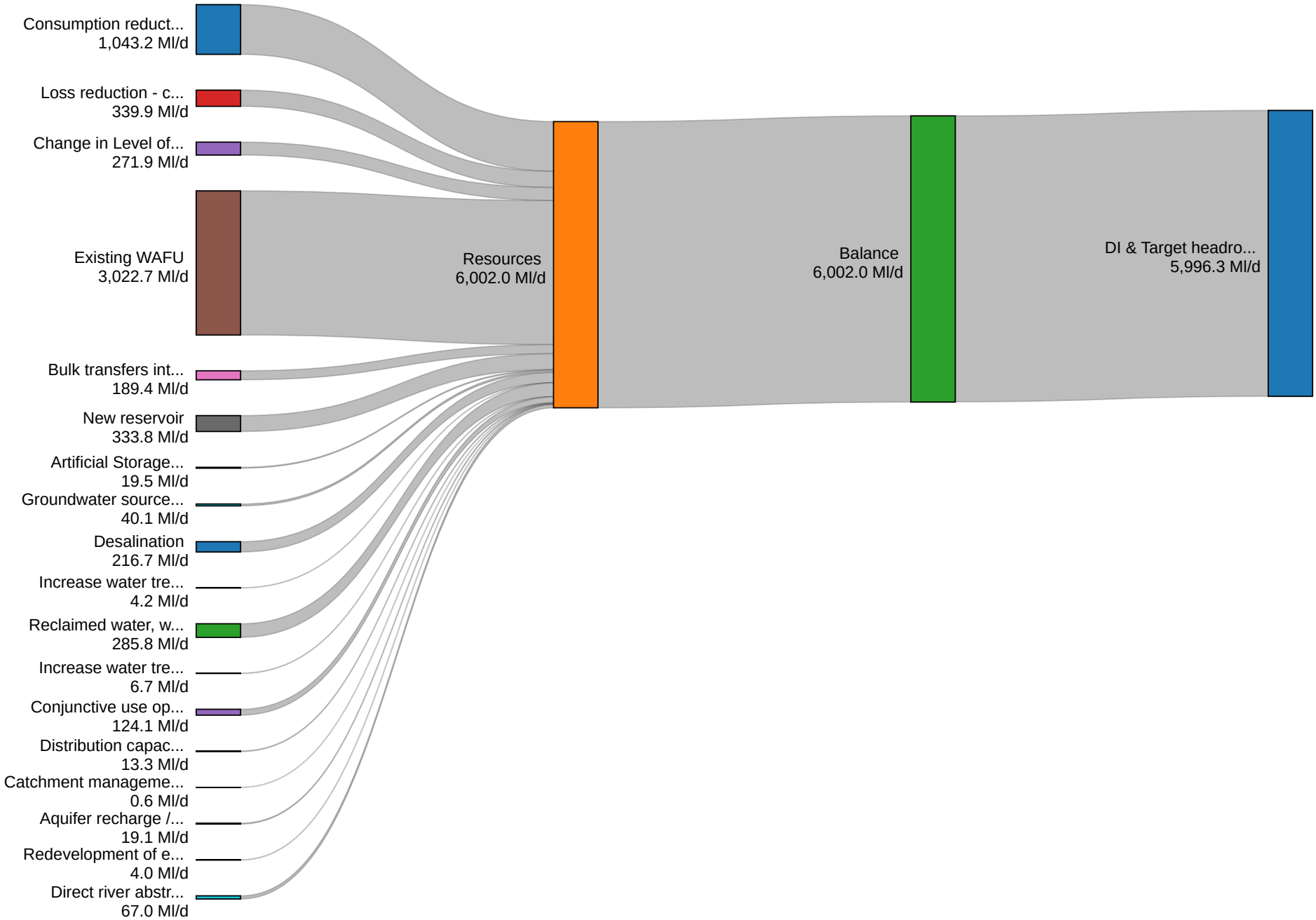
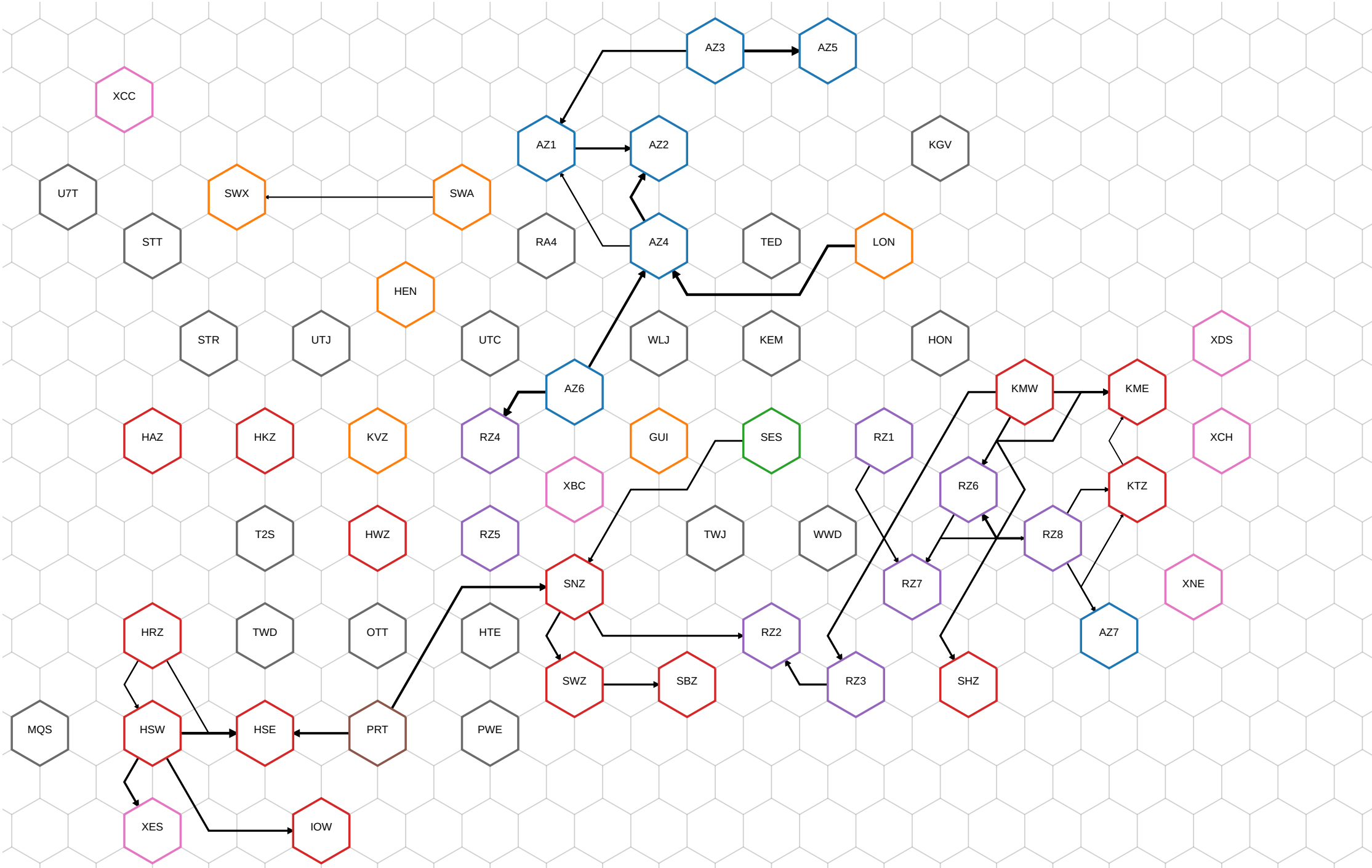


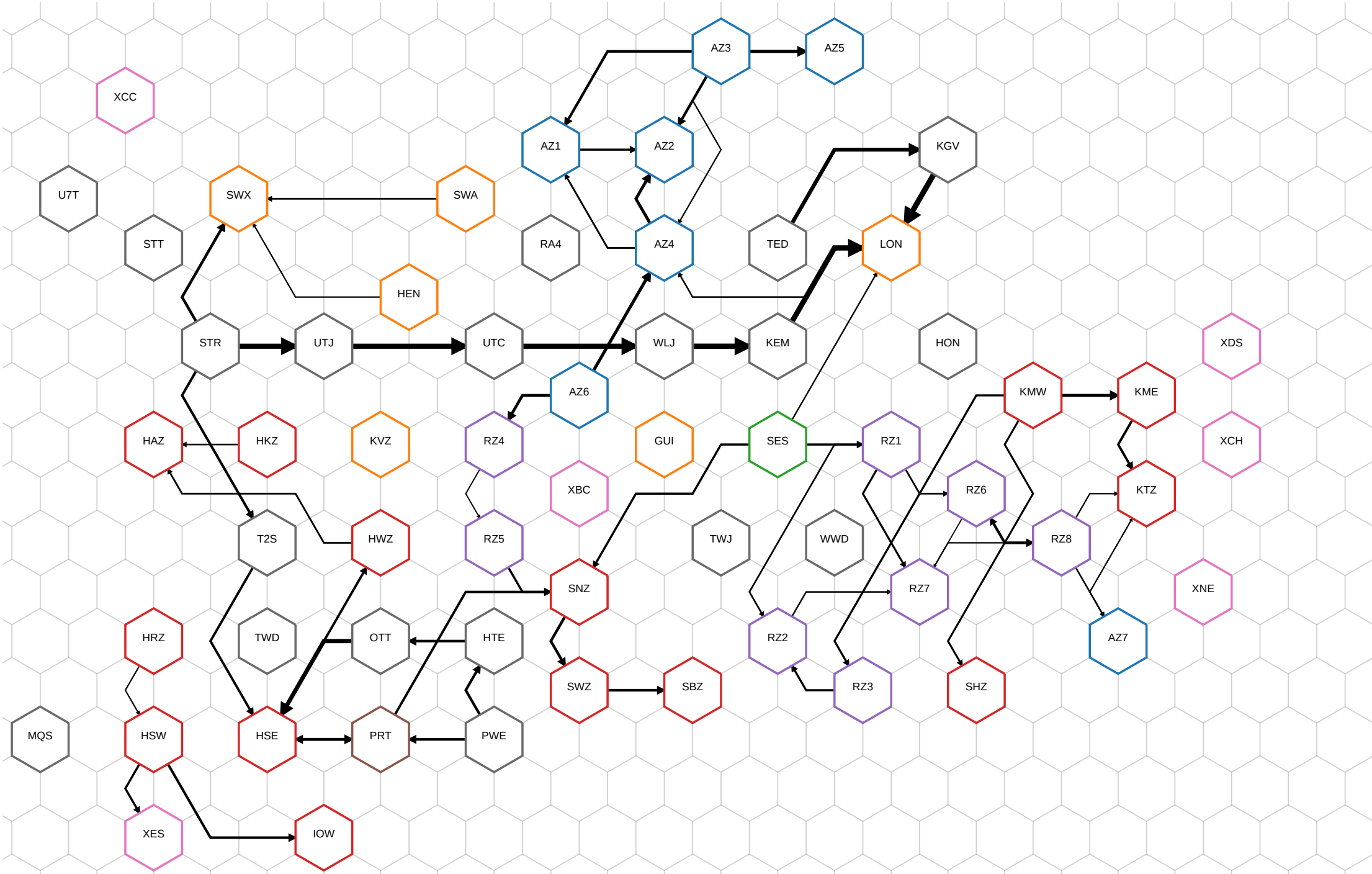
Situation 4 - 2075 (Thames Water)



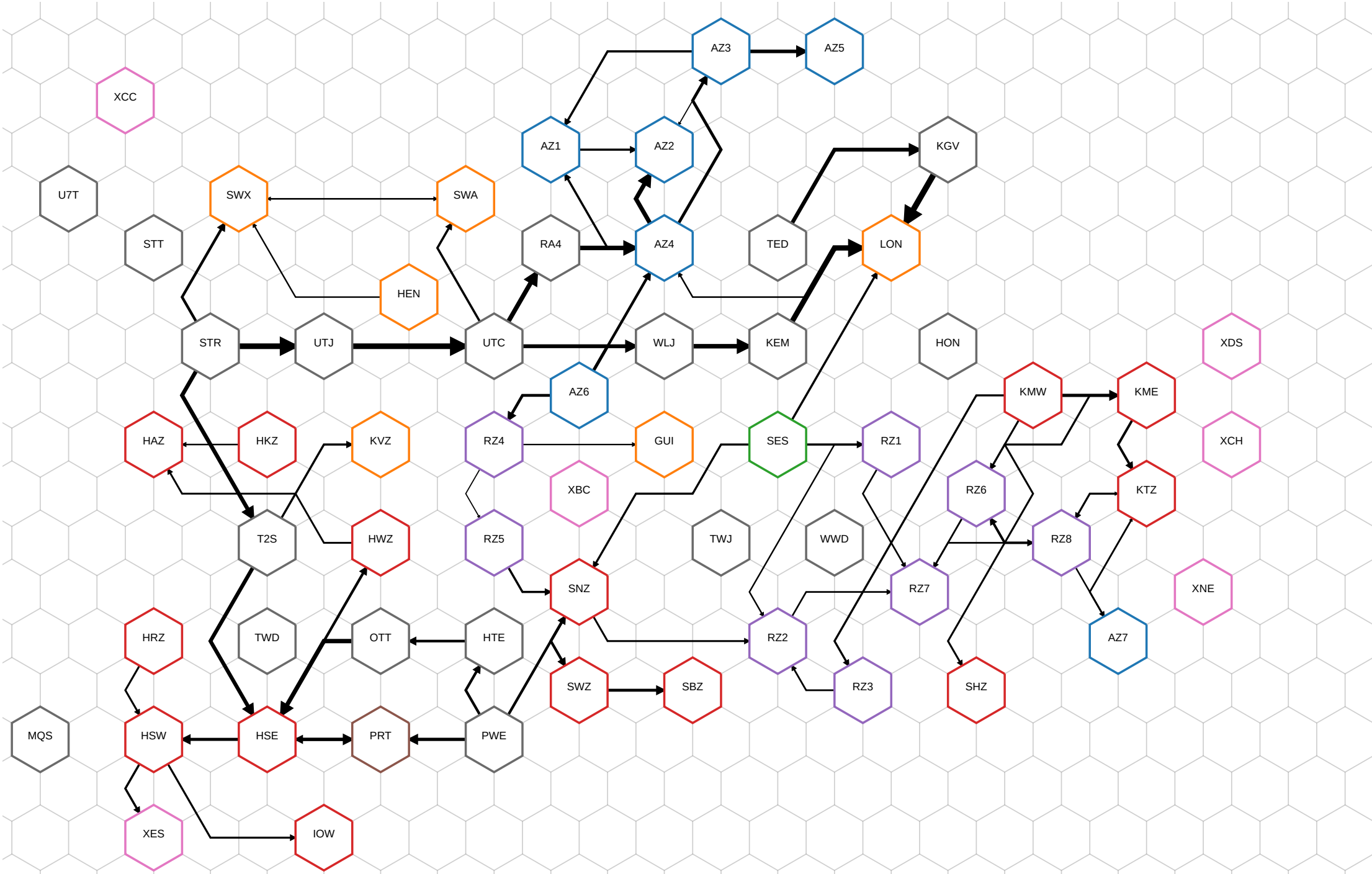
Situation 4 - 2026



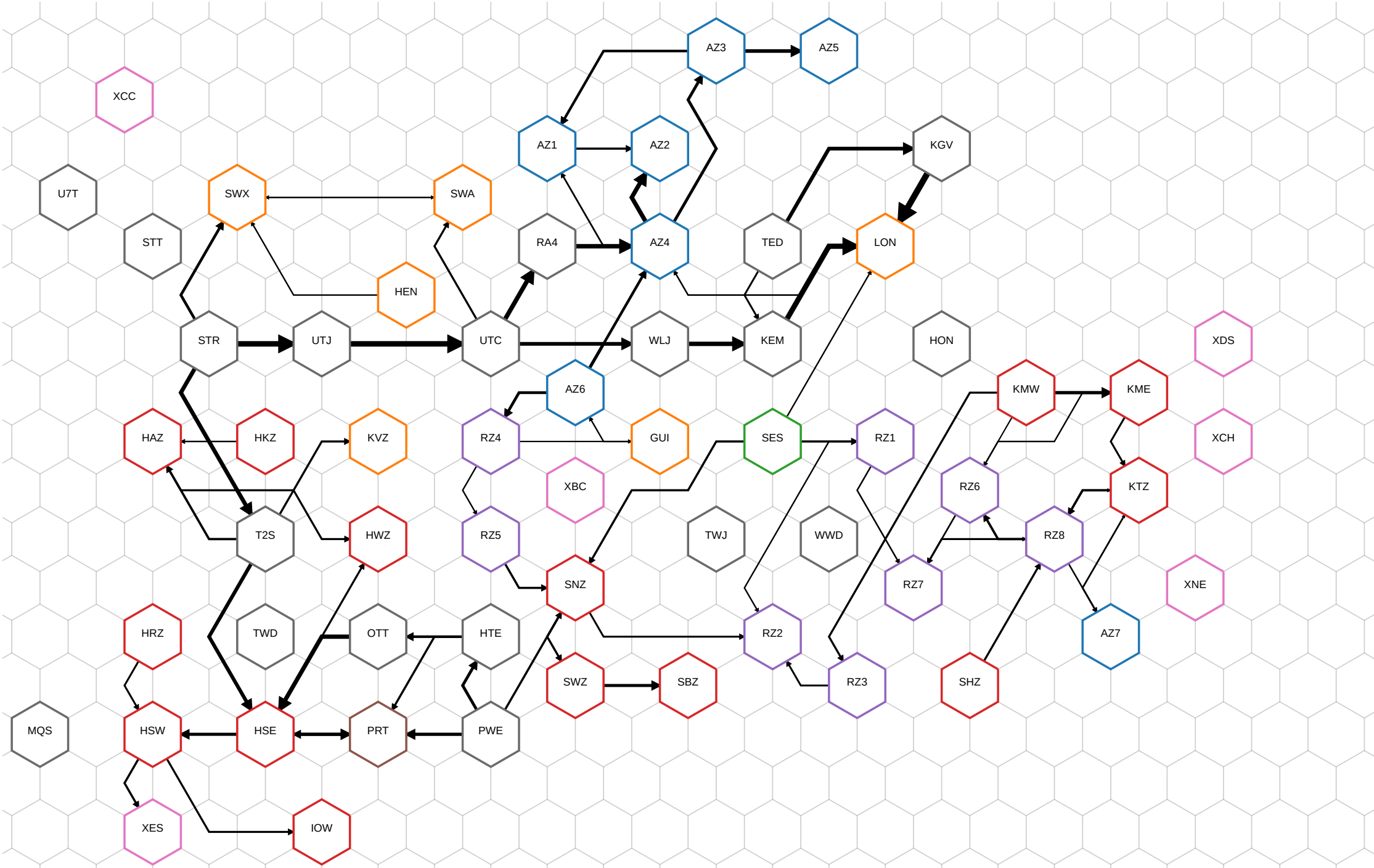
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

LOWER THAMES REDUCTIONS (MITIGATED BY TUNNEL)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ltrisks-rts-v4-2075
Description	Least cost run with hybrid-c+2 government interventions including baseline DO allowance for Lower Thames Risks (150 Ml/d from 2026) and River Thames Scheme (86 Ml/d from 2030) in LON. Includes emergency options to eliminate the deficits caused by these reductions until 2034 (including delaying 1in200 resilence). Includes Lower Thames tunnel option as an additional dependency for Teddington DRA, Mogden Reuse and Beckton Reuse. Modifies this option to move it to LON and make it a resource option.
Created at	20/07/2023, 10:56:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ltrisks-rts-v4
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Includes DO reduction due to Lower Thames risks. Includes LON DO reduction of 80 Ml/d due to River Thames Scheme (RTS). Includes emergency options to eliminate the deficits caused by these reductions until 2034. Includes Lower Thames tunnel option as an additional dependency for Teddington DRA, Mogden Reuse and Beckton Reuse. Modifies this option to move it to LON and make it a resource option.
Optimised discount rate	STPR

Metrics

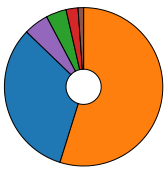
Net present value (Cost)

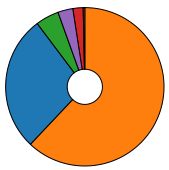
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,899	18,183	17,503	19,562	18,120	17,324	17,963	17,095	16,380	18,114	(£m)
Cost w/o deficit (STPR)	20,899	18,183	17,503	19,562	18,120	17,324	17,963	17,095	16,380	18,114	(£m)
Cost w/ deficit (IGEQ)	31,831	26,659	25,424	29,245	26,556	25,142	26,491	24,861	23,569	26,642	(£m)
Cost w/o deficit (IGEQ)	31,831	26,659	25,424	29,245	26,556	25,142	26,491	24,861	23,569	26,642	(£m)
Cost w/ deficit (LTDR)	23,017	19,852	19,069	21,453	19,782	18,870	19,637	18,630	17,807	19,791	(£m)
Cost w/o deficit (LTDR)	23,017	19,852	19,069	21,453	19,782	18,870	19,637	18,630	17,807	19,791	(£m)

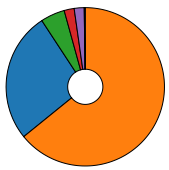
Cost breakdown (STPR)

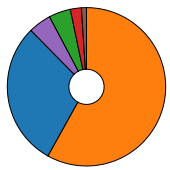
Select Company: Total

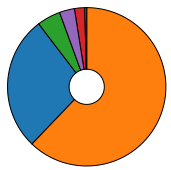
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,767	5,039	4,656	5,778	4,981	4,491	4,708	4,249	3,818	4,943	(£m)
Fixed opex	11,457	11,279	11,230	11,362	11,261	11,200	11,256	11,201	11,142	11,265	(£m)
Fixed operational carbon	874	865	865	876	869	868	869	864	863	868	(£m)
Embedded carbon	509	384	358	442	380	346	357	315	291	376	(£m)
Variable opex	1,056	556	356	905	556	359	670	420	250	570	(£m)
Variable carbon opex	236	60	37	199	73	60	102	46	15	92	(£m)

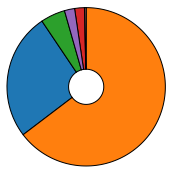
situation1 

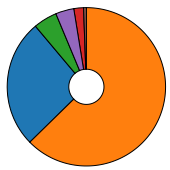
situation2 

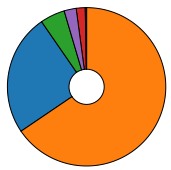
situation3 

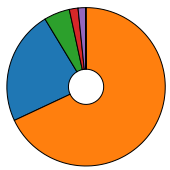
situation4 

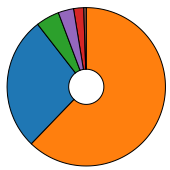
situation5 

situation6 

situation7 

situation8 

situation9 

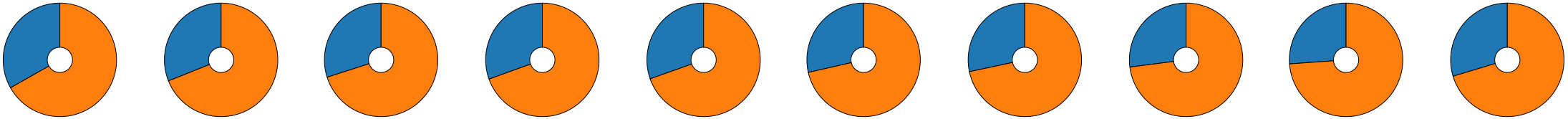
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,245,534	2,350,442	2,176,758	2,752,009	2,325,936	2,101,935	2,198,923	1,909,275	1,749,837	2,312,294	(tonnes)
Operational emissions	6,529,230	5,218,021	5,091,569	6,267,565	5,317,858	5,259,912	5,558,361	5,154,662	4,944,076	5,482,362	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

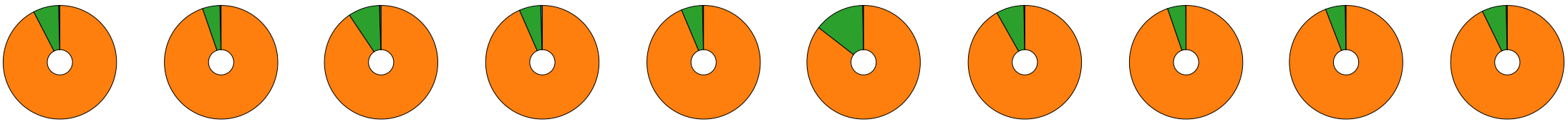


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	91	42	24	99	38	13	41	9	7	40	(GWh)
Grid	22,505	11,489	4,640	19,207	11,036	3,914	13,029	7,904	2,771	10,722	(GWh)
Renewable	1,763	600	459	1,258	713	654	1,121	433	165	796	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,121	63,469	62,581	66,509	63,345	62,179	63,721	61,364	60,428	63,524
SEA environmental disbenefit	110,738	79,943	72,571	96,452	78,903	71,946	81,695	68,063	59,411	79,969
Natural capital	83,838,009	79,112,142	81,992,514	75,570,441	77,228,211	80,069,569	81,087,645	83,070,161	84,713,407	80,742,455
Bio-diversity net gain	−195,368	−147,638	−114,803	−196,740	−149,853	−120,934	−118,669	−91,565	−62,946	−133,168

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,871	31,904	31,475	33,058	31,848	31,352	31,688	30,762	30,289	31,805

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	25.42	26.25	28.40	25.95	26.97	29.15	26.32	29.11	32.21	27.75
R1: Uncertainty of option supply/demand benefit	5.06	4.79	5.16	5.11	4.94	5.30	4.97	5.39	5.92	5.18
R3: Risk of service failure due to other physical hazards	5.96	6.36	7.03	6.23	6.58	7.25	6.40	7.27	8.24	6.81
R4: Availability of additional headroom	6.28	6.61	6.82	6.37	6.66	6.87	6.74	7.10	7.34	6.75
R5: Catchment/raw water quality risks (incl. climate change)	3.61	3.64	4.05	3.42	3.74	4.16	3.47	4.00	4.60	3.85
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.51	4.84	5.35	4.82	5.05	5.57	4.74	5.36	6.10	5.15
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

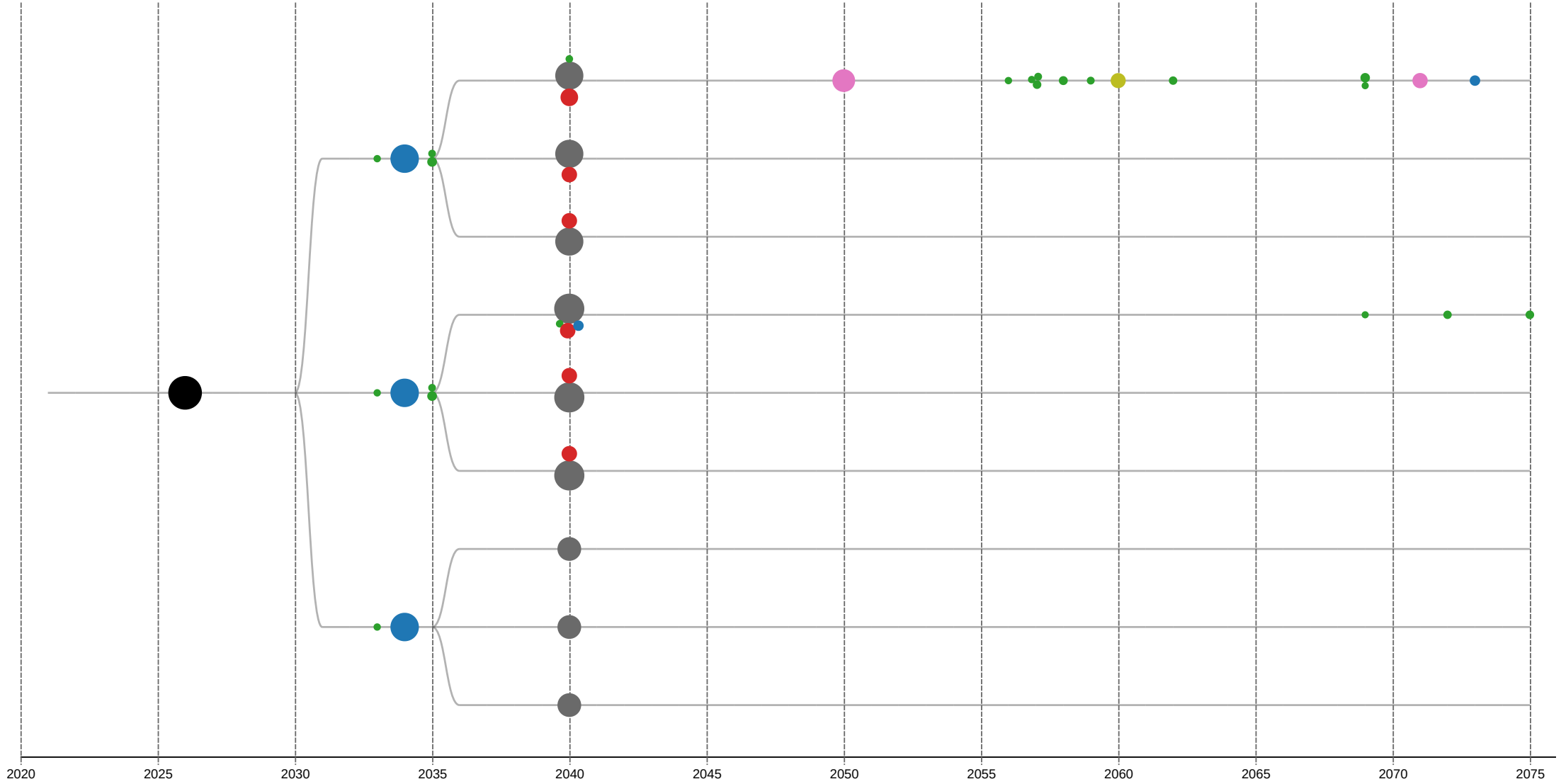
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	12.13	13.82	15.24	12.74	14.00	15.15	14.08	15.93	18.11	14.58
A3: Operational complexity and flexibility	5.57	6.16	6.83	5.98	6.39	7.09	6.22	7.13	8.16	6.61
A4: WRZ connectivity	6.54	7.64	8.38	6.73	7.59	8.03	7.84	8.76	9.93	7.94
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	16.81	17.86	19.44	17.08	18.08	19.62	18.80	21.38	24.11	19.24
E1: Scaleability and modularity of proposed changes	7.74	8.35	9.19	7.87	8.46	9.30	8.95	10.31	11.69	9.10
E2: Intervention lead times	3.67	3.73	3.91	3.63	3.76	3.88	3.72	4.08	4.49	3.87
E3: Reliance on external bodies to deliver changes	5.40	5.78	6.35	5.57	5.86	6.44	6.12	6.99	7.92	6.27
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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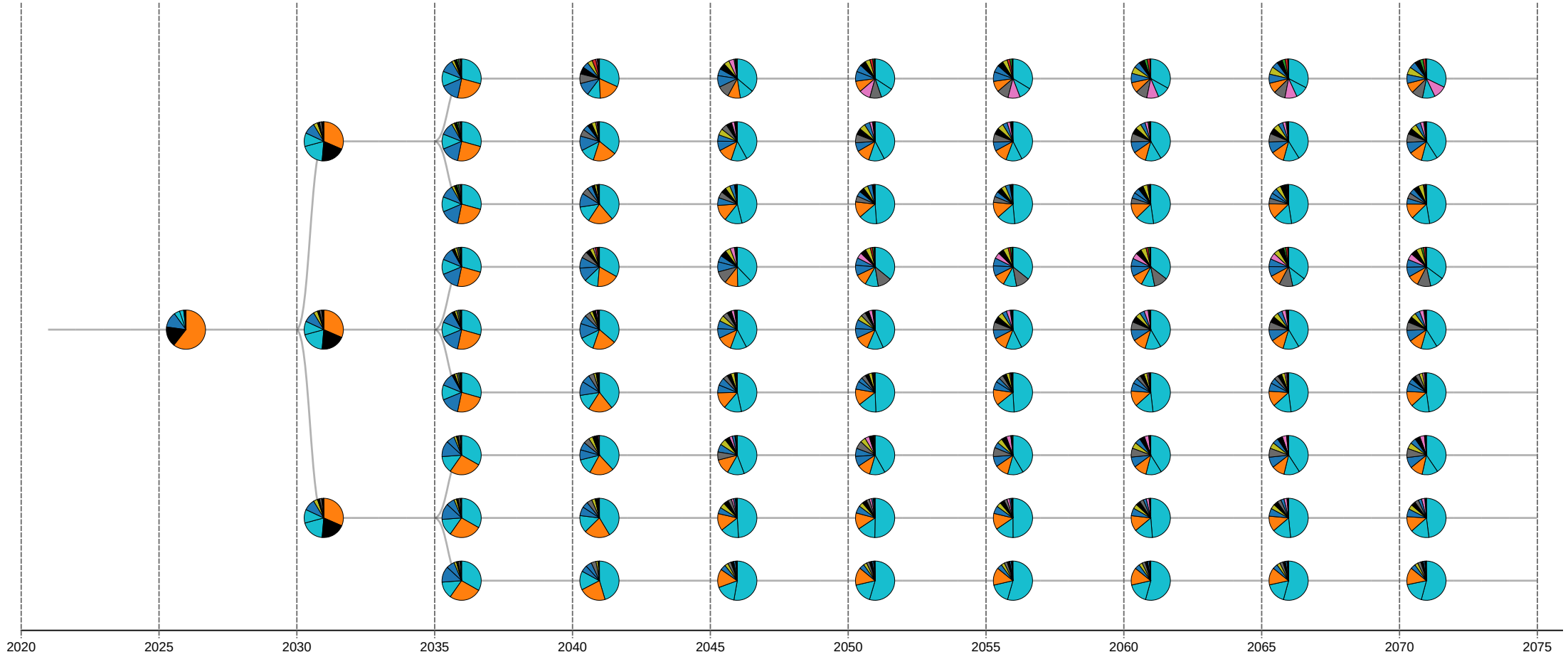
- Leakage reduction
- Other

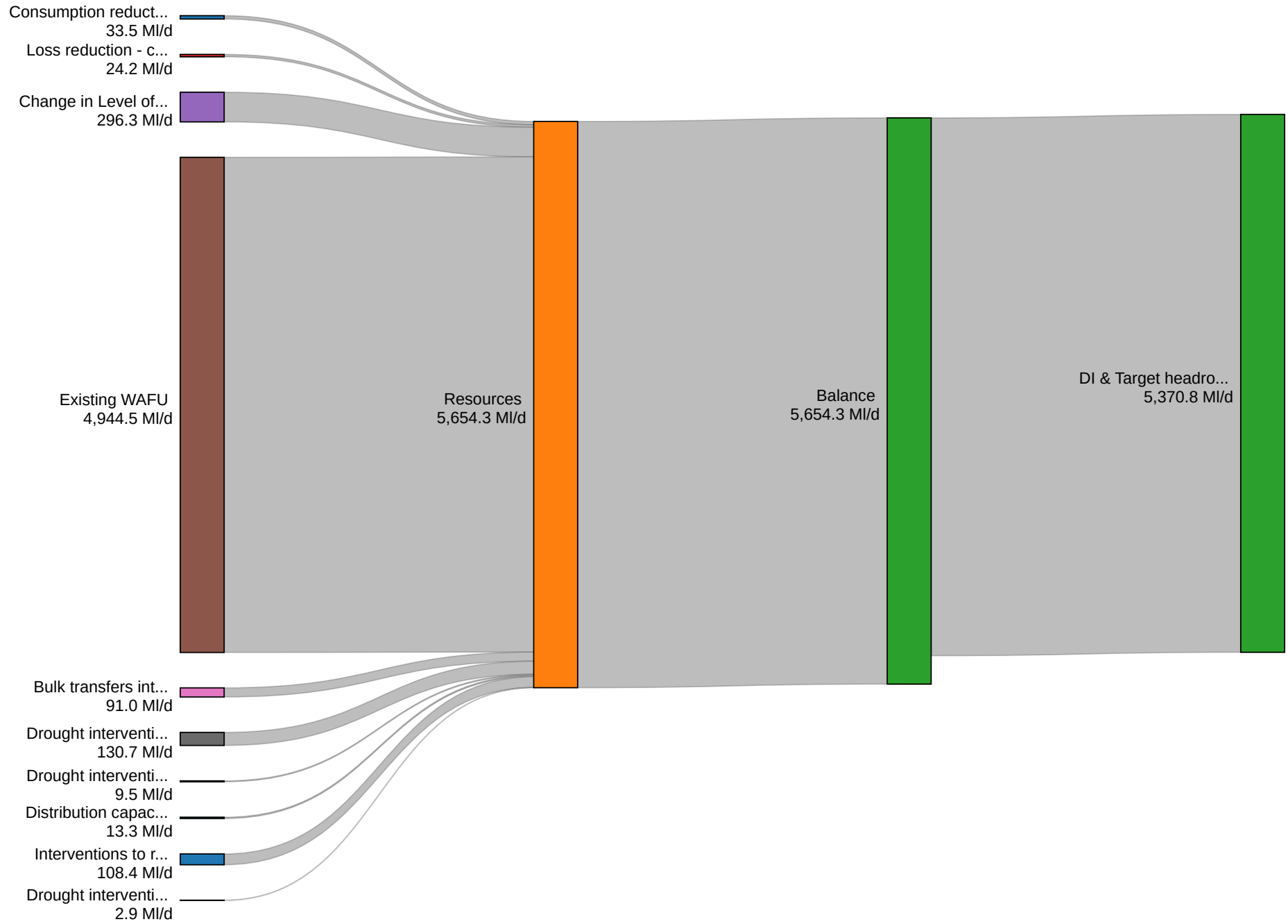
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

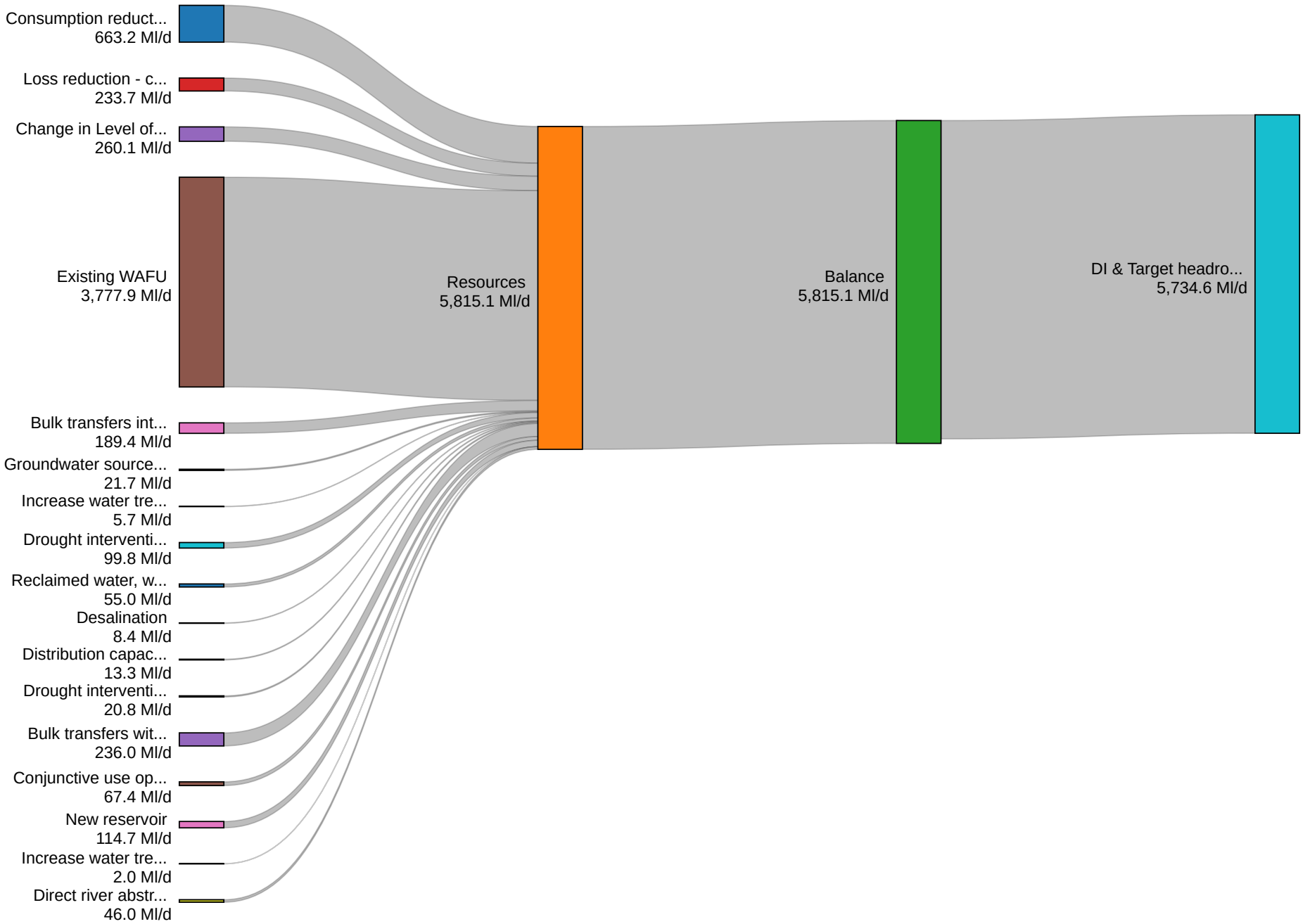


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

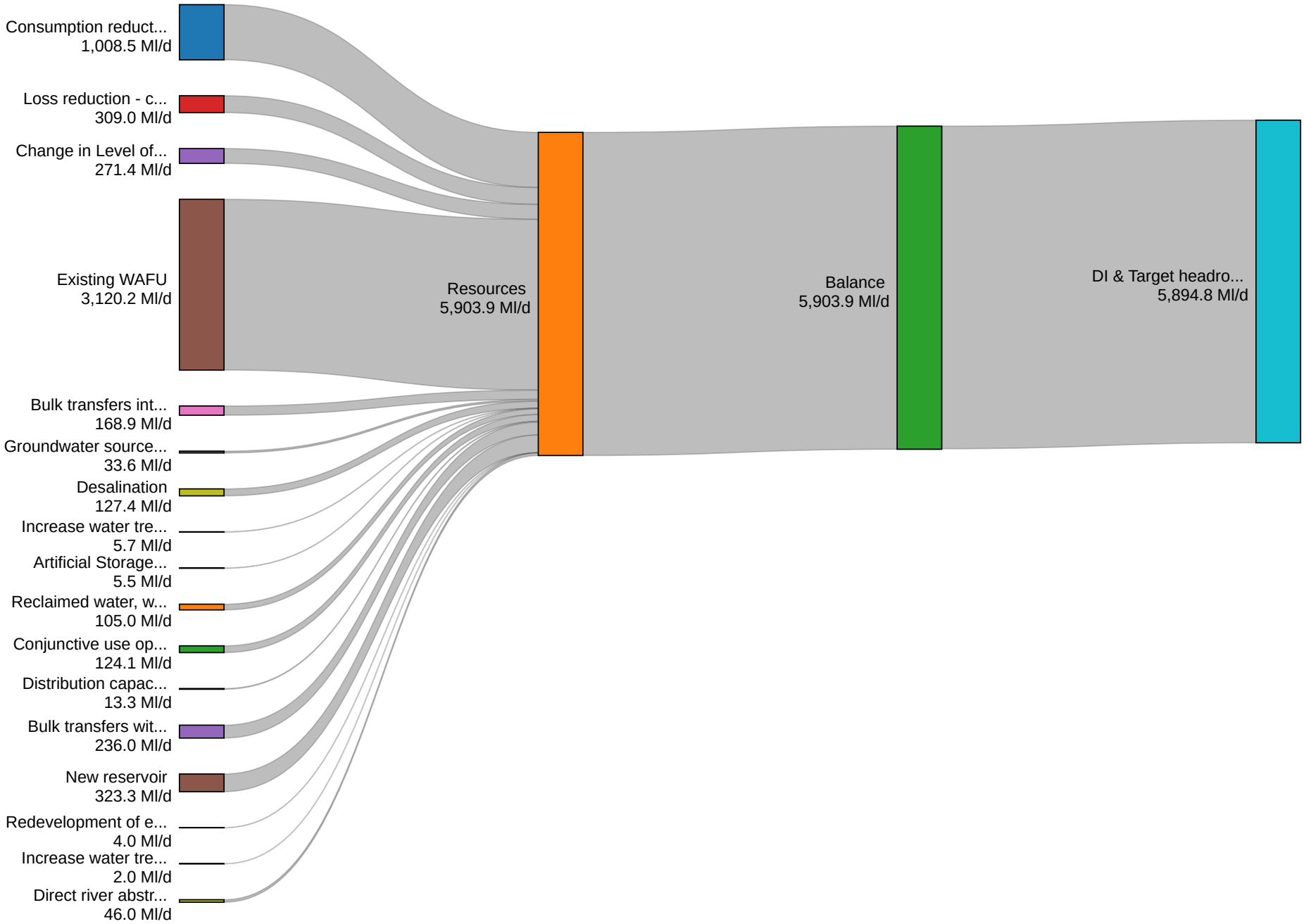
Situation 4 - 2026 (Thames Water)



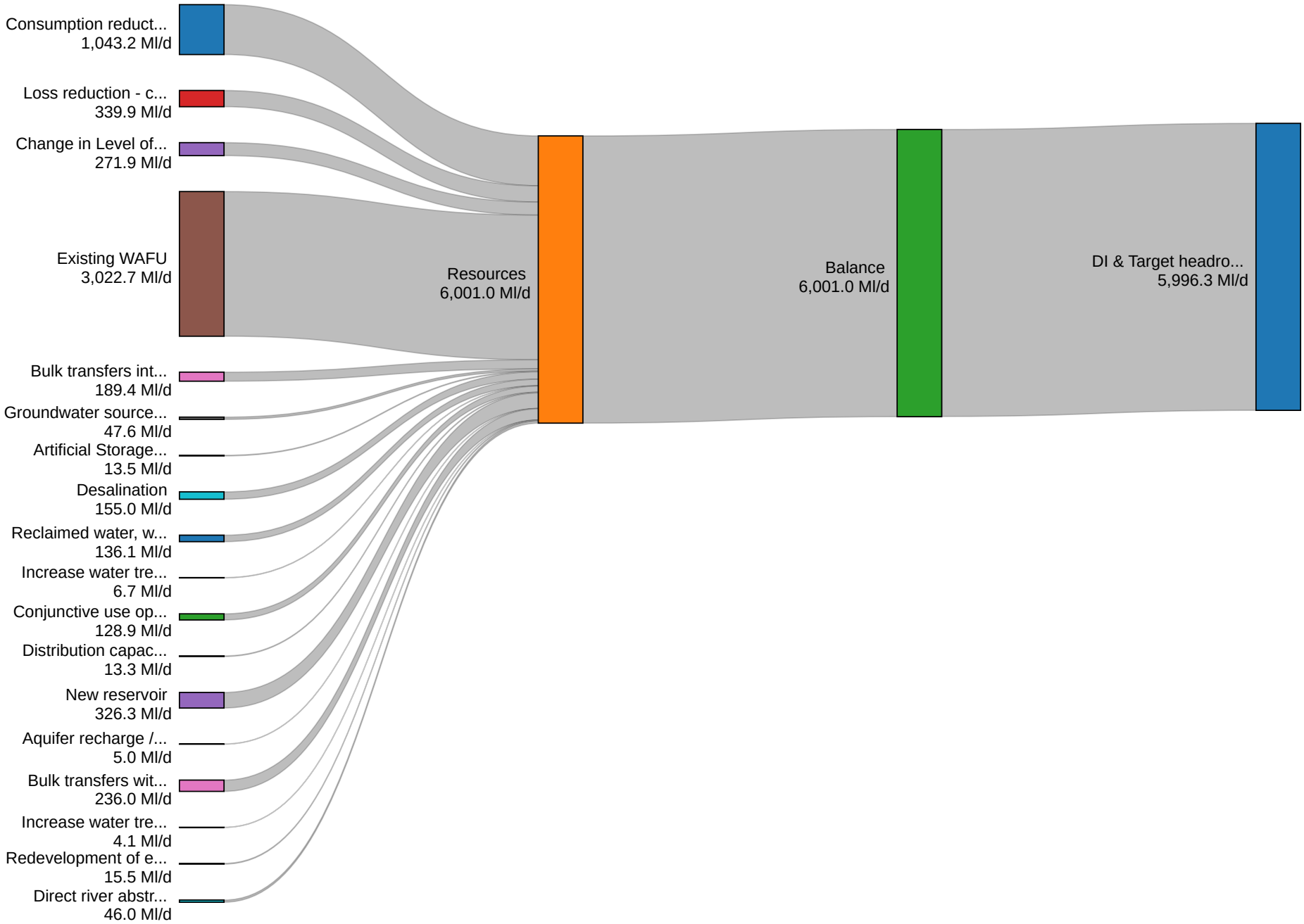
Situation 4 - 2040 (Thames Water)



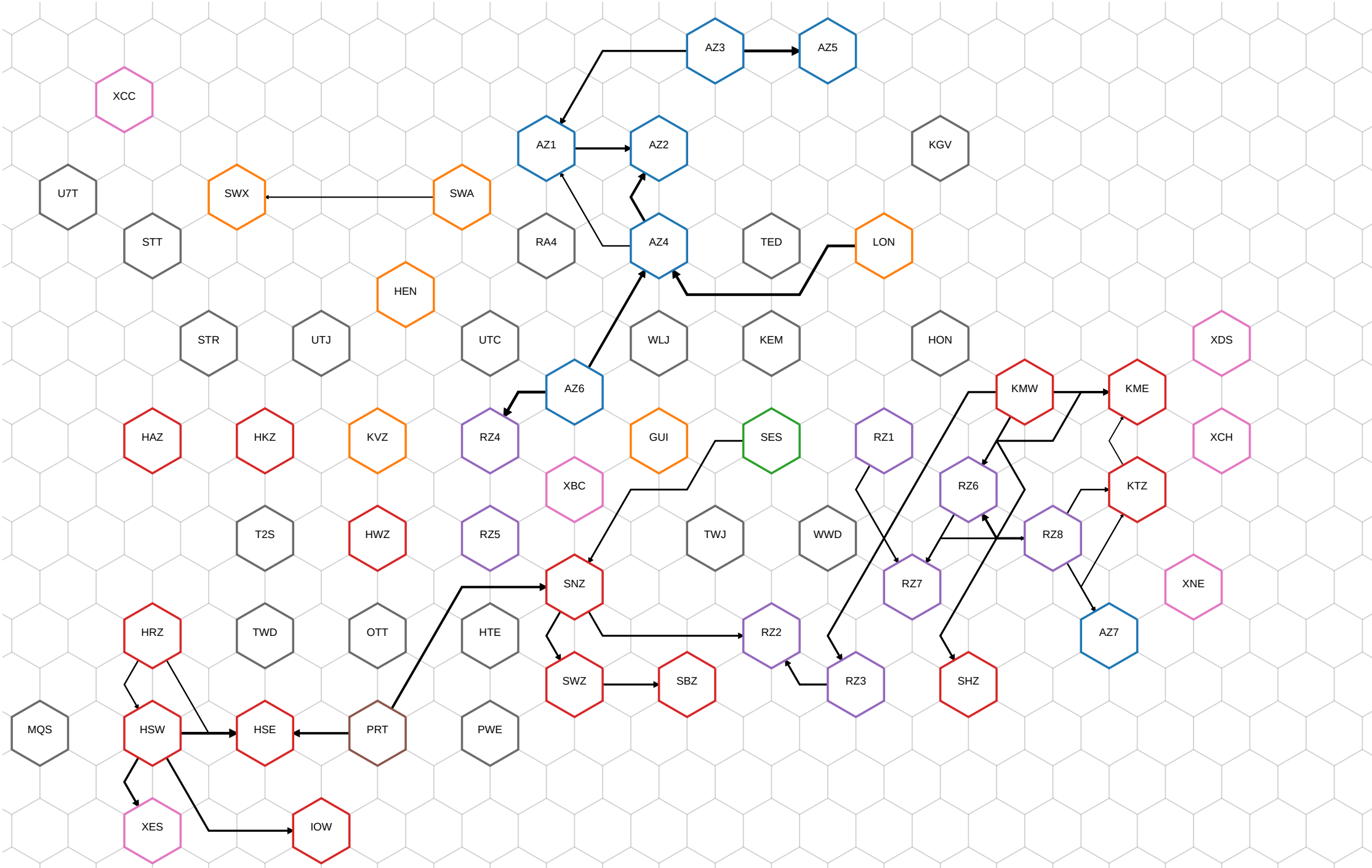
Situation 4 - 2050 (Thames Water)



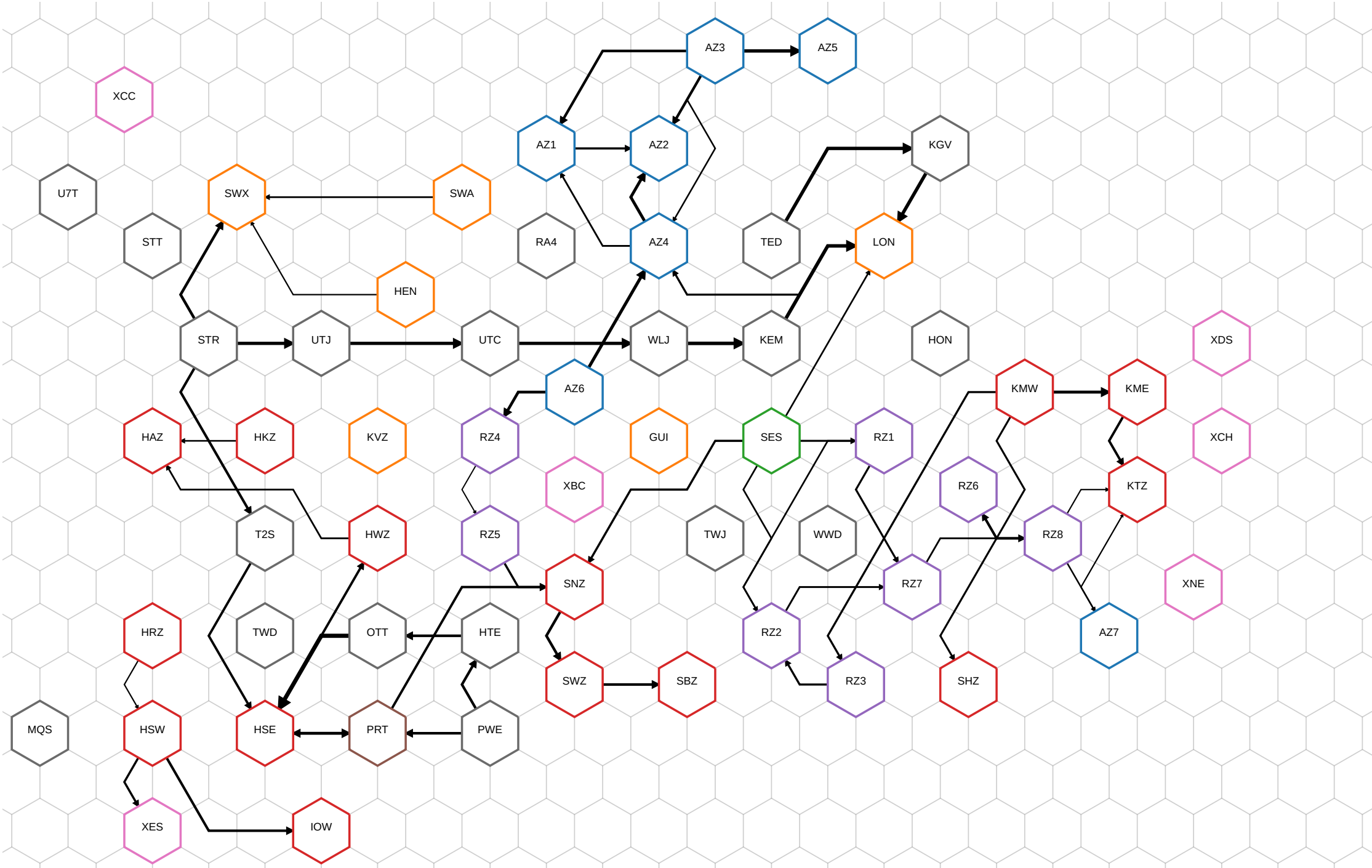
Situation 4 - 2075 (Thames Water)



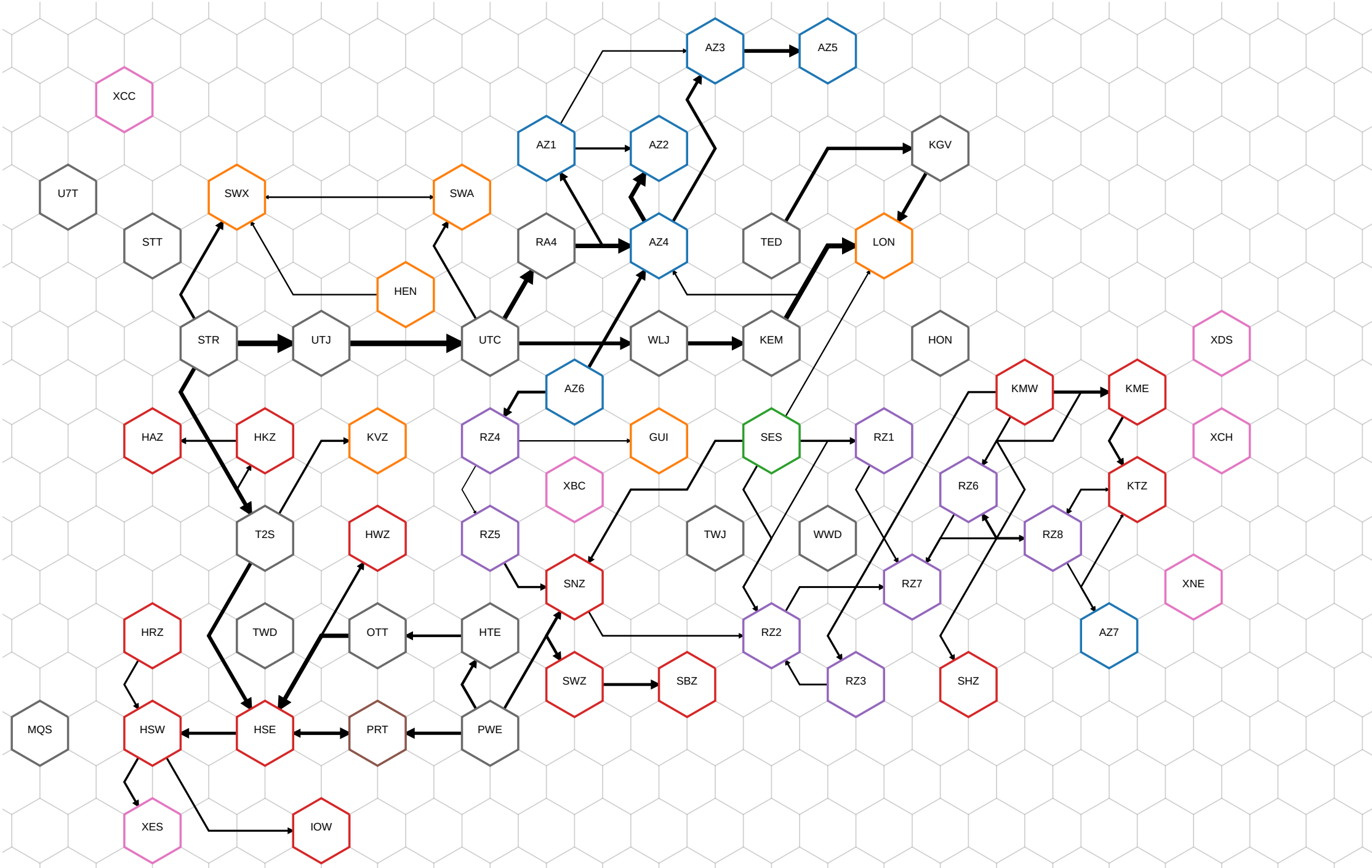
Situation 4 - 2026



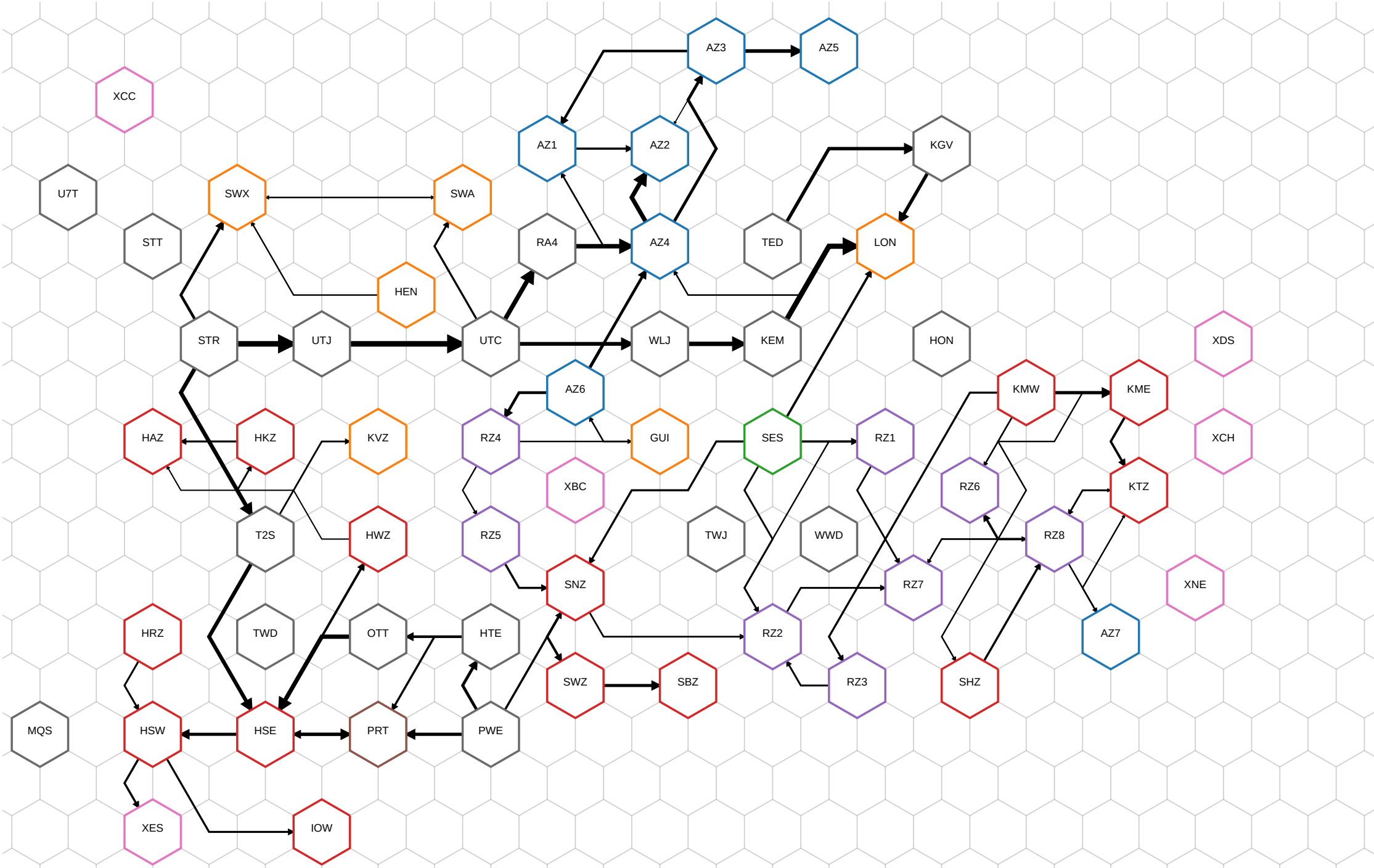
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

WBGWS WITHDRAWN IN 2040

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-wbgws-2040-2075
Description	Least cost run with hybrid-c+2 government interventions excluding WBGWS from 2040 onwards.
Created at	25/07/2023, 22:54:39
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-excl-wbgws-2040
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. WBGWs excluded from 2040.
Optimised discount rate	STPR

Metrics

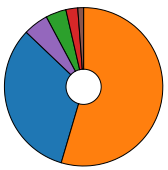
Net present value (Cost)

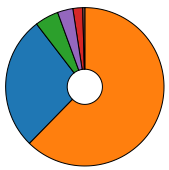
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,020	18,078	17,371	19,662	17,999	17,191	18,055	16,876	16,146	18,044	(£m)
Cost w/o deficit (STPR)	21,020	18,078	17,371	19,662	17,999	17,191	18,055	16,876	16,146	18,044	(£m)
Cost w/ deficit (IGEQ)	32,176	26,554	25,275	29,570	26,419	24,983	26,781	24,561	23,242	26,618	(£m)
Cost w/o deficit (IGEQ)	32,176	26,554	25,275	29,570	26,419	24,983	26,781	24,561	23,242	26,618	(£m)
Cost w/ deficit (LTDR)	23,177	19,747	18,934	21,593	19,658	18,732	19,765	18,394	17,555	19,728	(£m)
Cost w/o deficit (LTDR)	23,177	19,747	18,934	21,593	19,658	18,732	19,765	18,394	17,555	19,728	(£m)

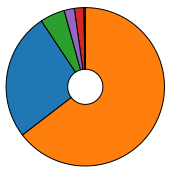
Cost breakdown (STPR)

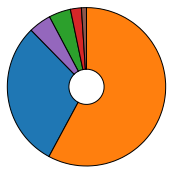
Select Company: Total

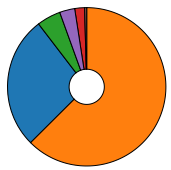
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,841	4,927	4,533	5,864	4,872	4,375	4,709	4,092	3,633	4,872	(£m)
Fixed opex	11,468	11,266	11,216	11,376	11,256	11,196	11,273	11,195	11,132	11,264	(£m)
Fixed operational carbon	884	876	878	882	877	877	871	867	865	875	(£m)
Embedded carbon	508	362	338	440	362	331	343	295	267	361	(£m)
Variable opex	1,070	568	359	899	556	355	671	387	231	566	(£m)
Variable carbon opex	248	78	48	202	76	57	188	40	18	106	(£m)

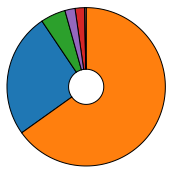
situation1 

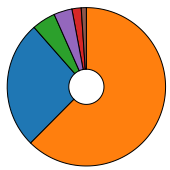
situation2 

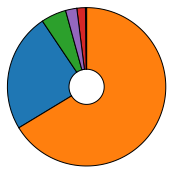
situation3 

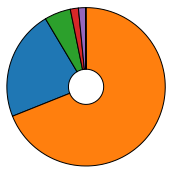
situation4 

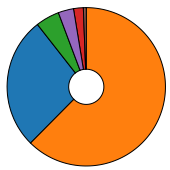
situation5 

situation6 

situation7 

situation8 

situation9 

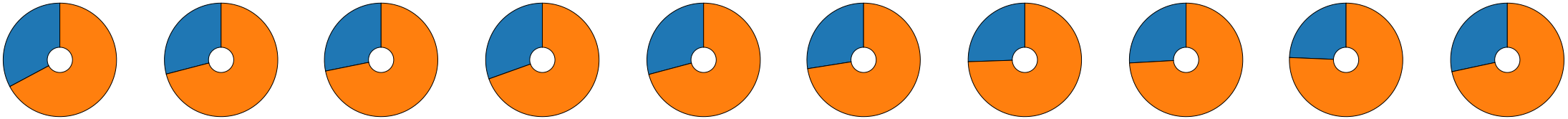
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,263,598	2,217,620	2,058,741	2,773,227	2,222,374	2,012,855	2,125,634	1,791,755	1,602,585	2,229,821	(tonnes)
Operational emissions	6,687,695	5,419,096	5,249,219	6,334,165	5,402,809	5,308,567	6,201,868	5,131,542	4,979,014	5,634,886	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

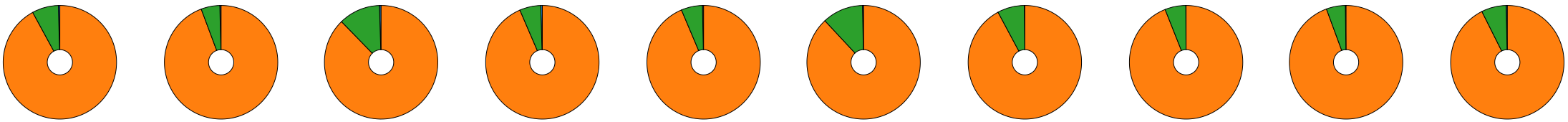


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	107	47	26	97	42	16	21	7	6	41	(GWh)
Grid	22,896	12,025	4,852	19,476	11,447	4,526	13,771	7,728	2,877	11,066	(GWh)
Renewable	1,870	681	655	1,253	739	598	1,150	489	165	844	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,598	64,725	63,941	68,219	64,534	63,223	64,461	62,039	60,235	64,553
SEA environmental disbenefit	114,249	80,141	73,217	103,141	79,208	72,972	85,143	68,948	59,023	81,782
Natural capital	81,682,504	77,201,582	80,055,888	79,750,859	77,244,737	80,053,771	64,464,312	65,102,224	68,004,078	74,839,995
Bio-diversity net gain	−222,630	−155,673	−125,254	−202,531	−154,293	−127,091	−133,365	−97,019	−67,447	−142,811

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,104	31,923	31,498	33,583	31,861	31,410	32,011	30,922	30,299	31,957

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.50	30.58	33.53	29.25	30.84	33.59	27.62	29.98	33.12	30.89
R1: Uncertainty of option supply/demand benefit	6.26	6.02	6.62	6.00	6.10	6.59	5.33	5.58	6.09	6.07
R3: Risk of service failure due to other physical hazards	7.08	7.61	8.52	7.13	7.69	8.54	6.72	7.49	8.49	7.70
R4: Availability of additional headroom	6.56	6.90	7.12	6.65	6.93	7.13	6.98	7.33	7.57	7.02
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.13	4.64	3.89	4.15	4.67	3.66	4.12	4.75	4.24
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.47	5.92	6.63	5.58	5.97	6.66	4.93	5.47	6.23	5.87
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

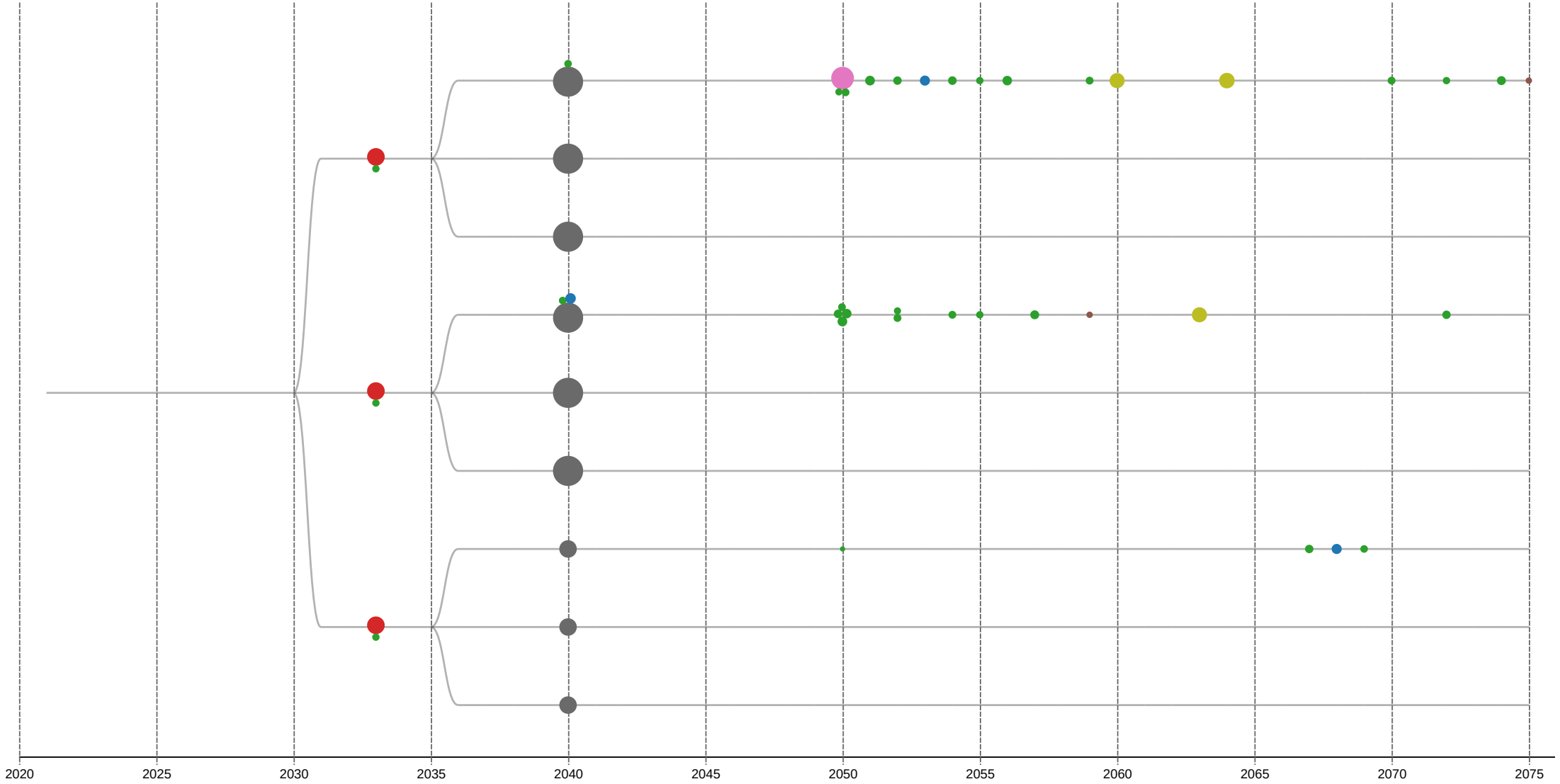
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.04	15.78	17.67	14.37	15.85	17.39	15.02	16.95	19.23	16.25
A3: Operational complexity and flexibility	6.61	7.33	8.24	6.80	7.40	8.30	6.39	7.20	8.24	7.39
A4: WRZ connectivity	7.39	8.43	9.41	7.53	8.42	9.07	8.59	9.71	10.96	8.83
A7: Customer relations support engagement with demand management	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.45	20.60	22.75	19.39	20.79	22.78	20.23	22.58	25.47	21.56
E1: Scaleability and modularity of proposed changes	8.90	9.59	10.71	8.91	9.71	10.76	9.58	10.85	12.30	10.15
E2: Intervention lead times	4.24	4.29	4.55	4.15	4.29	4.50	4.13	4.42	4.89	4.38
E3: Reliance on external bodies to deliver changes	6.31	6.71	7.49	6.32	6.79	7.51	6.52	7.31	8.28	7.03
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

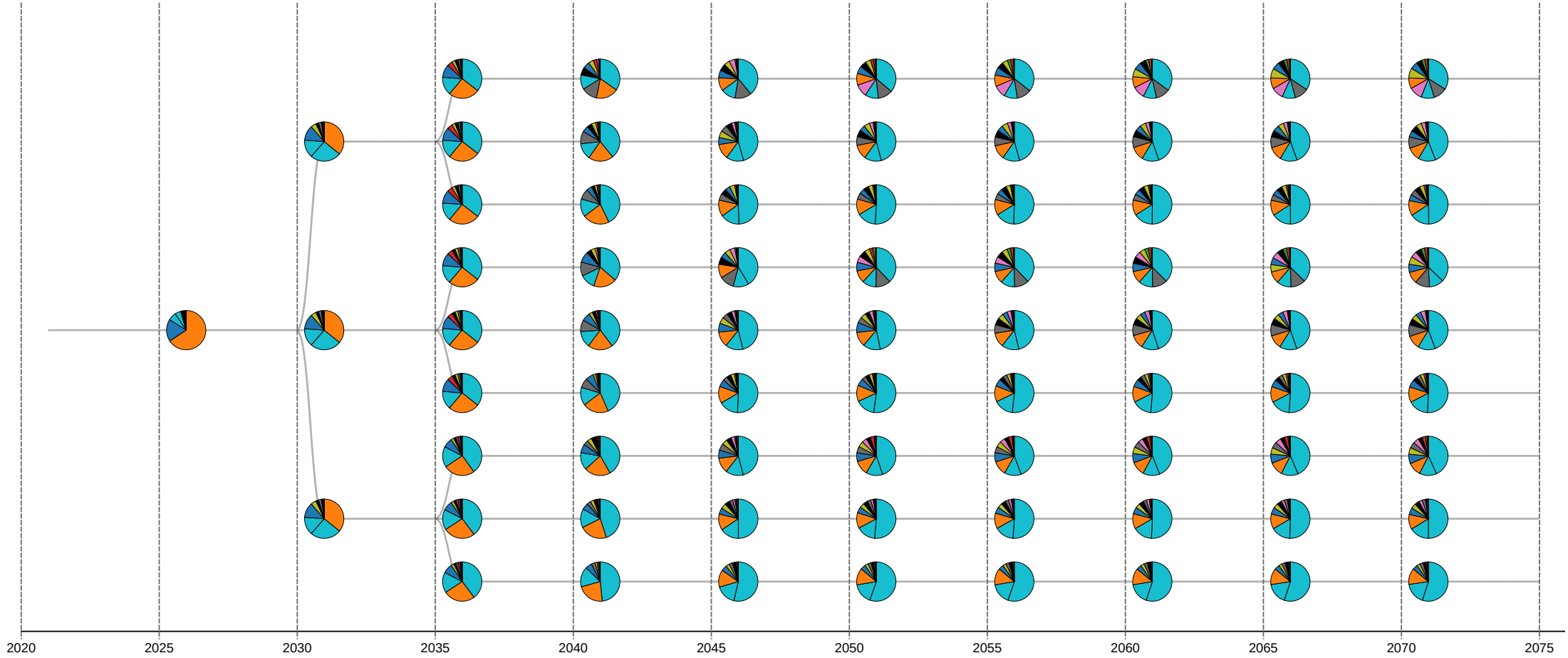
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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- Drought intervention
- Groundwater
- Direct river abstraction
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- Catchment management
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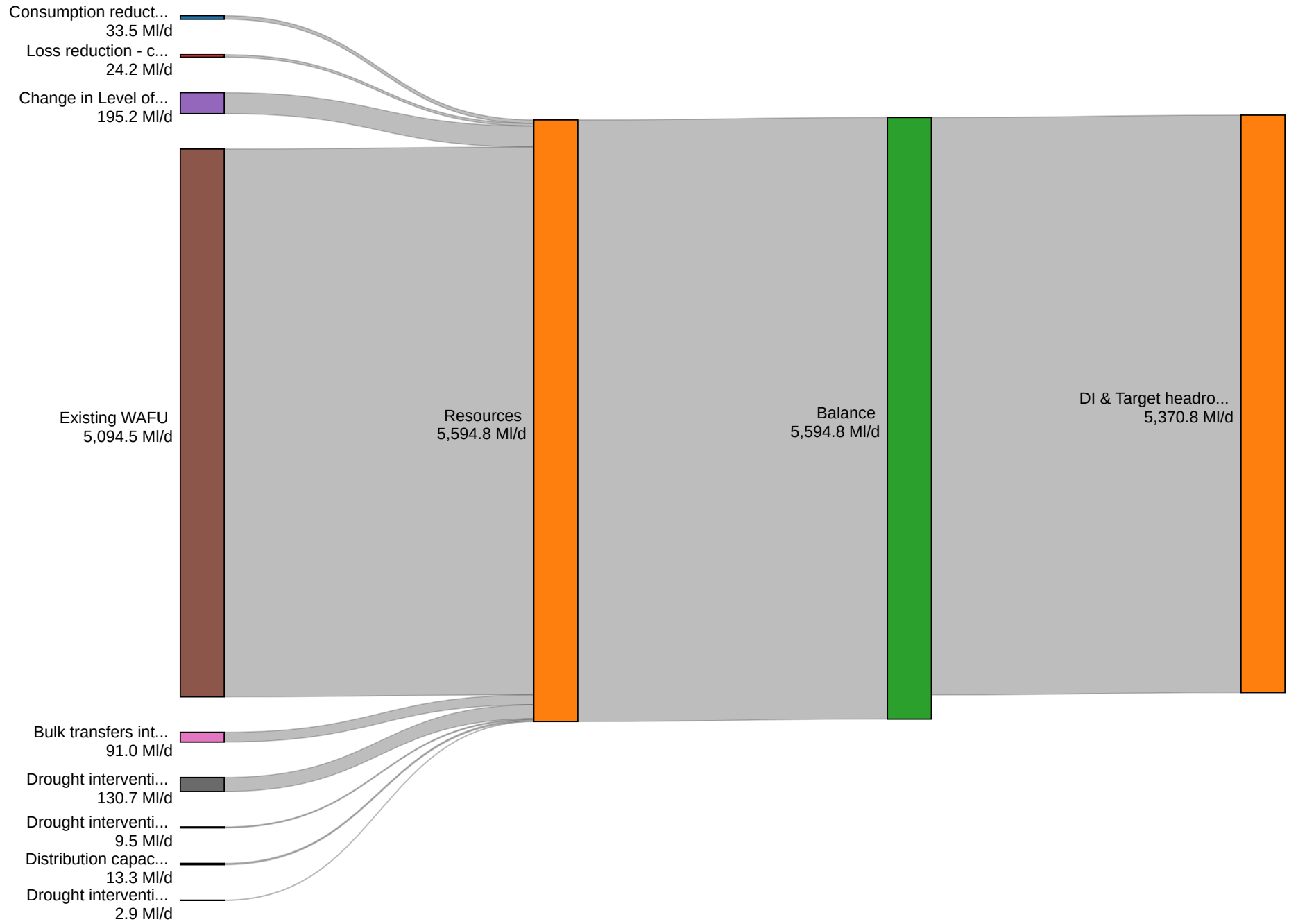
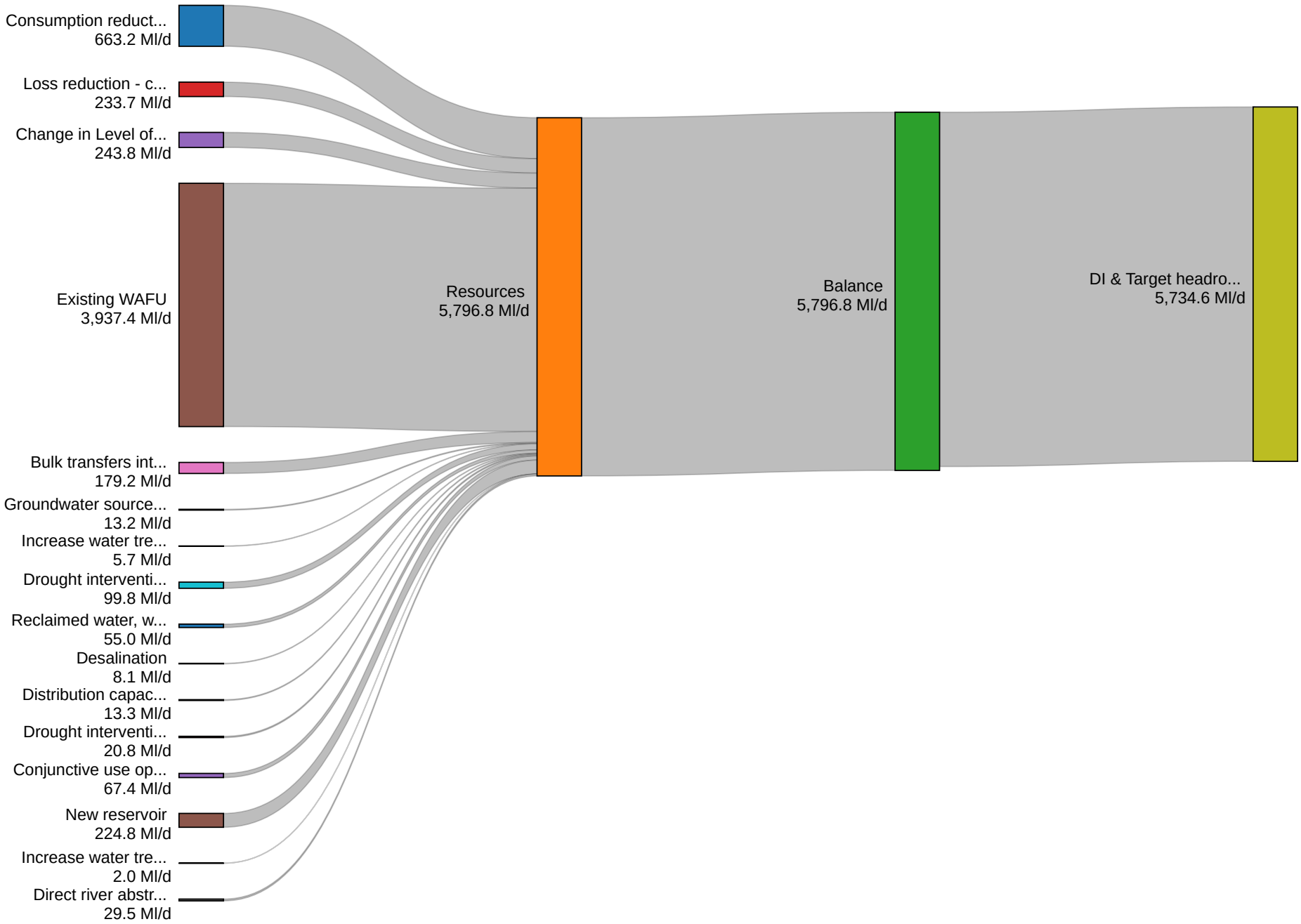
- Other

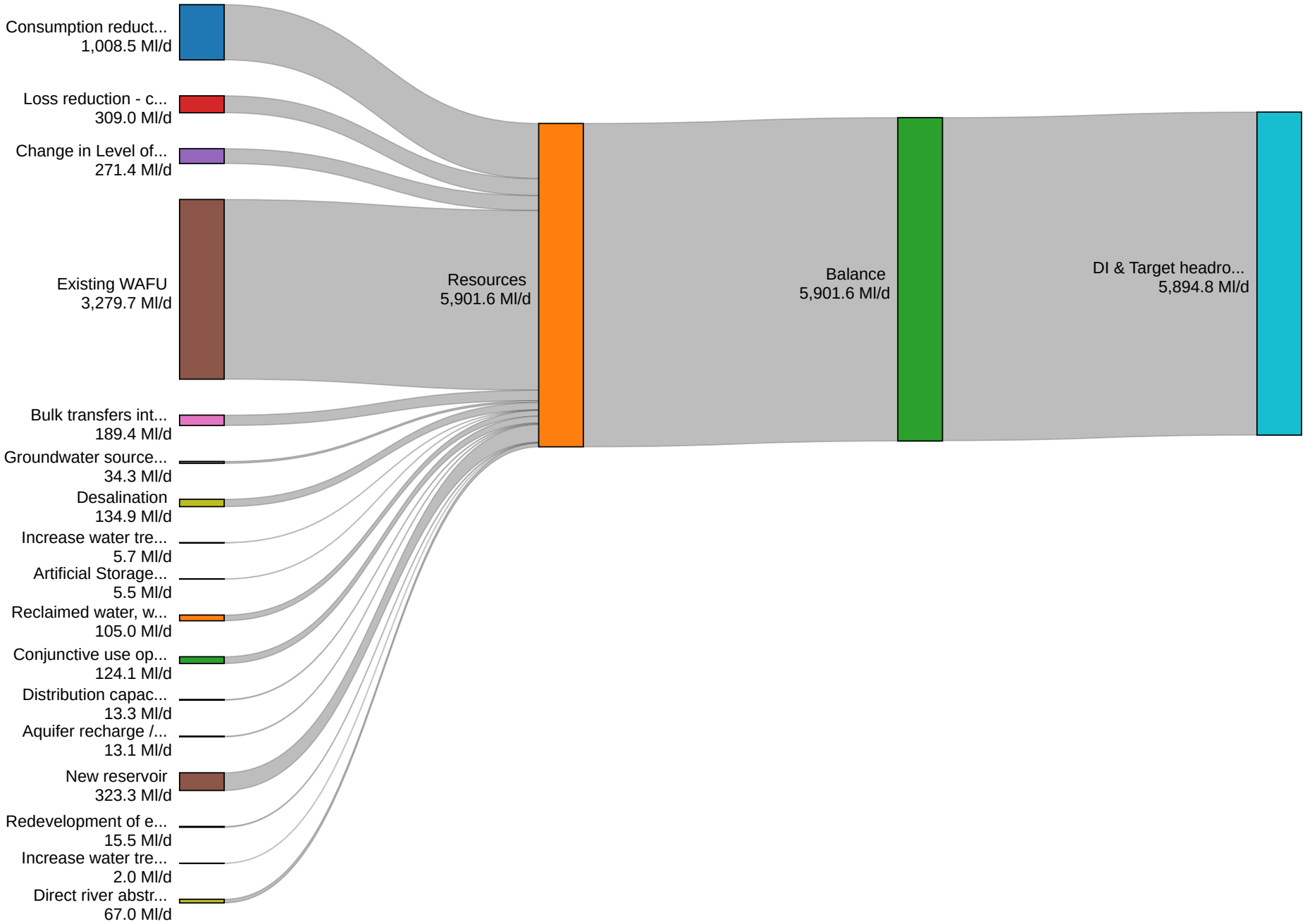
Situation 4 - 2026 (Thames Water)



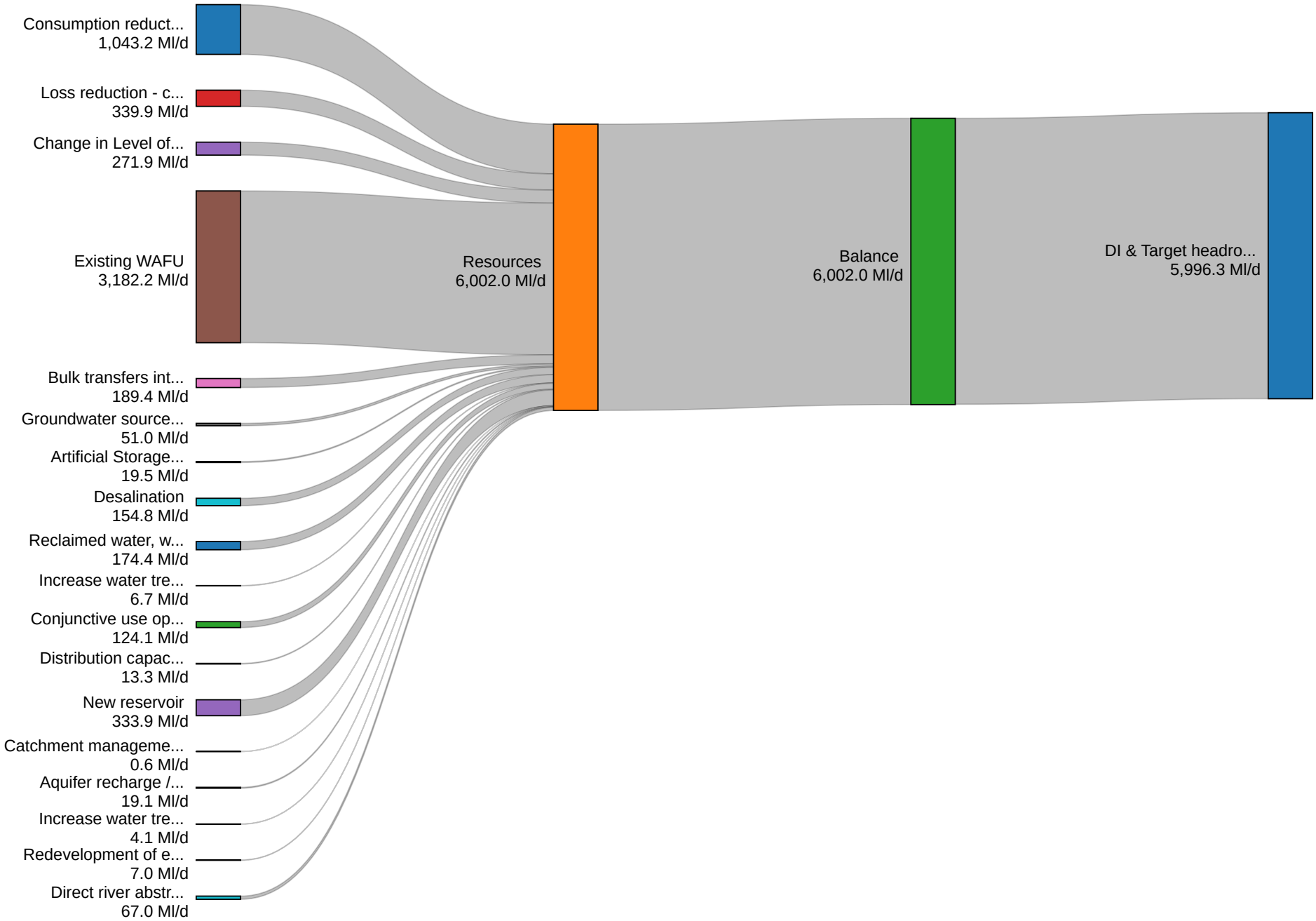
Situation 4 - 2040 (Thames Water)



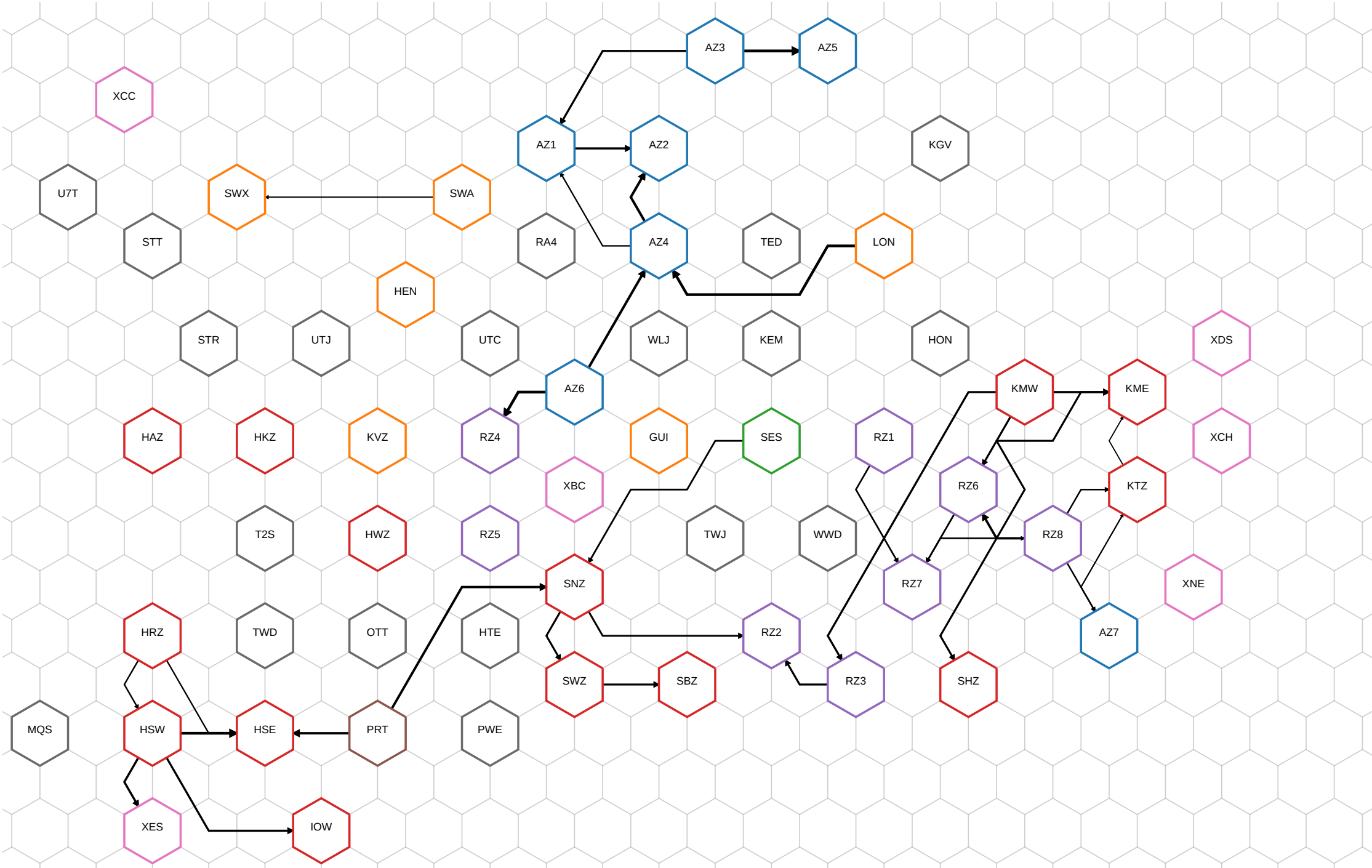
Situation 4 - 2050 (Thames Water)



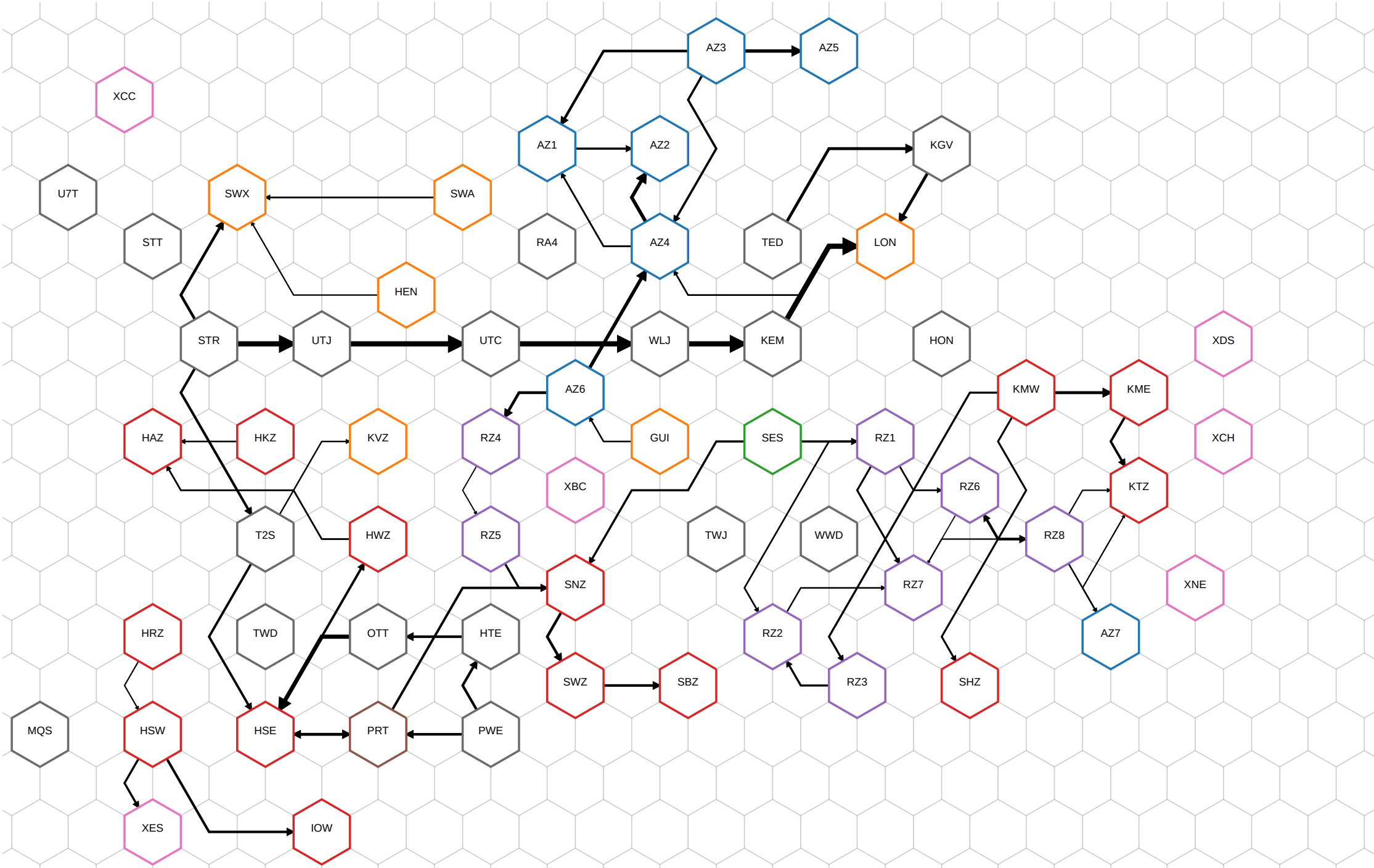
Situation 4 - 2075 (Thames Water)



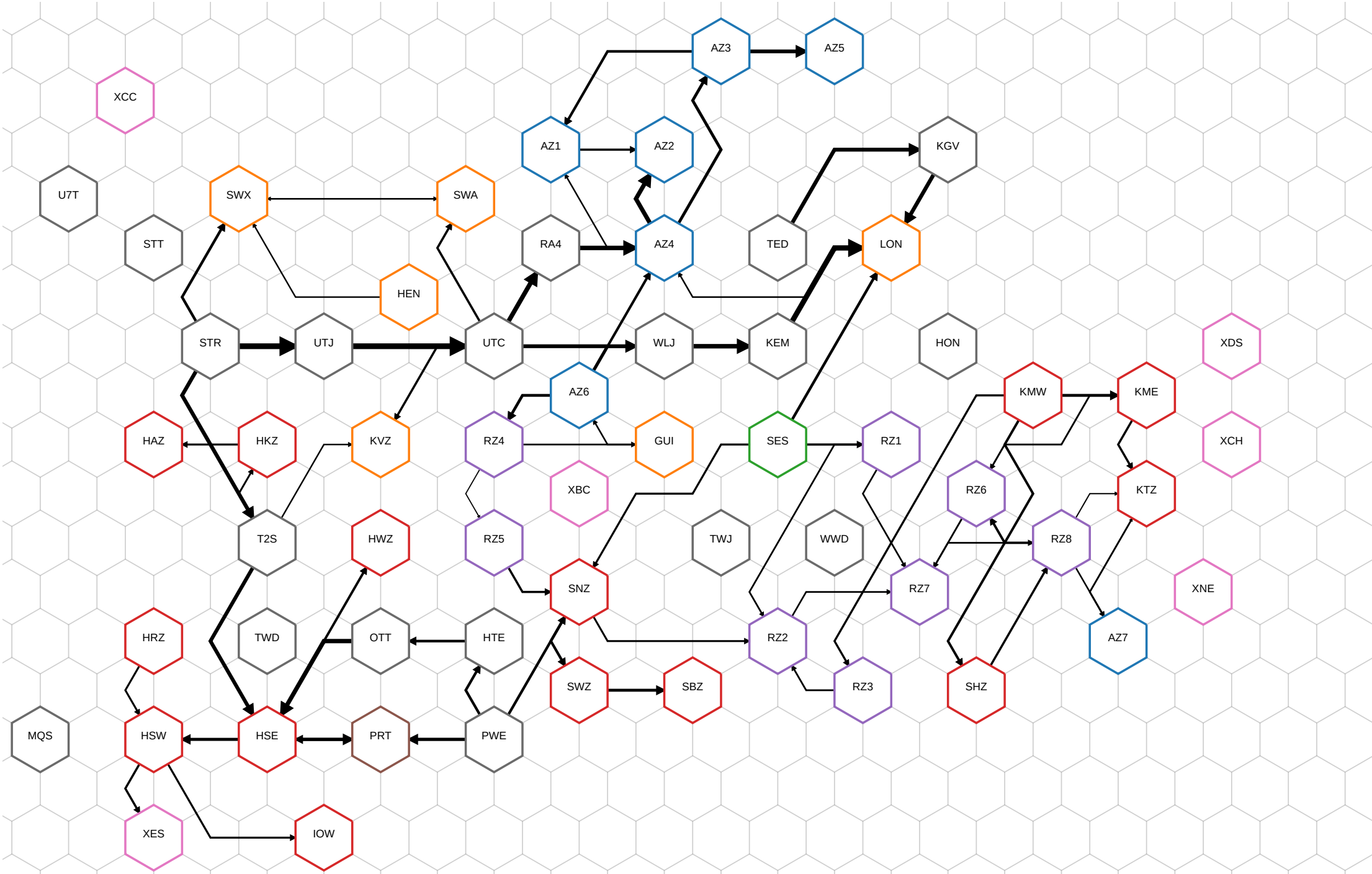
Situation 4 - 2026



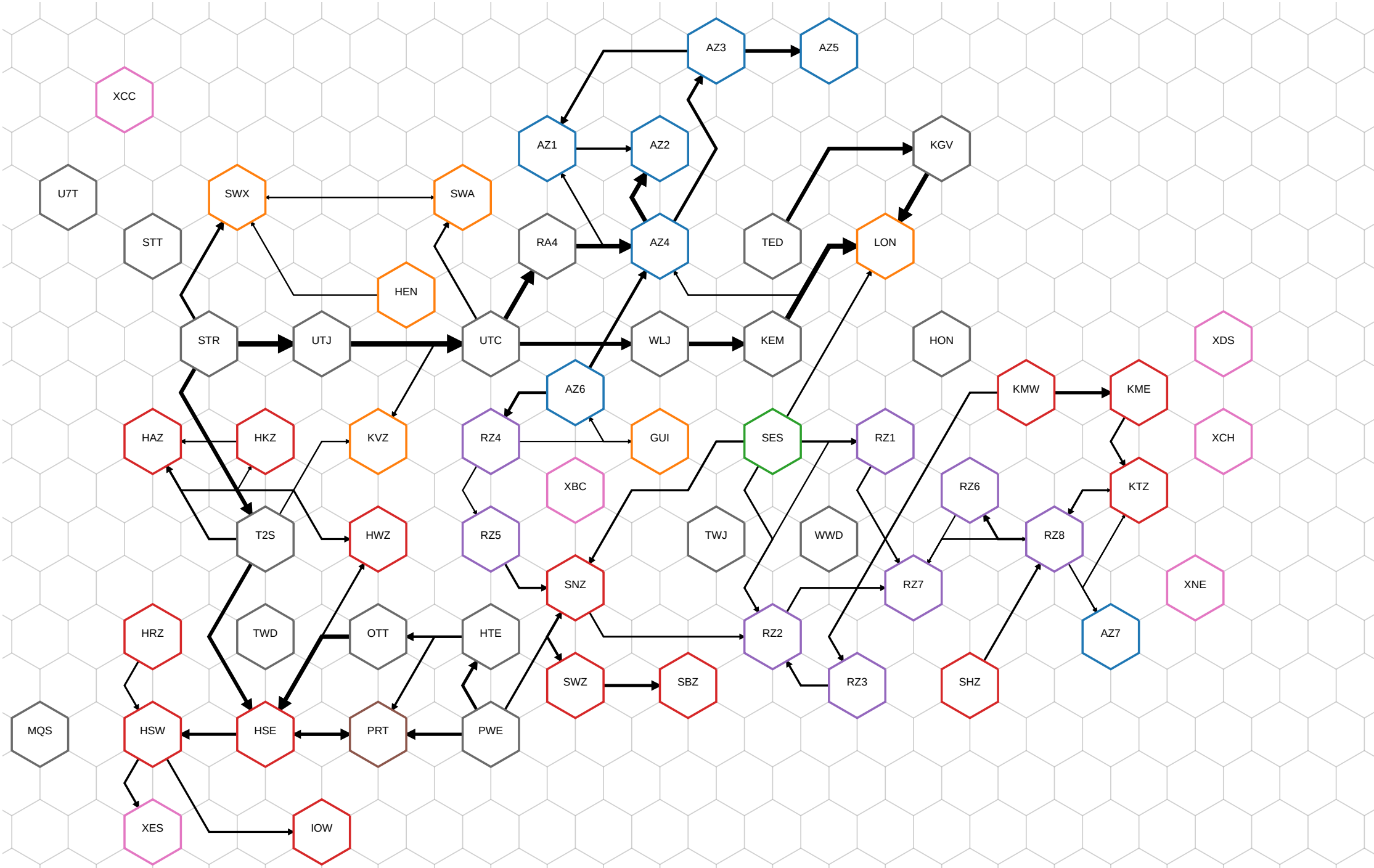
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

WBGWS WITHDRAWN IN 2050

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-excl-wbgws-2050-2075
Description	Least cost run with hybrid-c+2 government interventions excluding WBGWS from 2050 onwards.
Created at	28/06/2023, 10:50:48
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-excl-wbgws-2050
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. WBGWs excluded from 2050.
Optimised discount rate	STPR

Metrics

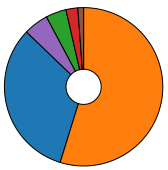
Net present value (Cost)

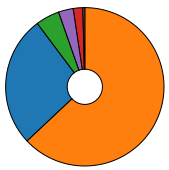
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,920	17,865	17,150	19,539	17,760	16,957	18,020	16,848	16,133	17,910	(£m)
Cost w/o deficit (STPR)	20,920	17,865	17,150	19,539	17,760	16,957	18,020	16,848	16,133	17,910	(£m)
Cost w/ deficit (IGEQ)	32,015	26,197	24,903	29,379	26,018	24,589	26,718	24,511	23,222	26,395	(£m)
Cost w/o deficit (IGEQ)	32,015	26,197	24,903	29,379	26,018	24,589	26,718	24,511	23,222	26,395	(£m)
Cost w/ deficit (LTDR)	23,065	19,507	18,684	21,456	19,388	18,468	19,724	18,363	17,541	19,577	(£m)
Cost w/o deficit (LTDR)	23,065	19,507	18,684	21,456	19,388	18,468	19,724	18,363	17,541	19,577	(£m)

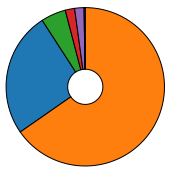
Cost breakdown (STPR)

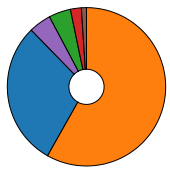
Select Company: Total

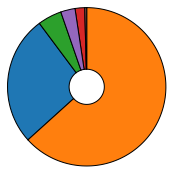
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,779	4,783	4,379	5,772	4,706	4,216	4,689	4,066	3,621	4,779	(£m)
Fixed opex	11,460	11,255	11,204	11,366	11,243	11,184	11,271	11,192	11,130	11,256	(£m)
Fixed operational carbon	880	869	870	879	870	870	871	867	865	871	(£m)
Embedded carbon	507	352	327	435	351	320	342	293	266	355	(£m)
Variable opex	1,051	536	327	884	520	317	674	390	232	548	(£m)
Variable carbon opex	244	72	43	202	70	51	172	41	18	101	(£m)

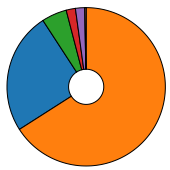
situation1 

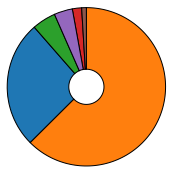
situation2 

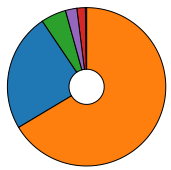
situation3 

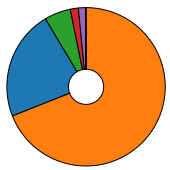
situation4 

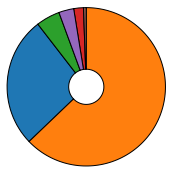
situation5 

situation6 

situation7 

situation8 

situation9 

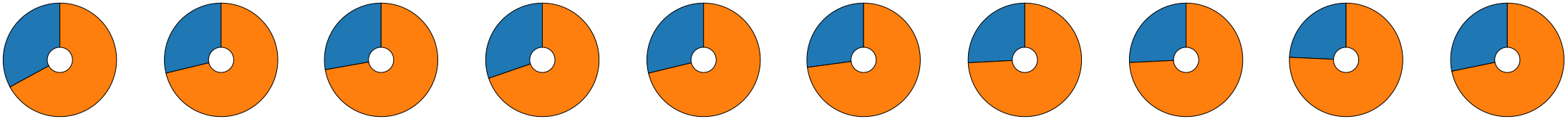
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,254,351	2,151,050	1,987,949	2,745,895	2,146,913	1,939,911	2,119,813	1,780,602	1,597,794	2,191,586	(tonnes)
Operational emissions	6,630,233	5,325,774	5,166,274	6,324,737	5,315,017	5,216,350	6,091,712	5,133,949	4,980,427	5,576,053	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

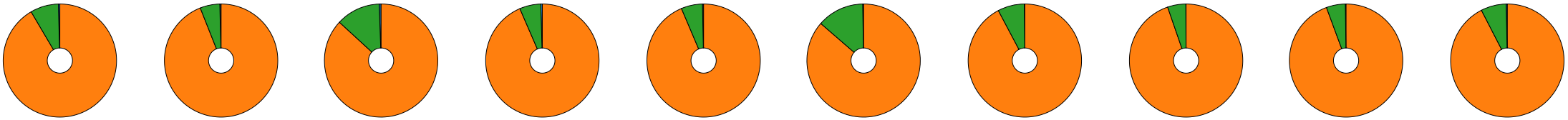


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	106	45	26	94	39	12	21	7	6	40	(GWh)
Grid	22,488	11,386	4,265	19,411	10,917	3,864	13,816	7,903	2,881	10,770	(GWh)
Renewable	1,971	681	619	1,253	706	598	1,137	433	165	841	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,427	63,545	62,688	67,697	63,274	62,051	63,751	61,291	60,204	63,770
SEA environmental disbenefit	112,682	77,411	70,625	100,731	76,495	70,342	85,274	67,189	57,908	79,851
Natural capital	81,690,504	77,234,892	80,088,893	75,499,771	77,271,911	80,086,758	64,405,339	65,102,566	68,004,382	74,376,113
Bio-diversity net gain	−223,464	−148,747	−118,812	−201,160	−147,951	−120,660	−142,405	−96,757	−67,207	−140,796

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,886	31,594	31,204	33,258	31,533	31,072	31,795	30,678	30,145	31,685

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.53	29.63	32.39	29.17	29.82	32.50	27.80	30.17	33.46	30.50
R1: Uncertainty of option supply/demand benefit	6.20	5.52	6.02	5.92	5.57	6.02	5.33	5.58	6.15	5.81
R3: Risk of service failure due to other physical hazards	7.09	7.35	8.21	7.10	7.41	8.25	6.77	7.54	8.59	7.59
R4: Availability of additional headroom	6.62	6.95	7.16	6.69	6.97	7.17	7.03	7.38	7.62	7.06
R5: Catchment/raw water quality risks (incl. climate change)	4.17	4.17	4.69	3.91	4.19	4.72	3.70	4.16	4.81	4.28
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.45	5.64	6.31	5.54	5.68	6.35	4.96	5.51	6.30	5.75
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

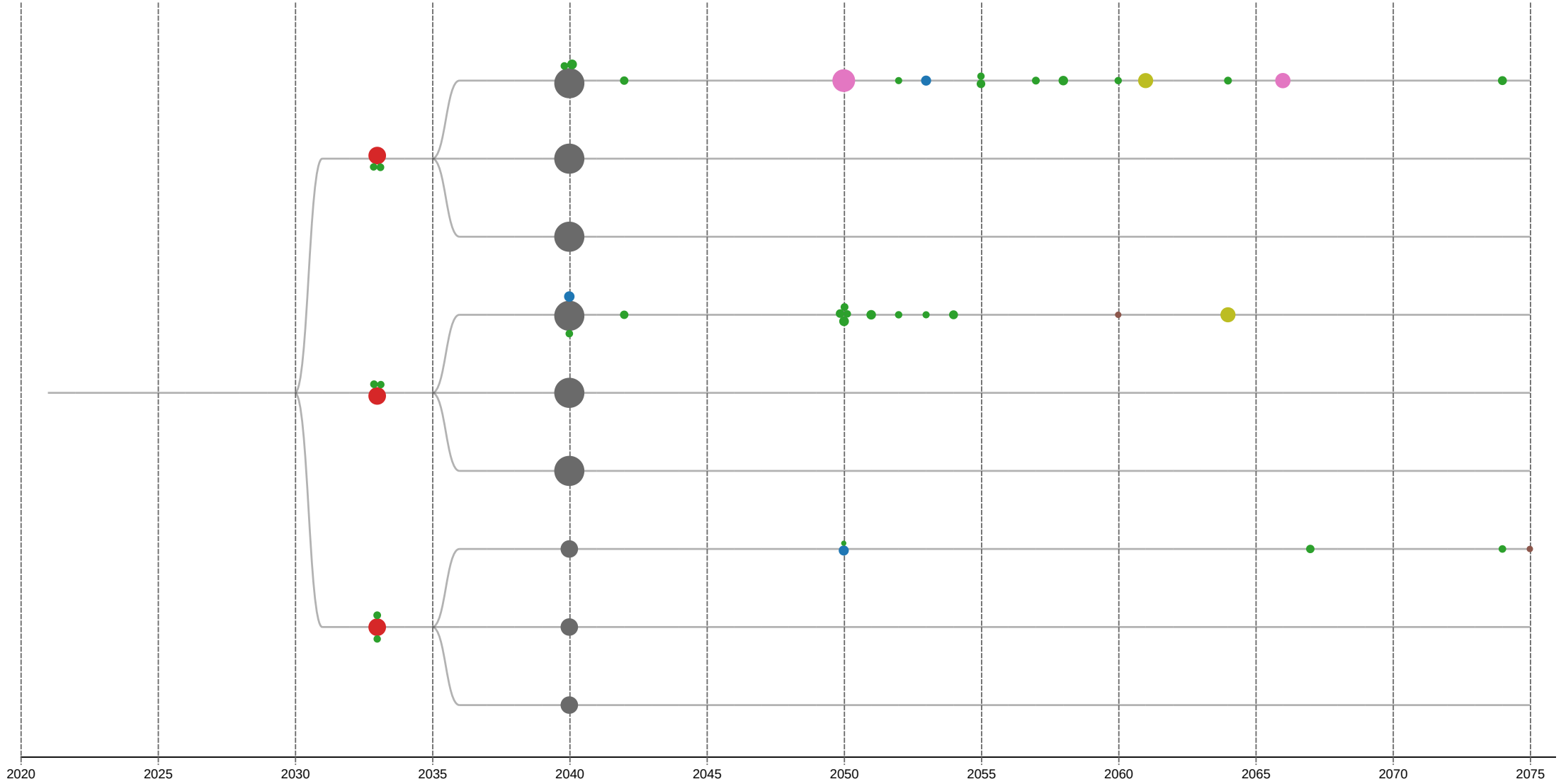
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.07	15.59	17.45	14.38	15.63	17.14	15.08	17.07	19.41	16.20
A3: Operational complexity and flexibility	6.61	7.07	7.93	6.77	7.13	8.00	6.44	7.27	8.34	7.28
A4: WRZ connectivity	7.44	8.50	9.49	7.58	8.47	9.11	8.60	9.78	11.04	8.89
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.46	20.02	22.07	19.38	20.18	22.12	20.36	22.75	25.76	21.34
E1: Scaleability and modularity of proposed changes	8.91	9.35	10.41	8.90	9.44	10.48	9.64	10.92	12.44	10.05
E2: Intervention lead times	4.26	4.23	4.48	4.17	4.24	4.43	4.15	4.47	4.95	4.38
E3: Reliance on external bodies to deliver changes	6.30	6.45	7.17	6.30	6.50	7.21	6.56	7.36	8.37	6.91
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00

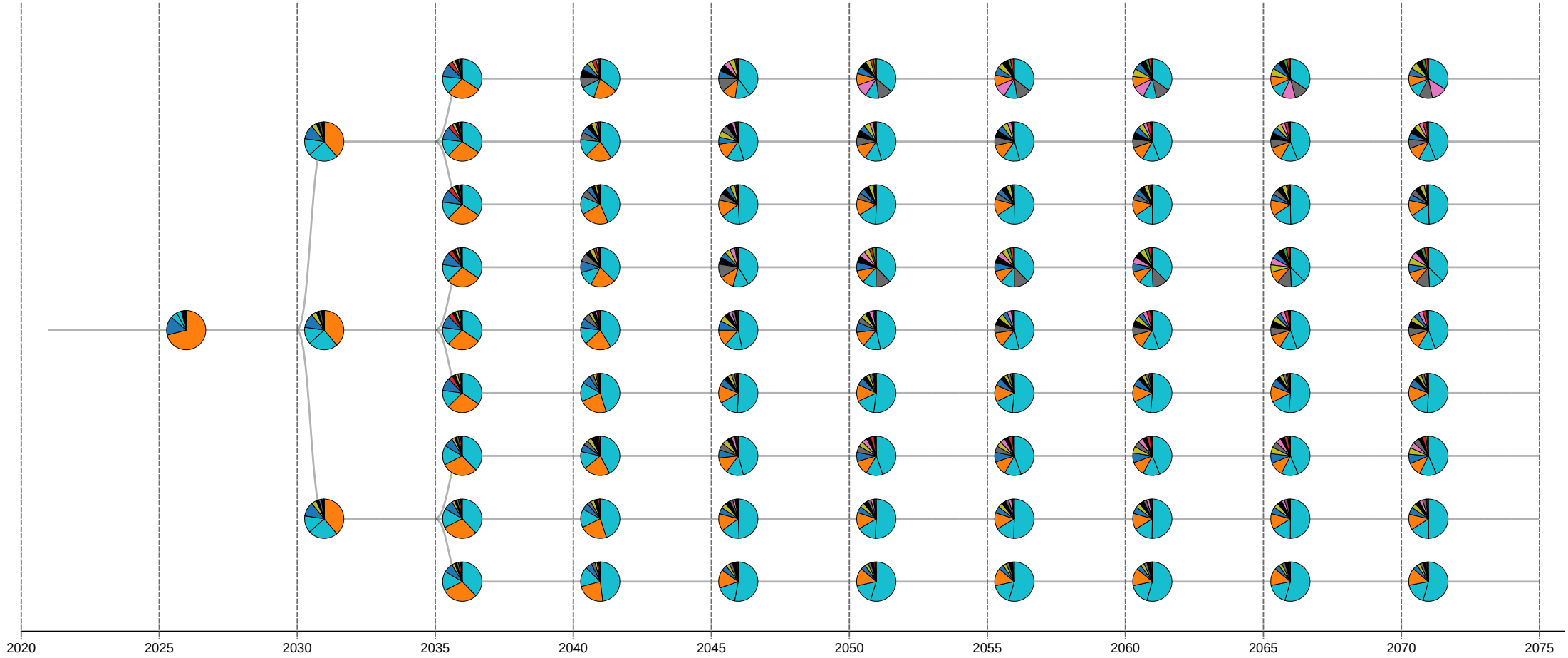
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

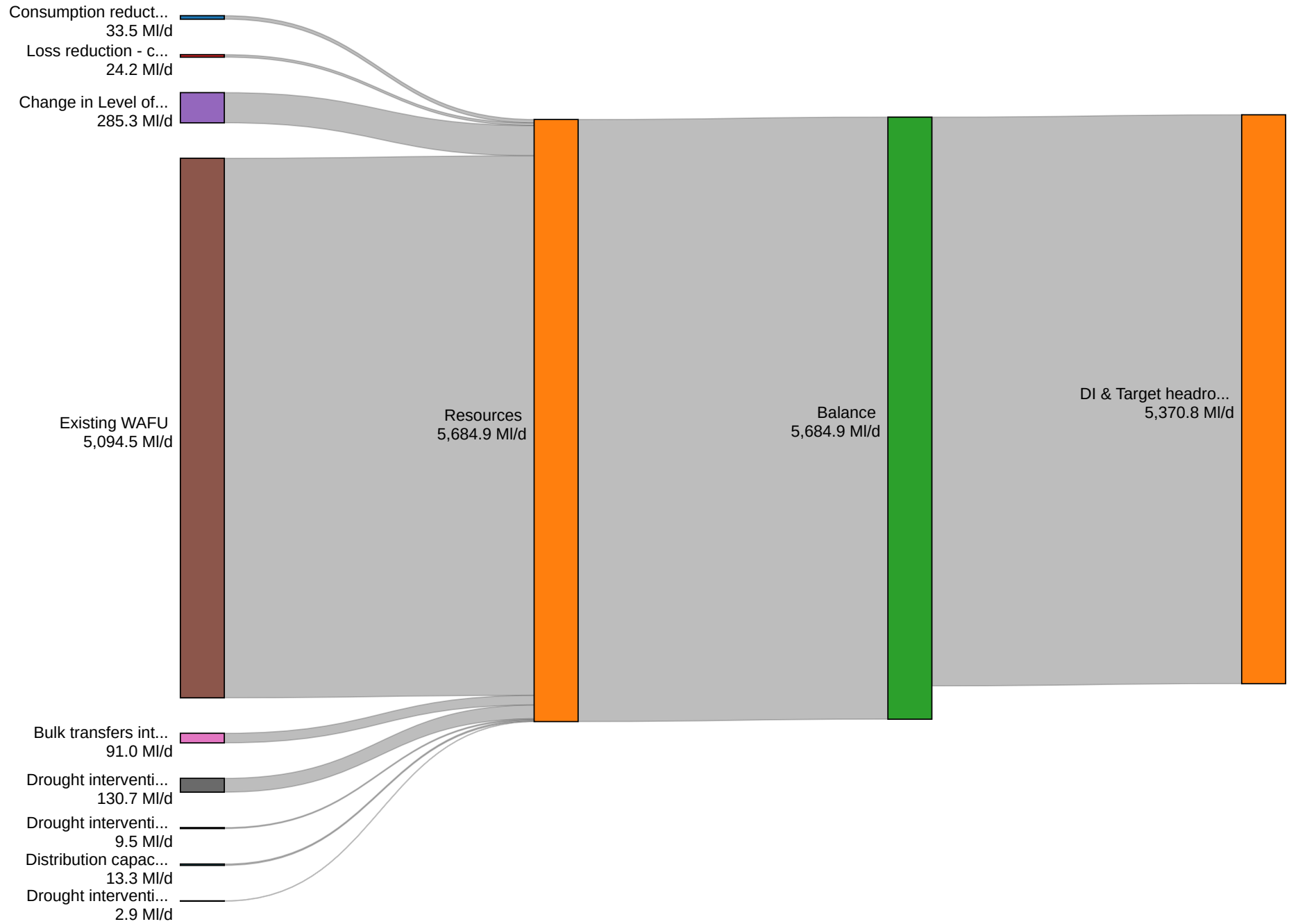
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

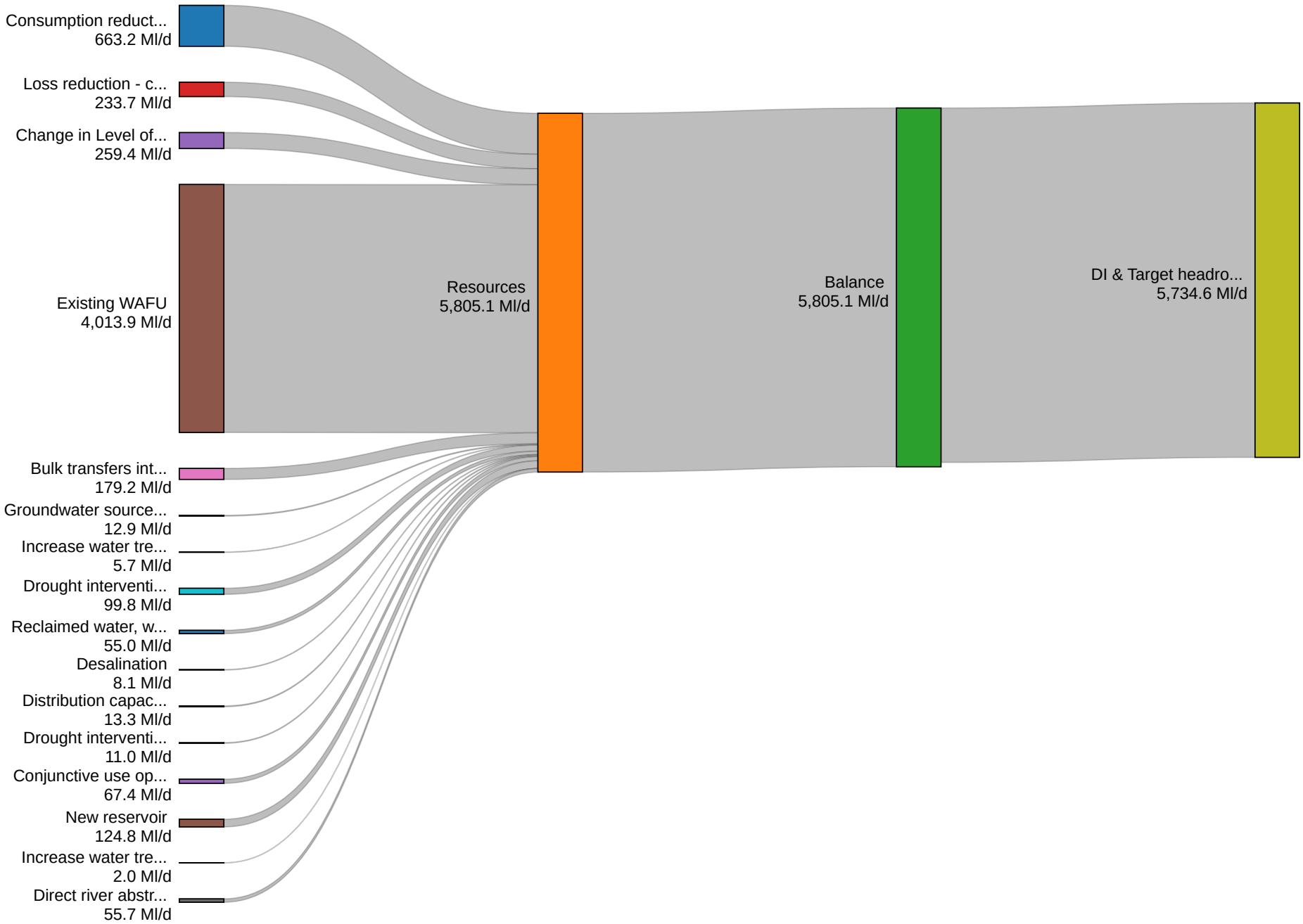


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

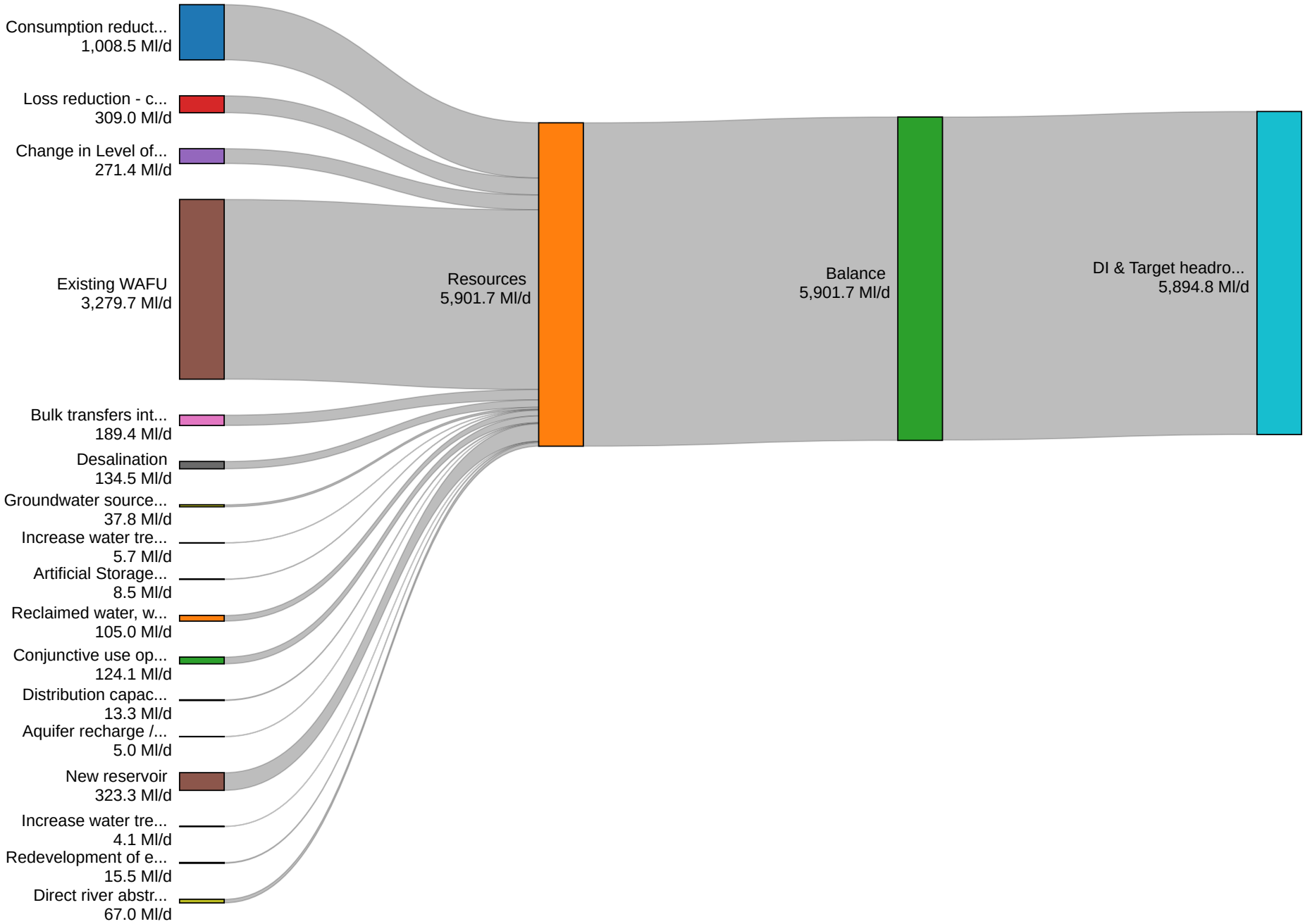
Situation 4 - 2026 (Thames Water)



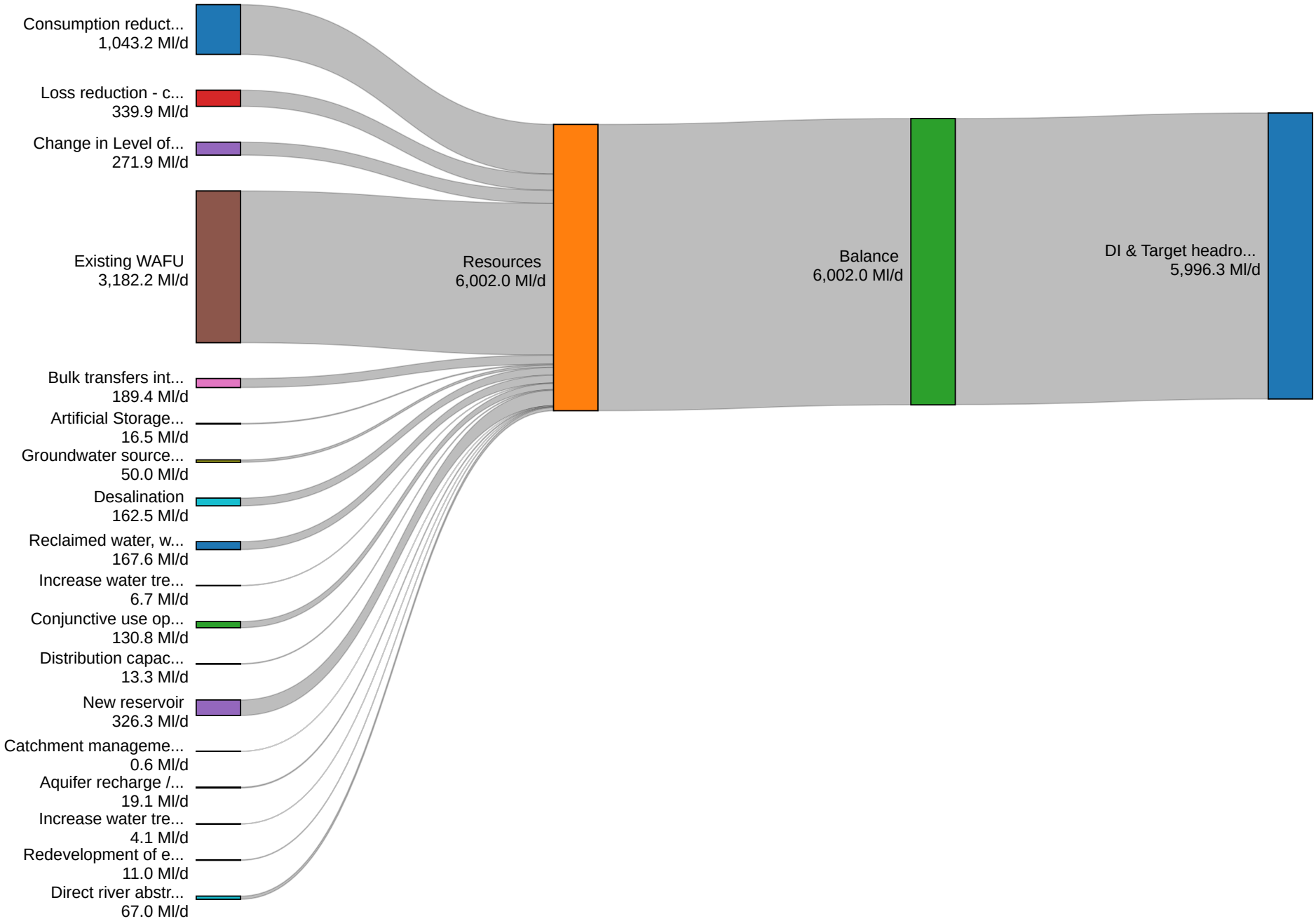
Situation 4 - 2040 (Thames Water)



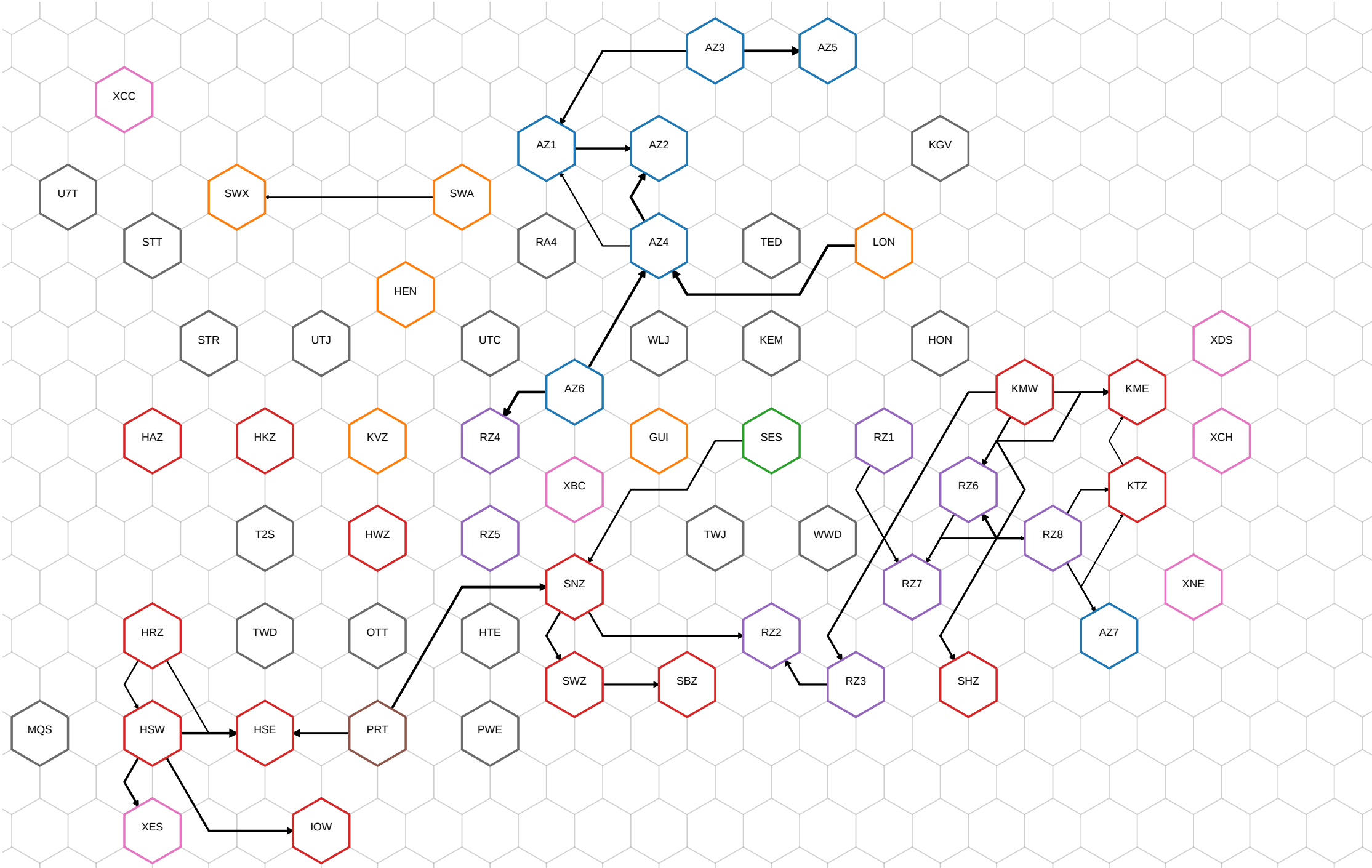
Situation 4 - 2050 (Thames Water)



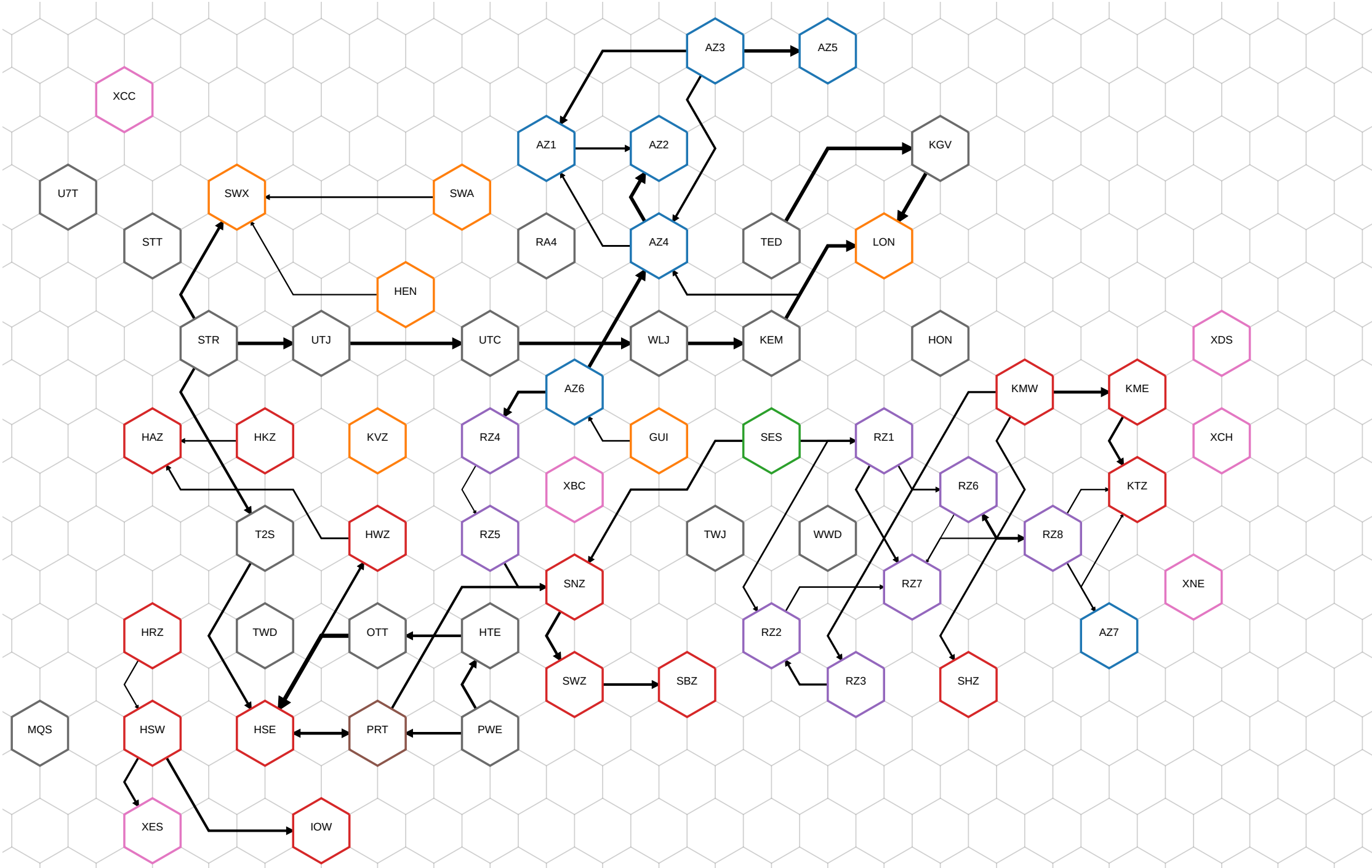
Situation 4 - 2075 (Thames Water)



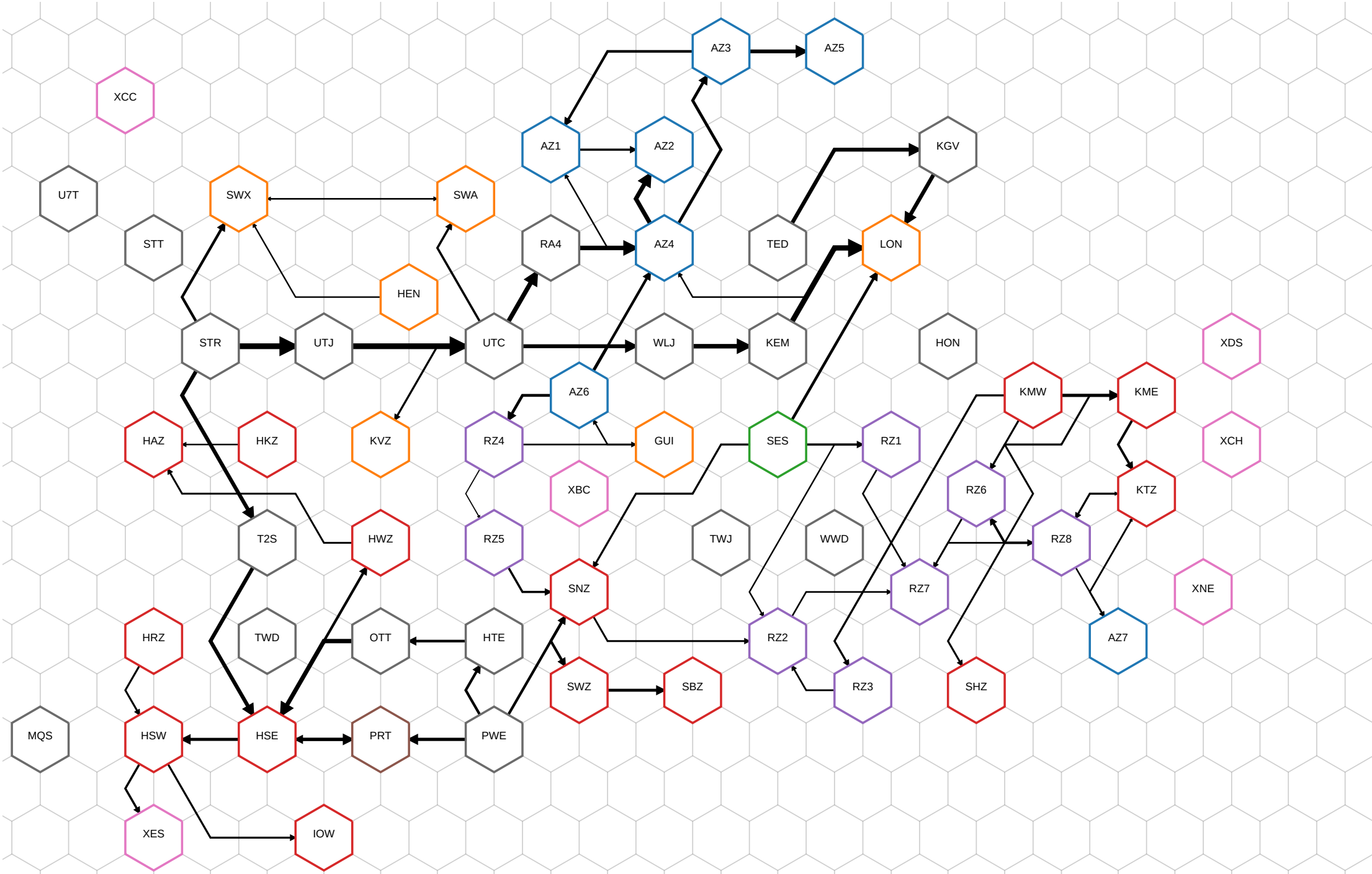
Situation 4 - 2026



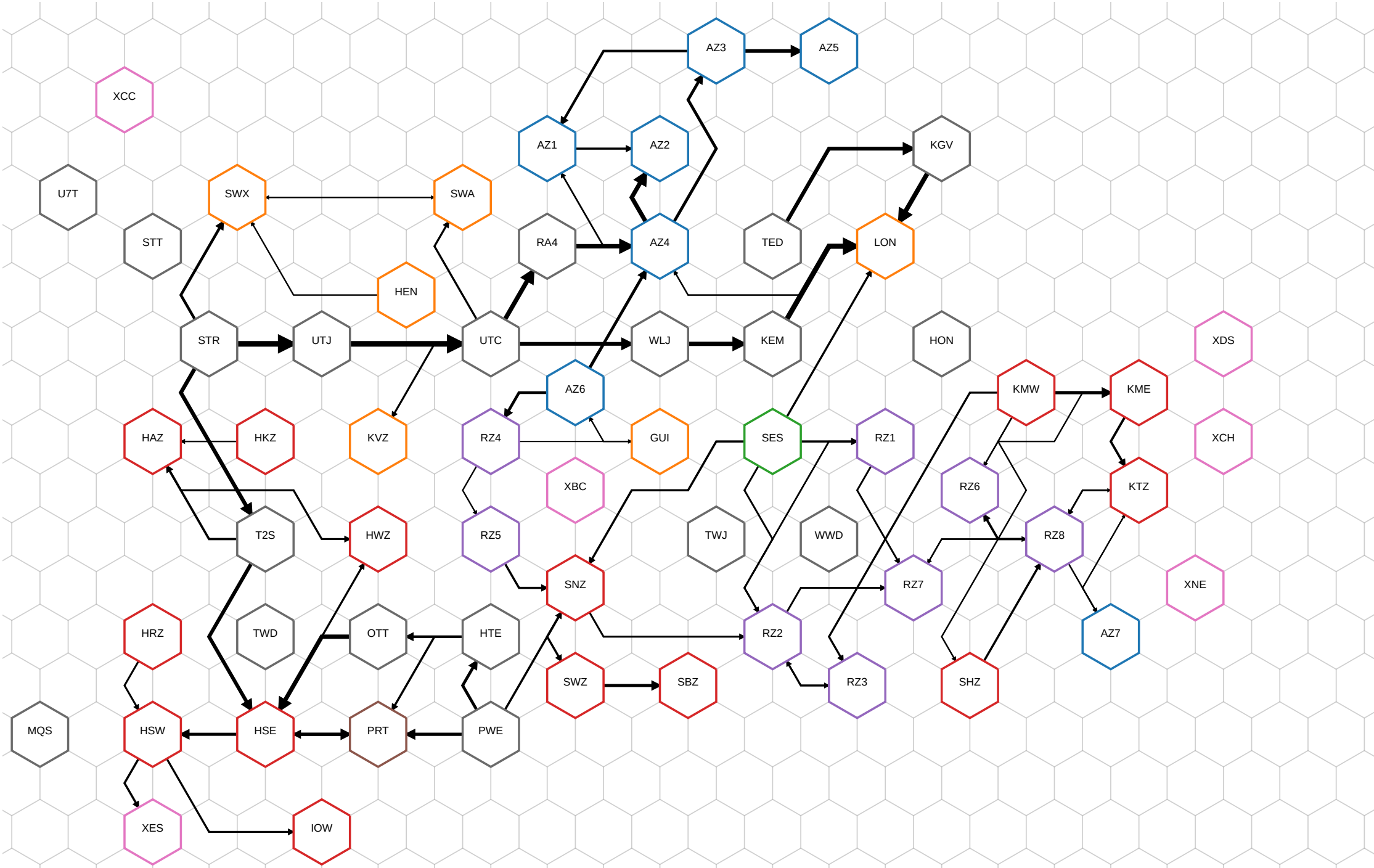
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

ESW EXPORT INCREASED IN 2030

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-chingford-2030-2075
Description	Least cost run with hybrid-c+2 government interventions with Chingford (ESW) reduced export ending in 2030.
Created at	03/08/2023, 15:19:07
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-chingford-2030
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Chingford (ESW) reduced export ends in 2030.
Optimised discount rate	STPR

Metrics

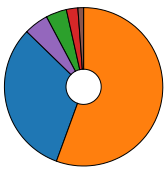
Net present value (Cost)

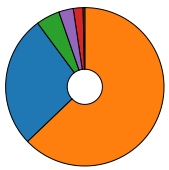
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,587	17,926	17,204	19,272	17,810	17,009	18,050	16,895	16,178	17,881	(£m)
Cost w/o deficit (STPR)	20,587	17,926	17,204	19,272	17,810	17,009	18,050	16,895	16,178	17,881	(£m)
Cost w/ deficit (IGEQ)	31,323	26,279	24,980	28,824	26,092	24,668	26,738	24,582	23,289	26,308	(£m)
Cost w/o deficit (IGEQ)	31,323	26,279	24,980	28,824	26,092	24,668	26,738	24,582	23,289	26,308	(£m)
Cost w/ deficit (LTDR)	22,668	19,572	18,742	21,138	19,443	18,524	19,754	18,414	17,590	19,538	(£m)
Cost w/o deficit (LTDR)	22,668	19,572	18,742	21,138	19,443	18,524	19,754	18,414	17,590	19,538	(£m)

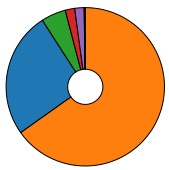
Cost breakdown (STPR)

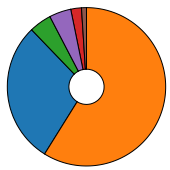
Select Company: Total

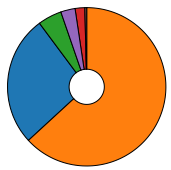
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,525	4,841	4,424	5,576	4,749	4,258	4,725	4,098	3,654	4,761	(£m)
Fixed opex	11,440	11,266	11,212	11,346	11,250	11,190	11,269	11,197	11,135	11,256	(£m)
Fixed operational carbon	878	867	867	877	869	869	870	867	865	870	(£m)
Embedded carbon	483	360	332	421	353	322	343	295	267	353	(£m)
Variable opex	1,023	530	328	856	522	320	670	397	237	543	(£m)
Variable carbon opex	238	62	39	195	67	49	172	41	18	98	(£m)

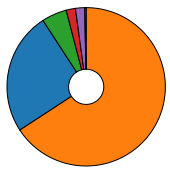
situation1 

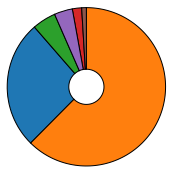
situation2 

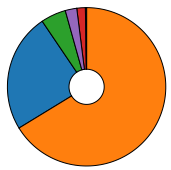
situation3 

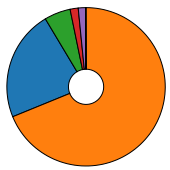
situation4 

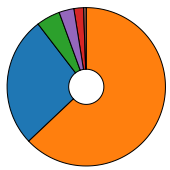
situation5 

situation6 

situation7 

situation8 

situation9 

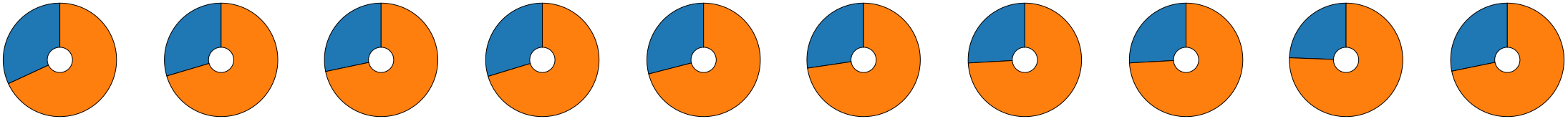
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,078,717	2,202,942	2,020,348	2,640,377	2,161,708	1,955,459	2,123,219	1,791,572	1,608,764	2,175,901	(tonnes)
Operational emissions	6,574,373	5,240,658	5,119,407	6,251,302	5,291,719	5,197,484	6,079,590	5,134,857	4,980,444	5,541,093	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

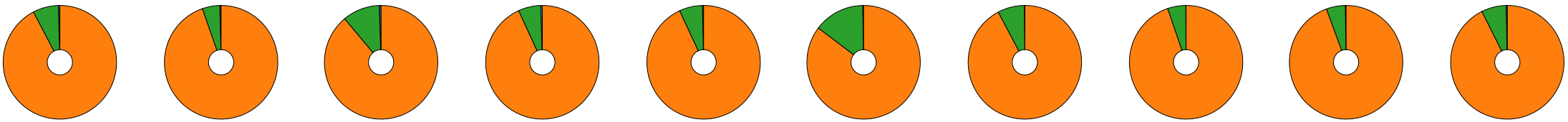


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	103	45	26	94	39	12	21	7	6	39	(GWh)
Grid	22,393	11,444	4,365	18,270	10,795	3,853	13,783	7,944	2,883	10,637	(GWh)
Renewable	1,766	601	519	1,249	765	652	1,139	433	165	810	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,909	63,898	63,153	67,026	63,692	62,533	64,289	62,320	61,233	64,117
SEA environmental disbenefit	108,827	78,640	72,694	95,095	78,012	71,701	83,907	69,740	60,459	79,897
Natural capital	81,915,017	77,207,703	80,081,855	75,481,232	77,206,309	80,024,247	64,518,525	65,102,274	68,004,090	74,393,472
Bio-diversity net gain	−206,896	−154,887	−126,946	−199,087	−148,386	−119,985	−135,081	−96,987	−67,437	−139,521

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,763	31,809	31,430	32,901	31,707	31,282	31,852	30,997	30,476	31,802

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.96	29.77	32.51	28.41	29.91	32.64	27.57	30.25	33.55	30.40
R1: Uncertainty of option supply/demand benefit	5.98	5.55	6.03	5.67	5.60	6.06	5.23	5.59	6.16	5.76
R3: Risk of service failure due to other physical hazards	6.95	7.38	8.23	6.92	7.43	8.29	6.71	7.56	8.61	7.57
R4: Availability of additional headroom	6.62	6.96	7.16	6.67	6.97	7.18	7.04	7.38	7.62	7.07
R5: Catchment/raw water quality risks (incl. climate change)	4.07	4.22	4.75	3.79	4.21	4.74	3.69	4.19	4.84	4.28
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.33	5.67	6.33	5.36	5.70	6.38	4.90	5.54	6.32	5.73
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

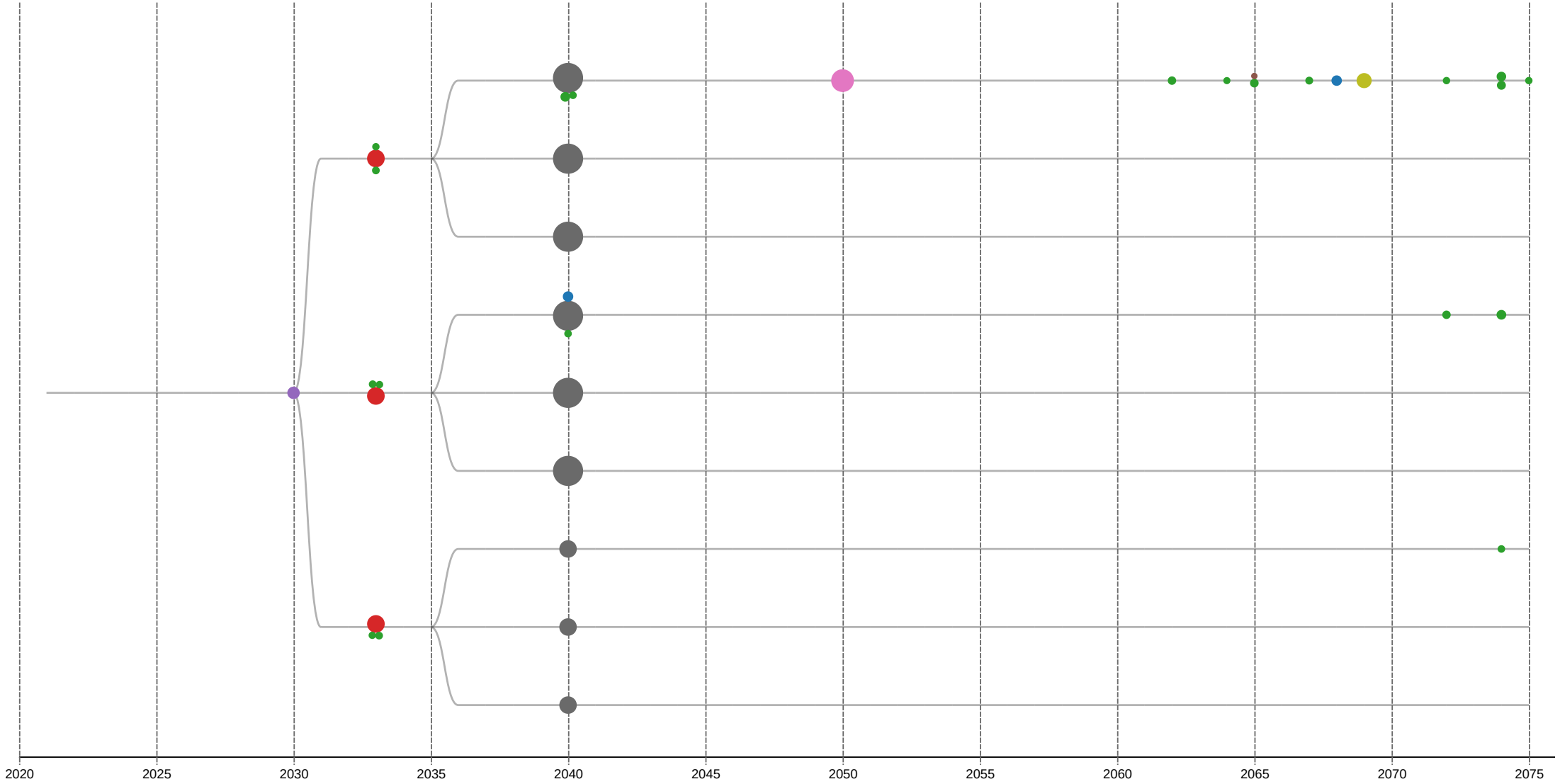
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.91	15.68	17.53	14.77	15.71	17.24	15.04	17.17	19.51	16.28
A3: Operational complexity and flexibility	6.49	7.09	7.95	6.59	7.15	8.03	6.38	7.29	8.36	7.26
A4: WRZ connectivity	7.39	8.57	9.55	8.15	8.53	9.18	8.64	9.85	11.12	9.00
A7: Customer relations support engagement with demand management	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.07	20.11	22.12	18.81	20.25	22.22	20.18	22.81	25.83	21.27
E1: Scaleability and modularity of proposed changes	8.73	9.38	10.43	8.67	9.48	10.53	9.58	10.94	12.46	10.02
E2: Intervention lead times	4.18	4.25	4.50	4.04	4.24	4.44	4.10	4.49	4.98	4.36
E3: Reliance on external bodies to deliver changes	6.16	6.47	7.19	6.10	6.53	7.25	6.50	7.38	8.39	6.89
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

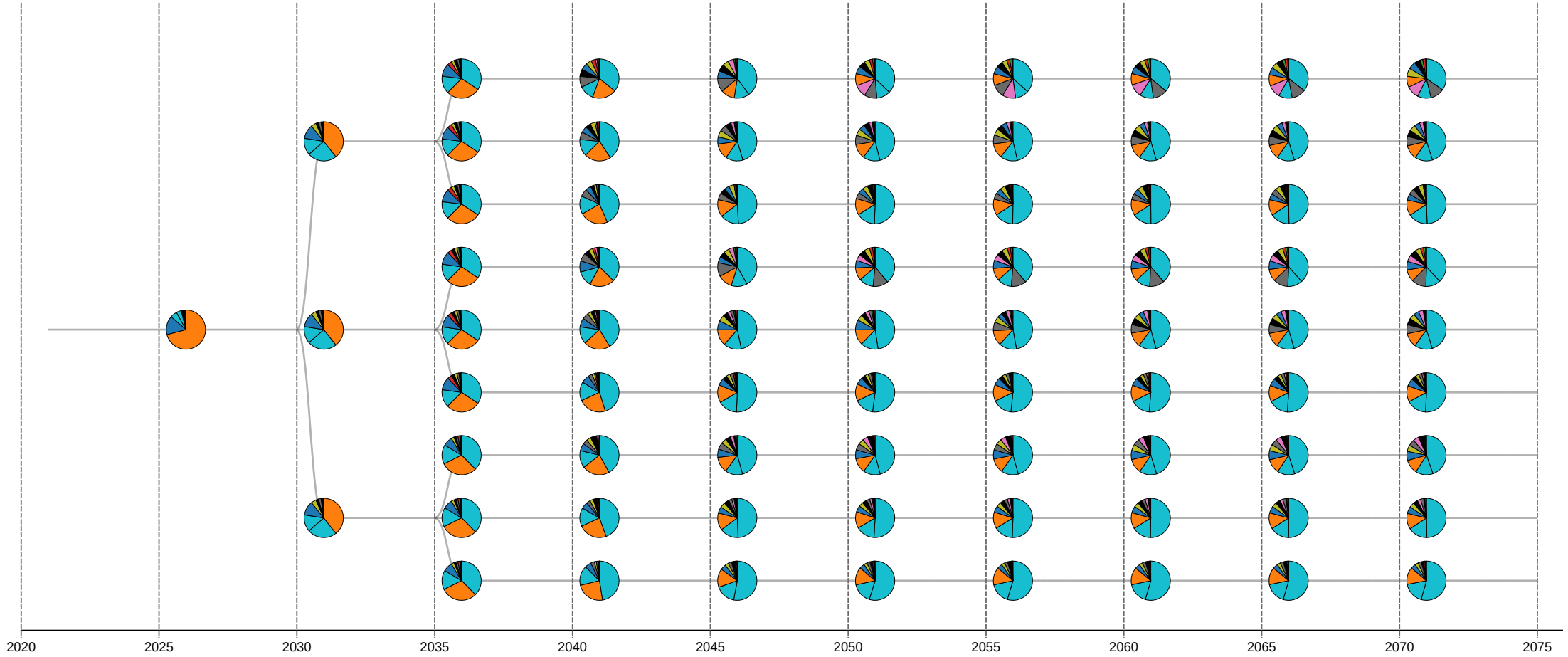
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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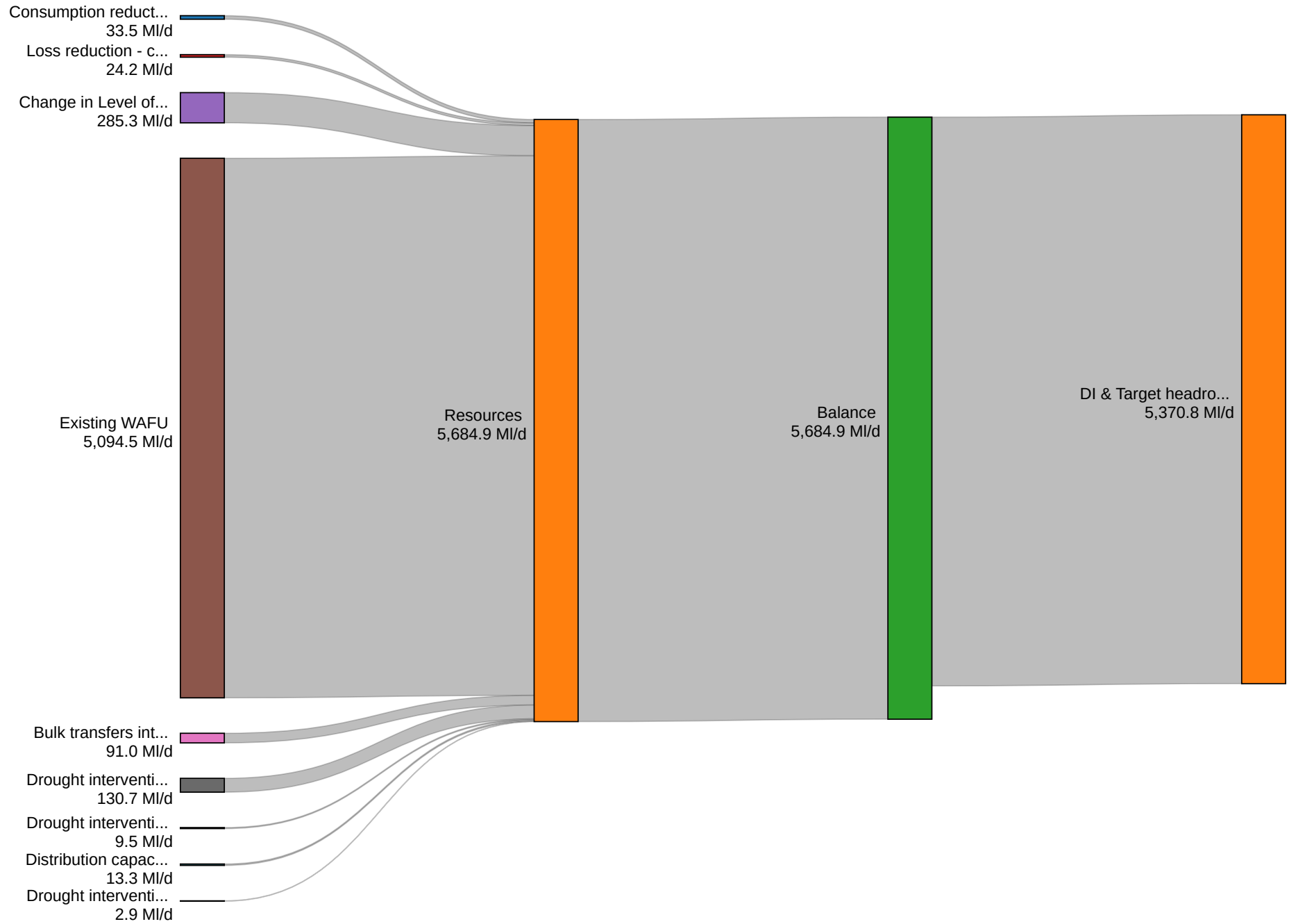
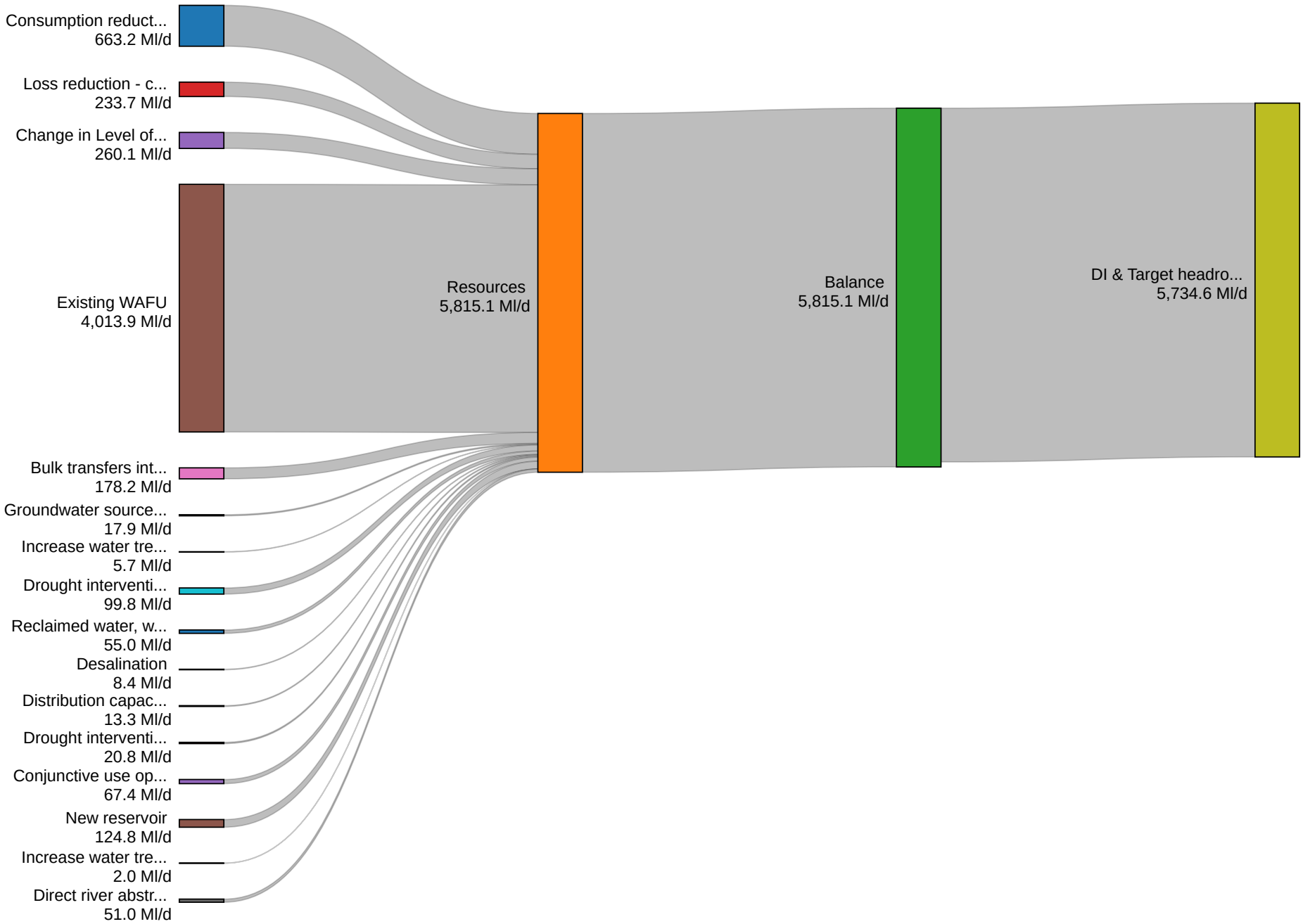
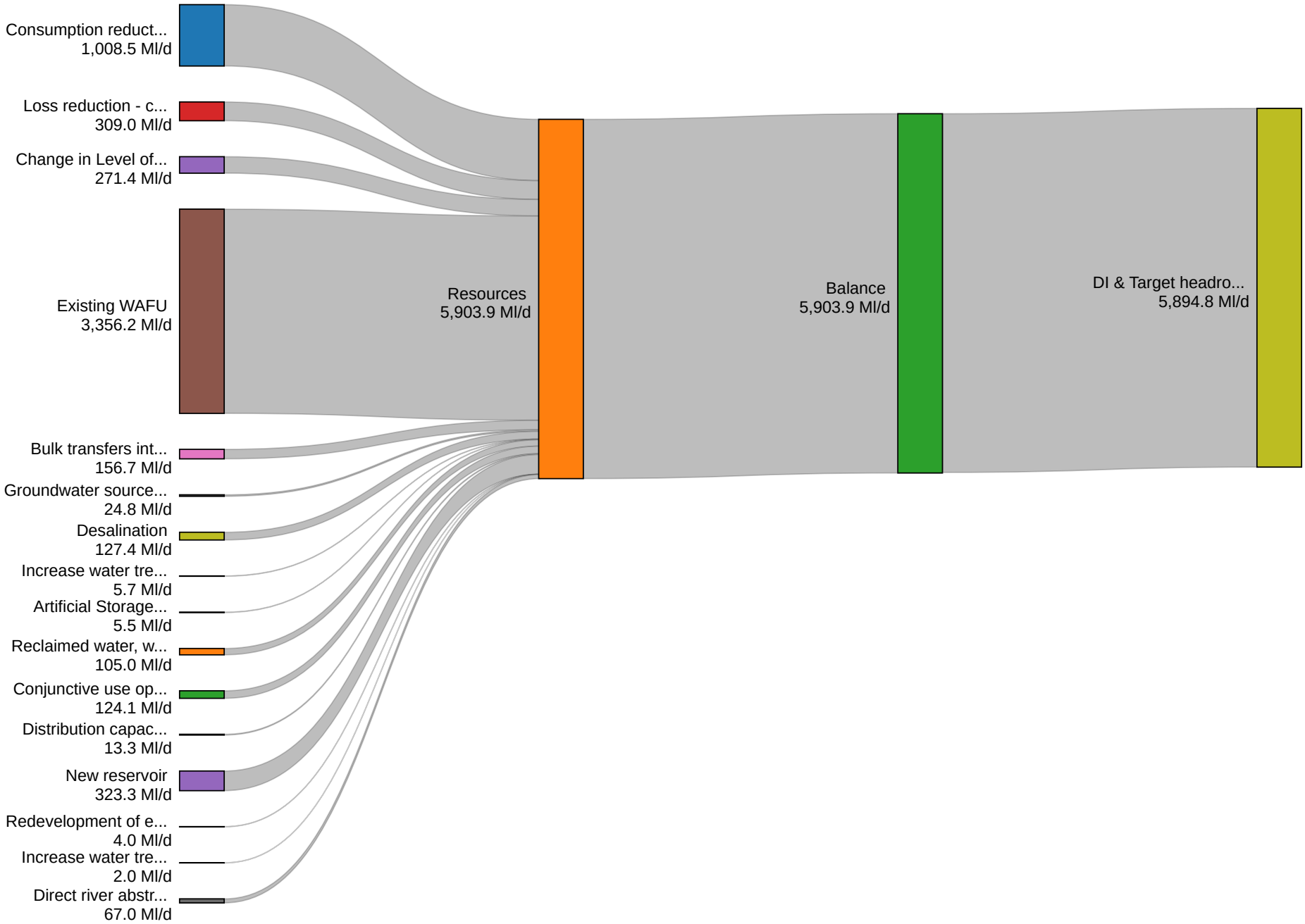
Situation 4 - 2026 (Thames Water)



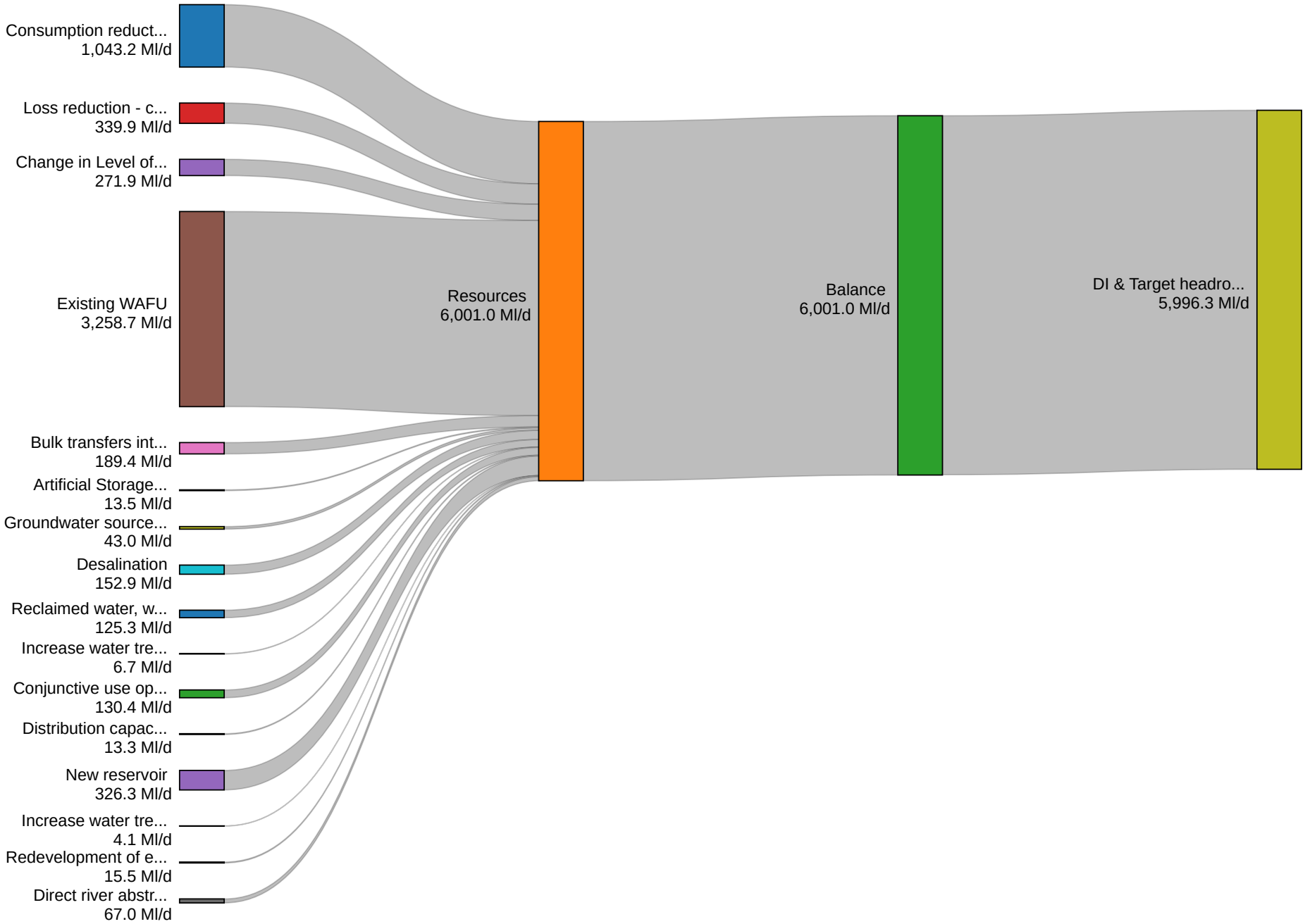
Situation 4 - 2040 (Thames Water)



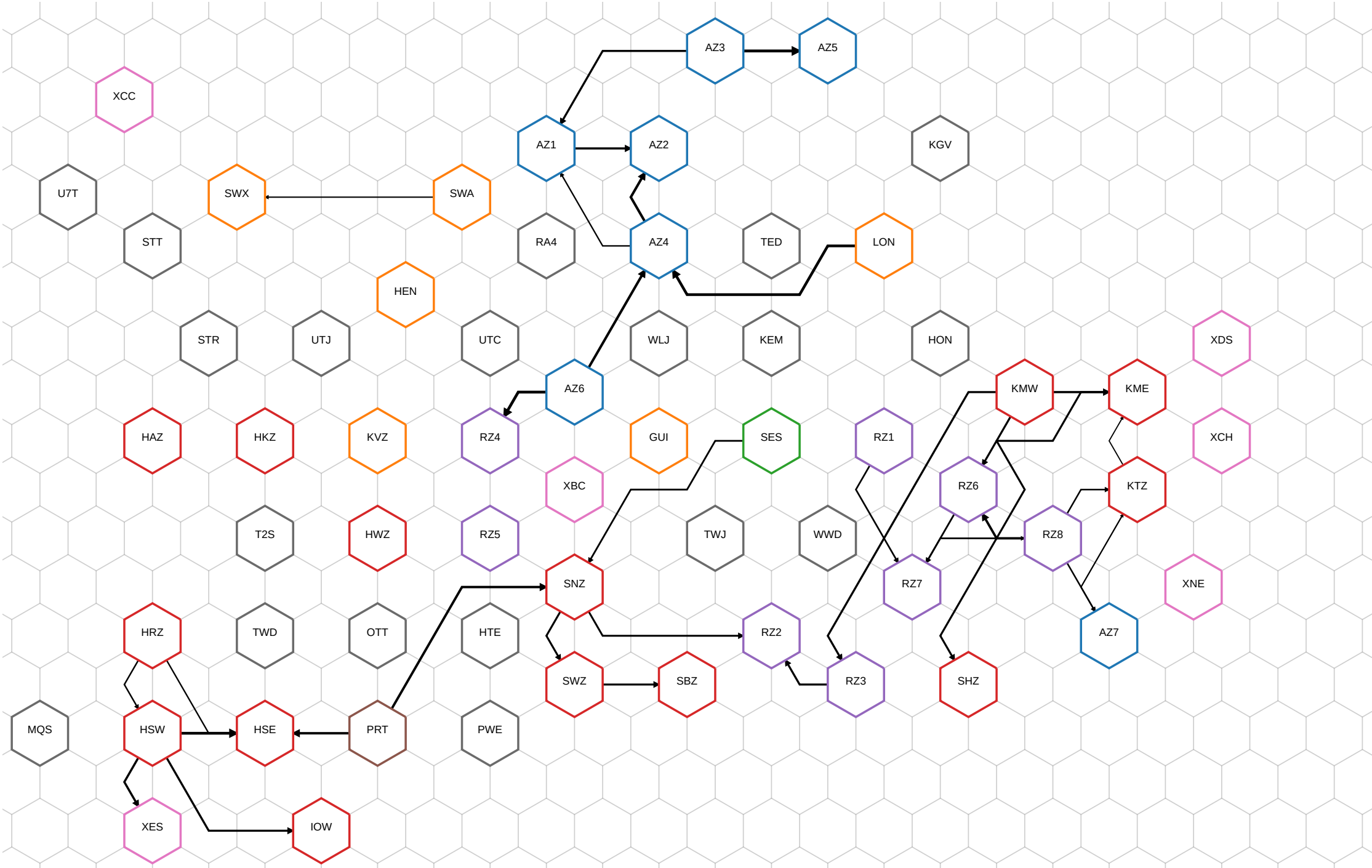
Situation 4 - 2050 (Thames Water)



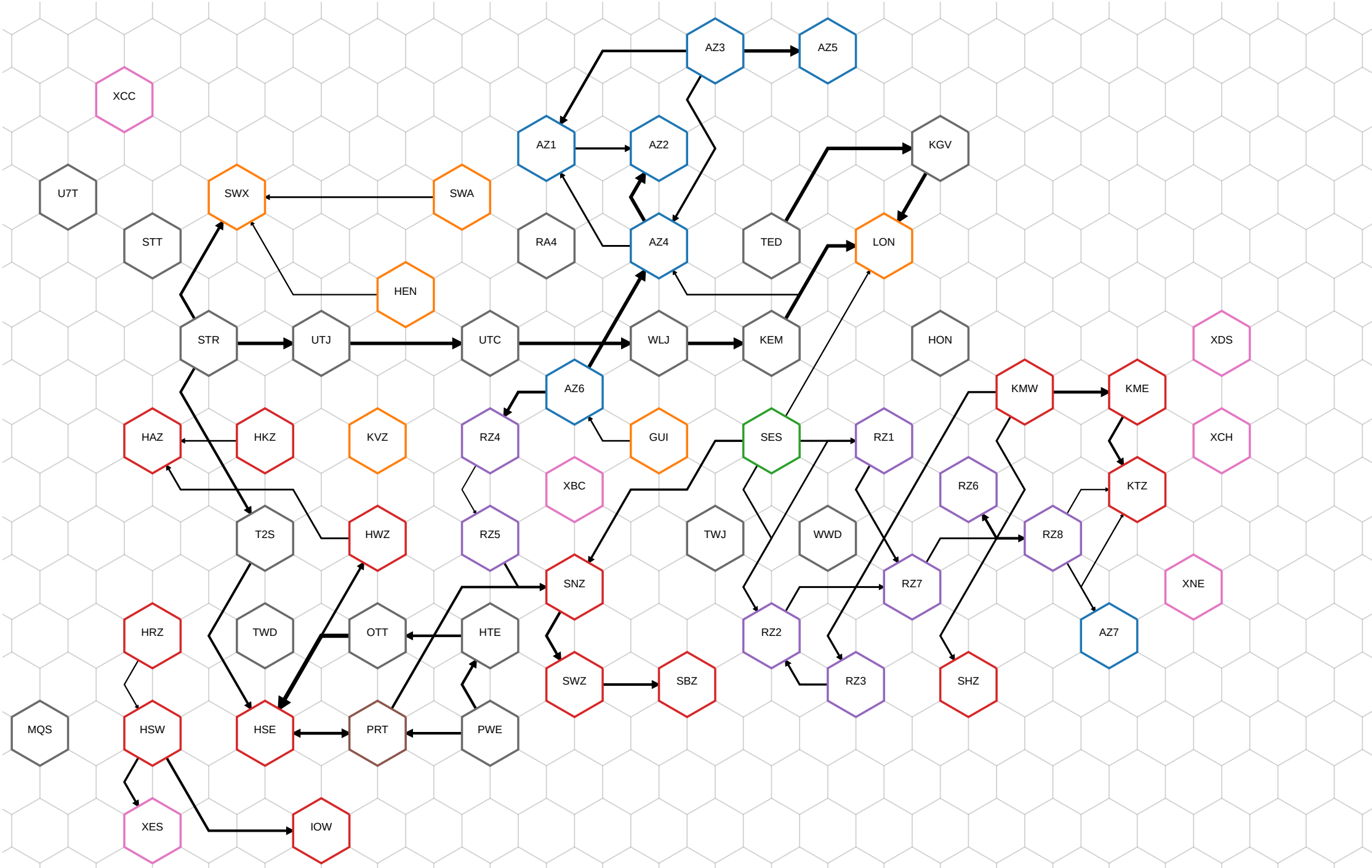
Situation 4 - 2075 (Thames Water)



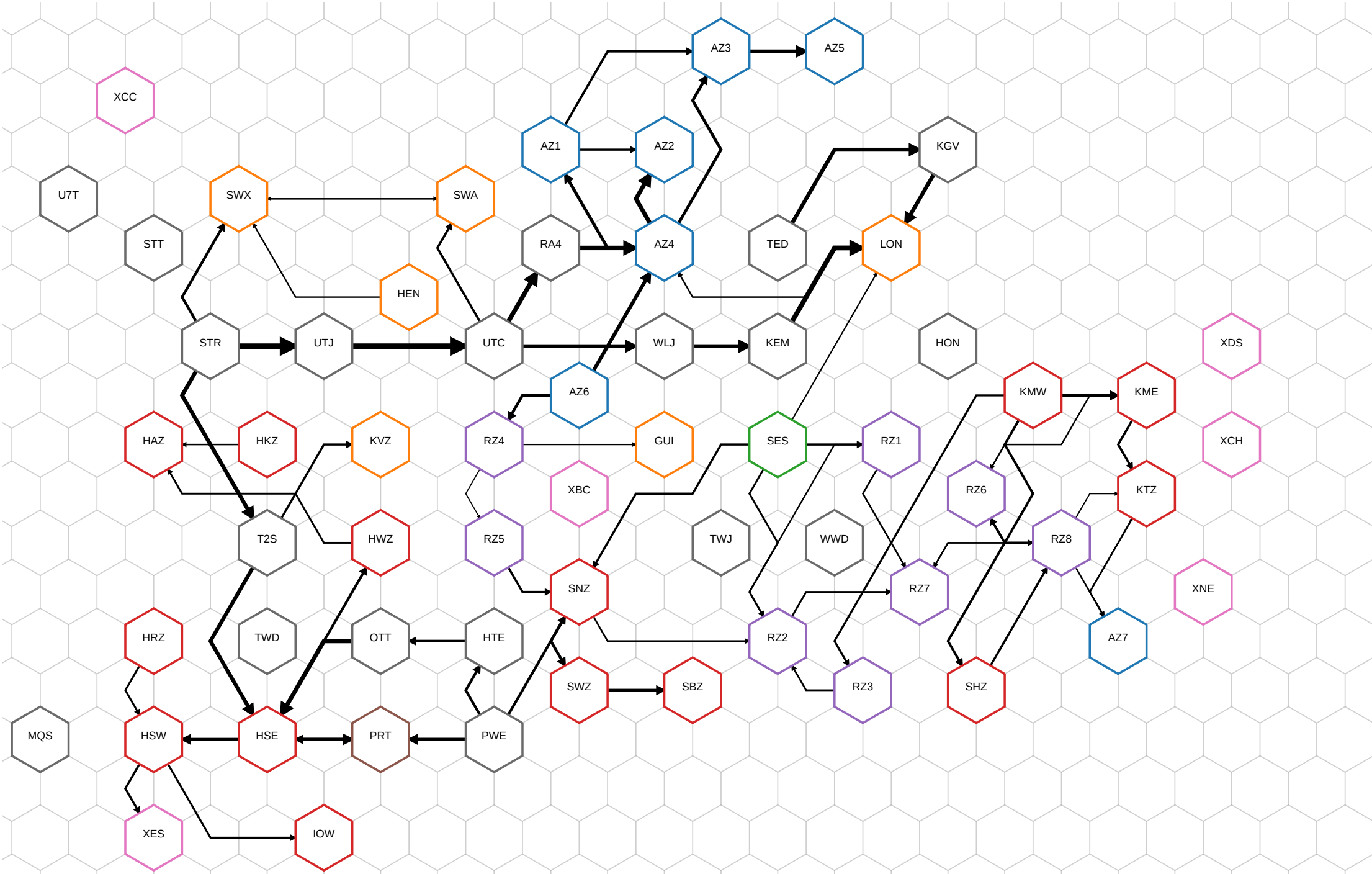
Situation 4 - 2026



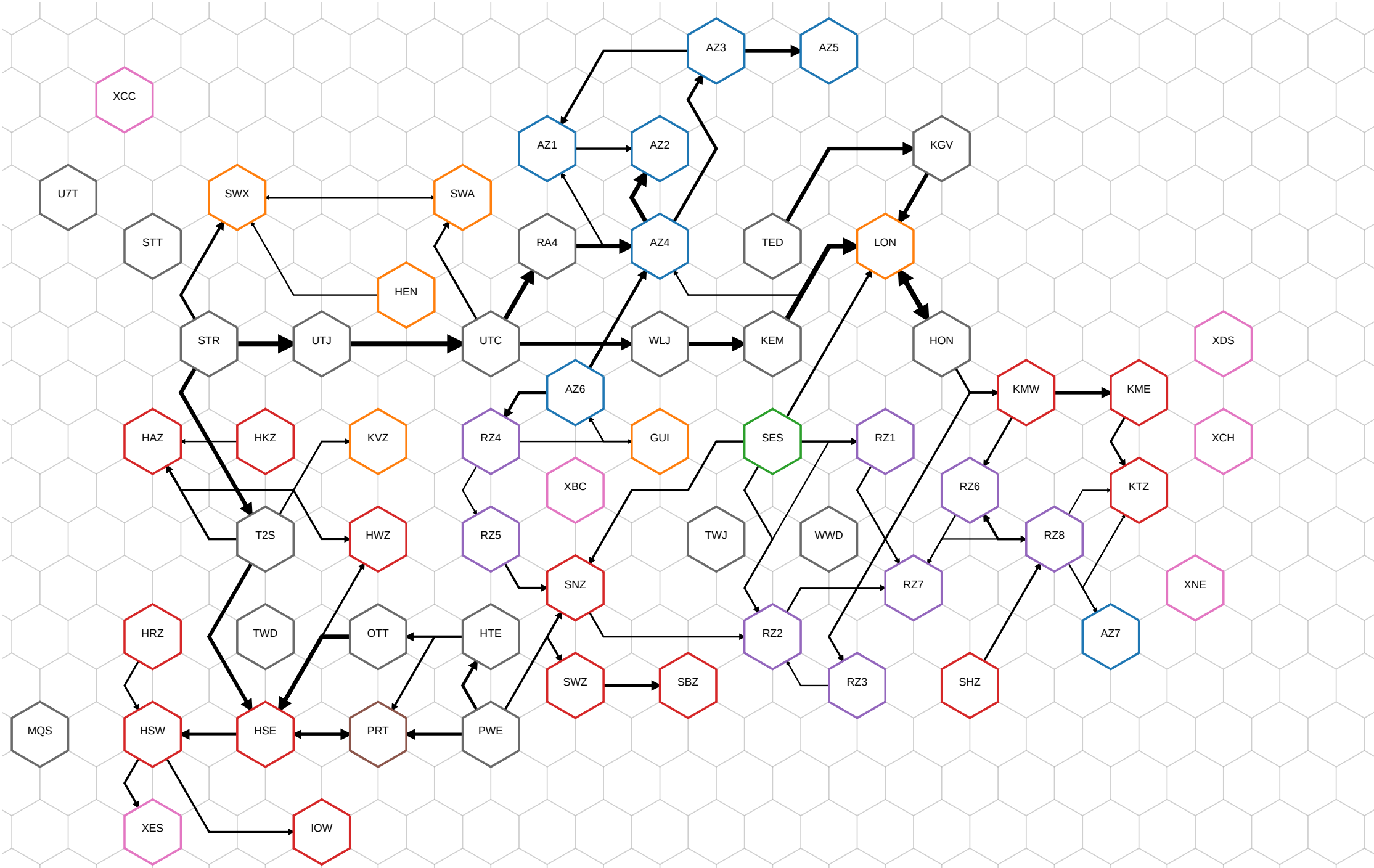
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED H + NON SESRO

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-excl-sesro-2075
Description	Least cost run with hybrid-h government interventions with increased capacity of T2S transfer to 200 Ml/d and increased Otterbourne - Gaters Mill transfer to 95 Ml/d. No cost changes to account for the increased capacities have been included. Includes a 6 Ml/d emergency deficit in RZ6 in 2049. Excludes SESRO. Extend Testwood and Candover drought permits to 2040.
Created at	08/07/2023, 03:13:16
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-excl-sesro
Setting description	Emergency options in RZ6 (2049). Excluding SES low, medium and high DMP baskets. Increase capacity of T2S transfer to 200 Ml/d and expand Otterbourne - Gaters Mill transfer to 95 Ml/d. Excludes SESRO. Extend Testwood and Candover drought permits to 2040.
Optimised discount rate	STPR

Metrics

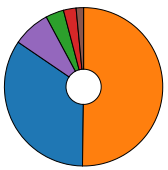
Net present value (Cost)

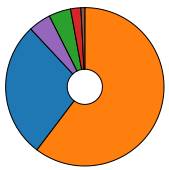
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	24,308	19,391	18,260	22,659	18,827	17,344	19,615	17,271	16,377	19,339	(£m)
Cost w/o deficit (STPR)	24,308	19,391	18,260	22,659	18,827	17,344	19,615	17,271	16,377	19,339	(£m)
Cost w/ deficit (IGEQ)	38,364	29,036	26,975	35,159	28,227	25,496	29,686	25,433	23,793	29,130	(£m)
Cost w/o deficit (IGEQ)	38,364	29,036	26,975	35,159	28,227	25,496	29,686	25,433	23,793	29,130	(£m)
Cost w/ deficit (LTDR)	27,001	21,278	19,974	25,073	20,662	18,950	21,576	18,877	17,845	21,248	(£m)
Cost w/o deficit (LTDR)	27,001	21,278	19,974	25,073	20,662	18,950	21,576	18,877	17,845	21,248	(£m)

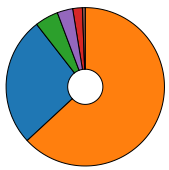
Cost breakdown (STPR)

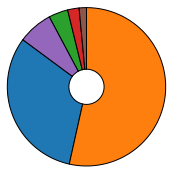
Select Company: Total

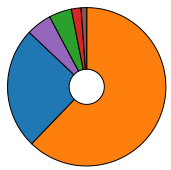
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,339	5,376	4,814	7,171	4,681	3,979	5,280	3,862	3,416	5,213	(£m)
Fixed opex	12,208	11,697	11,524	12,120	11,712	11,474	11,758	11,467	11,408	11,708	(£m)
Fixed operational carbon	908	876	875	897	878	874	877	869	866	880	(£m)
Embedded carbon	626	405	361	530	371	312	400	300	269	397	(£m)
Variable opex	1,858	883	579	1,602	970	587	1,108	657	363	956	(£m)
Variable carbon opex	369	154	106	337	215	118	192	115	56	185	(£m)

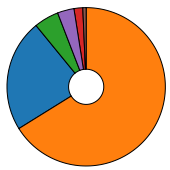
situation1 

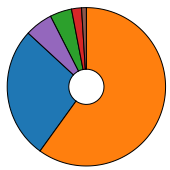
situation2 

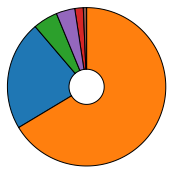
situation3 

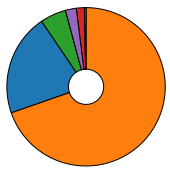
situation4 

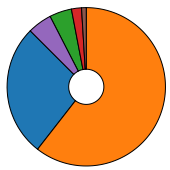
situation5 

situation6 

situation7 

situation8 

situation9 

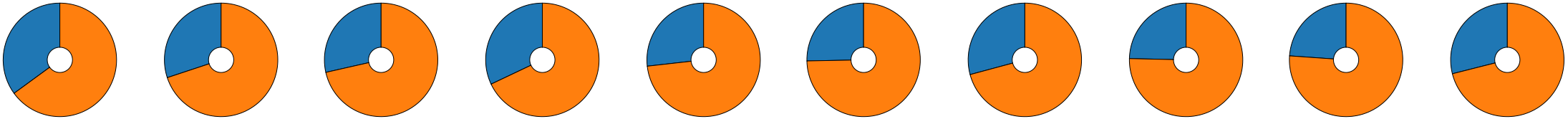
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	4,133,573	2,543,262	2,242,066	3,436,061	2,332,196	1,923,609	2,545,449	1,847,785	1,639,508	2,515,945	(tonnes)
Operational emissions	7,665,719	5,913,392	5,612,786	7,290,025	6,376,054	5,678,443	6,178,152	5,649,831	5,227,755	6,176,906	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

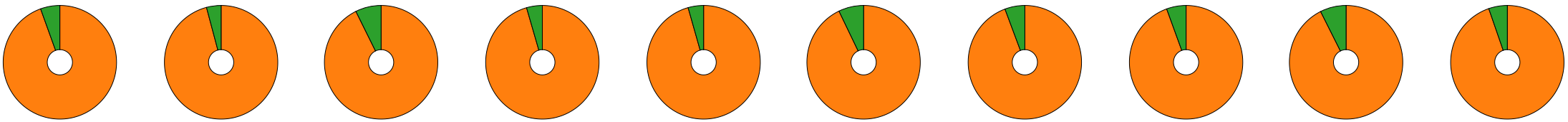


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	0	0	0	0	0	0	0	0	0	0	(GWh)
Grid	36,243	17,548	8,482	30,864	17,806	8,342	21,042	12,012	4,359	17,411	(GWh)
Renewable	2,117	761	671	1,453	821	642	1,272	708	349	977	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,568	65,049	63,438	68,595	64,556	62,054	65,164	60,728	59,622	64,530
SEA environmental disbenefit	129,521	91,717	79,758	116,335	92,593	76,677	93,825	71,992	64,015	90,715
Natural capital	5,763,871	2,370,201	4,409,096	1,369,605	5,207,505	10,155,152	3,150,326	7,854,748	10,378,395	5,628,766
Bio-diversity net gain	−274,807	−198,214	−182,062	−239,532	−231,066	−191,205	−198,693	−177,460	−165,132	−206,463

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,501	33,069	32,314	34,662	33,174	32,099	33,094	31,480	31,083	32,942

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	30.32	28.97	30.22	29.67	28.66	29.27	30.12	29.46	32.33	29.89
R1: Uncertainty of option supply/demand benefit	7.14	6.06	6.23	6.79	6.07	6.01	6.37	5.80	6.27	6.30
R3: Risk of service failure due to other physical hazards	6.66	6.55	6.93	6.54	6.44	6.66	6.76	6.61	7.42	6.73
R4: Availability of additional headroom	6.41	6.58	6.76	6.47	6.55	6.70	6.91	7.14	7.37	6.77
R5: Catchment/raw water quality risks (incl. climate change)	4.95	4.61	4.87	4.74	4.49	4.66	4.76	4.79	5.51	4.82
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.17	5.17	5.43	5.12	5.12	5.24	5.32	5.11	5.76	5.27
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

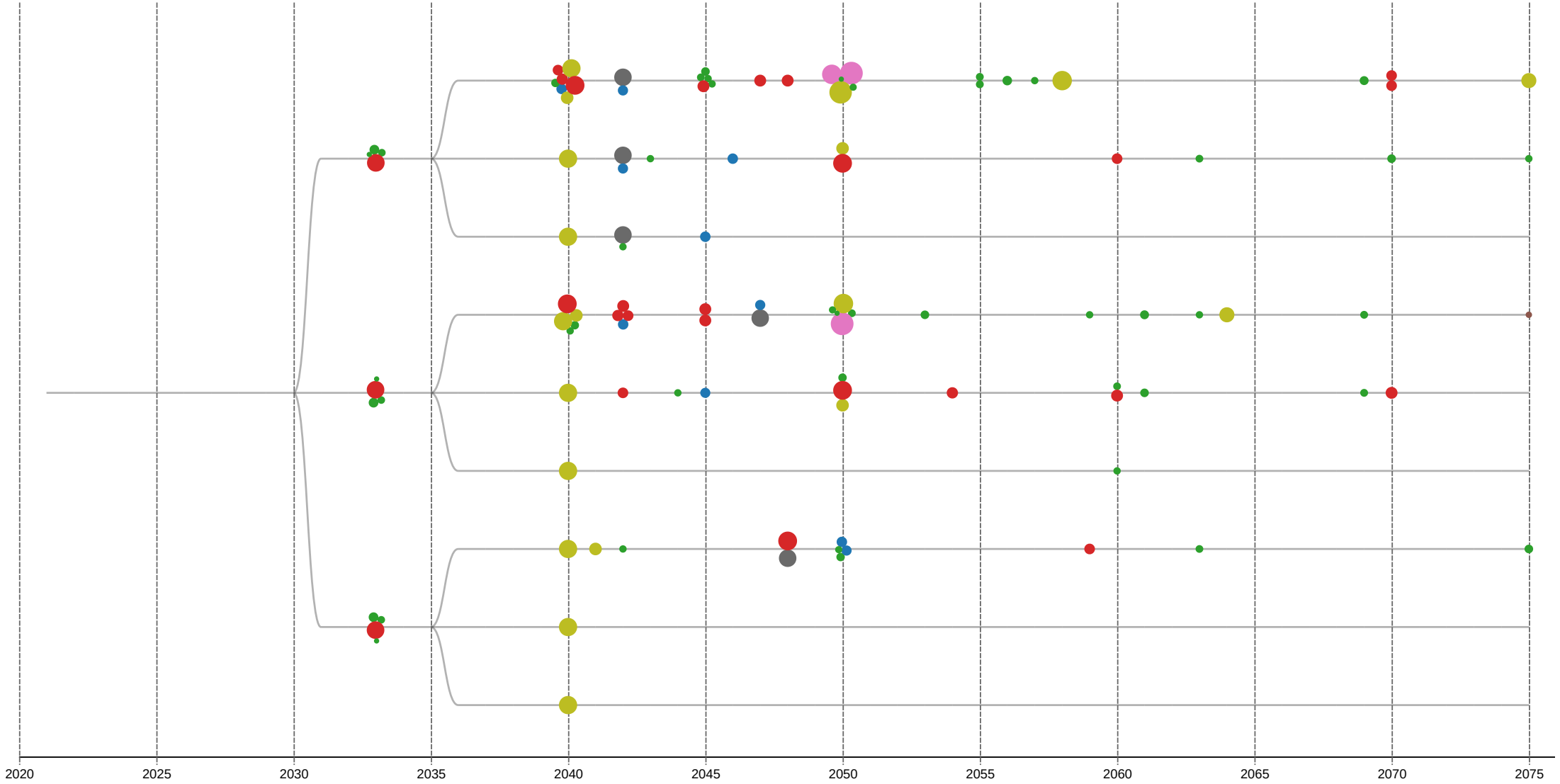
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.67	15.07	16.58	13.94	15.05	16.15	15.31	16.60	18.75	15.79
A3: Operational complexity and flexibility	5.71	5.91	6.34	5.71	5.80	6.09	6.05	6.01	6.82	6.05
A4: WRZ connectivity	8.92	9.11	10.19	8.18	9.21	10.01	9.22	10.54	11.88	9.70
A7: Customer relations support engagement with demand management	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.78	19.27	20.20	19.61	19.44	19.93	20.08	20.23	22.56	20.12
E1: Scaleability and modularity of proposed changes	8.35	8.20	8.80	8.21	8.27	8.73	8.49	8.88	9.93	8.65
E2: Intervention lead times	5.30	5.15	5.16	5.38	5.22	5.08	5.45	5.26	5.82	5.31
E3: Reliance on external bodies to deliver changes	6.13	5.92	6.23	6.02	5.95	6.12	6.14	6.09	6.81	6.16
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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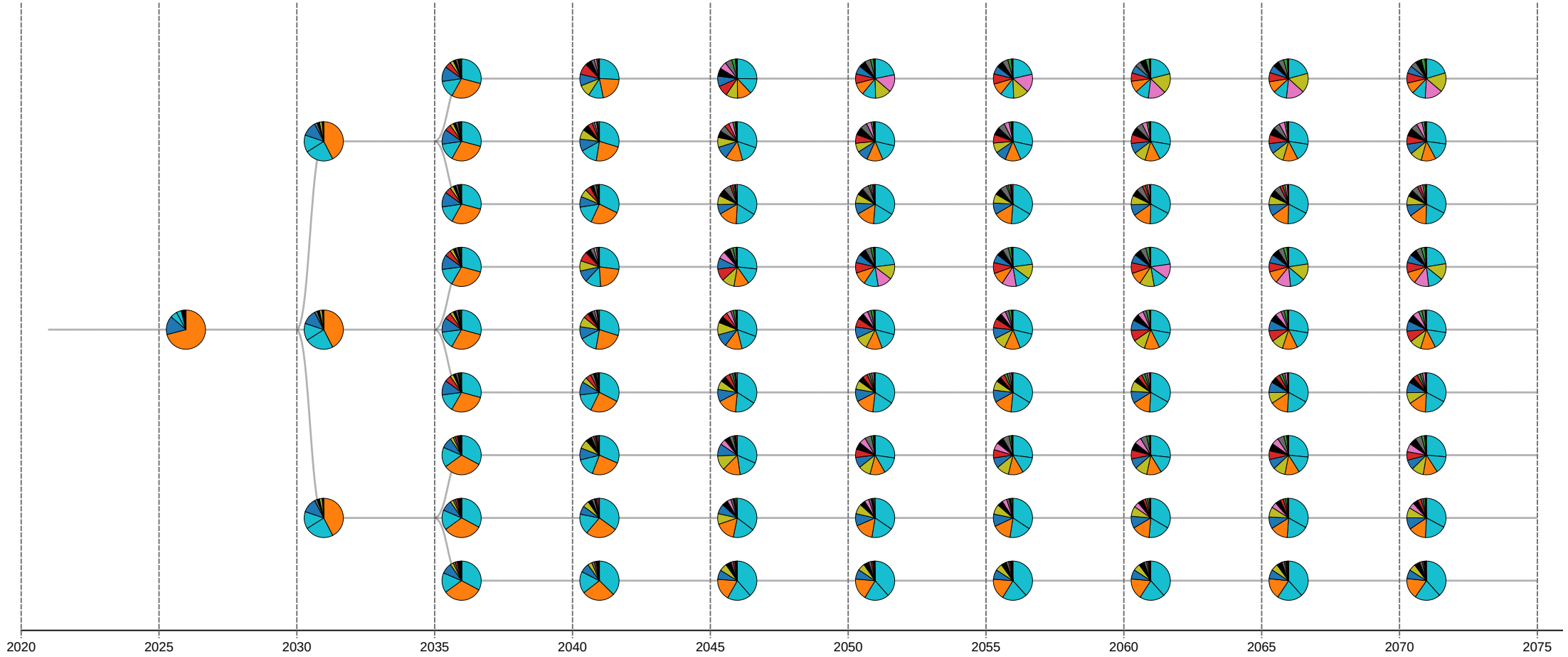
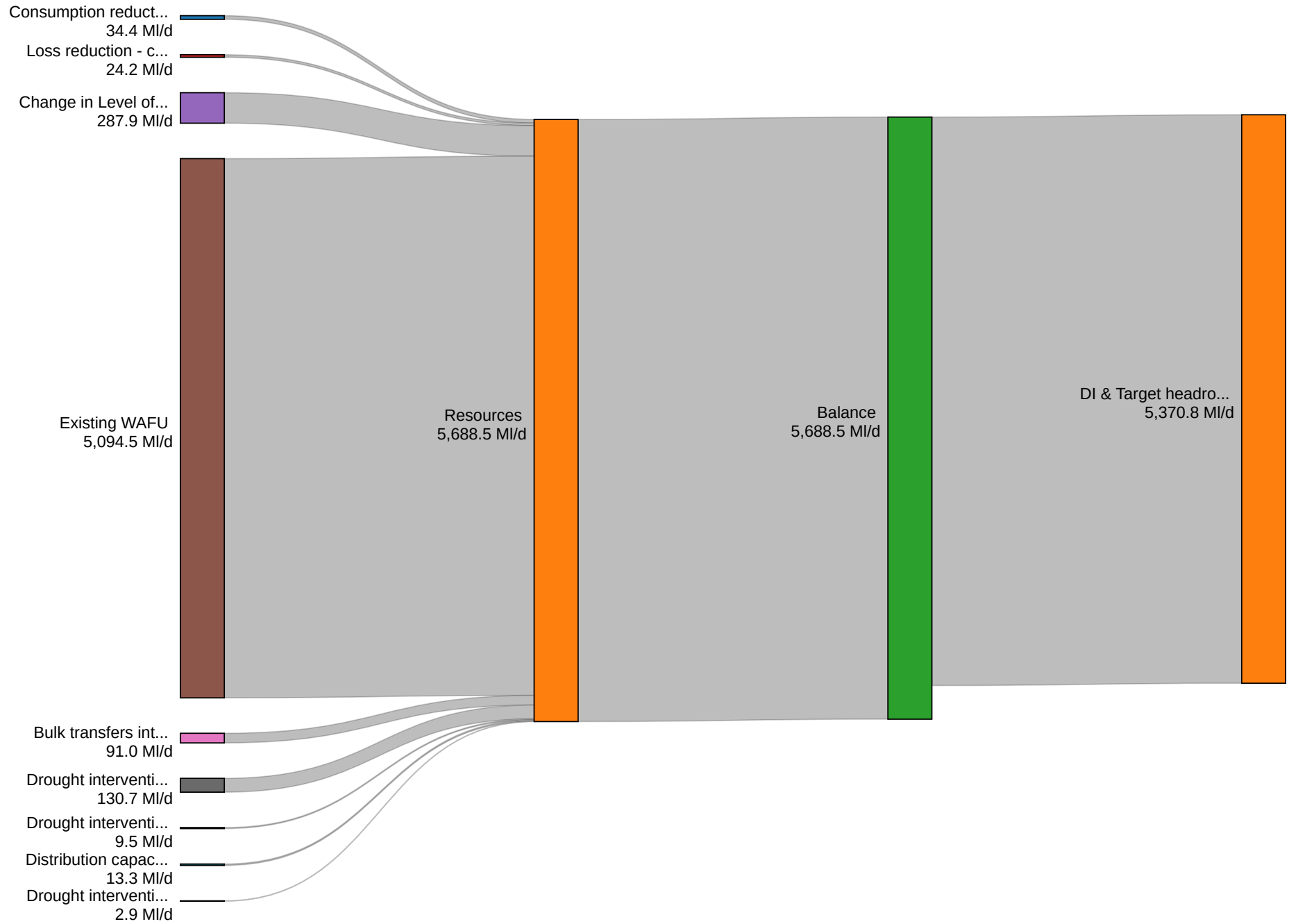
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

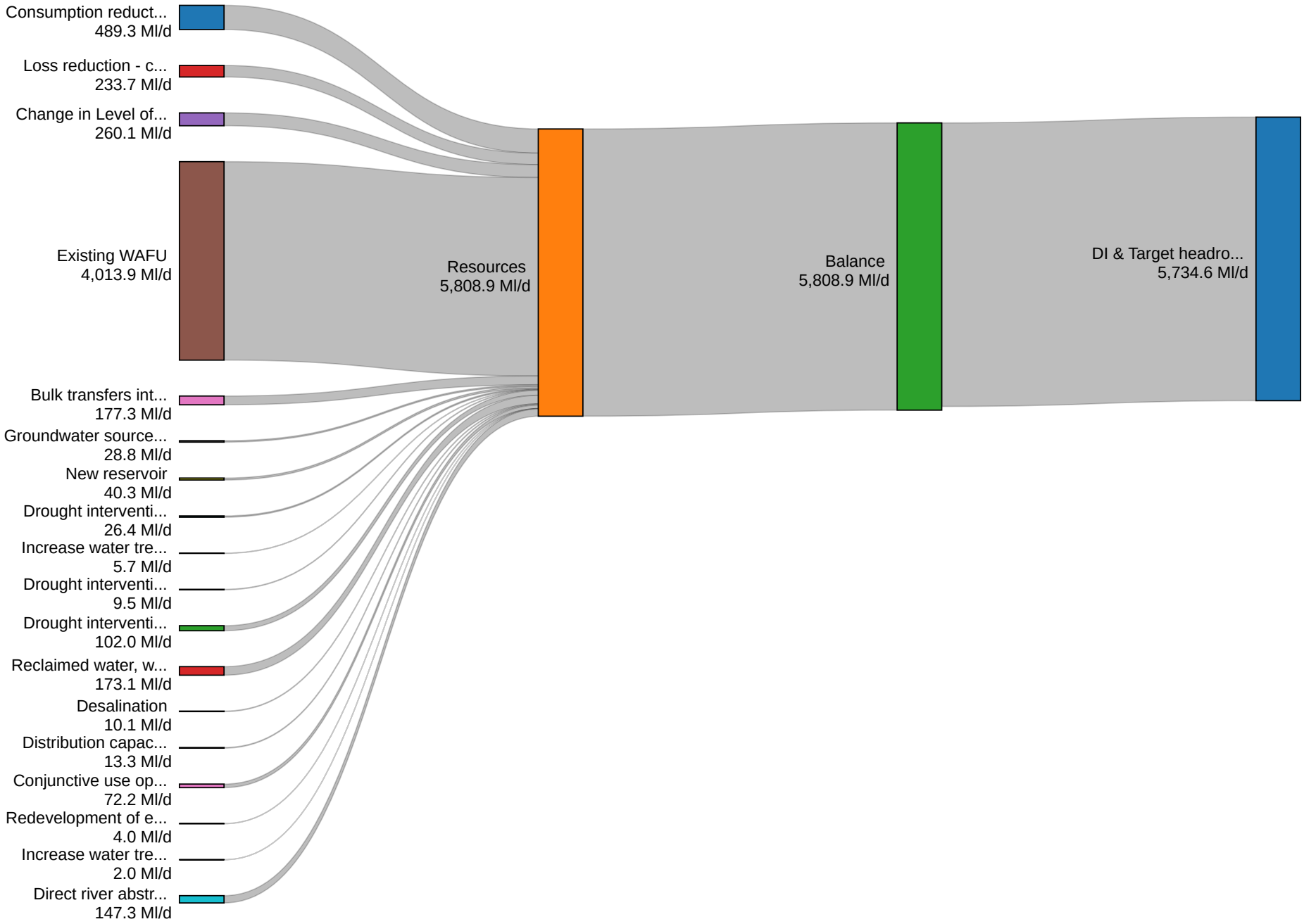


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

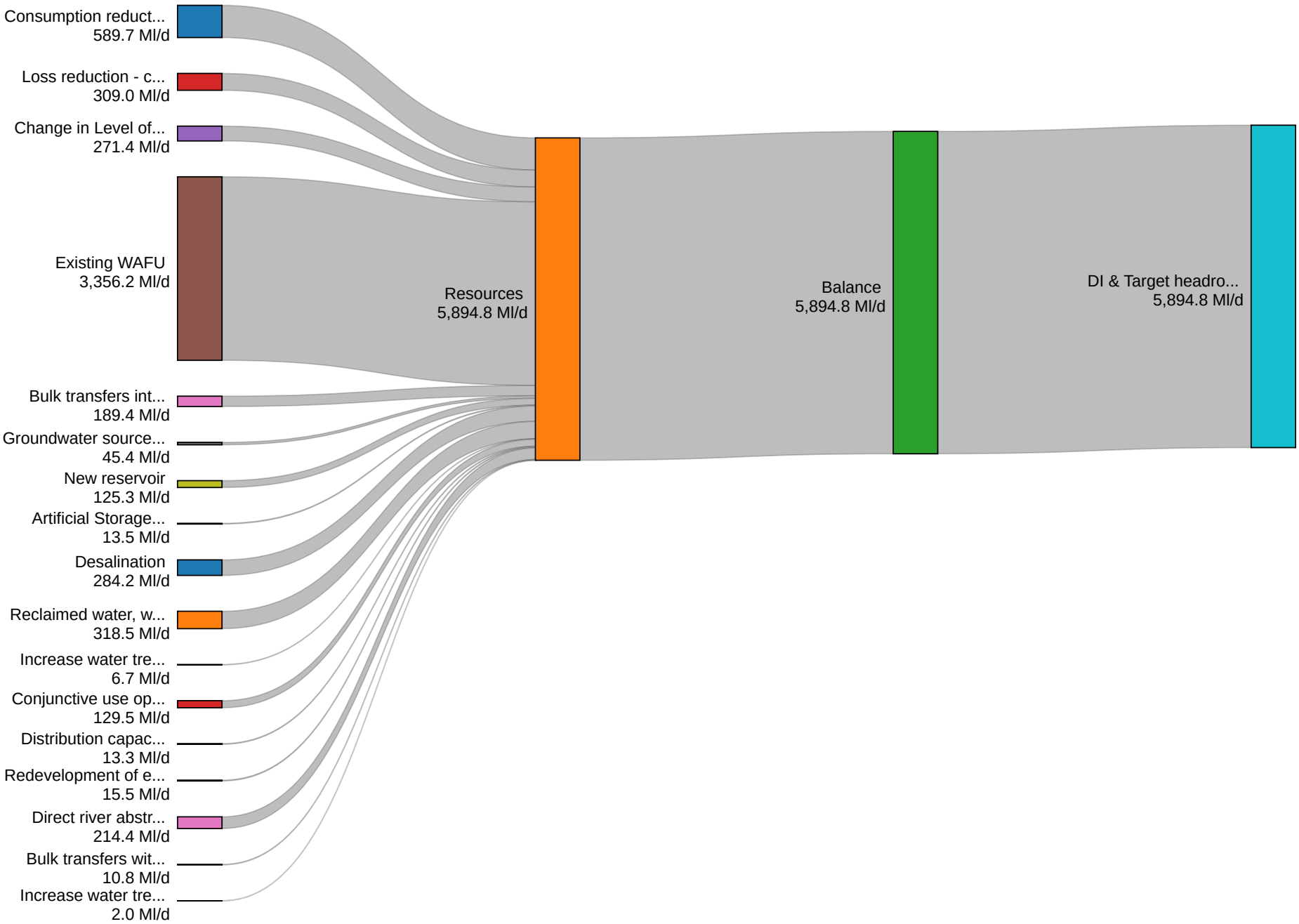
Situation 4 - 2026 (Thames Water)



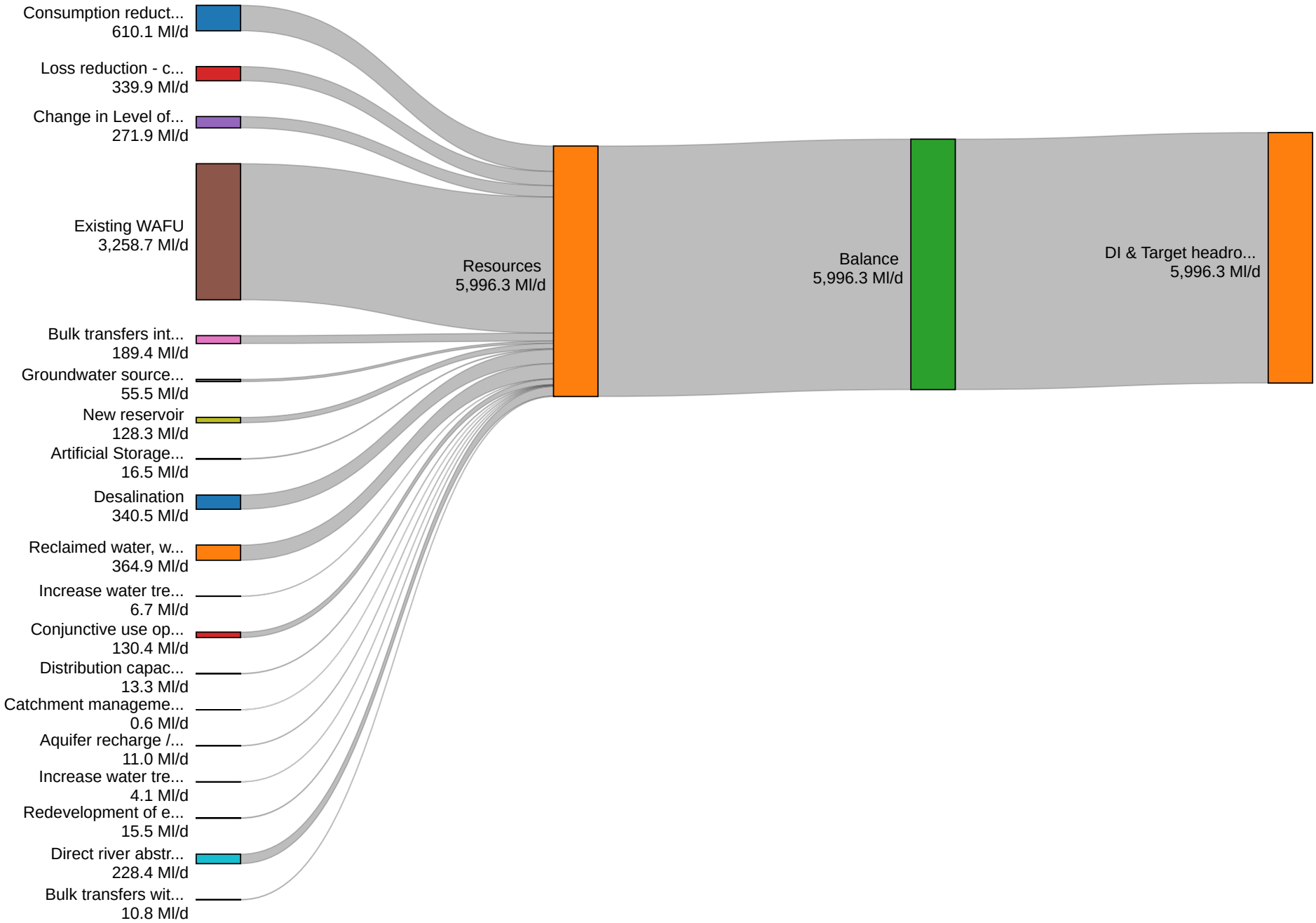
Situation 4 - 2040 (Thames Water)



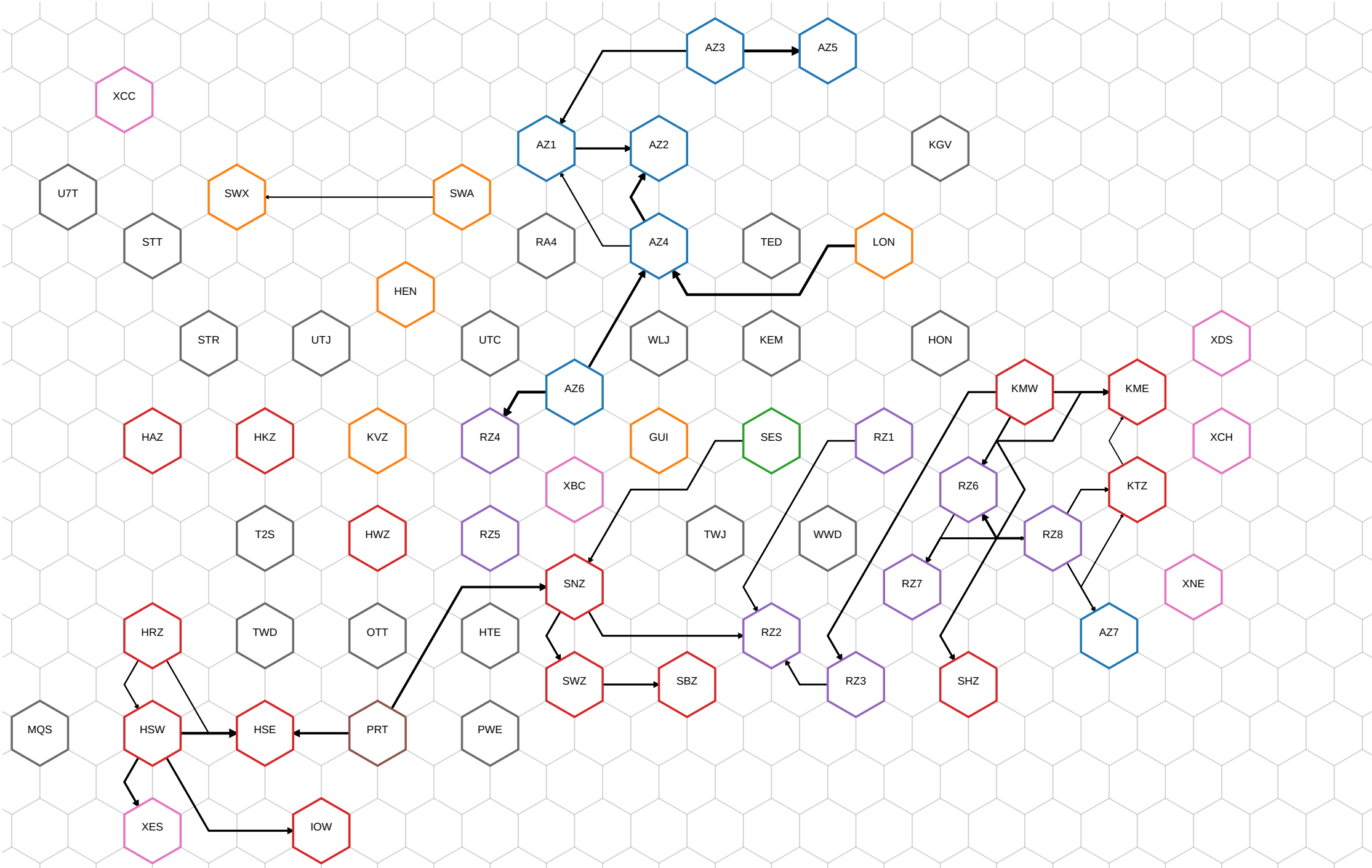
Situation 4 - 2050 (Thames Water)



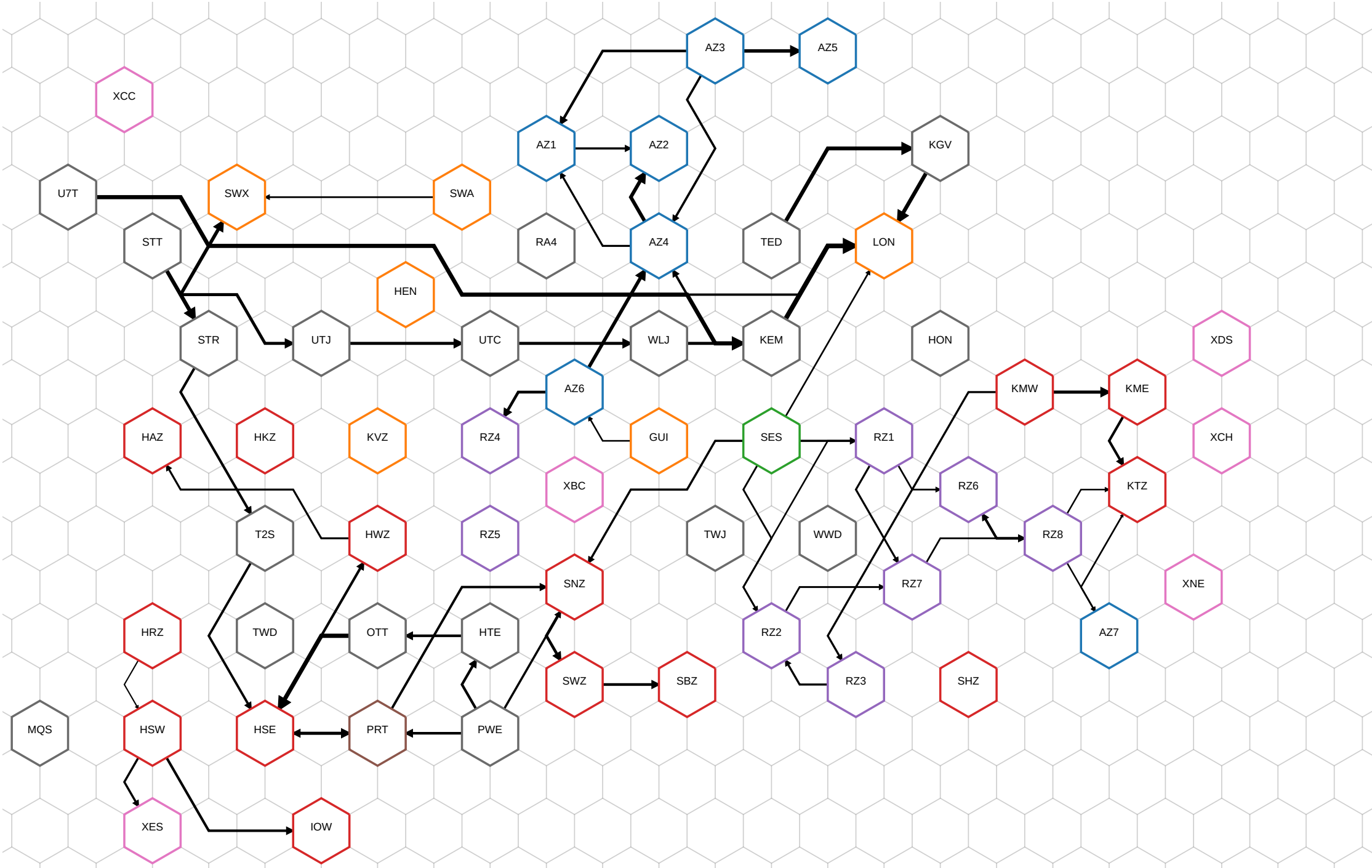
Situation 4 - 2075 (Thames Water)



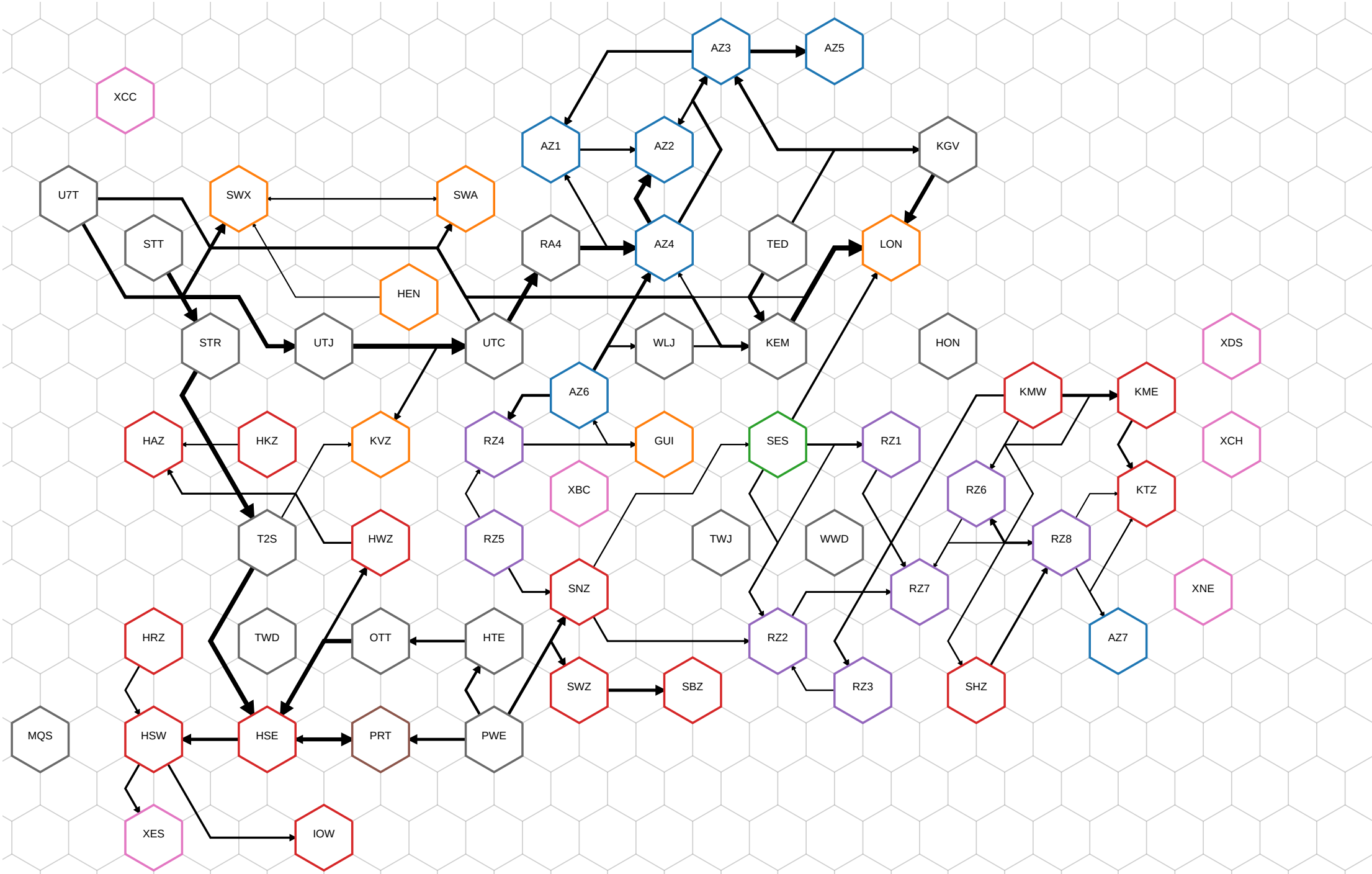
Situation 4 - 2026



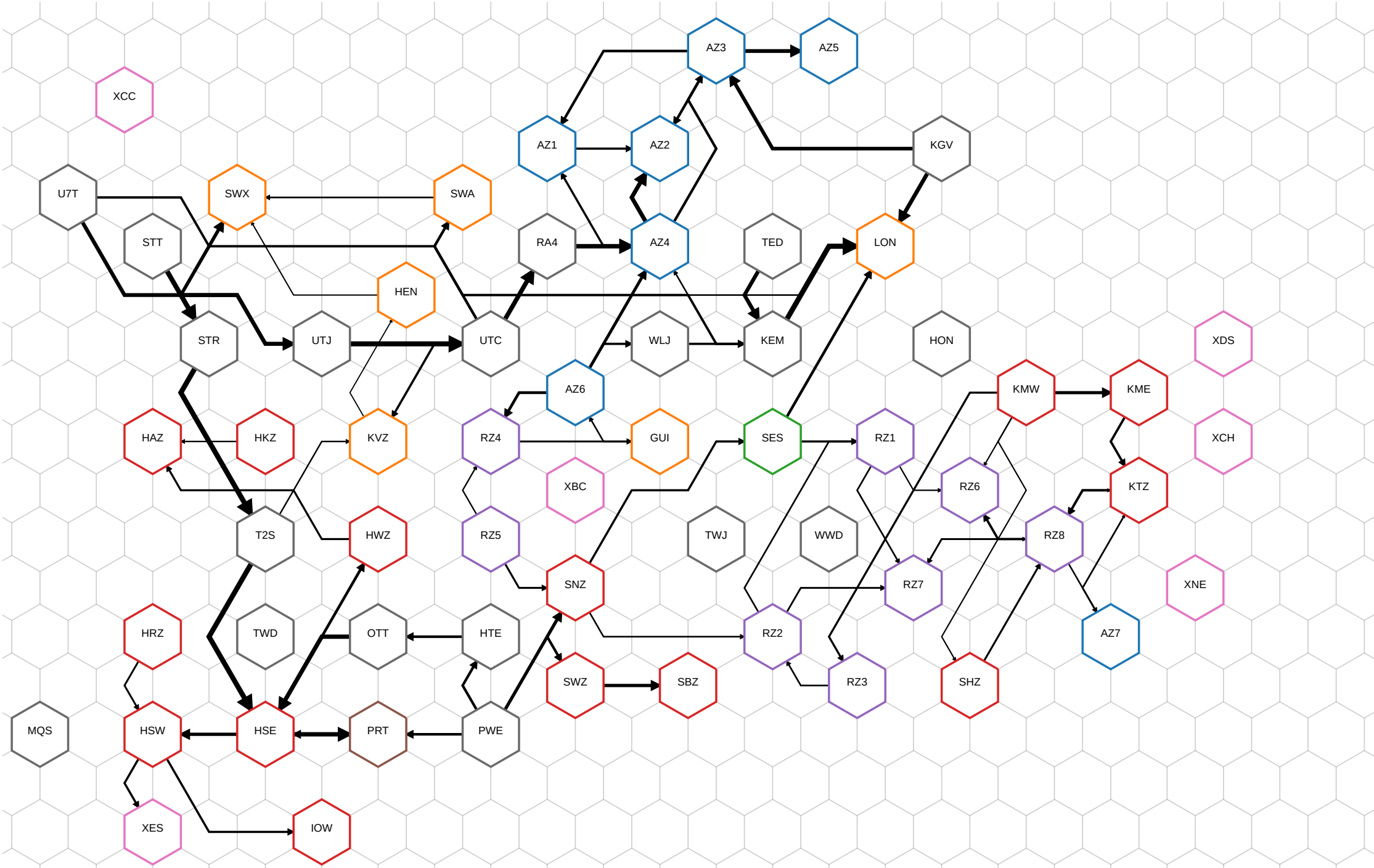
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED H + SESRO 125

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro125-2075
Description	Least cost run with hybrid-h government interventions with increased capacity of T2S transfer to 200 Ml/d and increased Otterbourne - Gaters Mill transfer to 95 Ml/d. No cost changes to account for the increased capacities have been included. Includes a 6 Ml/d emergency deficit in RZ6 in 2049. Includes only SESRO 125 Mm3. Extend Testwood and Candover drought permits to 2040.
Created at	06/07/2023, 21:29:10
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro125
Setting description	Emergency options in RZ6 (2049). Excluding SES low, medium and high DMP baskets. Increase capacity of T2S transfer to 200 Ml/d and expand Otterbourne - Gaters Mill transfer to 95 Ml/d. Exclude all SESRO variants except 125. Extend Testwood and Candover drought permits to 2040.
Optimised discount rate	STPR

Metrics

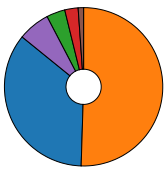
Net present value (Cost)

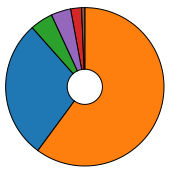
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	23,448	18,842	17,863	21,716	18,540	17,509	18,902	17,460	16,638	18,991	(£m)
Cost w/o deficit (STPR)	23,448	18,842	17,863	21,716	18,540	17,509	18,902	17,460	16,638	18,991	(£m)
Cost w/ deficit (IGEQ)	36,694	28,004	26,217	33,423	27,503	25,625	28,325	25,610	24,117	28,391	(£m)
Cost w/o deficit (IGEQ)	36,694	28,004	26,217	33,423	27,503	25,625	28,325	25,610	24,117	28,391	(£m)
Cost w/ deficit (LTDR)	25,992	20,637	19,510	23,981	20,298	19,110	20,741	19,066	18,119	20,828	(£m)
Cost w/o deficit (LTDR)	25,992	20,637	19,510	23,981	20,298	19,110	20,741	19,066	18,119	20,828	(£m)

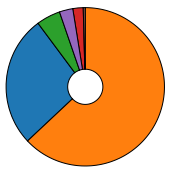
Cost breakdown (STPR)

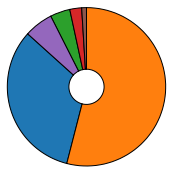
Select Company: Total

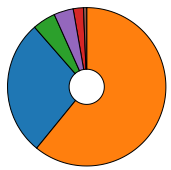
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,291	5,340	4,791	7,093	5,132	4,534	5,284	4,443	3,981	5,432	(£m)
Fixed opex	11,839	11,323	11,255	11,728	11,288	11,212	11,311	11,208	11,148	11,368	(£m)
Fixed operational carbon	895	877	875	884	876	874	877	869	866	877	(£m)
Embedded carbon	639	420	379	525	388	339	405	334	302	415	(£m)
Variable opex	1,525	756	490	1,274	734	477	886	537	301	775	(£m)
Variable carbon opex	259	125	74	211	122	72	139	68	41	123	(£m)

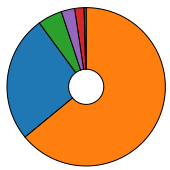
situation1 

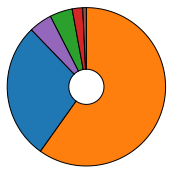
situation2 

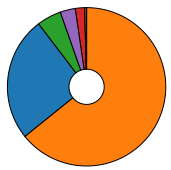
situation3 

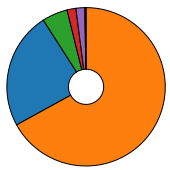
situation4 

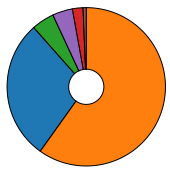
situation5 

situation6 

situation7 

situation8 

situation9 

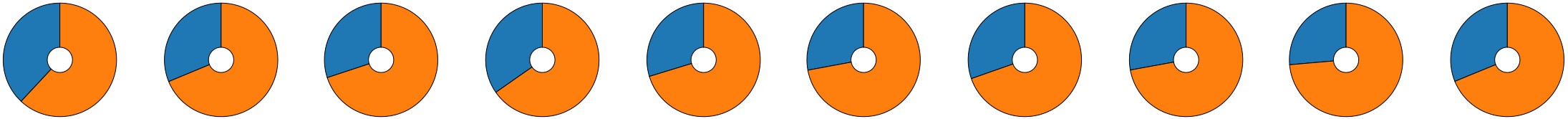
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	4,171,354	2,609,613	2,323,795	3,383,444	2,416,126	2,083,580	2,549,740	2,052,377	1,835,965	2,602,888	(tonnes)
Operational emissions	6,797,617	5,742,754	5,402,684	6,367,846	5,715,147	5,380,949	5,845,938	5,312,516	5,125,823	5,743,475	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

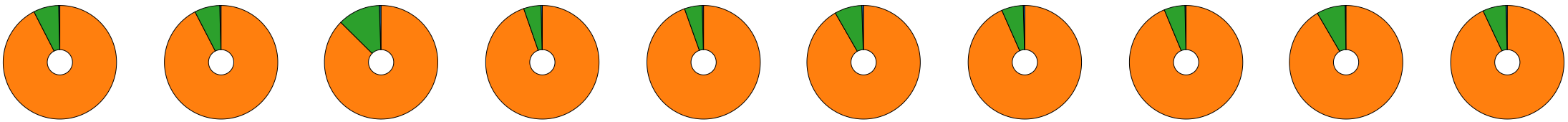


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	114	67	45	113	67	43	93	39	11	66	(GWh)
Grid	30,673	15,884	7,674	27,541	15,654	7,581	19,010	11,156	3,911	15,454	(GWh)
Renewable	2,392	1,241	1,061	1,436	836	644	1,260	708	349	1,103	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	72,536	66,503	65,362	69,748	65,884	64,100	66,496	62,869	61,739	66,137
SEA environmental disbenefit	126,191	92,453	80,645	113,294	89,052	75,250	95,370	72,804	66,134	90,133
Natural capital	81,646,425	86,250,881	86,441,889	74,822,185	78,538,531	81,825,059	78,315,859	79,463,054	82,109,154	81,045,893
Bio-diversity net gain	−249,294	−180,073	−163,166	−211,008	−166,297	−135,551	−172,687	−123,668	−109,240	−167,887

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,400	33,207	32,445	34,591	33,037	32,242	33,221	31,716	31,296	33,017

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.42	30.75	33.15	30.63	30.58	32.71	31.66	33.26	36.70	32.32
R1: Uncertainty of option supply/demand benefit	7.18	6.37	6.82	6.72	6.31	6.68	6.57	6.54	7.11	6.70
R3: Risk of service failure due to other physical hazards	7.02	7.10	7.79	6.89	7.07	7.70	7.27	7.76	8.74	7.48
R4: Availability of additional headroom	6.51	6.75	6.95	6.54	6.74	6.93	7.05	7.37	7.60	6.94
R5: Catchment/raw water quality risks (incl. climate change)	5.09	4.80	5.32	4.89	4.76	5.22	4.94	5.44	6.26	5.19
R6: Capacity of catchment services	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.62	5.72	6.27	5.59	5.68	6.18	5.82	6.15	6.98	6.00
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

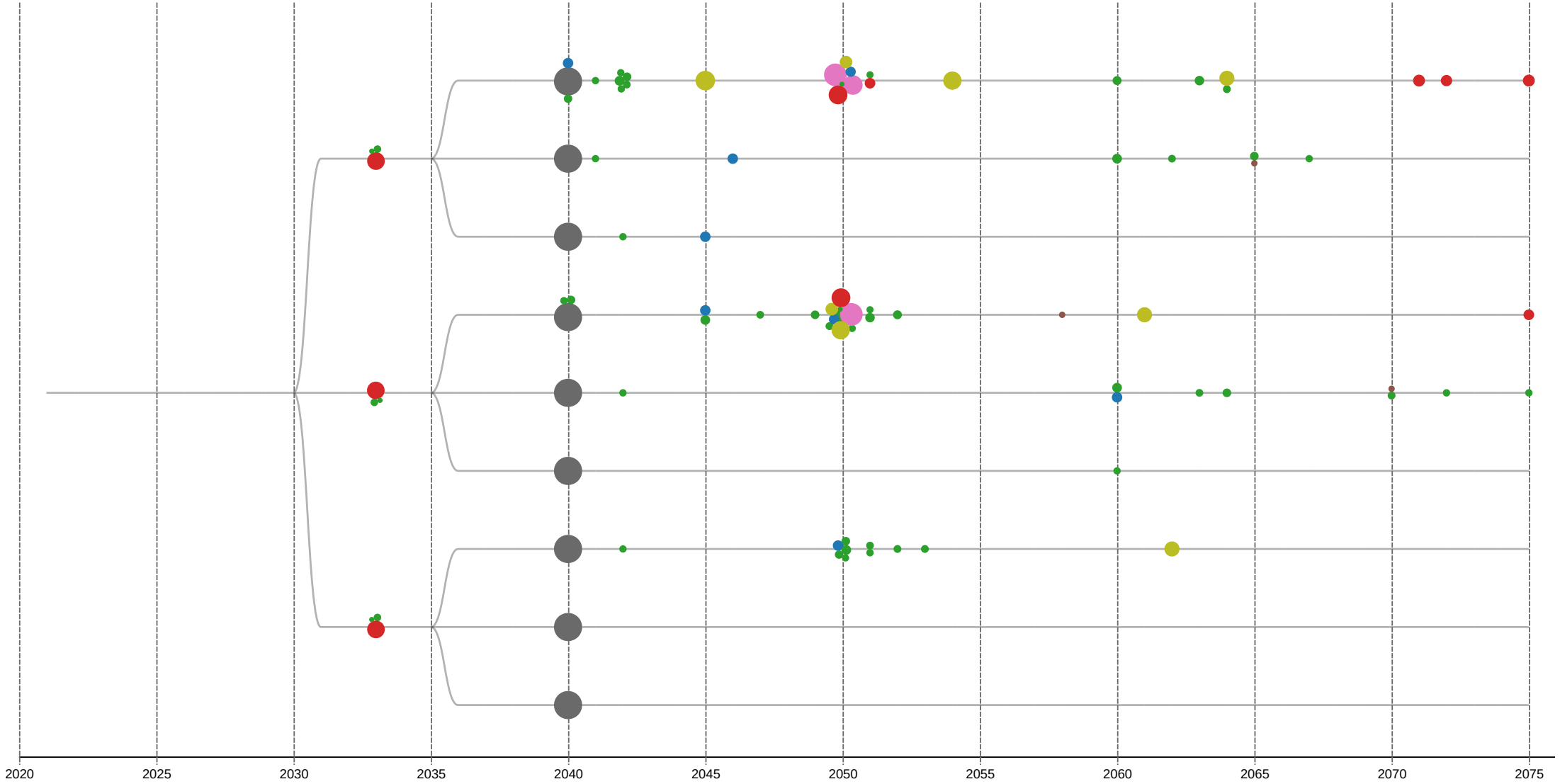
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	15.15	15.68	17.41	14.35	15.79	17.41	15.97	17.95	20.18	16.65
A3: Operational complexity and flexibility	6.18	6.56	7.22	6.19	6.58	7.19	6.71	7.22	8.24	6.90
A4: WRZ connectivity	8.93	9.07	10.14	8.11	9.16	10.18	9.21	10.68	11.89	9.71
A7: Customer relations support engagement with demand management	0.04	0.06	0.05	0.05	0.06	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.38	19.01	20.69	18.90	18.98	20.50	19.62	20.87	23.15	20.12
E1: Scaleability and modularity of proposed changes	8.13	8.13	8.86	7.96	8.14	8.81	8.39	9.02	10.10	8.62
E2: Intervention lead times	5.31	5.06	5.50	5.16	5.07	5.47	5.28	5.61	6.08	5.39
E3: Reliance on external bodies to deliver changes	5.94	5.81	6.32	5.78	5.76	6.22	5.95	6.24	6.98	6.11
E5: Collaborative land management	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00

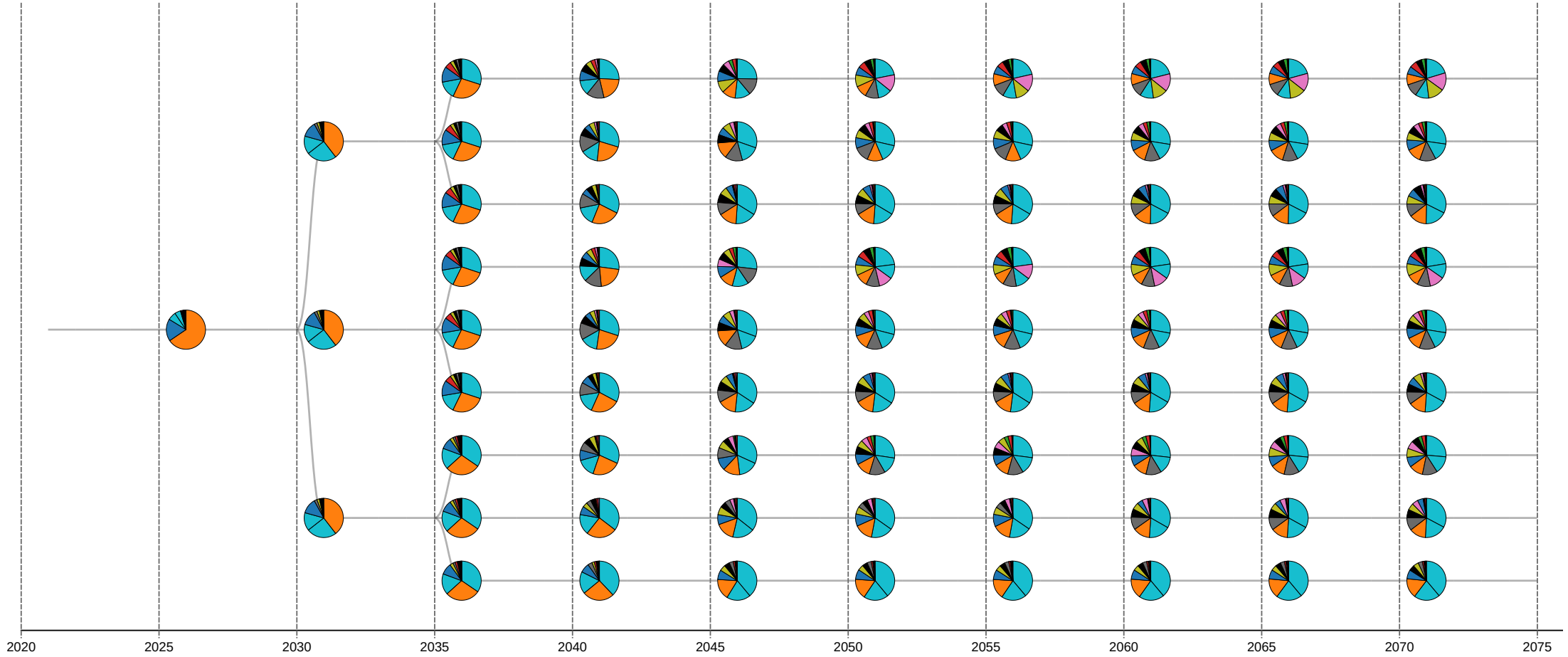
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
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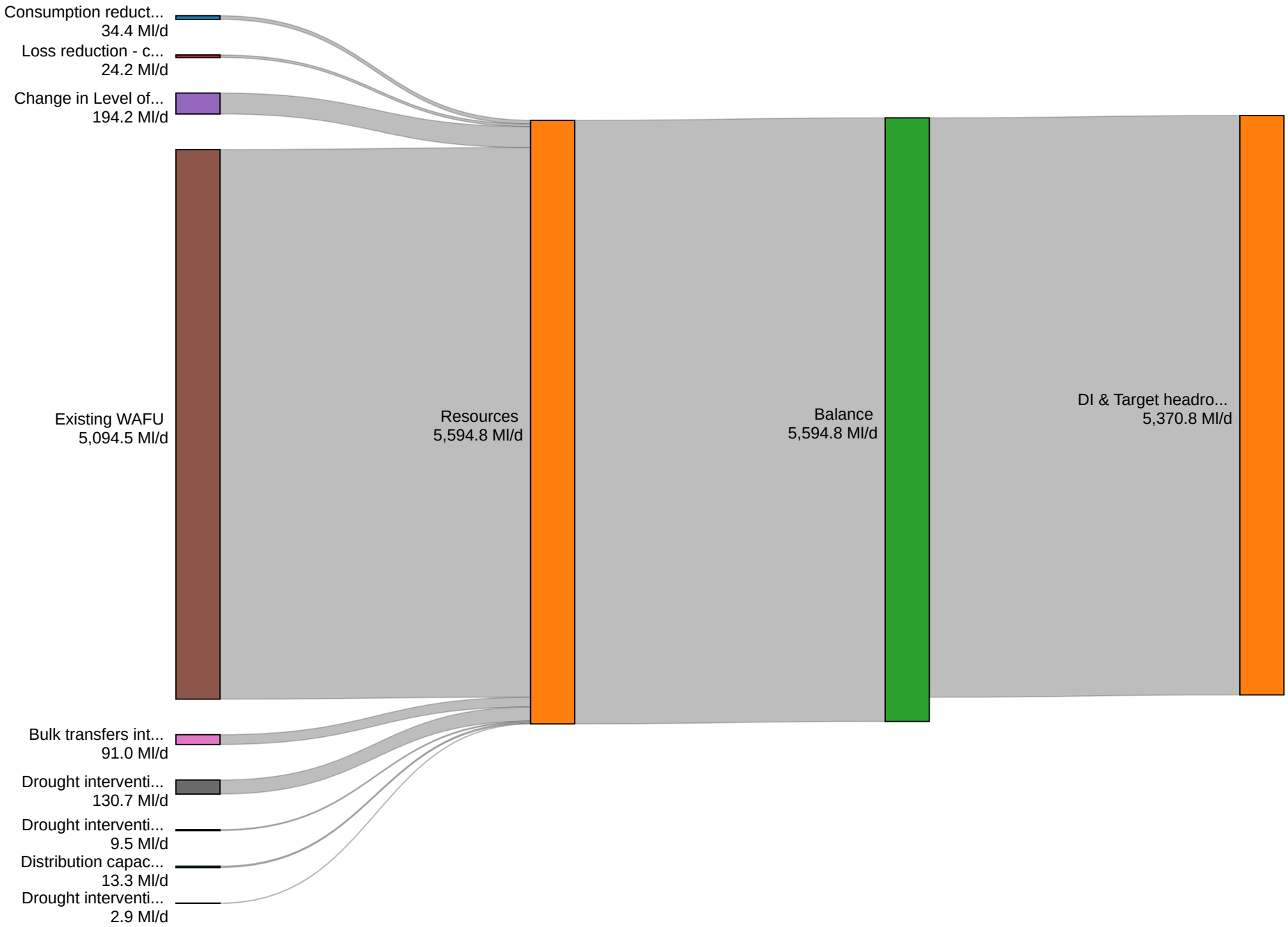
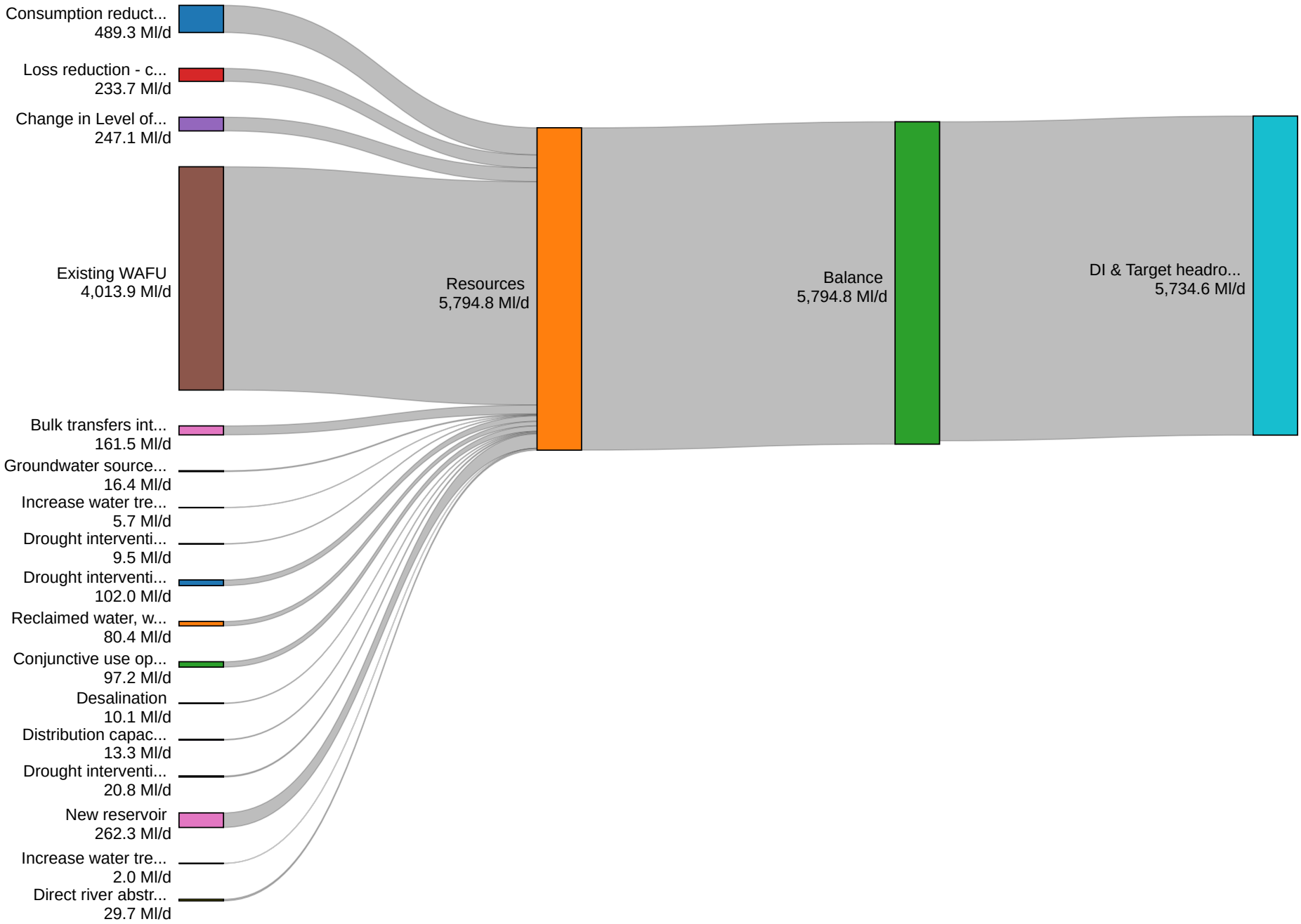
- Other

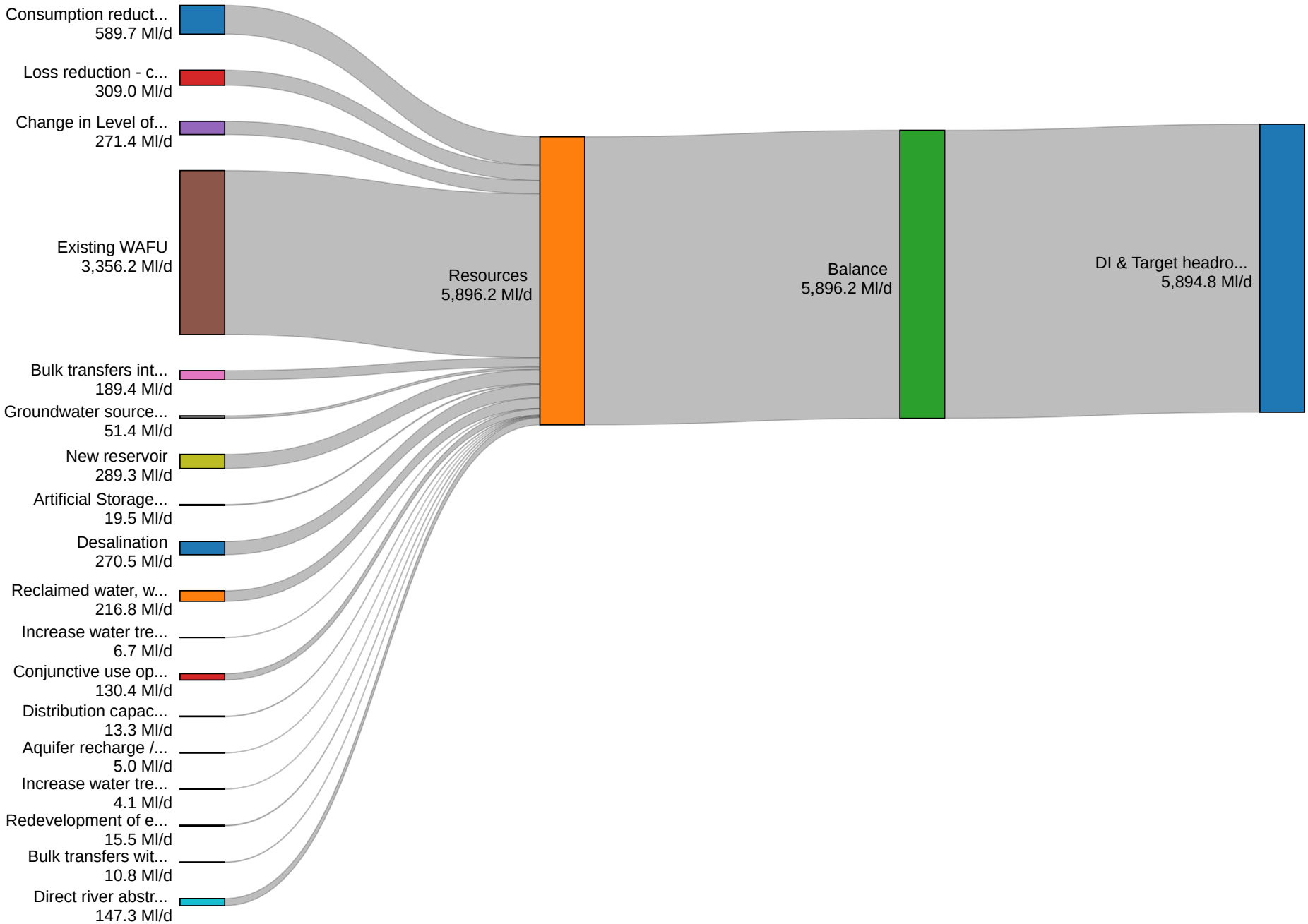
Situation 4 - 2026 (Thames Water)



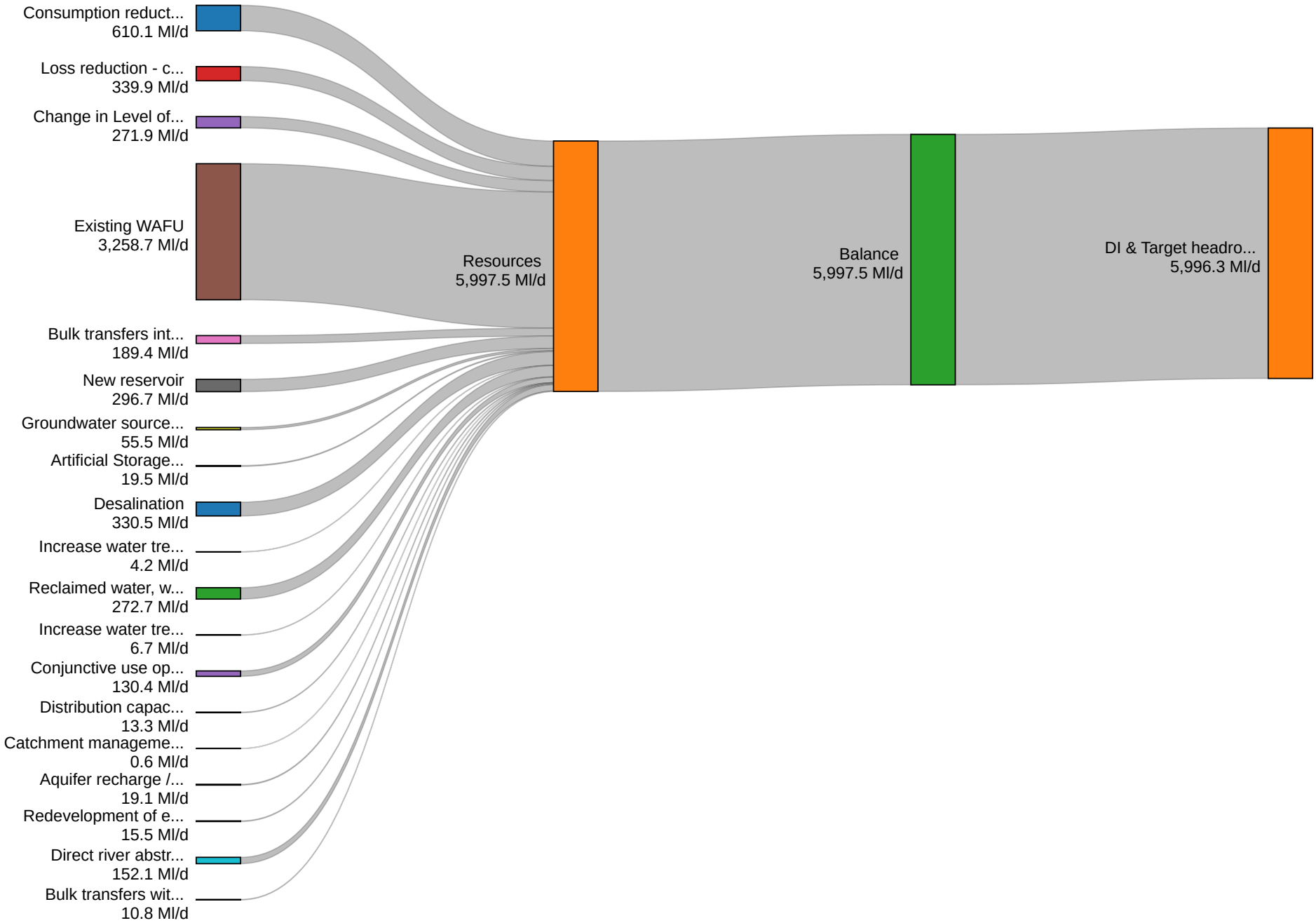
Situation 4 - 2040 (Thames Water)



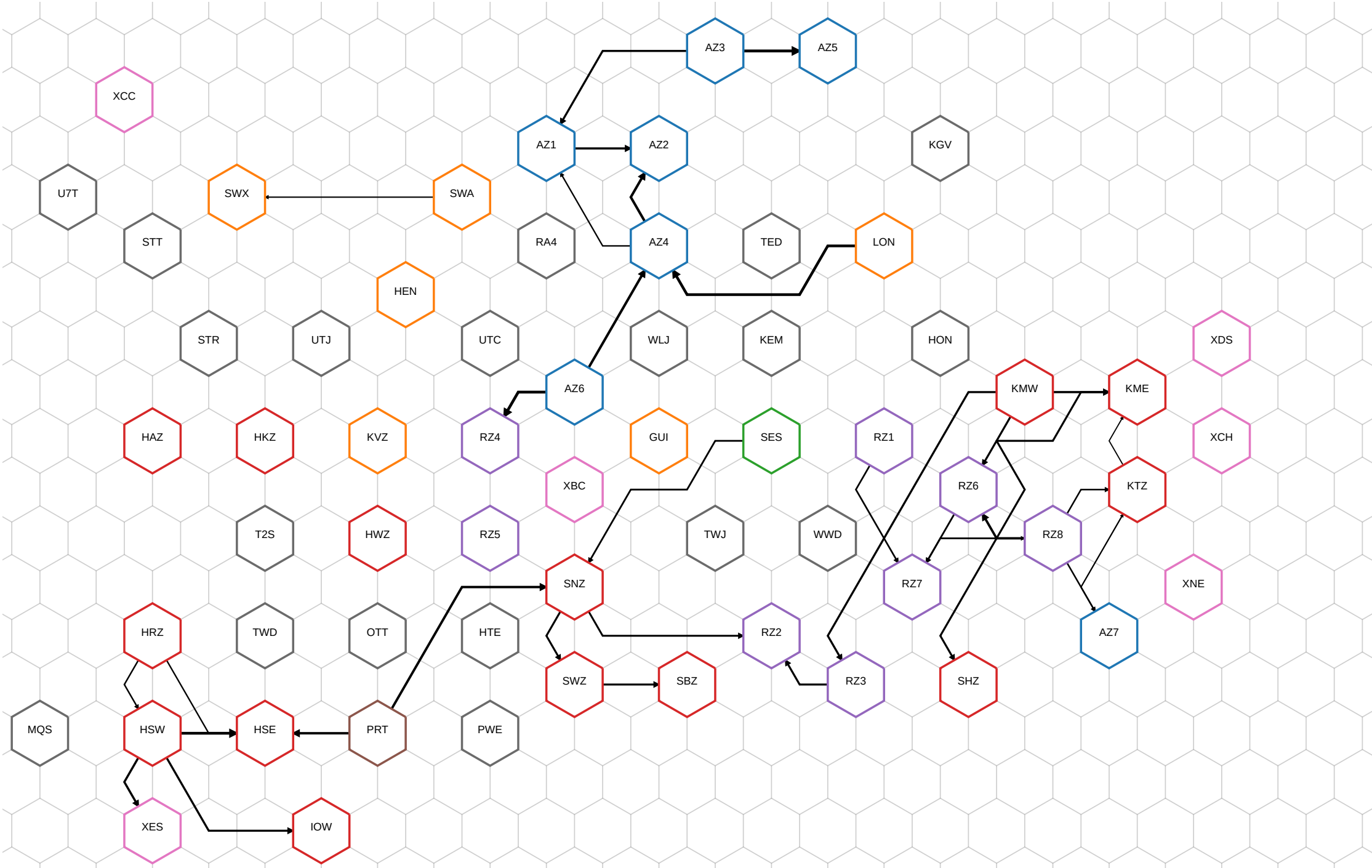
Situation 4 - 2050 (Thames Water)



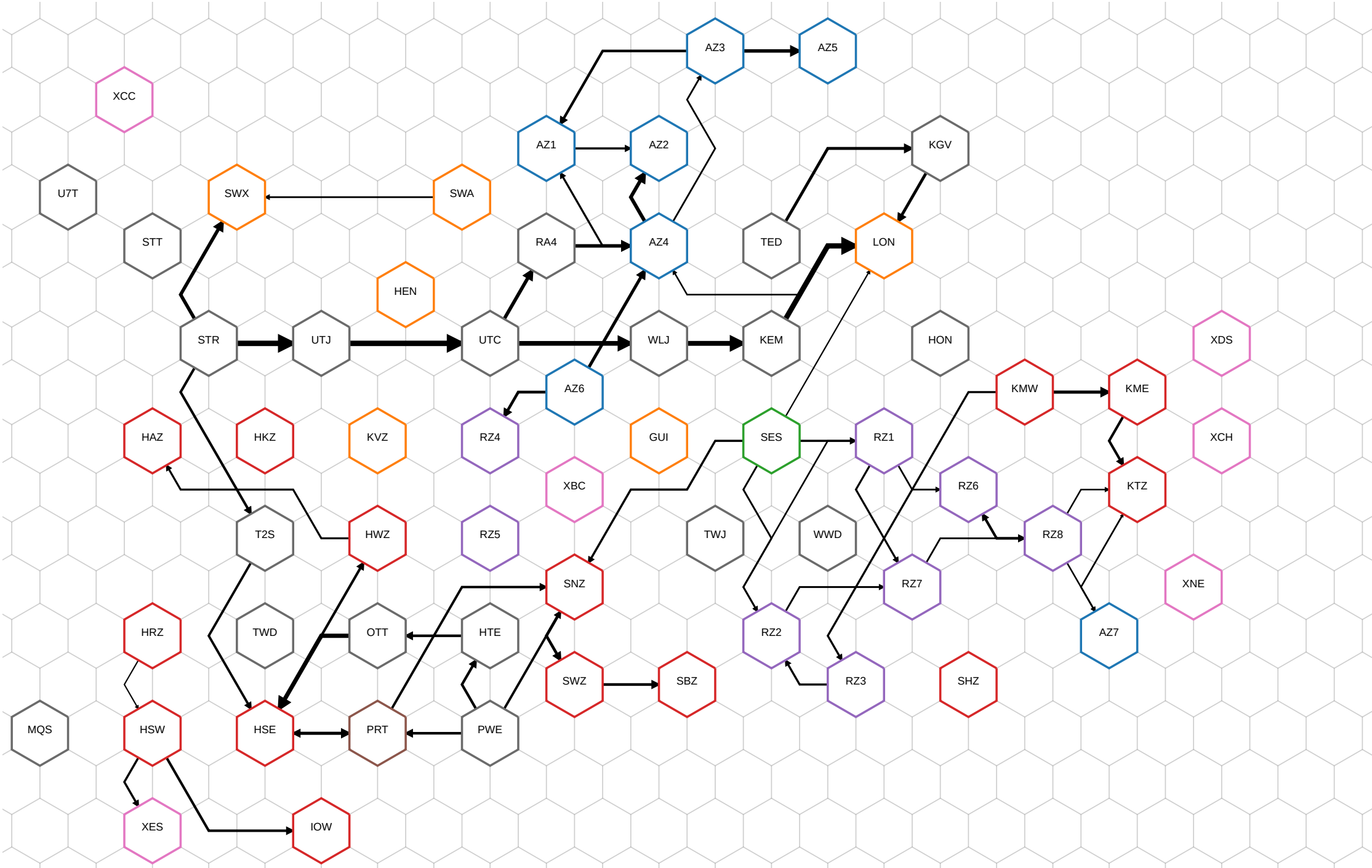
Situation 4 - 2075 (Thames Water)



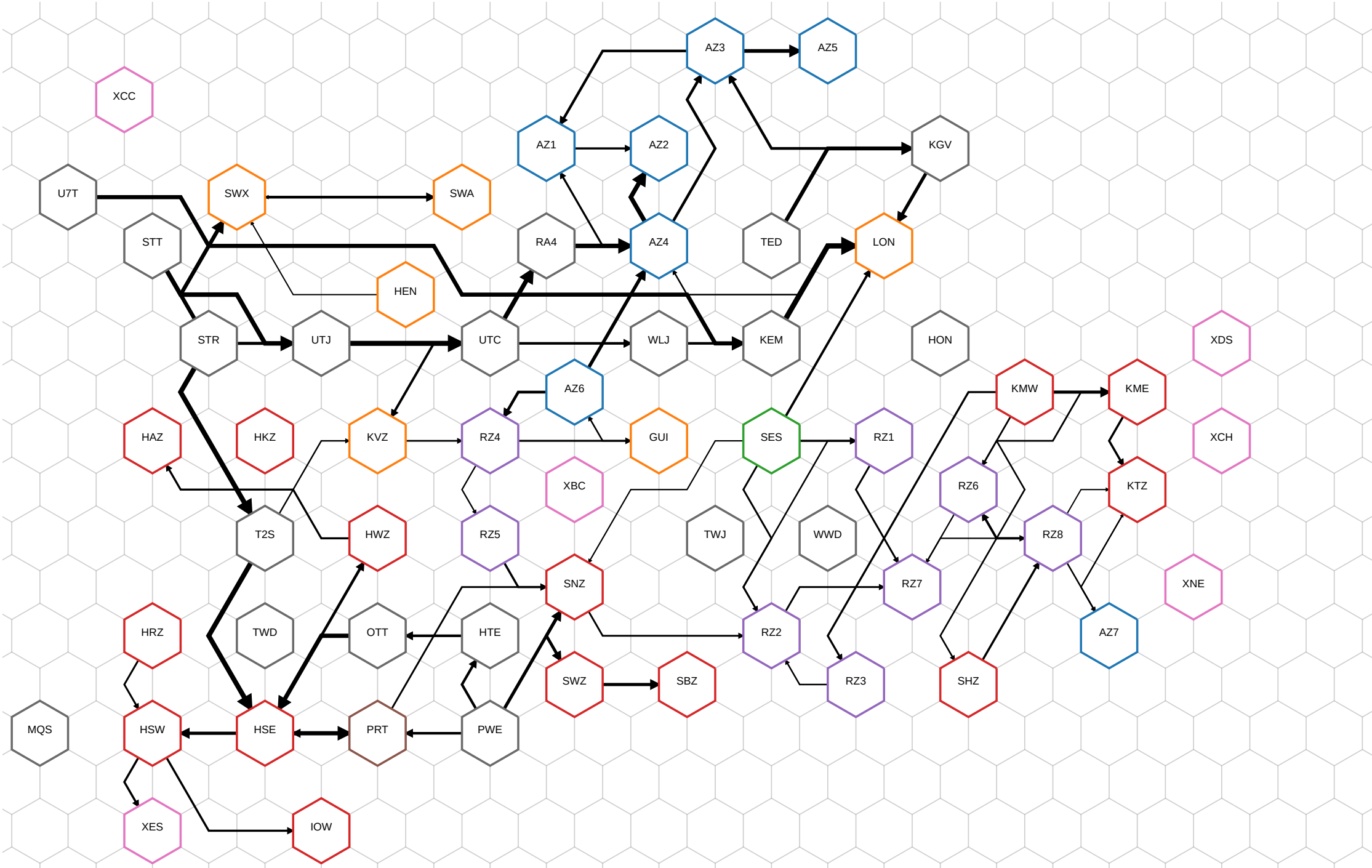
Situation 4 - 2026



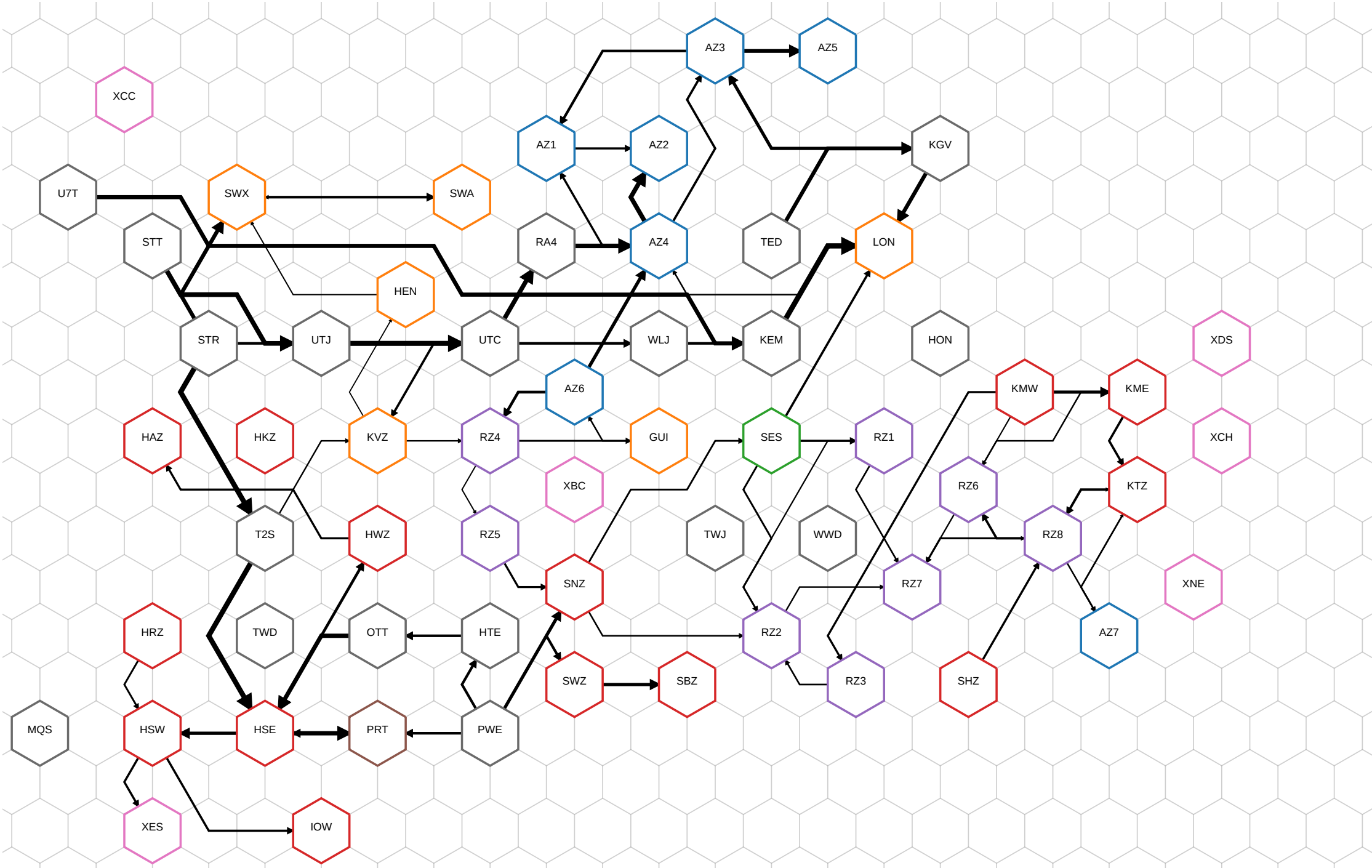
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED H + SESRO 100

IVM Summary: Thames Water

Home / jet-20230612-181202 / st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro100-2075

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro100-2075
Description	Least cost run with hybrid-h government interventions with increased capacity of T2S transfer to 200 Ml/d and increased Otterbourne - Gaters Mill transfer to 95 Ml/d. No cost changes to account for the increased capacities have been included. Includes a 6 Ml/d emergency deficit in RZ6 in 2049. Includes only SESRO 100 Mm3. Extend Testwood and Candover drought permits to 2040.
Created at	06/07/2023, 16:57:42
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro100
Setting description	Emergency options in RZ6 (2049). Excluding SES low, medium and high DMP baskets. Increase capacity of T2S transfer to 200 Ml/d and expand Otterbourne - Gaters Mill transfer to 95 Ml/d. Exclude all SESRO variants except 100. Extend Testwood and Candover drought permits to 2040.
Optimised discount rate	STPR

Metrics

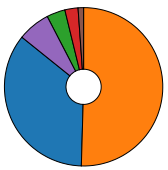
Net present value (Cost)

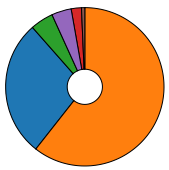
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	23,542	18,655	17,516	21,831	18,499	17,377	19,049	17,317	16,498	18,920	(£m)
Cost w/o deficit (STPR)	23,542	18,655	17,516	21,831	18,499	17,377	19,049	17,317	16,498	18,920	(£m)
Cost w/ deficit (IGEQ)	36,893	27,777	25,668	33,655	27,505	25,439	28,655	25,409	23,917	28,324	(£m)
Cost w/o deficit (IGEQ)	36,893	27,777	25,668	33,655	27,505	25,439	28,655	25,409	23,917	28,324	(£m)
Cost w/ deficit (LTDR)	26,105	20,441	19,124	24,118	20,263	18,967	20,922	18,912	17,968	20,758	(£m)
Cost w/o deficit (LTDR)	26,105	20,441	19,124	24,118	20,263	18,967	20,922	18,912	17,968	20,758	(£m)

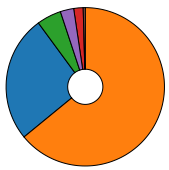
Cost breakdown (STPR)

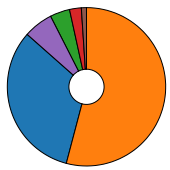
Select Company: Total

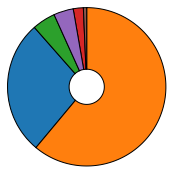
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,316	5,203	4,527	7,077	5,077	4,414	5,282	4,309	3,855	5,340	(£m)
Fixed opex	11,878	11,307	11,223	11,812	11,296	11,211	11,409	11,207	11,147	11,388	(£m)
Fixed operational carbon	893	877	875	886	876	874	877	870	866	877	(£m)
Embedded carbon	632	392	338	524	382	328	410	321	290	402	(£m)
Variable opex	1,558	749	479	1,305	743	477	923	540	301	786	(£m)
Variable carbon opex	264	126	74	227	125	72	148	70	41	127	(£m)

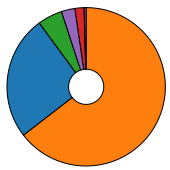
situation1 

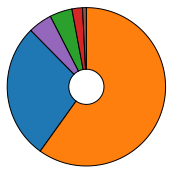
situation2 

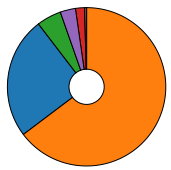
situation3 

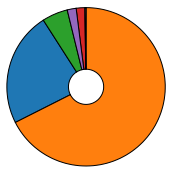
situation4 

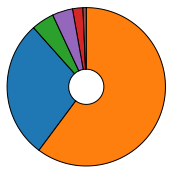
situation5 

situation6 

situation7 

situation8 

situation9 

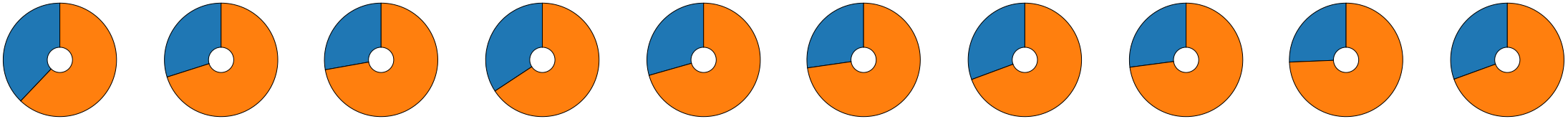
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	4,157,496	2,455,047	2,080,573	3,382,662	2,390,739	2,017,534	2,606,401	1,978,583	1,765,846	2,537,209	(tonnes)
Operational emissions	6,816,903	5,755,720	5,403,813	6,491,262	5,739,222	5,381,025	5,902,830	5,328,765	5,125,830	5,771,708	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

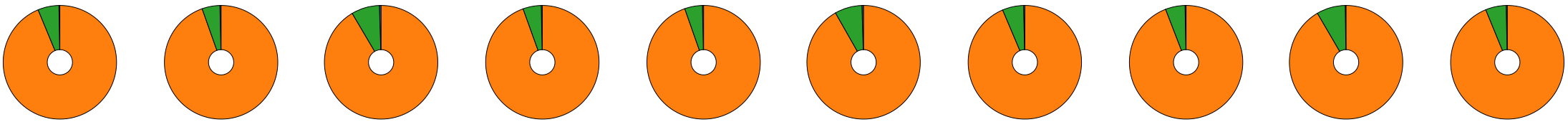


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	93	58	41	93	58	40	75	36	10	56	(GWh)
Grid	31,948	15,945	7,663	27,262	15,750	7,577	19,133	11,325	3,903	15,612	(GWh)
Renewable	2,044	858	671	1,500	839	642	1,232	673	349	979	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	72,527	66,402	64,831	69,698	65,992	64,063	66,366	62,749	61,695	66,036
SEA environmental disbenefit	126,177	92,978	79,140	114,804	89,990	75,259	91,488	73,026	66,126	89,888
Natural capital	80,439,586	78,355,842	78,853,257	74,984,281	79,347,411	82,621,094	77,549,722	80,227,179	82,905,172	79,475,949
Bio-diversity net gain	−233,051	−163,345	−144,579	−209,889	−154,518	−123,261	−153,767	−113,062	−97,141	−154,735

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,431	33,236	32,420	34,690	33,119	32,232	33,050	31,735	31,295	33,023

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.17	29.91	31.66	30.11	29.96	31.73	30.90	32.15	35.50	31.45
R1: Uncertainty of option supply/demand benefit	7.13	6.23	6.48	6.61	6.23	6.48	6.39	6.29	6.86	6.52
R3: Risk of service failure due to other physical hazards	6.94	6.88	7.41	6.74	6.89	7.43	7.07	7.45	8.42	7.25
R4: Availability of additional headroom	6.47	6.67	6.86	6.50	6.68	6.86	6.97	7.30	7.54	6.87
R5: Catchment/raw water quality risks (incl. climate change)	5.07	4.65	5.01	4.80	4.67	5.04	4.82	5.25	6.04	5.04
R6: Capacity of catchment services	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.55	5.48	5.90	5.45	5.48	5.91	5.65	5.86	6.65	5.77
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

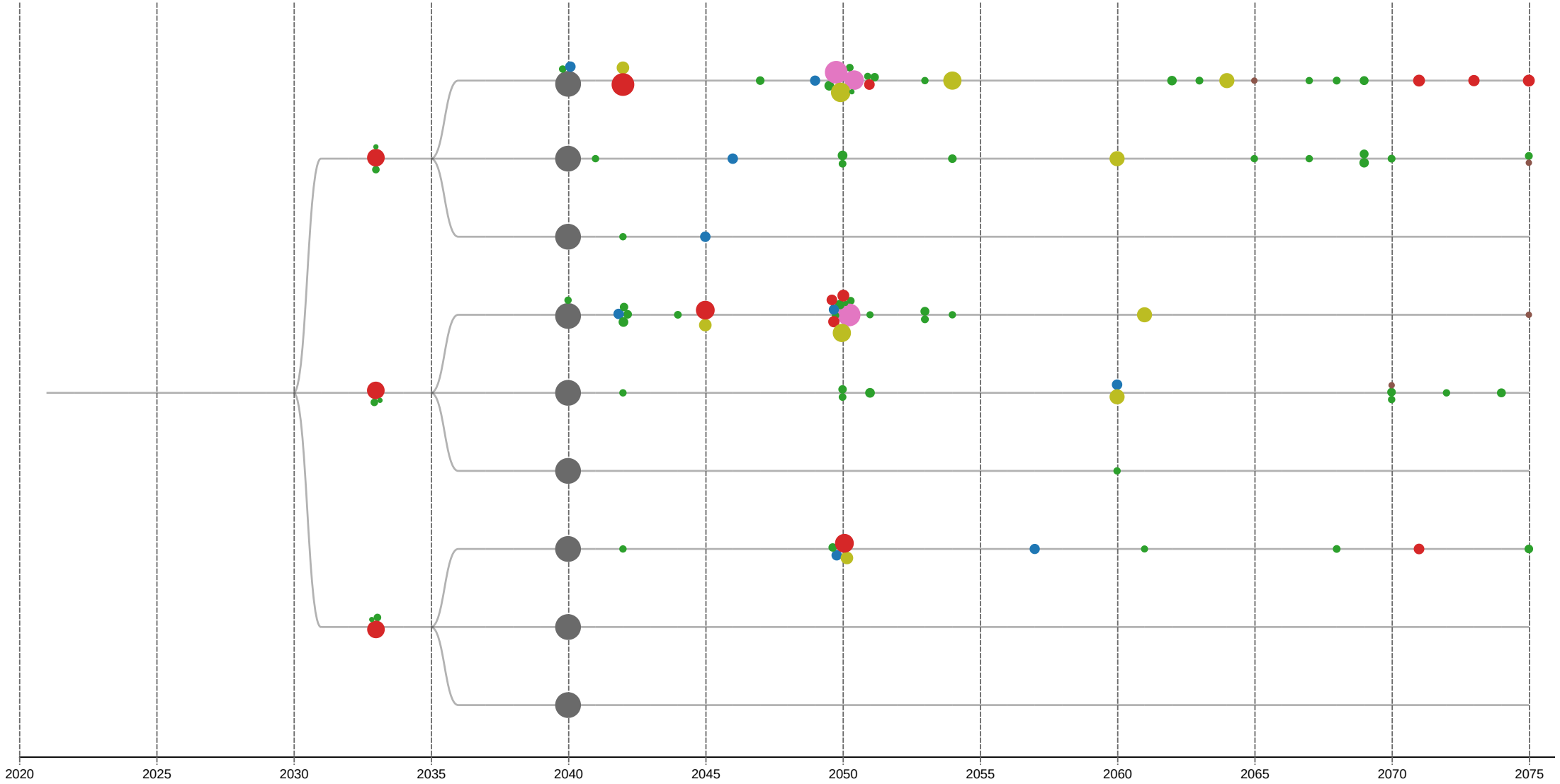
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	15.01	15.50	17.08	14.20	15.60	17.14	15.71	17.66	19.85	16.42
A3: Operational complexity and flexibility	6.06	6.35	6.88	6.03	6.37	6.92	6.47	6.93	7.91	6.66
A4: WRZ connectivity	8.89	9.09	10.15	8.12	9.17	10.18	9.19	10.68	11.89	9.71
A7: Customer relations support engagement with demand management	0.05	0.06	0.05	0.05	0.06	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	20.13	19.17	20.49	19.06	19.21	20.55	19.75	20.87	23.21	20.27
E1: Scaleability and modularity of proposed changes	8.62	8.35	8.95	8.12	8.37	8.99	8.48	9.18	10.32	8.82
E2: Intervention lead times	5.50	5.06	5.41	5.15	5.07	5.40	5.34	5.55	5.99	5.39
E3: Reliance on external bodies to deliver changes	6.00	5.75	6.14	5.78	5.76	6.16	5.93	6.15	6.90	6.06
E5: Collaborative land management	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00

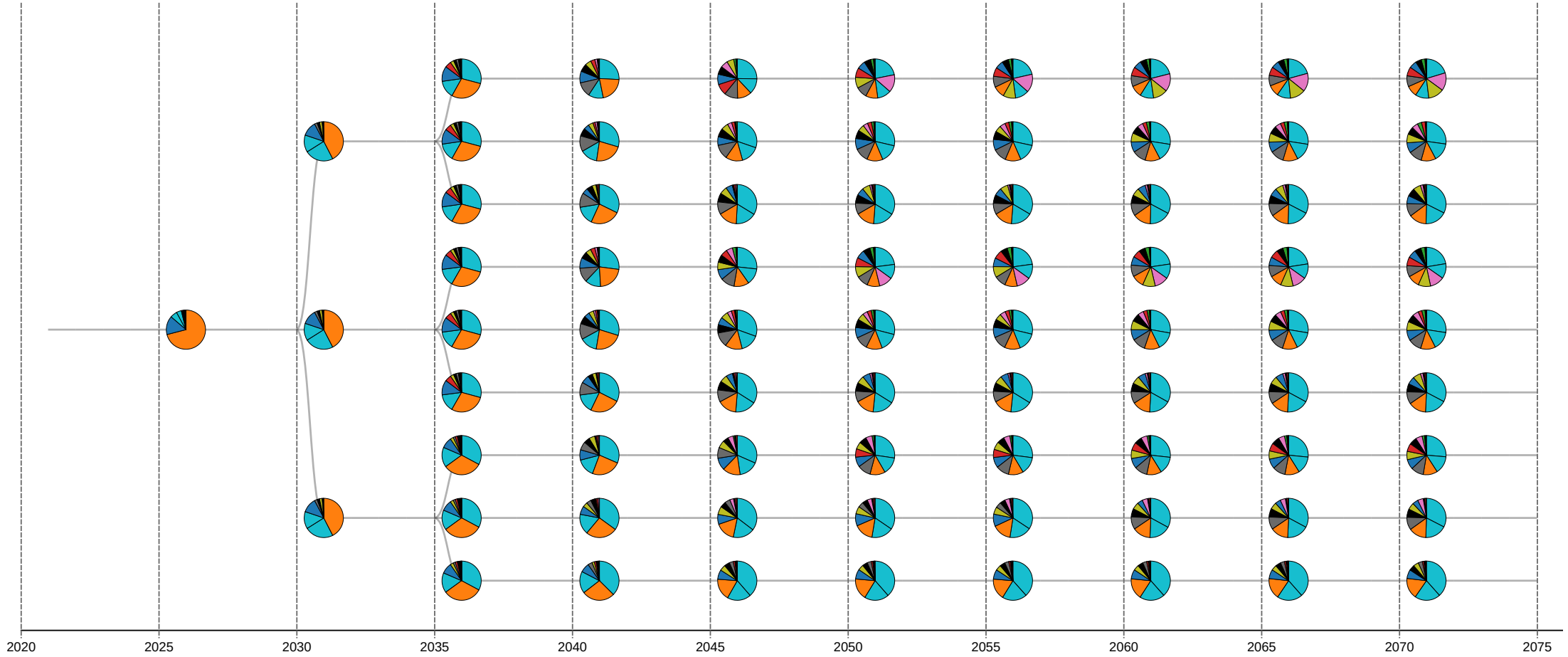
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

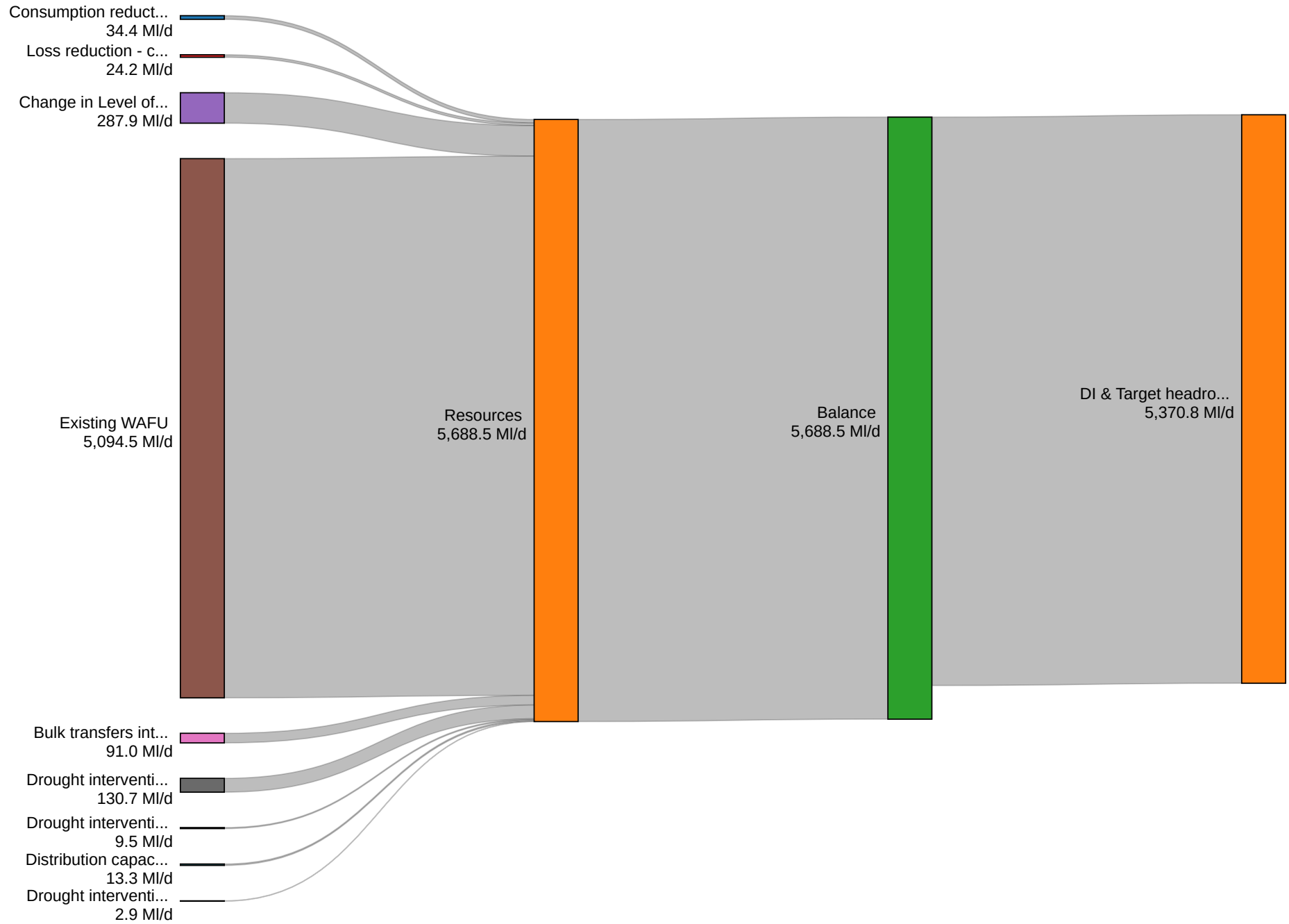
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

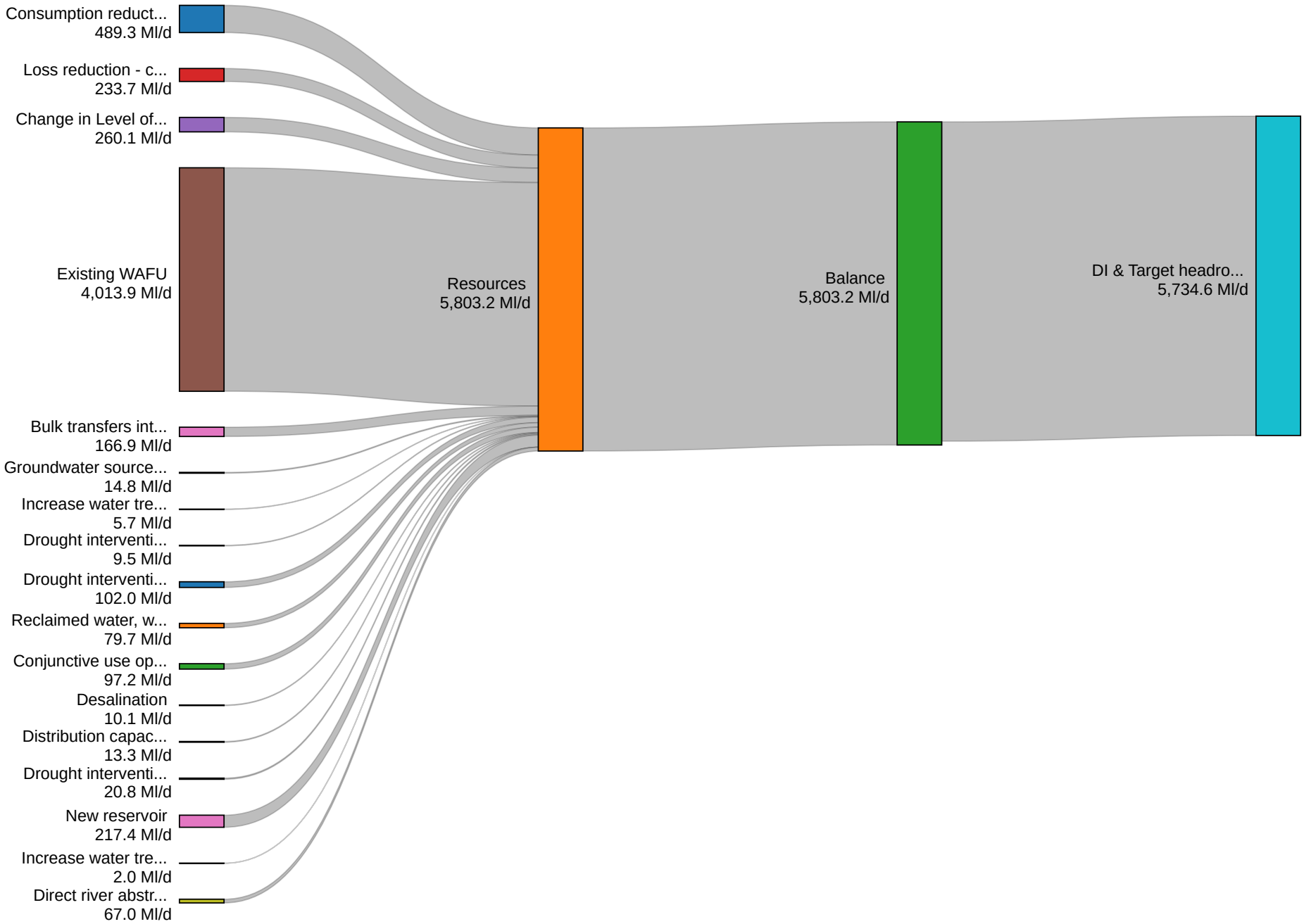


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

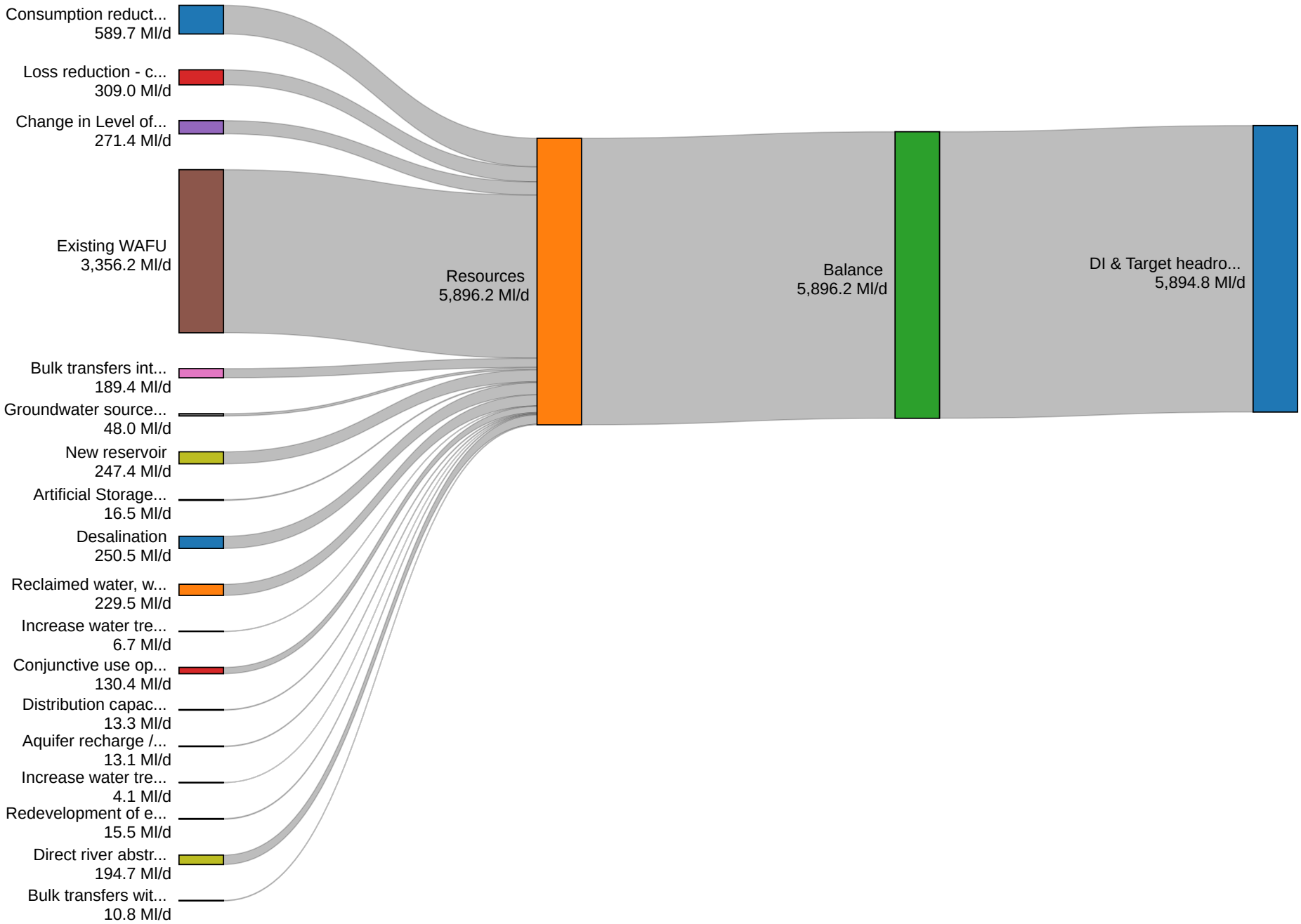
Situation 4 - 2026 (Thames Water)



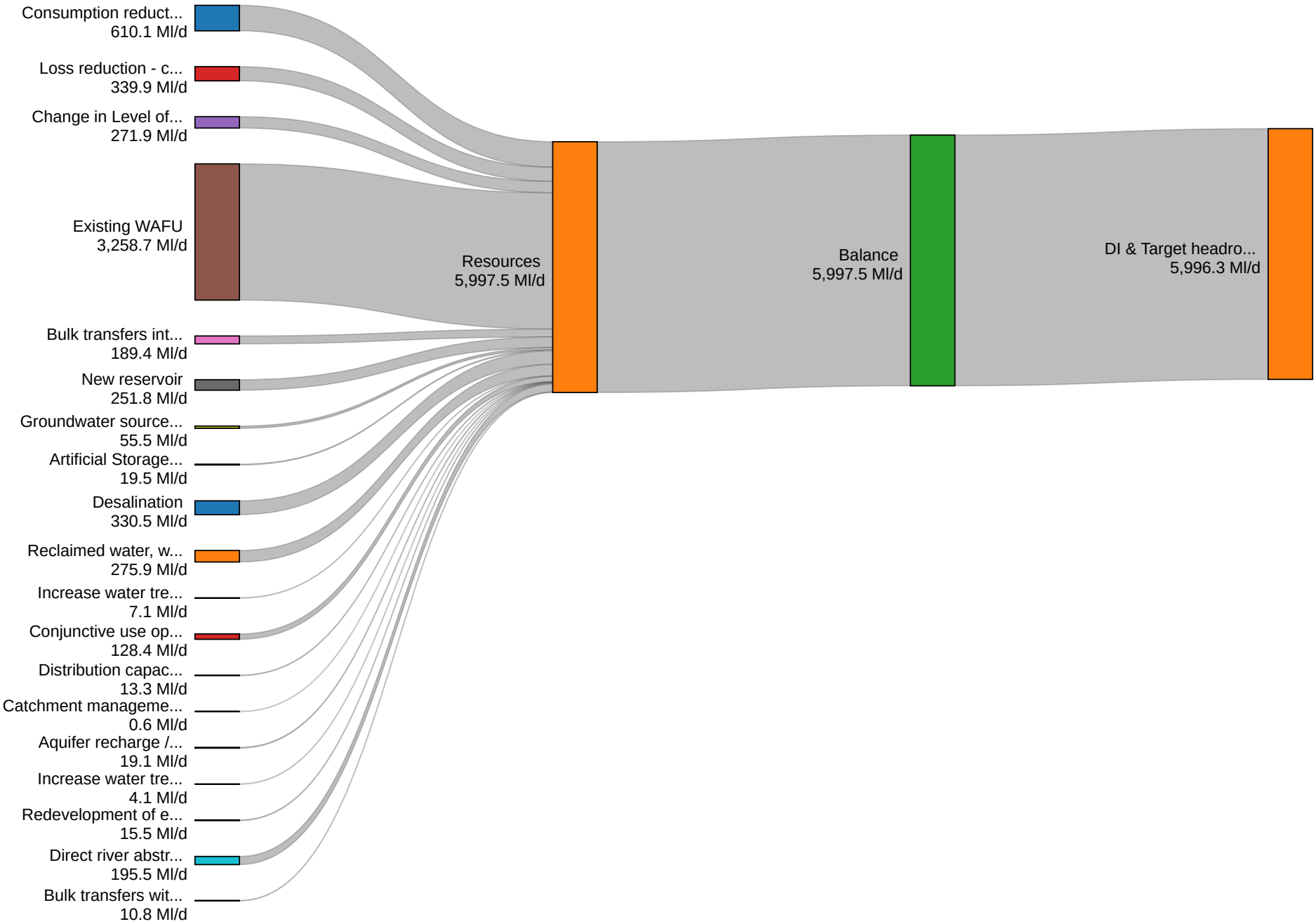
Situation 4 - 2040 (Thames Water)



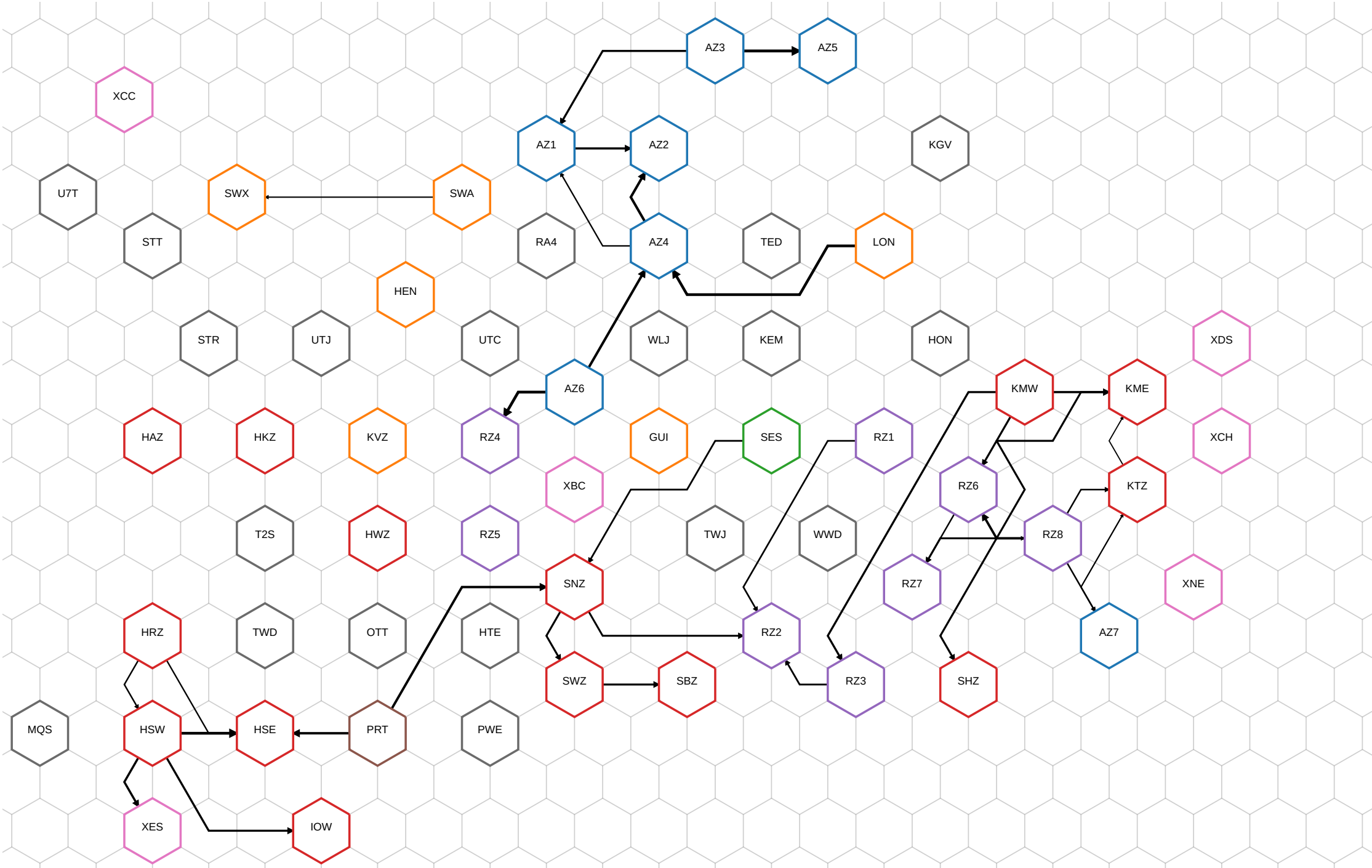
Situation 4 - 2050 (Thames Water)



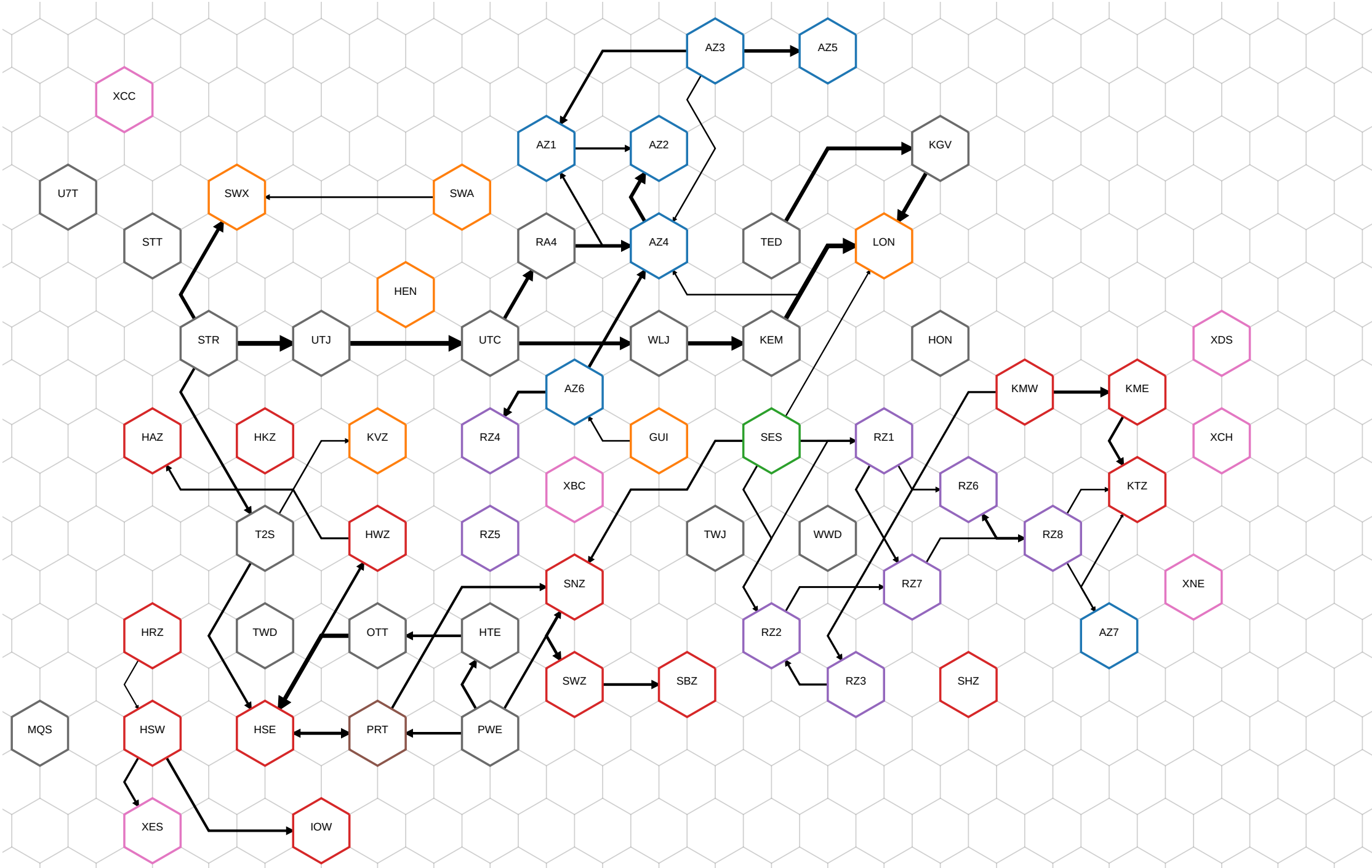
Situation 4 - 2075 (Thames Water)



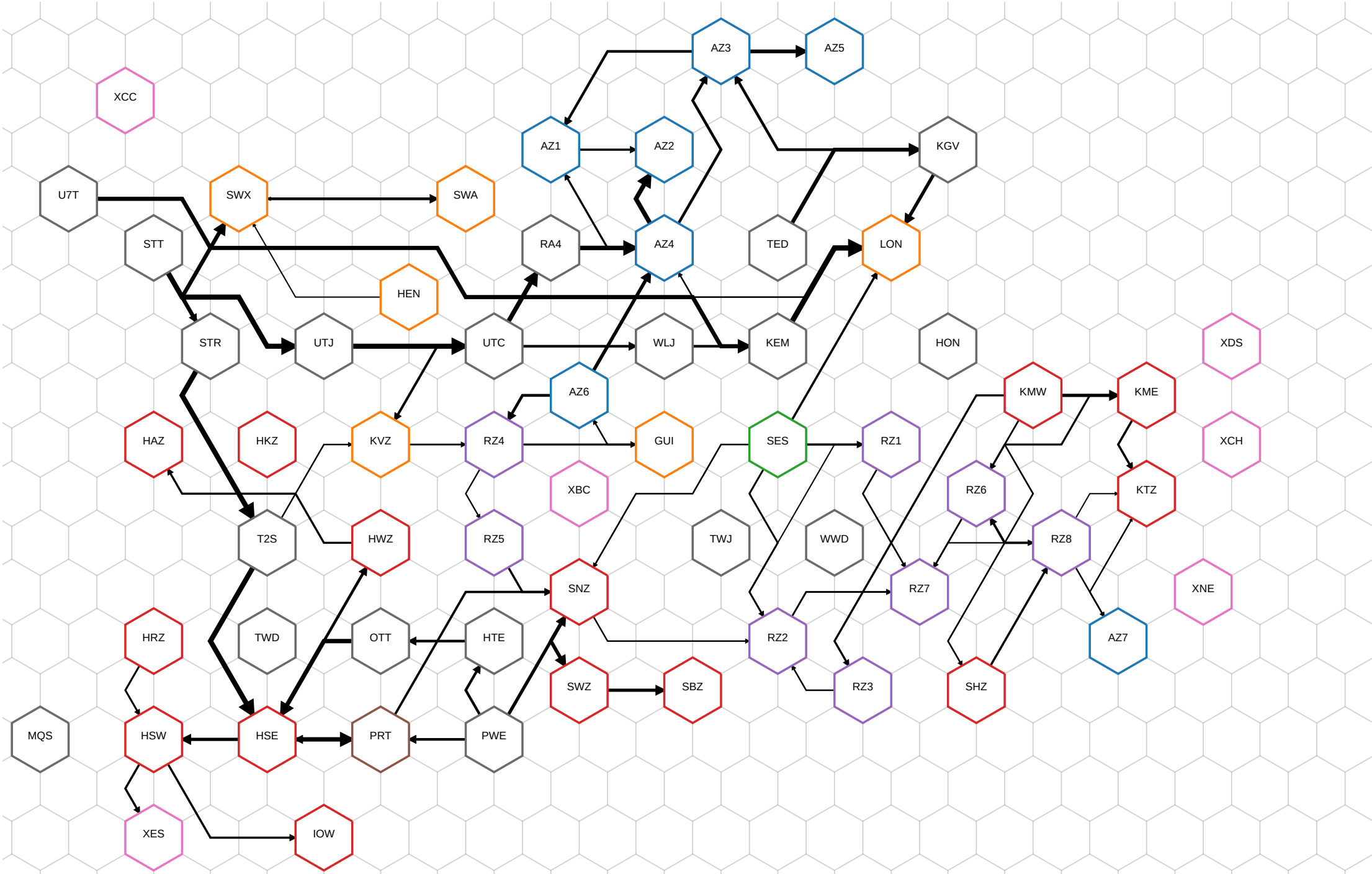
Situation 4 - 2026



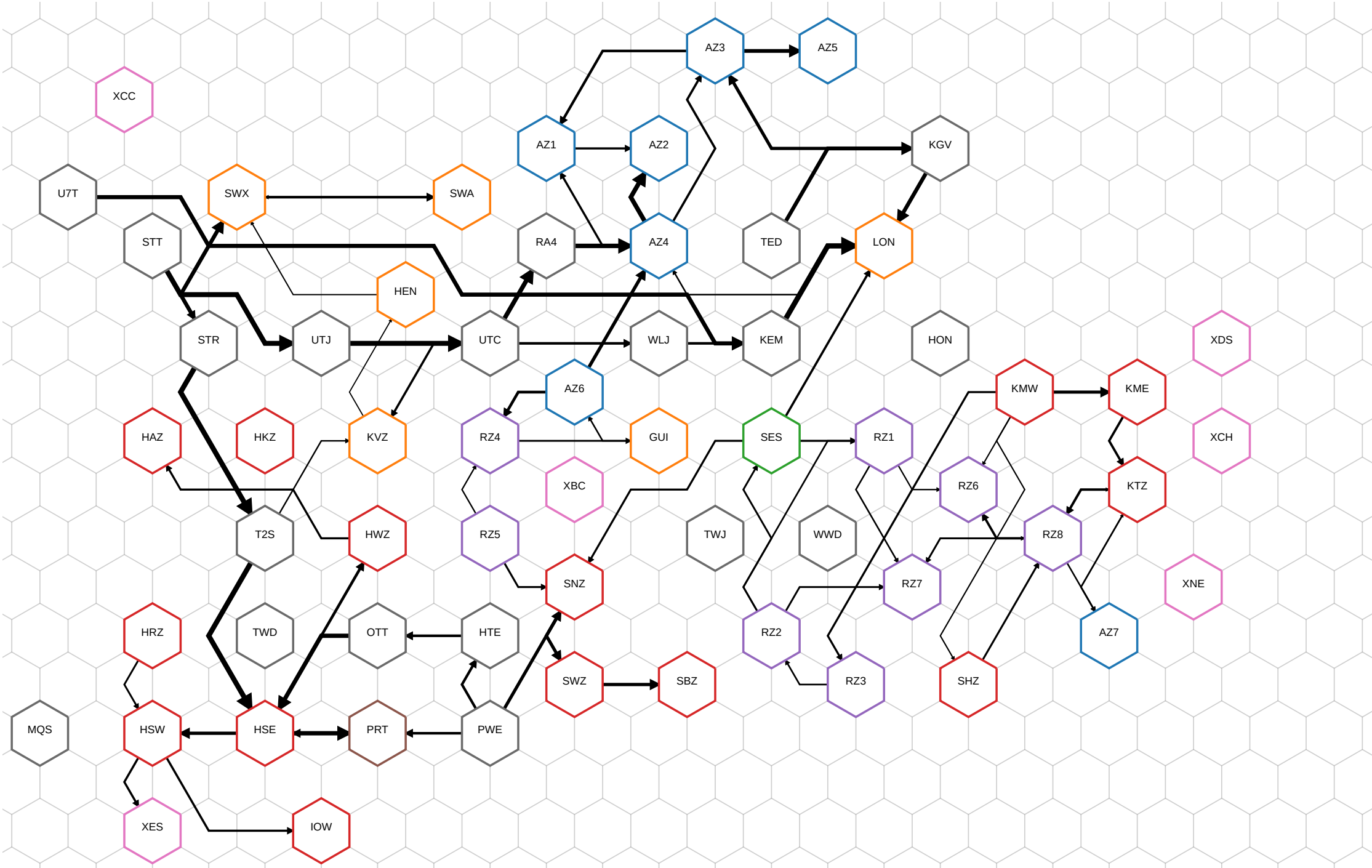
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED H + SESRO 75

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro75-2075
Description	Least cost run with hybrid-h government interventions with increased capacity of T2S transfer to 200 Ml/d and increased Otterbourne - Gaters Mill transfer to 95 Ml/d. No cost changes to account for the increased capacities have been included. Includes a 6 Ml/d emergency deficit in RZ6 in 2049. Includes only SESRO 75 Mm3. Extend Testwood and Candover drought permits to 2040.
Created at	06/07/2023, 14:58:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridh-large-sws-prt-transfer-v4-only-sesro75
Setting description	Emergency options in RZ6 (2049). Excluding SES low, medium and high DMP baskets. Increase capacity of T2S transfer to 200 Ml/d and expand Otterbourne - Gaters Mill transfer to 95 Ml/d. Exclude all SESRO variants except 75. Extend Testwood and Candover drought permits to 2040.
Optimised discount rate	STPR

Metrics

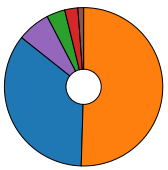
Net present value (Cost)

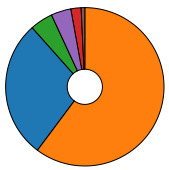
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	23,635	18,814	17,476	21,970	18,634	17,329	19,082	17,248	16,423	18,957	(£m)
Cost w/o deficit (STPR)	23,635	18,814	17,476	21,970	18,634	17,329	19,082	17,248	16,423	18,957	(£m)
Cost w/ deficit (IGEQ)	37,068	28,115	25,605	33,905	27,792	25,361	28,741	25,301	23,796	28,409	(£m)
Cost w/o deficit (IGEQ)	37,068	28,115	25,605	33,905	27,792	25,361	28,741	25,301	23,796	28,409	(£m)
Cost w/ deficit (LTDR)	26,214	20,632	19,079	24,277	20,425	18,914	20,964	18,835	17,884	20,803	(£m)
Cost w/o deficit (LTDR)	26,214	20,632	19,079	24,277	20,425	18,914	20,964	18,835	17,884	20,803	(£m)

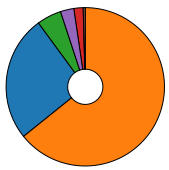
Cost breakdown (STPR)

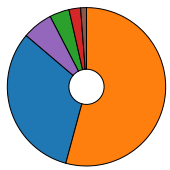
Select Company: Total

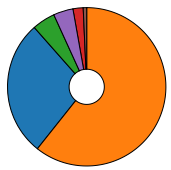
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	8,322	5,311	4,494	7,033	5,178	4,376	5,293	4,232	3,788	5,336	(£m)
Fixed opex	11,931	11,326	11,224	11,909	11,310	11,210	11,415	11,204	11,145	11,408	(£m)
Fixed operational carbon	894	878	875	888	877	874	877	869	866	877	(£m)
Embedded carbon	633	396	333	519	389	324	413	314	283	400	(£m)
Variable opex	1,581	763	477	1,360	748	475	937	547	300	799	(£m)
Variable carbon opex	274	140	73	261	132	70	146	81	41	135	(£m)

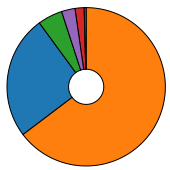
situation1 

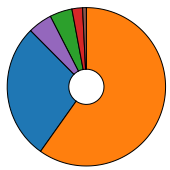
situation2 

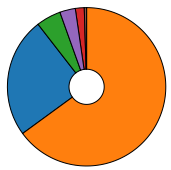
situation3 

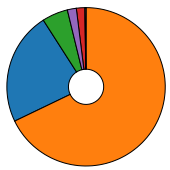
situation4 

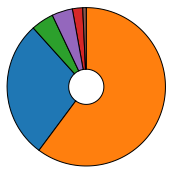
situation5 

situation6 

situation7 

situation8 

situation9 

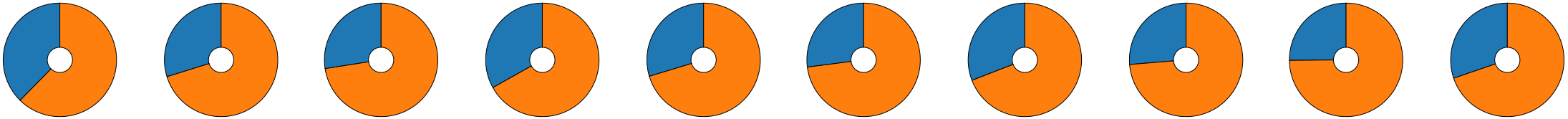
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	4,165,556	2,490,852	2,047,057	3,344,691	2,446,137	1,990,986	2,630,365	1,929,919	1,722,175	2,529,749	(tonnes)
Operational emissions	6,897,816	5,868,301	5,403,160	6,751,960	5,797,539	5,371,771	5,888,408	5,406,322	5,125,830	5,834,567	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

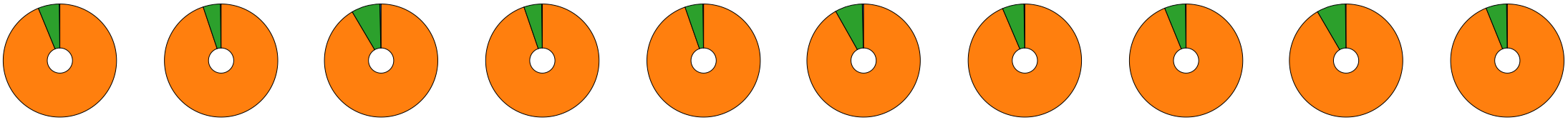


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	59	36	32	60	37	31	53	22	8	38	(GWh)
Grid	32,115	16,354	7,573	27,860	15,964	7,559	19,584	11,138	3,892	15,782	(GWh)
Renewable	2,062	848	671	1,482	859	642	1,290	708	349	990	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	72,758	66,900	64,857	69,632	66,236	64,063	66,349	62,780	61,695	66,141
SEA environmental disbenefit	129,059	97,813	79,400	113,879	93,694	75,259	91,908	72,701	66,126	91,093
Natural capital	81,558,381	79,708,686	80,494,992	76,334,113	80,559,488	84,033,934	78,945,441	81,701,071	84,318,012	80,850,458
Bio-diversity net gain	−217,036	−158,203	−130,889	−194,783	−153,486	−112,129	−145,018	−99,937	−86,009	−144,166

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,509	33,607	32,529	34,689	33,302	32,253	33,021	31,668	31,295	33,097

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.02	29.75	30.96	29.66	29.79	31.06	30.52	31.41	34.66	30.98
R1: Uncertainty of option supply/demand benefit	7.15	6.25	6.33	6.53	6.25	6.34	6.33	6.15	6.69	6.45
R3: Risk of service failure due to other physical hazards	6.89	6.82	7.22	6.62	6.83	7.25	6.95	7.25	8.18	7.11
R4: Availability of additional headroom	6.45	6.64	6.81	6.47	6.66	6.83	6.93	7.26	7.49	6.84
R5: Catchment/raw water quality risks (incl. climate change)	5.02	4.62	4.89	4.71	4.63	4.91	4.76	5.10	5.88	4.95
R6: Capacity of catchment services	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.51	5.42	5.71	5.32	5.41	5.72	5.54	5.65	6.42	5.63
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

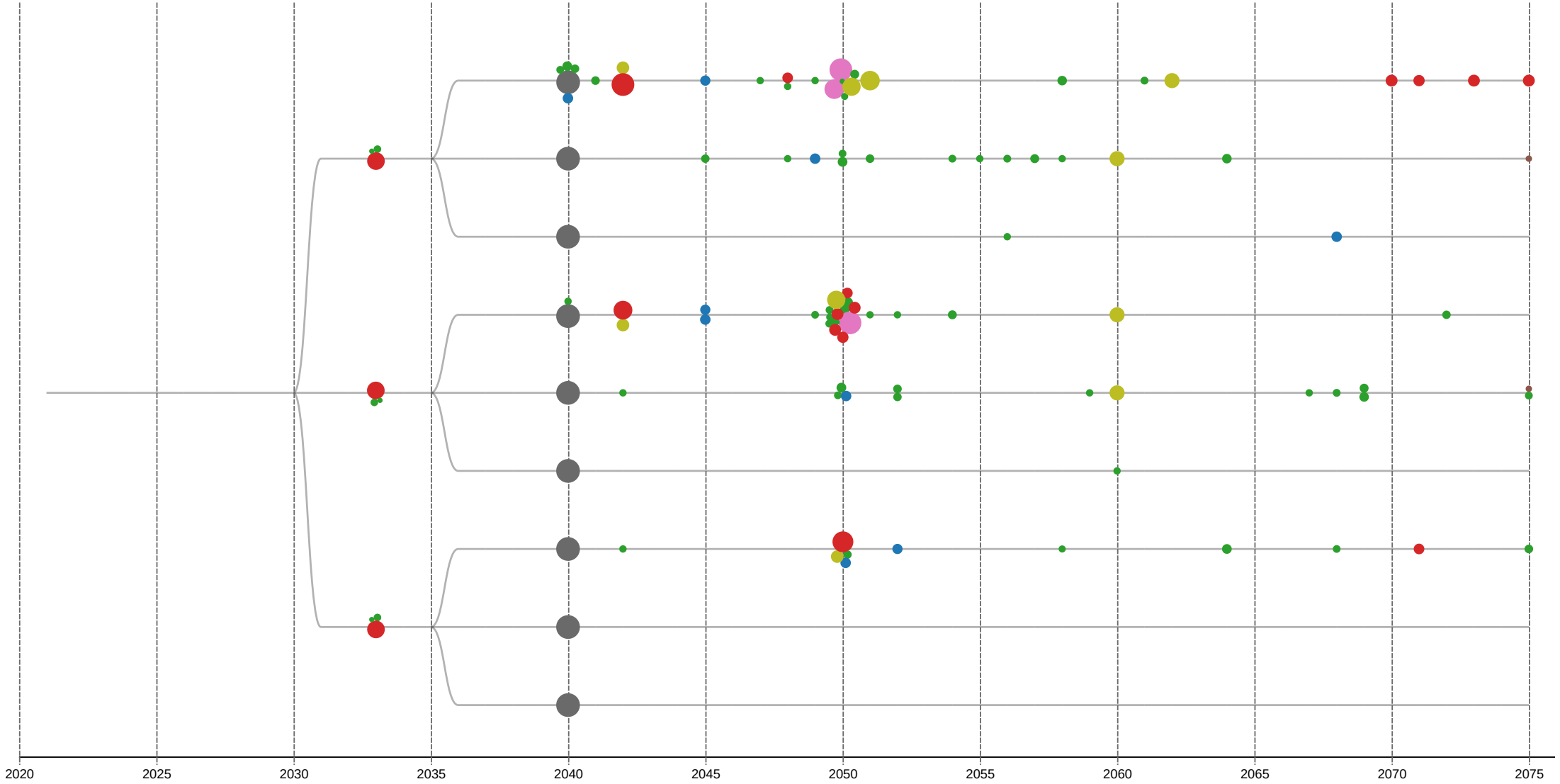
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.96	15.52	16.95	14.05	15.57	16.96	15.59	17.37	19.62	16.29
A3: Operational complexity and flexibility	6.00	6.29	6.69	5.89	6.30	6.73	6.35	6.73	7.68	6.52
A4: WRZ connectivity	8.92	9.17	10.21	8.12	9.21	10.18	9.19	10.59	11.89	9.72
A7: Customer relations support engagement with demand management	0.04	0.06	0.05	0.04	0.06	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	20.26	19.39	20.30	18.96	19.39	20.39	19.88	20.55	22.98	20.23
E1: Scaleability and modularity of proposed changes	8.66	8.40	8.85	8.06	8.42	8.90	8.54	9.09	10.20	8.79
E2: Intervention lead times	5.54	5.16	5.37	5.13	5.14	5.38	5.40	5.36	5.94	5.38
E3: Reliance on external bodies to deliver changes	6.06	5.82	6.09	5.77	5.82	6.11	5.95	6.10	6.84	6.06
E5: Collaborative land management	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

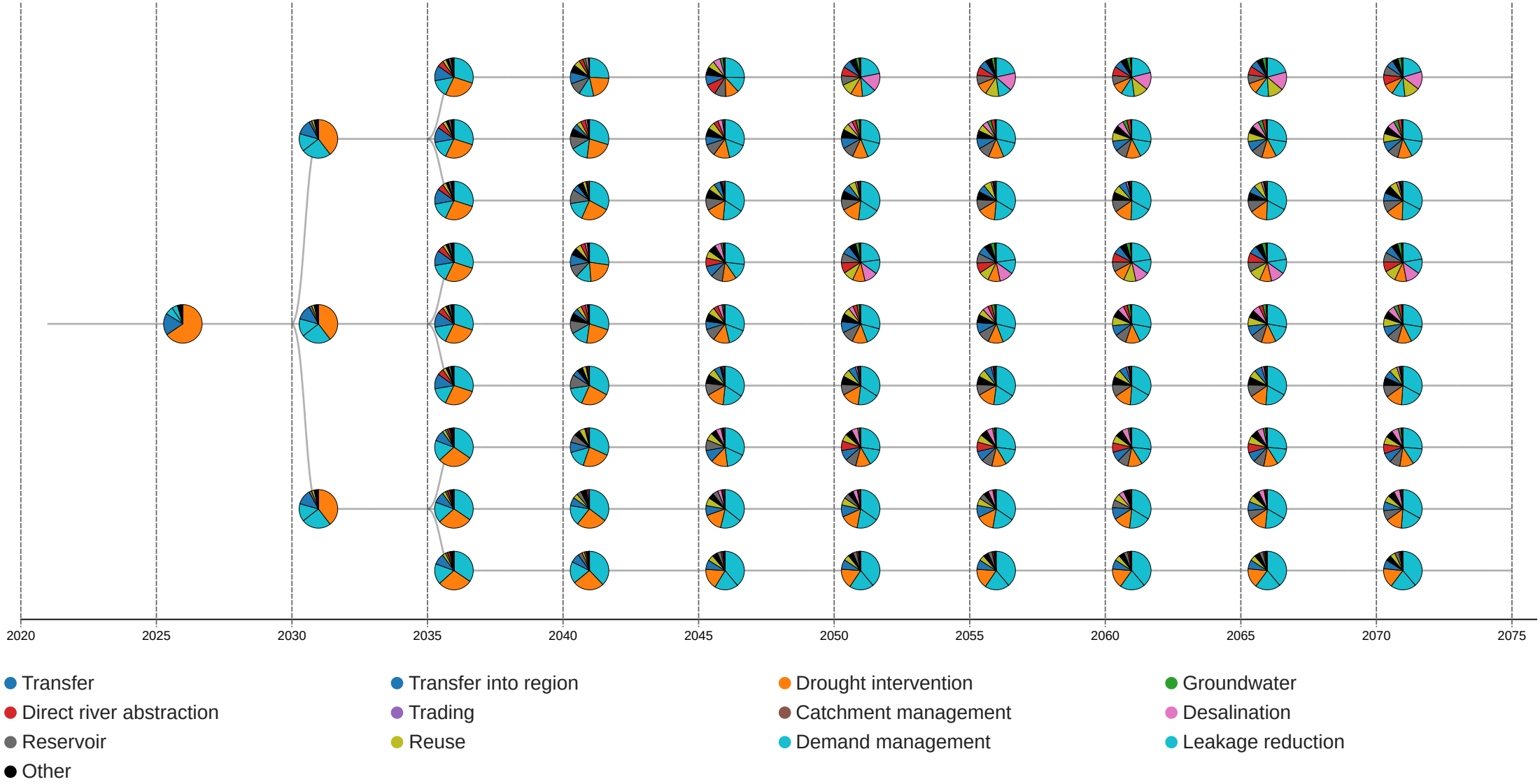
Option Selection (Thames Water)



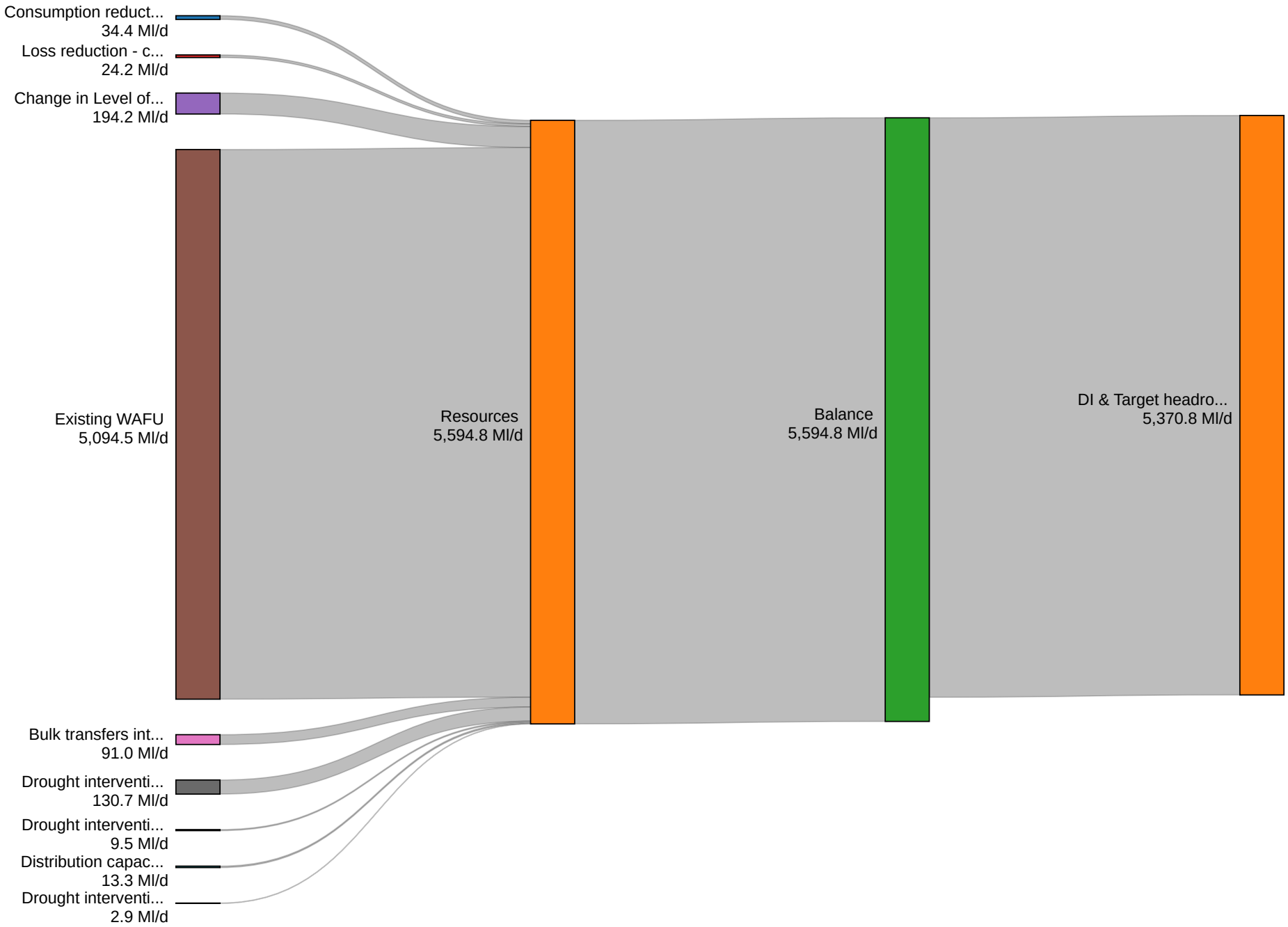
- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

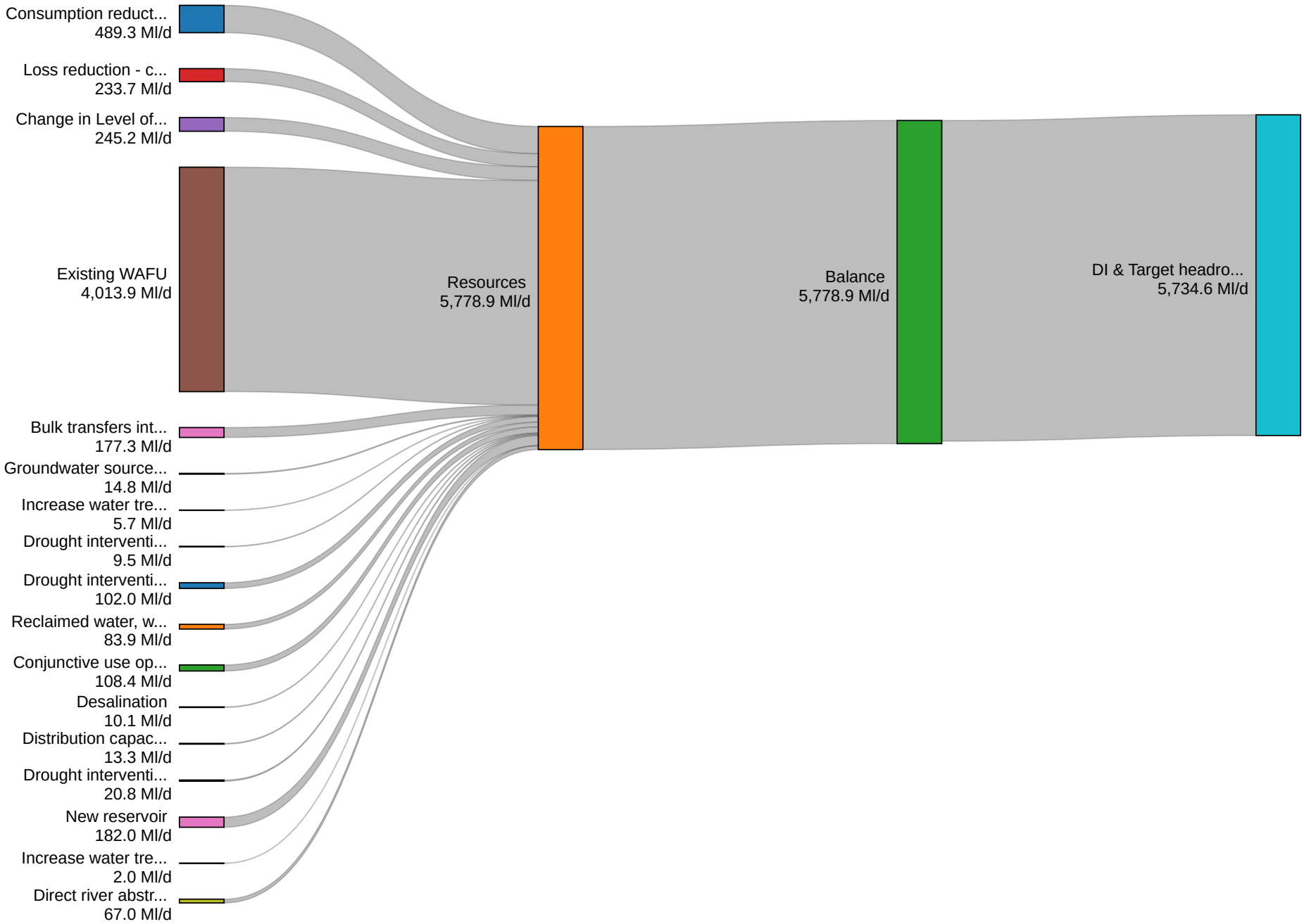
Pie charts show the breakdown of option utilisation by option category.



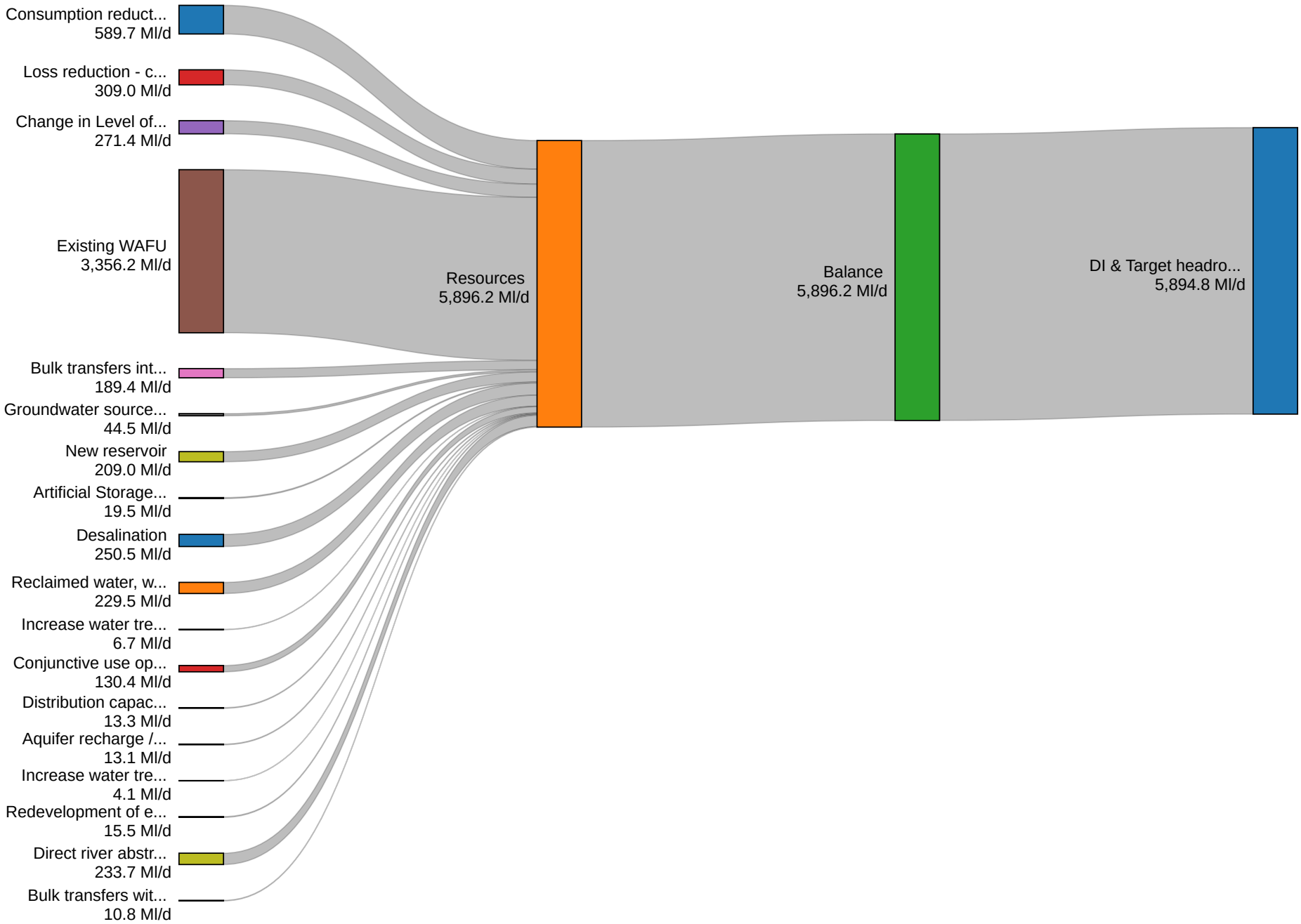
Situation 4 - 2026 (Thames Water)



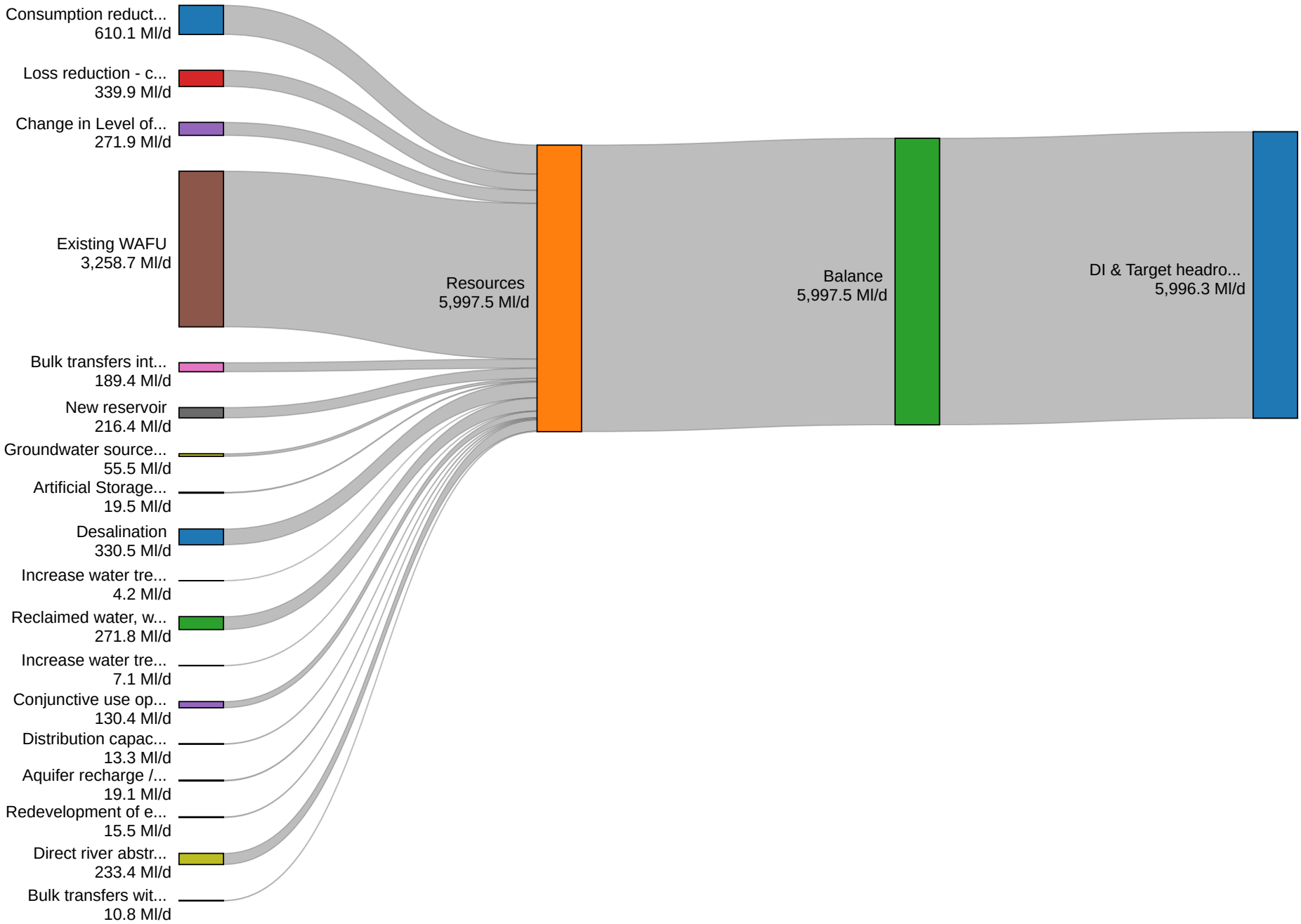
Situation 4 - 2040 (Thames Water)



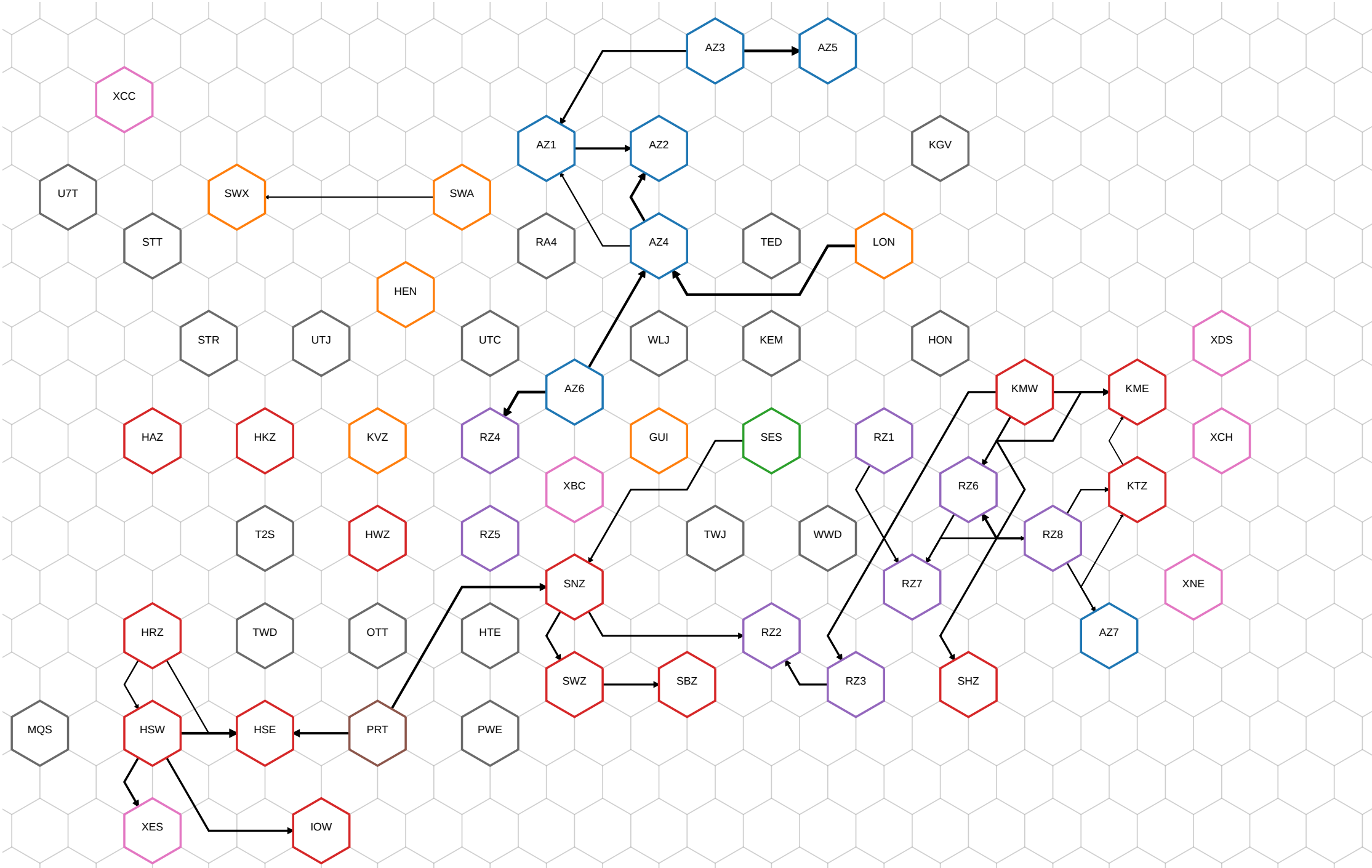
Situation 4 - 2050 (Thames Water)



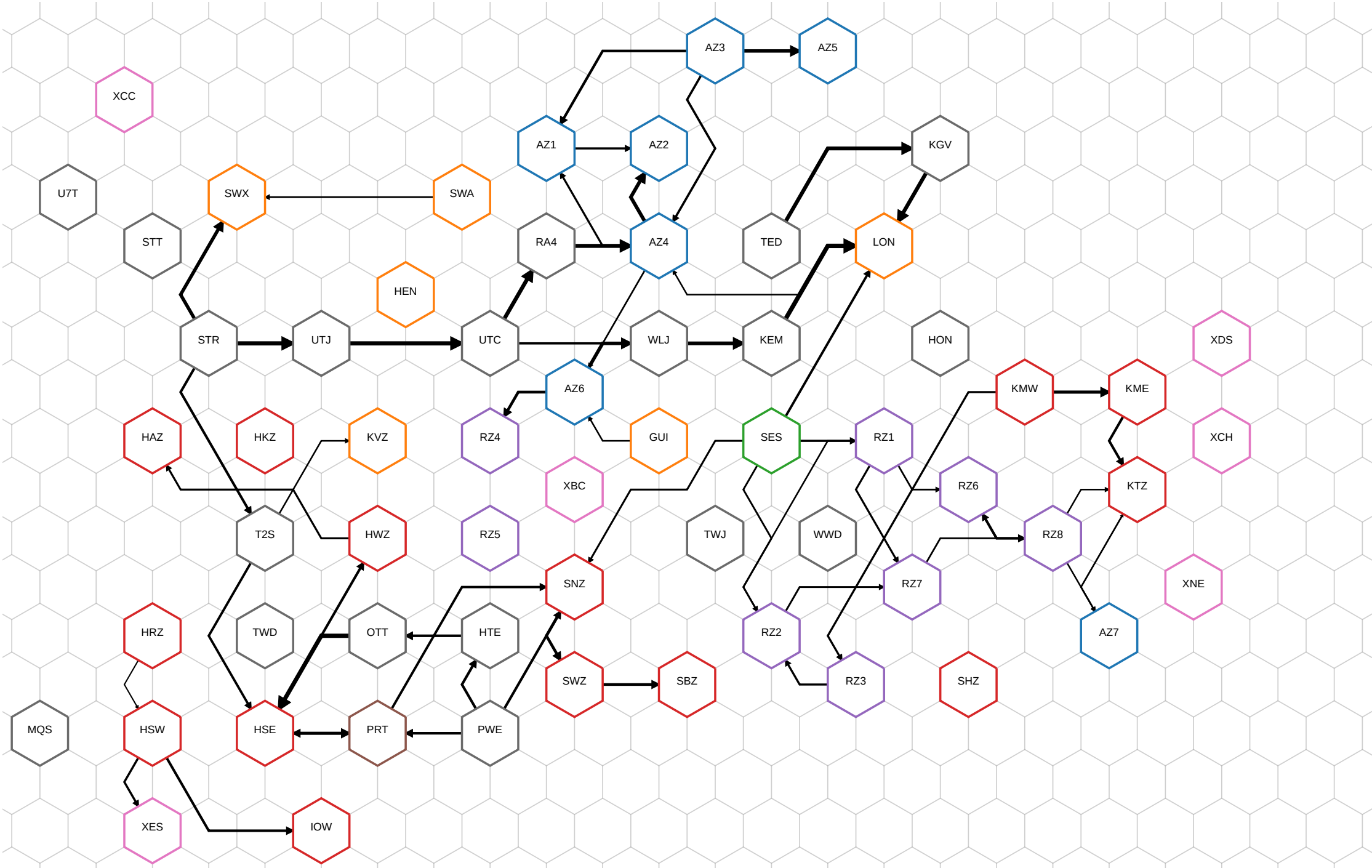
Situation 4 - 2075 (Thames Water)



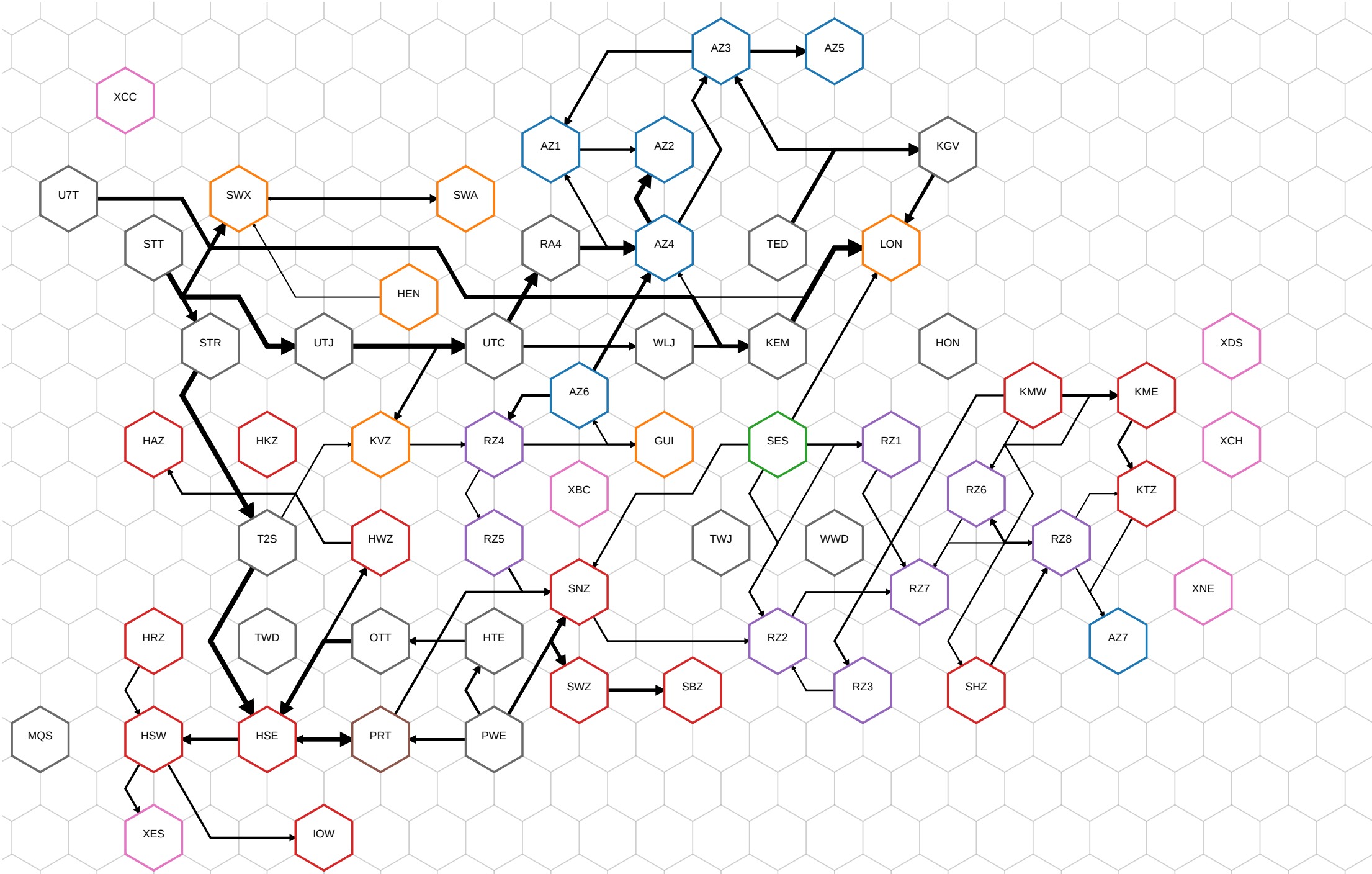
Situation 4 - 2026



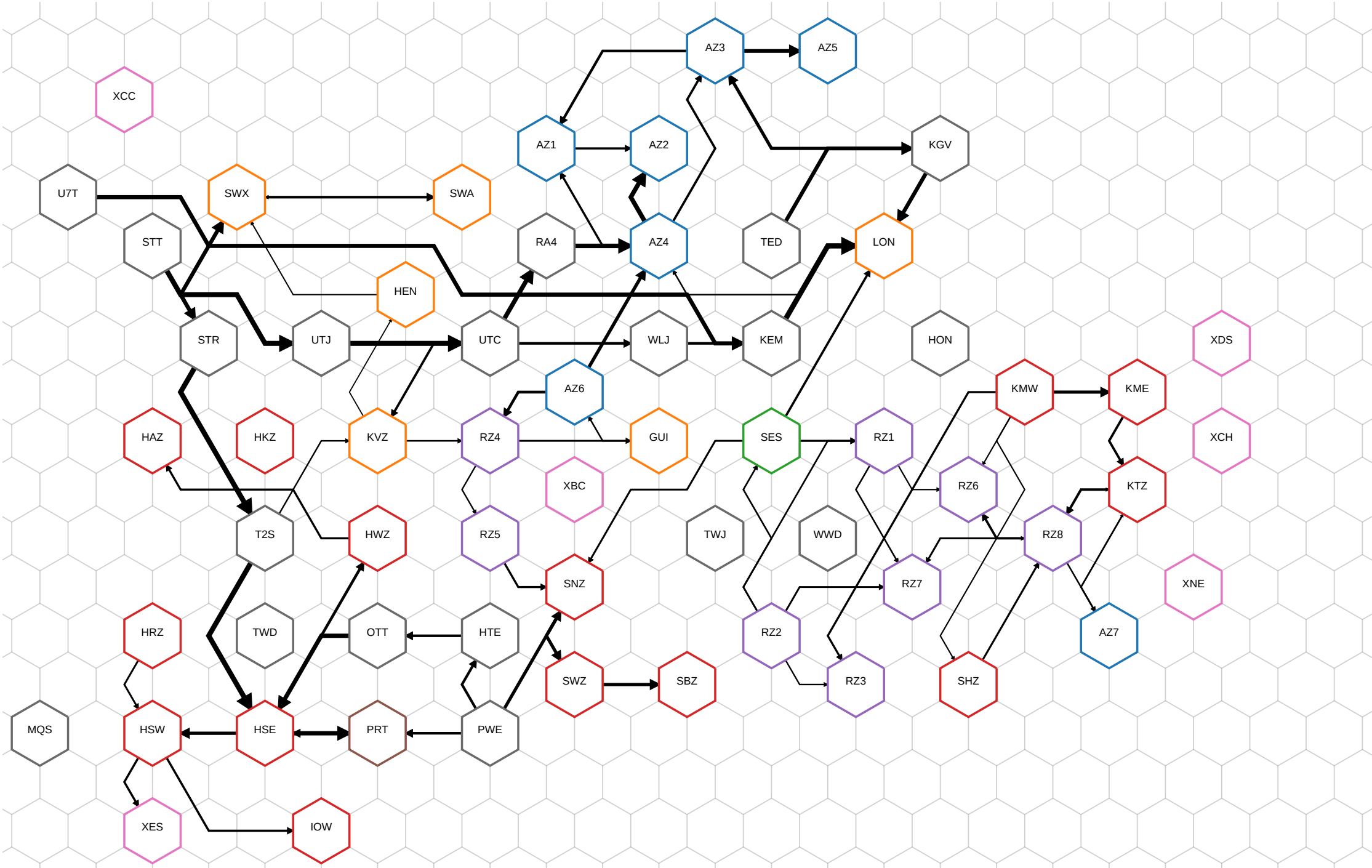
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED G + SESRO 150

IVM Summary: Thames Water

! This run contained total deficits of 29.9 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 4.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 23.9 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro150-2075
Description	Least cost run with hybrid-g government interventions including only SESRO 150 Mm3.
Created at	18/07/2023, 13:34:16
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridg-only-sesro150
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 150.
Optimised discount rate	STPR

Metrics

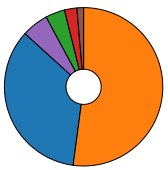
Net present value (Cost)

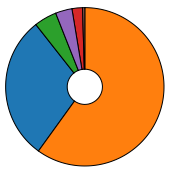
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	4,702,908	1,920,025	1,919,213	921,530	919,535	918,763	518,938	517,940	517,373	1,428,469	(£m)
Cost w/o deficit (STPR)	22,221	18,951	18,140	20,706	18,711	17,939	18,800	17,802	17,235	18,945	(£m)
Cost w/ deficit (IGEQ)	4,714,671	1,928,923	1,927,462	931,976	928,270	926,912	527,929	526,066	525,038	1,437,472	(£m)
Cost w/o deficit (IGEQ)	33,984	27,850	26,389	31,152	27,446	26,088	27,791	25,929	24,900	27,948	(£m)
Cost w/ deficit (LTDR)	4,705,186	1,921,776	1,920,844	923,567	921,256	920,373	520,702	519,545	518,892	1,430,238	(£m)
Cost w/o deficit (LTDR)	24,499	20,703	19,771	22,743	20,432	19,549	20,564	19,407	18,754	20,713	(£m)

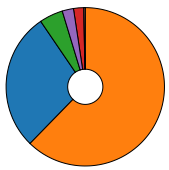
Cost breakdown (STPR)

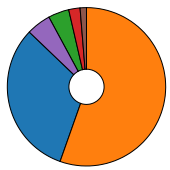
Select Company: Total

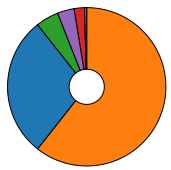
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,695	5,580	5,115	6,573	5,374	4,929	5,306	4,766	4,486	5,536	(£m)
Fixed opex	11,580	11,362	11,300	11,473	11,342	11,282	11,336	11,274	11,237	11,354	(£m)
Fixed operational carbon	884	874	874	884	876	875	872	866	866	874	(£m)
Embedded carbon	562	407	377	479	397	365	395	357	340	409	(£m)
Variable opex	1,200	640	417	1,029	636	424	748	478	280	650	(£m)
Variable carbon opex	301	88	57	269	86	64	143	61	26	122	(£m)

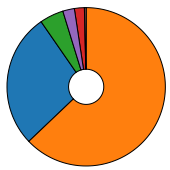
situation1 

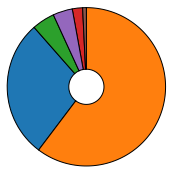
situation2 

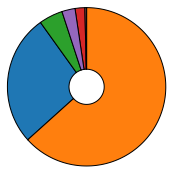
situation3 

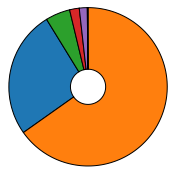
situation4 

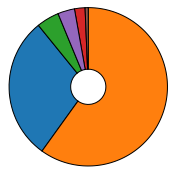
situation5 

situation6 

situation7 

situation8 

situation9 

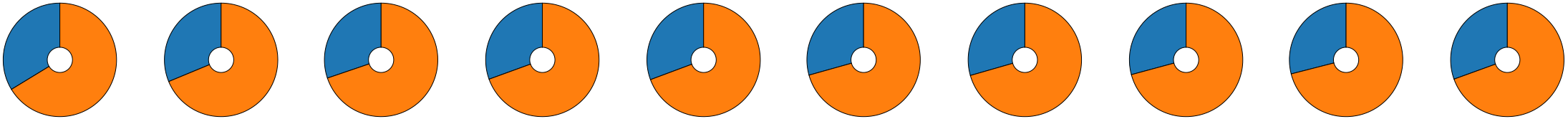
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,566,344	2,477,667	2,278,740	2,984,623	2,412,988	2,207,798	2,432,916	2,158,713	2,047,473	2,507,473	(tonnes)
Operational emissions	7,014,978	5,453,275	5,264,710	6,789,340	5,454,385	5,316,925	5,830,334	5,234,823	5,015,951	5,708,302	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

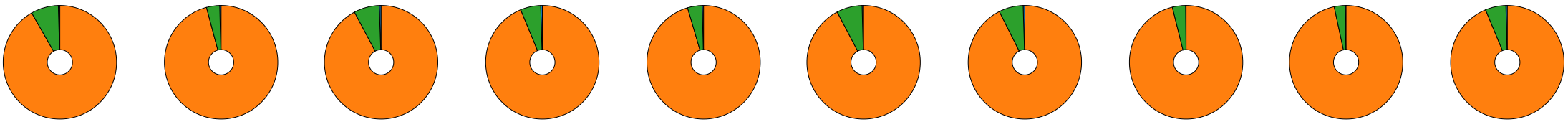


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	119	59	36	111	58	29	80	16	12	58	(GWh)
Grid	24,853	14,103	6,402	21,697	13,764	5,997	15,142	9,696	4,029	12,853	(GWh)
Renewable	2,121	554	504	1,331	602	473	1,134	379	129	803	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,321	66,590	65,813	69,125	65,883	65,109	65,869	63,822	62,805	66,260
SEA environmental disbenefit	125,170	92,992	86,330	112,398	89,718	83,399	92,095	78,566	72,110	92,531
Natural capital	85,811,426	87,284,792	87,682,331	78,736,673	80,279,871	82,889,265	79,691,426	80,671,721	83,448,004	82,943,945
Bio-diversity net gain	−268,008	−190,404	−155,543	−225,791	−167,637	−152,616	−168,242	−133,777	−105,637	−174,184

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,914	32,952	32,614	34,221	32,822	32,399	32,881	31,854	31,373	32,892

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	31.18	32.36	35.38	30.90	32.37	35.43	32.58	35.97	40.45	34.07
R1: Uncertainty of option supply/demand benefit	6.48	6.12	6.65	6.23	6.10	6.63	5.98	6.38	7.24	6.42
R3: Risk of service failure due to other physical hazards	7.20	7.74	8.59	7.23	7.76	8.66	7.72	8.70	9.97	8.18
R4: Availability of additional headroom	6.53	6.83	7.04	6.59	6.84	7.04	7.15	7.50	7.75	7.03
R5: Catchment/raw water quality risks (incl. climate change)	5.29	5.48	6.17	5.10	5.48	6.17	5.63	6.50	7.53	5.93
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.67	6.20	6.93	5.75	6.20	6.93	6.10	6.89	7.95	6.51
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

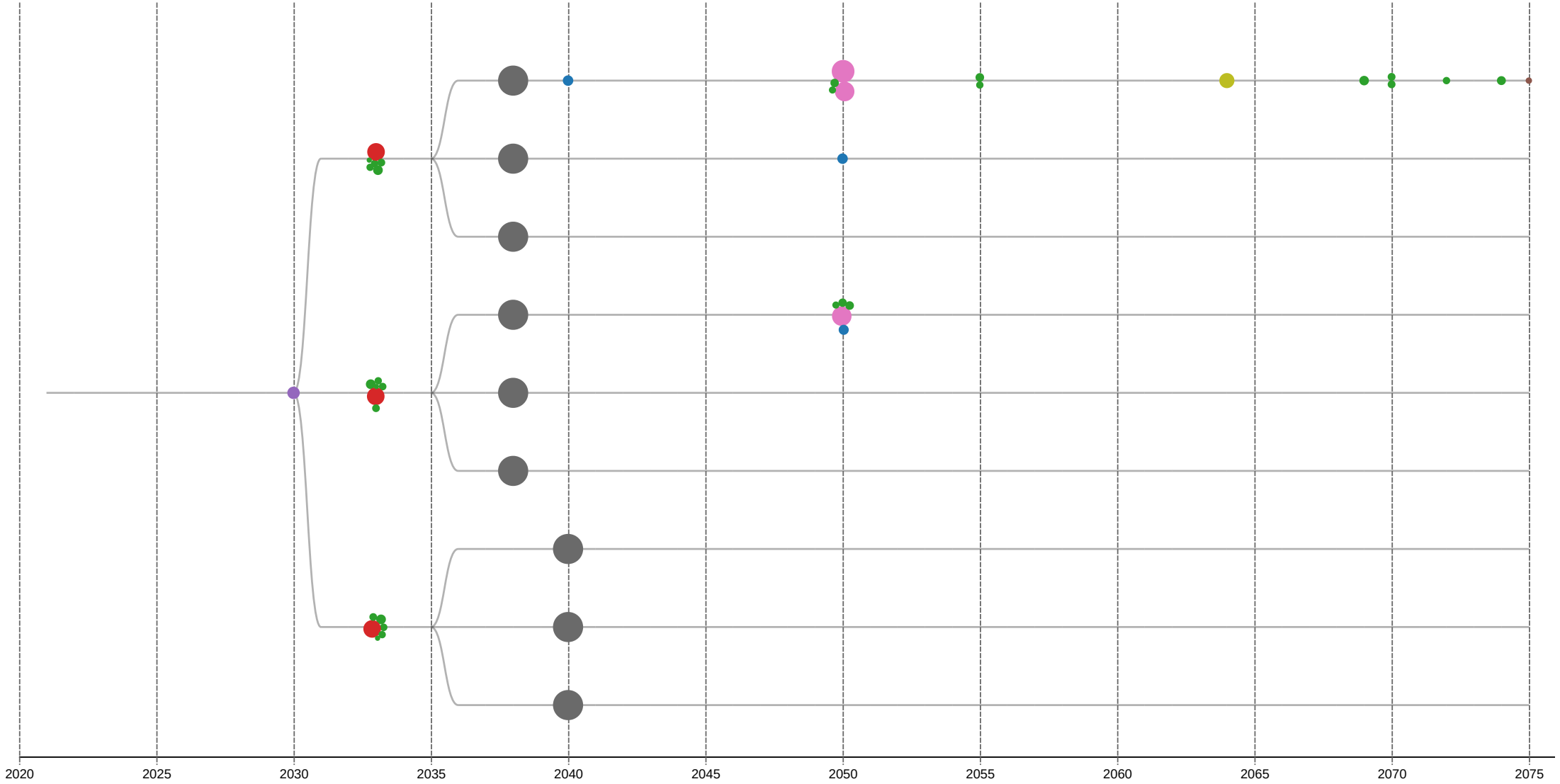
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.97	15.84	17.80	14.31	15.85	17.75	15.90	18.10	20.71	16.69
A3: Operational complexity and flexibility	6.36	7.08	7.92	6.51	7.08	7.94	7.00	7.97	9.21	7.45
A4: WRZ connectivity	7.56	8.72	9.83	7.75	8.73	9.77	8.85	10.07	11.45	9.19
A7: Customer relations support engagement with demand management	0.05	0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.01	19.89	22.01	18.87	19.96	21.94	20.02	22.29	25.46	21.05
E1: Scaleability and modularity of proposed changes	8.17	8.61	9.54	8.11	8.64	9.59	8.63	9.76	11.21	9.14
E2: Intervention lead times	5.34	5.60	6.19	5.33	5.64	6.08	5.80	6.28	7.09	5.93
E3: Reliance on external bodies to deliver changes	5.49	5.68	6.28	5.43	5.67	6.27	5.60	6.24	7.15	5.98
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
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- Trading
- Catchment management
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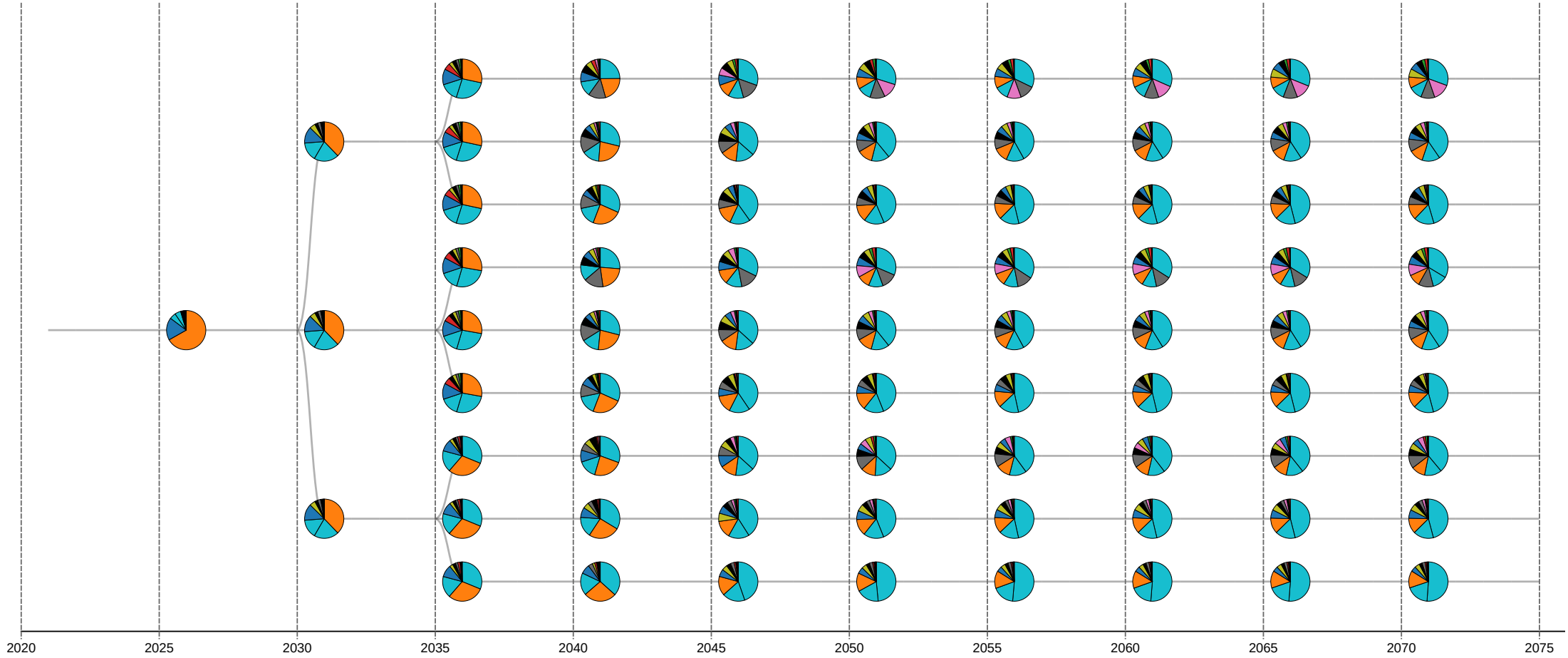
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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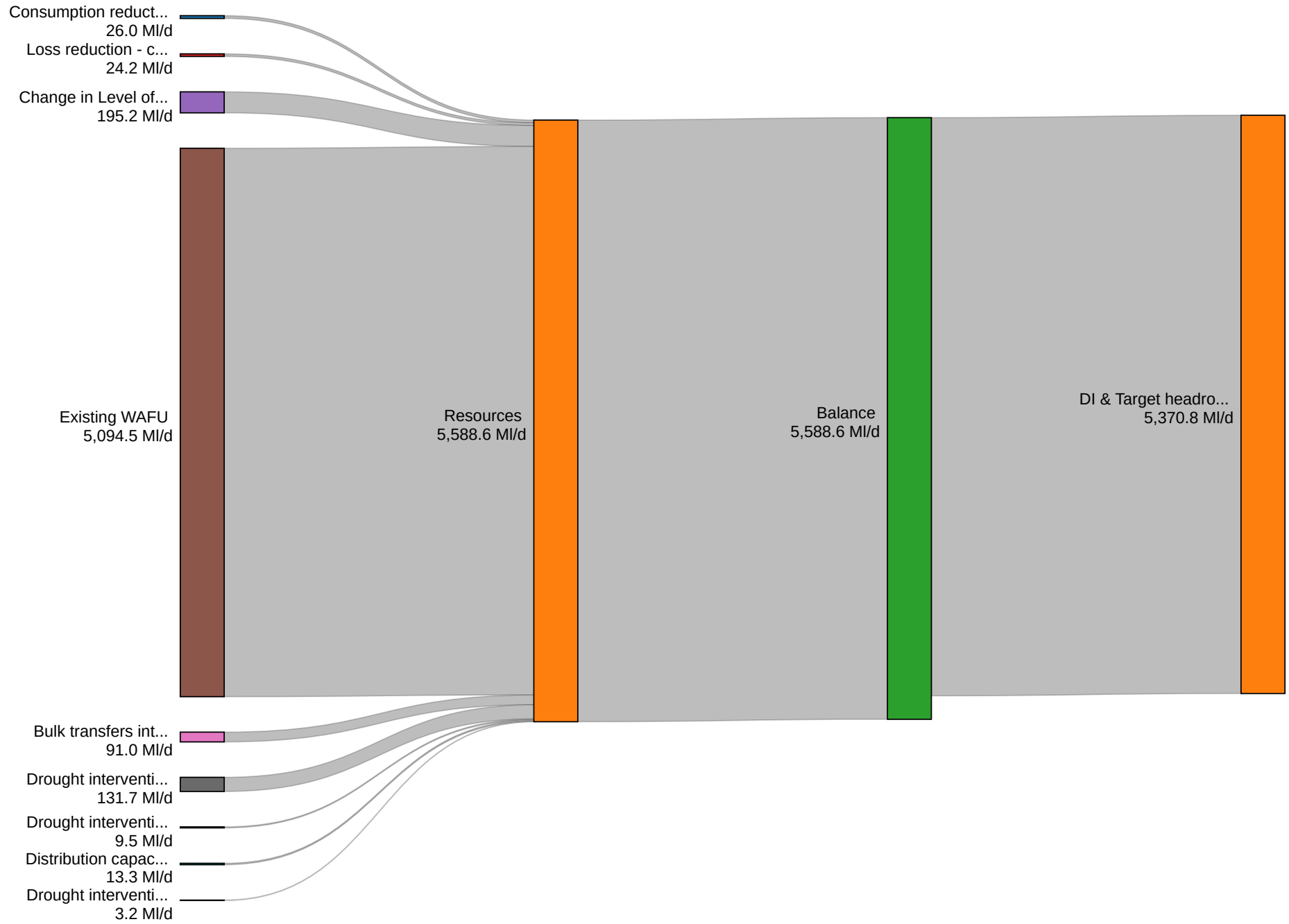
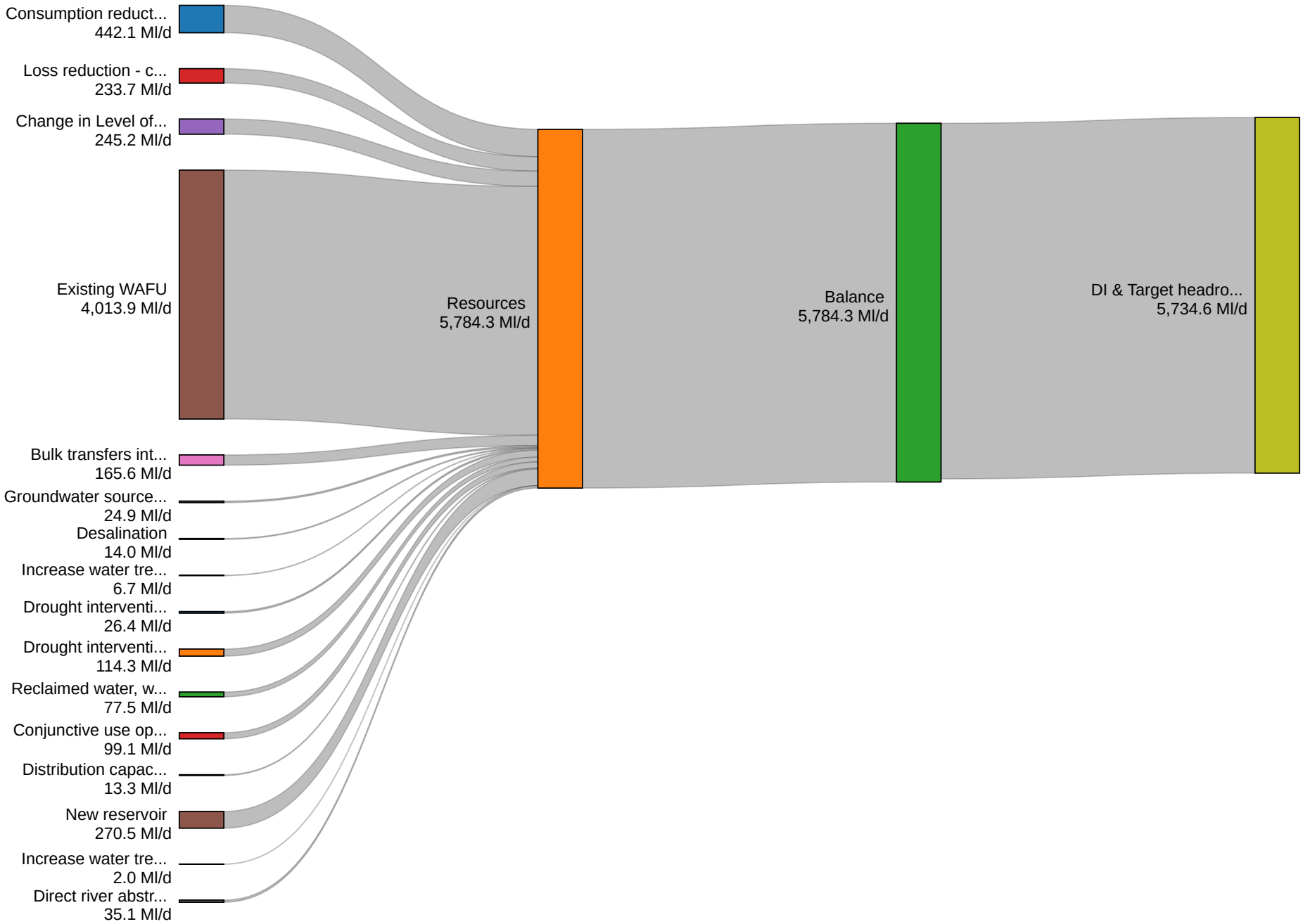
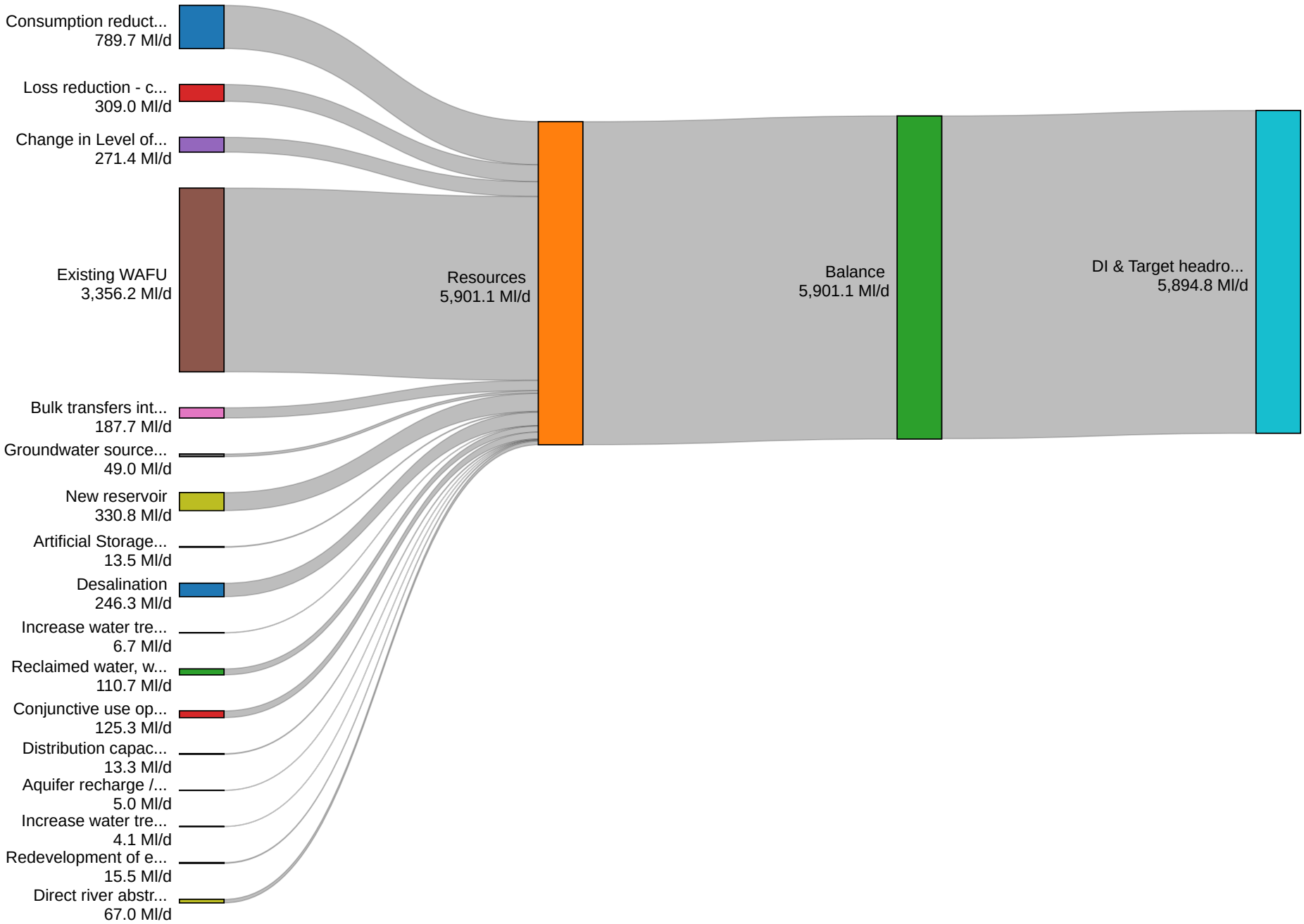
Situation 4 - 2026 (Thames Water)



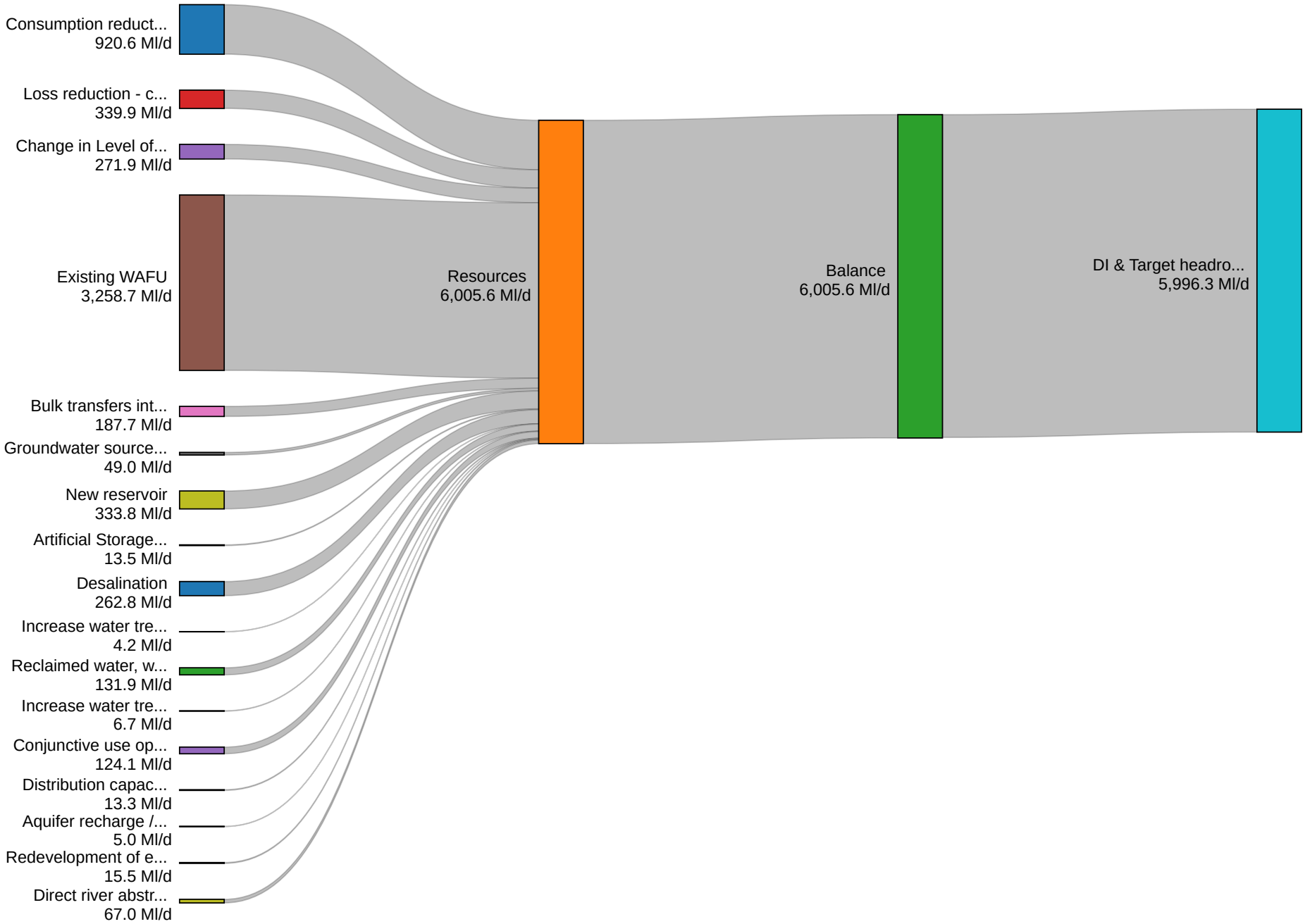
Situation 4 - 2040 (Thames Water)



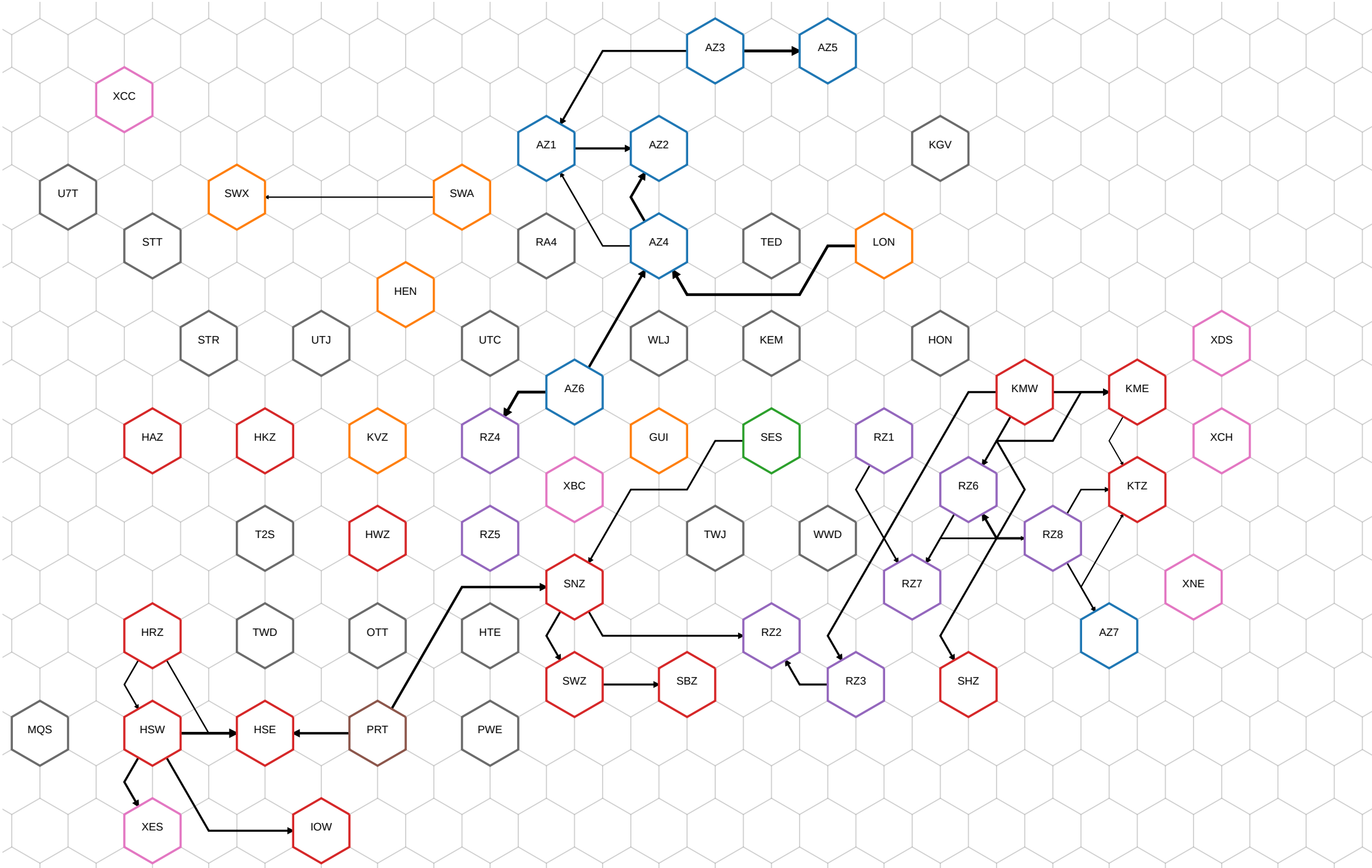
Situation 4 - 2050 (Thames Water)



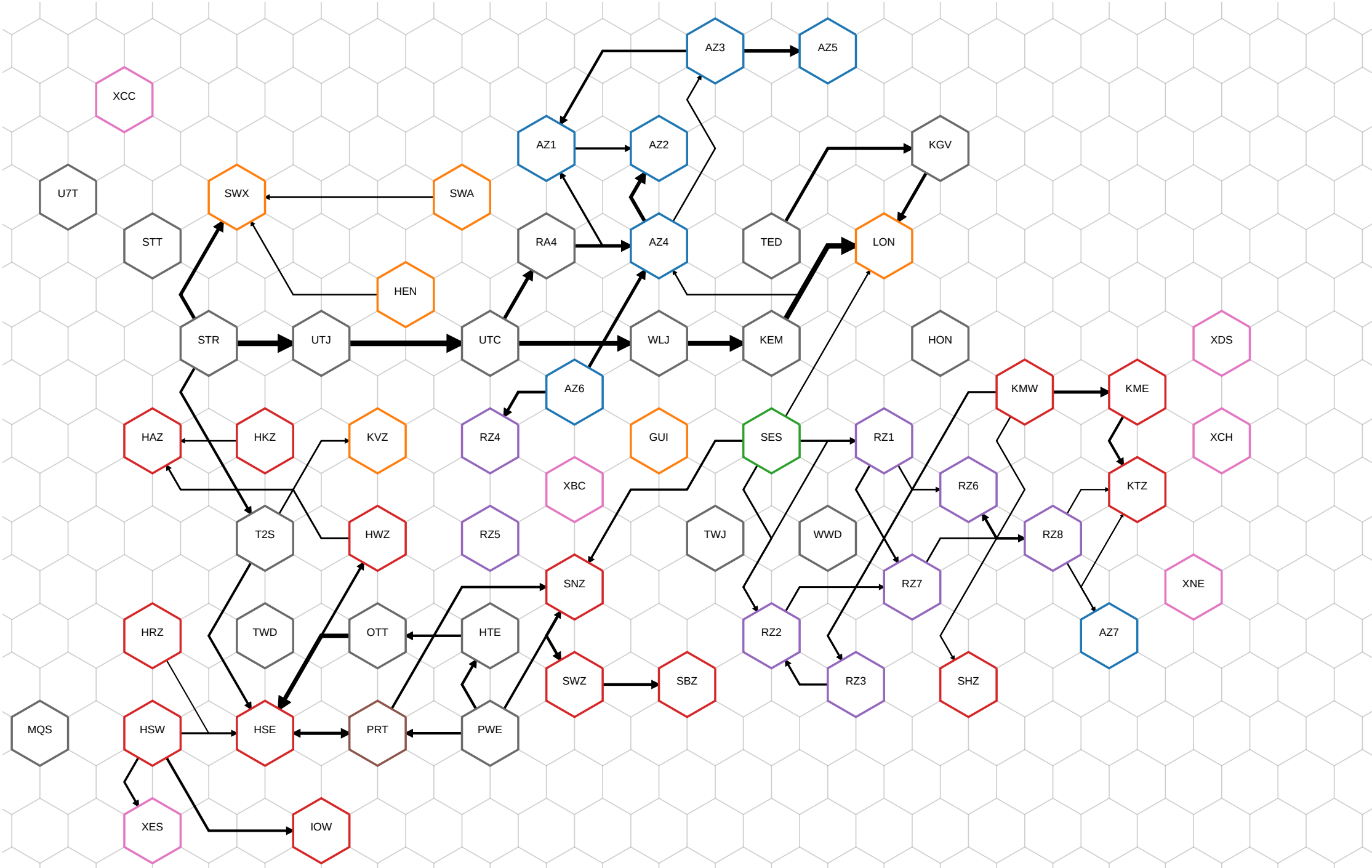
Situation 4 - 2075 (Thames Water)



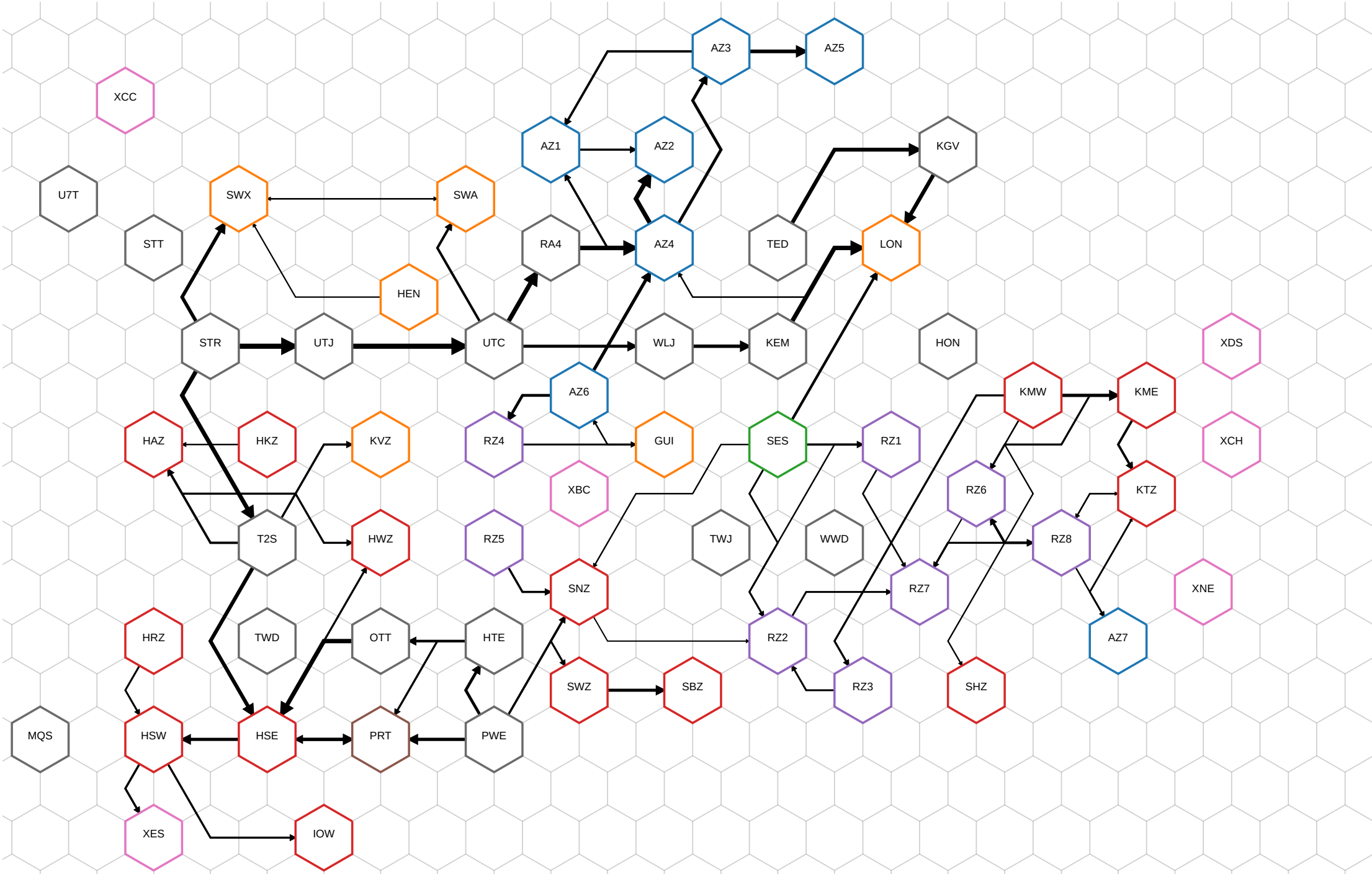
Situation 4 - 2026



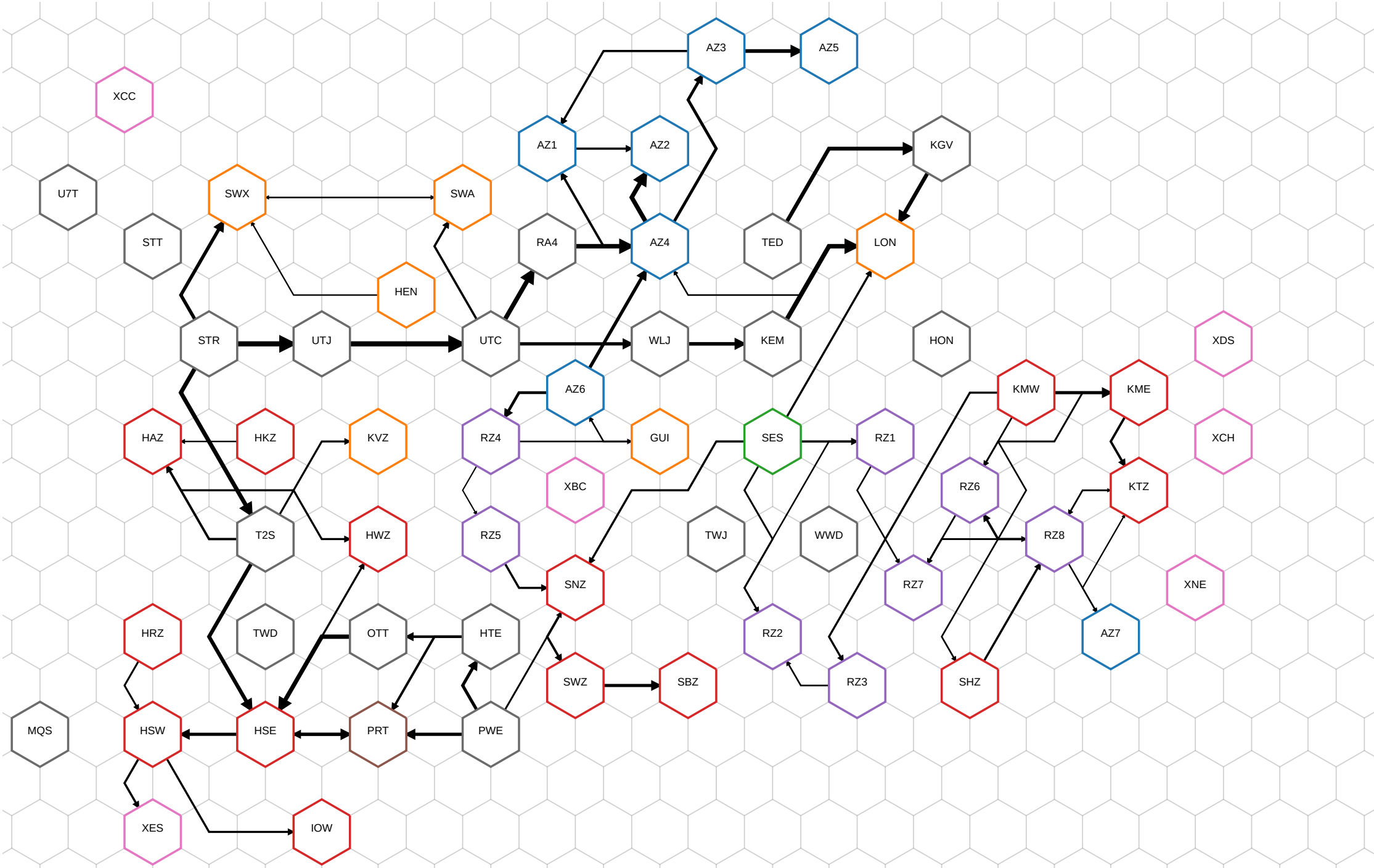
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED G + SESRO 125

IVM Summary: Thames Water

! This run contained total deficits of 29.9 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 4.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 23.9 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro125-2075
Description	Least cost run with hybrid-g government interventions including only SESRO 125 Mm3.
Created at	18/07/2023, 12:30:04
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridg-only-sesro125
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 125.
Optimised discount rate	STPR

Metrics

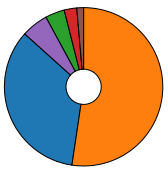
Net present value (Cost)

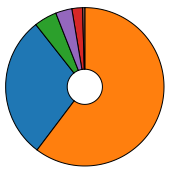
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	4,703,011	1,919,927	1,919,041	921,648	919,459	918,675	518,869	517,865	517,296	1,428,421	(£m)
Cost w/o deficit (STPR)	22,323	18,853	17,967	20,824	18,635	17,850	18,731	17,727	17,159	18,897	(£m)
Cost w/ deficit (IGEQ)	4,714,923	1,928,769	1,927,184	932,232	928,154	926,766	527,829	525,954	524,920	1,437,415	(£m)
Cost w/o deficit (IGEQ)	34,236	27,696	26,110	31,408	27,330	25,942	27,692	25,816	24,783	27,890	(£m)
Cost w/ deficit (LTDR)	4,705,314	1,921,667	1,920,651	923,709	921,172	920,274	520,627	519,463	518,808	1,430,187	(£m)
Cost w/o deficit (LTDR)	24,627	20,594	19,578	22,885	20,348	19,450	20,489	19,325	18,670	20,663	(£m)

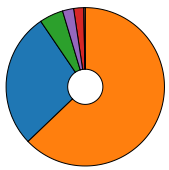
Cost breakdown (STPR)

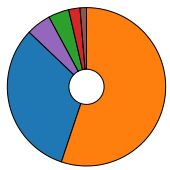
Select Company: Total

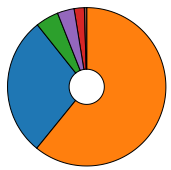
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,657	5,486	4,966	6,661	5,300	4,848	5,243	4,697	4,417	5,475	(£m)
Fixed opex	11,687	11,367	11,295	11,481	11,341	11,280	11,336	11,274	11,236	11,366	(£m)
Fixed operational carbon	885	876	874	885	876	876	872	866	866	875	(£m)
Embedded carbon	571	409	370	481	391	359	390	351	335	406	(£m)
Variable opex	1,214	627	407	1,044	638	424	748	478	280	651	(£m)
Variable carbon opex	308	88	56	272	88	64	143	61	26	123	(£m)

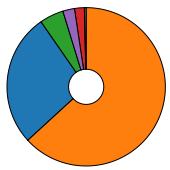
situation1 

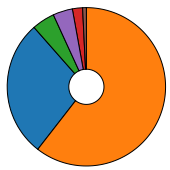
situation2 

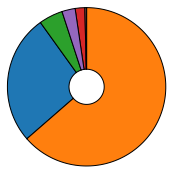
situation3 

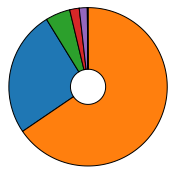
situation4 

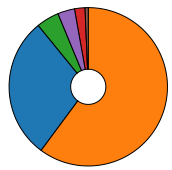
situation5 

situation6 

situation7 

situation8 

situation9 

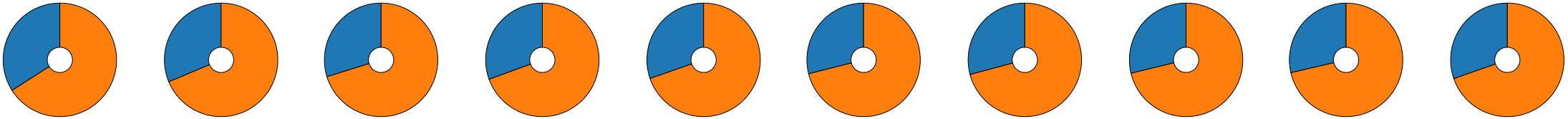
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,652,844	2,493,240	2,233,669	3,003,540	2,378,098	2,169,774	2,400,646	2,121,040	2,013,836	2,496,299	(tonnes)
Operational emissions	7,079,540	5,467,897	5,260,899	6,820,526	5,465,876	5,324,044	5,832,248	5,242,388	5,015,952	5,723,263	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

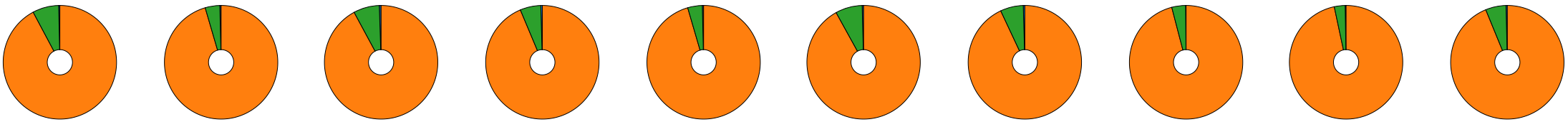


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	94	53	34	99	53	26	74	14	11	51	(GWh)
Grid	25,052	13,660	6,091	21,125	13,748	5,962	15,275	9,689	4,020	12,736	(GWh)
Renewable	2,027	596	488	1,331	600	496	1,074	397	129	793	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,257	66,089	65,157	69,397	65,743	64,902	65,597	63,621	62,615	66,042
SEA environmental disbenefit	127,546	92,002	85,792	113,126	89,764	83,718	90,746	78,468	72,066	92,581
Natural capital	84,333,305	80,436,684	81,294,285	80,688,691	82,262,116	84,884,091	81,756,332	82,658,334	85,430,477	82,638,257
Bio-diversity net gain	−248,725	−166,576	−151,956	−217,176	−158,317	−141,037	−154,640	−121,516	−96,227	−161,797

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,150	32,923	32,609	34,269	32,785	32,383	32,804	31,798	31,339	32,896

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	30.76	31.72	34.41	30.62	31.60	34.58	31.84	35.10	39.42	33.34
R1: Uncertainty of option supply/demand benefit	6.35	5.99	6.45	6.21	5.94	6.46	5.83	6.21	7.03	6.28
R3: Risk of service failure due to other physical hazards	7.13	7.59	8.33	7.14	7.55	8.43	7.53	8.46	9.69	7.98
R4: Availability of additional headroom	6.46	6.78	6.98	6.56	6.78	6.99	7.10	7.44	7.70	6.98
R5: Catchment/raw water quality risks (incl. climate change)	5.18	5.33	5.98	5.08	5.33	6.01	5.49	6.33	7.34	5.79
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.63	6.02	6.68	5.61	5.99	6.69	5.90	6.65	7.67	6.32
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

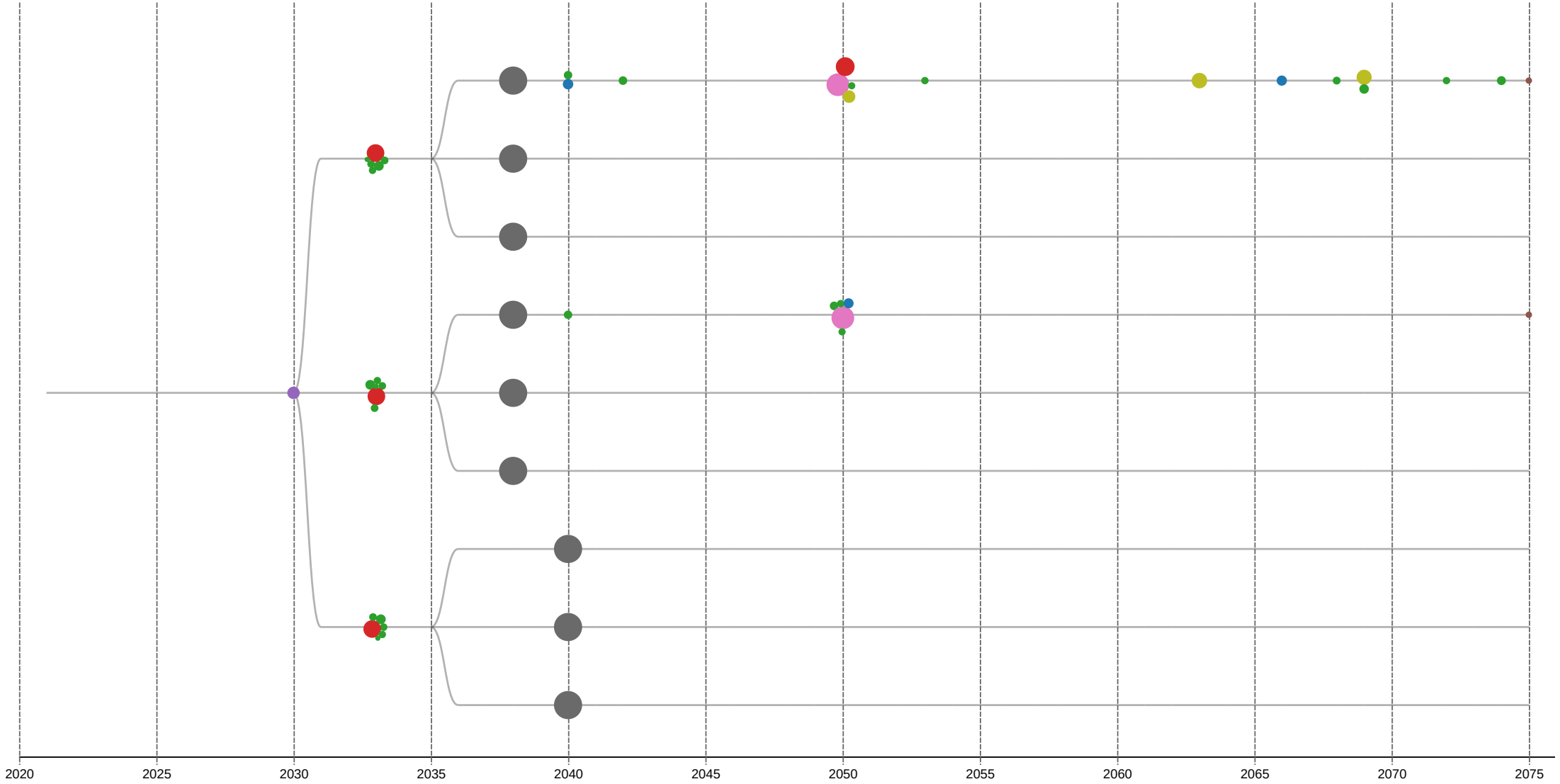
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.77	15.54	17.41	14.86	15.64	17.52	15.69	17.85	20.43	16.52
A3: Operational complexity and flexibility	6.27	6.91	7.66	6.37	6.87	7.71	6.80	7.73	8.92	7.25
A4: WRZ connectivity	7.45	8.59	9.71	8.44	8.73	9.77	8.85	10.06	11.45	9.23
A7: Customer relations support engagement with demand management	0.05	0.04	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.17	19.81	21.82	18.96	19.78	21.77	19.88	22.12	25.24	20.95
E1: Scaleability and modularity of proposed changes	8.10	8.59	9.48	8.16	8.59	9.53	8.58	9.71	11.14	9.10
E2: Intervention lead times	5.54	5.58	6.14	5.34	5.57	6.02	5.75	6.23	7.02	5.91
E3: Reliance on external bodies to deliver changes	5.52	5.64	6.20	5.45	5.62	6.22	5.56	6.18	7.08	5.94
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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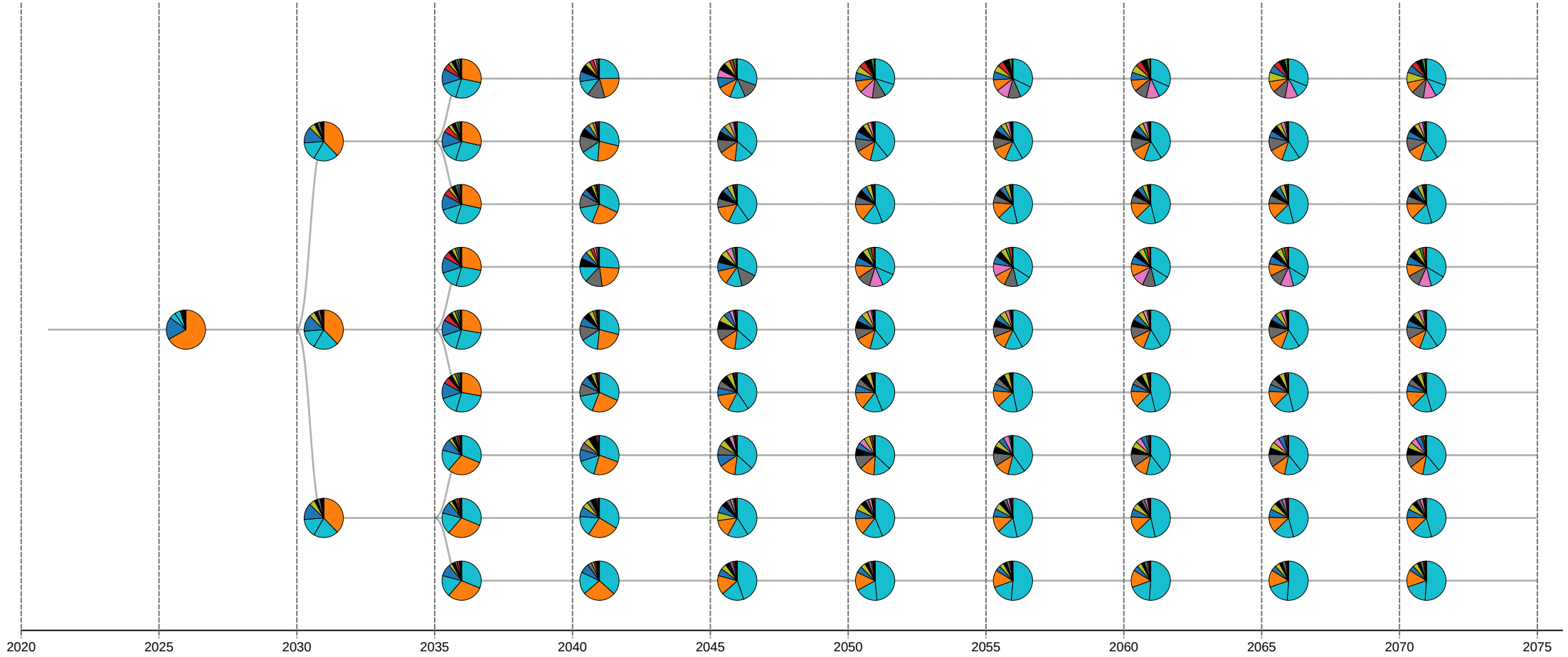
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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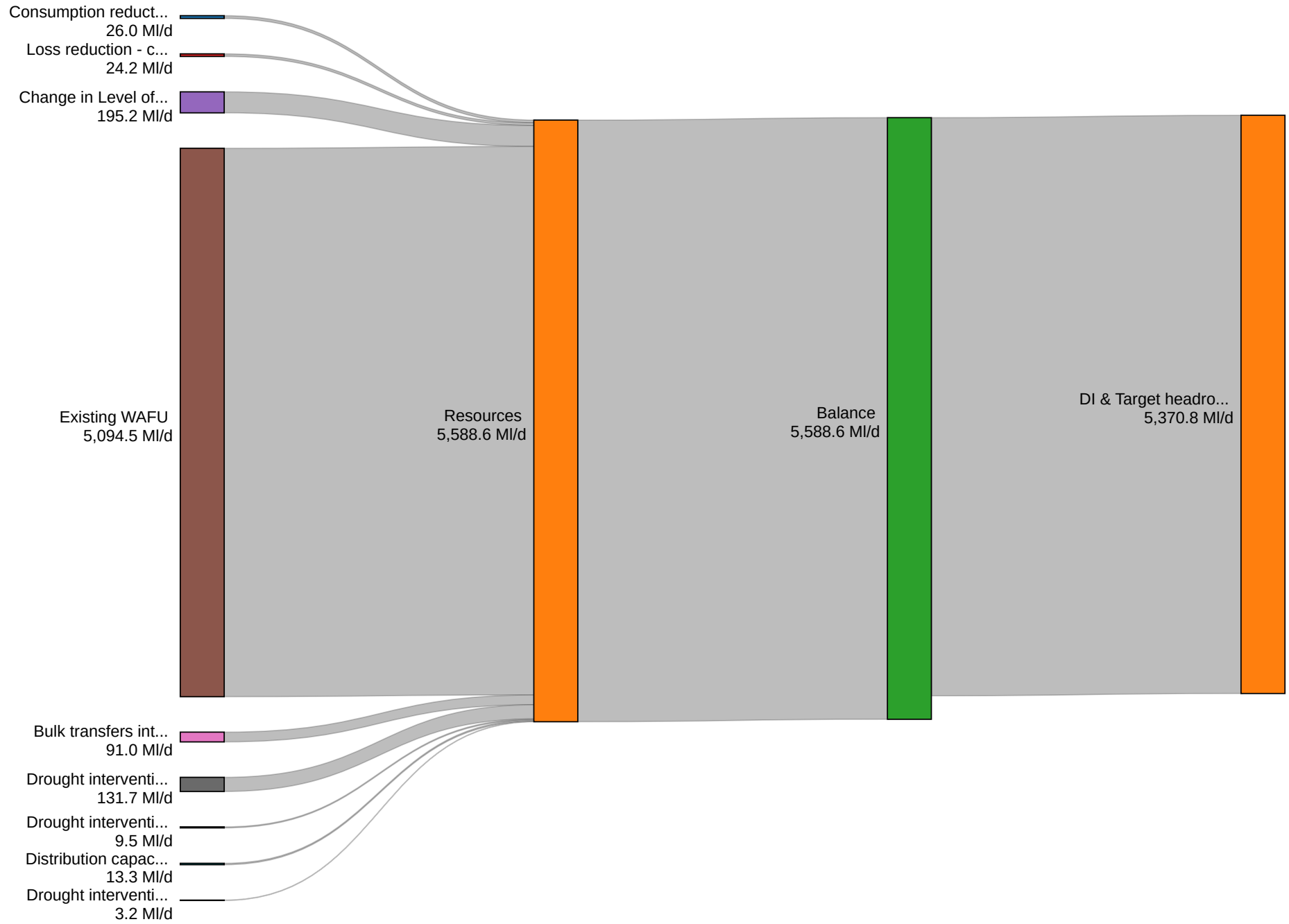
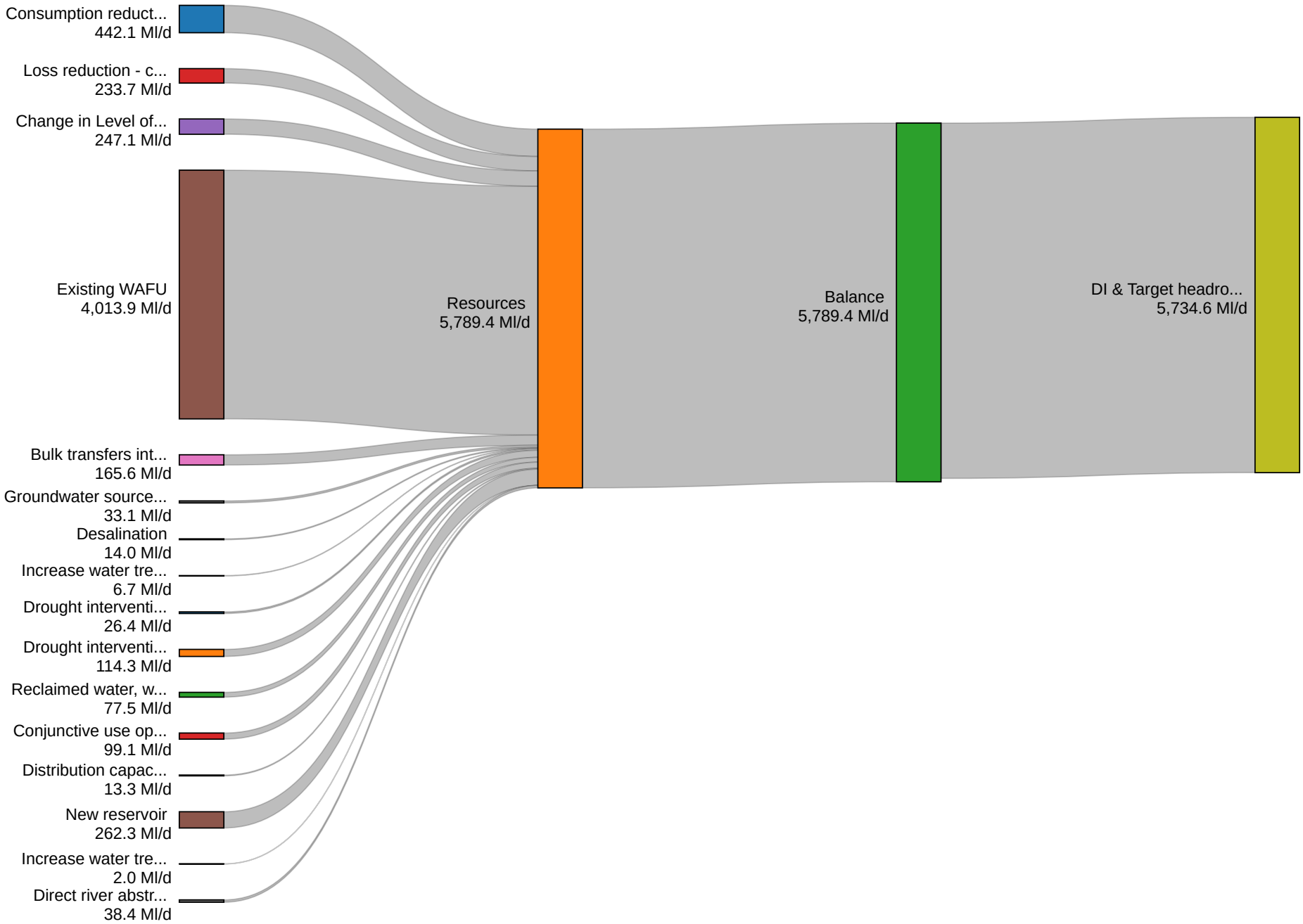
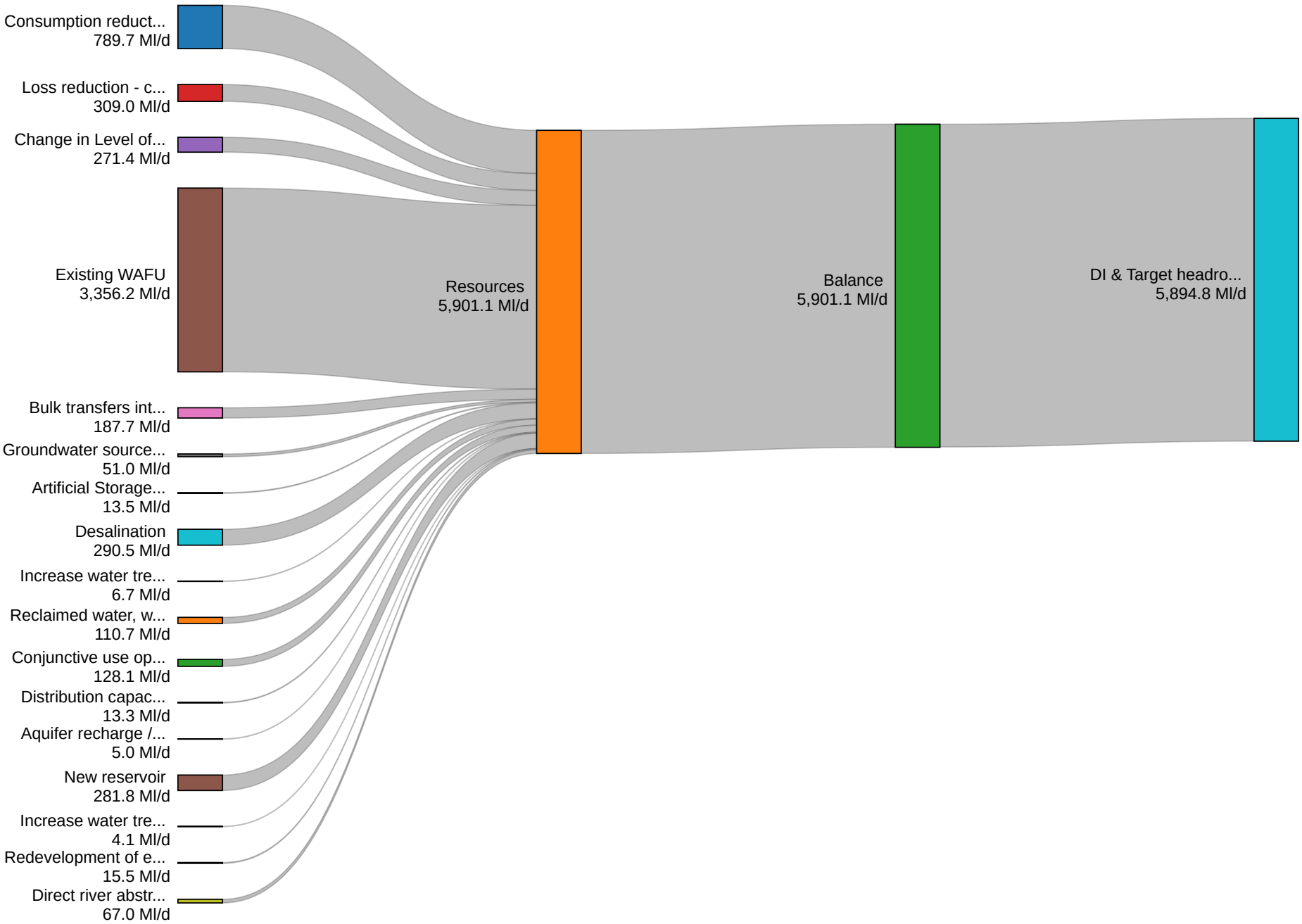
Situation 4 - 2026 (Thames Water)



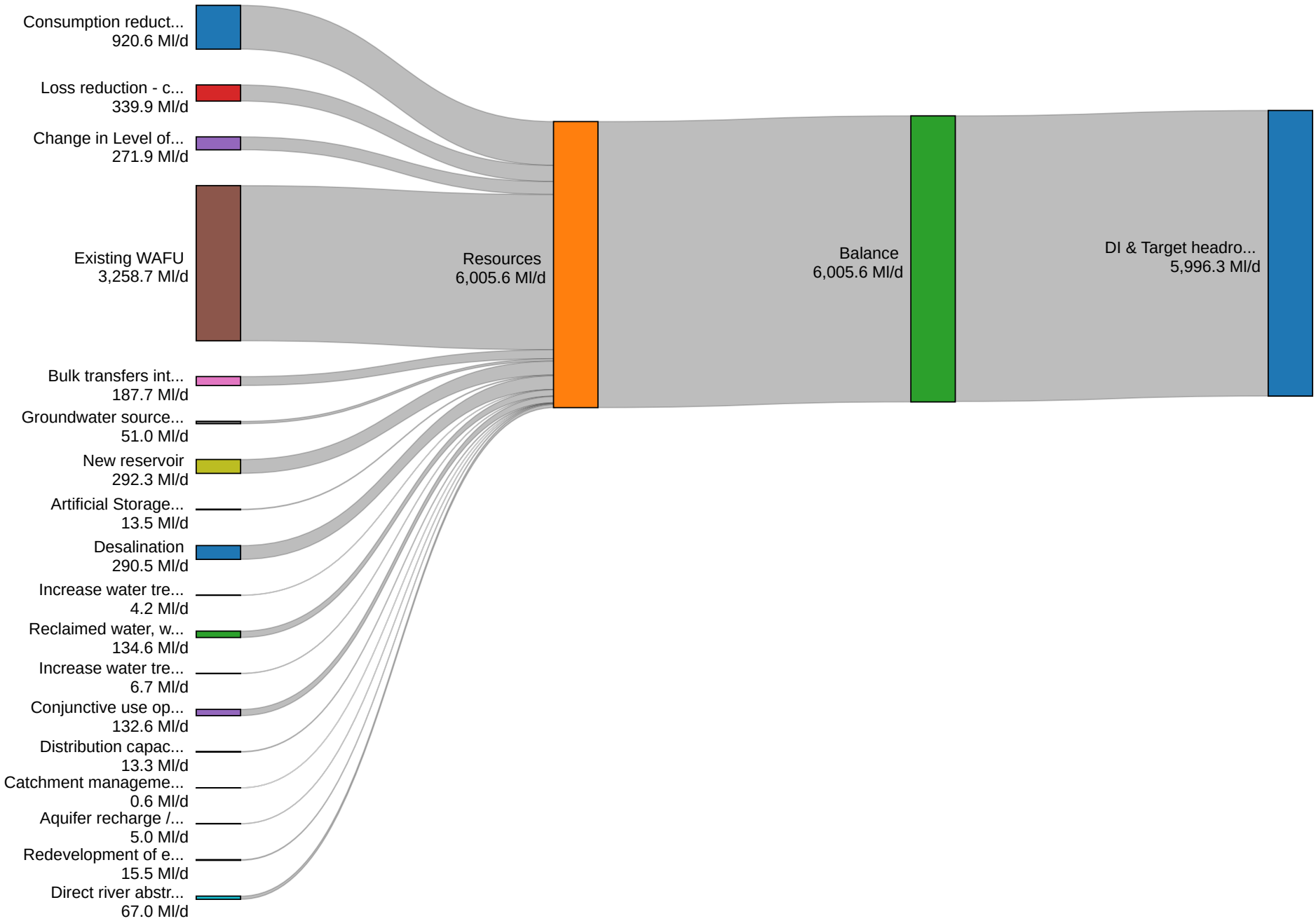
Situation 4 - 2040 (Thames Water)



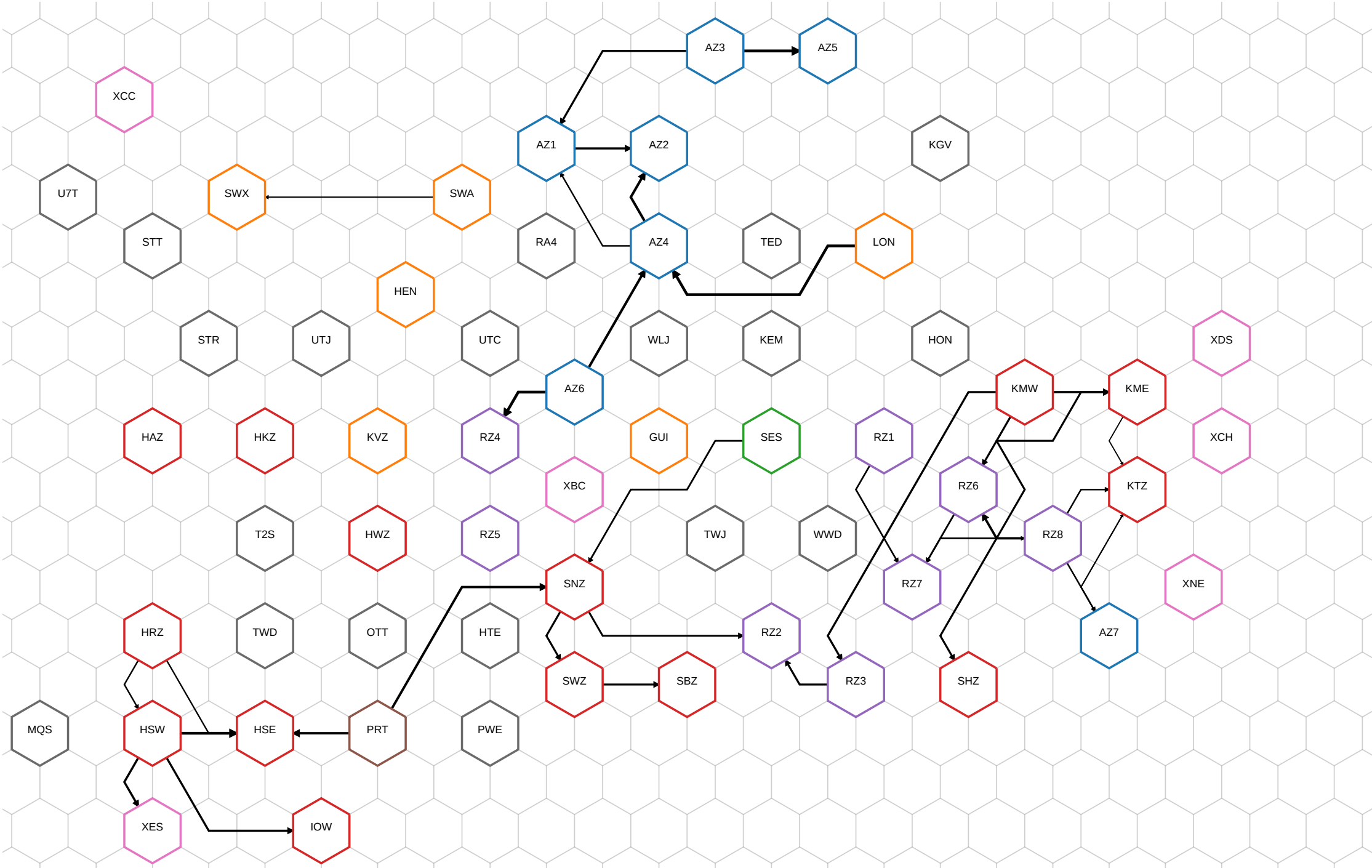
Situation 4 - 2050 (Thames Water)



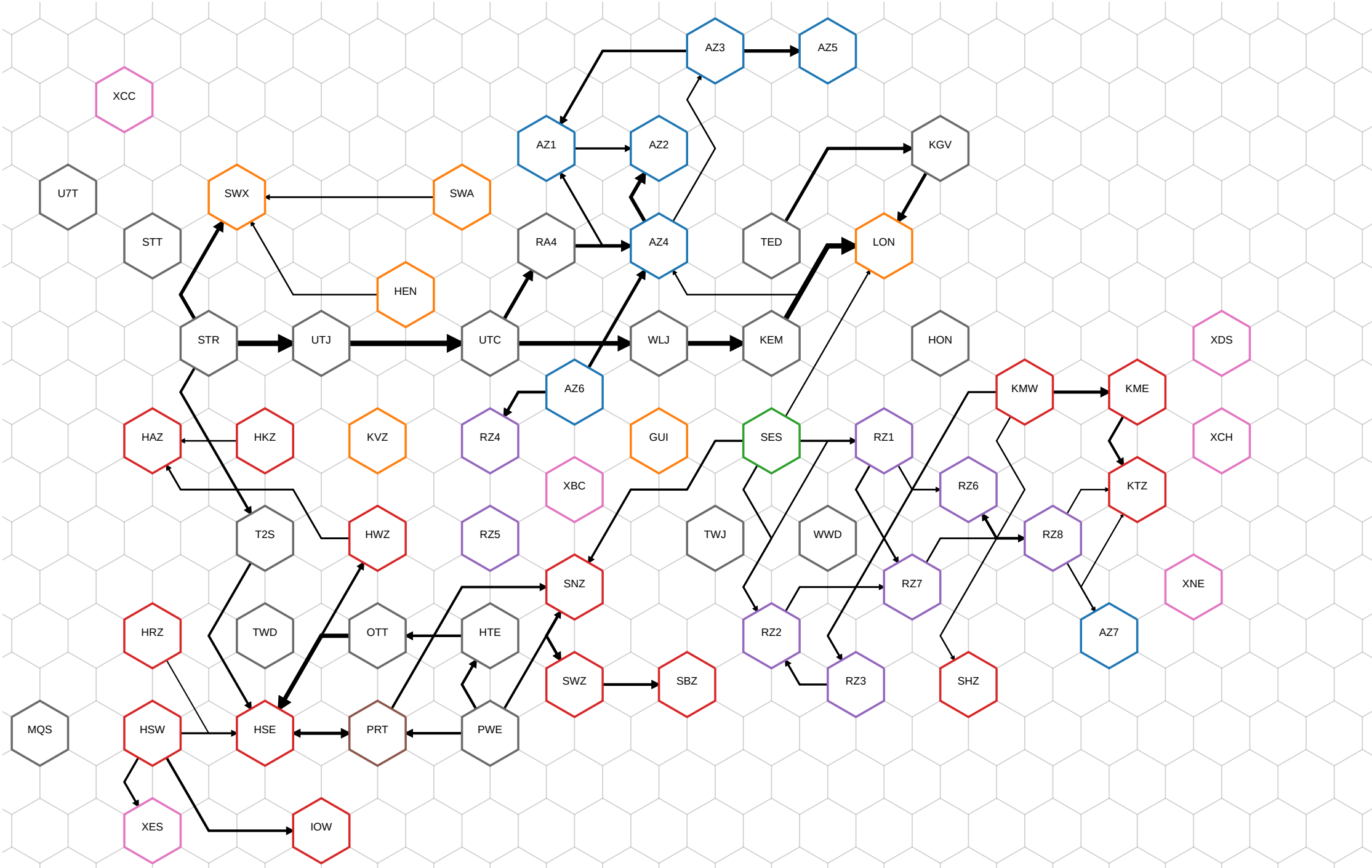
Situation 4 - 2075 (Thames Water)



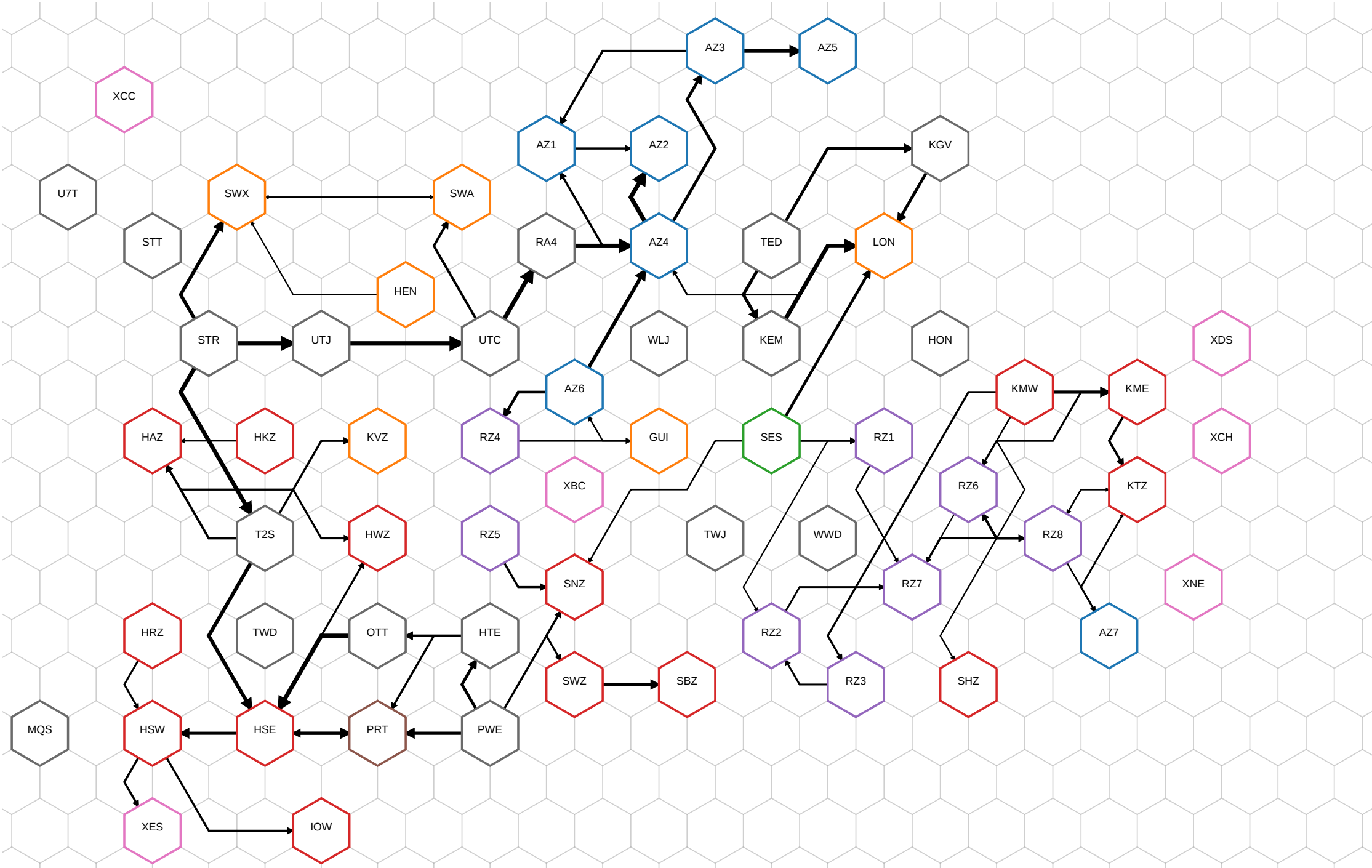
Situation 4 - 2026



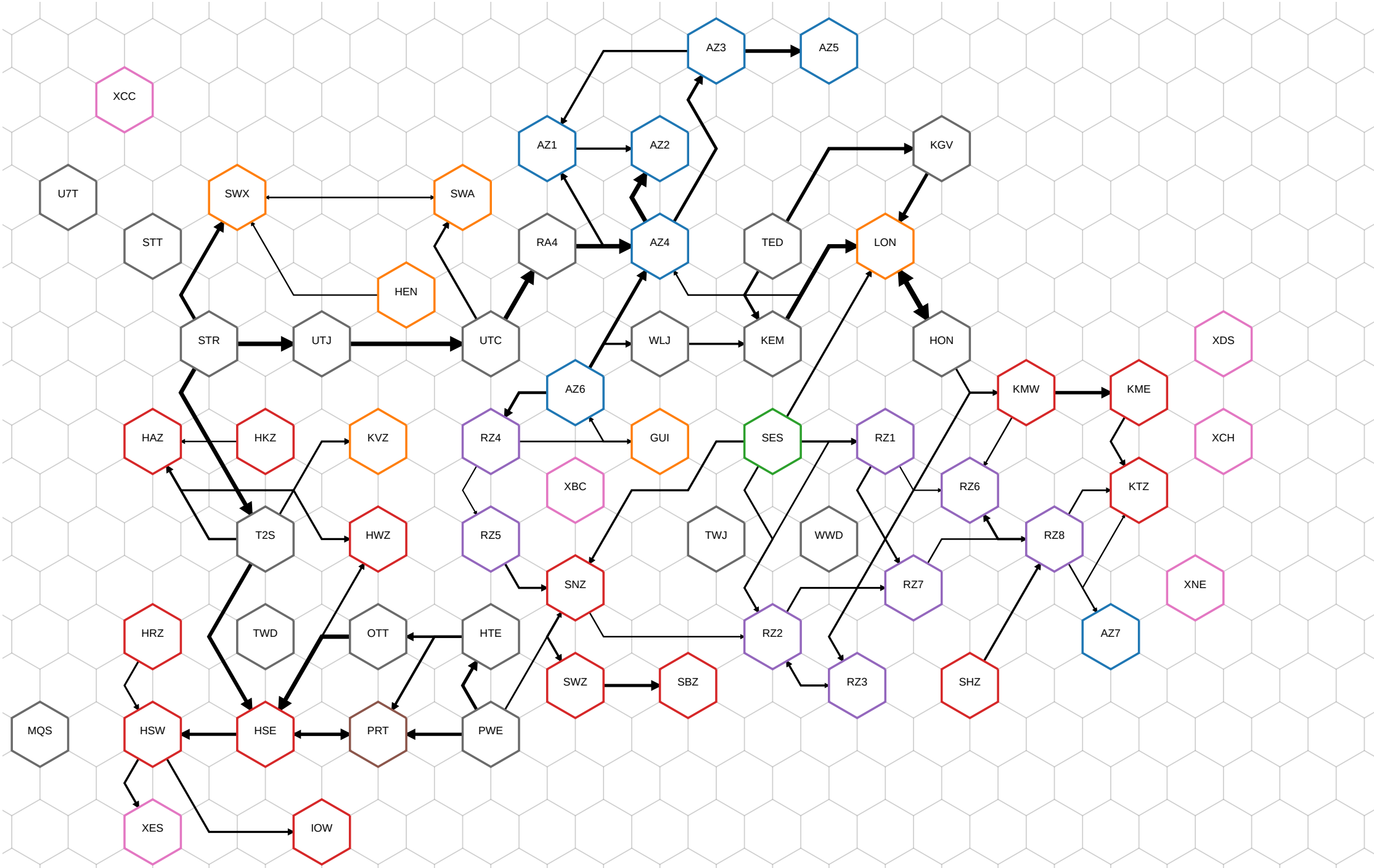
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED G + SESRO 100

IVM Summary: Thames Water

! This run contained total deficits of 29.9 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 4.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 23.9 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro100-2075
Description	Least cost run with hybrid-g government interventions including only SESRO 100 Mm3.
Created at	18/07/2023, 12:29:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridg-only-sesro100
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 100.
Optimised discount rate	STPR

Metrics

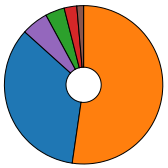
Net present value (Cost)

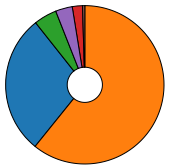
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	4,703,079	1,919,746	1,918,969	922,055	919,327	918,547	518,758	517,752	516,984	1,428,358	(£m)
Cost w/o deficit (STPR)	22,392	18,673	17,896	21,231	18,503	17,723	18,620	17,614	16,846	18,833	(£m)
Cost w/ deficit (IGEQ)	4,715,113	1,928,517	1,927,104	933,044	927,997	926,622	527,689	525,820	524,441	1,437,372	(£m)
Cost w/o deficit (IGEQ)	34,426	27,444	26,031	32,220	27,173	25,798	27,551	25,682	24,303	27,847	(£m)
Cost w/ deficit (LTDR)	4,705,404	1,921,472	1,920,578	924,192	921,034	920,143	520,510	519,345	518,463	1,430,127	(£m)
Cost w/o deficit (LTDR)	24,717	20,399	19,504	23,368	20,210	19,319	20,372	19,207	18,325	20,602	(£m)

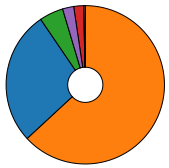
Cost breakdown (STPR)

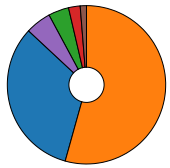
Select Company: Total

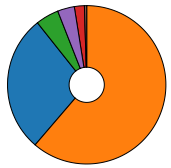
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,695	5,328	4,901	6,922	5,187	4,732	5,144	4,596	4,156	5,407	(£m)
Fixed opex	11,710	11,354	11,294	11,536	11,340	11,280	11,335	11,274	11,211	11,370	(£m)
Fixed operational carbon	883	874	874	893	874	874	872	866	866	875	(£m)
Embedded carbon	576	389	364	504	380	349	380	341	313	400	(£m)
Variable opex	1,218	641	407	1,106	636	424	744	477	275	659	(£m)
Variable carbon opex	309	88	56	270	85	64	145	61	25	123	(£m)

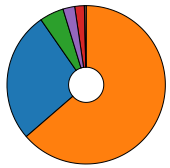
situation1 

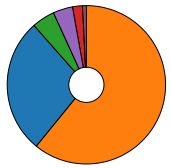
situation2 

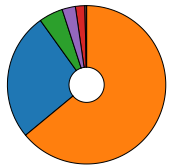
situation3 

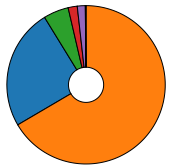
situation4 

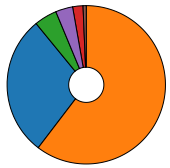
situation5 

situation6 

situation7 

situation8 

situation9 

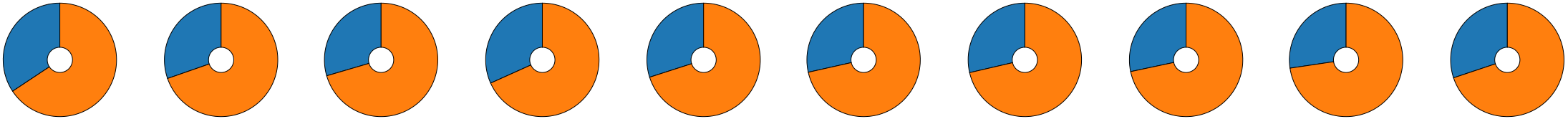
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,693,625	2,372,332	2,204,601	3,189,885	2,323,600	2,118,111	2,342,508	2,068,451	1,885,437	2,466,506	(tonnes)
Operational emissions	7,070,197	5,451,762	5,260,972	6,867,883	5,434,868	5,312,120	5,843,869	5,235,000	5,011,003	5,720,853	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

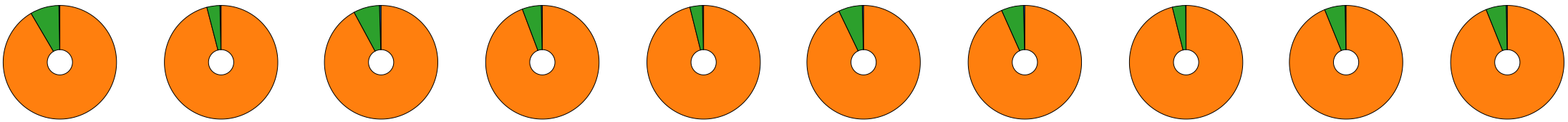


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	75	50	31	80	49	24	66	13	10	44	(GWh)
Grid	24,404	13,920	6,098	22,753	13,863	6,065	15,851	9,645	3,429	12,892	(GWh)
Renewable	2,186	537	492	1,307	514	443	1,073	378	215	794	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,742	65,983	65,204	69,606	65,754	64,874	65,548	63,573	62,512	66,088
SEA environmental disbenefit	129,994	91,492	85,861	115,933	89,265	82,808	91,852	78,369	71,063	92,960
Natural capital	86,518,256	82,055,267	82,304,328	81,605,408	83,107,280	85,868,905	82,720,831	83,561,094	86,331,421	83,785,866
Bio-diversity net gain	−239,392	−160,028	−142,844	−205,052	−152,701	−124,497	−131,903	−111,830	−84,026	−150,253

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,243	32,857	32,589	34,474	32,710	32,285	32,841	31,821	31,359	32,909

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	30.32	30.66	33.57	30.36	30.85	33.76	30.95	34.12	38.14	32.53
R1: Uncertainty of option supply/demand benefit	6.28	5.76	6.26	6.26	5.80	6.32	5.66	6.01	6.68	6.11
R3: Risk of service failure due to other physical hazards	7.00	7.29	8.13	7.04	7.35	8.21	7.25	8.19	9.38	7.76
R4: Availability of additional headroom	6.43	6.71	6.93	6.53	6.73	6.93	7.04	7.38	7.62	6.92
R5: Catchment/raw water quality risks (incl. climate change)	5.11	5.16	5.83	5.03	5.19	5.84	5.33	6.15	7.13	5.64
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.51	5.74	6.43	5.50	5.78	6.47	5.67	6.39	7.33	6.09
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

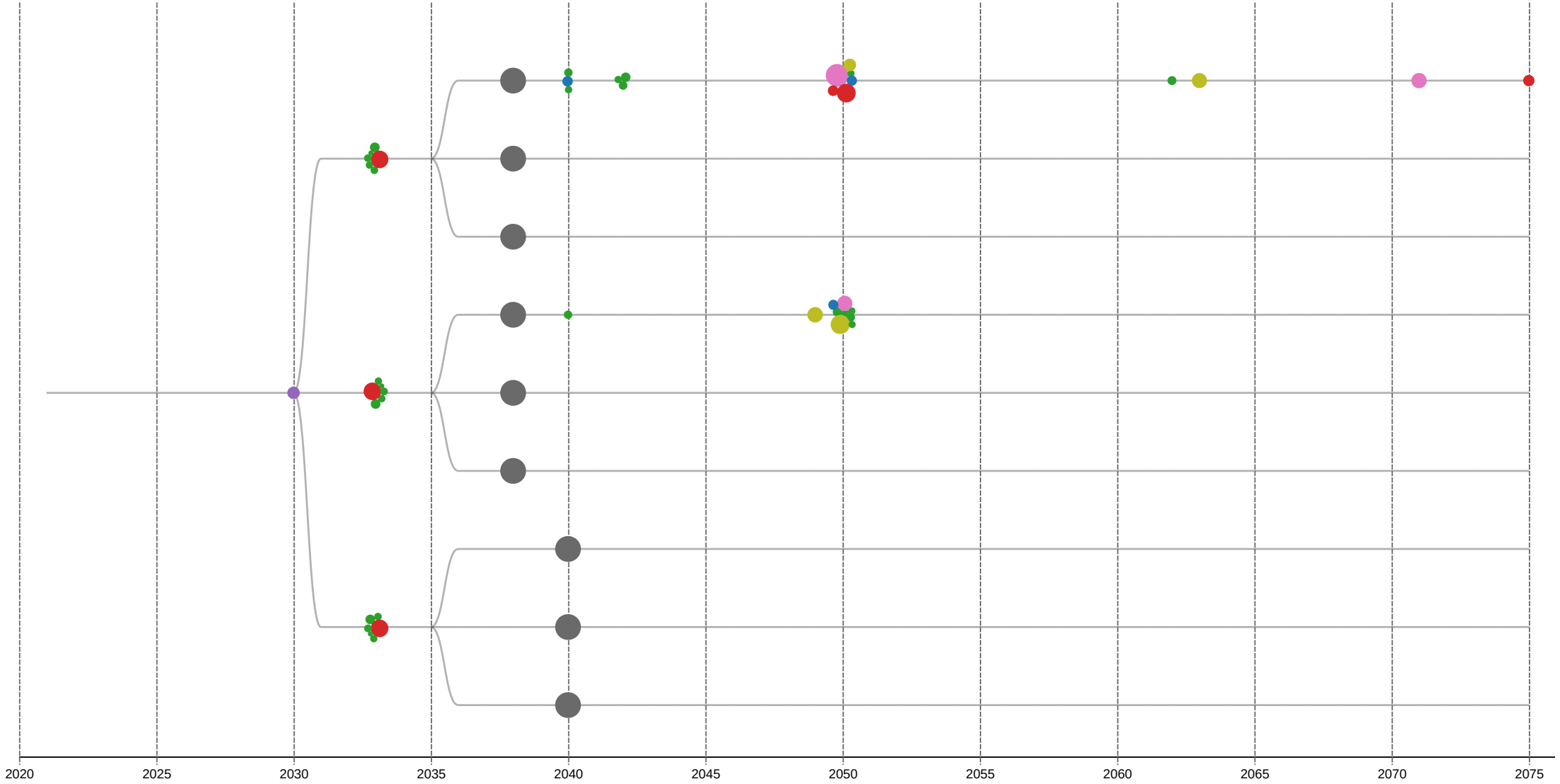
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.15	15.37	17.31	14.14	15.43	17.28	15.50	17.64	20.20	16.33
A3: Operational complexity and flexibility	6.13	6.61	7.41	6.26	6.66	7.47	6.58	7.46	8.59	7.02
A4: WRZ connectivity	7.98	8.72	9.85	7.84	8.73	9.76	8.87	10.13	11.56	9.27
A7: Customer relations support engagement with demand management	0.04	0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.37	19.76	21.95	19.62	19.90	21.92	19.89	22.19	25.18	21.09
E1: Scaleability and modularity of proposed changes	8.32	8.71	9.67	8.47	8.78	9.76	8.75	9.92	11.29	9.29
E2: Intervention lead times	5.52	5.51	6.14	5.64	5.54	5.98	5.65	6.15	6.95	5.90
E3: Reliance on external bodies to deliver changes	5.54	5.54	6.14	5.52	5.58	6.18	5.50	6.12	6.94	5.89
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

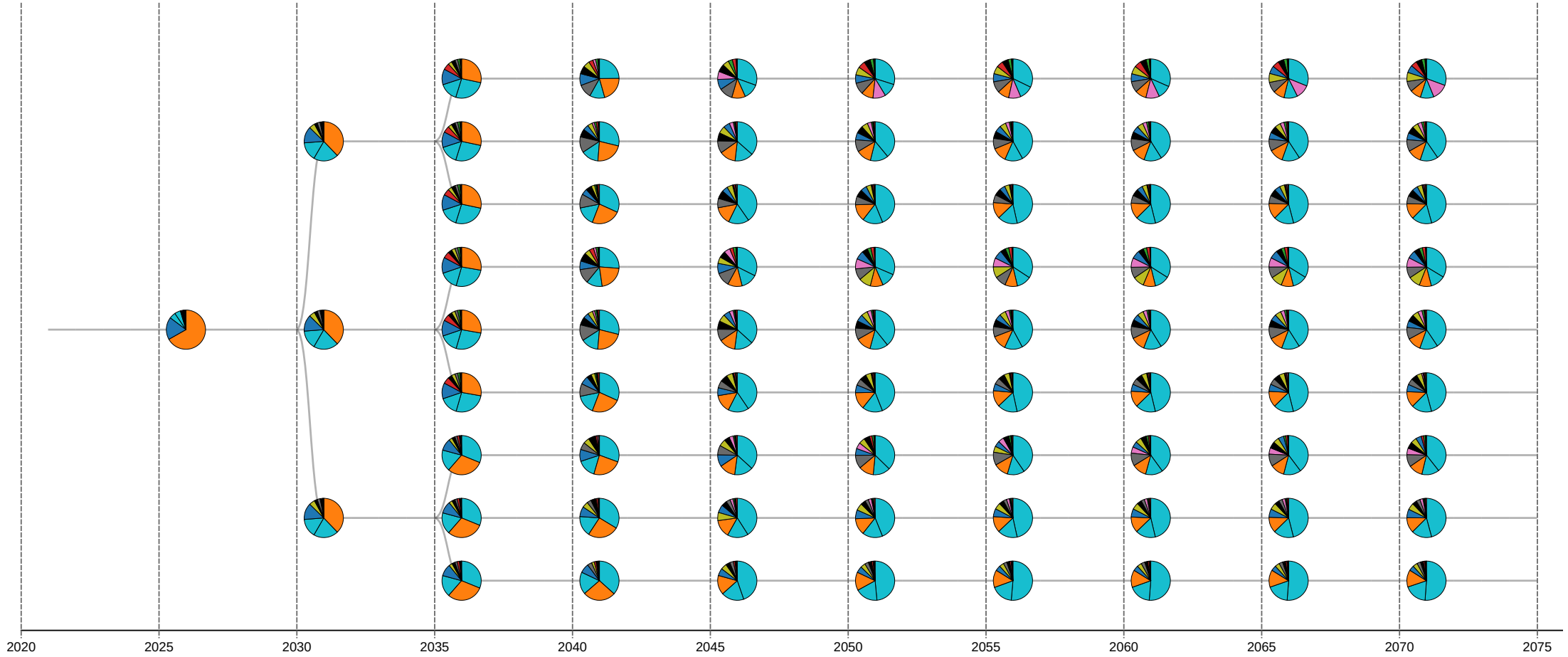
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

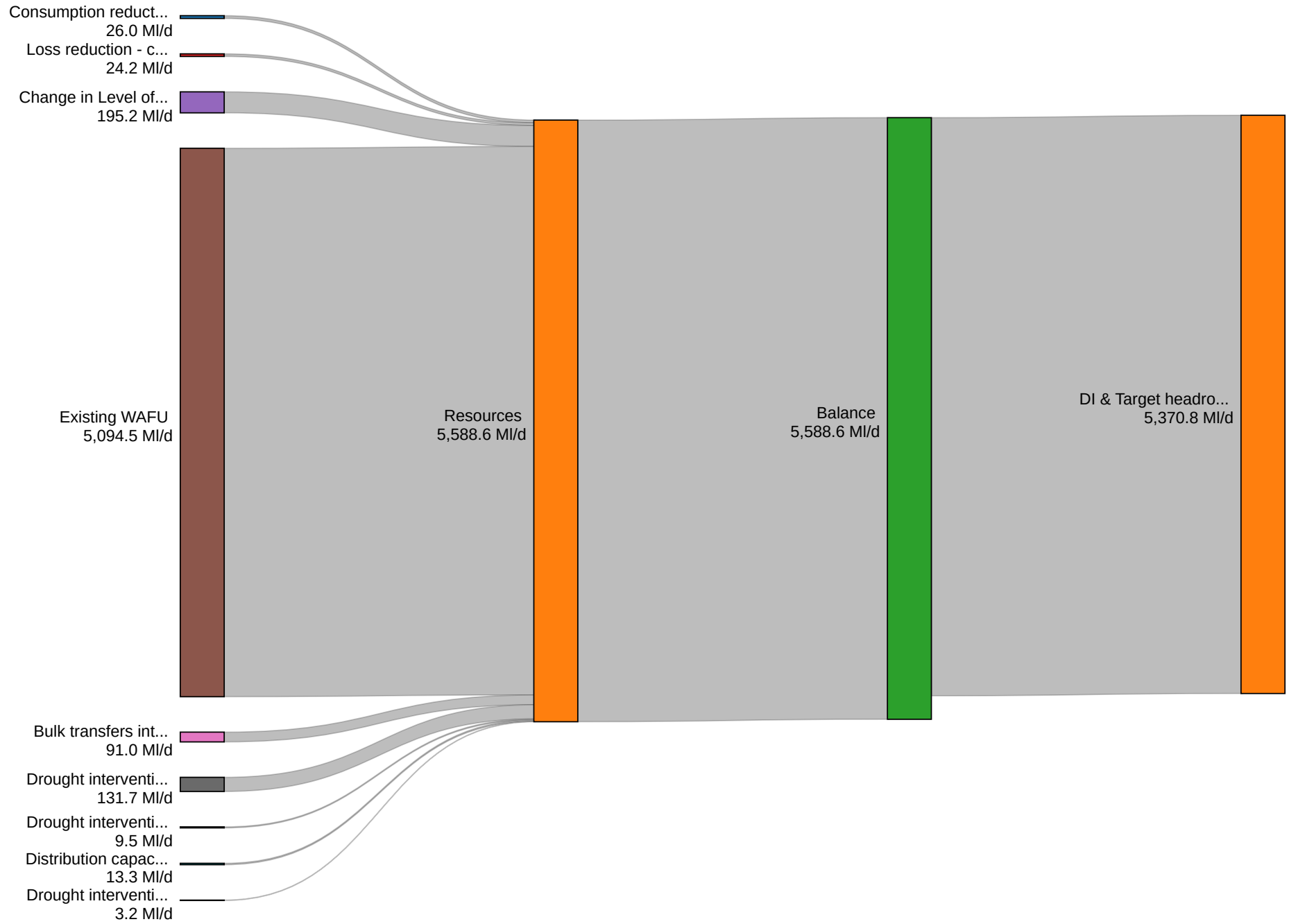
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

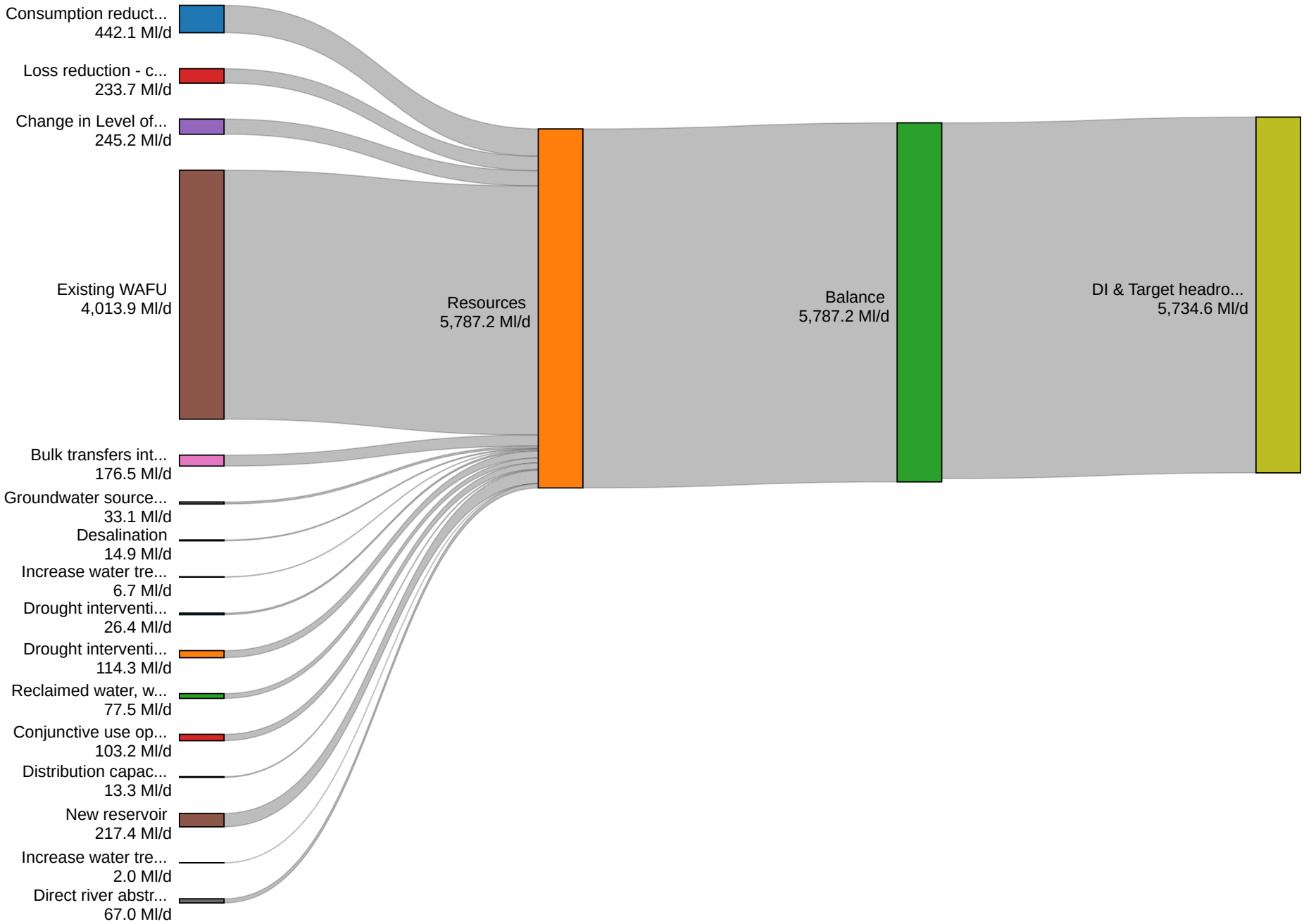


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

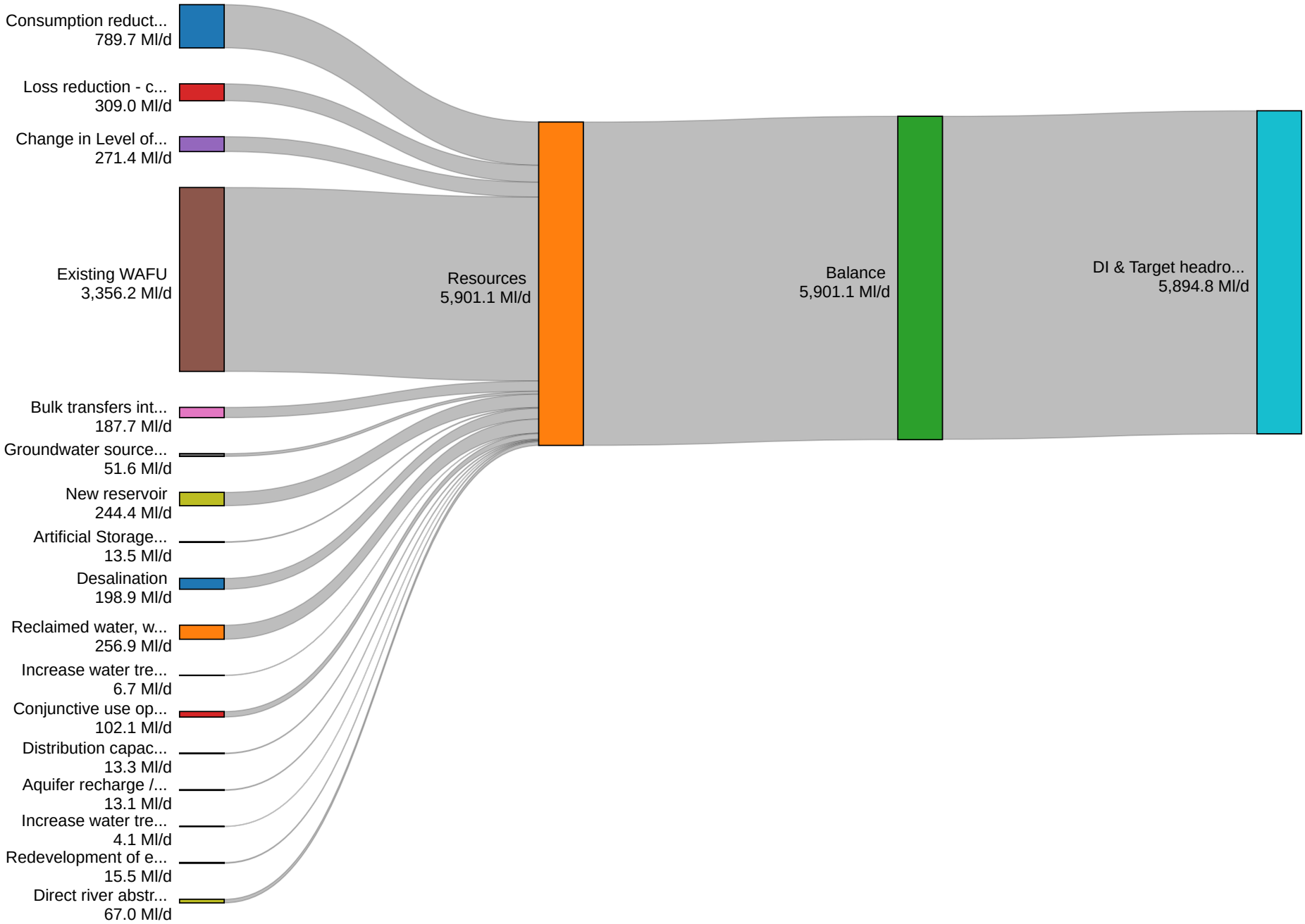
Situation 4 - 2026 (Thames Water)



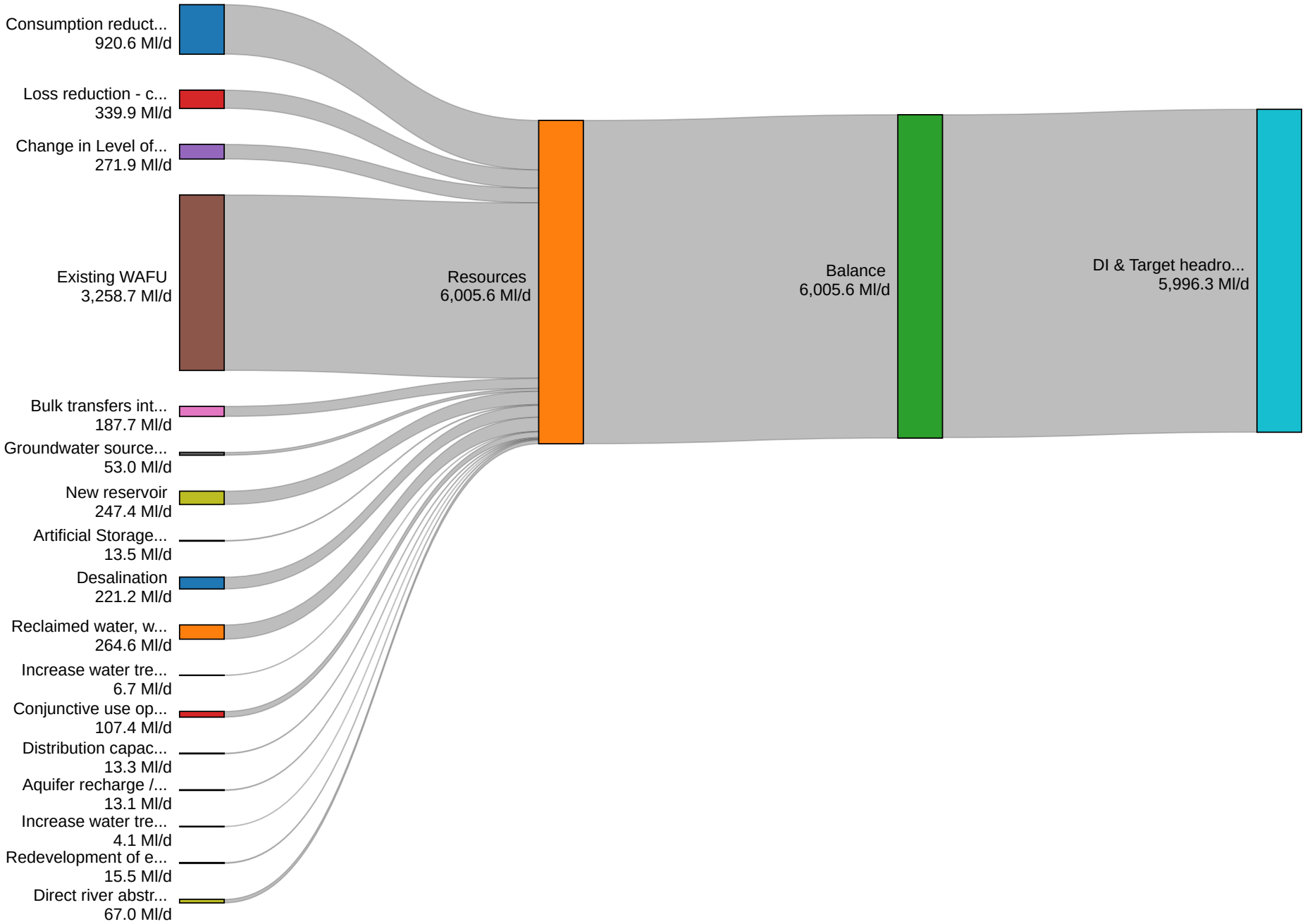
Situation 4 - 2040 (Thames Water)



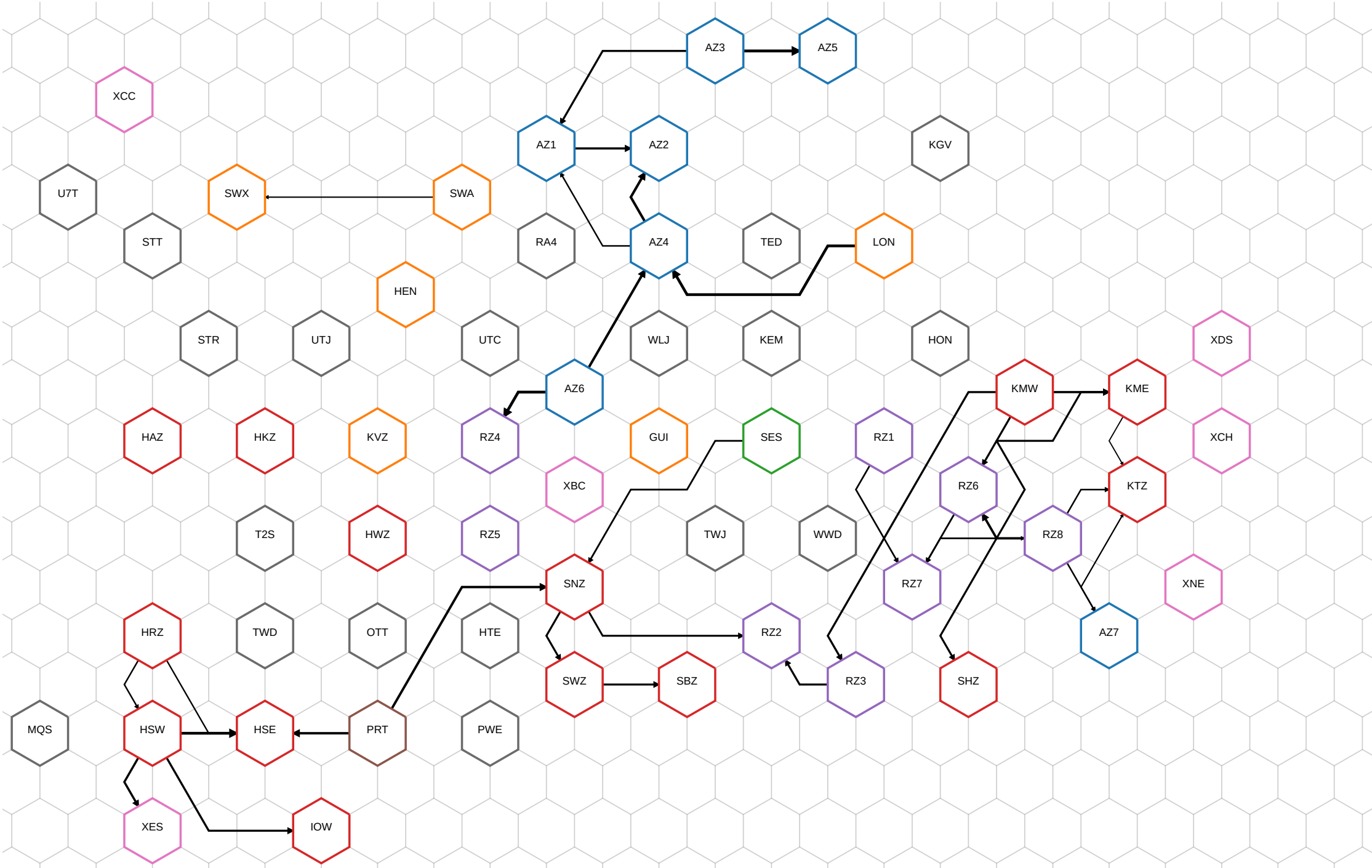
Situation 4 - 2050 (Thames Water)



Situation 4 - 2075 (Thames Water)



Situation 4 - 2026



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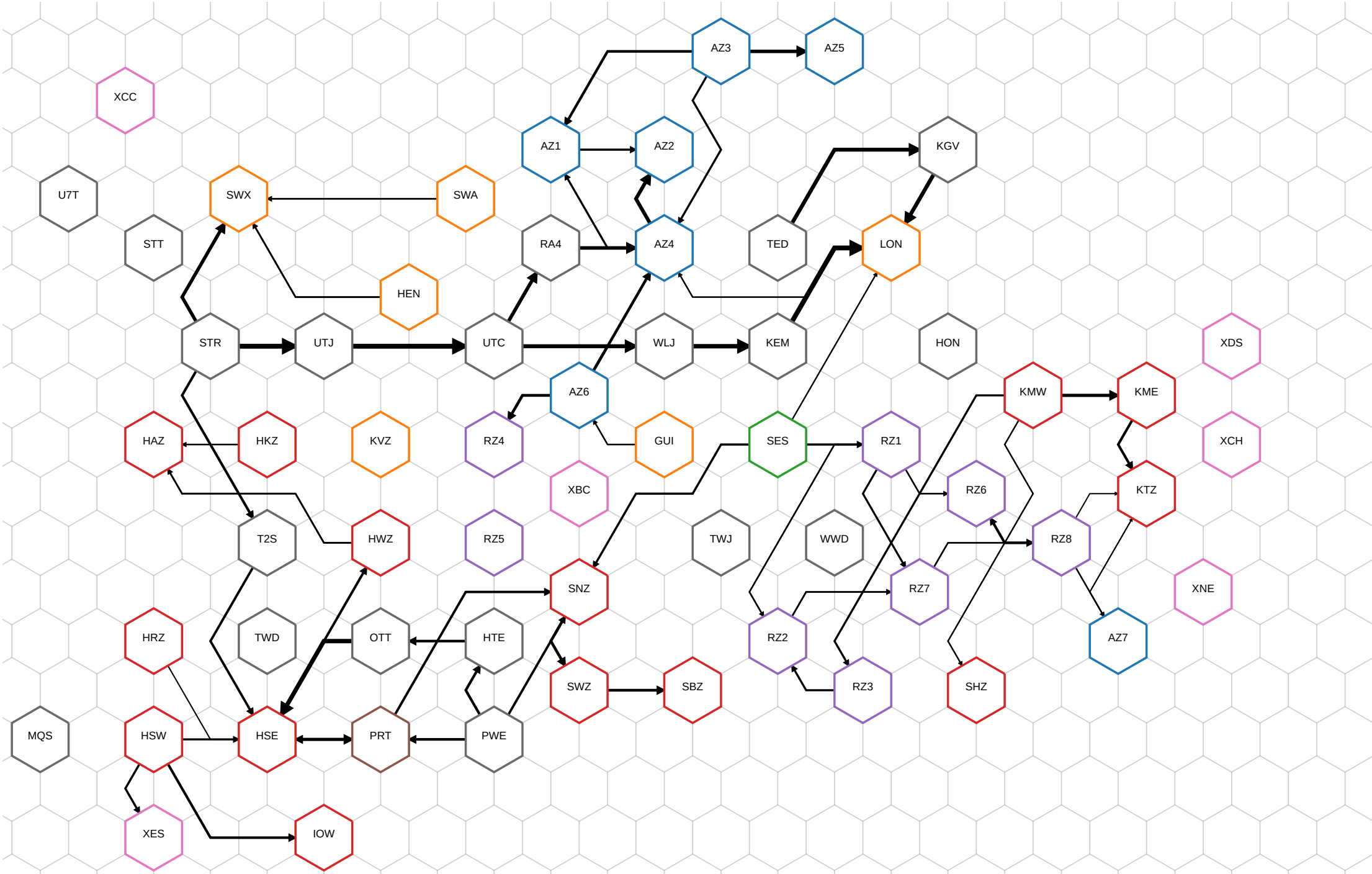
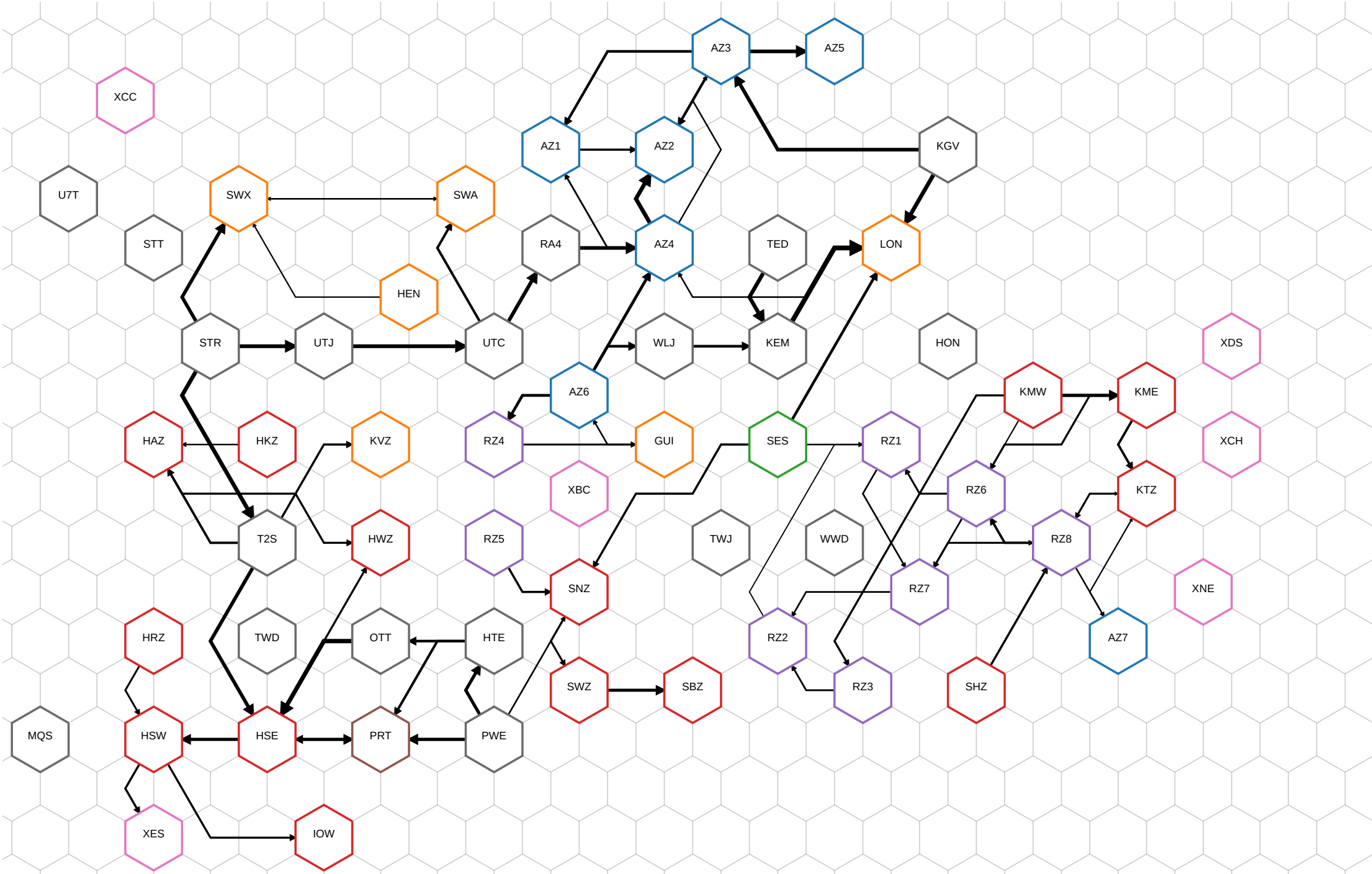
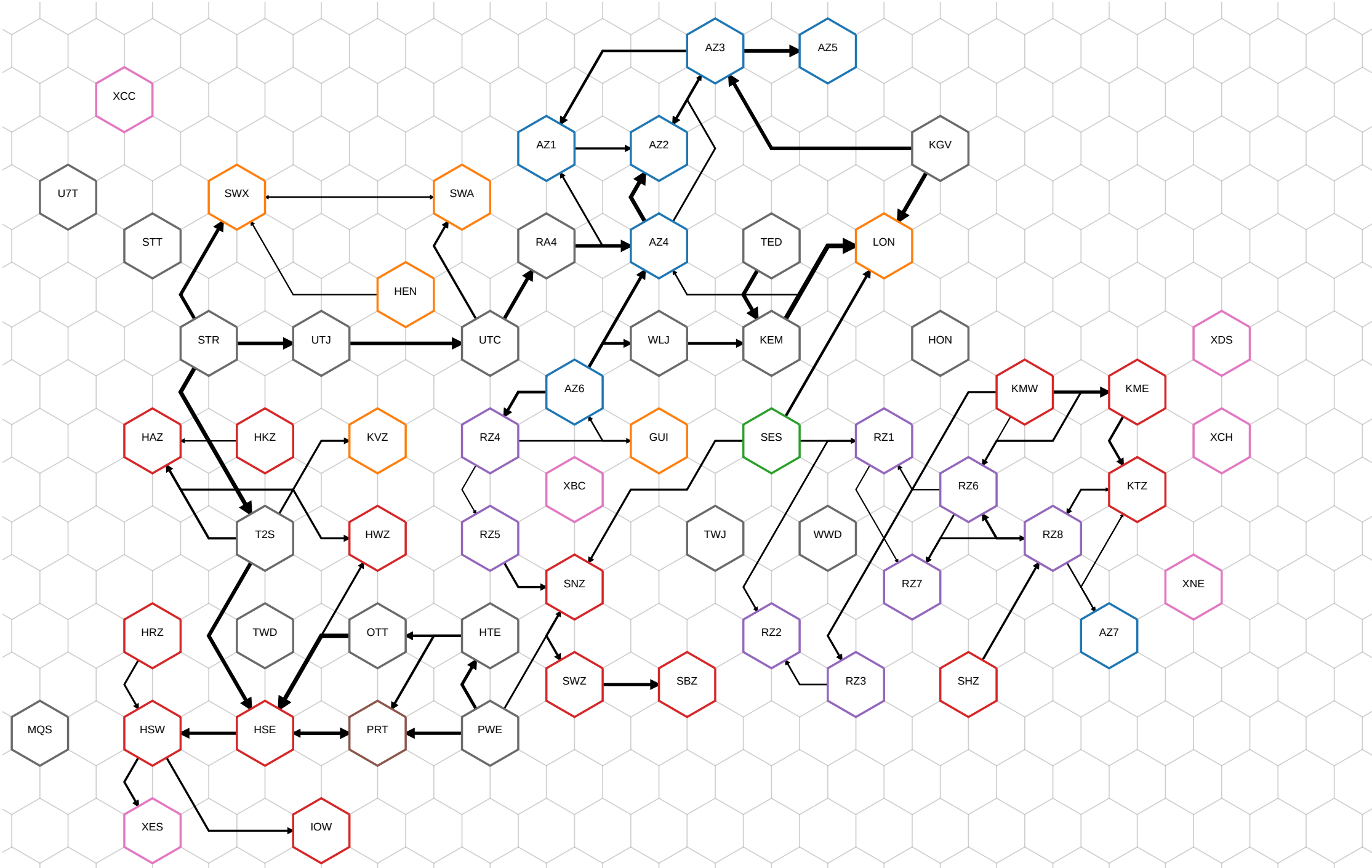


Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GOVERNMENT-LED G + SESRO 75

IVM Summary: Thames Water

! This run contained total deficits of 29.9 Ml/d in the **"100a-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 4.9 Ml/d in the **"hybrida-dyaa-hplan-fthr"** planning scenario.

! This run contained total deficits of 23.9 Ml/d in the **"normal-hplan-fthr"** planning scenario.

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridg-only-sesro75-2075
Description	Least cost run with hybrid-g government interventions including only SESRO 75 Mm3.
Created at	18/07/2023, 14:21:52
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridg-only-sesro75
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all SESRO variants except 75.
Optimised discount rate	STPR

Metrics

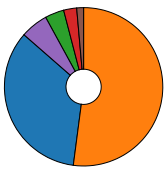
Net present value (Cost)

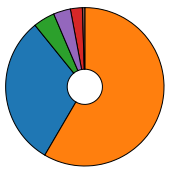
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	4,703,316	1,920,919	1,920,180	921,867	919,370	918,451	518,720	517,669	516,918	1,428,601	(£m)
Cost w/o deficit (STPR)	22,629	19,846	19,106	21,043	18,546	17,627	18,582	17,531	16,780	19,077	(£m)
Cost w/ deficit (IGEQ)	4,715,369	1,930,464	1,929,137	932,667	928,075	926,438	527,655	525,674	524,336	1,437,757	(£m)
Cost w/o deficit (IGEQ)	34,681	29,390	28,063	31,843	27,251	25,614	27,517	25,536	24,198	28,233	(£m)
Cost w/ deficit (LTDR)	4,705,648	1,922,794	1,921,945	923,969	921,084	920,031	520,471	519,250	518,390	1,430,398	(£m)
Cost w/o deficit (LTDR)	24,961	21,720	20,872	23,145	20,260	19,207	20,334	19,113	18,252	20,874	(£m)

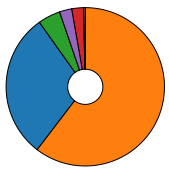
Cost breakdown (STPR)

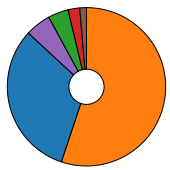
Select Company: Total

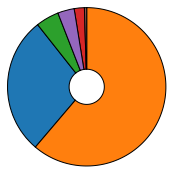
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,773	6,102	5,691	6,683	5,219	4,674	5,104	4,521	4,098	5,541	(£m)
Fixed opex	11,784	11,595	11,538	11,599	11,354	11,277	11,336	11,271	11,209	11,440	(£m)
Fixed operational carbon	884	875	874	883	874	875	872	866	866	874	(£m)
Embedded carbon	602	485	461	497	386	342	380	334	308	422	(£m)
Variable opex	1,270	691	476	1,092	626	406	745	478	275	673	(£m)
Variable carbon opex	316	98	67	289	86	54	146	61	25	127	(£m)

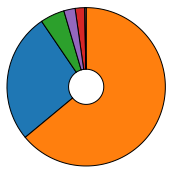
situation1 

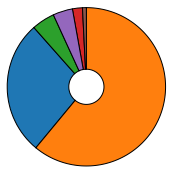
situation2 

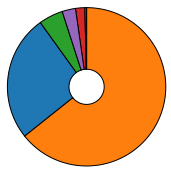
situation3 

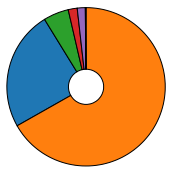
situation4 

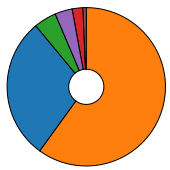
situation5 

situation6 

situation7 

situation8 

situation9 

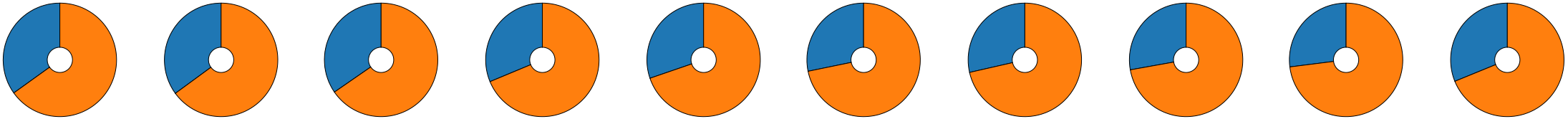
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,819,416	2,981,687	2,821,883	3,140,077	2,361,202	2,065,276	2,342,385	2,020,379	1,852,181	2,600,499	(tonnes)
Operational emissions	7,122,579	5,525,007	5,331,394	6,902,097	5,443,869	5,251,607	5,860,948	5,242,296	5,010,421	5,743,357	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

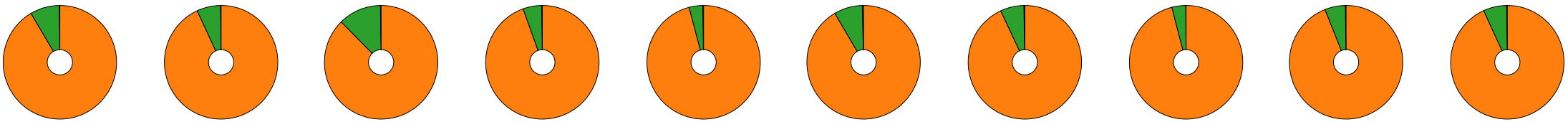


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	50	29	16	50	35	23	45	10	8	30	(GWh)
Grid	24,924	14,078	6,705	22,853	13,606	5,647	15,026	9,659	3,433	12,881	(GWh)
Renewable	2,264	1,021	935	1,285	550	499	1,083	397	214	916	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	71,354	67,057	66,264	69,277	65,616	64,652	65,709	63,578	62,517	66,225
SEA environmental disbenefit	124,112	93,288	87,015	113,113	89,282	83,556	92,054	78,405	71,108	92,437
Natural capital	88,423,114	90,150,595	90,448,439	81,526,257	83,919,492	87,150,647	87,304,150	85,038,093	87,808,449	86,863,249
Bio-diversity net gain	−219,971	−158,996	−134,085	−185,302	−129,638	−120,741	−132,083	−97,377	−72,444	−138,960

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	35,028	32,920	32,637	34,309	32,734	32,483	32,842	31,803	31,340	32,900

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	30.42	32.27	35.40	29.80	30.45	33.12	30.32	33.37	37.26	32.49
R1: Uncertainty of option supply/demand benefit	6.31	6.19	6.76	6.02	5.73	6.18	5.52	5.86	6.50	6.12
R3: Risk of service failure due to other physical hazards	7.00	7.64	8.53	6.95	7.25	8.03	7.11	7.99	9.14	7.74
R4: Availability of additional headroom	6.45	6.80	7.01	6.45	6.70	6.90	6.99	7.33	7.57	6.91
R5: Catchment/raw water quality risks (incl. climate change)	5.15	5.55	6.27	4.89	5.11	5.73	5.21	6.01	6.96	5.65
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.50	6.09	6.82	5.48	5.67	6.29	5.49	6.18	7.09	6.07
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

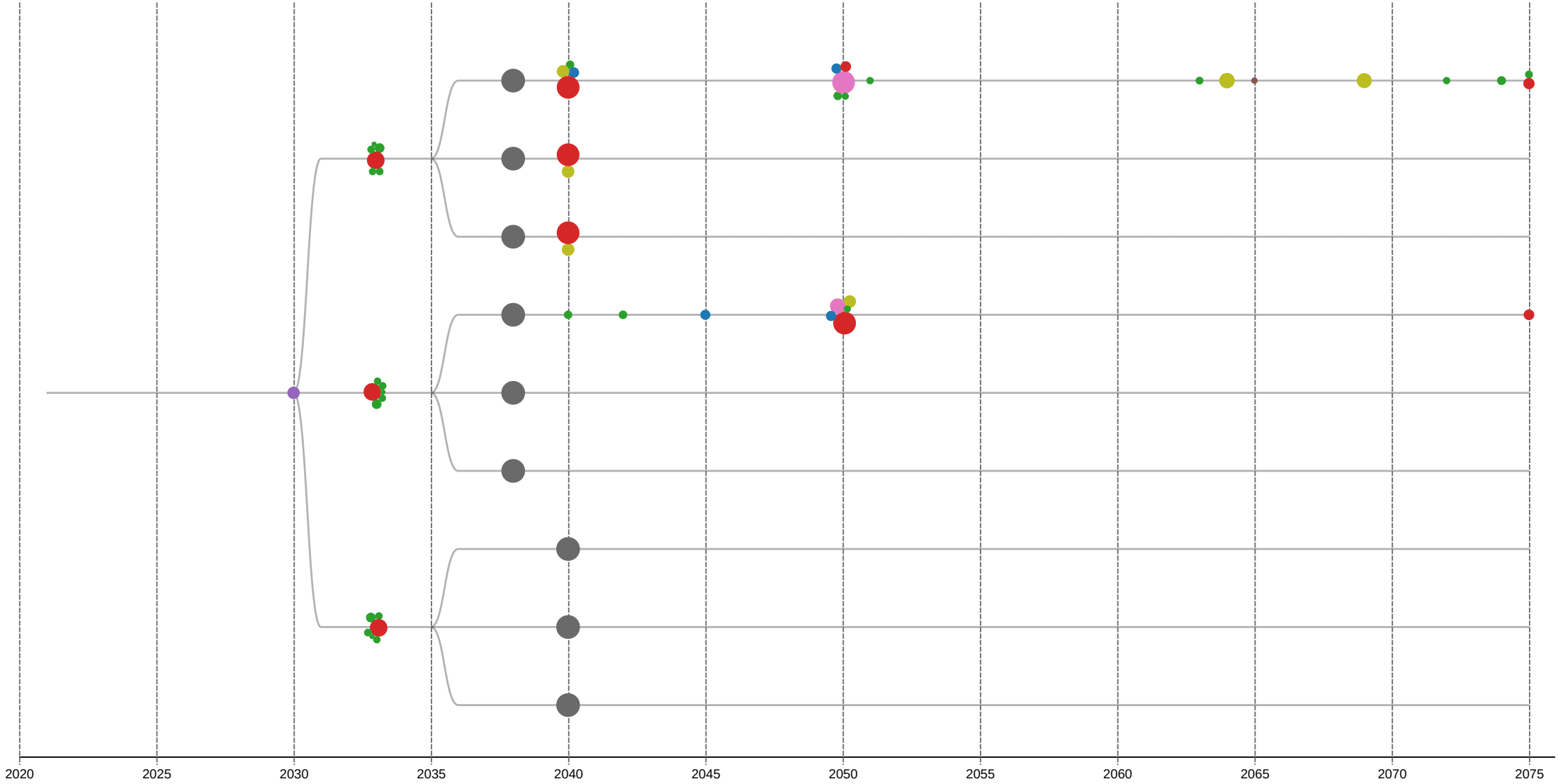
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.67	15.51	17.45	13.76	15.14	16.90	15.27	17.37	19.89	16.11
A3: Operational complexity and flexibility	6.07	6.77	7.60	6.14	6.56	7.28	6.41	7.26	8.34	6.94
A4: WRZ connectivity	7.55	8.70	9.80	7.58	8.53	9.57	8.81	10.06	11.49	9.12
A7: Customer relations support engagement with demand management	0.05	0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.06	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.93	21.46	23.89	19.59	19.82	21.94	19.60	21.99	24.93	21.46
E1: Scaleability and modularity of proposed changes	8.55	9.30	10.35	8.44	8.73	9.66	8.65	9.81	11.17	9.41
E2: Intervention lead times	5.74	6.14	6.86	5.63	5.52	6.13	5.50	6.11	6.89	6.06
E3: Reliance on external bodies to deliver changes	5.63	6.02	6.69	5.52	5.57	6.14	5.45	6.07	6.88	6.00
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

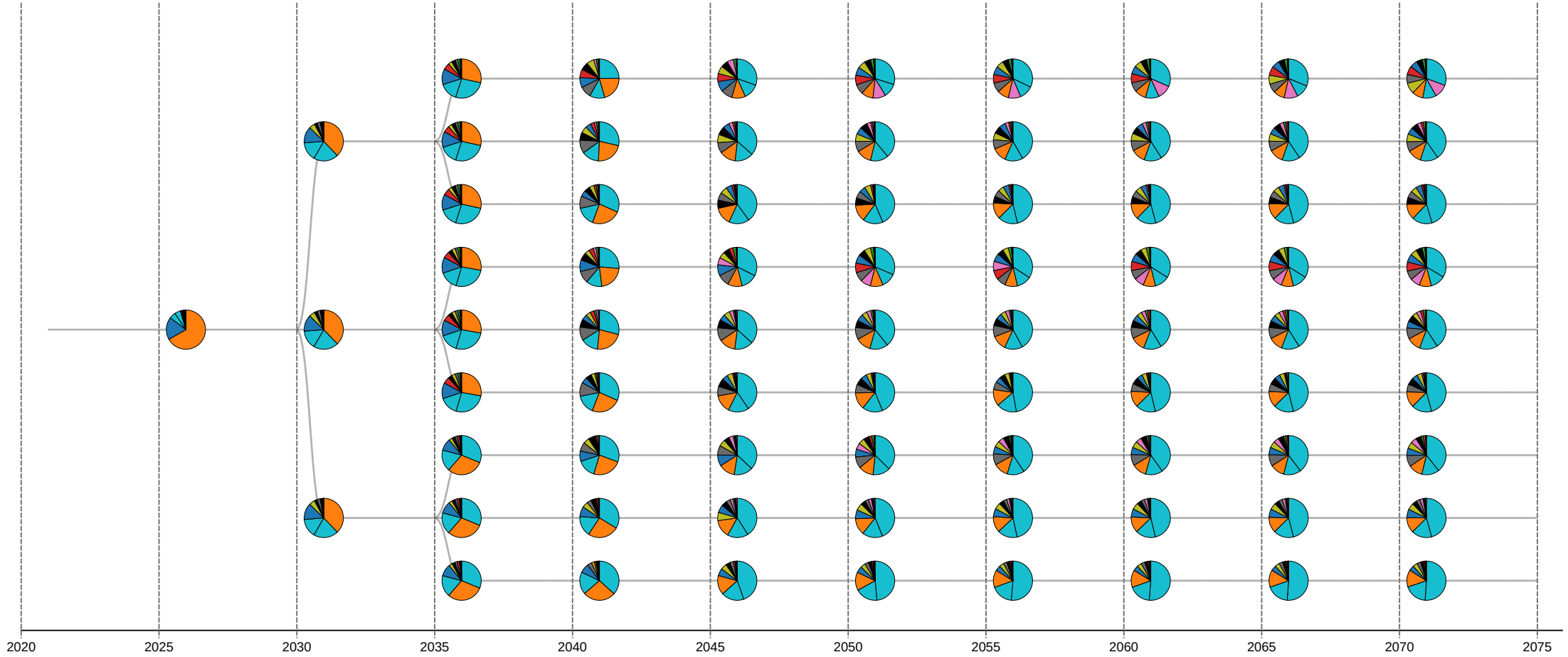
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

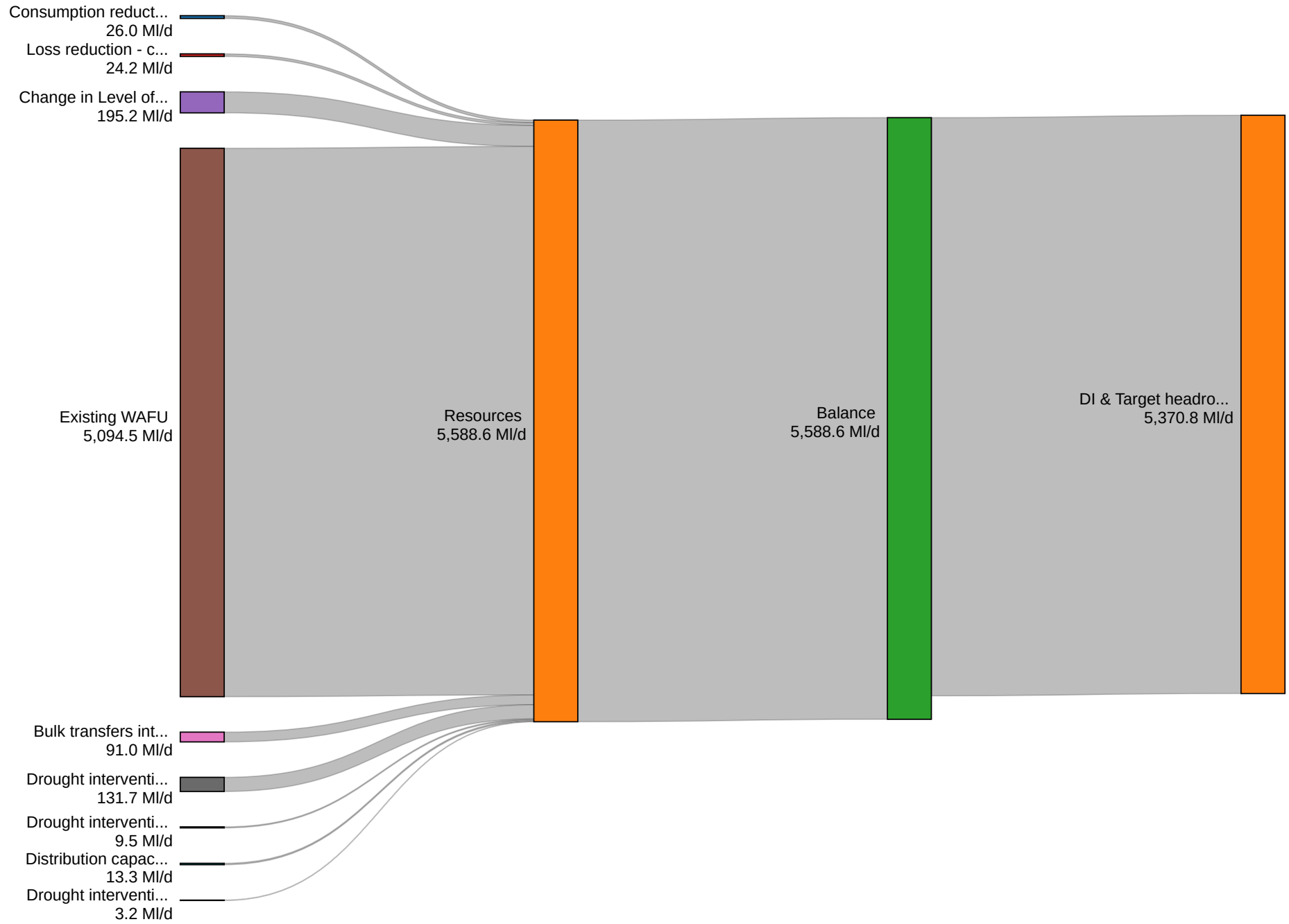
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

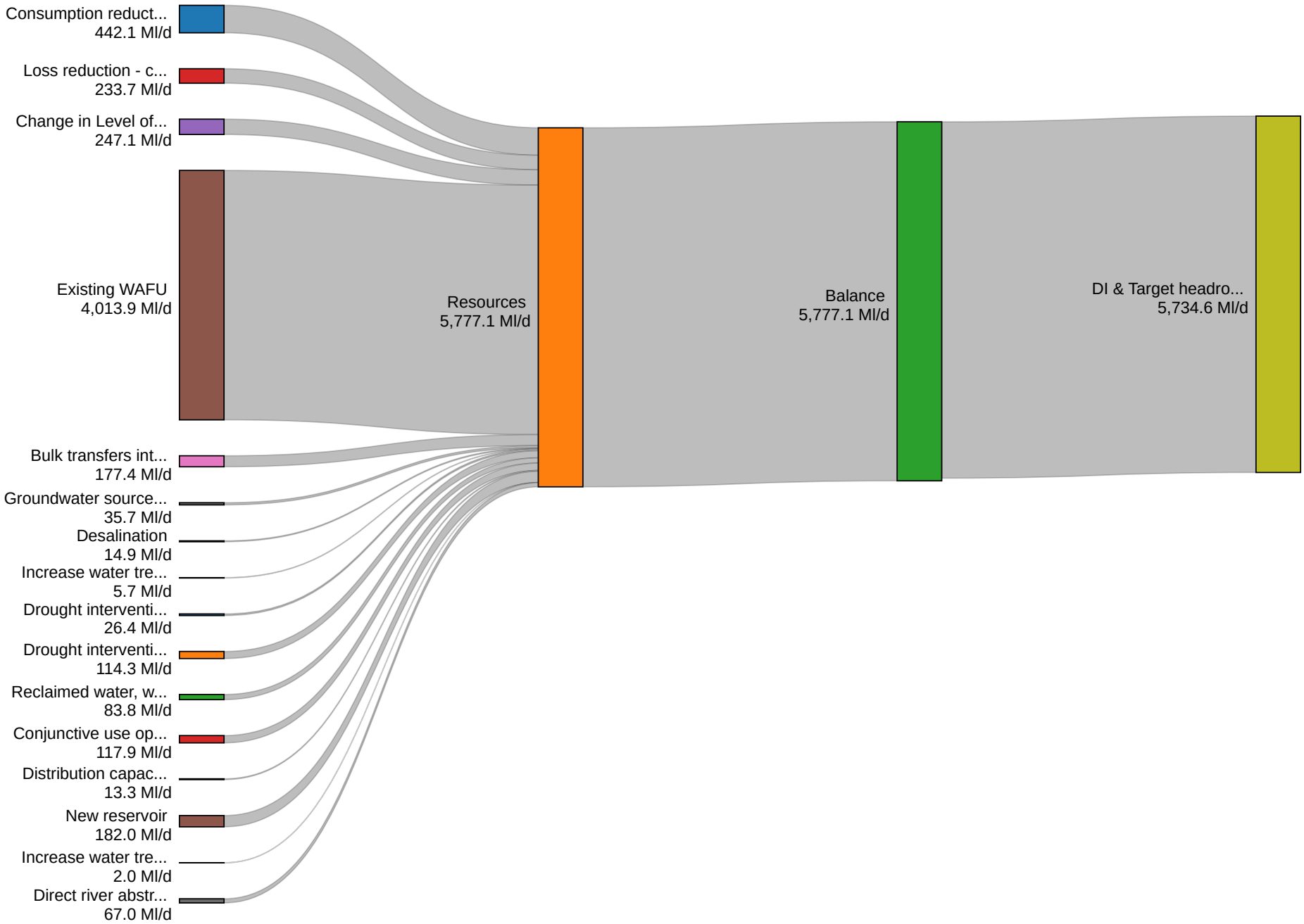


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

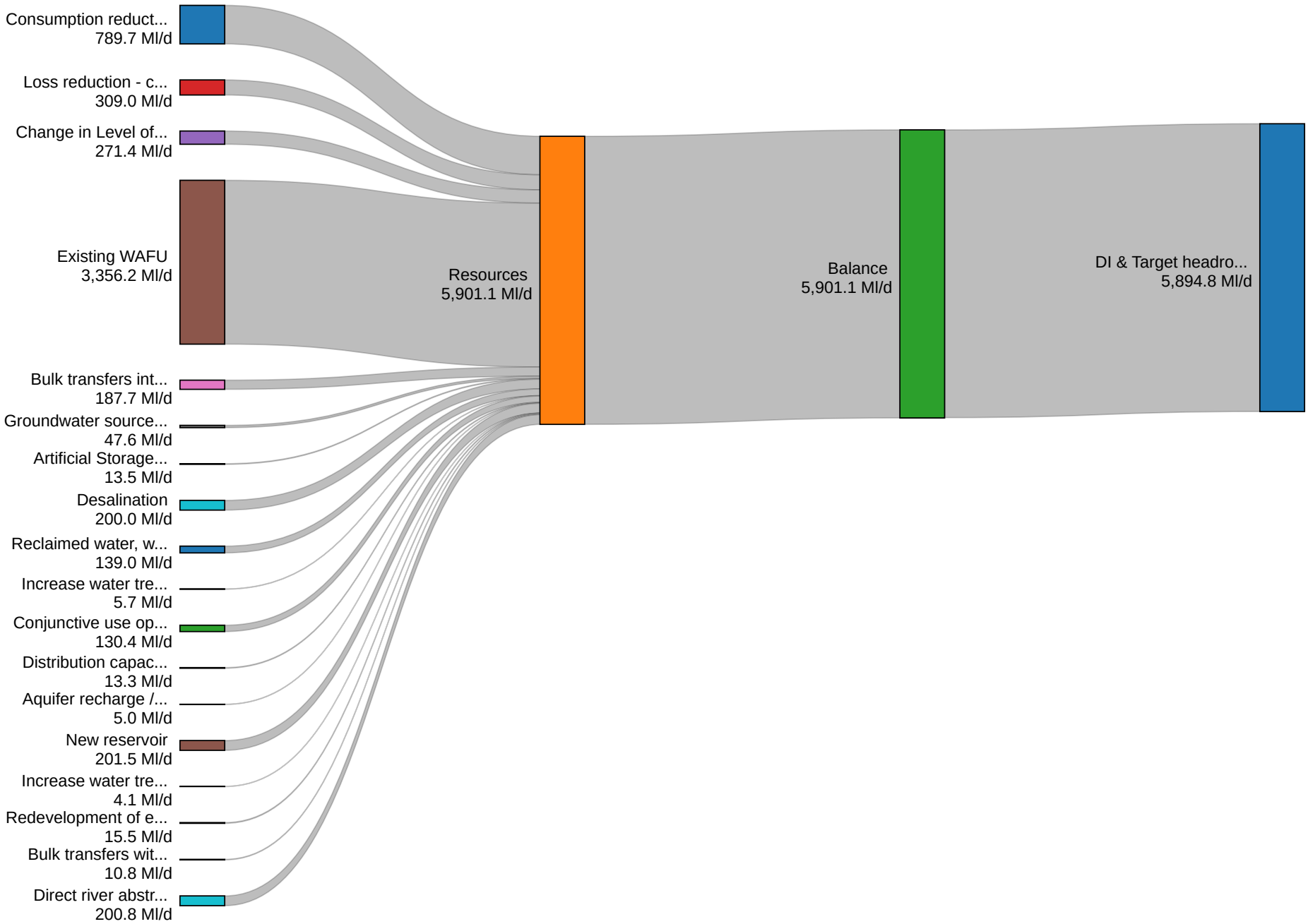
Situation 4 - 2026 (Thames Water)



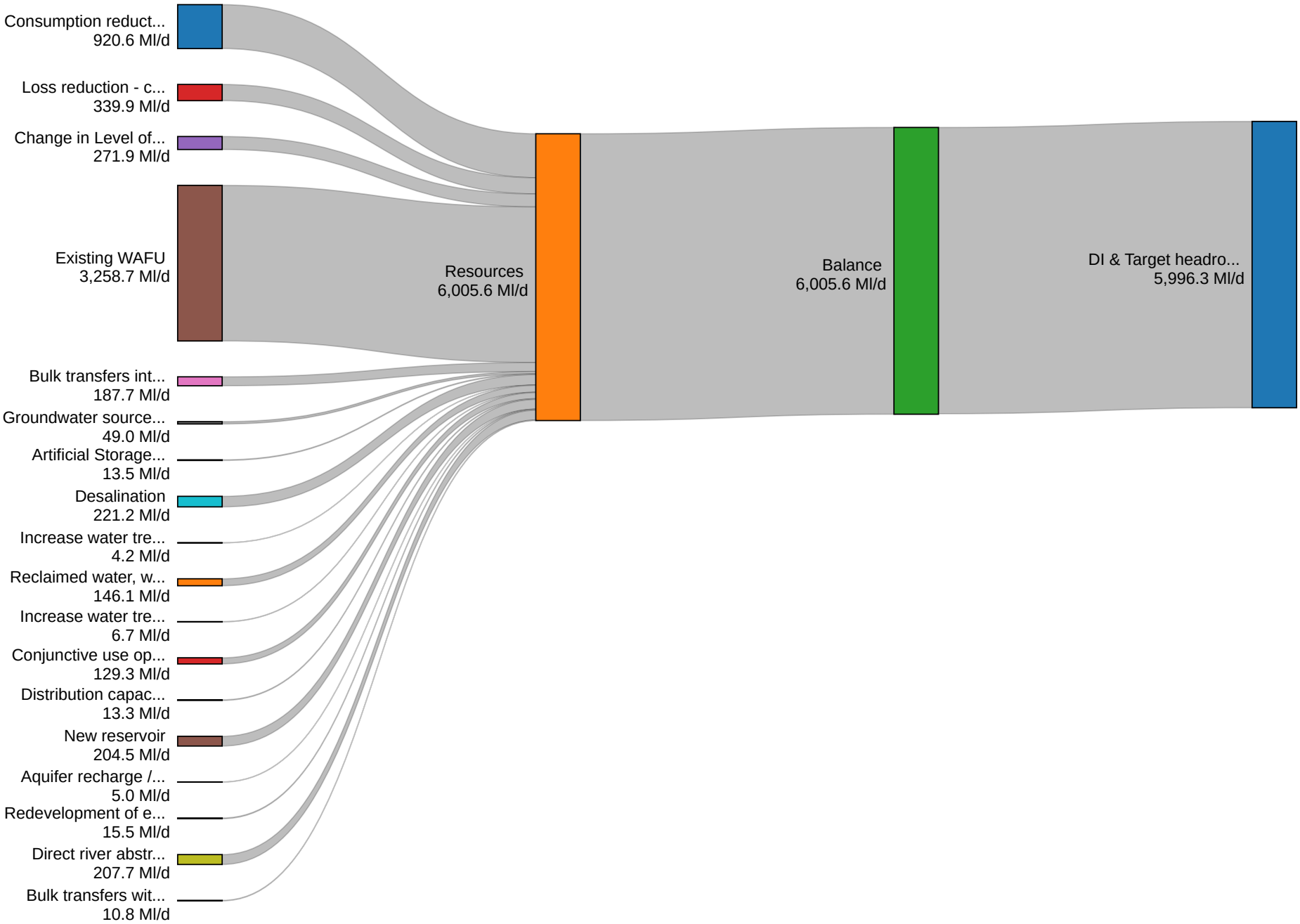
Situation 4 - 2040 (Thames Water)



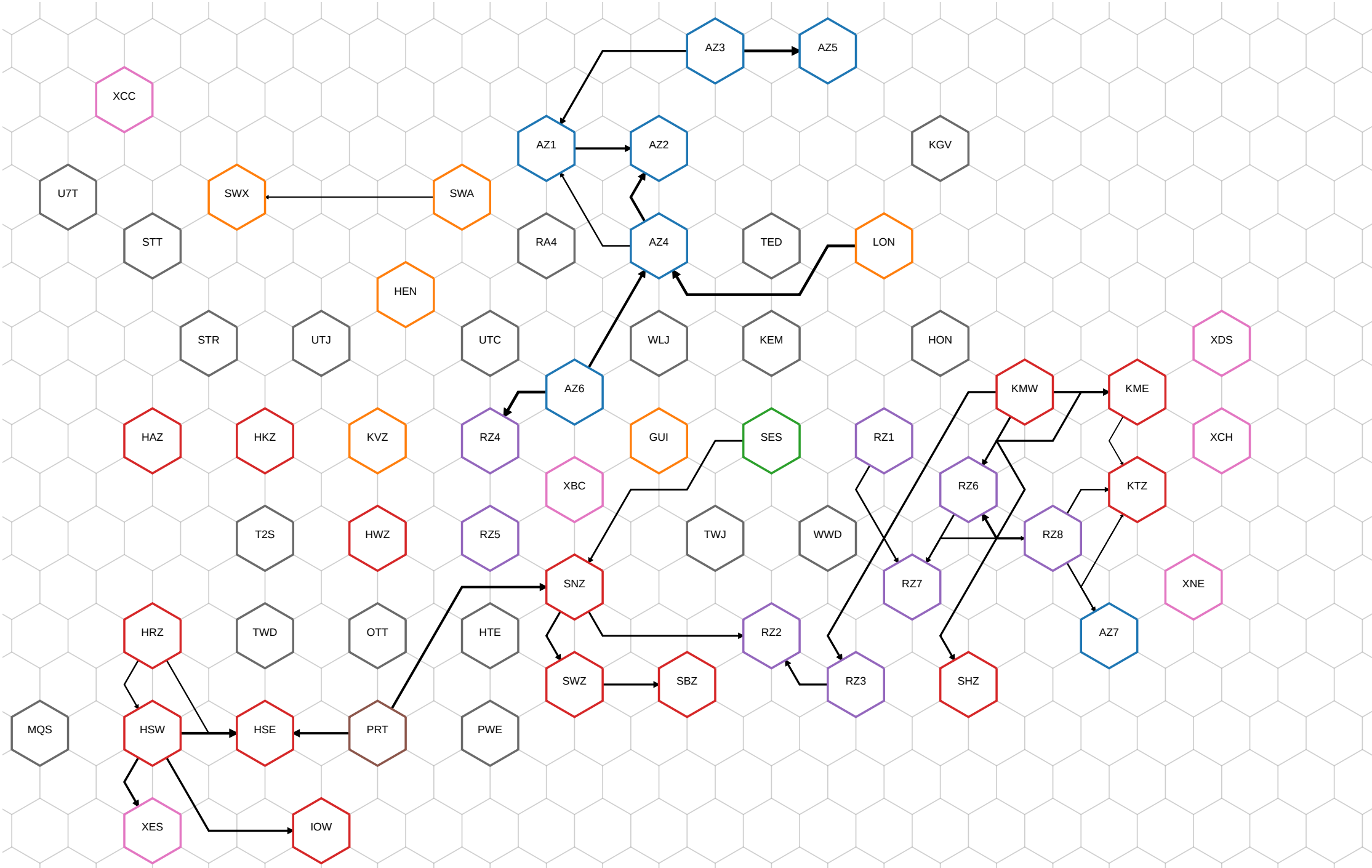
Situation 4 - 2050 (Thames Water)



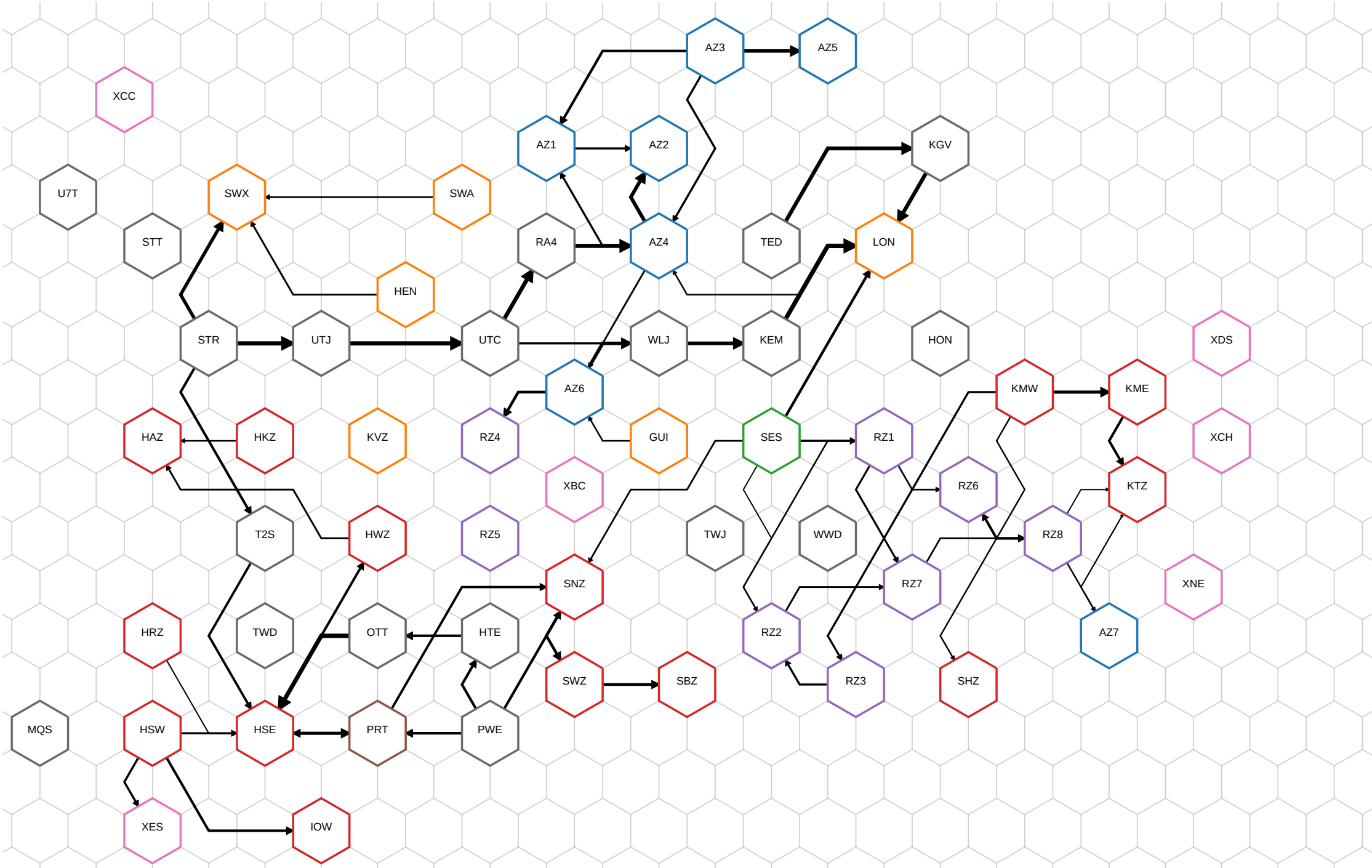
Situation 4 - 2075 (Thames Water)



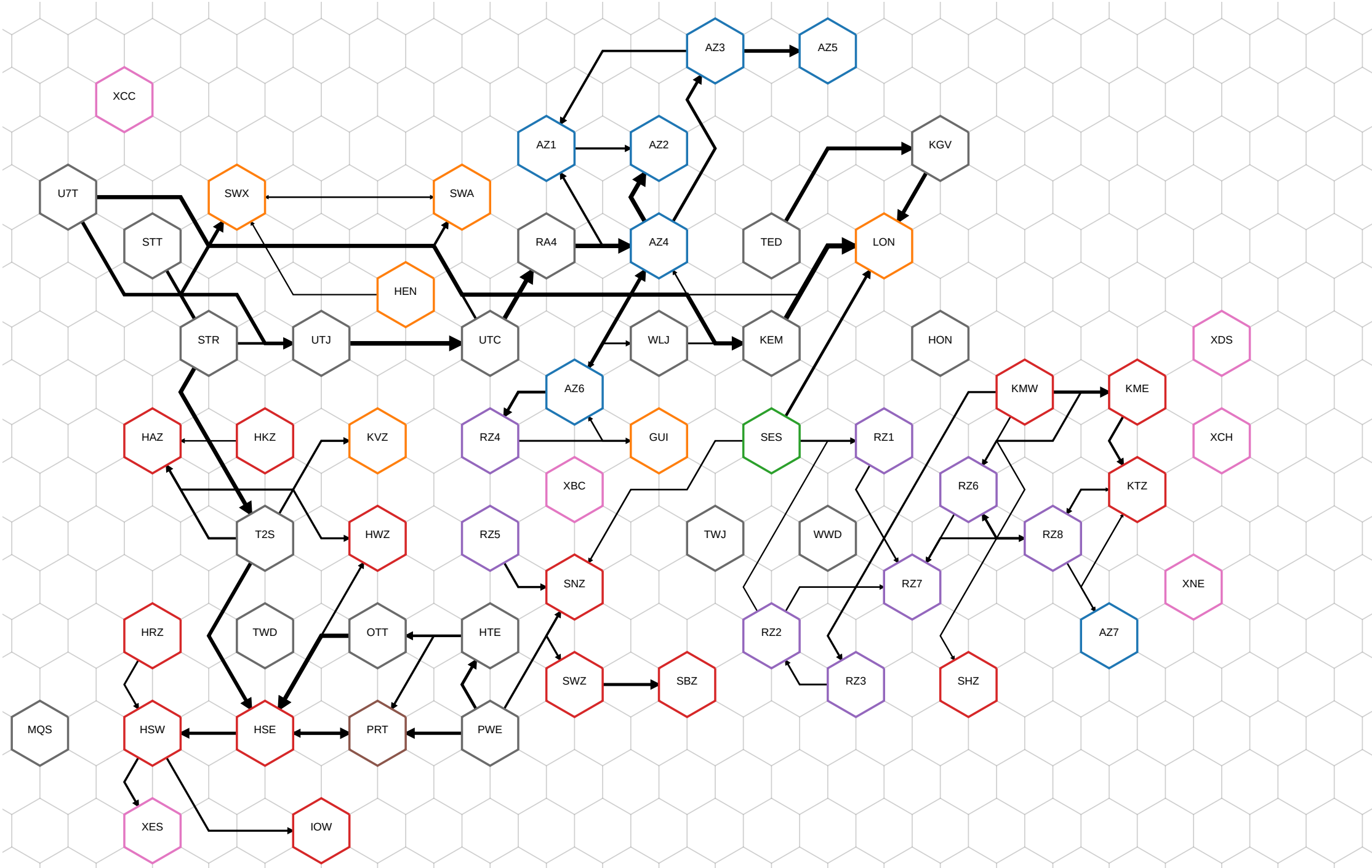
Situation 4 - 2026



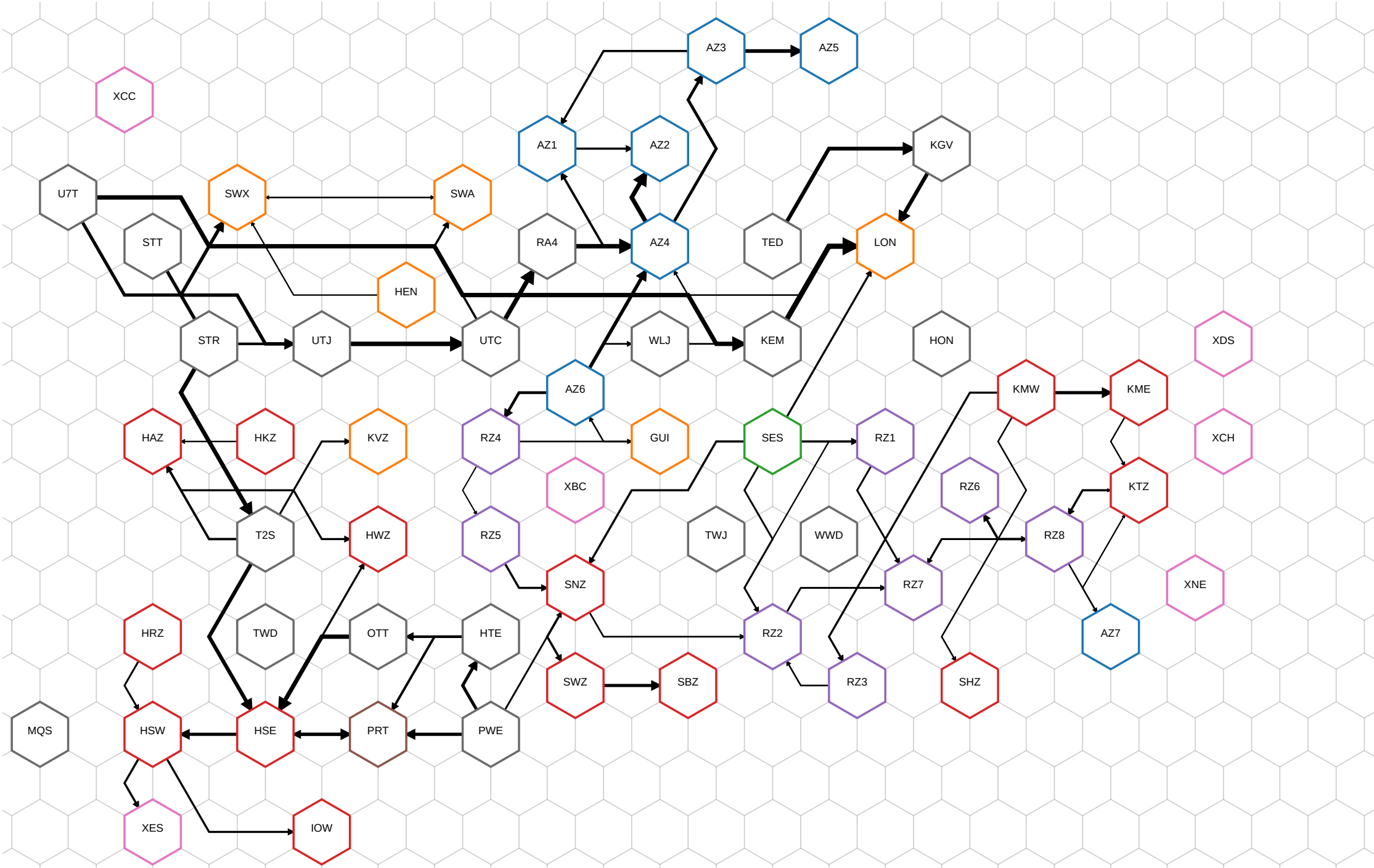
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

RESILIENCE + SESRO 150

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-resilience-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 150 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:07:49
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 150. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

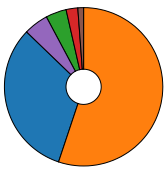
Net present value (Cost)

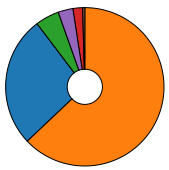
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,772	17,880	17,163	19,317	17,772	16,998	18,112	17,253	16,537	17,978	(£m)
Cost w/o deficit (STPR)	20,772	17,880	17,163	19,317	17,772	16,998	18,112	17,253	16,537	17,978	(£m)
Cost w/ deficit (IGEQ)	31,676	26,225	24,927	28,938	26,042	24,659	26,750	25,138	23,845	26,467	(£m)
Cost w/o deficit (IGEQ)	31,676	26,225	24,927	28,938	26,042	24,659	26,750	25,138	23,845	26,467	(£m)
Cost w/ deficit (LTDR)	22,884	19,524	18,699	21,195	19,401	18,514	19,807	18,811	17,987	19,647	(£m)
Cost w/o deficit (LTDR)	22,884	19,524	18,699	21,195	19,401	18,514	19,807	18,811	17,987	19,647	(£m)

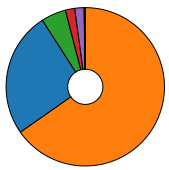
Cost breakdown (STPR)

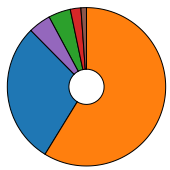
Select Company: Total

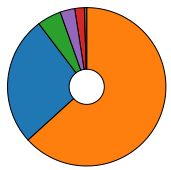
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,663	4,784	4,398	5,571	4,695	4,252	4,866	4,419	3,975	4,847	(£m)
Fixed opex	11,450	11,254	11,202	11,352	11,243	11,189	11,256	11,204	11,143	11,255	(£m)
Fixed operational carbon	880	869	869	877	870	868	871	867	866	871	(£m)
Embedded carbon	496	354	329	417	350	322	369	331	303	363	(£m)
Variable opex	1,041	541	324	882	531	318	647	391	232	545	(£m)
Variable carbon opex	243	79	41	218	84	49	102	41	18	97	(£m)

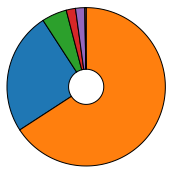
situation1 

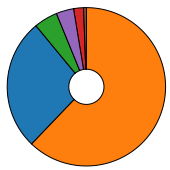
situation2 

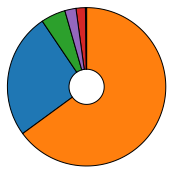
situation3 

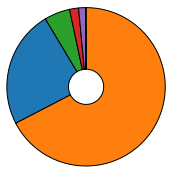
situation4 

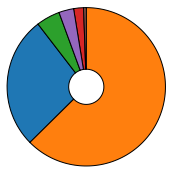
situation5 

situation6 

situation7 

situation8 

situation9 

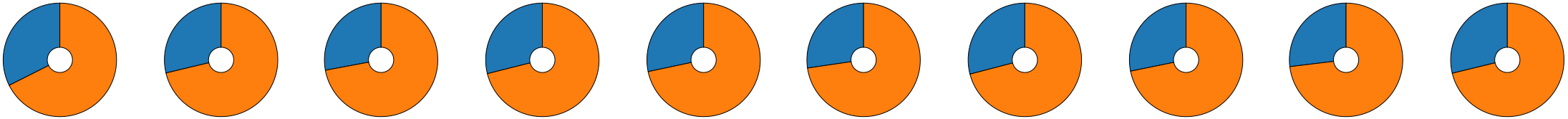
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,172,065	2,166,121	1,995,147	2,606,013	2,137,966	1,951,839	2,282,161	2,016,496	1,833,688	2,240,166	(tonnes)
Operational emissions	6,614,521	5,376,013	5,146,493	6,407,007	5,409,389	5,195,410	5,573,796	5,134,766	4,980,353	5,537,528	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

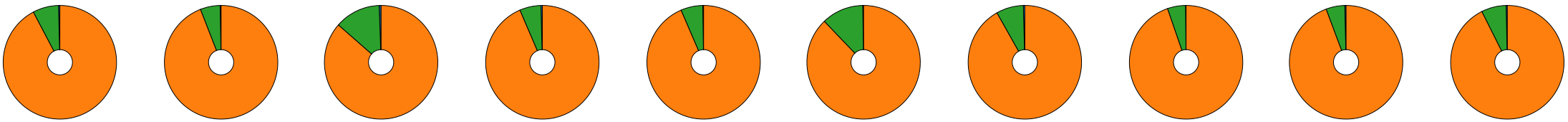


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	95	34	26	82	29	12	61	13	12	40	(GWh)
Grid	22,658	11,367	4,200	19,236	10,935	4,096	13,210	7,983	2,920	10,734	(GWh)
Renewable	1,804	681	633	1,245	730	556	1,115	433	165	818	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,814	64,856	64,183	68,363	64,537	63,181	65,576	63,395	62,308	65,246
SEA environmental disbenefit	113,479	79,965	73,682	100,185	78,560	71,047	83,142	69,741	60,460	81,140
Natural capital	81,356,818	77,198,203	80,078,304	76,465,996	77,198,747	80,024,907	76,868,217	77,637,864	80,539,680	78,596,526
Bio-diversity net gain	−216,032	−149,912	−122,785	−204,879	−150,080	−118,585	−151,610	−124,608	−95,058	−148,172

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,167	31,912	31,567	33,273	31,830	31,306	31,938	31,052	30,531	31,953

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.55	29.61	32.52	29.33	29.79	32.64	31.14	34.61	38.58	31.98
R1: Uncertainty of option supply/demand benefit	6.08	5.50	6.05	5.86	5.55	6.06	5.93	6.48	7.20	6.08
R3: Risk of service failure due to other physical hazards	7.01	7.34	8.25	7.05	7.40	8.29	7.69	8.76	10.00	7.98
R4: Availability of additional headroom	6.62	6.96	7.17	6.69	6.98	7.19	7.30	7.66	7.90	7.16
R5: Catchment/raw water quality risks (incl. climate change)	4.07	4.17	4.71	3.82	4.19	4.74	4.32	4.99	5.77	4.53
R6: Capacity of catchment services	0.29	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.07
R7: Risk of service failure to other exceptional events	5.38	5.64	6.34	5.49	5.68	6.37	5.91	6.72	7.71	6.14
R8: Soil health	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.02

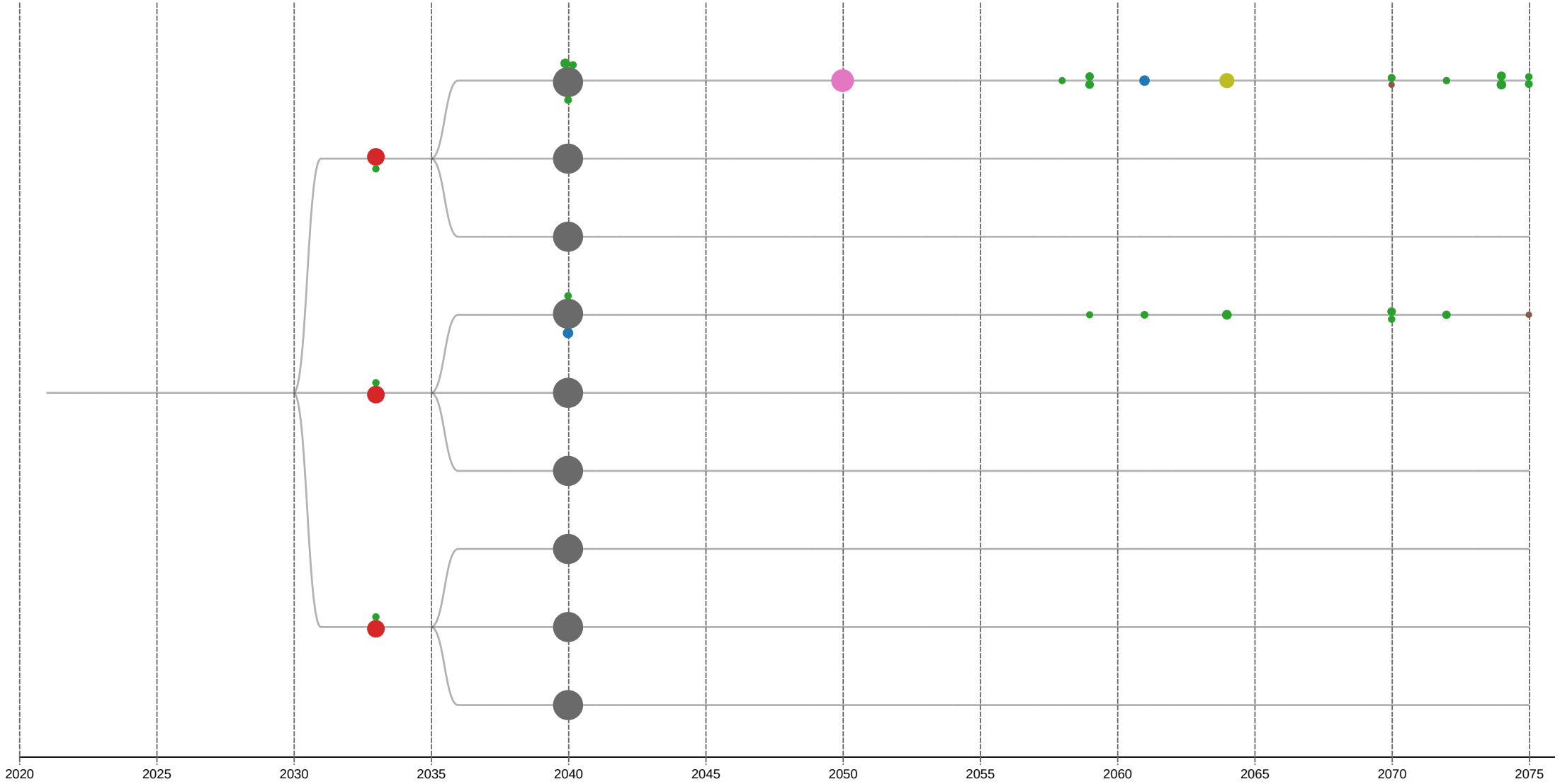
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.30	15.64	17.48	14.38	15.65	17.28	16.14	18.40	20.95	16.69
A3: Operational complexity and flexibility	6.56	7.07	7.96	6.73	7.13	8.03	7.38	8.48	9.75	7.68
A4: WRZ connectivity	7.65	8.54	9.49	7.53	8.49	9.22	8.73	9.89	11.17	8.97
A7: Customer relations support engagement with demand management	0.09	0.03	0.03	0.13	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.64	19.89	22.15	19.62	20.05	22.23	20.79	23.62	26.77	21.64
E1: Scaleability and modularity of proposed changes	8.80	9.35	10.46	8.81	9.44	10.53	9.71	11.15	12.71	10.11
E2: Intervention lead times	4.20	4.10	4.49	4.12	4.12	4.46	4.34	4.79	5.32	4.44
E3: Reliance on external bodies to deliver changes	6.21	6.44	7.20	6.23	6.50	7.24	6.74	7.68	8.74	7.00
E5: Collaborative land management	0.43	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.10

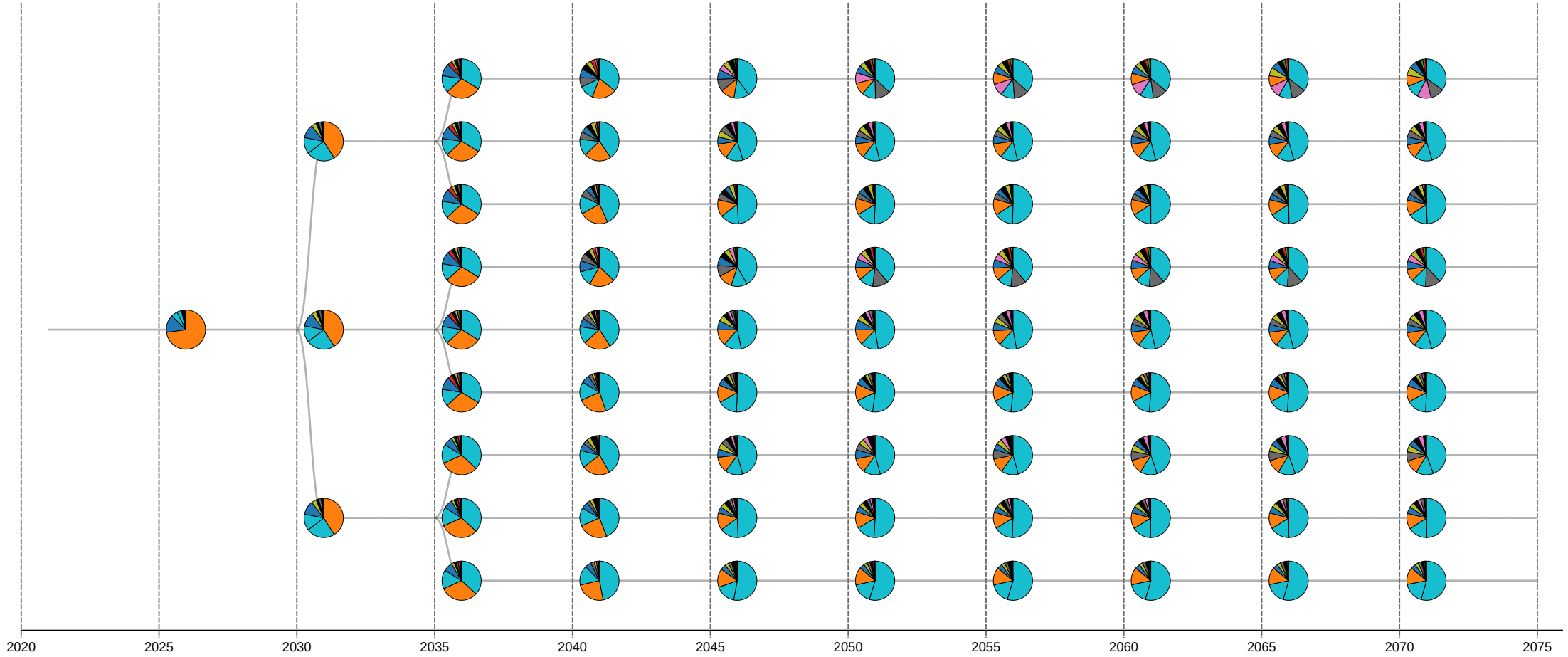
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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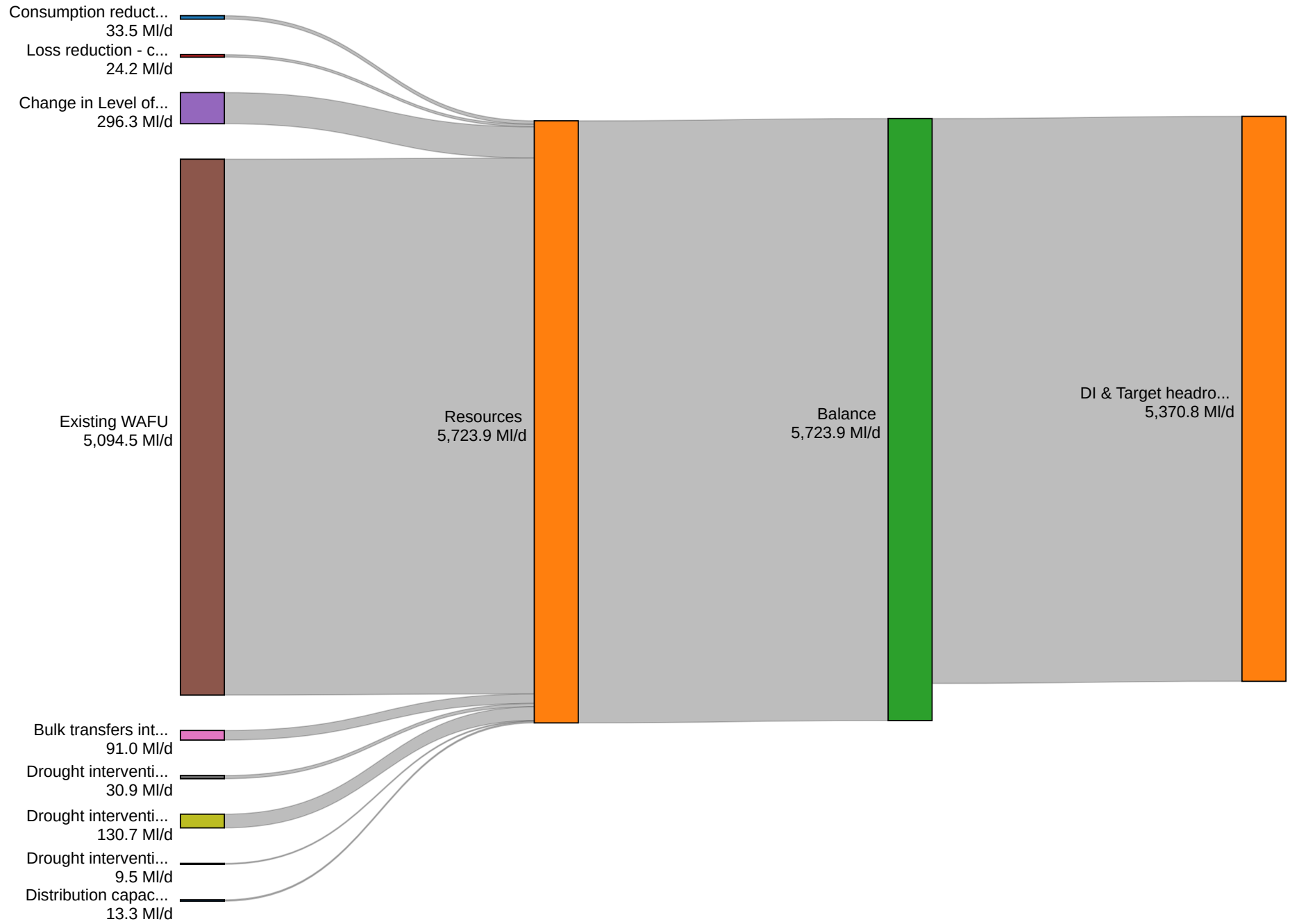
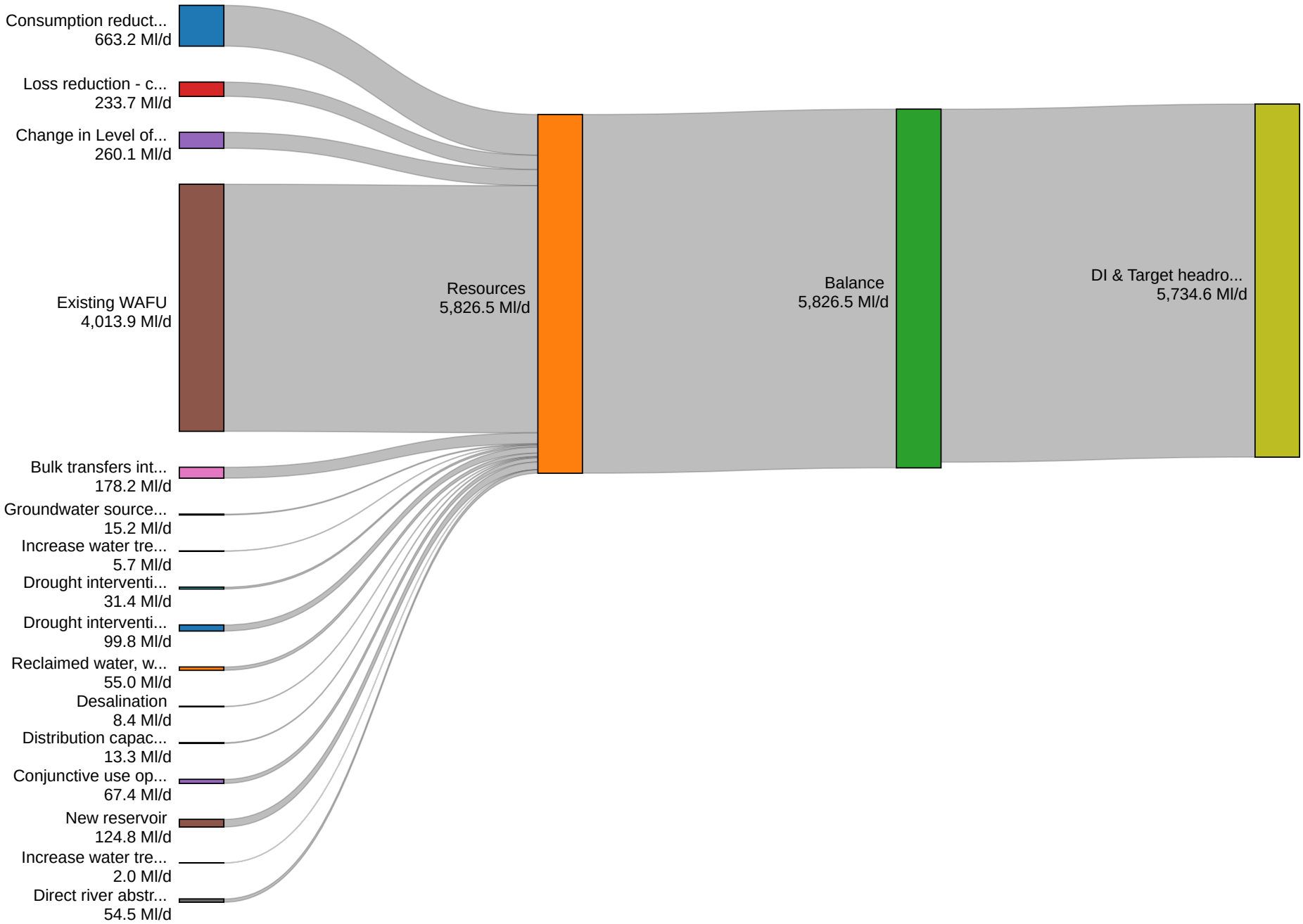
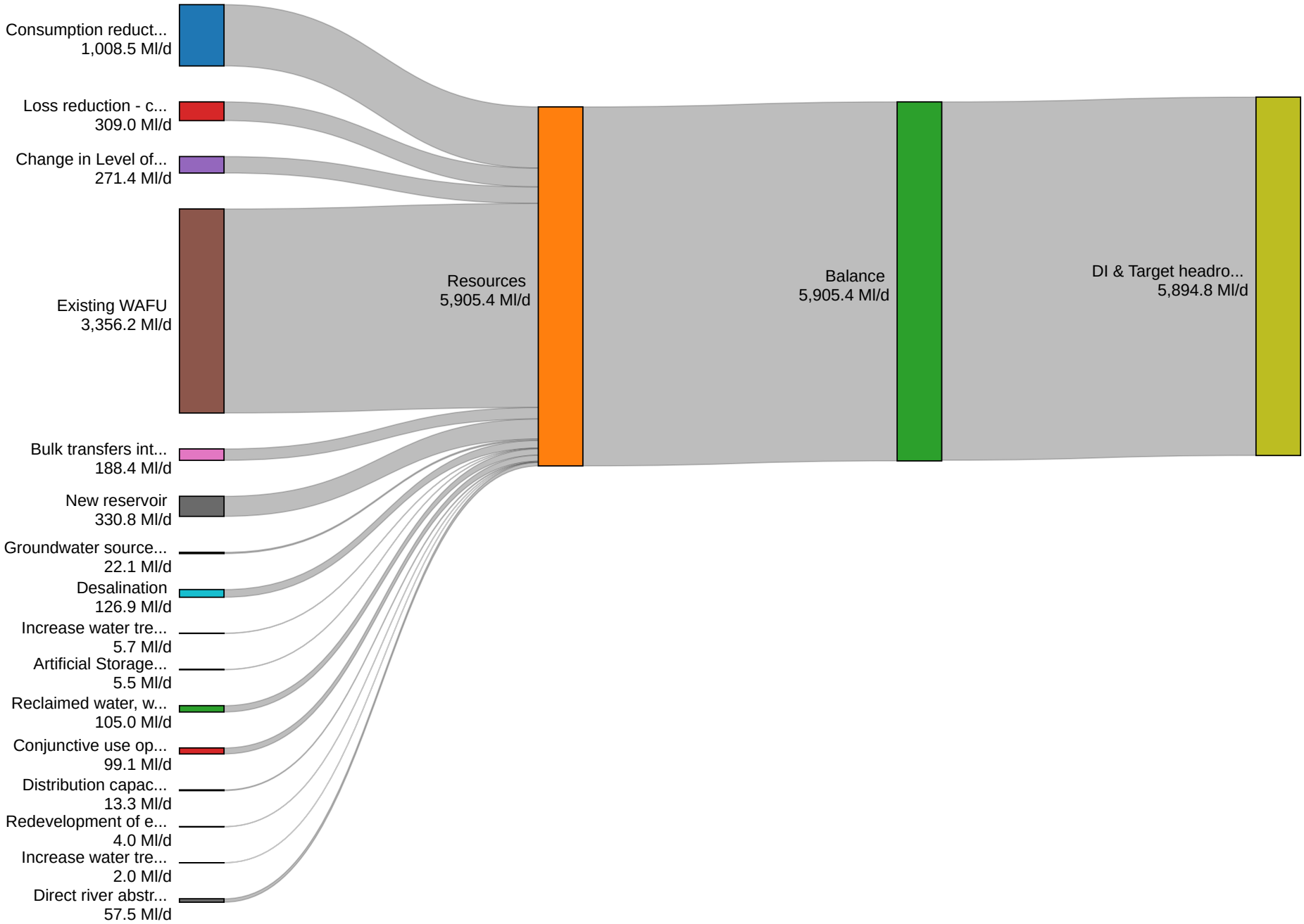
Situation 4 - 2026 (Thames Water)



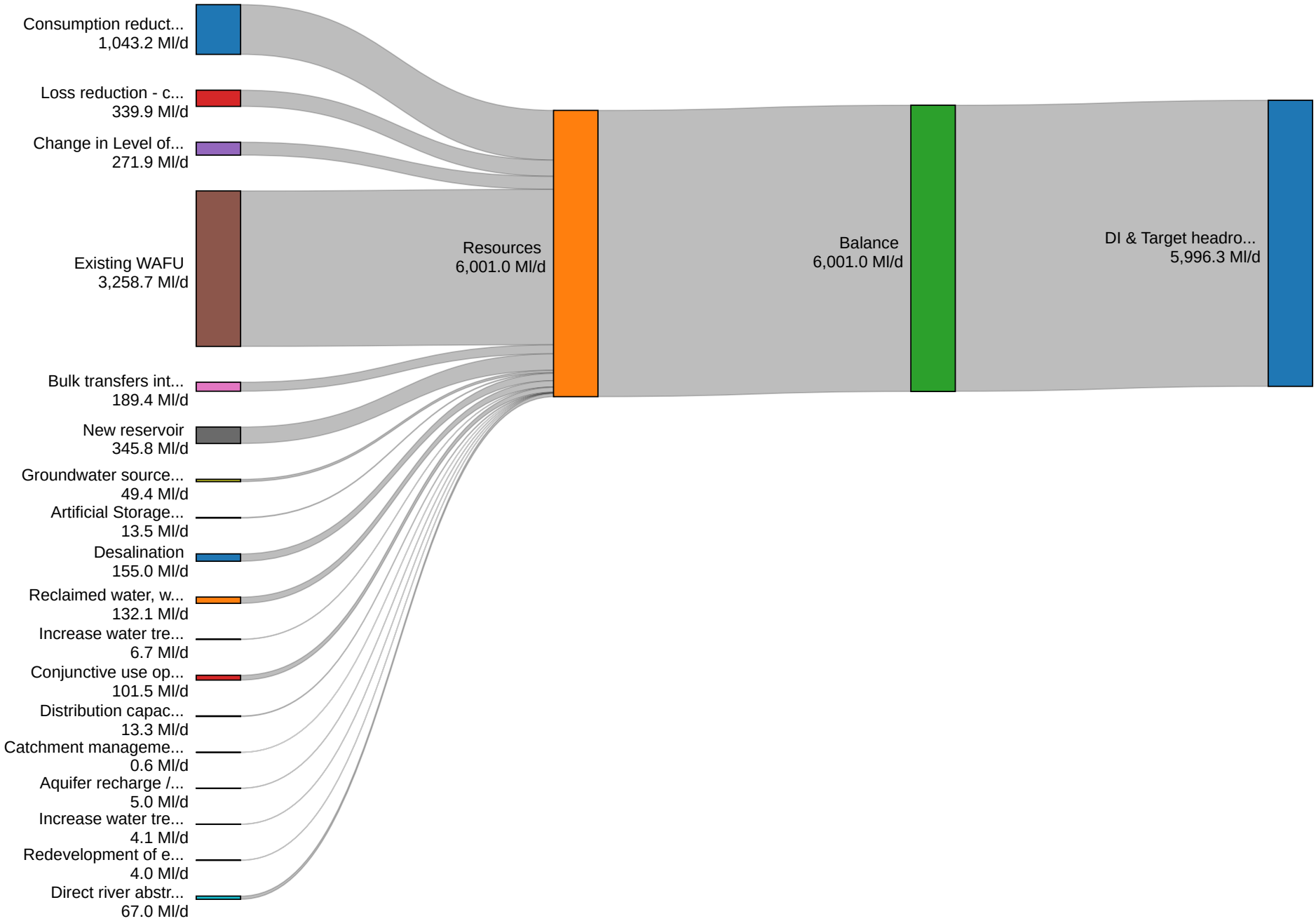
Situation 4 - 2040 (Thames Water)



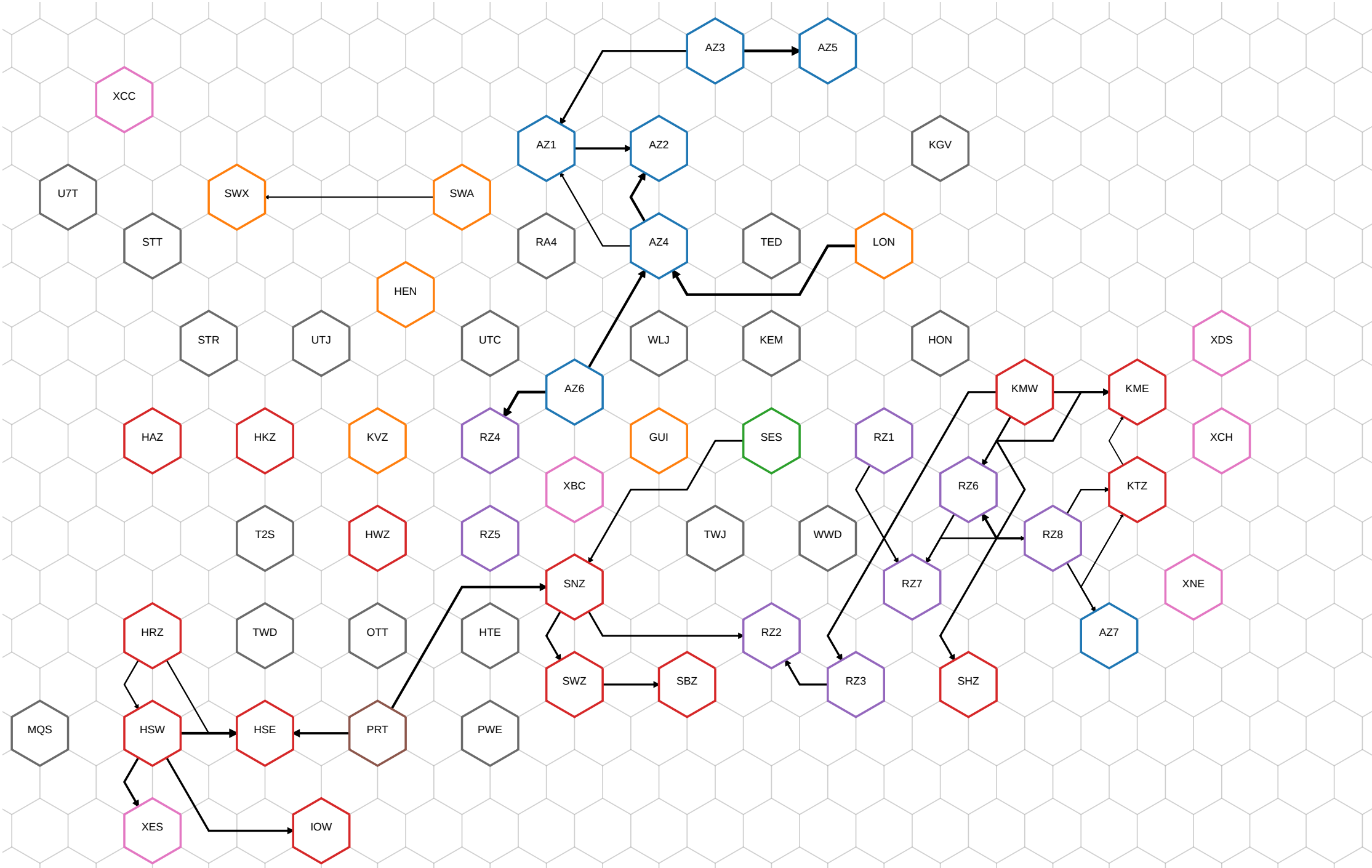
Situation 4 - 2050 (Thames Water)



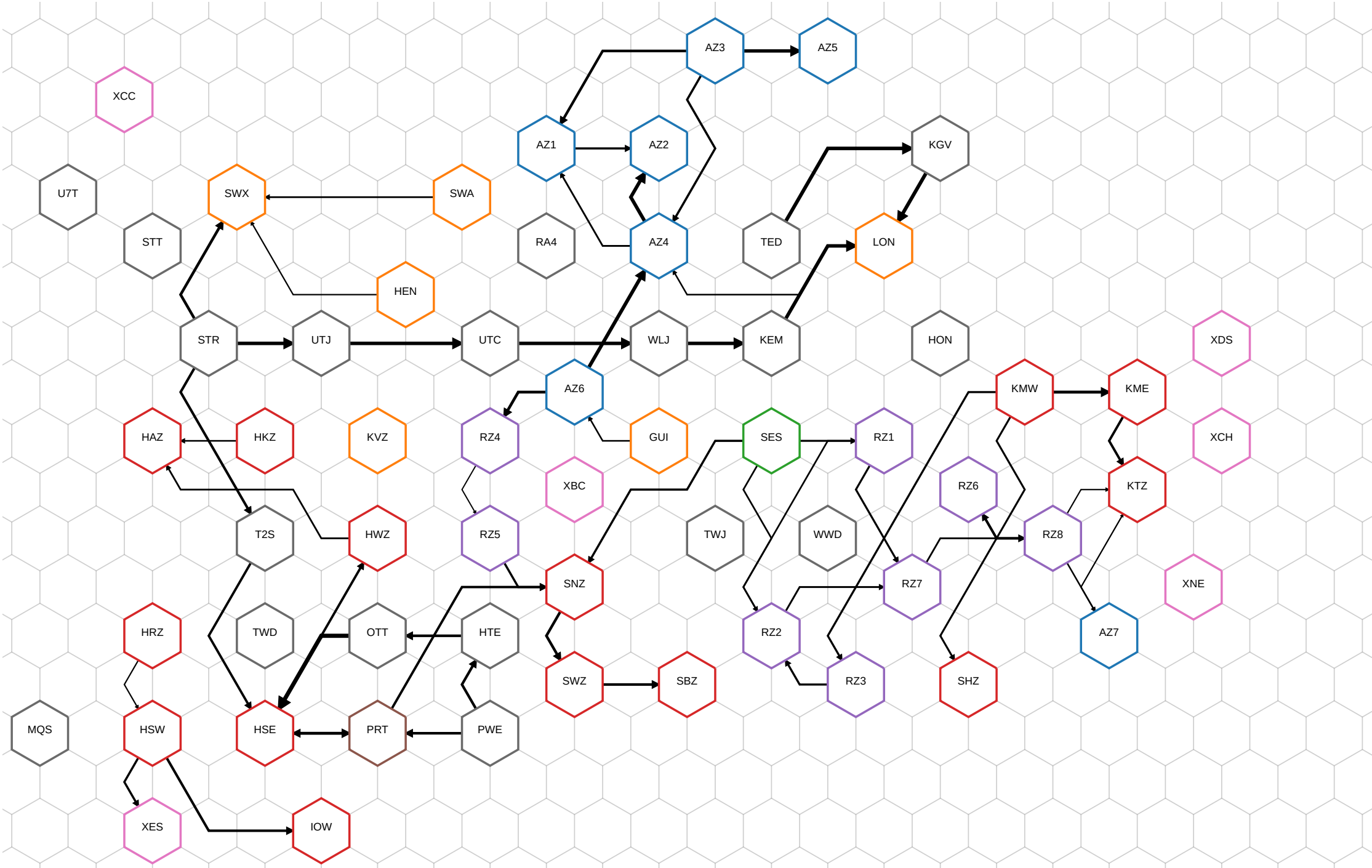
Situation 4 - 2075 (Thames Water)



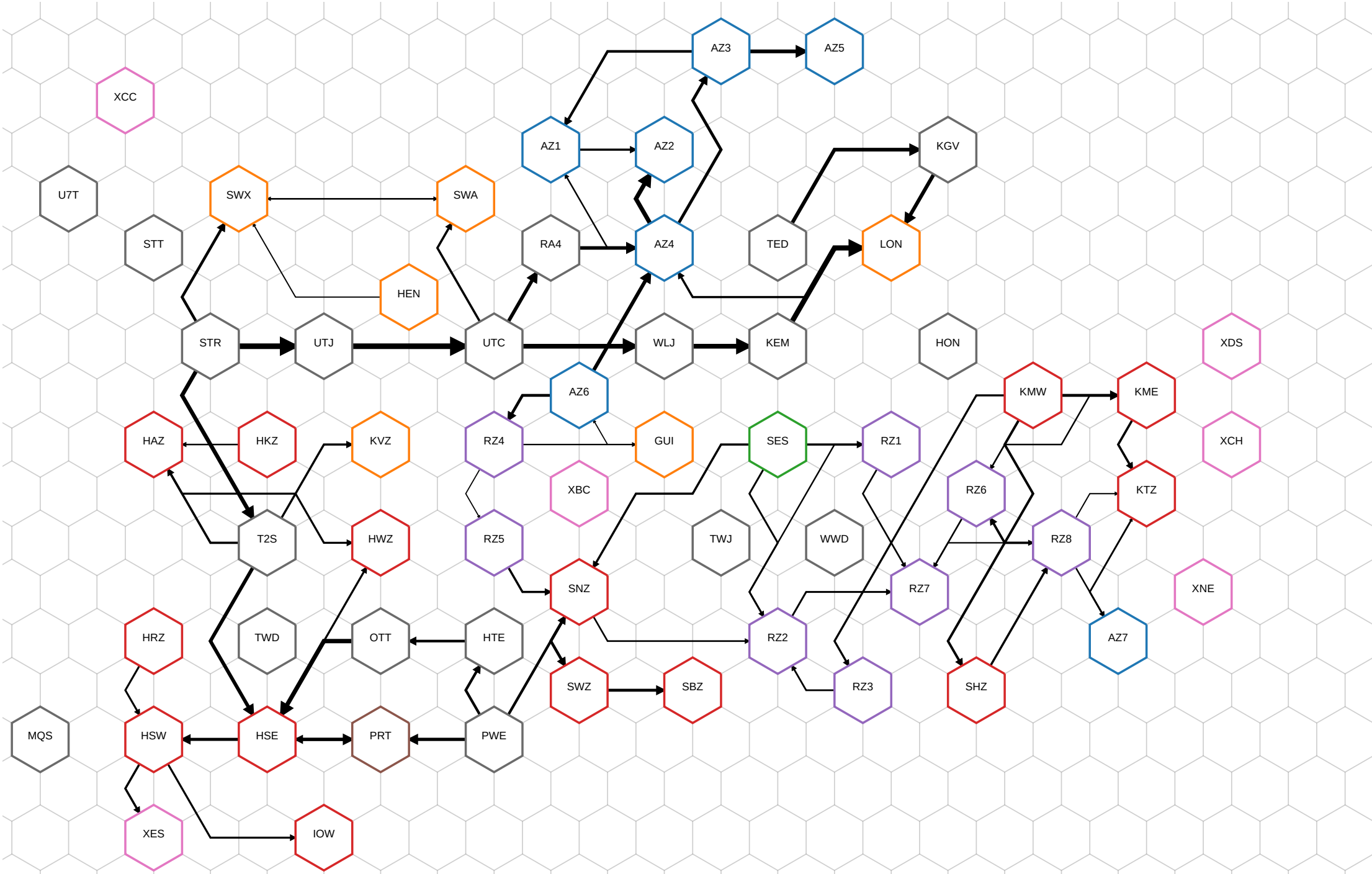
Situation 4 - 2026



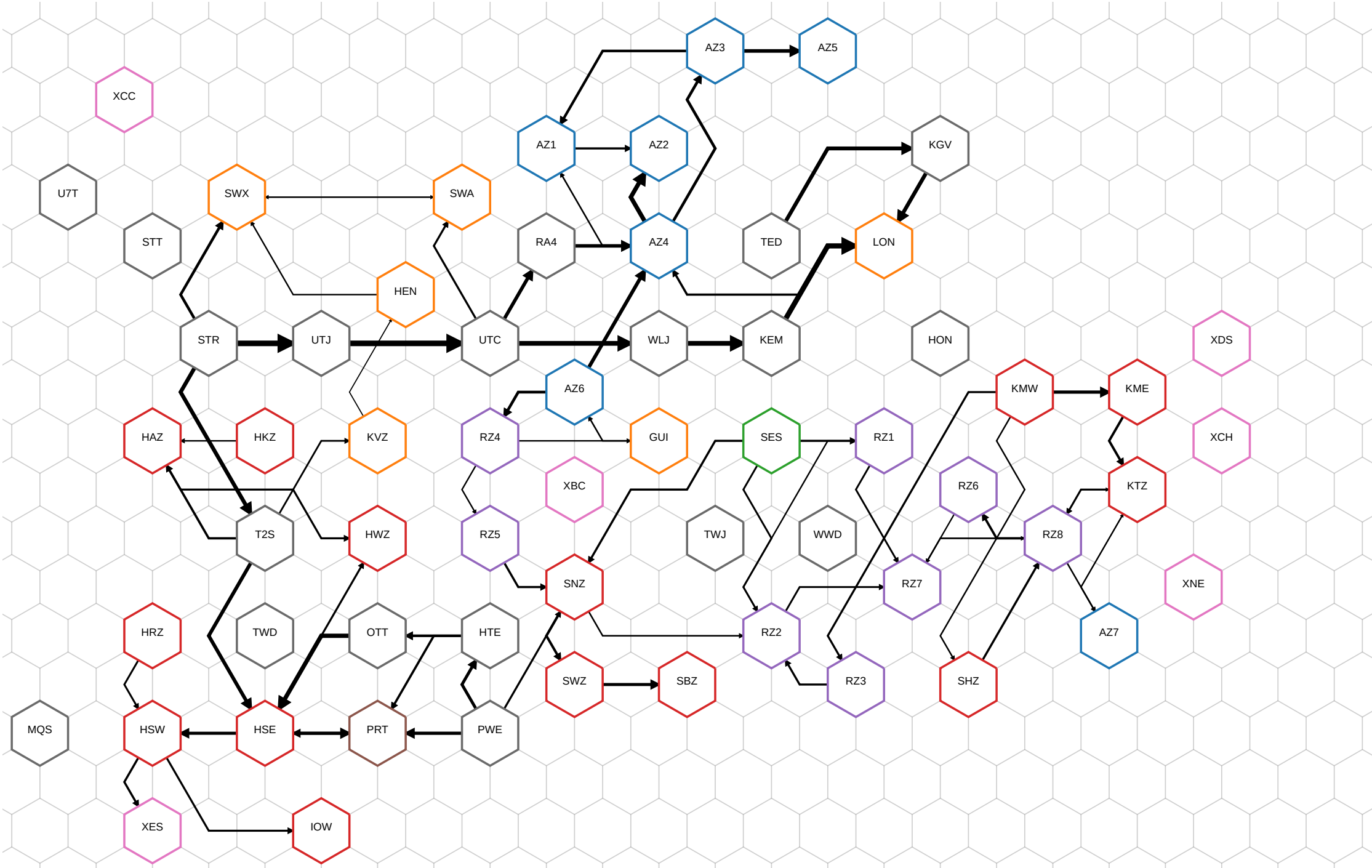
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

RESILIENCE + SESRO 125

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-resilience-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 125 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:07:08
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 125. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

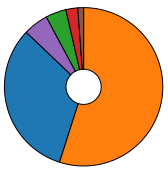
Net present value (Cost)

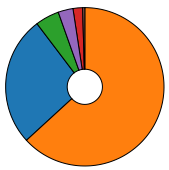
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,873	17,810	17,090	19,339	17,701	16,895	18,043	17,184	16,468	17,934	(£m)
Cost w/o deficit (STPR)	20,873	17,810	17,090	19,339	17,701	16,895	18,043	17,184	16,468	17,934	(£m)
Cost w/ deficit (IGEQ)	31,915	26,113	24,808	29,009	25,929	24,491	26,641	25,028	23,736	26,408	(£m)
Cost w/o deficit (IGEQ)	31,915	26,113	24,808	29,009	25,929	24,491	26,641	25,028	23,736	26,408	(£m)
Cost w/ deficit (LTDR)	23,009	19,445	18,618	21,225	19,322	18,399	19,731	18,734	17,910	19,599	(£m)
Cost w/o deficit (LTDR)	23,009	19,445	18,618	21,225	19,322	18,399	19,731	18,734	17,910	19,599	(£m)

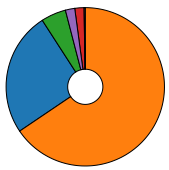
Cost breakdown (STPR)

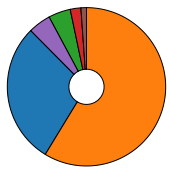
Select Company: Total

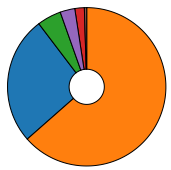
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,719	4,719	4,329	5,581	4,630	4,163	4,804	4,356	3,912	4,801	(£m)
Fixed opex	11,462	11,253	11,202	11,354	11,242	11,185	11,256	11,203	11,142	11,255	(£m)
Fixed operational carbon	883	869	870	877	870	869	871	867	866	871	(£m)
Embedded carbon	507	349	323	420	344	315	364	326	298	361	(£m)
Variable opex	1,058	541	326	889	531	314	647	391	232	548	(£m)
Variable carbon opex	244	79	41	218	84	49	102	41	18	97	(£m)

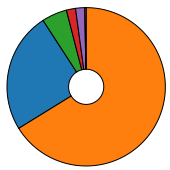
situation1 

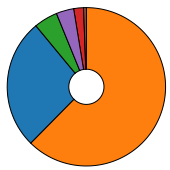
situation2 

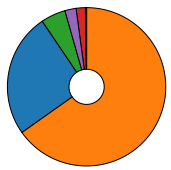
situation3 

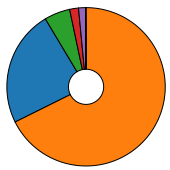
situation4 

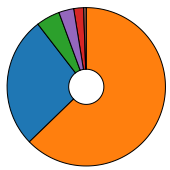
situation5 

situation6 

situation7 

situation8 

situation9 

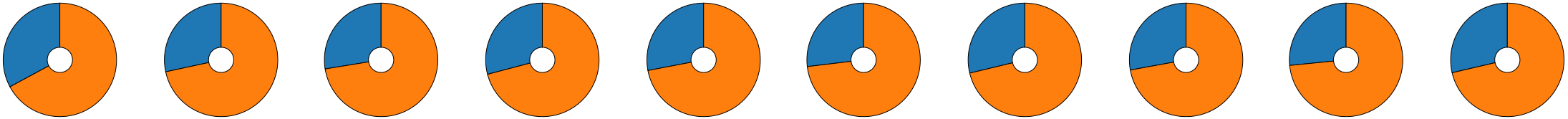
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,258,706	2,131,473	1,961,071	2,630,705	2,104,941	1,912,151	2,250,045	1,984,379	1,801,571	2,226,116	(tonnes)
Operational emissions	6,654,239	5,378,166	5,154,408	6,408,023	5,410,932	5,197,459	5,573,172	5,134,766	4,980,353	5,543,502	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

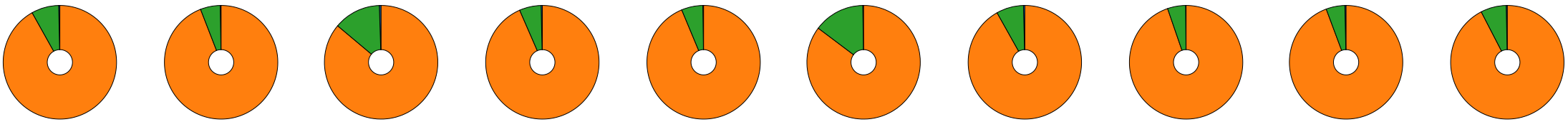


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	85	32	25	74	27	11	57	12	11	37	(GWh)
Grid	22,725	11,358	4,204	19,376	10,978	3,840	13,204	7,975	2,912	10,730	(GWh)
Renewable	1,926	681	655	1,284	713	654	1,116	433	165	847	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,494	64,636	63,827	68,523	64,287	63,117	65,396	63,215	62,128	65,069
SEA environmental disbenefit	113,458	79,895	72,552	103,135	78,153	71,497	83,142	69,741	60,460	81,337
Natural capital	83,278,072	79,101,734	81,986,683	77,132,999	79,104,427	81,922,734	78,766,317	79,535,964	82,437,780	80,362,968
Bio-diversity net gain	−210,753	−140,654	−110,053	−198,101	−139,375	−110,832	−142,610	−115,608	−86,058	−139,338

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,140	31,875	31,492	33,524	31,738	31,337	31,968	31,054	30,533	31,962

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.15	28.88	31.72	28.84	29.07	31.82	30.42	33.74	37.57	31.25
R1: Uncertainty of option supply/demand benefit	6.09	5.35	5.89	5.75	5.40	5.89	5.78	6.30	6.99	5.94
R3: Risk of service failure due to other physical hazards	6.91	7.14	8.03	6.92	7.20	8.06	7.50	8.52	9.72	7.78
R4: Availability of additional headroom	6.57	6.91	7.13	6.64	6.93	7.14	7.25	7.61	7.85	7.11
R5: Catchment/raw water quality risks (incl. climate change)	4.05	4.03	4.56	3.76	4.06	4.58	4.18	4.83	5.58	4.40
R6: Capacity of catchment services	0.20	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.06
R7: Risk of service failure to other exceptional events	5.26	5.44	6.11	5.36	5.48	6.15	5.71	6.49	7.43	5.94
R8: Soil health	0.08	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.02

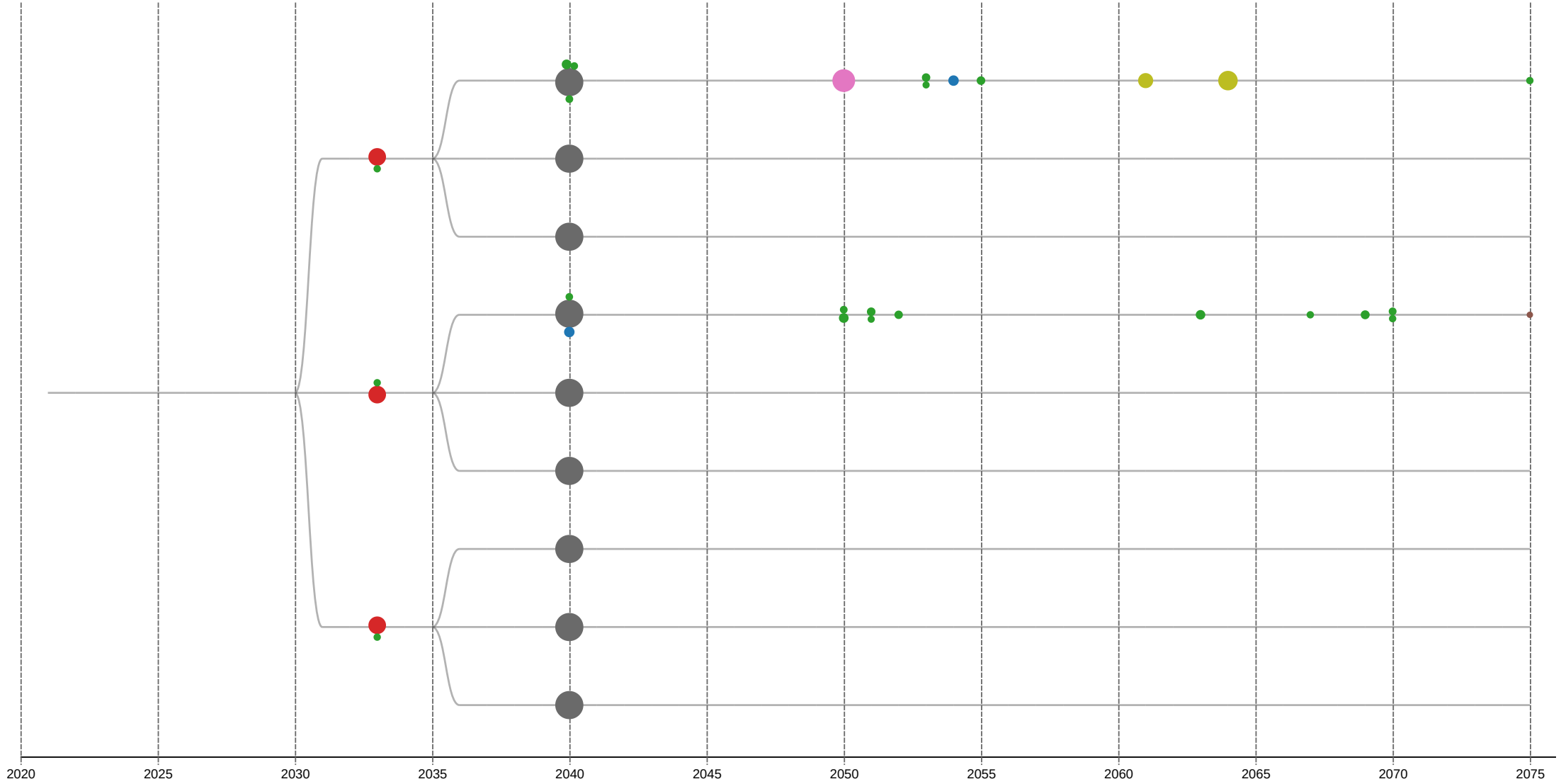
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.28	15.41	17.24	14.29	15.45	17.05	15.95	18.17	20.68	16.50
A3: Operational complexity and flexibility	6.43	6.87	7.74	6.59	6.94	7.80	7.18	8.24	9.47	7.47
A4: WRZ connectivity	7.78	8.51	9.47	7.57	8.49	9.22	8.74	9.90	11.18	8.98
A7: Customer relations support engagement with demand management	0.08	0.03	0.03	0.13	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.64	19.74	21.99	19.62	19.91	22.05	20.64	23.44	26.56	21.51
E1: Scaleability and modularity of proposed changes	8.85	9.30	10.40	8.82	9.39	10.48	9.66	11.09	12.64	10.07
E2: Intervention lead times	4.22	4.05	4.44	4.12	4.07	4.38	4.29	4.73	5.26	4.39
E3: Reliance on external bodies to deliver changes	6.24	6.39	7.15	6.23	6.45	7.19	6.69	7.62	8.67	6.96
E5: Collaborative land management	0.34	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.09

Option Selection (Thames Water)



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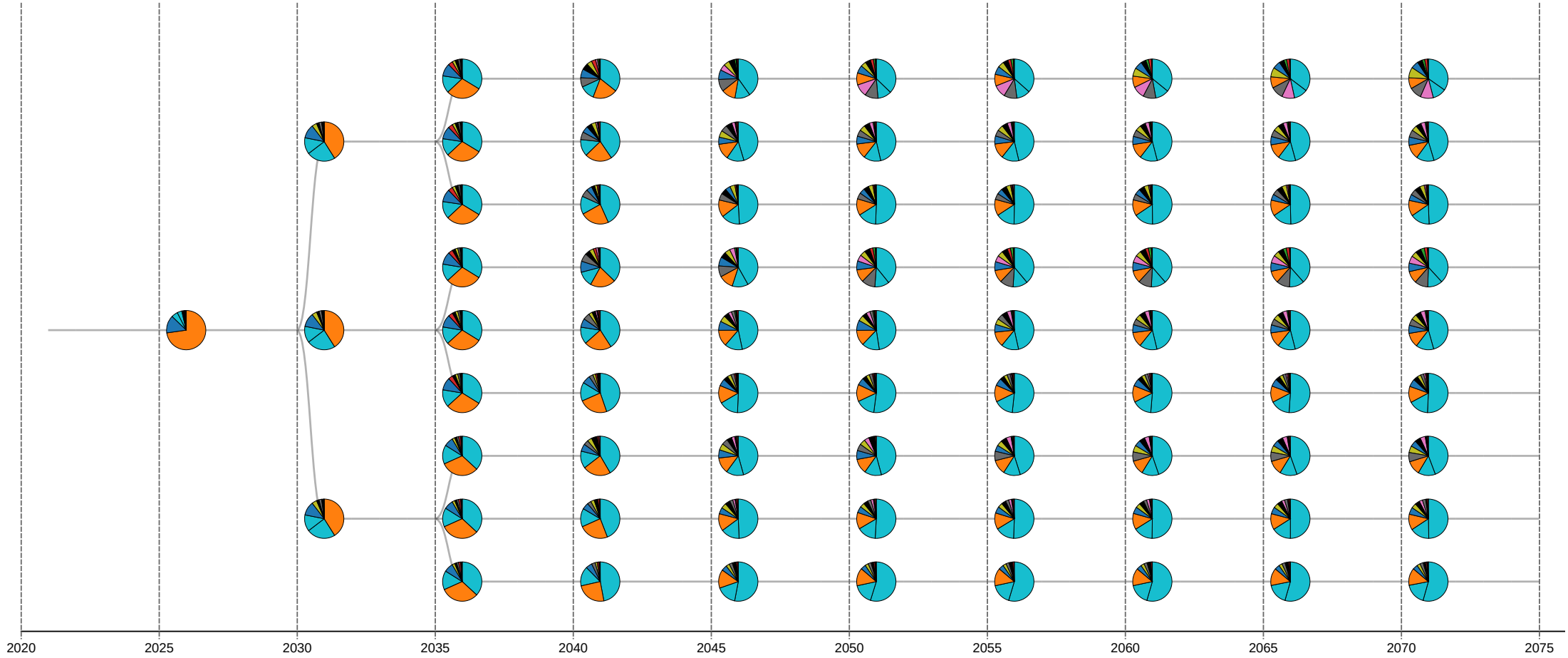
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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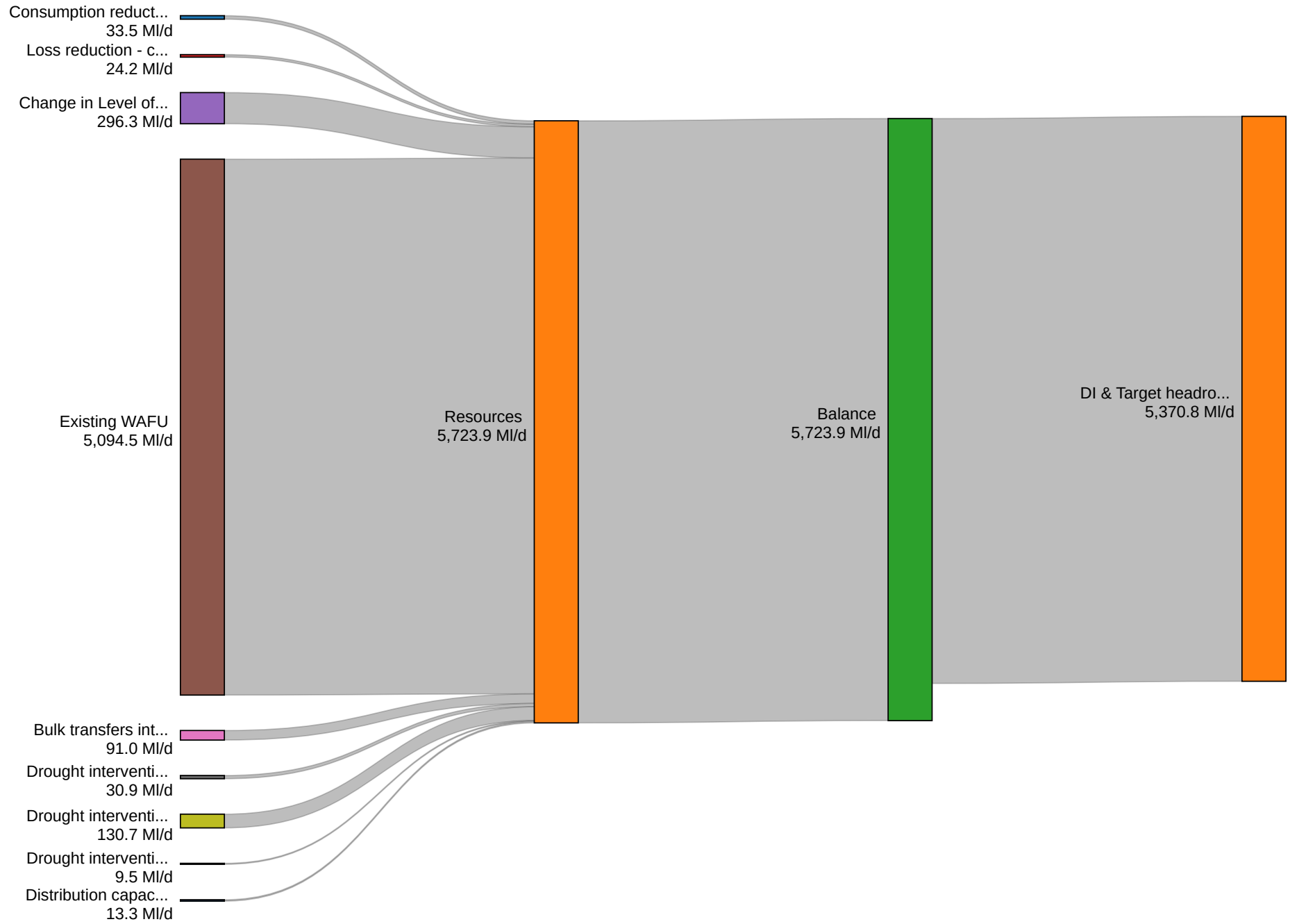
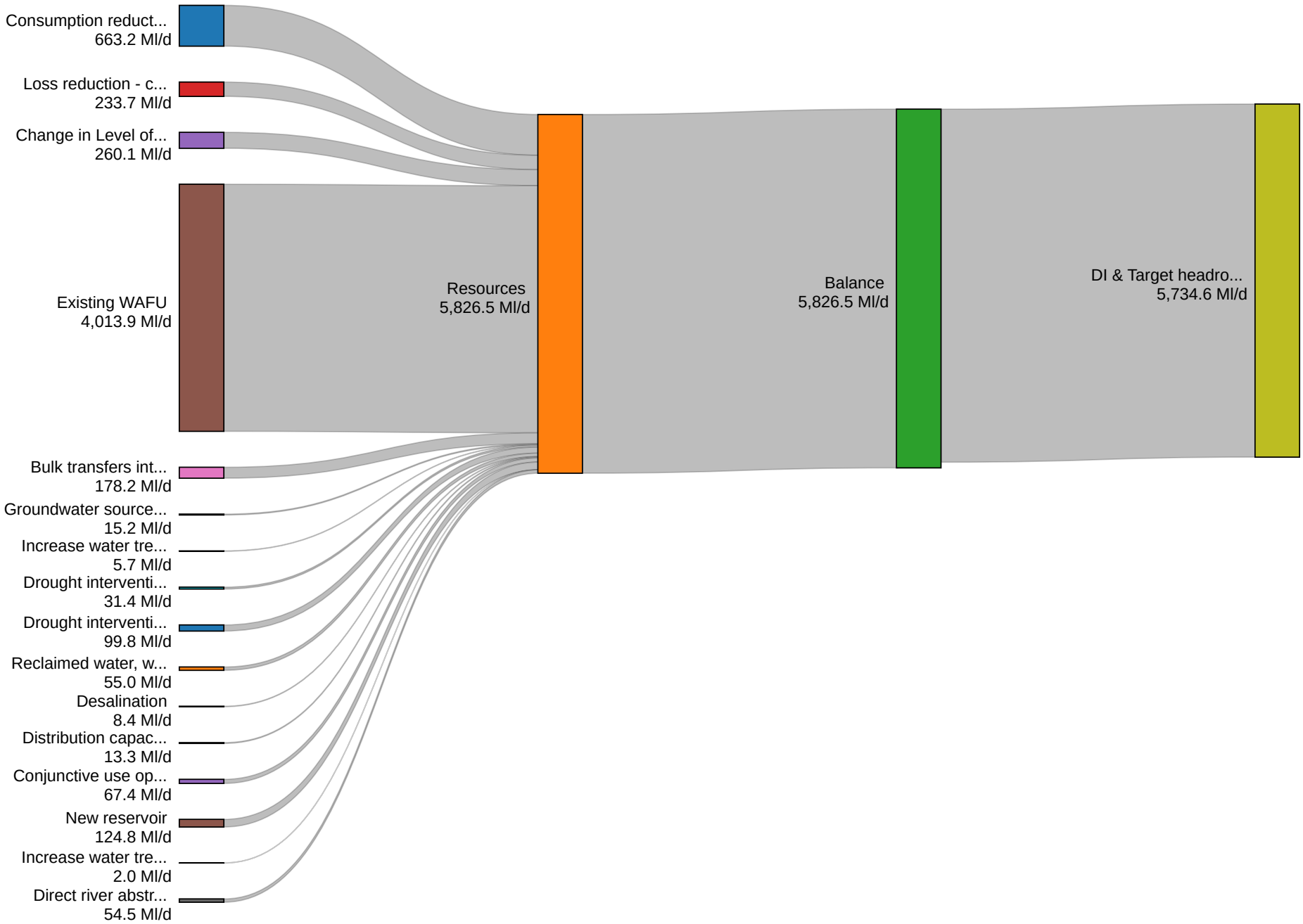
- Other

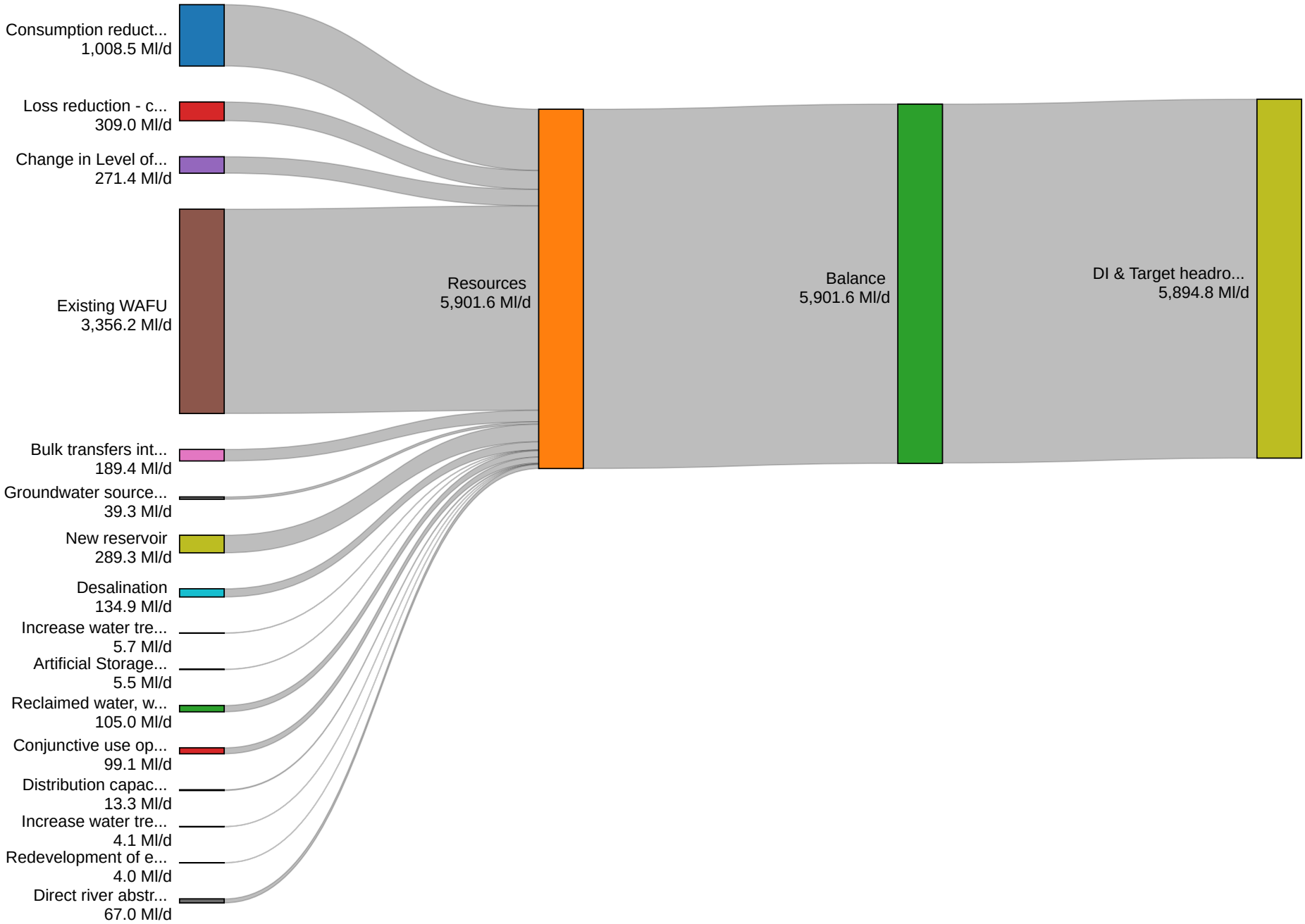
Situation 4 - 2026 (Thames Water)



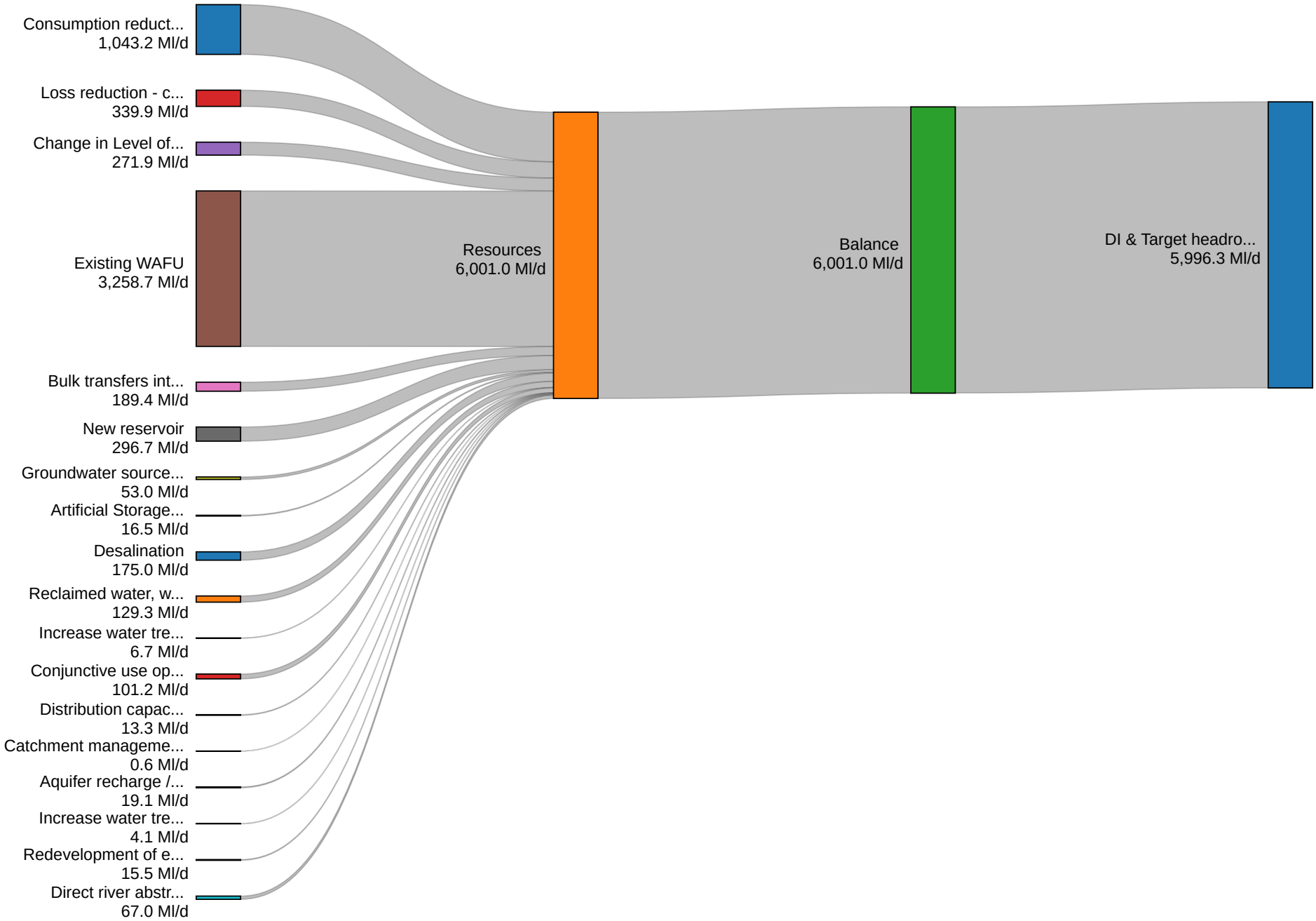
Situation 4 - 2040 (Thames Water)



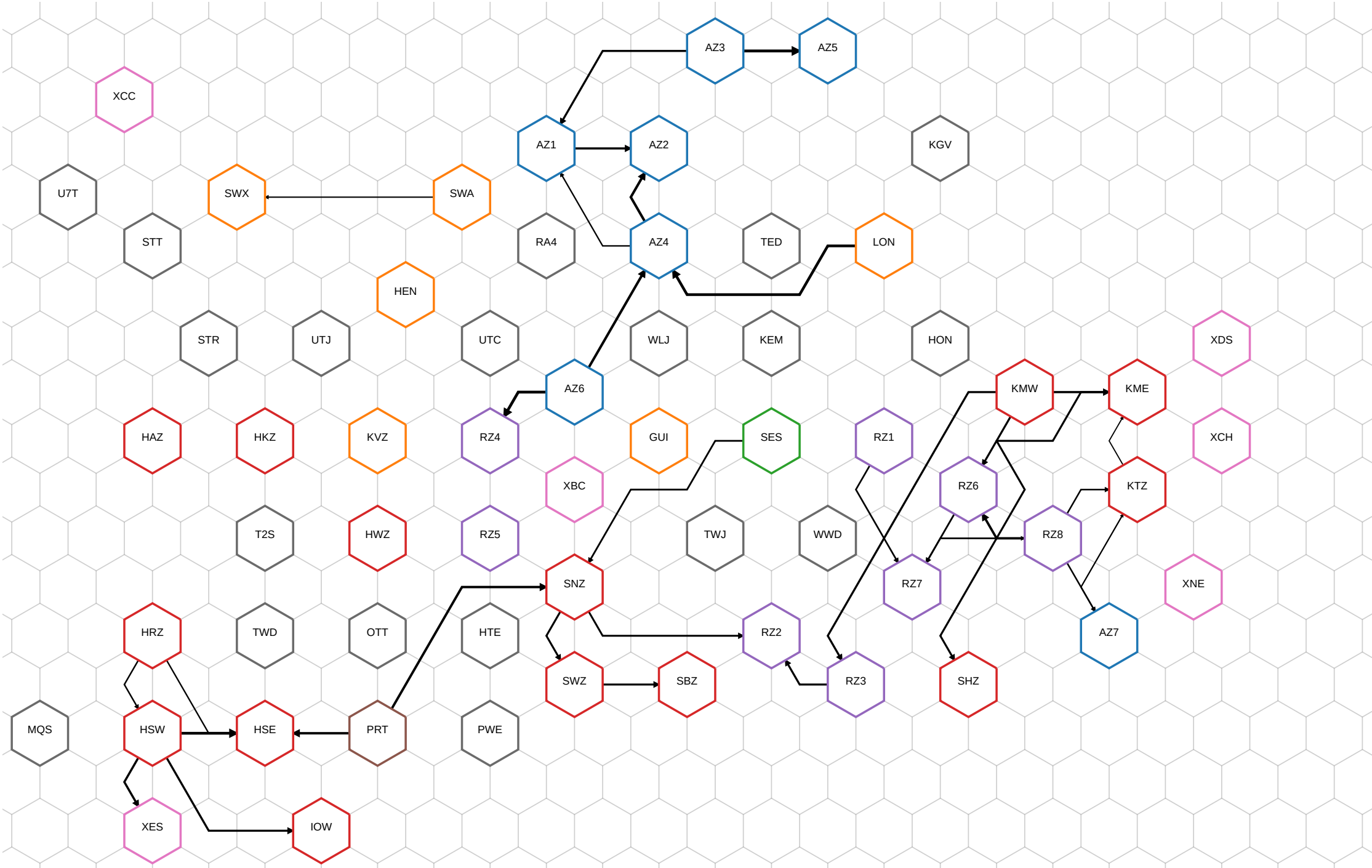
Situation 4 - 2050 (Thames Water)



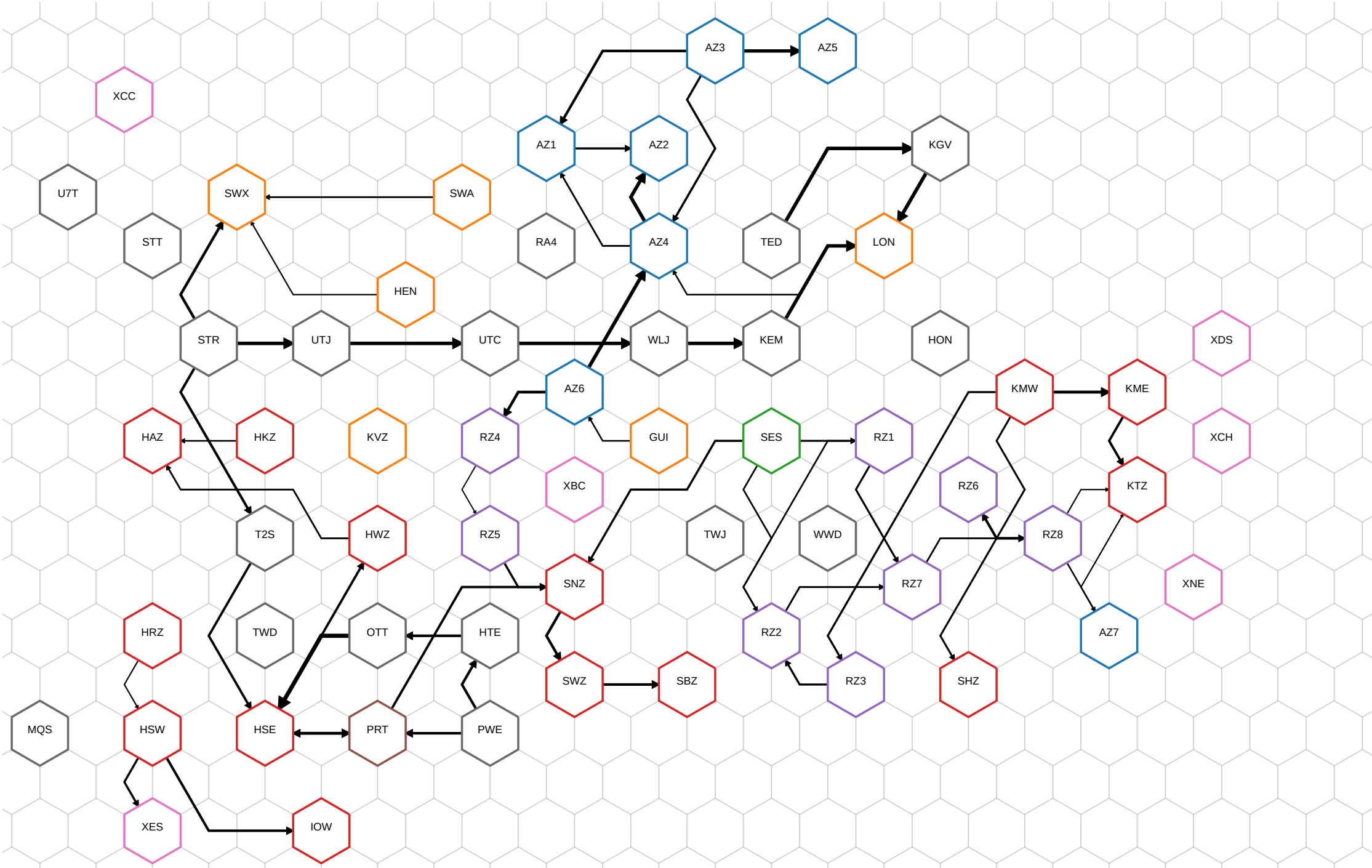
Situation 4 - 2075 (Thames Water)



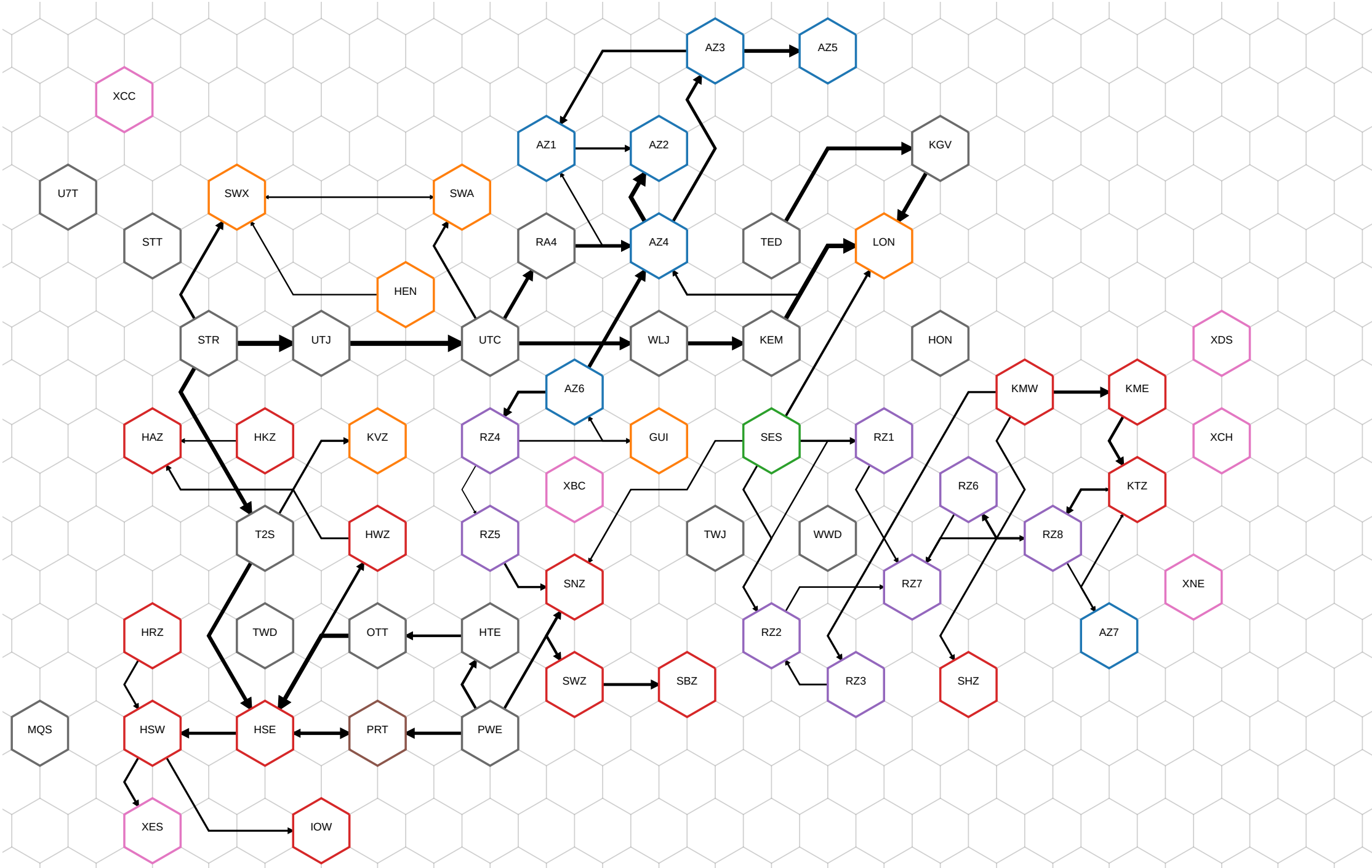
Situation 4 - 2026



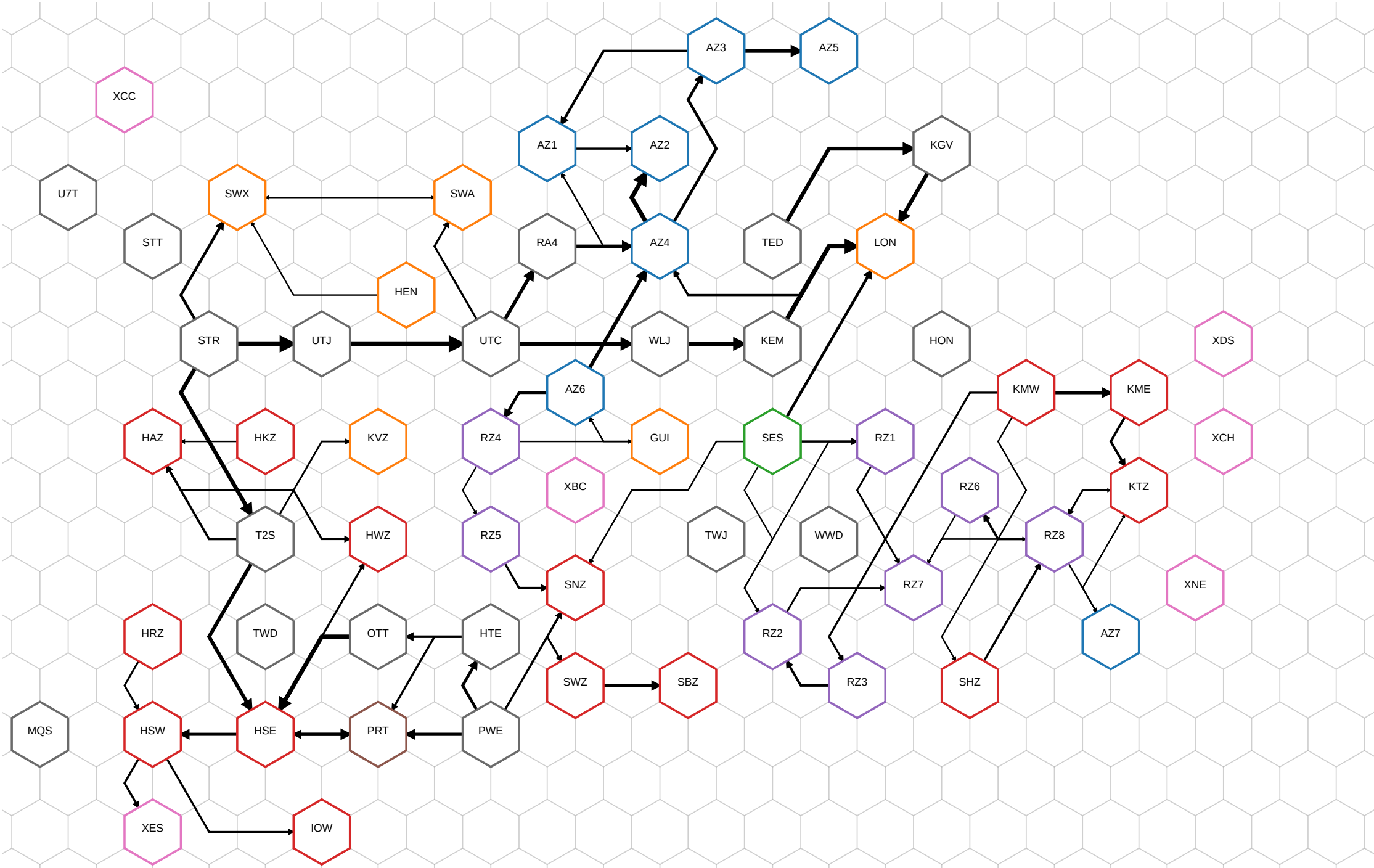
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

RESILIENCE + SESRO 100

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-resilience-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 100 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:06:56
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 100. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

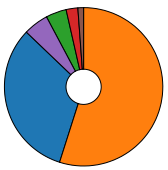
Net present value (Cost)

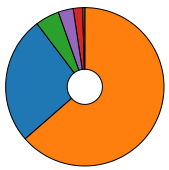
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,895	17,710	17,015	19,428	17,558	16,775	17,905	17,047	16,330	17,851	(£m)
Cost w/o deficit (STPR)	20,895	17,710	17,015	19,428	17,558	16,775	17,905	17,047	16,330	17,851	(£m)
Cost w/ deficit (IGEQ)	32,025	25,972	24,706	29,250	25,723	24,322	26,445	24,833	23,541	26,313	(£m)
Cost w/o deficit (IGEQ)	32,025	25,972	24,706	29,250	25,723	24,322	26,445	24,833	23,541	26,313	(£m)
Cost w/ deficit (LTDR)	23,046	19,337	18,537	21,341	19,168	18,269	19,581	18,585	17,761	19,514	(£m)
Cost w/o deficit (LTDR)	23,046	19,337	18,537	21,341	19,168	18,269	19,581	18,585	17,761	19,514	(£m)

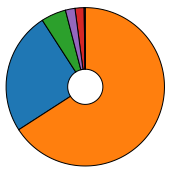
Cost breakdown (STPR)

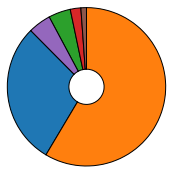
Select Company: Total

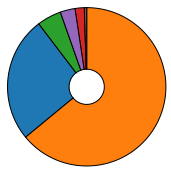
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,735	4,625	4,254	5,639	4,501	4,056	4,679	4,231	3,787	4,723	(£m)
Fixed opex	11,473	11,258	11,209	11,375	11,240	11,184	11,254	11,202	11,141	11,259	(£m)
Fixed operational carbon	882	867	866	877	870	867	871	867	866	870	(£m)
Embedded carbon	499	341	316	419	333	305	352	314	287	352	(£m)
Variable opex	1,064	541	330	897	531	316	646	391	232	550	(£m)
Variable carbon opex	242	77	39	221	84	47	102	41	18	97	(£m)

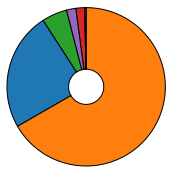
situation1 

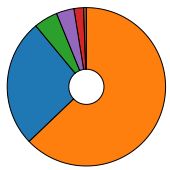
situation2 

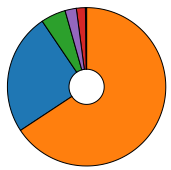
situation3 

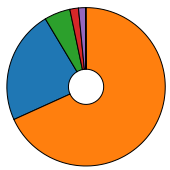
situation4 

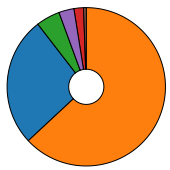
situation5 

situation6 

situation7 

situation8 

situation9 

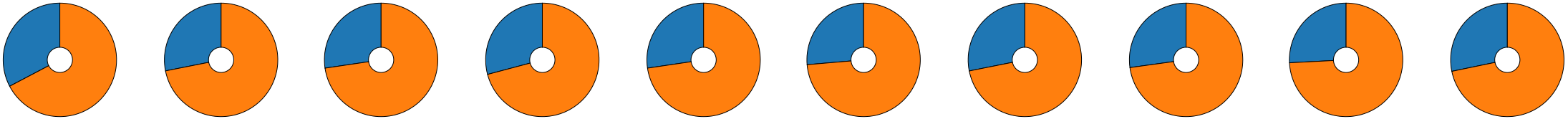
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,222,569	2,091,996	1,923,699	2,642,311	2,035,543	1,848,941	2,181,712	1,916,046	1,733,238	2,177,339	(tonnes)
Operational emissions	6,635,439	5,348,014	5,114,192	6,428,577	5,412,890	5,167,244	5,573,796	5,134,766	4,980,353	5,532,808	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

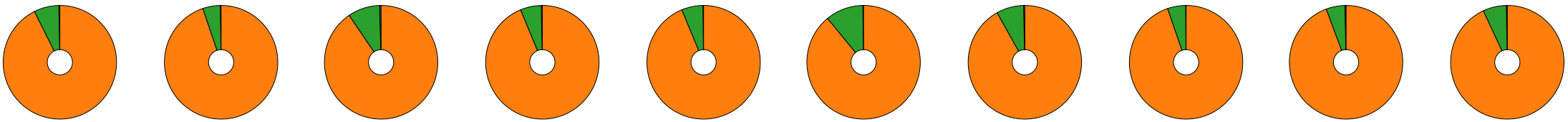


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	72	29	23	65	24	10	52	11	10	33	(GWh)
Grid	23,019	11,417	4,591	19,614	10,928	4,058	13,184	7,966	2,904	10,853	(GWh)
Renewable	1,765	601	461	1,244	706	490	1,115	433	165	776	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,438	64,521	63,571	69,623	64,315	63,093	65,349	63,168	62,081	65,129
SEA environmental disbenefit	114,753	78,612	70,922	108,020	78,467	71,954	83,079	69,678	60,397	81,765
Natural capital	84,114,351	79,897,868	82,783,146	82,483,867	79,965,749	82,776,434	79,562,347	80,331,994	83,233,810	81,683,285
Bio-diversity net gain	−191,229	−134,007	−100,936	−187,772	−127,072	−100,124	−130,501	−103,499	−73,949	−127,677

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,229	31,845	31,436	33,789	31,795	31,370	31,936	31,051	30,530	31,998

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.34	28.21	30.79	28.27	28.20	30.77	29.54	32.70	36.38	30.36
R1: Uncertainty of option supply/demand benefit	5.82	5.20	5.69	5.64	5.22	5.65	5.60	6.09	6.74	5.74
R3: Risk of service failure due to other physical hazards	6.64	6.92	7.77	6.75	6.97	7.78	7.26	8.23	9.39	7.52
R4: Availability of additional headroom	6.54	6.85	7.07	6.59	6.86	7.07	7.18	7.54	7.78	7.05
R5: Catchment/raw water quality risks (incl. climate change)	3.99	3.91	4.42	3.73	3.90	4.40	4.02	4.64	5.36	4.26
R6: Capacity of catchment services	0.26	0.08	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.07
R7: Risk of service failure to other exceptional events	4.98	5.21	5.85	5.19	5.25	5.87	5.47	6.20	7.10	5.68
R8: Soil health	0.11	0.03	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.03

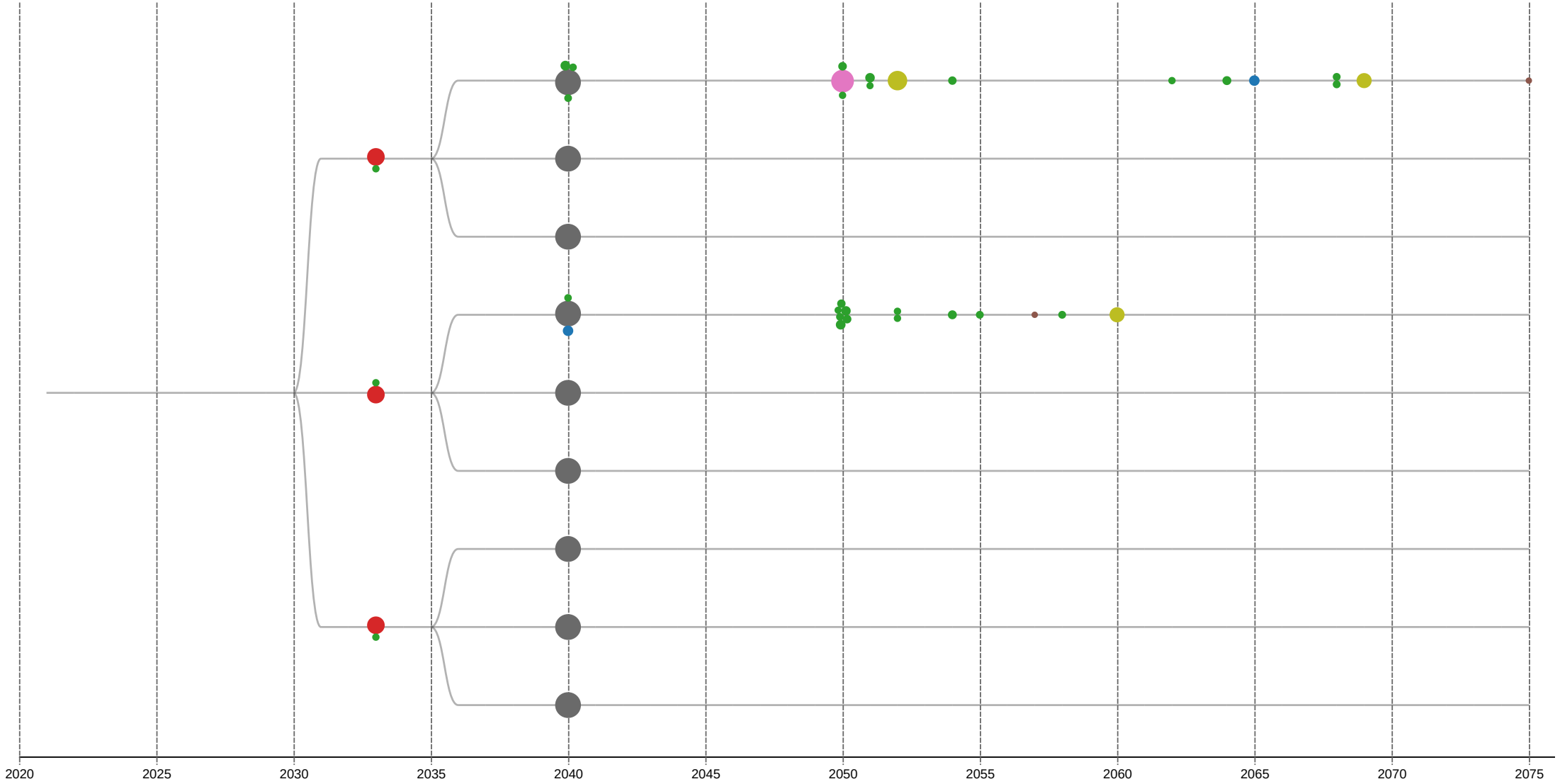
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.28	15.21	16.98	14.23	15.21	16.79	15.71	17.89	20.35	16.29
A3: Operational complexity and flexibility	6.15	6.64	7.47	6.43	6.70	7.52	6.94	7.96	9.14	7.22
A4: WRZ connectivity	8.05	8.53	9.48	7.72	8.49	9.23	8.74	9.90	11.18	9.04
A7: Customer relations support engagement with demand management	0.07	0.03	0.03	0.08	0.03	0.03	0.03	0.03	0.03	0.04

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.64	19.90	22.05	19.64	19.95	22.05	20.69	23.49	26.62	21.56
E1: Scaleability and modularity of proposed changes	8.95	9.47	10.58	9.02	9.55	10.63	9.82	11.28	12.86	10.24
E2: Intervention lead times	4.18	4.00	4.39	4.06	4.01	4.32	4.23	4.66	5.17	4.34
E3: Reliance on external bodies to deliver changes	6.13	6.34	7.08	6.22	6.39	7.10	6.63	7.55	8.59	6.89
E5: Collaborative land management	0.39	0.08	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.09

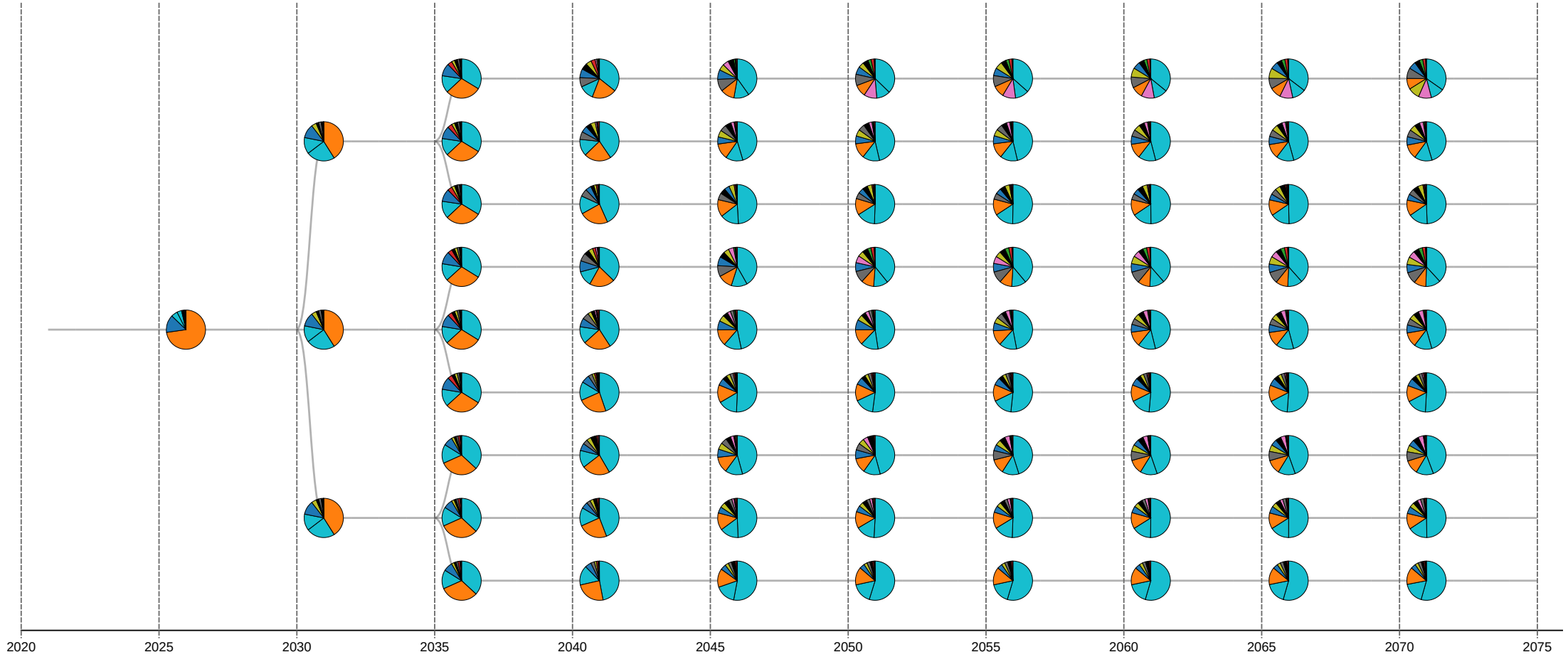
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

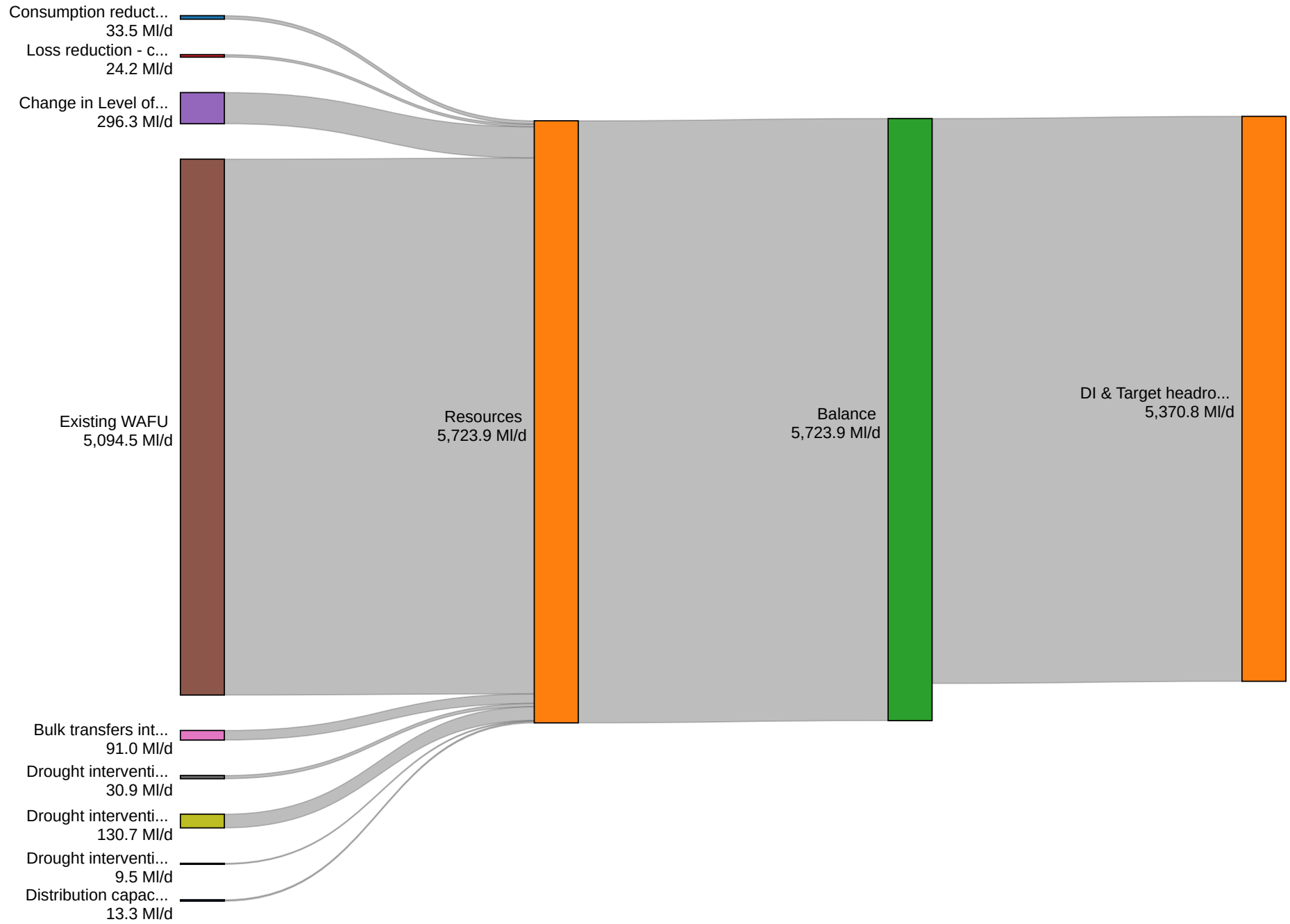
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

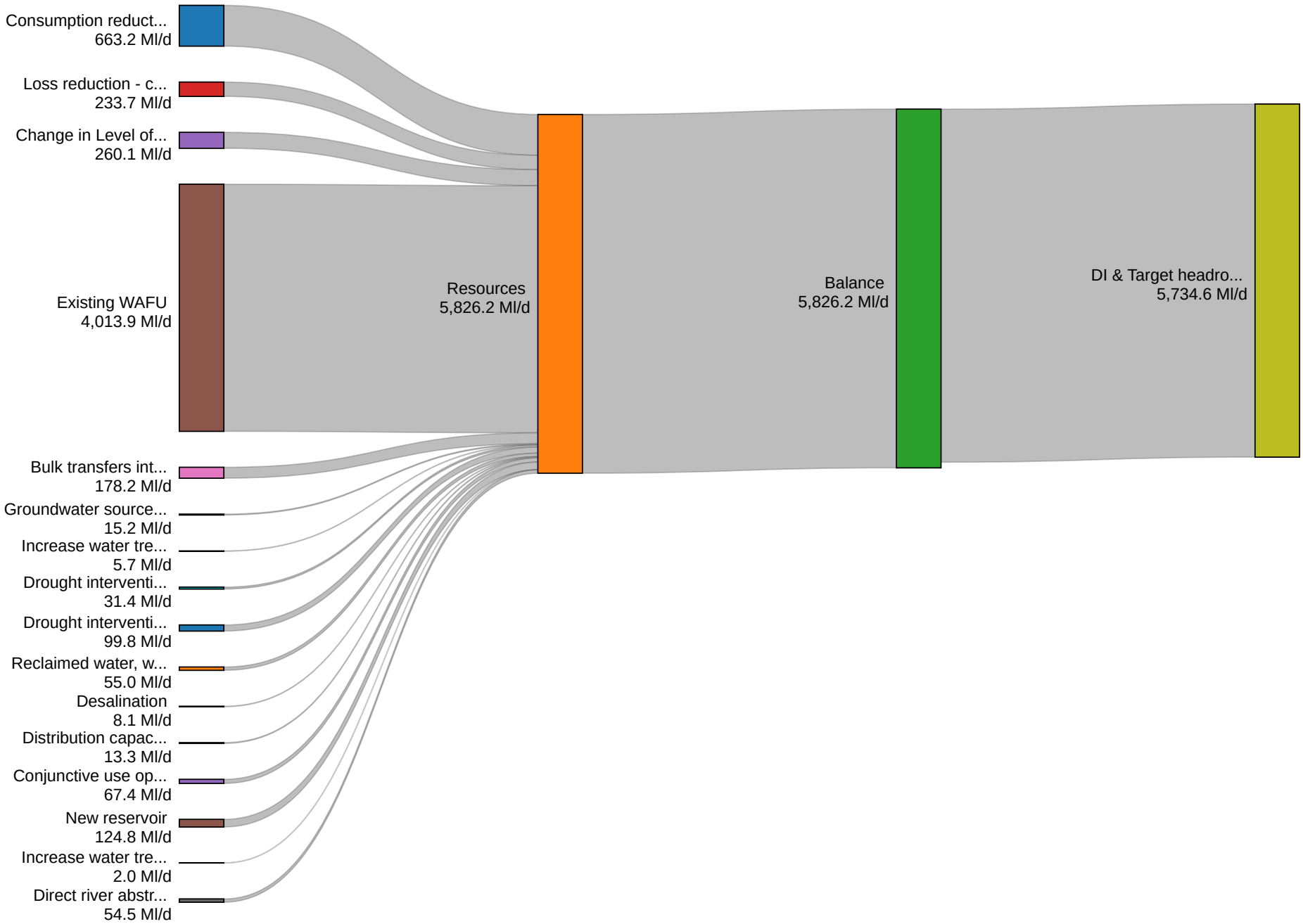


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

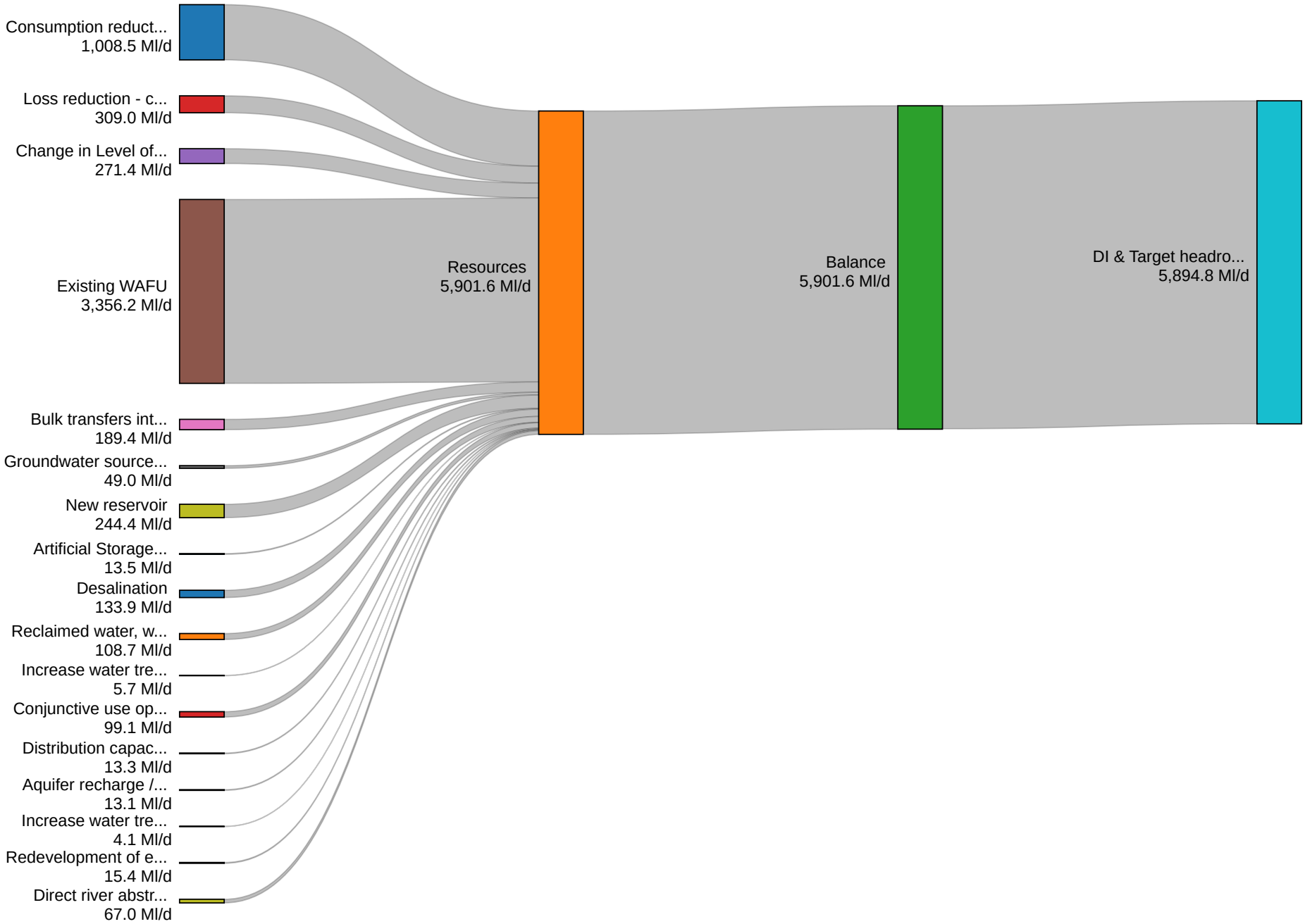
Situation 4 - 2026 (Thames Water)



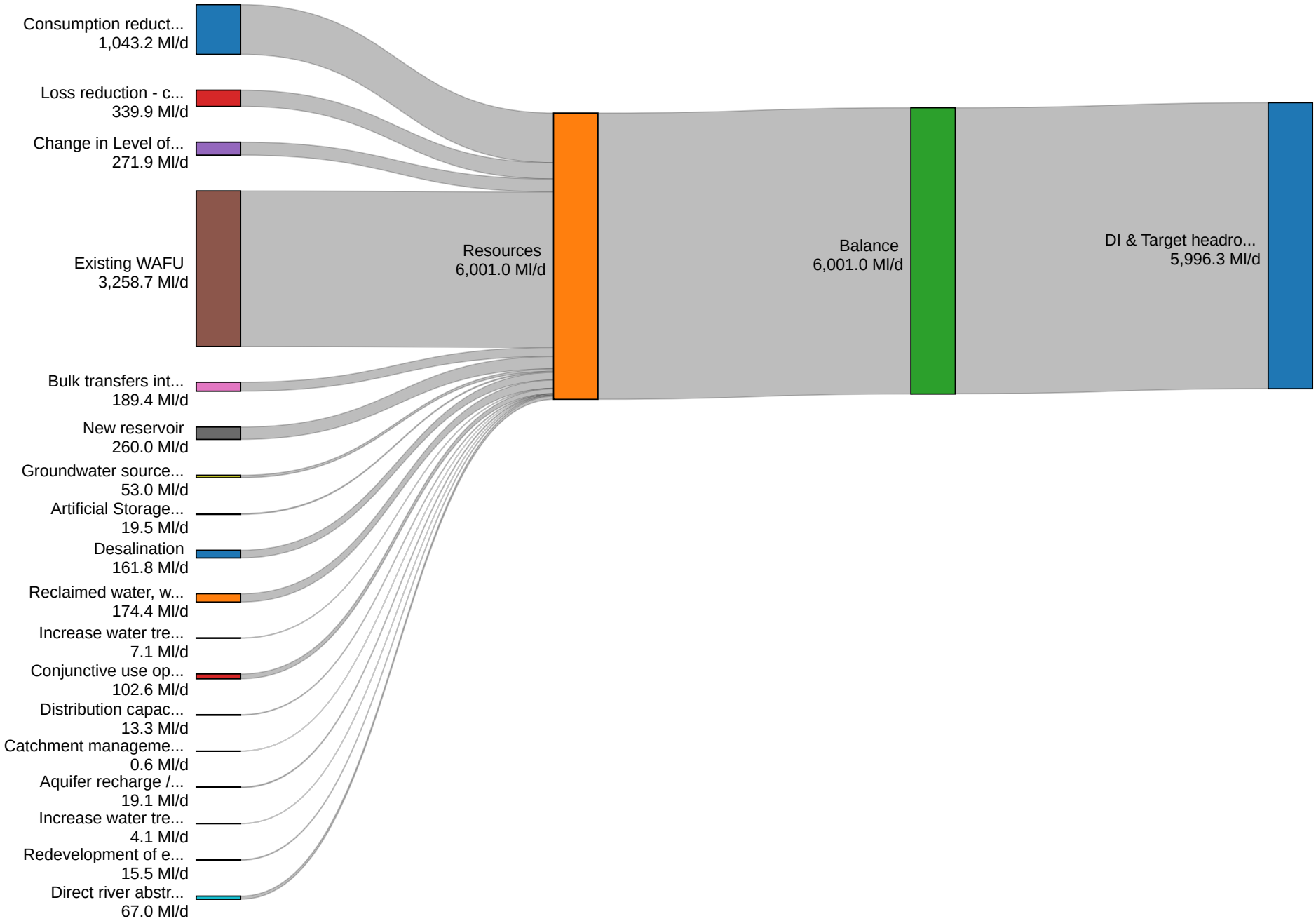
Situation 4 - 2040 (Thames Water)



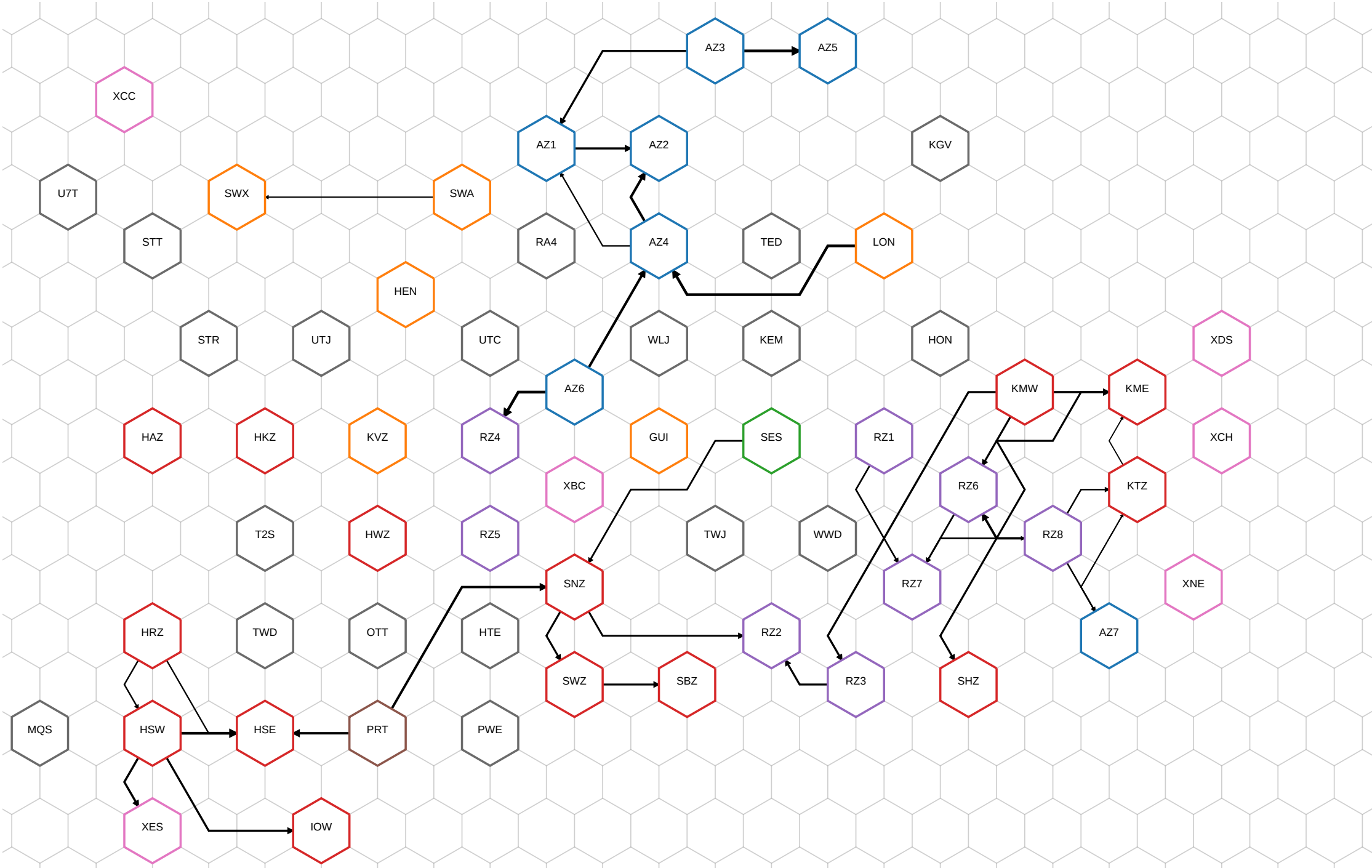
Situation 4 - 2050 (Thames Water)



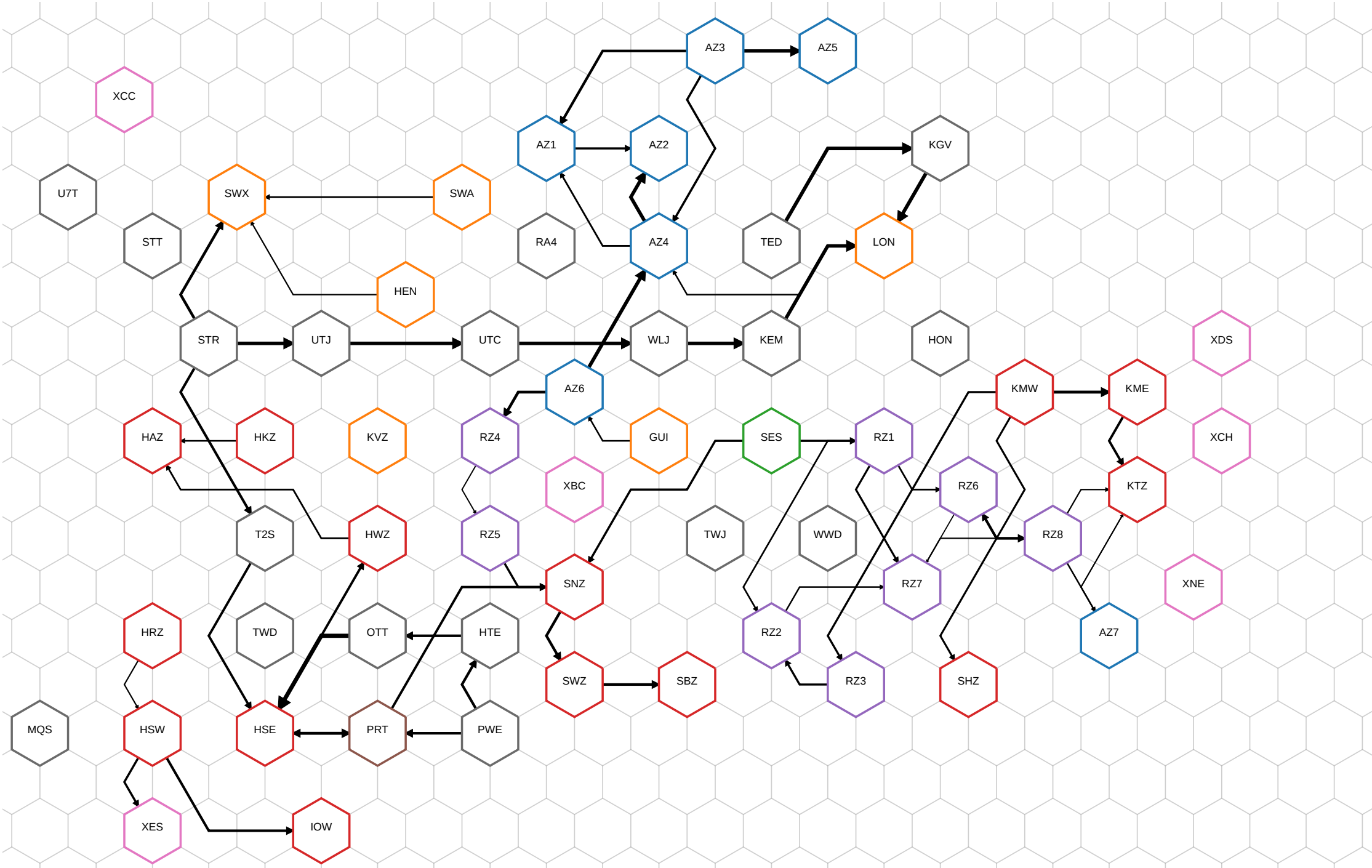
Situation 4 - 2075 (Thames Water)



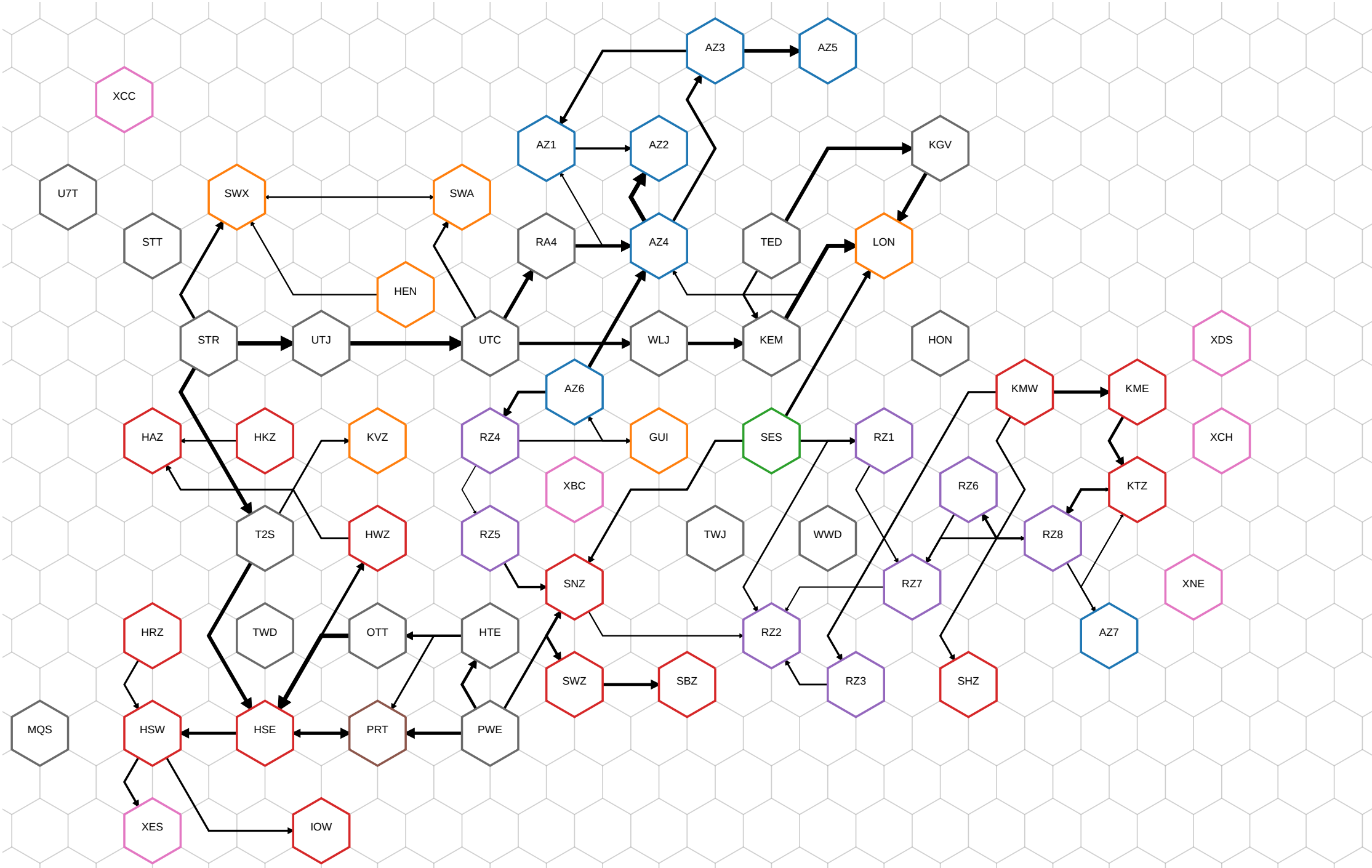
Situation 4 - 2026



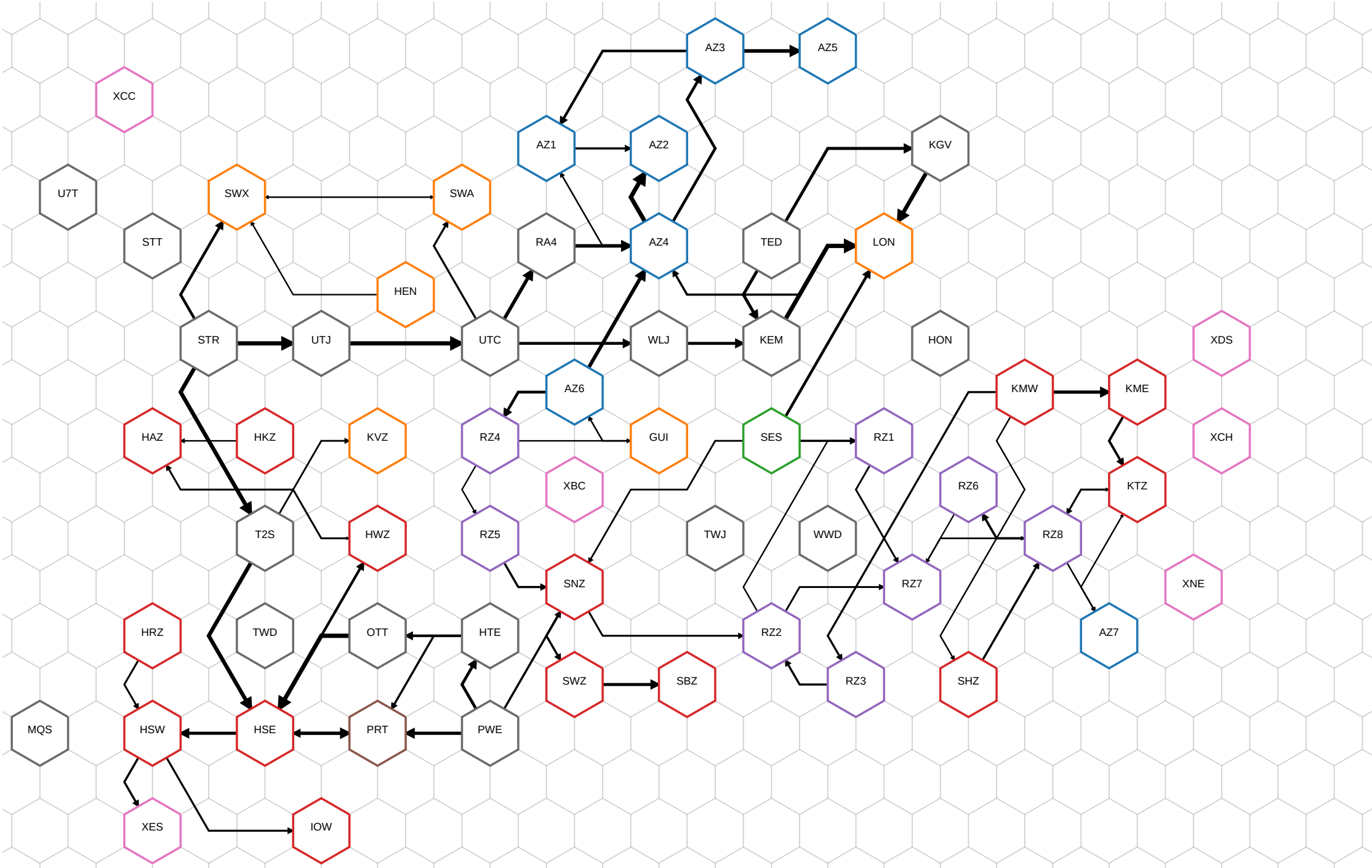
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

RESILIENCE + SESRO 75

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-resilience-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 75 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 18:07:05
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 75. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

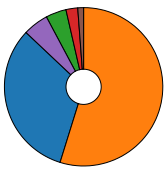
Net present value (Cost)

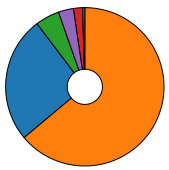
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,001	17,612	16,899	19,486	17,498	16,683	17,830	16,971	16,255	17,804	(£m)
Cost w/o deficit (STPR)	21,001	17,612	16,899	19,486	17,498	16,683	17,830	16,971	16,255	17,804	(£m)
Cost w/ deficit (IGEQ)	32,314	25,830	24,529	29,406	25,634	24,178	26,324	24,712	23,420	26,261	(£m)
Cost w/o deficit (IGEQ)	32,314	25,830	24,529	29,406	25,634	24,178	26,324	24,712	23,420	26,261	(£m)
Cost w/ deficit (LTDR)	23,182	19,231	18,409	21,415	19,102	18,167	19,497	18,501	17,677	19,464	(£m)
Cost w/o deficit (LTDR)	23,182	19,231	18,409	21,415	19,102	18,167	19,497	18,501	17,677	19,464	(£m)

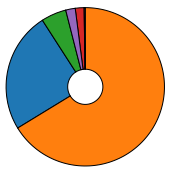
Cost breakdown (STPR)

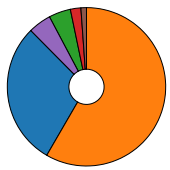
Select Company: Total

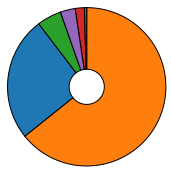
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,770	4,540	4,161	5,694	4,446	3,968	4,613	4,164	3,719	4,675	(£m)
Fixed opex	11,508	11,255	11,200	11,373	11,242	11,182	11,253	11,201	11,139	11,262	(£m)
Fixed operational carbon	883	869	867	873	870	870	871	867	865	871	(£m)
Embedded carbon	504	329	304	417	326	296	346	308	280	346	(£m)
Variable opex	1,087	540	328	909	531	316	645	391	232	553	(£m)
Variable carbon opex	248	79	39	220	84	50	101	41	18	98	(£m)

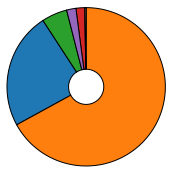
situation1 

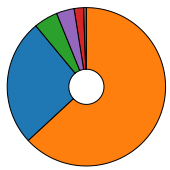
situation2 

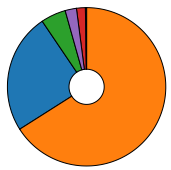
situation3 

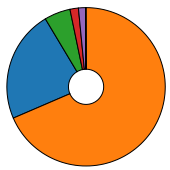
situation4 

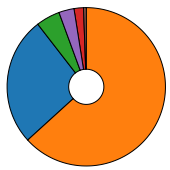
situation5 

situation6 

situation7 

situation8 

situation9 

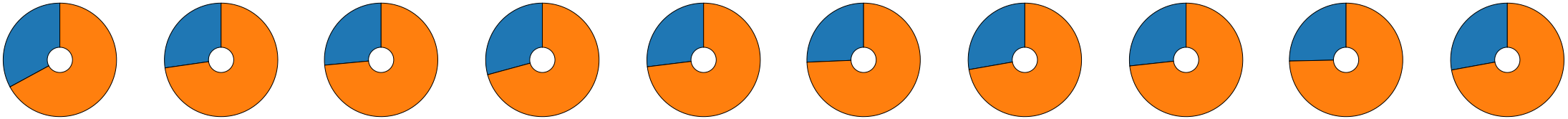
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,279,871	2,015,945	1,845,393	2,640,772	1,995,841	1,796,997	2,138,486	1,872,376	1,689,568	2,141,694	(tonnes)
Operational emissions	6,687,893	5,377,910	5,119,710	6,394,439	5,410,750	5,208,583	5,567,094	5,134,761	4,980,347	5,542,387	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

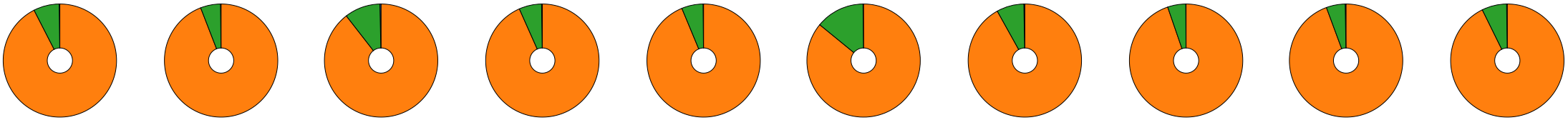


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	50	22	17	47	19	8	40	9	8	24	(GWh)
Grid	22,993	11,307	4,427	19,227	10,940	3,861	13,158	7,957	2,895	10,752	(GWh)
Renewable	1,819	683	502	1,323	713	625	1,115	433	165	820	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	70,734	65,147	63,735	68,804	64,604	63,066	65,358	63,168	62,081	65,189
SEA environmental disbenefit	117,299	83,299	73,949	103,751	79,291	72,255	83,286	69,866	60,585	82,620
Natural capital	85,292,129	81,312,296	84,076,782	79,274,686	81,311,825	84,123,660	80,969,355	81,744,834	84,646,650	82,528,024
Bio-diversity net gain	−187,136	−121,313	−97,702	−170,302	−116,647	−89,868	−119,469	−92,367	−62,817	−117,513

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,423	32,205	31,534	33,525	31,901	31,355	31,937	31,052	30,531	32,051

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.29	28.19	30.02	28.27	28.18	30.07	28.93	31.98	35.54	29.94
R1: Uncertainty of option supply/demand benefit	5.85	5.20	5.51	5.78	5.17	5.51	5.48	5.94	6.57	5.67
R3: Risk of service failure due to other physical hazards	6.62	6.85	7.57	6.71	6.85	7.58	7.10	8.04	9.16	7.39
R4: Availability of additional headroom	6.49	6.80	7.02	6.58	6.82	7.03	7.14	7.49	7.73	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.77	4.25	3.70	3.79	4.27	3.91	4.50	5.20	4.15
R6: Capacity of catchment services	0.31	0.31	0.00	0.31	0.31	0.00	0.00	0.00	0.00	0.14
R7: Risk of service failure to other exceptional events	4.94	5.14	5.66	5.07	5.12	5.68	5.31	6.00	6.87	5.53
R8: Soil health	0.11	0.11	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.05

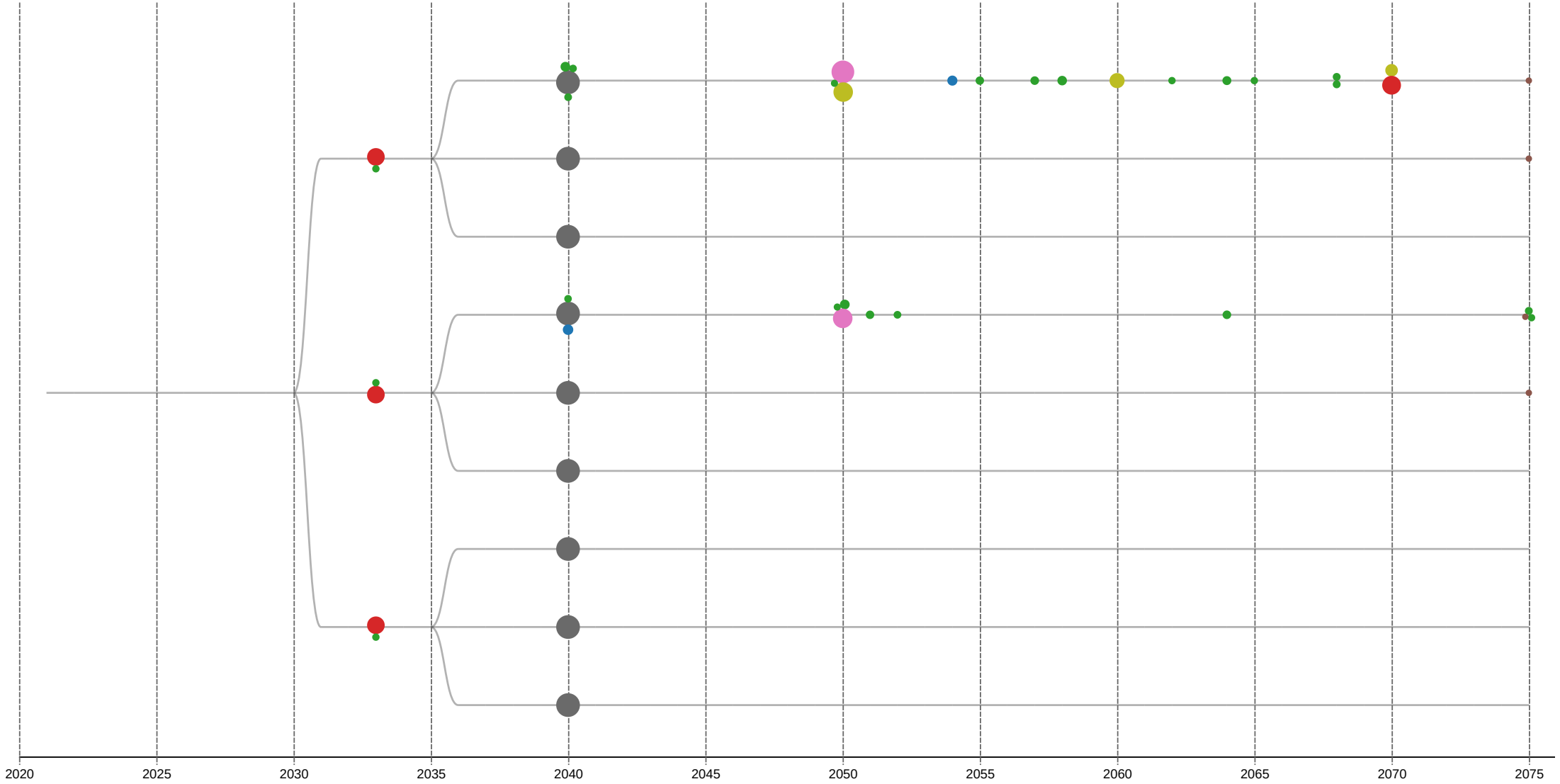
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.32	15.21	16.78	14.27	15.20	16.60	15.55	17.69	20.12	16.19
A3: Operational complexity and flexibility	6.09	6.56	7.28	6.31	6.58	7.34	6.78	7.76	8.91	7.07
A4: WRZ connectivity	8.11	8.51	9.47	7.84	8.49	9.23	8.74	9.90	11.18	9.05
A7: Customer relations support engagement with demand management	0.12	0.13	0.03	0.12	0.13	0.03	0.03	0.03	0.03	0.07

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.91	20.42	21.82	19.91	20.41	21.86	20.52	23.29	26.39	21.62
E1: Scaleability and modularity of proposed changes	8.97	9.48	10.46	9.07	9.52	10.53	9.74	11.18	12.74	10.19
E2: Intervention lead times	4.30	4.09	4.34	4.11	4.04	4.27	4.19	4.61	5.11	4.34
E3: Reliance on external bodies to deliver changes	6.19	6.40	7.02	6.27	6.40	7.06	6.59	7.50	8.53	6.88
E5: Collaborative land management	0.46	0.46	0.00	0.46	0.46	0.00	0.00	0.00	0.00	0.20

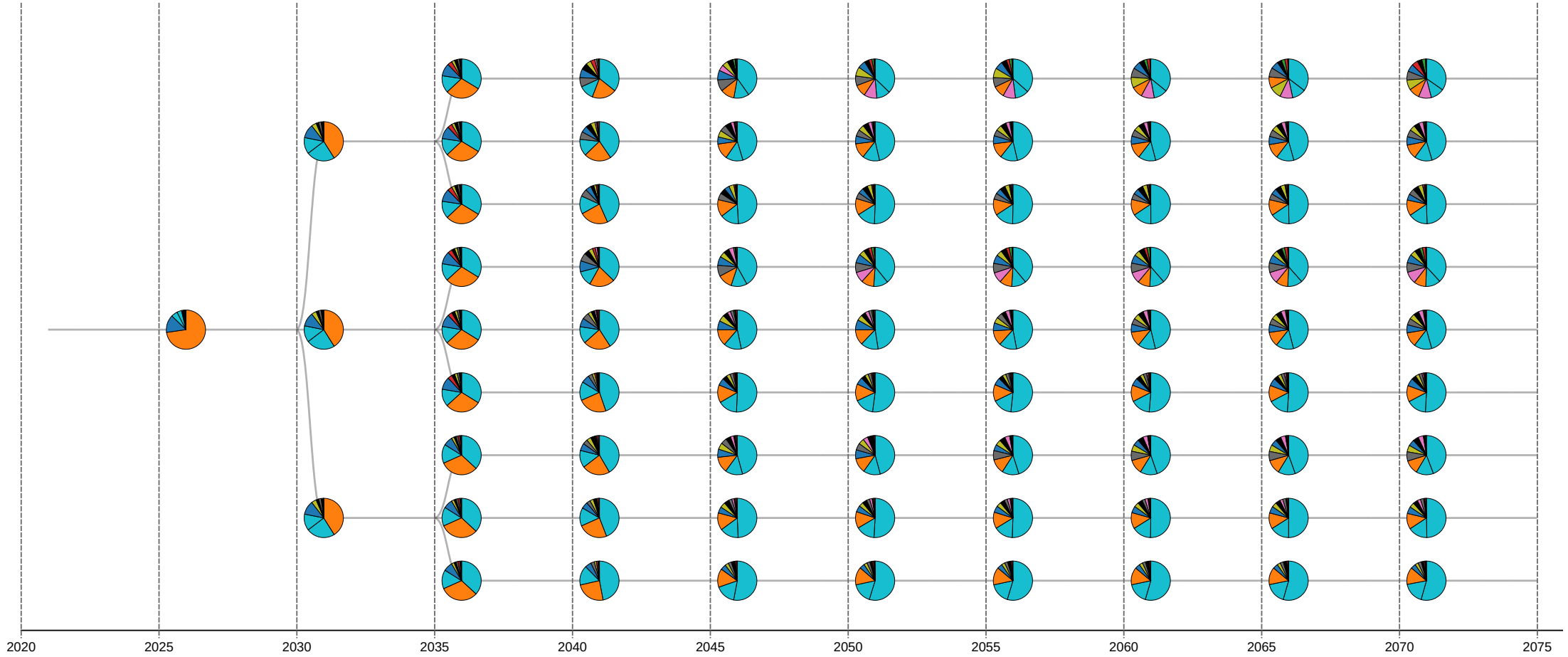
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

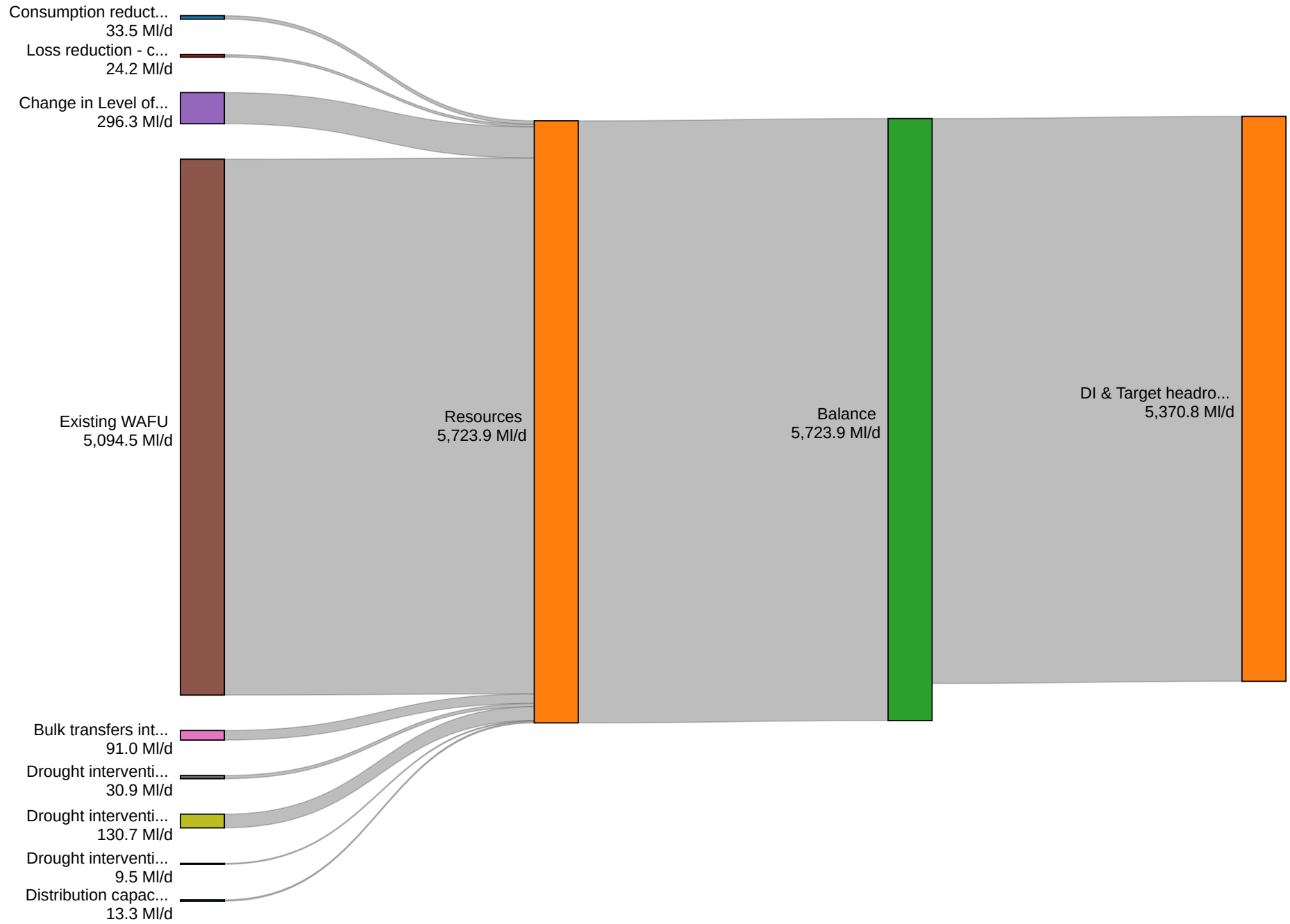
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

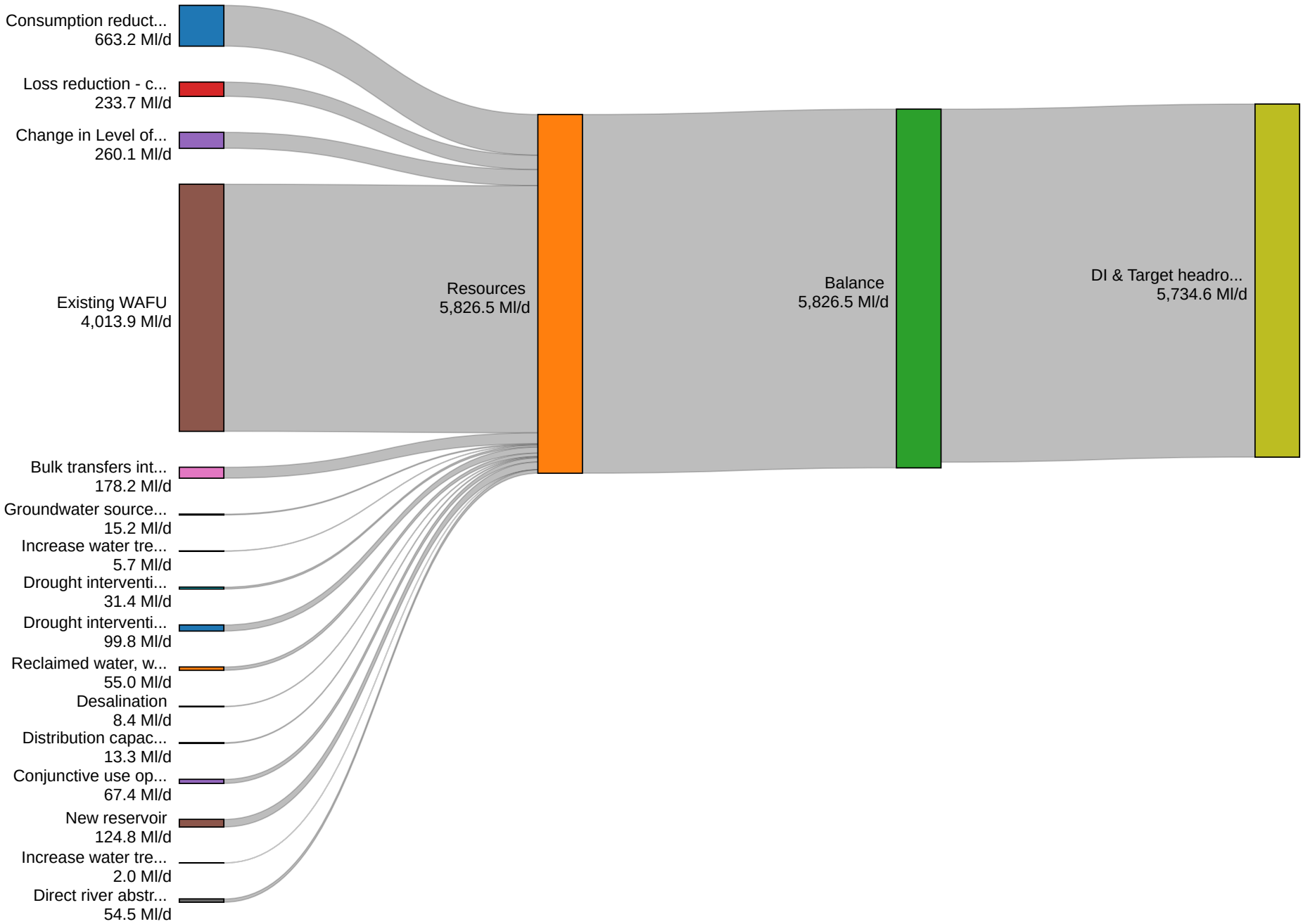


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

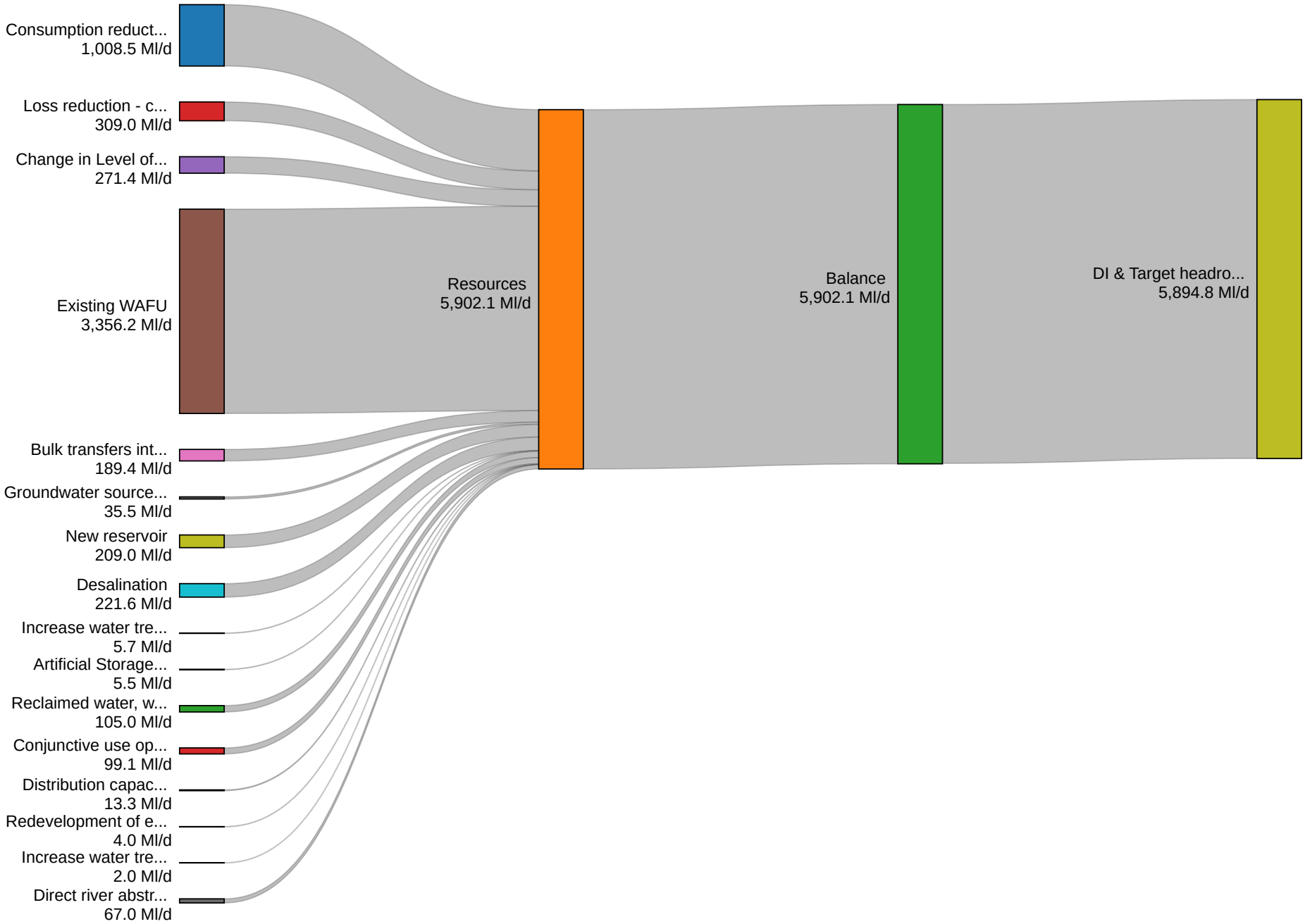
Situation 4 - 2026 (Thames Water)



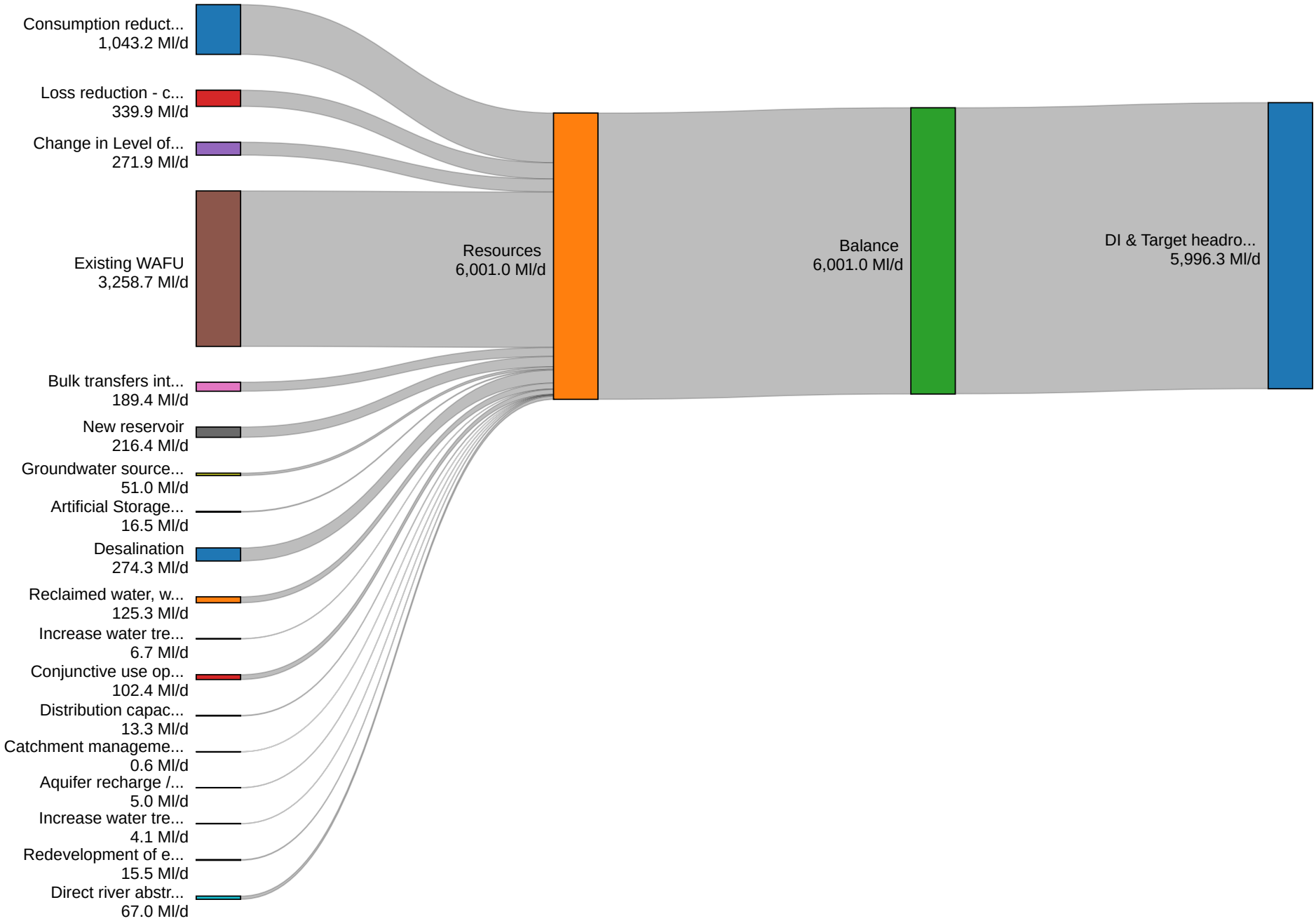
Situation 4 - 2040 (Thames Water)



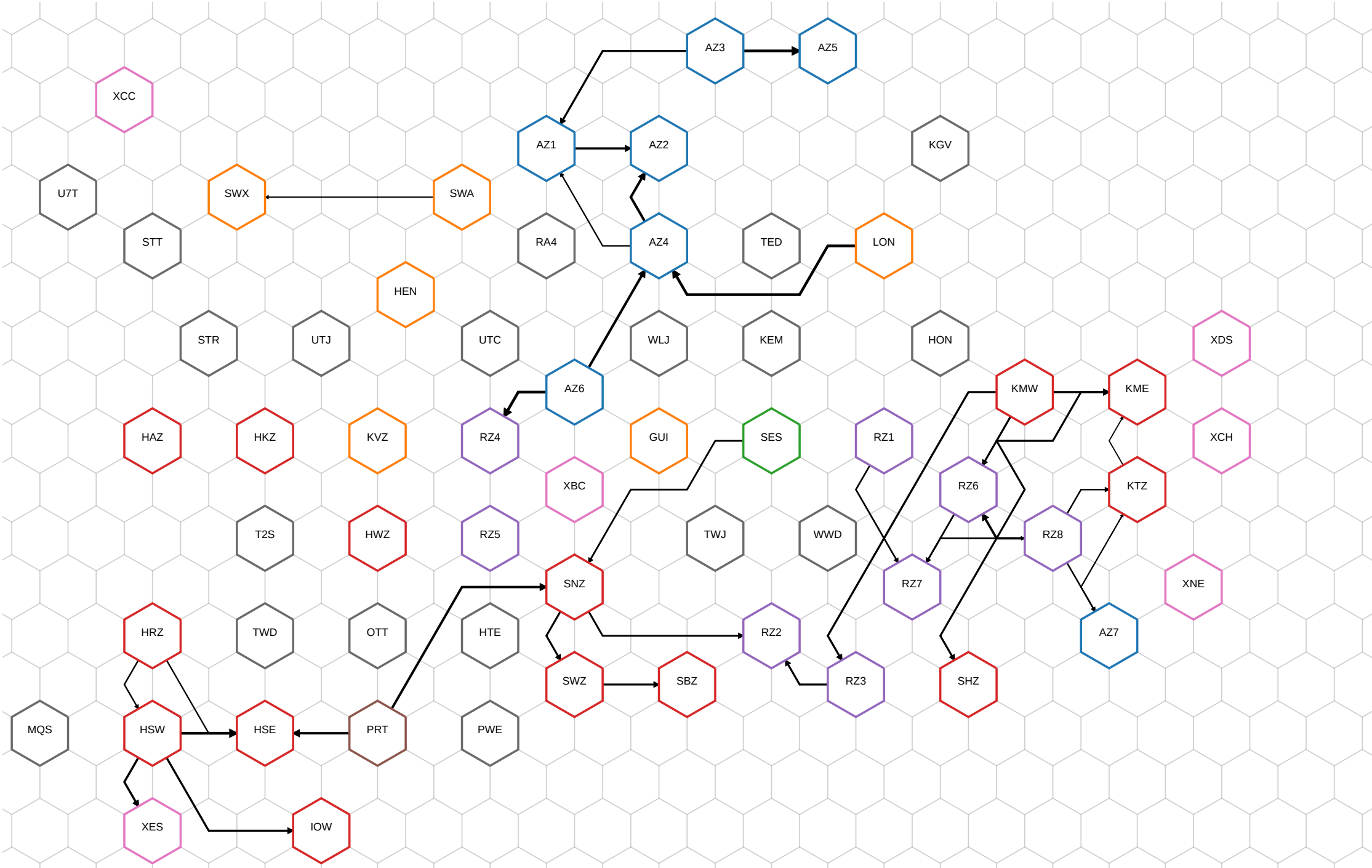
Situation 4 - 2050 (Thames Water)



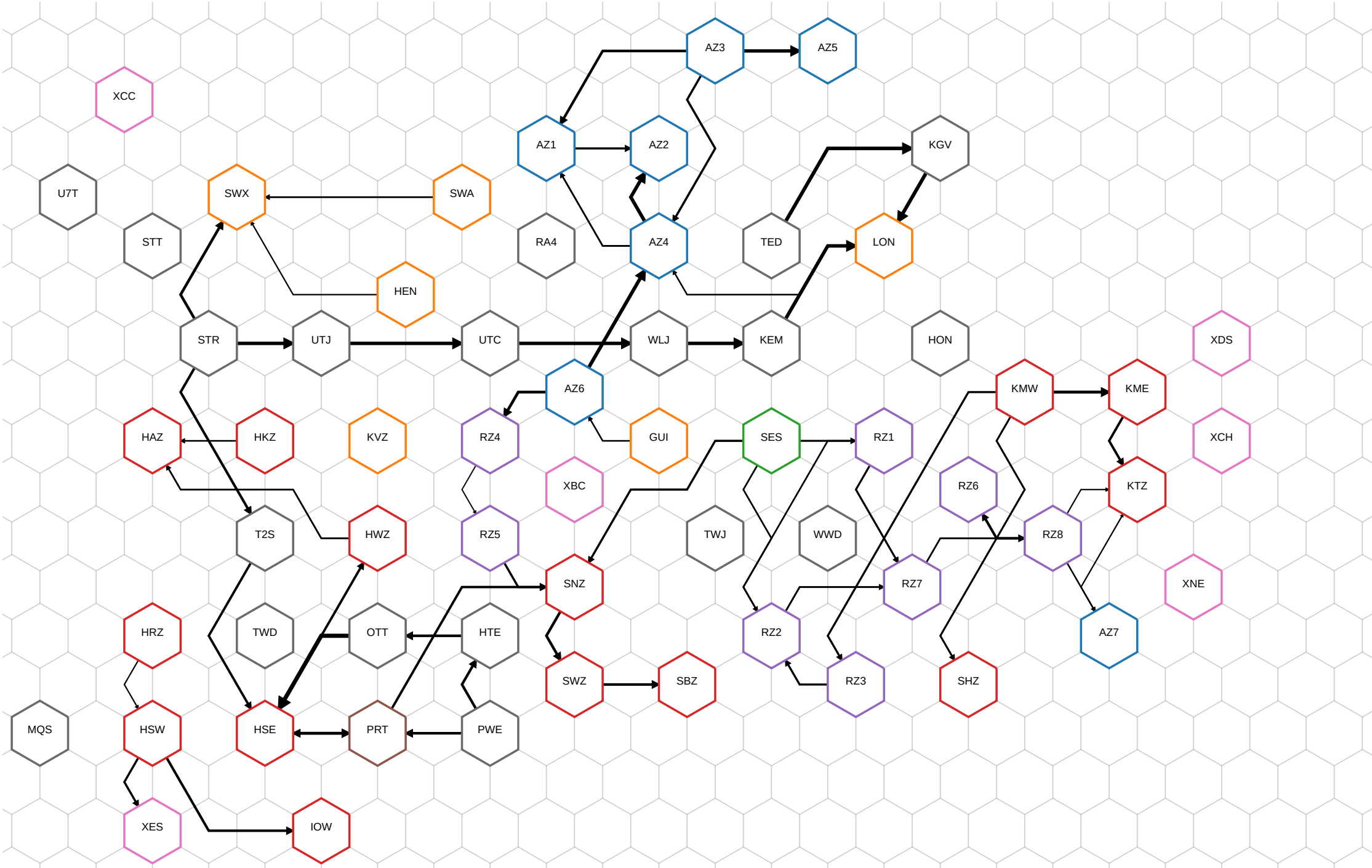
Situation 4 - 2075 (Thames Water)



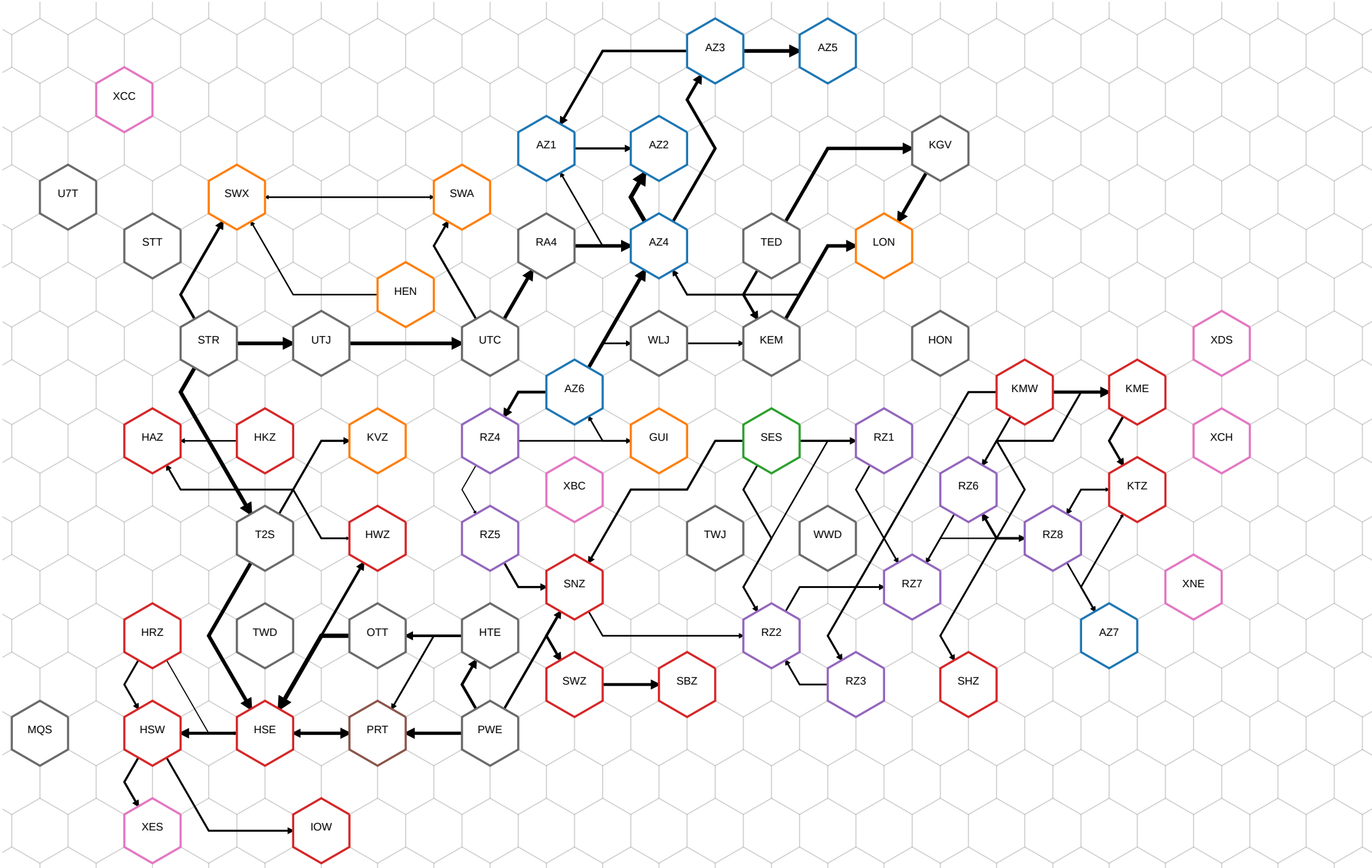
Situation 4 - 2026



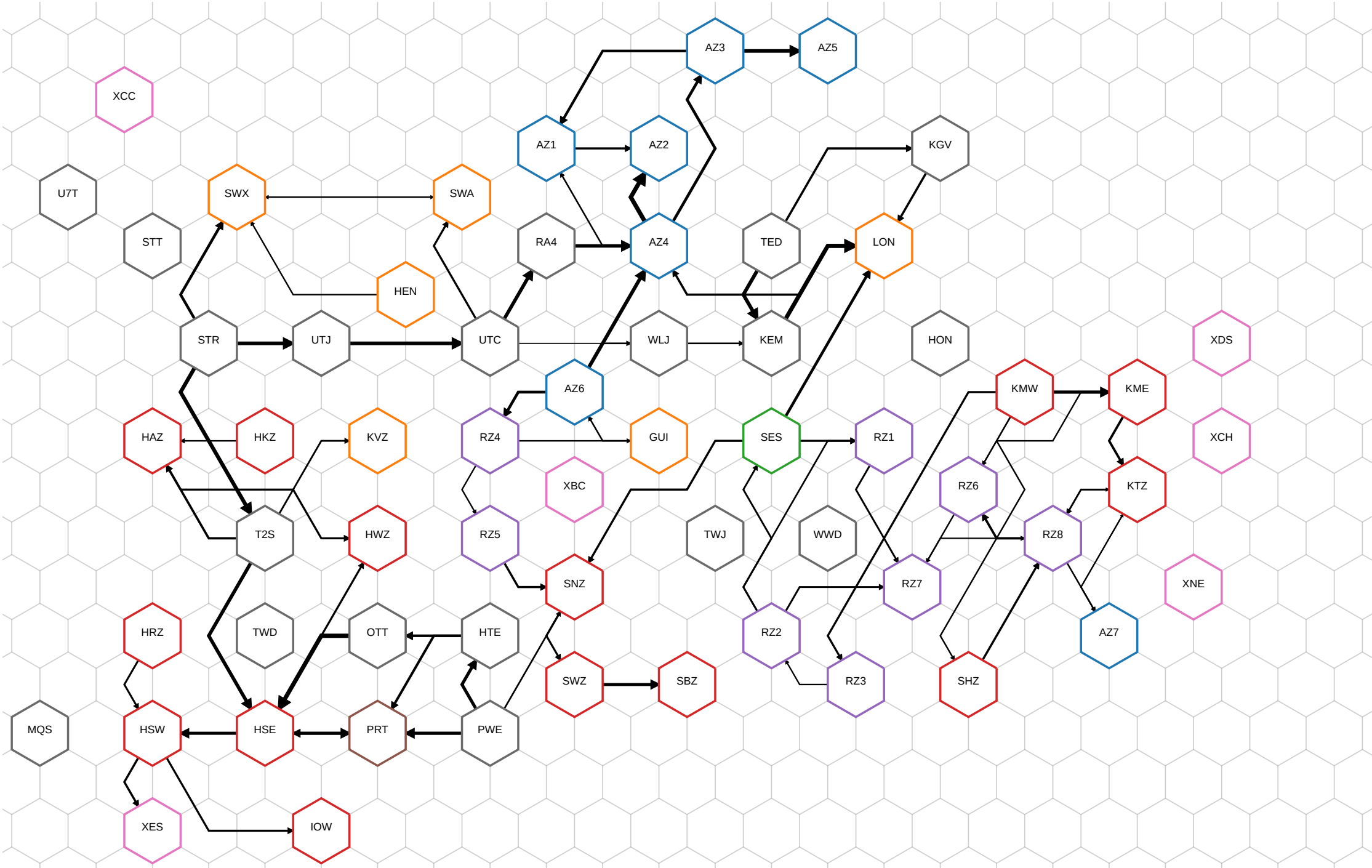
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

E&S + SESRO 150

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-envsoc-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 150 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:07:30
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 150. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

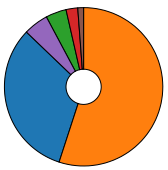
Net present value (Cost)

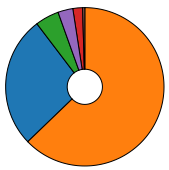
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,814	17,919	17,166	19,341	17,810	17,001	18,168	17,306	16,569	18,010	(£m)
Cost w/o deficit (STPR)	20,814	17,919	17,166	19,341	17,810	17,001	18,168	17,306	16,569	18,010	(£m)
Cost w/ deficit (IGEQ)	31,757	26,296	24,931	28,968	26,109	24,664	26,861	25,237	23,904	26,525	(£m)
Cost w/o deficit (IGEQ)	31,757	26,296	24,931	28,968	26,109	24,664	26,861	25,237	23,904	26,525	(£m)
Cost w/ deficit (LTDR)	22,933	19,569	18,702	21,220	19,445	18,517	19,873	18,872	18,024	19,684	(£m)
Cost w/o deficit (LTDR)	22,933	19,569	18,702	21,220	19,445	18,517	19,873	18,872	18,024	19,684	(£m)

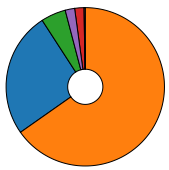
Cost breakdown (STPR)

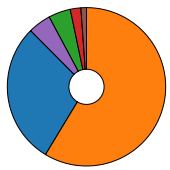
Select Company: Total

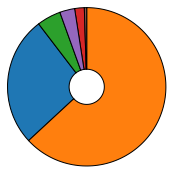
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,692	4,813	4,394	5,589	4,721	4,254	4,908	4,461	4,001	4,870	(£m)
Fixed opex	11,449	11,254	11,201	11,343	11,240	11,185	11,256	11,204	11,143	11,253	(£m)
Fixed operational carbon	880	870	870	877	870	869	872	867	866	871	(£m)
Embedded carbon	496	355	328	418	351	321	372	333	305	364	(£m)
Variable opex	1,052	546	330	896	543	321	658	399	237	554	(£m)
Variable carbon opex	246	81	43	218	85	50	103	41	18	98	(£m)

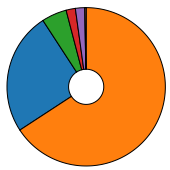
situation1 

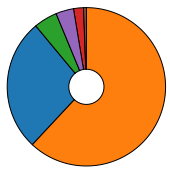
situation2 

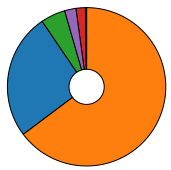
situation3 

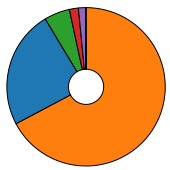
situation4 

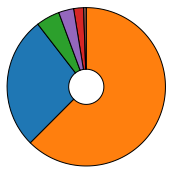
situation5 

situation6 

situation7 

situation8 

situation9 

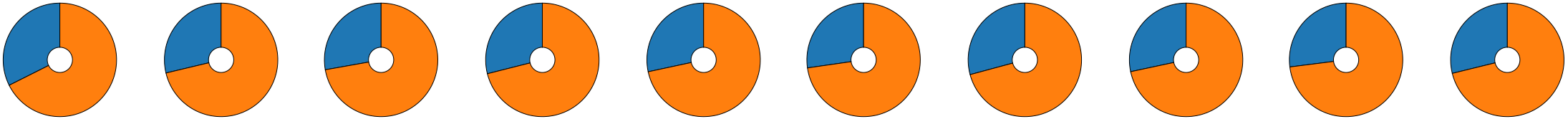
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,177,489	2,175,644	1,989,192	2,606,725	2,146,438	1,951,758	2,300,916	2,033,407	1,841,877	2,247,050	(tonnes)
Operational emissions	6,632,165	5,398,288	5,166,400	6,403,810	5,420,650	5,205,327	5,581,748	5,140,840	4,980,394	5,547,736	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

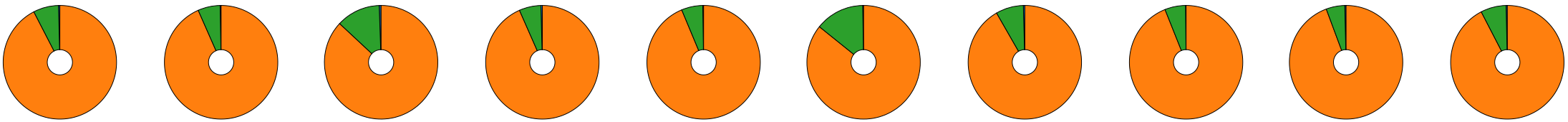


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	95	34	26	83	29	12	60	13	12	40	(GWh)
Grid	22,703	11,119	4,288	18,961	10,949	3,843	13,100	7,773	2,924	10,629	(GWh)
Renewable	1,770	754	619	1,260	709	627	1,126	489	165	835	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,793	65,338	65,338	67,145	65,338	65,338	66,432	65,338	65,338	65,711
SEA environmental disbenefit	105,001	77,866	71,561	97,667	78,037	72,116	82,937	69,735	62,343	79,696
Natural capital	82,142,068	81,089,555	81,291,516	82,733,280	81,001,254	81,292,203	81,649,134	81,352,100	81,684,833	81,581,771
Bio-diversity net gain	−202,516	−141,163	−118,749	−202,283	−147,661	−119,605	−150,502	−125,320	−101,850	−145,517

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,521	35,088	34,763	36,399	35,202	34,918	35,384	34,597	34,168	35,227

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.17	29.68	32.41	28.49	29.76	32.60	31.12	34.66	38.52	31.82
R1: Uncertainty of option supply/demand benefit	6.11	5.57	6.02	5.68	5.55	6.06	5.94	6.53	7.20	6.07
R3: Risk of service failure due to other physical hazards	7.00	7.36	8.22	6.94	7.39	8.27	7.68	8.77	9.98	7.96
R4: Availability of additional headroom	6.60	6.95	7.16	6.68	6.97	7.18	7.29	7.65	7.89	7.15
R5: Catchment/raw water quality risks (incl. climate change)	4.08	4.15	4.69	3.81	4.18	4.72	4.31	4.98	5.76	4.52
R6: Capacity of catchment services	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00
R7: Risk of service failure to other exceptional events	5.37	5.64	6.31	5.38	5.67	6.36	5.90	6.72	7.69	6.12
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

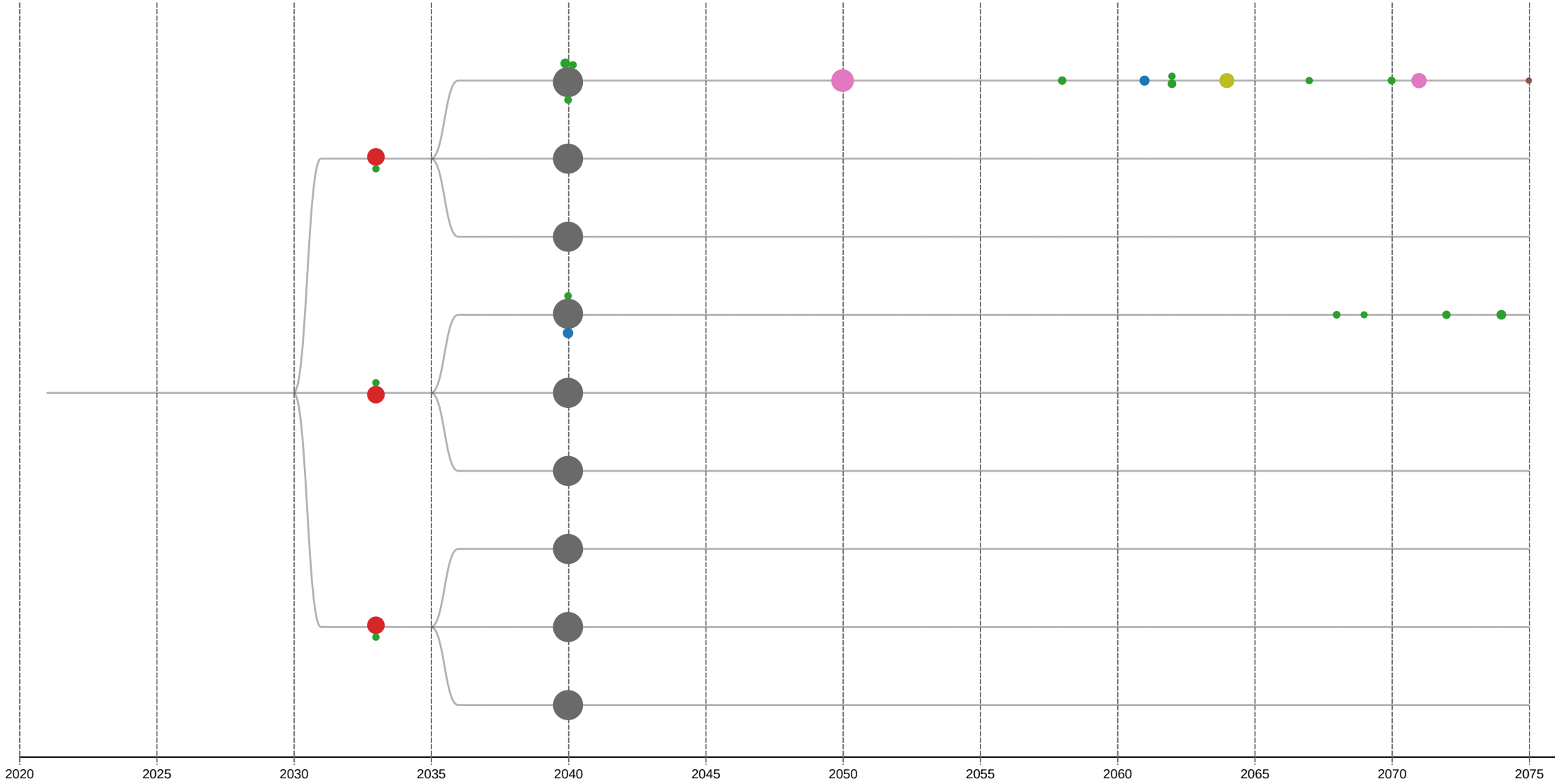
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.00	15.61	17.44	14.14	15.67	17.31	16.17	18.45	21.00	16.64
A3: Operational complexity and flexibility	6.54	7.07	7.94	6.63	7.12	8.02	7.38	8.48	9.73	7.66
A4: WRZ connectivity	7.42	8.52	9.47	7.48	8.52	9.26	8.77	9.94	11.23	8.96
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.15	19.94	22.08	18.70	20.03	22.18	20.76	23.65	26.72	21.47
E1: Scaleability and modularity of proposed changes	8.80	9.38	10.41	8.68	9.43	10.52	9.71	11.17	12.68	10.09
E2: Intervention lead times	4.13	4.09	4.48	3.91	4.11	4.42	4.32	4.78	5.31	4.39
E3: Reliance on external bodies to deliver changes	6.21	6.46	7.17	6.11	6.48	7.23	6.73	7.69	8.72	6.98
E5: Collaborative land management	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01

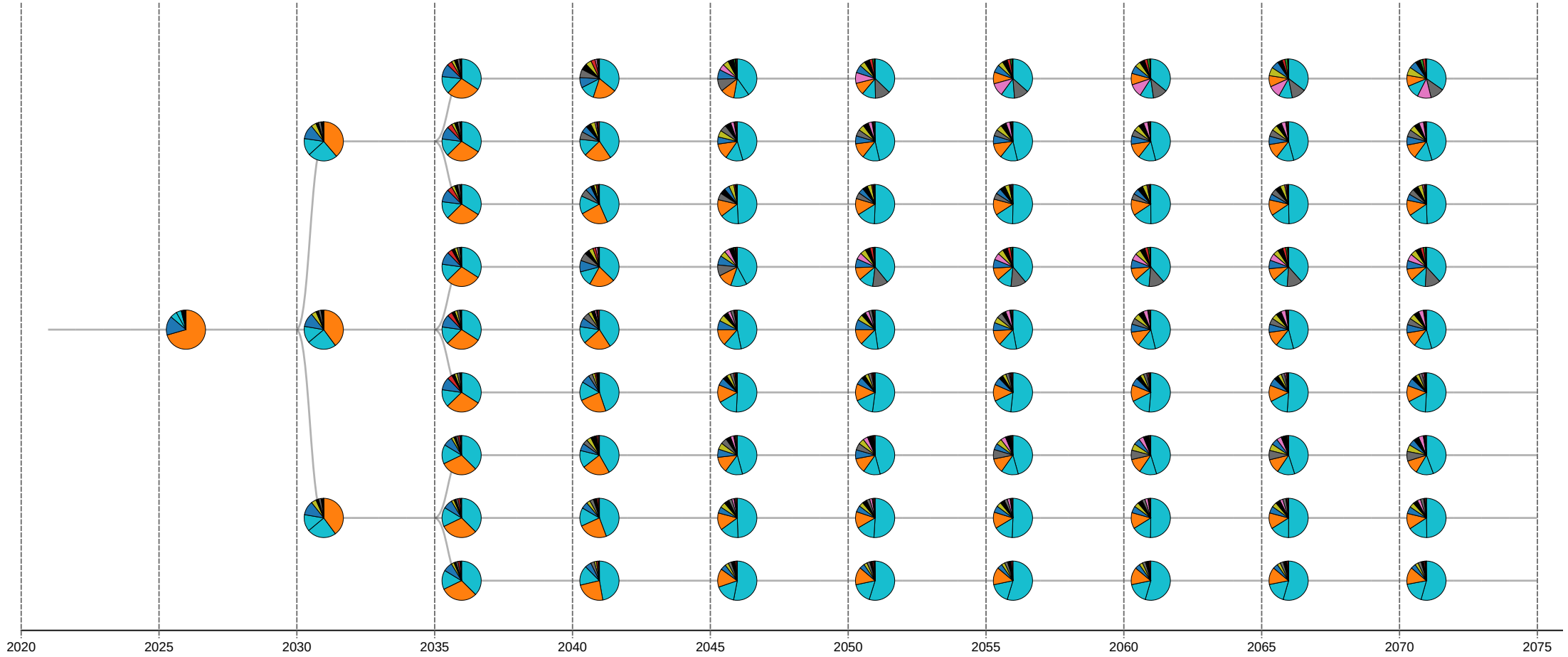
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

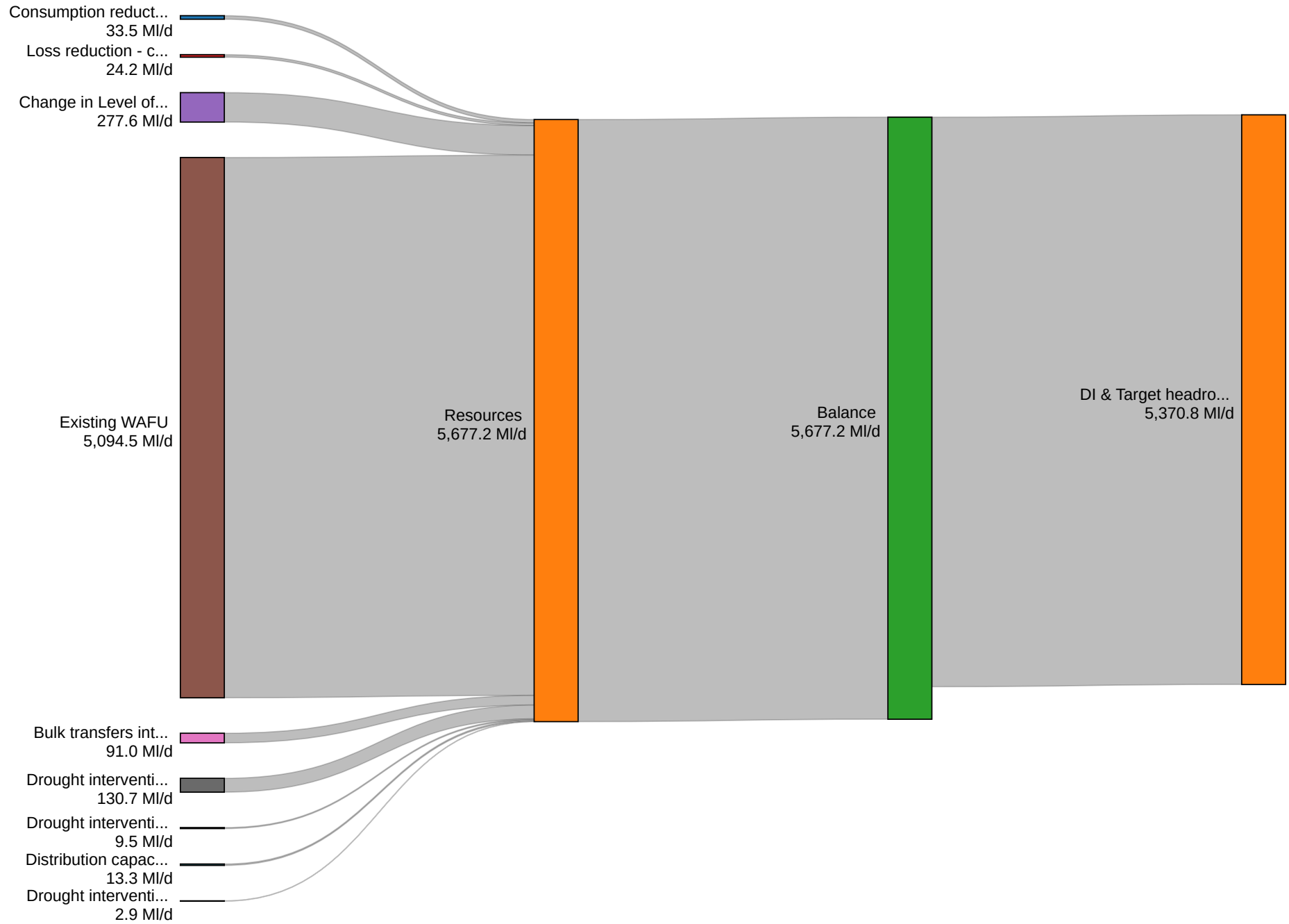
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

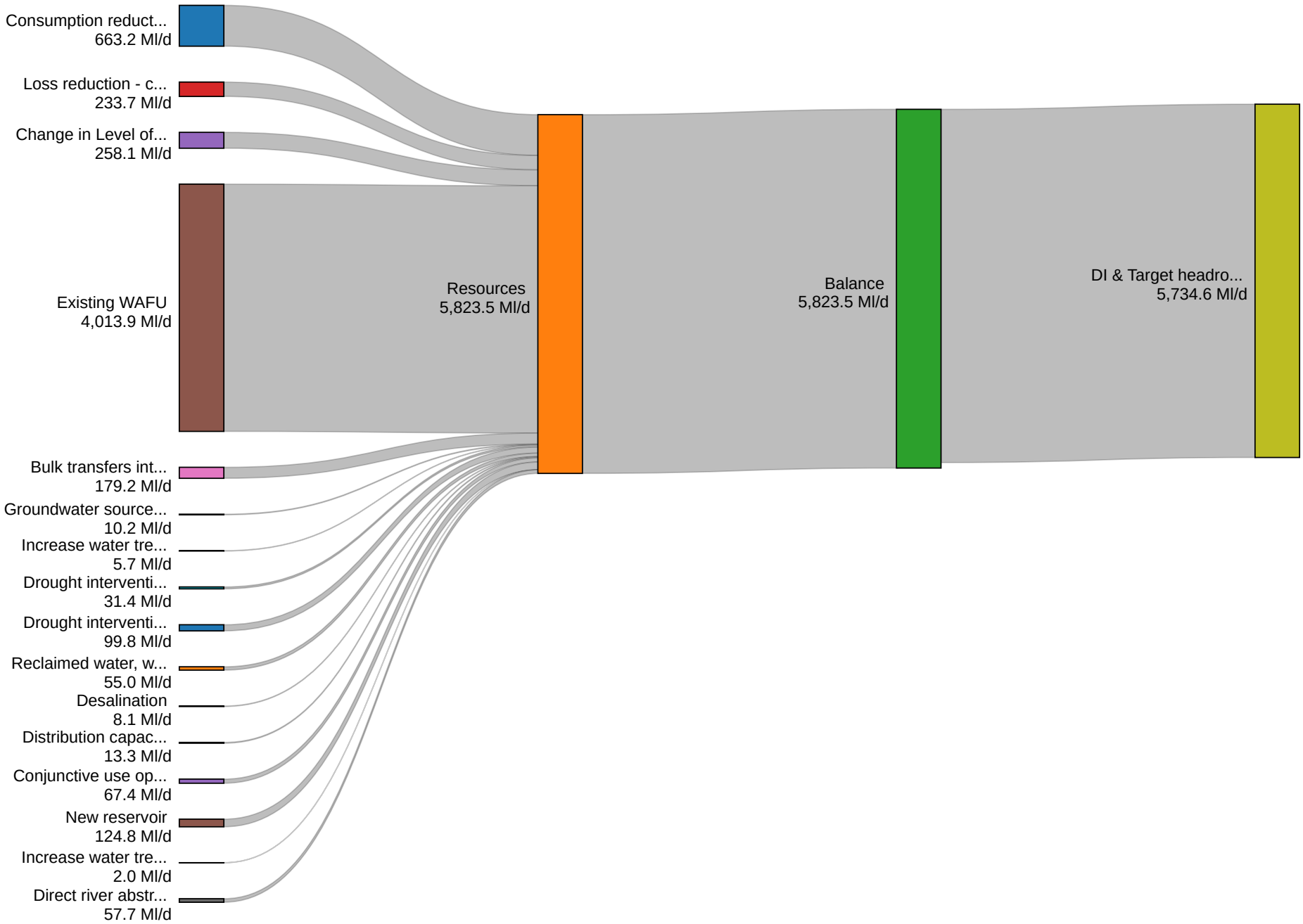


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

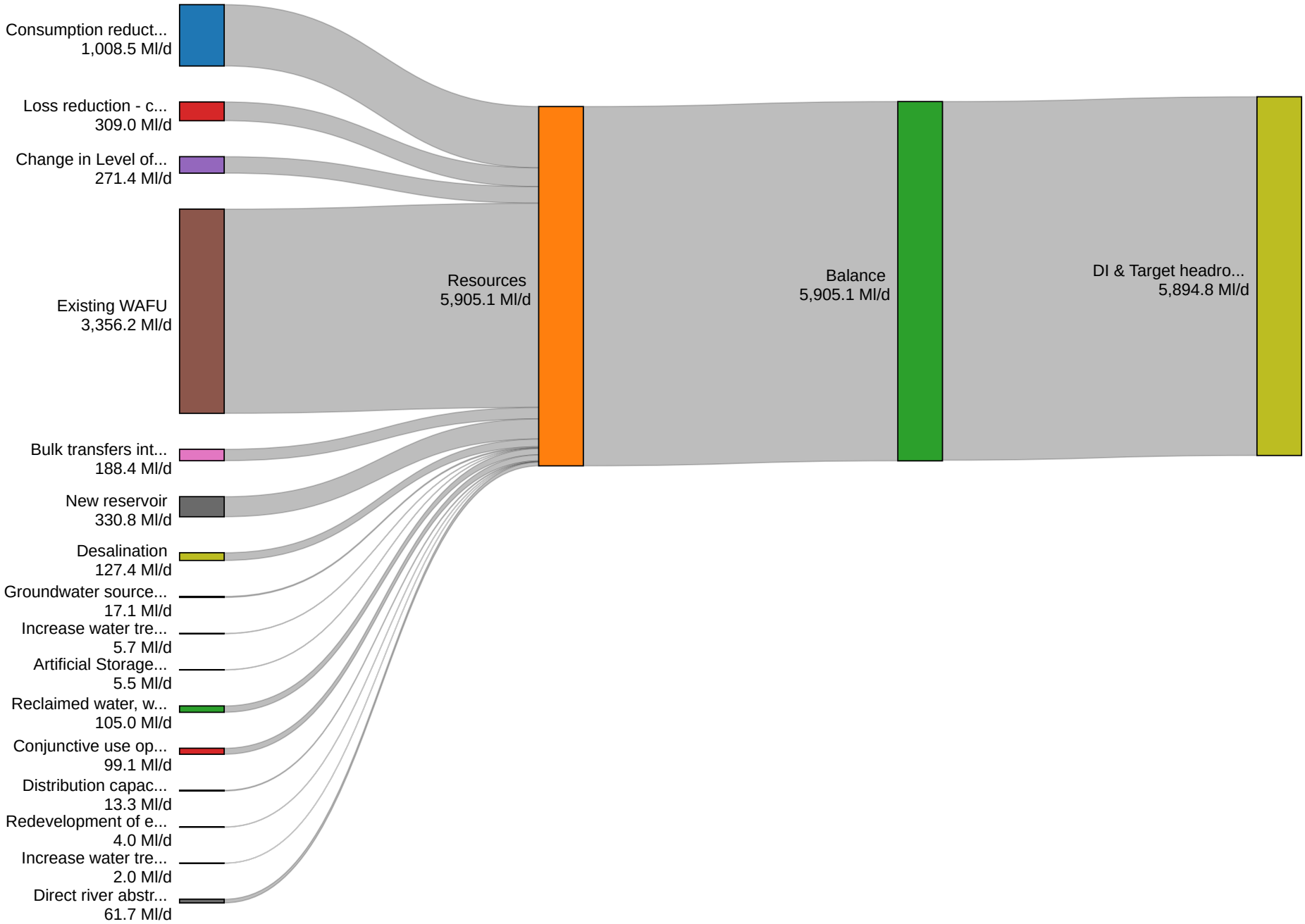
Situation 4 - 2026 (Thames Water)



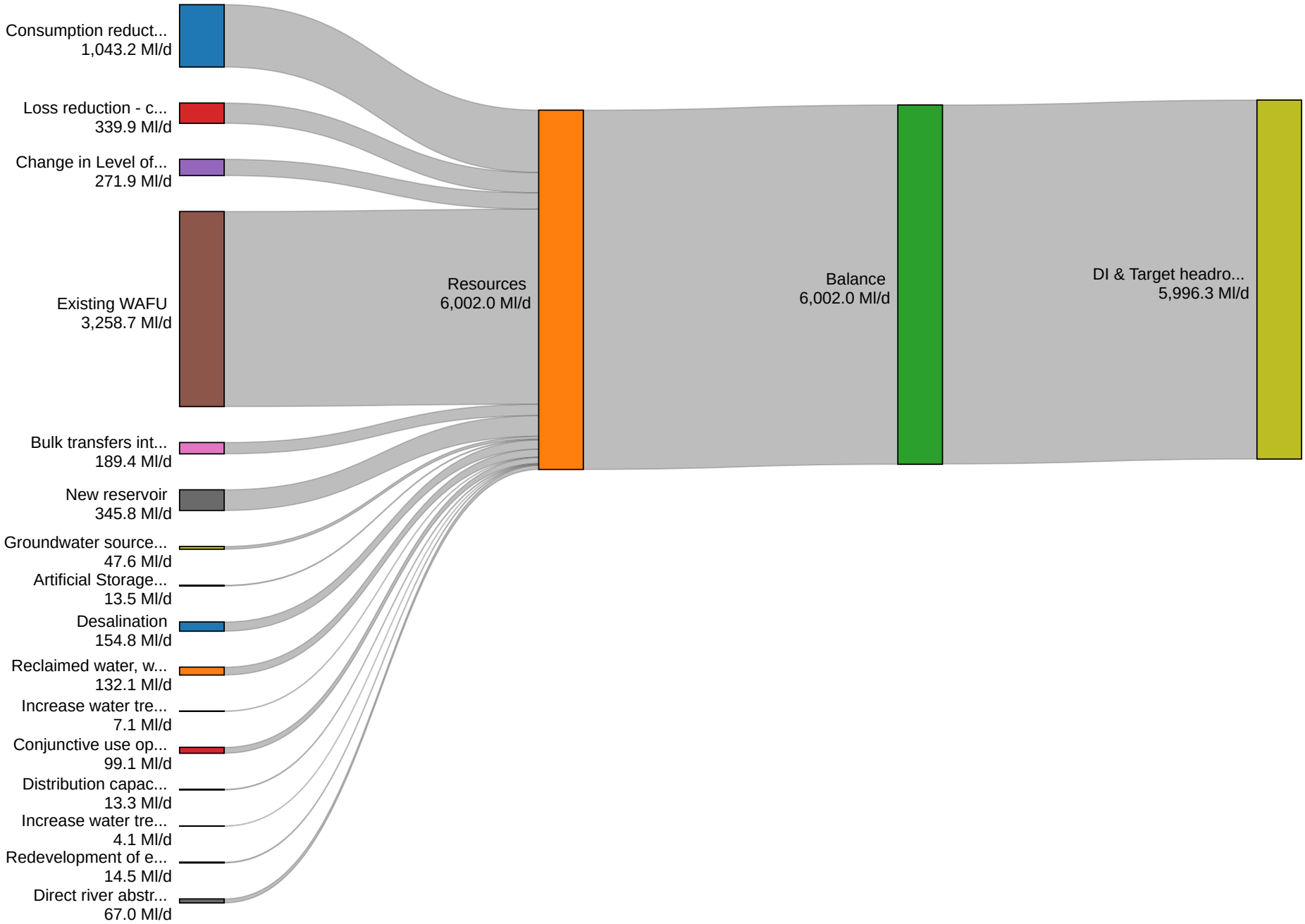
Situation 4 - 2040 (Thames Water)



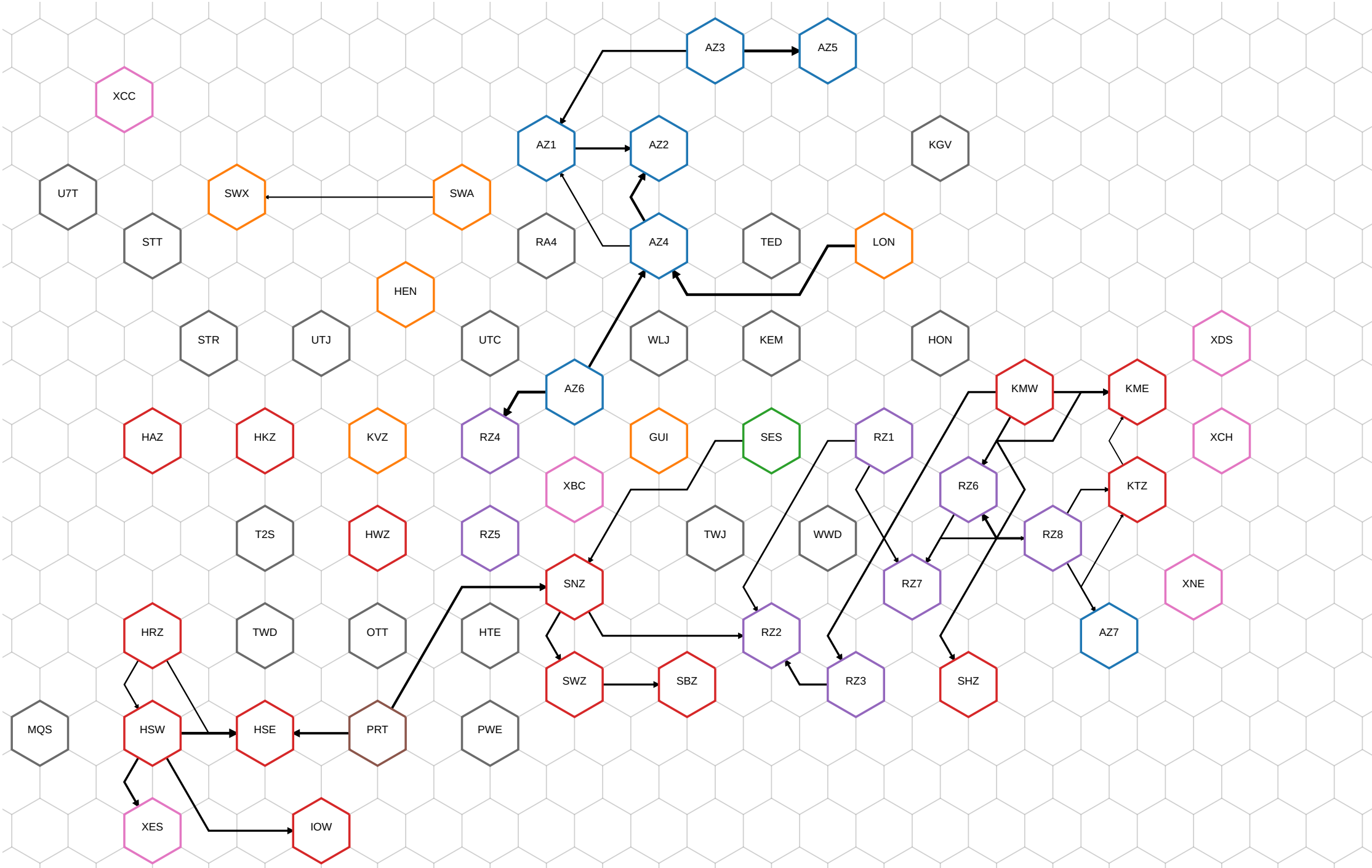
Situation 4 - 2050 (Thames Water)



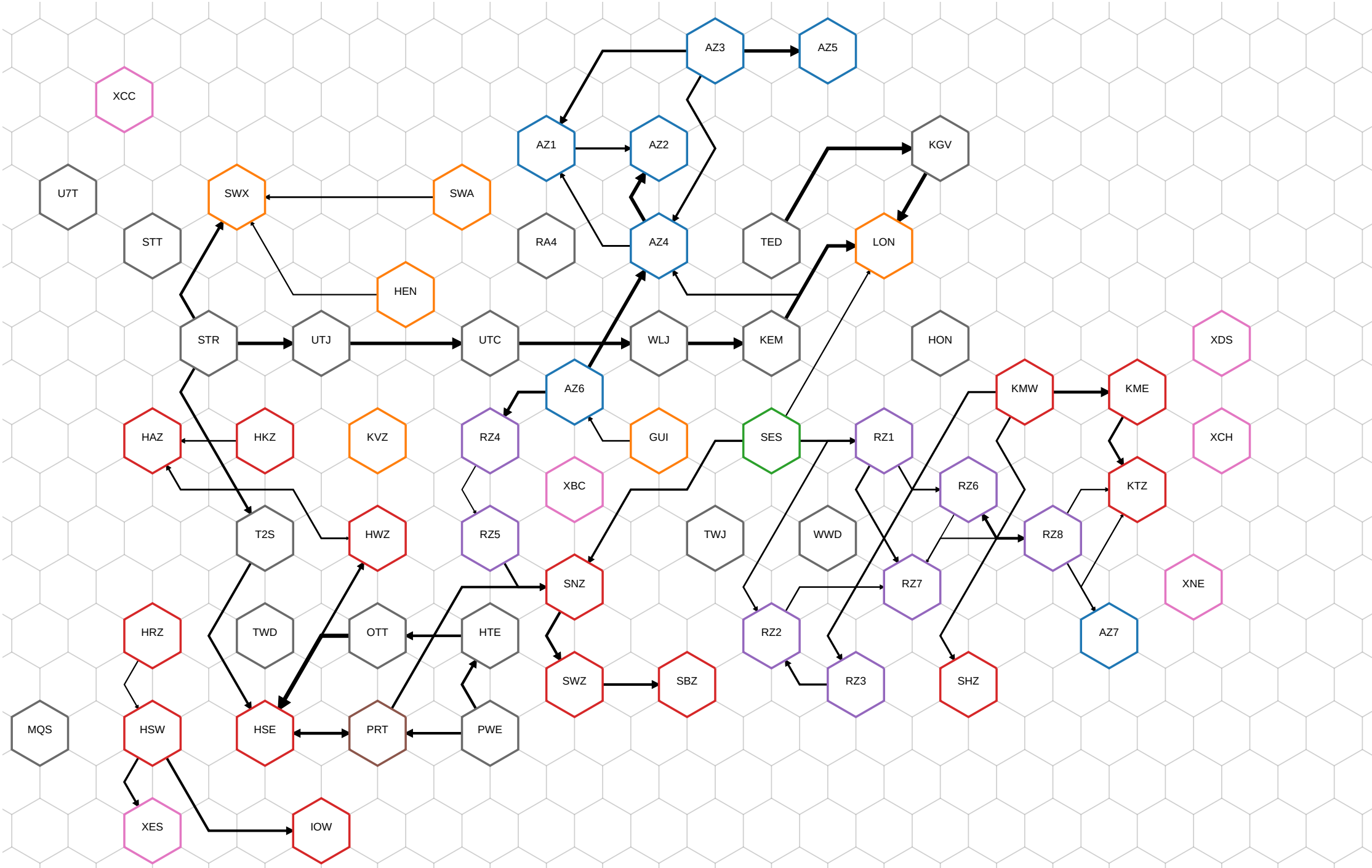
Situation 4 - 2075 (Thames Water)



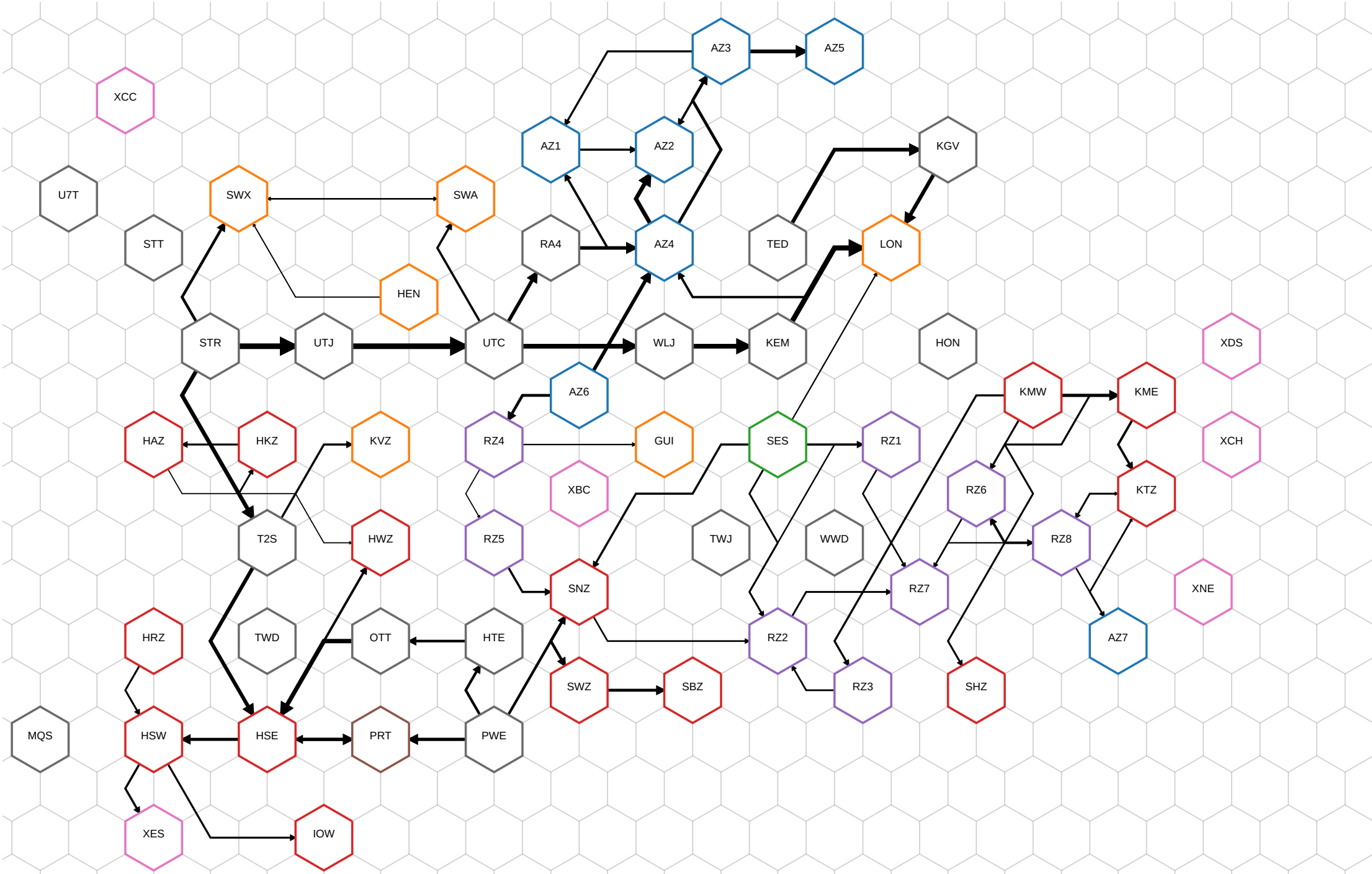
Situation 4 - 2026



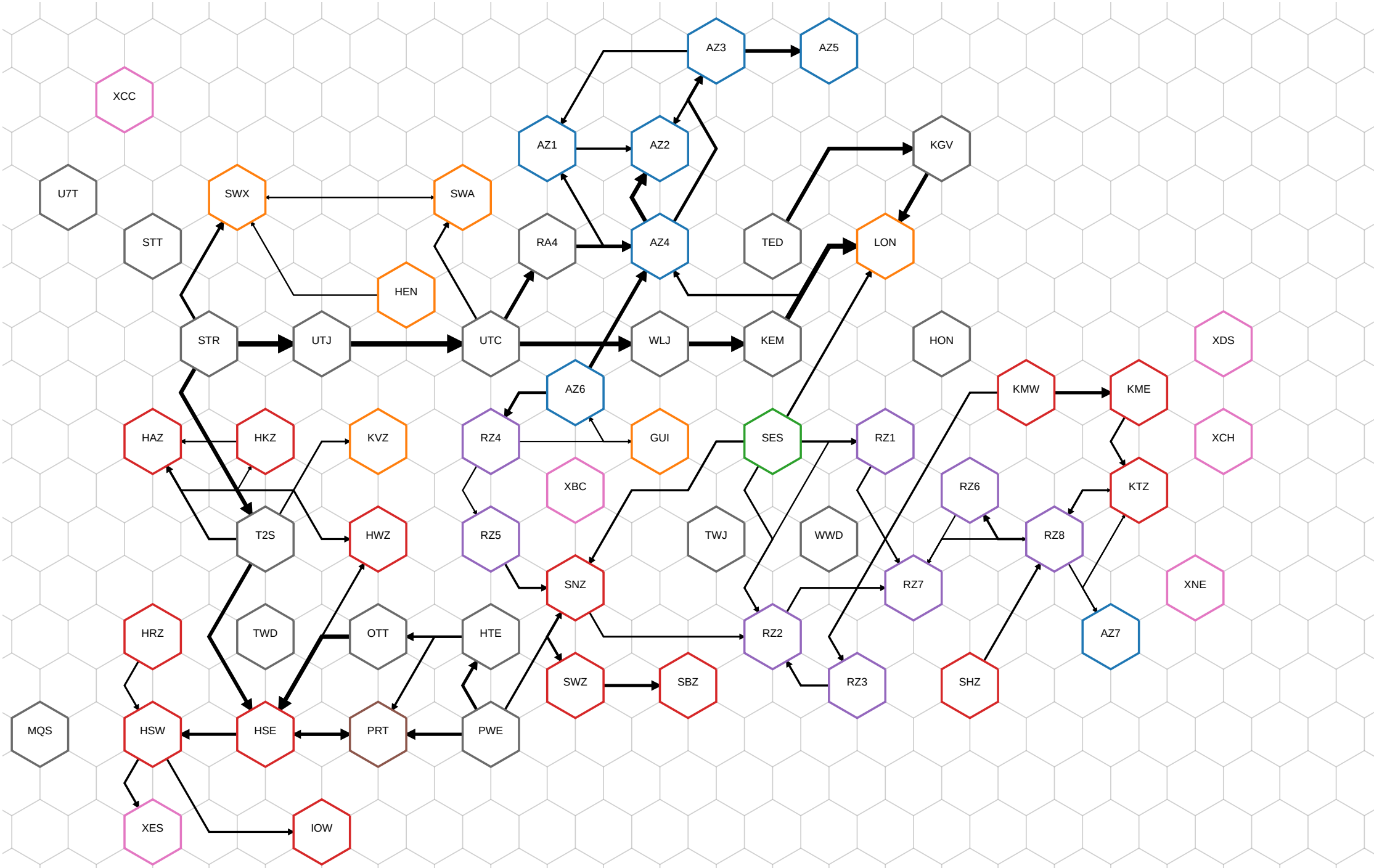
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

E&S + SESRO 125

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-envsoc-07_50-v3
Description	Resilience run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 125 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:07:19
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 125. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

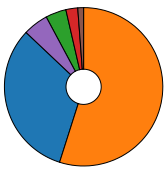
Net present value (Cost)

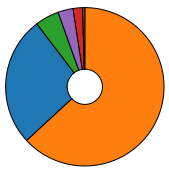
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,874	17,823	17,092	19,357	17,762	16,929	18,072	17,214	16,490	17,957	(£m)
Cost w/o deficit (STPR)	20,874	17,823	17,092	19,357	17,762	16,929	18,072	17,214	16,490	17,957	(£m)
Cost w/ deficit (IGEQ)	31,900	26,133	24,819	29,036	26,040	24,548	26,688	25,079	23,772	26,446	(£m)
Cost w/o deficit (IGEQ)	31,900	26,133	24,819	29,036	26,040	24,548	26,688	25,079	23,772	26,446	(£m)
Cost w/ deficit (LTDR)	23,008	19,460	18,621	21,245	19,393	18,437	19,763	18,768	17,935	19,625	(£m)
Cost w/o deficit (LTDR)	23,008	19,460	18,621	21,245	19,393	18,437	19,763	18,768	17,935	19,625	(£m)

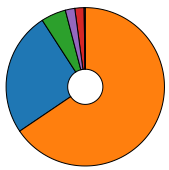
Cost breakdown (STPR)

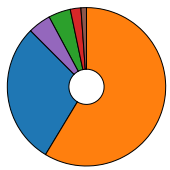
Select Company: Total

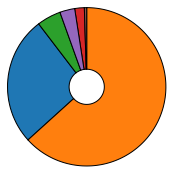
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,710	4,725	4,331	5,589	4,677	4,187	4,822	4,378	3,928	4,816	(£m)
Fixed opex	11,460	11,250	11,201	11,353	11,242	11,186	11,254	11,201	11,142	11,254	(£m)
Fixed operational carbon	882	869	868	877	869	869	871	866	866	871	(£m)
Embedded carbon	505	349	324	419	348	317	365	327	299	361	(£m)
Variable opex	1,070	549	328	901	541	321	657	401	237	556	(£m)
Variable carbon opex	247	81	40	218	84	50	102	41	18	98	(£m)

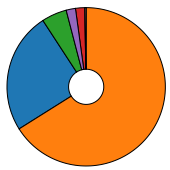
situation1 

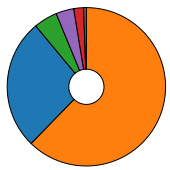
situation2 

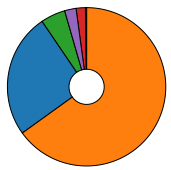
situation3 

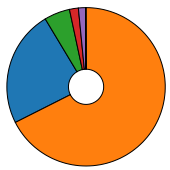
situation4 

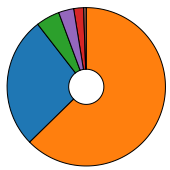
situation5 

situation6 

situation7 

situation8 

situation9 

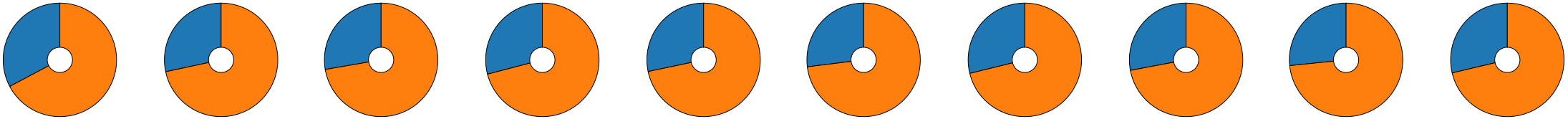
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,243,577	2,132,351	1,968,928	2,624,079	2,134,813	1,920,726	2,258,701	1,991,846	1,807,758	2,231,420	(tonnes)
Operational emissions	6,659,090	5,385,619	5,135,836	6,405,104	5,409,152	5,204,742	5,573,860	5,128,607	4,980,417	5,542,492	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

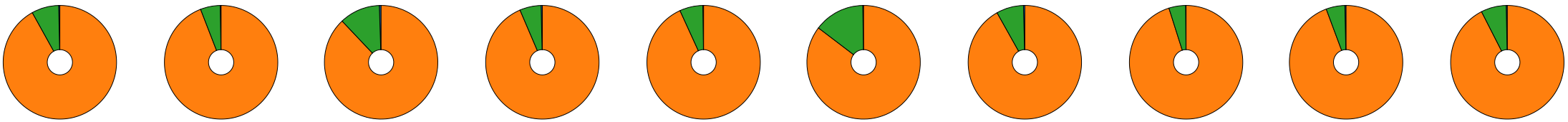


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	85	32	25	75	26	11	57	12	11	37	(GWh)
Grid	22,846	11,364	4,288	19,294	10,782	3,836	13,207	8,075	2,916	10,734	(GWh)
Renewable	1,923	680	565	1,255	765	648	1,115	404	165	836	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,339	65,338	65,338	68,499	65,338	65,338	66,000	65,344	65,338	65,764
SEA environmental disbenefit	105,000	79,027	72,961	100,368	77,199	71,243	82,439	69,834	62,656	80,081
Natural capital	83,835,543	81,616,396	81,908,760	81,460,112	81,621,203	81,908,240	81,278,392	81,916,516	82,352,035	81,988,578
Bio-diversity net gain	−199,196	−140,381	−118,110	−187,095	−139,264	−109,641	−142,348	−121,885	−90,133	−138,673

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,352	35,079	34,808	36,566	35,136	34,772	35,339	34,608	34,319	35,220

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.78	28.81	31.52	28.10	29.09	31.75	30.35	33.65	37.48	31.06
R1: Uncertainty of option supply/demand benefit	6.07	5.35	5.82	5.62	5.44	5.89	5.77	6.29	6.98	5.91
R3: Risk of service failure due to other physical hazards	6.89	7.13	7.98	6.82	7.21	8.04	7.48	8.49	9.69	7.75
R4: Availability of additional headroom	6.55	6.89	7.10	6.64	6.92	7.13	7.24	7.60	7.84	7.10
R5: Catchment/raw water quality risks (incl. climate change)	4.02	4.01	4.54	3.75	4.03	4.56	4.17	4.81	5.56	4.38
R6: Capacity of catchment services	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01
R7: Risk of service failure to other exceptional events	5.24	5.42	6.08	5.27	5.47	6.13	5.69	6.46	7.40	5.91
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

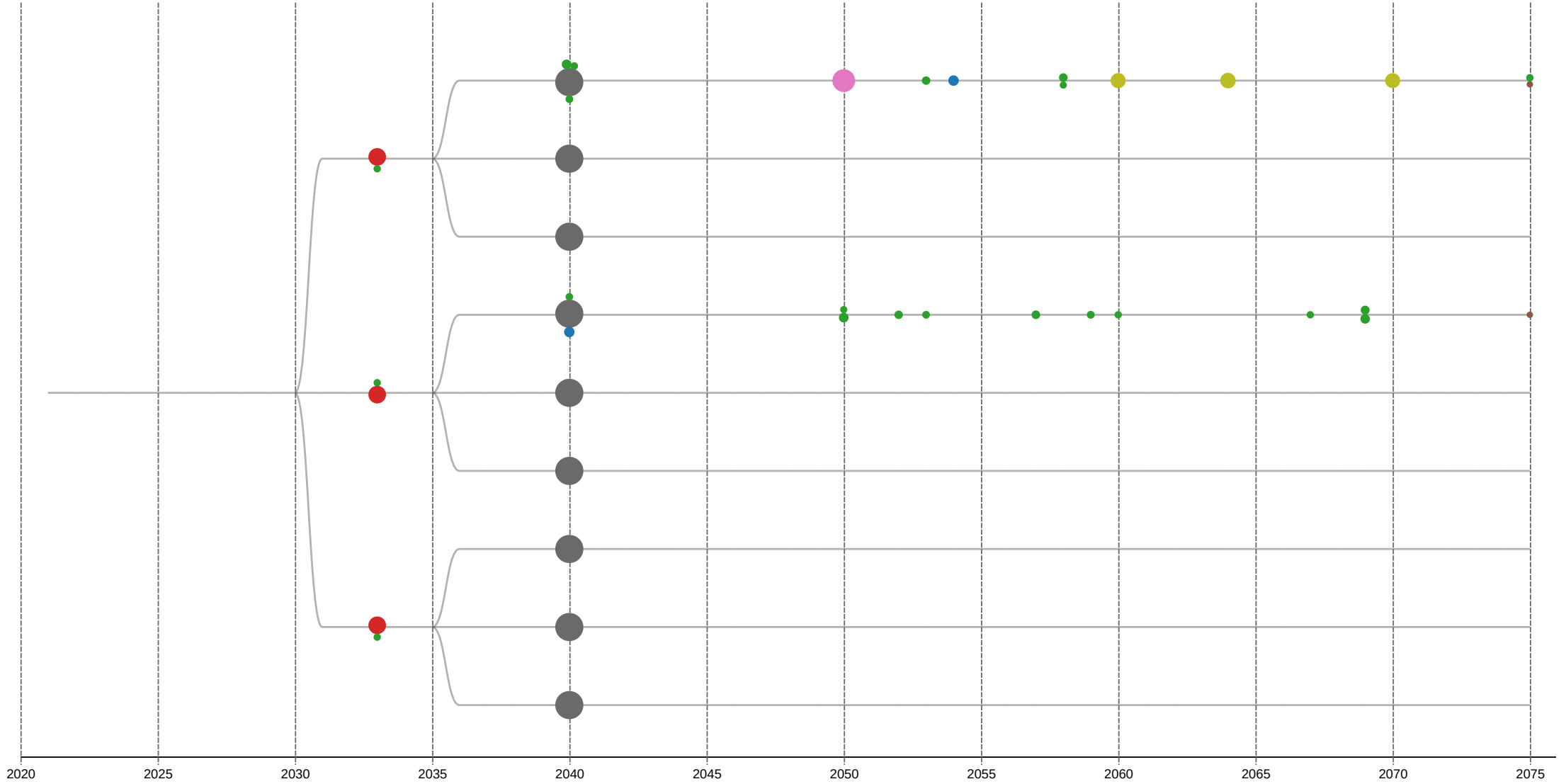
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.86	15.40	17.23	14.02	15.48	17.07	15.97	18.19	20.71	16.44
A3: Operational complexity and flexibility	6.40	6.85	7.70	6.52	6.93	7.78	7.16	8.22	9.44	7.44
A4: WRZ connectivity	7.43	8.52	9.50	7.46	8.52	9.26	8.78	9.94	11.23	8.96
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.20	19.70	21.86	18.80	19.93	22.00	20.60	23.37	26.50	21.33
E1: Scaleability and modularity of proposed changes	8.82	9.28	10.34	8.72	9.41	10.46	9.65	11.07	12.61	10.04
E2: Intervention lead times	4.14	4.03	4.41	3.93	4.06	4.37	4.28	4.71	5.24	4.35
E3: Reliance on external bodies to deliver changes	6.22	6.37	7.10	6.14	6.45	7.17	6.67	7.59	8.65	6.93
E5: Collaborative land management	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01

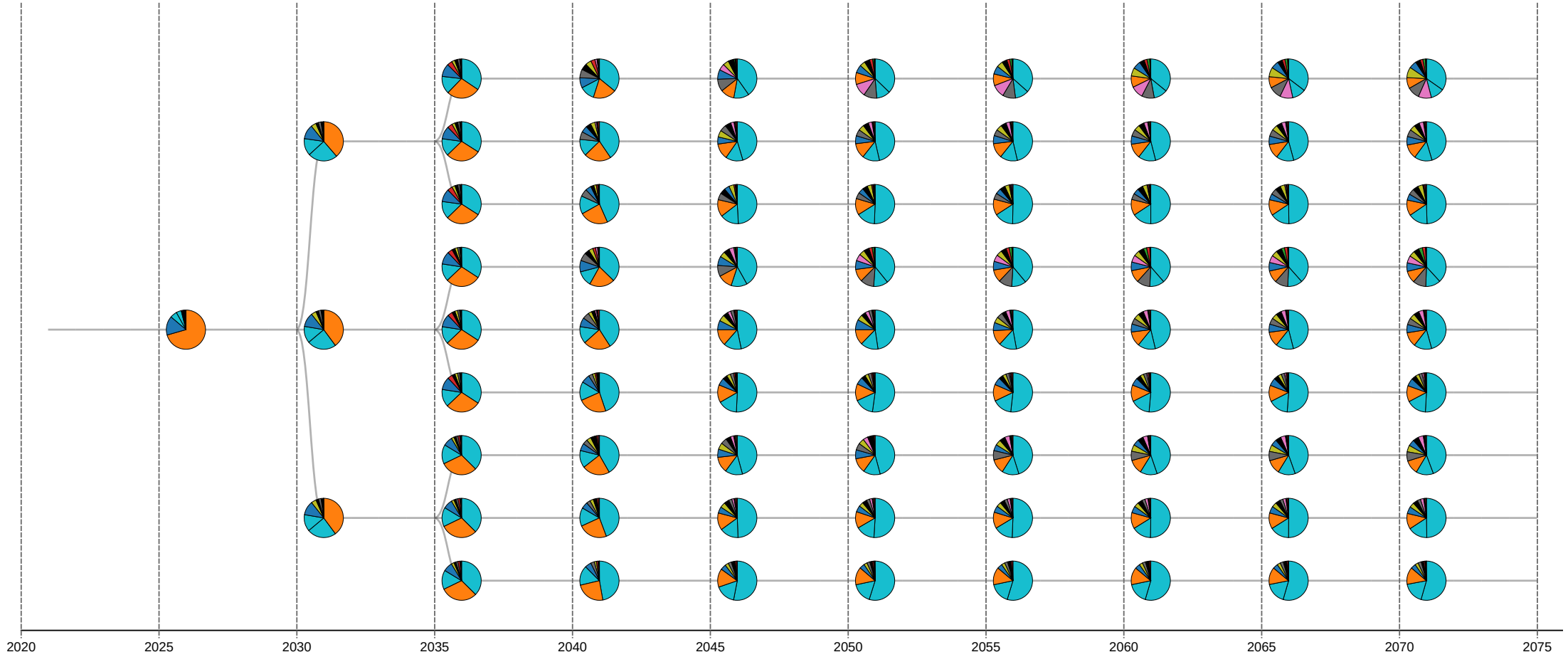
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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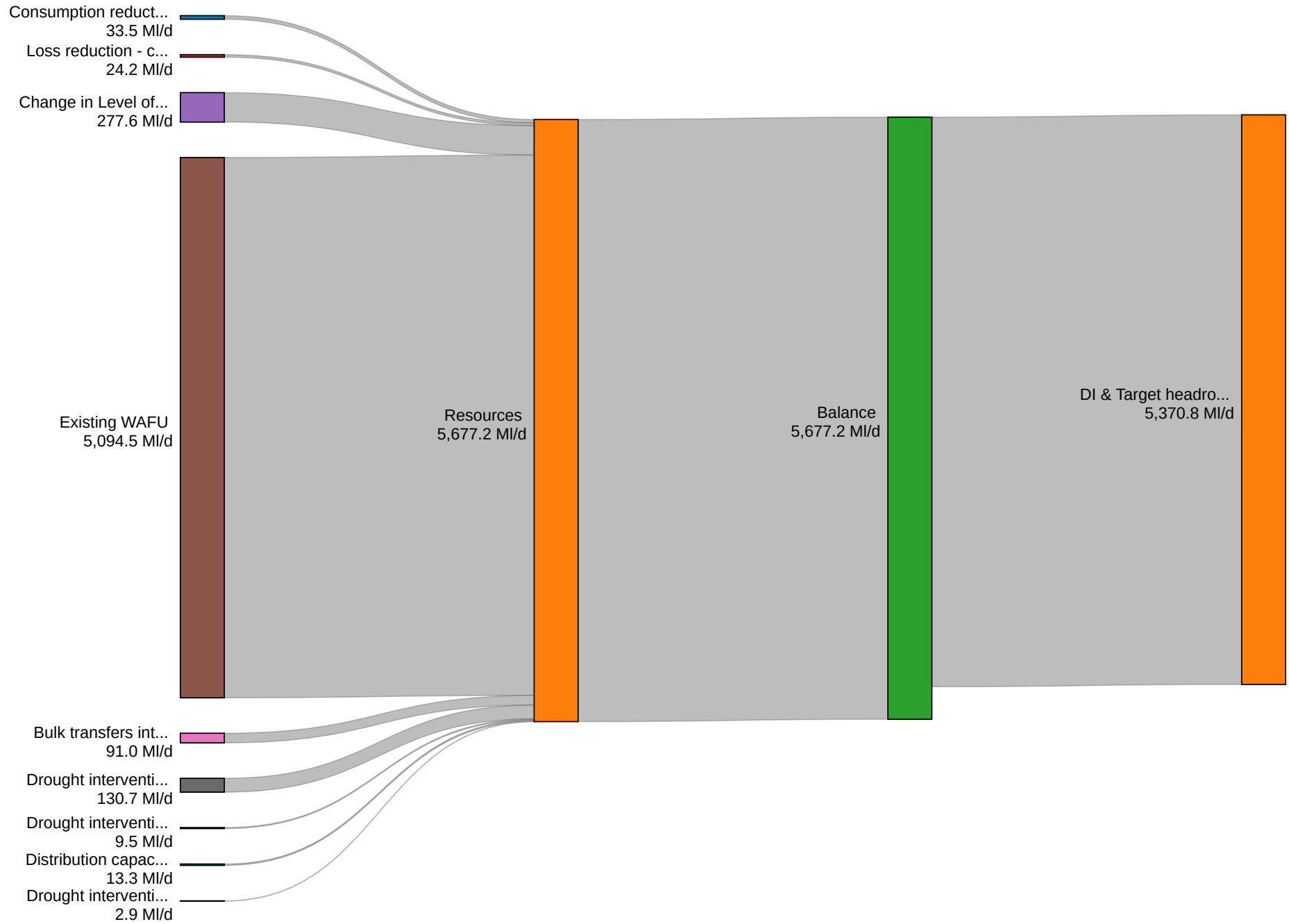
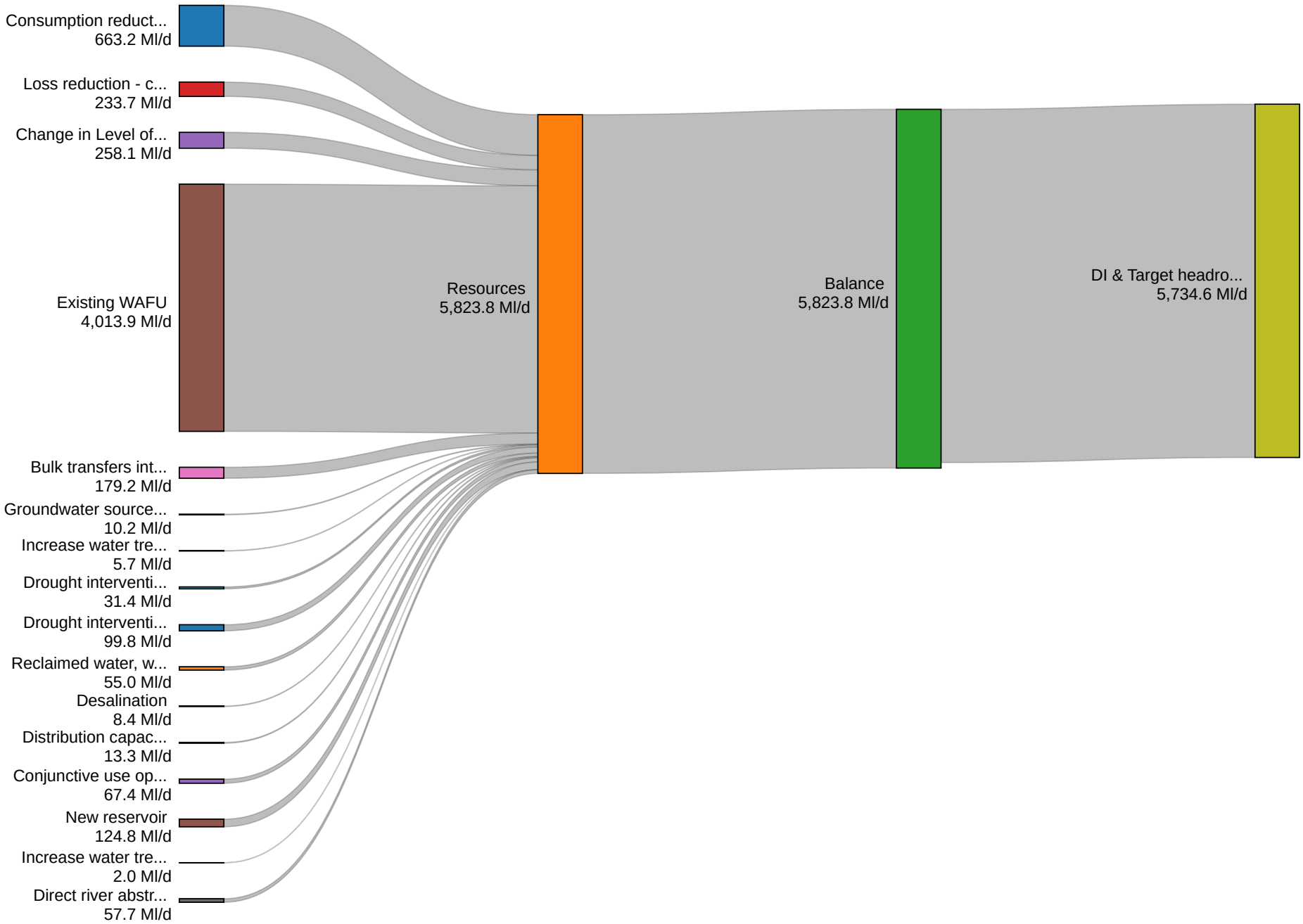
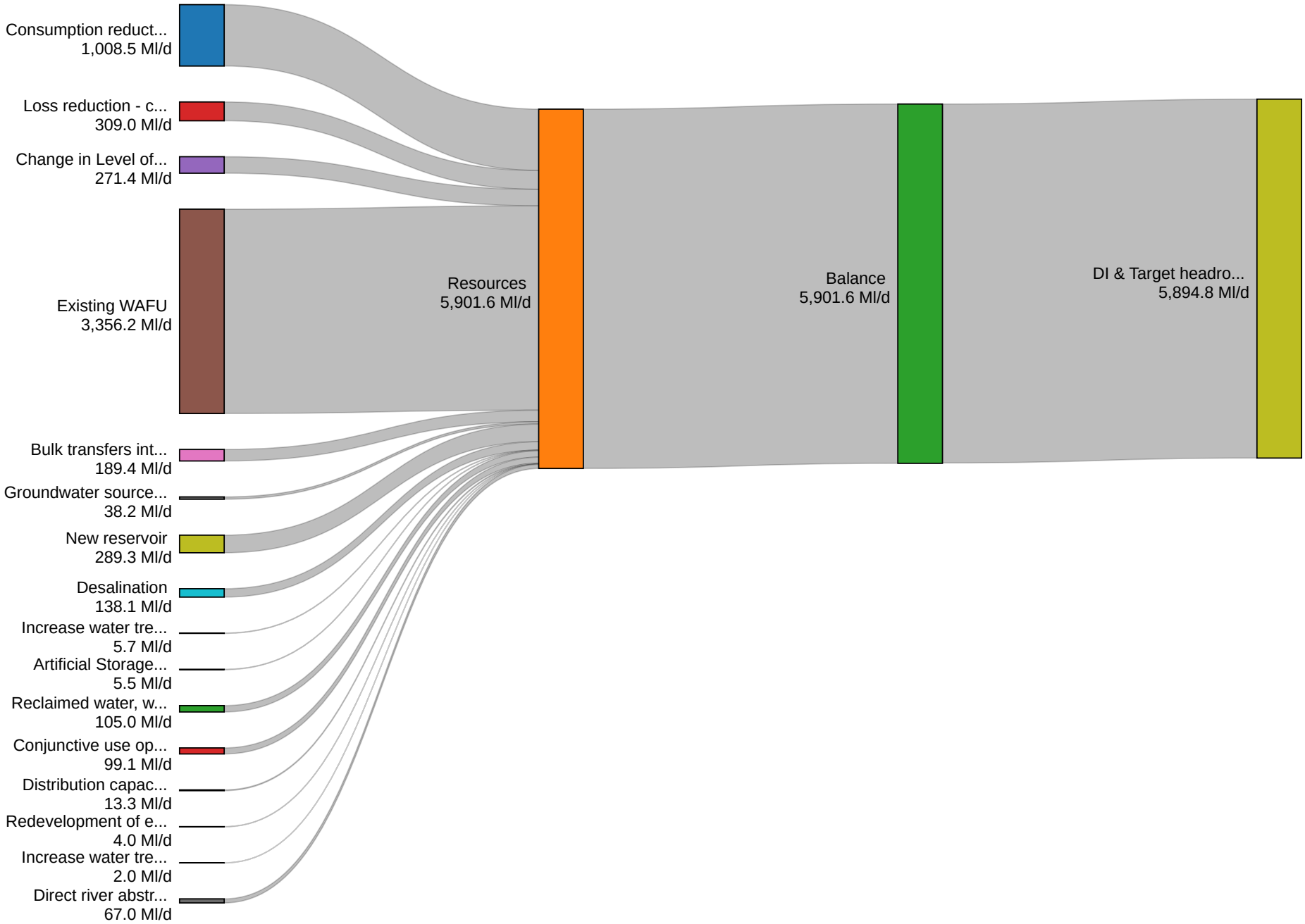
Situation 4 - 2026 (Thames Water)



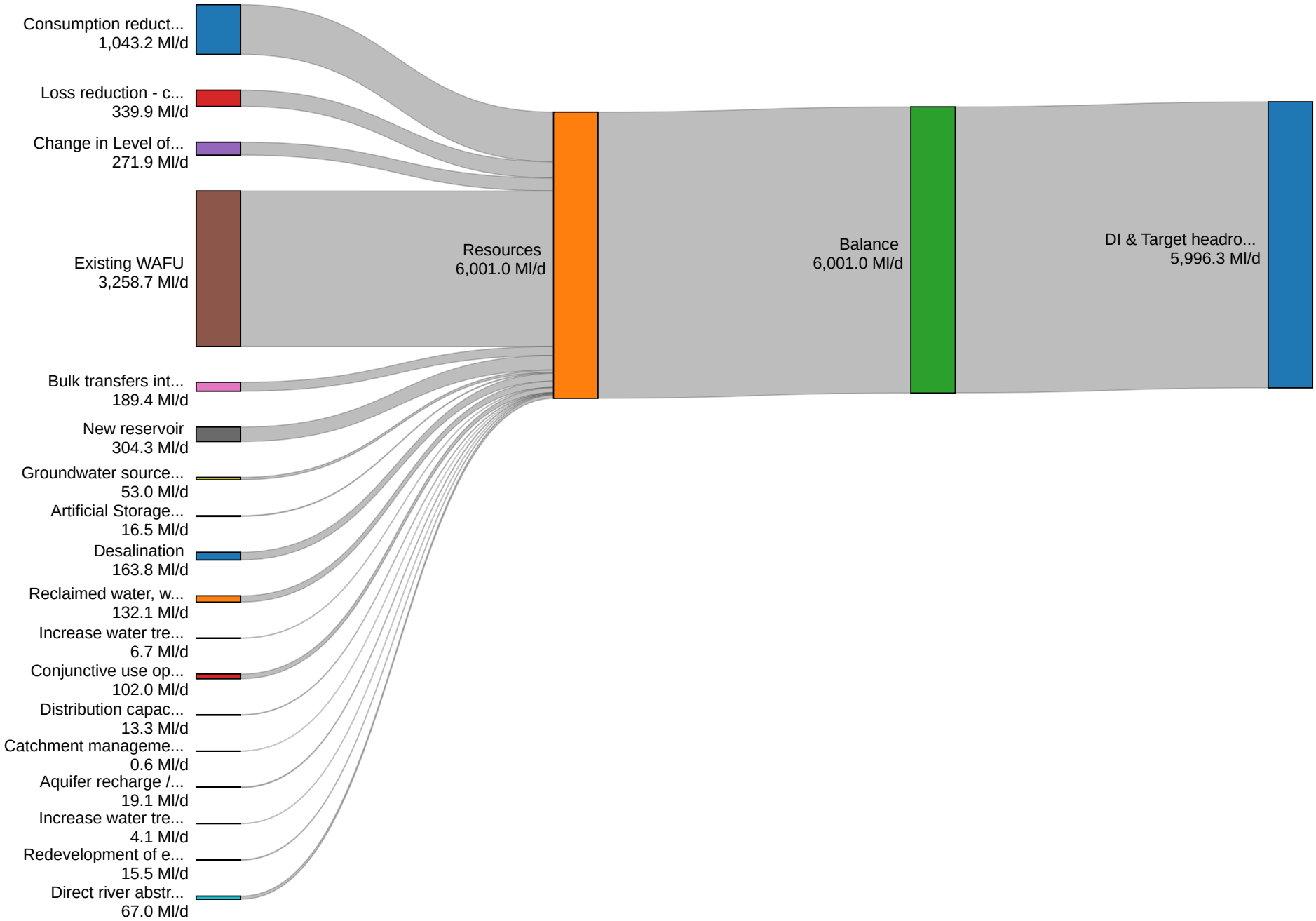
Situation 4 - 2040 (Thames Water)



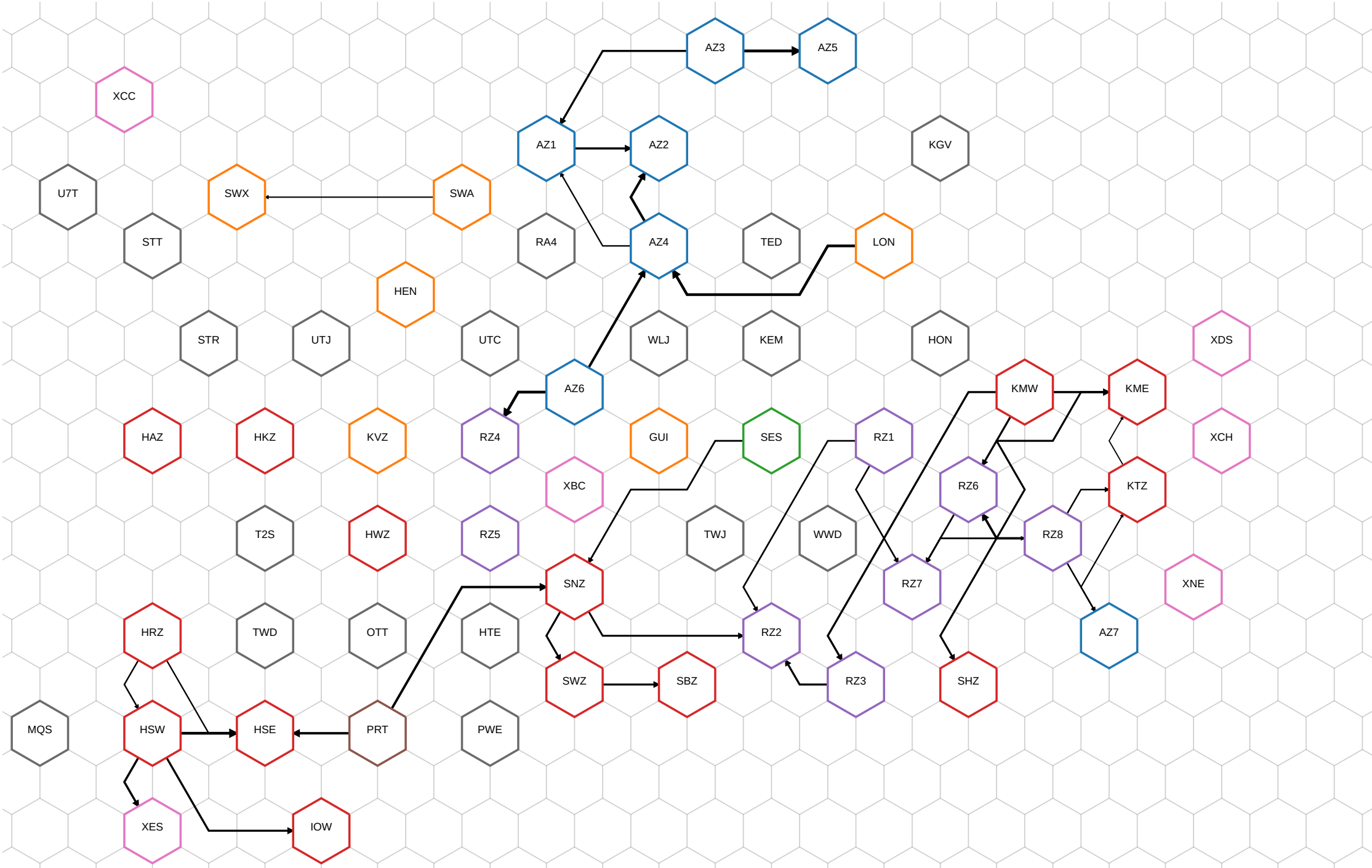
Situation 4 - 2050 (Thames Water)



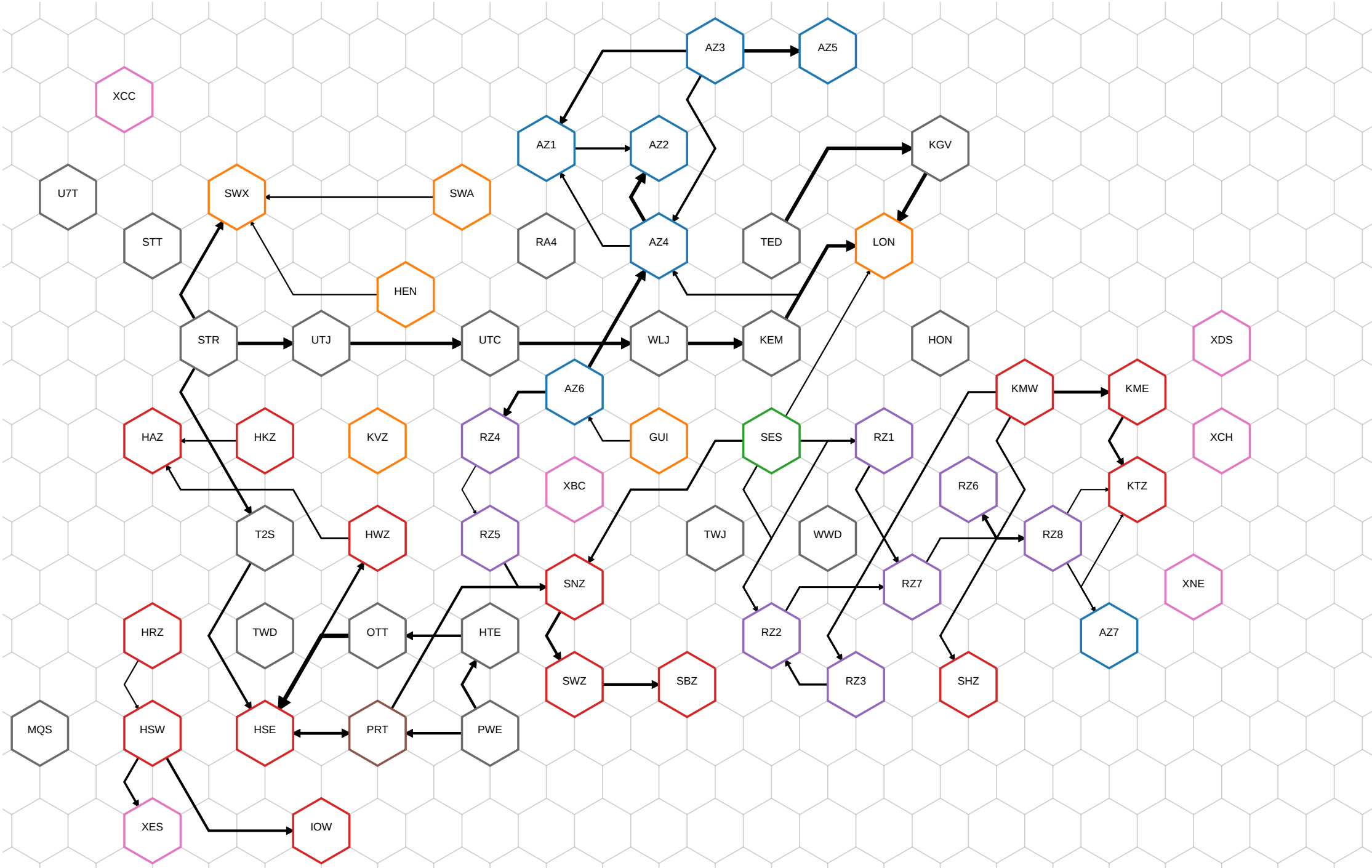
Situation 4 - 2075 (Thames Water)



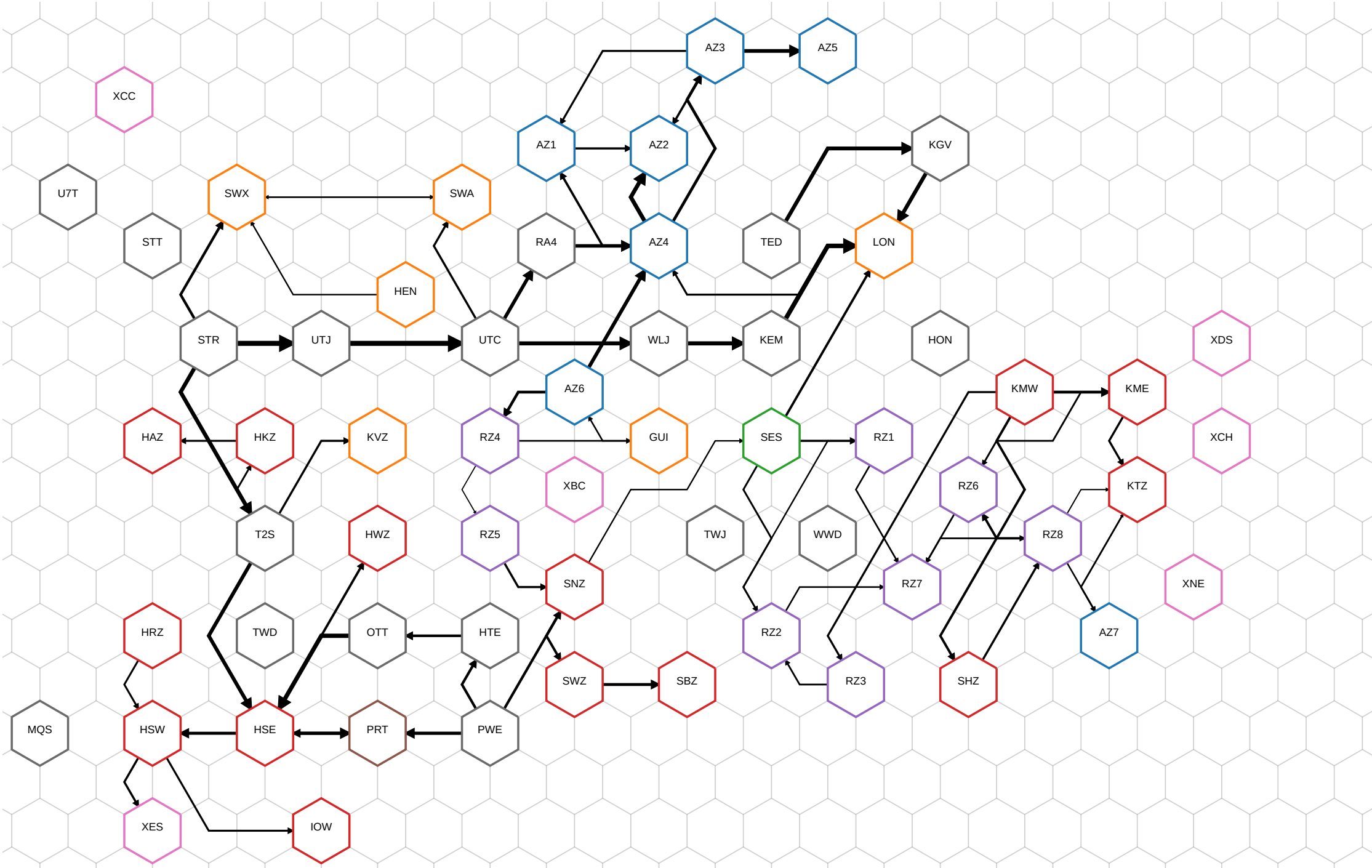
Situation 4 - 2026



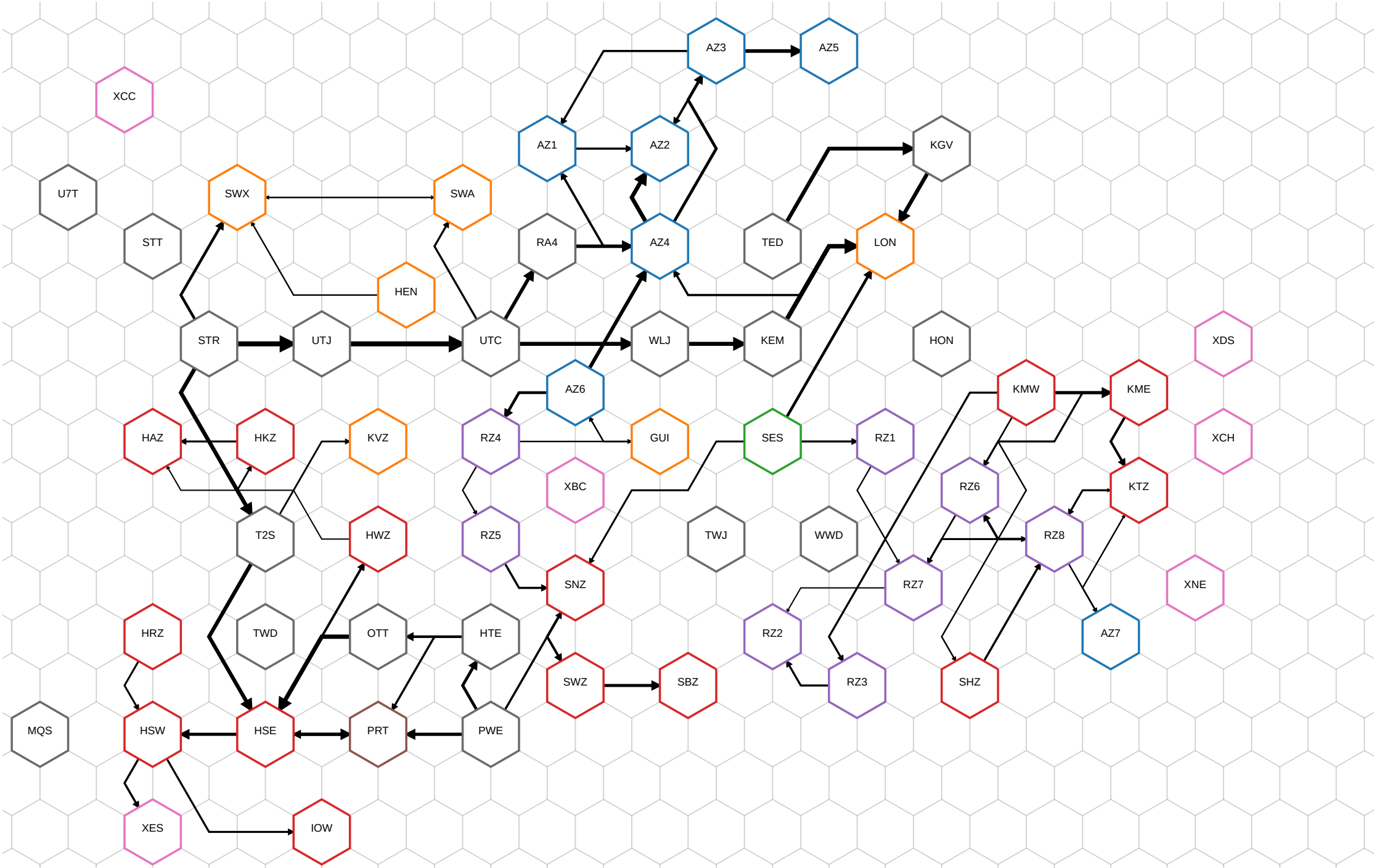
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

E&S + SESRO 100

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-envsoc-07_50-v3
Description	Environmental-social run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 100 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 10:06:42
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 100. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

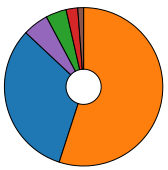
Net present value (Cost)

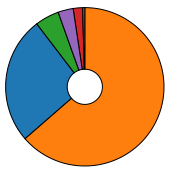
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,864	17,687	16,959	19,420	17,595	16,786	17,935	17,076	16,354	17,853	(£m)
Cost w/o deficit (STPR)	20,864	17,687	16,959	19,420	17,595	16,786	17,935	17,076	16,354	17,853	(£m)
Cost w/ deficit (IGEQ)	31,946	25,940	24,619	29,212	25,783	24,338	26,493	24,880	23,578	26,310	(£m)
Cost w/o deficit (IGEQ)	31,946	25,940	24,619	29,212	25,783	24,338	26,493	24,880	23,578	26,310	(£m)
Cost w/ deficit (LTDR)	23,007	19,313	18,475	21,328	19,209	18,281	19,615	18,617	17,788	19,515	(£m)
Cost w/o deficit (LTDR)	23,007	19,313	18,475	21,328	19,209	18,281	19,615	18,617	17,788	19,515	(£m)

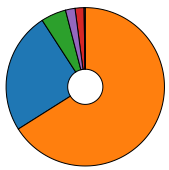
Cost breakdown (STPR)

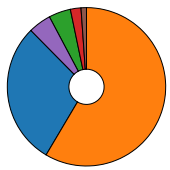
Select Company: Total

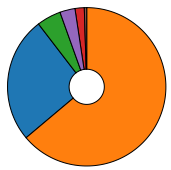
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,676	4,603	4,208	5,650	4,525	4,057	4,698	4,250	3,803	4,719	(£m)
Fixed opex	11,472	11,250	11,200	11,364	11,238	11,183	11,253	11,200	11,141	11,256	(£m)
Fixed operational carbon	884	869	870	873	870	869	872	867	866	871	(£m)
Embedded carbon	494	337	312	419	334	305	354	316	288	351	(£m)
Variable opex	1,090	547	328	899	544	322	657	401	238	558	(£m)
Variable carbon opex	248	81	41	215	85	50	101	41	18	98	(£m)

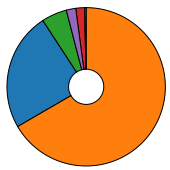
situation1 

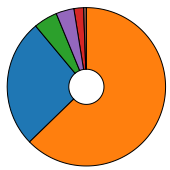
situation2 

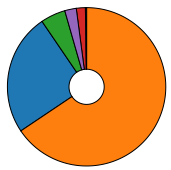
situation3 

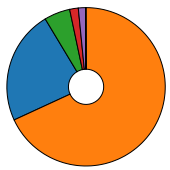
situation4 

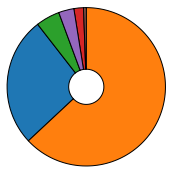
situation5 

situation6 

situation7 

situation8 

situation9 

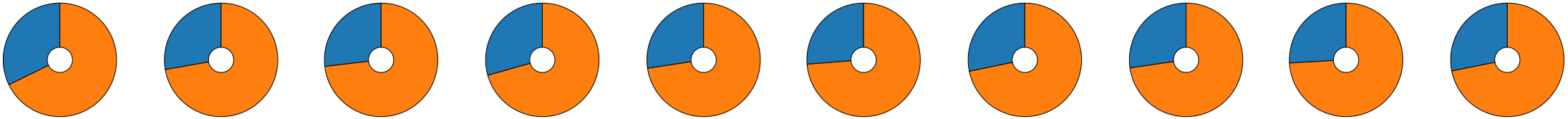
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,182,814	2,066,450	1,891,910	2,643,463	2,044,352	1,849,505	2,192,923	1,924,767	1,739,491	2,170,631	(tonnes)
Operational emissions	6,694,219	5,385,695	5,154,533	6,351,372	5,420,701	5,205,178	5,572,613	5,134,828	4,980,414	5,544,395	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

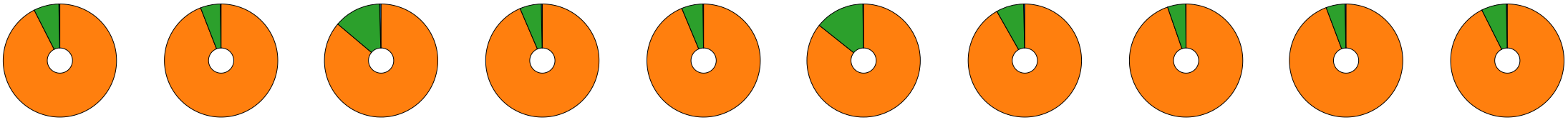


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	72	29	23	67	24	10	52	11	10	33	(GWh)
Grid	23,079	11,351	4,210	19,239	10,932	3,830	13,140	7,974	2,911	10,740	(GWh)
Renewable	1,791	682	654	1,254	708	629	1,123	434	167	827	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,431	65,340	65,338	68,366	65,338	65,338	66,202	65,341	65,338	65,781
SEA environmental disbenefit	105,000	78,682	71,799	102,821	77,534	71,718	81,607	69,455	63,020	80,182
Natural capital	84,678,171	80,975,500	82,723,781	80,973,683	81,986,303	82,766,847	82,090,032	82,841,247	83,081,120	82,457,410
Bio-diversity net gain	−181,604	−128,800	−97,573	−182,790	−126,977	−98,367	−130,600	−103,195	−77,522	−125,270

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,254	35,009	34,801	36,675	35,129	34,809	35,297	34,584	34,371	35,214

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.05	27.95	30.66	27.11	28.13	30.76	29.48	32.63	36.28	30.11
R1: Uncertainty of option supply/demand benefit	5.90	5.17	5.69	5.31	5.22	5.69	5.60	6.08	6.73	5.71
R3: Risk of service failure due to other physical hazards	6.67	6.89	7.74	6.53	6.95	7.77	7.24	8.21	9.37	7.49
R4: Availability of additional headroom	6.51	6.83	7.04	6.59	6.86	7.07	7.17	7.53	7.77	7.04
R5: Catchment/raw water quality risks (incl. climate change)	3.98	3.85	4.35	3.72	3.88	4.38	4.01	4.62	5.34	4.24
R6: Capacity of catchment services	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
R7: Risk of service failure to other exceptional events	4.98	5.19	5.83	4.94	5.23	5.86	5.46	6.18	7.07	5.64
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

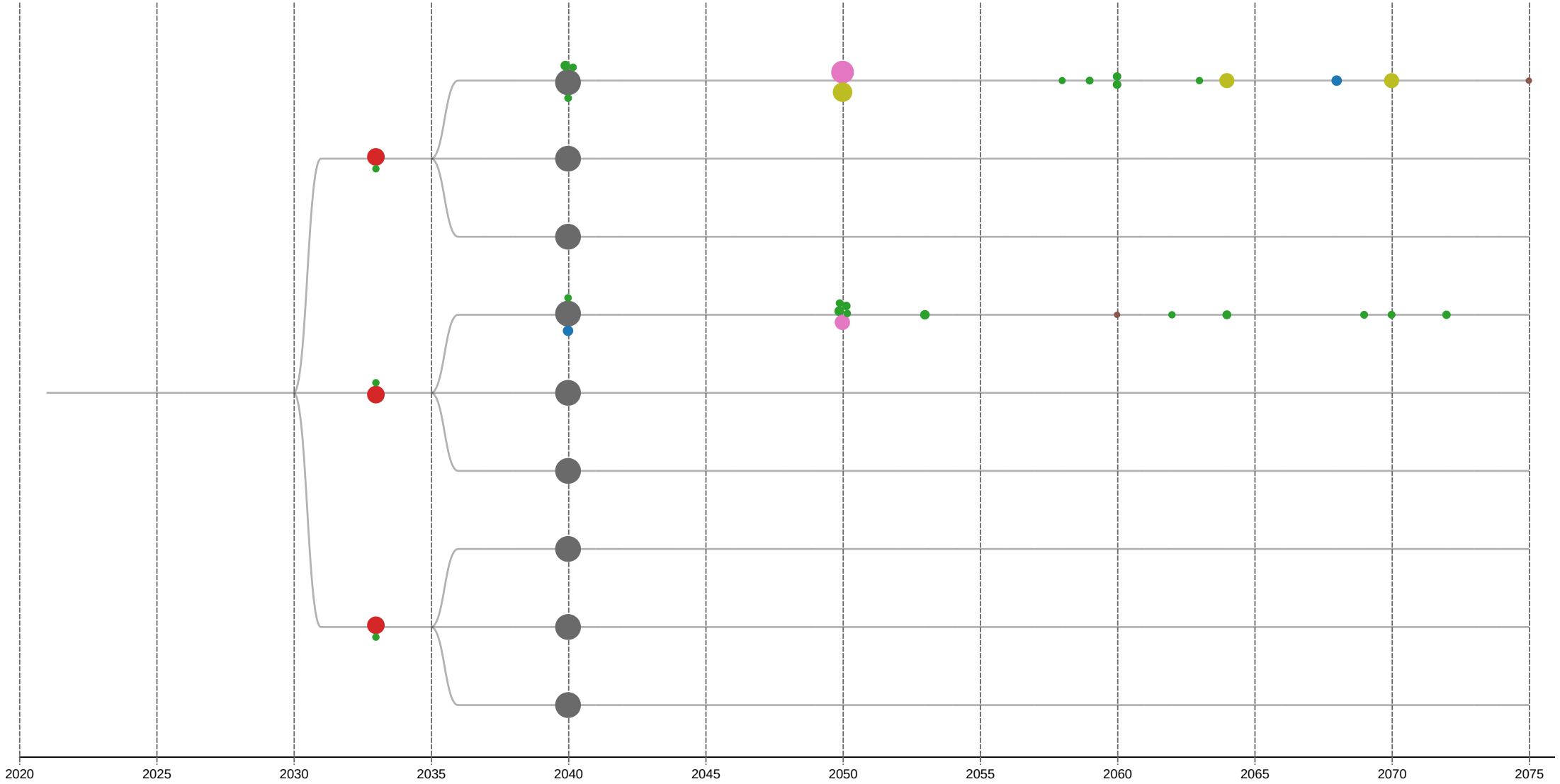
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.63	15.21	16.95	13.72	15.24	16.80	15.73	17.91	20.39	16.18
A3: Operational complexity and flexibility	6.15	6.62	7.45	6.19	6.68	7.51	6.93	7.93	9.11	7.17
A4: WRZ connectivity	7.44	8.56	9.47	7.50	8.54	9.26	8.78	9.94	11.23	8.97
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.05	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.23	19.73	21.98	18.68	19.91	22.04	20.64	23.43	26.55	21.36
E1: Scaleability and modularity of proposed changes	8.96	9.44	10.56	8.80	9.53	10.63	9.81	11.26	12.83	10.20
E2: Intervention lead times	4.12	3.97	4.35	3.88	4.00	4.30	4.22	4.64	5.15	4.29
E3: Reliance on external bodies to deliver changes	6.14	6.32	7.06	5.99	6.37	7.10	6.61	7.52	8.56	6.85
E5: Collaborative land management	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Option Selection (Thames Water)



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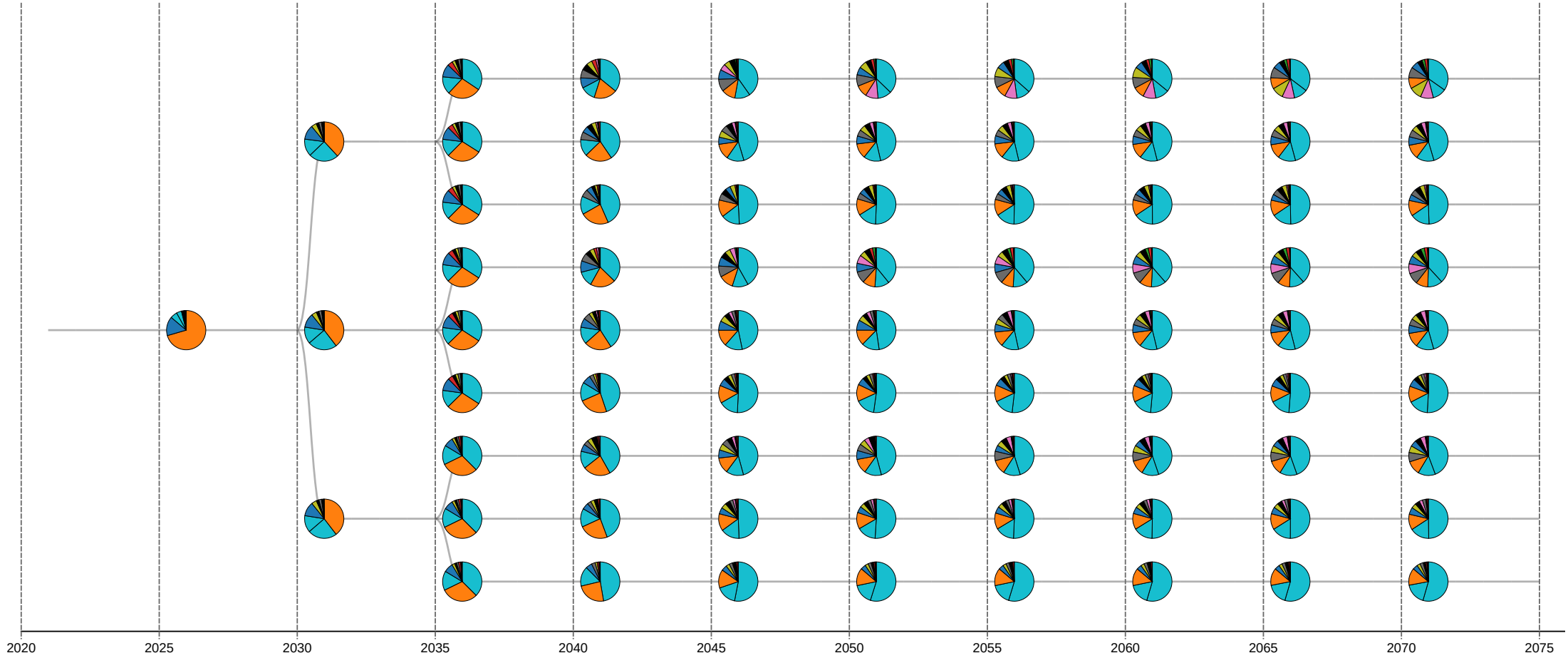
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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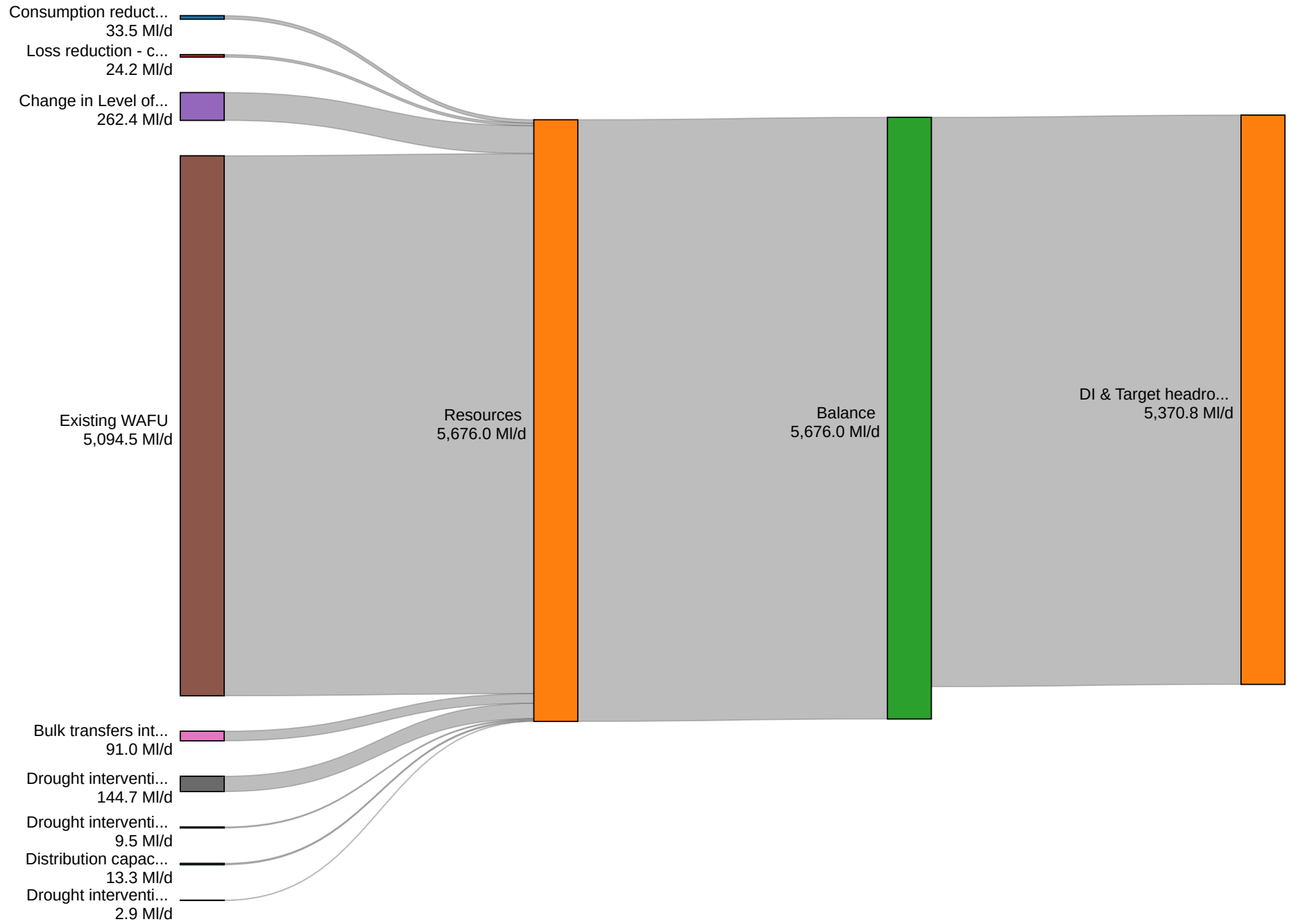
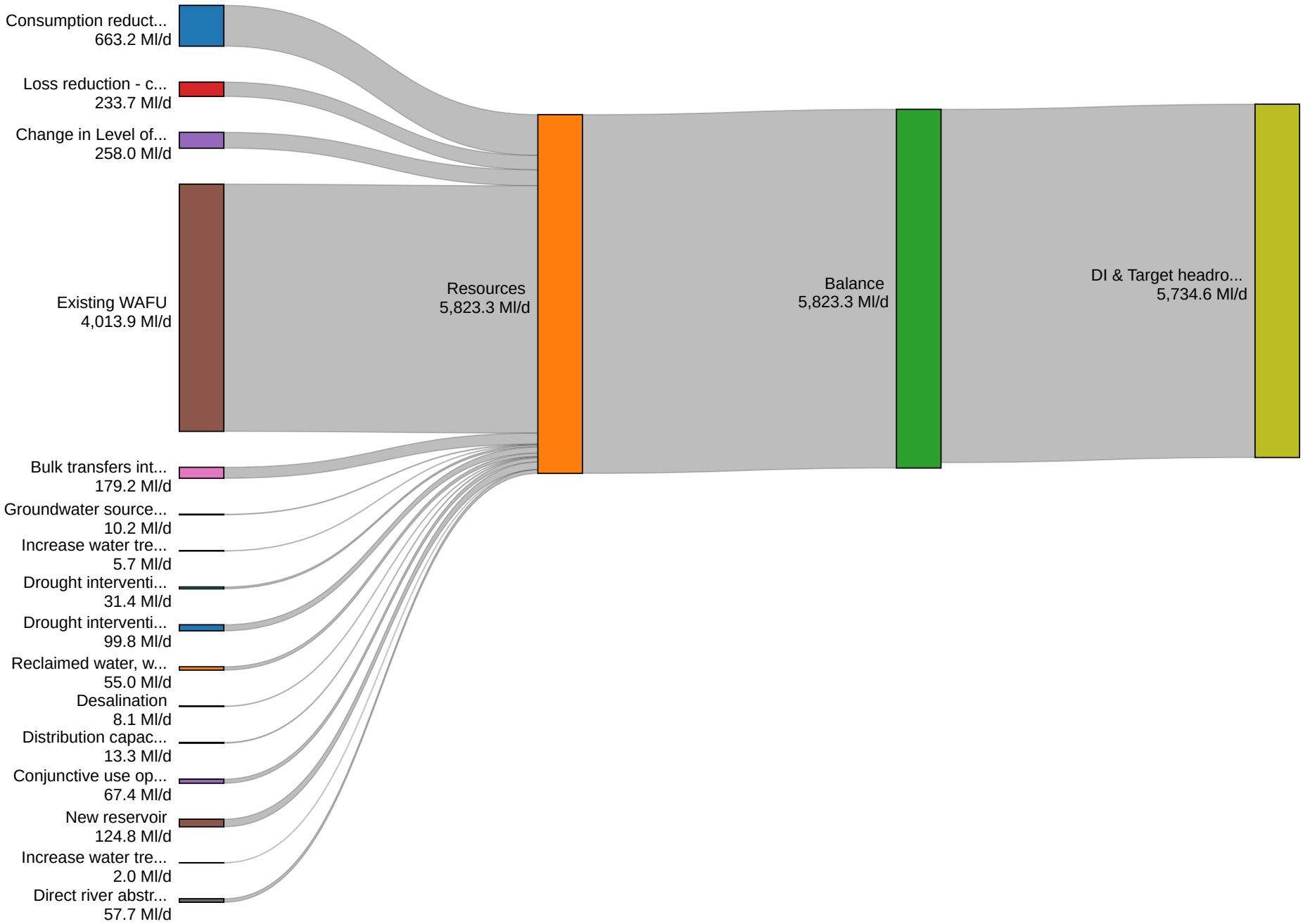
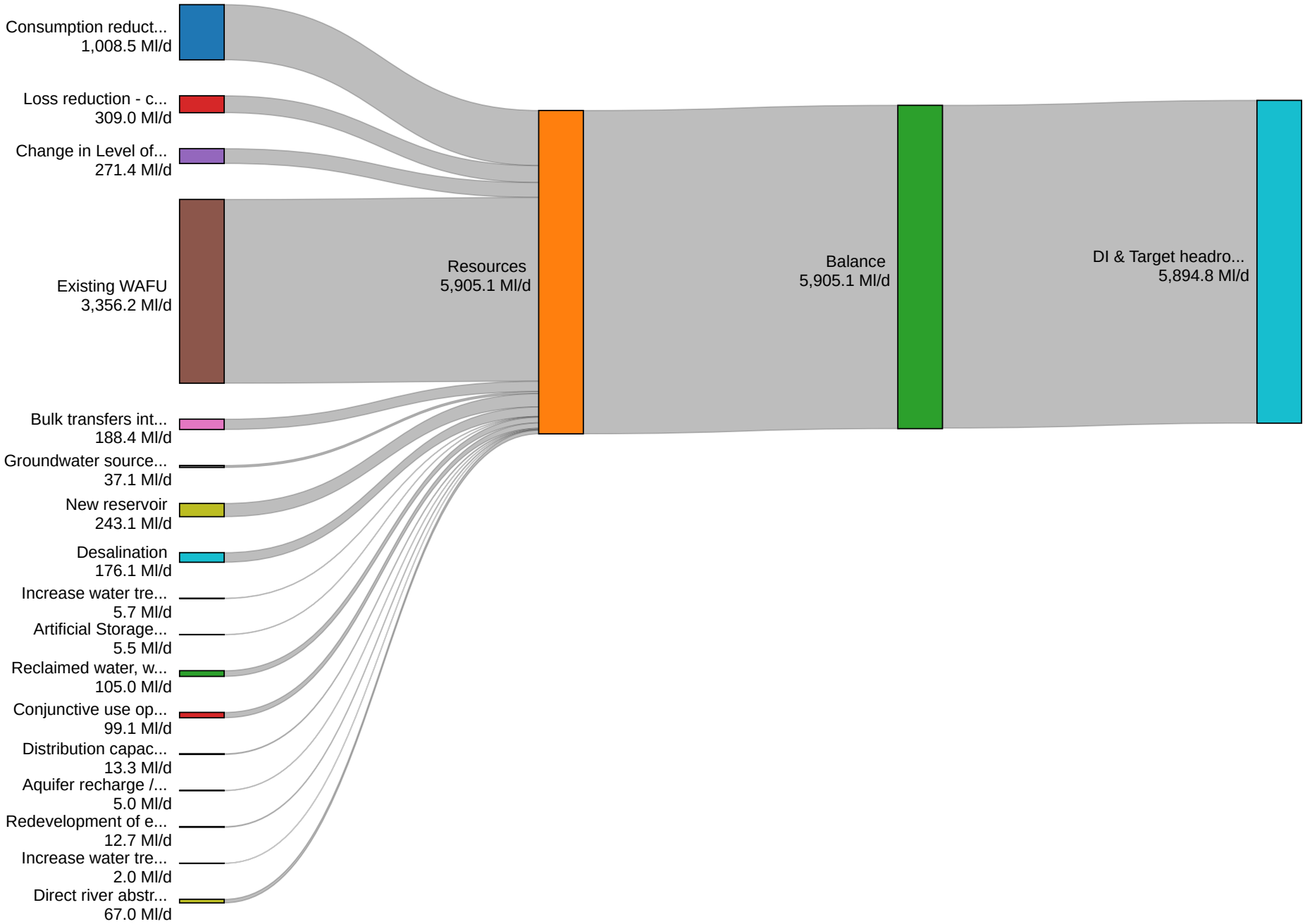
Situation 4 - 2026 (Thames Water)



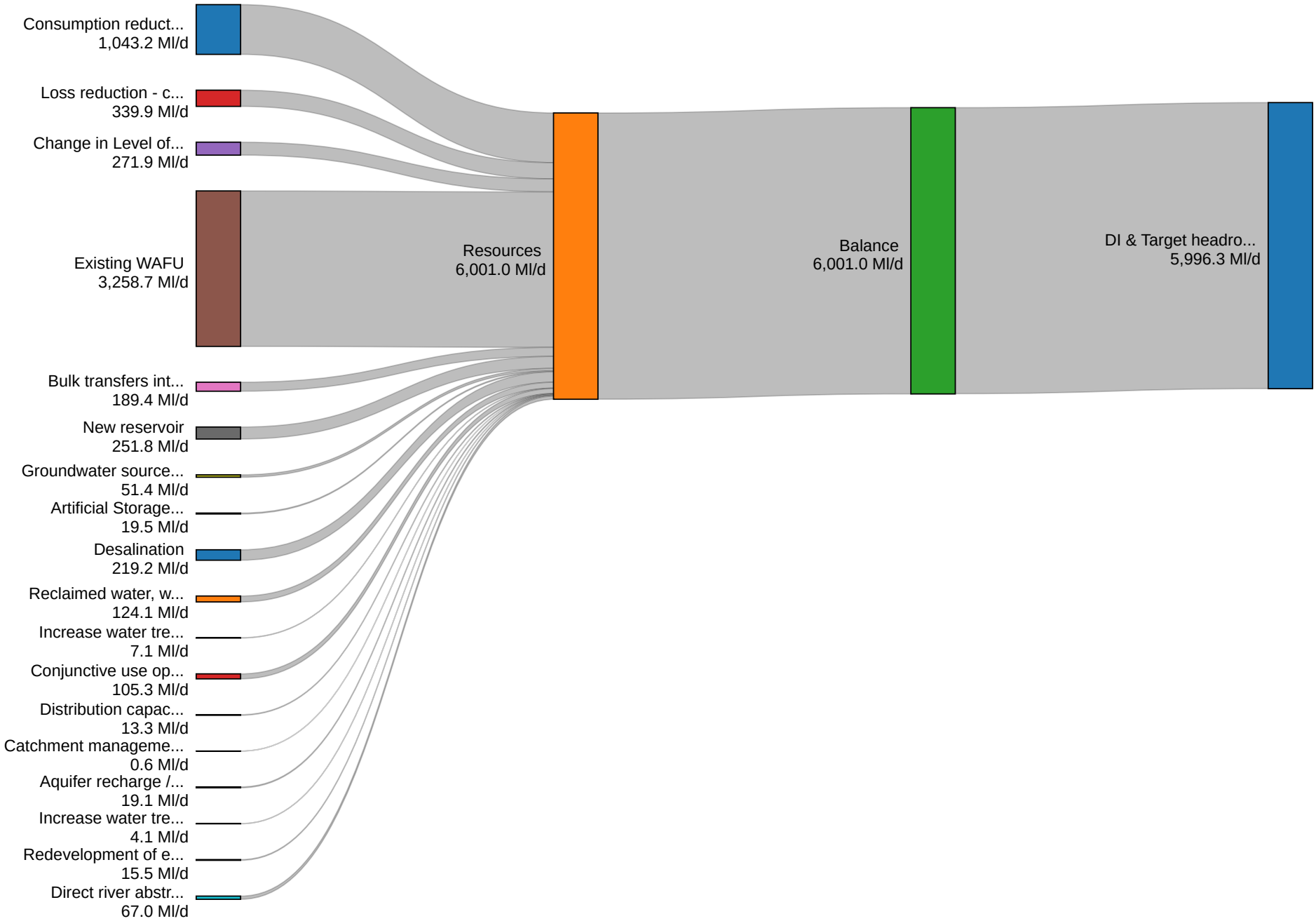
Situation 4 - 2040 (Thames Water)



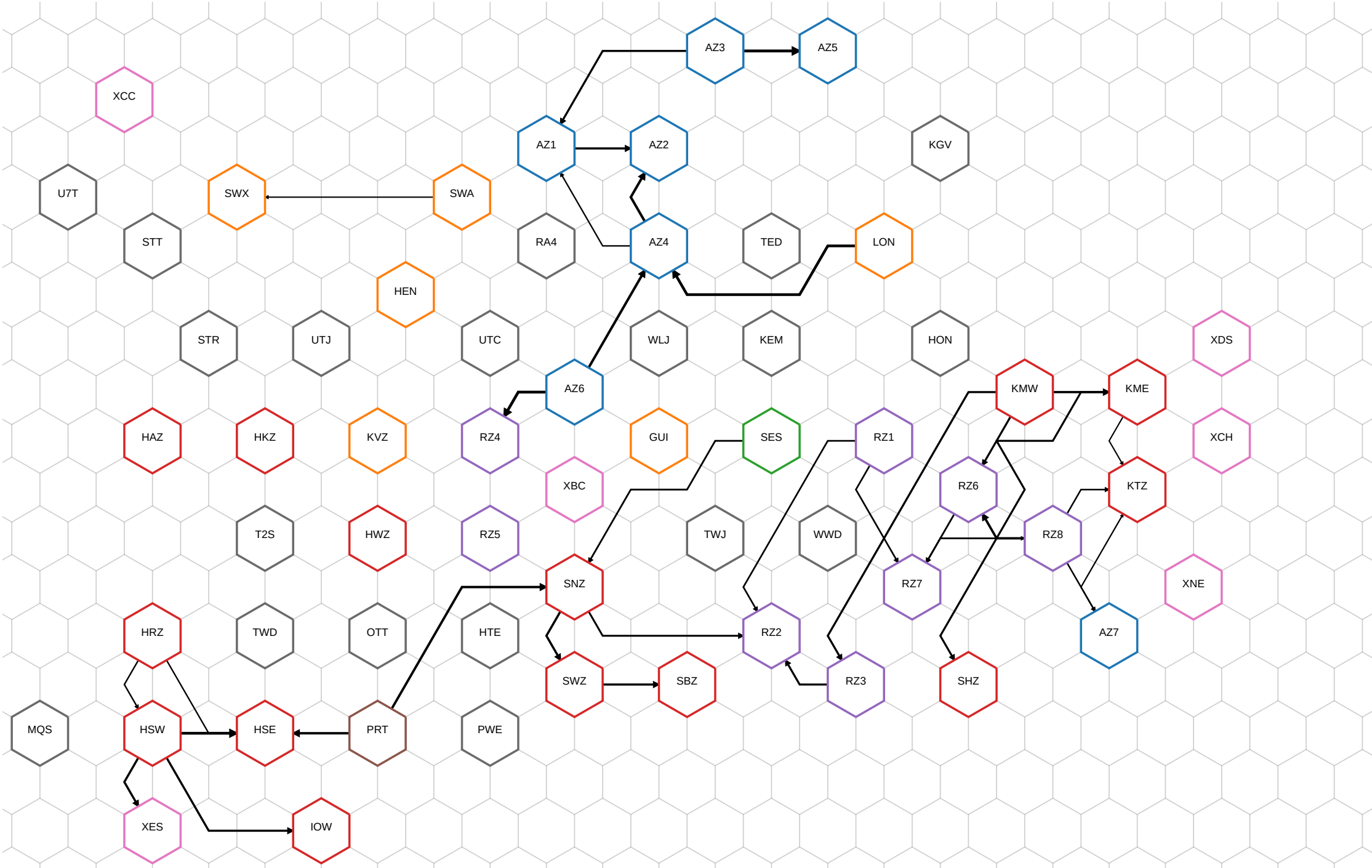
Situation 4 - 2050 (Thames Water)



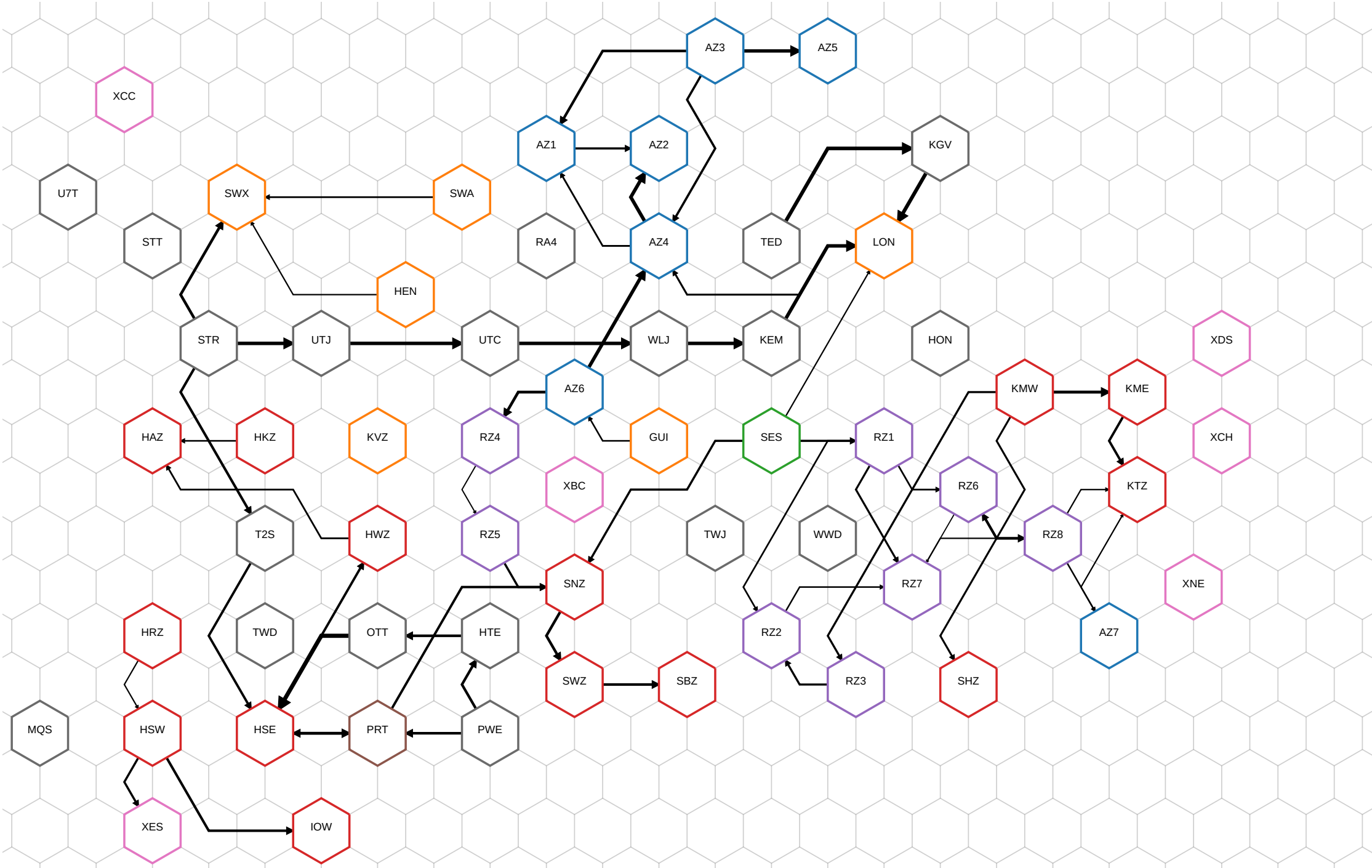
Situation 4 - 2075 (Thames Water)



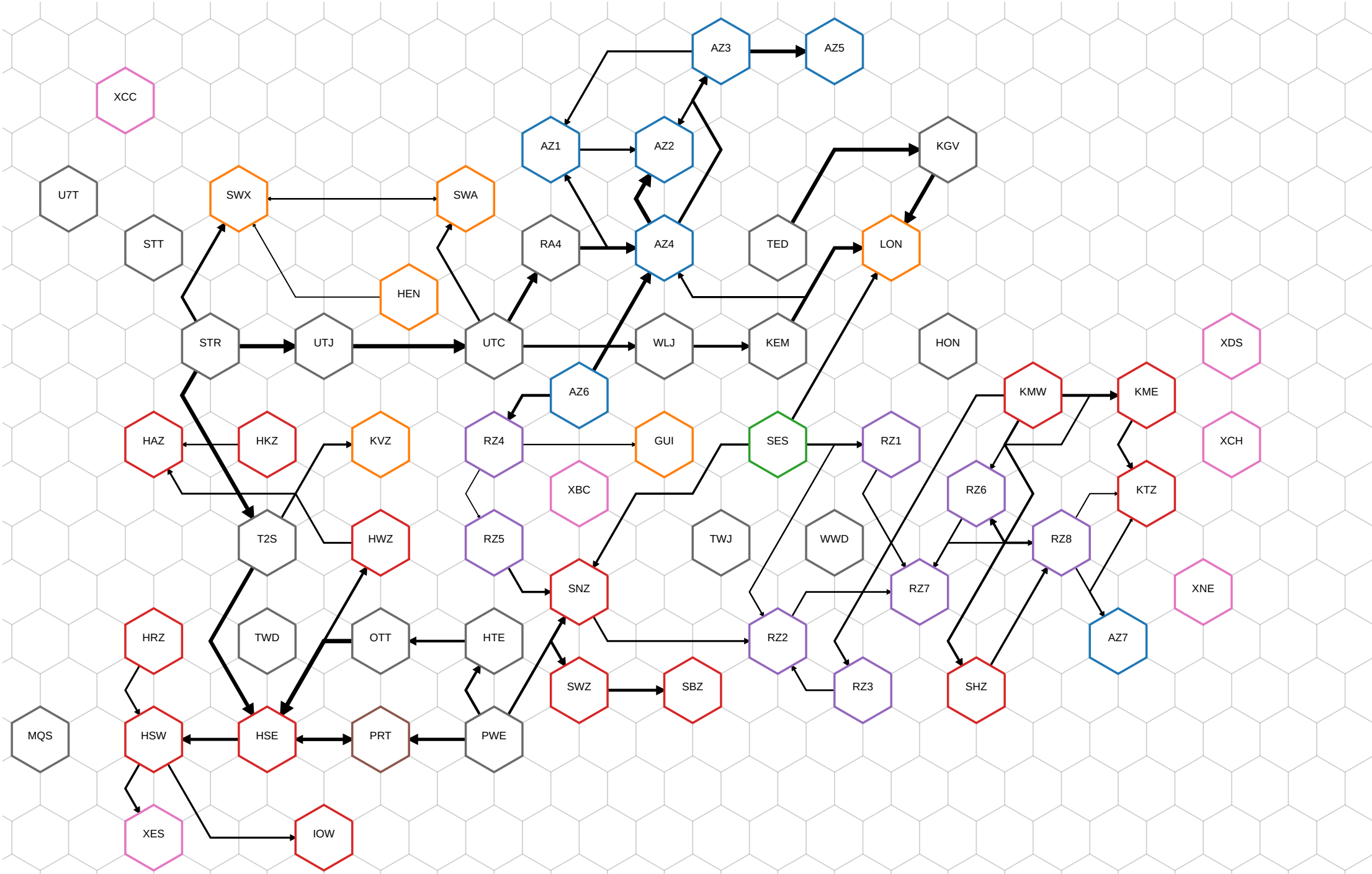
Situation 4 - 2026



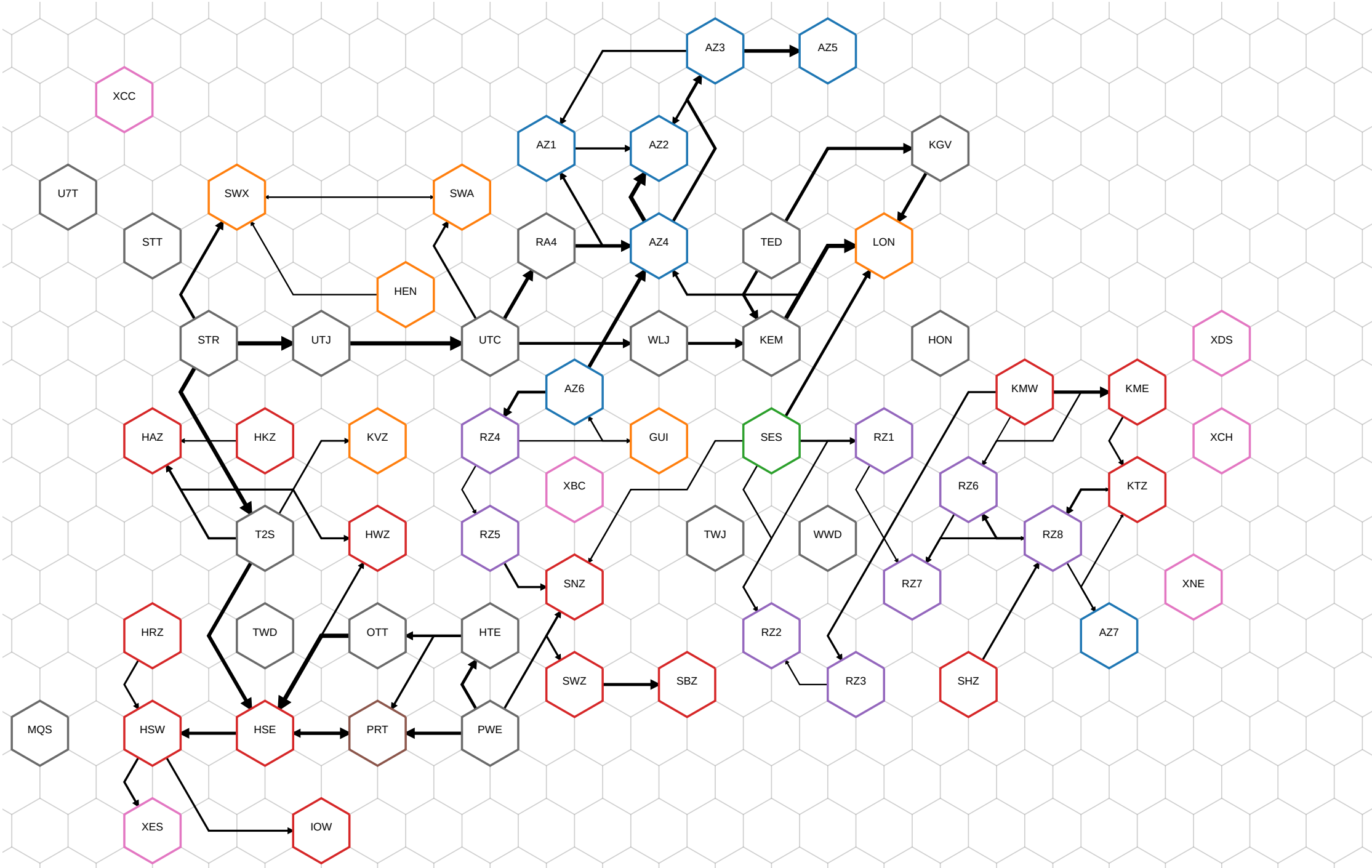
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

E&S + SESRO 75

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-envsoc-07_50-v3
Description	Environmental-social run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 75 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	24/07/2023, 20:01:59
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 75. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

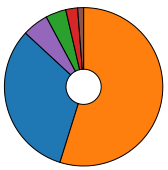
Net present value (Cost)

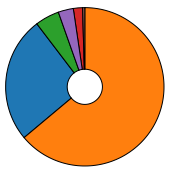
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,012	17,603	16,880	19,419	17,518	16,712	17,852	16,994	16,278	17,808	(£m)
Cost w/o deficit (STPR)	21,012	17,603	16,880	19,419	17,518	16,712	17,852	16,994	16,278	17,808	(£m)
Cost w/ deficit (IGEQ)	32,280	25,804	24,503	29,227	25,658	24,221	26,358	24,747	23,455	26,250	(£m)
Cost w/o deficit (IGEQ)	32,280	25,804	24,503	29,227	25,658	24,221	26,358	24,747	23,455	26,250	(£m)
Cost w/ deficit (LTDR)	23,188	19,219	18,389	21,330	19,122	18,199	19,522	18,526	17,702	19,466	(£m)
Cost w/o deficit (LTDR)	23,188	19,219	18,389	21,330	19,122	18,199	19,522	18,526	17,702	19,466	(£m)

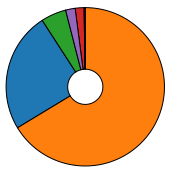
Cost breakdown (STPR)

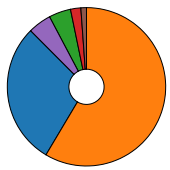
Select Company: Total

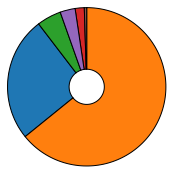
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,735	4,531	4,140	5,630	4,458	3,991	4,628	4,180	3,736	4,670	(£m)
Fixed opex	11,520	11,250	11,198	11,369	11,240	11,182	11,253	11,201	11,140	11,261	(£m)
Fixed operational carbon	884	869	868	873	870	869	871	867	865	871	(£m)
Embedded carbon	507	330	306	408	327	298	347	308	281	346	(£m)
Variable opex	1,112	544	328	918	538	321	652	397	237	561	(£m)
Variable carbon opex	254	81	40	221	85	50	102	41	18	99	(£m)

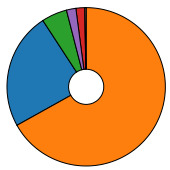
situation1 

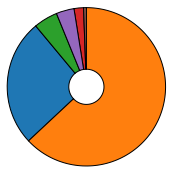
situation2 

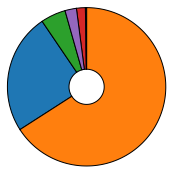
situation3 

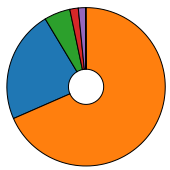
situation4 

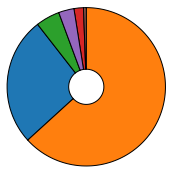
situation5 

situation6 

situation7 

situation8 

situation9 

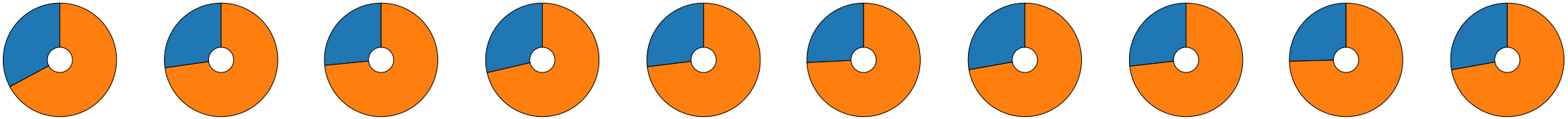
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,290,515	2,017,956	1,857,696	2,565,735	1,999,203	1,806,412	2,144,293	1,878,627	1,695,819	2,139,584	(tonnes)
Operational emissions	6,729,412	5,385,630	5,135,698	6,397,304	5,418,672	5,205,358	5,573,856	5,134,826	4,980,413	5,551,241	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

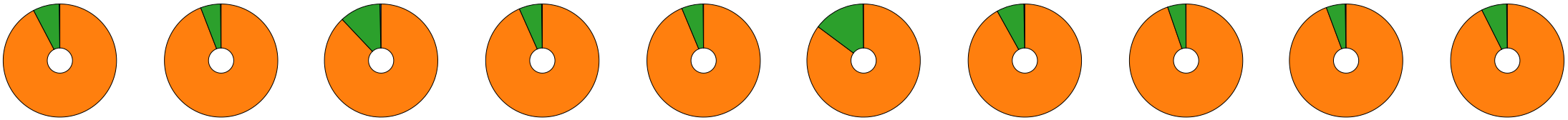


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	50	22	17	47	19	8	40	9	8	24	(GWh)
Grid	23,376	11,331	4,268	19,193	10,950	3,818	13,167	7,960	2,898	10,773	(GWh)
Renewable	1,890	682	566	1,319	714	656	1,116	434	167	838	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,340	65,338	65,338	67,451	65,342	65,338	66,593	65,338	65,338	65,713
SEA environmental disbenefit	105,002	78,799	72,621	100,922	77,140	71,144	82,144	69,285	62,714	79,975
Natural capital	85,381,385	81,299,191	84,168,236	80,977,882	81,300,271	84,118,578	80,960,554	81,730,202	84,538,568	82,719,430
Bio-diversity net gain	−172,843	−117,352	−92,308	−167,101	−116,087	−87,544	−119,302	−92,300	−66,710	−114,616

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,356	35,141	34,820	36,593	35,159	34,801	35,367	34,608	34,361	35,245

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.80	27.34	29.88	26.73	27.53	30.07	28.86	31.90	35.45	29.51
R1: Uncertainty of option supply/demand benefit	5.86	5.05	5.49	5.28	5.10	5.54	5.47	5.93	6.56	5.59
R3: Risk of service failure due to other physical hazards	6.60	6.73	7.53	6.40	6.78	7.58	7.08	8.01	9.13	7.32
R4: Availability of additional headroom	6.47	6.79	7.00	6.57	6.82	7.03	7.13	7.49	7.73	7.00
R5: Catchment/raw water quality risks (incl. climate change)	3.94	3.74	4.23	3.70	3.77	4.25	3.89	4.48	5.18	4.13
R6: Capacity of catchment services	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01
R7: Risk of service failure to other exceptional events	4.92	5.03	5.63	4.77	5.06	5.67	5.29	5.98	6.84	5.47
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

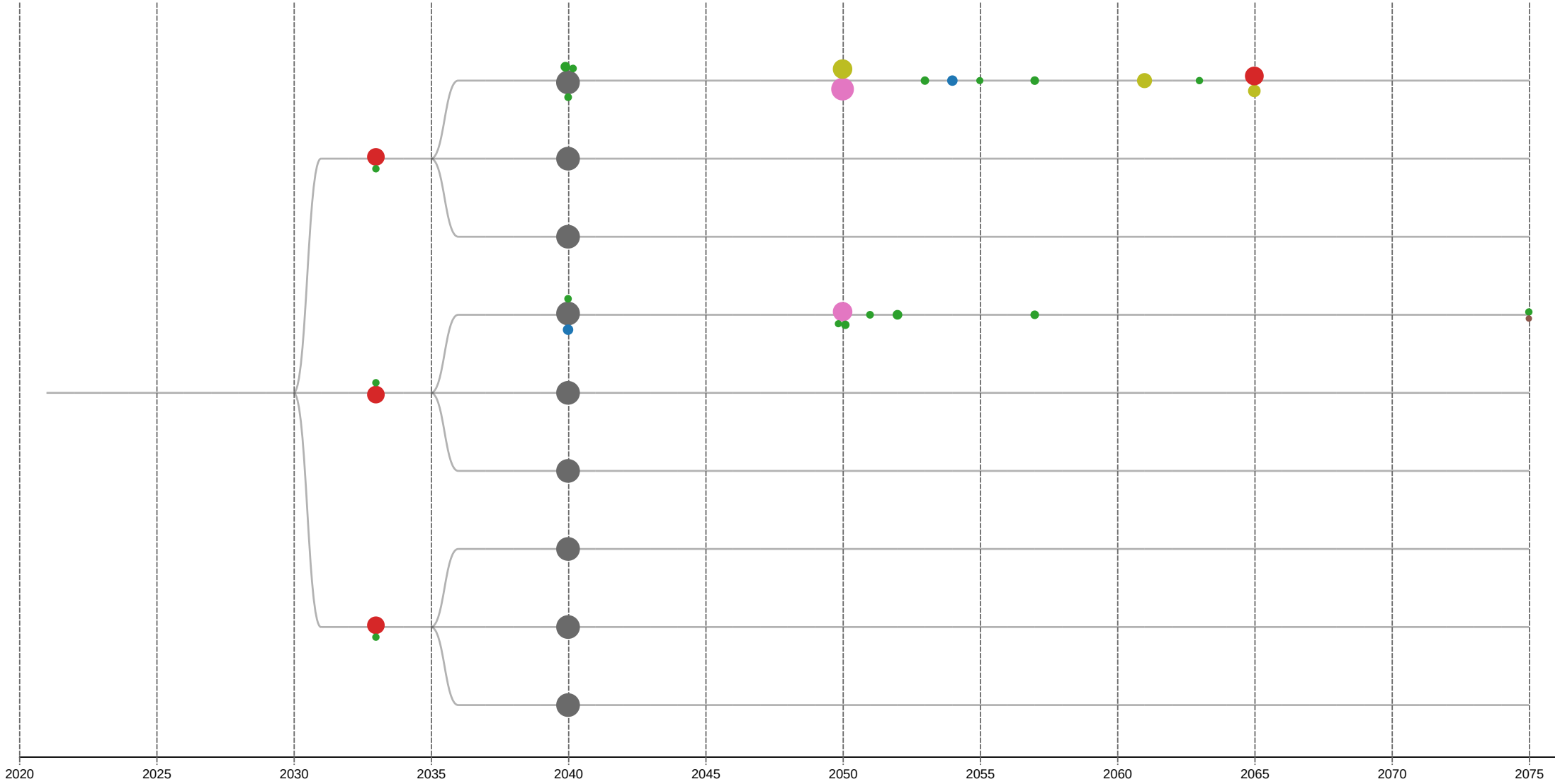
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.52	15.00	16.77	13.57	15.07	16.62	15.56	17.71	20.15	16.00
A3: Operational complexity and flexibility	6.06	6.45	7.25	6.02	6.52	7.32	6.76	7.74	8.88	7.00
A4: WRZ connectivity	7.44	8.52	9.49	7.51	8.53	9.26	8.77	9.94	11.23	8.97
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.29	19.57	21.72	18.59	19.75	21.85	20.48	23.23	26.32	21.20
E1: Scaleability and modularity of proposed changes	8.93	9.35	10.42	8.76	9.45	10.54	9.72	11.16	12.71	10.12
E2: Intervention lead times	4.18	3.93	4.30	3.85	3.96	4.25	4.18	4.59	5.10	4.26
E3: Reliance on external bodies to deliver changes	6.17	6.27	6.99	5.96	6.33	7.05	6.57	7.47	8.51	6.81
E5: Collaborative land management	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01

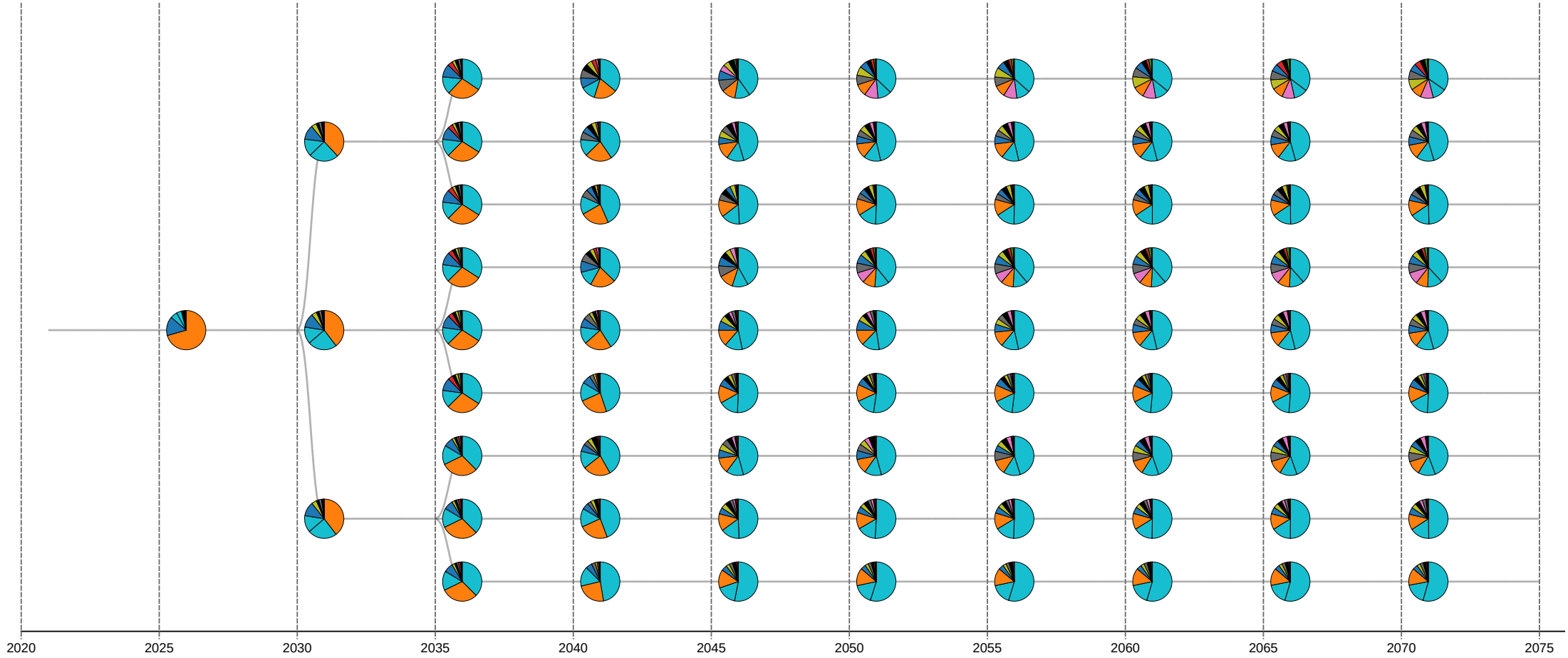
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

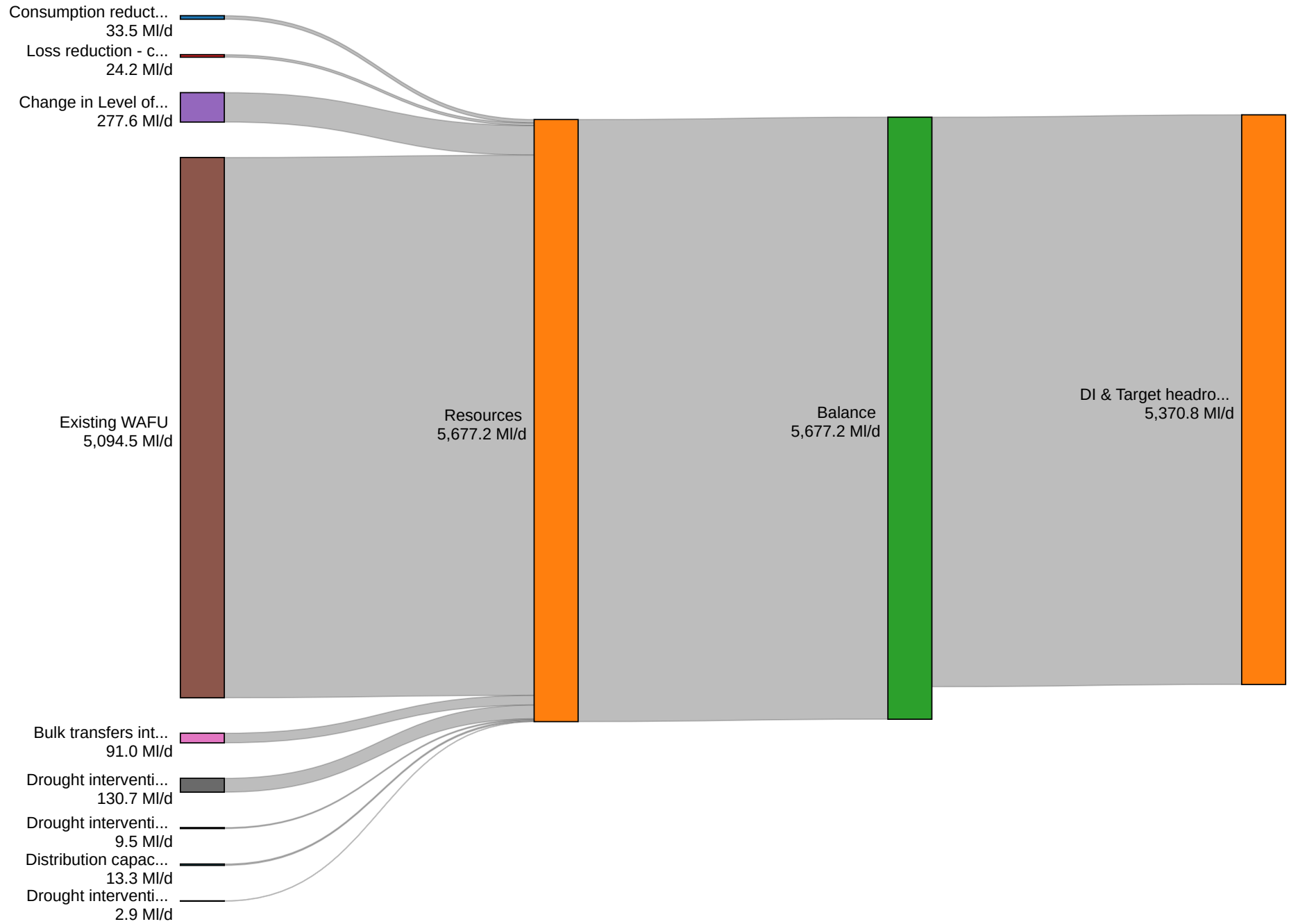
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

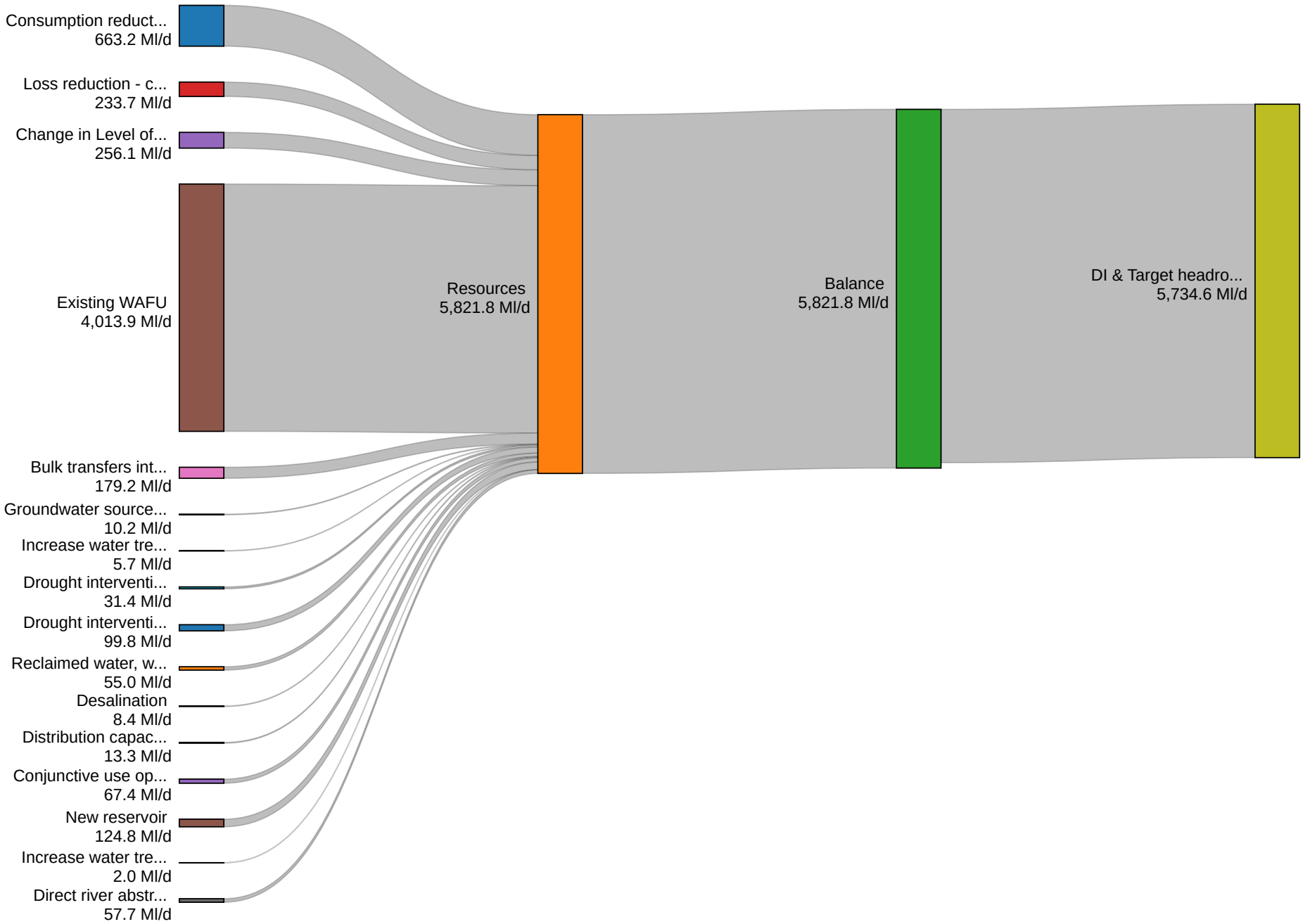


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

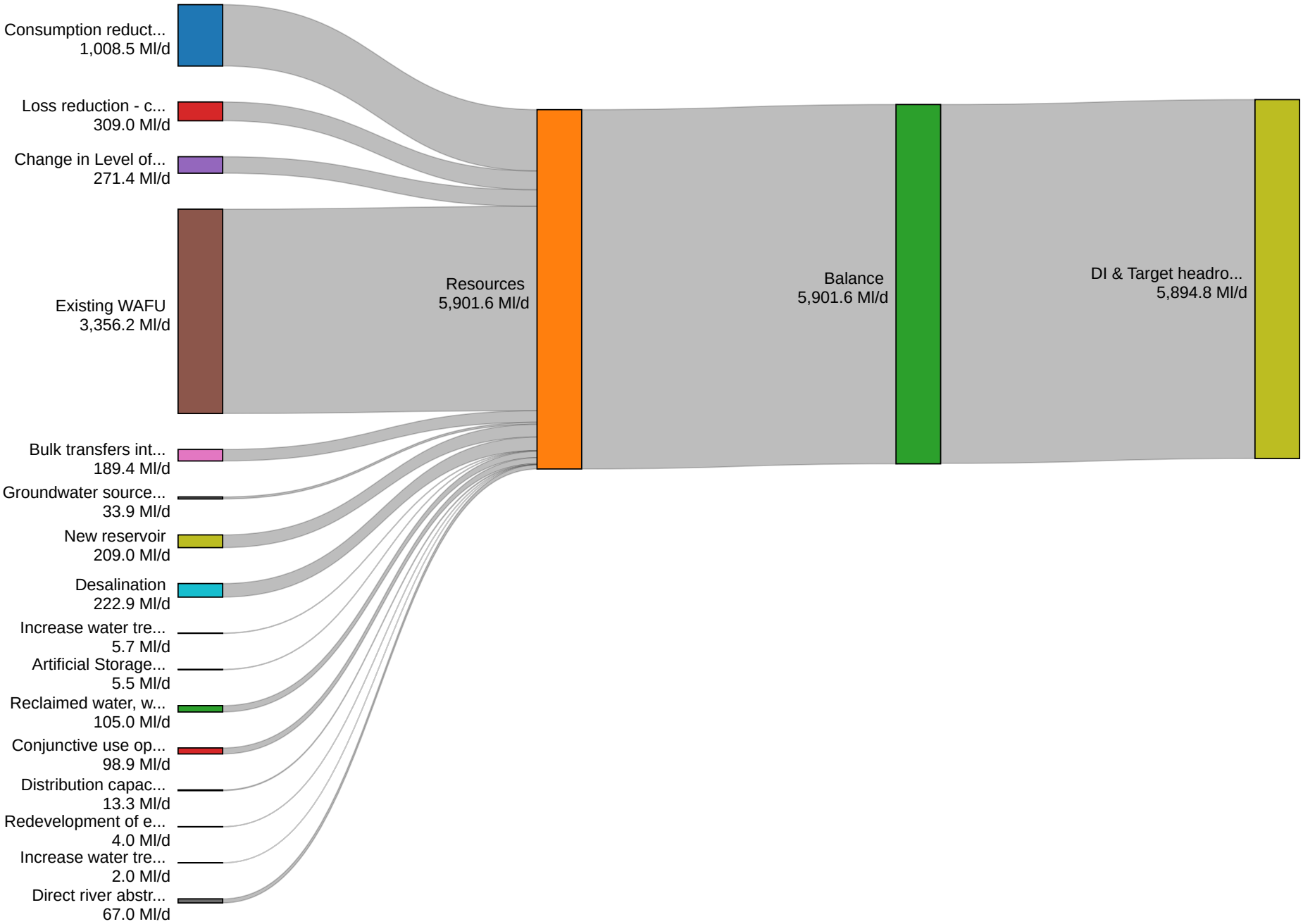
Situation 4 - 2026 (Thames Water)



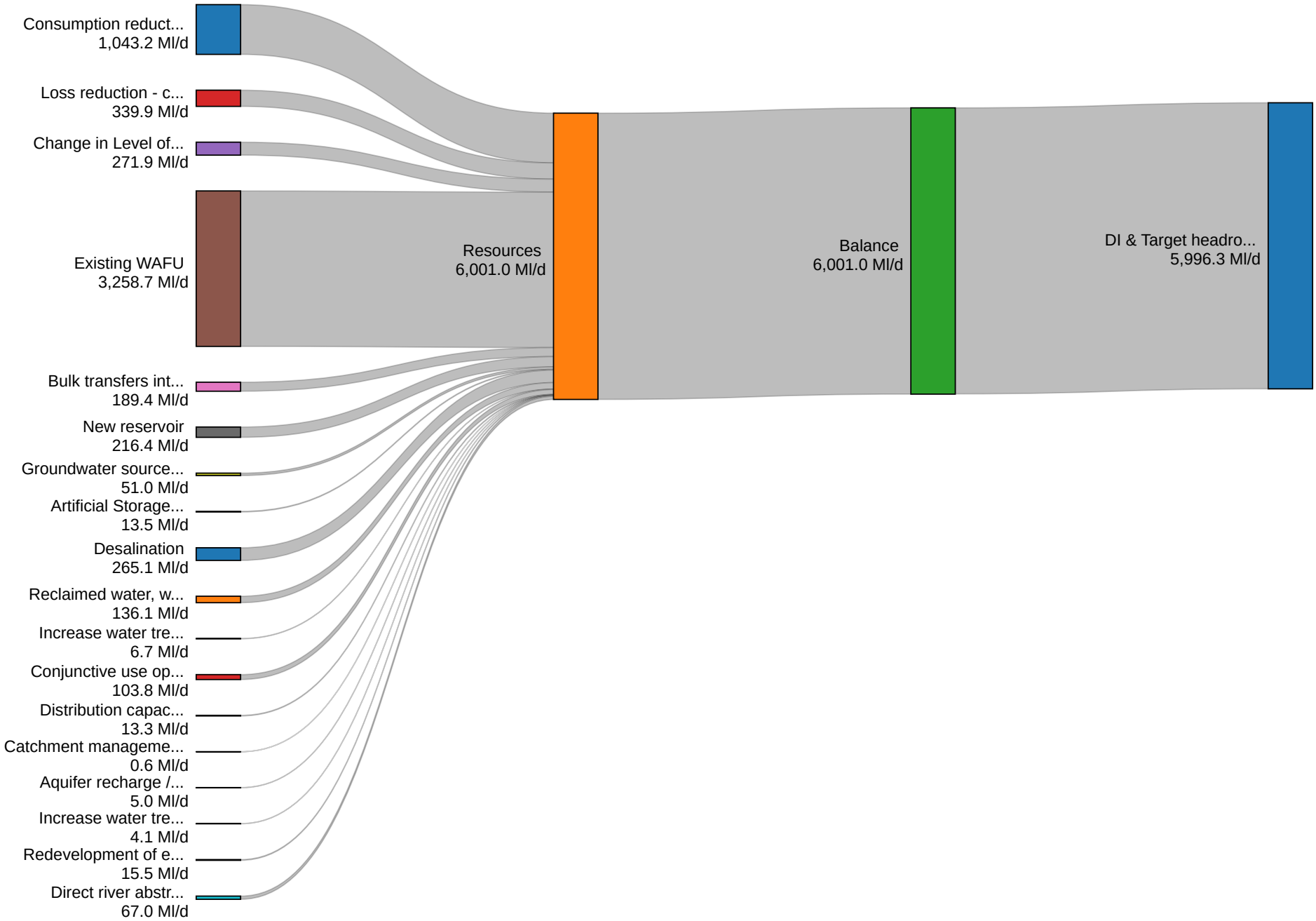
Situation 4 - 2040 (Thames Water)



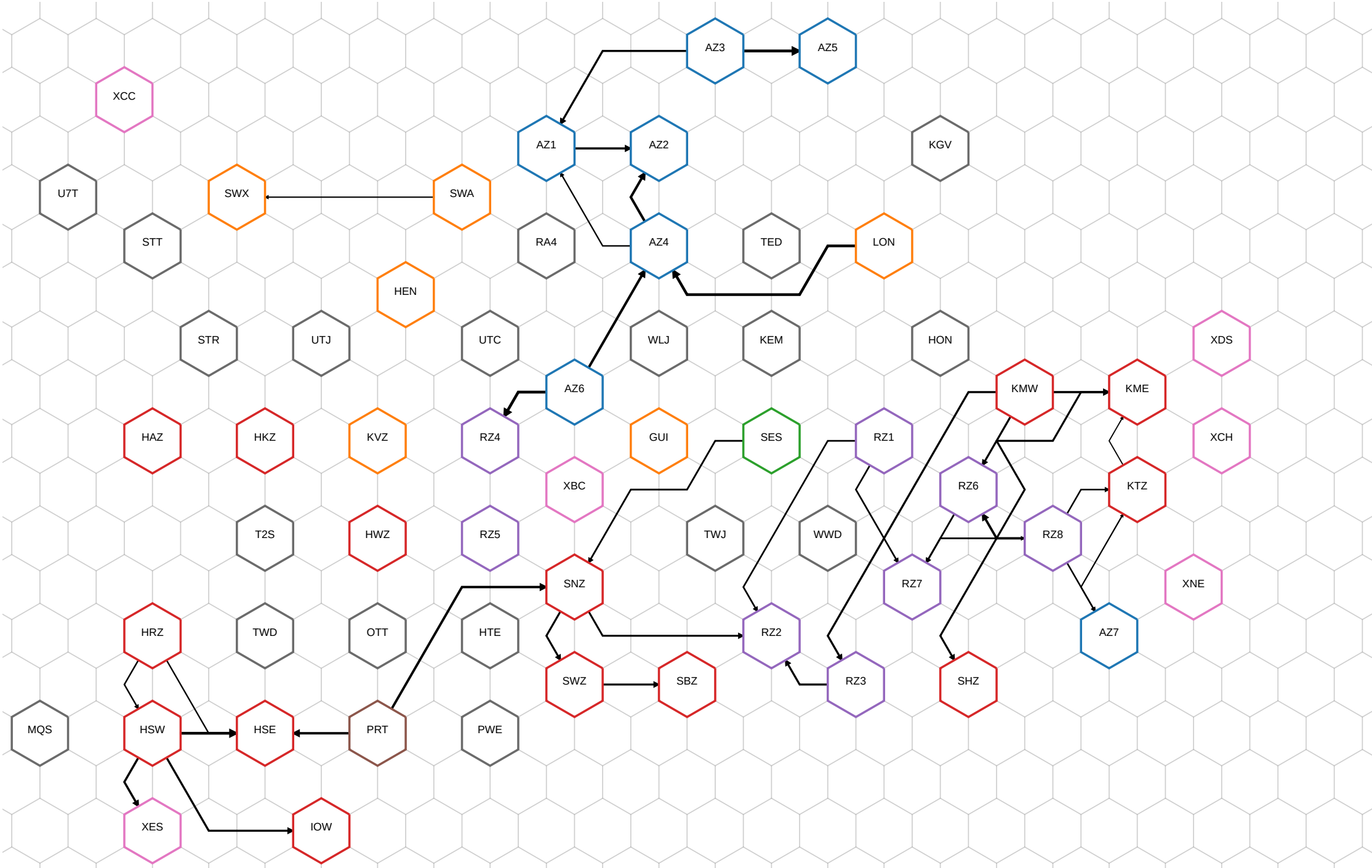
Situation 4 - 2050 (Thames Water)



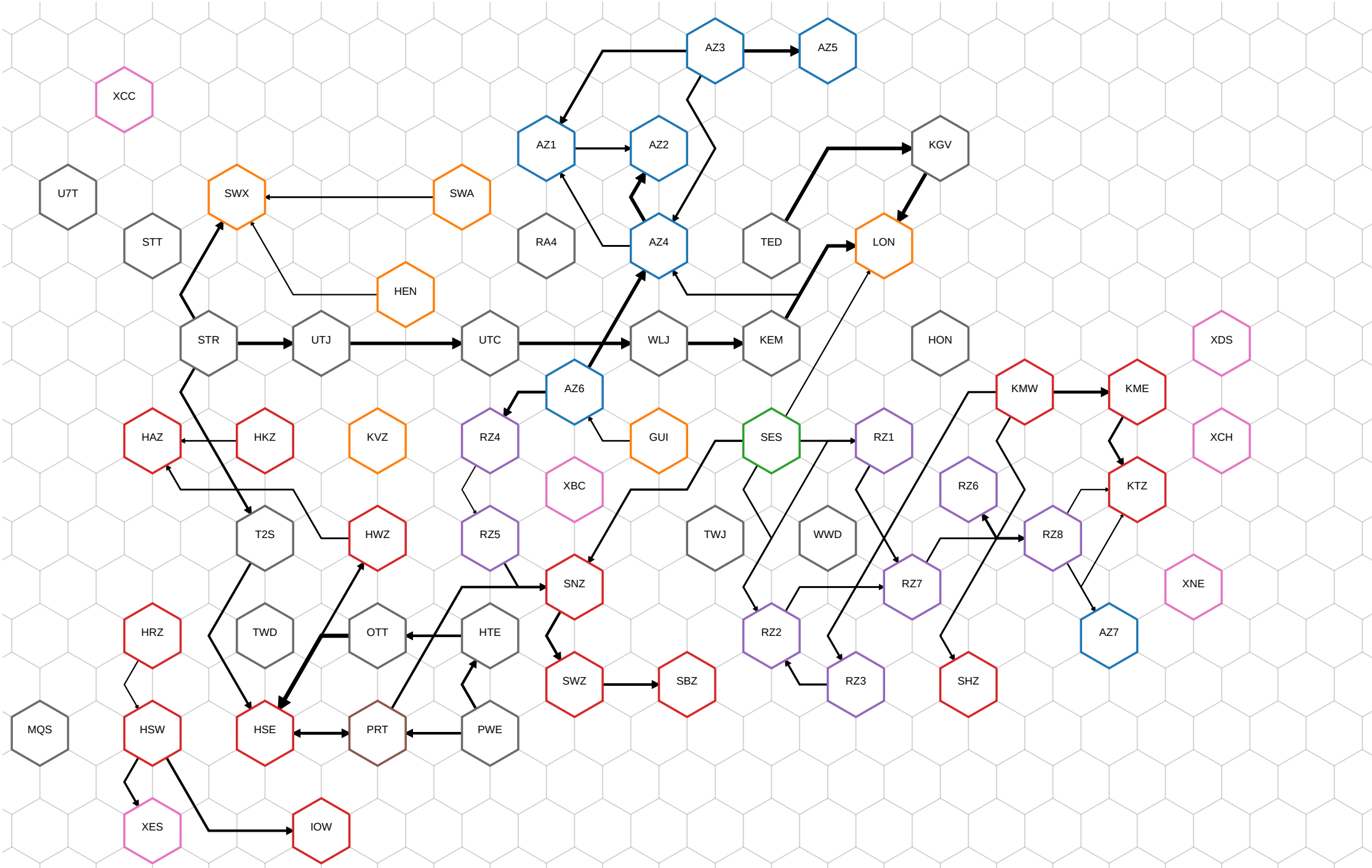
Situation 4 - 2075 (Thames Water)



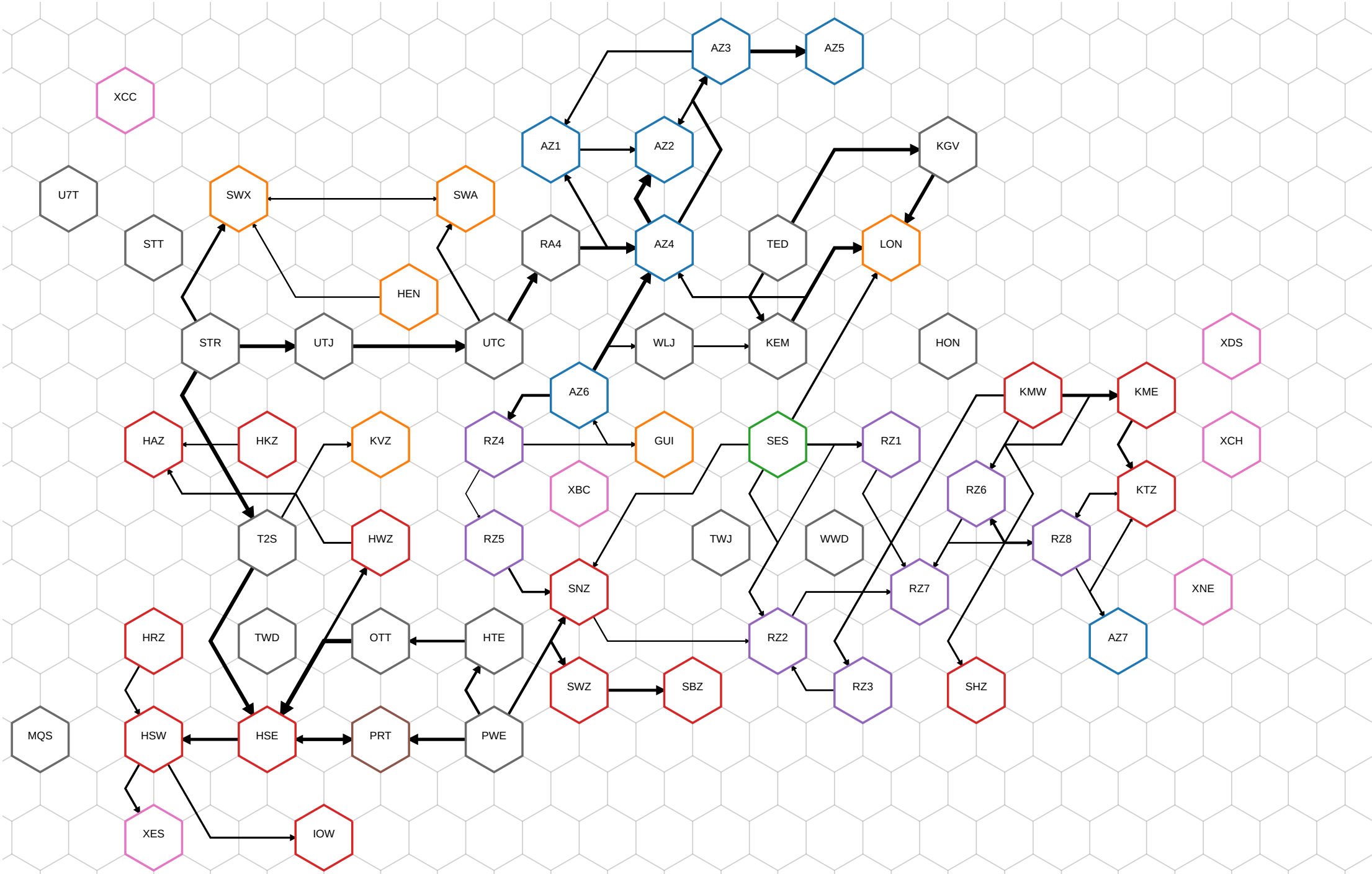
Situation 4 - 2026



Situation 4 - 2040



Situation 4 - 2050



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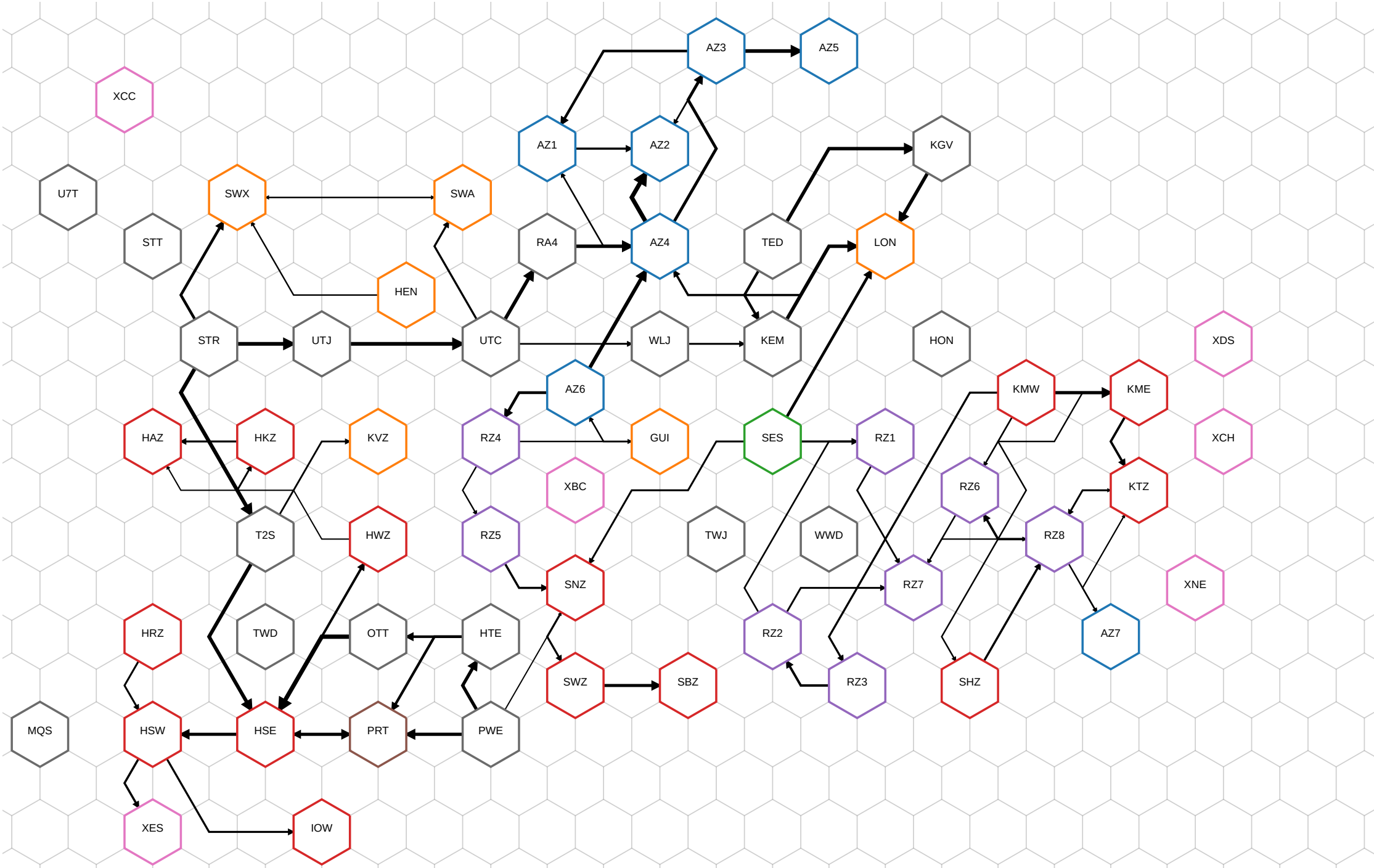


IVM RUN DOSSIER

GENERAL BVP + SESRO 150

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50-2075-bvp-07_50-v3
Description	BVP run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 150 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	17/07/2023, 10:43:04
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro150-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 150. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

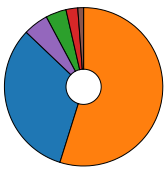
Net present value (Cost)

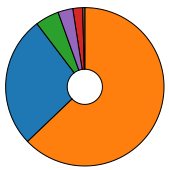
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,892	17,901	17,157	19,350	17,785	16,969	18,132	17,260	16,540	17,999	(£m)
Cost w/o deficit (STPR)	20,892	17,901	17,157	19,350	17,785	16,969	18,132	17,260	16,540	17,999	(£m)
Cost w/ deficit (IGEQ)	31,925	26,259	24,922	29,005	26,070	24,614	26,799	25,158	23,858	26,512	(£m)
Cost w/o deficit (IGEQ)	31,925	26,259	24,922	29,005	26,070	24,614	26,799	25,158	23,858	26,512	(£m)
Cost w/ deficit (LTDR)	23,027	19,547	18,693	21,234	19,417	18,481	19,833	18,820	17,991	19,672	(£m)
Cost w/o deficit (LTDR)	23,027	19,547	18,693	21,234	19,417	18,481	19,833	18,820	17,991	19,672	(£m)

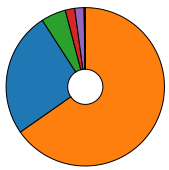
Cost breakdown (STPR)

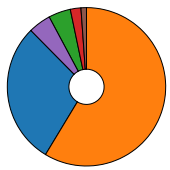
Select Company: Total

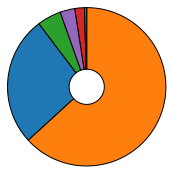
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,743	4,800	4,390	5,602	4,710	4,231	4,884	4,425	3,978	4,863	(£m)
Fixed opex	11,455	11,252	11,202	11,350	11,240	11,185	11,255	11,202	11,143	11,254	(£m)
Fixed operational carbon	883	868	870	877	869	869	872	867	866	871	(£m)
Embedded carbon	501	358	328	418	351	320	370	331	304	365	(£m)
Variable opex	1,064	542	326	887	532	314	651	394	232	549	(£m)
Variable carbon opex	246	80	41	216	82	49	101	41	18	97	(£m)

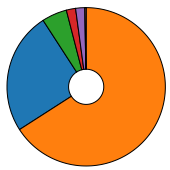
situation1 

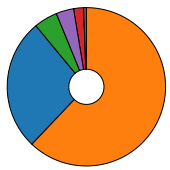
situation2 

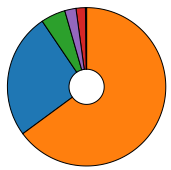
situation3 

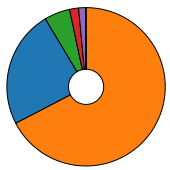
situation4 

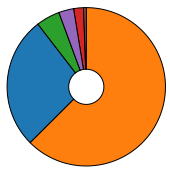
situation5 

situation6 

situation7 

situation8 

situation9 

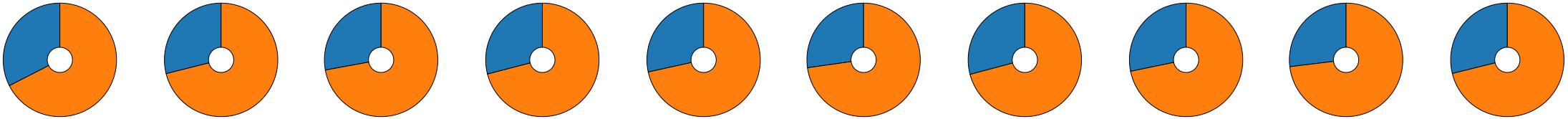
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,216,648	2,188,141	1,991,719	2,615,317	2,144,739	1,944,877	2,288,747	2,020,153	1,834,877	2,249,469	(tonnes)
Operational emissions	6,672,858	5,381,837	5,154,600	6,394,043	5,397,921	5,197,197	5,570,947	5,133,909	4,980,387	5,542,633	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

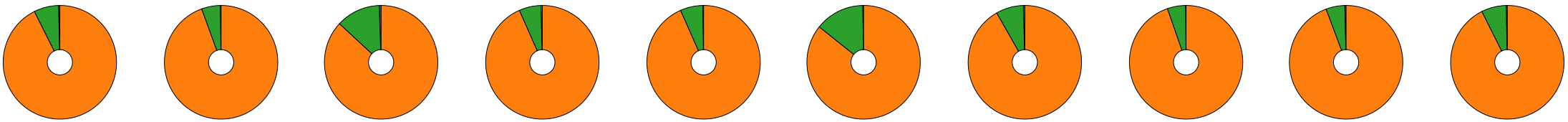


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	95	34	26	83	28	12	61	13	12	40	(GWh)
Grid	23,293	11,889	4,224	19,011	10,780	3,835	13,137	7,947	2,923	10,782	(GWh)
Renewable	1,766	666	612	1,266	739	628	1,121	434	166	822	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	66,289	65,338	65,338	67,729	65,342	65,338	66,448	65,338	65,338	65,833
SEA environmental disbenefit	105,001	77,756	71,871	99,854	77,689	71,562	83,668	69,306	61,857	79,840
Natural capital	81,881,669	81,056,041	81,282,170	81,736,582	81,001,855	81,293,410	81,593,235	81,366,173	81,714,776	81,436,212
Bio-diversity net gain	−200,794	−140,626	−122,030	−202,165	−147,460	−119,032	−151,415	−123,870	−98,977	−145,152

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,487	35,040	34,774	36,629	35,069	34,760	35,308	34,520	34,095	35,187

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.73	29.63	32.47	29.41	29.90	32.68	31.20	34.65	38.61	32.03
R1: Uncertainty of option supply/demand benefit	6.17	5.51	6.02	5.88	5.59	6.07	5.94	6.49	7.21	6.10
R3: Risk of service failure due to other physical hazards	7.02	7.35	8.24	7.08	7.43	8.29	7.71	8.76	10.01	7.99
R4: Availability of additional headroom	6.61	6.95	7.16	6.69	6.98	7.19	7.30	7.66	7.90	7.16
R5: Catchment/raw water quality risks (incl. climate change)	4.13	4.17	4.71	3.83	4.20	4.74	4.33	5.00	5.78	4.54
R6: Capacity of catchment services	0.30	0.01	0.01	0.31	0.00	0.01	0.00	0.01	0.01	0.07
R7: Risk of service failure to other exceptional events	5.39	5.65	6.33	5.51	5.70	6.38	5.92	6.73	7.71	6.15
R8: Soil health	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.03

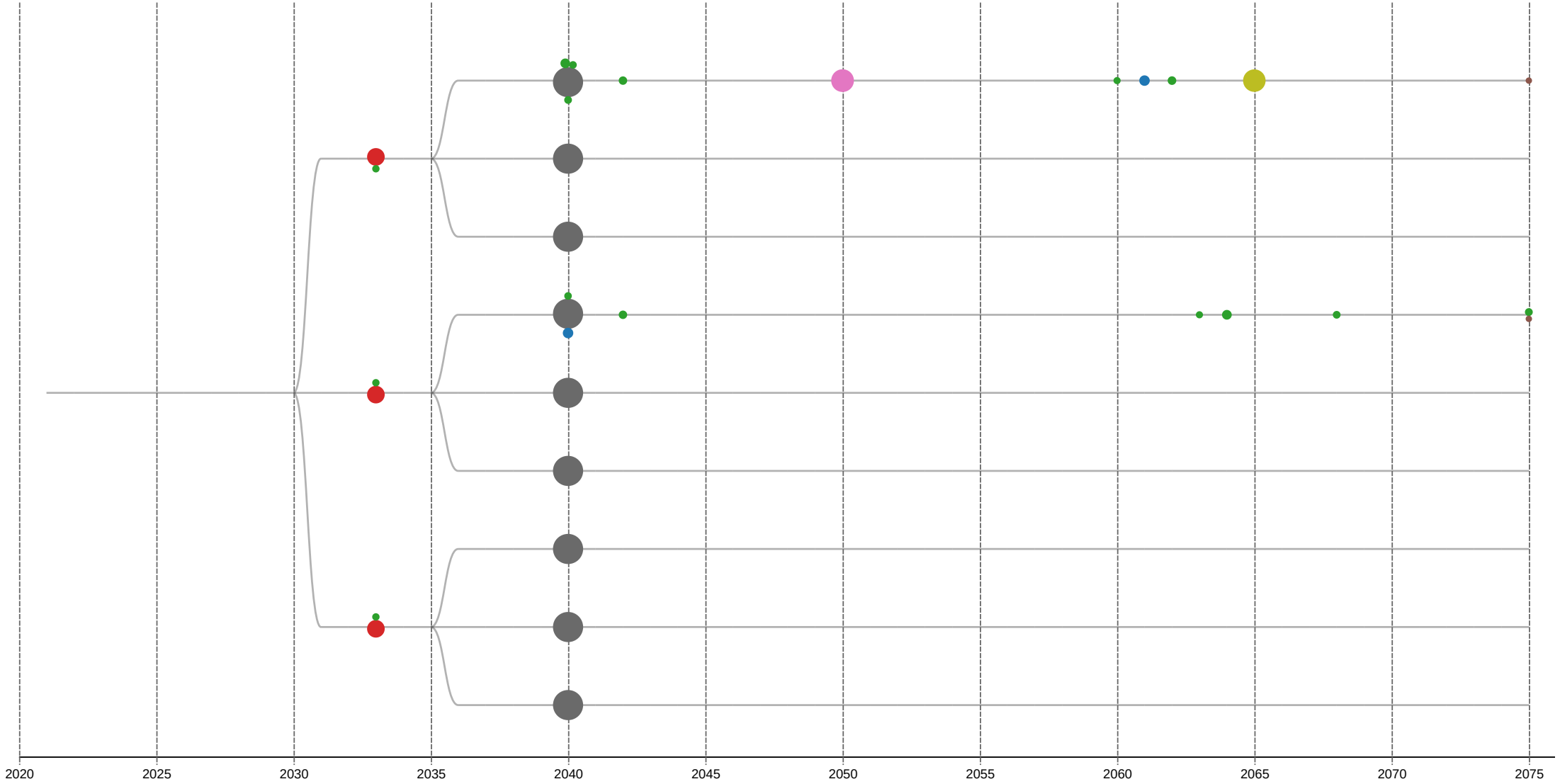
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.32	15.56	17.45	14.35	15.64	17.26	16.16	18.39	20.94	16.67
A3: Operational complexity and flexibility	6.56	7.08	7.96	6.74	7.15	8.04	7.39	8.49	9.76	7.68
A4: WRZ connectivity	7.65	8.46	9.46	7.47	8.46	9.19	8.74	9.87	11.15	8.94
A7: Customer relations support engagement with demand management	0.11	0.03	0.03	0.14	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.65	19.86	22.12	19.63	20.12	22.24	20.81	23.64	26.79	21.65
E1: Scaleability and modularity of proposed changes	8.85	9.35	10.43	8.82	9.47	10.54	9.72	11.16	12.71	10.12
E2: Intervention lead times	4.11	4.05	4.49	4.10	4.11	4.44	4.34	4.79	5.33	4.42
E3: Reliance on external bodies to deliver changes	6.25	6.45	7.19	6.25	6.52	7.25	6.75	7.68	8.75	7.01
E5: Collaborative land management	0.44	0.01	0.01	0.46	0.01	0.01	0.00	0.01	0.01	0.11

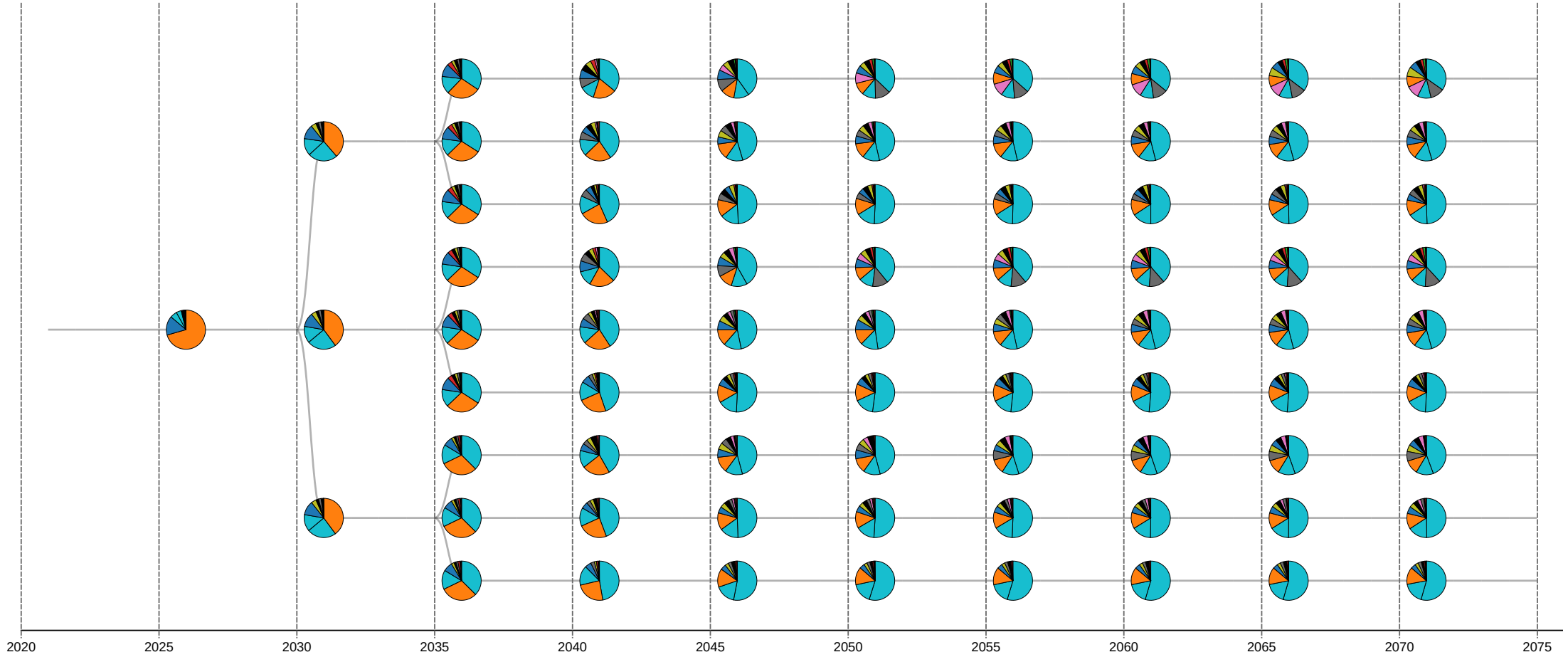
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

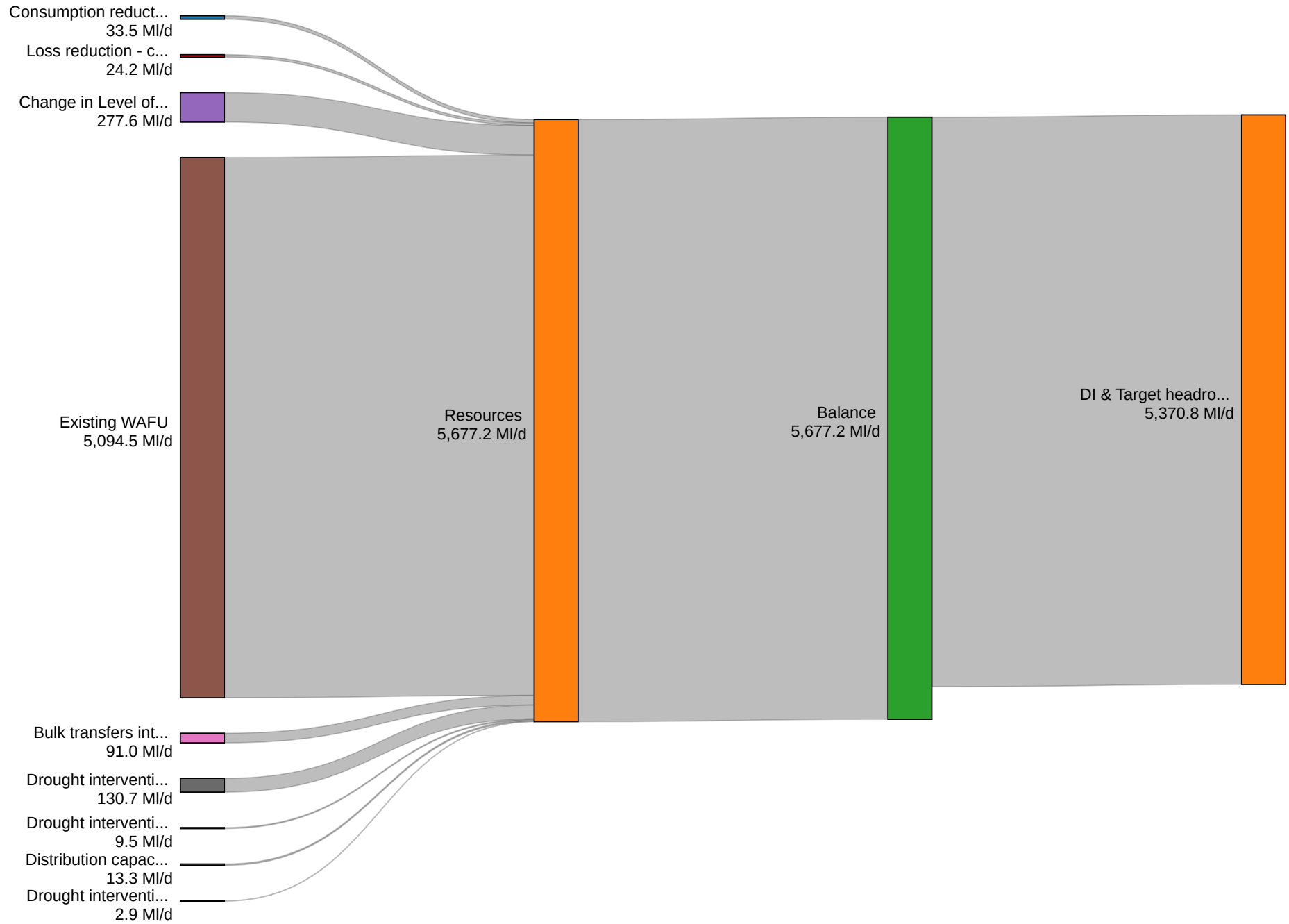
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

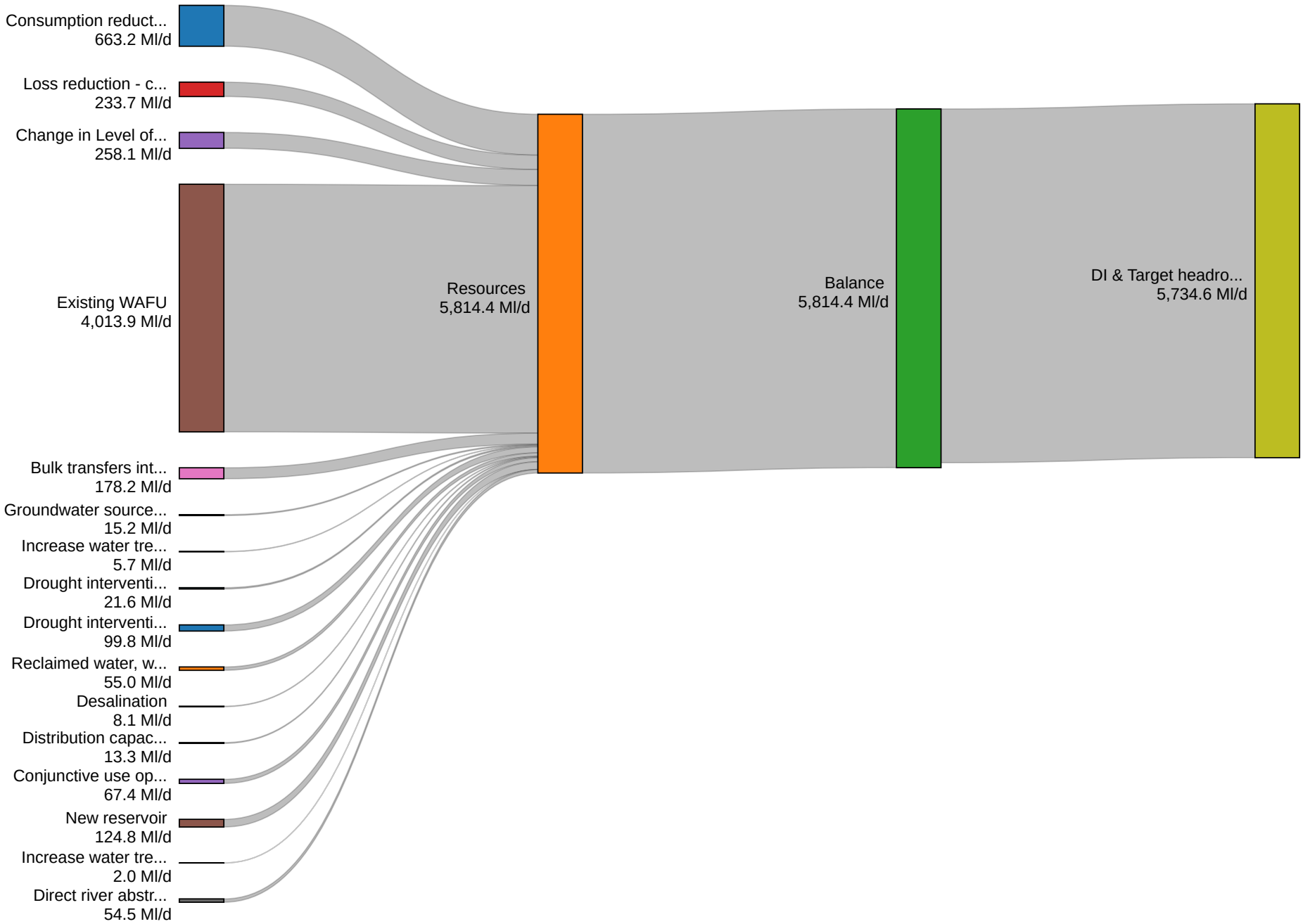


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

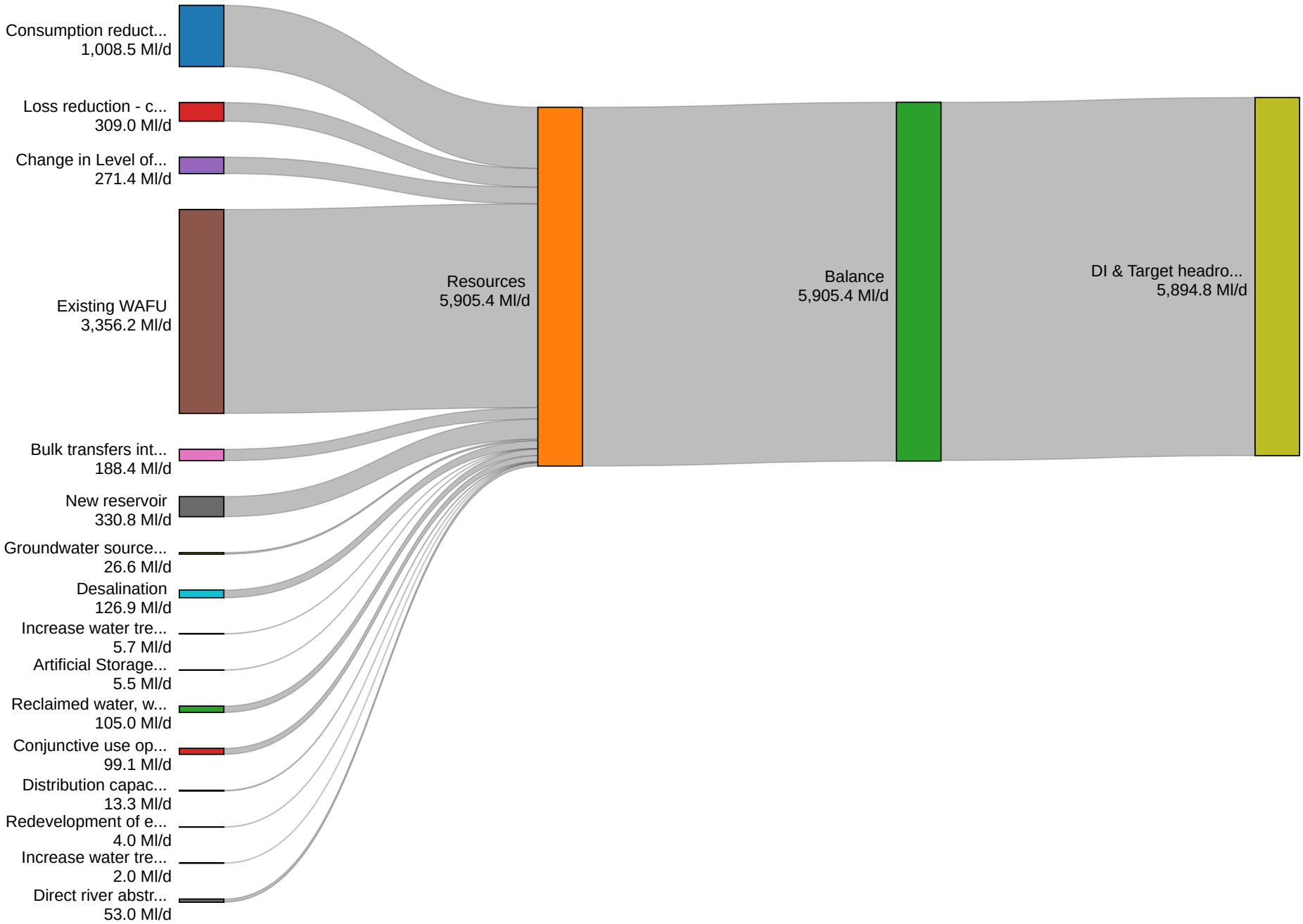
Situation 4 - 2026 (Thames Water)



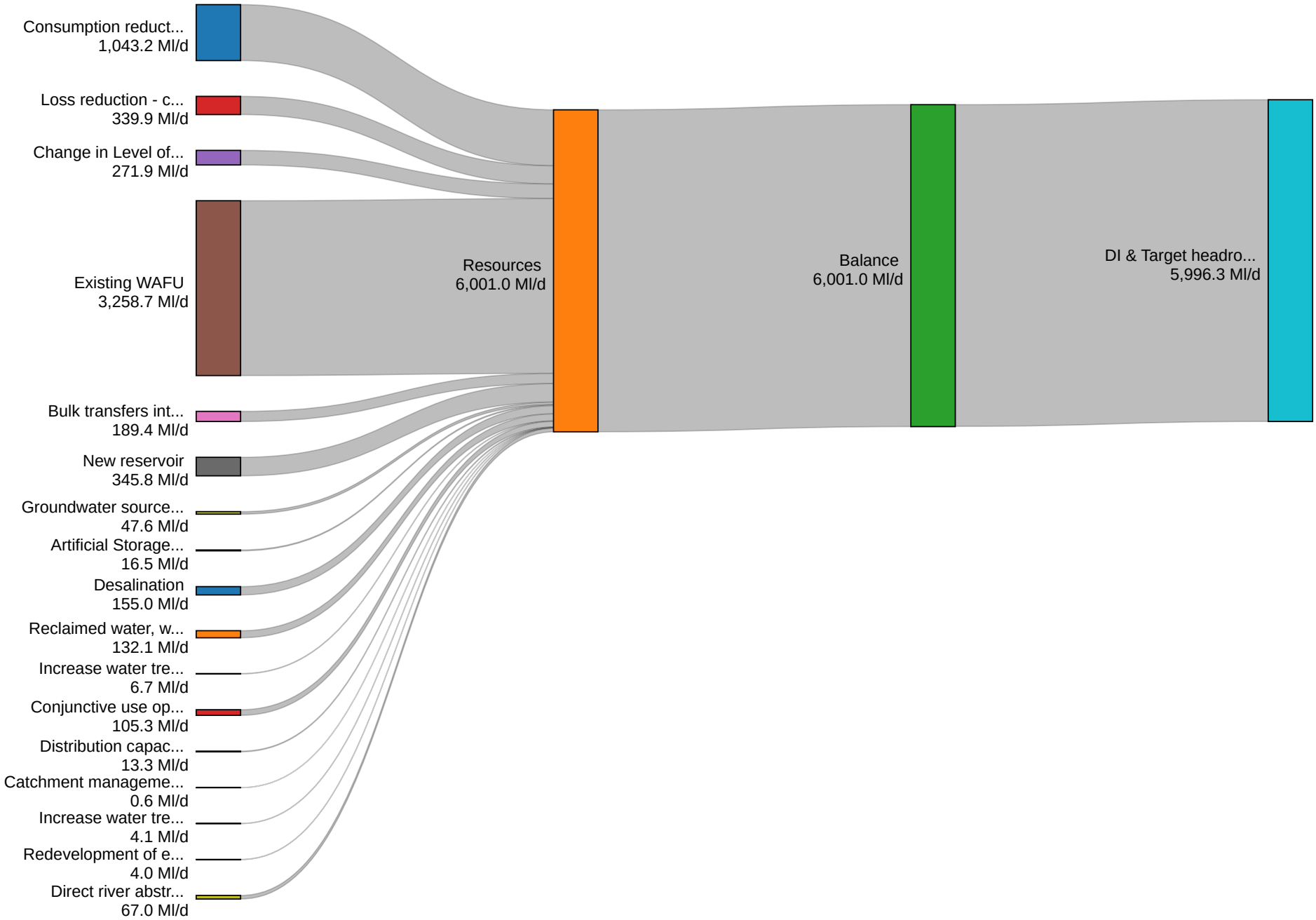
Situation 4 - 2040 (Thames Water)



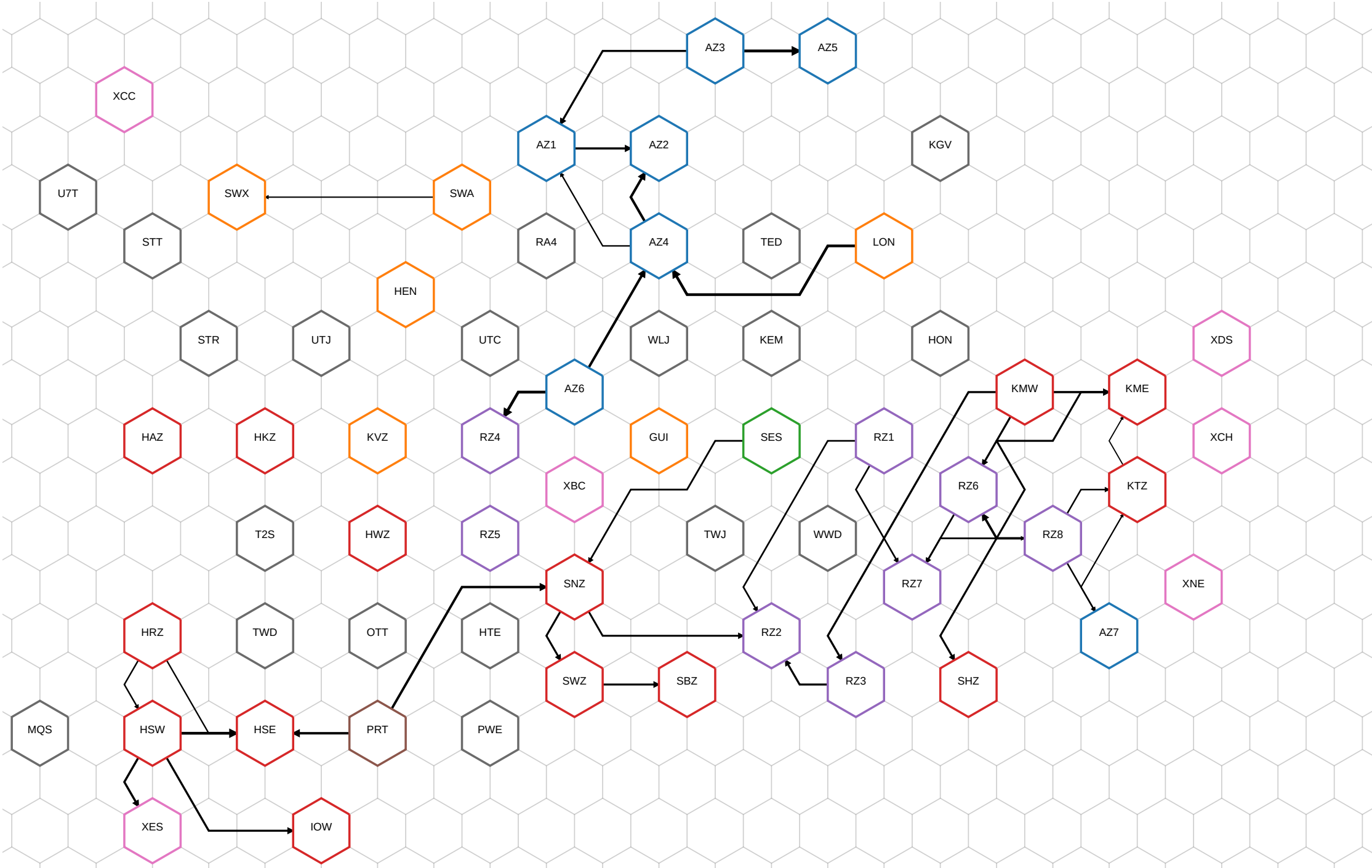
Situation 4 - 2050 (Thames Water)



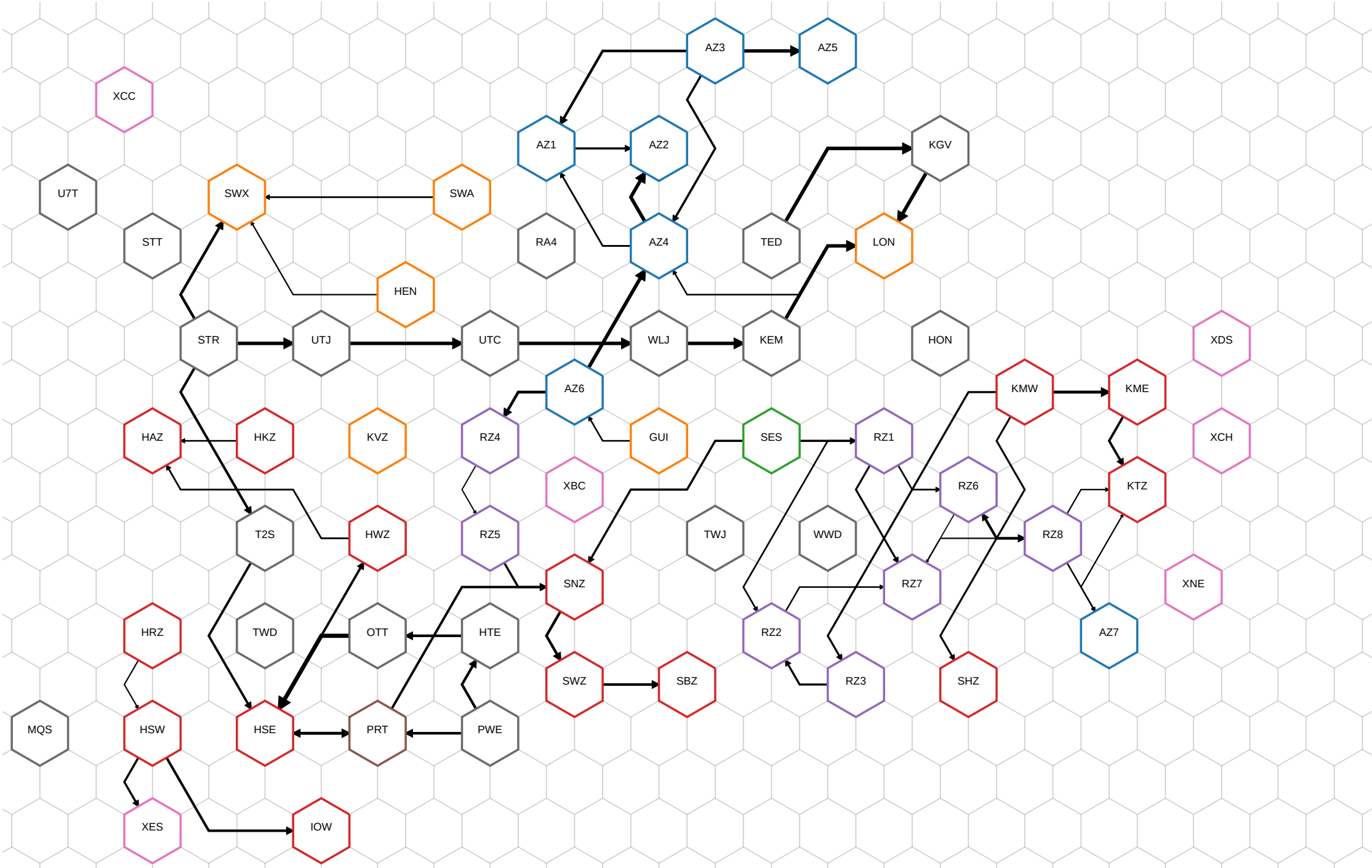
Situation 4 - 2075 (Thames Water)



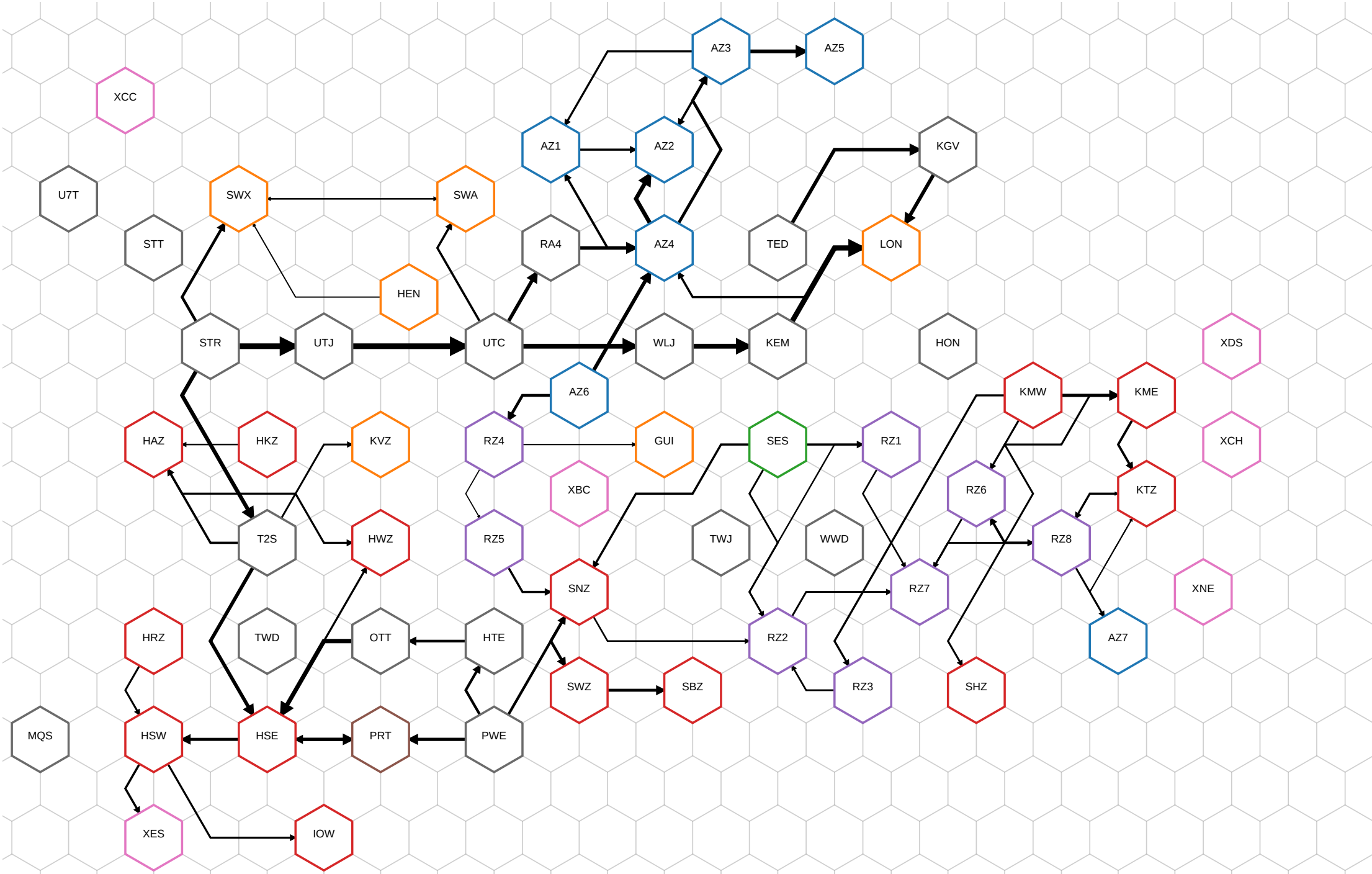
Situation 4 - 2026



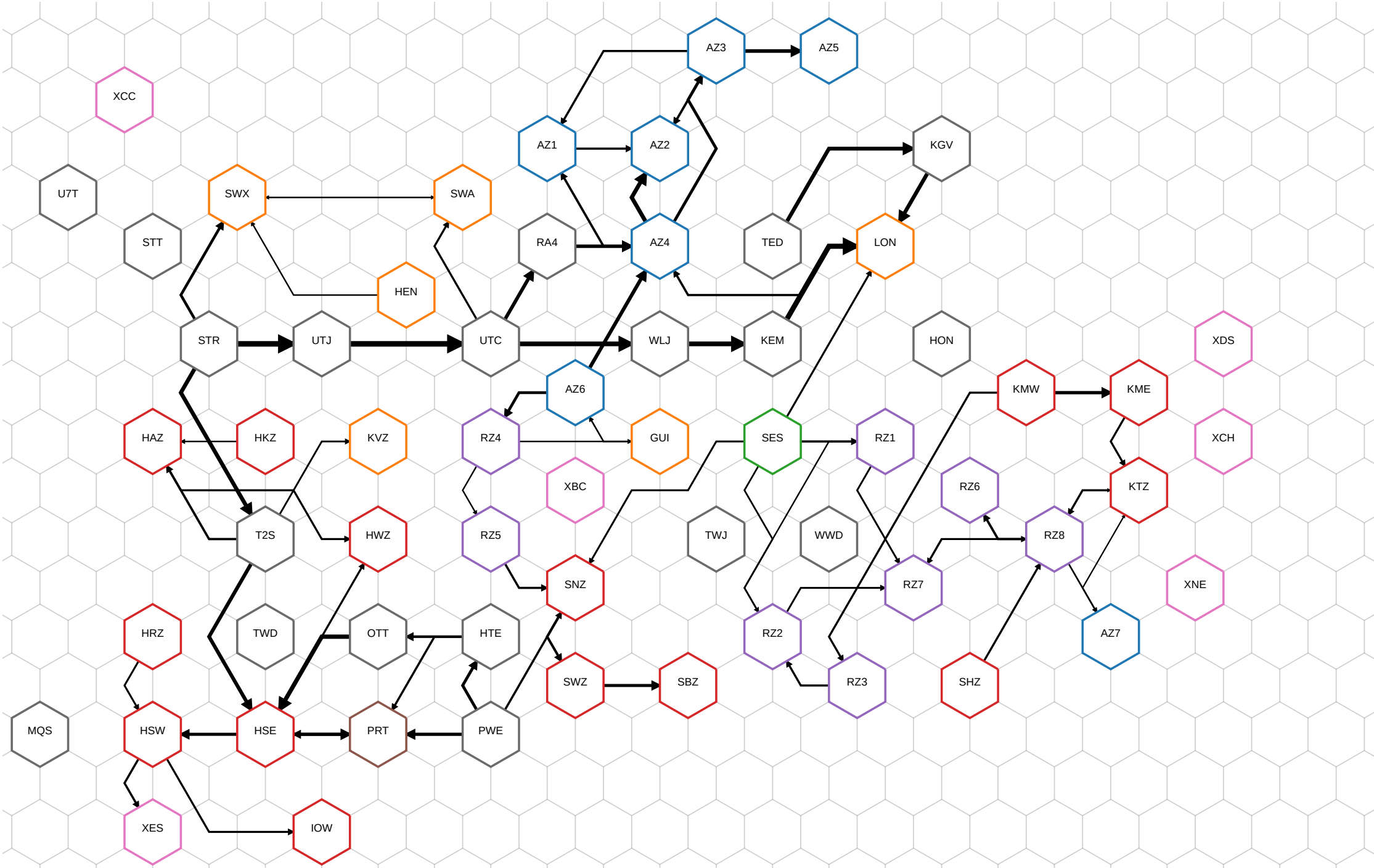
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GENERAL BVP + SESRO 125

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50-2075-bvp-07_50-v3
Description	BVP run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 125 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	17/07/2023, 20:21:47
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro125-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 125. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

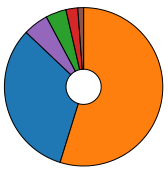
Net present value (Cost)

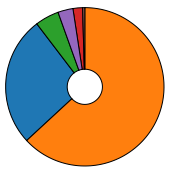
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,920	17,823	17,093	19,362	17,735	16,917	18,072	17,213	16,491	17,959	(£m)
Cost w/o deficit (STPR)	20,920	17,823	17,093	19,362	17,735	16,917	18,072	17,213	16,491	17,959	(£m)
Cost w/ deficit (IGEQ)	31,996	26,134	24,819	29,045	25,985	24,528	26,689	25,076	23,773	26,449	(£m)
Cost w/o deficit (IGEQ)	31,996	26,134	24,819	29,045	25,985	24,528	26,689	25,076	23,773	26,449	(£m)
Cost w/ deficit (LTDR)	23,063	19,460	18,621	21,251	19,361	18,424	19,764	18,766	17,936	19,627	(£m)
Cost w/o deficit (LTDR)	23,063	19,460	18,621	21,251	19,361	18,424	19,764	18,766	17,936	19,627	(£m)

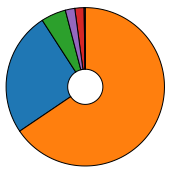
Cost breakdown (STPR)

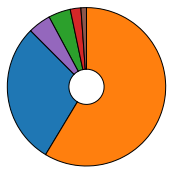
Select Company: Total

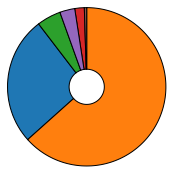
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,753	4,725	4,331	5,595	4,651	4,173	4,823	4,376	3,929	4,817	(£m)
Fixed opex	11,463	11,251	11,201	11,353	11,241	11,185	11,254	11,202	11,142	11,254	(£m)
Fixed operational carbon	884	869	868	877	870	870	871	867	866	871	(£m)
Embedded carbon	503	349	324	420	346	316	365	327	299	361	(£m)
Variable opex	1,070	549	328	898	543	323	657	401	237	556	(£m)
Variable carbon opex	247	81	40	219	85	51	102	41	18	98	(£m)

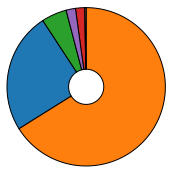
situation1 

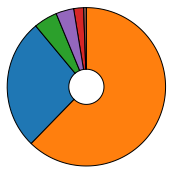
situation2 

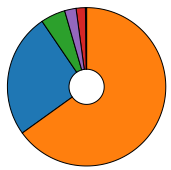
situation3 

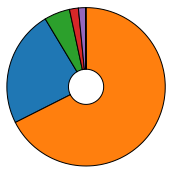
situation4 

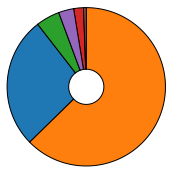
situation5 

situation6 

situation7 

situation8 

situation9 

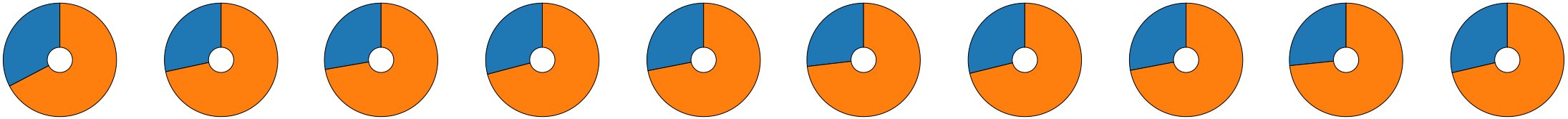
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,237,807	2,132,356	1,968,930	2,630,567	2,113,879	1,915,189	2,258,703	1,993,037	1,807,760	2,228,692	(tonnes)
Operational emissions	6,679,858	5,385,598	5,135,825	6,413,821	5,417,893	5,216,489	5,573,860	5,134,830	4,980,417	5,548,732	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

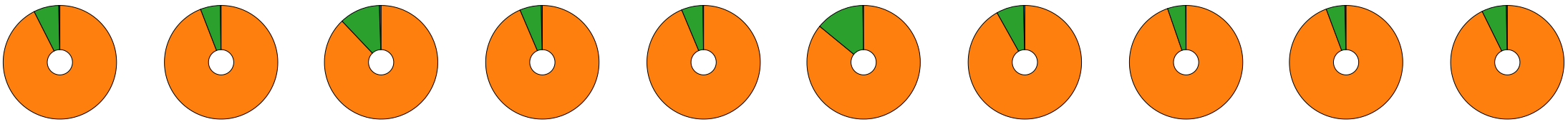


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	85	32	25	74	27	11	57	12	11	37	(GWh)
Grid	22,671	11,363	4,286	19,467	10,971	3,874	13,207	7,979	2,916	10,748	(GWh)
Renewable	1,747	680	565	1,264	713	625	1,115	433	165	812	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,508	65,338	65,338	69,341	65,338	65,338	66,099	65,338	65,338	65,886
SEA environmental disbenefit	105,001	79,026	72,960	103,064	77,810	71,879	82,459	69,518	62,472	80,465
Natural capital	83,975,600	81,616,396	81,908,760	81,270,674	81,125,975	81,900,192	81,278,392	82,048,040	82,368,763	81,943,644
Bio-diversity net gain	−189,168	−140,381	−118,110	−197,535	−138,945	−113,064	−142,348	−115,346	−90,253	−138,350

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,473	35,108	34,847	36,864	35,152	34,820	35,293	34,579	34,247	35,265

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.21	28.81	31.52	28.86	29.01	31.67	30.35	33.66	37.48	31.18
R1: Uncertainty of option supply/demand benefit	6.07	5.35	5.82	5.76	5.40	5.85	5.77	6.29	6.98	5.92
R3: Risk of service failure due to other physical hazards	6.90	7.13	7.98	6.92	7.18	8.02	7.48	8.49	9.69	7.75
R4: Availability of additional headroom	6.56	6.90	7.10	6.64	6.92	7.13	7.24	7.60	7.84	7.10
R5: Catchment/raw water quality risks (incl. climate change)	4.04	4.01	4.54	3.76	4.04	4.56	4.17	4.81	5.56	4.39
R6: Capacity of catchment services	0.31	0.01	0.01	0.31	0.00	0.01	0.00	0.01	0.01	0.07
R7: Risk of service failure to other exceptional events	5.23	5.42	6.08	5.36	5.47	6.12	5.69	6.46	7.40	5.91
R8: Soil health	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.03

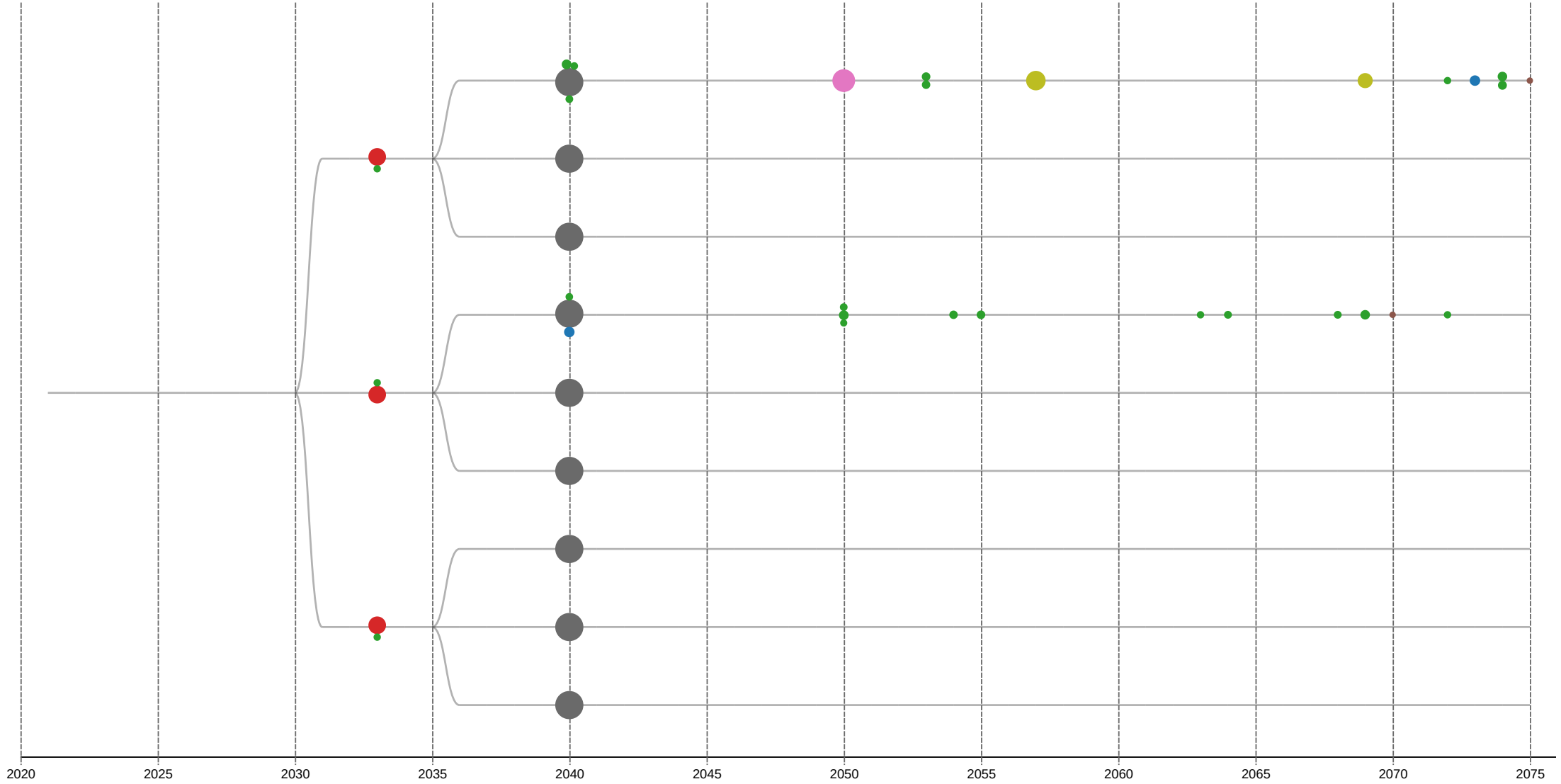
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.36	15.40	17.23	14.28	15.48	17.08	15.97	18.19	20.71	16.52
A3: Operational complexity and flexibility	6.40	6.85	7.70	6.60	6.92	7.77	7.16	8.22	9.44	7.45
A4: WRZ connectivity	7.83	8.52	9.50	7.55	8.54	9.27	8.78	9.94	11.23	9.02
A7: Customer relations support engagement with demand management	0.13	0.03	0.03	0.13	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.65	19.70	21.86	19.63	19.88	21.96	20.60	23.39	26.50	21.46
E1: Scaleability and modularity of proposed changes	8.83	9.28	10.34	8.82	9.38	10.43	9.65	11.07	12.61	10.04
E2: Intervention lead times	4.14	4.03	4.41	4.12	4.06	4.37	4.28	4.71	5.24	4.37
E3: Reliance on external bodies to deliver changes	6.22	6.37	7.10	6.23	6.43	7.15	6.67	7.60	8.65	6.93
E5: Collaborative land management	0.46	0.01	0.01	0.46	0.01	0.01	0.00	0.01	0.01	0.11

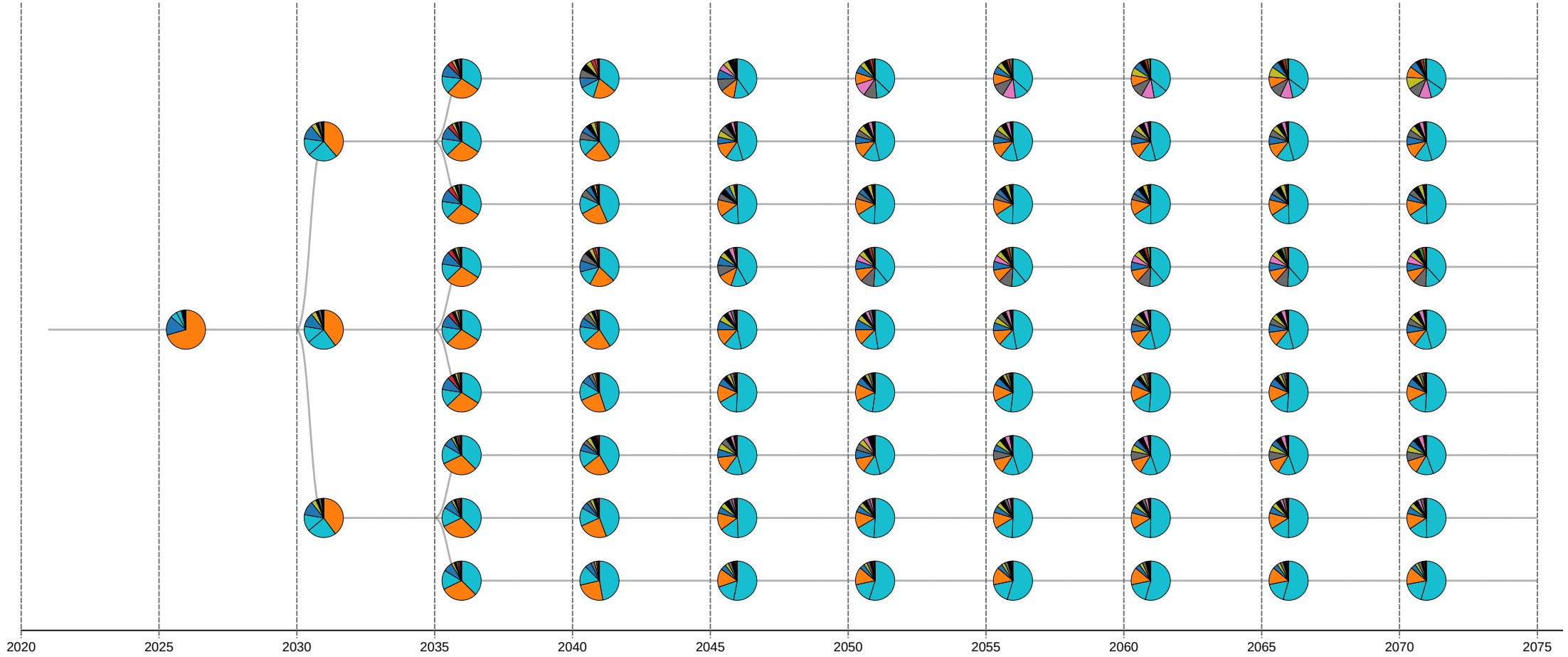
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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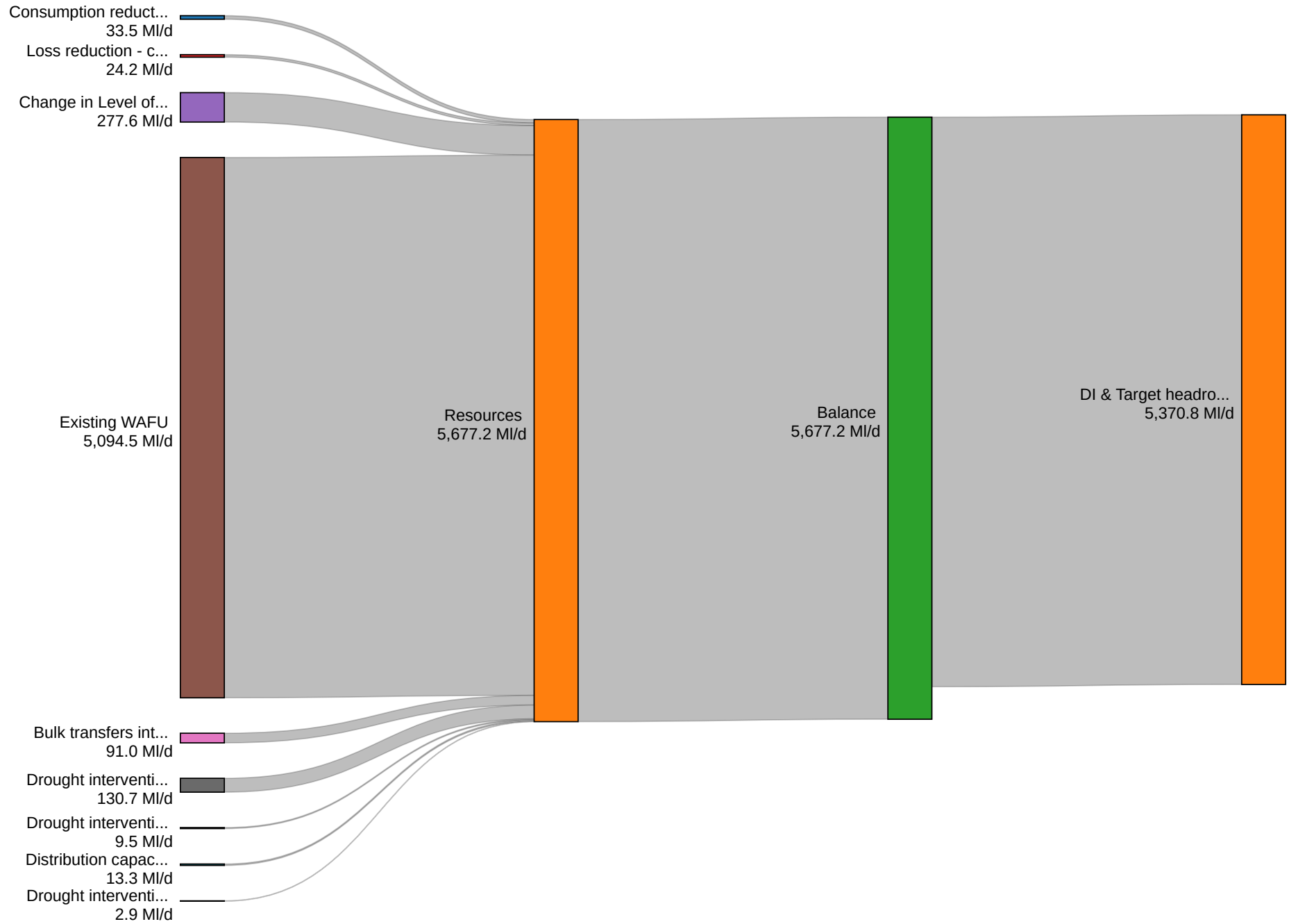
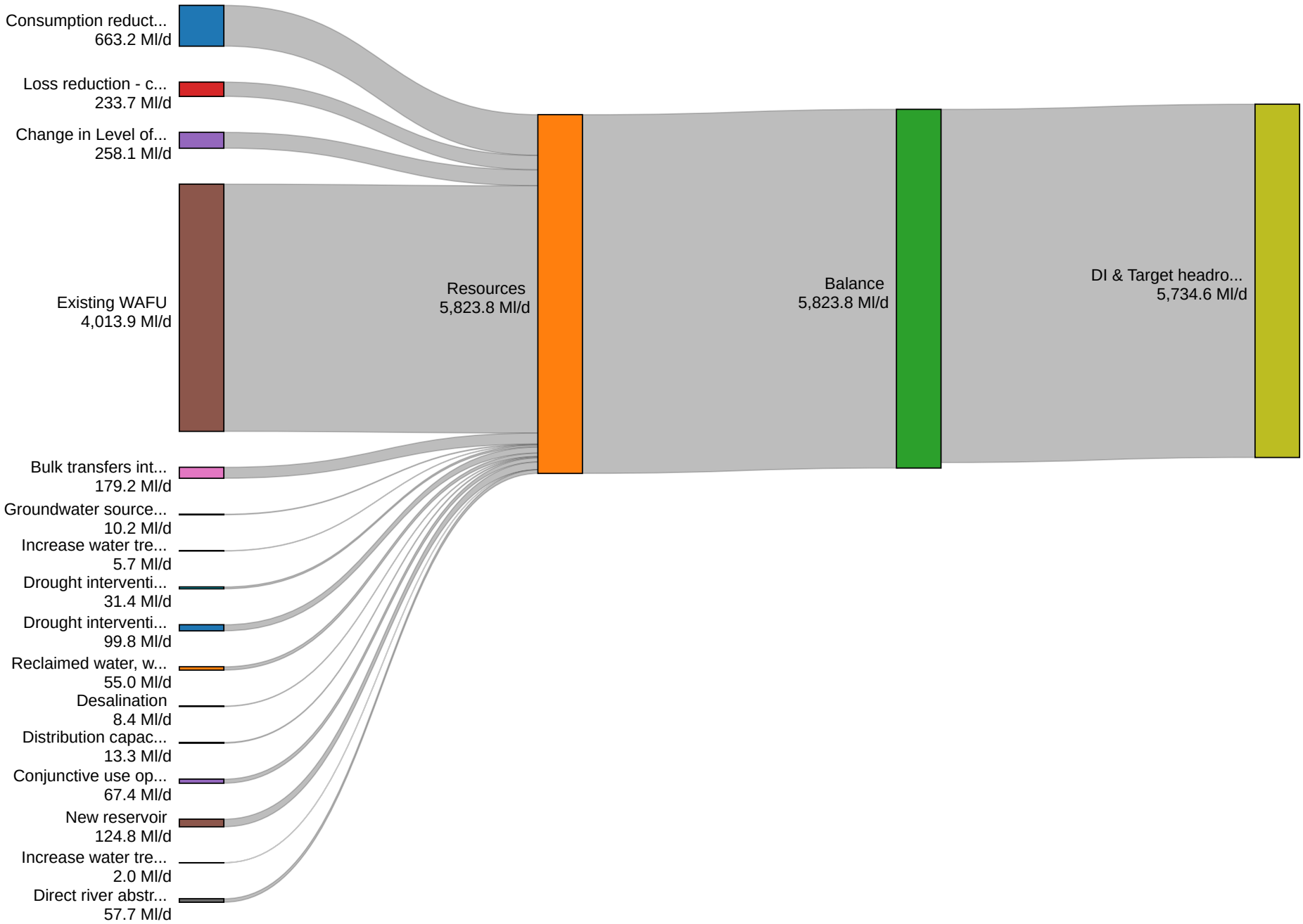
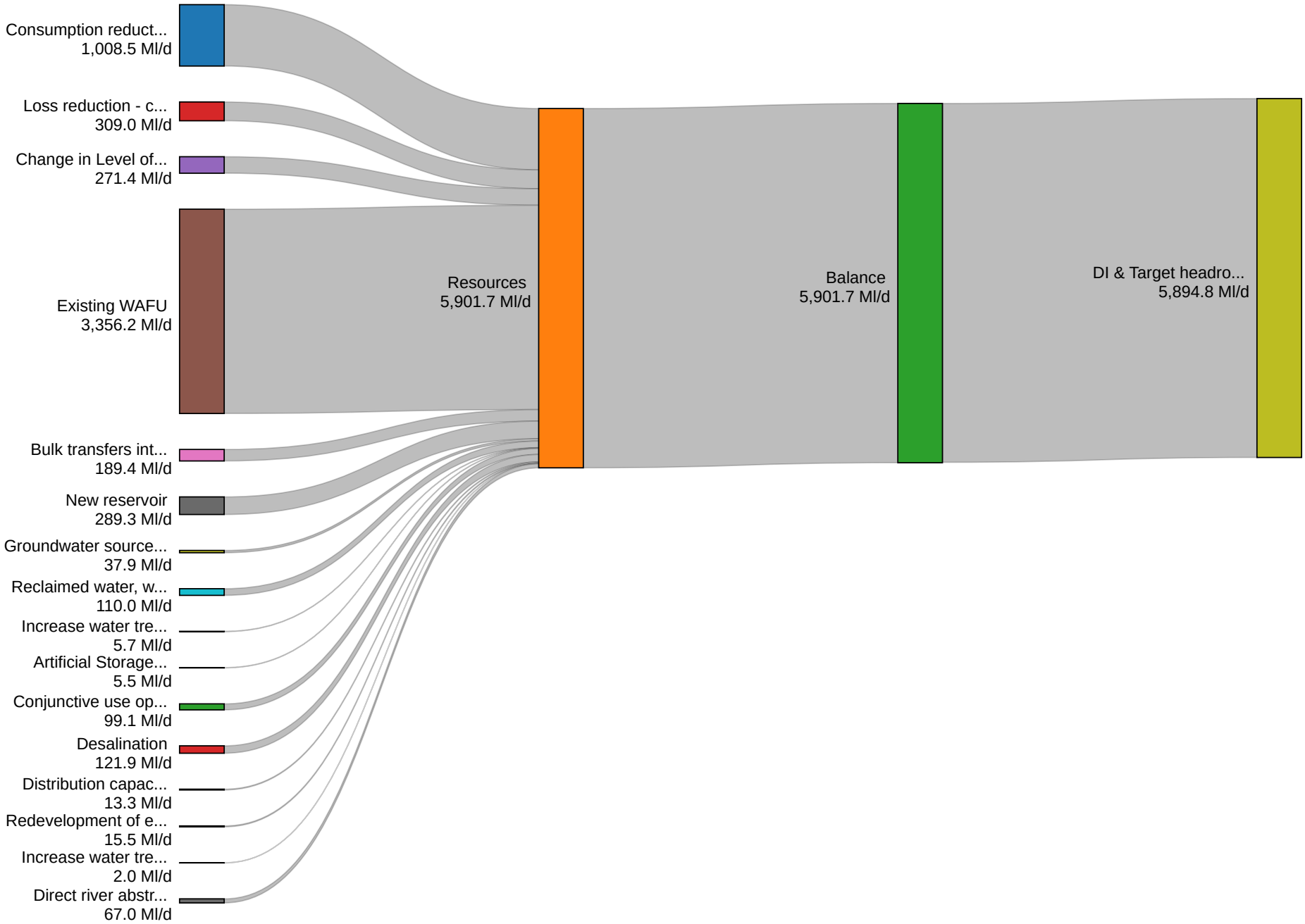
Situation 4 - 2026 (Thames Water)



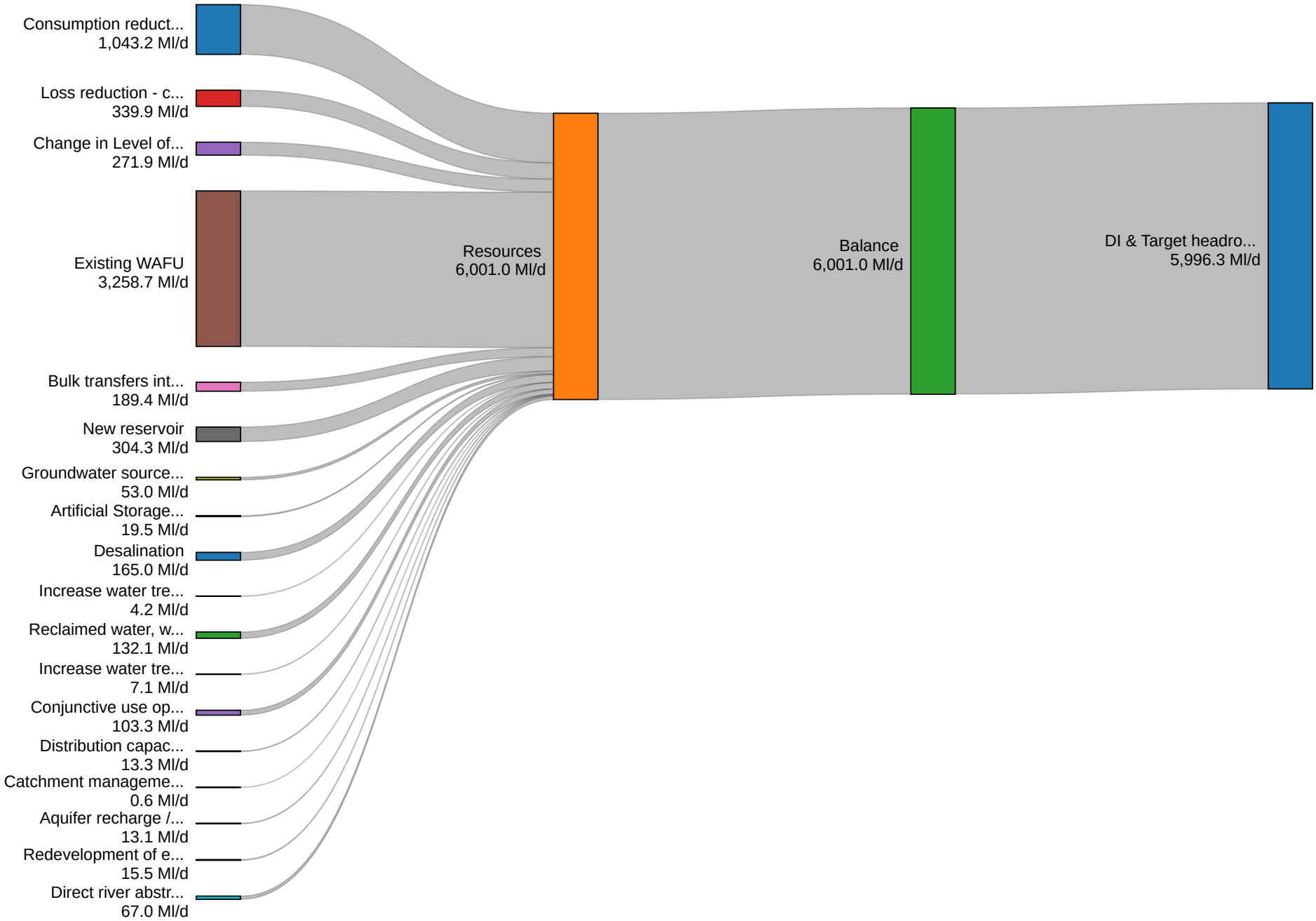
Situation 4 - 2040 (Thames Water)



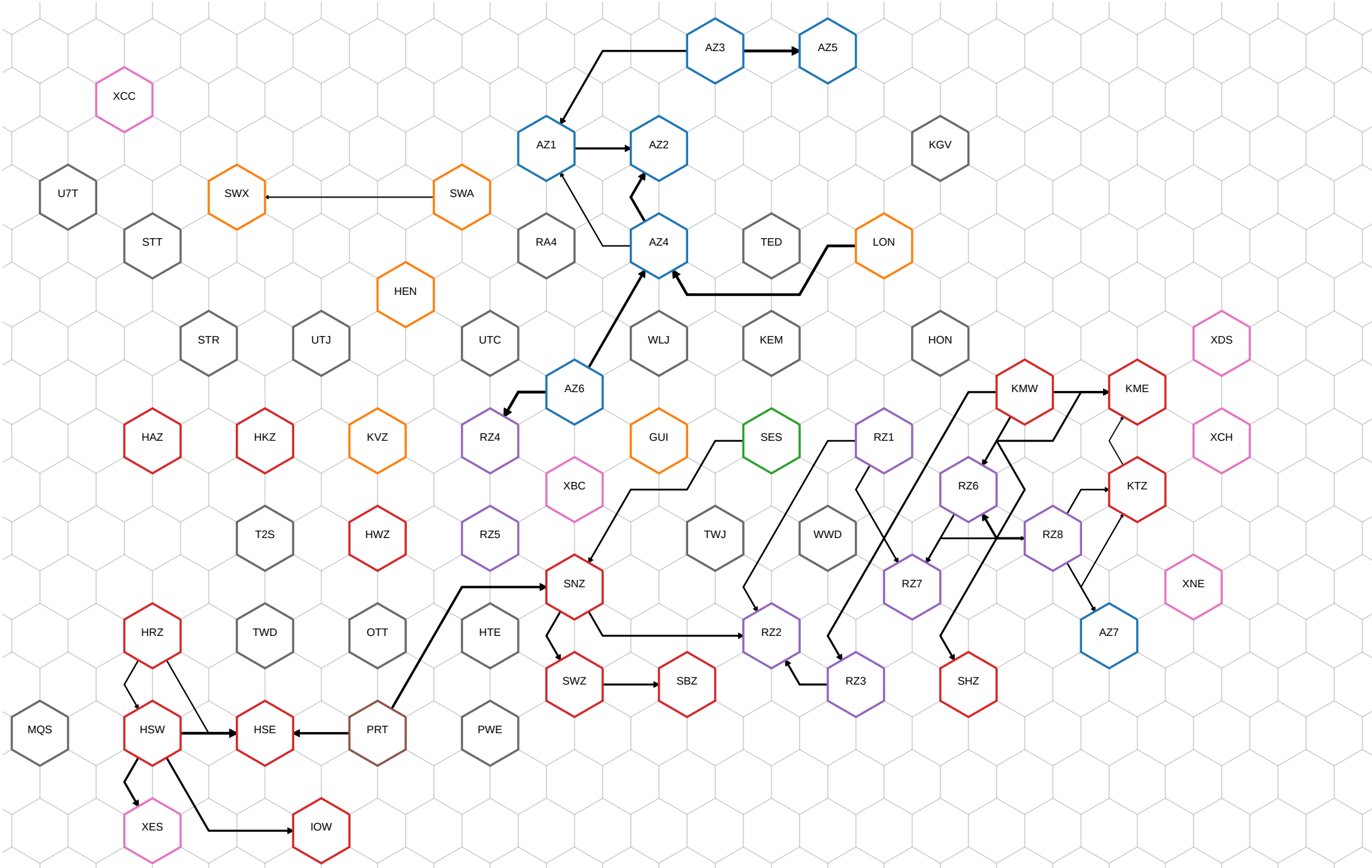
Situation 4 - 2050 (Thames Water)



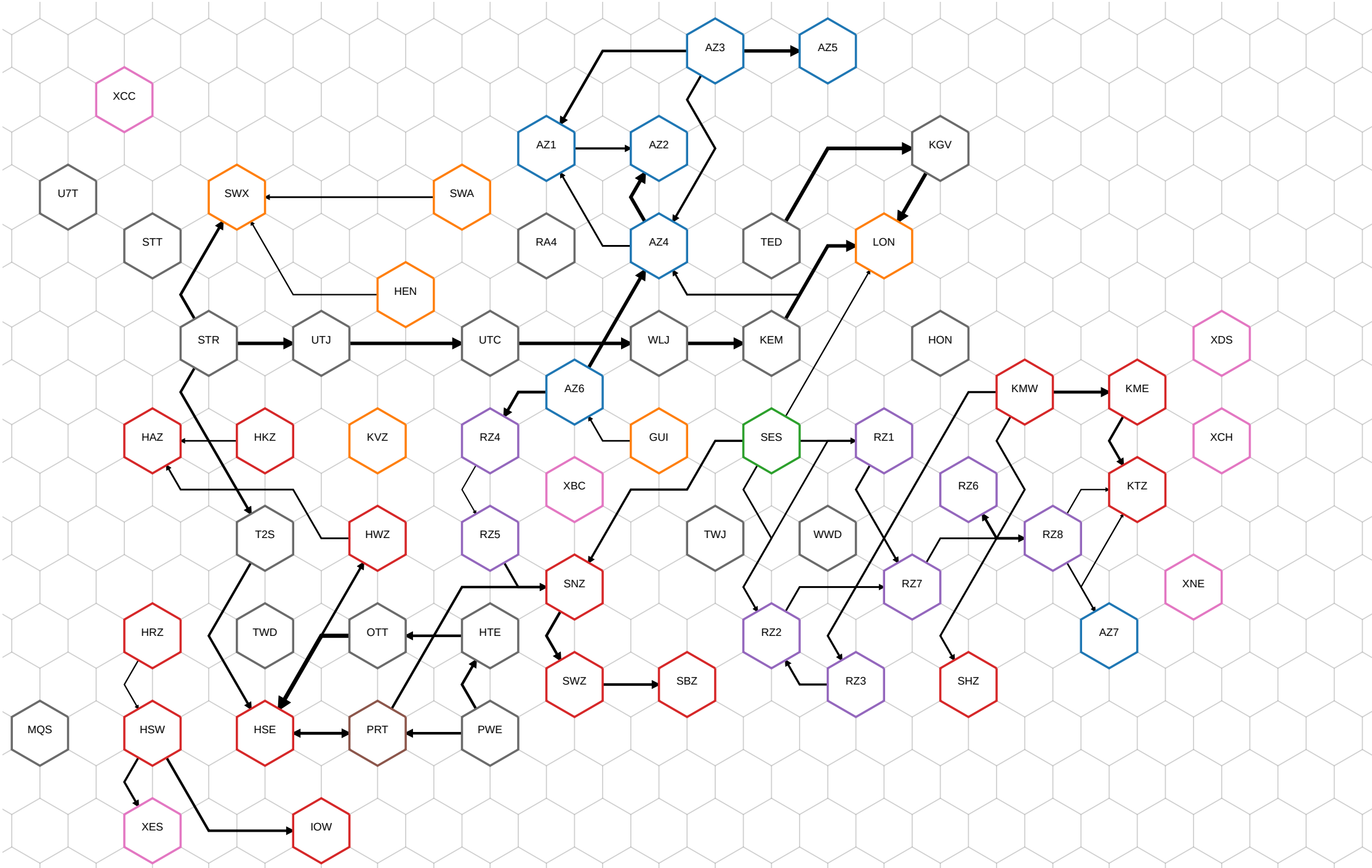
Situation 4 - 2075 (Thames Water)



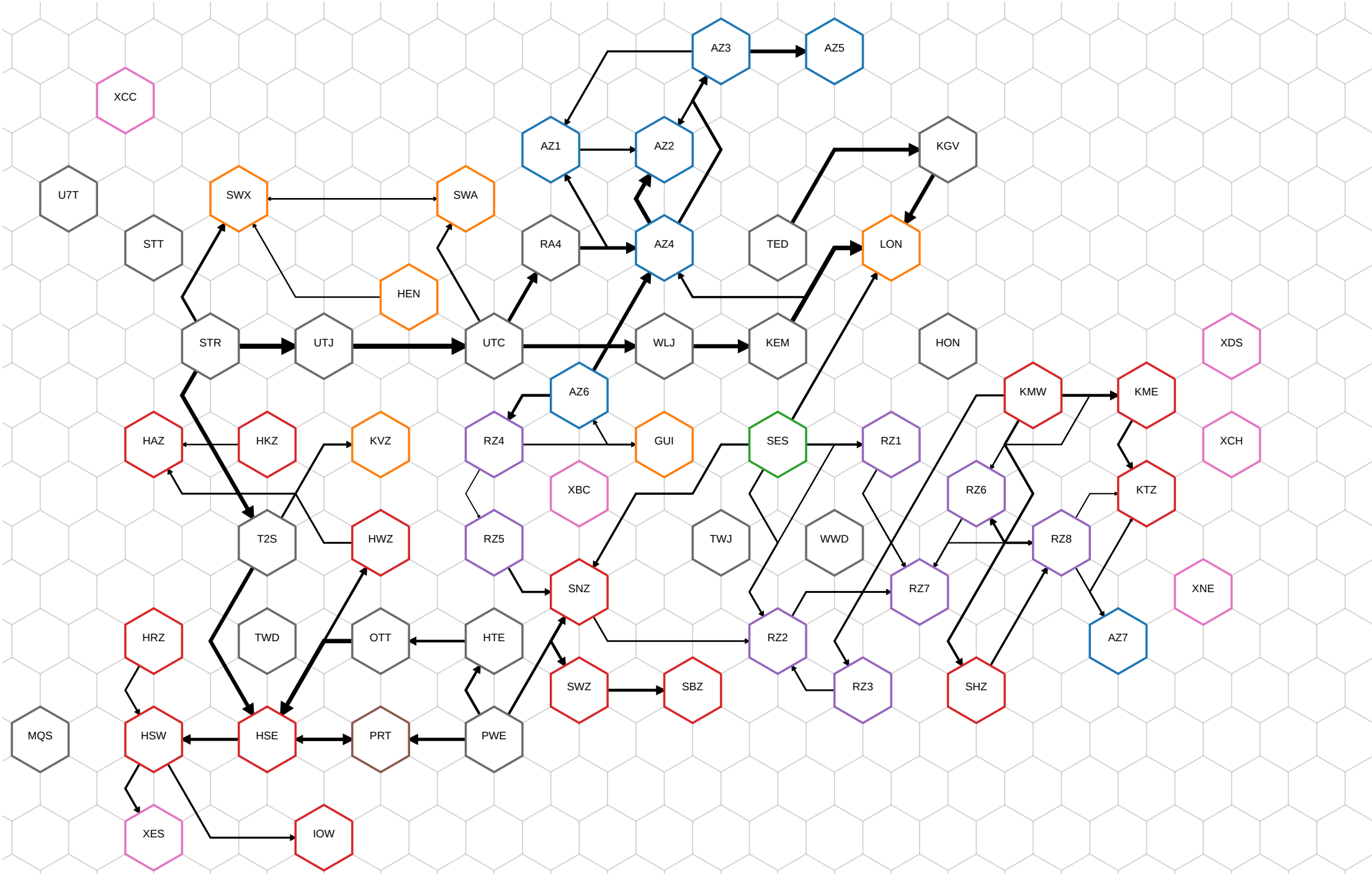
Situation 4 - 2026



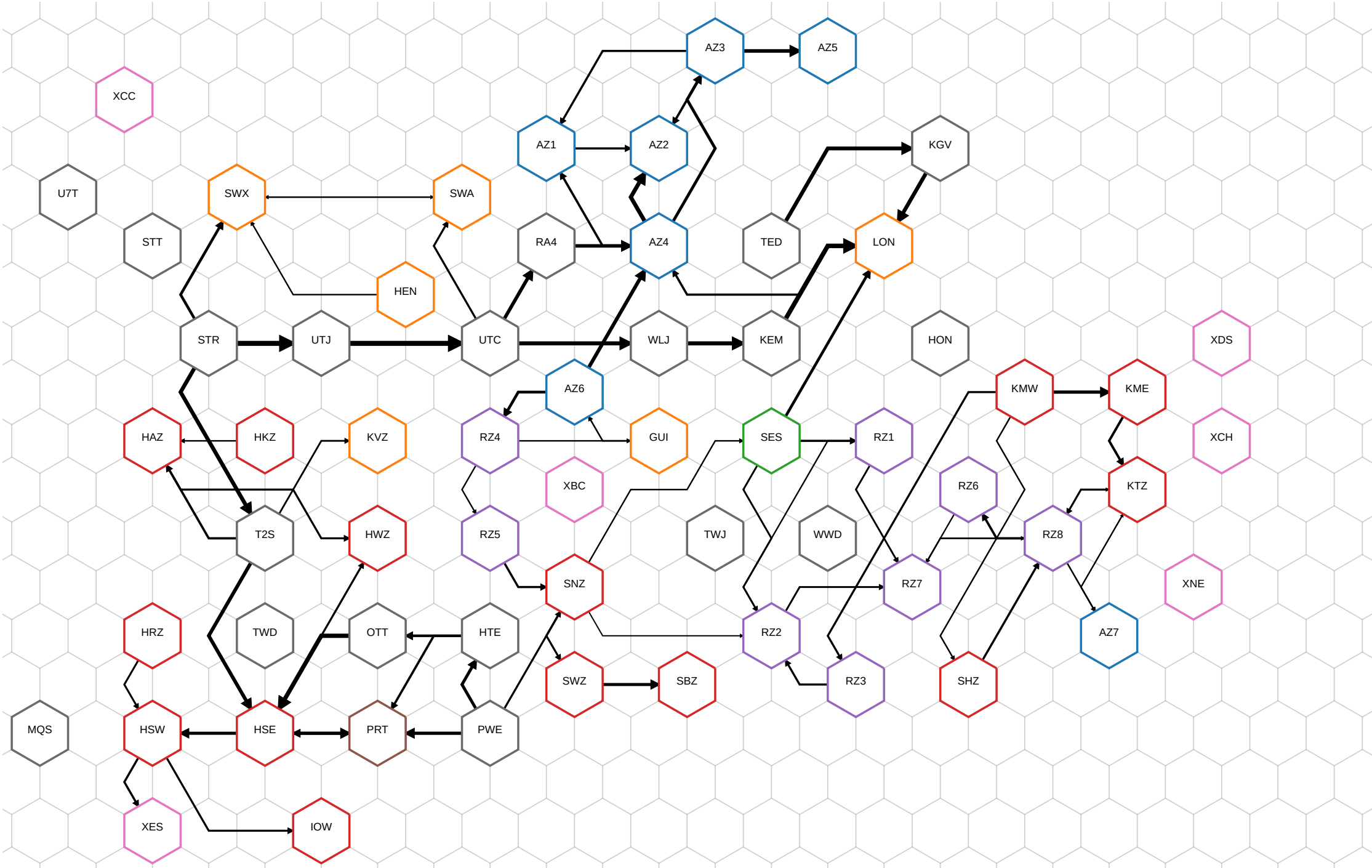
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GENERAL BVP + SESRO 100

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50-2075-bvp-07_50-v3
Description	BVP run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 100 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	17/07/2023, 21:18:00
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro100-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 100. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

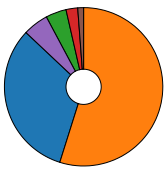
Net present value (Cost)

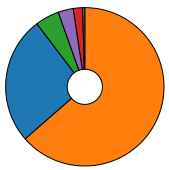
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,915	17,709	16,970	19,450	17,602	16,783	17,971	17,109	16,385	17,877	(£m)
Cost w/o deficit (STPR)	20,915	17,709	16,970	19,450	17,602	16,783	17,971	17,109	16,385	17,877	(£m)
Cost w/ deficit (IGEQ)	32,065	25,976	24,637	29,274	25,797	24,335	26,552	24,936	23,629	26,356	(£m)
Cost w/o deficit (IGEQ)	32,065	25,976	24,637	29,274	25,797	24,335	26,552	24,936	23,629	26,356	(£m)
Cost w/ deficit (LTDR)	23,070	19,338	18,487	21,364	19,217	18,278	19,655	18,655	17,822	19,543	(£m)
Cost w/o deficit (LTDR)	23,070	19,338	18,487	21,364	19,217	18,278	19,655	18,655	17,822	19,543	(£m)

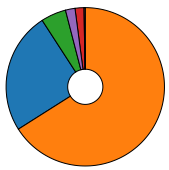
Cost breakdown (STPR)

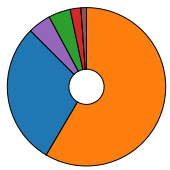
Select Company: Total

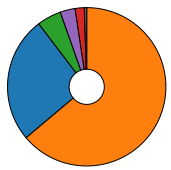
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,728	4,622	4,214	5,649	4,539	4,057	4,732	4,281	3,831	4,739	(£m)
Fixed opex	11,473	11,255	11,202	11,373	11,242	11,185	11,258	11,205	11,146	11,260	(£m)
Fixed operational carbon	884	869	870	877	869	869	873	868	867	872	(£m)
Embedded carbon	499	338	311	423	336	305	356	318	290	353	(£m)
Variable opex	1,083	545	329	907	533	317	651	395	233	555	(£m)
Variable carbon opex	248	81	43	221	84	51	101	41	18	99	(£m)

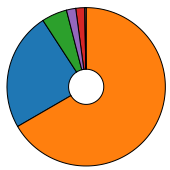
situation1 

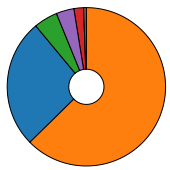
situation2 

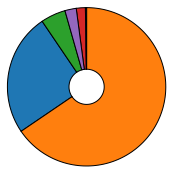
situation3 

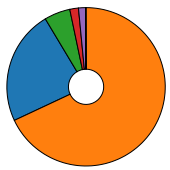
situation4 

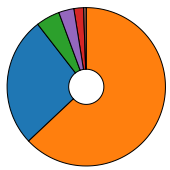
situation5 

situation6 

situation7 

situation8 

situation9 

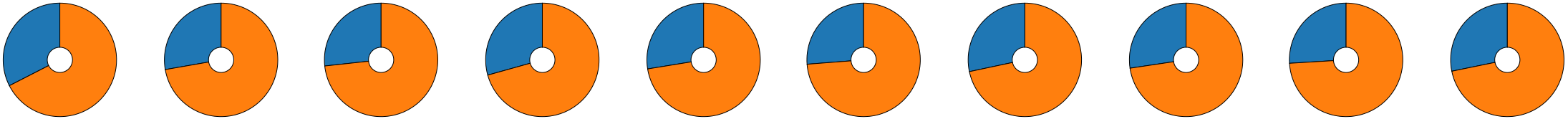
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,225,180	2,068,249	1,885,191	2,668,325	2,056,526	1,851,224	2,205,161	1,936,893	1,750,319	2,183,008	(tonnes)
Operational emissions	6,692,577	5,386,200	5,168,054	6,428,763	5,406,295	5,206,765	5,579,642	5,145,321	4,991,360	5,556,109	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

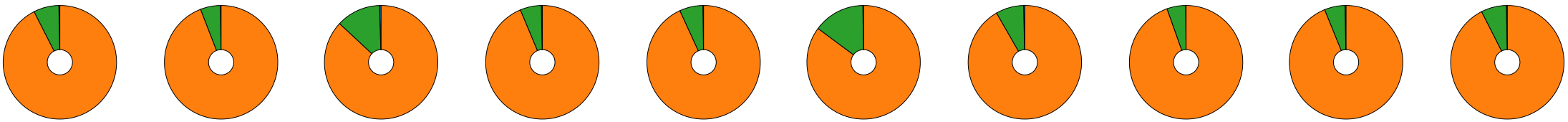


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	72	29	23	65	24	10	52	11	10	33	(GWh)
Grid	22,736	11,328	4,260	19,693	10,737	3,816	13,108	7,941	2,911	10,725	(GWh)
Renewable	1,772	680	619	1,263	767	656	1,135	448	181	836	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,692	65,338	65,338	68,993	65,338	65,338	65,844	65,338	65,338	65,840
SEA environmental disbenefit	104,995	78,108	71,521	102,778	76,394	70,672	83,288	70,138	63,117	80,112
Natural capital	84,722,539	80,937,505	82,761,460	80,957,004	80,934,393	82,702,729	82,092,115	82,843,617	83,107,764	82,339,903
Bio-diversity net gain	−179,911	−122,836	−99,537	−177,610	−128,289	−99,334	−131,932	−103,677	−77,567	−124,521

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,592	35,139	34,855	36,819	35,093	34,735	35,392	34,616	34,354	35,288

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.41	28.22	30.74	28.28	28.34	30.91	29.63	32.83	36.52	30.43
R1: Uncertainty of option supply/demand benefit	5.88	5.20	5.67	5.64	5.27	5.71	5.62	6.12	6.78	5.77
R3: Risk of service failure due to other physical hazards	6.67	6.92	7.76	6.75	7.01	7.81	7.28	8.27	9.43	7.54
R4: Availability of additional headroom	6.52	6.84	7.05	6.60	6.87	7.08	7.19	7.55	7.79	7.05
R5: Catchment/raw water quality risks (incl. climate change)	4.00	3.89	4.39	3.71	3.91	4.41	4.04	4.66	5.38	4.26
R6: Capacity of catchment services	0.26	0.11	0.01	0.29	0.01	0.01	0.00	0.01	0.01	0.08
R7: Risk of service failure to other exceptional events	4.98	5.22	5.86	5.17	5.27	5.89	5.49	6.23	7.14	5.70
R8: Soil health	0.10	0.03	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.03

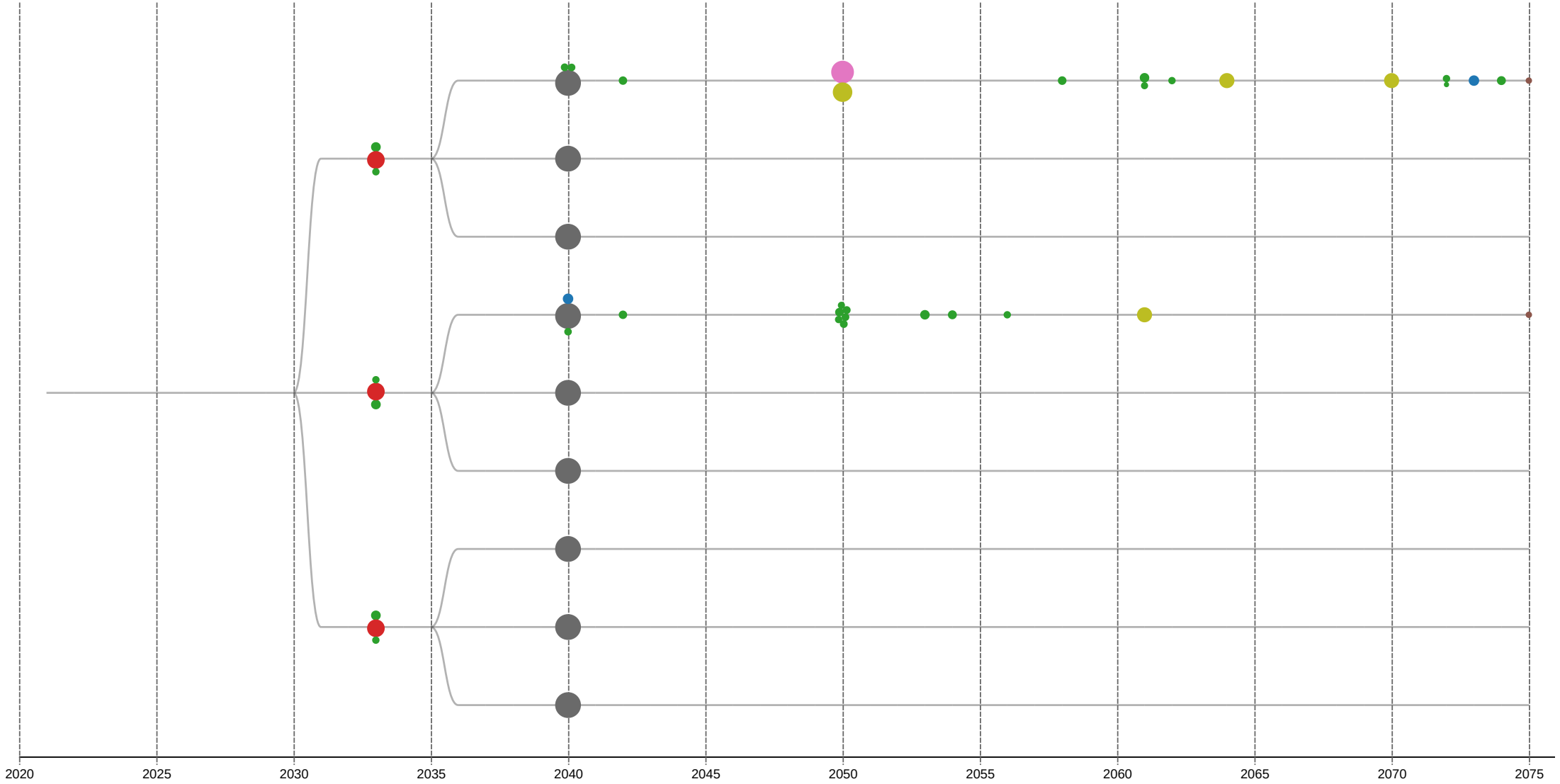
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.33	15.22	16.95	14.27	15.25	16.77	15.72	17.87	20.32	16.30
A3: Operational complexity and flexibility	6.15	6.65	7.48	6.41	6.72	7.55	6.96	7.99	9.17	7.23
A4: WRZ connectivity	8.06	8.53	9.44	7.74	8.50	9.19	8.73	9.85	11.11	9.02
A7: Customer relations support engagement with demand management	0.12	0.03	0.03	0.11	0.03	0.03	0.03	0.03	0.03	0.05

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.65	19.96	22.05	19.68	20.05	22.15	20.74	23.59	26.74	21.62
E1: Scaleability and modularity of proposed changes	8.96	9.47	10.57	9.02	9.59	10.67	9.84	11.31	12.89	10.26
E2: Intervention lead times	4.15	4.01	4.40	4.03	4.03	4.33	4.25	4.69	5.21	4.34
E3: Reliance on external bodies to deliver changes	6.14	6.35	7.08	6.21	6.42	7.14	6.65	7.58	8.62	6.91
E5: Collaborative land management	0.41	0.13	0.01	0.42	0.01	0.01	0.00	0.01	0.01	0.11

Option Selection (Thames Water)



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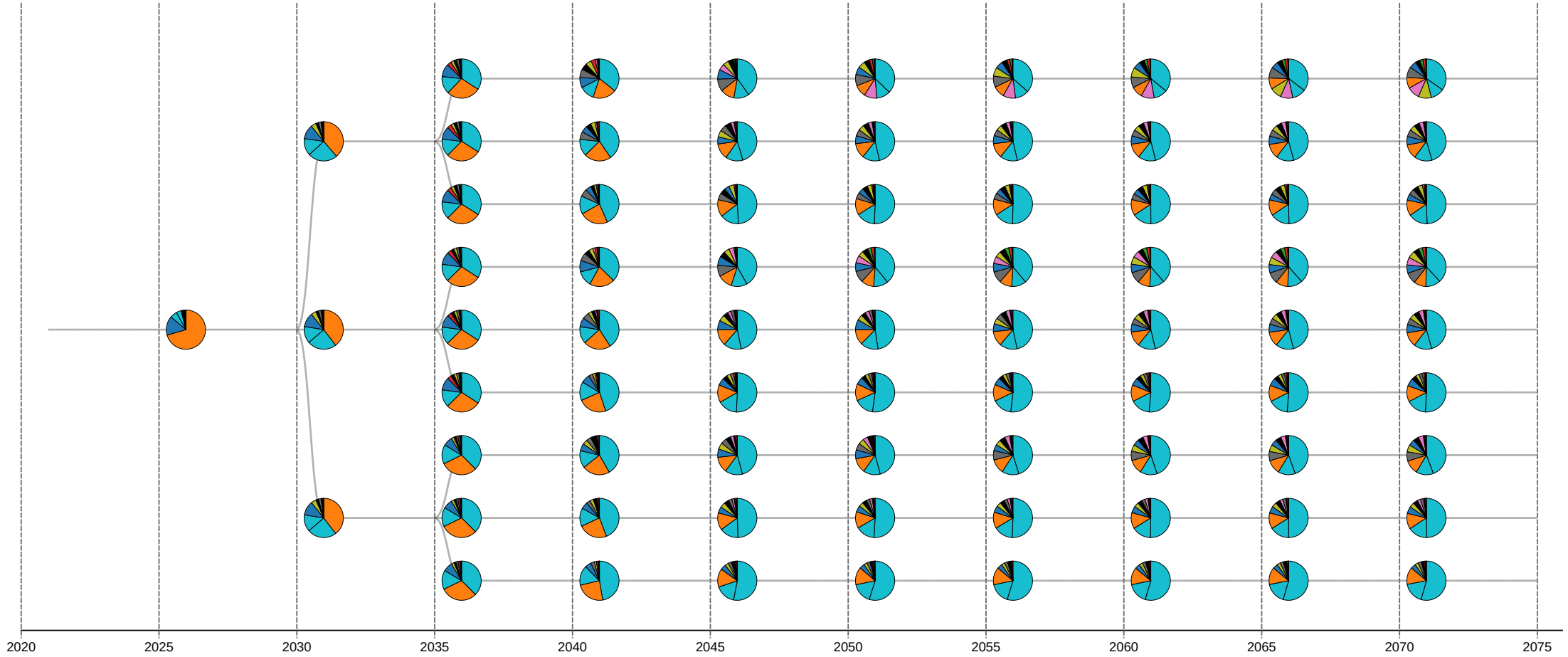
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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- Catchment management
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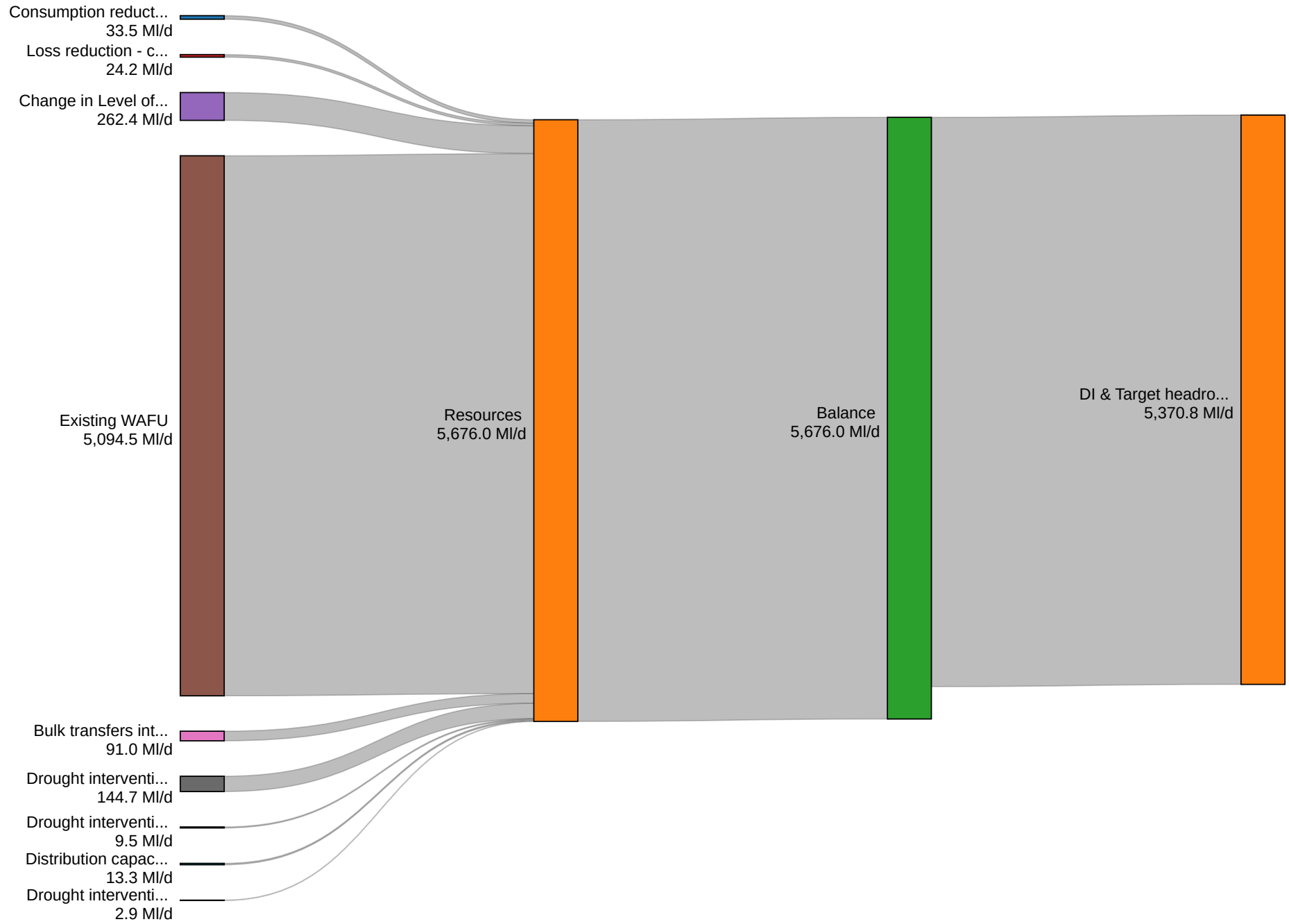
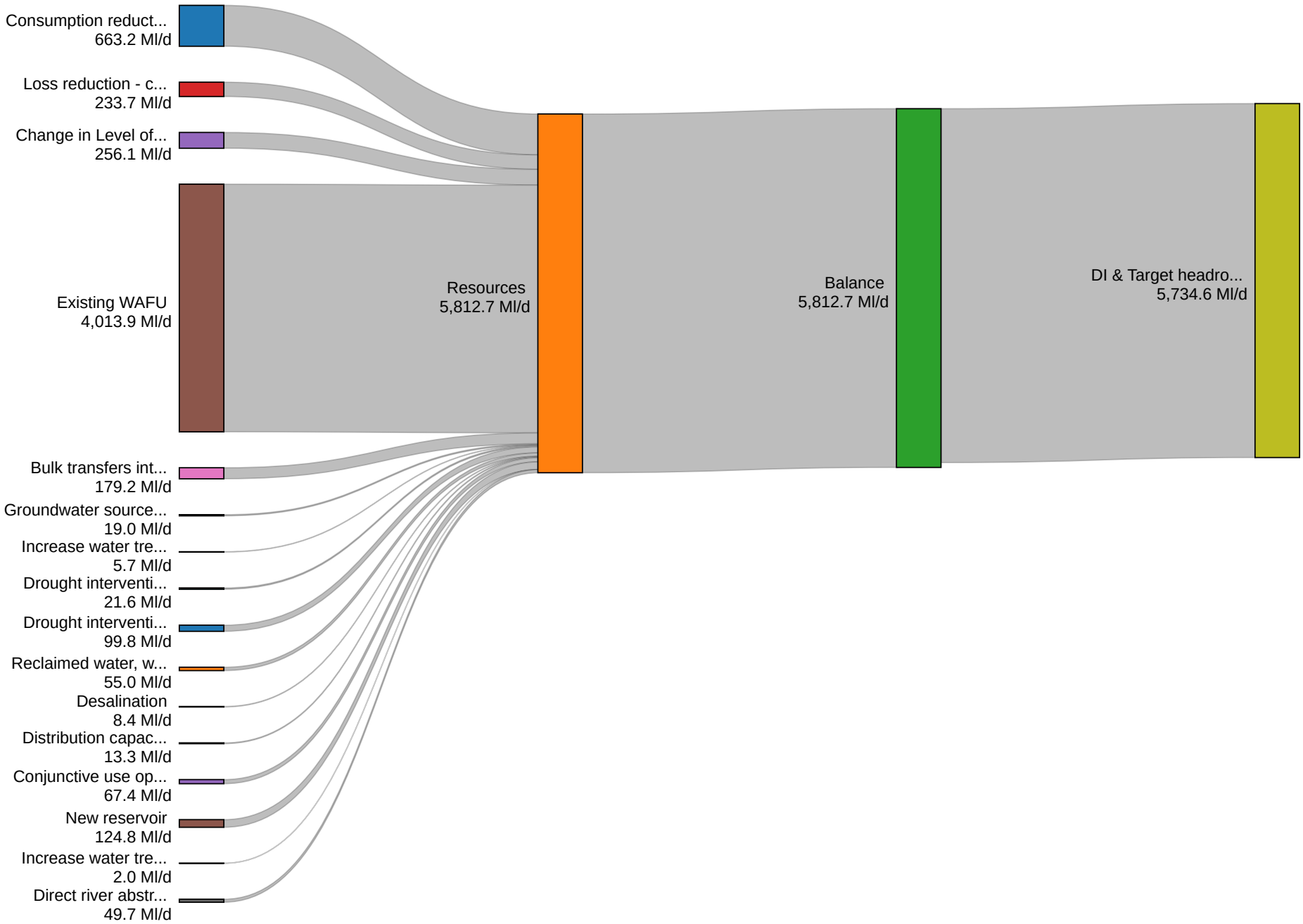
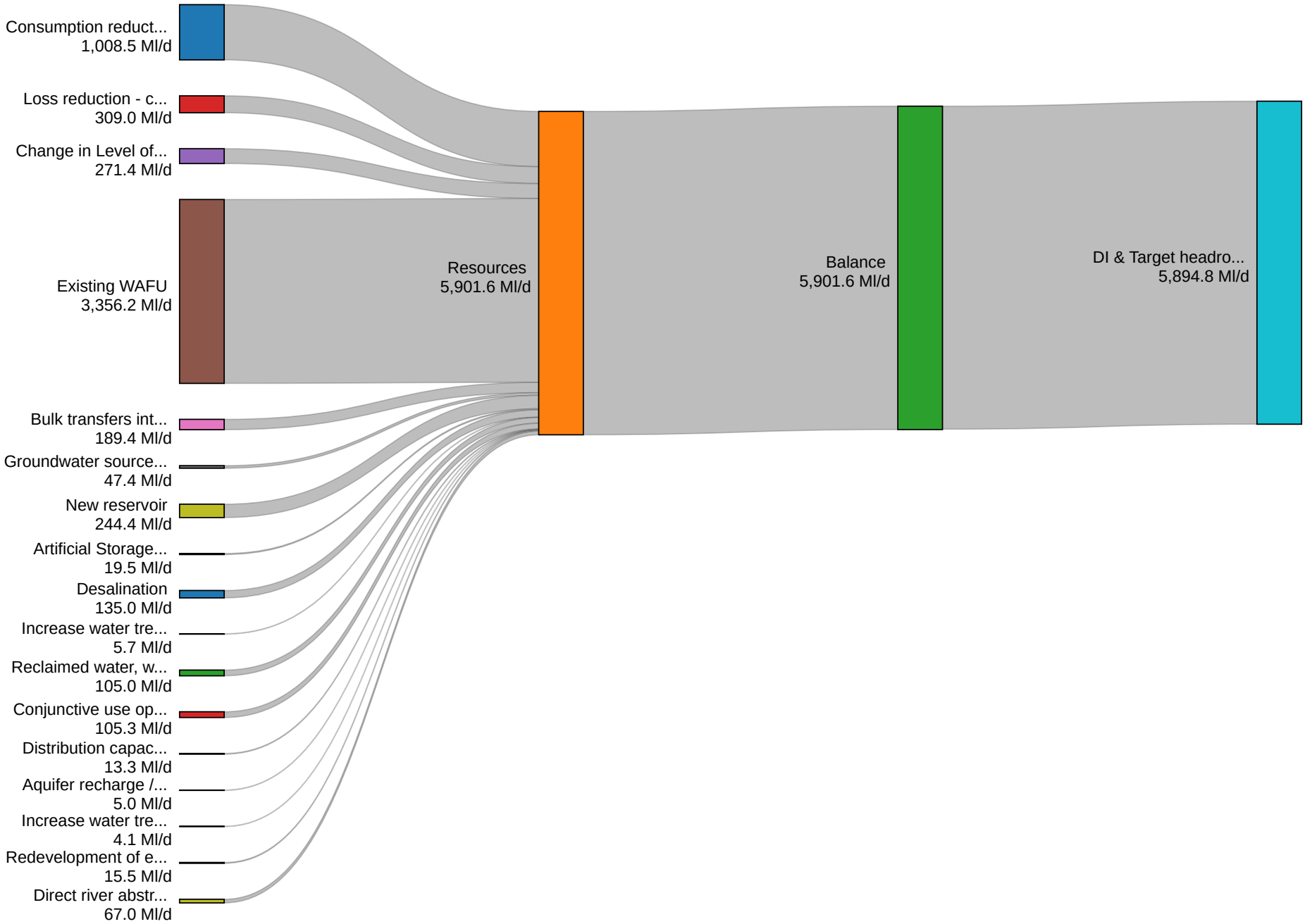
Situation 4 - 2026 (Thames Water)



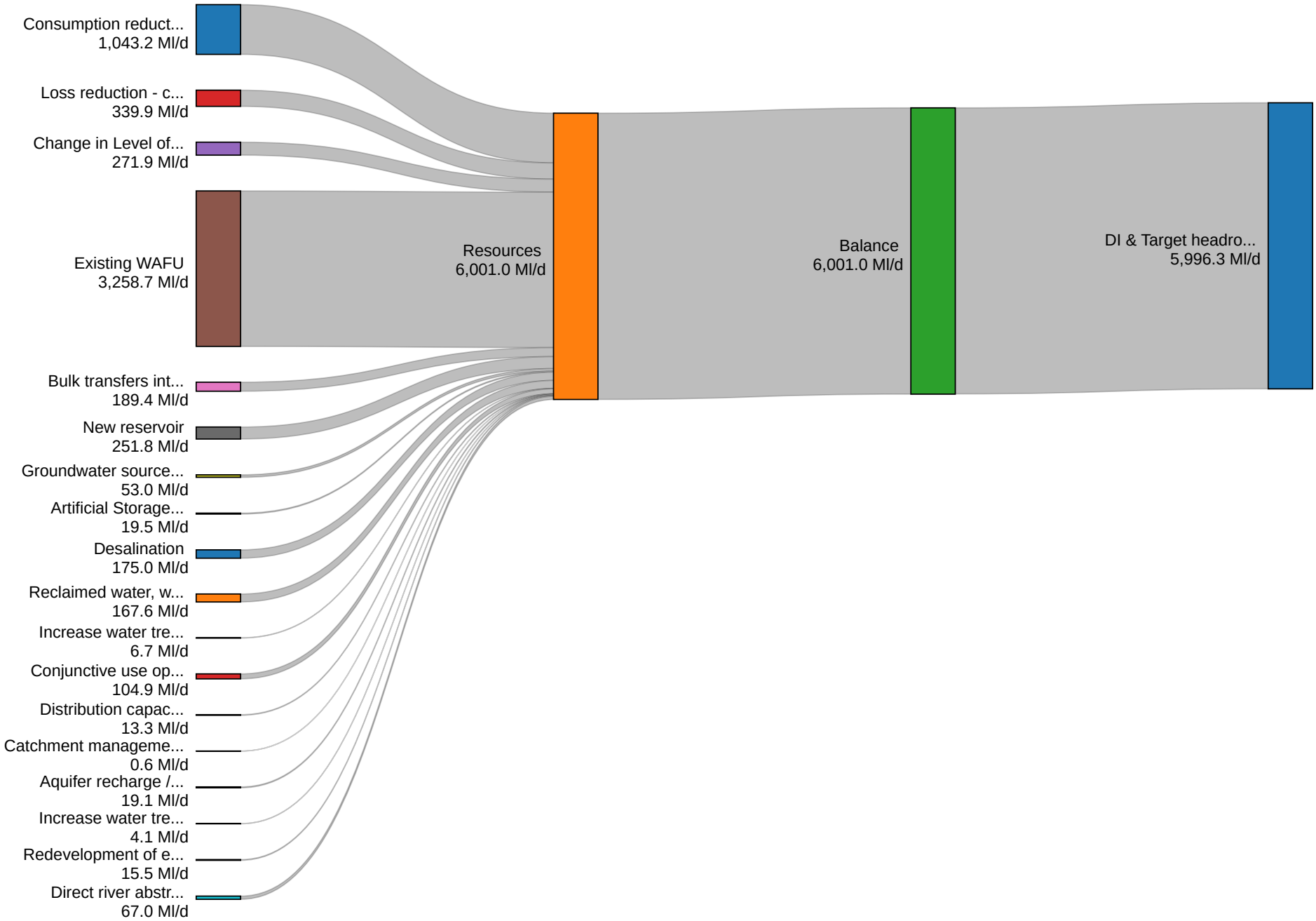
Situation 4 - 2040 (Thames Water)



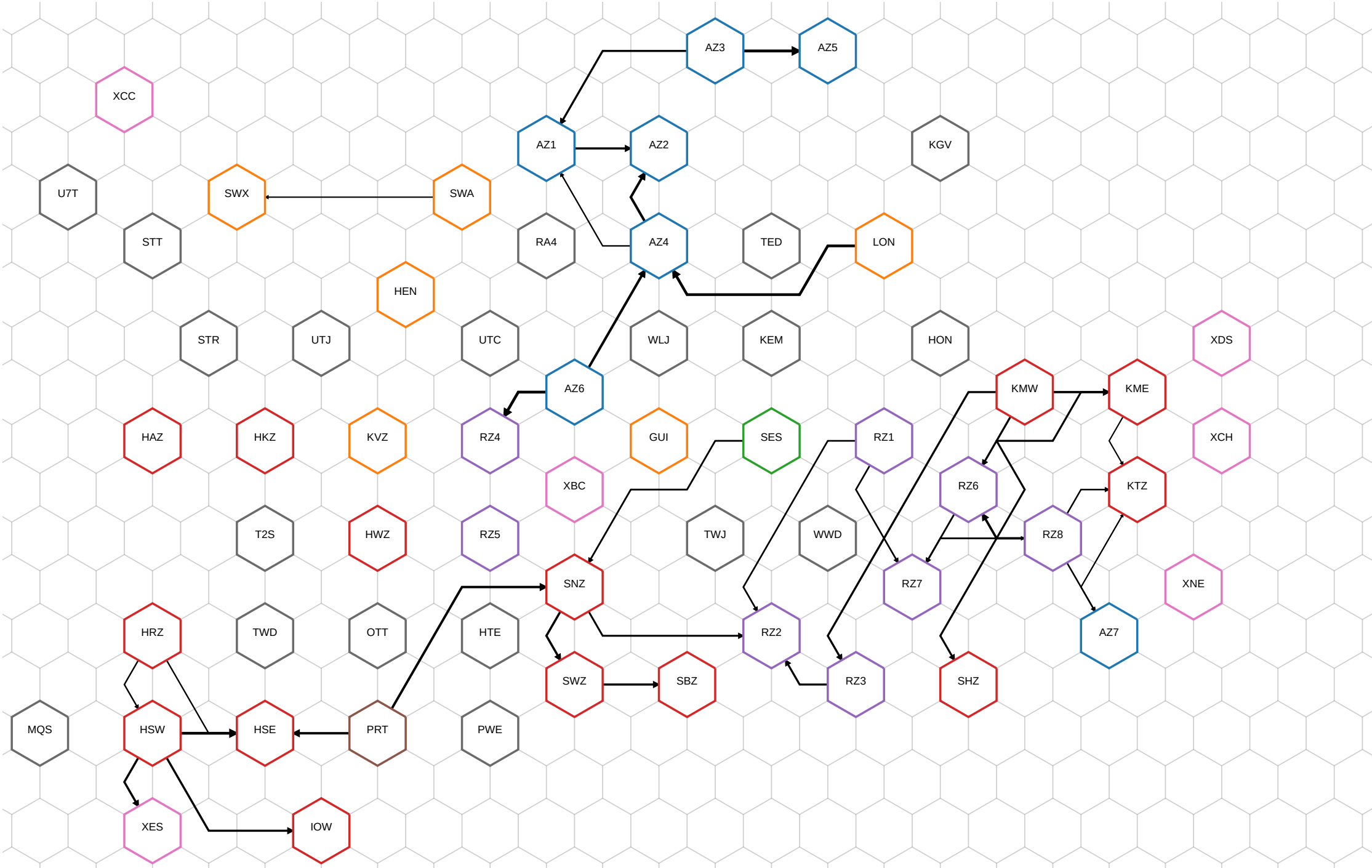
Situation 4 - 2050 (Thames Water)



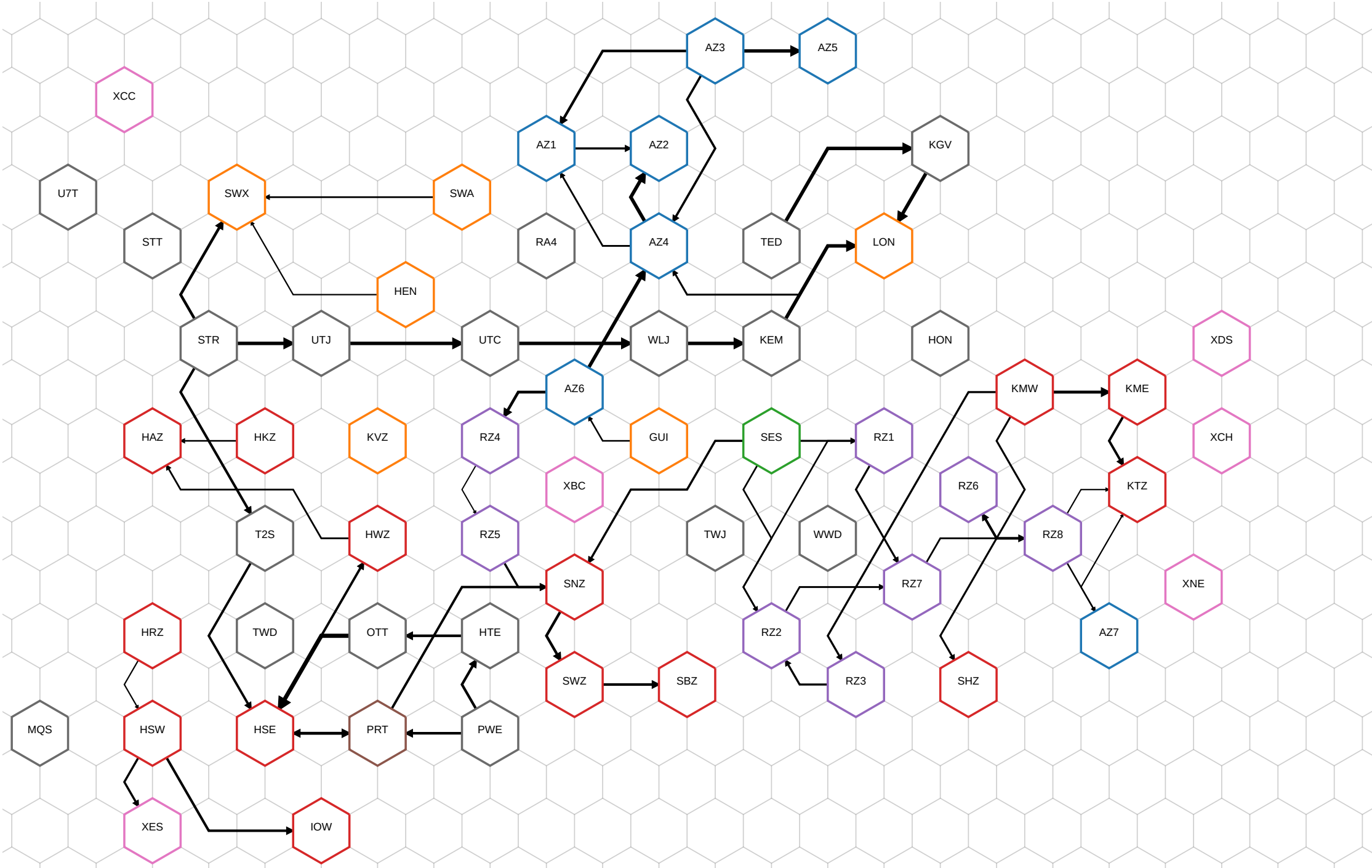
Situation 4 - 2075 (Thames Water)



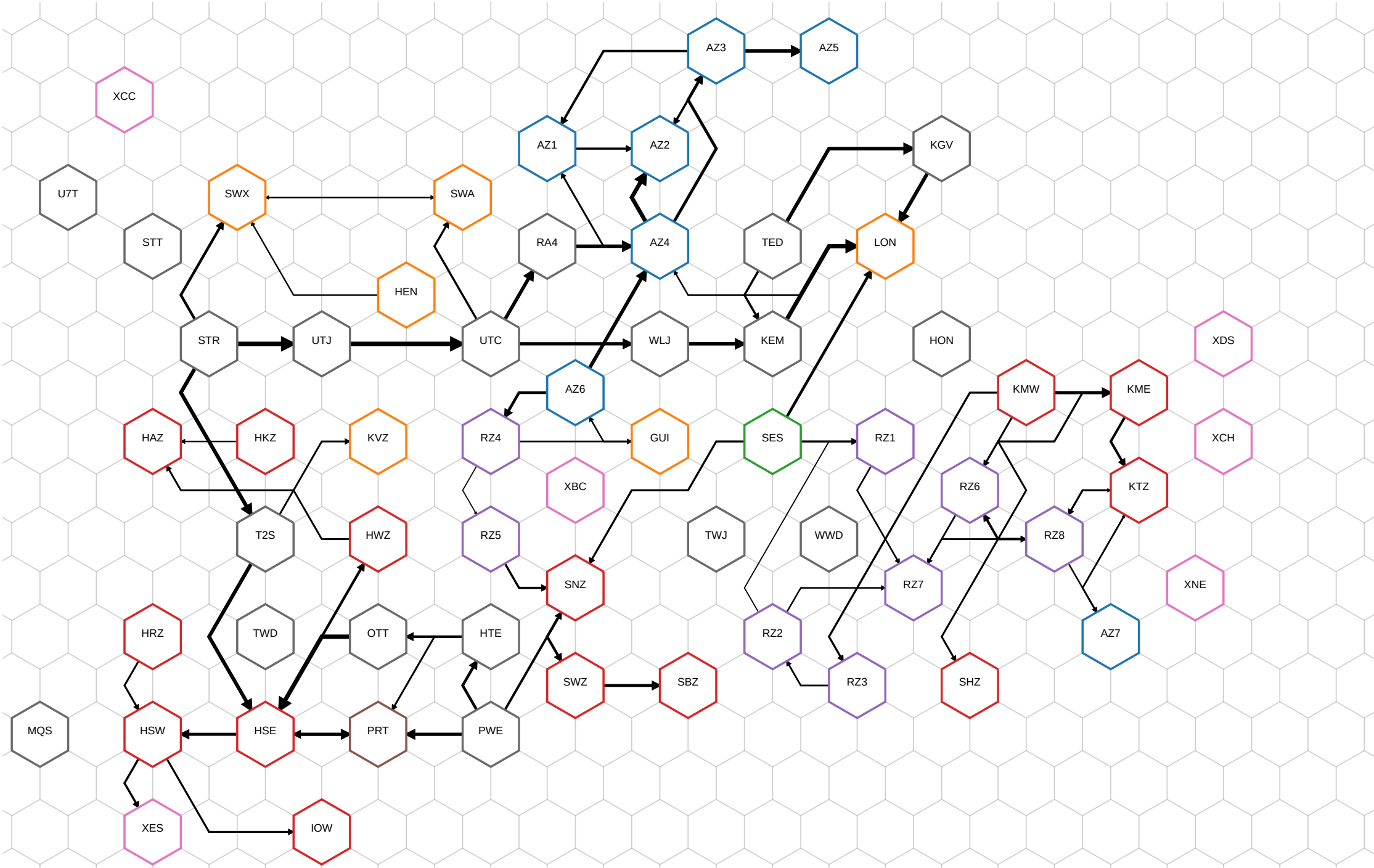
Situation 4 - 2026



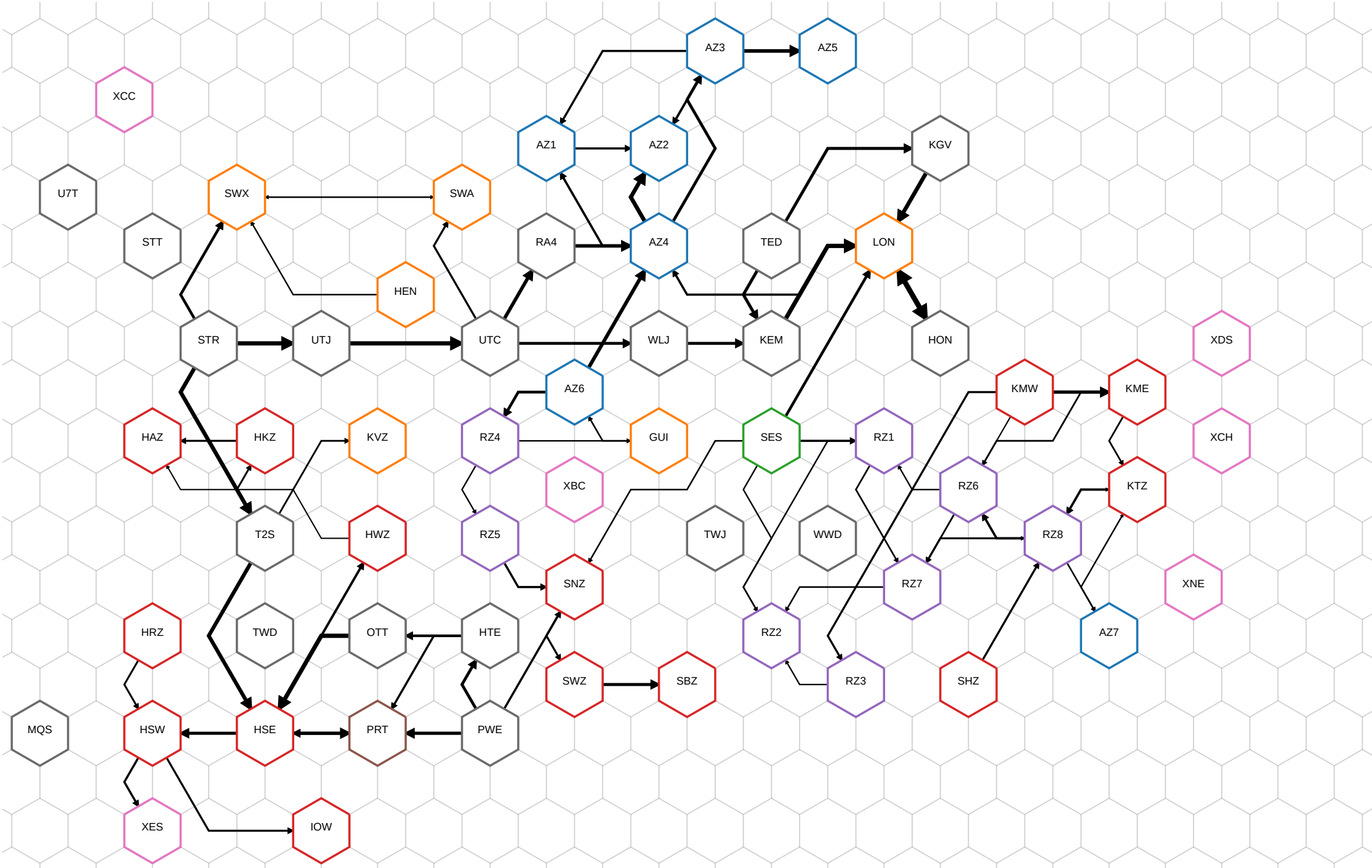
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

GENERAL BVP + SESRO 75

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50-2075-bvp-07_50-v3
Description	BVP run with hybrid-c+2 government interventions including only GUC 100 Ml/d, SESRO 75 Mm3 and 50 Ml/d T2A transfer. Constrained to 7.5% improvement in worst BVP metrics from "st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-only-sesro150-2075".
Created at	17/07/2023, 10:42:53
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-only-guc100-only-sesro75-only-t2a50
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Exclude all GUC variants except 100. Exclude all SESRO variants except 75. Excludes T2A 100 Ml/d transfer (i.e. only 50 Ml/d).
Optimised discount rate	STPR

Metrics

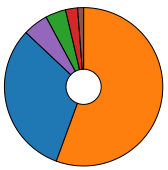
Net present value (Cost)

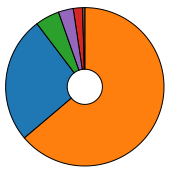
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,101	17,639	16,875	19,515	17,517	16,700	17,850	16,987	16,273	17,829	(£m)
Cost w/o deficit (STPR)	21,101	17,639	16,875	19,515	17,517	16,700	17,850	16,987	16,273	17,829	(£m)
Cost w/ deficit (IGEQ)	32,413	25,863	24,484	29,453	25,661	24,205	26,356	24,736	23,448	26,291	(£m)
Cost w/o deficit (IGEQ)	32,413	25,863	24,484	29,453	25,661	24,205	26,356	24,736	23,448	26,291	(£m)
Cost w/ deficit (LTDR)	23,286	19,259	18,382	21,447	19,122	18,186	19,520	18,518	17,697	19,491	(£m)
Cost w/o deficit (LTDR)	23,286	19,259	18,382	21,447	19,122	18,186	19,520	18,518	17,697	19,491	(£m)

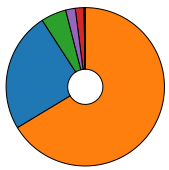
Cost breakdown (STPR)

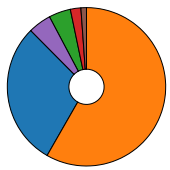
Select Company: Total

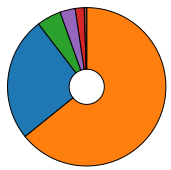
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,631	4,562	4,134	5,716	4,451	3,977	4,626	4,175	3,731	4,667	(£m)
Fixed opex	11,731	11,256	11,198	11,374	11,243	11,182	11,253	11,201	11,139	11,286	(£m)
Fixed operational carbon	888	870	870	873	870	870	871	867	865	872	(£m)
Embedded carbon	518	334	303	418	327	297	347	308	281	348	(£m)
Variable opex	1,076	535	328	913	539	323	651	396	238	555	(£m)
Variable carbon opex	256	81	41	221	87	52	102	41	18	100	(£m)

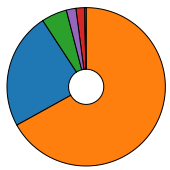
situation1 

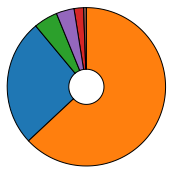
situation2 

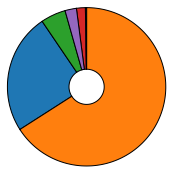
situation3 

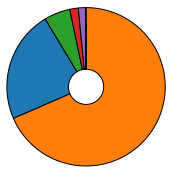
situation4 

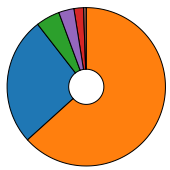
situation5 

situation6 

situation7 

situation8 

situation9 

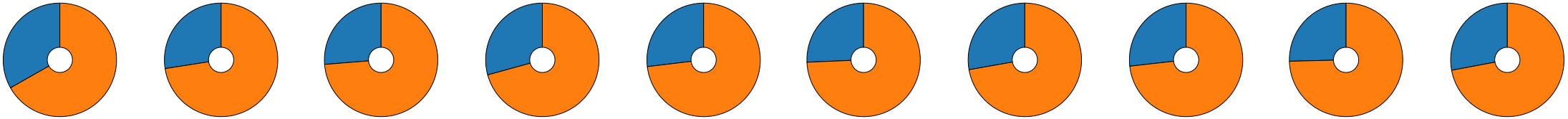
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,366,104	2,044,731	1,837,659	2,648,025	2,000,750	1,801,904	2,144,194	1,878,059	1,695,251	2,157,408	(tonnes)
Operational emissions	6,771,200	5,400,171	5,154,554	6,396,980	5,433,950	5,218,423	5,573,522	5,133,960	4,980,438	5,562,578	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

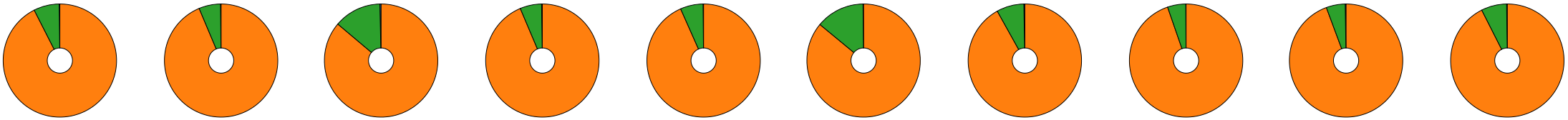


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	47	22	17	47	18	8	40	8	8	24	(GWh)
Grid	22,569	11,478	4,179	19,433	10,893	3,862	13,161	7,926	2,903	10,712	(GWh)
Renewable	1,775	754	654	1,273	756	621	1,116	434	167	839	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	65,343	65,349	65,338	69,107	65,341	65,338	66,274	65,338	65,338	65,863
SEA environmental disbenefit	105,002	77,666	71,069	103,938	77,215	71,109	81,770	68,376	62,119	79,807
Natural capital	83,879,644	81,583,929	84,159,232	81,395,991	81,308,139	84,065,681	80,960,605	81,730,494	84,488,677	82,619,155
Bio-diversity net gain	−174,462	−103,135	−87,403	−172,543	−112,515	−90,917	−119,262	−92,070	−66,120	−113,159

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	36,523	35,195	34,767	36,889	35,254	34,829	35,293	34,552	34,333	35,293

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.22	28.21	29.98	28.29	28.21	30.00	28.86	31.90	35.45	30.01
R1: Uncertainty of option supply/demand benefit	6.38	5.25	5.55	5.78	5.20	5.51	5.47	5.93	6.56	5.74
R3: Risk of service failure due to other physical hazards	7.04	6.86	7.55	6.71	6.86	7.56	7.08	8.01	9.13	7.42
R4: Availability of additional headroom	6.41	6.80	7.00	6.57	6.82	7.02	7.13	7.49	7.73	7.00
R5: Catchment/raw water quality risks (incl. climate change)	3.80	3.76	4.23	3.72	3.77	4.25	3.89	4.48	5.18	4.12
R6: Capacity of catchment services	0.01	0.31	0.01	0.31	0.31	0.01	0.00	0.01	0.01	0.11
R7: Risk of service failure to other exceptional events	5.57	5.12	5.64	5.09	5.13	5.66	5.29	5.98	6.84	5.59
R8: Soil health	0.00	0.11	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.04

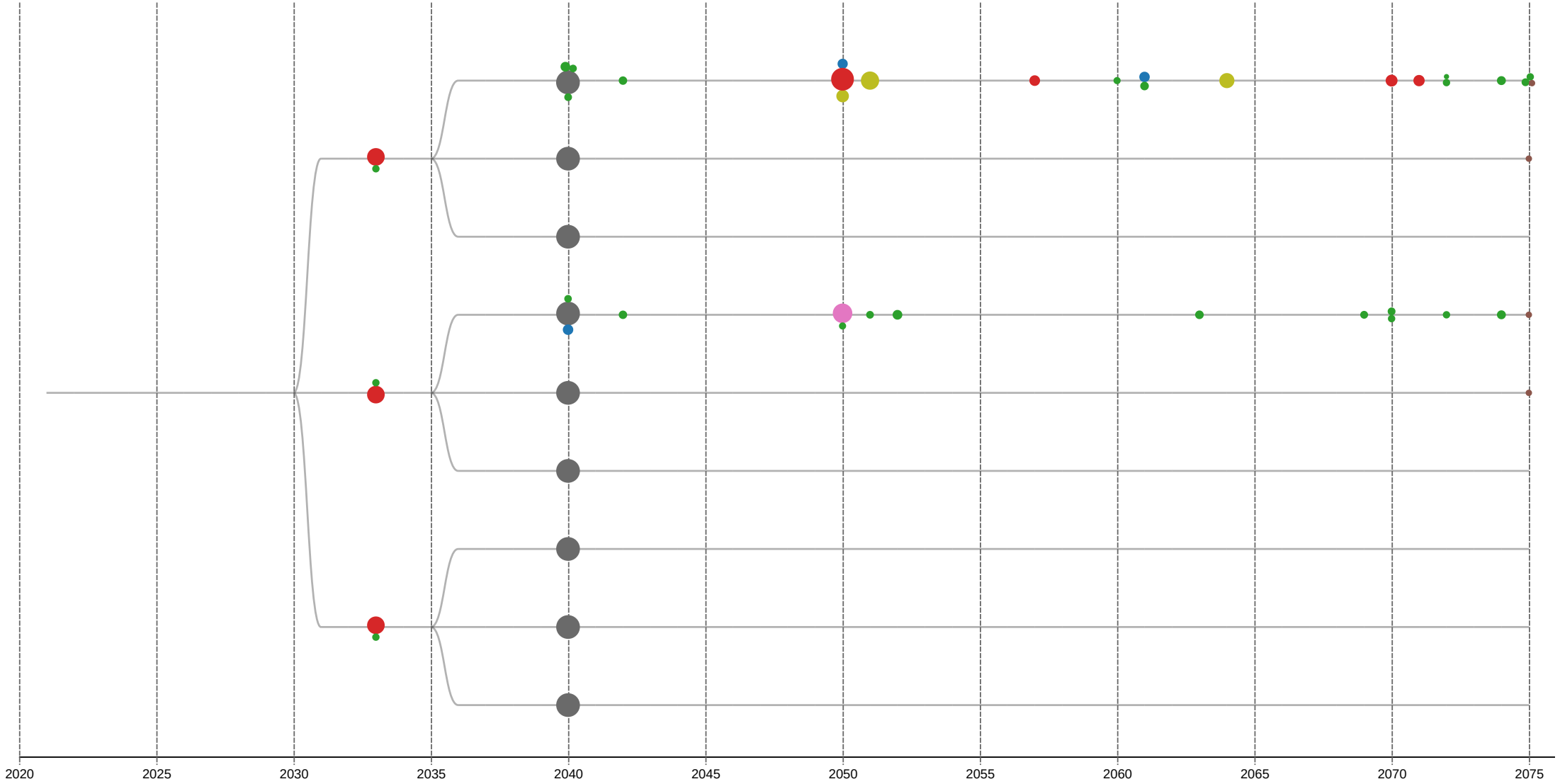
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	15.17	15.15	16.74	14.28	15.19	16.58	15.56	17.68	20.13	16.28
A3: Operational complexity and flexibility	6.57	6.55	7.26	6.33	6.58	7.32	6.76	7.74	8.88	7.11
A4: WRZ connectivity	8.57	8.47	9.45	7.83	8.48	9.24	8.77	9.91	11.20	9.10
A7: Customer relations support engagement with demand management	0.04	0.13	0.03	0.12	0.13	0.03	0.03	0.03	0.05	0.07

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	20.55	20.38	21.79	19.97	20.45	21.82	20.48	23.23	26.33	21.67
E1: Scaleability and modularity of proposed changes	9.44	9.50	10.47	9.07	9.53	10.51	9.72	11.16	12.71	10.24
E2: Intervention lead times	4.46	4.02	4.30	4.17	4.06	4.26	4.18	4.59	5.10	4.35
E3: Reliance on external bodies to deliver changes	6.63	6.40	7.02	6.28	6.41	7.04	6.57	7.47	8.50	6.92
E5: Collaborative land management	0.02	0.46	0.01	0.46	0.46	0.01	0.01	0.01	0.01	0.16

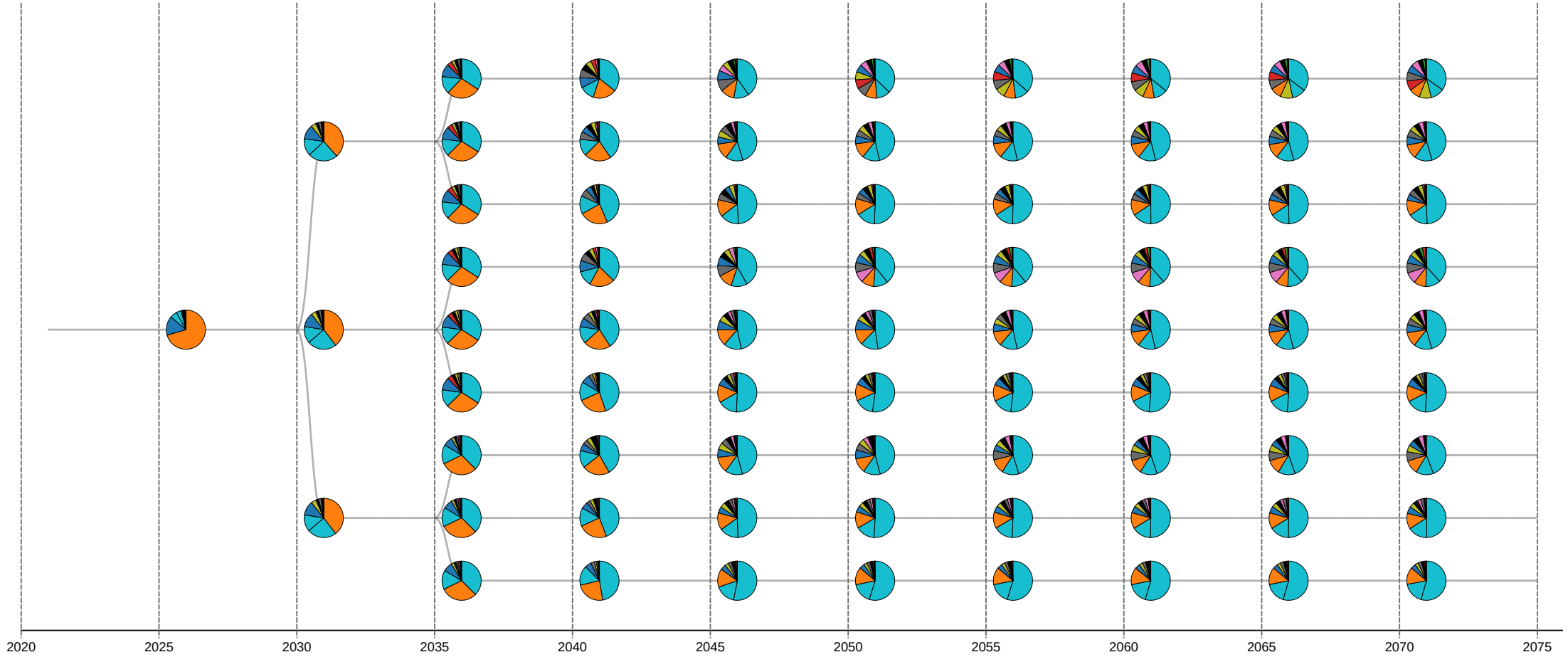
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

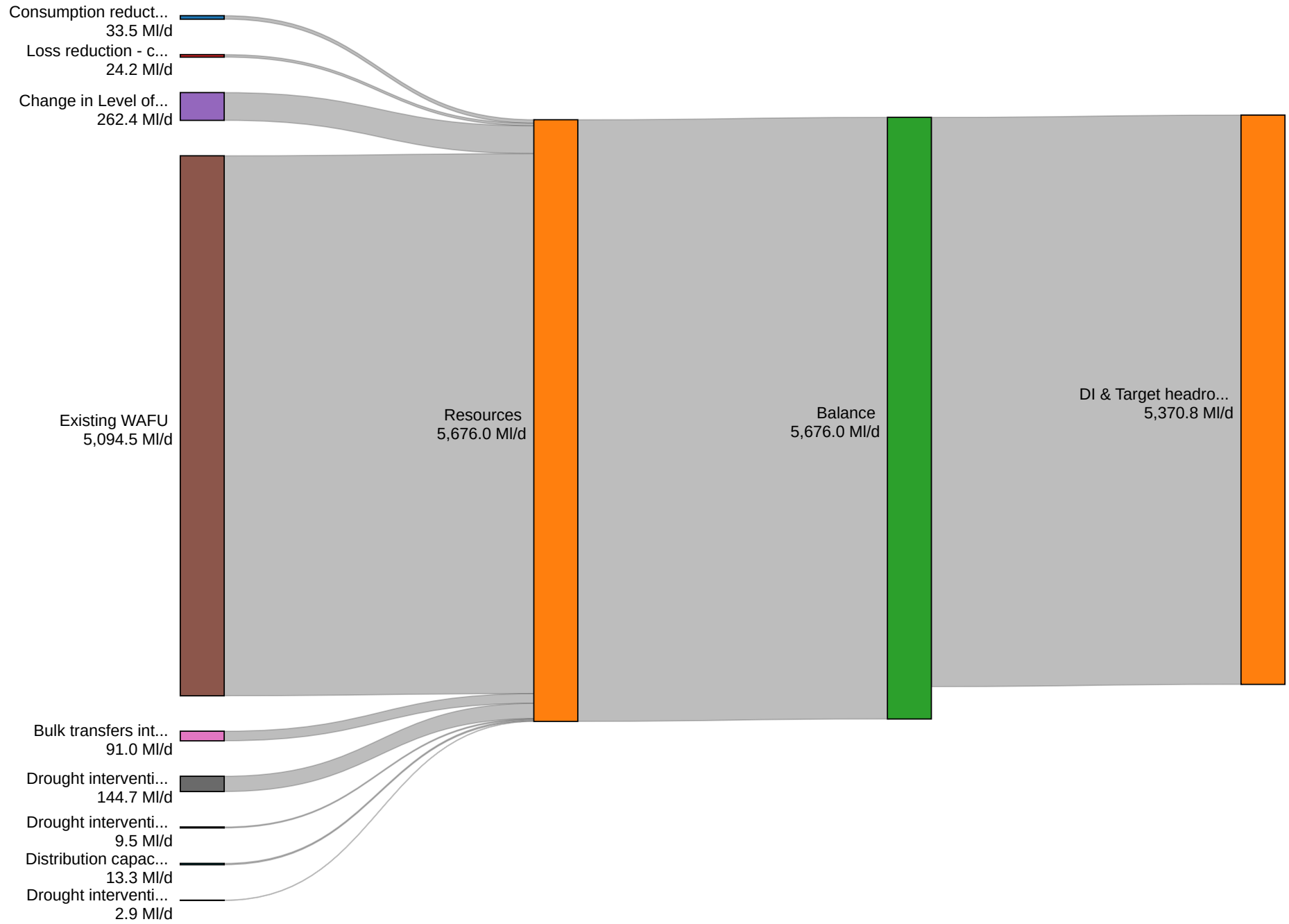
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

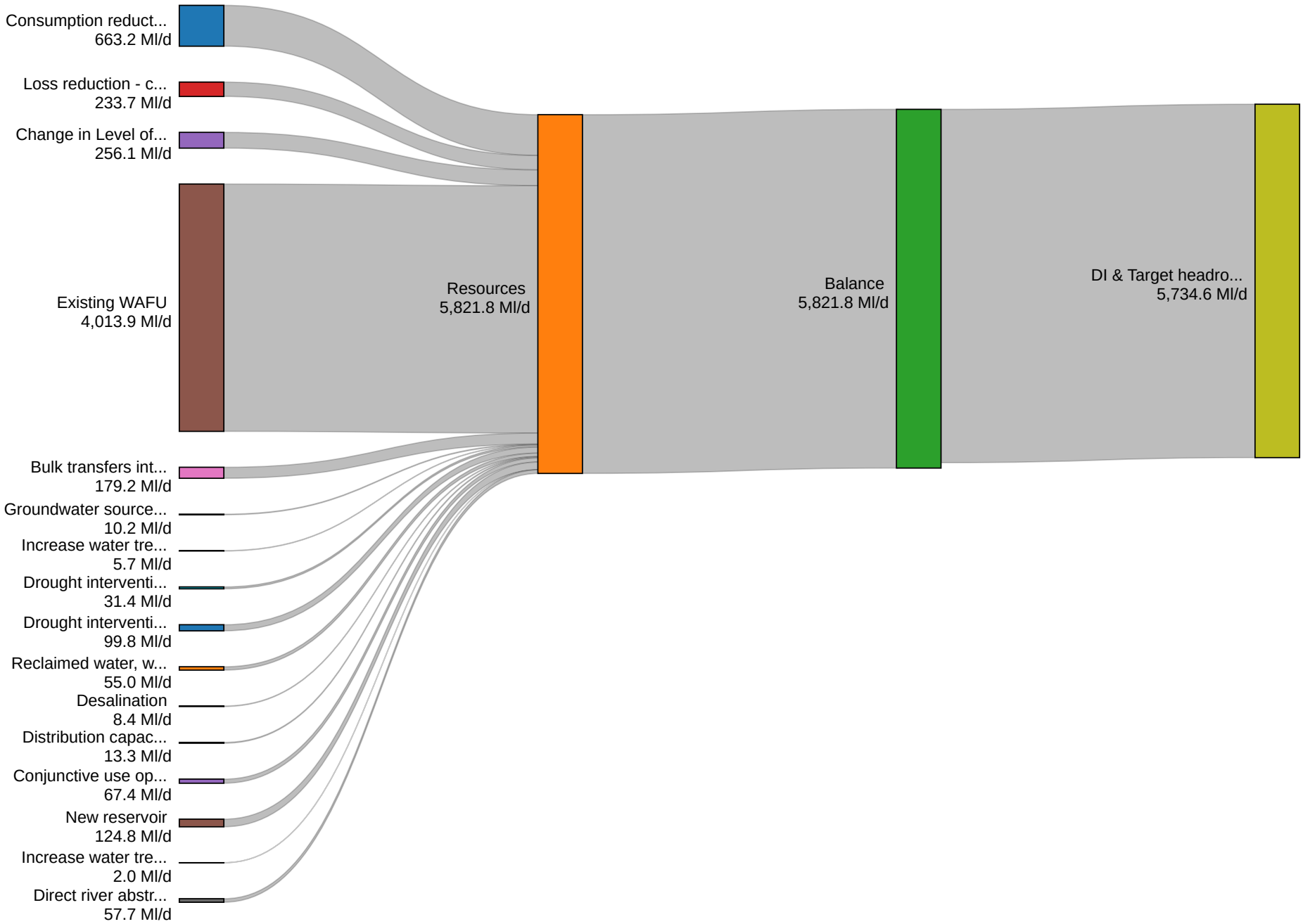


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

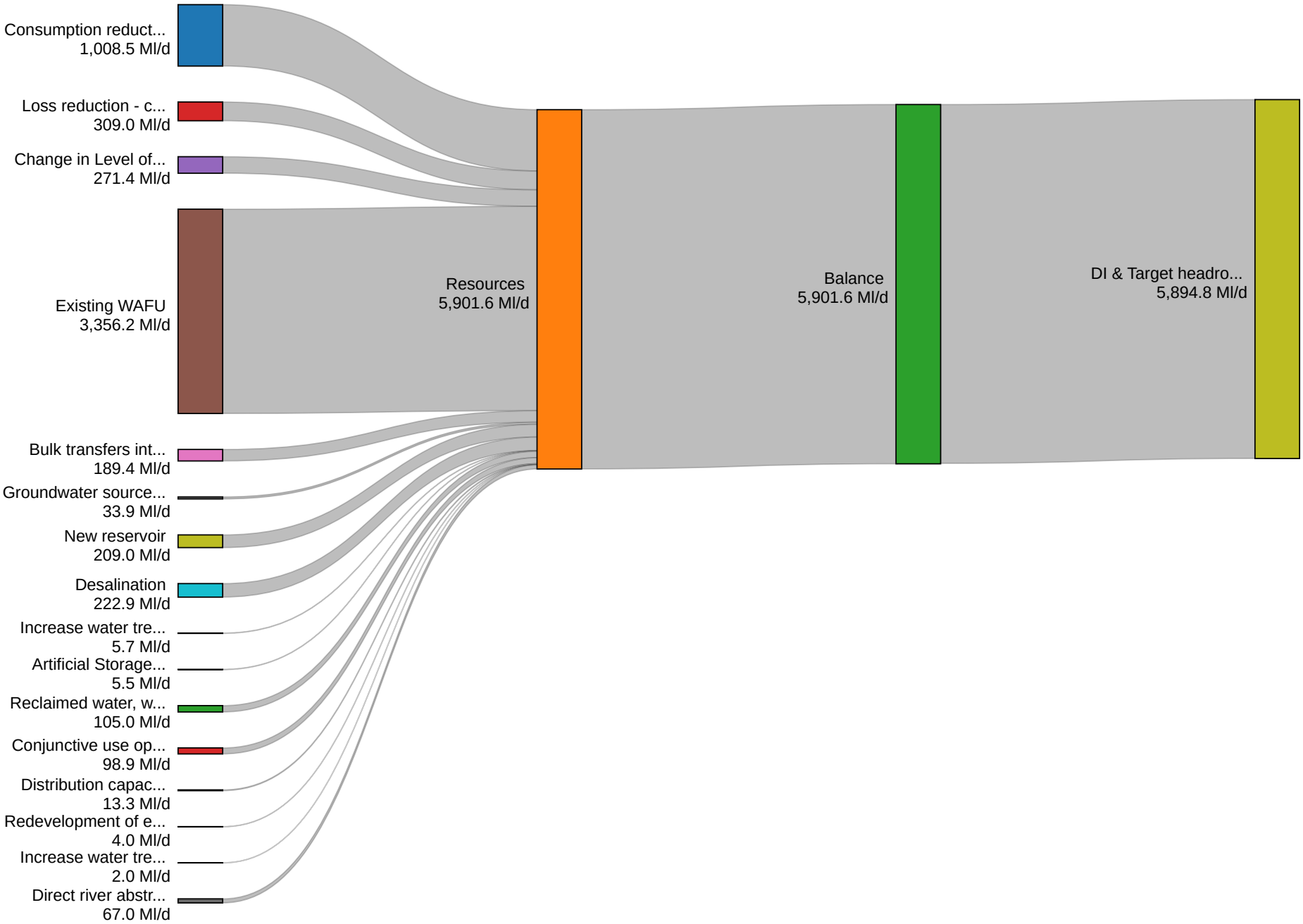
Situation 4 - 2026 (Thames Water)



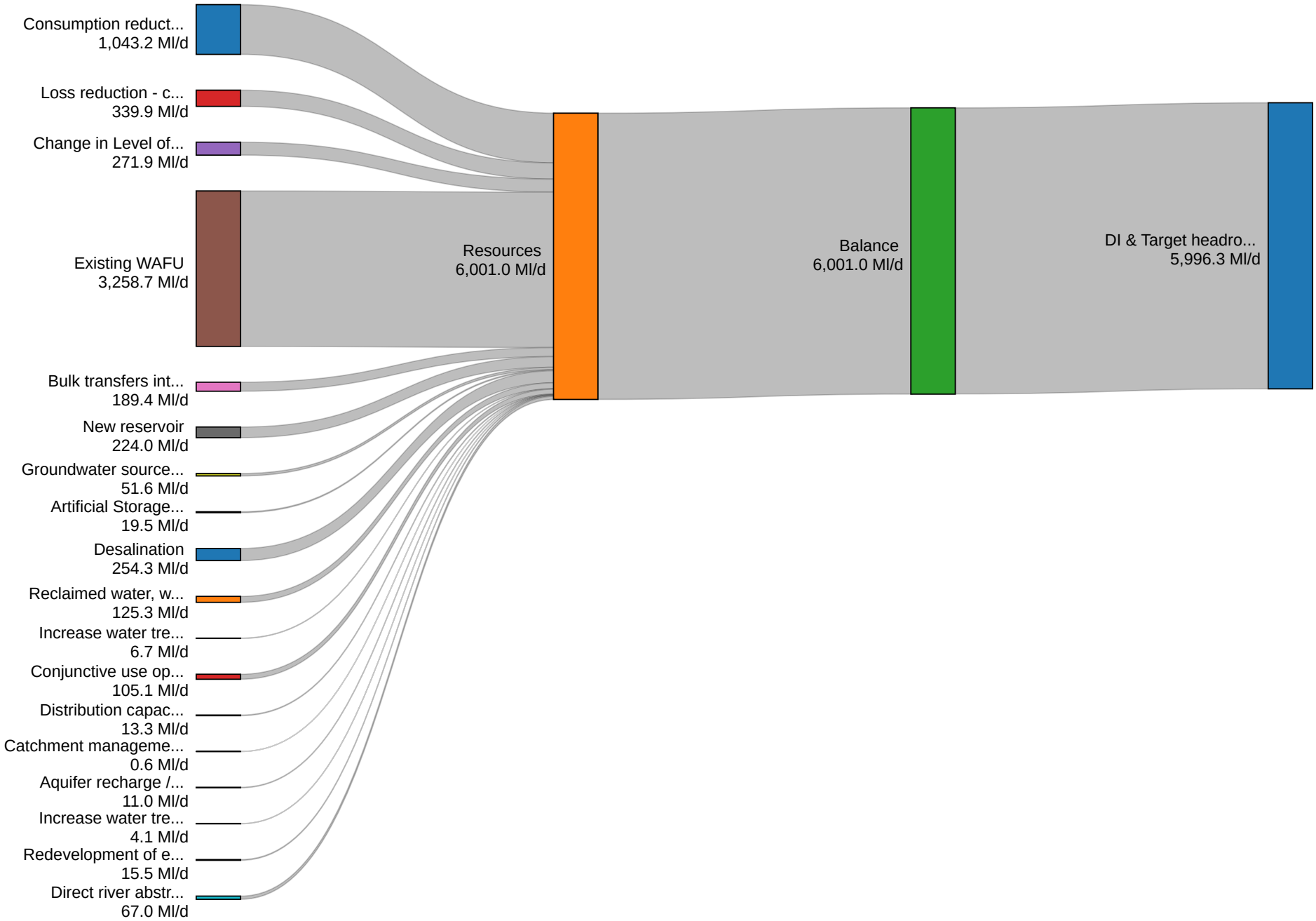
Situation 4 - 2040 (Thames Water)



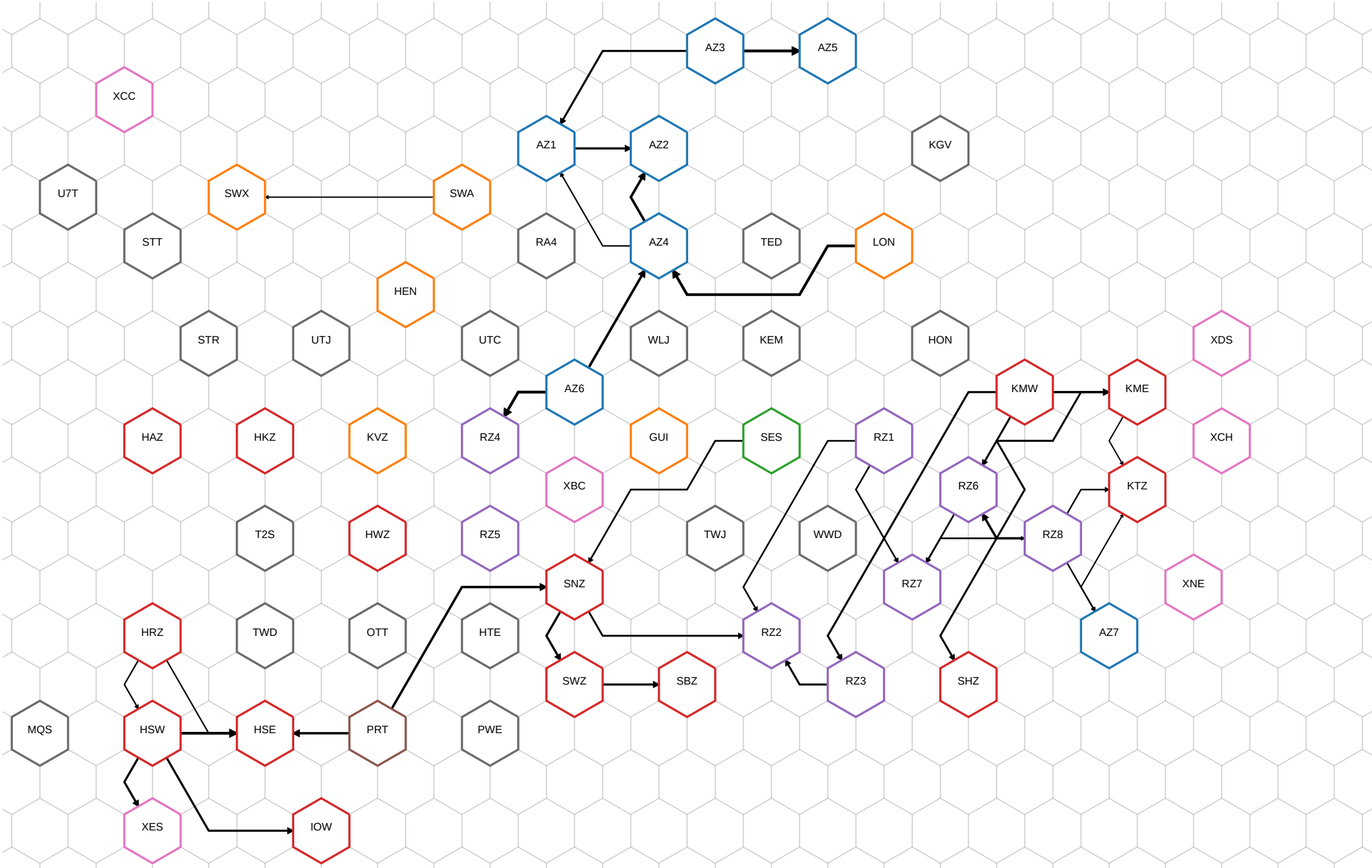
Situation 4 - 2050 (Thames Water)



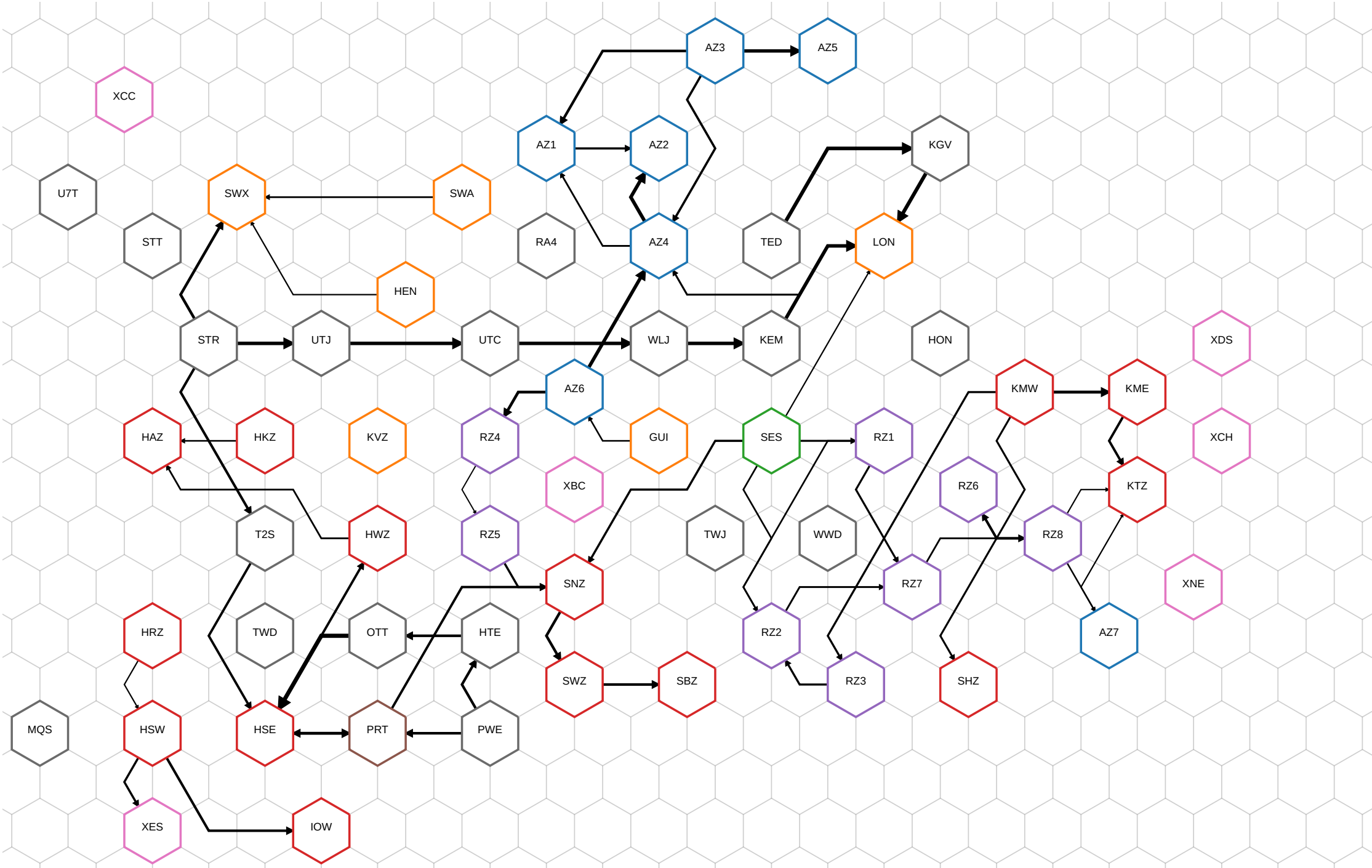
Situation 4 - 2075 (Thames Water)



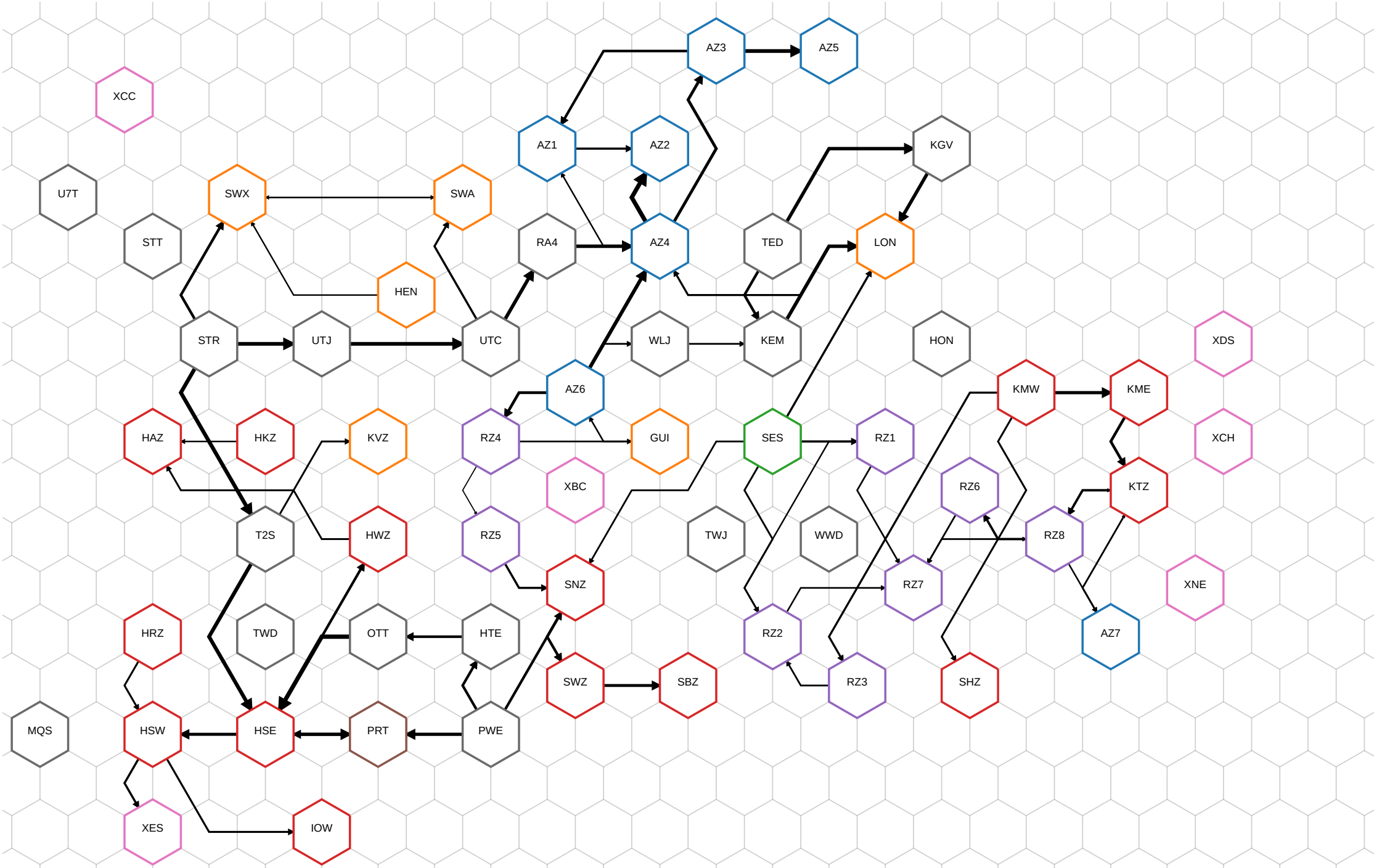
Situation 4 - 2026



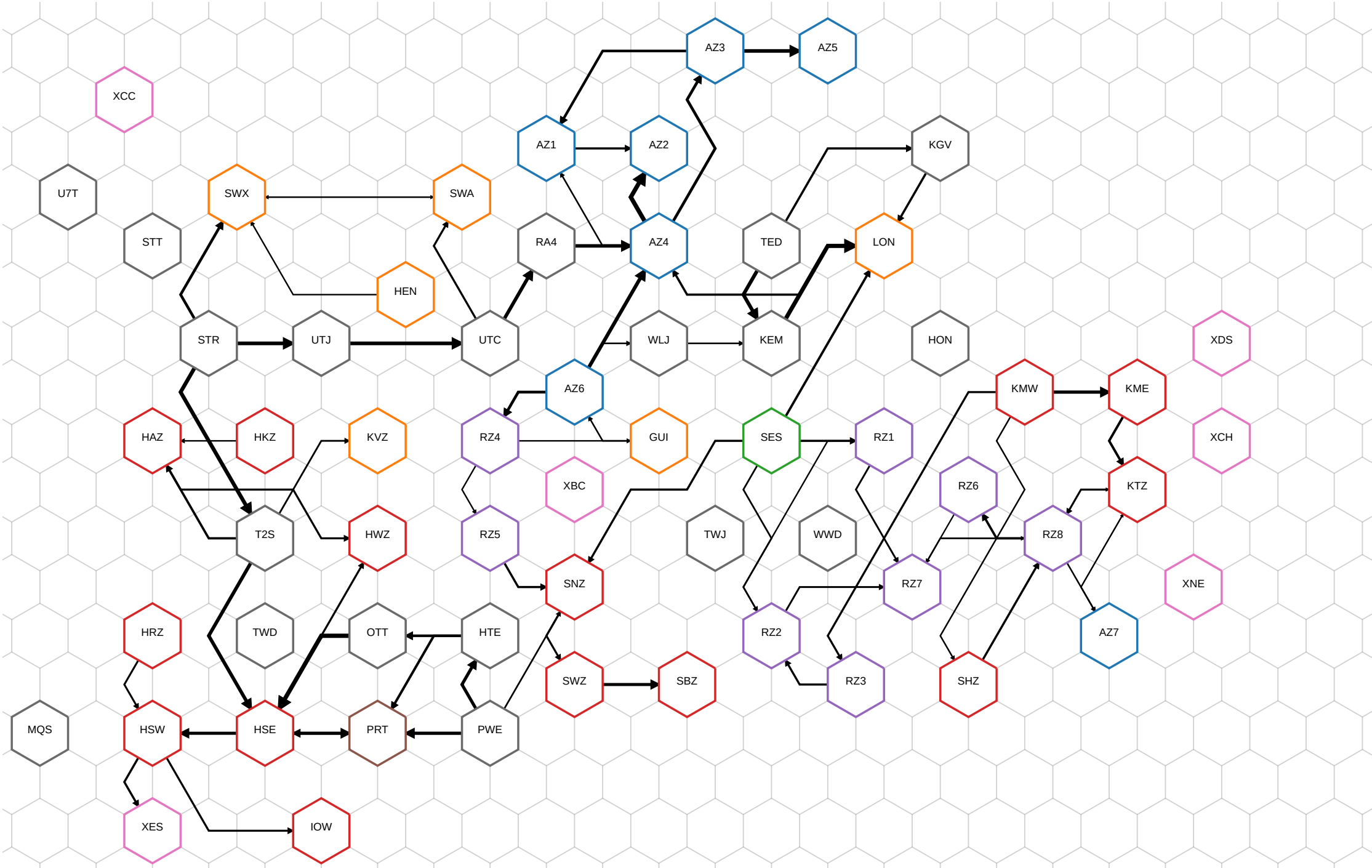
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +10% OB (ALL OPTIONS)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p10pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions with Teddington DRA optimism bias changed by +0.1.
Created at	13/12/2023, 11:10:00
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p10pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change Teddington DRA optimism bias by +0.1.
Optimised discount rate	STPR

Metrics

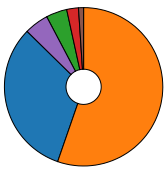
Net present value (Cost)

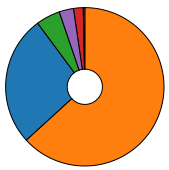
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,536	17,662	16,987	19,062	17,562	16,811	17,614	16,770	16,077	17,676	(£m)
Cost w/o deficit (STPR)	20,536	17,662	16,987	19,062	17,562	16,811	17,614	16,770	16,077	17,676	(£m)
Cost w/ deficit (IGEQ)	31,329	25,881	24,661	28,525	25,708	24,372	25,991	24,402	23,155	26,003	(£m)
Cost w/o deficit (IGEQ)	31,329	25,881	24,661	28,525	25,708	24,372	25,991	24,402	23,155	26,003	(£m)
Cost w/ deficit (LTDR)	22,626	19,282	18,506	20,910	19,168	18,308	19,259	18,279	17,482	19,313	(£m)
Cost w/o deficit (LTDR)	22,626	19,282	18,506	20,910	19,168	18,308	19,259	18,279	17,482	19,313	(£m)

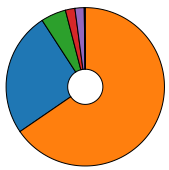
Cost breakdown (STPR)

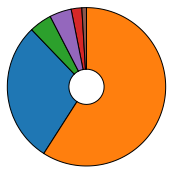
Select Company: Total

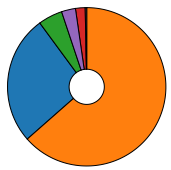
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,579	4,705	4,317	5,484	4,636	4,194	4,516	4,072	3,637	4,682	(£m)
Fixed opex	11,358	11,165	11,114	11,258	11,155	11,099	11,160	11,108	11,048	11,163	(£m)
Fixed operational carbon	880	869	870	877	870	869	872	867	866	871	(£m)
Embedded carbon	493	353	330	415	347	319	342	305	280	354	(£m)
Variable opex	1,013	517	320	848	501	299	633	383	229	527	(£m)
Variable carbon opex	212	55	36	180	53	31	91	35	17	79	(£m)

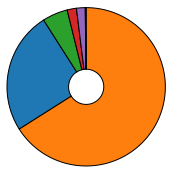
situation1 

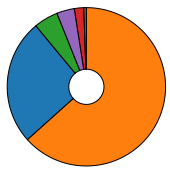
situation2 

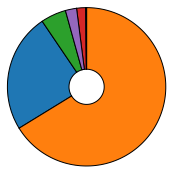
situation3 

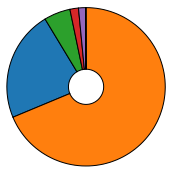
situation4 

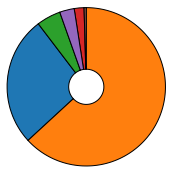
situation5 

situation6 

situation7 

situation8 

situation9 

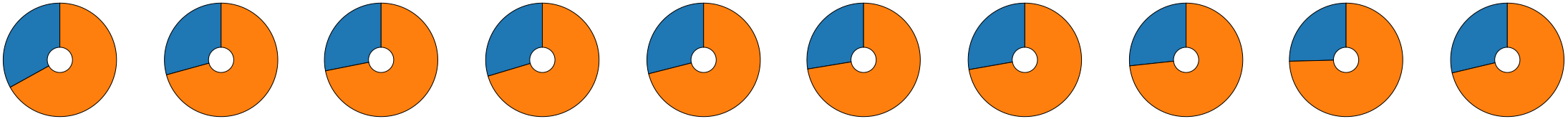
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,167,594	2,157,936	2,004,473	2,594,723	2,127,393	1,937,594	2,118,706	1,855,554	1,692,798	2,184,085	(tonnes)
Operational emissions	6,421,842	5,216,316	5,126,841	6,162,680	5,221,006	5,085,014	5,513,406	5,097,605	4,973,558	5,424,252	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

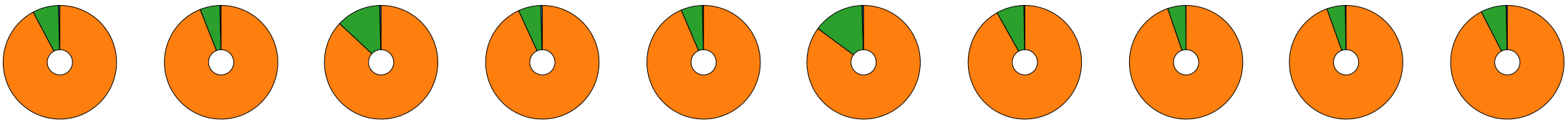


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	96	43	21	41	9	8	43	(GWh)
Grid	22,643	11,348	4,259	18,981	10,976	3,862	13,080	7,893	2,891	10,659	(GWh)
Renewable	1,807	681	619	1,303	713	654	1,118	429	160	832	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,275	63,947	63,084	67,116	63,667	62,758	63,996	61,914	60,640	64,044
SEA environmental disbenefit	113,343	81,923	75,064	100,020	80,271	74,166	84,472	72,217	62,699	82,686
Natural capital	81,592,380	77,190,134	80,044,243	75,277,586	77,131,522	79,780,701	80,967,557	81,731,689	84,605,231	79,813,449
Bio-diversity net gain	−216,997	−149,878	−119,778	−203,703	−149,655	−124,012	−120,188	−92,473	−62,755	−137,715

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,937	31,850	31,486	33,067	31,704	31,337	31,775	30,927	30,393	31,831

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.92	29.35	32.17	28.29	29.51	32.35	28.55	31.54	35.04	30.64
R1: Uncertainty of option supply/demand benefit	5.96	5.35	5.85	5.56	5.39	5.89	5.30	5.73	6.33	5.71
R3: Risk of service failure due to other physical hazards	6.97	7.31	8.19	6.91	7.36	8.25	7.03	7.96	9.08	7.67
R4: Availability of additional headroom	6.58	6.92	7.14	6.65	6.94	7.16	7.09	7.45	7.69	7.07
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.86	4.25	4.81	3.95	4.55	5.26	4.42
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.54	6.21	5.30	5.57	6.25	5.18	5.85	6.70	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

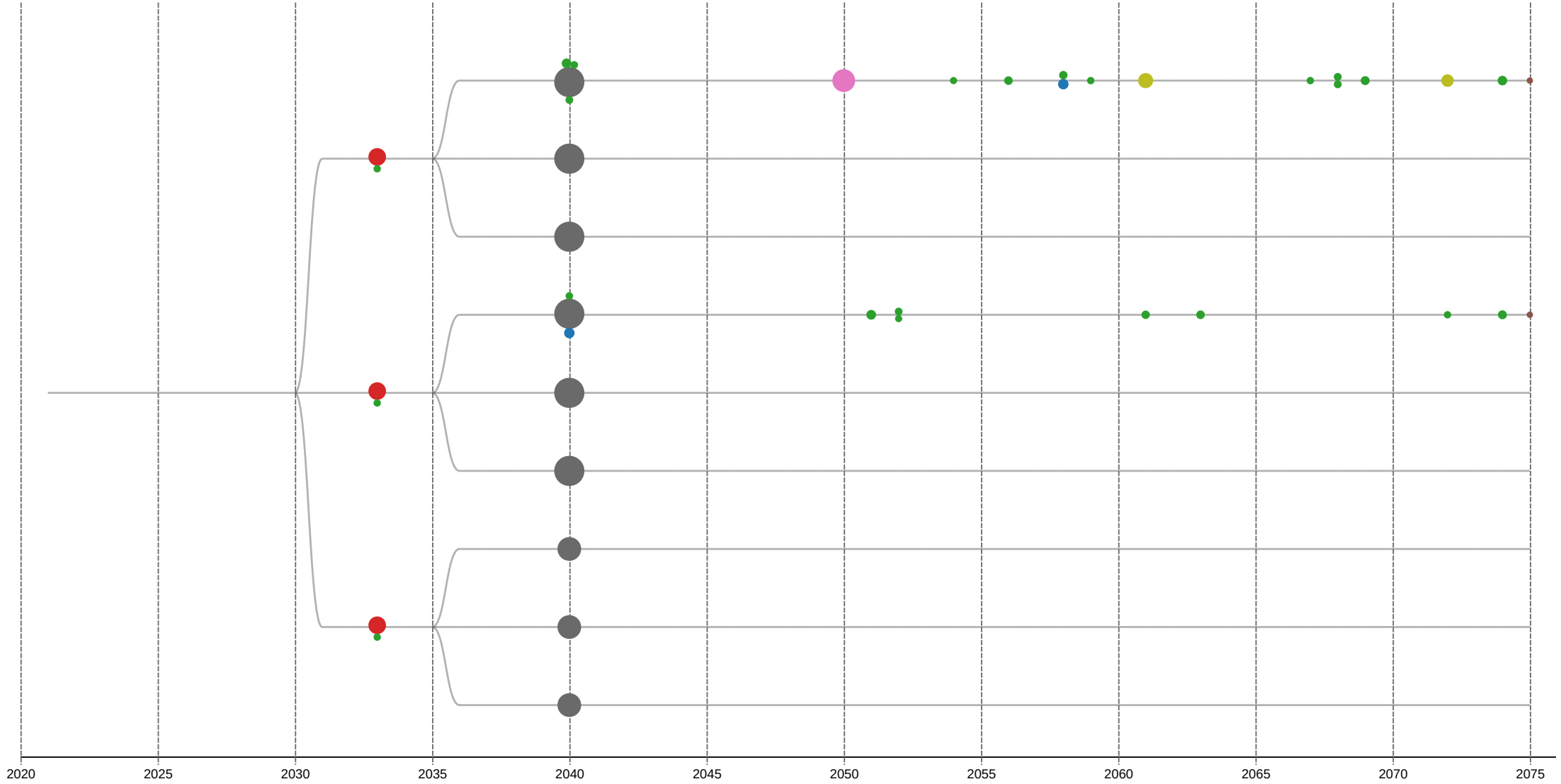
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.63	17.51	14.19	15.69	17.41	15.43	17.54	19.98	16.38
A3: Operational complexity and flexibility	6.50	7.02	7.90	6.59	7.08	7.97	6.72	7.69	8.83	7.37
A4: WRZ connectivity	7.50	8.58	9.58	7.57	8.58	9.41	8.68	9.82	11.12	8.98
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.14	19.81	22.03	18.70	19.94	22.00	20.21	22.93	25.97	21.19
E1: Scaleability and modularity of proposed changes	8.77	9.30	10.37	8.66	9.38	10.47	9.67	11.10	12.64	10.04
E2: Intervention lead times	4.19	4.13	4.54	3.95	4.12	4.35	4.04	4.43	4.91	4.30
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.08	6.43	7.18	6.51	7.40	8.42	6.86
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

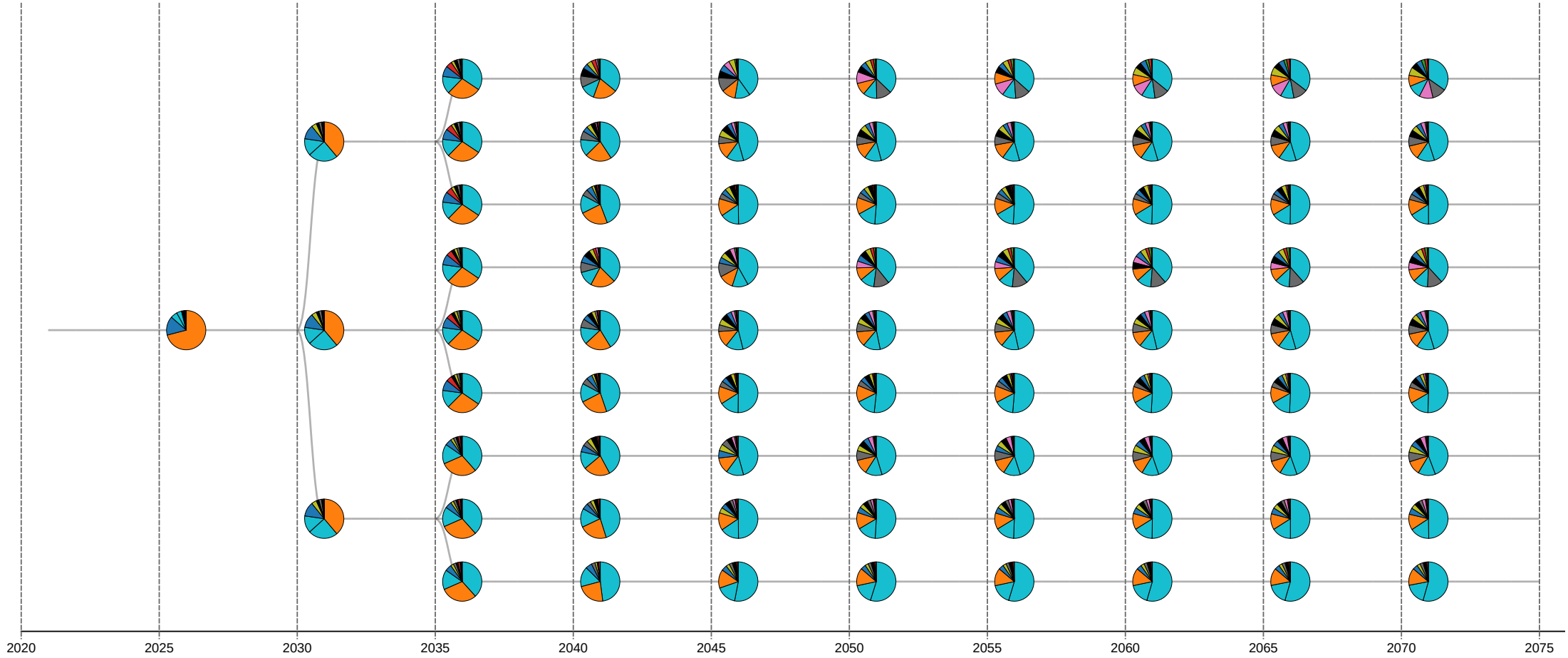
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

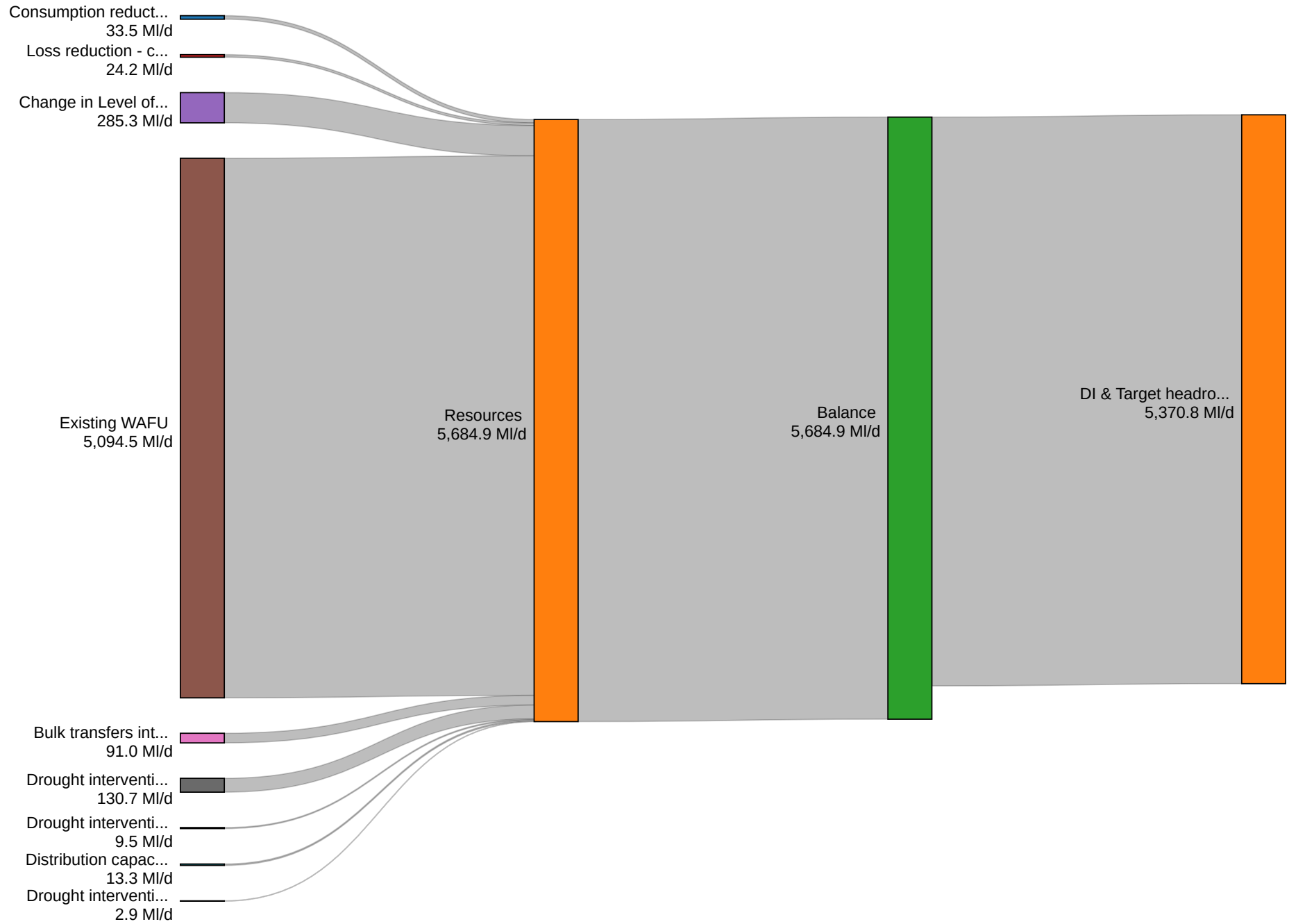
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

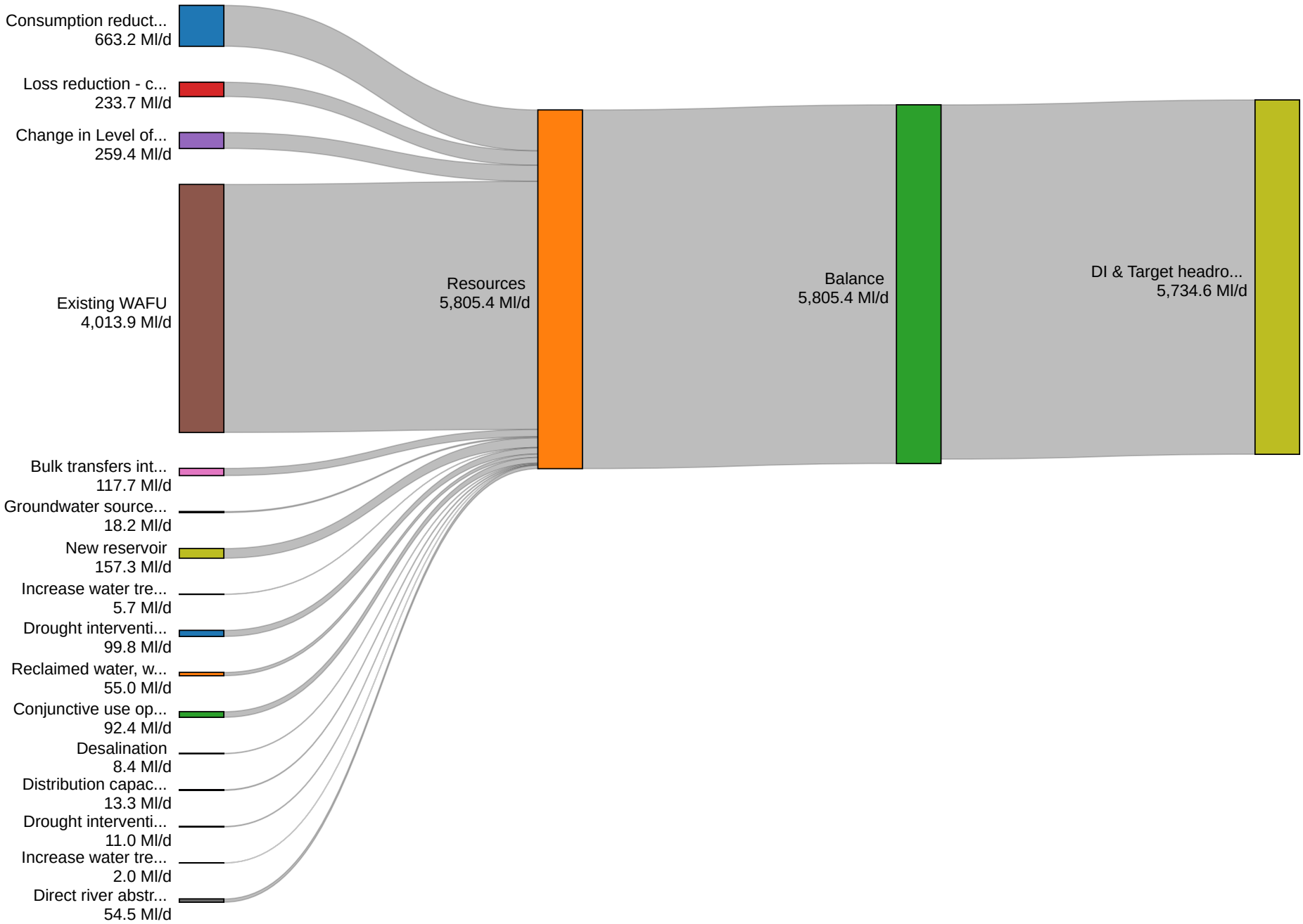


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

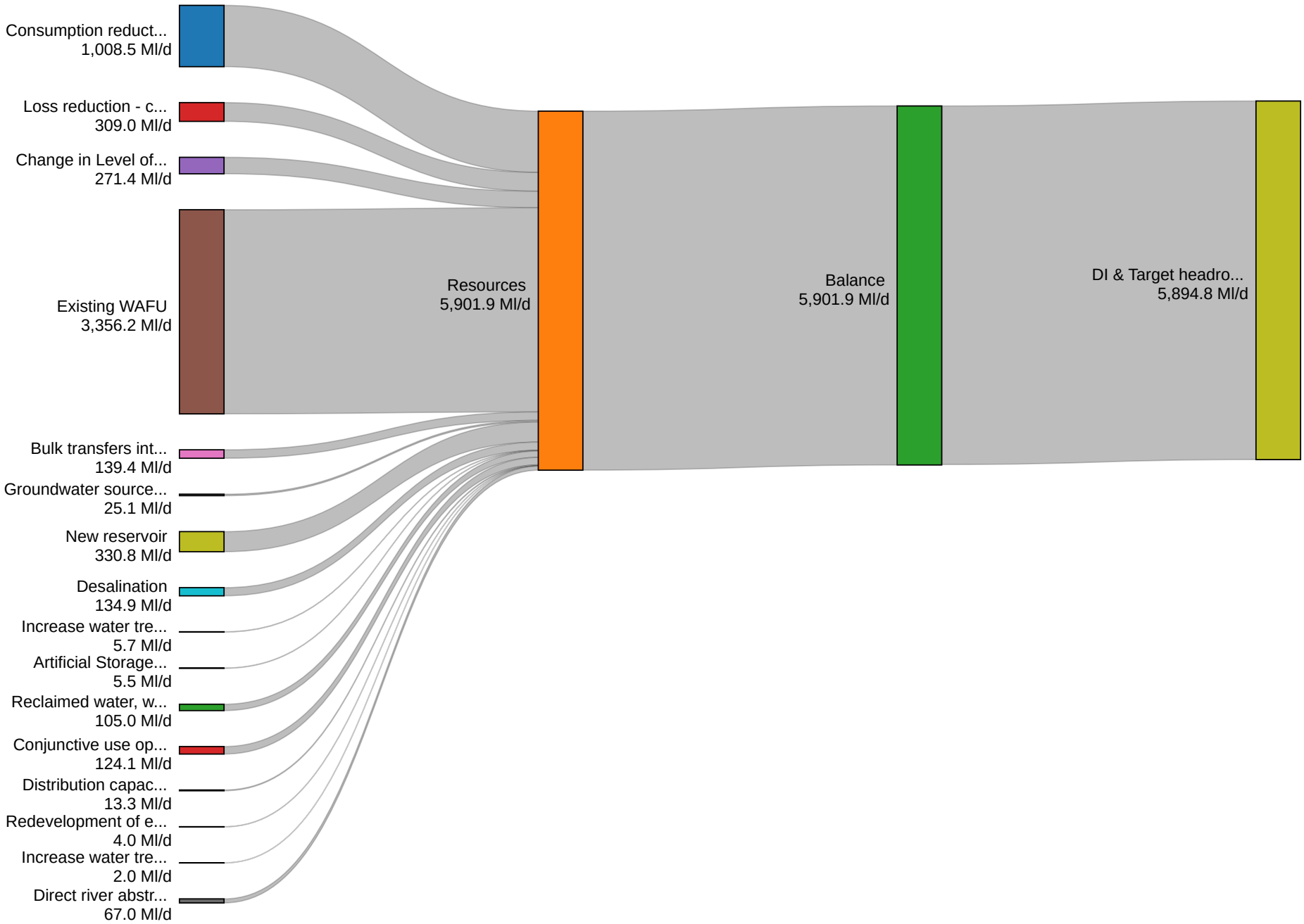
Situation 4 - 2026 (Thames Water)



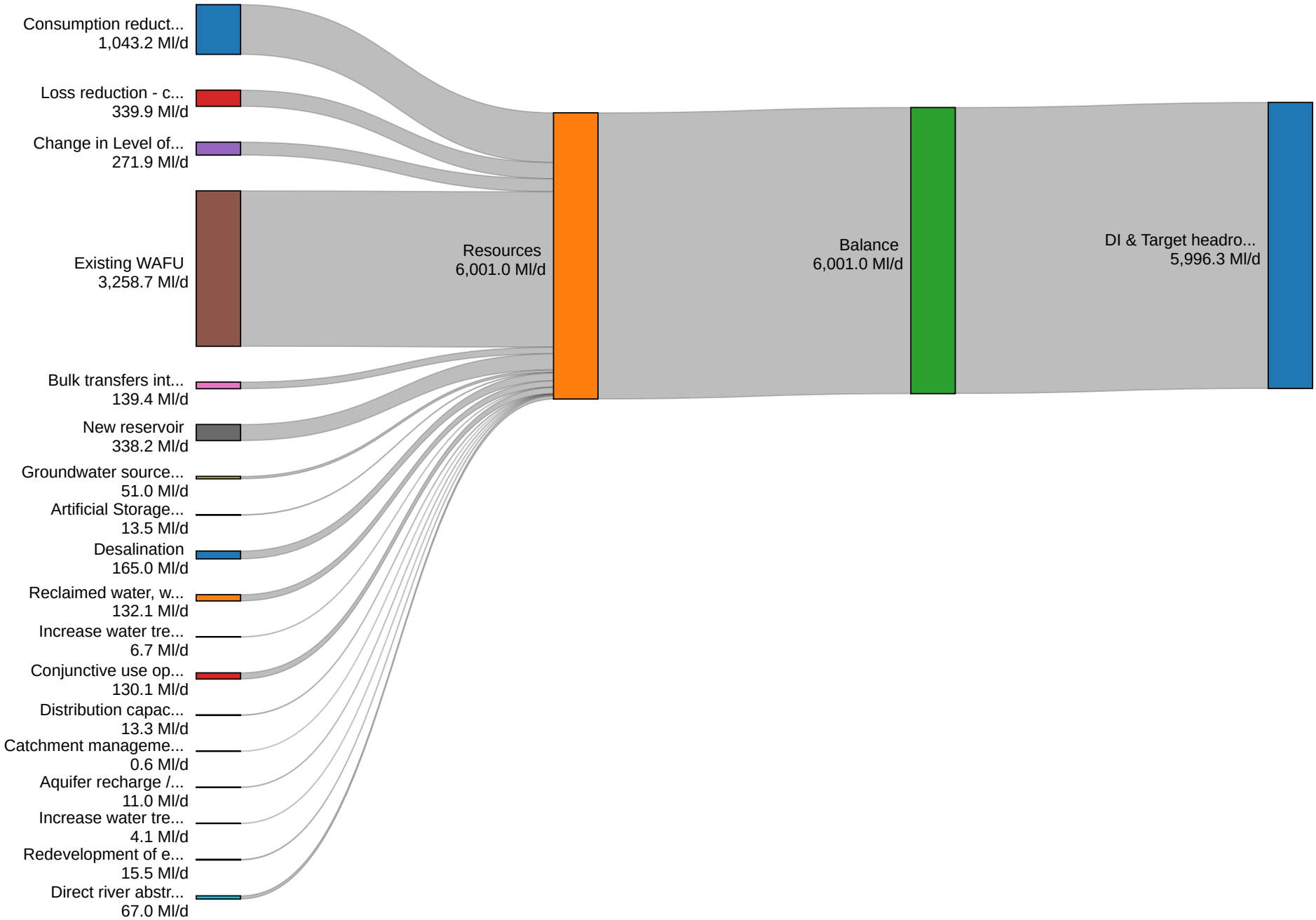
Situation 4 - 2040 (Thames Water)



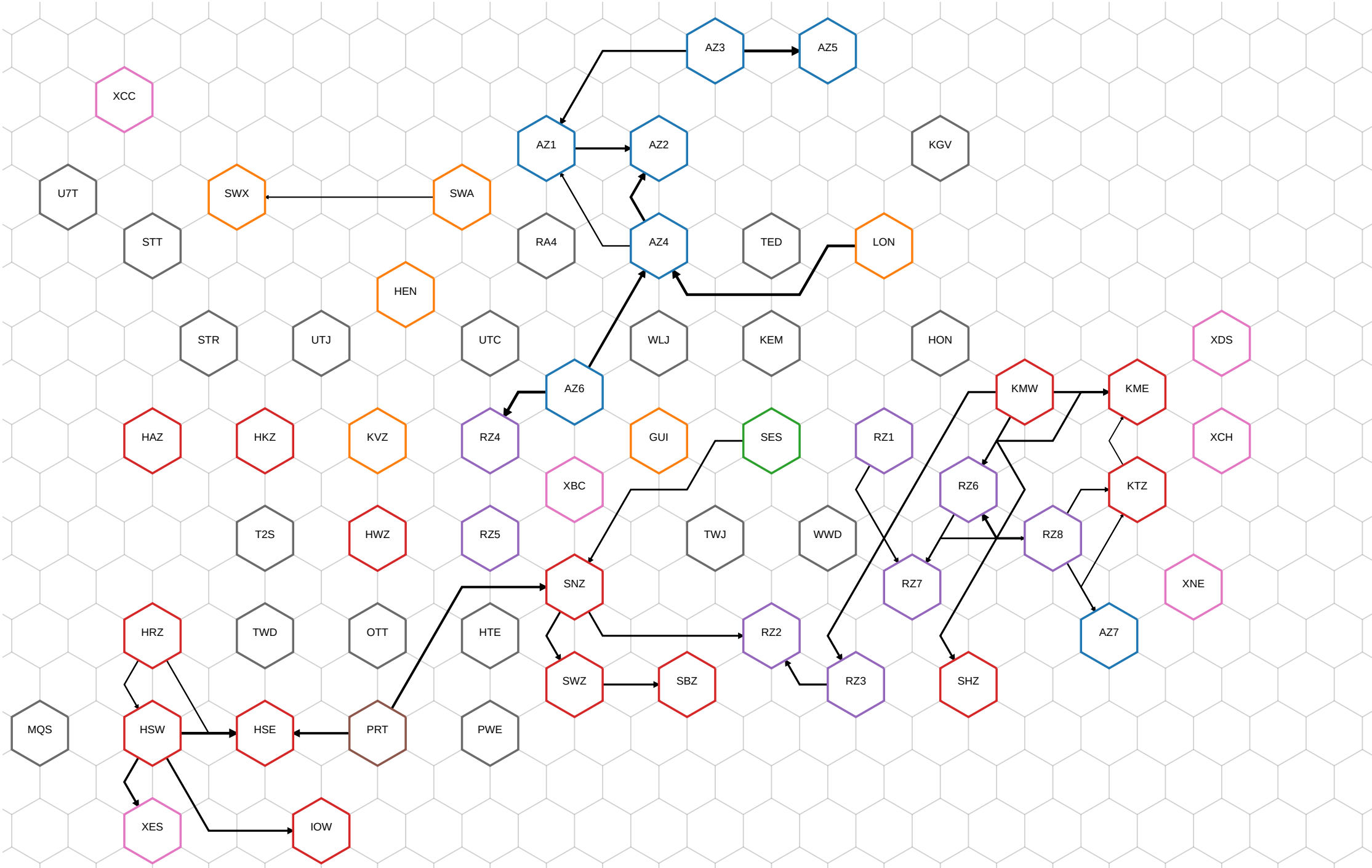
Situation 4 - 2050 (Thames Water)



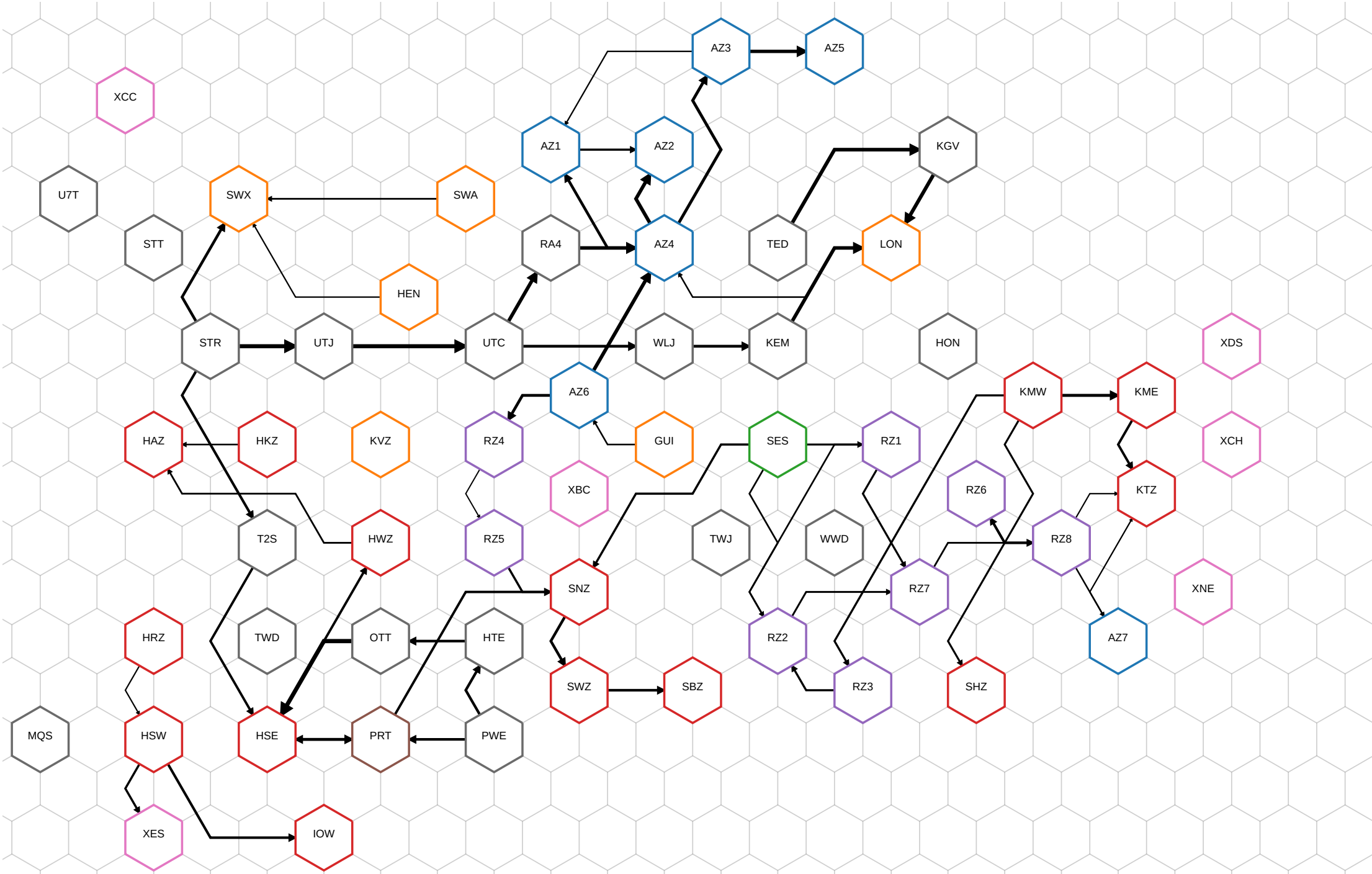
Situation 4 - 2075 (Thames Water)



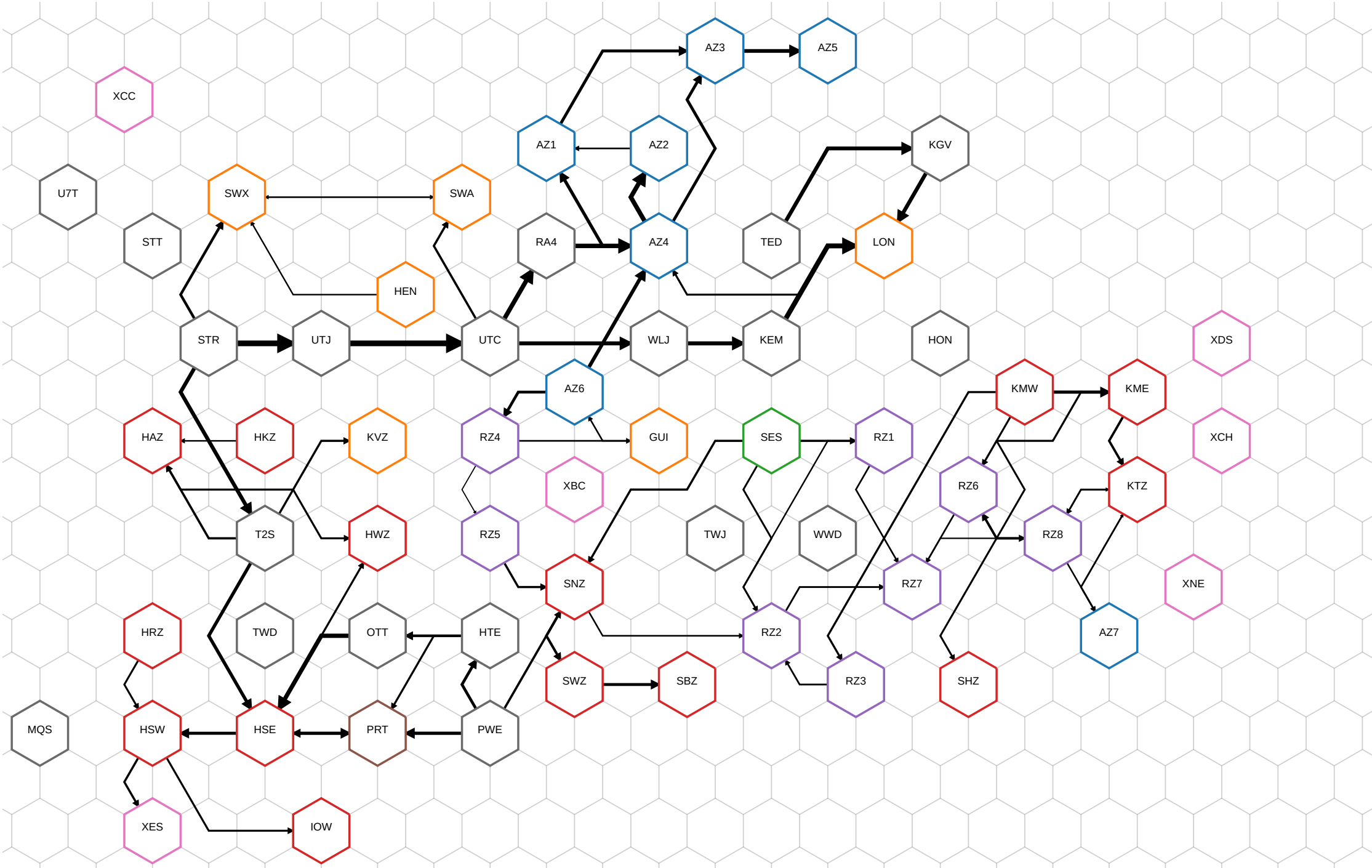
Situation 4 - 2026



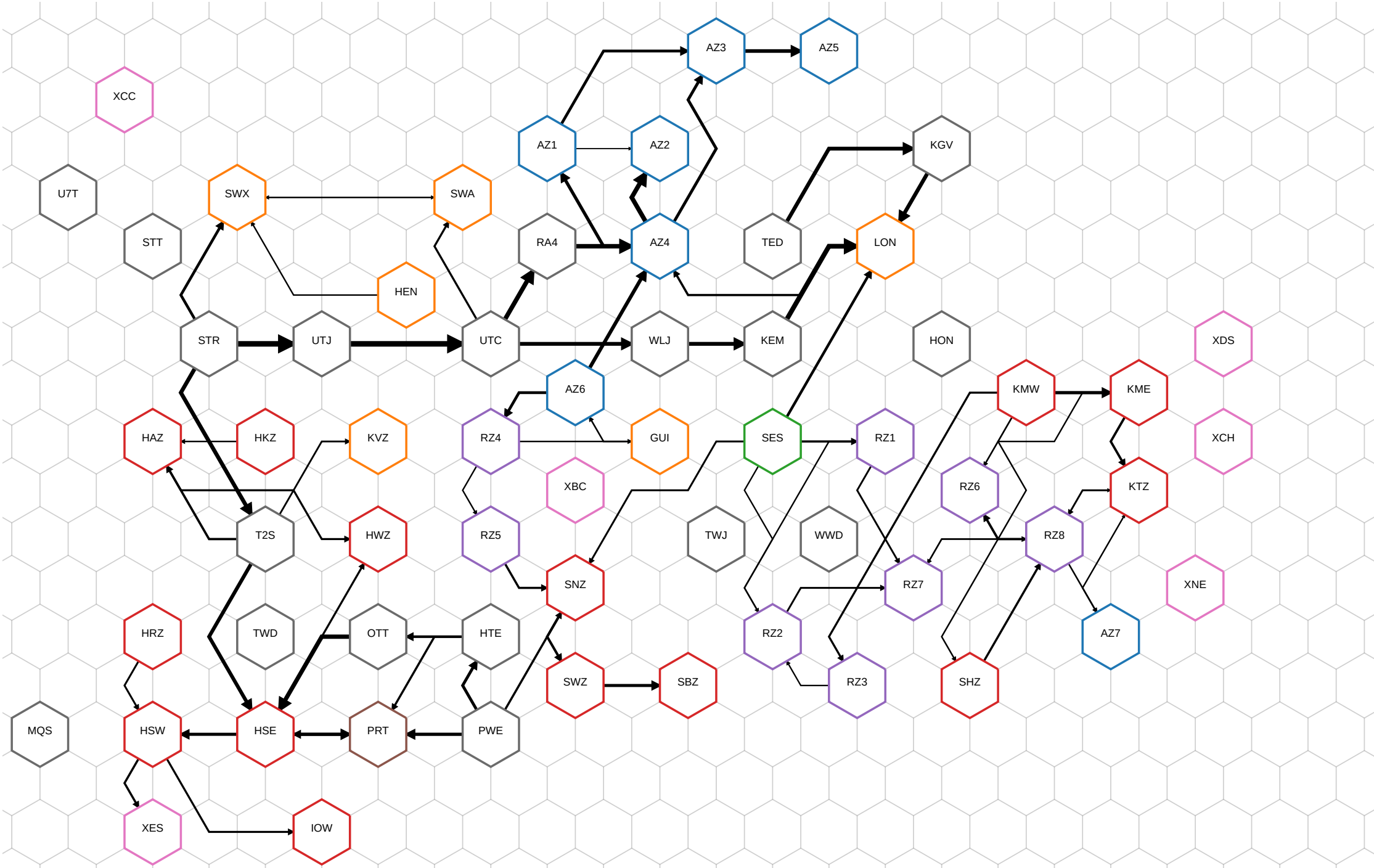
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +20% OB (ALL OPTIONS)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p20pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions with Teddington DRA optimism bias changed by +0.2.
Created at	13/12/2023, 11:10:13
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p20pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change Teddington DRA optimism bias by +0.2.
Optimised discount rate	STPR

Metrics

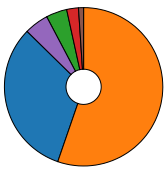
Net present value (Cost)

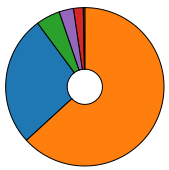
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,544	17,671	16,995	19,067	17,558	16,802	17,608	16,760	16,066	17,674	(£m)
Cost w/o deficit (STPR)	20,544	17,671	16,995	19,067	17,558	16,802	17,608	16,760	16,066	17,674	(£m)
Cost w/ deficit (IGEQ)	31,342	25,894	24,674	28,533	25,701	24,359	25,983	24,385	23,136	26,001	(£m)
Cost w/o deficit (IGEQ)	31,342	25,894	24,674	28,533	25,701	24,359	25,983	24,385	23,136	26,001	(£m)
Cost w/ deficit (LTDR)	22,635	19,292	18,515	20,915	19,163	18,298	19,253	18,267	17,470	19,312	(£m)
Cost w/o deficit (LTDR)	22,635	19,292	18,515	20,915	19,163	18,298	19,253	18,267	17,470	19,312	(£m)

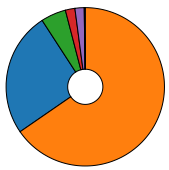
Cost breakdown (STPR)

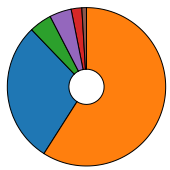
Select Company: Total

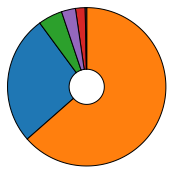
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,587	4,712	4,324	5,491	4,632	4,183	4,509	4,061	3,628	4,681	(£m)
Fixed opex	11,358	11,164	11,114	11,254	11,153	11,097	11,157	11,106	11,046	11,161	(£m)
Fixed operational carbon	880	869	870	877	870	870	871	867	865	871	(£m)
Embedded carbon	494	354	331	416	347	318	342	305	280	354	(£m)
Variable opex	1,013	517	320	849	502	302	636	385	230	528	(£m)
Variable carbon opex	212	55	36	180	54	32	93	37	17	80	(£m)

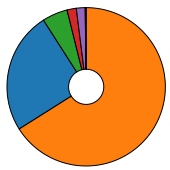
situation1 

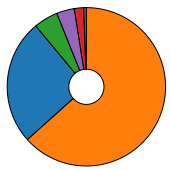
situation2 

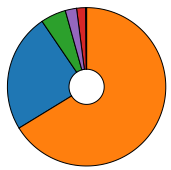
situation3 

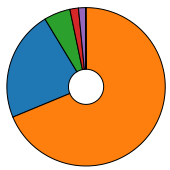
situation4 

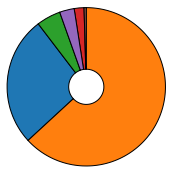
situation5 

situation6 

situation7 

situation8 

situation9 

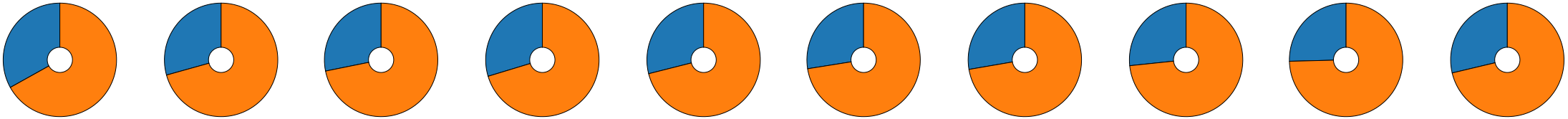
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,174,251	2,164,593	2,011,129	2,601,431	2,127,300	1,934,350	2,116,095	1,855,249	1,693,630	2,186,448	(tonnes)
Operational emissions	6,422,257	5,216,731	5,127,256	6,165,155	5,225,609	5,097,248	5,523,937	5,107,088	4,973,821	5,428,789	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

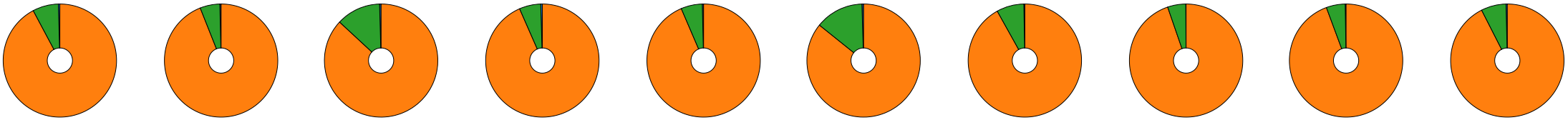


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	44	22	41	9	8	43	(GWh)
Grid	22,643	11,348	4,259	19,210	10,976	3,900	13,147	7,944	2,891	10,702	(GWh)
Renewable	1,807	681	619	1,257	713	625	1,115	433	165	824	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,272	63,944	63,081	67,171	63,620	62,707	63,883	61,609	60,553	63,982
SEA environmental disbenefit	113,304	81,884	75,025	99,939	79,528	74,041	83,828	70,451	61,604	82,178
Natural capital	81,592,380	77,190,134	80,044,243	75,273,704	77,131,522	79,772,757	80,951,905	81,730,369	84,602,292	79,809,923
Bio-diversity net gain	−216,997	−149,878	−119,778	−202,622	−149,655	−126,289	−119,765	−92,607	−63,553	−137,905

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,934	31,845	31,483	33,096	31,723	31,334	31,711	30,798	30,308	31,804

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.92	29.35	32.17	28.36	29.50	32.22	28.49	31.45	34.94	30.60
R1: Uncertainty of option supply/demand benefit	5.96	5.35	5.85	5.58	5.39	5.84	5.28	5.70	6.29	5.69
R3: Risk of service failure due to other physical hazards	6.97	7.31	8.19	6.93	7.36	8.21	7.02	7.94	9.05	7.66
R4: Availability of additional headroom	6.58	6.92	7.14	6.65	6.94	7.15	7.08	7.44	7.68	7.06
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.87	4.24	4.79	3.94	4.54	5.24	4.42
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.54	6.21	5.32	5.56	6.23	5.17	5.83	6.67	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

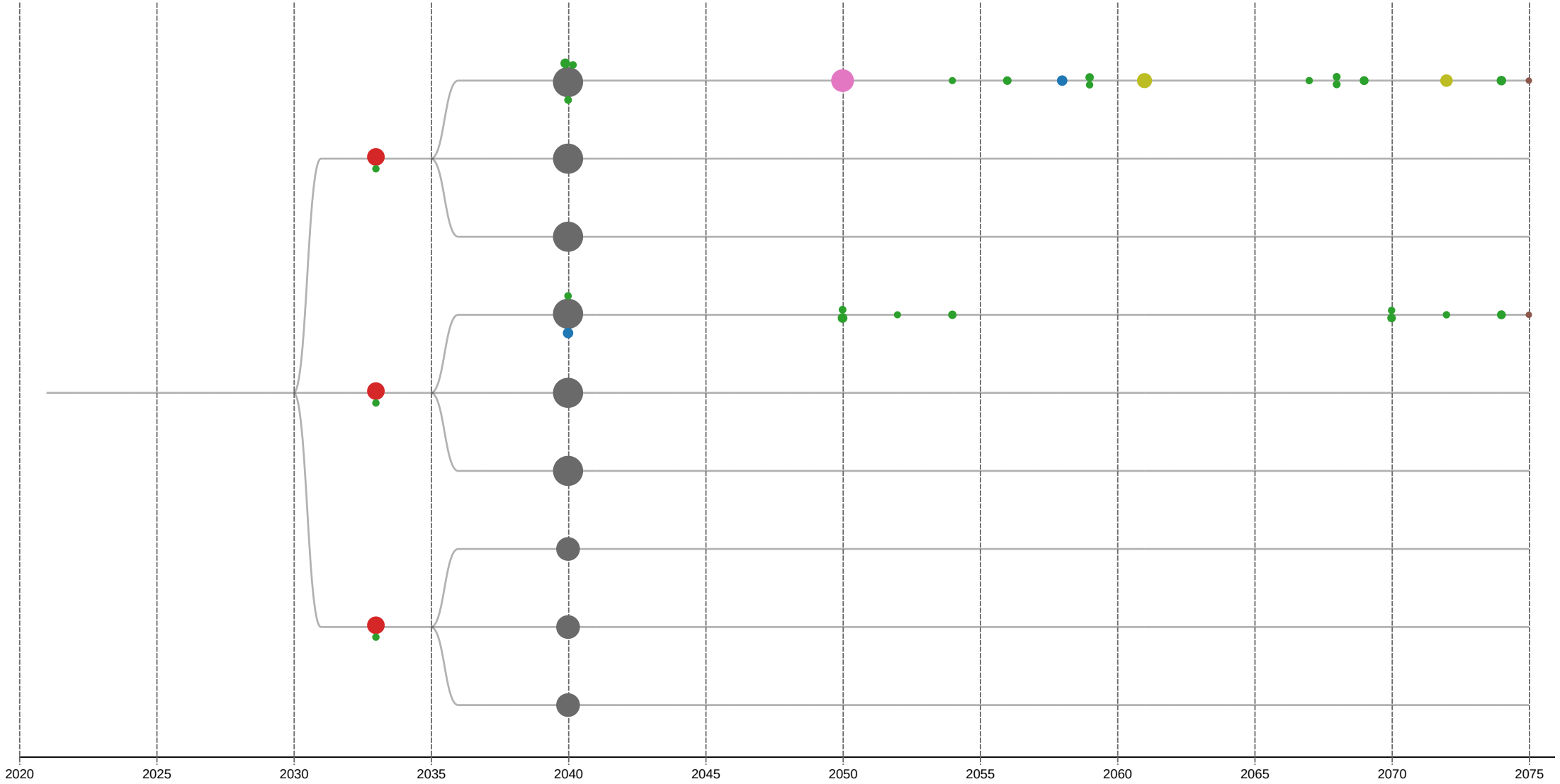
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.63	17.51	14.21	15.68	17.40	15.41	17.53	19.99	16.38
A3: Operational complexity and flexibility	6.50	7.02	7.89	6.60	7.08	7.95	6.70	7.67	8.80	7.36
A4: WRZ connectivity	7.50	8.58	9.58	7.57	8.58	9.42	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.14	19.81	22.03	18.76	19.92	21.91	20.17	22.86	25.89	21.17
E1: Scaleability and modularity of proposed changes	8.77	9.29	10.37	8.68	9.38	10.43	9.65	11.08	12.61	10.03
E2: Intervention lead times	4.19	4.13	4.54	3.98	4.12	4.34	4.02	4.40	4.88	4.29
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.09	6.43	7.15	6.49	7.38	8.40	6.85
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

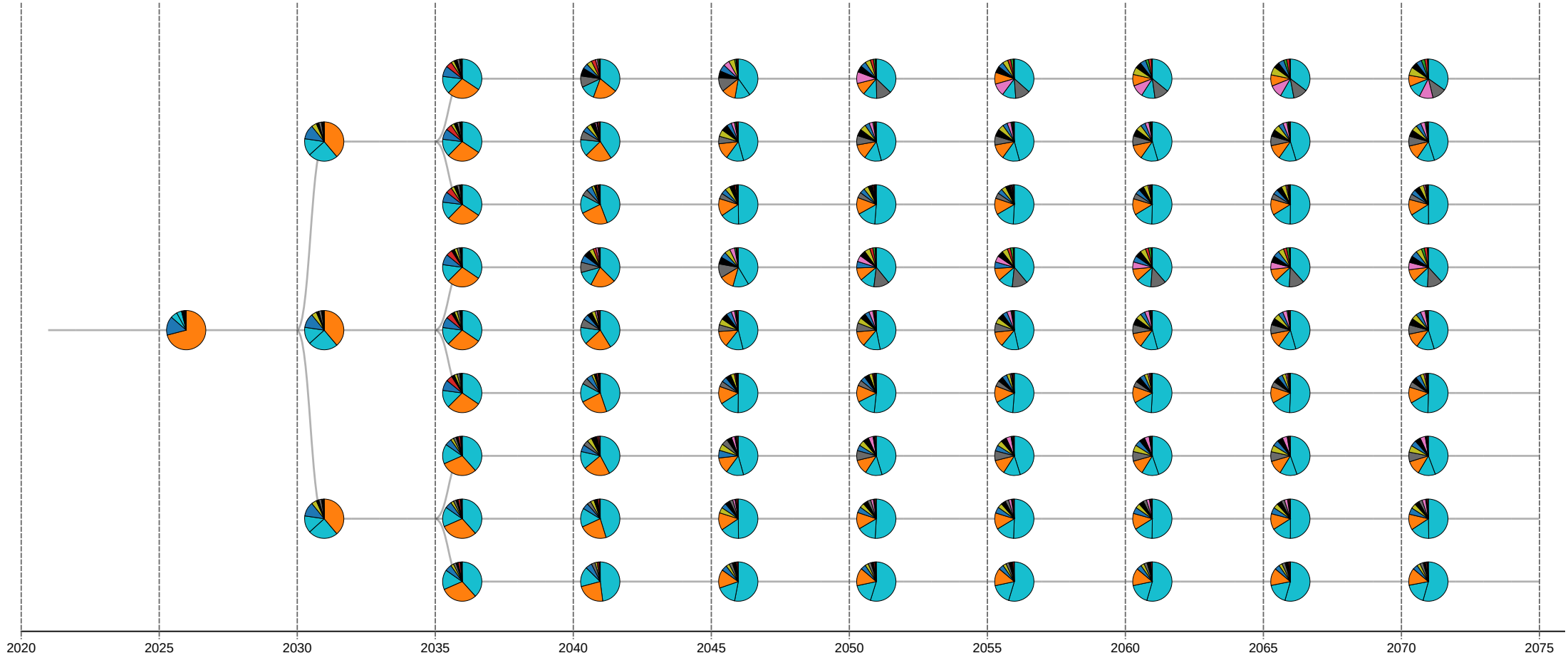
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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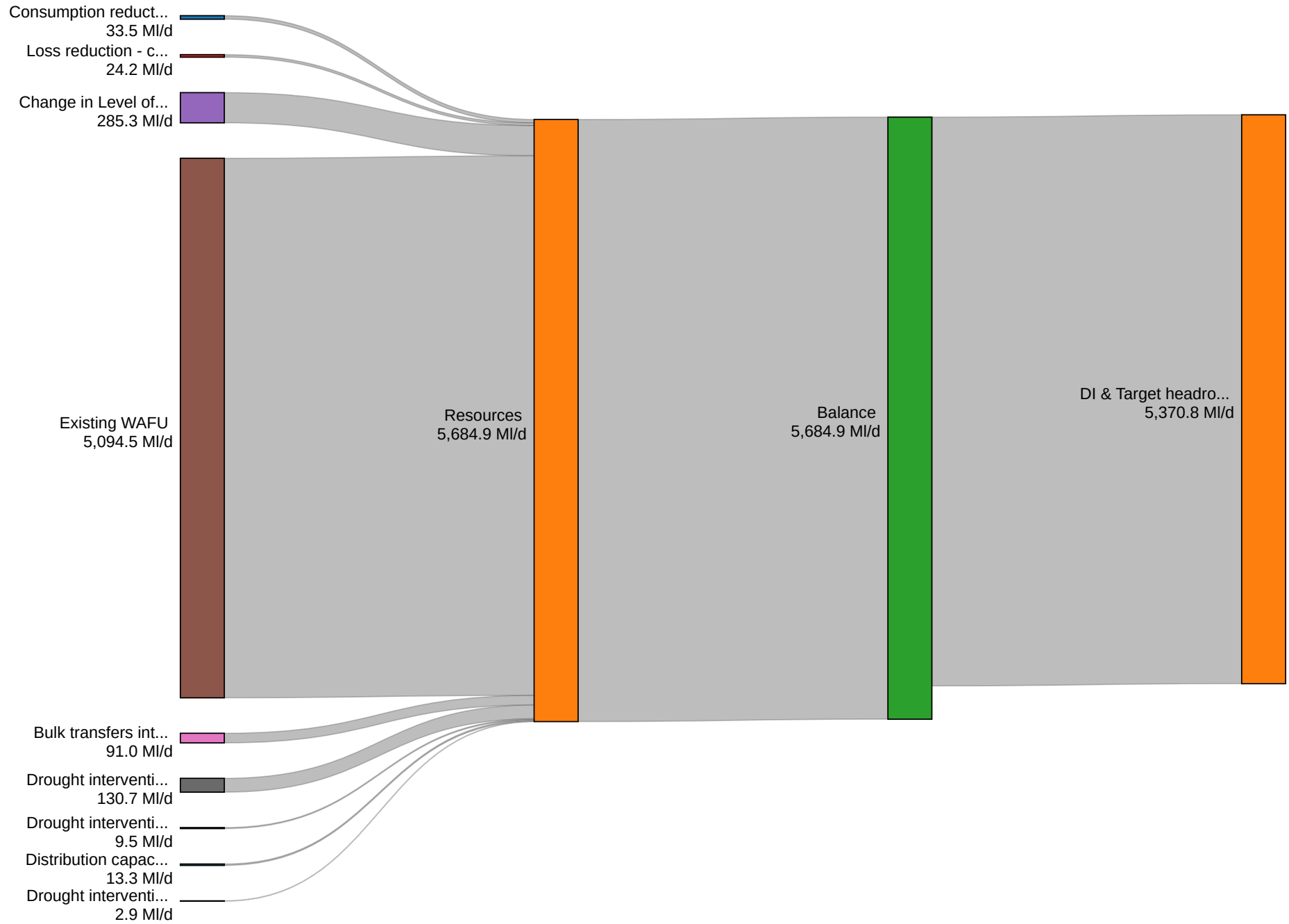
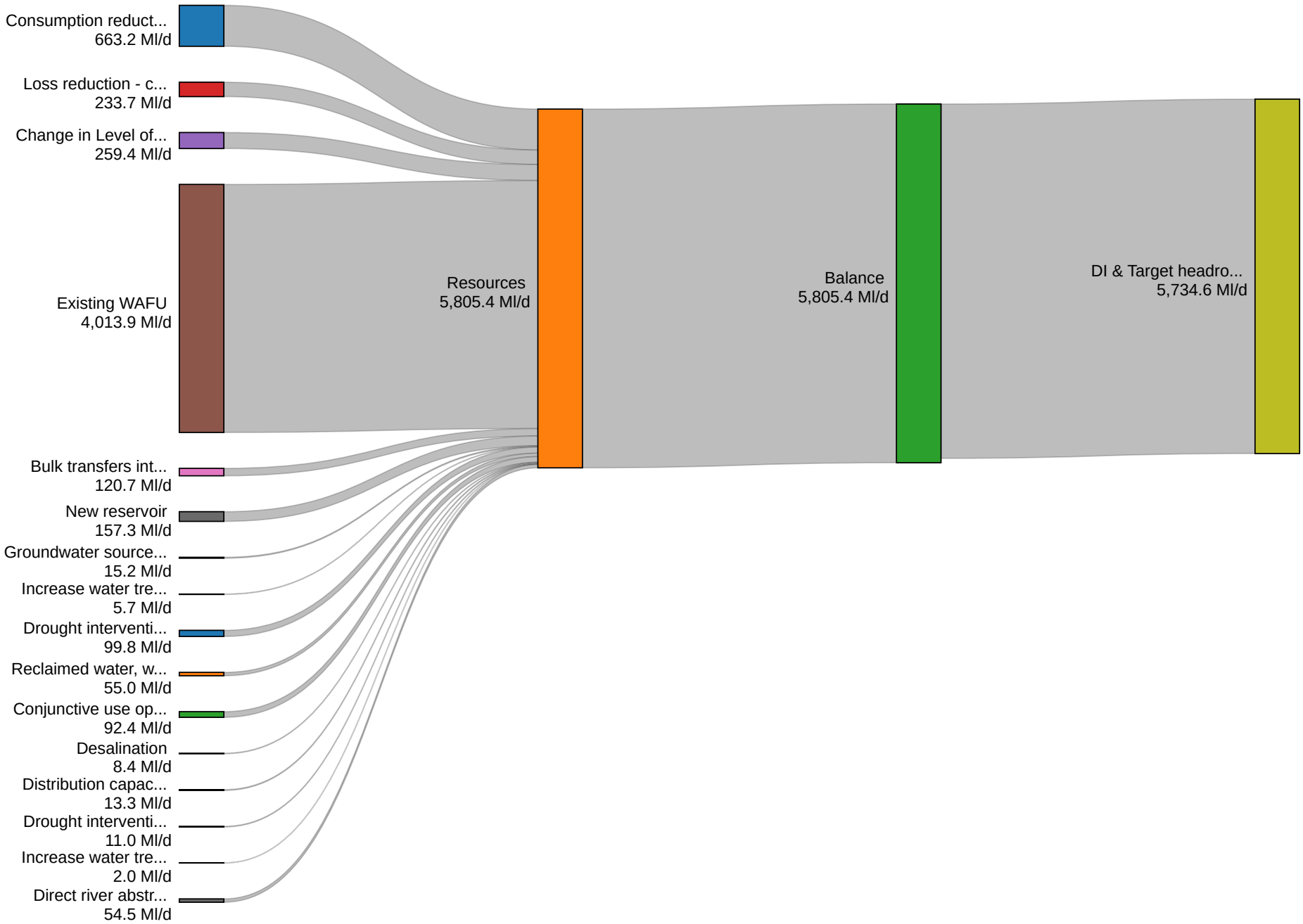
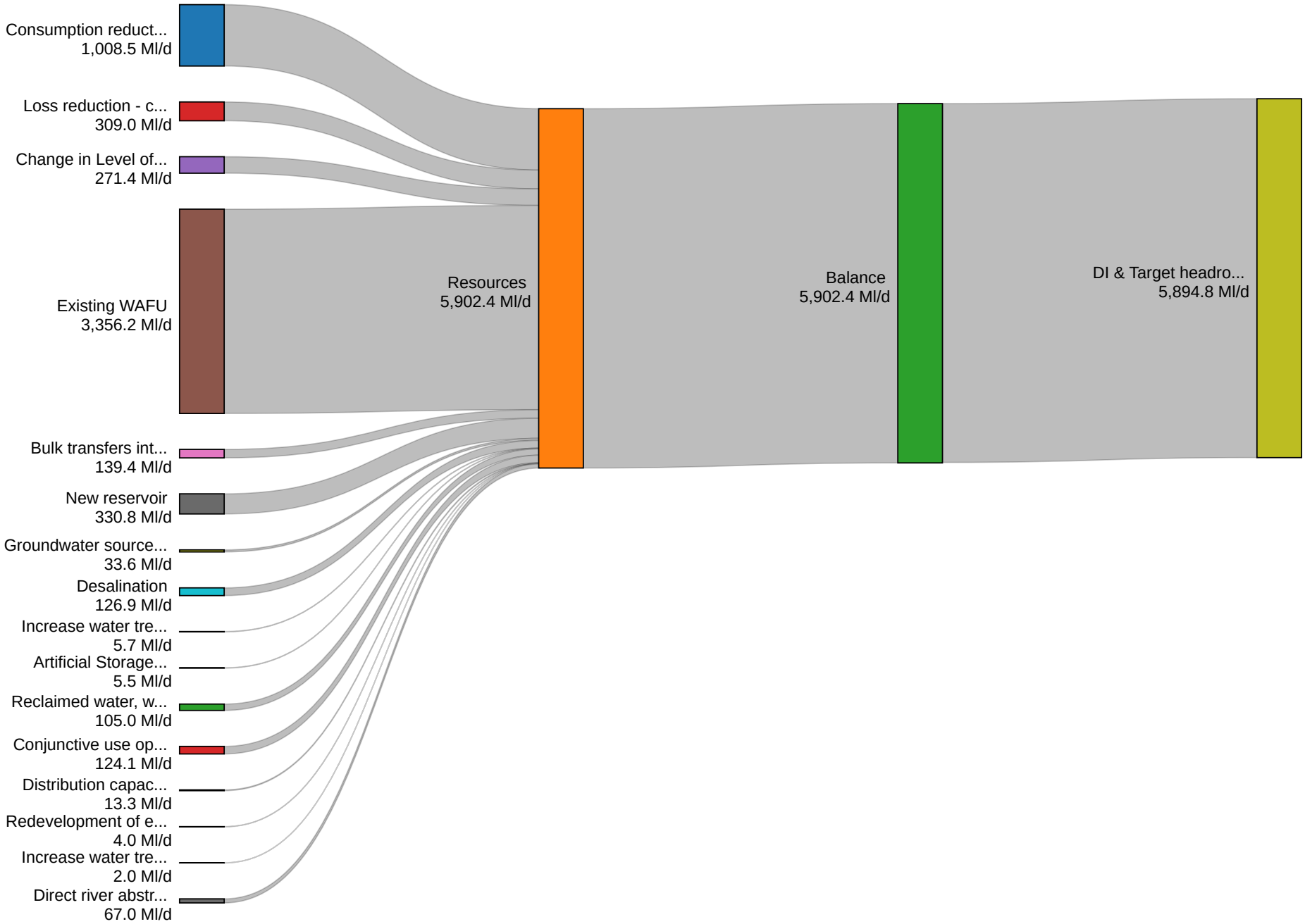
Situation 4 - 2026 (Thames Water)



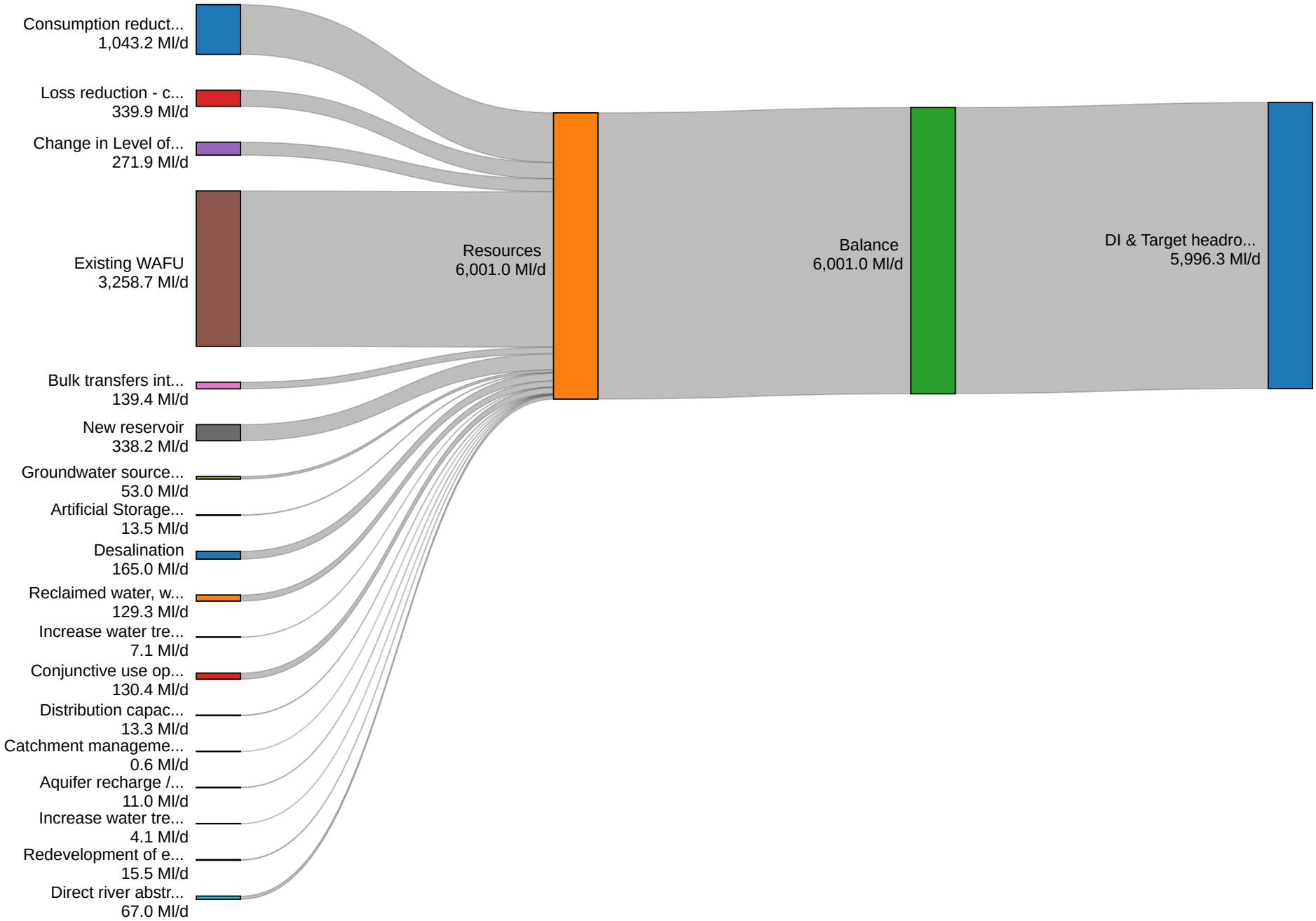
Situation 4 - 2040 (Thames Water)



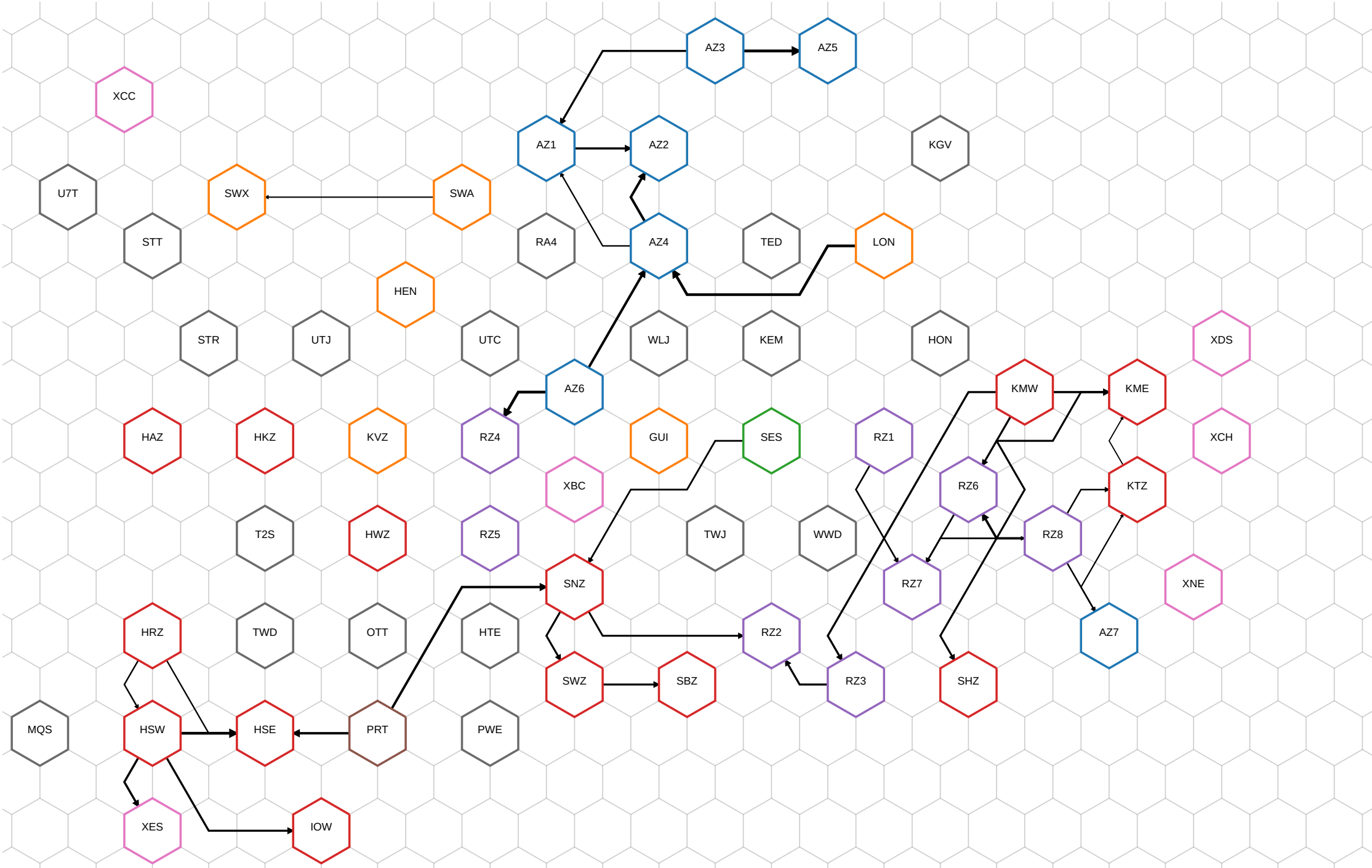
Situation 4 - 2050 (Thames Water)



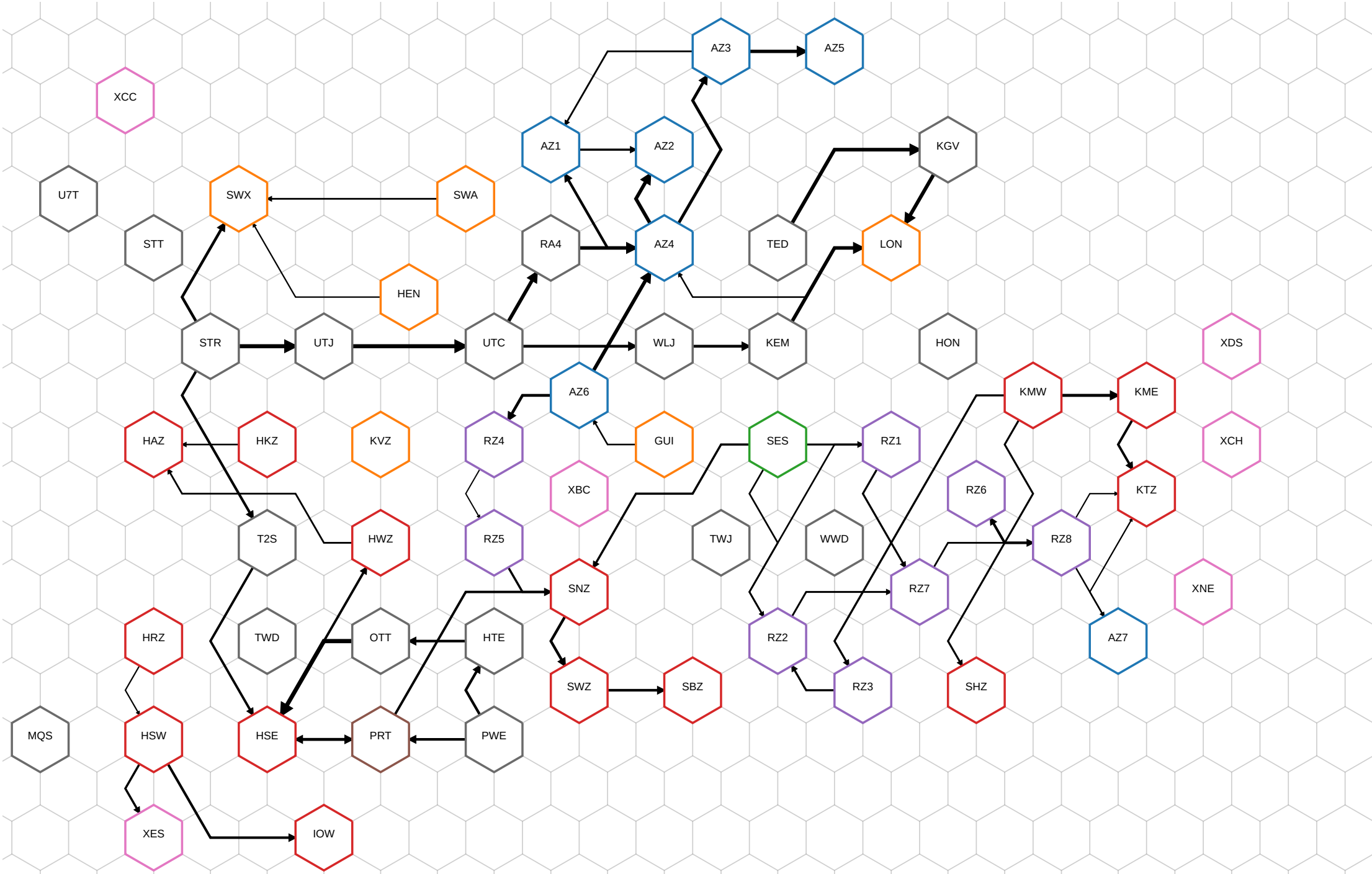
Situation 4 - 2075 (Thames Water)



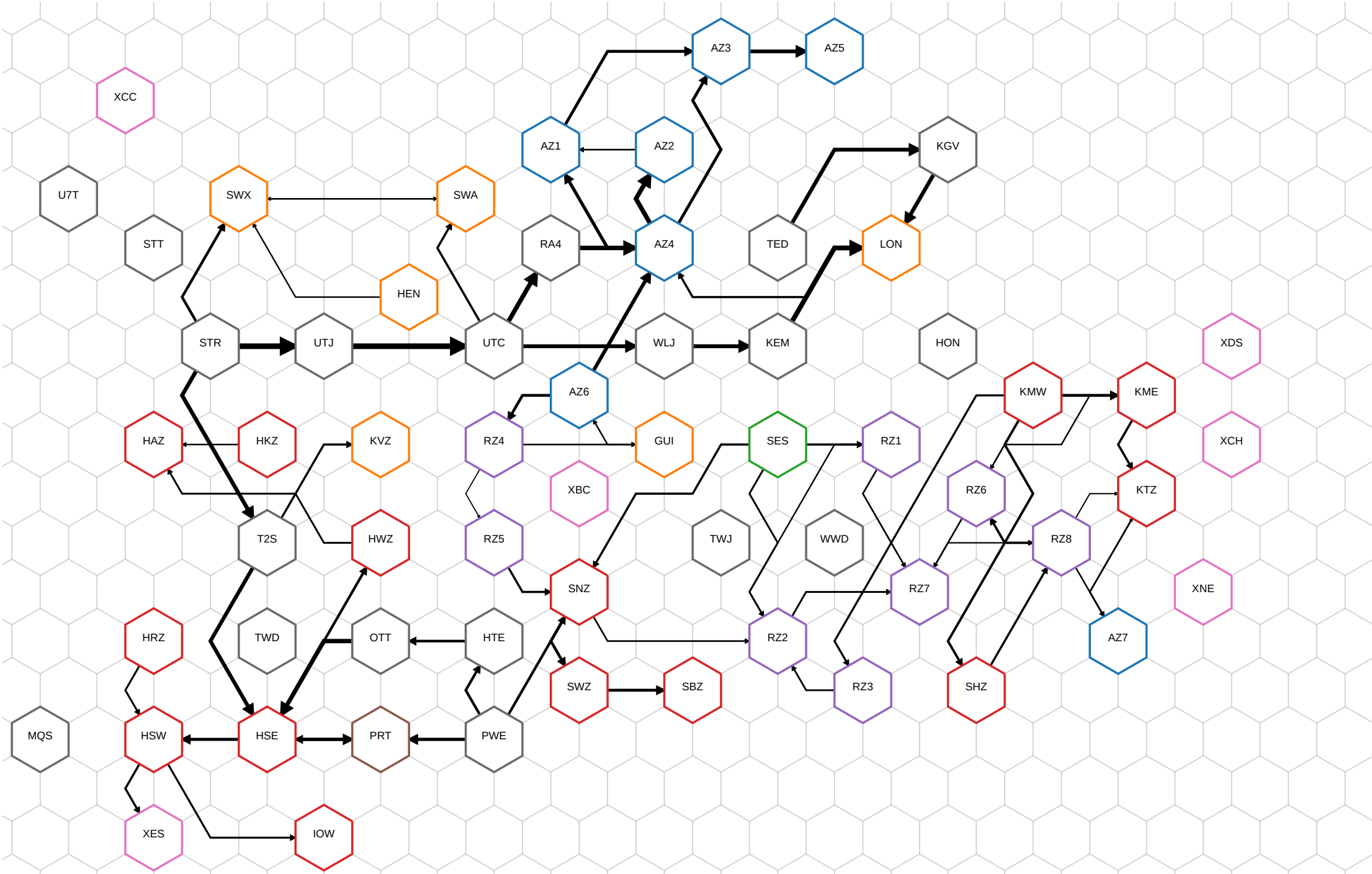
Situation 4 - 2026



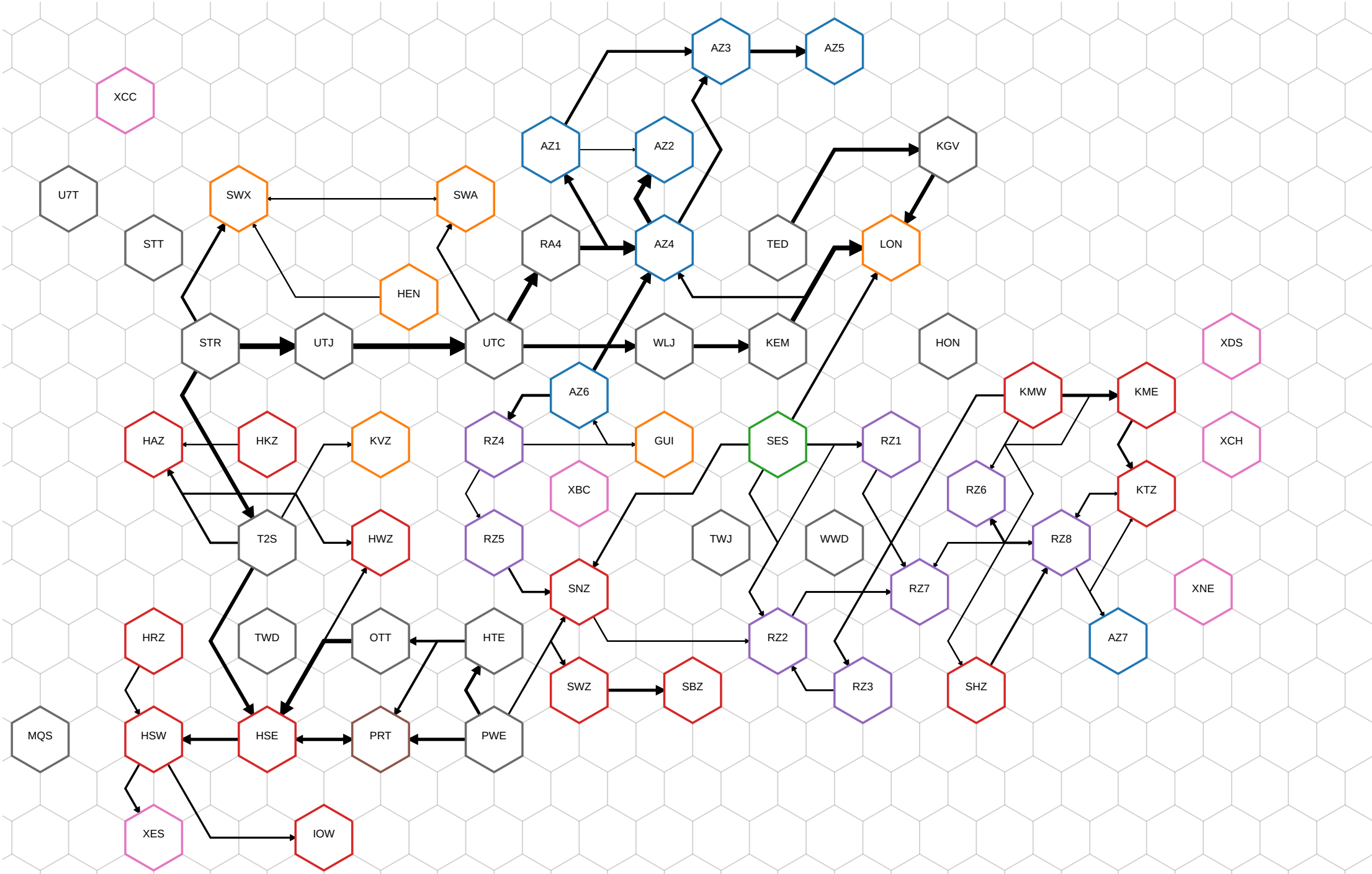
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +50% OB (ALL OPTIONS)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p50pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions with Teddington DRA optimism bias changed by +0.5.
Created at	13/12/2023, 23:44:51
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p50pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change Teddington DRA optimism bias by +0.5.
Optimised discount rate	STPR

Metrics

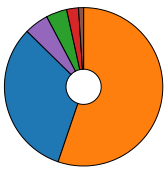
Net present value (Cost)

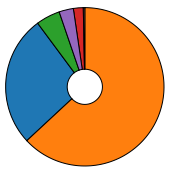
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,571	17,698	17,023	19,107	17,593	16,838	17,647	16,799	16,108	17,709	(£m)
Cost w/o deficit (STPR)	20,571	17,698	17,023	19,107	17,593	16,838	17,647	16,799	16,108	17,709	(£m)
Cost w/ deficit (IGEQ)	31,384	25,936	24,716	28,595	25,754	24,413	26,043	24,446	23,202	26,055	(£m)
Cost w/o deficit (IGEQ)	31,384	25,936	24,716	28,595	25,754	24,413	26,043	24,446	23,202	26,055	(£m)
Cost w/ deficit (LTDR)	22,665	19,322	18,545	20,960	19,202	18,338	19,296	18,311	17,517	19,351	(£m)
Cost w/o deficit (LTDR)	22,665	19,322	18,545	20,960	19,202	18,338	19,296	18,311	17,517	19,351	(£m)

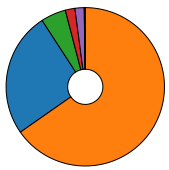
Cost breakdown (STPR)

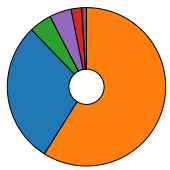
Select Company: Total

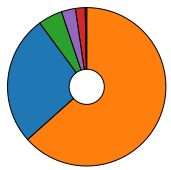
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,611	4,737	4,348	5,525	4,664	4,215	4,545	4,097	3,664	4,712	(£m)
Fixed opex	11,358	11,165	11,114	11,254	11,153	11,098	11,159	11,108	11,048	11,162	(£m)
Fixed operational carbon	880	869	870	877	870	870	871	867	865	871	(£m)
Embedded carbon	498	357	334	420	352	322	346	309	285	358	(£m)
Variable opex	1,013	517	320	850	501	301	634	384	230	528	(£m)
Variable carbon opex	212	55	36	181	54	32	92	35	17	79	(£m)

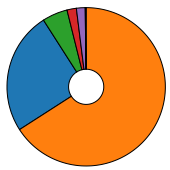
situation1 

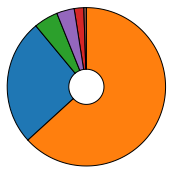
situation2 

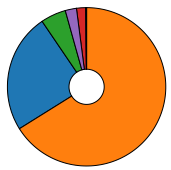
situation3 

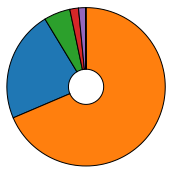
situation4 

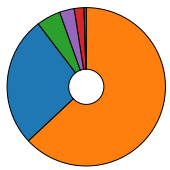
situation5 

situation6 

situation7 

situation8 

situation9 

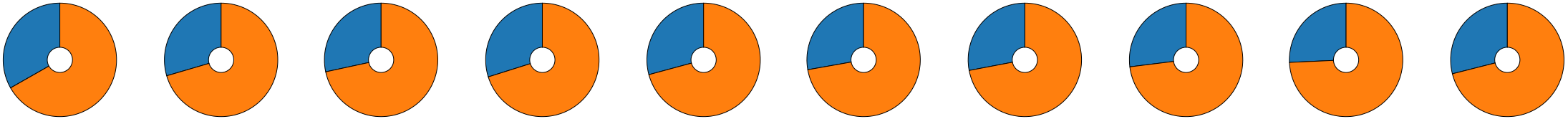
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,195,245	2,185,587	2,032,123	2,628,000	2,153,977	1,960,707	2,143,839	1,882,992	1,721,373	2,211,538	(tonnes)
Operational emissions	6,421,853	5,216,327	5,126,852	6,173,989	5,222,976	5,096,135	5,514,790	5,099,920	4,973,356	5,427,355	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

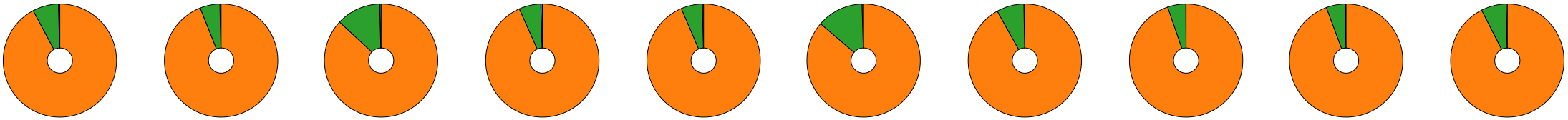


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	43	21	41	9	8	43	(GWh)
Grid	22,643	11,348	4,259	19,141	10,936	3,899	13,147	7,944	2,891	10,690	(GWh)
Renewable	1,807	681	619	1,267	706	598	1,115	433	165	821	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,272	63,944	63,081	67,256	63,739	62,772	63,927	61,653	60,597	64,027
SEA environmental disbenefit	113,306	81,886	75,027	101,156	80,611	74,949	84,534	71,157	62,310	82,771
Natural capital	81,592,380	77,190,134	80,044,243	75,323,678	77,196,813	79,842,533	80,951,905	81,730,369	84,602,292	79,830,483
Bio-diversity net gain	−216,997	−149,878	−119,778	−202,617	−149,461	−125,070	−119,765	−92,607	−63,553	−137,747

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,914	31,833	31,478	33,151	31,754	31,412	31,751	30,842	30,352	31,832

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.92	29.35	32.17	28.35	29.52	32.28	28.54	31.52	35.01	30.63
R1: Uncertainty of option supply/demand benefit	5.96	5.35	5.85	5.59	5.39	5.85	5.30	5.72	6.31	5.70
R3: Risk of service failure due to other physical hazards	6.97	7.31	8.19	6.93	7.36	8.23	7.03	7.96	9.07	7.67
R4: Availability of additional headroom	6.58	6.92	7.14	6.65	6.94	7.15	7.09	7.44	7.68	7.07
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.87	4.25	4.81	3.95	4.55	5.26	4.42
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.54	6.21	5.31	5.57	6.24	5.18	5.85	6.68	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

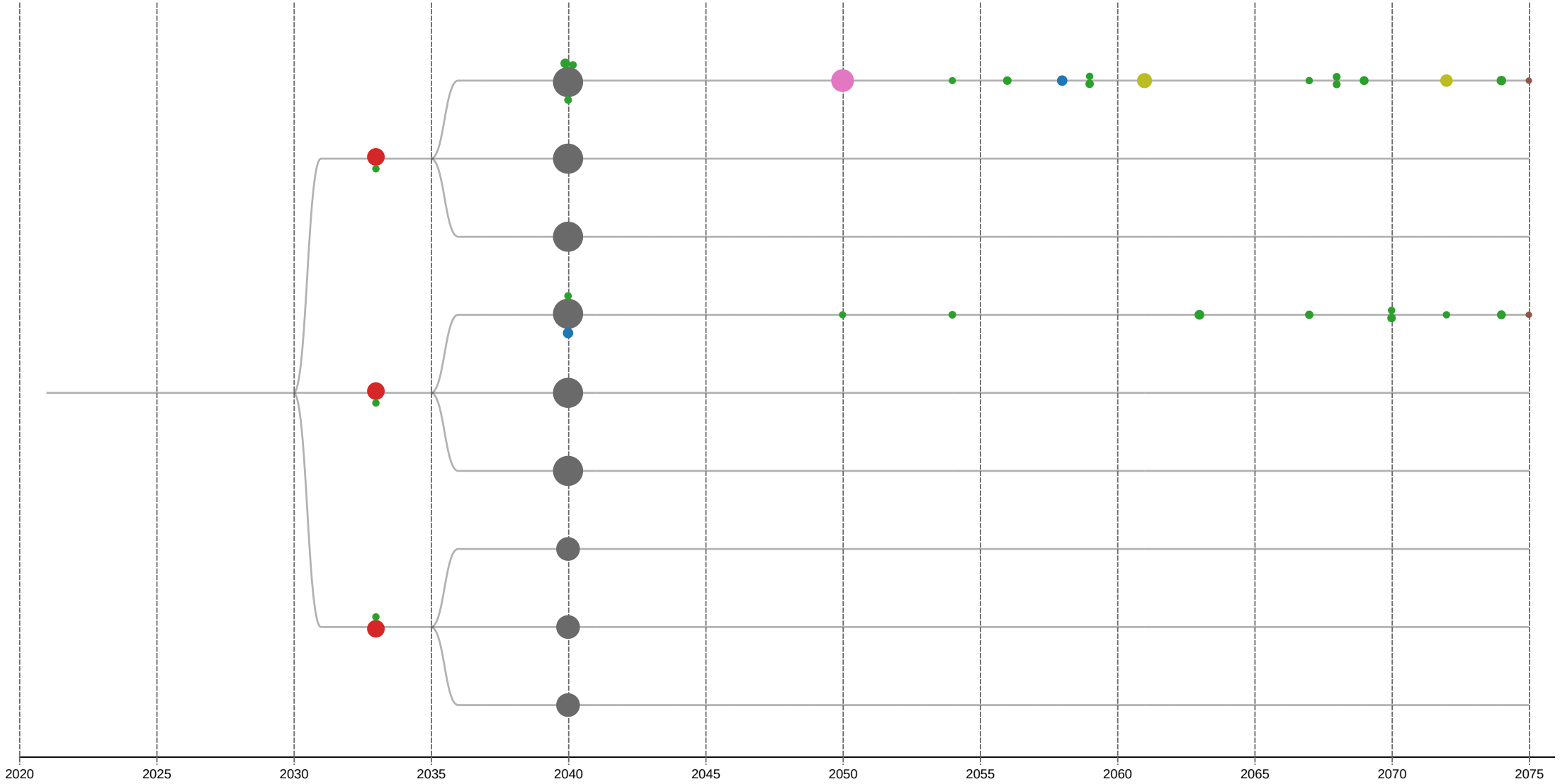
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.63	17.51	14.22	15.69	17.41	15.42	17.55	20.00	16.38
A3: Operational complexity and flexibility	6.50	7.02	7.90	6.60	7.08	7.96	6.71	7.68	8.82	7.36
A4: WRZ connectivity	7.50	8.58	9.58	7.58	8.58	9.42	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.14	19.81	22.03	18.75	19.94	21.96	20.21	22.90	25.94	21.19
E1: Scaleability and modularity of proposed changes	8.77	9.30	10.37	8.68	9.38	10.44	9.66	11.09	12.63	10.04
E2: Intervention lead times	4.19	4.13	4.54	3.97	4.13	4.36	4.04	4.42	4.90	4.30
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.09	6.43	7.16	6.51	7.40	8.41	6.85
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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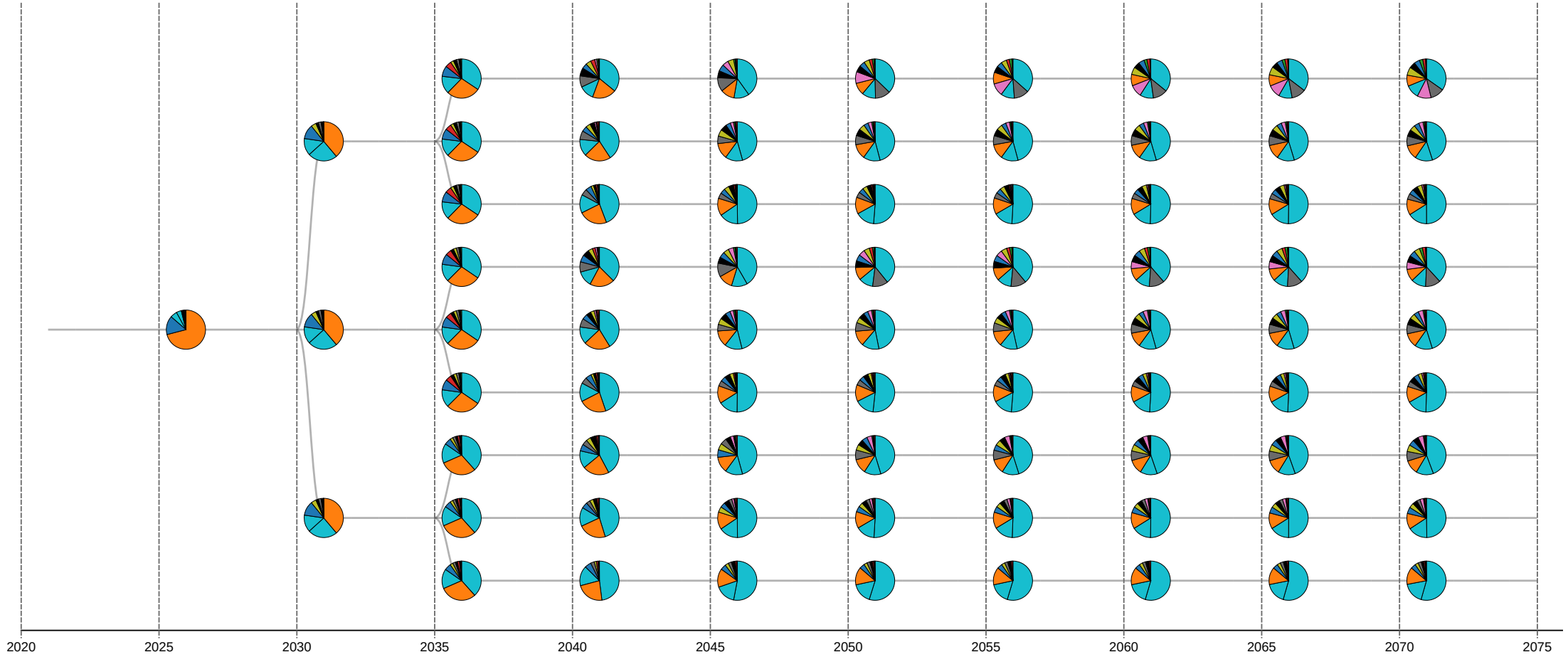
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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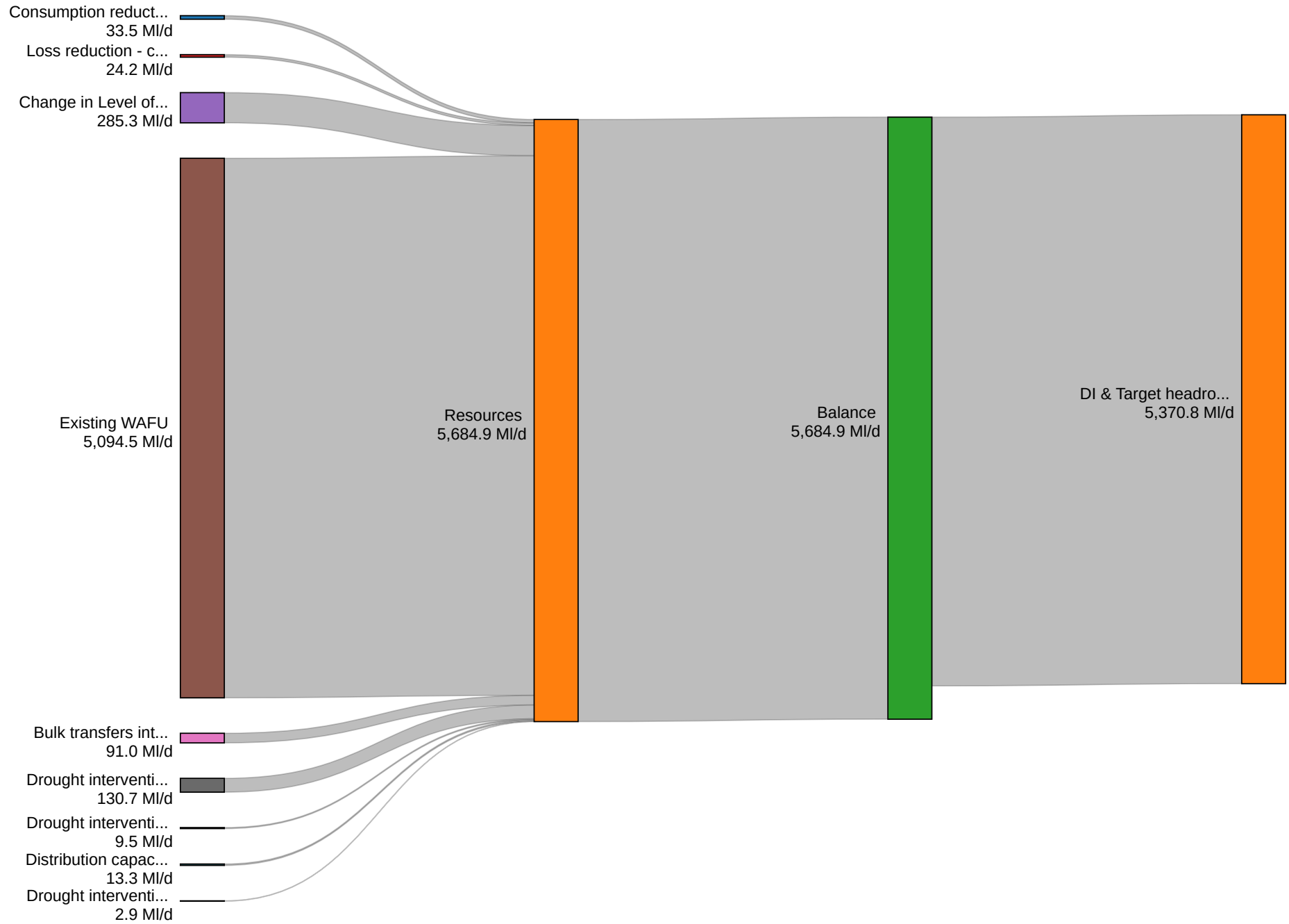
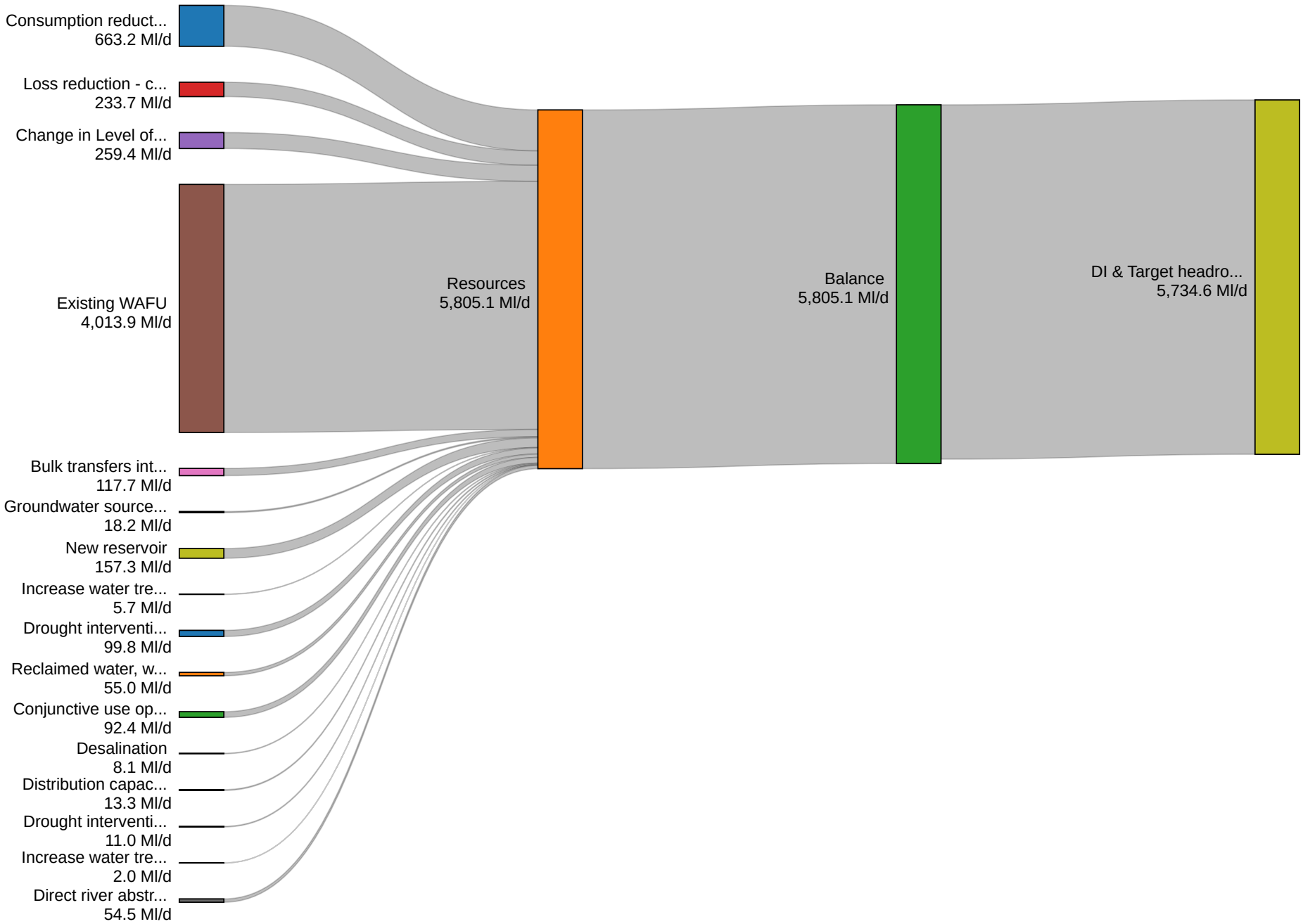
- Other

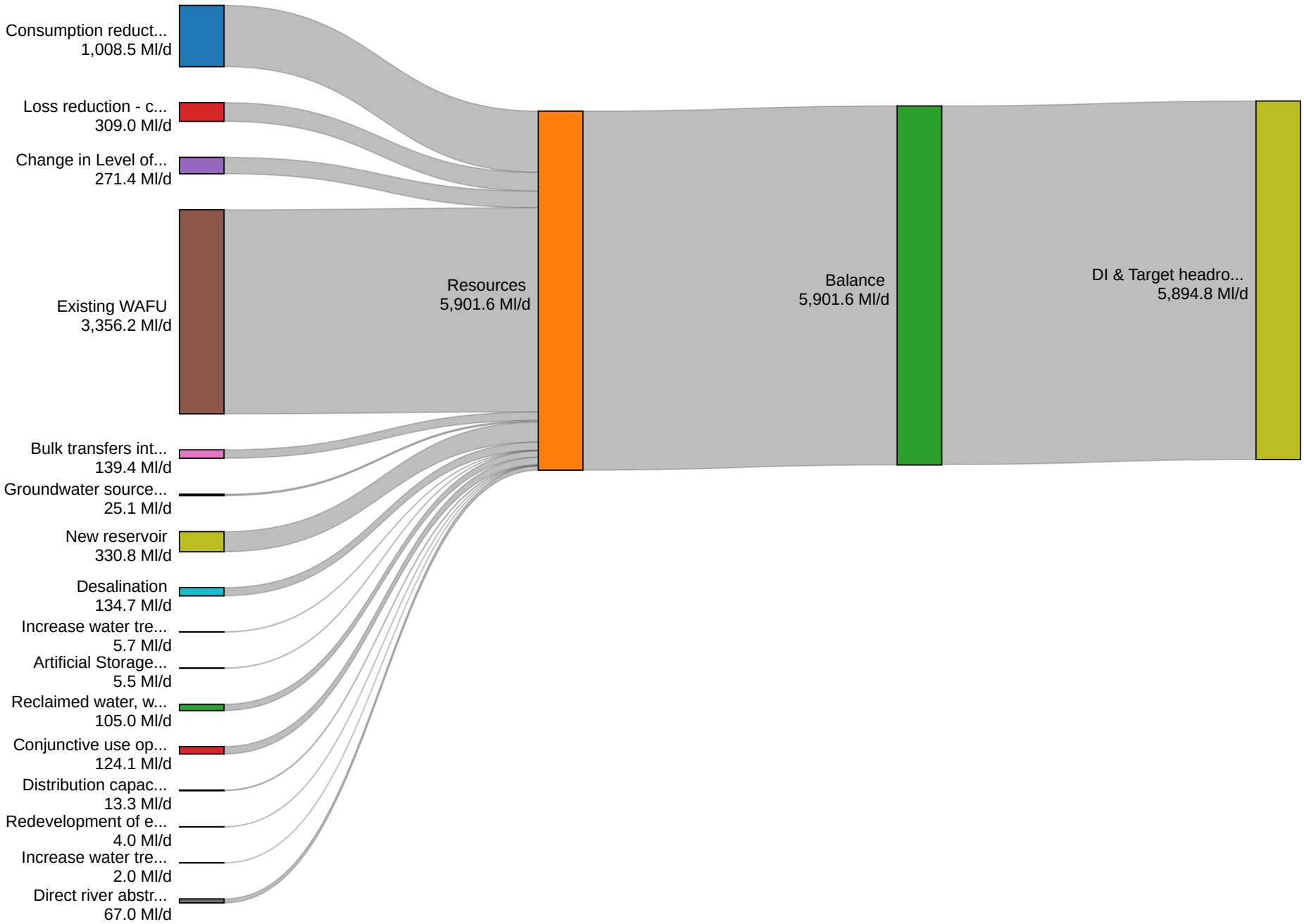
Situation 4 - 2026 (Thames Water)



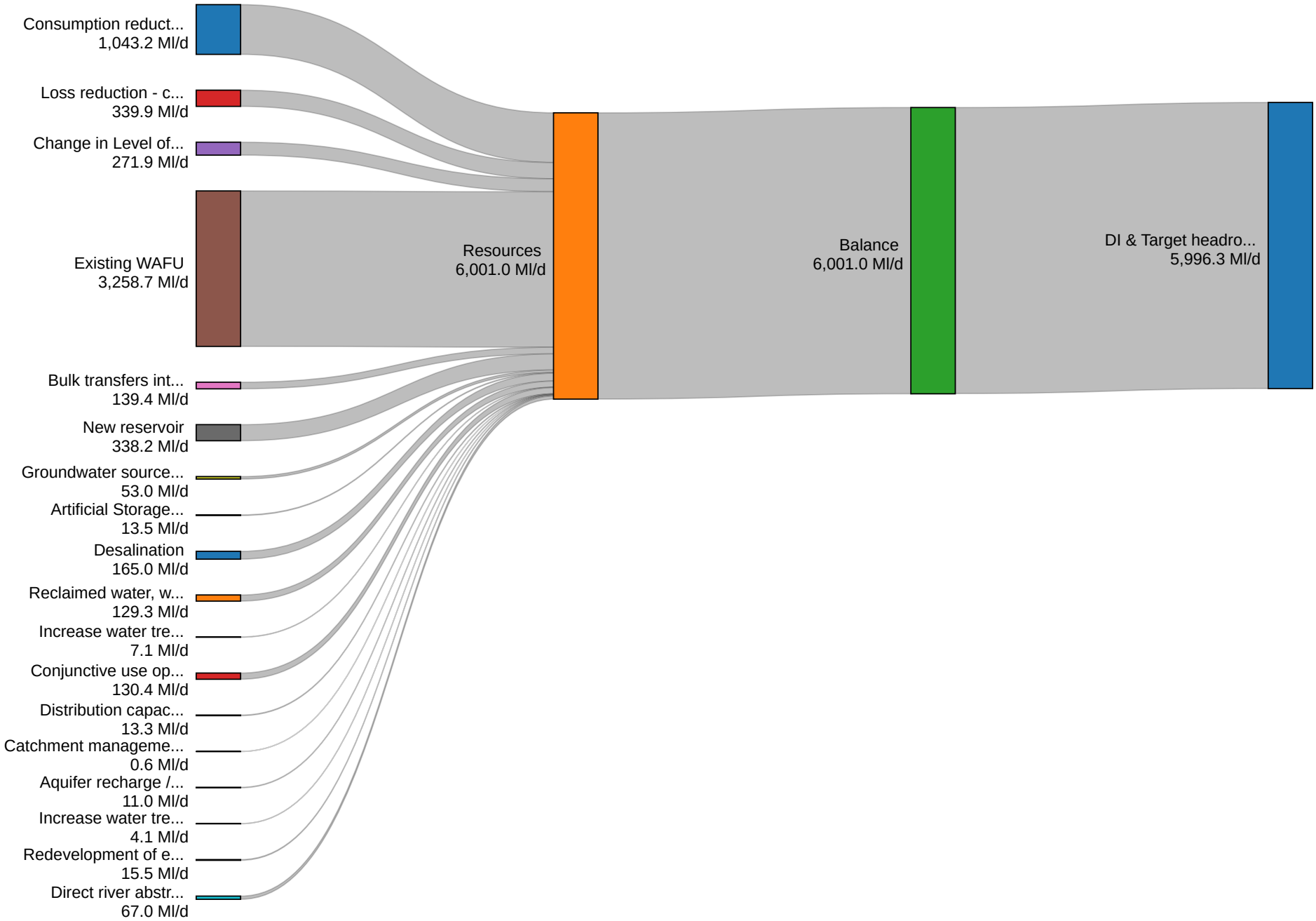
Situation 4 - 2040 (Thames Water)



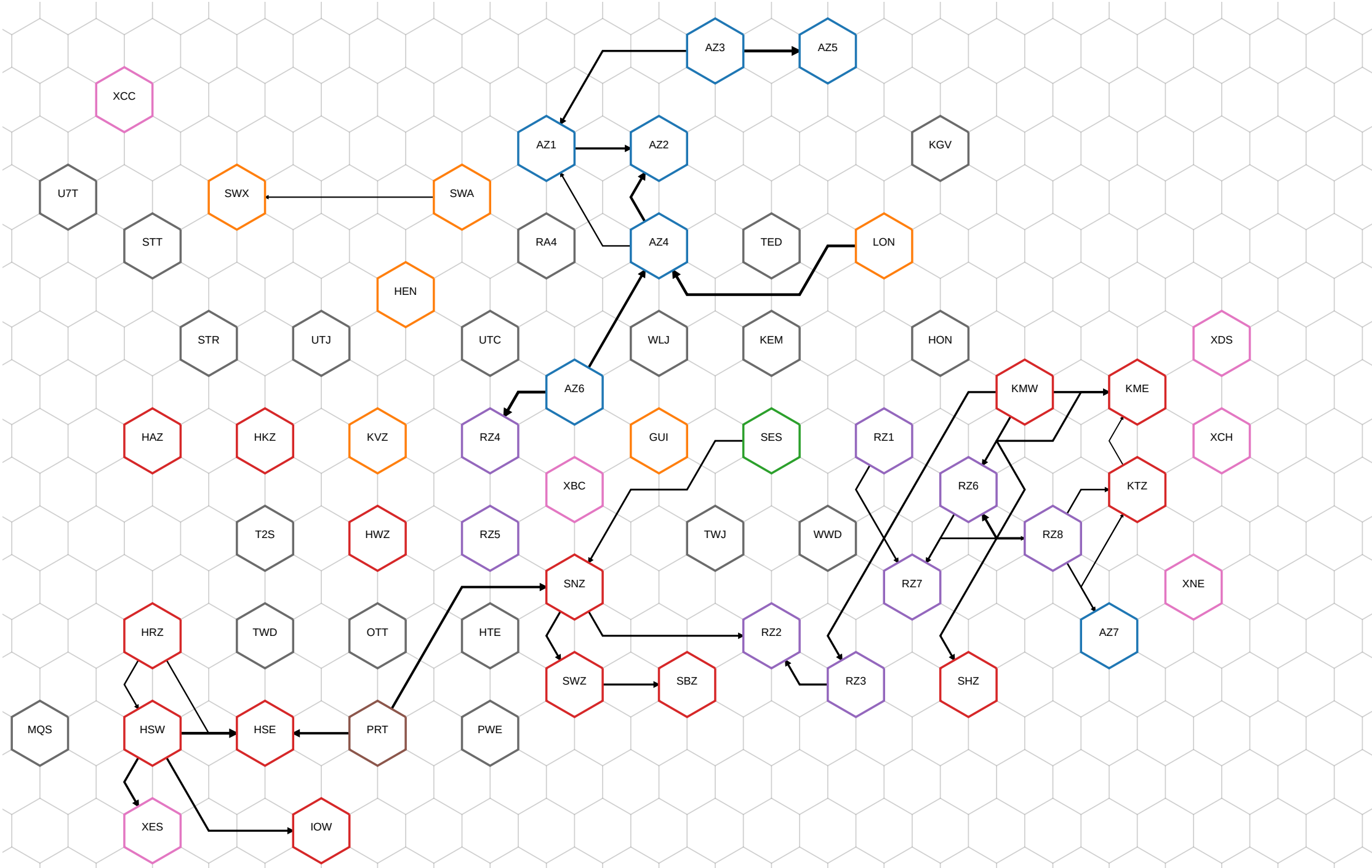
Situation 4 - 2050 (Thames Water)



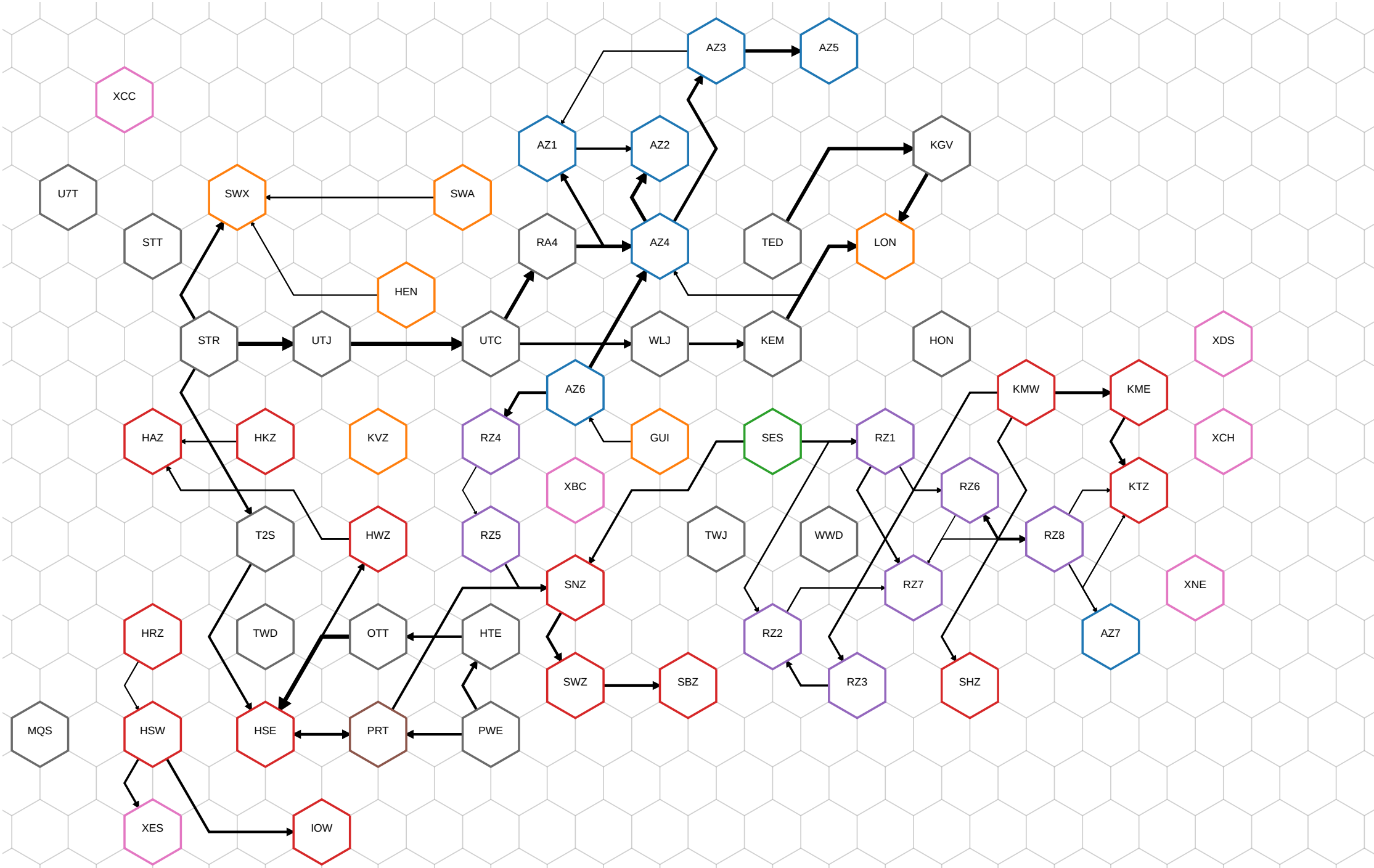
Situation 4 - 2075 (Thames Water)



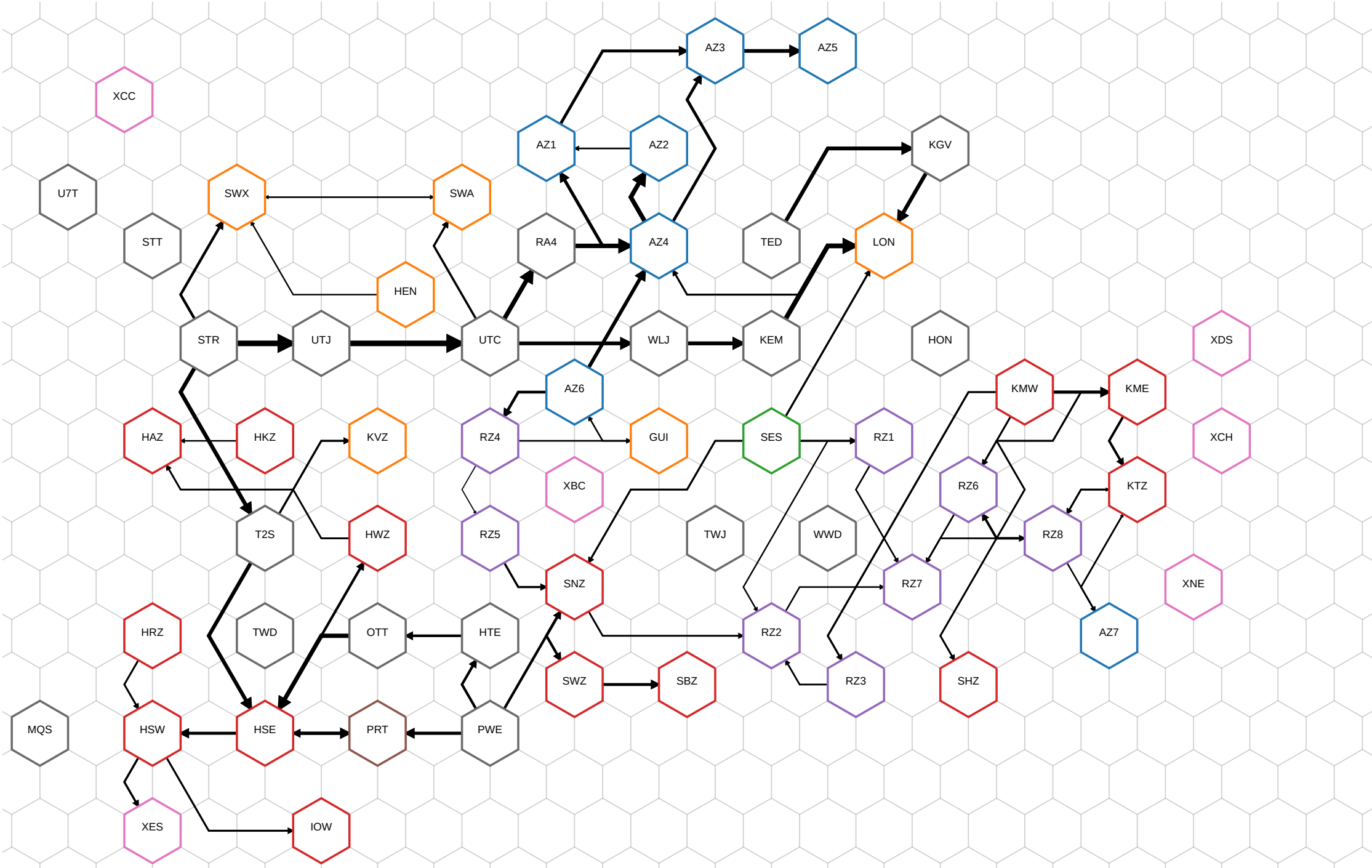
Situation 4 - 2026



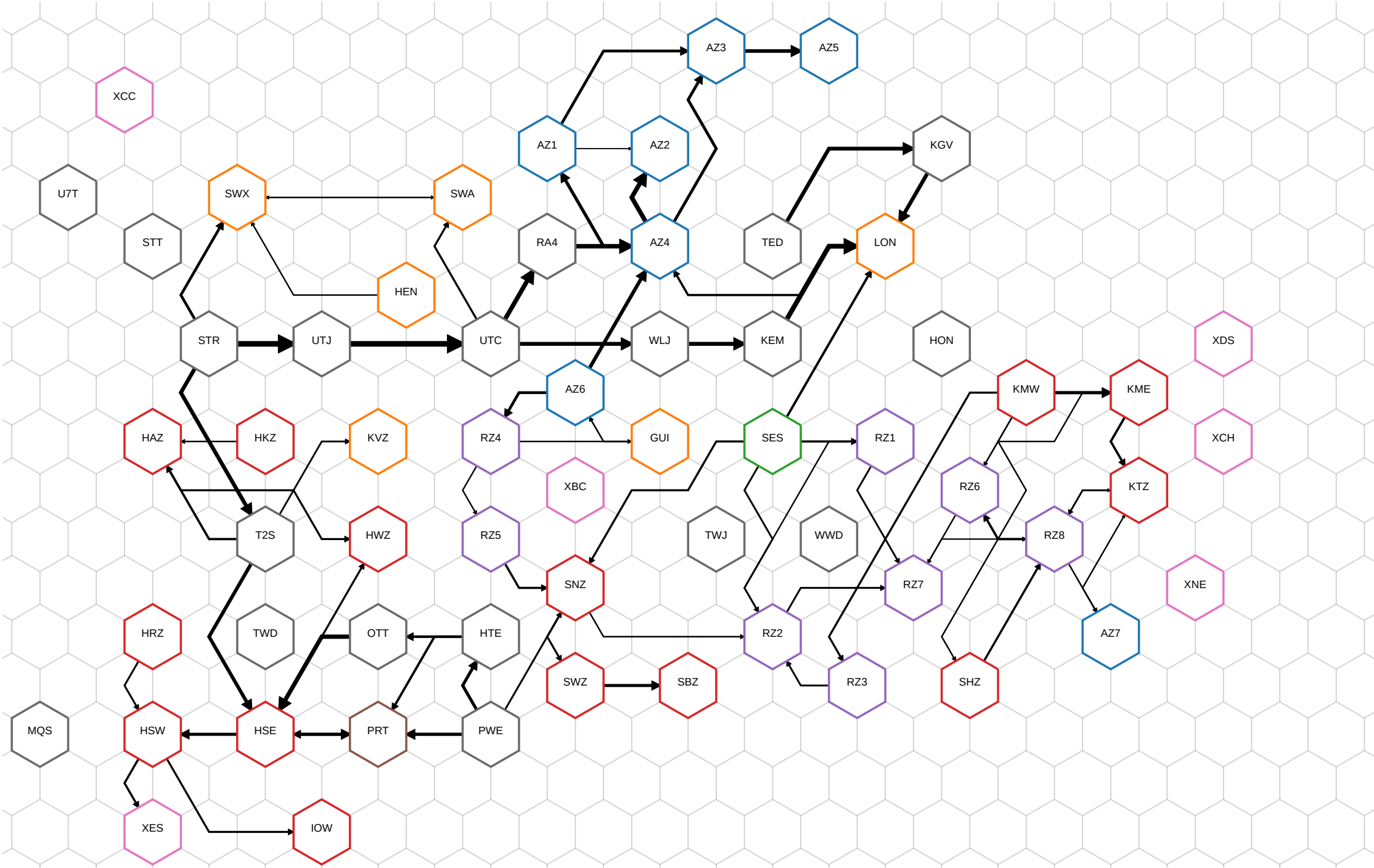
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +100% OB (ALL OPTIONS)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p100pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions with Teddington DRA optimism bias changed by +1.0.
Created at	13/12/2023, 14:07:31
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p100pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change Teddington DRA optimism bias by +1.0.
Optimised discount rate	STPR

Metrics

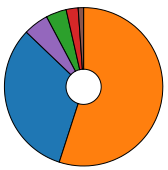
Net present value (Cost)

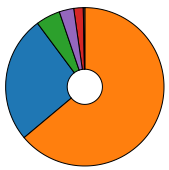
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,913	17,465	16,790	19,135	17,635	16,874	17,680	16,832	16,138	17,718	(£m)
Cost w/o deficit (STPR)	20,913	17,465	16,790	19,135	17,635	16,874	17,680	16,832	16,138	17,718	(£m)
Cost w/ deficit (IGEQ)	32,086	25,584	24,364	28,639	25,821	24,470	26,094	24,496	23,248	26,089	(£m)
Cost w/o deficit (IGEQ)	32,086	25,584	24,364	28,639	25,821	24,470	26,094	24,496	23,248	26,089	(£m)
Cost w/ deficit (LTDR)	23,073	19,066	18,289	20,991	19,249	18,377	19,332	18,346	17,550	19,364	(£m)
Cost w/o deficit (LTDR)	23,073	19,066	18,289	20,991	19,249	18,377	19,332	18,346	17,550	19,364	(£m)

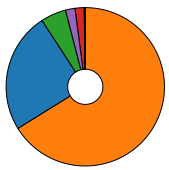
Cost breakdown (STPR)

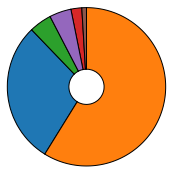
Select Company: Total

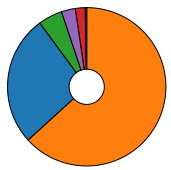
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,726	4,525	4,136	5,547	4,704	4,246	4,572	4,124	3,691	4,697	(£m)
Fixed opex	11,496	11,161	11,110	11,256	11,153	11,097	11,157	11,106	11,046	11,176	(£m)
Fixed operational carbon	880	869	870	877	869	870	871	867	865	871	(£m)
Embedded carbon	512	339	316	424	357	327	351	314	289	359	(£m)
Variable opex	1,069	517	320	849	500	302	636	385	230	534	(£m)
Variable carbon opex	230	55	36	181	53	32	93	37	17	82	(£m)

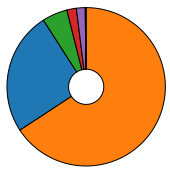
situation1 

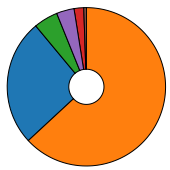
situation2 

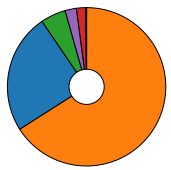
situation3 

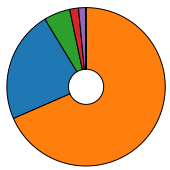
situation4 

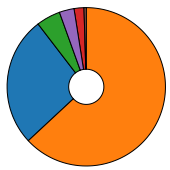
situation5 

situation6 

situation7 

situation8 

situation9 

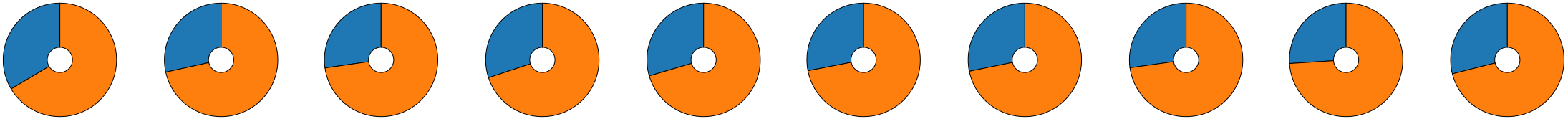
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,308,629	2,076,386	1,922,923	2,655,996	2,187,284	1,989,740	2,171,485	1,910,639	1,749,020	2,219,122	(tonnes)
Operational emissions	6,551,282	5,217,396	5,127,256	6,172,422	5,212,620	5,097,248	5,523,937	5,107,088	4,973,821	5,442,563	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

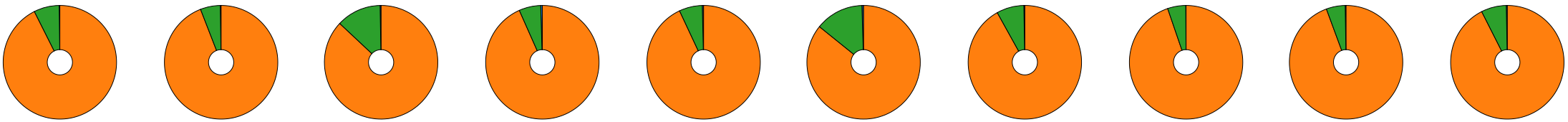


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	96	44	22	41	9	8	34	(GWh)
Grid	23,161	11,308	4,228	19,082	10,784	3,900	13,147	7,944	2,891	10,716	(GWh)
Renewable	1,809	681	619	1,266	765	625	1,115	433	165	831	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,522	63,718	62,855	67,126	63,694	62,707	63,883	61,609	60,553	63,963
SEA environmental disbenefit	114,647	81,832	74,973	99,736	79,336	74,041	83,828	70,451	61,604	82,272
Natural capital	84,511,823	81,297,104	84,151,213	75,310,296	77,131,503	79,772,757	80,951,905	81,730,369	84,602,292	81,051,029
Bio-diversity net gain	−196,593	−117,637	−87,537	−200,452	−149,666	−126,289	−119,765	−92,607	−63,553	−128,233

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,109	31,843	31,474	33,038	31,653	31,341	31,704	30,795	30,305	31,807

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.80	27.15	29.70	28.30	29.54	32.22	28.49	31.45	34.94	29.95
R1: Uncertainty of option supply/demand benefit	5.78	4.91	5.35	5.57	5.41	5.84	5.28	5.70	6.29	5.57
R3: Risk of service failure due to other physical hazards	6.65	6.71	7.52	6.92	7.37	8.21	7.02	7.94	9.05	7.49
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.95	3.82	4.32	3.87	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.94	5.53	5.31	5.57	6.23	5.17	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

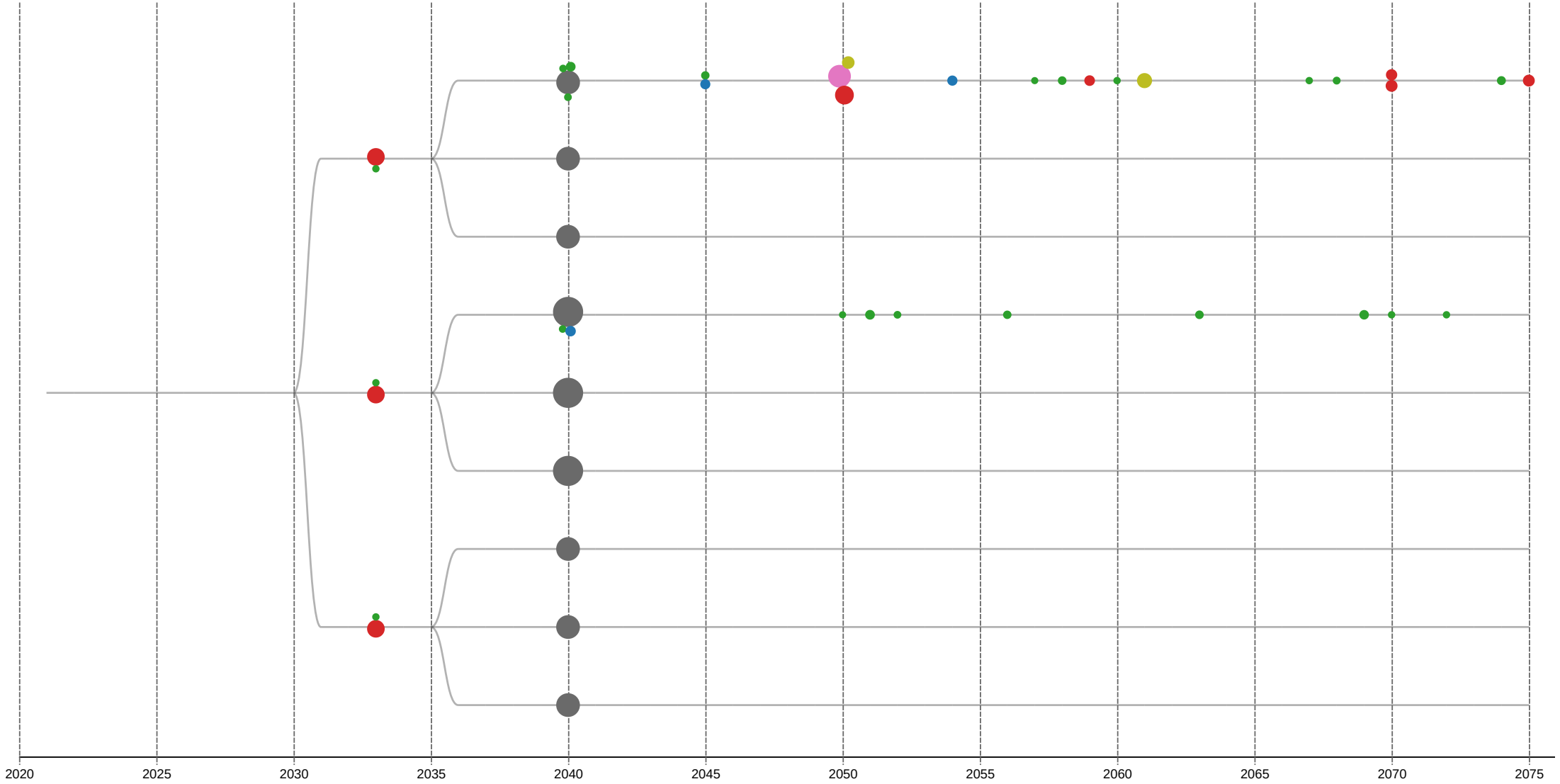
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.03	16.83	14.19	15.69	17.40	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.22	6.59	7.08	7.95	6.70	7.67	8.80	7.17
A4: WRZ connectivity	7.50	8.58	9.58	7.57	8.58	9.42	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.43	19.54	21.72	18.72	19.94	21.91	20.17	22.86	25.89	21.13
E1: Scaleability and modularity of proposed changes	8.90	9.32	10.40	8.67	9.40	10.43	9.65	11.08	12.61	10.05
E2: Intervention lead times	4.31	3.98	4.37	3.96	4.10	4.34	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.95	6.09	6.44	7.15	6.49	7.38	8.40	6.82
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

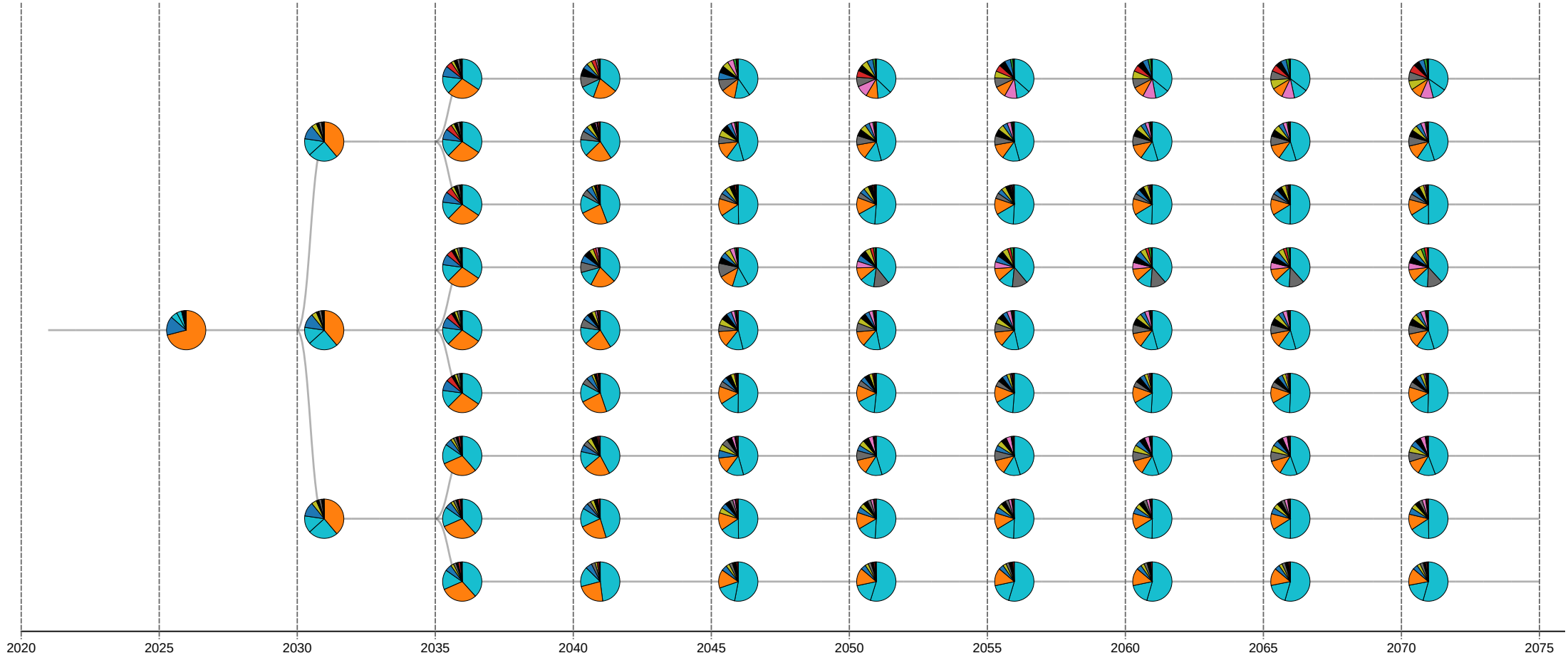
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

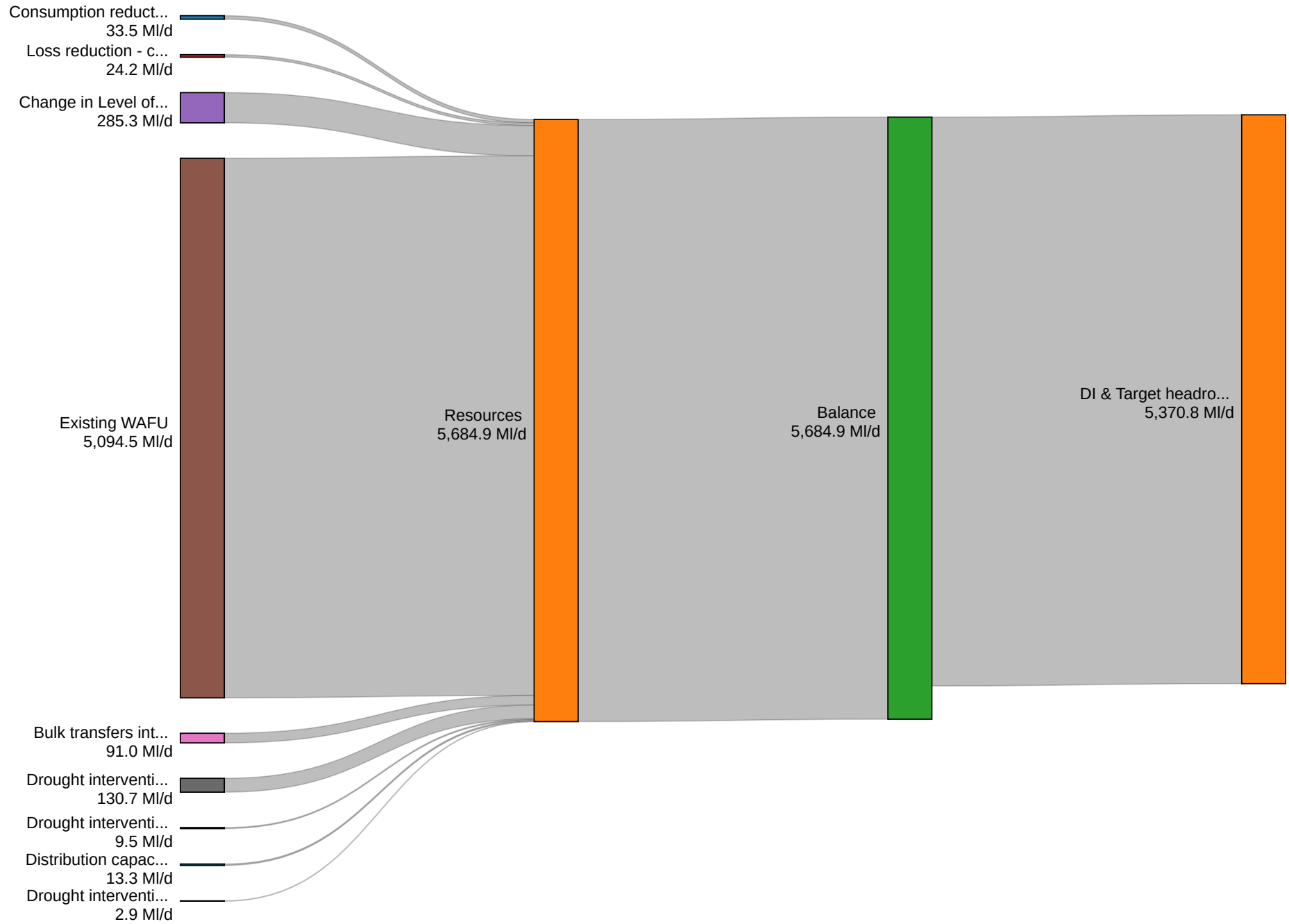
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

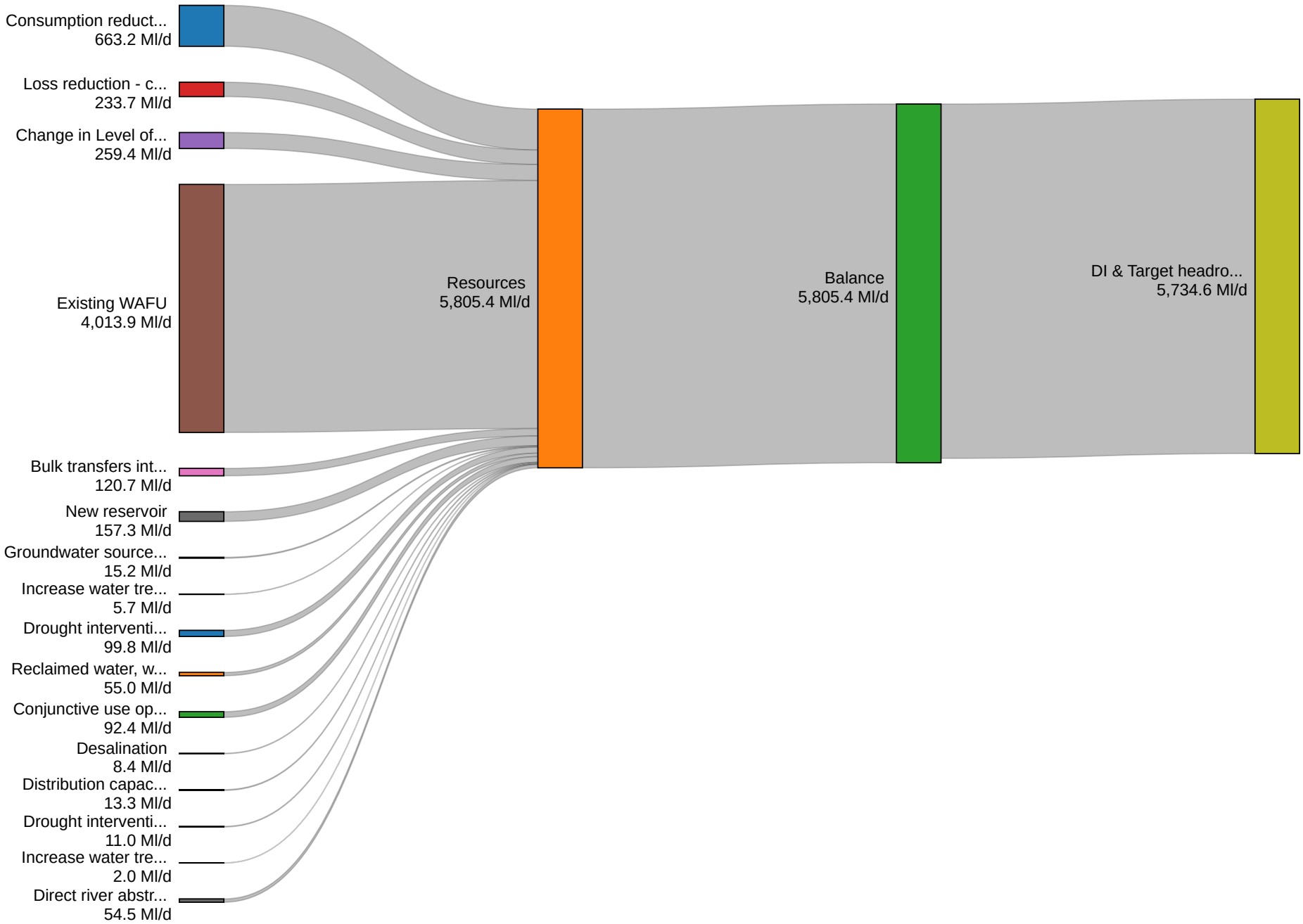


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

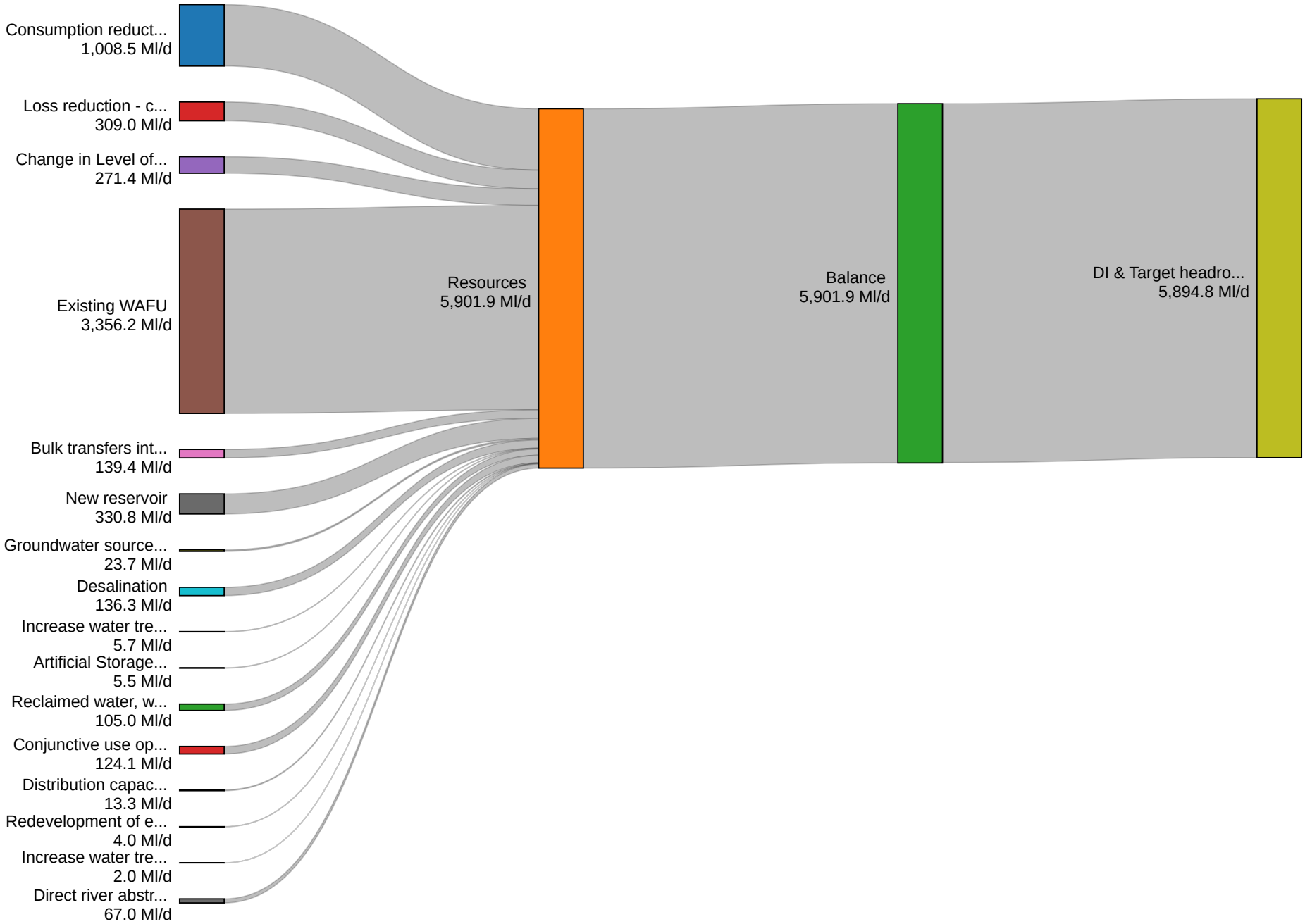
Situation 4 - 2026 (Thames Water)



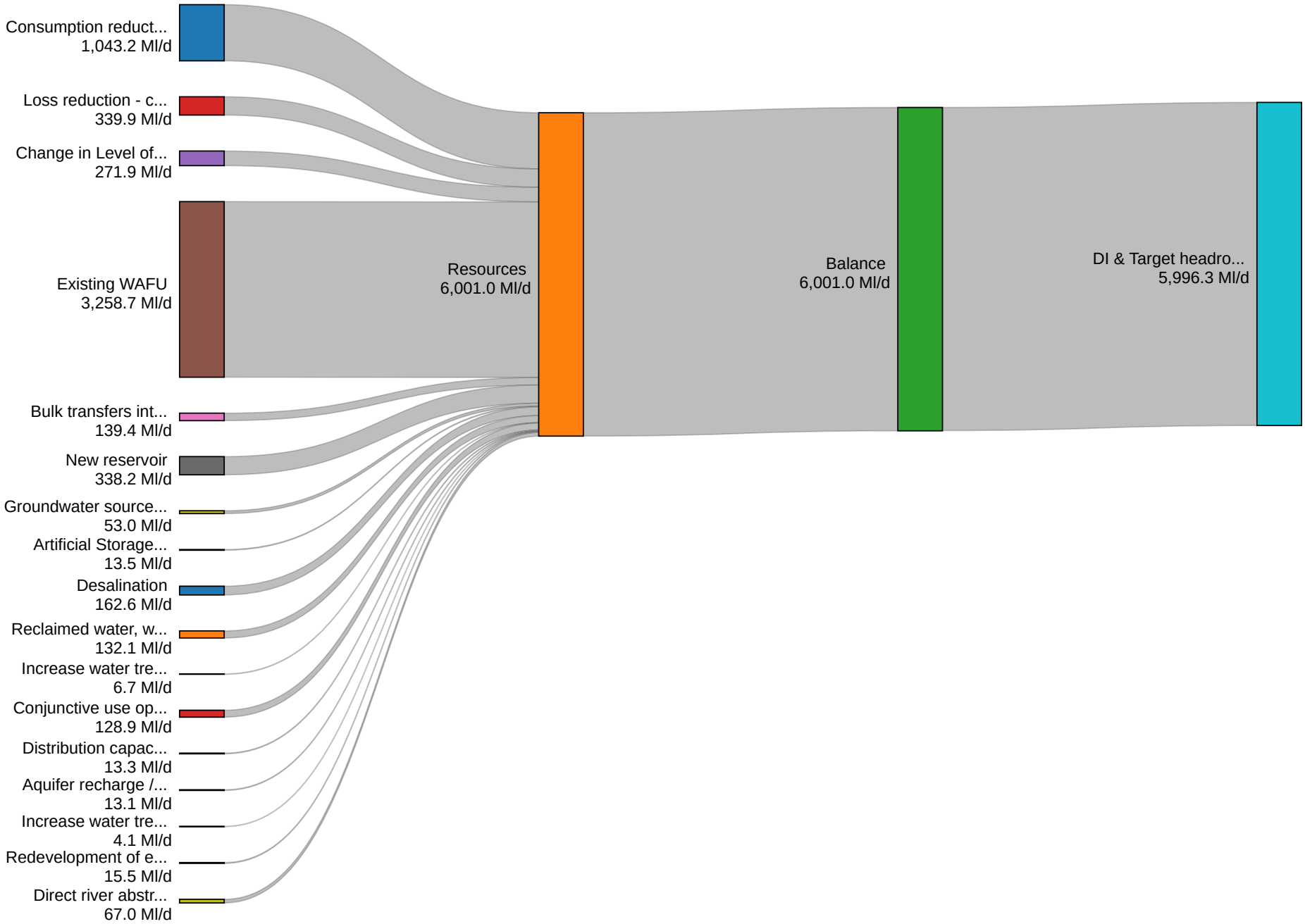
Situation 4 - 2040 (Thames Water)



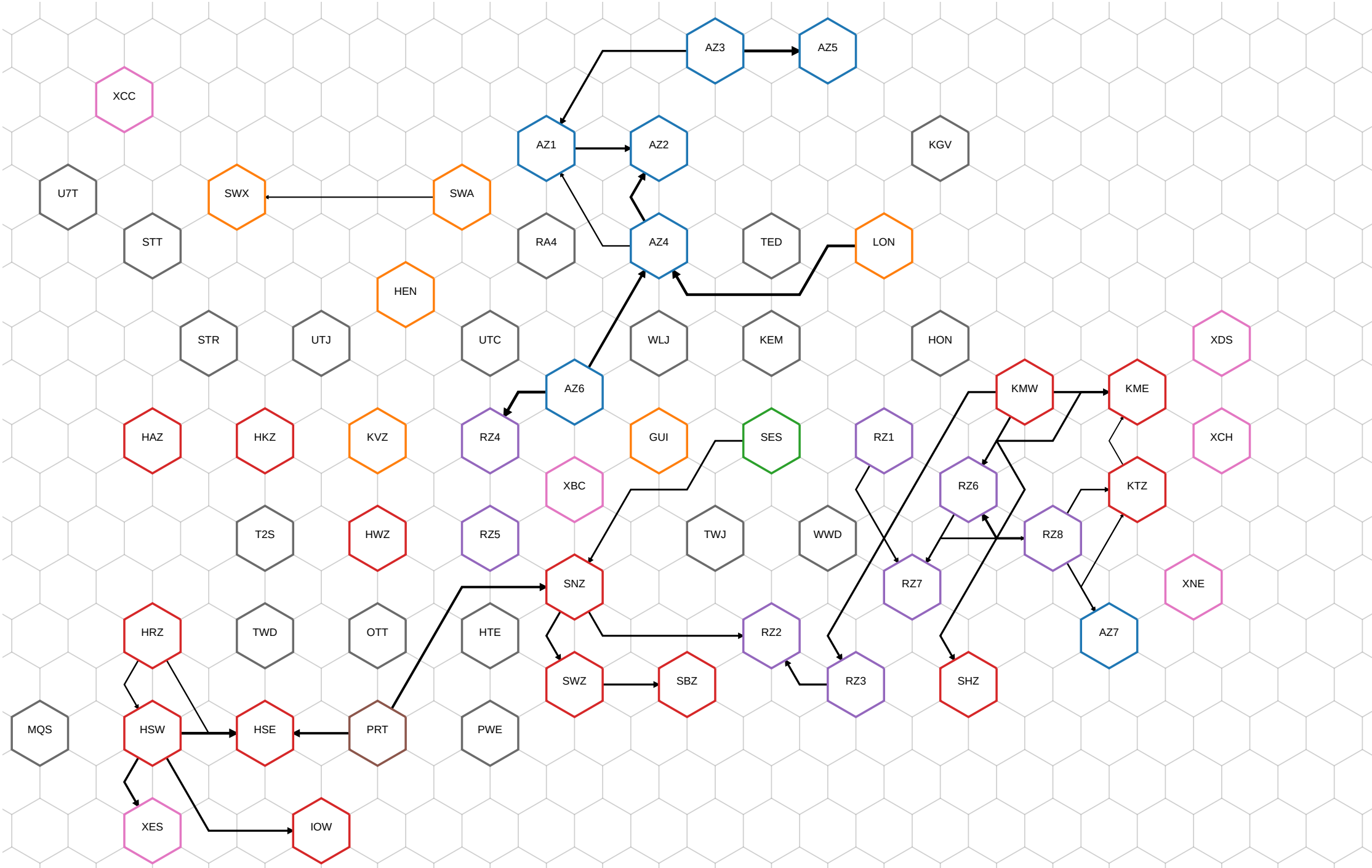
Situation 4 - 2050 (Thames Water)



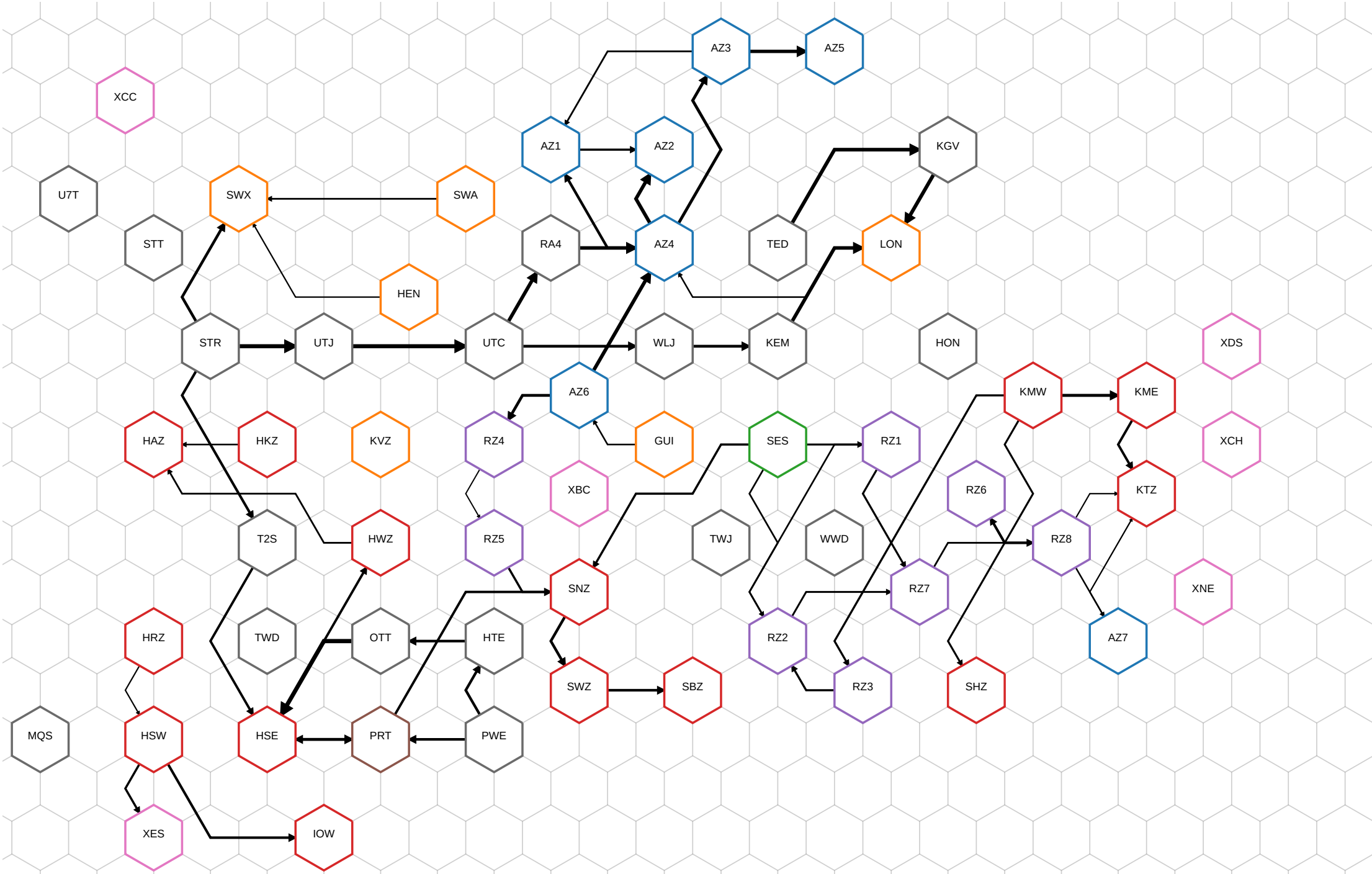
Situation 4 - 2075 (Thames Water)



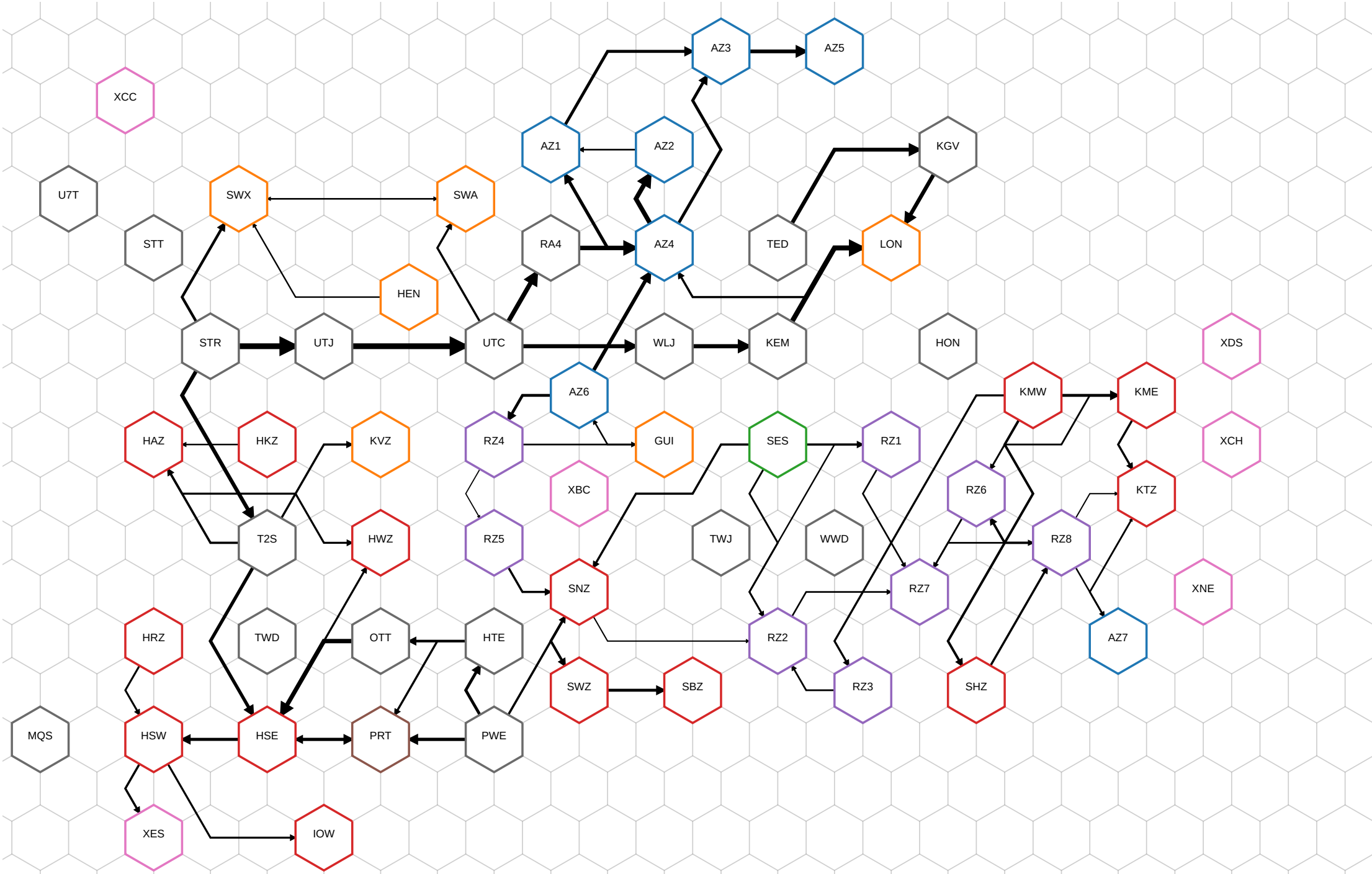
Situation 4 - 2026



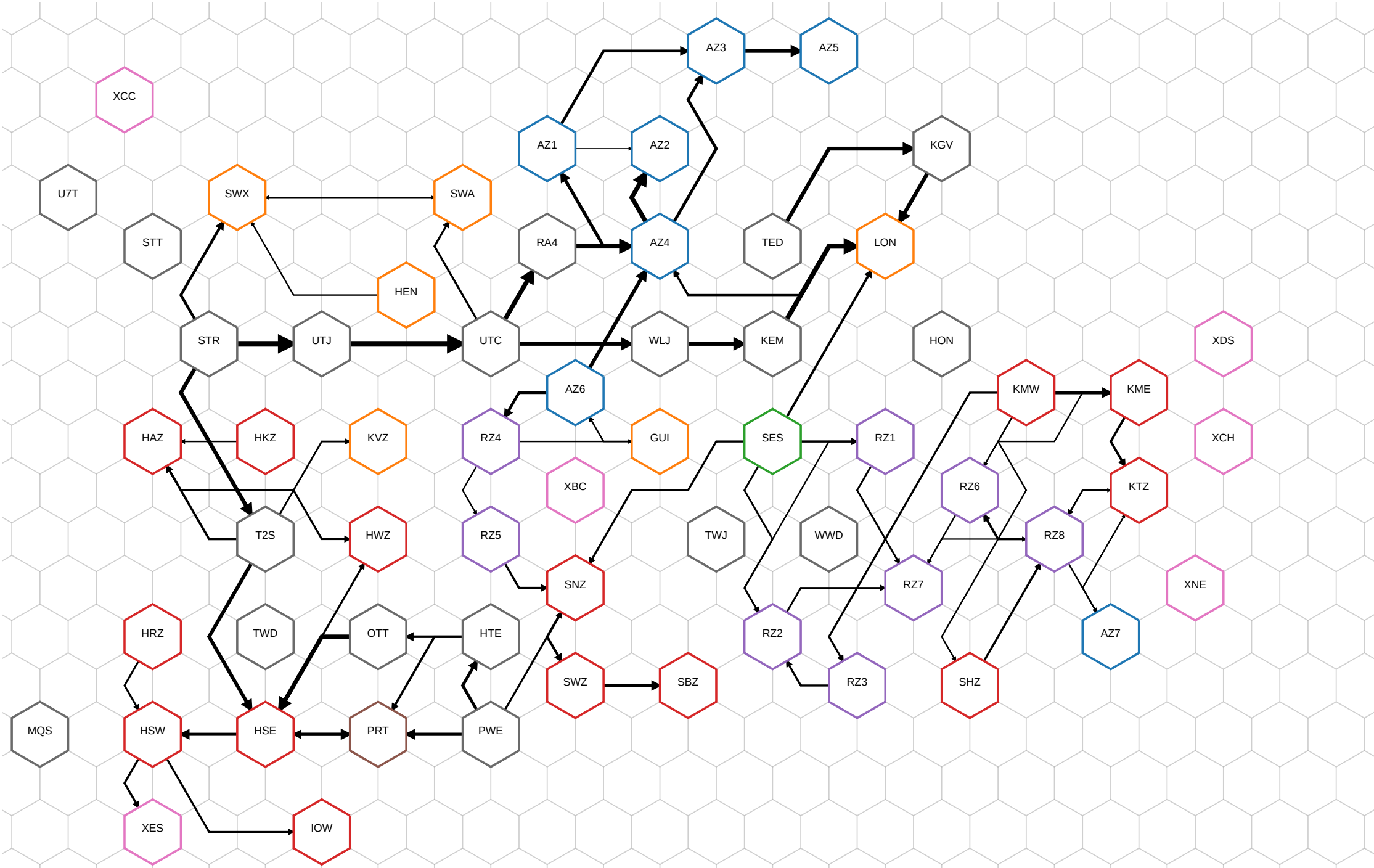
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +200% OB (ALL OPTIONS)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p200pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions with Teddington DRA optimism bias changed by +2.0. Optimisation tolerances identical to LCP.
Created at	06/01/2024, 02:18:47
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p200pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change Teddington DRA optimism bias by +2.0.
Optimised discount rate	STPR

Metrics

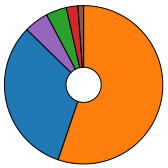
Net present value (Cost)

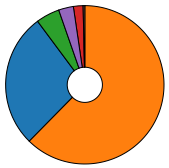
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,739	18,080	17,368	19,270	17,767	16,966	18,003	16,865	16,157	17,913	(£m)
Cost w/o deficit (STPR)	20,739	18,080	17,368	19,270	17,767	16,966	18,003	16,865	16,157	17,913	(£m)
Cost w/ deficit (IGEQ)	31,599	26,552	25,265	28,836	26,021	24,599	26,669	24,532	23,257	26,370	(£m)
Cost w/o deficit (IGEQ)	31,599	26,552	25,265	28,836	26,021	24,599	26,669	24,532	23,257	26,370	(£m)
Cost w/ deficit (LTDR)	22,843	19,748	18,929	21,138	19,394	18,477	19,701	18,380	17,567	19,575	(£m)
Cost w/o deficit (LTDR)	22,843	19,748	18,929	21,138	19,394	18,477	19,701	18,380	17,567	19,575	(£m)

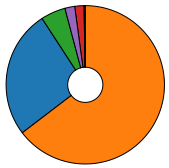
Cost breakdown (STPR)

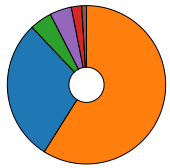
Select Company: Total

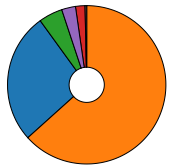
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,651	4,963	4,548	5,588	4,739	4,254	4,721	4,104	3,660	4,803	(£m)
Fixed opex	11,450	11,277	11,225	11,356	11,254	11,195	11,277	11,203	11,142	11,264	(£m)
Fixed operational carbon	880	874	875	875	867	867	868	864	863	870	(£m)
Embedded carbon	491	358	331	412	344	314	334	287	260	348	(£m)
Variable opex	1,030	546	347	852	502	298	645	374	219	535	(£m)
Variable carbon opex	236	62	42	187	60	39	159	32	14	92	(£m)

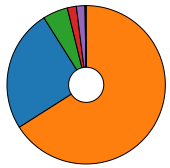
situation1 

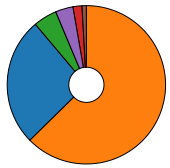
situation2 

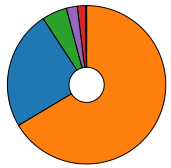
situation3 

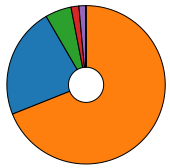
situation4 

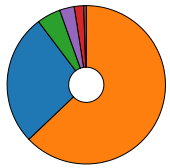
situation5 

situation6 

situation7 

situation8 

situation9 

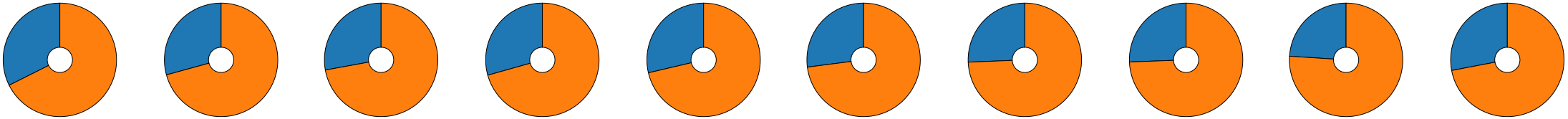
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,151,481	2,192,395	2,009,287	2,573,839	2,104,596	1,900,182	2,061,817	1,740,872	1,558,064	2,143,615	(tonnes)
Operational emissions	6,580,220	5,298,464	5,198,510	6,193,791	5,235,779	5,126,656	5,977,867	5,061,164	4,939,818	5,512,474	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

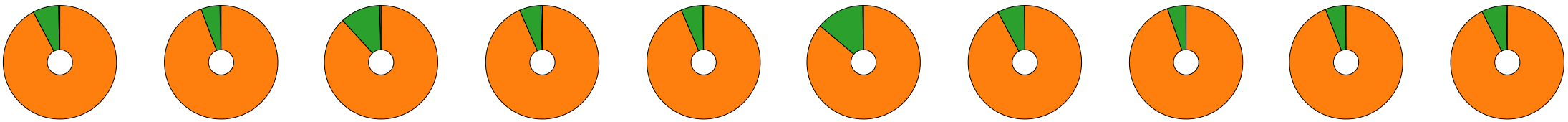


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	45	26	93	38	11	21	7	6	39	(GWh)
Grid	22,572	11,876	4,800	19,152	10,829	3,771	13,651	7,817	2,729	10,800	(GWh)
Renewable	1,789	681	619	1,246	706	598	1,138	433	165	819	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,986	64,701	63,658	66,719	63,379	62,160	63,890	61,851	60,764	64,012
SEA environmental disbenefit	112,363	85,440	78,098	100,965	82,714	76,520	88,738	73,752	64,471	84,785
Natural capital	81,799,630	77,156,479	80,036,963	75,552,831	77,258,494	80,067,509	64,472,651	65,083,317	67,985,133	74,379,223
Bio-diversity net gain	−217,348	−161,023	−130,160	−201,675	−153,008	−125,817	−141,336	−101,914	−72,364	−144,961

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,829	32,024	31,549	33,074	31,845	31,388	31,984	31,038	30,515	31,916

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	29.09	30.47	33.33	28.18	29.41	32.09	27.10	29.74	32.96	30.26
R1: Uncertainty of option supply/demand benefit	6.11	5.98	6.54	5.66	5.48	5.92	5.13	5.48	6.04	5.82
R3: Risk of service failure due to other physical hazards	6.99	7.57	8.46	6.84	7.29	8.12	6.57	7.41	8.43	7.52
R4: Availability of additional headroom	6.57	6.92	7.13	6.65	6.94	7.14	7.01	7.35	7.59	7.03
R5: Catchment/raw water quality risks (incl. climate change)	4.02	4.11	4.62	3.75	4.12	4.65	3.60	4.09	4.72	4.19
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.39	5.89	6.59	5.29	5.59	6.25	4.79	5.41	6.18	5.71
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

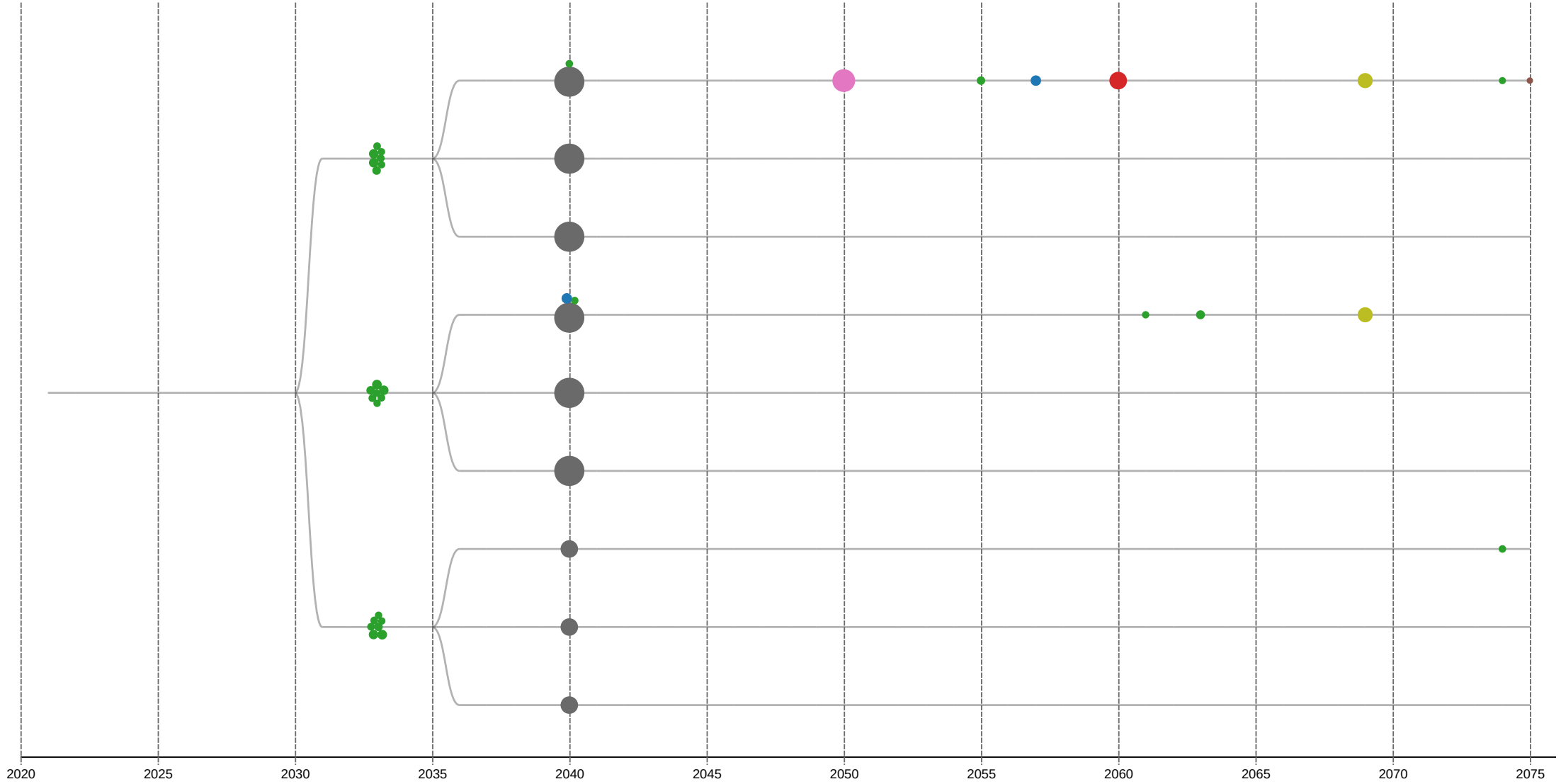
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.85	15.59	17.41	13.82	15.28	16.76	14.61	16.67	18.94	15.88
A3: Operational complexity and flexibility	6.59	7.38	8.29	6.58	7.11	7.99	6.34	7.25	8.32	7.32
A4: WRZ connectivity	7.23	8.18	9.09	7.21	8.14	8.75	8.24	9.39	10.59	8.54
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.28	20.77	22.91	18.85	20.14	22.10	20.09	22.74	25.75	21.40
E1: Scaleability and modularity of proposed changes	8.80	9.62	10.72	8.65	9.38	10.43	9.51	10.87	12.37	10.04
E2: Intervention lead times	4.19	4.31	4.57	4.03	4.19	4.39	4.04	4.43	4.91	4.34
E3: Reliance on external bodies to deliver changes	6.28	6.84	7.62	6.17	6.56	7.29	6.55	7.44	8.47	7.02
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

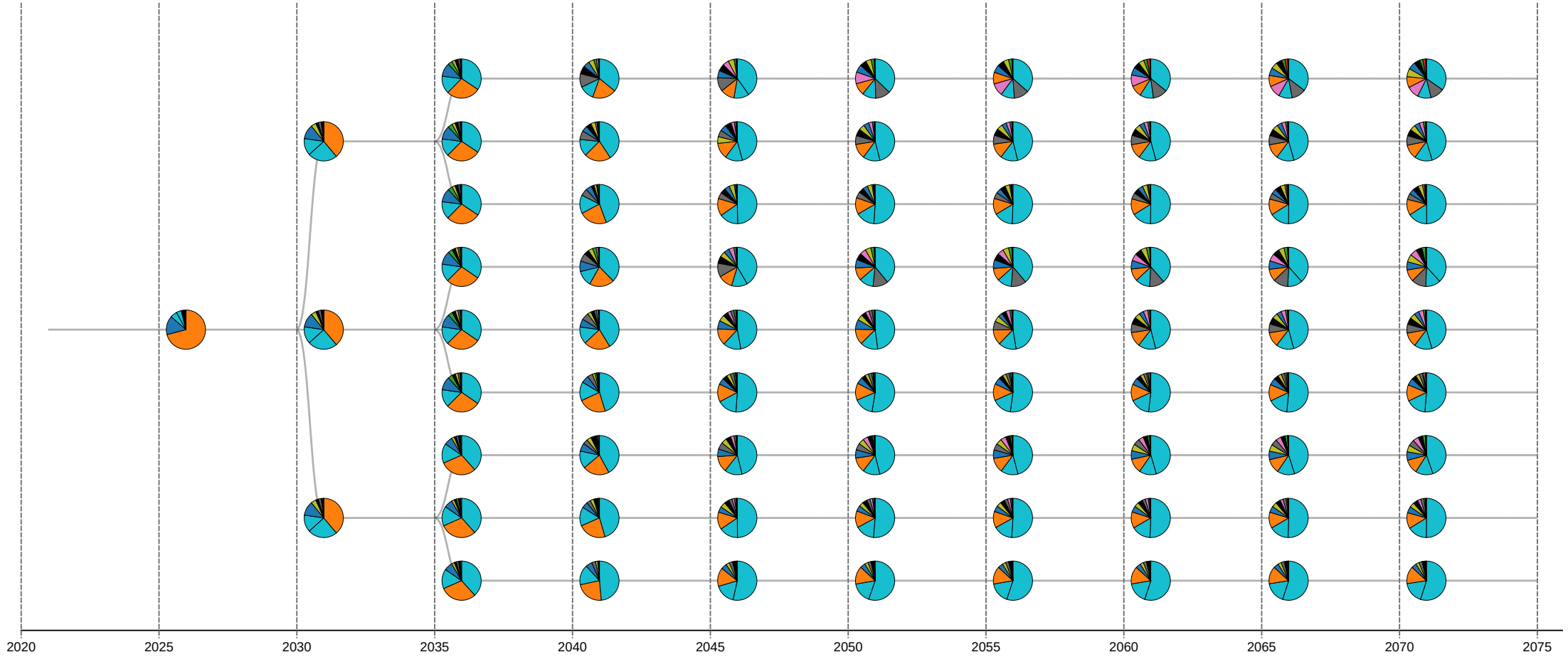
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

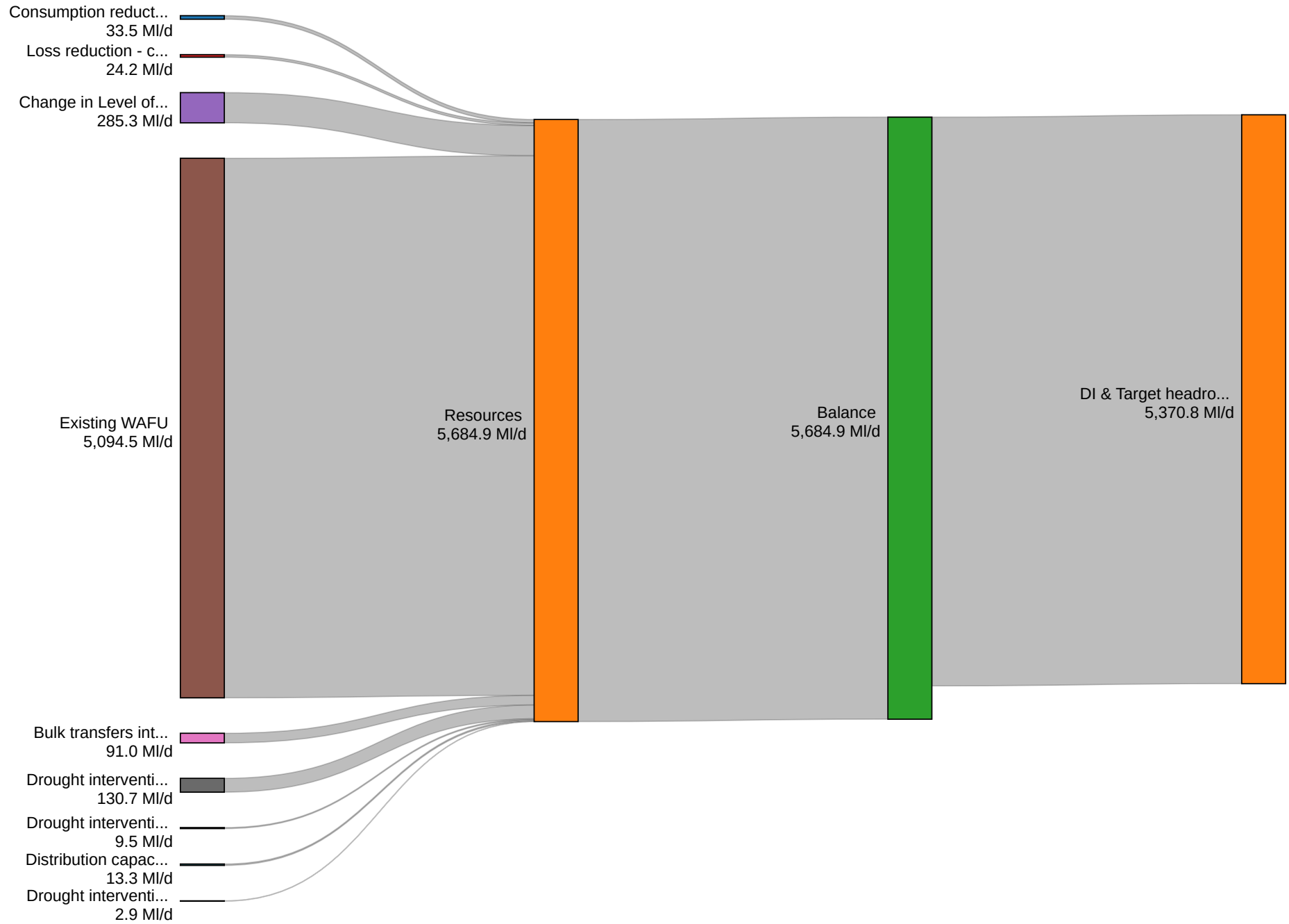
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

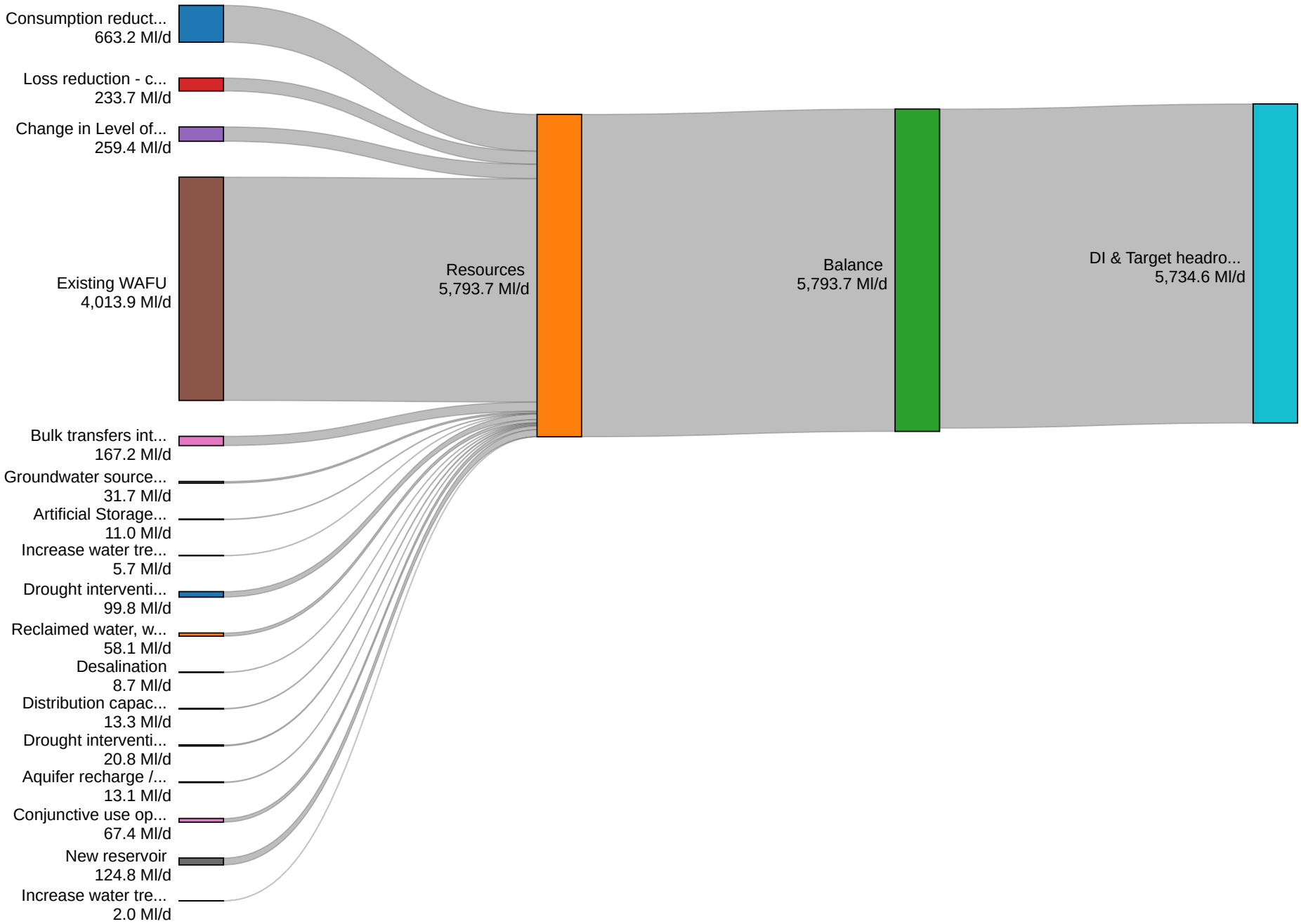


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

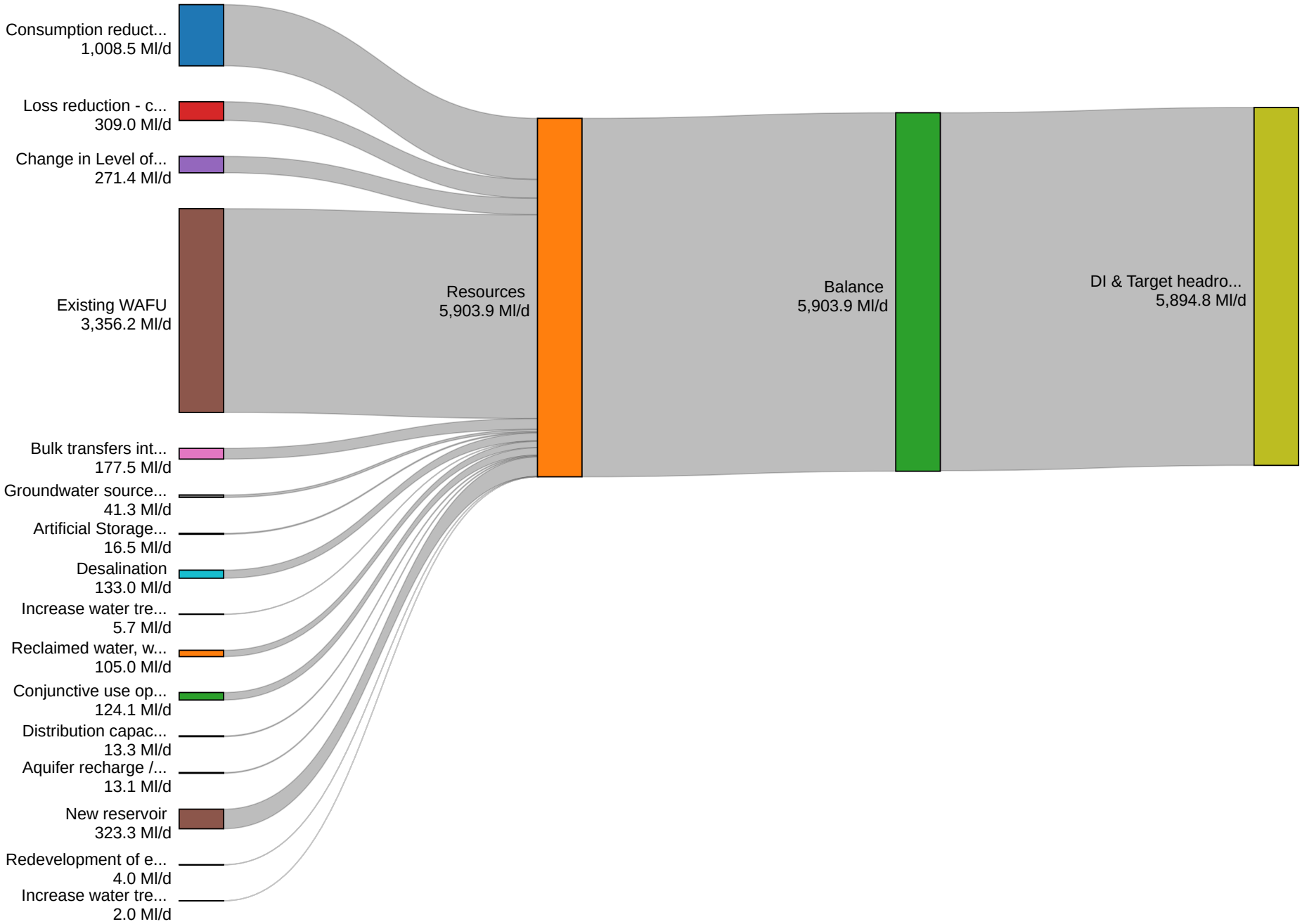
Situation 4 - 2026 (Thames Water)



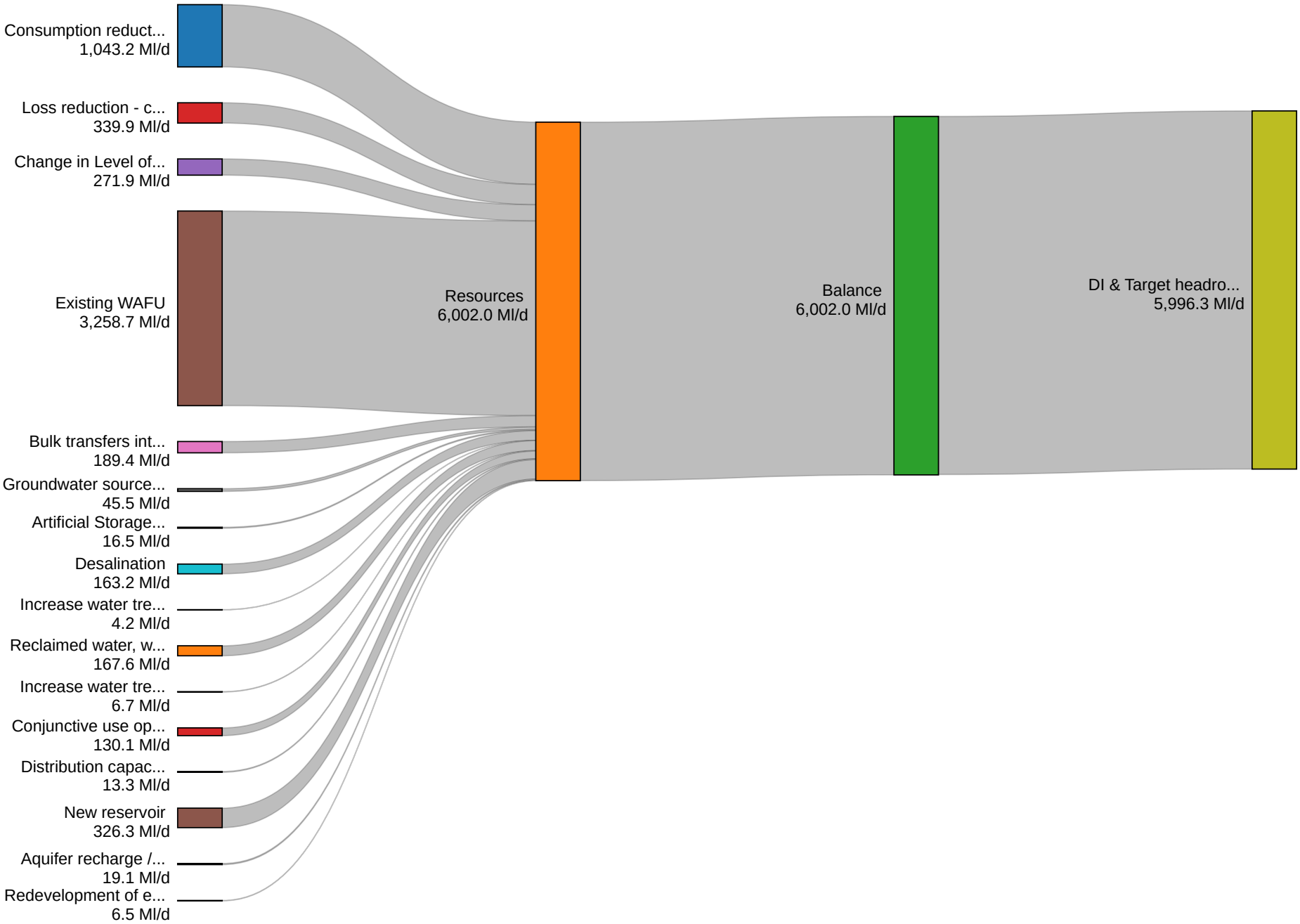
Situation 4 - 2040 (Thames Water)



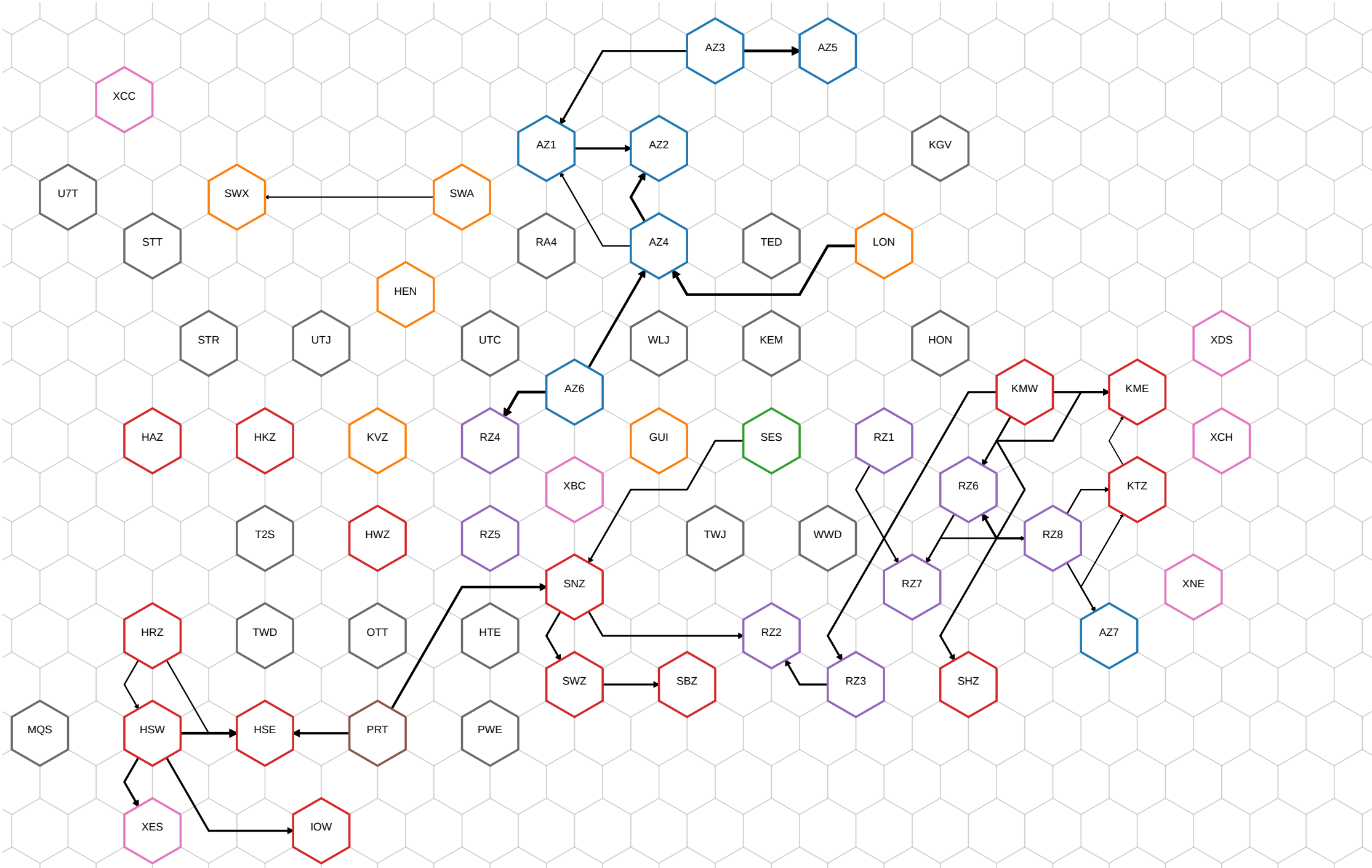
Situation 4 - 2050 (Thames Water)



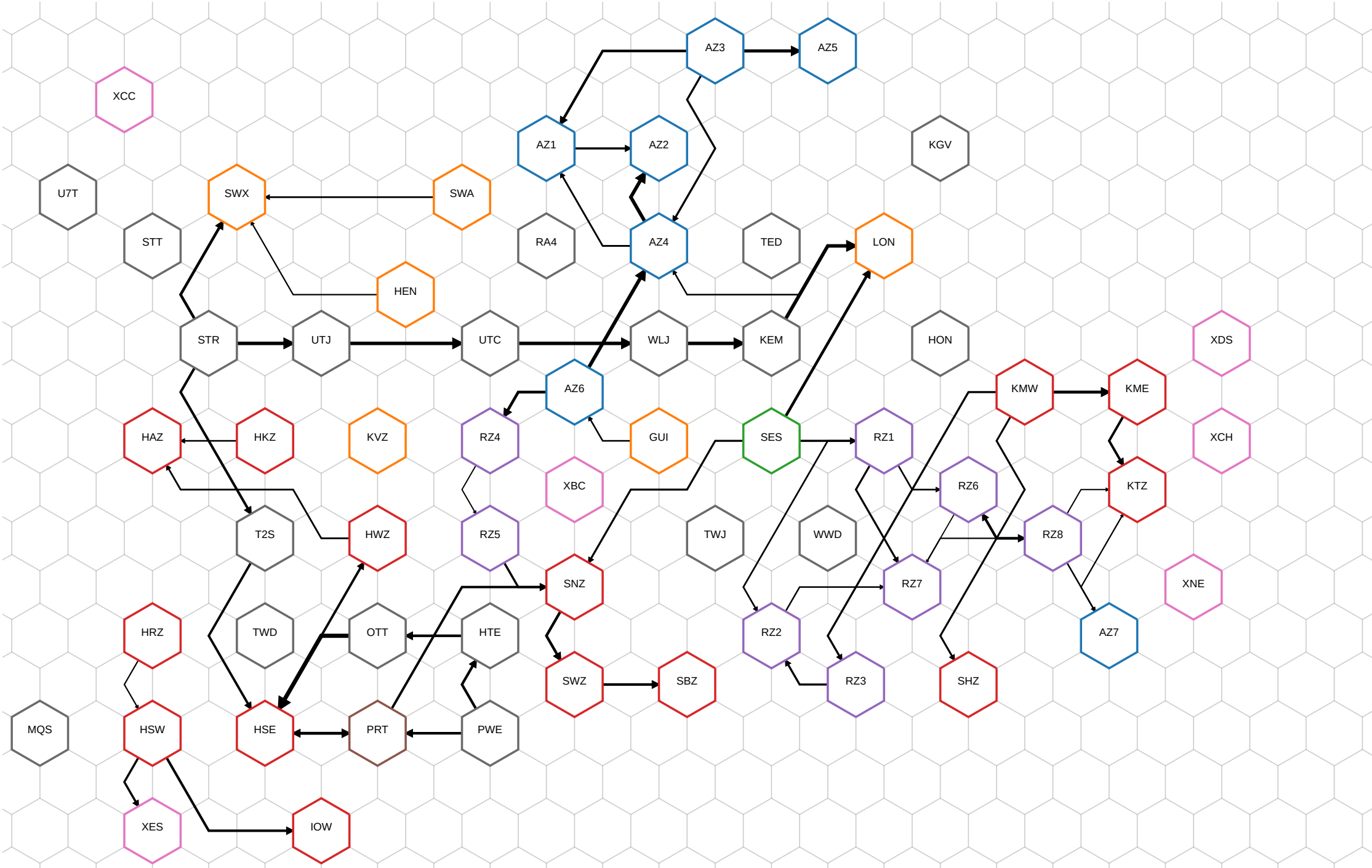
Situation 4 - 2075 (Thames Water)



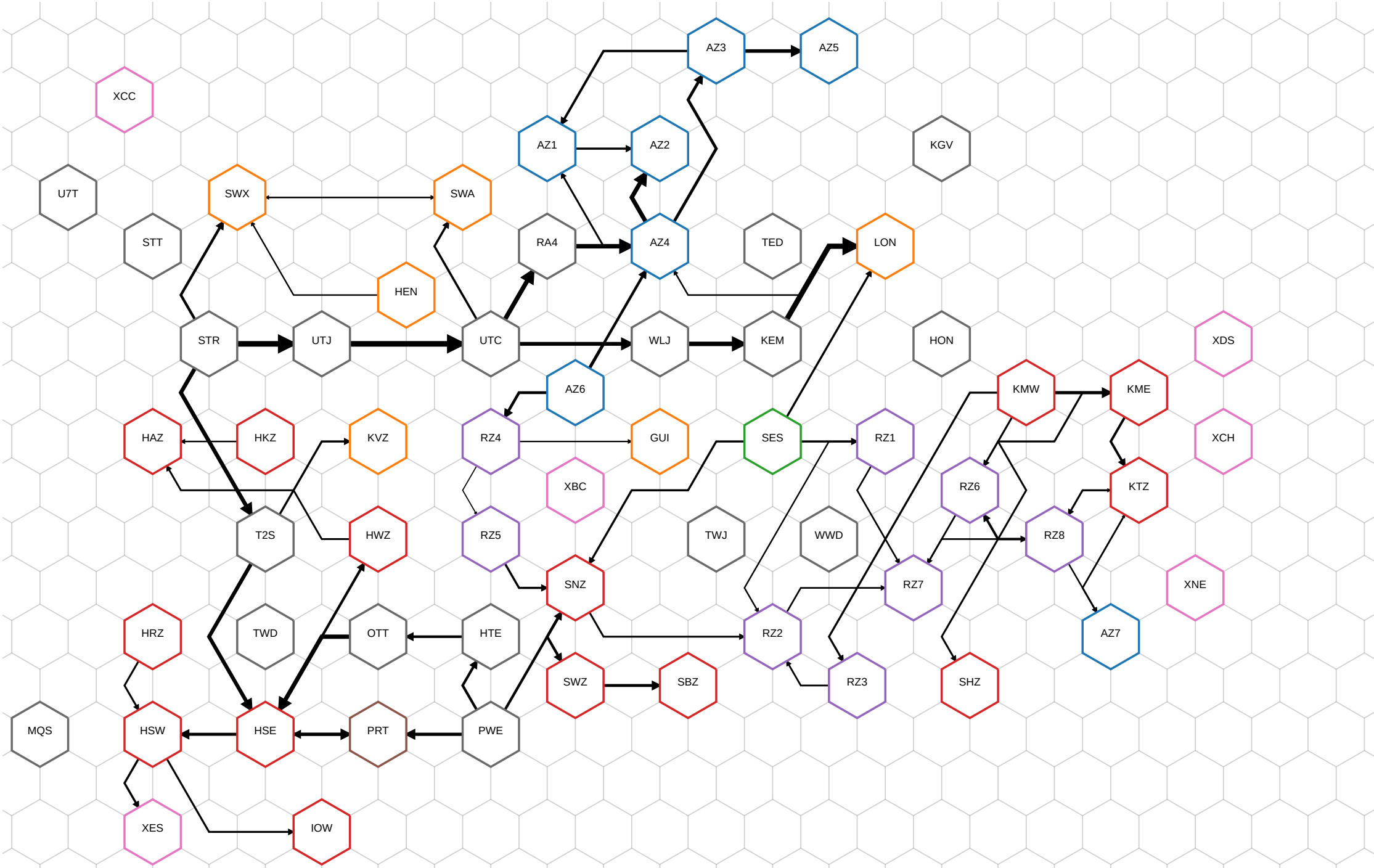
Situation 4 - 2026



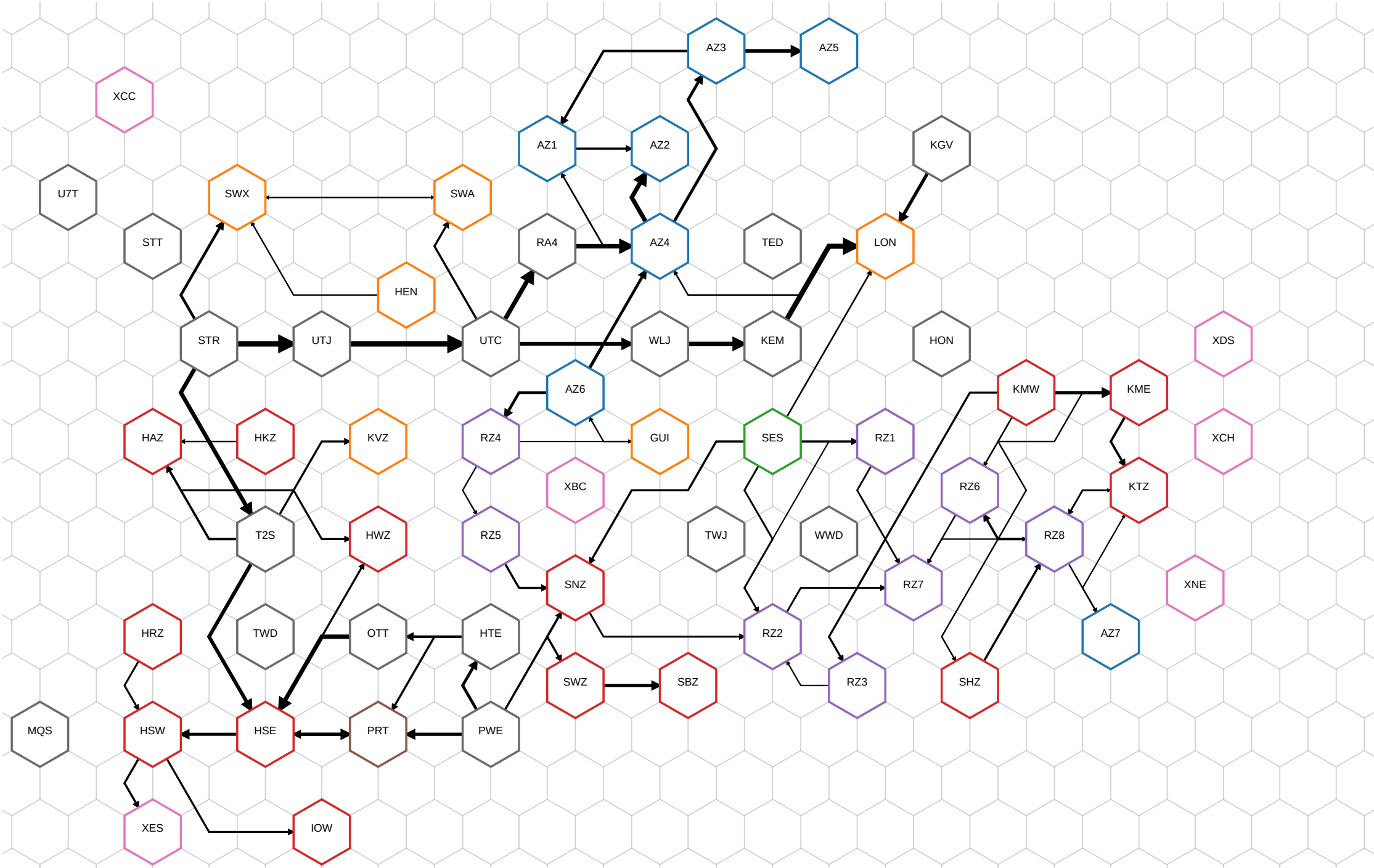
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +200% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p200pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions delaying TWU groundwater options until 2040 and Teddington DRA optimism bias changed by +2.0. Optimisation tolerances identical to LCP.
Created at	12/04/2024, 10:47:23
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p200pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +2.0.
Optimised discount rate	STPR

Metrics

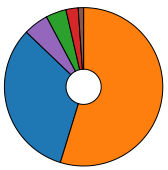
Net present value (Cost)

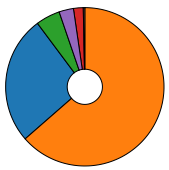
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,000	17,555	16,882	19,225	17,720	16,968	17,770	16,922	16,228	17,808	(£m)
Cost w/o deficit (STPR)	21,000	17,555	16,882	19,225	17,720	16,968	17,770	16,922	16,228	17,808	(£m)
Cost w/ deficit (IGEQ)	32,220	25,723	24,508	28,778	25,951	24,612	26,233	24,635	23,386	26,227	(£m)
Cost w/o deficit (IGEQ)	32,220	25,723	24,508	28,778	25,951	24,612	26,233	24,635	23,386	26,227	(£m)
Cost w/ deficit (LTDR)	23,169	19,165	18,392	21,090	19,342	18,481	19,432	18,446	17,649	19,463	(£m)
Cost w/o deficit (LTDR)	23,169	19,165	18,392	21,090	19,342	18,481	19,432	18,446	17,649	19,463	(£m)

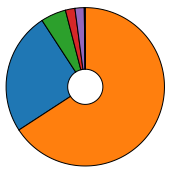
Cost breakdown (STPR)

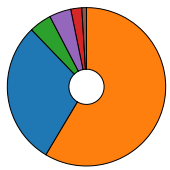
Select Company: Total

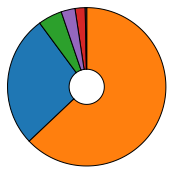
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,803	4,604	4,221	5,625	4,773	4,331	4,651	4,203	3,770	4,776	(£m)
Fixed opex	11,495	11,161	11,110	11,256	11,153	11,097	11,157	11,106	11,046	11,176	(£m)
Fixed operational carbon	880	869	870	877	870	869	871	867	865	871	(£m)
Embedded carbon	523	350	328	435	367	339	362	325	300	370	(£m)
Variable opex	1,068	517	318	850	502	300	636	385	230	534	(£m)
Variable carbon opex	230	55	35	181	54	31	93	37	17	81	(£m)

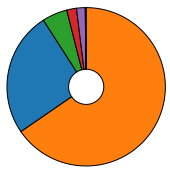
situation1 

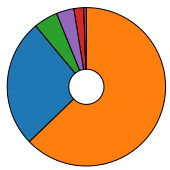
situation2 

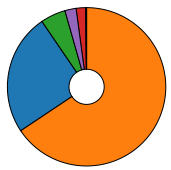
situation3 

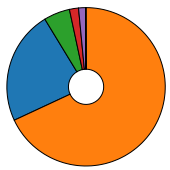
situation4 

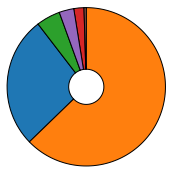
situation5 

situation6 

situation7 

situation8 

situation9 

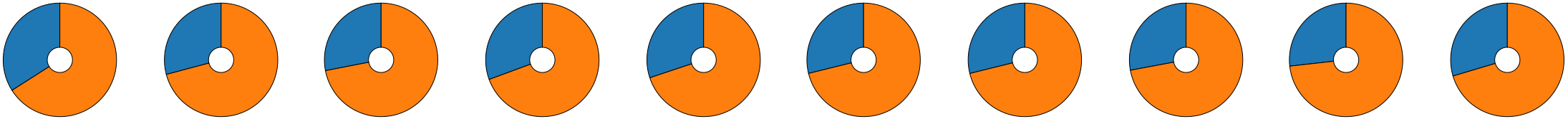
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,379,092	2,145,624	1,994,437	2,722,897	2,251,927	2,062,128	2,240,723	1,979,876	1,818,257	2,288,329	(tonnes)
Operational emissions	6,553,009	5,217,396	5,115,620	6,170,889	5,225,609	5,086,117	5,523,937	5,107,088	4,973,821	5,441,498	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

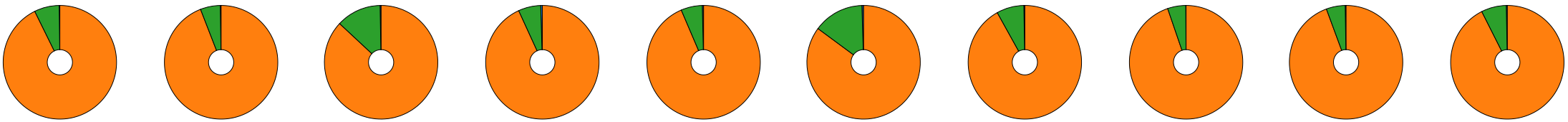


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	96	44	22	41	9	8	34	(GWh)
Grid	23,165	11,308	4,178	19,009	10,976	3,861	13,147	7,944	2,891	10,720	(GWh)
Renewable	1,777	681	614	1,302	713	654	1,115	433	165	828	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,538	63,718	62,874	67,118	63,620	62,711	63,883	61,609	60,553	63,958
SEA environmental disbenefit	114,154	81,832	75,471	99,773	79,528	73,423	83,828	70,451	61,604	82,229
Natural capital	84,358,305	81,297,104	84,141,525	75,310,600	77,131,522	79,780,701	80,951,905	81,730,369	84,602,292	81,033,814
Bio-diversity net gain	−190,975	−117,637	−91,041	−202,143	−149,655	−124,012	−119,765	−92,607	−63,553	−127,932

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,053	31,810	31,503	33,048	31,673	31,319	31,708	30,795	30,305	31,802

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.81	27.15	29.68	28.29	29.47	32.29	28.49	31.45	34.94	29.95
R1: Uncertainty of option supply/demand benefit	5.77	4.91	5.34	5.56	5.38	5.87	5.28	5.70	6.29	5.57
R3: Risk of service failure due to other physical hazards	6.65	6.71	7.51	6.91	7.35	8.23	7.02	7.94	9.05	7.49
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.82	4.32	3.86	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.94	5.53	5.30	5.56	6.24	5.17	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

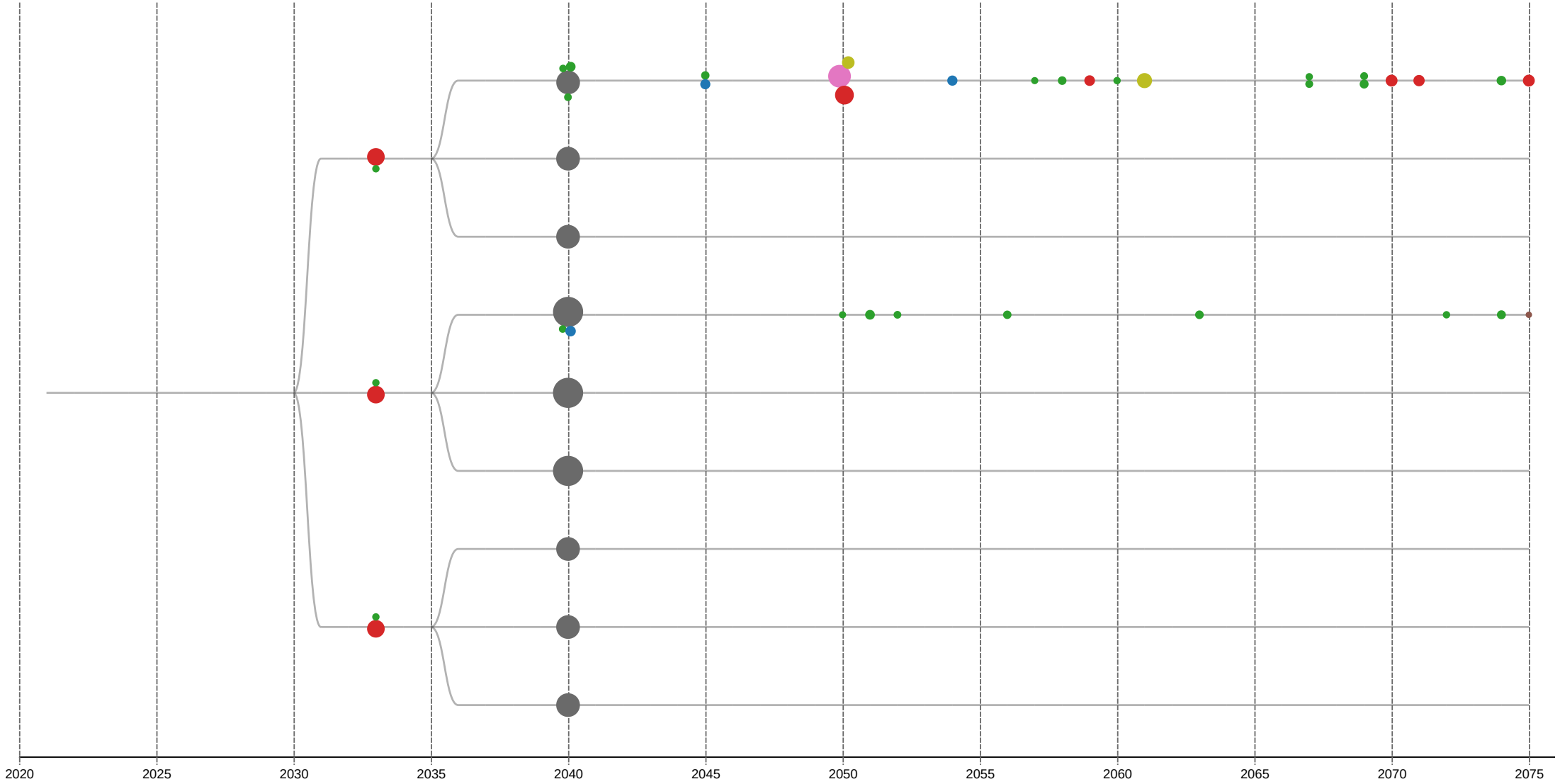
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.03	16.85	14.19	15.68	17.40	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.22	6.59	7.07	7.96	6.70	7.67	8.80	7.17
A4: WRZ connectivity	7.50	8.58	9.60	7.57	8.58	9.41	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.44	19.54	21.71	18.71	19.90	21.95	20.17	22.86	25.89	21.13
E1: Scaleability and modularity of proposed changes	8.91	9.32	10.39	8.66	9.37	10.46	9.65	11.08	12.61	10.05
E2: Intervention lead times	4.31	3.98	4.36	3.95	4.11	4.33	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.95	6.08	6.42	7.16	6.49	7.38	8.40	6.82
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

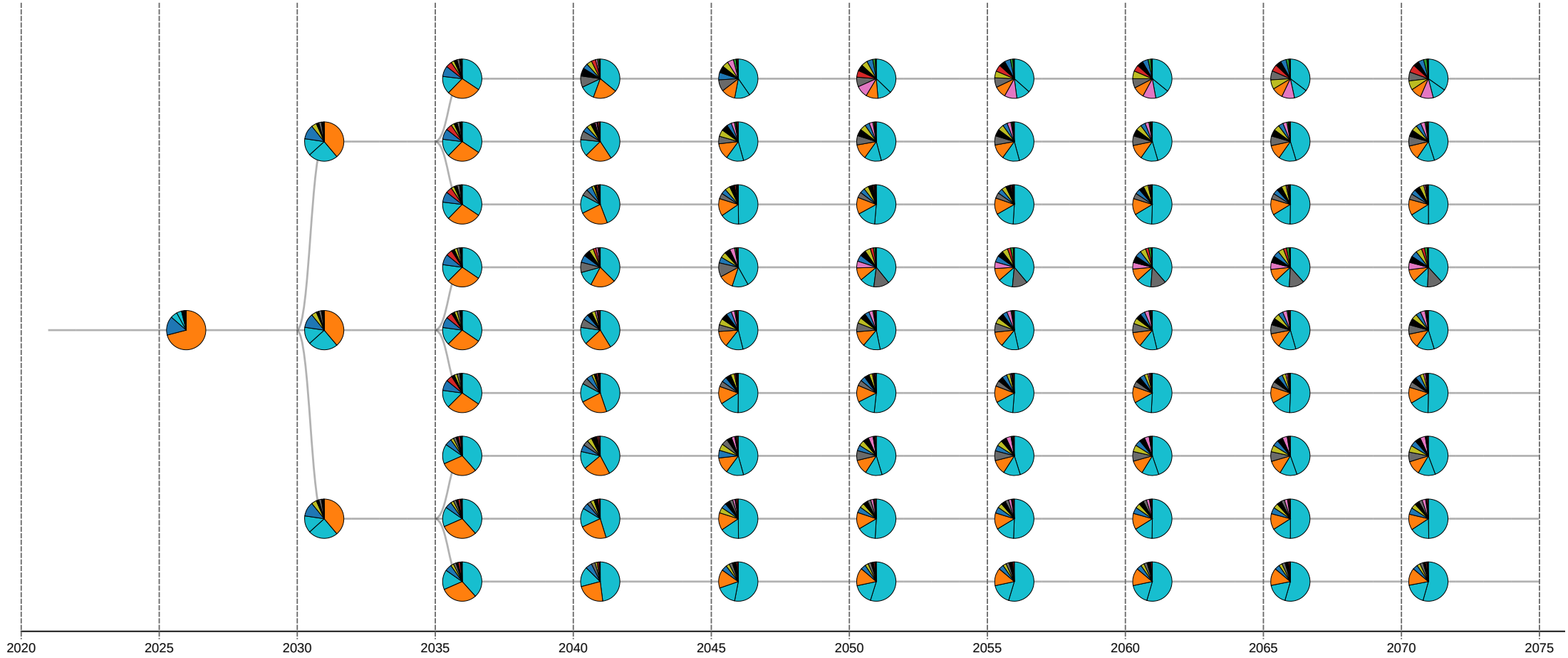
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
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- Catchment management
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- Reservoir
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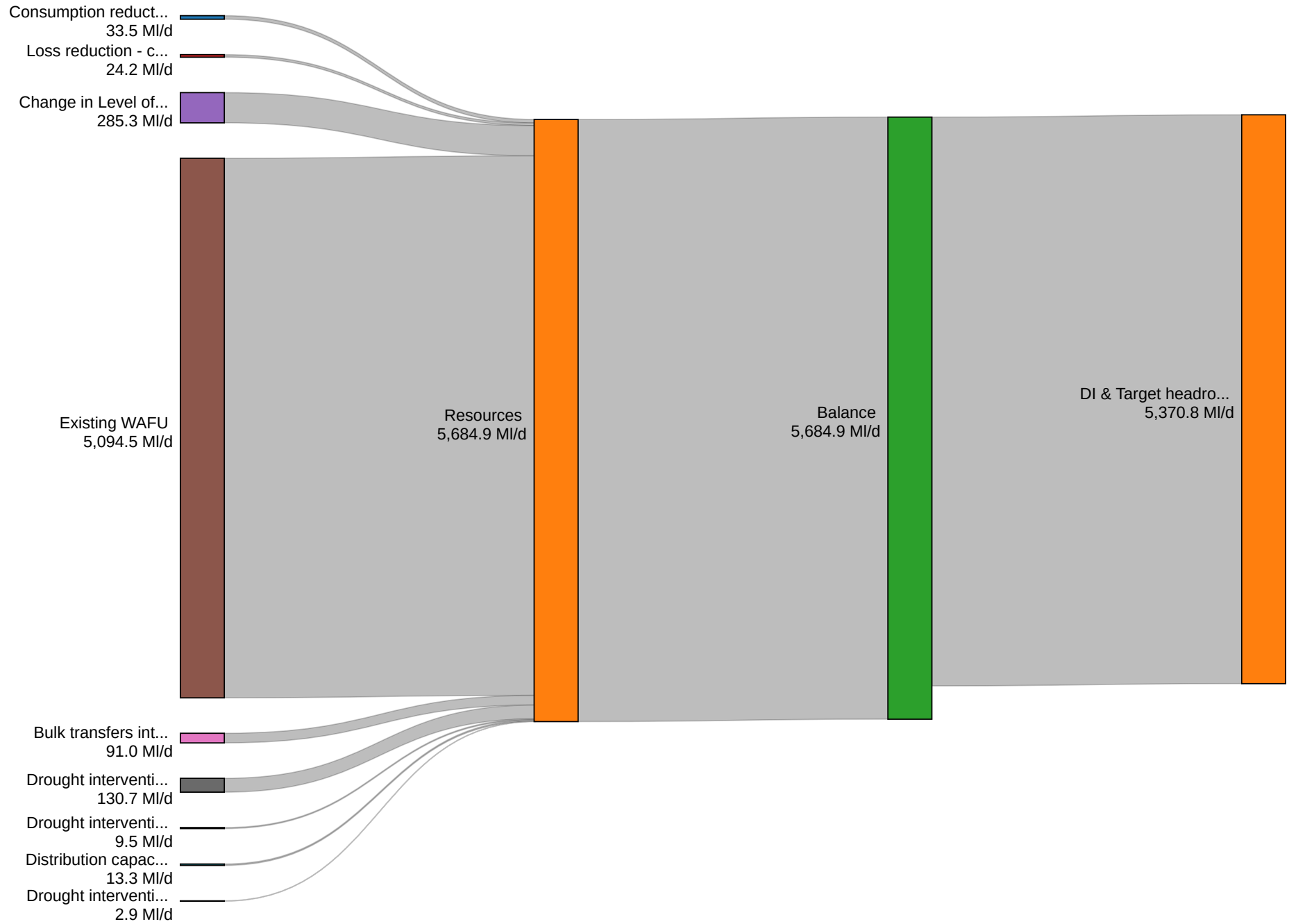
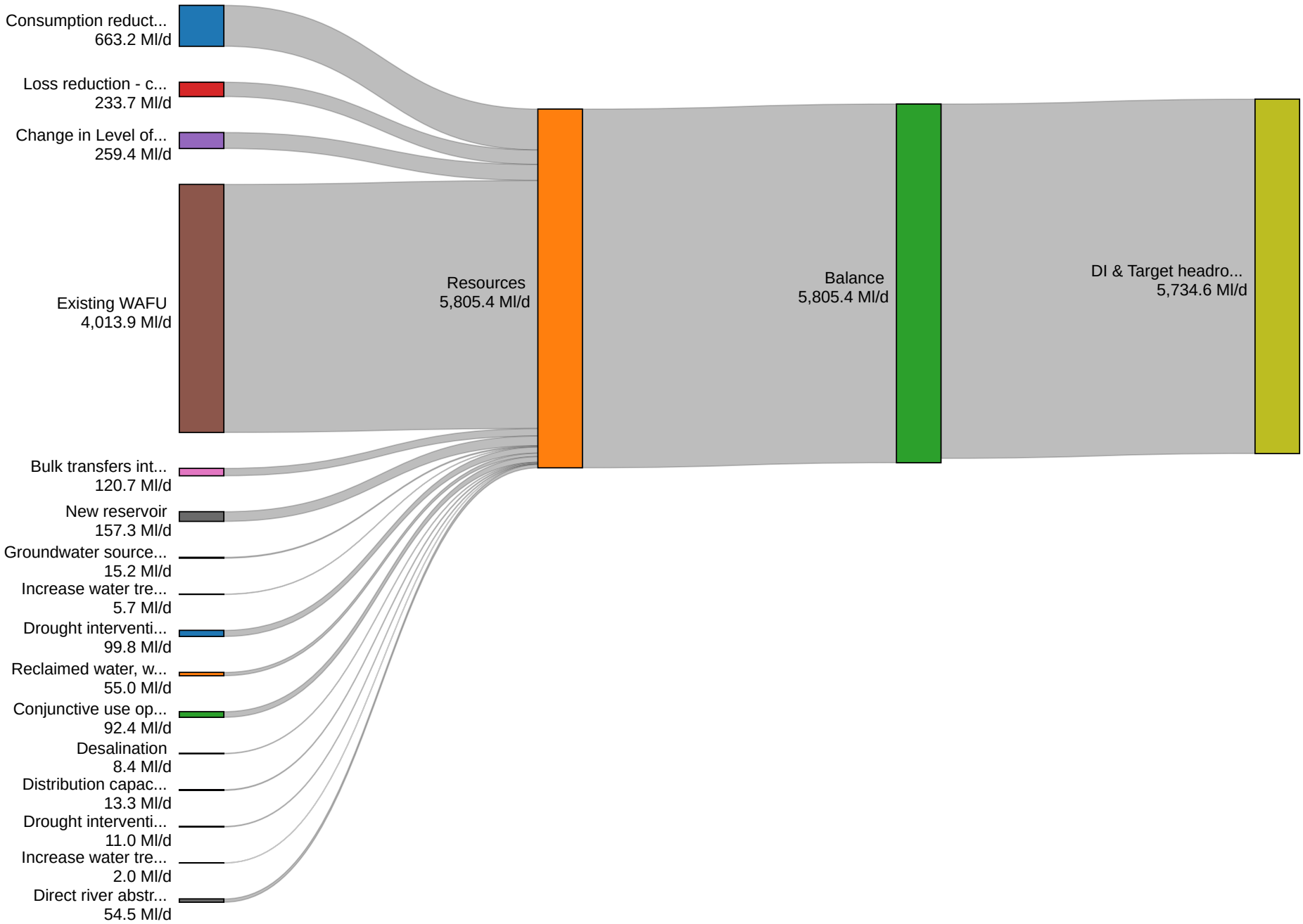
- Other

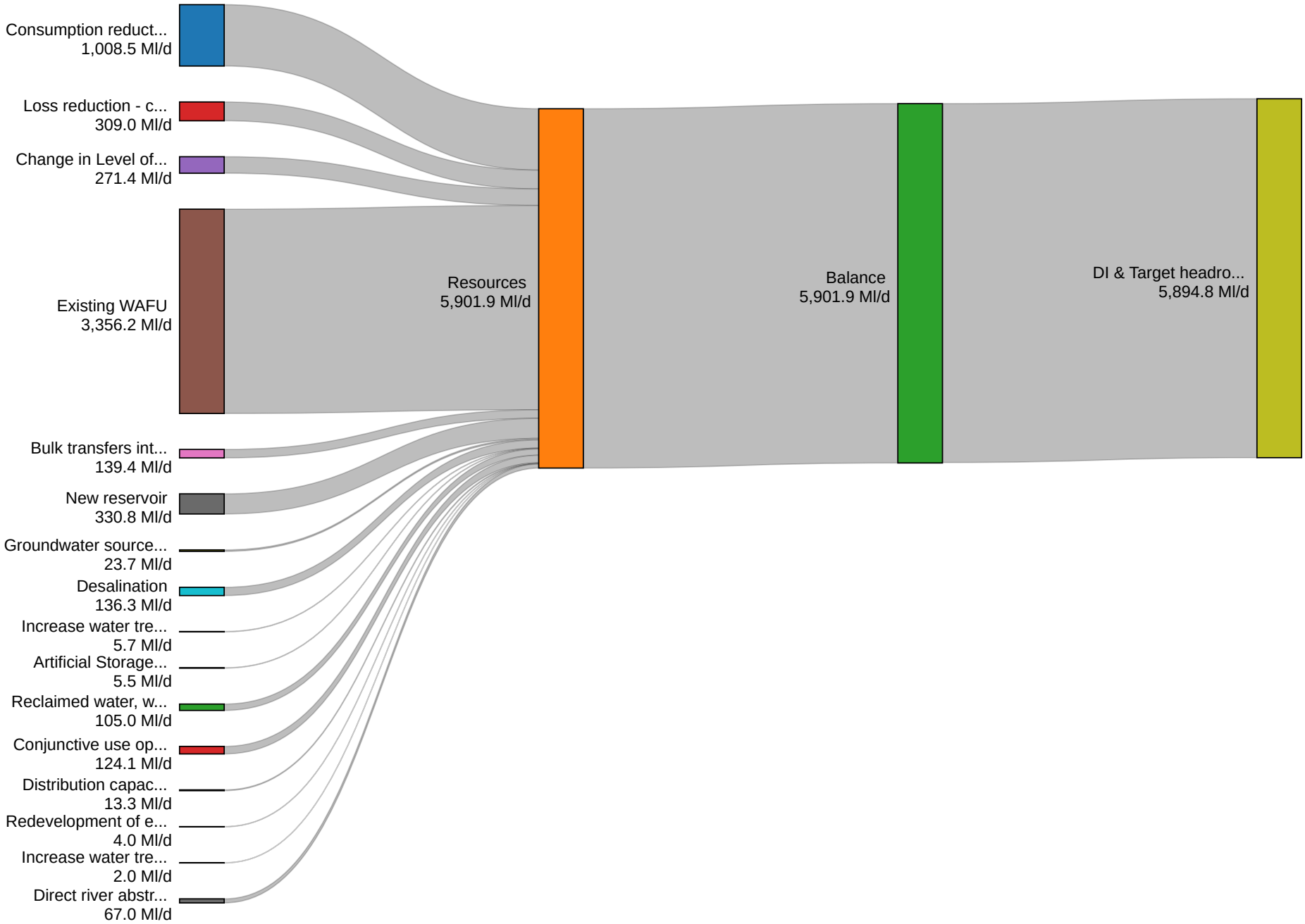
Situation 4 - 2026 (Thames Water)



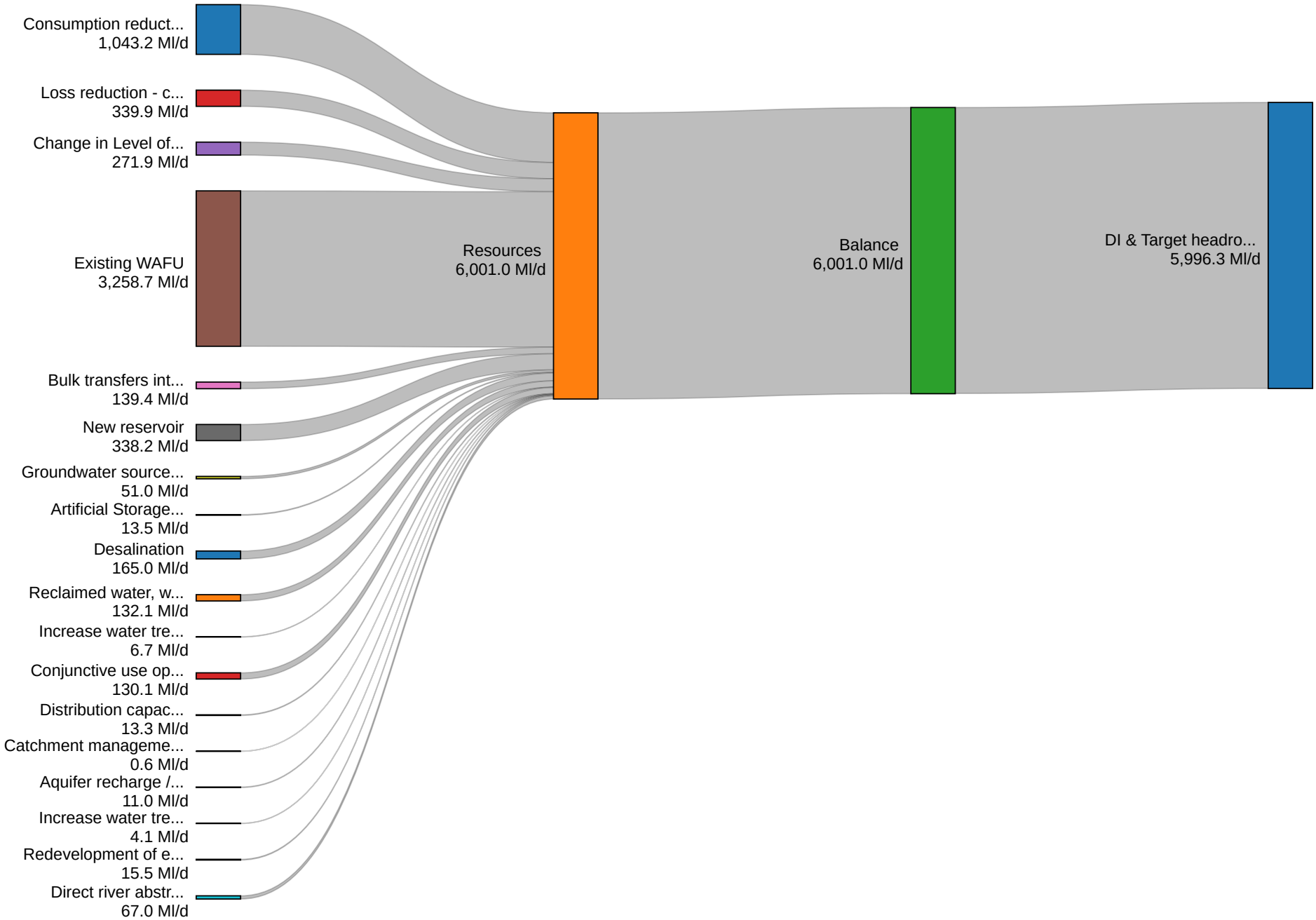
Situation 4 - 2040 (Thames Water)



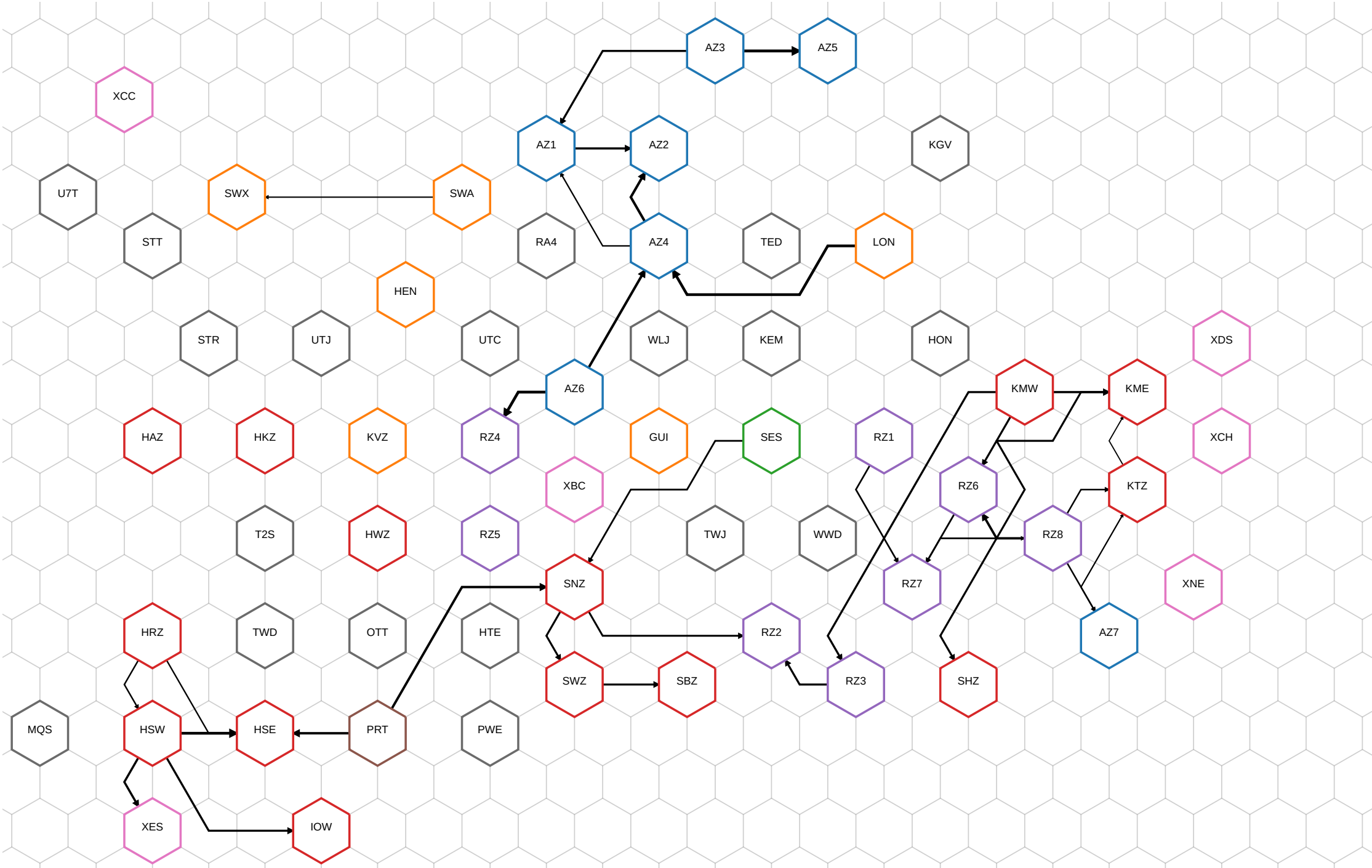
Situation 4 - 2050 (Thames Water)



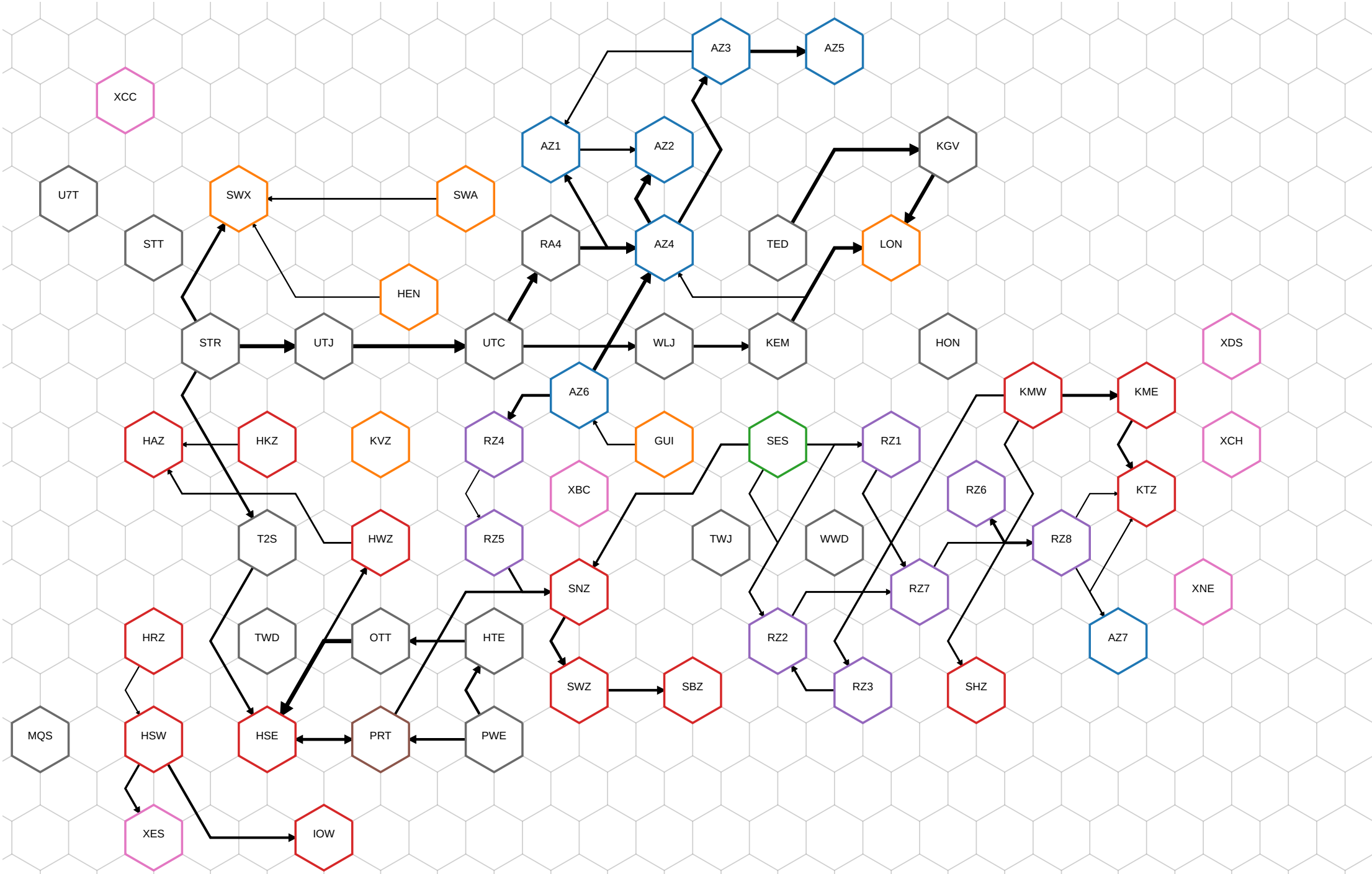
Situation 4 - 2075 (Thames Water)



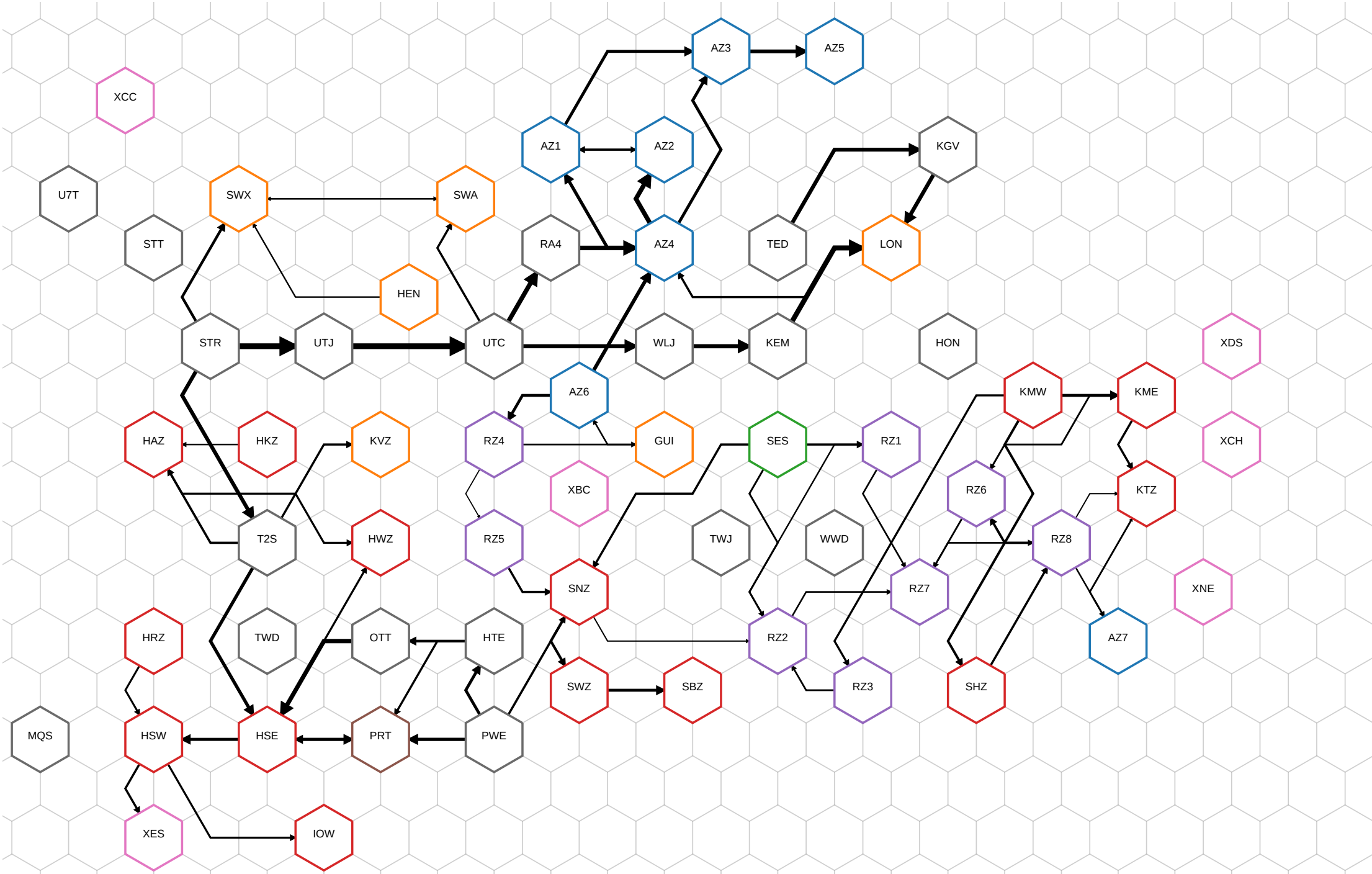
Situation 4 - 2026



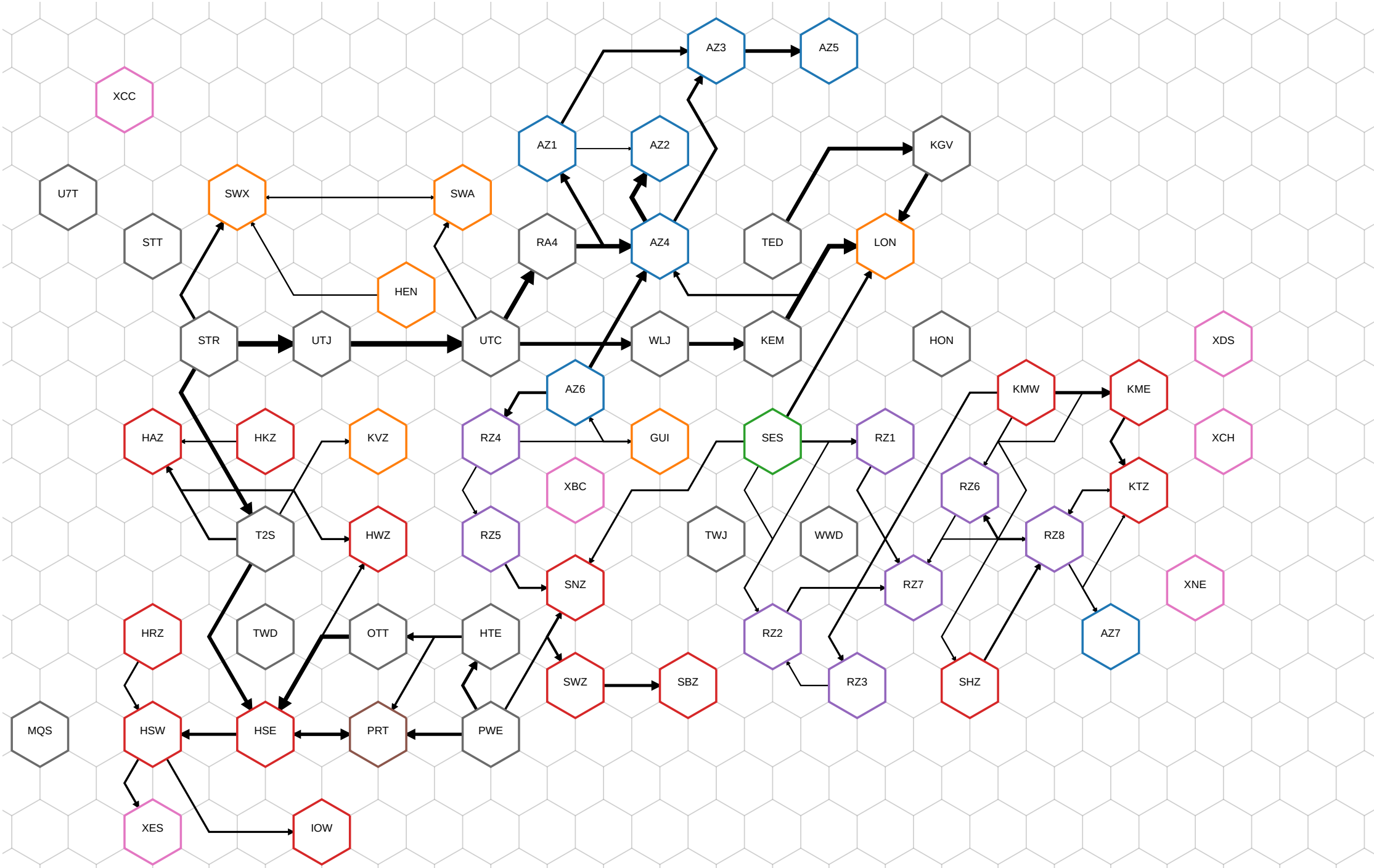
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +300% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p300pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions delaying TWU groundwater options until 2040 and Teddington DRA optimism bias changed by +3.0. Optimisation tolerances identical to LCP.
Created at	12/04/2024, 10:47:40
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p300pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +3.0.
Optimised discount rate	STPR

Metrics

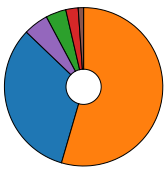
Net present value (Cost)

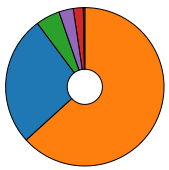
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,093	17,645	16,972	19,319	17,810	17,054	17,860	17,012	16,318	17,898	(£m)
Cost w/o deficit (STPR)	21,093	17,645	16,972	19,319	17,810	17,054	17,860	17,012	16,318	17,898	(£m)
Cost w/ deficit (IGEQ)	32,367	25,861	24,647	28,923	26,090	24,747	26,372	24,773	23,525	26,367	(£m)
Cost w/o deficit (IGEQ)	32,367	25,861	24,647	28,923	26,090	24,747	26,372	24,773	23,525	26,367	(£m)
Cost w/ deficit (LTDR)	23,272	19,265	18,491	21,194	19,442	18,576	19,531	18,545	17,749	19,563	(£m)
Cost w/o deficit (LTDR)	23,272	19,265	18,491	21,194	19,442	18,576	19,531	18,545	17,749	19,563	(£m)

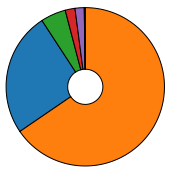
Cost breakdown (STPR)

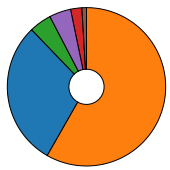
Select Company: Total

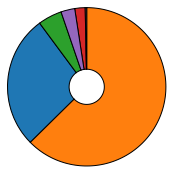
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,884	4,683	4,300	5,713	4,852	4,404	4,730	4,282	3,849	4,855	(£m)
Fixed opex	11,496	11,161	11,110	11,254	11,153	11,097	11,157	11,106	11,046	11,175	(£m)
Fixed operational carbon	880	869	870	877	870	870	871	867	865	871	(£m)
Embedded carbon	533	362	339	447	379	349	373	336	312	381	(£m)
Variable opex	1,067	517	318	850	502	302	636	385	230	534	(£m)
Variable carbon opex	231	55	35	179	54	32	93	37	17	81	(£m)

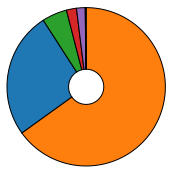
situation1 

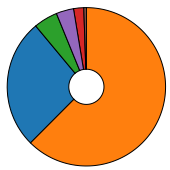
situation2 

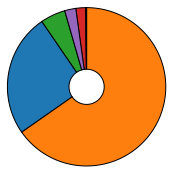
situation3 

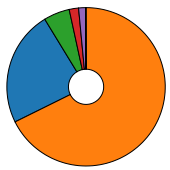
situation4 

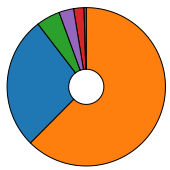
situation5 

situation6 

situation7 

situation8 

situation9 

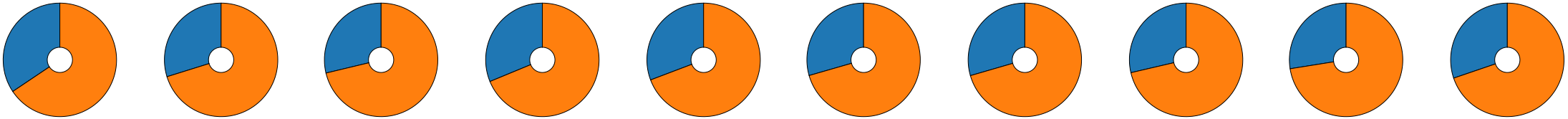
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,440,026	2,214,861	2,063,675	2,796,089	2,321,165	2,128,215	2,309,960	2,049,114	1,887,495	2,356,733	(tonnes)
Operational emissions	6,558,979	5,217,396	5,115,620	6,157,673	5,225,609	5,097,248	5,523,937	5,107,088	4,973,821	5,441,930	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

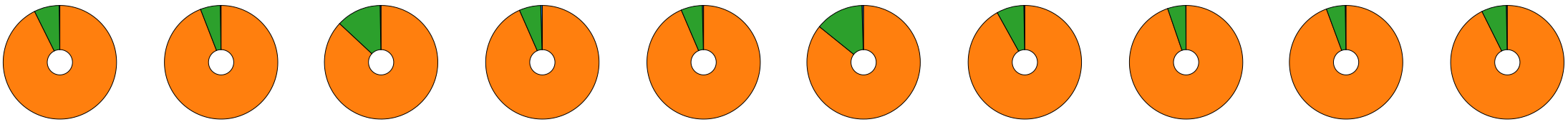


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	95	44	22	41	9	8	34	(GWh)
Grid	23,103	11,308	4,178	19,177	10,976	3,900	13,147	7,944	2,891	10,736	(GWh)
Renewable	1,785	681	614	1,260	713	625	1,115	433	165	821	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,583	63,718	62,874	67,145	63,620	62,707	63,883	61,609	60,553	63,966
SEA environmental disbenefit	114,281	81,832	75,471	99,851	79,528	74,041	83,828	70,451	61,604	82,321
Natural capital	84,372,729	81,297,104	84,141,525	75,270,011	77,131,522	79,772,757	80,951,905	81,730,369	84,602,292	81,030,024
Bio-diversity net gain	−190,708	−117,637	−91,041	−202,489	−149,655	−126,289	−119,765	−92,607	−63,553	−128,194

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,061	31,832	31,503	33,090	31,669	31,357	31,711	30,798	30,308	31,814

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.80	27.15	29.68	28.32	29.49	32.22	28.49	31.45	34.94	29.95
R1: Uncertainty of option supply/demand benefit	5.77	4.91	5.34	5.57	5.39	5.84	5.28	5.70	6.29	5.57
R3: Risk of service failure due to other physical hazards	6.64	6.71	7.51	6.92	7.36	8.21	7.02	7.94	9.05	7.49
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.82	4.32	3.87	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.94	5.53	5.31	5.56	6.23	5.17	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

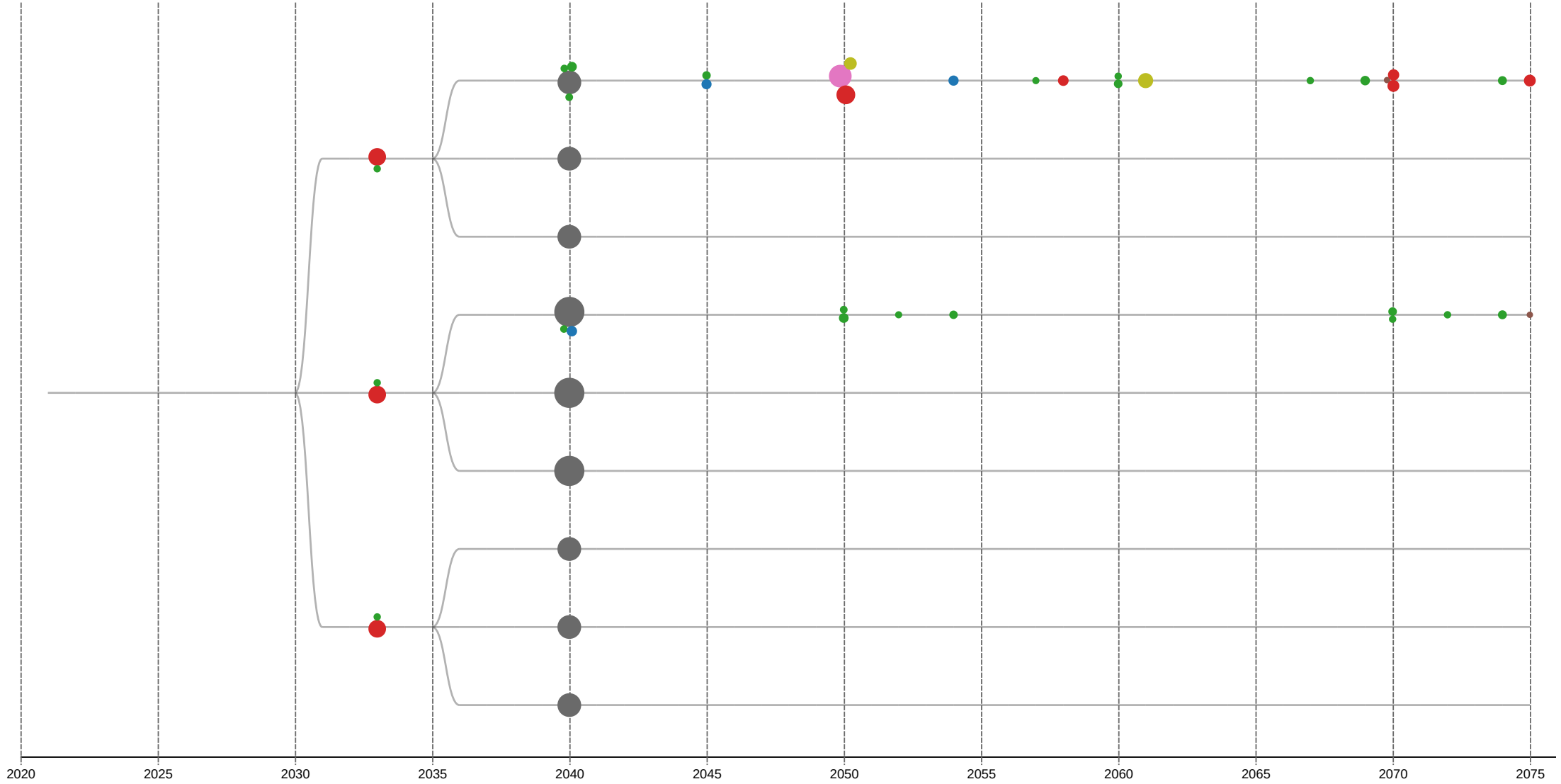
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.66	15.03	16.85	14.19	15.68	17.40	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.22	6.59	7.08	7.95	6.70	7.67	8.80	7.17
A4: WRZ connectivity	7.49	8.58	9.60	7.57	8.58	9.42	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.43	19.54	21.71	18.73	19.92	21.91	20.17	22.86	25.89	21.13
E1: Scaleability and modularity of proposed changes	8.90	9.32	10.39	8.67	9.38	10.43	9.65	11.08	12.61	10.05
E2: Intervention lead times	4.30	3.98	4.36	3.97	4.11	4.34	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.95	6.08	6.43	7.15	6.49	7.38	8.40	6.81
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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- Transfer into region
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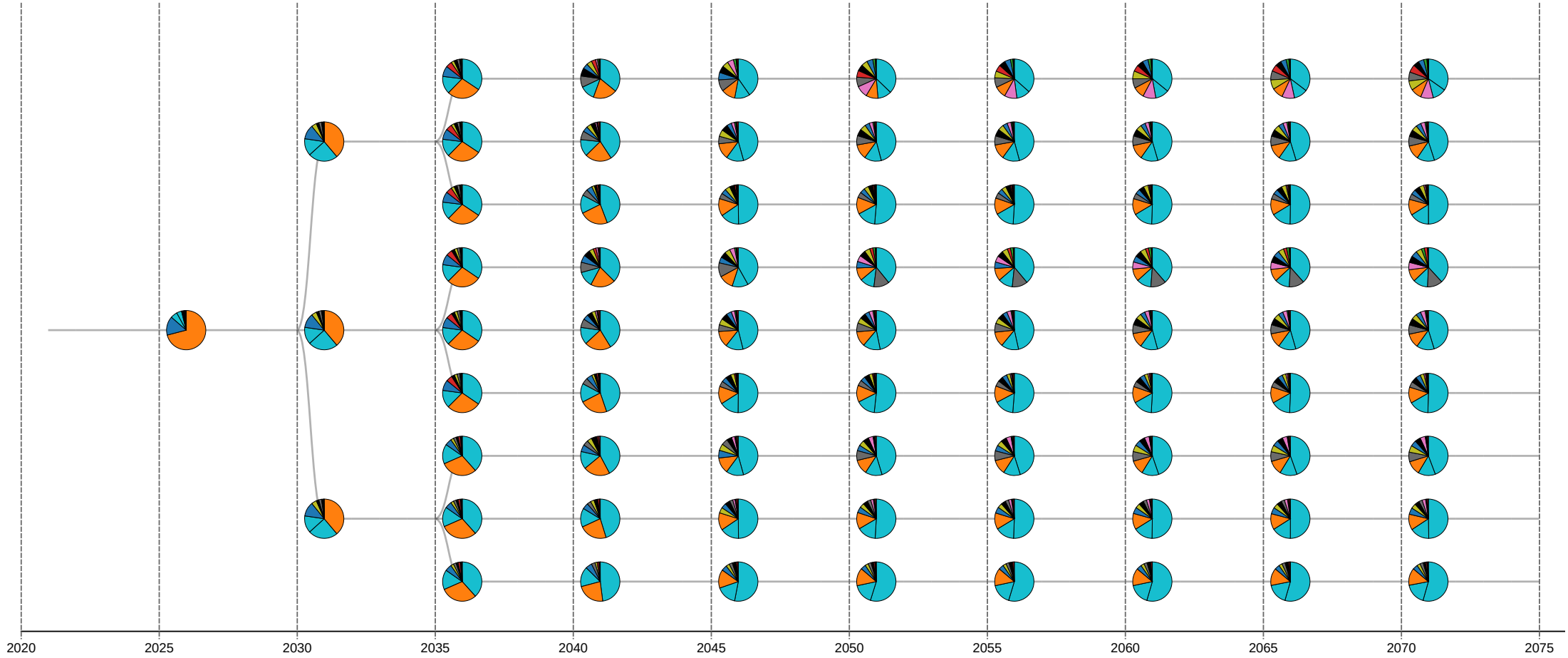
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
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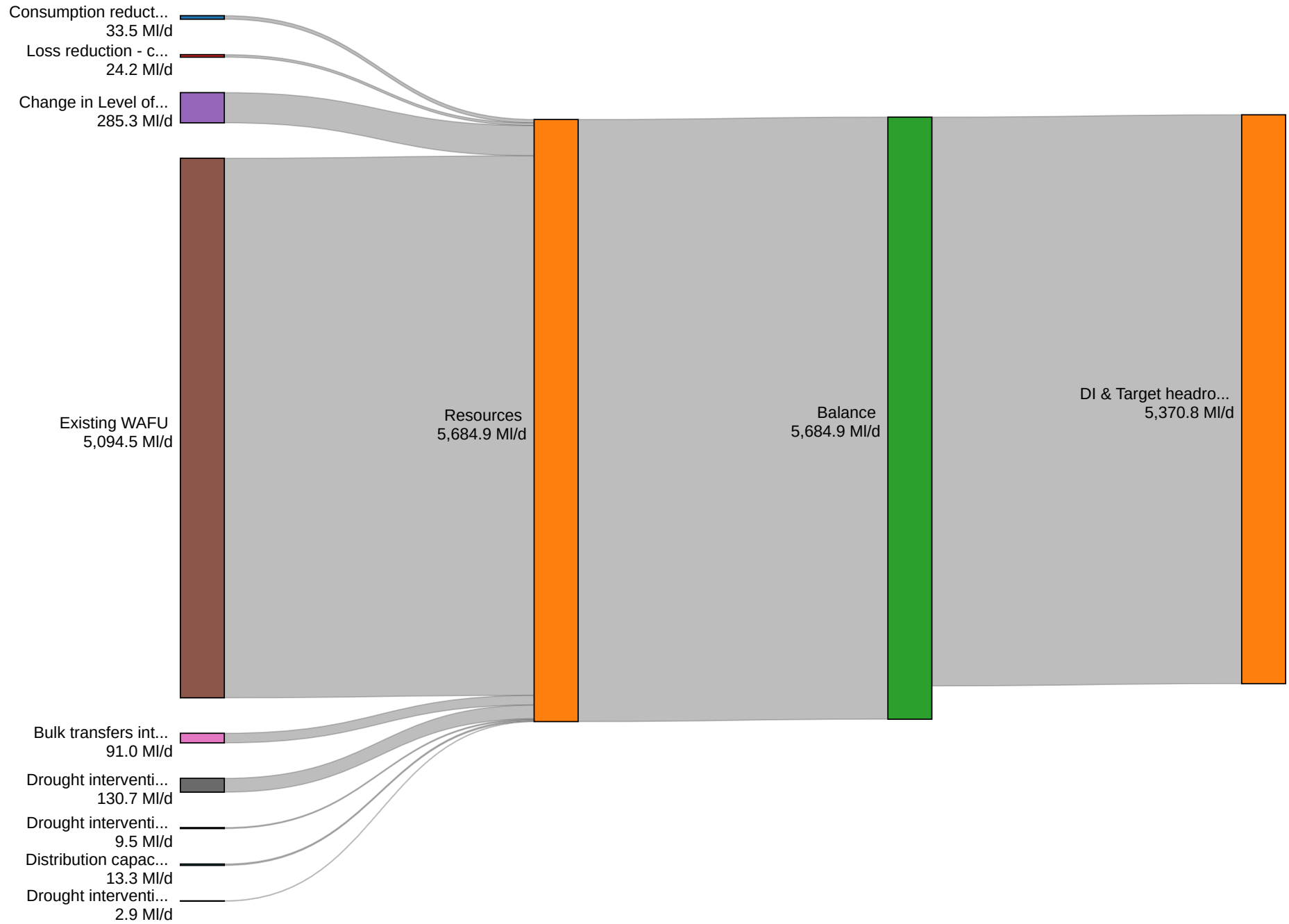
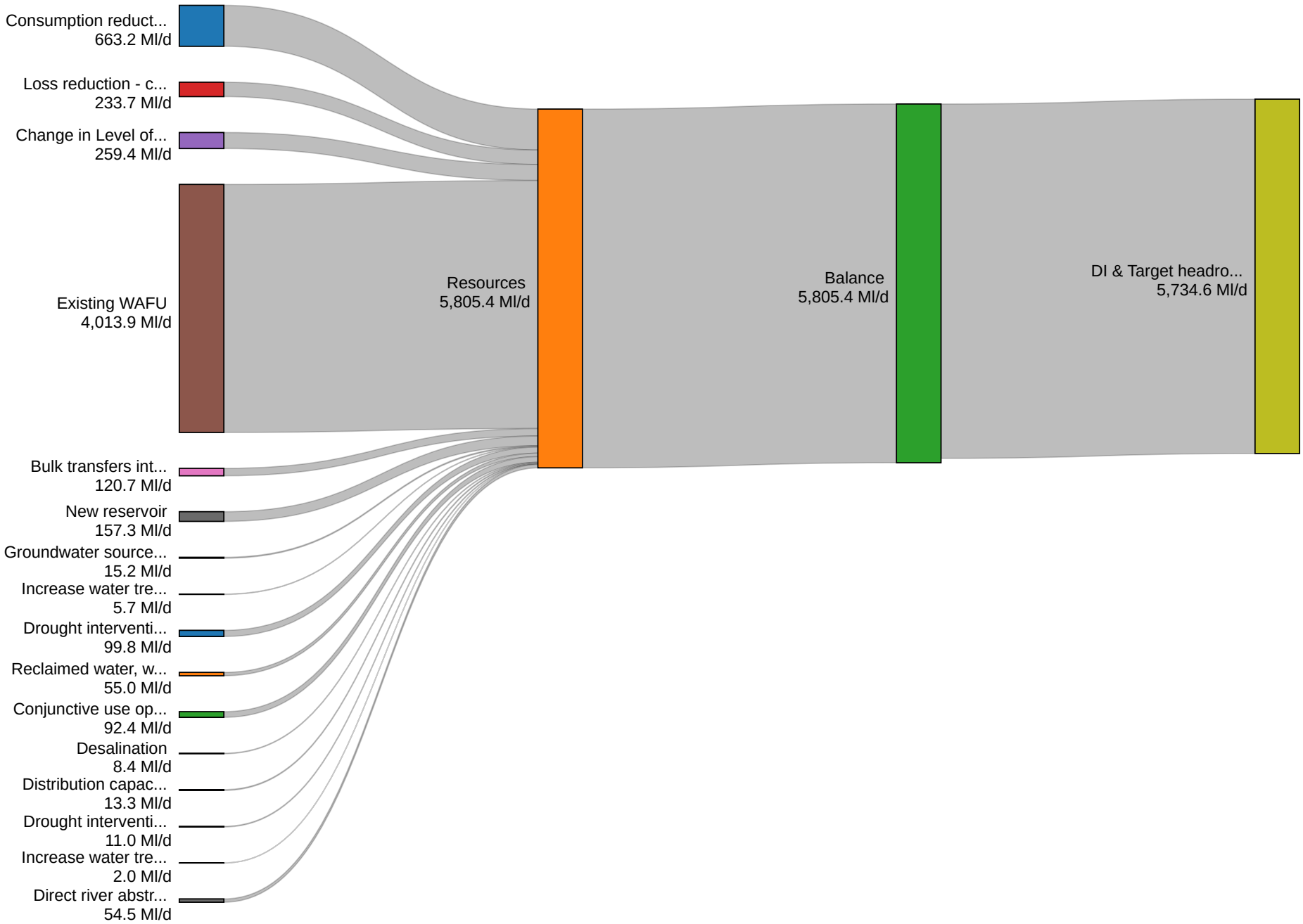
- Leakage reduction
- Other

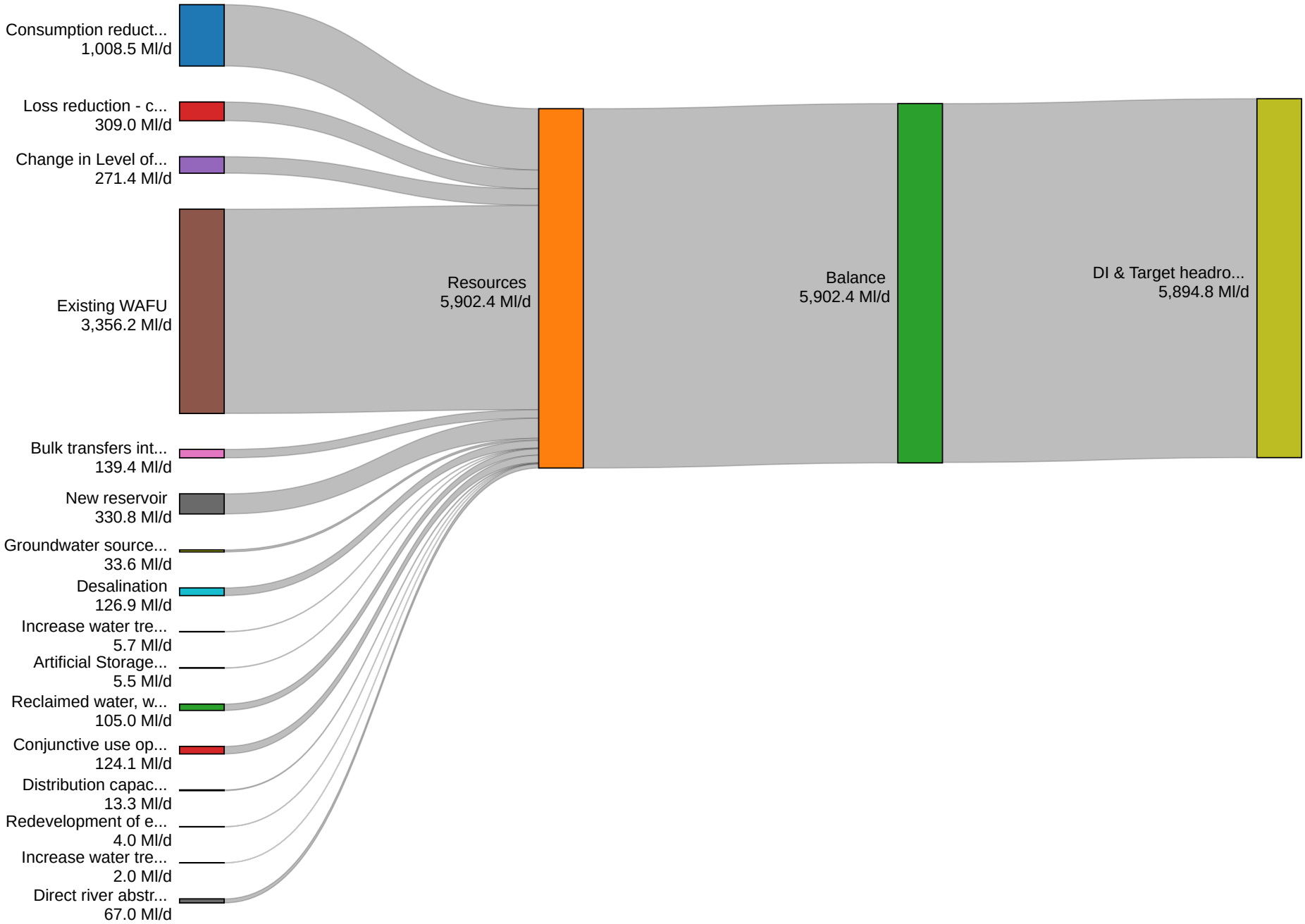
Situation 4 - 2026 (Thames Water)



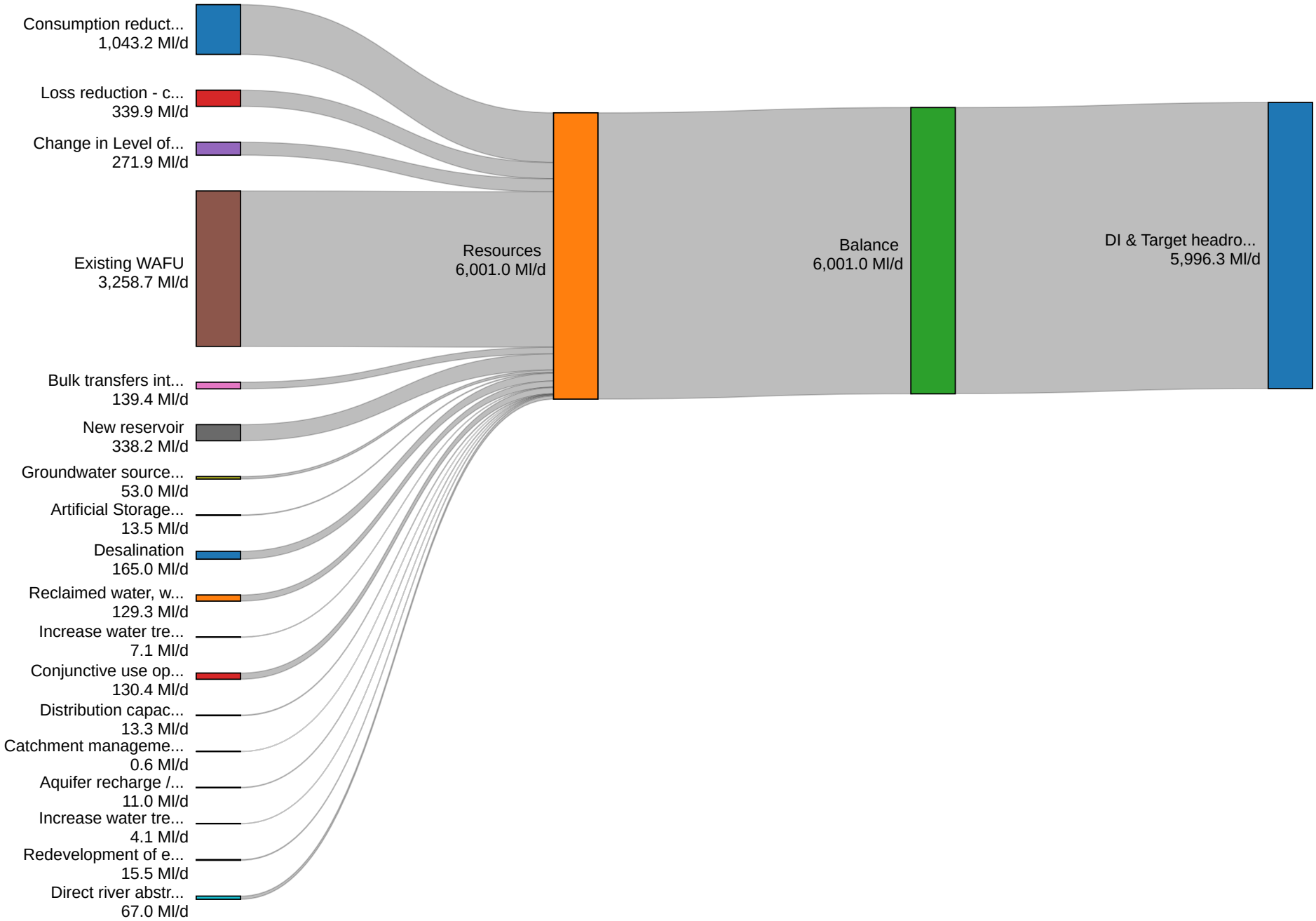
Situation 4 - 2040 (Thames Water)



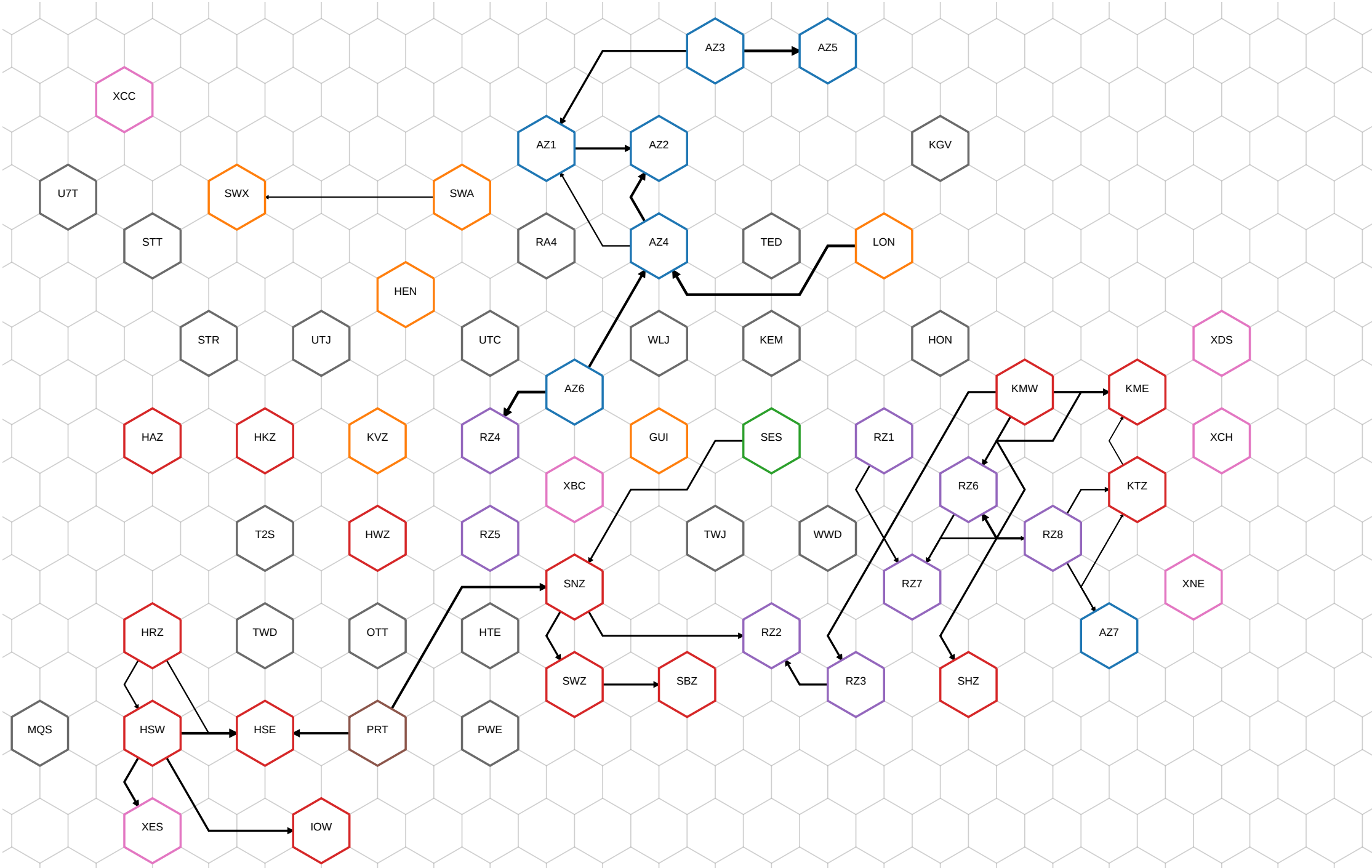
Situation 4 - 2050 (Thames Water)



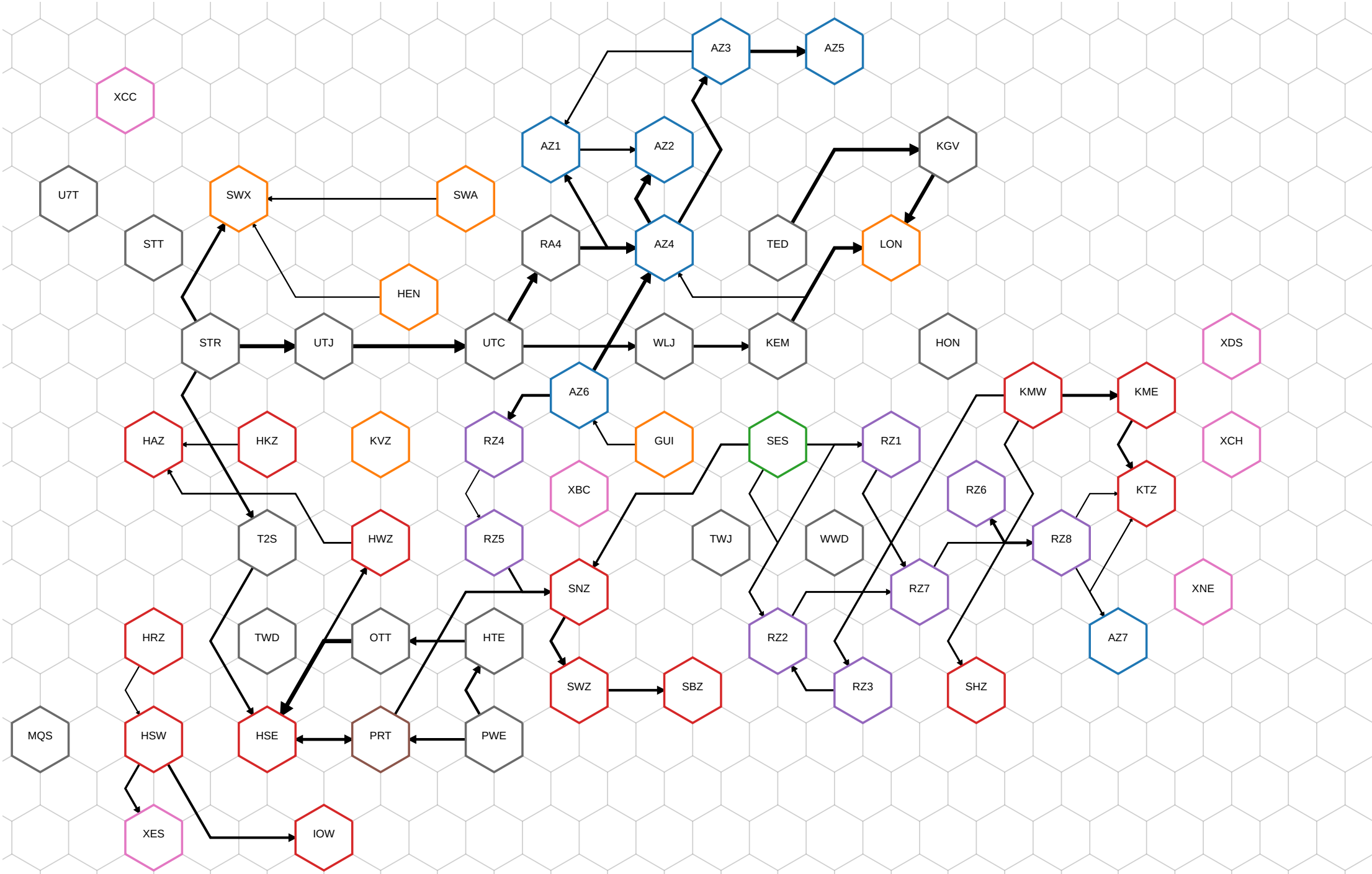
Situation 4 - 2075 (Thames Water)



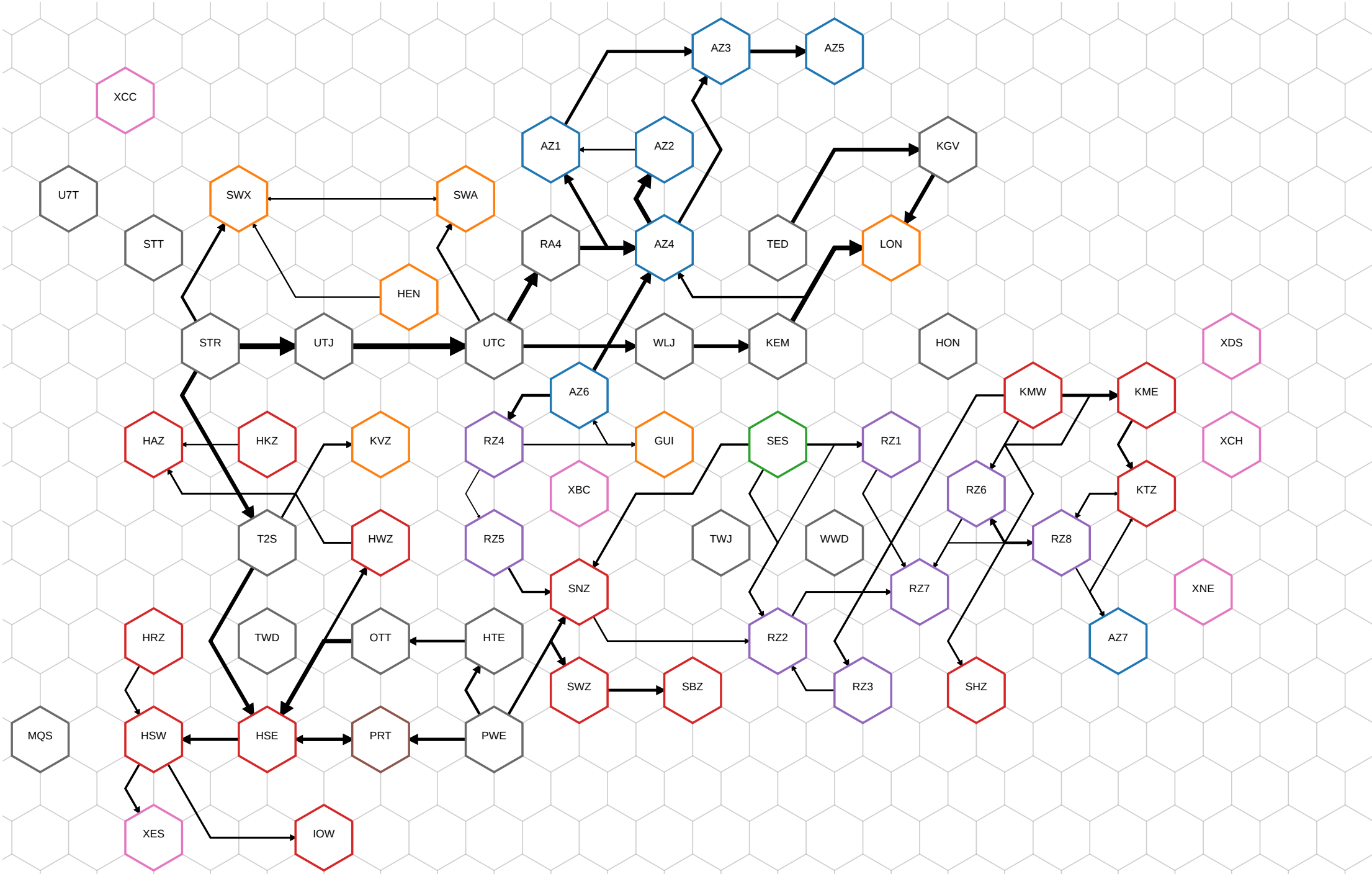
Situation 4 - 2026



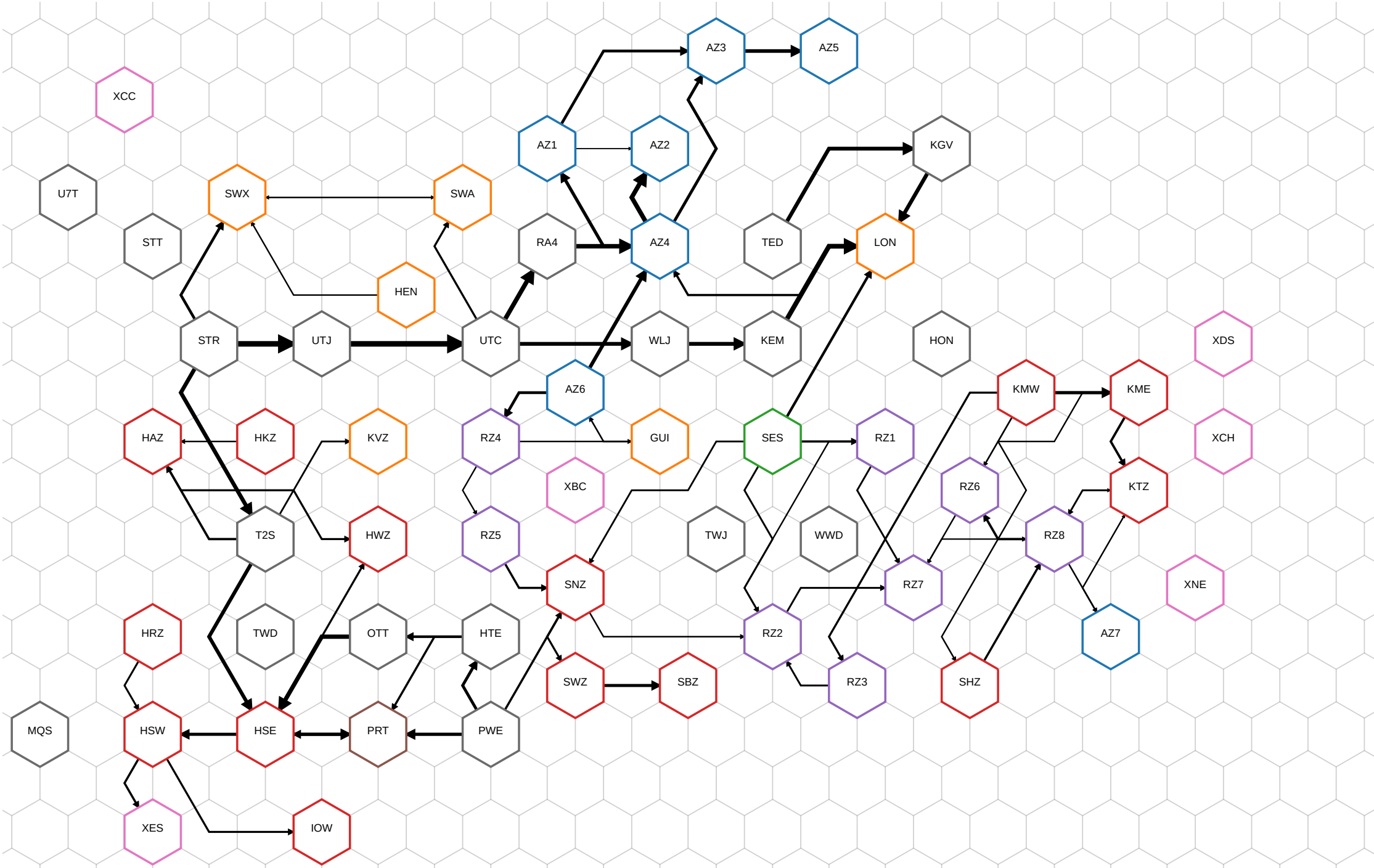
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +400% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p400pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions delaying TWU groundwater options until 2040 and Teddington DRA optimism bias changed by +4.0. Optimisation tolerances identical to LCP.
Created at	12/04/2024, 10:47:48
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p400pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +4.0.
Optimised discount rate	STPR

Metrics

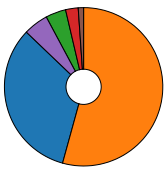
Net present value (Cost)

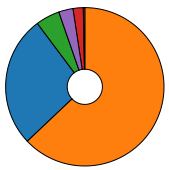
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,181	17,735	17,068	19,416	17,895	17,145	17,950	17,102	16,408	17,989	(£m)
Cost w/o deficit (STPR)	21,181	17,735	17,068	19,416	17,895	17,145	17,950	17,102	16,408	17,989	(£m)
Cost w/ deficit (IGEQ)	32,500	26,000	24,794	29,075	26,220	24,885	26,511	24,912	23,664	26,507	(£m)
Cost w/o deficit (IGEQ)	32,500	26,000	24,794	29,075	26,220	24,885	26,511	24,912	23,664	26,507	(£m)
Cost w/ deficit (LTDR)	23,369	19,364	18,597	21,302	19,536	18,677	19,631	18,645	17,848	19,663	(£m)
Cost w/o deficit (LTDR)	23,369	19,364	18,597	21,302	19,536	18,677	19,631	18,645	17,848	19,663	(£m)

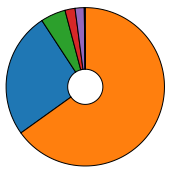
Cost breakdown (STPR)

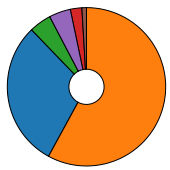
Select Company: Total

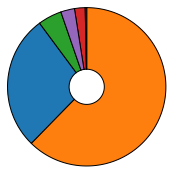
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,960	4,762	4,384	5,795	4,928	4,488	4,809	4,361	3,928	4,935	(£m)
Fixed opex	11,497	11,161	11,111	11,252	11,151	11,096	11,157	11,106	11,046	11,175	(£m)
Fixed operational carbon	880	869	870	877	870	869	871	867	865	871	(£m)
Embedded carbon	545	373	351	459	390	361	384	347	323	392	(£m)
Variable opex	1,068	517	318	852	502	300	636	385	230	534	(£m)
Variable carbon opex	230	55	35	180	54	31	93	37	17	81	(£m)

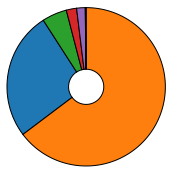
situation1 

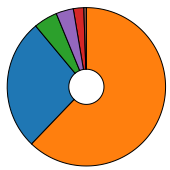
situation2 

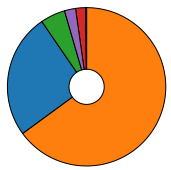
situation3 

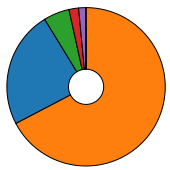
situation4 

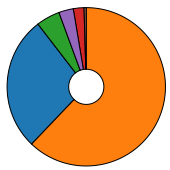
situation5 

situation6 

situation7 

situation8 

situation9 

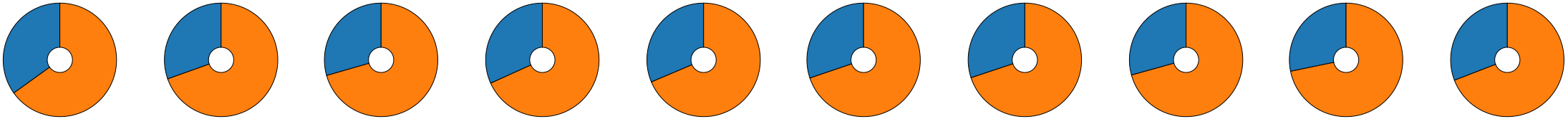
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,517,022	2,284,099	2,135,570	2,868,637	2,389,336	2,200,024	2,379,197	2,118,351	1,956,732	2,427,663	(tonnes)
Operational emissions	6,553,211	5,217,396	5,115,371	6,166,767	5,227,568	5,085,935	5,523,937	5,107,088	4,973,821	5,441,233	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

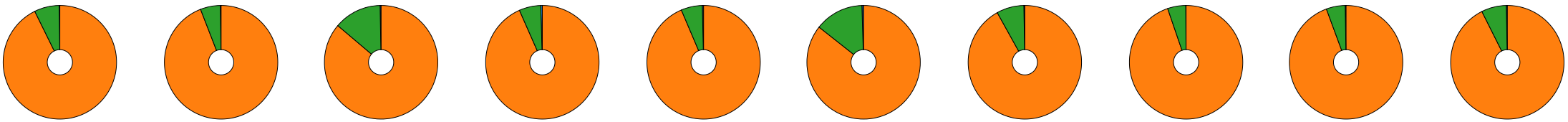


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	95	44	22	41	9	8	34	(GWh)
Grid	23,164	11,308	4,165	19,145	10,935	3,861	13,147	7,944	2,891	10,729	(GWh)
Renewable	1,776	681	655	1,262	706	627	1,115	433	165	825	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,706	63,718	62,941	67,149	63,695	62,754	63,883	61,609	60,553	64,001
SEA environmental disbenefit	114,229	81,832	74,937	100,381	79,905	73,944	83,828	70,451	61,604	82,346
Natural capital	84,358,382	81,297,104	84,151,194	75,324,948	77,196,813	79,846,220	80,951,905	81,730,369	84,602,292	81,051,025
Bio-diversity net gain	−190,959	−117,637	−87,548	−202,754	−149,461	−123,728	−119,765	−92,607	−63,553	−127,557

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,094	31,863	31,482	33,136	31,700	31,347	31,711	30,798	30,308	31,827

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.82	27.15	29.76	28.30	29.49	32.29	28.49	31.45	34.94	29.97
R1: Uncertainty of option supply/demand benefit	5.77	4.91	5.38	5.56	5.38	5.87	5.28	5.70	6.29	5.57
R3: Risk of service failure due to other physical hazards	6.65	6.71	7.54	6.91	7.36	8.23	7.02	7.94	9.05	7.49
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.82	4.32	3.87	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.94	5.54	5.30	5.56	6.24	5.17	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

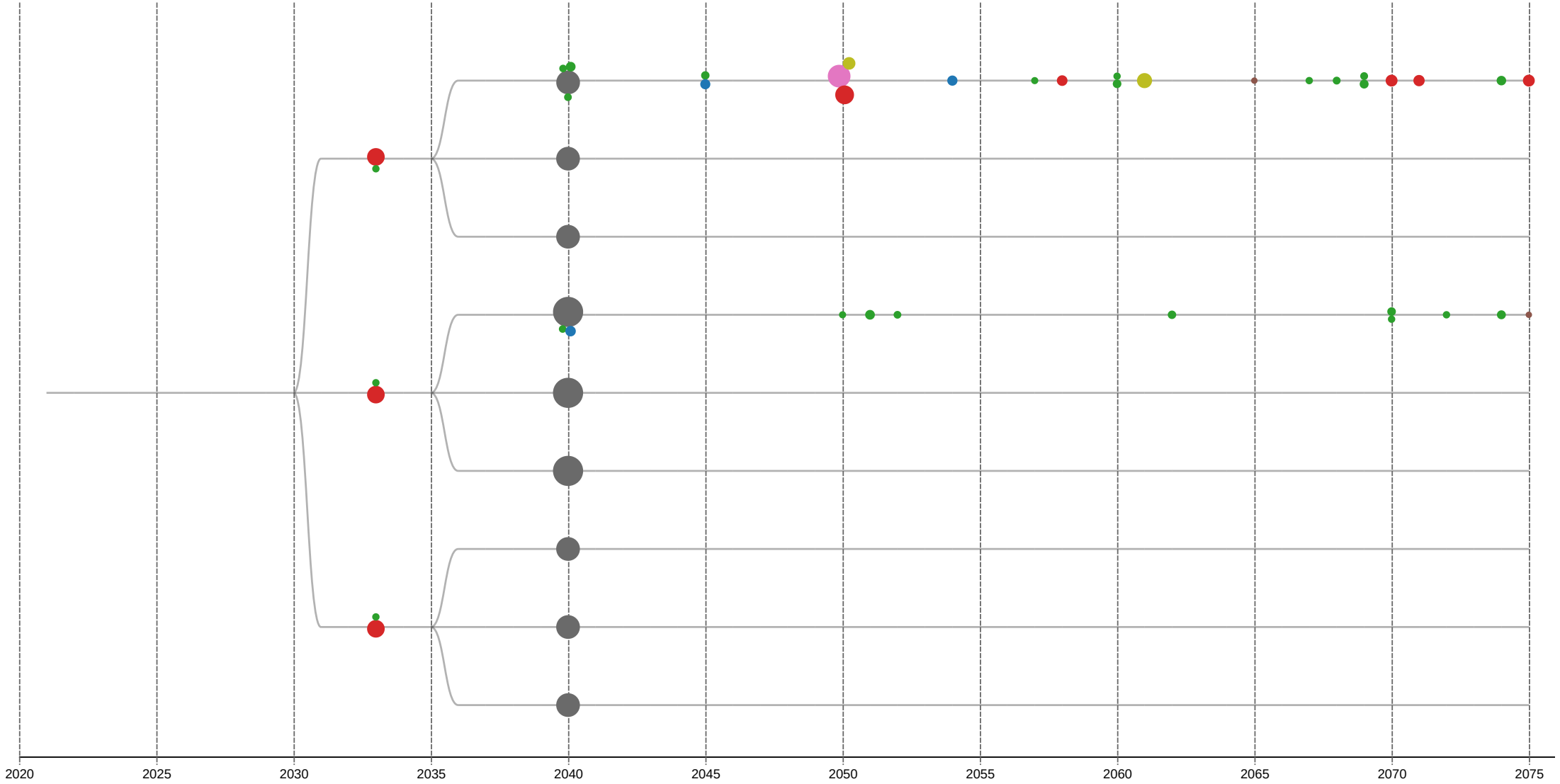
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.66	15.03	16.84	14.19	15.68	17.40	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.23	6.58	7.07	7.96	6.70	7.67	8.80	7.17
A4: WRZ connectivity	7.50	8.58	9.58	7.57	8.58	9.41	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.45	19.54	21.75	18.70	19.92	21.95	20.17	22.86	25.89	21.14
E1: Scaleability and modularity of proposed changes	8.91	9.32	10.43	8.66	9.38	10.46	9.65	11.08	12.61	10.05
E2: Intervention lead times	4.31	3.98	4.36	3.96	4.11	4.33	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.97	6.08	6.43	7.16	6.49	7.38	8.40	6.82
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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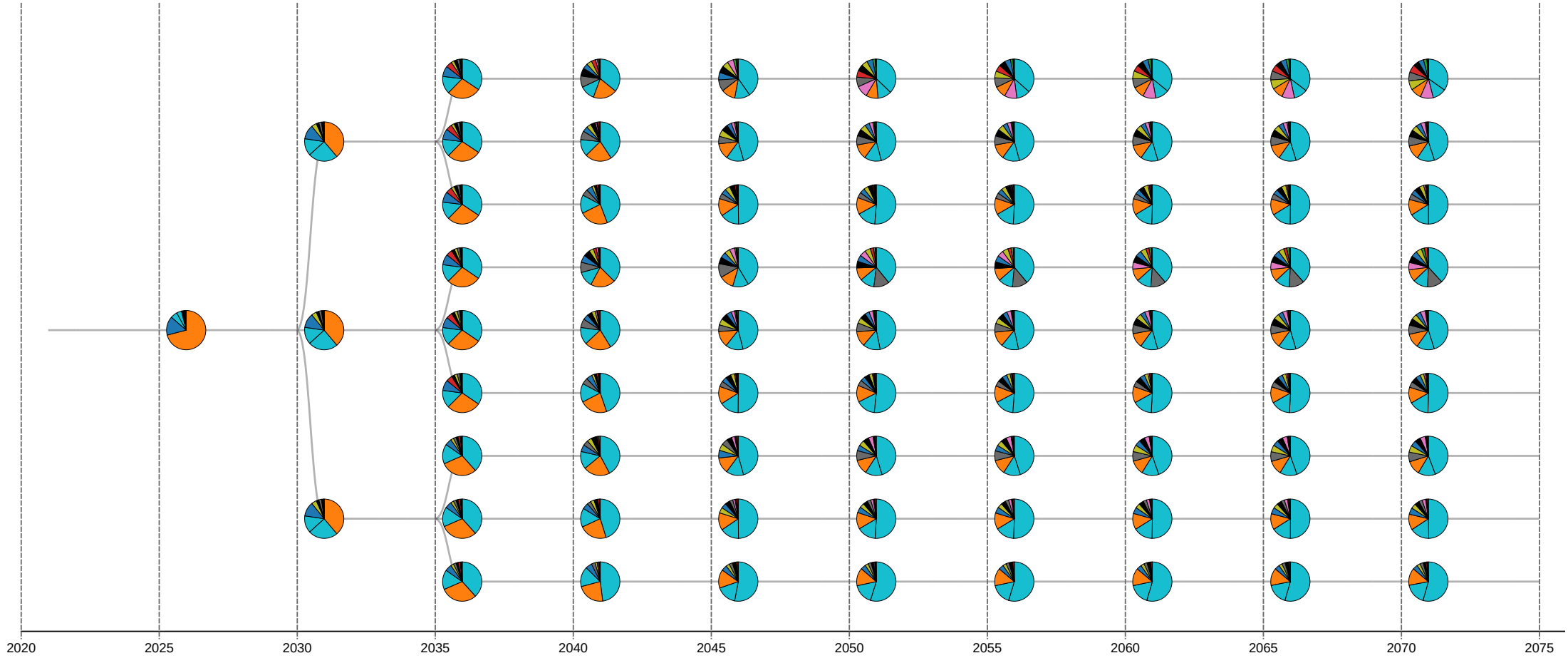
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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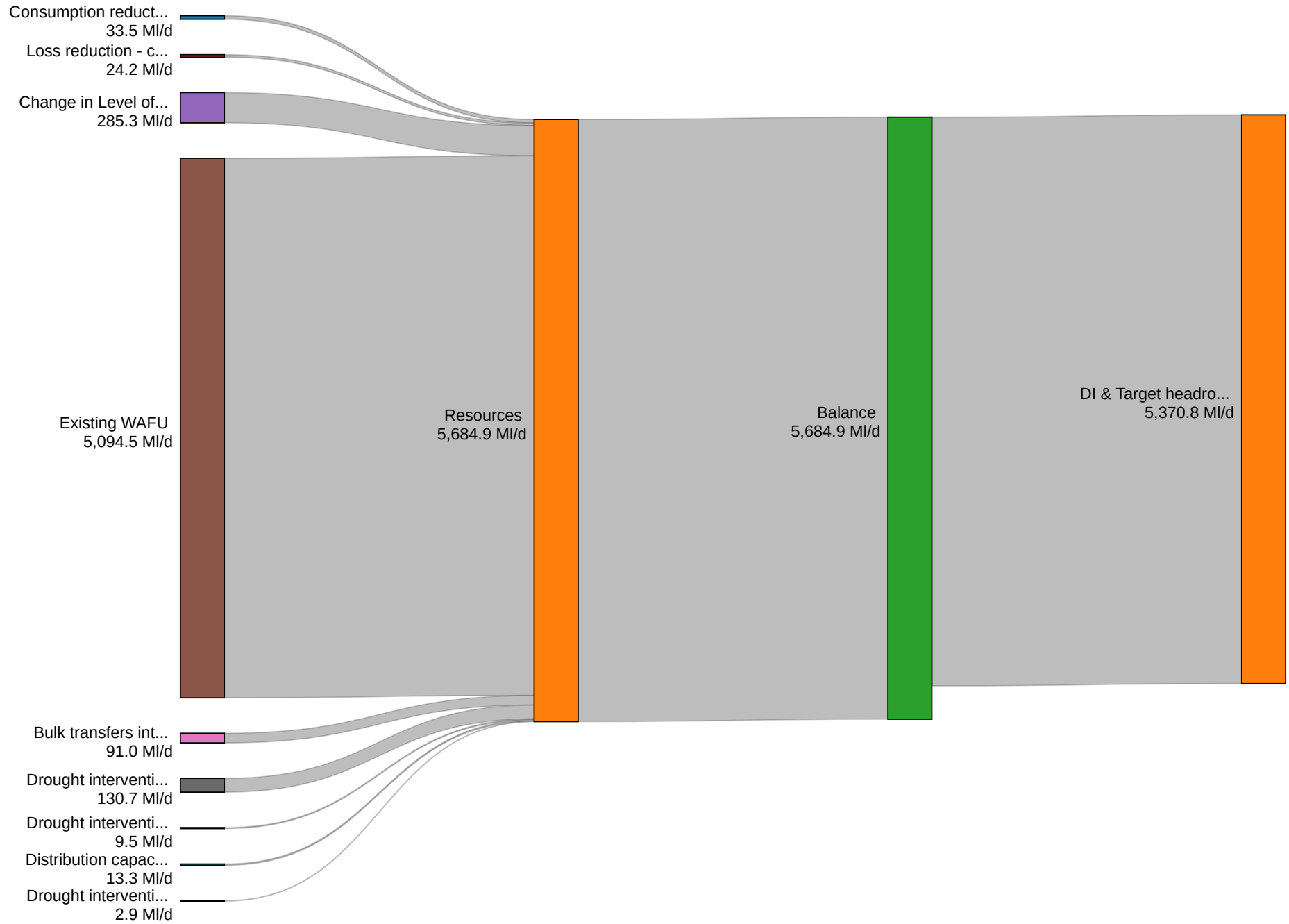
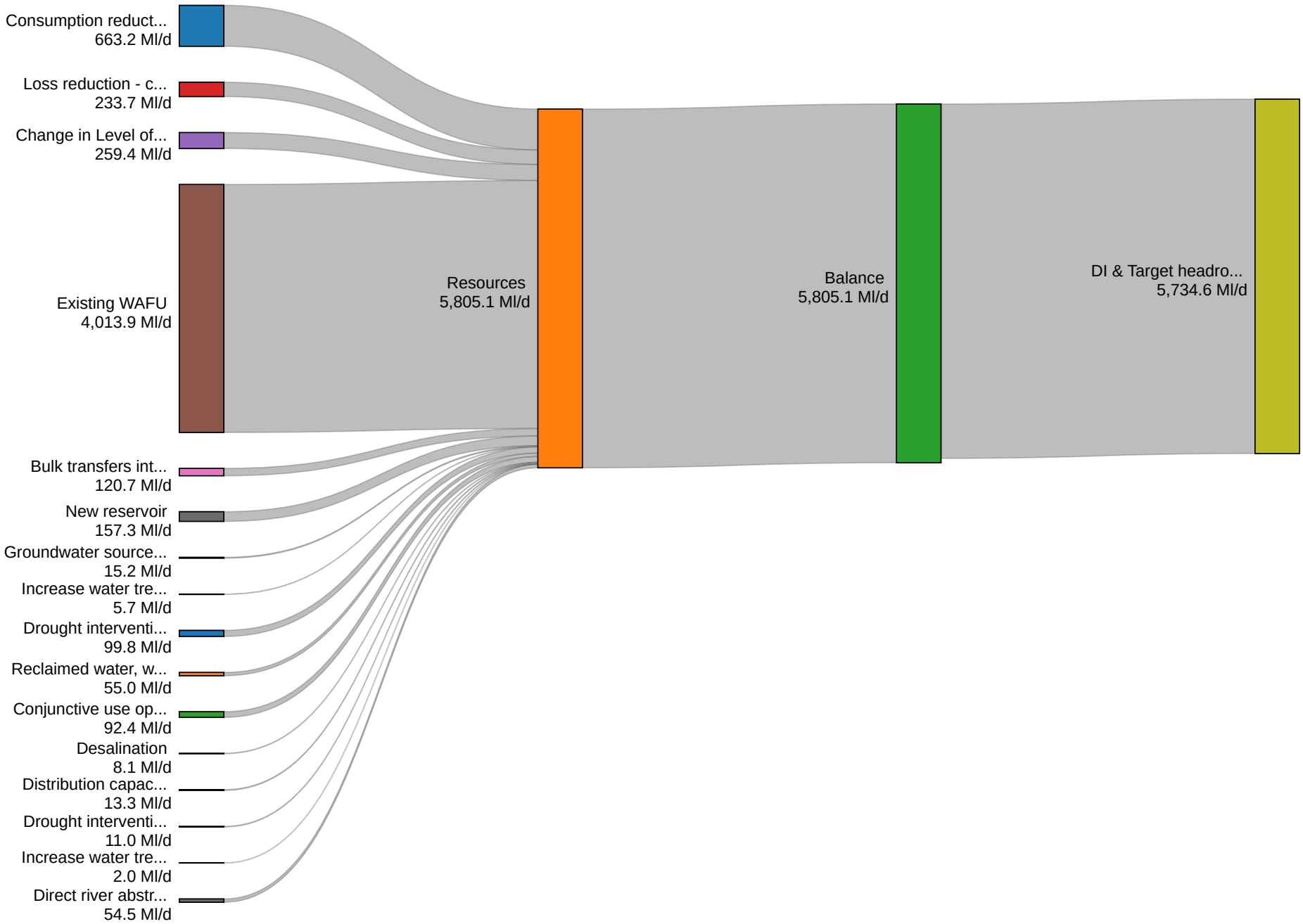
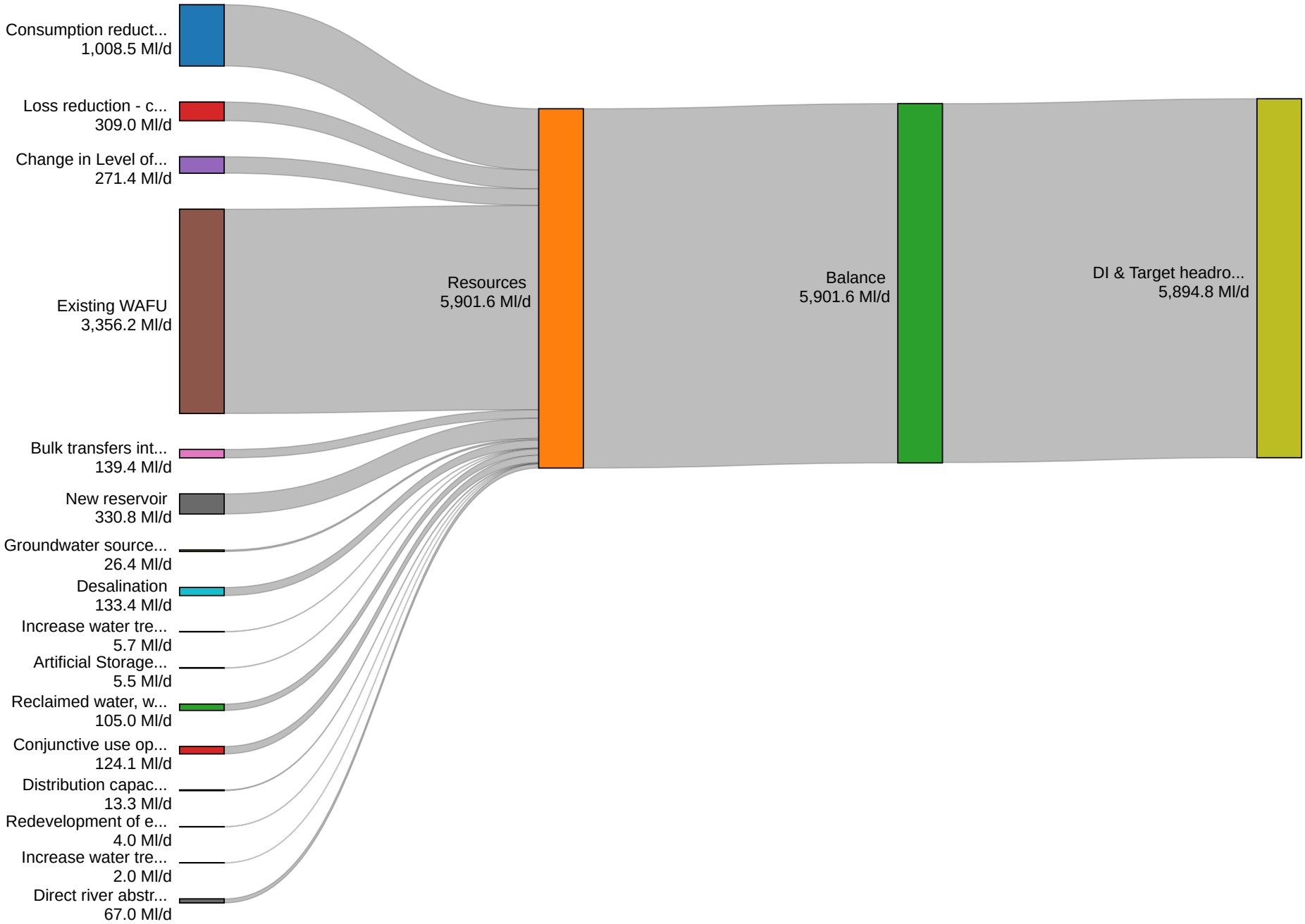
Situation 4 - 2026 (Thames Water)



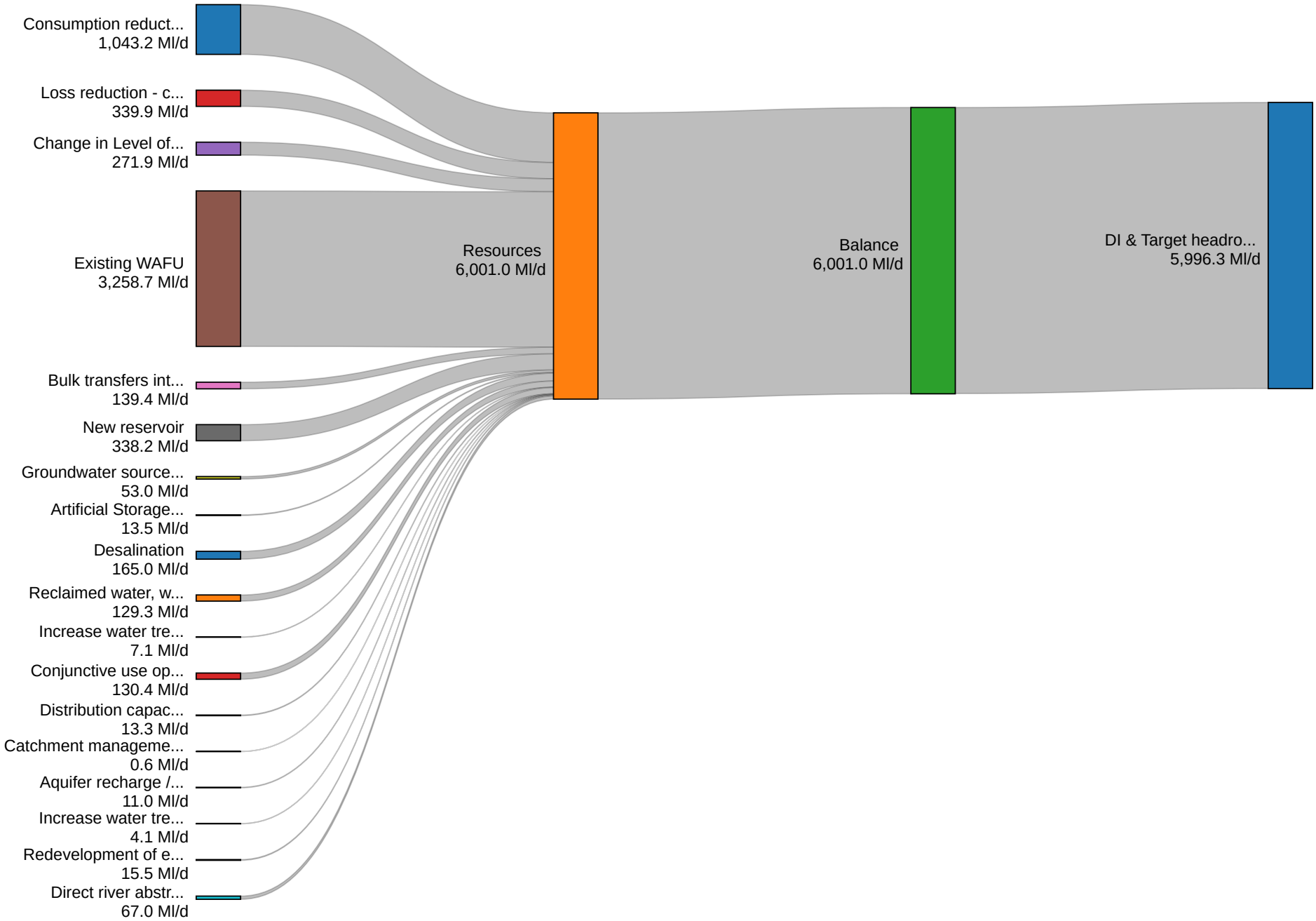
Situation 4 - 2040 (Thames Water)



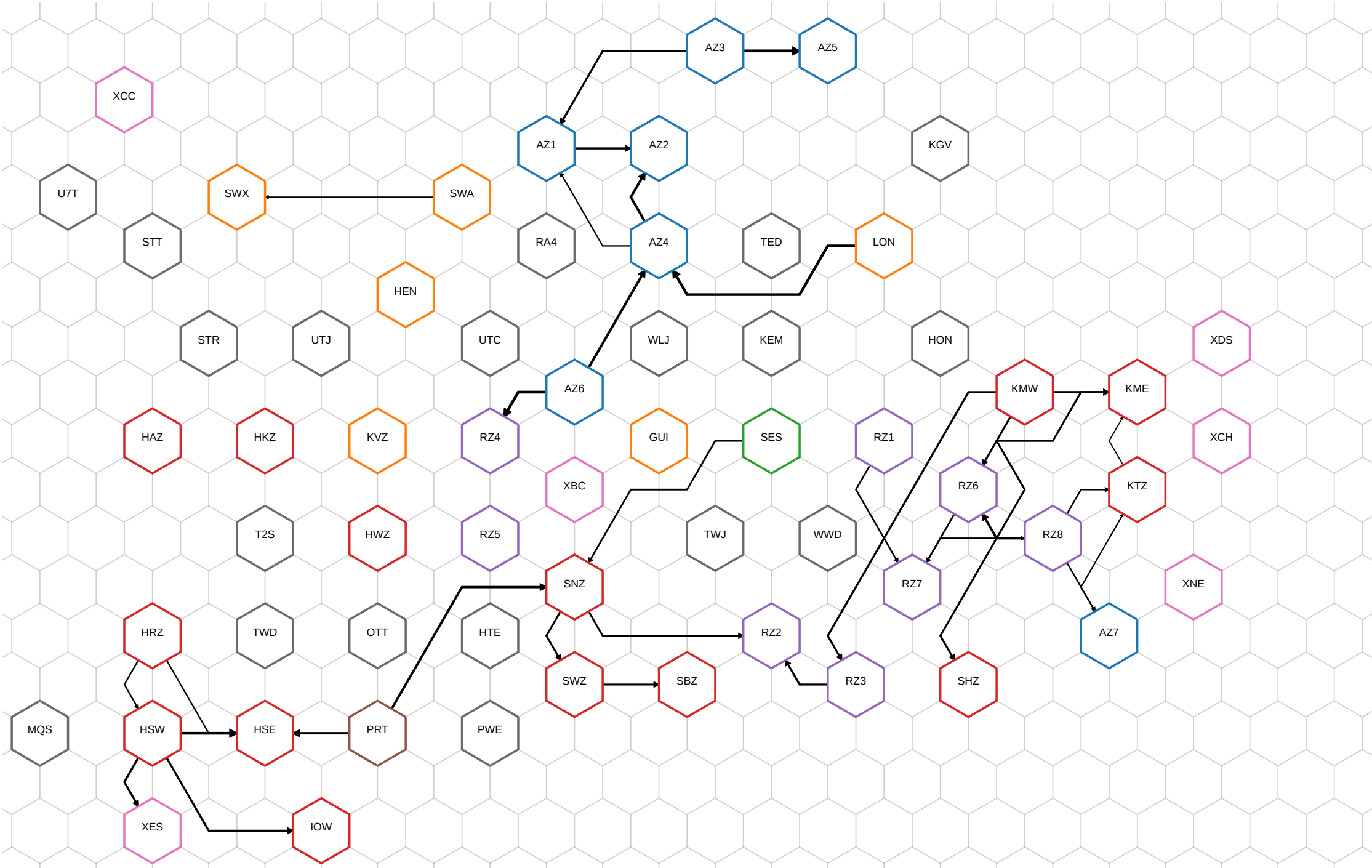
Situation 4 - 2050 (Thames Water)



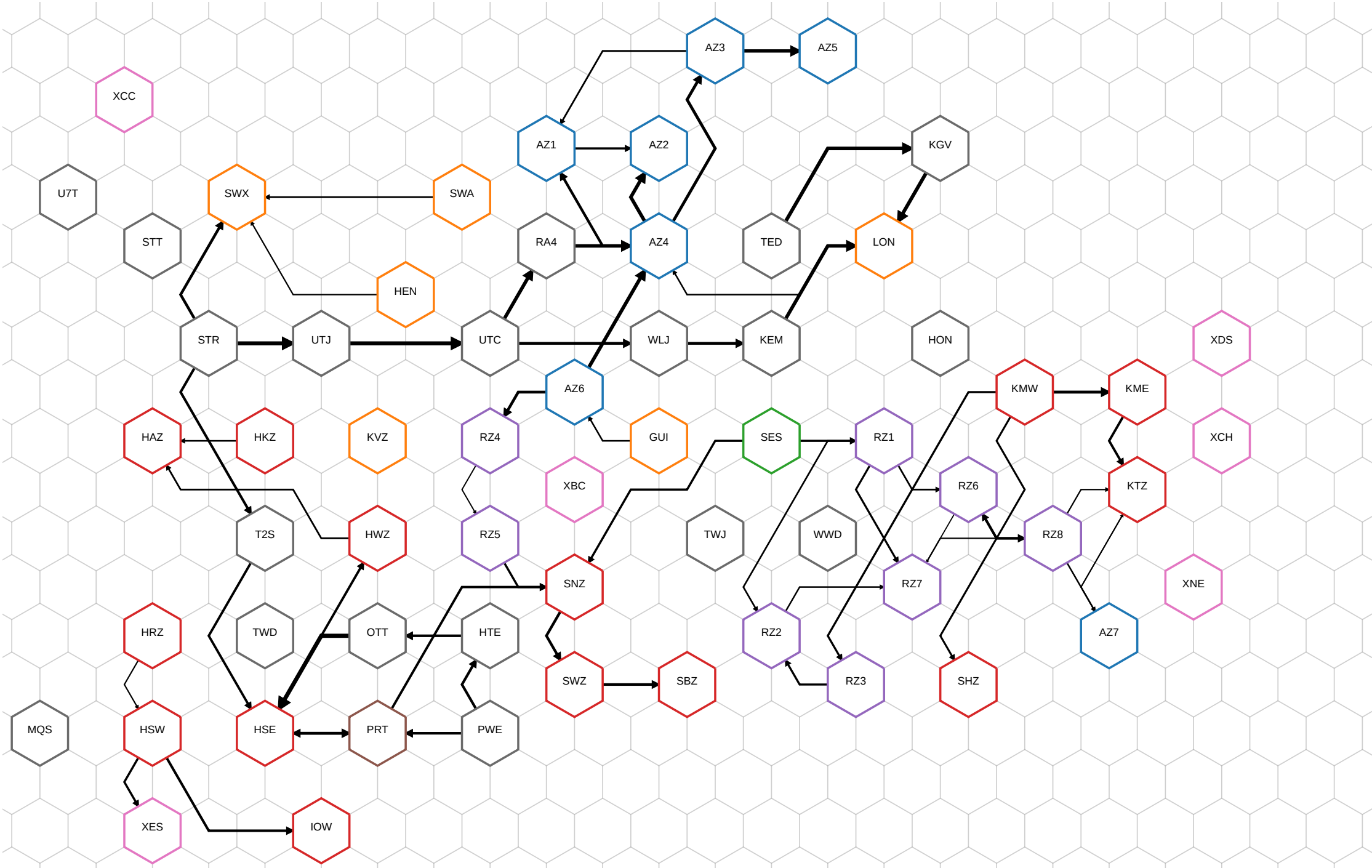
Situation 4 - 2075 (Thames Water)



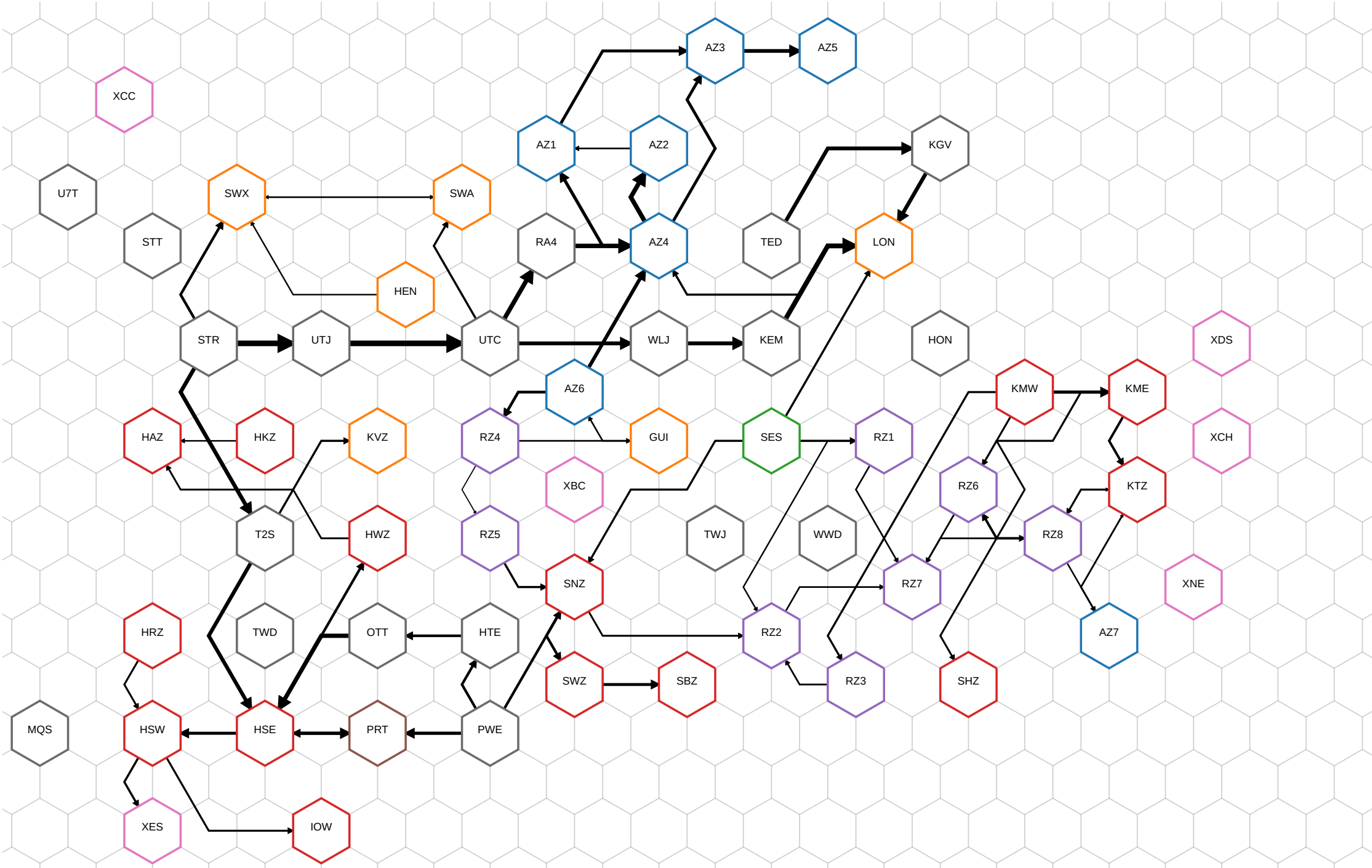
Situation 4 - 2026



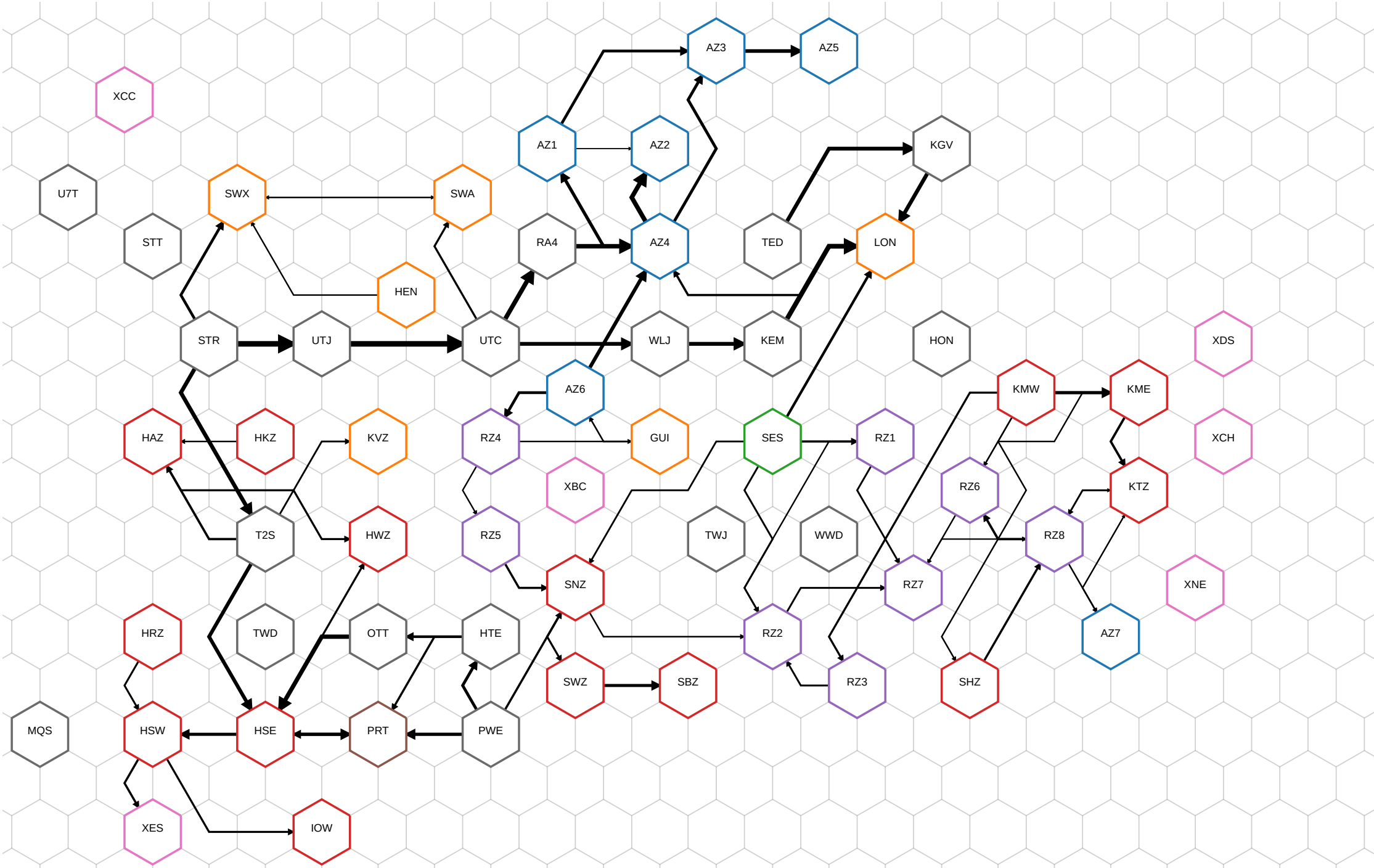
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +500% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

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Created at	12/04/2024, 10:47:57
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Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p500pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +5.0.
Optimised discount rate	STPR

Metrics

Net present value (Cost)

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
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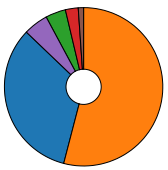
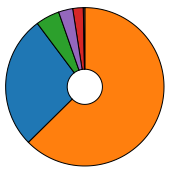
Cost w/o deficit (STPR)	21,270	17,825	17,150	19,499	17,995	17,238	18,040	17,192	16,498	18,079	(£m)
Cost w/ deficit (IGEQ)	32,636	26,139	24,920	29,201	26,376	25,029	26,649	25,051	23,803	26,645	(£m)
Cost w/o deficit (IGEQ)	32,636	26,139	24,920	29,201	26,376	25,029	26,649	25,051	23,803	26,645	(£m)
Cost w/ deficit (LTDR)	23,467	19,464	18,687	21,393	19,647	18,779	19,730	18,744	17,948	19,762	(£m)
Cost w/o deficit (LTDR)	23,467	19,464	18,687	21,393	19,647	18,779	19,730	18,744	17,948	19,762	(£m)

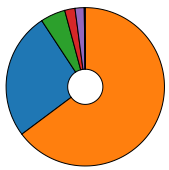
Cost breakdown (STPR)

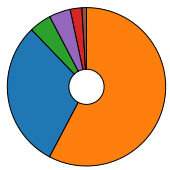
Select Company: Total

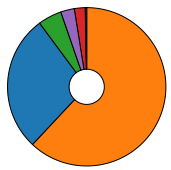
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,039	4,841	4,452	5,872	5,019	4,568	4,887	4,440	4,007	5,014	(£m)
Fixed opex	11,495	11,161	11,110	11,254	11,153	11,097	11,157	11,106	11,046	11,175	(£m)
Fixed operational carbon	880	869	870	877	869	869	871	867	865	871	(£m)
Embedded carbon	556	384	361	469	402	372	395	358	334	403	(£m)
Variable opex	1,068	517	320	848	500	300	636	385	230	534	(£m)
Variable carbon opex	230	55	36	179	53	31	93	37	17	81	(£m)

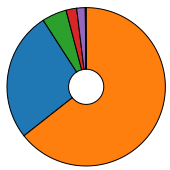
situation1 

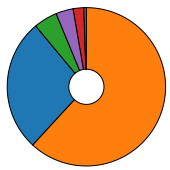
situation2 

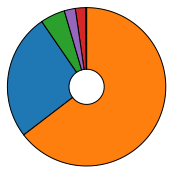
situation3 

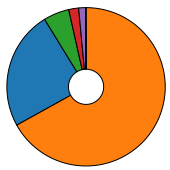
situation4 

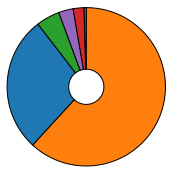
situation5 

situation6 

situation7 

situation8 

situation9 

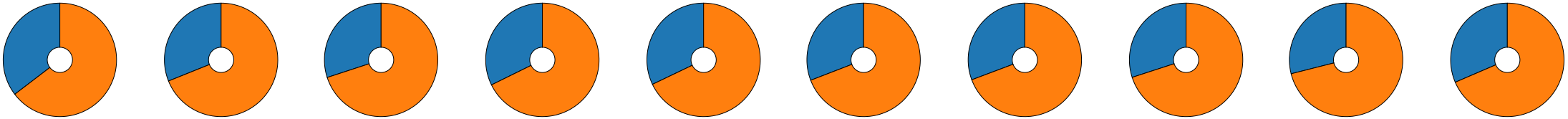
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,586,259	2,353,336	2,199,873	2,935,170	2,464,234	2,269,841	2,448,435	2,187,589	2,025,970	2,496,745	(tonnes)
Operational emissions	6,553,622	5,217,396	5,127,256	6,159,309	5,212,620	5,086,117	5,523,937	5,107,088	4,973,821	5,440,130	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

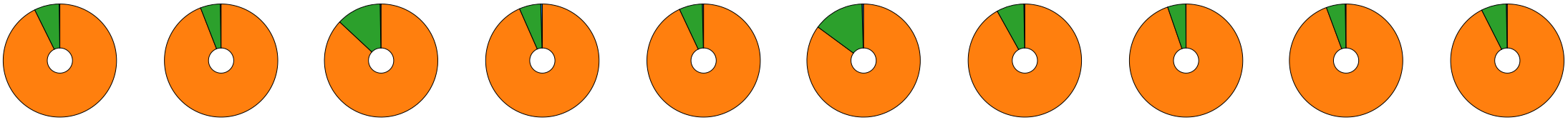


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	95	44	22	41	9	8	34	(GWh)
Grid	23,166	11,308	4,228	19,175	10,784	3,861	13,147	7,944	2,891	10,723	(GWh)
Renewable	1,776	681	619	1,258	765	654	1,115	433	165	830	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,530	63,718	62,855	67,209	63,694	62,711	63,883	61,609	60,553	63,974
SEA environmental disbenefit	114,108	81,832	74,973	100,155	79,336	73,423	83,828	70,451	61,604	82,190
Natural capital	84,358,382	81,297,104	84,151,213	75,258,546	77,131,503	79,780,701	80,951,905	81,730,369	84,602,292	81,029,113
Bio-diversity net gain	−190,959	−117,637	−87,537	−202,533	−149,666	−124,012	−119,765	−92,607	−63,553	−127,585

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,051	31,810	31,477	33,055	31,676	31,285	31,708	30,795	30,305	31,796

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.81	27.15	29.70	28.33	29.54	32.29	28.49	31.45	34.94	29.97
R1: Uncertainty of option supply/demand benefit	5.77	4.91	5.35	5.57	5.42	5.87	5.28	5.70	6.29	5.57
R3: Risk of service failure due to other physical hazards	6.65	6.71	7.52	6.92	7.37	8.23	7.02	7.94	9.05	7.49
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.82	4.32	3.88	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.98	4.94	5.53	5.31	5.57	6.24	5.17	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

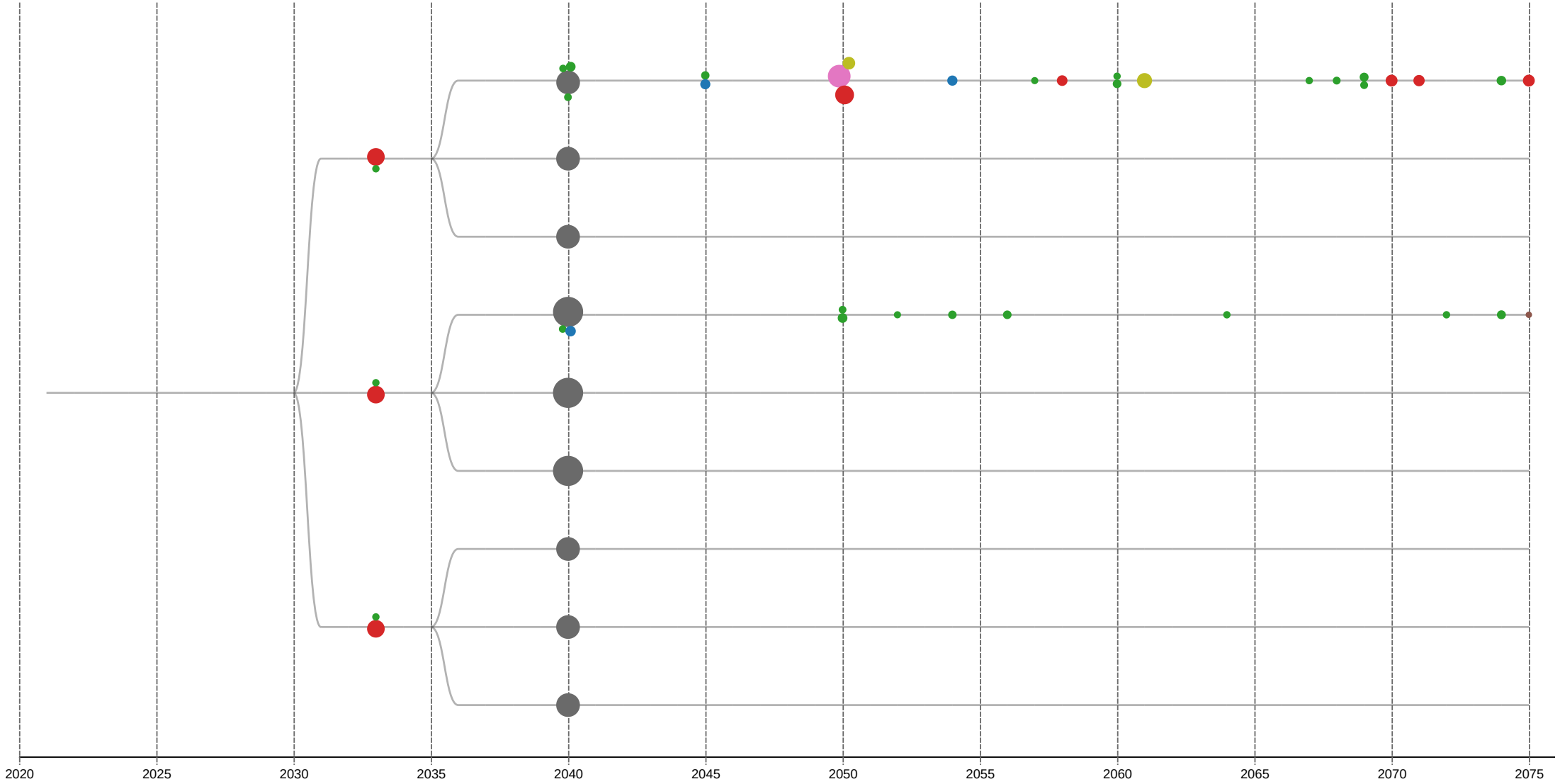
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.03	16.83	14.19	15.69	17.40	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.22	6.60	7.08	7.96	6.70	7.67	8.80	7.18
A4: WRZ connectivity	7.50	8.58	9.58	7.56	8.58	9.41	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.44	19.54	21.72	18.74	19.94	21.95	20.17	22.86	25.89	21.14
E1: Scaleability and modularity of proposed changes	8.91	9.32	10.40	8.68	9.40	10.46	9.65	11.08	12.61	10.06
E2: Intervention lead times	4.31	3.98	4.37	3.97	4.10	4.33	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.95	6.09	6.44	7.16	6.49	7.38	8.40	6.82
E5: Collaborative land management	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

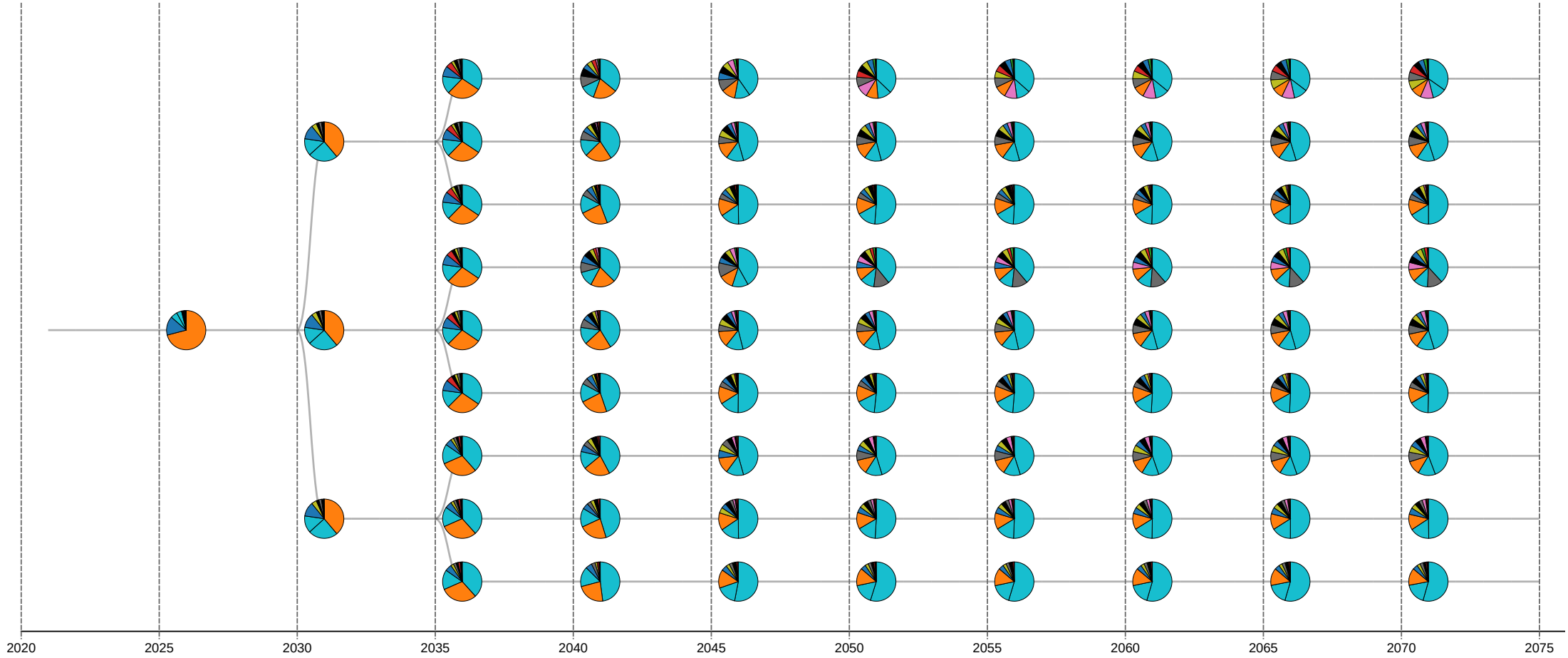
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

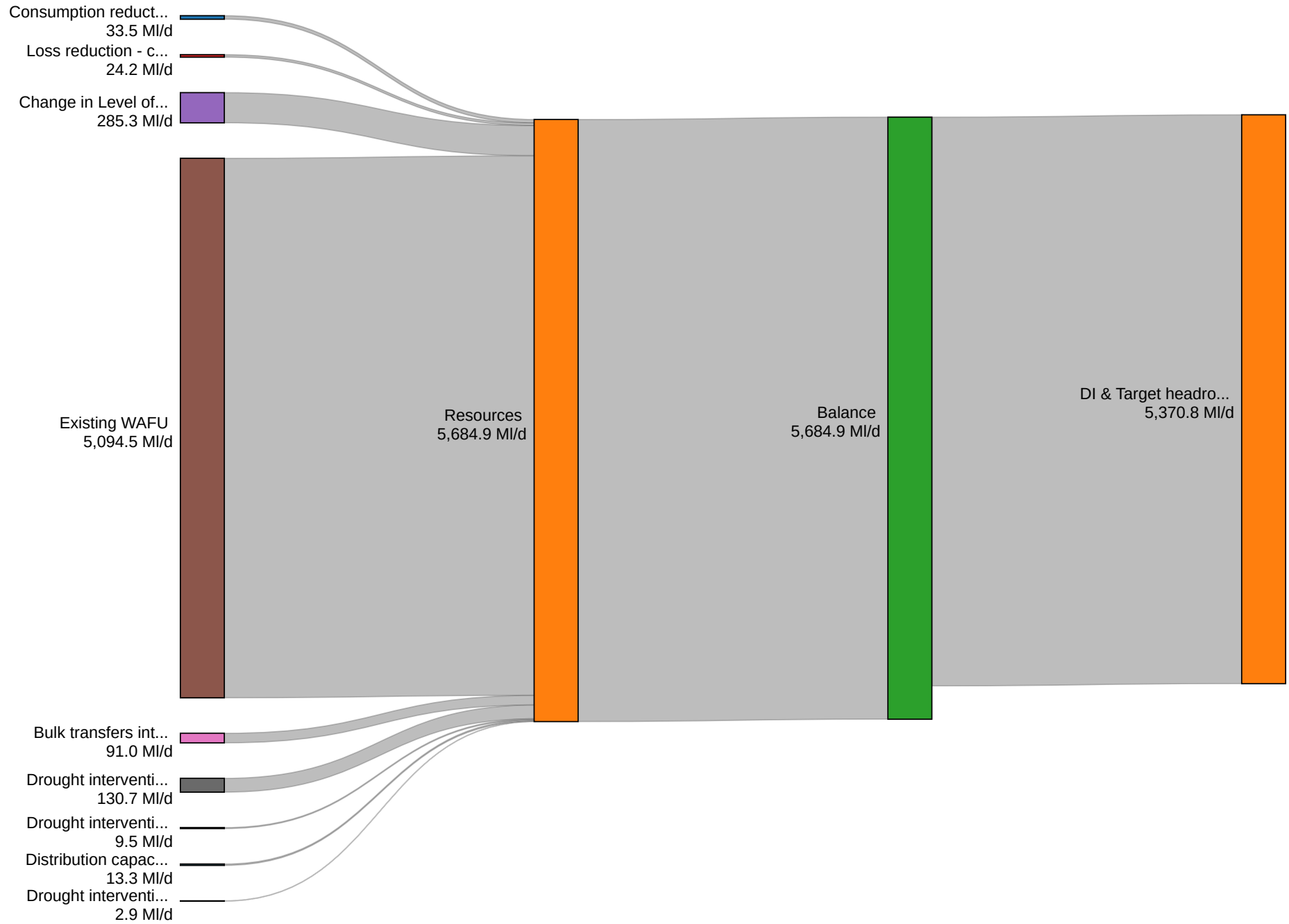
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

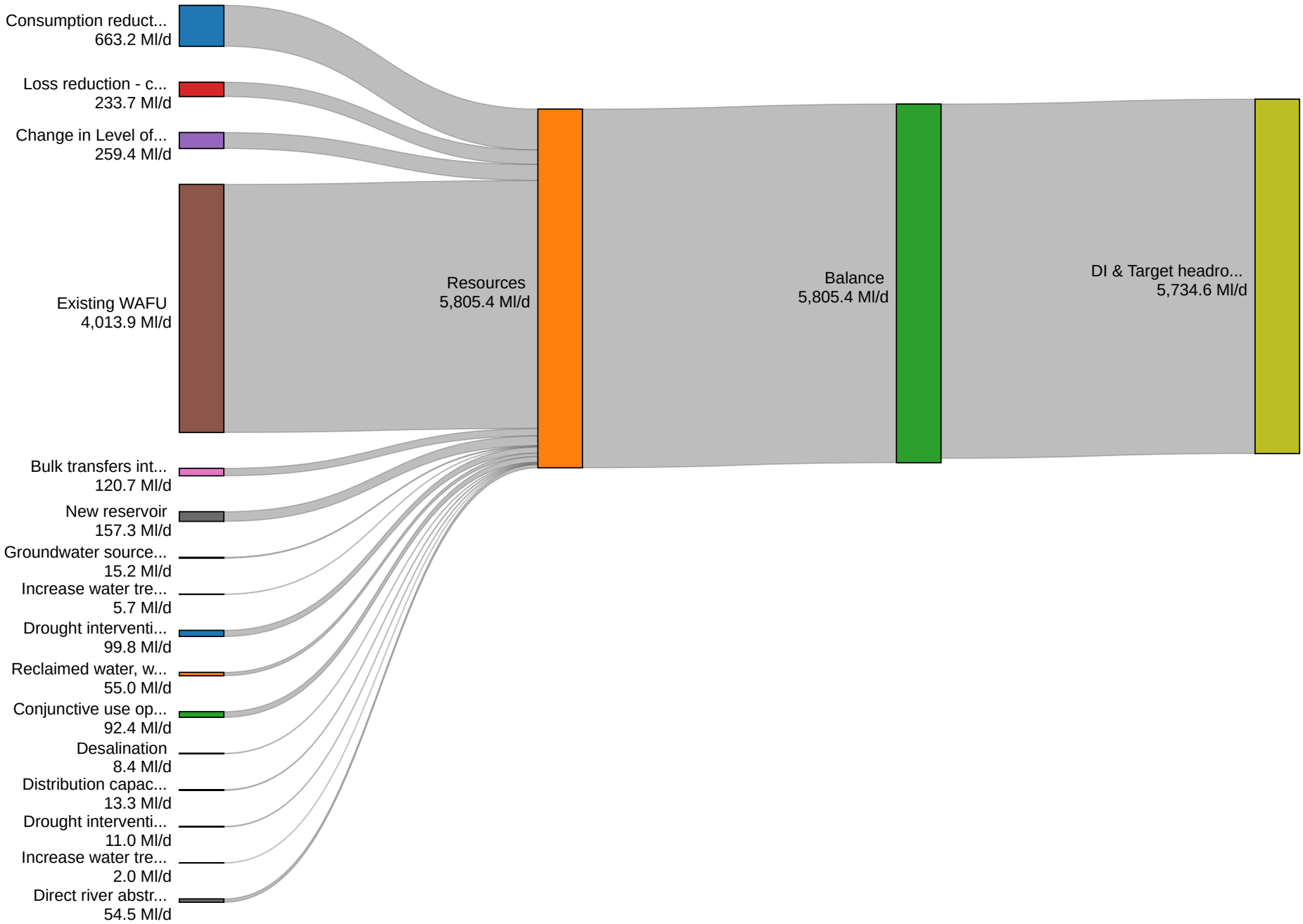


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

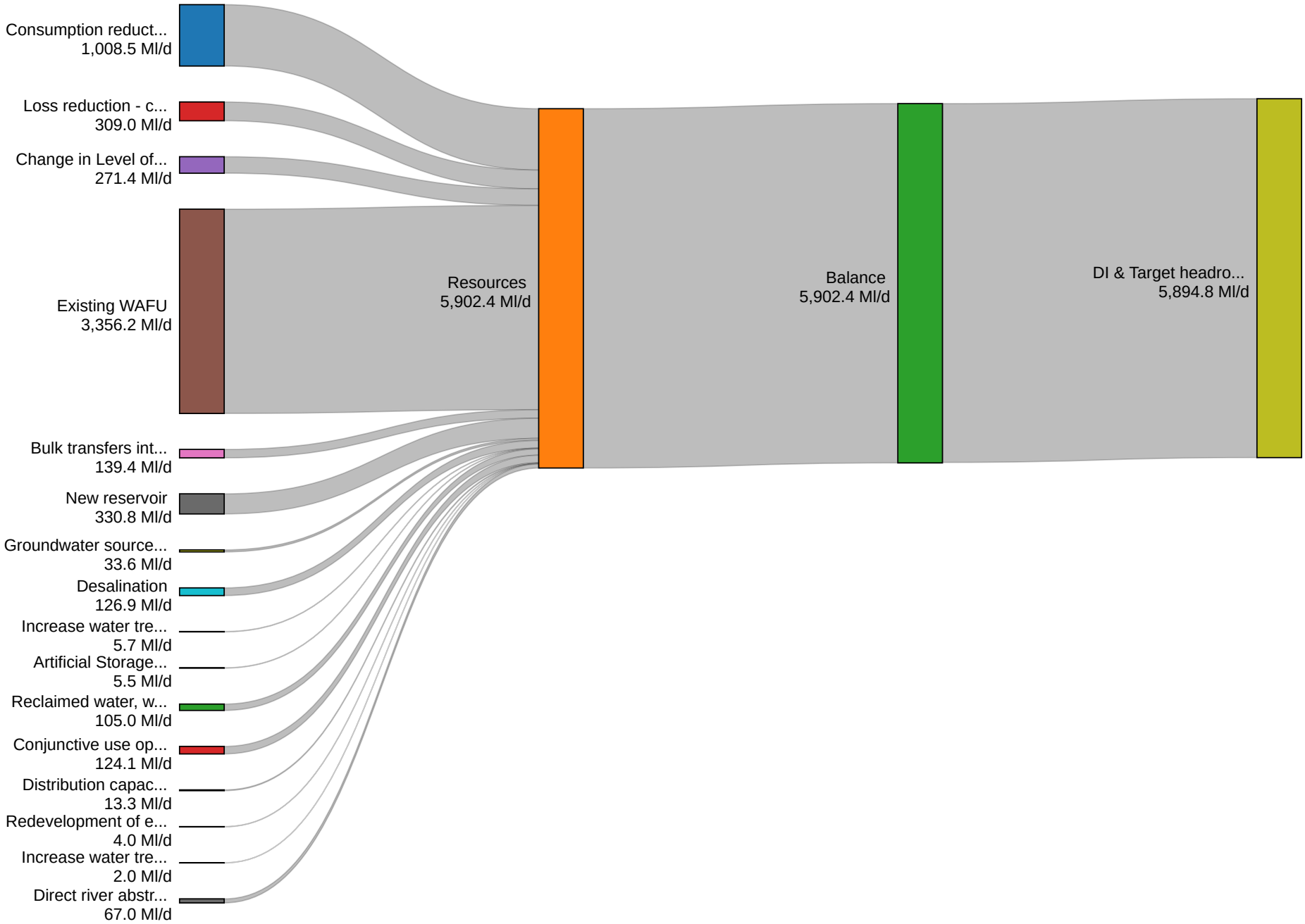
Situation 4 - 2026 (Thames Water)



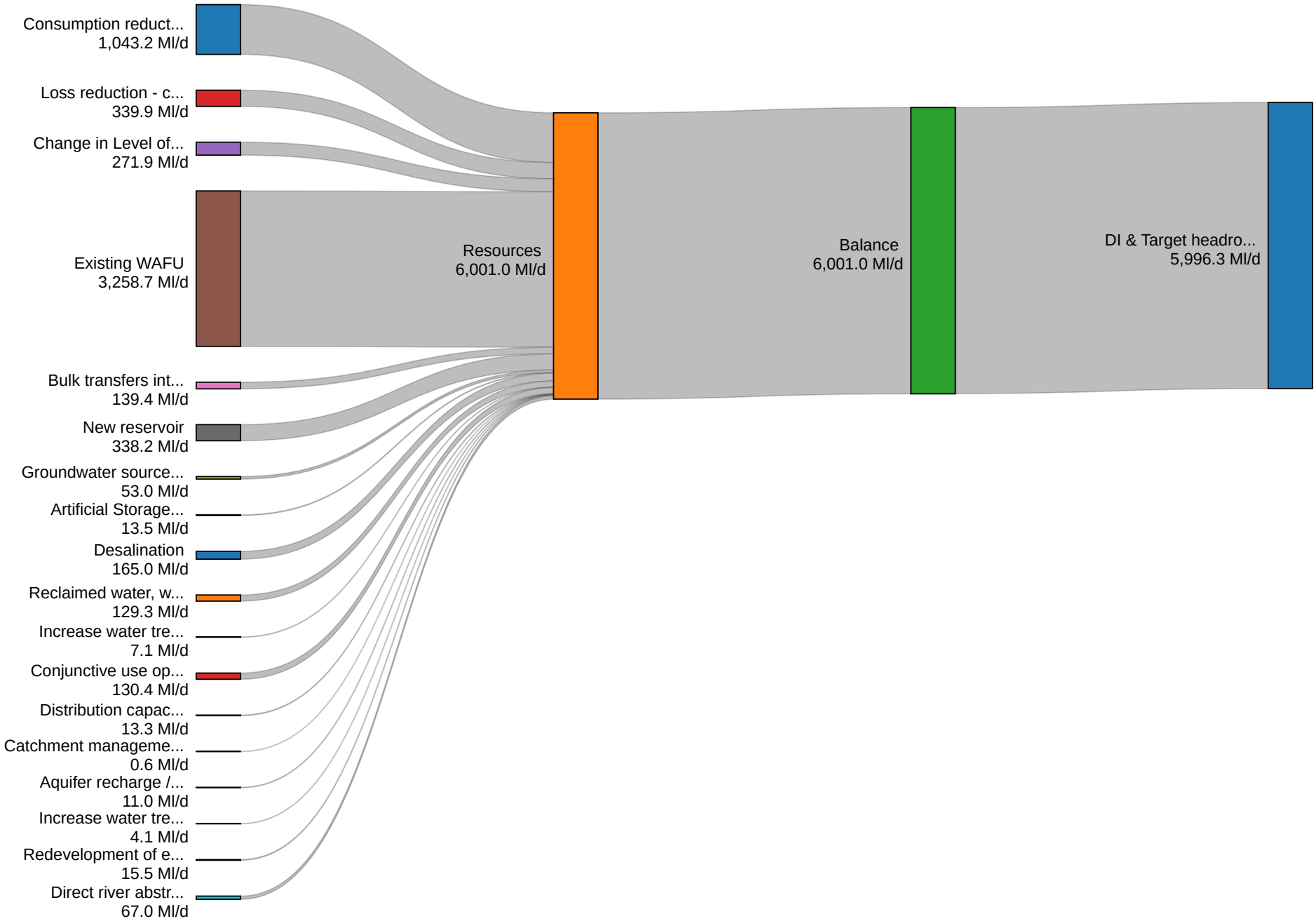
Situation 4 - 2040 (Thames Water)



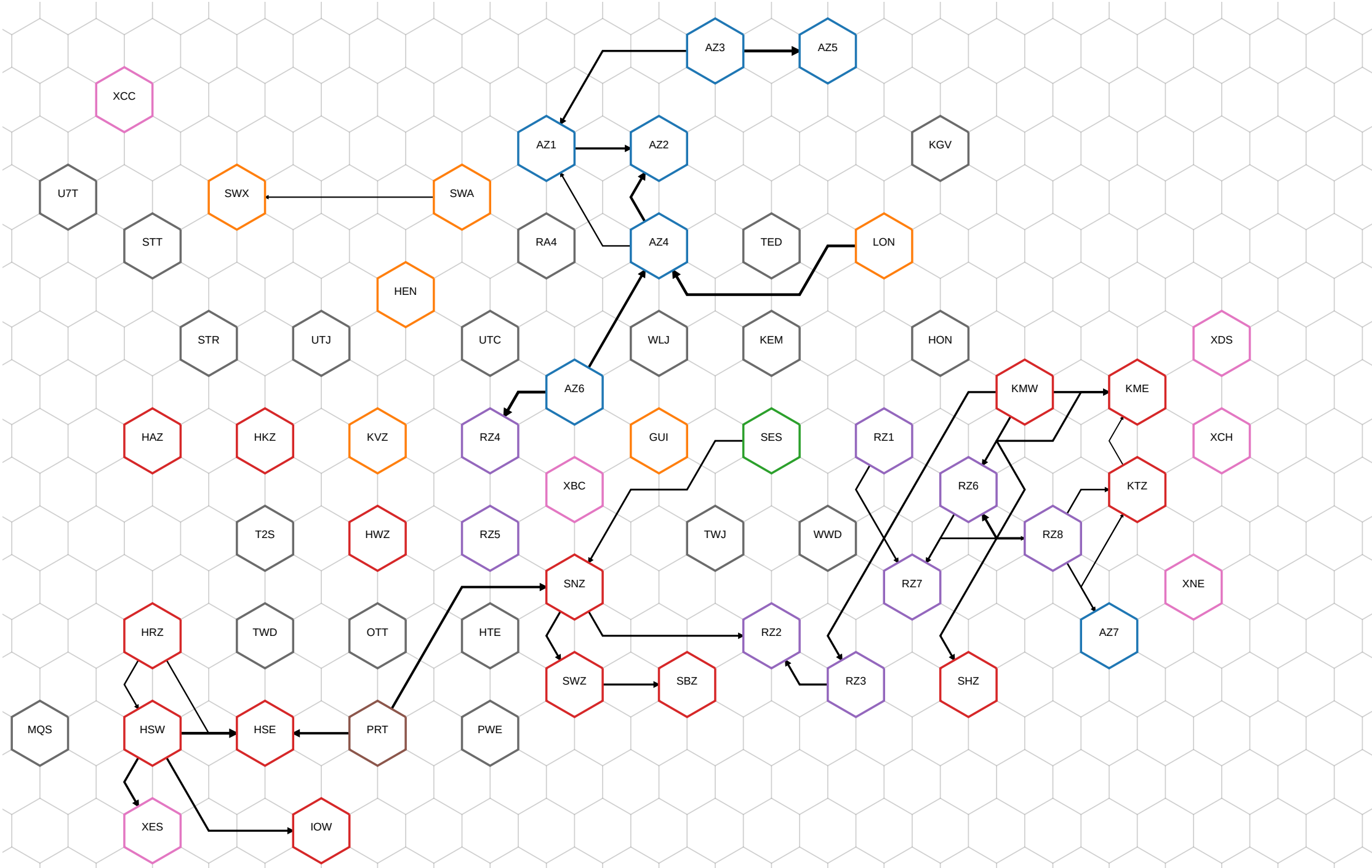
Situation 4 - 2050 (Thames Water)



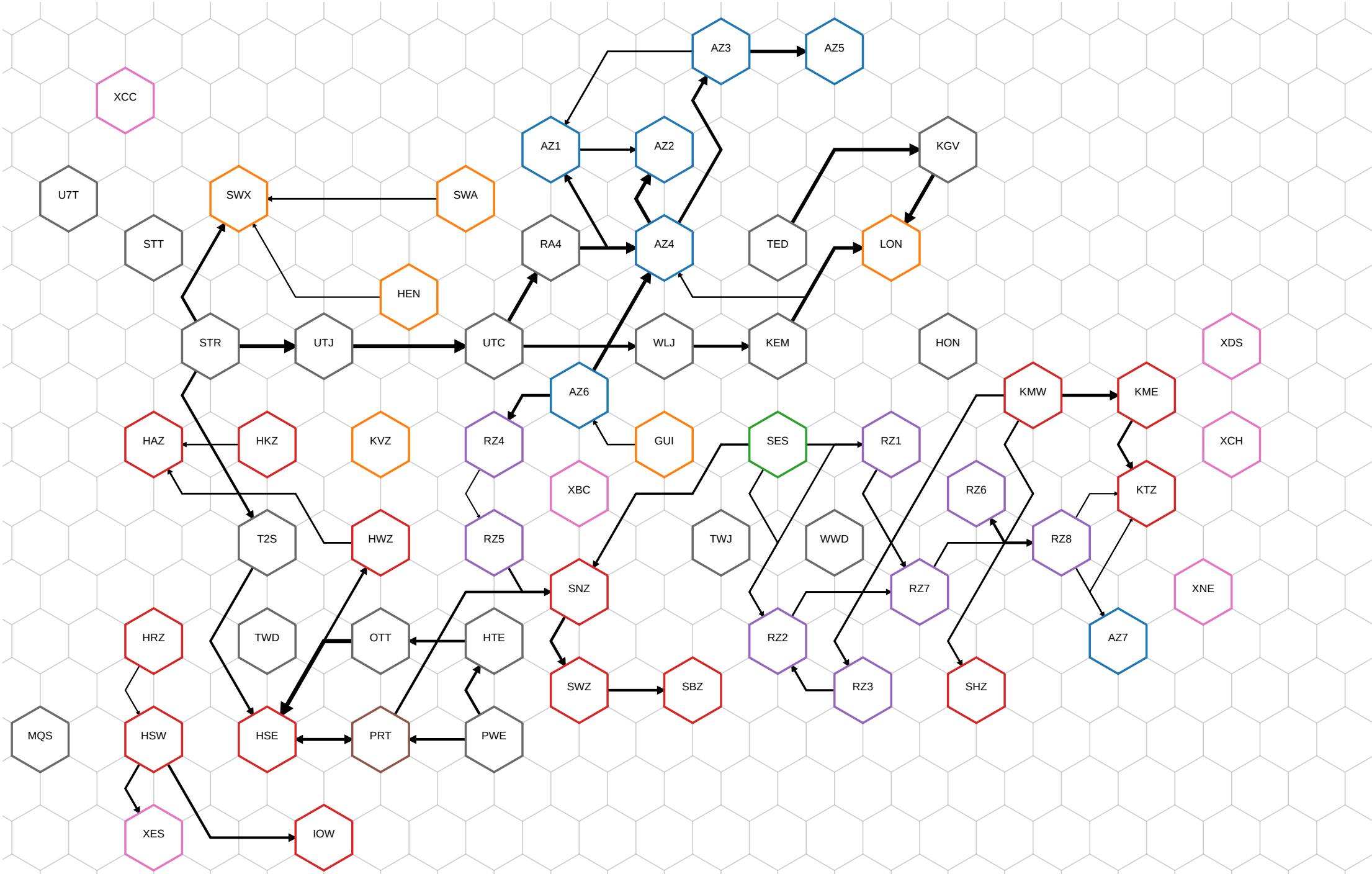
Situation 4 - 2075 (Thames Water)



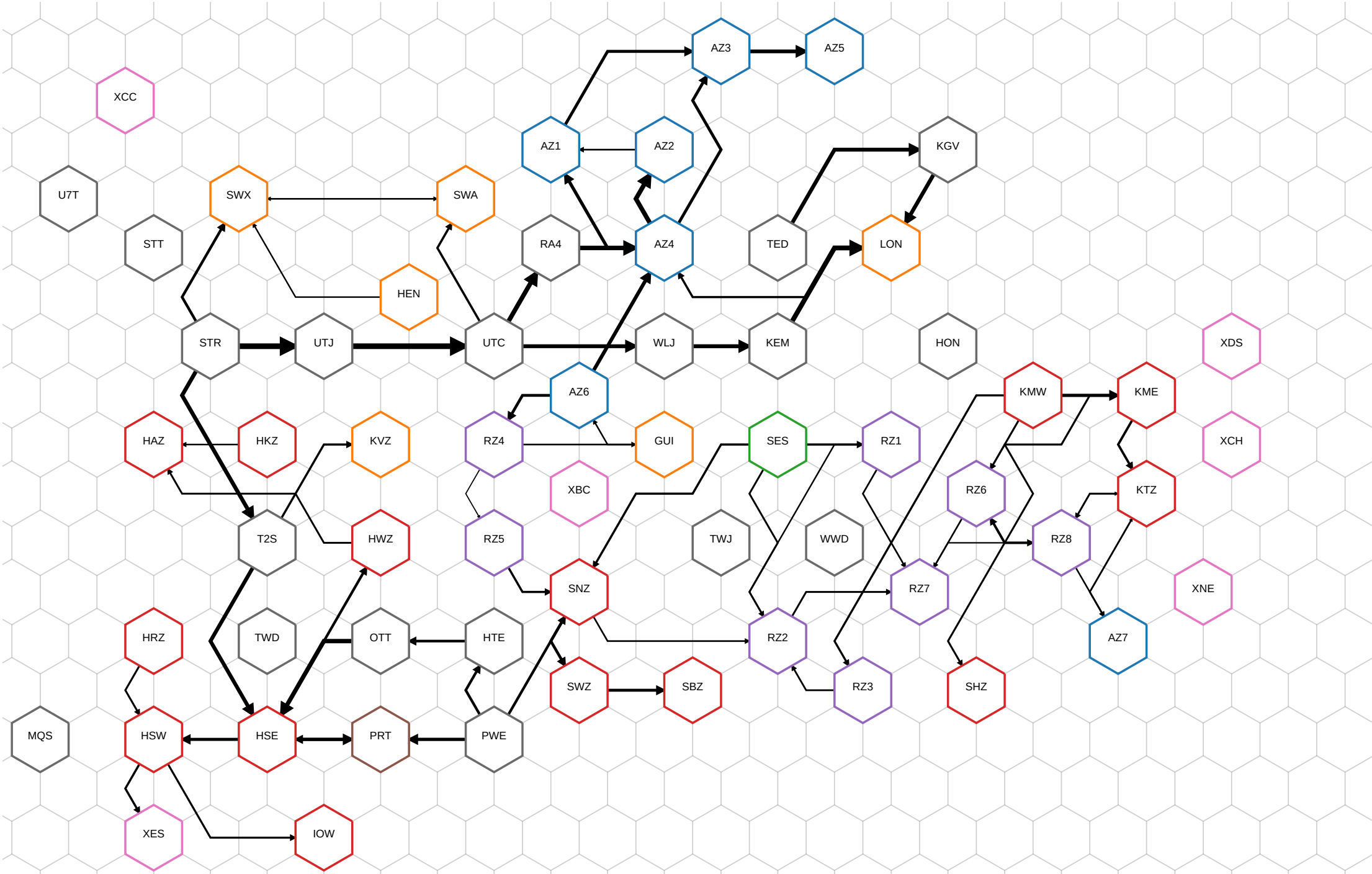
Situation 4 - 2026



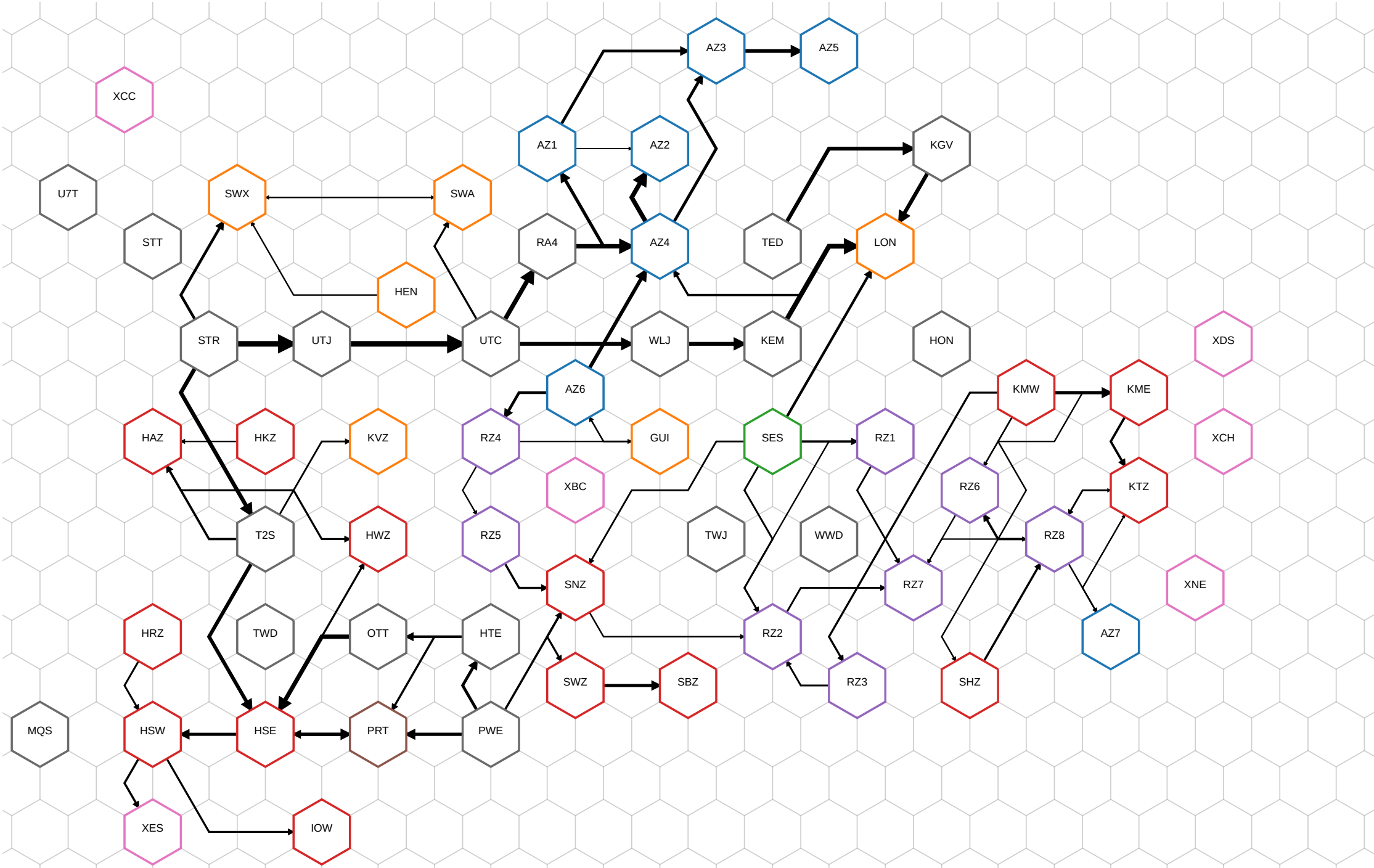
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +600% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p600pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions delaying TWU groundwater options until 2040 and Teddington DRA optimism bias changed by +6.0. Optimisation tolerances identical to LCP.
Created at	16/04/2024, 10:28:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p600pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +6.0.
Optimised discount rate	STPR

Metrics

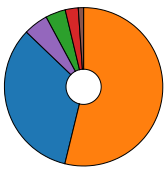
Net present value (Cost)

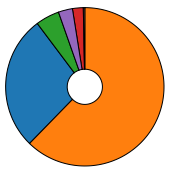
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,369	17,915	17,246	19,592	18,075	17,320	18,133	17,282	16,588	18,169	(£m)
Cost w/o deficit (STPR)	21,369	17,915	17,246	19,592	18,075	17,320	18,133	17,282	16,588	18,169	(£m)
Cost w/ deficit (IGEQ)	32,794	26,278	25,073	29,349	26,497	25,157	26,793	25,190	23,942	26,786	(£m)
Cost w/o deficit (IGEQ)	32,794	26,278	25,073	29,349	26,497	25,157	26,793	25,190	23,942	26,786	(£m)
Cost w/ deficit (LTDR)	23,578	19,563	18,793	21,497	19,735	18,870	19,833	18,844	18,047	19,862	(£m)
Cost w/o deficit (LTDR)	23,578	19,563	18,793	21,497	19,735	18,870	19,833	18,844	18,047	19,862	(£m)

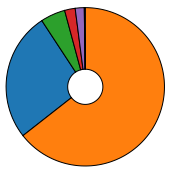
Cost breakdown (STPR)

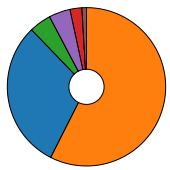
Select Company: Total

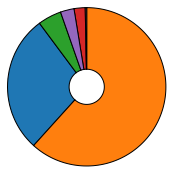
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	7,126	4,919	4,542	5,947	5,086	4,637	4,969	4,518	4,086	5,092	(£m)
Fixed opex	11,497	11,161	11,109	11,256	11,151	11,096	11,158	11,106	11,046	11,176	(£m)
Fixed operational carbon	880	869	869	877	870	870	871	867	865	871	(£m)
Embedded carbon	567	395	372	480	412	382	407	369	345	414	(£m)
Variable opex	1,067	517	318	851	502	302	636	385	230	534	(£m)
Variable carbon opex	231	55	34	181	54	33	93	37	17	82	(£m)

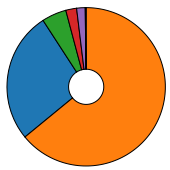
situation1 

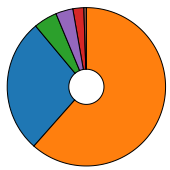
situation2 

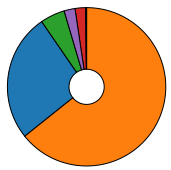
situation3 

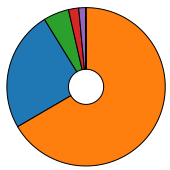
situation4 

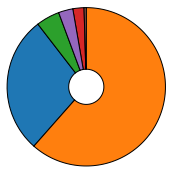
situation5 

situation6 

situation7 

situation8 

situation9 

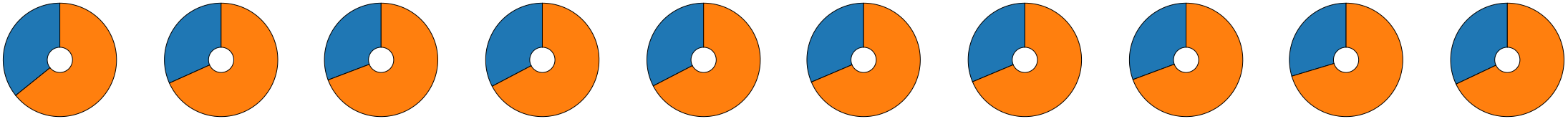
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,653,367	2,422,574	2,269,966	2,998,580	2,527,811	2,333,707	2,518,222	2,256,826	2,095,207	2,564,029	(tonnes)
Operational emissions	6,556,283	5,217,396	5,107,698	6,172,924	5,227,568	5,099,137	5,524,696	5,107,088	4,973,821	5,442,957	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

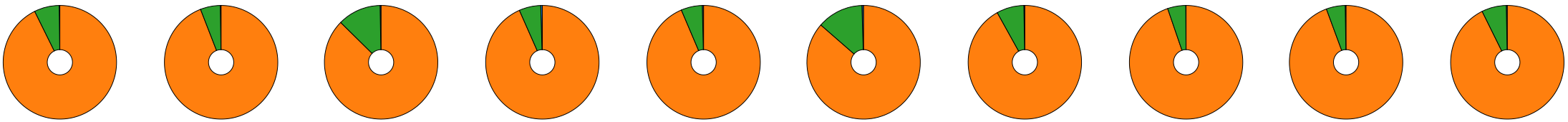


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	48	29	14	96	44	22	41	9	8	34	(GWh)
Grid	23,112	11,308	4,186	19,078	10,935	3,917	13,137	7,944	2,891	10,723	(GWh)
Renewable	1,777	681	591	1,260	706	595	1,115	433	165	814	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,676	63,718	62,915	67,139	63,695	62,686	63,889	61,609	60,553	63,987
SEA environmental disbenefit	114,683	81,832	75,901	100,492	79,905	74,207	83,993	70,451	61,604	82,563
Natural capital	84,346,093	81,297,104	83,940,279	75,320,217	77,196,813	79,799,774	80,953,405	81,730,369	84,602,292	81,020,705
Bio-diversity net gain	−190,884	−117,637	−101,095	−203,553	−149,461	−126,051	−119,545	−92,607	−63,553	−129,376

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,079	31,835	31,538	33,111	31,723	31,365	31,710	30,798	30,308	31,830

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.81	27.15	29.66	28.29	29.49	32.22	28.48	31.45	34.94	29.94
R1: Uncertainty of option supply/demand benefit	5.77	4.91	5.33	5.56	5.39	5.84	5.28	5.70	6.29	5.56
R3: Risk of service failure due to other physical hazards	6.64	6.71	7.51	6.91	7.36	8.21	7.02	7.94	9.05	7.48
R4: Availability of additional headroom	6.44	6.77	6.98	6.65	6.94	7.15	7.08	7.44	7.68	7.01
R5: Catchment/raw water quality risks (incl. climate change)	3.96	3.82	4.32	3.87	4.24	4.79	3.94	4.54	5.24	4.30
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.99	4.94	5.53	5.30	5.56	6.23	5.16	5.83	6.67	5.58
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

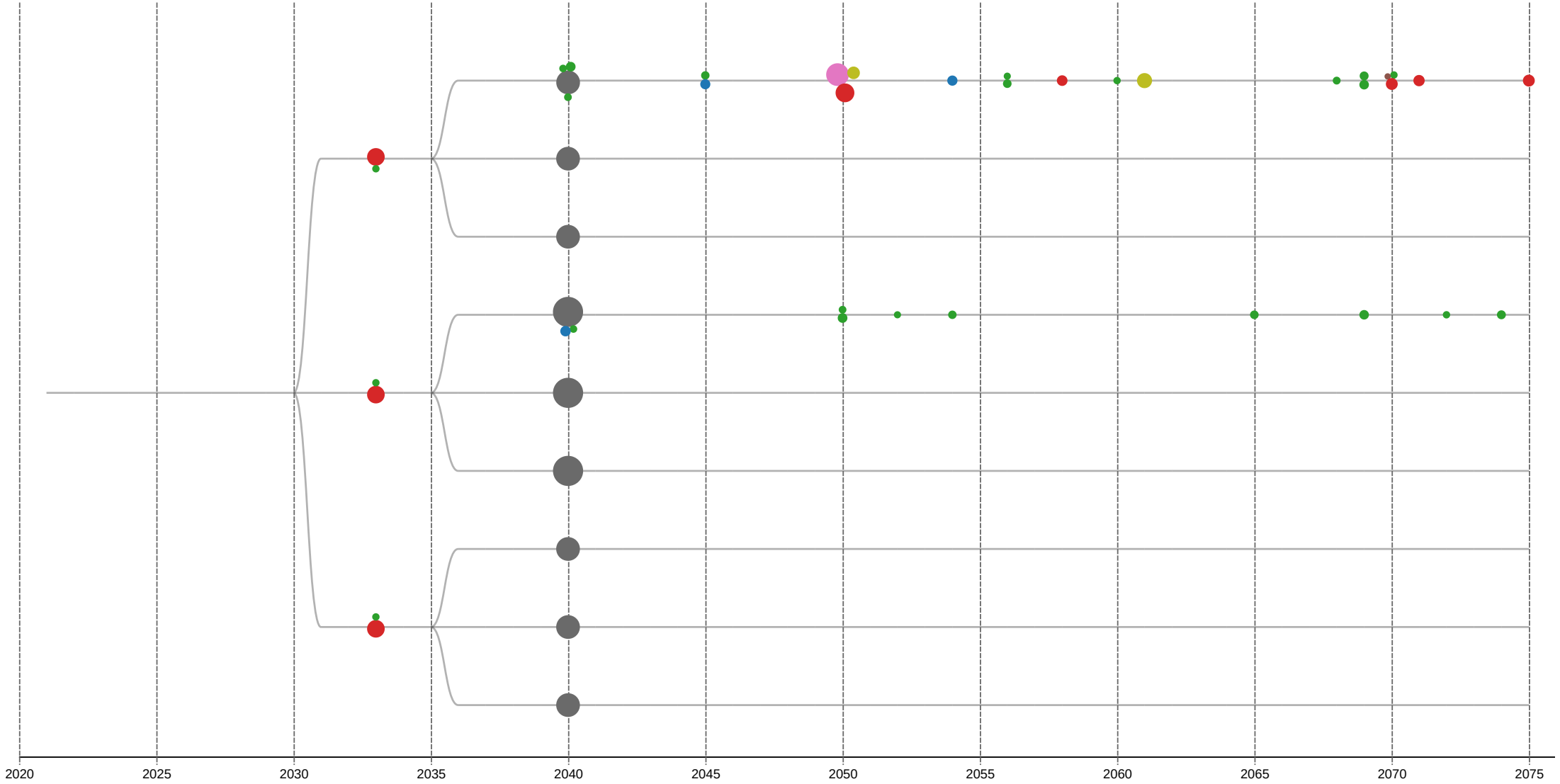
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.67	15.03	16.85	14.17	15.68	17.39	15.41	17.53	19.99	16.19
A3: Operational complexity and flexibility	6.13	6.43	7.22	6.59	7.08	7.95	6.70	7.67	8.80	7.17
A4: WRZ connectivity	7.50	8.58	9.60	7.55	8.58	9.41	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.44	19.54	21.69	18.70	19.92	21.92	20.16	22.86	25.89	21.12
E1: Scaleability and modularity of proposed changes	8.91	9.32	10.39	8.66	9.38	10.43	9.65	11.08	12.61	10.05
E2: Intervention lead times	4.30	3.98	4.36	3.96	4.12	4.34	4.02	4.40	4.88	4.26
E3: Reliance on external bodies to deliver changes	6.22	6.23	6.94	6.08	6.43	7.15	6.49	7.38	8.40	6.81
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

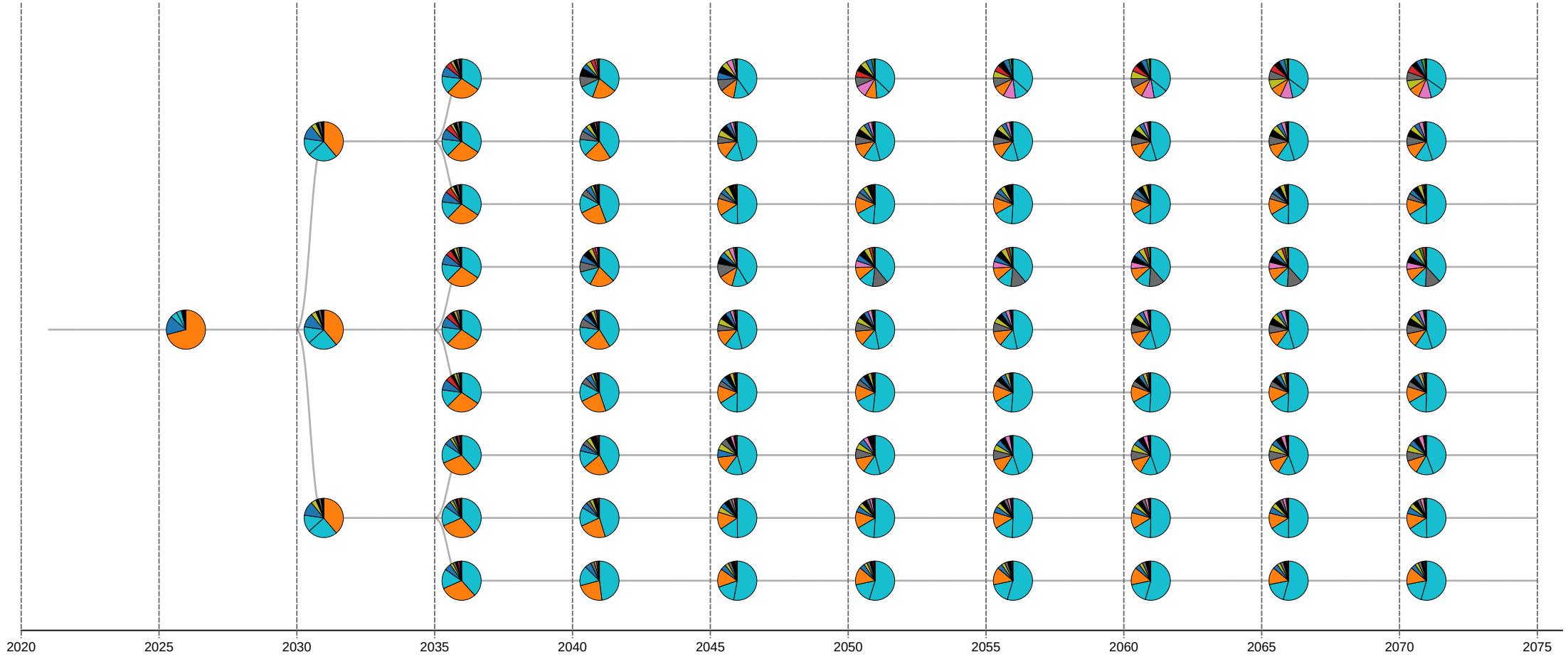
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

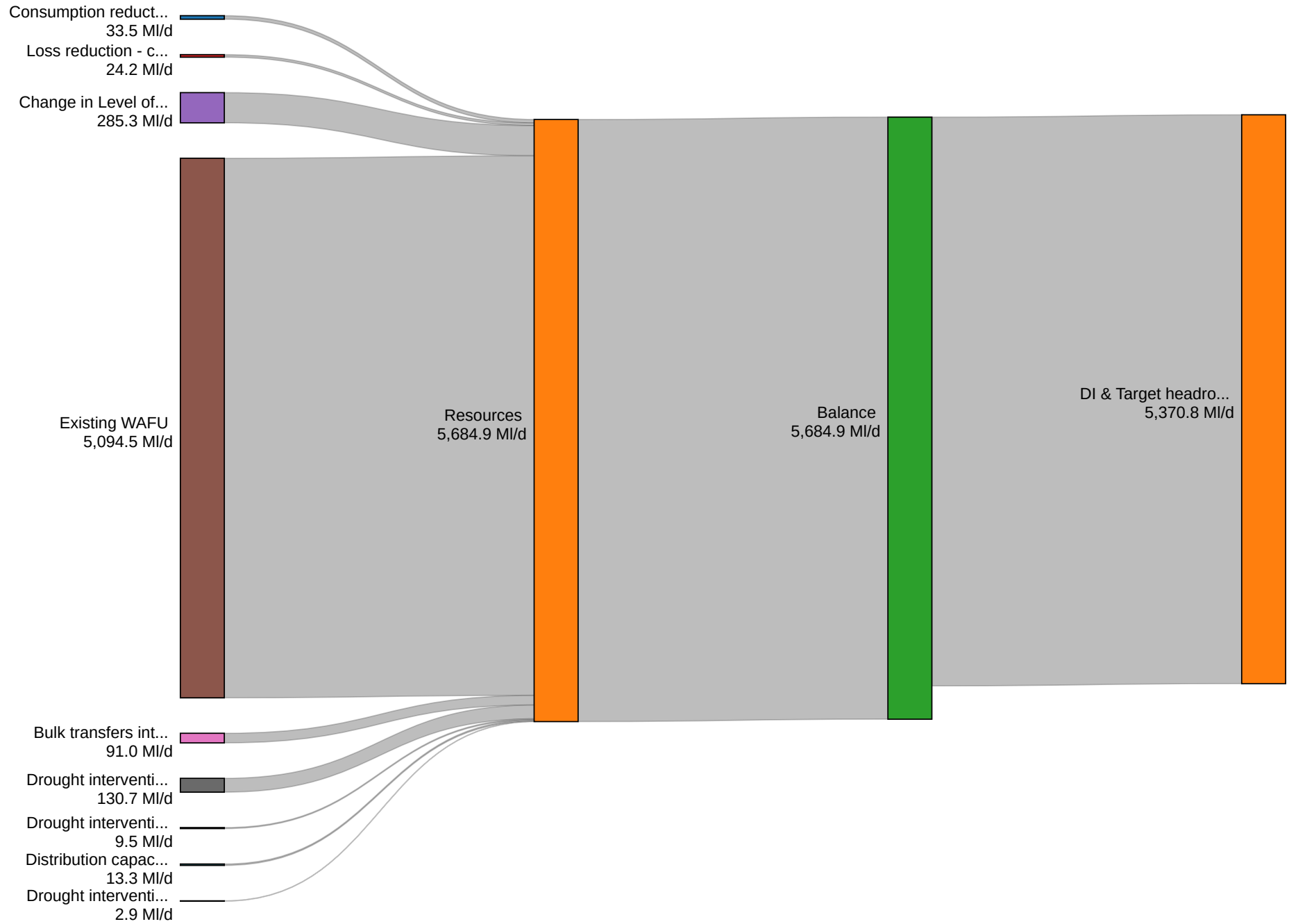
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

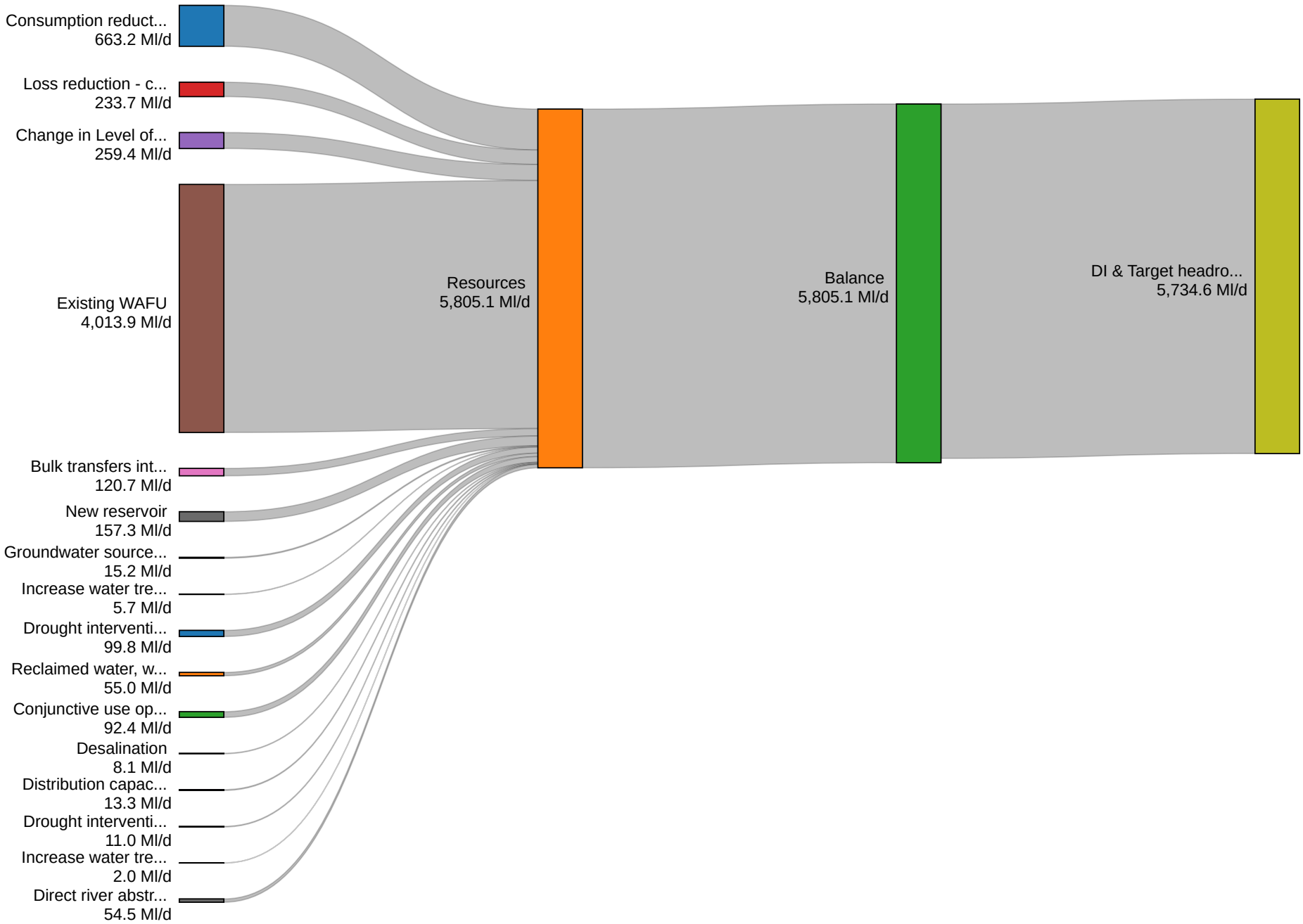


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

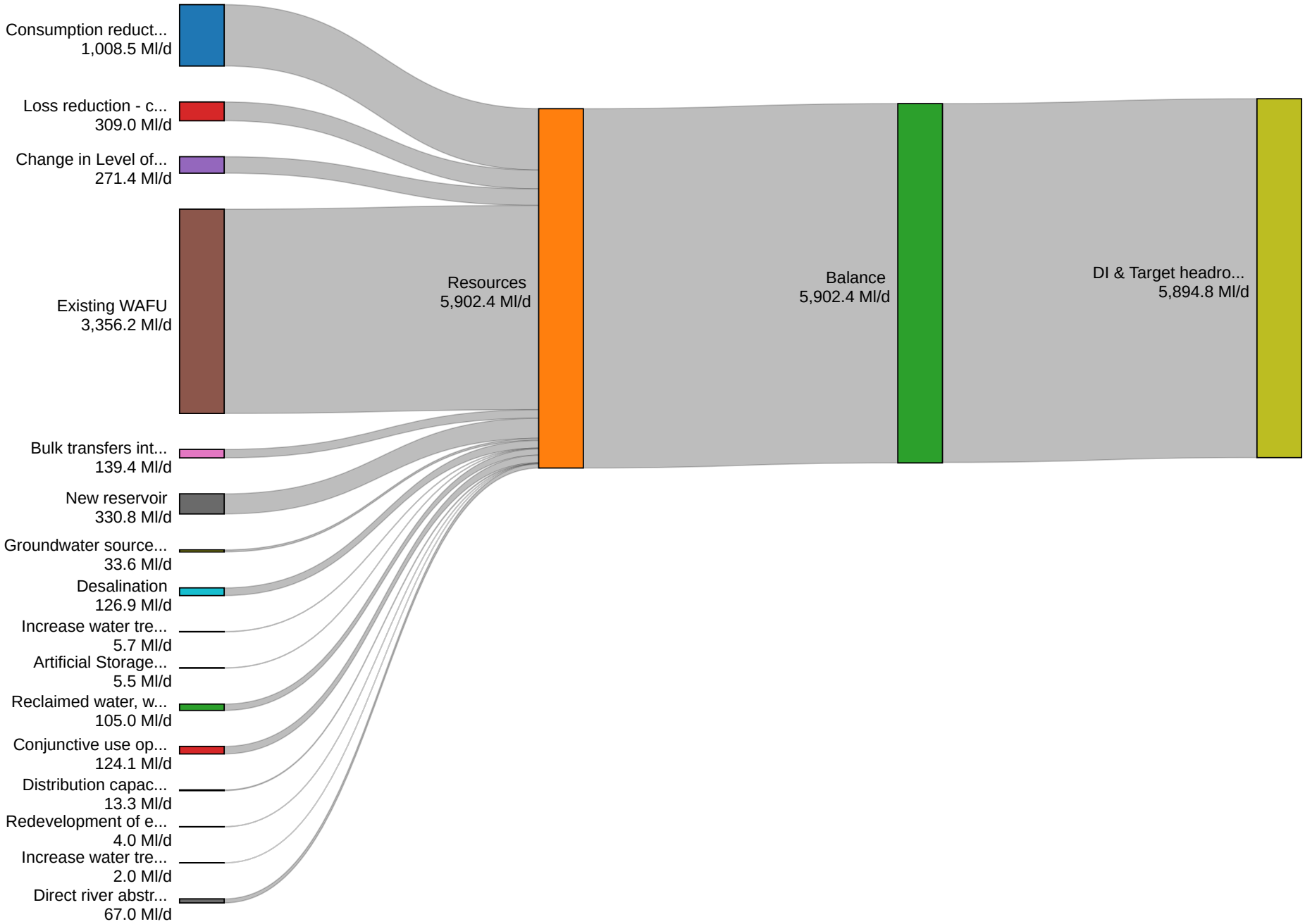
Situation 4 - 2026 (Thames Water)



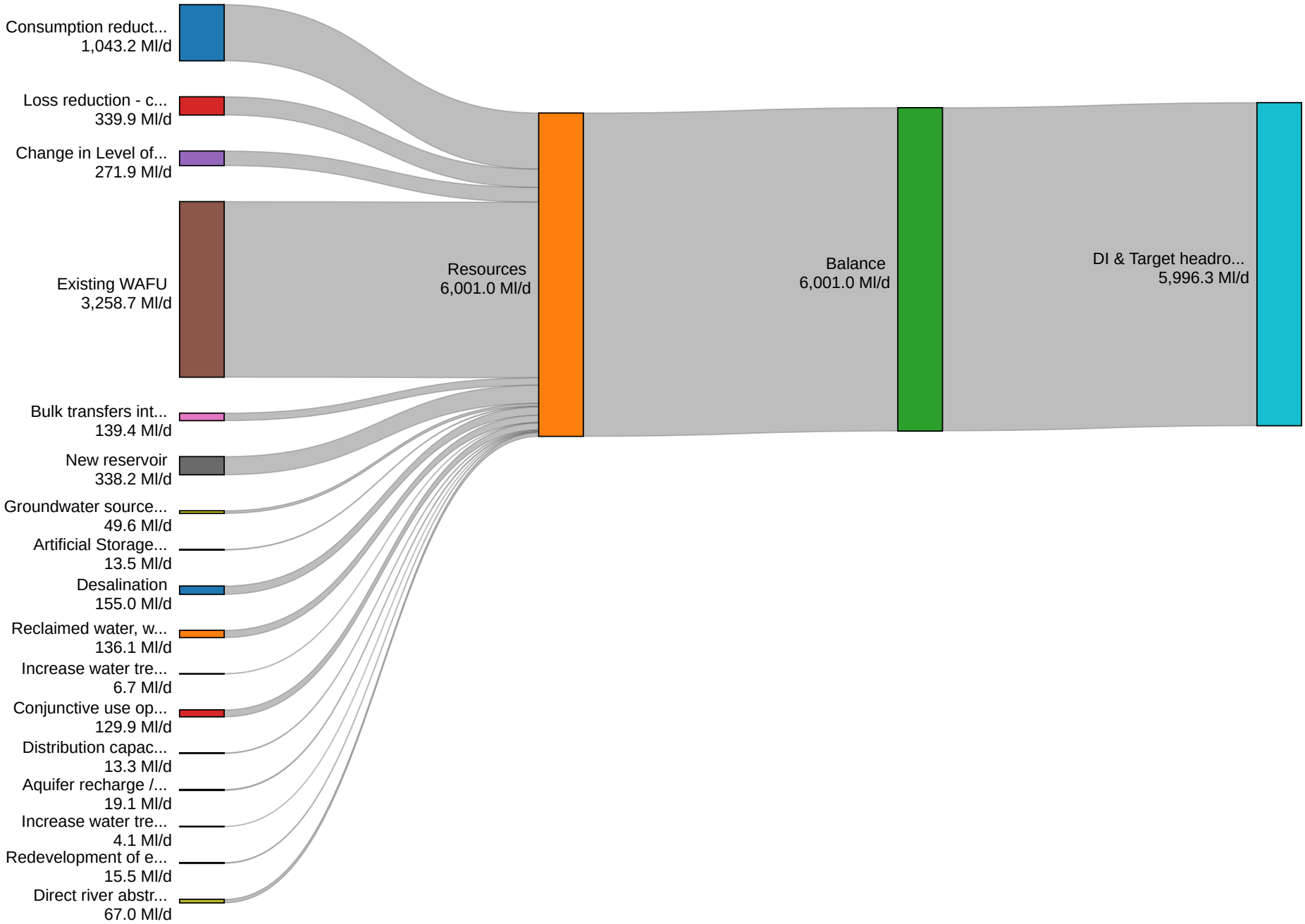
Situation 4 - 2040 (Thames Water)



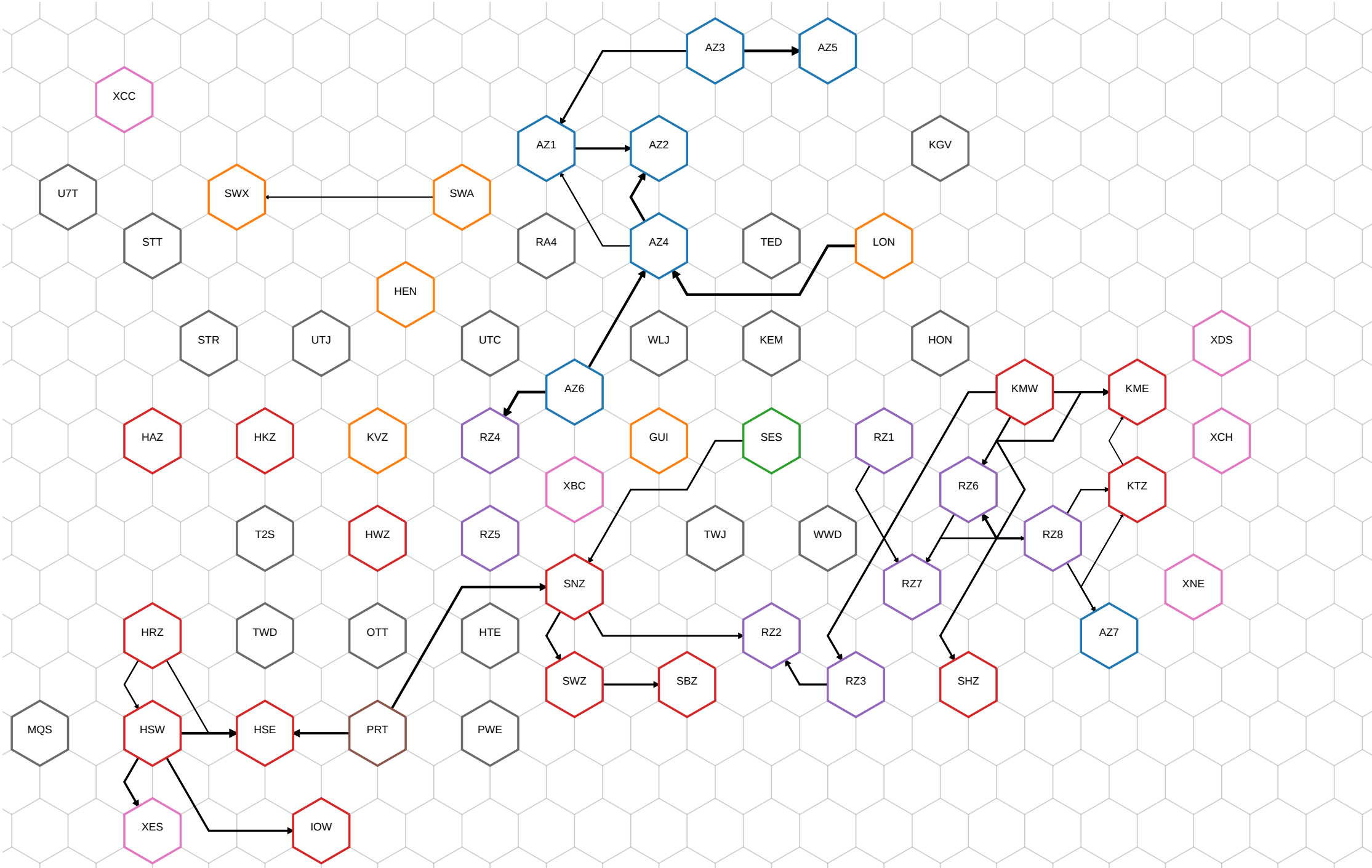
Situation 4 - 2050 (Thames Water)



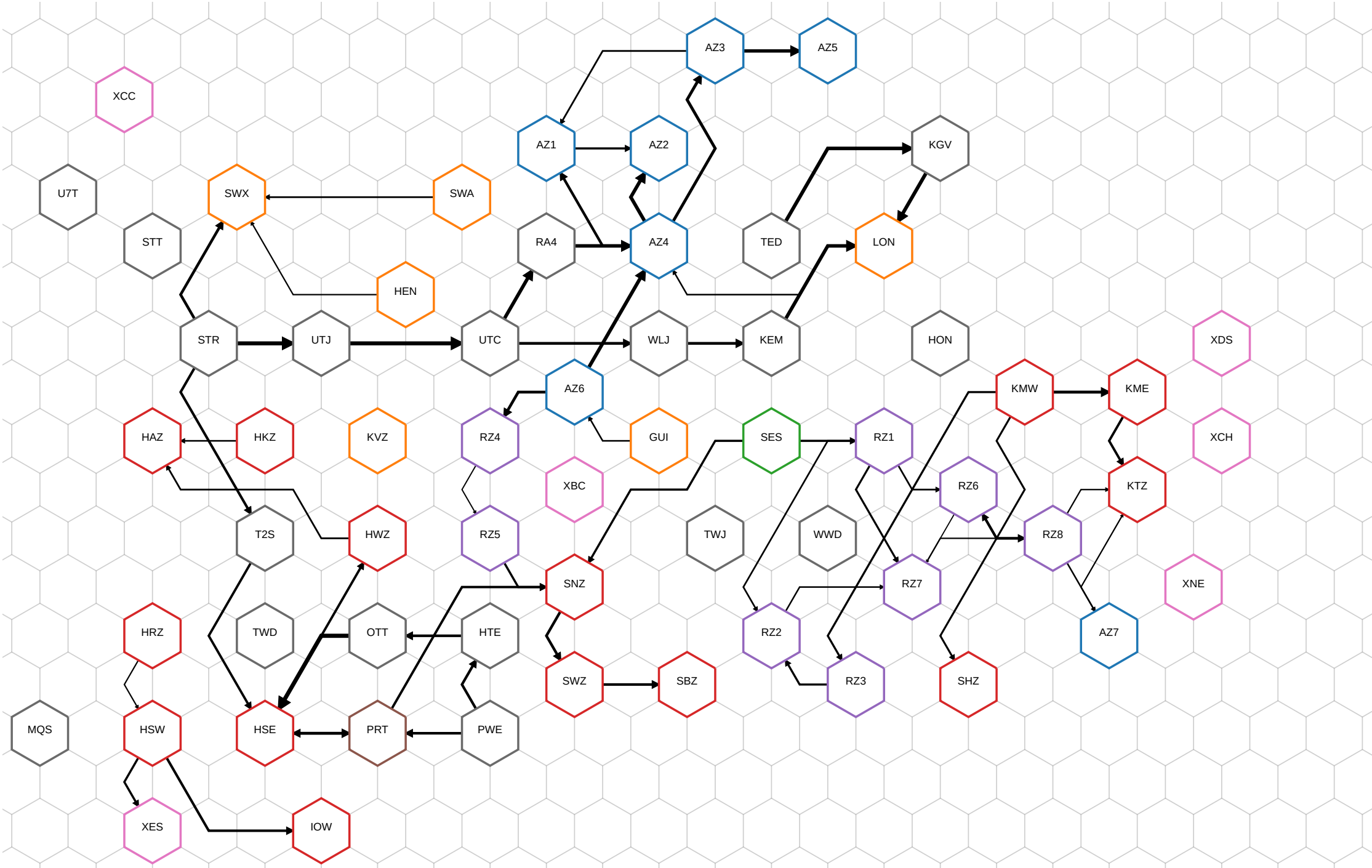
Situation 4 - 2075 (Thames Water)



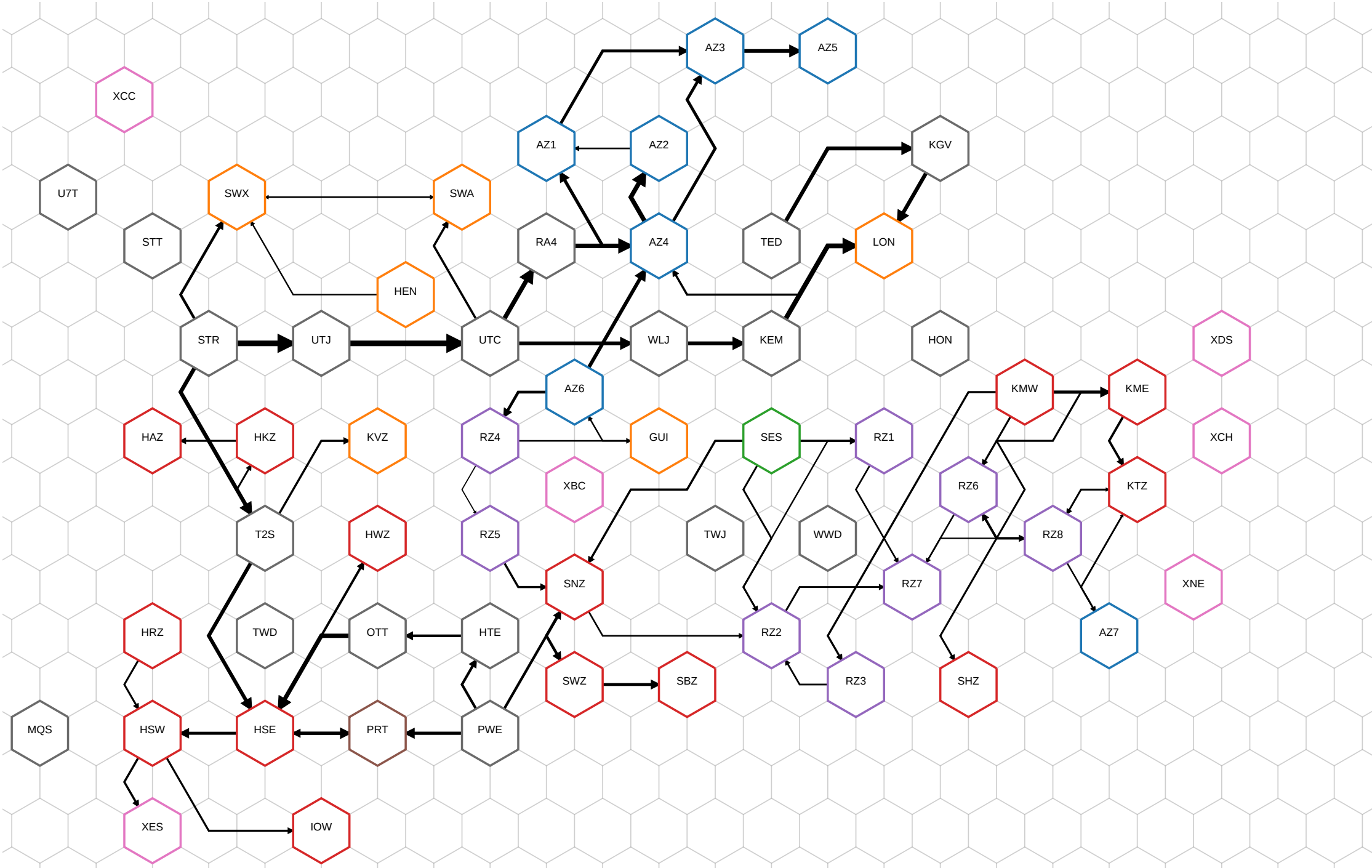
Situation 4 - 2026



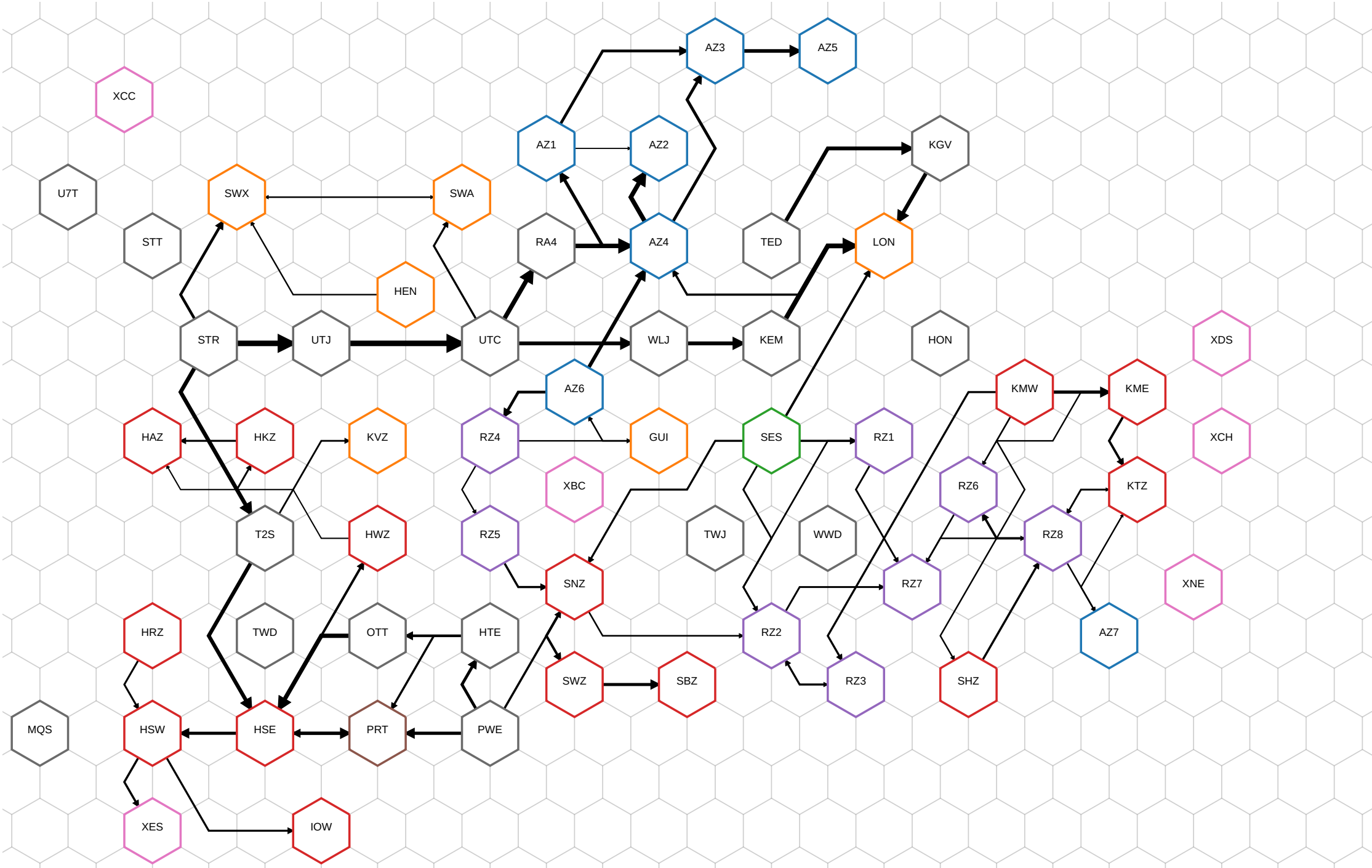
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – TEDDINGTON DRA +700% OB (STRATEGIC ALTERNATIVES)

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p700pc-ted-dra-2075
Description	Least cost run with hybrid-c+2 government interventions delaying TWU groundwater options until 2040 and Teddington DRA optimism bias changed by +7.0. Optimisation tolerances identical to LCP.
Created at	16/04/2024, 10:29:05
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-delay-twu-gw-2040-ob-p700pc-ted-dra
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Delay TWU groundwater options to 2040. Change Teddington DRA optimism bias by +7.0.
Optimised discount rate	STPR

Metrics

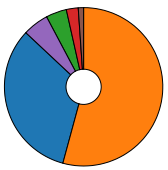
Net present value (Cost)

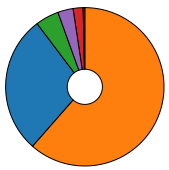
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,052	18,249	17,573	19,702	18,136	17,379	18,410	17,219	16,526	18,250	(£m)
Cost w/o deficit (STPR)	21,052	18,249	17,573	19,702	18,136	17,379	18,410	17,219	16,526	18,250	(£m)
Cost w/ deficit (IGEQ)	32,118	26,768	25,549	29,531	26,575	25,231	27,303	25,069	23,821	26,885	(£m)
Cost w/o deficit (IGEQ)	32,118	26,768	25,549	29,531	26,575	25,231	27,303	25,069	23,821	26,885	(£m)
Cost w/ deficit (LTDR)	23,194	19,927	19,150	21,620	19,799	18,932	20,153	18,770	17,973	19,946	(£m)
Cost w/o deficit (LTDR)	23,194	19,927	19,150	21,620	19,799	18,932	20,153	18,770	17,973	19,946	(£m)

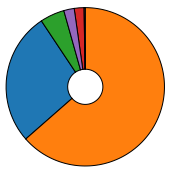
Cost breakdown (STPR)

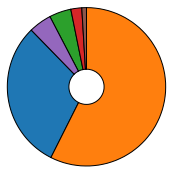
Select Company: Total

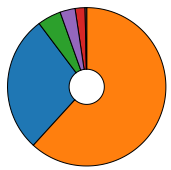
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,897	5,154	4,765	5,970	5,072	4,623	5,095	4,406	3,973	5,106	(£m)
Fixed opex	11,414	11,216	11,166	11,312	11,203	11,147	11,226	11,149	11,089	11,213	(£m)
Fixed operational carbon	893	873	875	881	874	874	874	871	870	876	(£m)
Embedded carbon	511	375	352	439	368	339	360	311	286	371	(£m)
Variable opex	1,109	570	373	913	559	358	703	440	285	590	(£m)
Variable carbon opex	228	61	42	187	61	39	152	43	23	93	(£m)

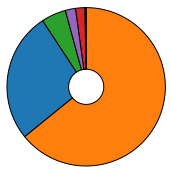
situation1 

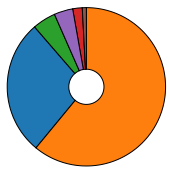
situation2 

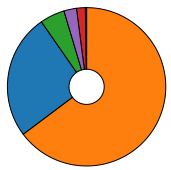
situation3 

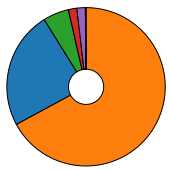
situation4 

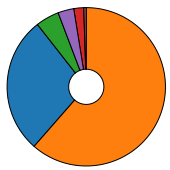
situation5 

situation6 

situation7 

situation8 

situation9 

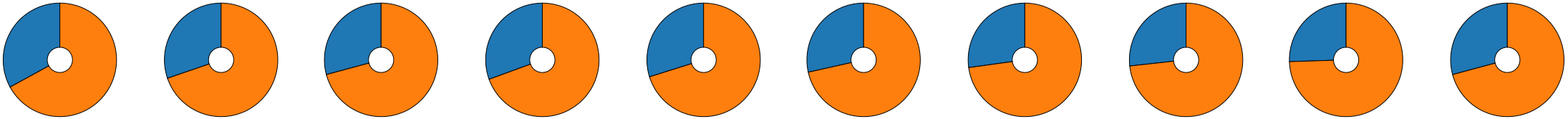
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,258,343	2,291,550	2,138,087	2,744,592	2,249,860	2,056,590	2,226,419	1,886,397	1,724,778	2,286,291	(tonnes)
Operational emissions	6,626,382	5,279,553	5,190,067	6,235,331	5,290,393	5,160,015	5,964,500	5,169,433	5,036,165	5,550,204	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

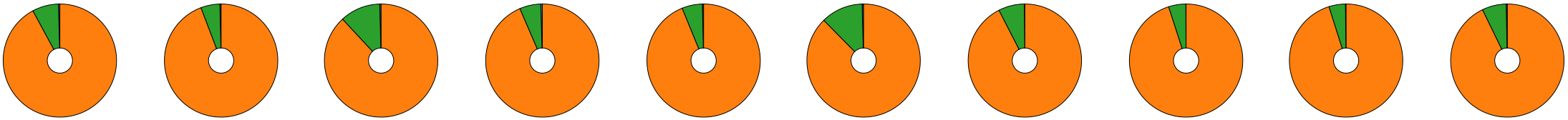


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	105	44	21	95	44	22	21	7	6	41	(GWh)
Grid	24,292	11,828	4,739	19,659	11,416	4,378	14,224	8,403	3,350	11,365	(GWh)
Renewable	1,972	681	619	1,265	706	598	1,138	433	165	842	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,023	64,015	63,152	67,364	63,643	62,676	64,302	62,008	60,952	64,126
SEA environmental disbenefit	116,179	83,911	77,052	103,750	81,317	75,655	87,962	72,248	63,401	84,608
Natural capital	81,548,819	77,241,147	80,095,255	75,331,901	77,249,411	79,895,130	64,321,450	65,140,407	68,012,329	74,315,094
Bio-diversity net gain	−220,786	−150,830	−120,730	−205,539	−150,085	−125,694	−142,401	−97,851	−68,797	−142,524

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,022	31,879	31,542	33,240	31,756	31,414	31,929	30,916	30,426	31,903

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.81	29.08	31.86	28.15	29.14	31.85	26.77	29.34	32.50	29.72
R1: Uncertainty of option supply/demand benefit	6.06	5.42	5.93	5.66	5.44	5.91	5.08	5.43	5.97	5.66
R3: Risk of service failure due to other physical hazards	6.91	7.19	8.06	6.84	7.22	8.07	6.50	7.32	8.33	7.38
R4: Availability of additional headroom	6.55	6.90	7.12	6.63	6.92	7.12	6.97	7.32	7.55	7.01
R5: Catchment/raw water quality risks (incl. climate change)	4.10	4.18	4.72	3.85	4.17	4.72	3.64	4.14	4.78	4.26
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.19	5.37	6.03	5.18	5.38	6.02	4.57	5.15	5.87	5.42
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

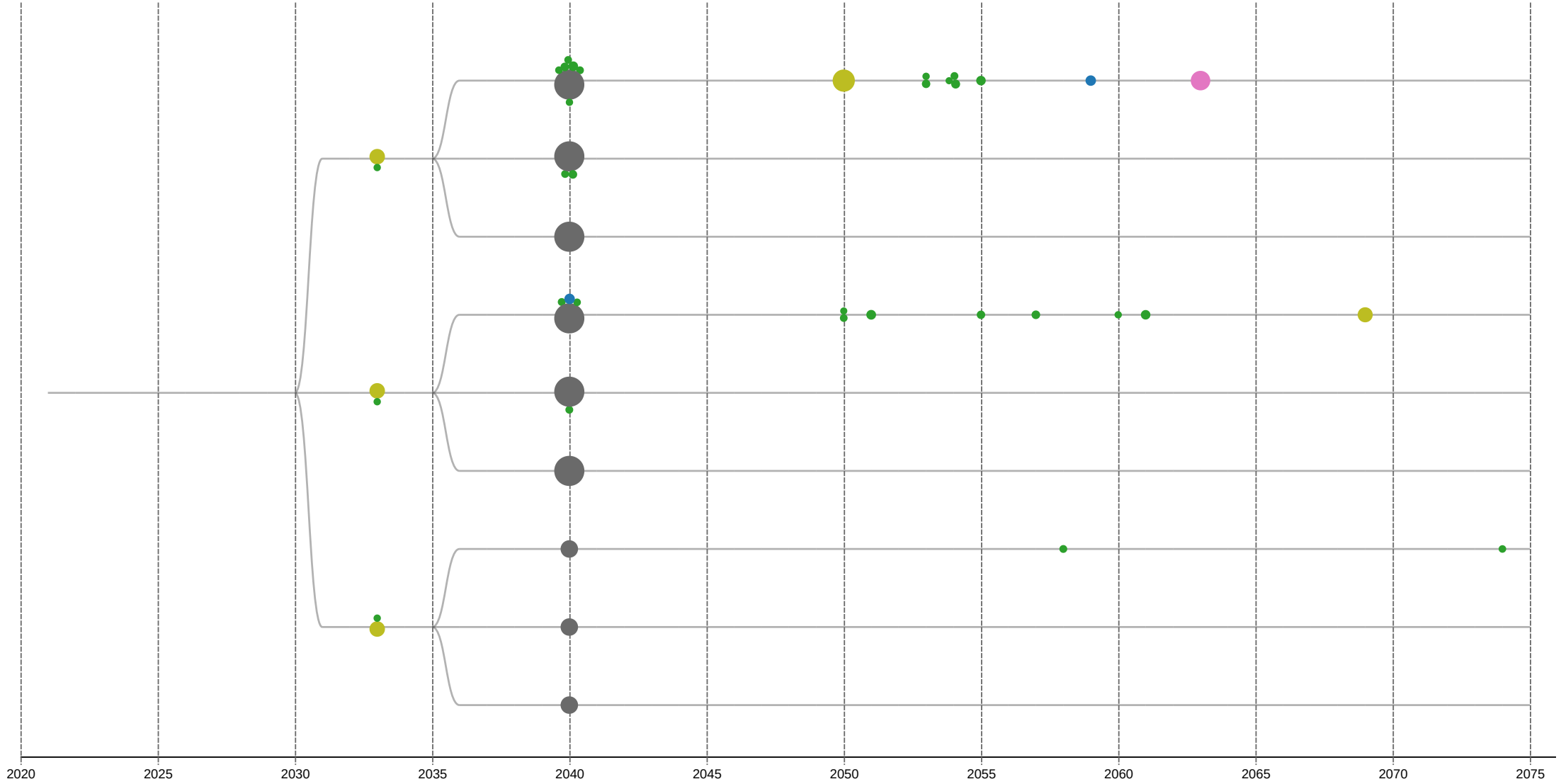
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.65	15.16	16.98	13.78	15.22	16.88	14.55	16.52	18.81	15.73
A3: Operational complexity and flexibility	6.46	6.94	7.80	6.53	6.97	7.84	6.19	7.07	8.11	7.10
A4: WRZ connectivity	7.17	8.20	9.15	7.22	8.22	9.01	8.33	9.41	10.66	8.60
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.39	19.79	22.01	18.75	19.83	21.83	19.77	22.30	25.24	20.99
E1: Scaleability and modularity of proposed changes	8.78	9.25	10.32	8.66	9.31	10.36	9.42	10.76	12.25	9.90
E2: Intervention lead times	4.36	4.10	4.50	3.95	4.06	4.28	3.91	4.22	4.67	4.23
E3: Reliance on external bodies to deliver changes	6.25	6.44	7.18	6.15	6.46	7.19	6.44	7.31	8.31	6.86
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

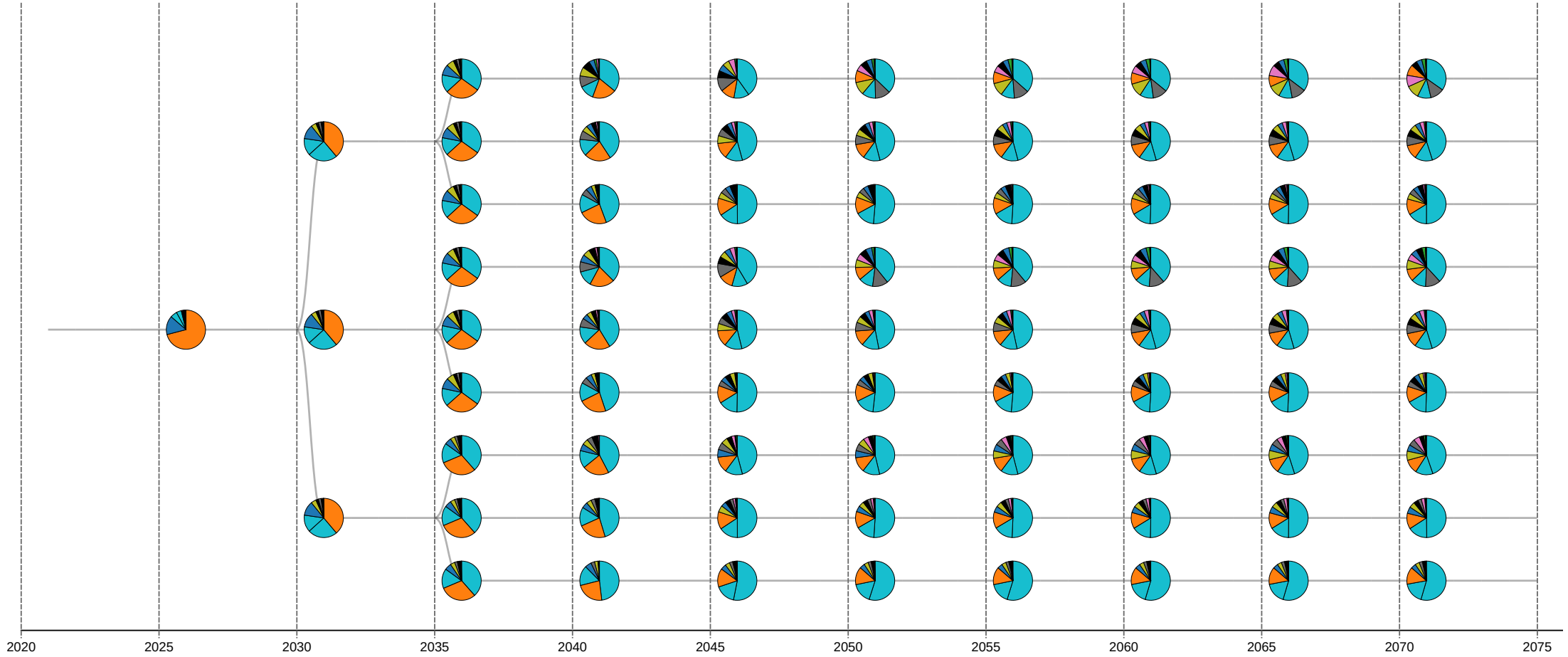
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



- Transfer
- Transfer into region
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- Groundwater
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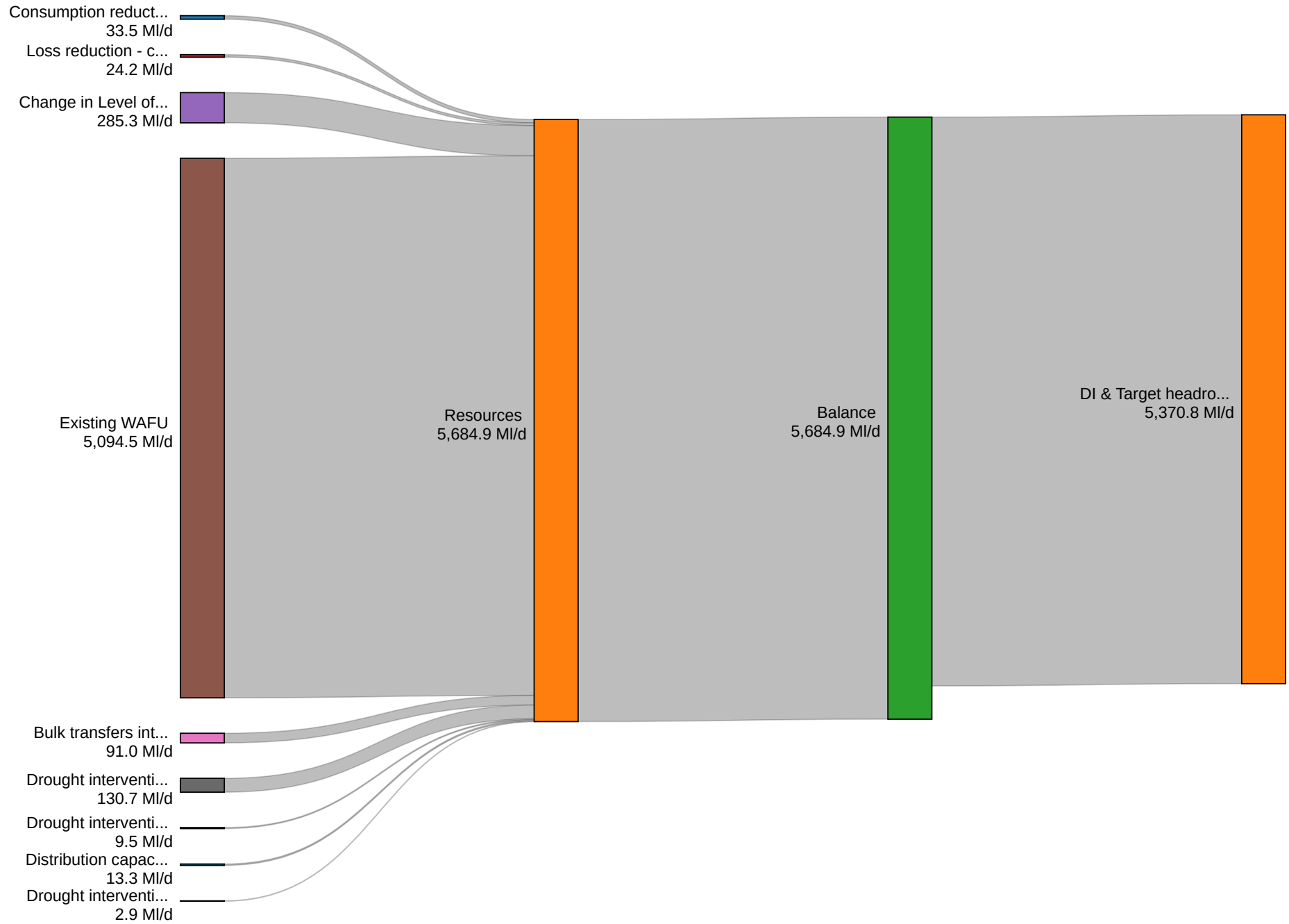
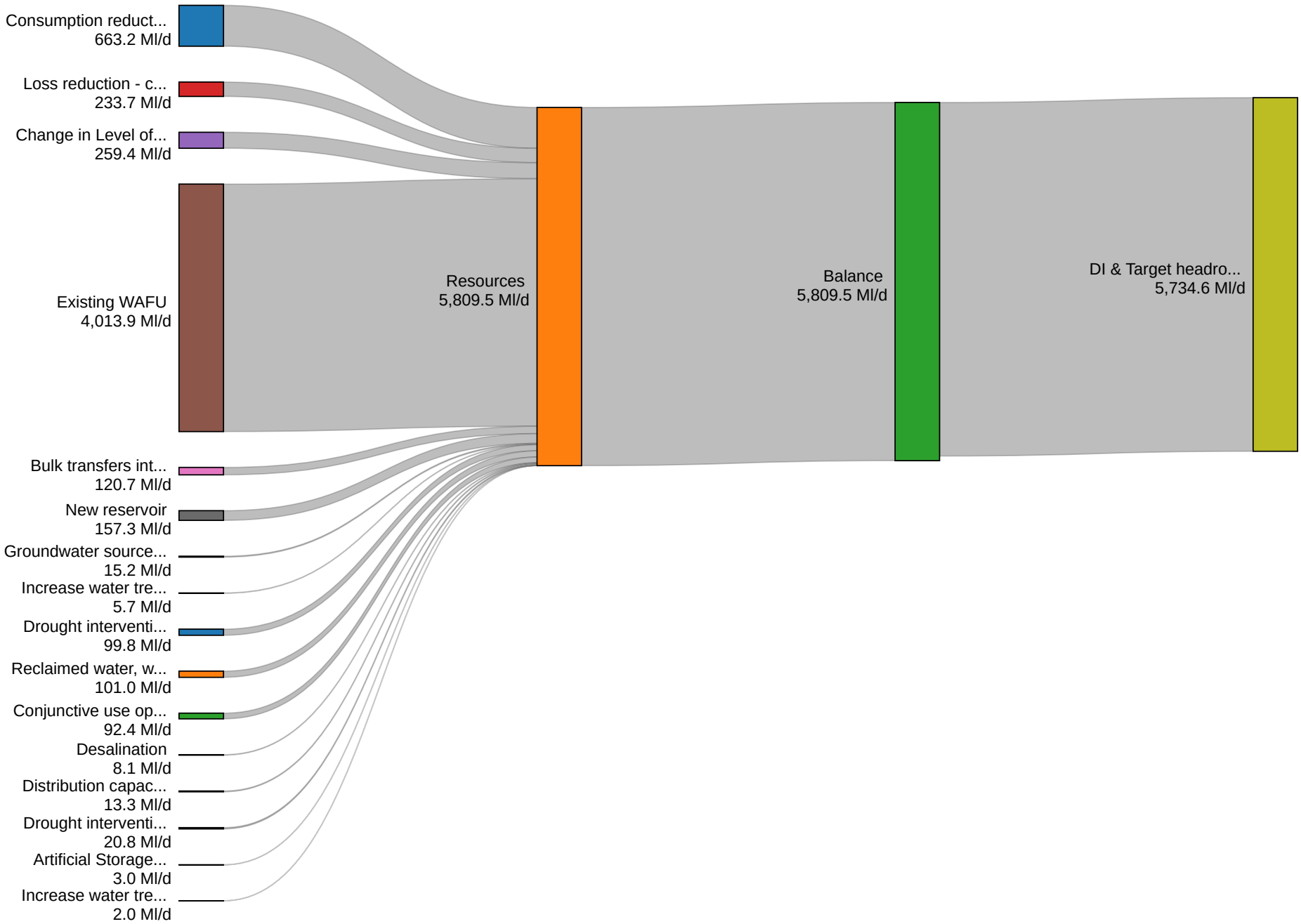
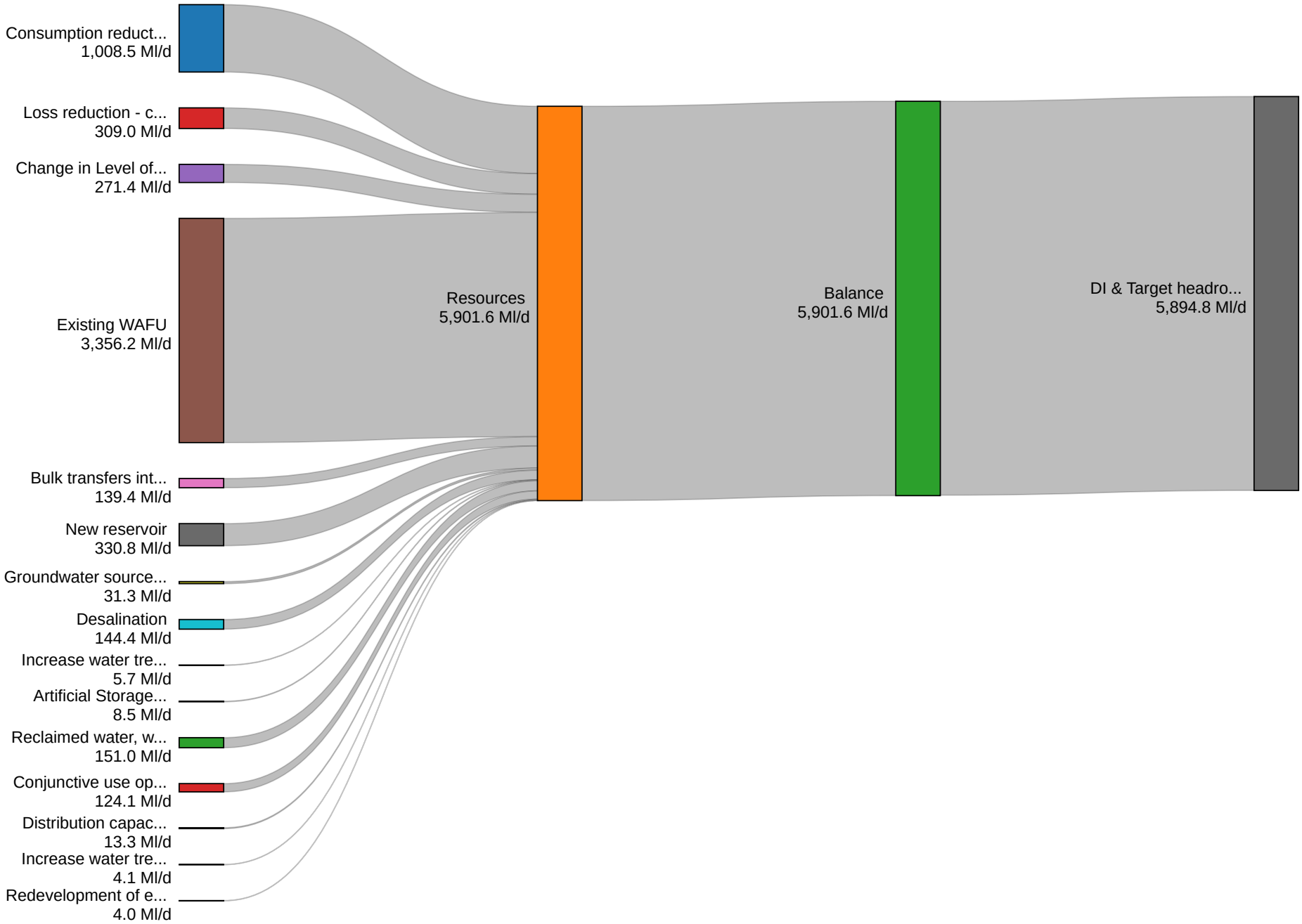
Situation 4 - 2026 (Thames Water)



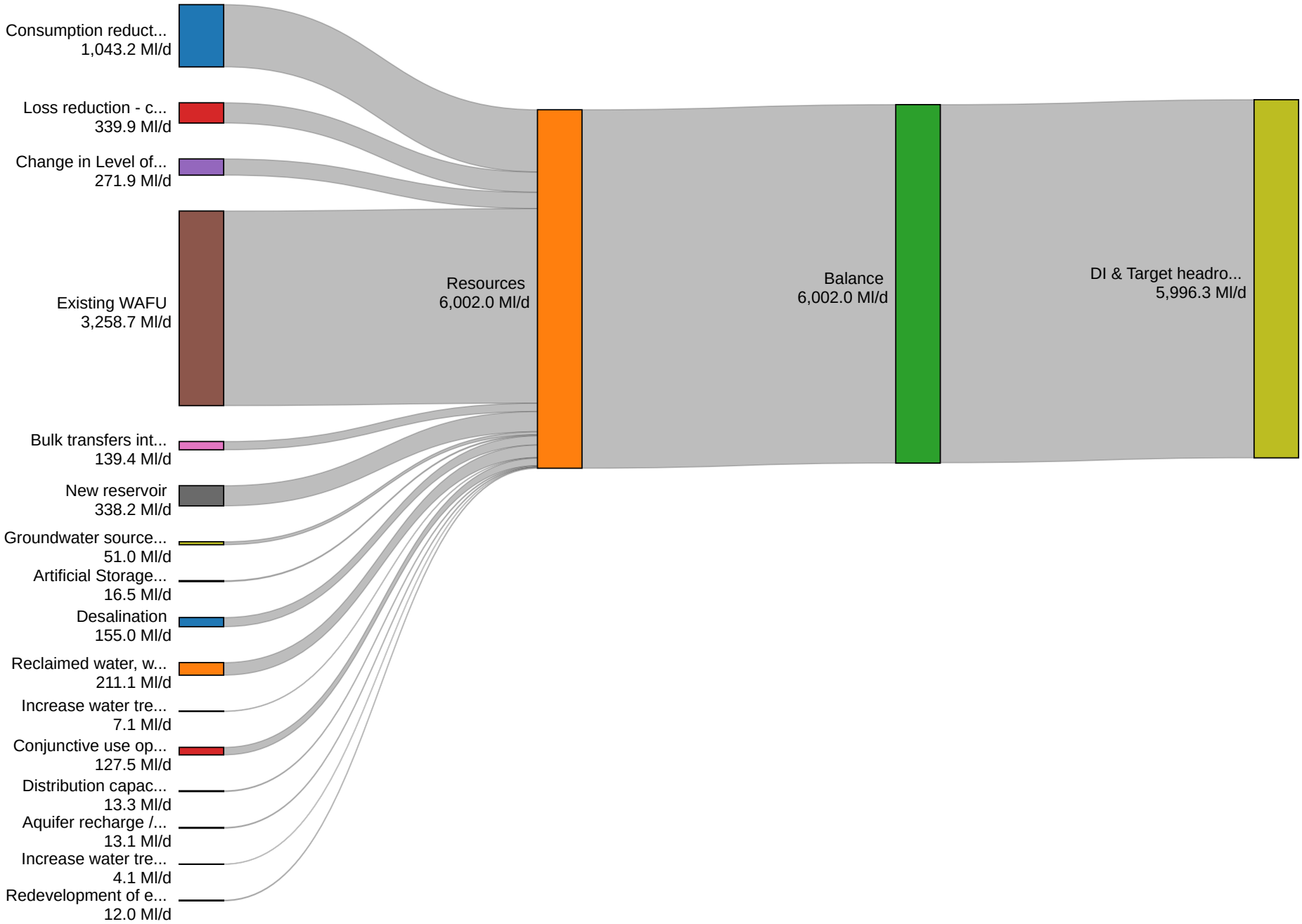
Situation 4 - 2040 (Thames Water)



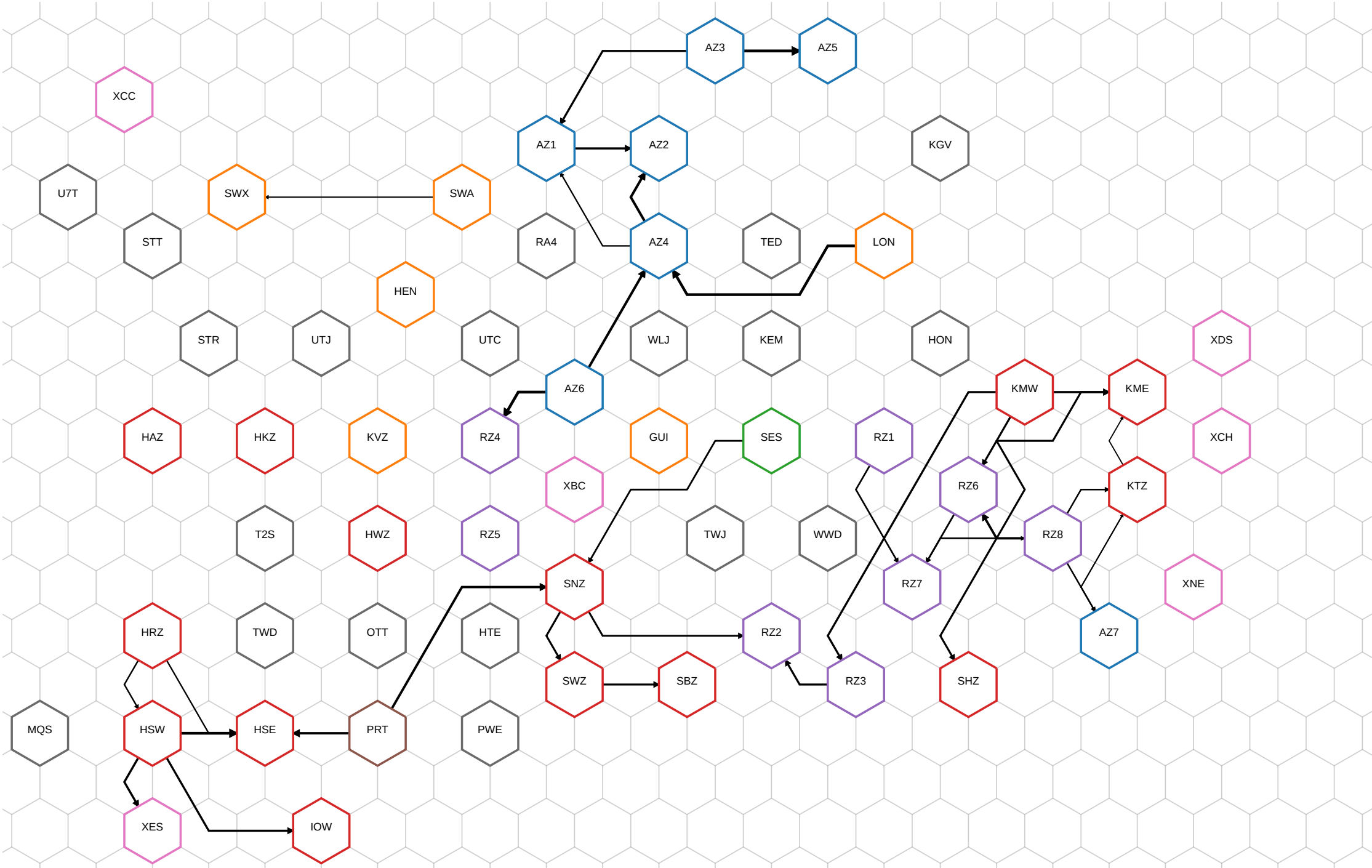
Situation 4 - 2050 (Thames Water)



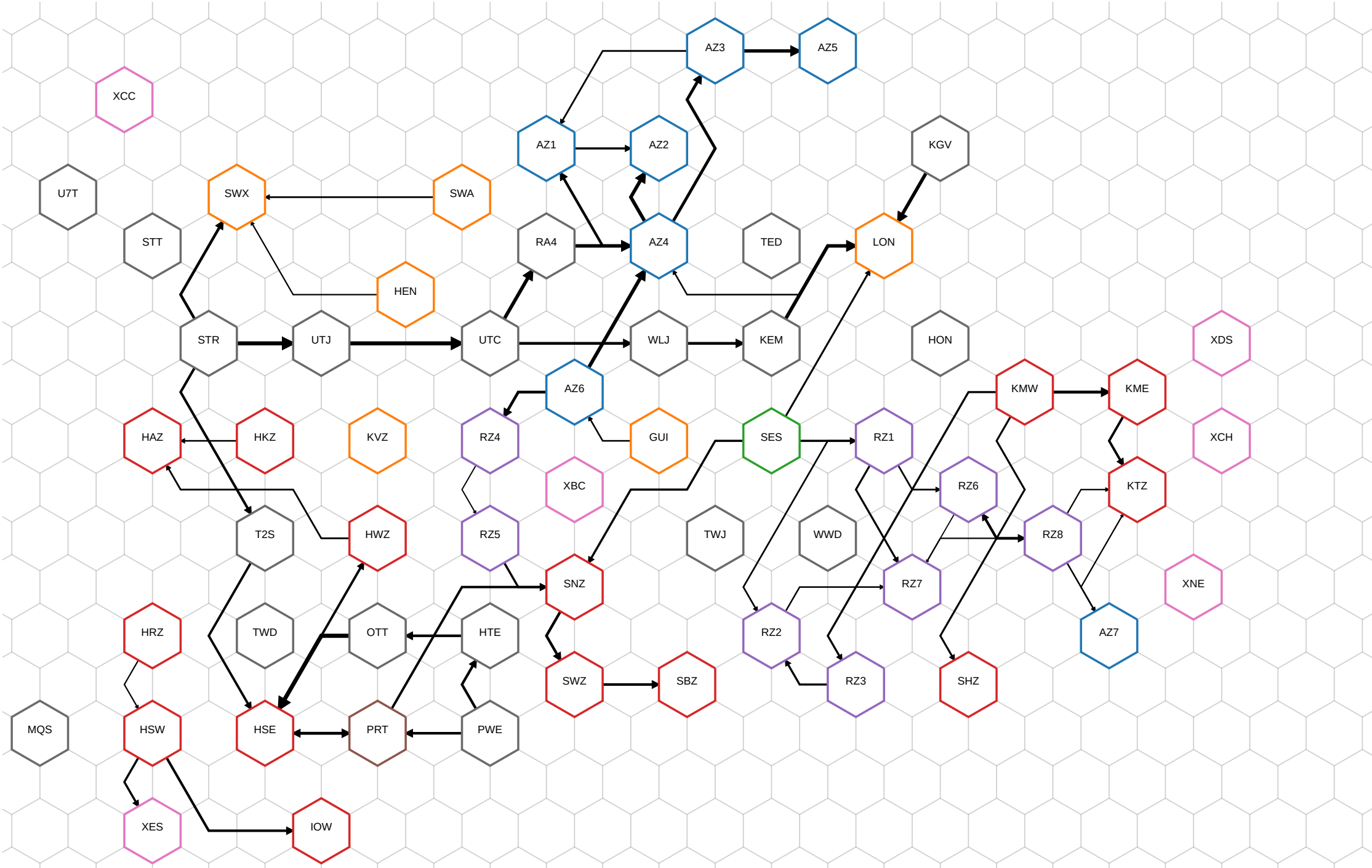
Situation 4 - 2075 (Thames Water)



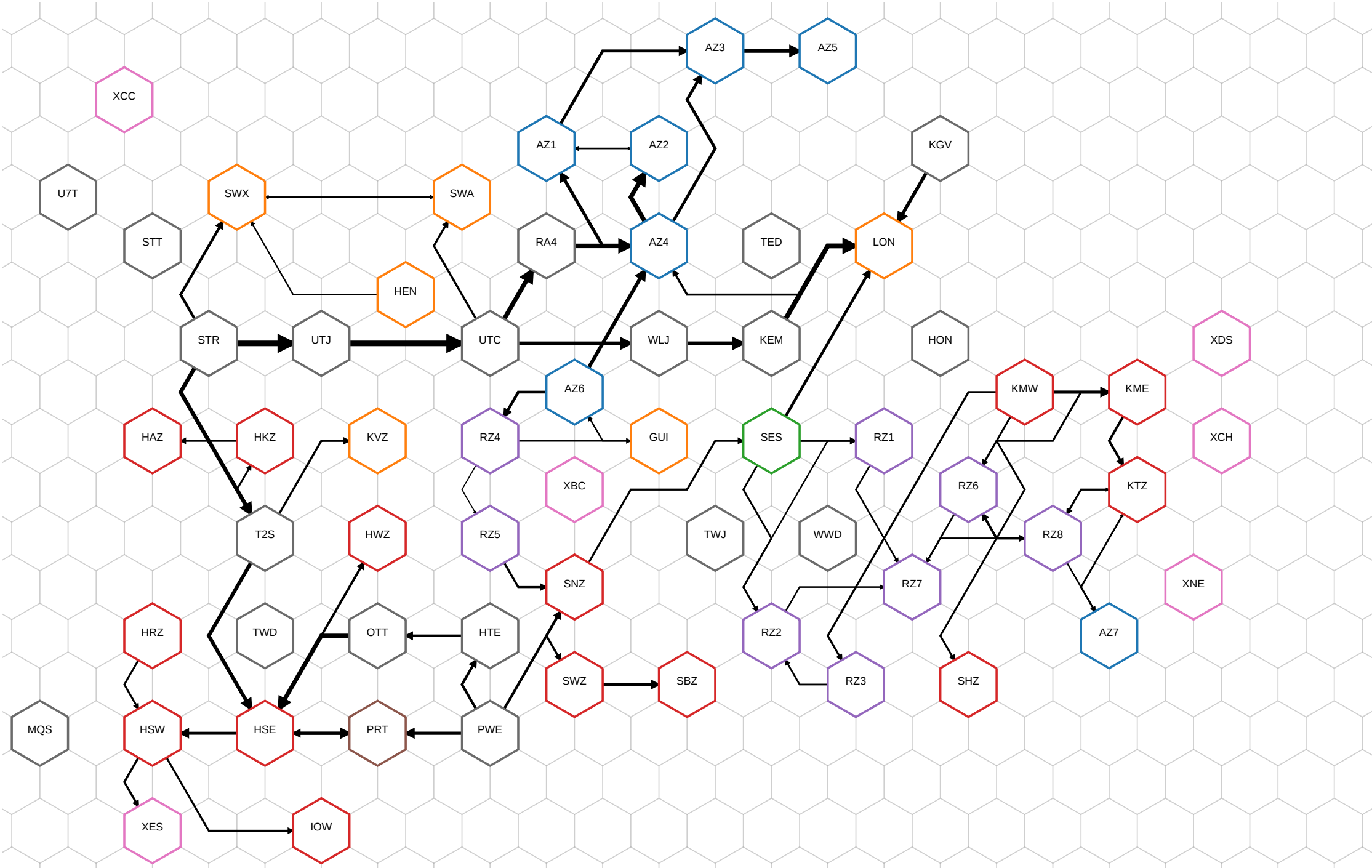
Situation 4 - 2026



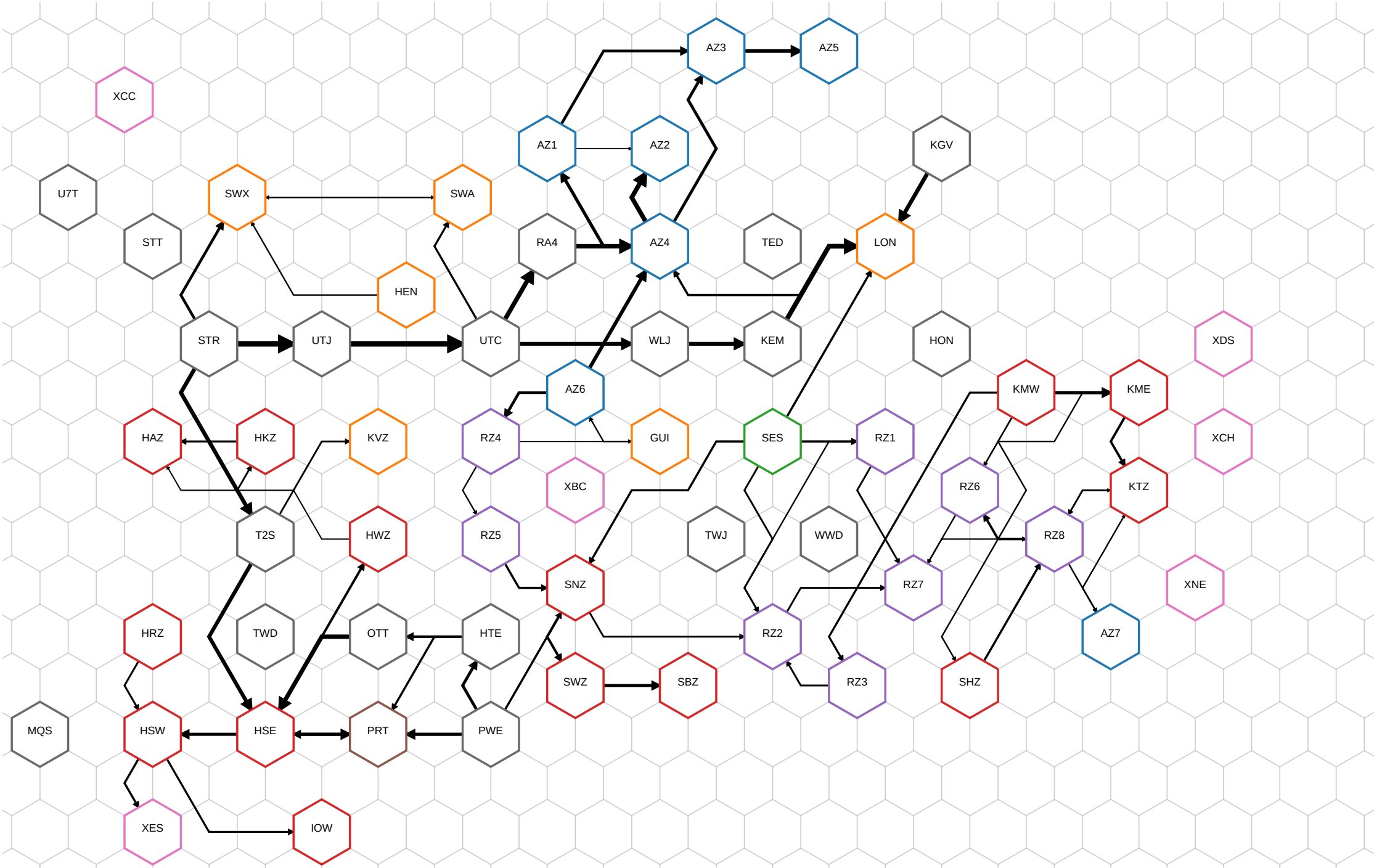
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – SESRO +20% OB

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p20pc-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions with SESRO optimism bias changed by +0.2.
Created at	08/09/2023, 02:16:08
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p20pc-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change SESRO optimism bias by 0.2.
Optimised discount rate	STPR

Metrics

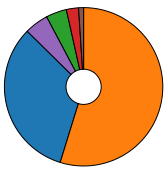
Net present value (Cost)

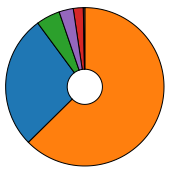
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,754	17,830	17,163	19,237	17,718	16,960	17,724	16,879	16,182	17,827	(£m)
Cost w/o deficit (STPR)	20,754	17,830	17,163	19,237	17,718	16,960	17,724	16,879	16,182	17,827	(£m)
Cost w/ deficit (IGEQ)	31,701	26,145	24,952	28,809	25,954	24,607	26,170	24,578	23,323	26,249	(£m)
Cost w/o deficit (IGEQ)	31,701	26,145	24,952	28,809	25,954	24,607	26,170	24,578	23,323	26,249	(£m)
Cost w/ deficit (LTDR)	22,873	19,468	18,703	21,106	19,342	18,474	19,383	18,400	17,600	19,483	(£m)
Cost w/o deficit (LTDR)	22,873	19,468	18,703	21,106	19,342	18,474	19,383	18,400	17,600	19,483	(£m)

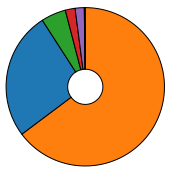
Cost breakdown (STPR)

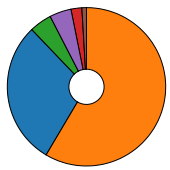
Select Company: Total

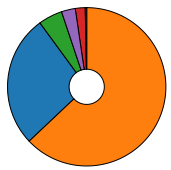
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,769	4,860	4,484	5,647	4,784	4,333	4,618	4,177	3,737	4,823	(£m)
Fixed opex	11,369	11,164	11,114	11,255	11,153	11,097	11,157	11,105	11,046	11,162	(£m)
Fixed operational carbon	881	869	868	877	869	869	871	866	865	871	(£m)
Embedded carbon	516	365	343	428	359	330	349	312	288	365	(£m)
Variable opex	1,009	517	319	849	500	300	636	383	230	527	(£m)
Variable carbon opex	210	55	34	180	53	31	93	35	17	79	(£m)

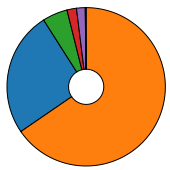
situation1 

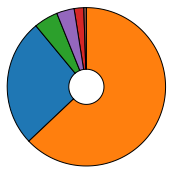
situation2 

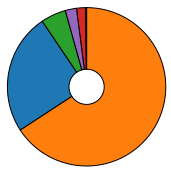
situation3 

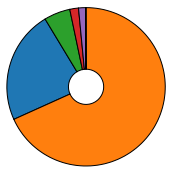
situation4 

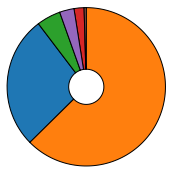
situation5 

situation6 

situation7 

situation8 

situation9 

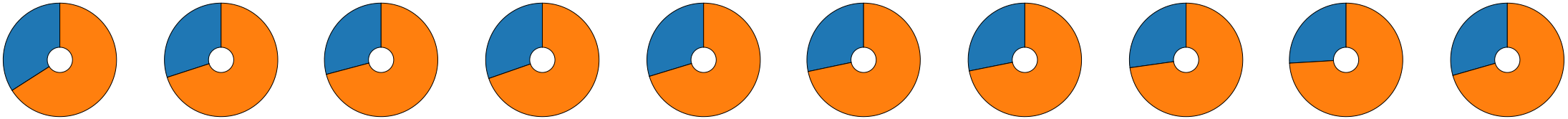
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,317,631	2,234,478	2,094,535	2,681,197	2,201,779	2,007,386	2,163,527	1,903,853	1,741,062	2,260,605	(tonnes)
Operational emissions	6,425,605	5,216,731	5,096,318	6,161,998	5,212,620	5,086,117	5,523,937	5,089,599	4,973,821	5,420,750	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

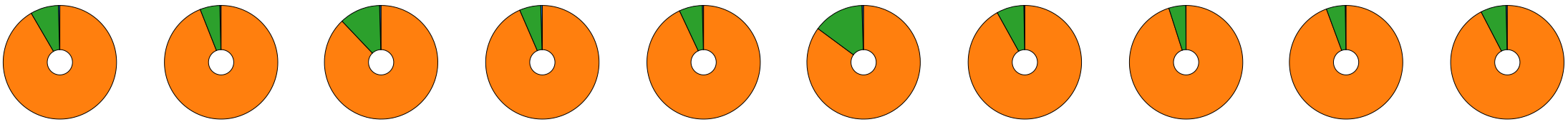


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	44	22	41	9	8	43	(GWh)
Grid	22,396	11,348	4,278	19,376	10,784	3,861	13,147	7,876	2,891	10,662	(GWh)
Renewable	1,954	681	567	1,257	765	654	1,115	399	165	840	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,722	63,944	63,170	67,257	63,694	62,711	63,883	61,721	60,553	64,073
SEA environmental disbenefit	115,146	81,884	76,405	101,107	79,336	73,423	83,828	71,319	61,604	82,672
Natural capital	81,650,219	77,190,134	79,902,539	75,211,013	77,131,503	79,780,701	80,951,905	81,609,792	84,602,292	79,781,122
Bio-diversity net gain	−222,318	−149,878	−131,509	−205,365	−149,666	−124,012	−119,765	−101,655	−63,553	−140,858

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,099	31,836	31,569	33,098	31,670	31,343	31,710	30,875	30,311	31,835

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.93	29.35	32.13	28.36	29.53	32.29	28.49	31.42	34.94	30.60
R1: Uncertainty of option supply/demand benefit	5.94	5.35	5.83	5.58	5.41	5.87	5.28	5.68	6.29	5.69
R3: Risk of service failure due to other physical hazards	6.98	7.31	8.18	6.93	7.37	8.23	7.02	7.93	9.05	7.67
R4: Availability of additional headroom	6.57	6.92	7.13	6.65	6.94	7.15	7.08	7.44	7.68	7.06
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.88	4.24	4.79	3.94	4.54	5.24	4.42
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.32	5.54	6.20	5.32	5.57	6.24	5.17	5.83	6.67	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

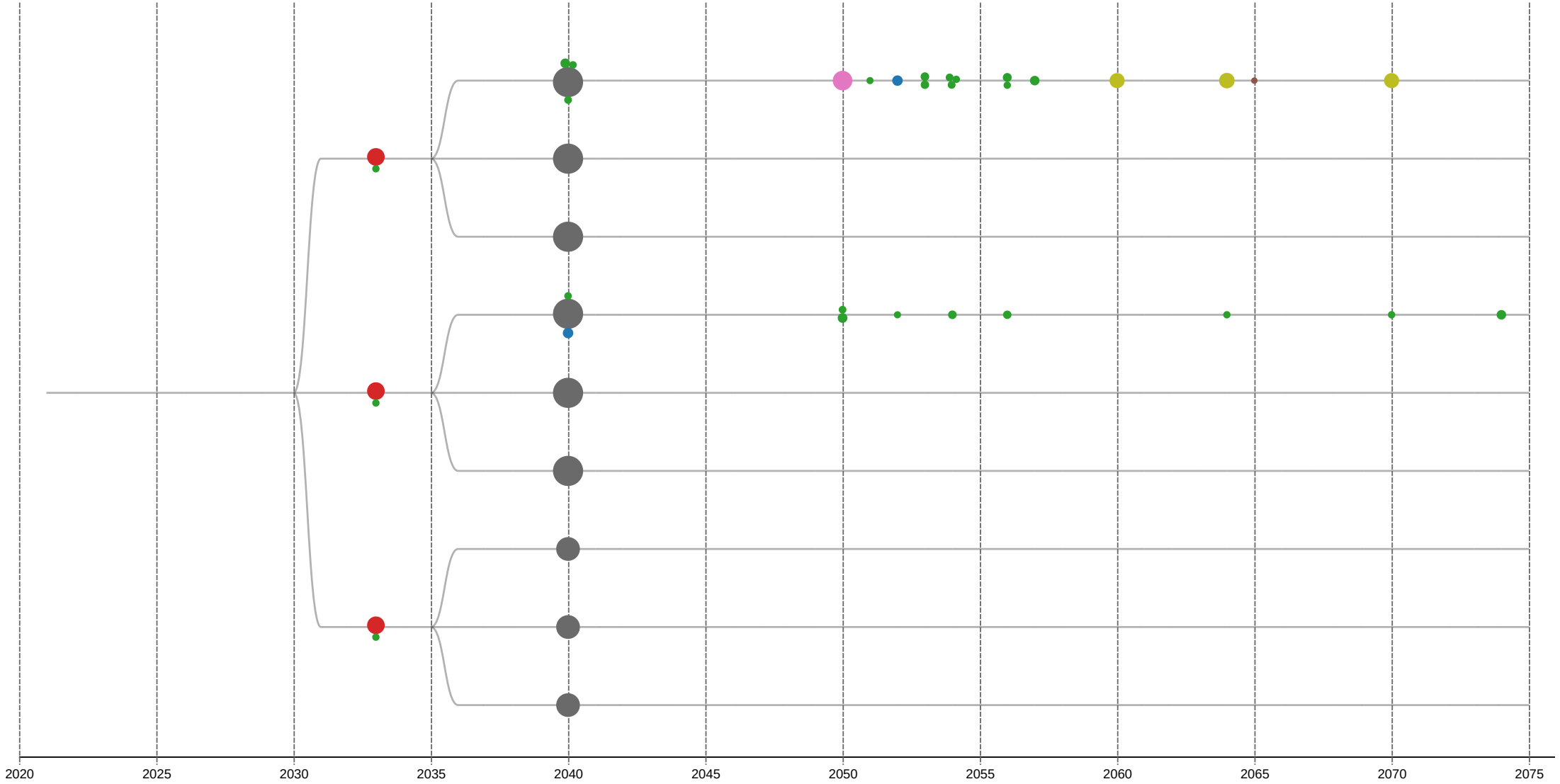
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.06	15.63	17.52	14.23	15.69	17.40	15.41	17.55	19.99	16.39
A3: Operational complexity and flexibility	6.52	7.02	7.89	6.61	7.08	7.96	6.70	7.66	8.80	7.36
A4: WRZ connectivity	7.50	8.58	9.60	7.59	8.58	9.41	8.68	9.86	11.15	9.00
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.20	19.81	21.98	18.82	19.94	21.95	20.17	22.83	25.89	21.18
E1: Scaleability and modularity of proposed changes	8.78	9.29	10.35	8.69	9.40	10.46	9.65	11.06	12.61	10.03
E2: Intervention lead times	4.23	4.13	4.52	4.03	4.10	4.33	4.02	4.39	4.88	4.29
E3: Reliance on external bodies to deliver changes	6.18	6.38	7.11	6.10	6.44	7.16	6.49	7.37	8.40	6.85
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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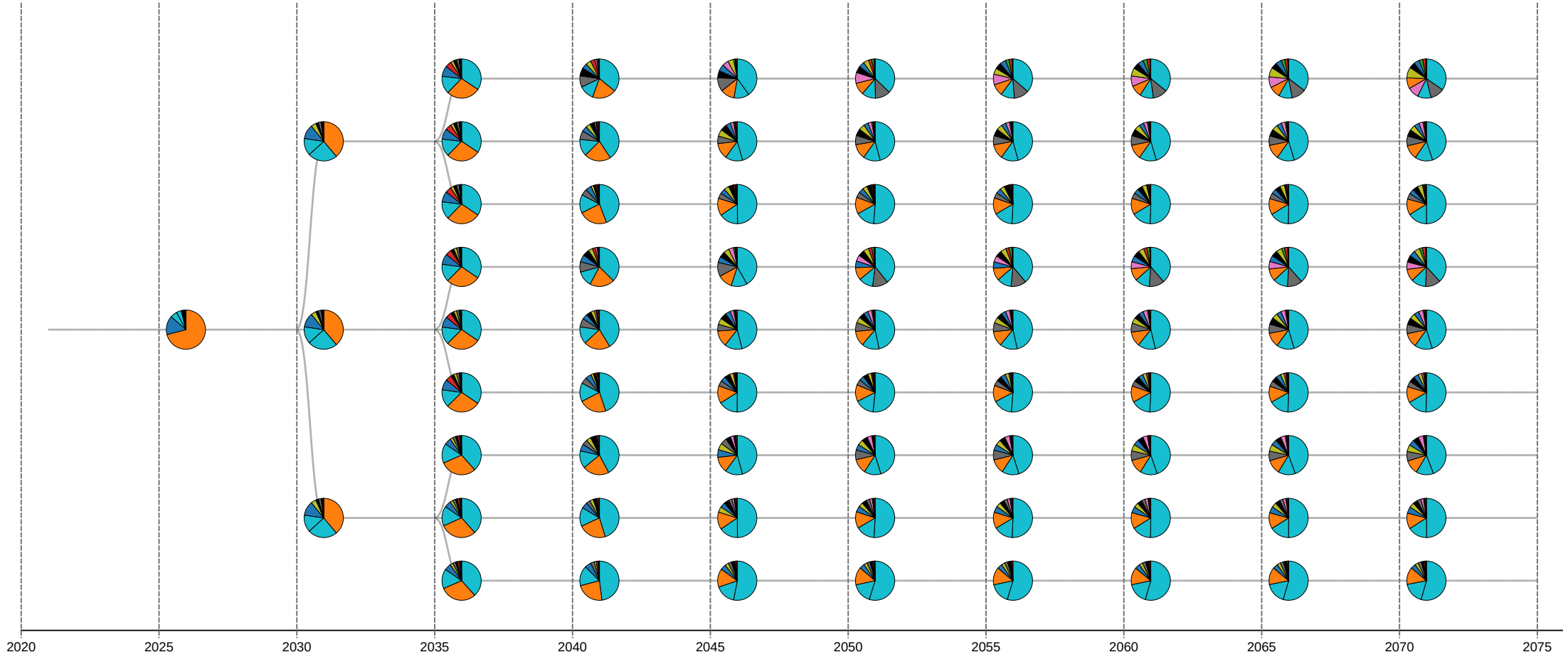
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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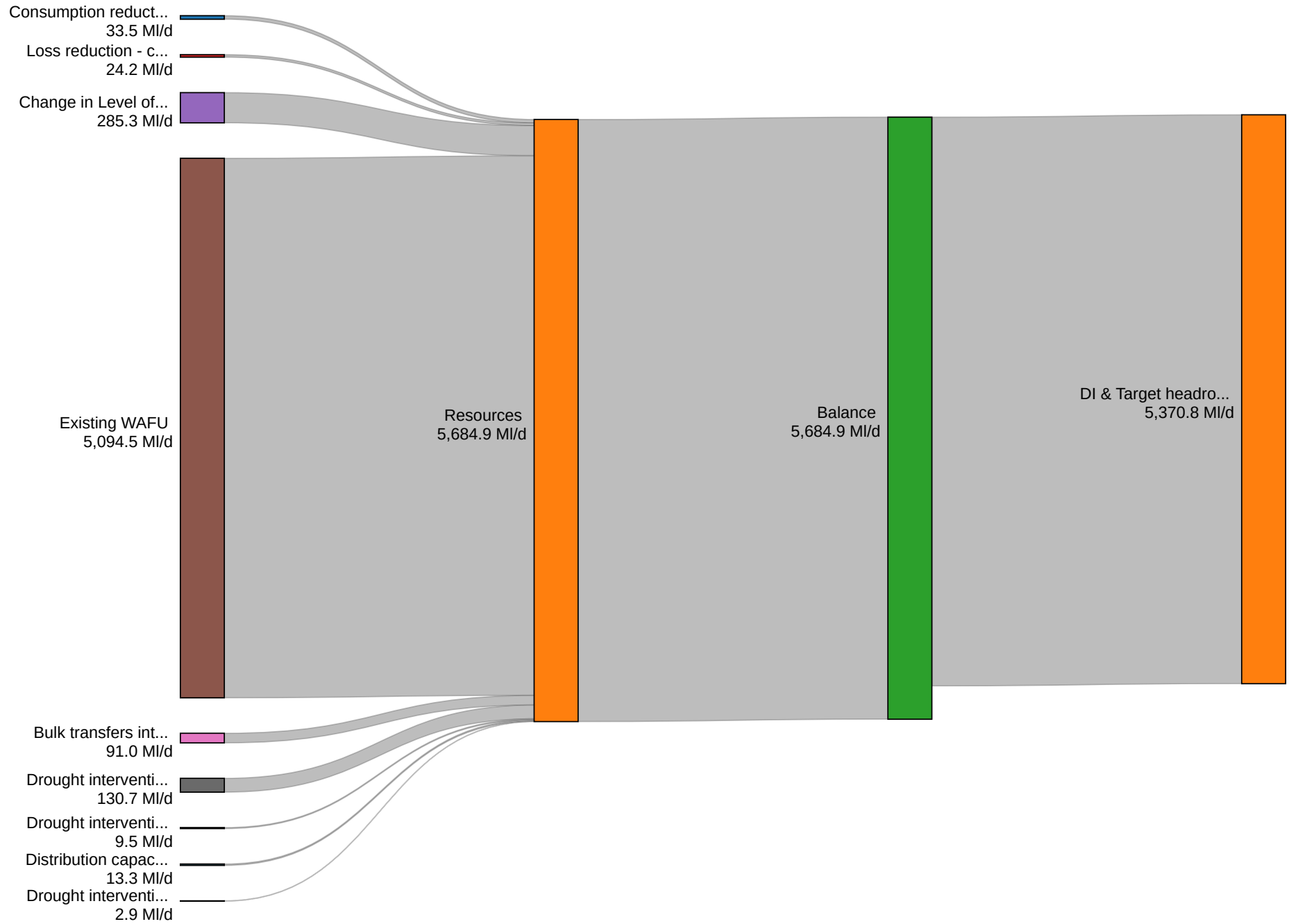
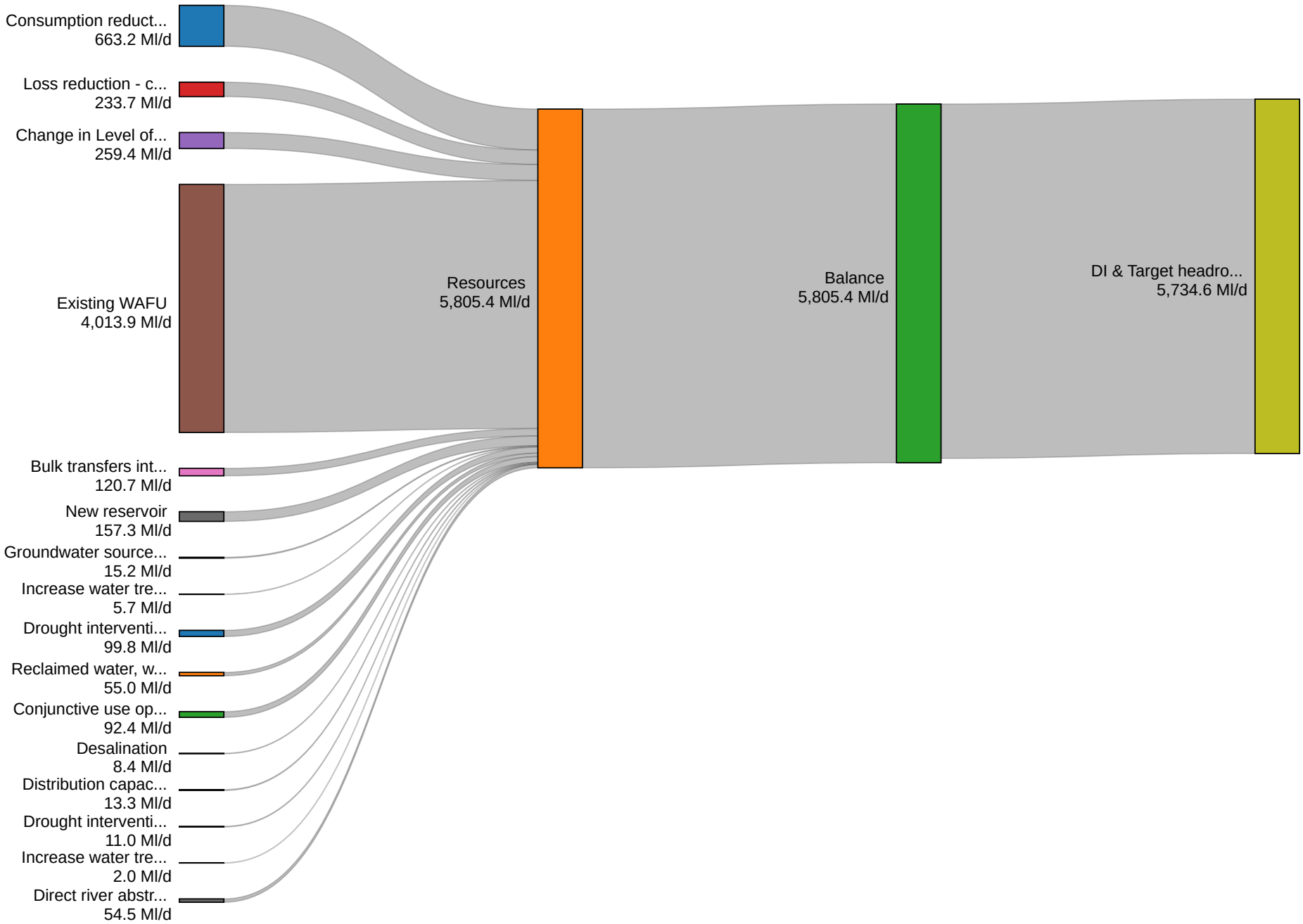
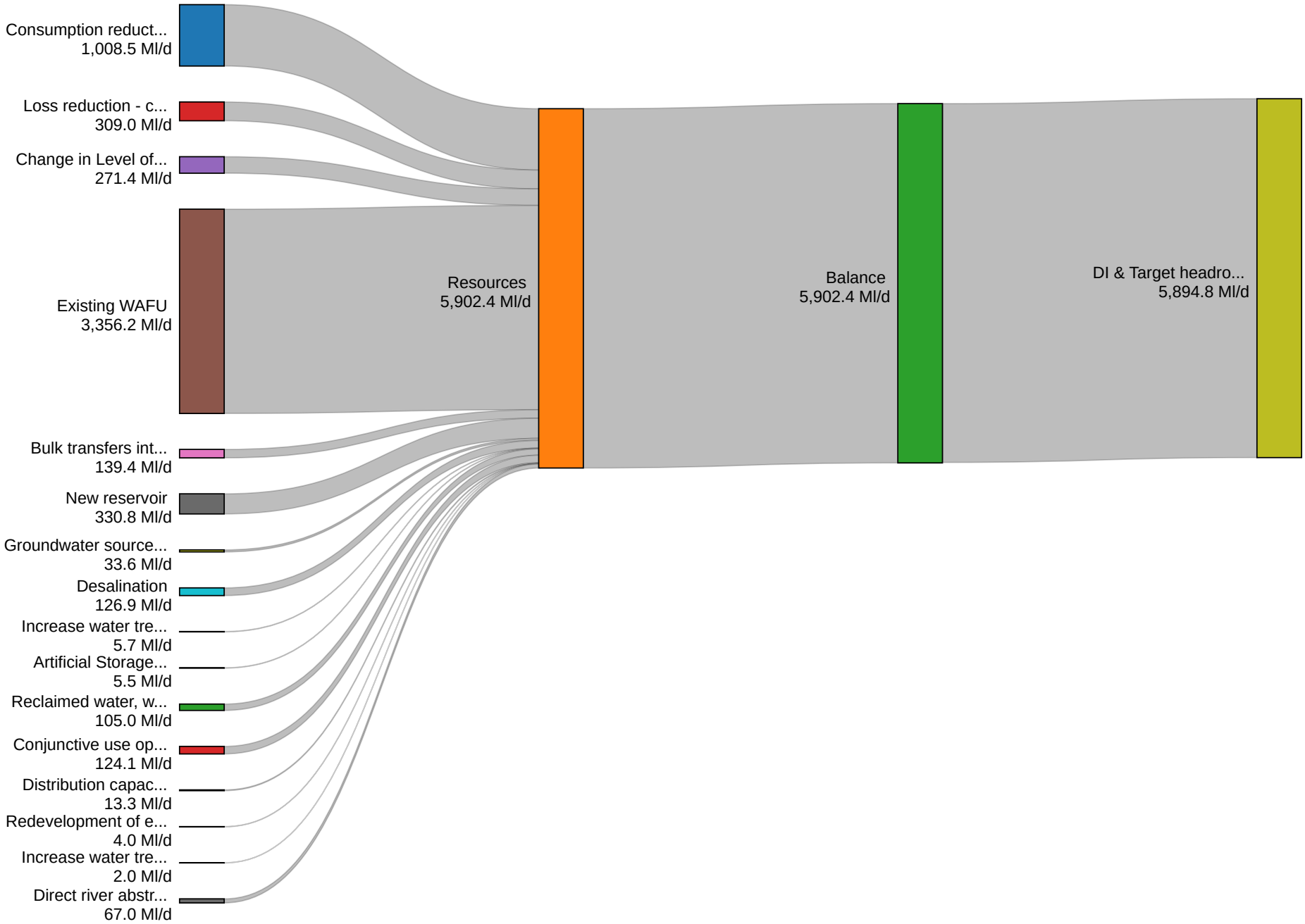
Situation 4 - 2026 (Thames Water)



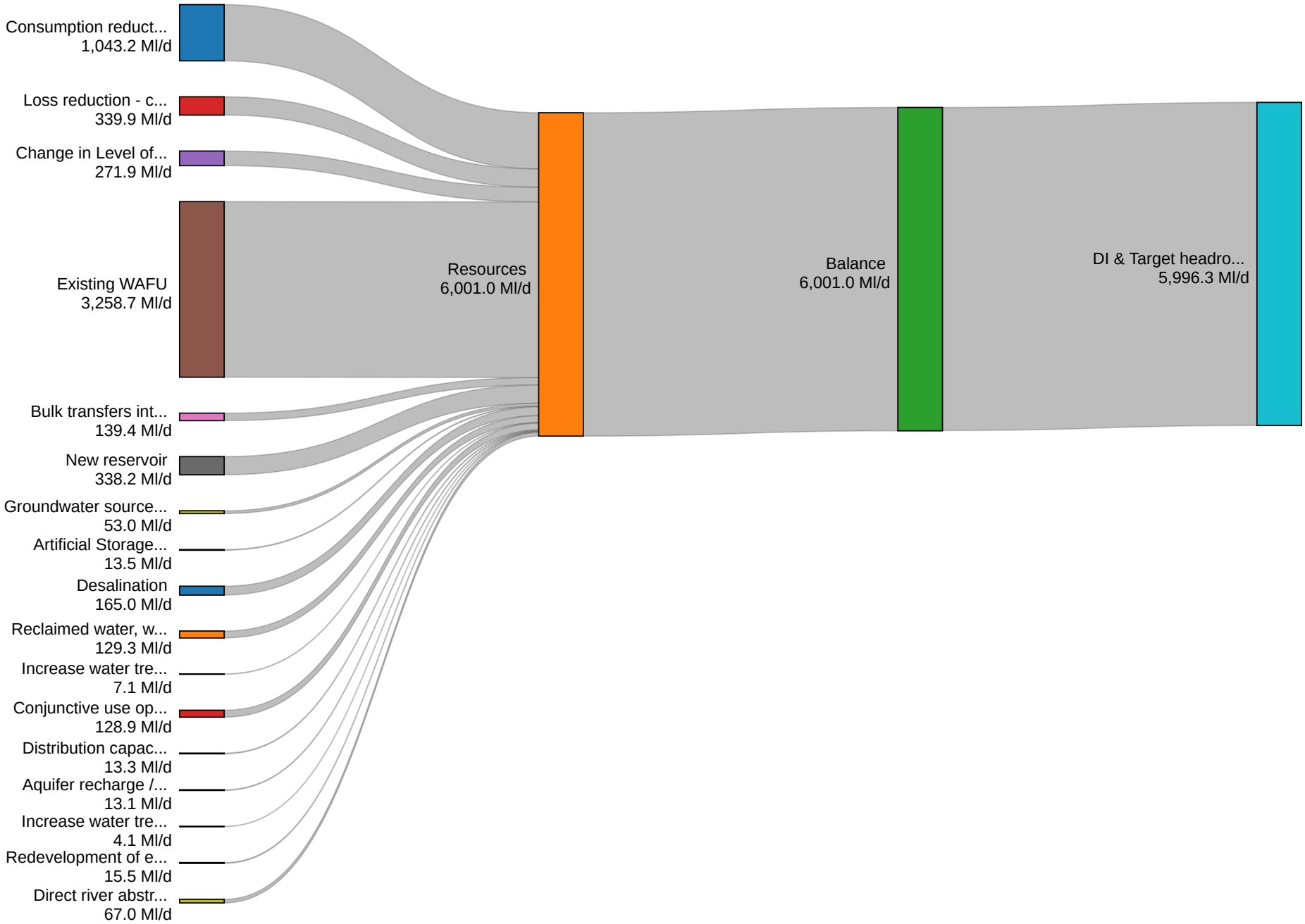
Situation 4 - 2040 (Thames Water)



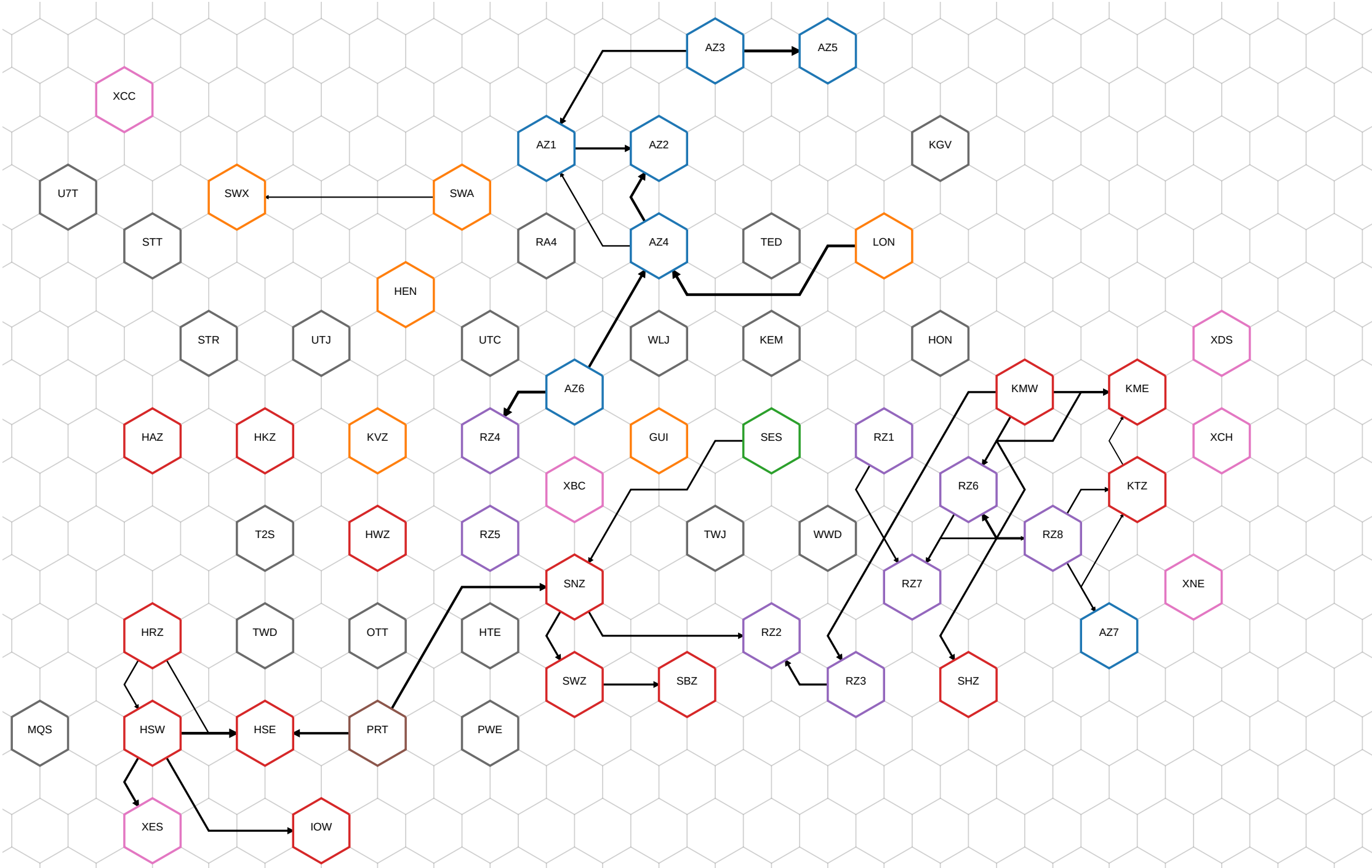
Situation 4 - 2050 (Thames Water)



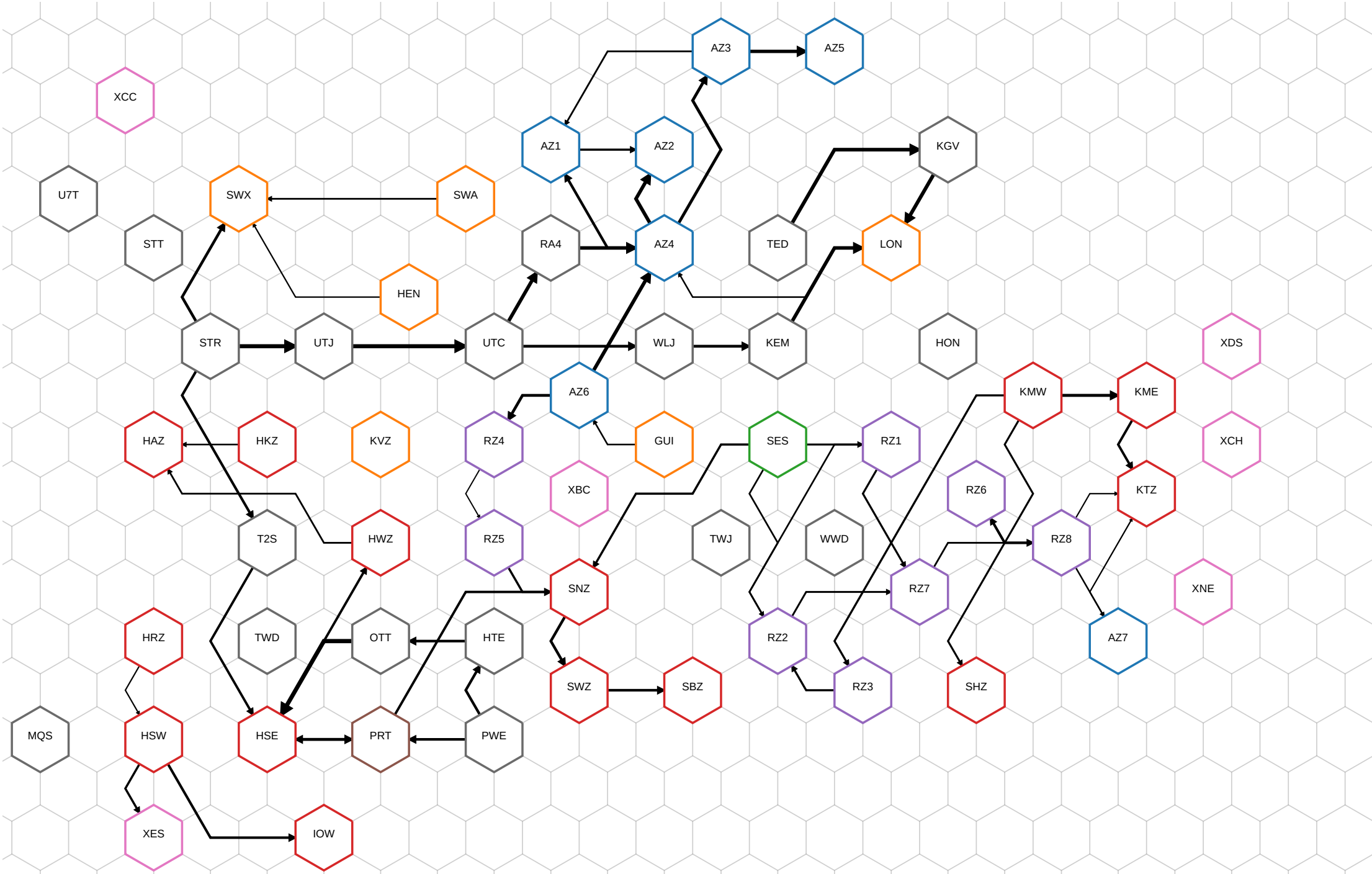
Situation 4 - 2075 (Thames Water)



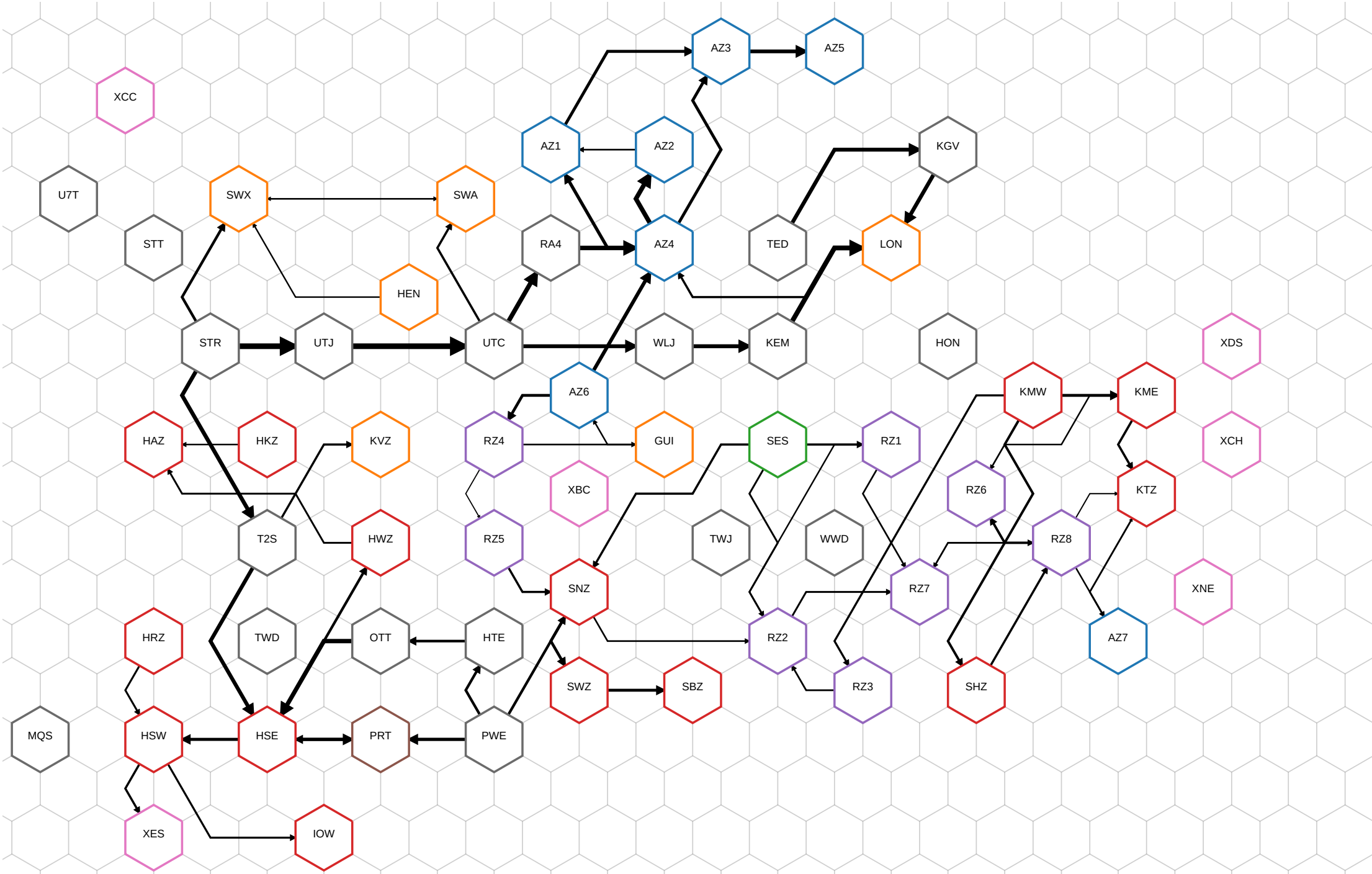
Situation 4 - 2026



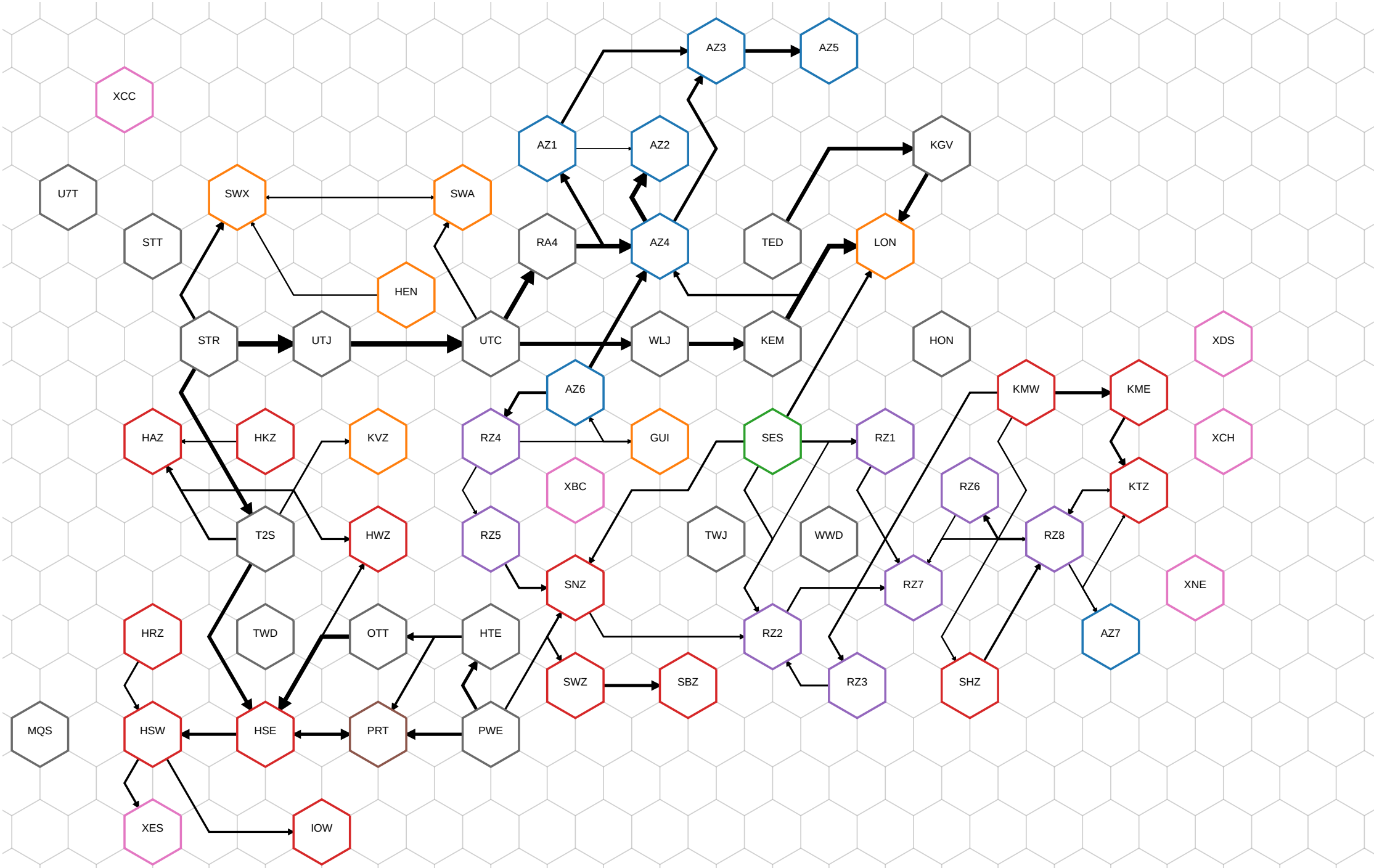
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – SESRO +30% OB

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p30pc-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions with SESRO optimism bias changed by +0.3.
Created at	08/09/2023, 12:46:53
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p30pc-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change SESRO optimism bias by 0.3.
Optimised discount rate	STPR

Metrics

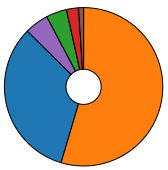
Net present value (Cost)

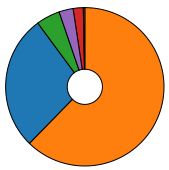
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,811	17,918	17,283	19,317	17,808	17,052	17,791	16,943	16,249	17,908	(£m)
Cost w/o deficit (STPR)	20,811	17,918	17,283	19,317	17,808	17,052	17,791	16,943	16,249	17,908	(£m)
Cost w/ deficit (IGEQ)	31,778	26,285	25,135	28,934	26,096	24,763	26,277	24,679	23,431	26,375	(£m)
Cost w/o deficit (IGEQ)	31,778	26,285	25,135	28,934	26,096	24,763	26,277	24,679	23,431	26,375	(£m)
Cost w/ deficit (LTDR)	22,934	19,566	18,836	21,195	19,442	18,578	19,457	18,471	17,675	19,573	(£m)
Cost w/o deficit (LTDR)	22,934	19,566	18,836	21,195	19,442	18,578	19,457	18,471	17,675	19,573	(£m)

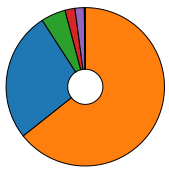
Cost breakdown (STPR)

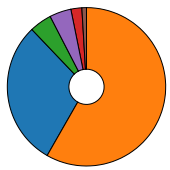
Select Company: Total

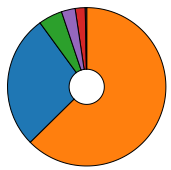
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,834	4,942	4,587	5,720	4,869	4,424	4,680	4,232	3,799	4,898	(£m)
Fixed opex	11,360	11,164	11,117	11,256	11,152	11,096	11,157	11,106	11,046	11,162	(£m)
Fixed operational carbon	880	869	868	877	869	867	871	867	865	870	(£m)
Embedded carbon	513	371	350	433	366	336	354	317	292	370	(£m)
Variable opex	1,012	517	327	850	499	299	636	385	230	528	(£m)
Variable carbon opex	212	55	35	181	53	30	93	37	17	79	(£m)

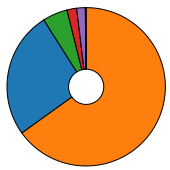
situation1 

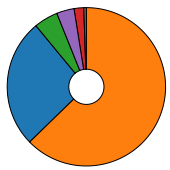
situation2 

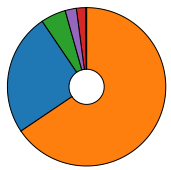
situation3 

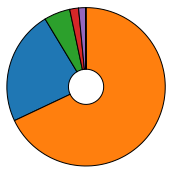
situation4 

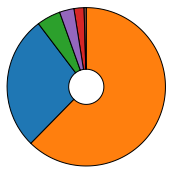
situation5 

situation6 

situation7 

situation8 

situation9 

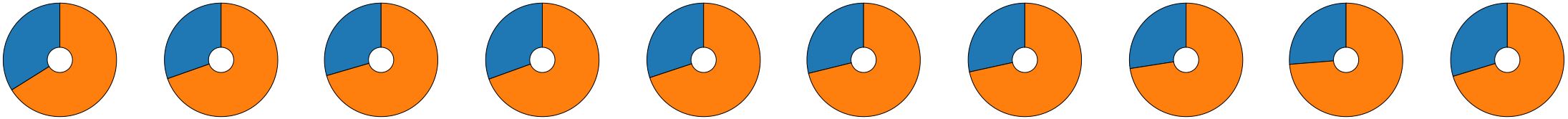
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,294,807	2,276,336	2,133,780	2,708,783	2,243,090	2,050,916	2,194,167	1,933,321	1,771,702	2,289,656	(tonnes)
Operational emissions	6,426,357	5,216,750	5,099,956	6,168,701	5,213,547	5,062,433	5,523,937	5,107,088	4,973,821	5,421,399	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

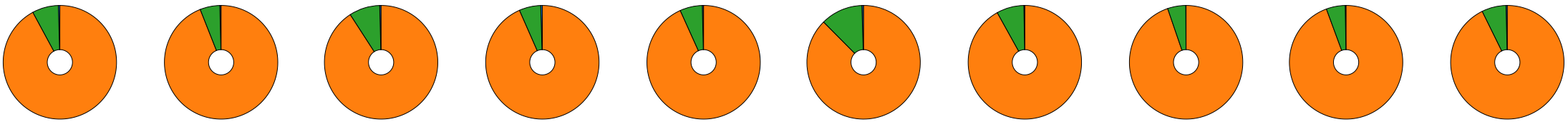


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	44	22	41	9	8	43	(GWh)
Grid	22,630	11,350	4,809	19,110	10,797	3,890	13,147	7,944	2,891	10,730	(GWh)
Renewable	1,837	681	463	1,257	739	532	1,115	433	165	803	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,329	63,942	63,072	67,165	63,787	62,908	63,883	61,609	60,553	64,028
SEA environmental disbenefit	114,980	81,875	74,905	100,618	79,947	75,529	83,828	70,451	61,604	82,637
Natural capital	80,815,629	77,190,134	79,960,252	75,317,089	77,196,794	79,705,268	80,951,905	81,730,369	84,602,292	79,718,859
Bio-diversity net gain	−218,313	−149,878	−123,818	−203,847	−149,472	−133,352	−119,765	−92,607	−63,553	−139,401

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,054	31,882	31,509	33,167	31,712	31,470	31,710	30,801	30,311	31,846

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.94	29.35	32.20	28.29	29.53	32.19	28.49	31.45	34.94	30.60
R1: Uncertainty of option supply/demand benefit	5.97	5.35	5.86	5.56	5.41	5.81	5.28	5.70	6.29	5.69
R3: Risk of service failure due to other physical hazards	6.97	7.31	8.21	6.91	7.37	8.20	7.02	7.94	9.05	7.67
R4: Availability of additional headroom	6.57	6.92	7.14	6.65	6.94	7.14	7.08	7.44	7.68	7.06
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.87	4.24	4.80	3.94	4.54	5.24	4.42
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.53	6.21	5.30	5.57	6.22	5.17	5.83	6.67	5.76
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

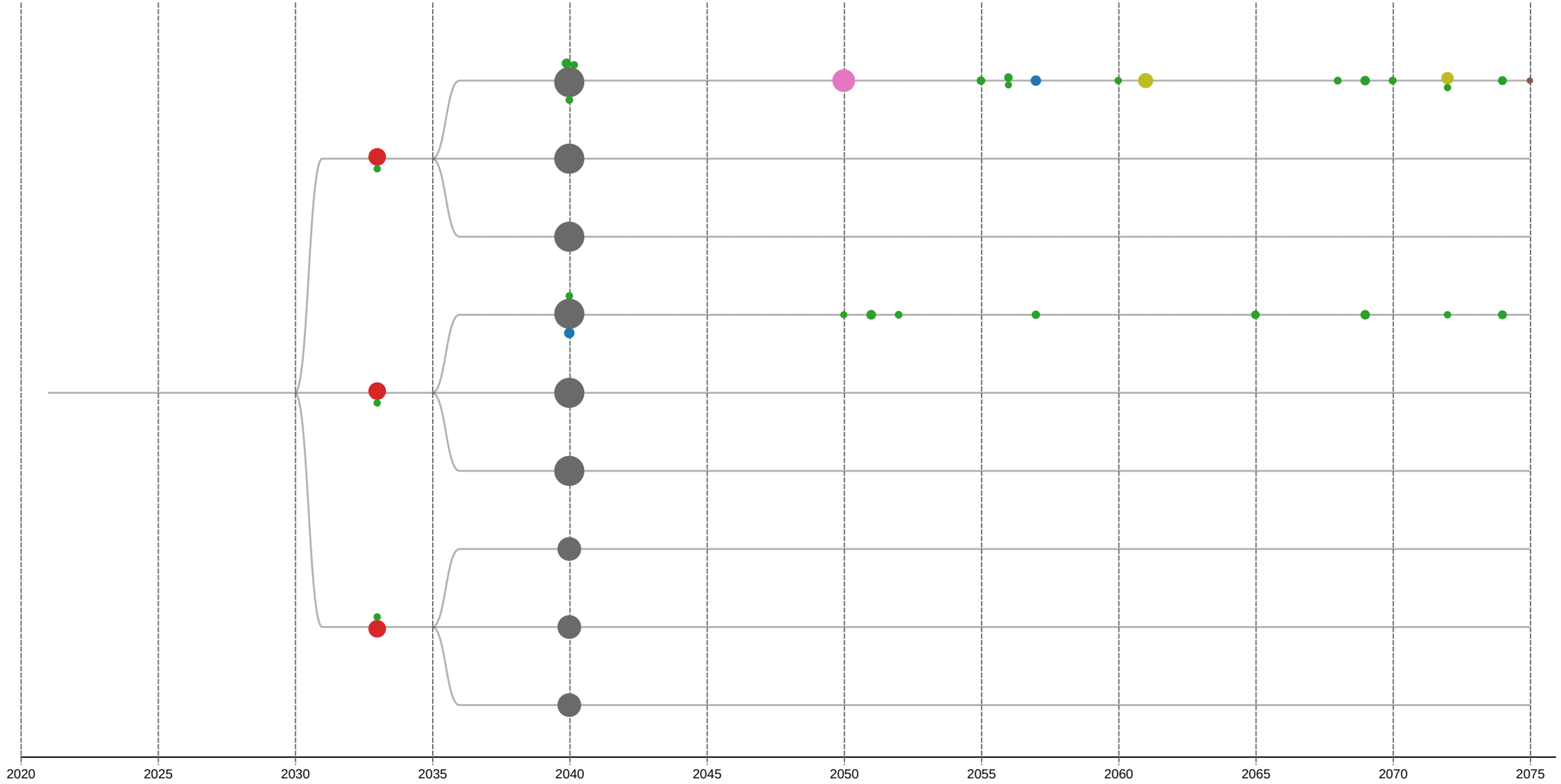
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.04	15.63	17.49	14.15	15.68	17.40	15.41	17.53	19.99	16.37
A3: Operational complexity and flexibility	6.50	7.02	7.90	6.59	7.08	7.95	6.70	7.67	8.80	7.36
A4: WRZ connectivity	7.51	8.58	9.57	7.54	8.58	9.42	8.68	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.17	19.81	22.04	18.70	19.94	21.88	20.17	22.86	25.89	21.16
E1: Scaleability and modularity of proposed changes	8.77	9.29	10.38	8.67	9.40	10.41	9.65	11.08	12.61	10.03
E2: Intervention lead times	4.21	4.13	4.54	3.96	4.10	4.33	4.02	4.40	4.88	4.29
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.08	6.44	7.14	6.49	7.38	8.40	6.85
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

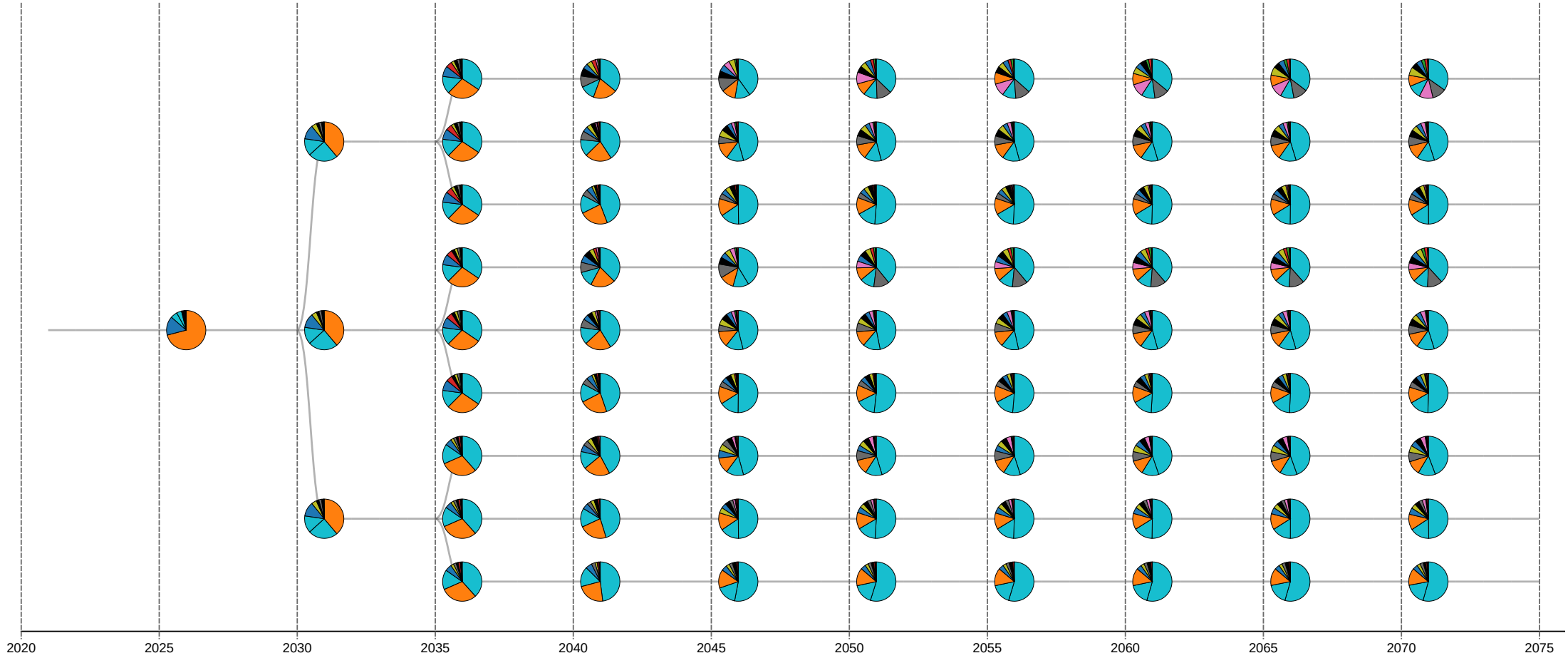
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

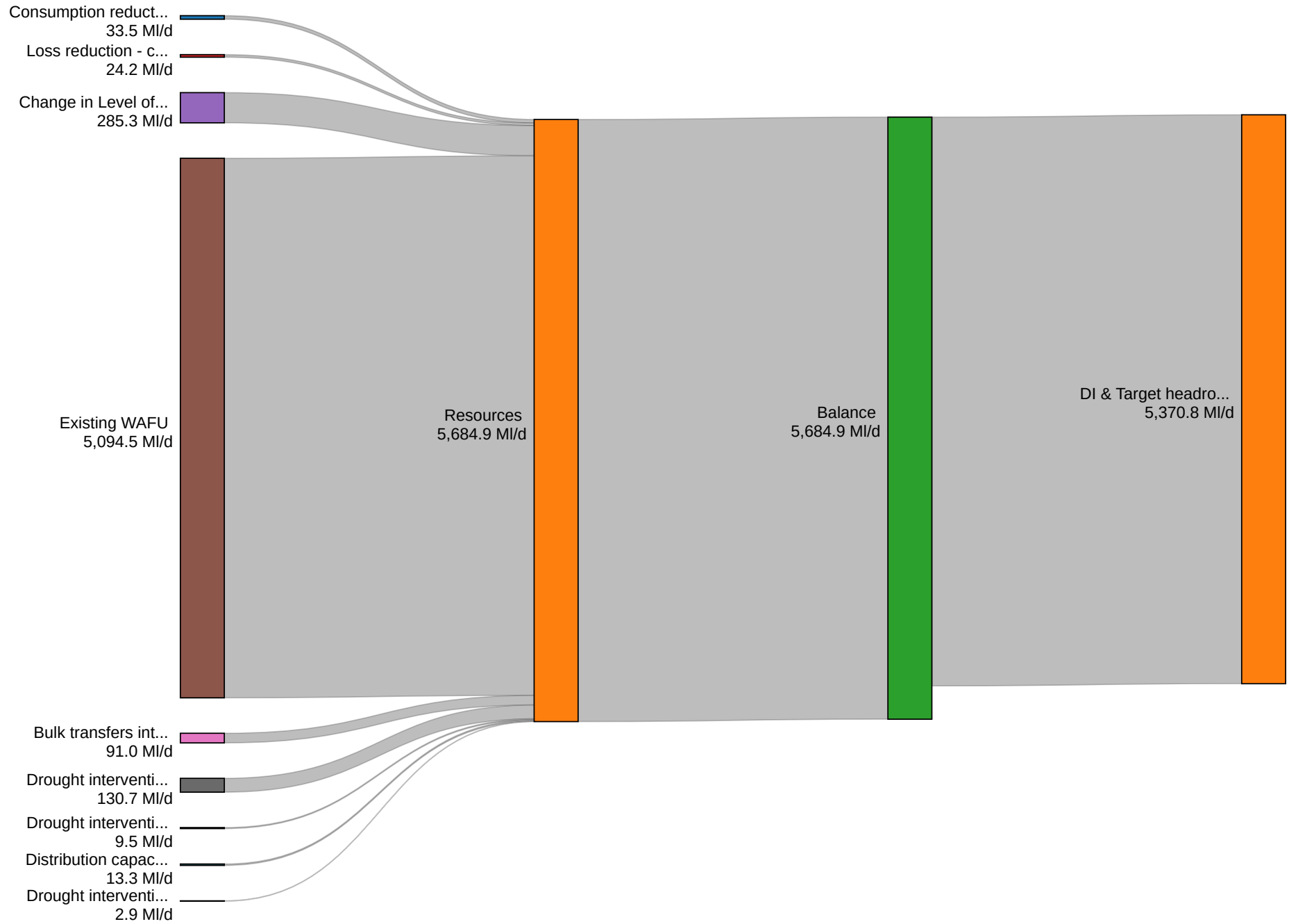
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

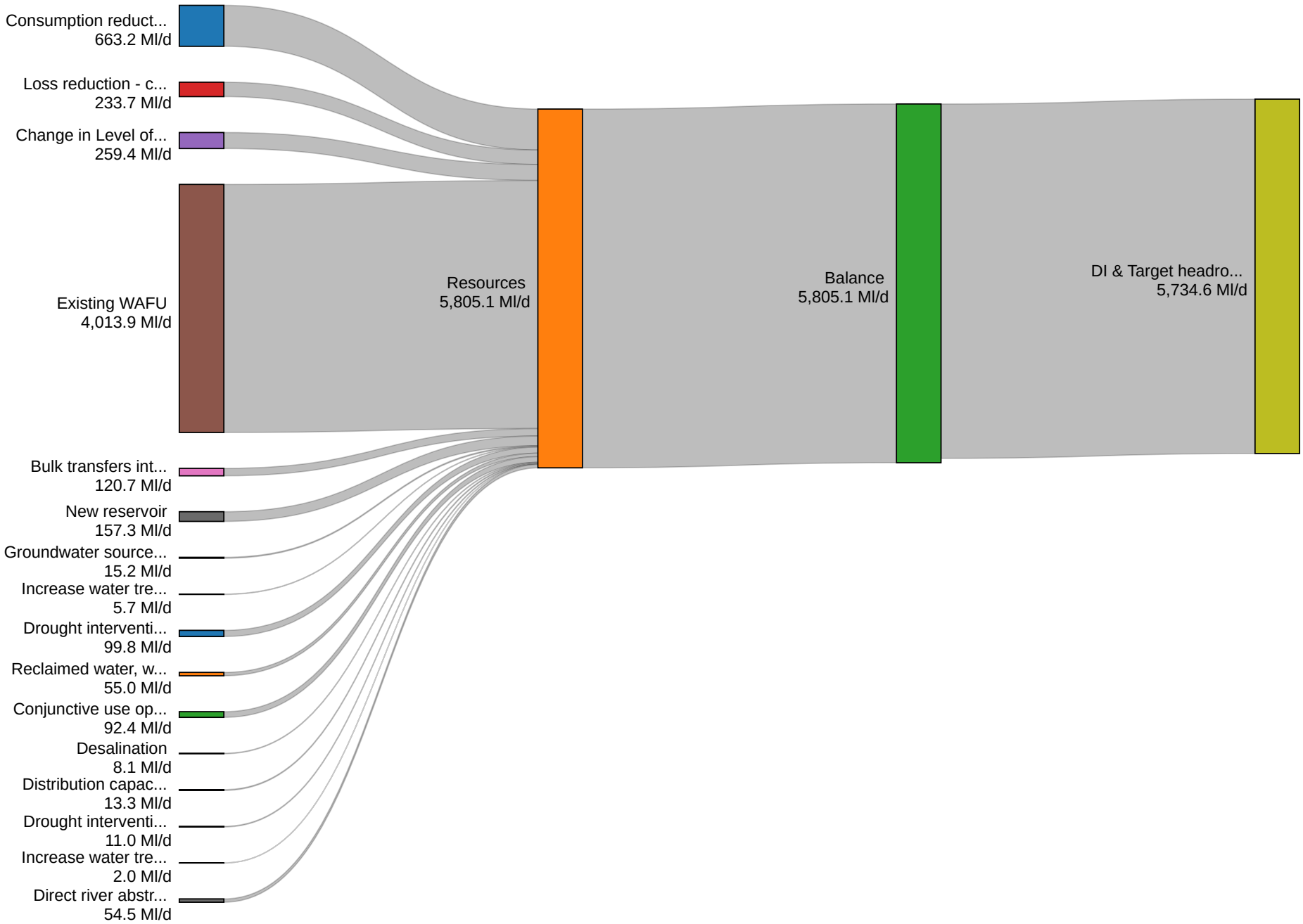


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

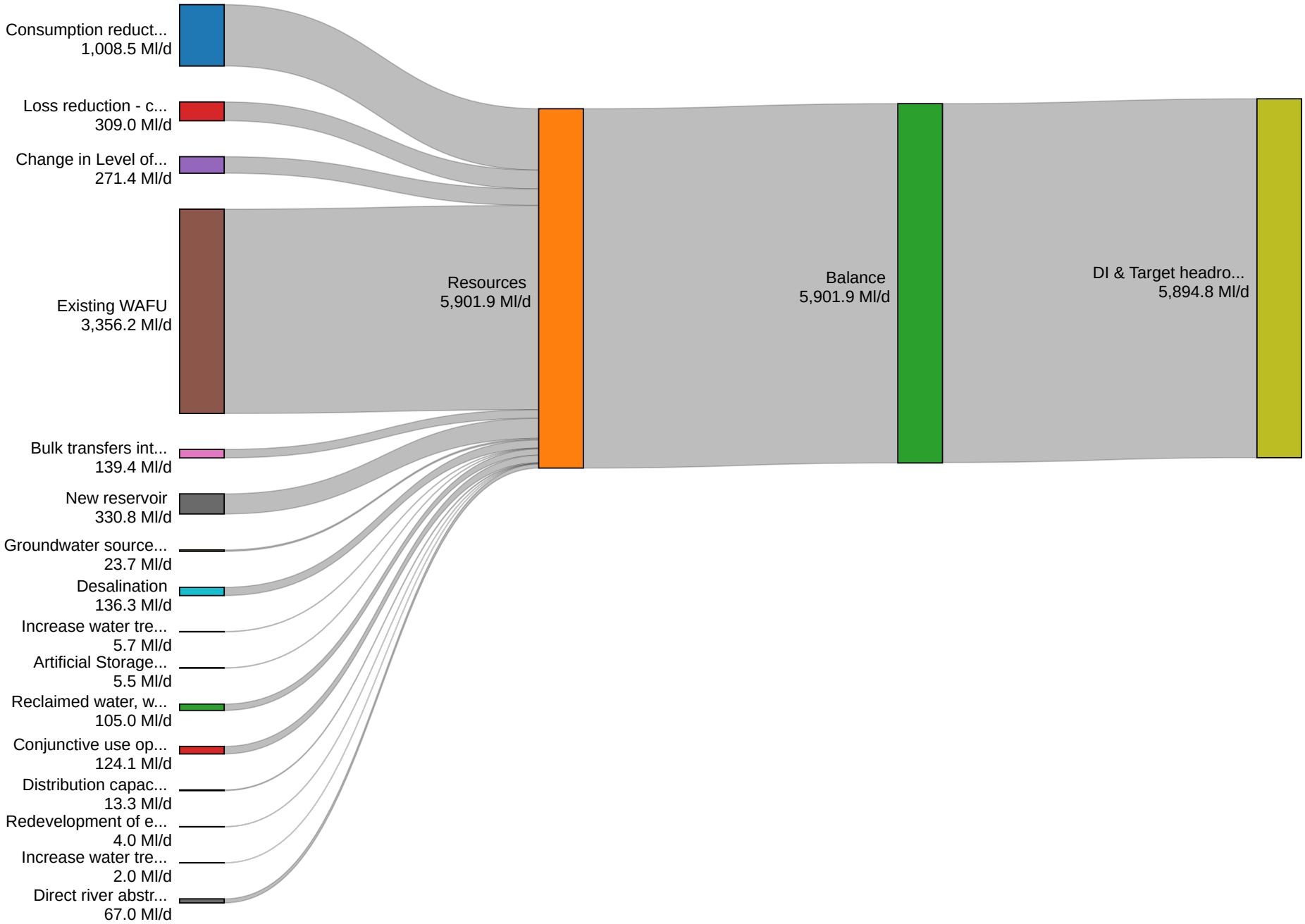
Situation 4 - 2026 (Thames Water)



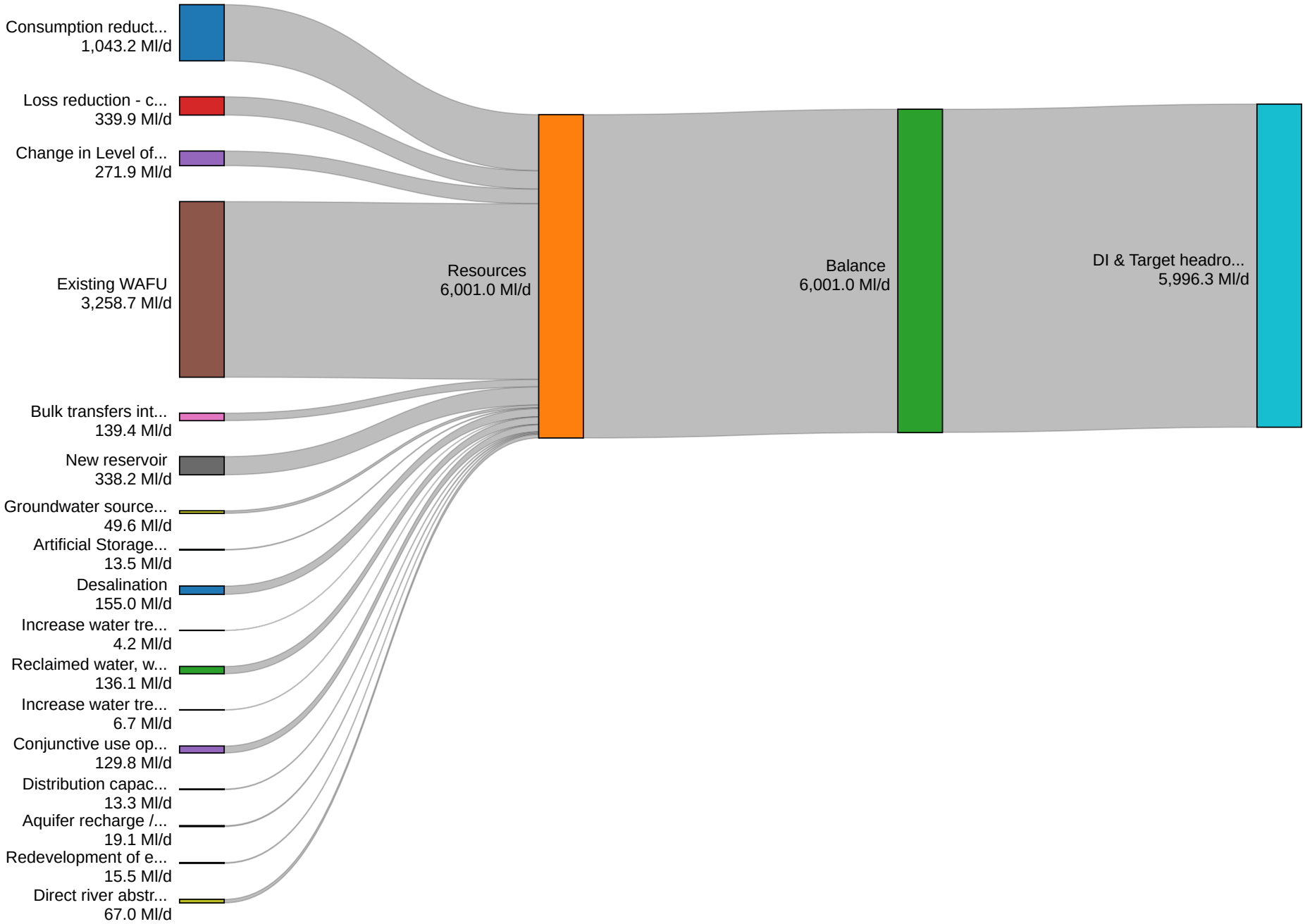
Situation 4 - 2040 (Thames Water)



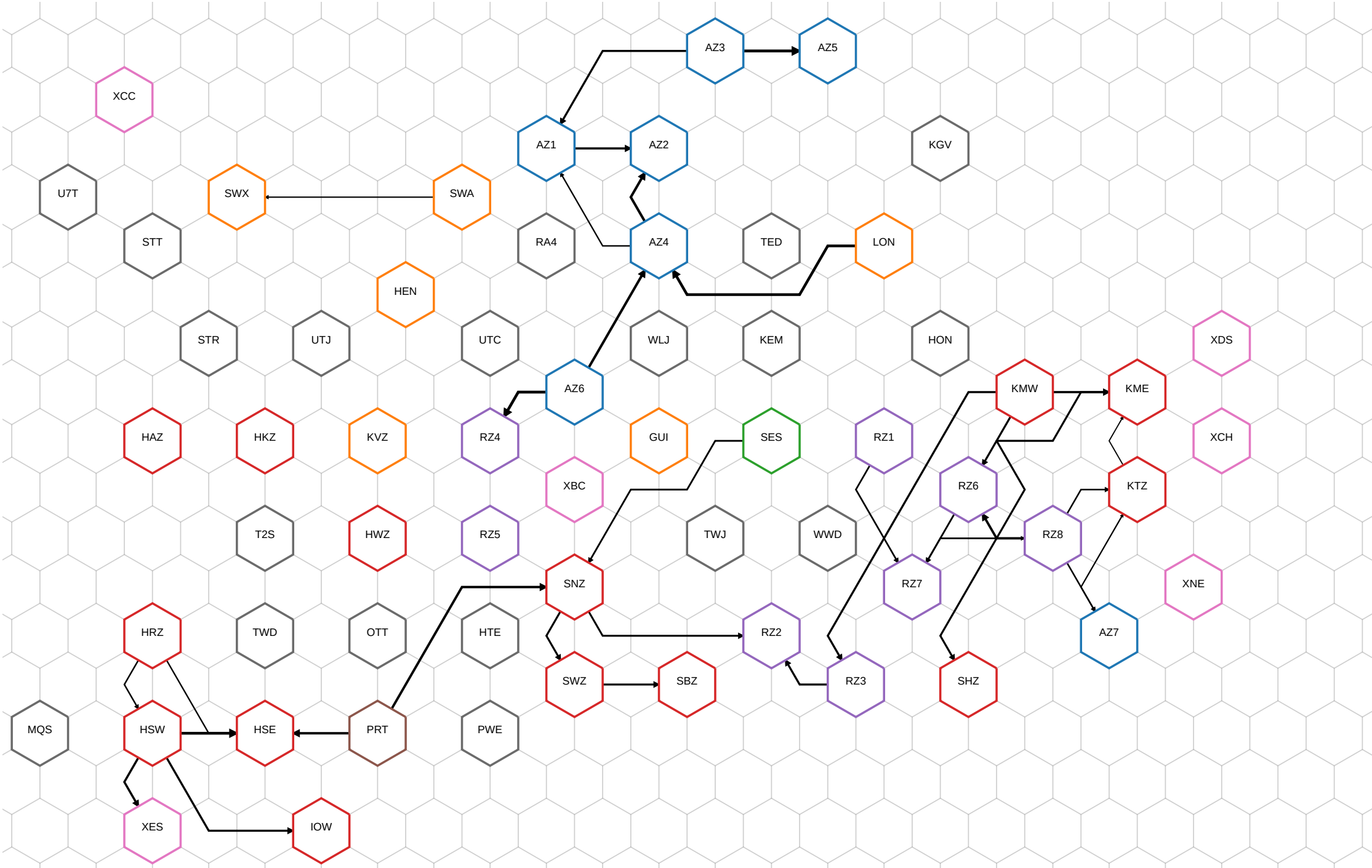
Situation 4 - 2050 (Thames Water)



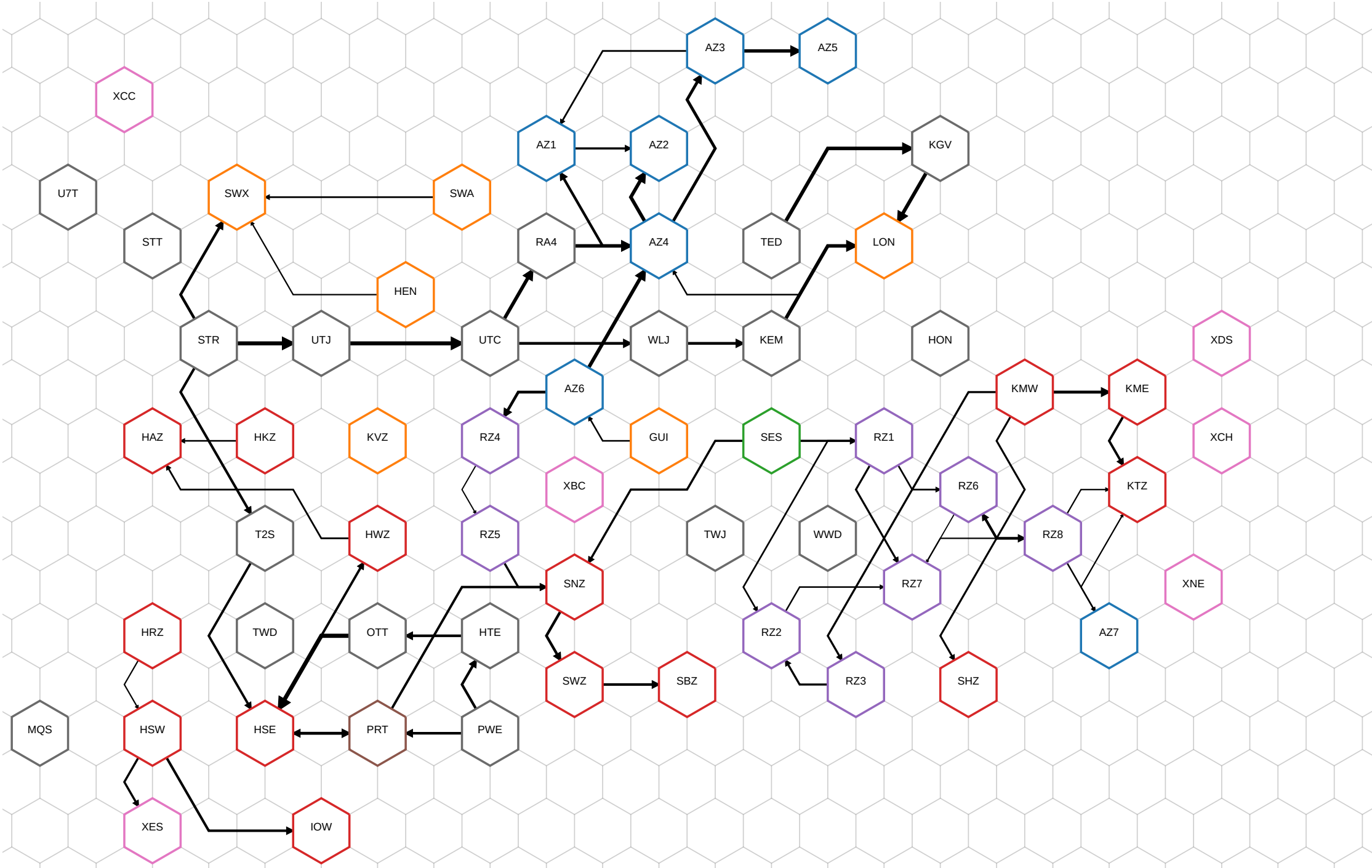
Situation 4 - 2075 (Thames Water)



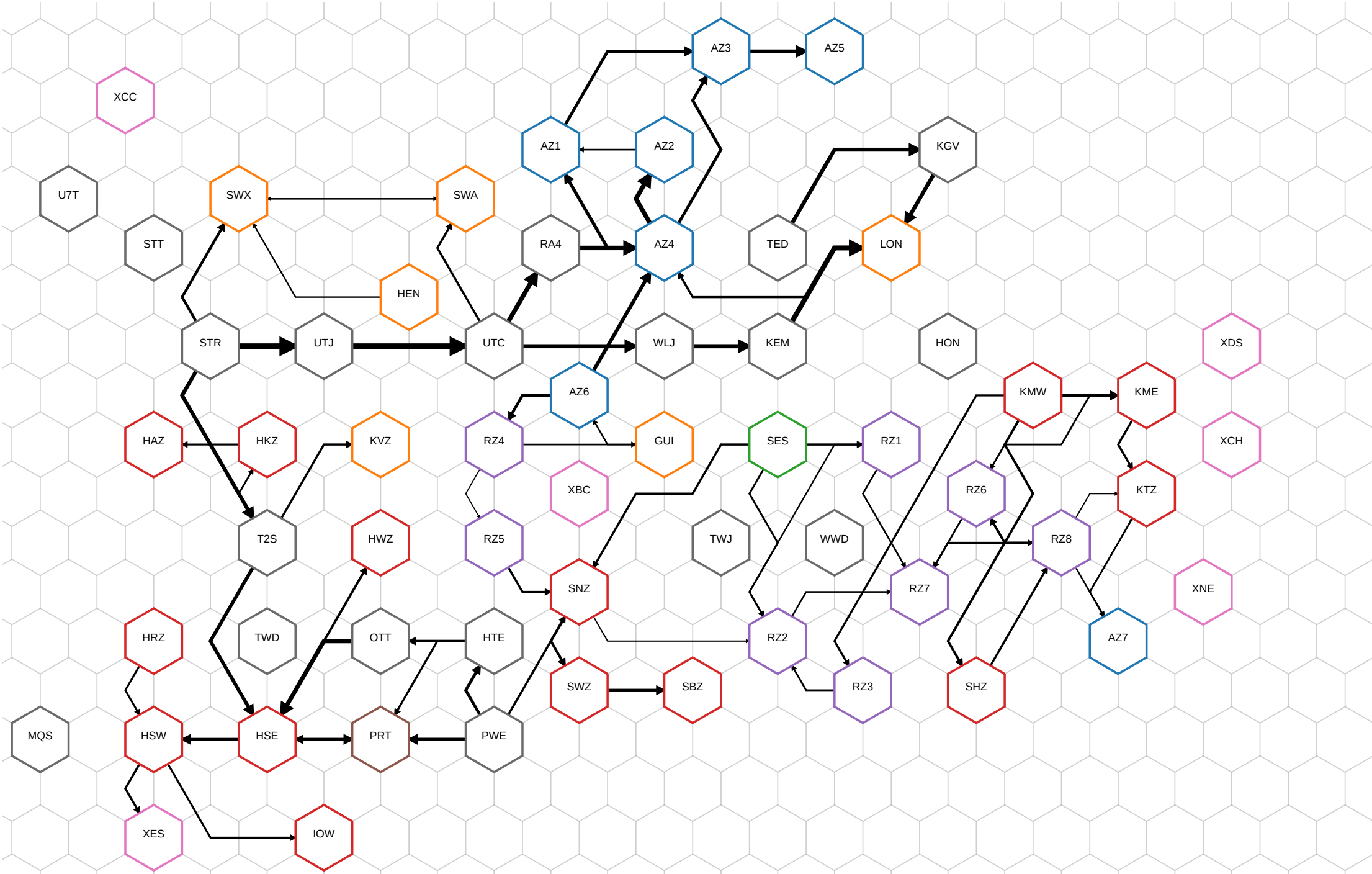
Situation 4 - 2026



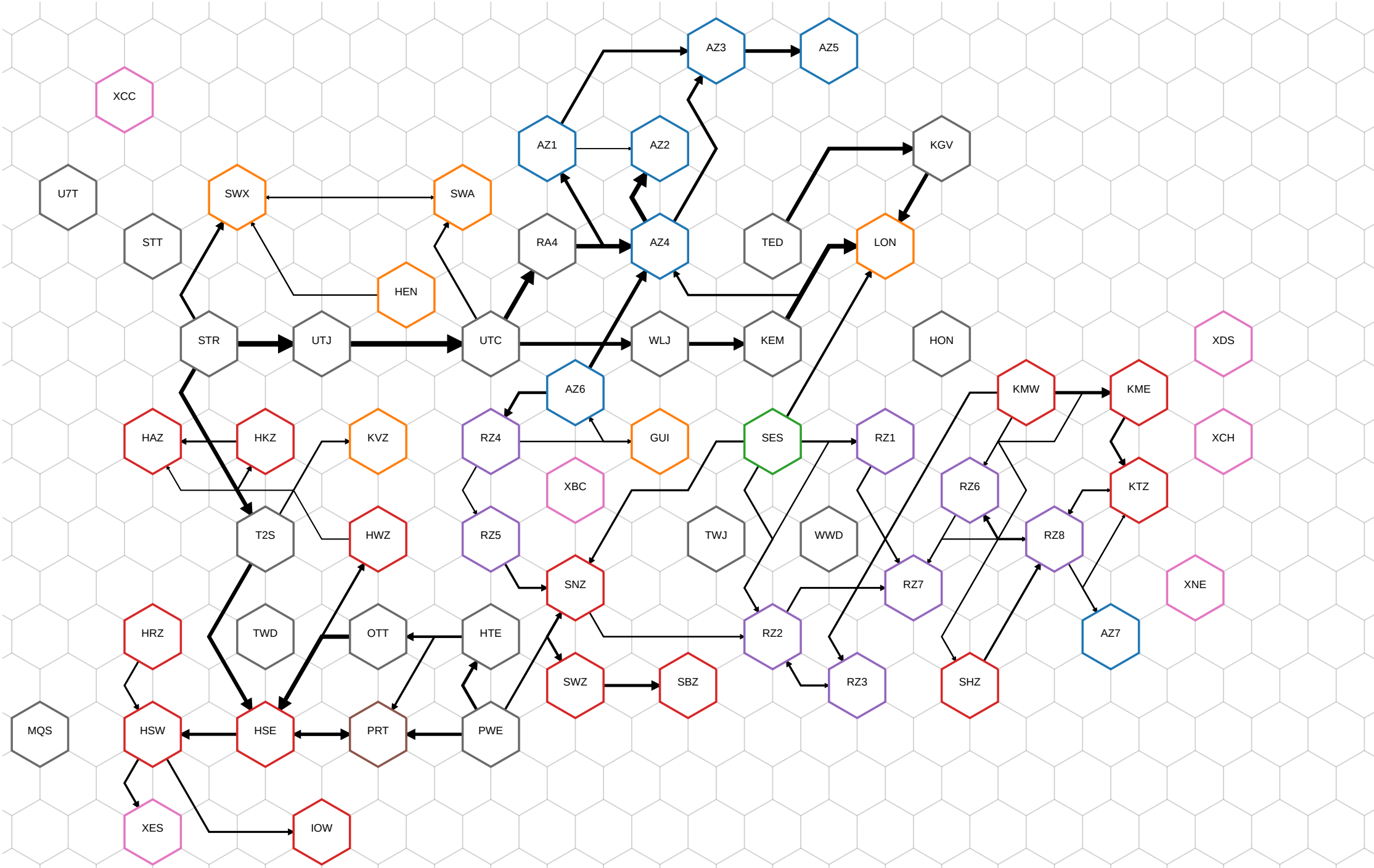
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – SESRO +40% OB

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p40pc-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions with SESRO optimism bias changed by +0.4.
Created at	08/09/2023, 13:21:56
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p40pc-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change SESRO optimism bias by 0.4.
Optimised discount rate	STPR

Metrics

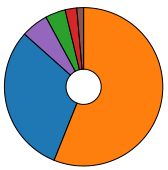
Net present value (Cost)

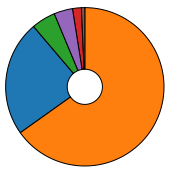
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,217	17,687	16,850	19,724	17,465	16,501	18,218	16,696	15,960	17,813	(£m)
Cost w/o deficit (STPR)	21,217	17,687	16,850	19,724	17,465	16,501	18,218	16,696	15,960	17,813	(£m)
Cost w/ deficit (IGEQ)	32,560	26,058	24,532	29,854	25,718	23,956	27,124	24,339	23,010	26,350	(£m)
Cost w/o deficit (IGEQ)	32,560	26,058	24,532	29,854	25,718	23,956	27,124	24,339	23,010	26,350	(£m)
Cost w/ deficit (LTDR)	23,412	19,334	18,369	21,695	19,087	17,976	19,961	18,206	17,360	19,489	(£m)
Cost w/o deficit (LTDR)	23,412	19,334	18,369	21,695	19,087	17,976	19,961	18,206	17,360	19,489	(£m)

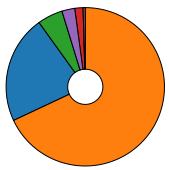
Cost breakdown (STPR)

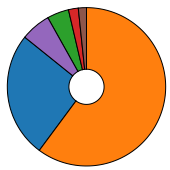
Select Company: Total

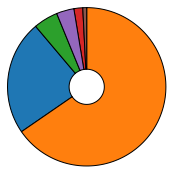
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,477	4,182	3,718	5,054	4,093	3,572	4,272	3,708	3,254	4,259	(£m)
Fixed opex	11,896	11,523	11,460	11,866	11,423	11,330	11,694	11,345	11,282	11,535	(£m)
Fixed operational carbon	883	869	870	880	870	869	872	867	865	872	(£m)
Embedded carbon	503	321	284	395	317	281	329	284	257	330	(£m)
Variable opex	1,166	670	441	1,203	624	381	855	437	273	672	(£m)
Variable carbon opex	292	121	76	327	139	68	196	55	30	145	(£m)

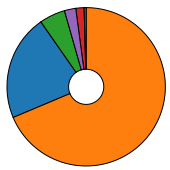
situation1 

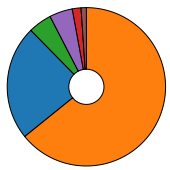
situation2 

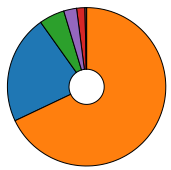
situation3 

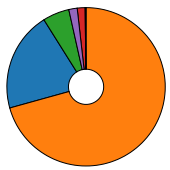
situation4 

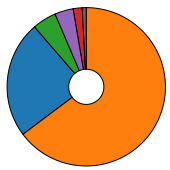
situation5 

situation6 

situation7 

situation8 

situation9 

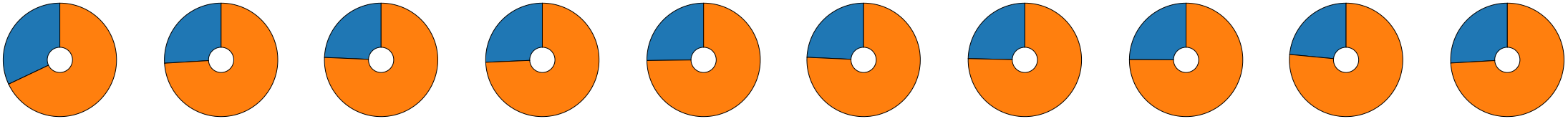
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,266,265	1,981,049	1,729,048	2,484,072	1,951,769	1,705,991	2,040,659	1,736,059	1,550,629	2,049,505	(tonnes)
Operational emissions	6,927,966	5,654,654	5,381,166	7,188,656	5,800,432	5,320,049	6,238,428	5,230,470	5,055,091	5,866,323	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

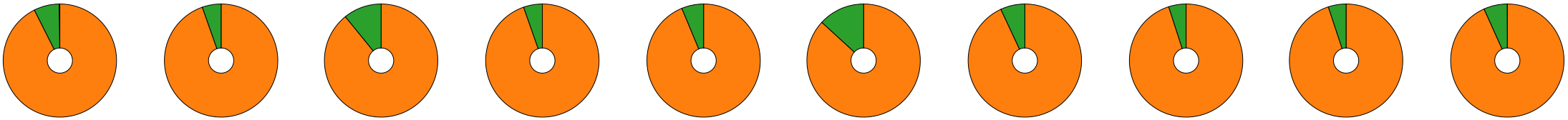


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	52	0	0	0	0	0	0	0	0	6	(GWh)
Grid	23,105	12,000	5,001	22,311	11,492	4,310	15,017	8,311	3,098	11,627	(GWh)
Renewable	1,798	683	609	1,263	768	654	1,121	434	165	833	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	68,450	61,304	60,330	65,112	61,724	60,499	62,201	60,159	58,936	62,079
SEA environmental disbenefit	109,170	77,833	69,379	98,435	76,172	69,552	82,072	68,058	57,744	78,713
Natural capital	65,090,453	6,763,918	10,137,487	3,602,984	6,309,111	9,012,965	4,989,242	6,440,097	9,341,914	13,520,908
Bio-diversity net gain	−198,472	−201,266	−166,165	−249,112	−196,520	−168,291	−198,173	−170,197	−140,647	−187,649

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,927	31,646	31,271	33,147	31,583	31,049	31,843	30,763	30,189	31,713

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.65	25.90	27.97	26.56	26.53	28.54	28.06	29.80	32.92	28.32
R1: Uncertainty of option supply/demand benefit	6.08	4.82	5.16	5.42	4.99	5.29	5.34	5.43	5.95	5.39
R3: Risk of service failure due to other physical hazards	6.87	6.26	6.92	6.30	6.49	7.11	6.72	7.38	8.37	6.94
R4: Availability of additional headroom	6.47	6.68	6.88	6.49	6.72	6.92	7.08	7.38	7.61	6.91
R5: Catchment/raw water quality risks (incl. climate change)	3.85	3.52	3.92	3.54	3.61	4.02	3.93	4.26	4.90	3.95
R6: Capacity of catchment services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.39	4.62	5.09	4.80	4.72	5.20	4.99	5.35	6.08	5.14
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

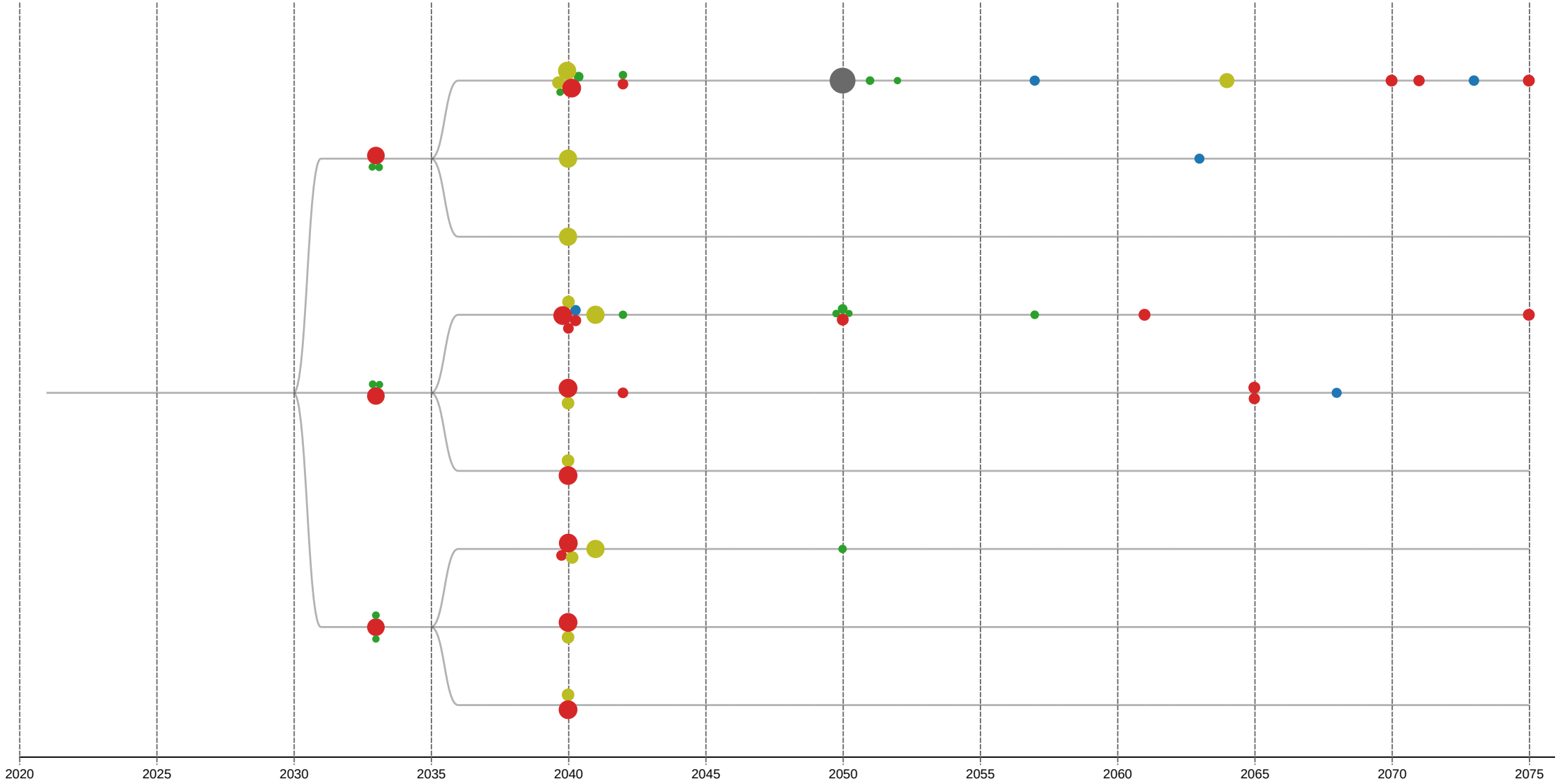
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.59	14.30	15.88	13.31	14.46	15.89	14.69	16.60	18.82	15.39
A3: Operational complexity and flexibility	6.35	5.92	6.56	5.82	6.08	6.74	6.23	6.98	7.98	6.52
A4: WRZ connectivity	8.21	8.35	9.30	7.46	8.36	9.12	8.44	9.58	10.80	8.85
A7: Customer relations support engagement with demand management	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.90	19.37	21.38	19.32	20.09	22.08	20.88	23.20	26.17	21.38
E1: Scaleability and modularity of proposed changes	9.01	9.21	10.21	8.81	9.39	10.38	9.66	10.87	12.33	9.99
E2: Intervention lead times	4.44	3.86	4.20	4.21	4.19	4.52	4.47	4.85	5.36	4.46
E3: Reliance on external bodies to deliver changes	6.45	6.30	6.97	6.31	6.52	7.18	6.75	7.47	8.48	6.94
E5: Collaborative land management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

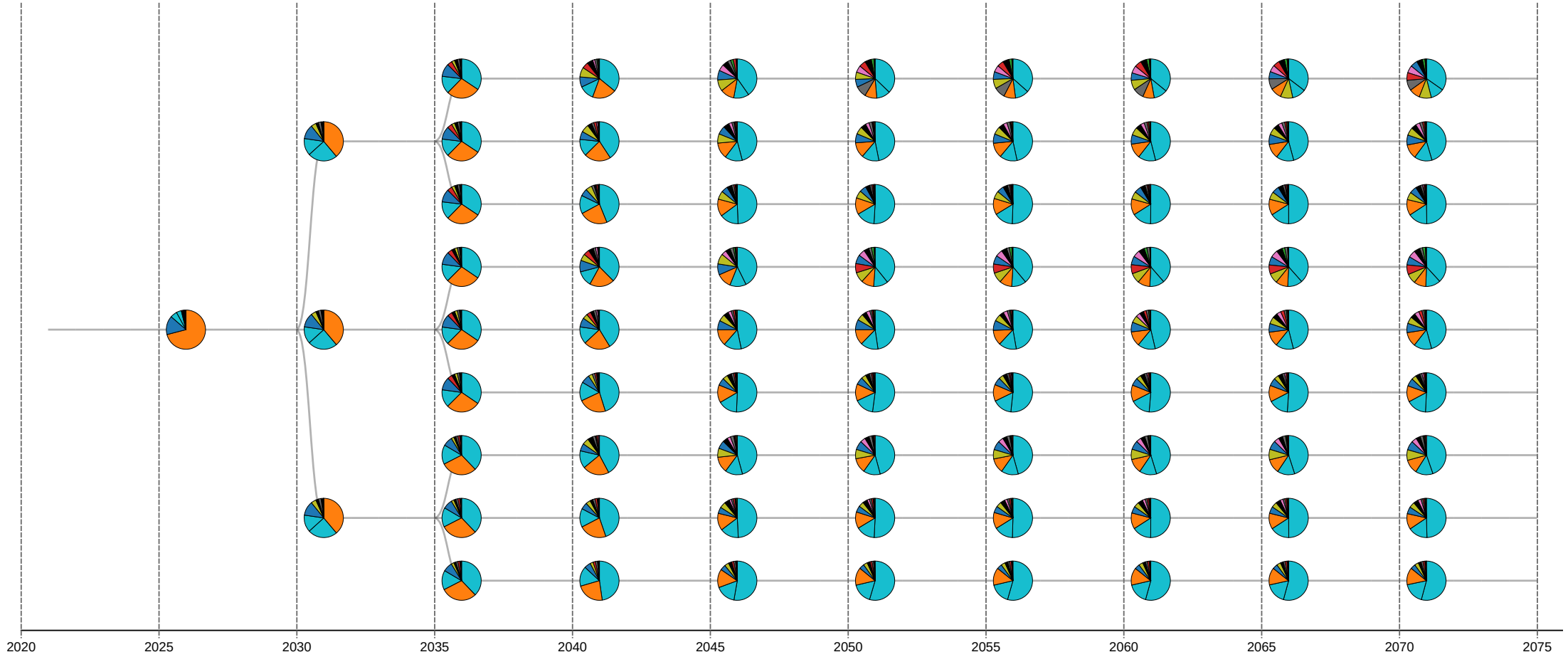
Option Selection (Thames Water)



- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

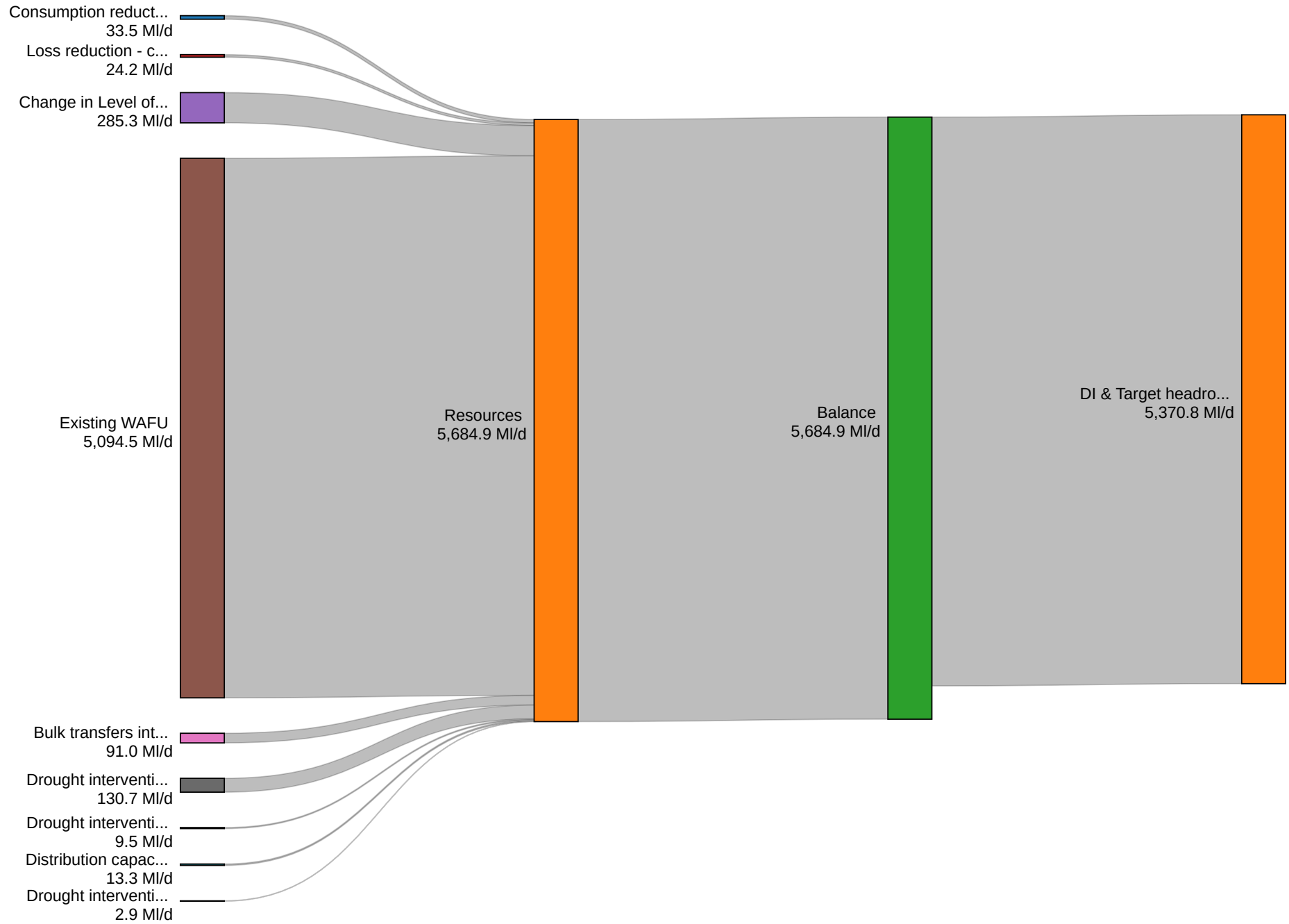
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.

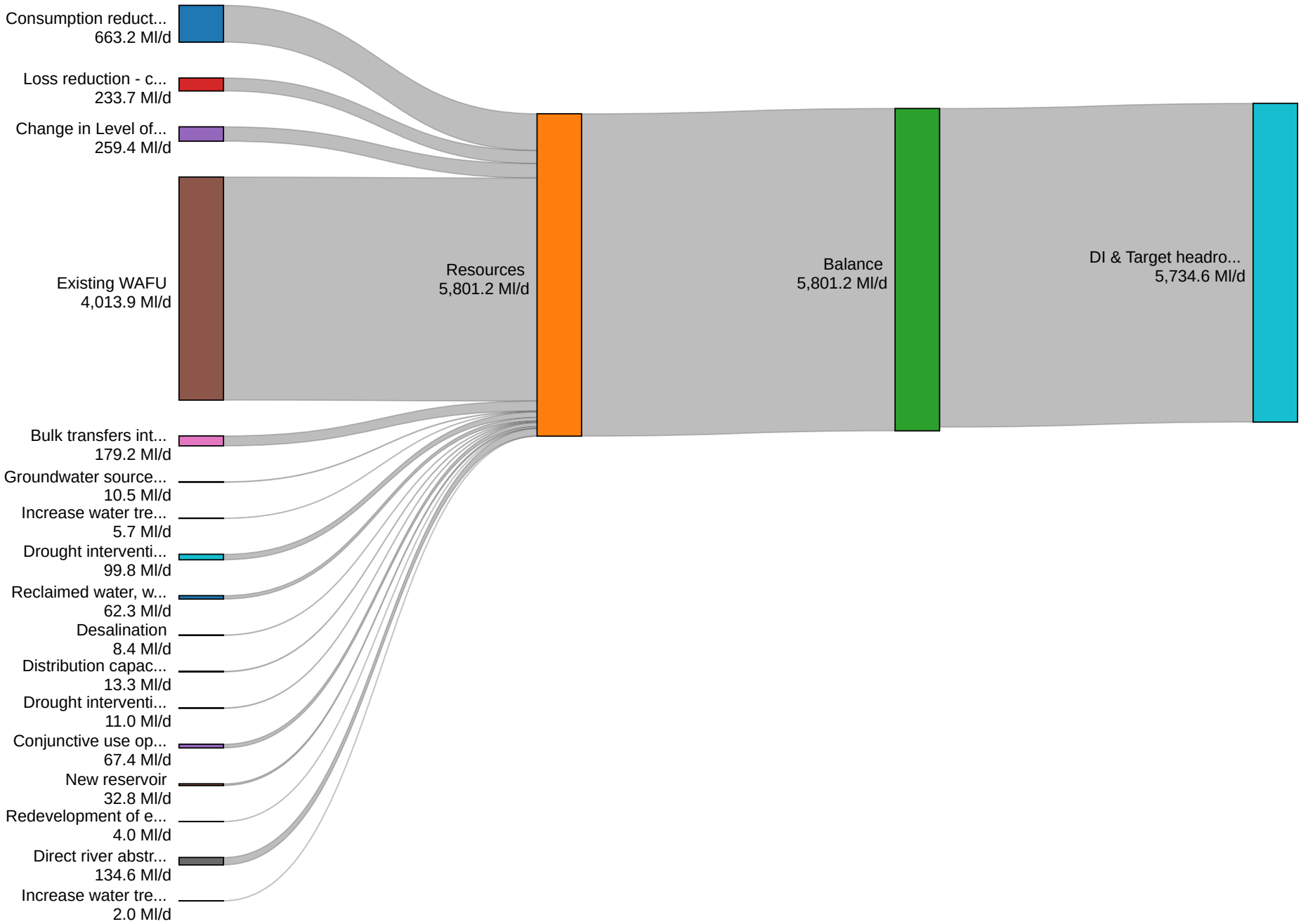


- Transfer
- Transfer into region
- Drought intervention
- Groundwater
- Direct river abstraction
- Trading
- Catchment management
- Desalination
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

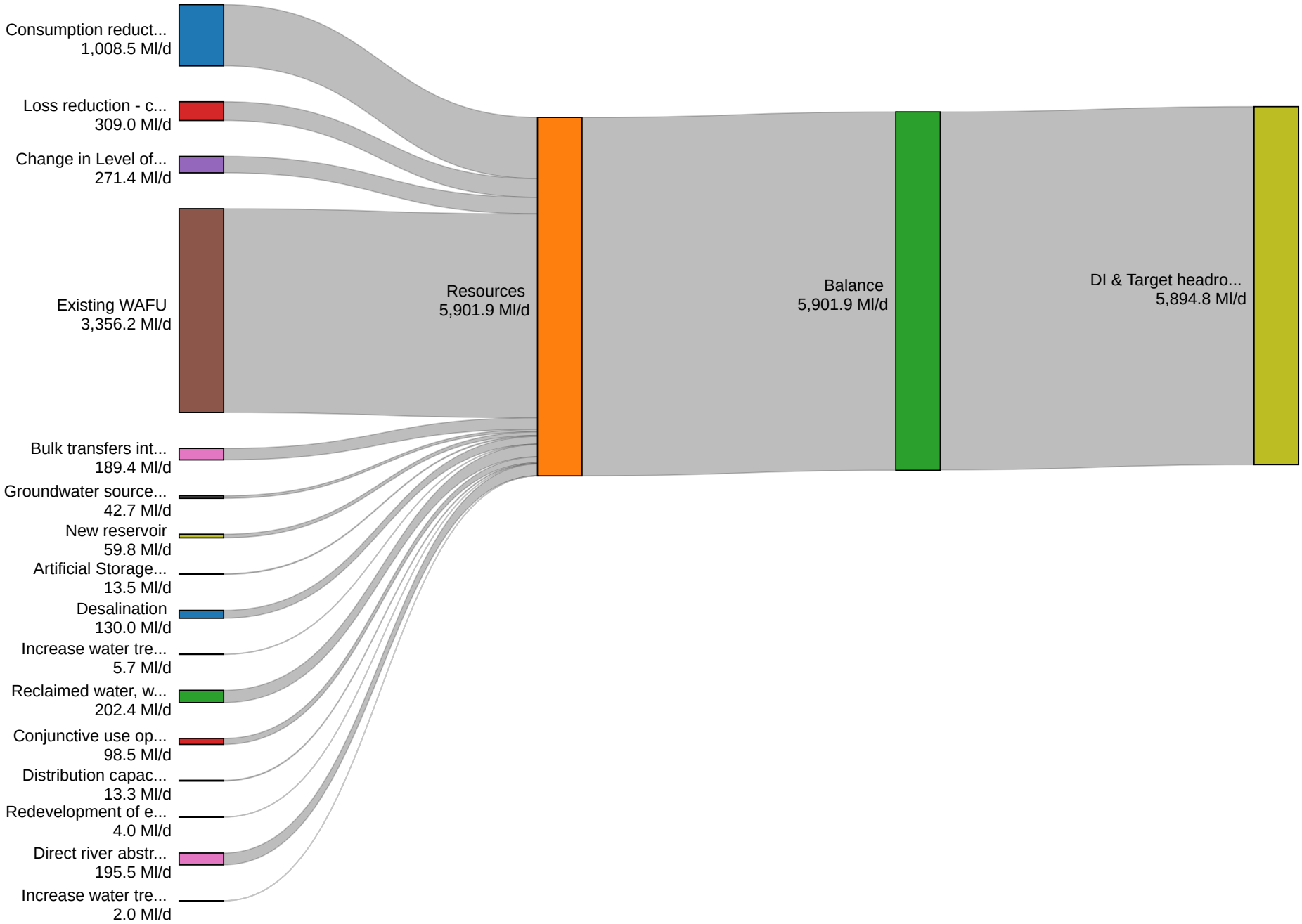
Situation 4 - 2026 (Thames Water)



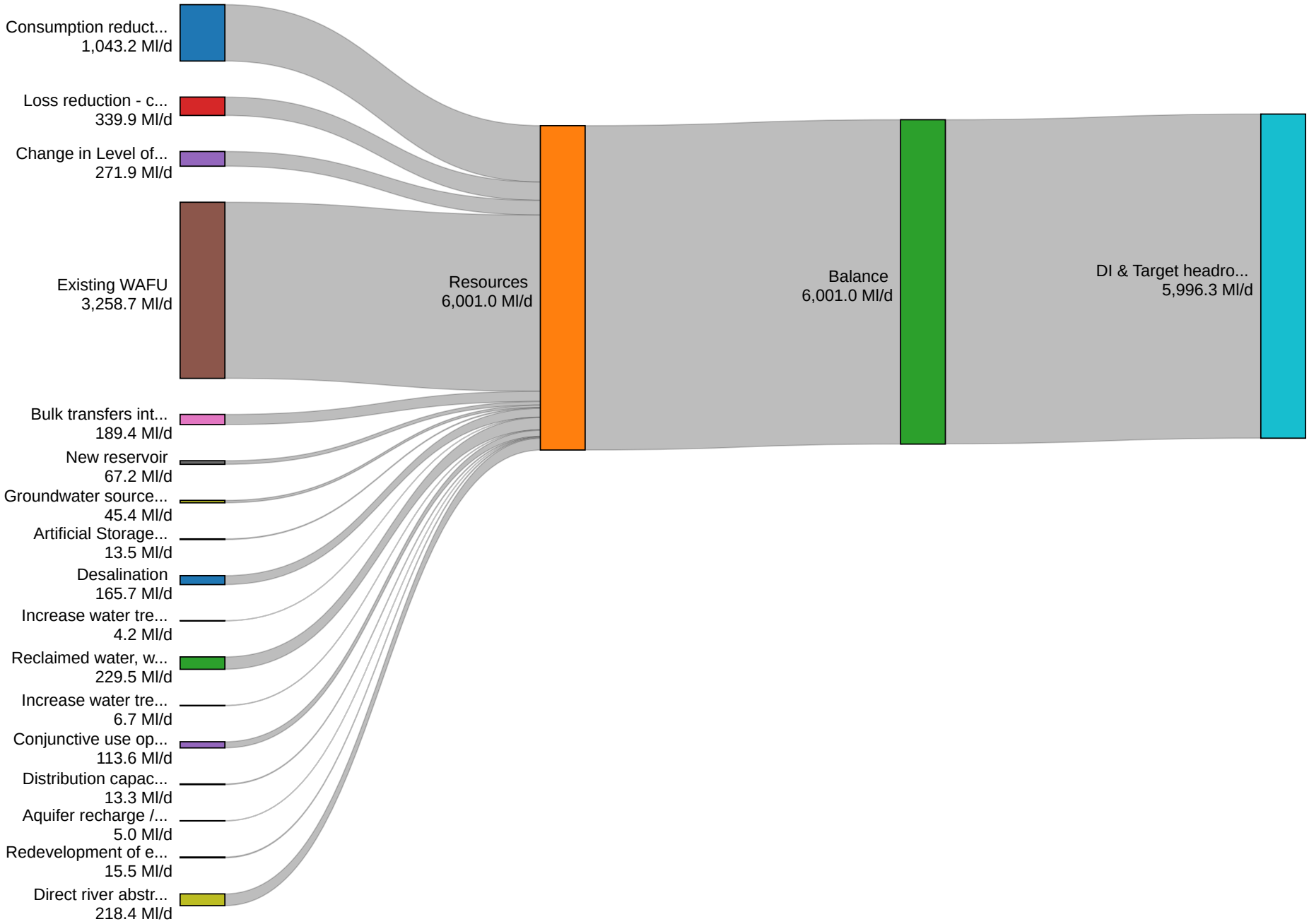
Situation 4 - 2040 (Thames Water)



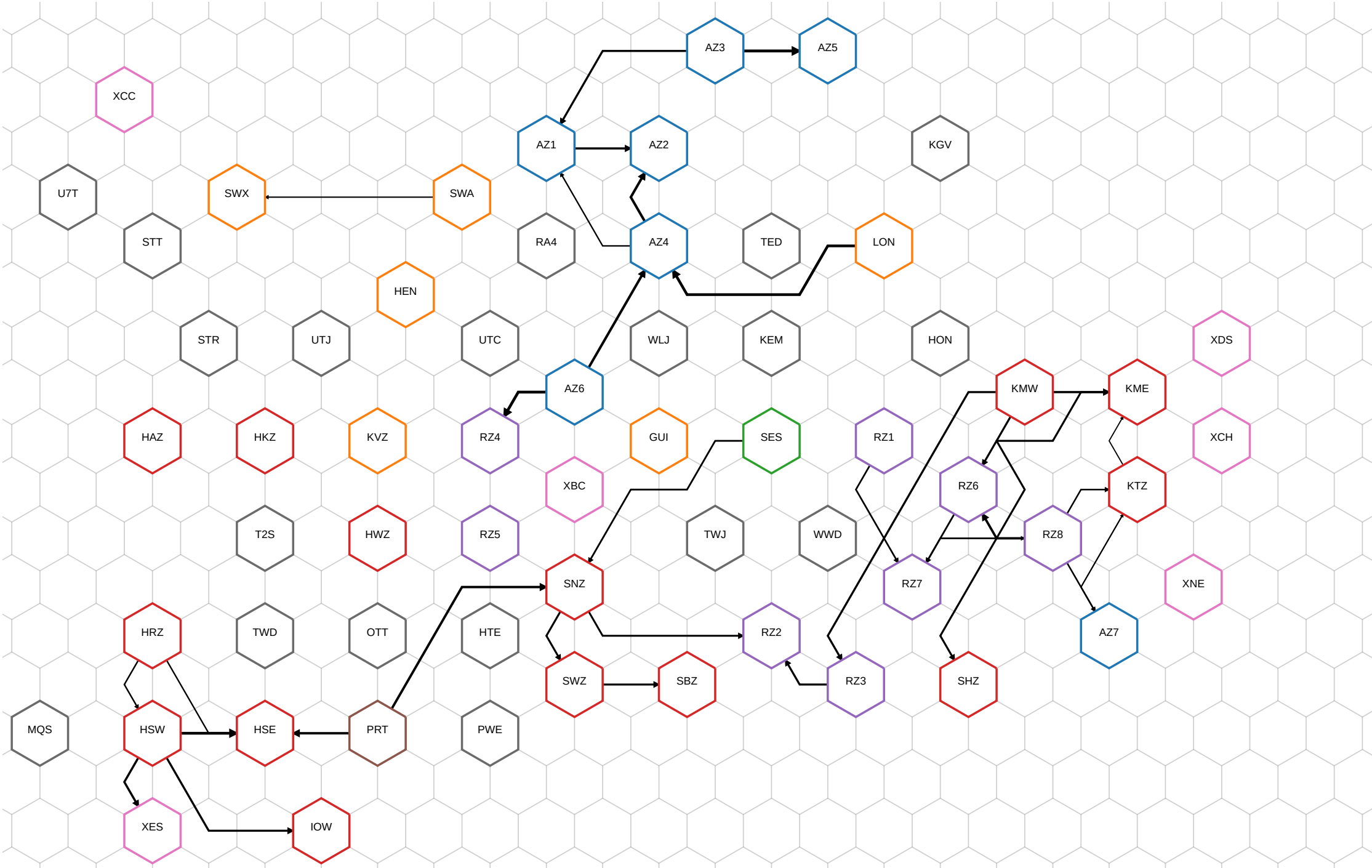
Situation 4 - 2050 (Thames Water)



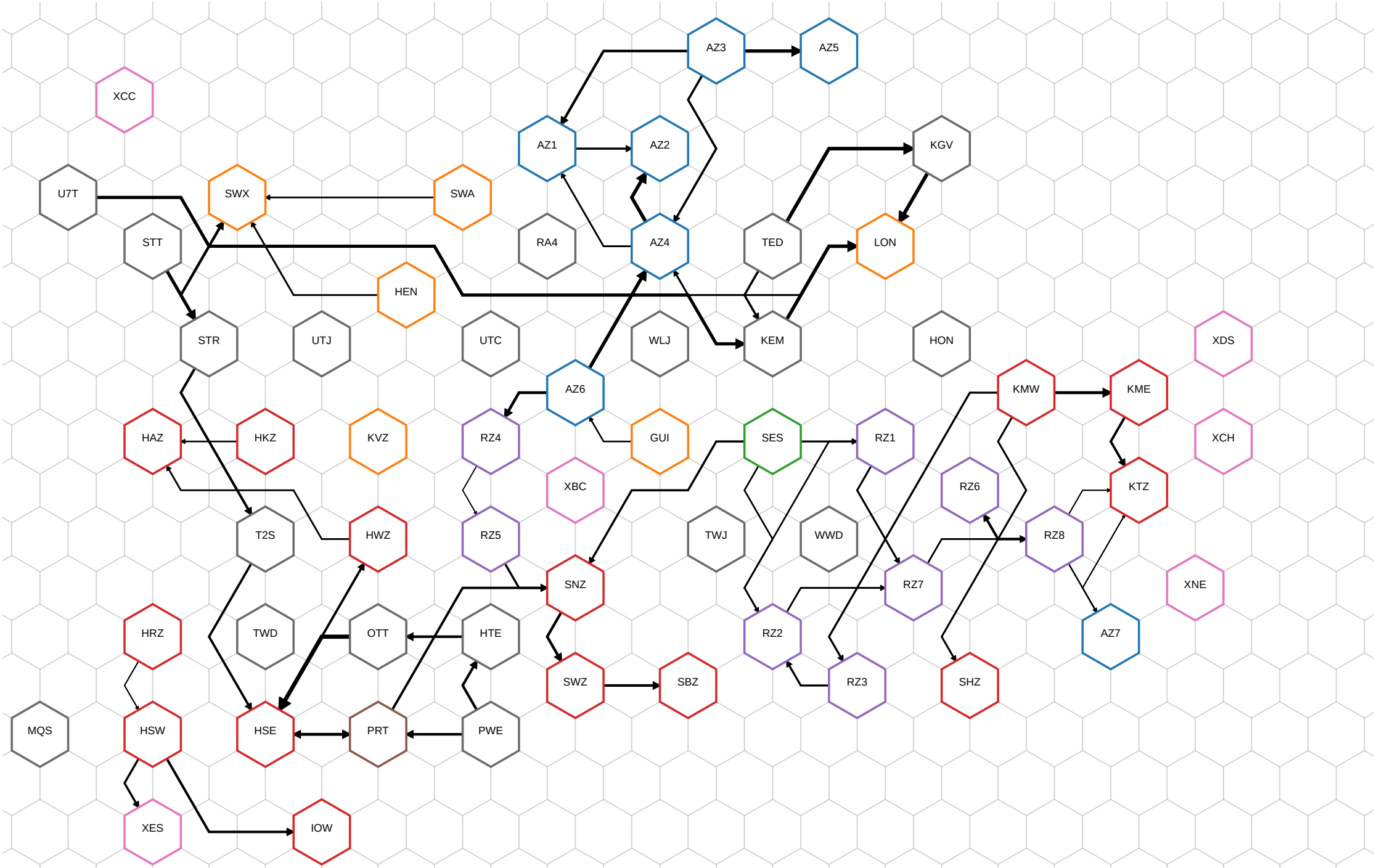
Situation 4 - 2075 (Thames Water)



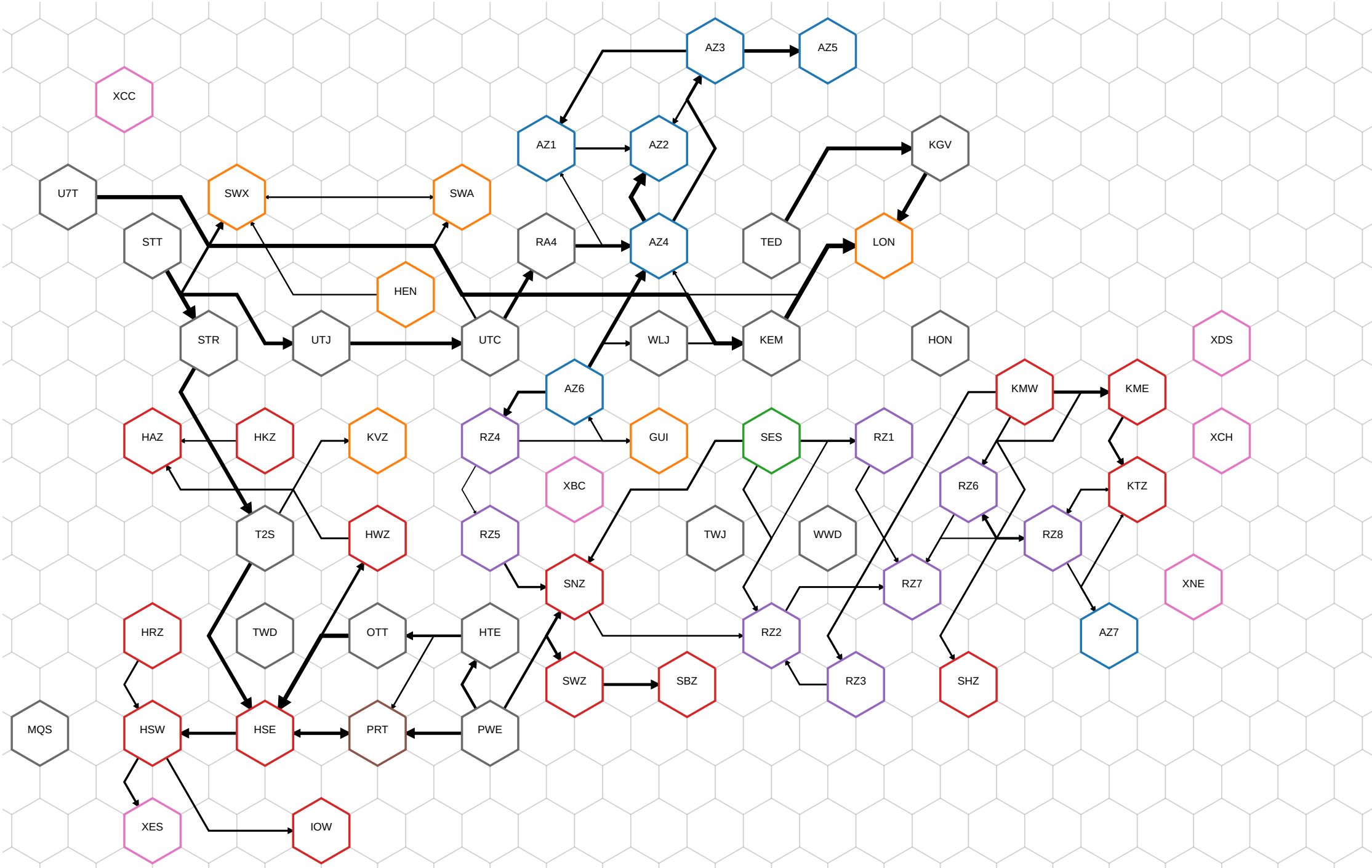
Situation 4 - 2026



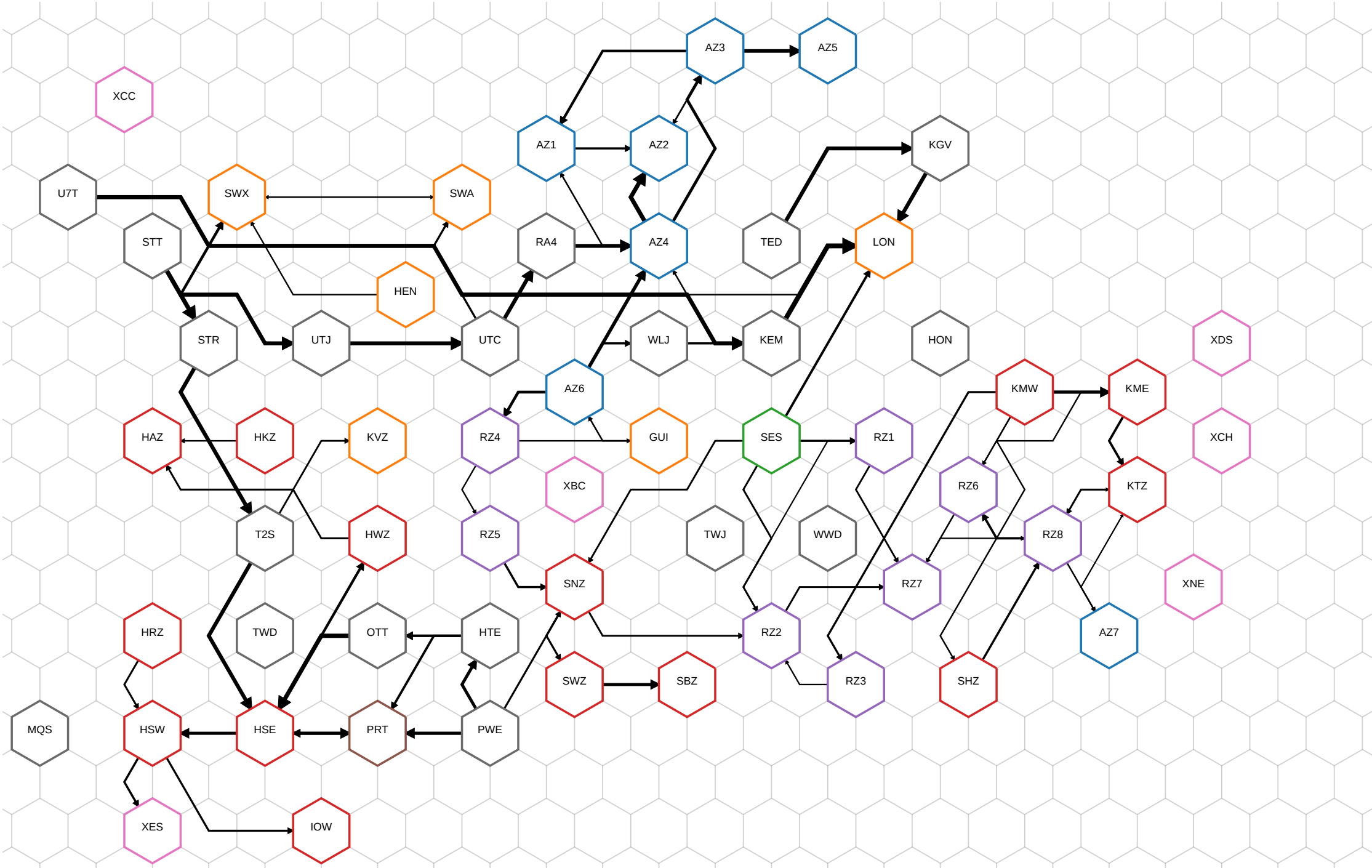
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – SESRO +50% OB

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p50pc-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions with SESRO optimism bias changed by +0.5. Optimisation tolerances identical to LCP.
Created at	04/01/2024, 16:37:06
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p50pc-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change SESRO optimism bias by 0.5.
Optimised discount rate	STPR

Metrics

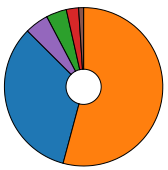
Net present value (Cost)

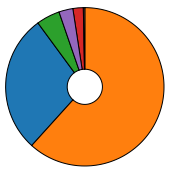
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	20,969	18,095	17,423	19,491	17,995	17,244	18,201	16,924	16,233	18,064	(£m)
Cost w/o deficit (STPR)	20,969	18,095	17,423	19,491	17,995	17,244	18,201	16,924	16,233	18,064	(£m)
Cost w/ deficit (IGEQ)	32,013	26,565	25,351	29,203	26,392	25,056	27,034	24,646	23,402	26,629	(£m)
Cost w/o deficit (IGEQ)	32,013	26,565	25,351	29,203	26,392	25,056	27,034	24,646	23,402	26,629	(£m)
Cost w/ deficit (LTDR)	23,107	19,764	18,990	21,387	19,650	18,789	19,931	18,450	17,656	19,747	(£m)
Cost w/o deficit (LTDR)	23,107	19,764	18,990	21,387	19,650	18,789	19,931	18,450	17,656	19,747	(£m)

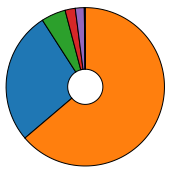
Cost breakdown (STPR)

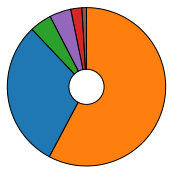
Select Company: Total

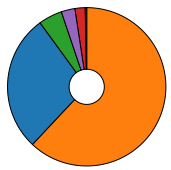
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,981	5,106	4,724	5,879	5,037	4,595	5,012	4,232	3,799	5,040	(£m)
Fixed opex	11,358	11,165	11,114	11,258	11,155	11,099	11,181	11,099	11,039	11,163	(£m)
Fixed operational carbon	880	869	870	877	870	869	870	867	865	871	(£m)
Embedded carbon	525	384	362	446	379	351	364	307	283	378	(£m)
Variable opex	1,013	517	318	849	501	299	636	384	230	527	(£m)
Variable carbon opex	212	55	35	181	53	31	137	35	17	84	(£m)

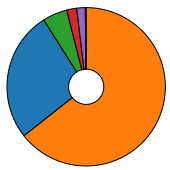
situation1 

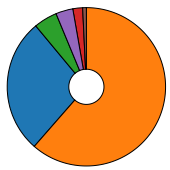
situation2 

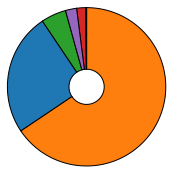
situation3 

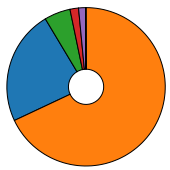
situation4 

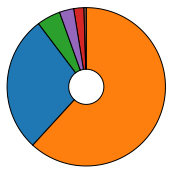
situation5 

situation6 

situation7 

situation8 

situation9 

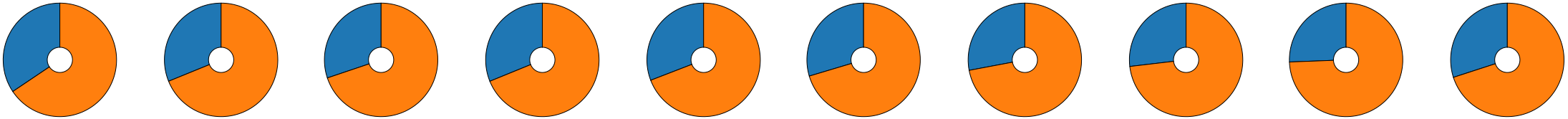
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,369,957	2,360,299	2,209,113	2,792,509	2,329,756	2,139,957	2,269,189	1,872,944	1,711,325	2,339,450	(tonnes)
Operational emissions	6,421,853	5,216,327	5,115,216	6,170,325	5,221,017	5,085,025	5,845,779	5,099,920	4,973,356	5,460,980	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

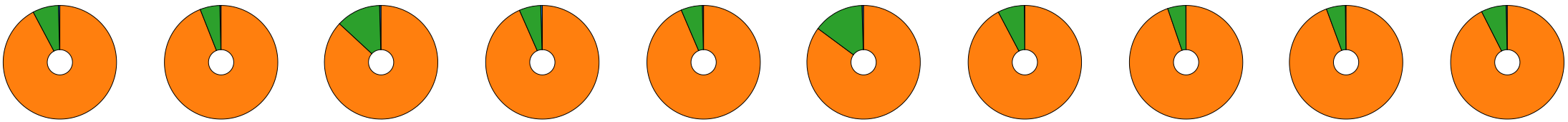


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	104	44	22	95	43	21	21	7	6	41	(GWh)
Grid	22,643	11,348	4,209	19,138	10,976	3,862	13,805	7,928	2,875	10,754	(GWh)
Renewable	1,807	681	614	1,260	713	654	1,138	433	165	829	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	69,272	63,944	63,100	67,244	63,664	62,755	63,935	61,653	60,597	64,018
SEA environmental disbenefit	113,306	81,886	75,525	100,136	80,234	74,129	86,817	71,157	62,310	82,833
Natural capital	81,592,380	77,190,134	80,034,555	75,302,932	77,131,522	79,780,701	64,268,853	65,087,809	67,959,732	74,260,957
Bio-diversity net gain	−216,997	−149,878	−123,282	−201,781	−149,655	−124,012	−141,777	−97,227	−68,173	−141,420

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	33,948	31,850	31,541	33,107	31,722	31,352	31,885	30,845	30,355	31,845

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	28.92	29.35	32.16	28.32	29.54	32.35	27.15	29.80	33.03	30.07
R1: Uncertainty of option supply/demand benefit	5.96	5.35	5.85	5.56	5.40	5.89	5.03	5.37	5.90	5.59
R3: Risk of service failure due to other physical hazards	6.97	7.31	8.19	6.92	7.37	8.25	6.64	7.48	8.52	7.52
R4: Availability of additional headroom	6.58	6.92	7.14	6.65	6.94	7.16	7.00	7.34	7.58	7.03
R5: Catchment/raw water quality risks (incl. climate change)	4.12	4.23	4.78	3.87	4.25	4.81	3.72	4.23	4.89	4.32
R6: Capacity of catchment services	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	5.29	5.54	6.21	5.31	5.58	6.25	4.76	5.37	6.14	5.60
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

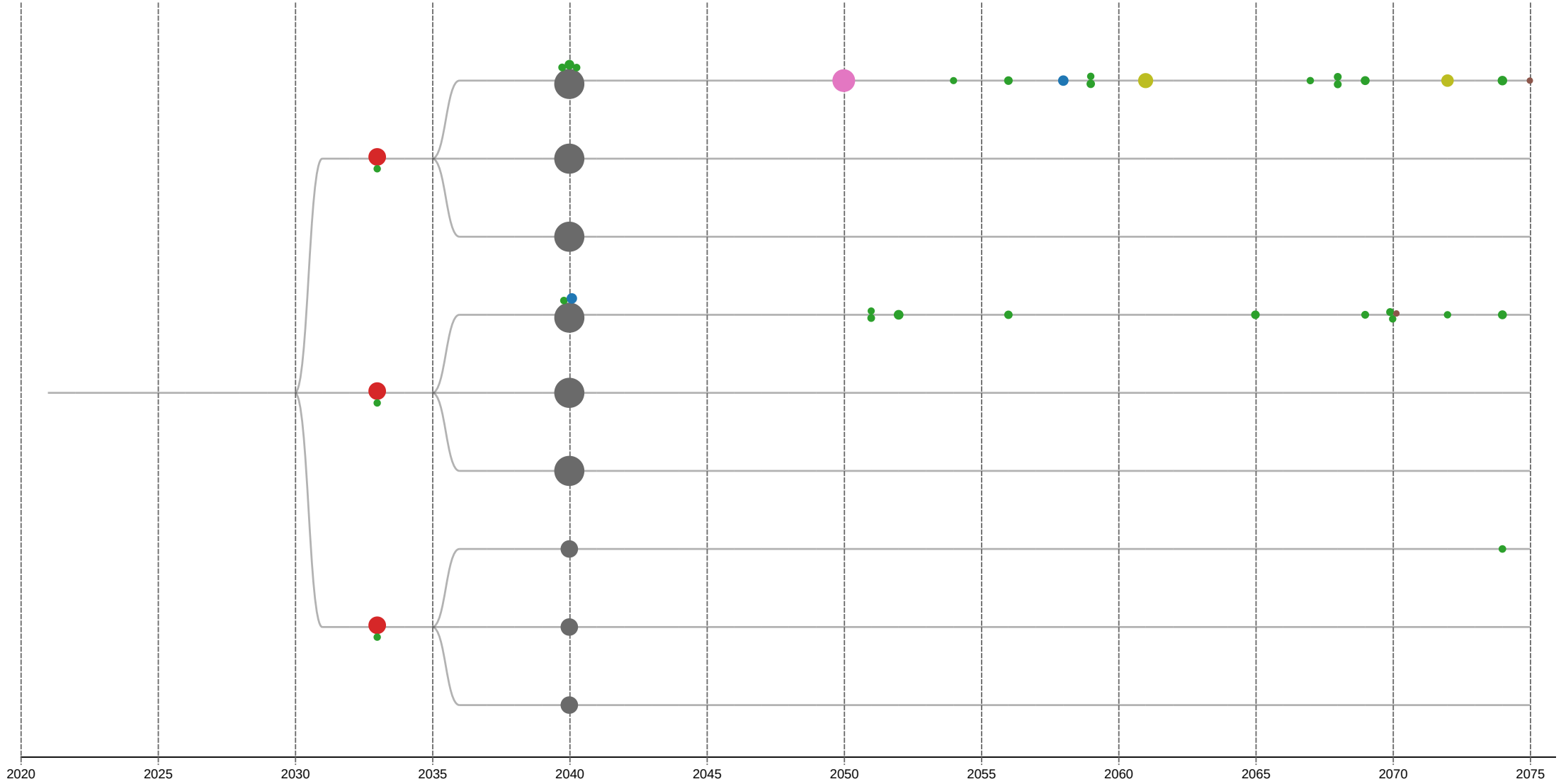
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	14.03	15.63	17.52	14.16	15.69	17.41	15.02	17.07	19.45	16.22
A3: Operational complexity and flexibility	6.50	7.02	7.89	6.59	7.09	7.97	6.30	7.21	8.27	7.21
A4: WRZ connectivity	7.50	8.58	9.60	7.53	8.58	9.41	8.69	9.83	11.15	8.99
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.14	19.81	22.02	18.72	19.96	22.00	19.88	22.43	25.39	21.04
E1: Scaleability and modularity of proposed changes	8.77	9.30	10.37	8.67	9.39	10.47	9.50	10.85	12.36	9.96
E2: Intervention lead times	4.19	4.13	4.53	3.96	4.13	4.35	3.97	4.30	4.76	4.26
E3: Reliance on external bodies to deliver changes	6.17	6.38	7.12	6.08	6.44	7.18	6.41	7.28	8.28	6.82
E5: Collaborative land management	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



- Transfer
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- Trading
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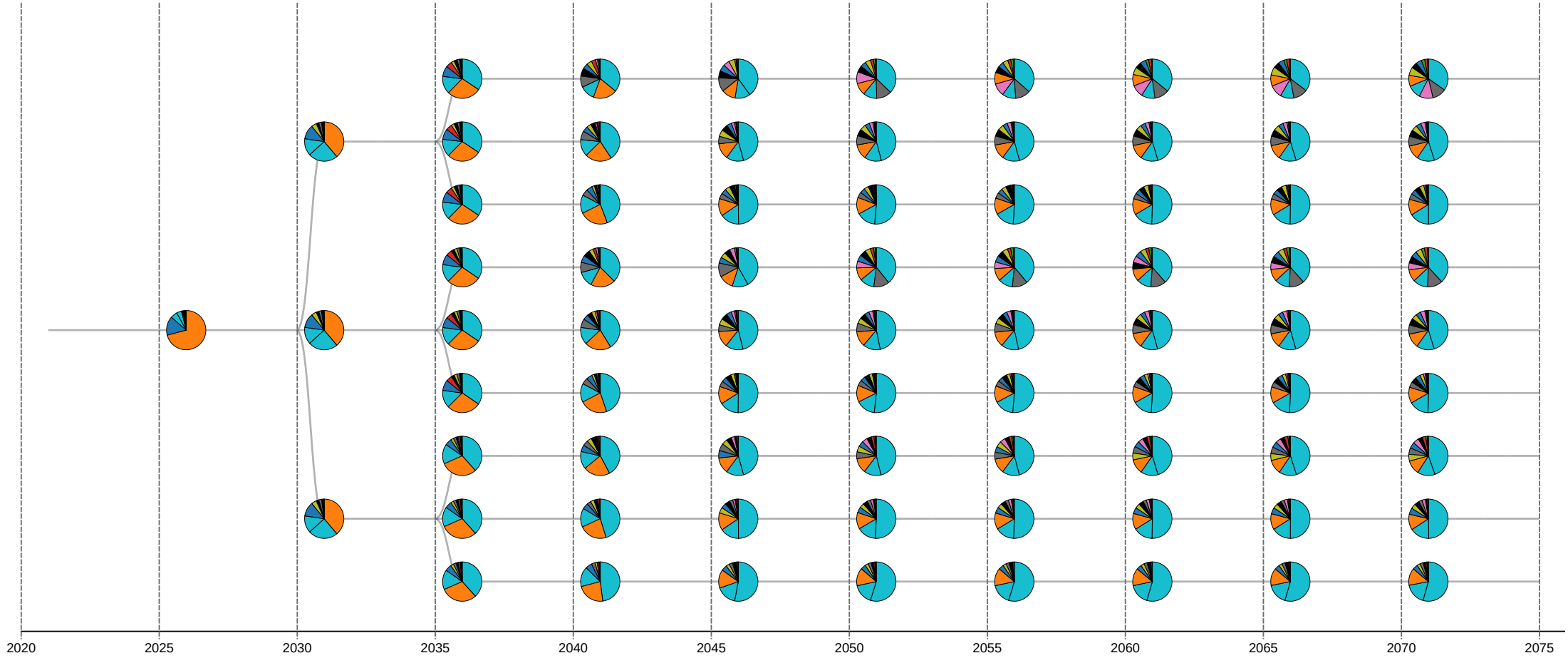
- Reservoir
- Reuse
- Demand management
- Leakage reduction
- Other

Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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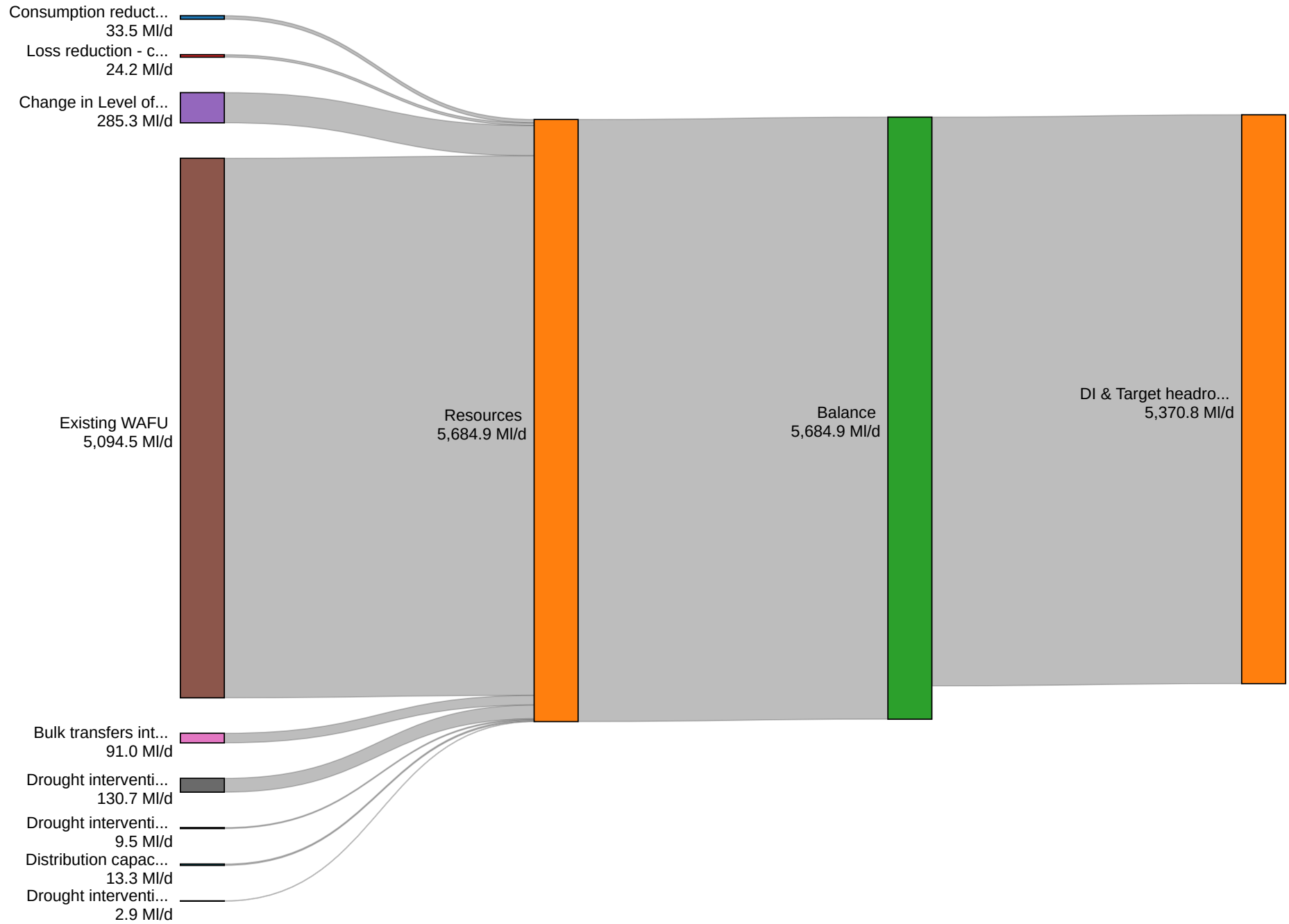
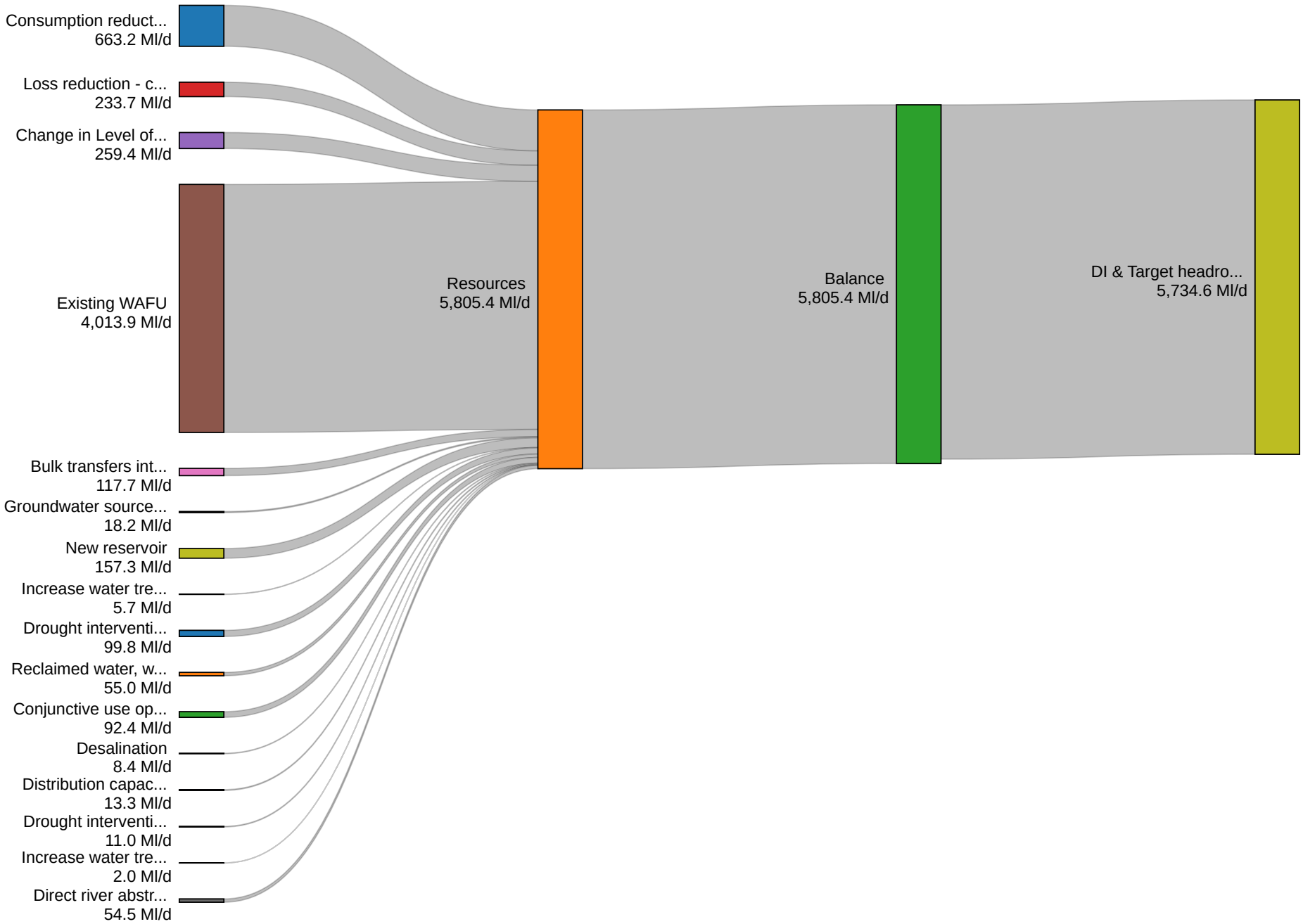
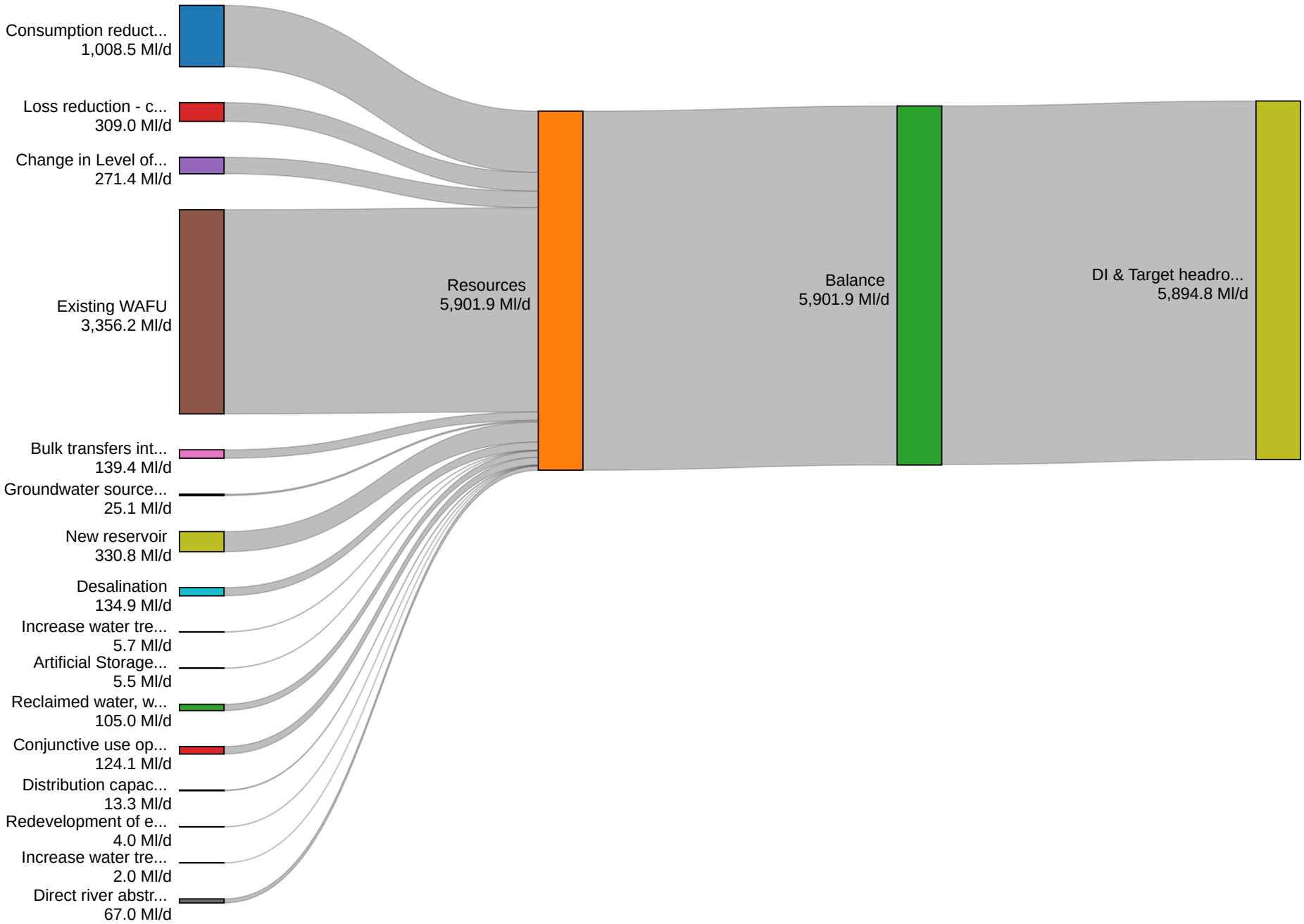
Situation 4 - 2026 (Thames Water)



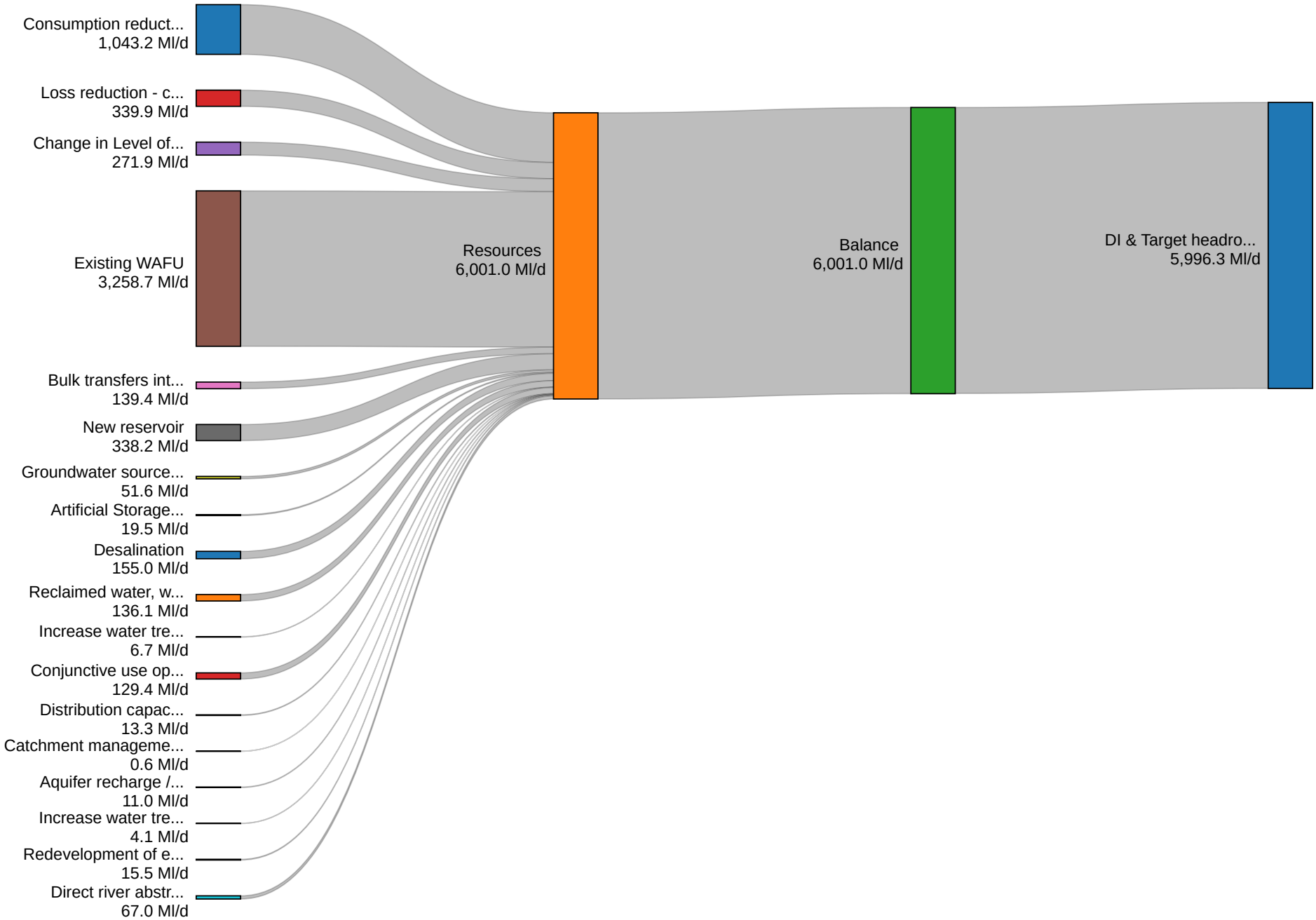
Situation 4 - 2040 (Thames Water)



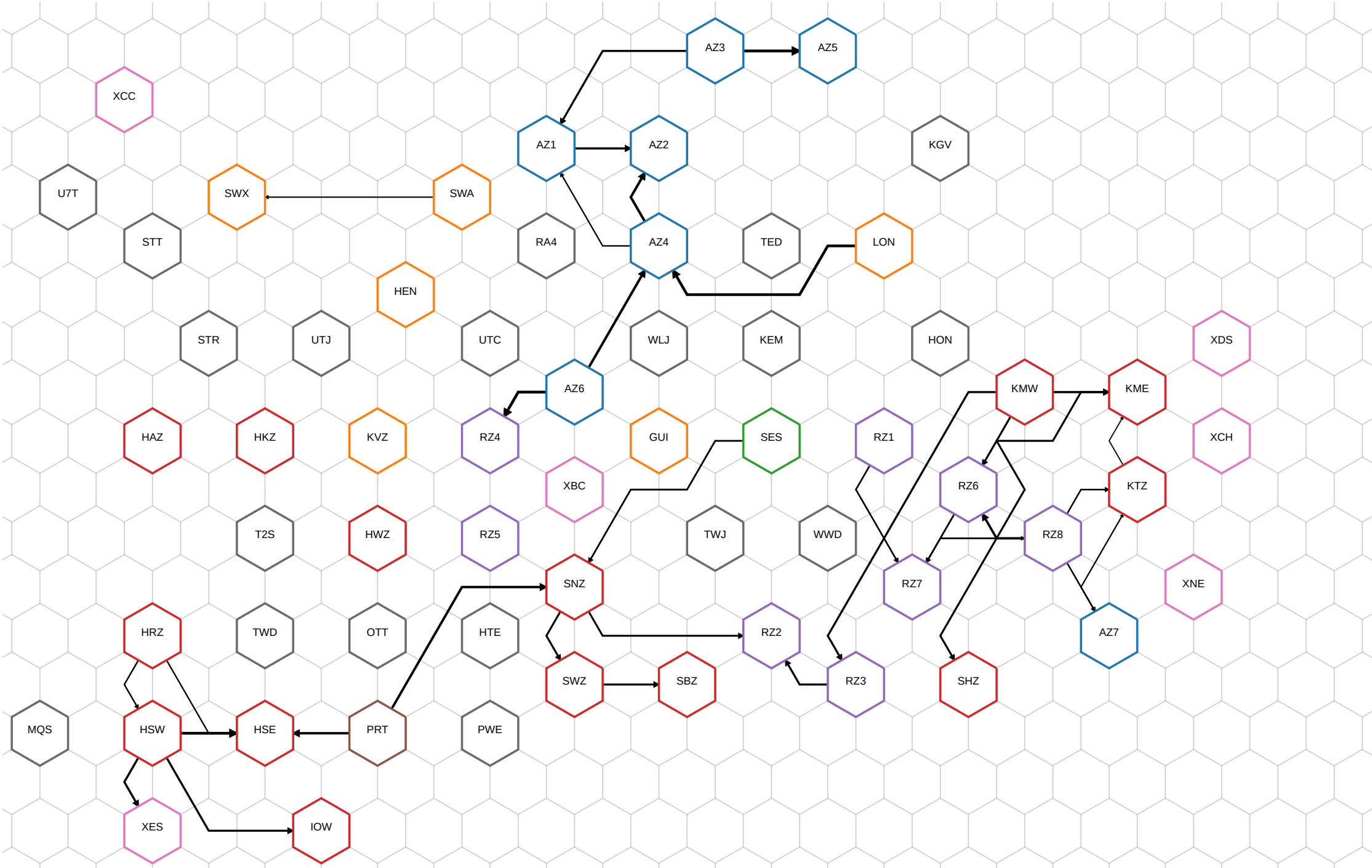
Situation 4 - 2050 (Thames Water)



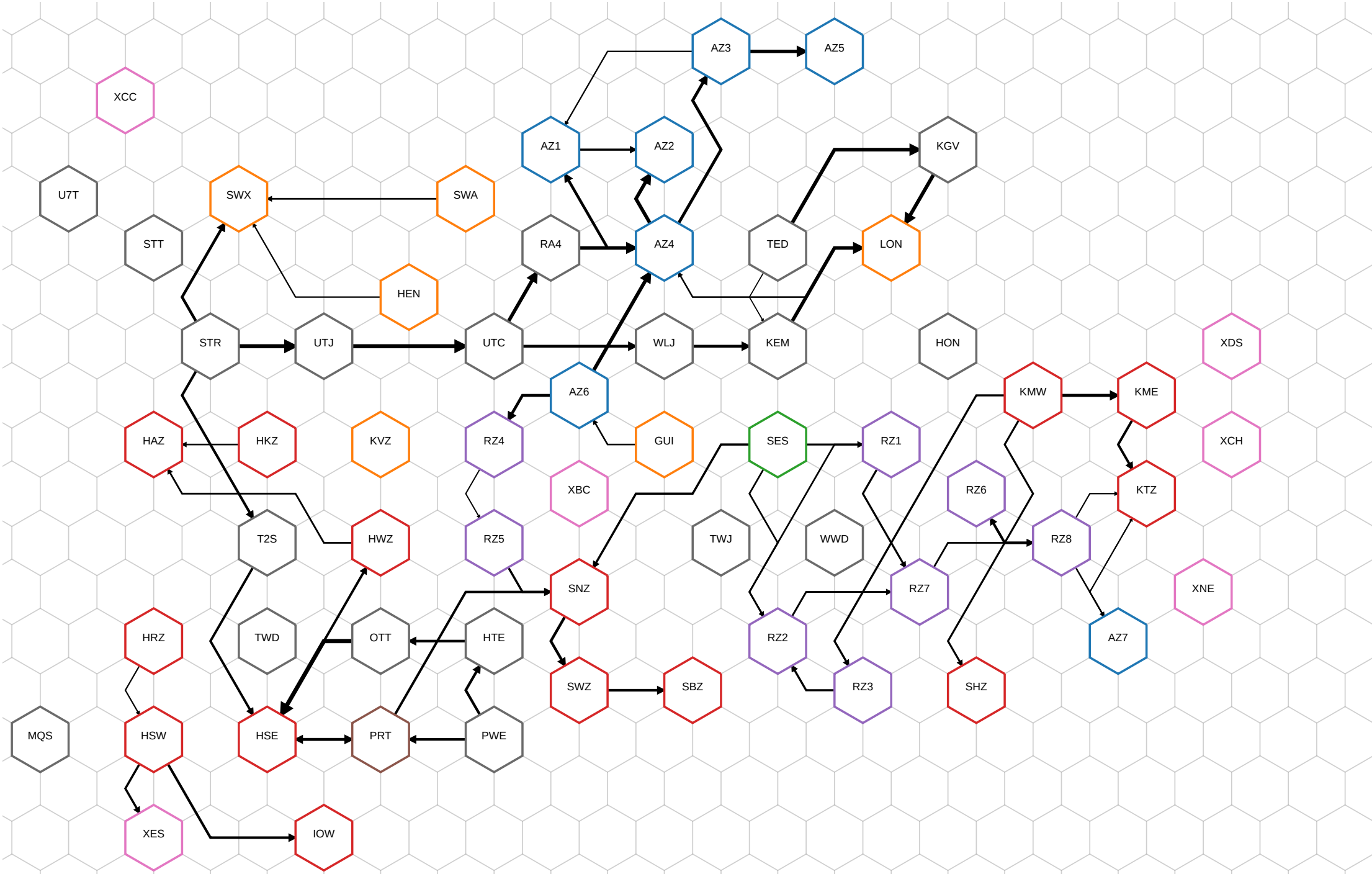
Situation 4 - 2075 (Thames Water)



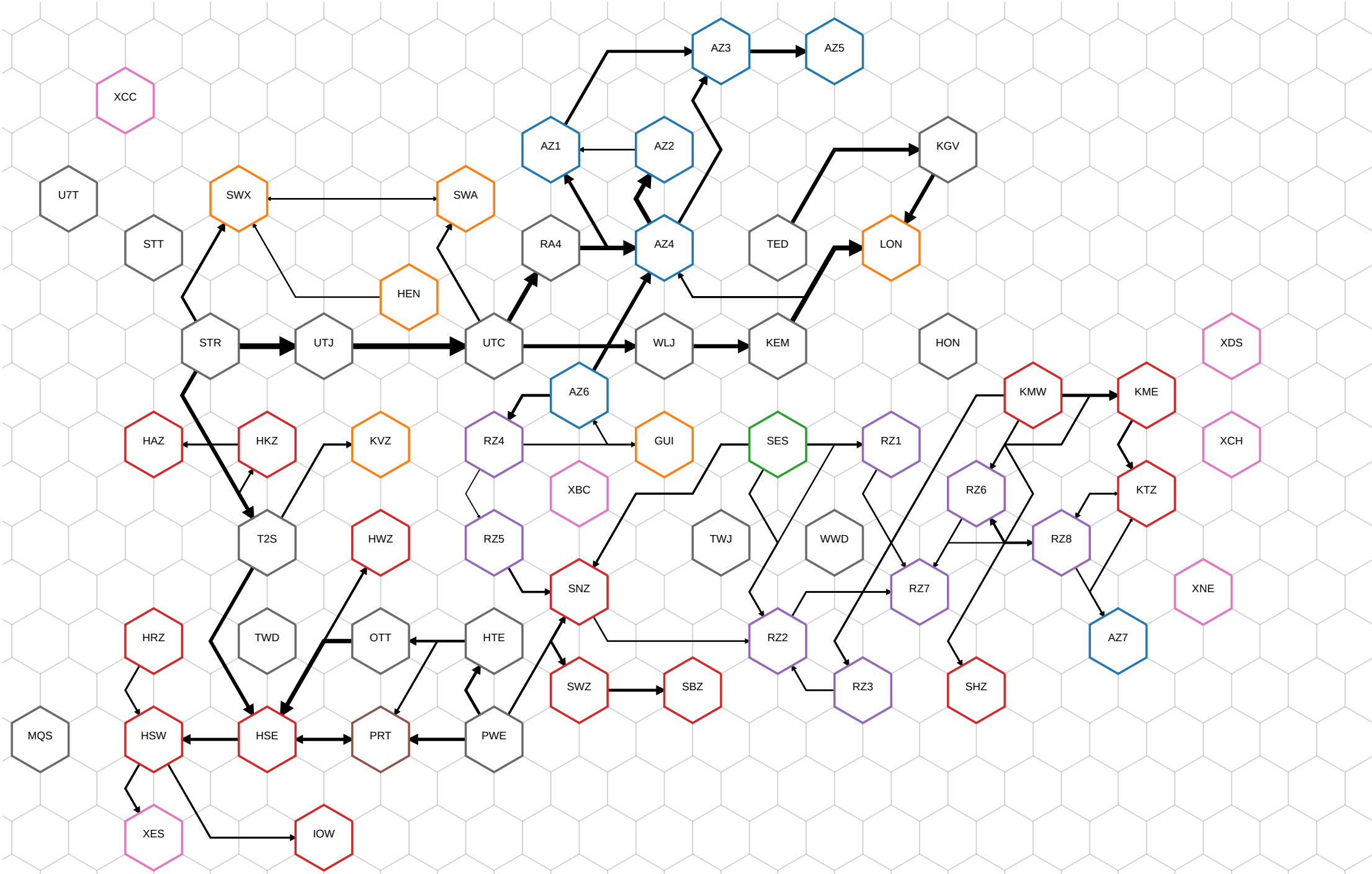
Situation 4 - 2026



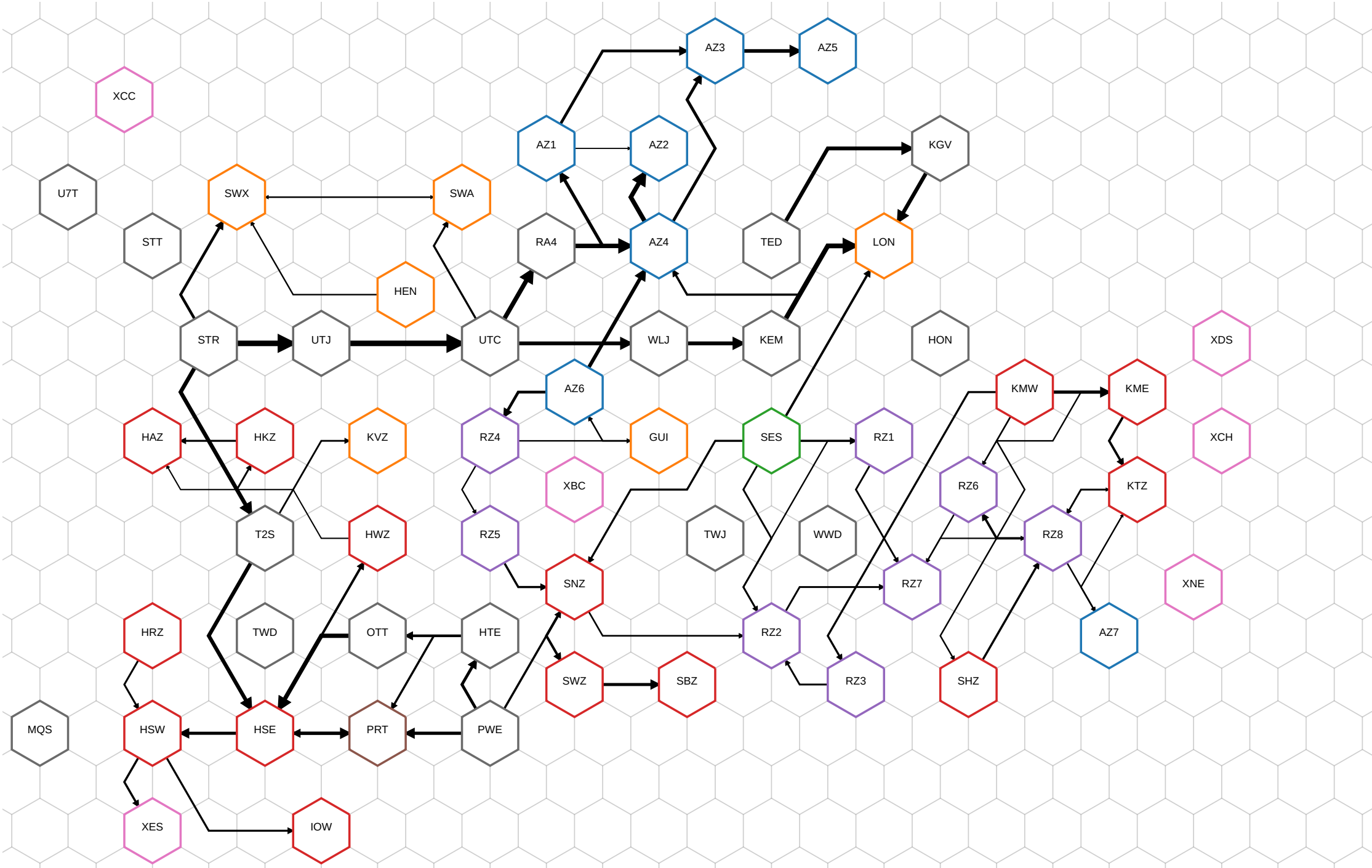
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



IVM RUN DOSSIER

COST SENSITIVITY – SESRO +60% OB

IVM Summary: Thames Water

Metadata

General Settings

Name	st-hybrid-dy-w1-tree16.05-options-v61-gov-led-hybridcp2-ob-p60pc-sesro-2075
Description	Least cost run with hybrid-c+2 government interventions with SESRO optimism bias changed by +0.6. Optimisation tolerances identical to LCP.
Created at	04/01/2024, 23:11:57
Tree	tree16.05: Root and branch tree 16.05: Stage 1 - Begins Hplan and LOW LCED, Stage 2 - Branches on growth (OxCam1a, Hplan and ONS18c), Stage 3 - Branches on licenced capped environmental destination, climate change and further growth scenarios (Hmax and Hmin)
Setting name	options-v61-gov-led-hybridcp2-ob-p60pc-sesro
Setting description	No emergency options. Excluding SES low, medium and high DMP baskets. Change SESRO optimism bias by 0.6.
Optimised discount rate	STPR

Metrics

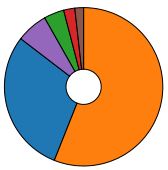
Net present value (Cost)

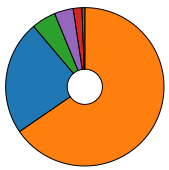
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Cost w/ deficit (STPR)	21,318	17,478	16,690	19,646	17,319	16,476	18,018	16,453	15,740	17,682	(£m)
Cost w/o deficit (STPR)	21,318	17,478	16,690	19,646	17,319	16,476	18,018	16,453	15,740	17,682	(£m)
Cost w/ deficit (IGEQ)	32,921	25,732	24,290	29,821	25,461	23,942	26,830	23,964	22,679	26,182	(£m)
Cost w/o deficit (IGEQ)	32,921	25,732	24,290	29,821	25,461	23,942	26,830	23,964	22,679	26,182	(£m)
Cost w/ deficit (LTDR)	23,558	19,102	18,193	21,623	18,922	17,953	19,743	17,937	17,118	19,350	(£m)
Cost w/o deficit (LTDR)	23,558	19,102	18,193	21,623	18,922	17,953	19,743	17,937	17,118	19,350	(£m)

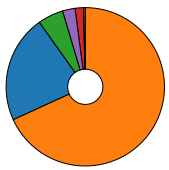
Cost breakdown (STPR)

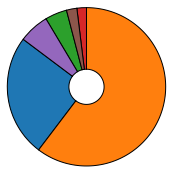
Select Company: Total

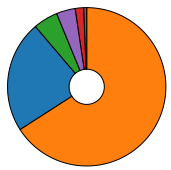
Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capex	6,262	4,090	3,670	4,896	3,964	3,508	4,198	3,576	3,134	4,144	(£m)
Fixed opex	11,943	11,432	11,378	11,852	11,413	11,353	11,600	11,250	11,189	11,490	(£m)
Fixed operational carbon	884	869	870	883	870	870	871	867	865	872	(£m)
Embedded carbon	486	314	288	383	307	276	324	278	254	323	(£m)
Variable opex	1,363	670	425	1,216	663	410	847	431	271	700	(£m)
Variable carbon opex	379	102	59	416	102	59	177	51	28	153	(£m)

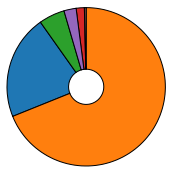
situation1 

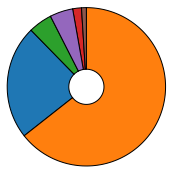
situation2 

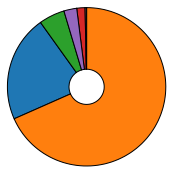
situation3 

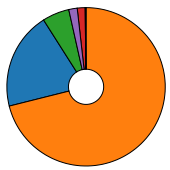
situation4 

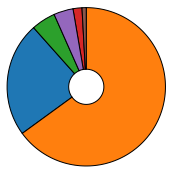
situation5 

situation6 

situation7 

situation8 

situation9 

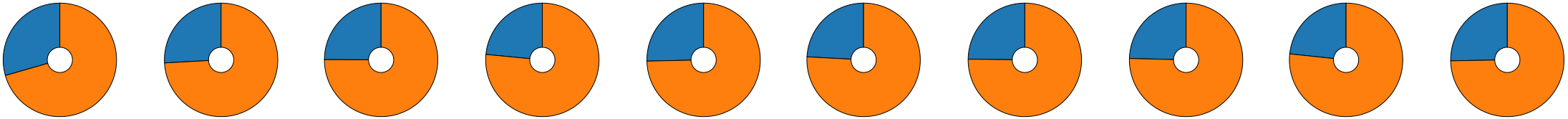
Average 

Emissions breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Capital emissions	3,152,788	1,932,035	1,752,127	2,411,606	1,885,313	1,680,090	2,015,289	1,698,807	1,534,566	2,006,958	(tonnes)
Operational emissions	7,552,767	5,535,621	5,274,503	7,862,296	5,548,759	5,275,157	6,107,244	5,202,741	5,048,508	5,934,177	(tonnes)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average

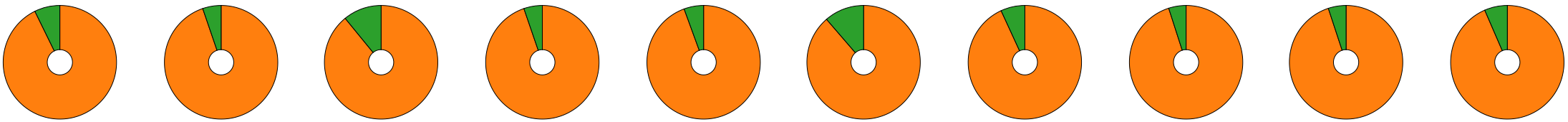


Electricity breakdown

Select Company: Total

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average	Units
Generated (on site)	0	0	0	0	0	0	0	0	0	0	(GWh)
Grid	25,623	12,304	5,055	23,039	11,934	4,673	15,176	8,301	3,095	12,133	(GWh)
Renewable	2,008	683	620	1,284	706	598	1,121	434	165	847	(GWh)

situation1 situation2 situation3 situation4 situation5 situation6 situation7 situation8 situation9 Average



Environmental

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
SEA environmental benefit	67,929	62,036	60,871	65,560	61,456	60,391	62,368	60,267	59,075	62,217
SEA environmental disbenefit	114,828	82,002	73,379	100,486	78,438	71,425	83,885	70,185	60,305	81,659
Natural capital	9,025,657	7,262,546	10,149,250	3,441,371	7,482,046	10,197,942	4,835,185	6,425,633	9,297,555	7,568,576
Bio-diversity net gain	−264,208	−211,385	−167,083	−252,988	−211,169	−173,709	−209,810	−170,437	−141,383	−200,241

Social

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Customer preference	34,254	31,951	31,439	33,294	31,690	31,306	31,995	30,834	30,291	31,895

Reliability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Reliability	27.33	25.63	27.89	26.20	25.54	27.73	27.55	29.33	32.38	27.73
R1: Uncertainty of option supply/demand benefit	5.75	4.66	5.04	5.27	4.63	4.97	5.07	5.19	5.67	5.14
R3: Risk of service failure due to other physical hazards	6.44	6.21	6.92	6.24	6.20	6.89	6.62	7.30	8.28	6.79
R4: Availability of additional headroom	6.40	6.64	6.86	6.44	6.66	6.87	7.05	7.34	7.57	6.87
R5: Catchment/raw water quality risks (incl. climate change)	3.93	3.59	4.02	3.56	3.57	4.01	3.99	4.30	4.96	3.99
R6: Capacity of catchment services	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R7: Risk of service failure to other exceptional events	4.80	4.53	5.04	4.69	4.49	4.99	4.82	5.20	5.90	4.94
R8: Soil health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

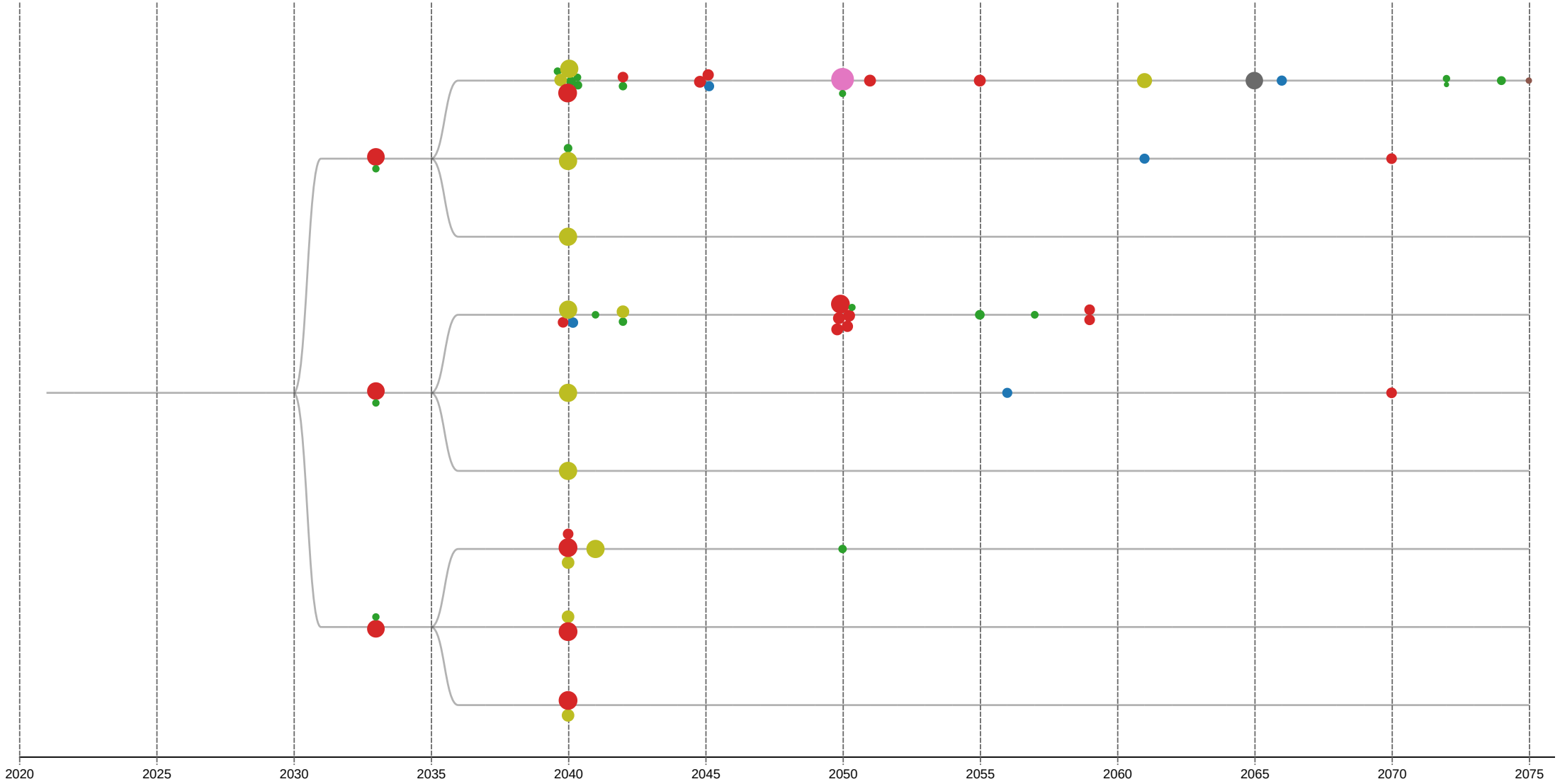
Adaptability

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Adaptability	13.32	14.49	16.04	13.31	14.44	15.97	14.60	16.46	18.70	15.26
A3: Operational complexity and flexibility	5.81	5.87	6.57	5.75	5.86	6.55	6.12	6.90	7.89	6.37
A4: WRZ connectivity	7.48	8.59	9.45	7.54	8.56	9.39	8.46	9.52	10.78	8.86
A7: Customer relations support engagement with demand management	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Evolvablility

Metric	situation1	situation2	situation3	situation4	situation5	situation6	situation7	situation8	situation9	Average
Evolvability	19.68	19.28	21.32	19.08	19.21	21.21	20.48	22.81	25.72	20.98
E1: Scaleability and modularity of proposed changes	8.89	9.20	10.24	8.74	9.21	10.22	9.54	10.77	12.22	9.89
E2: Intervention lead times	4.40	3.82	4.12	4.10	3.74	4.05	4.32	4.66	5.14	4.26
E3: Reliance on external bodies to deliver changes	6.38	6.26	6.96	6.24	6.25	6.94	6.62	7.37	8.36	6.82
E5: Collaborative land management	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Option Selection (Thames Water)



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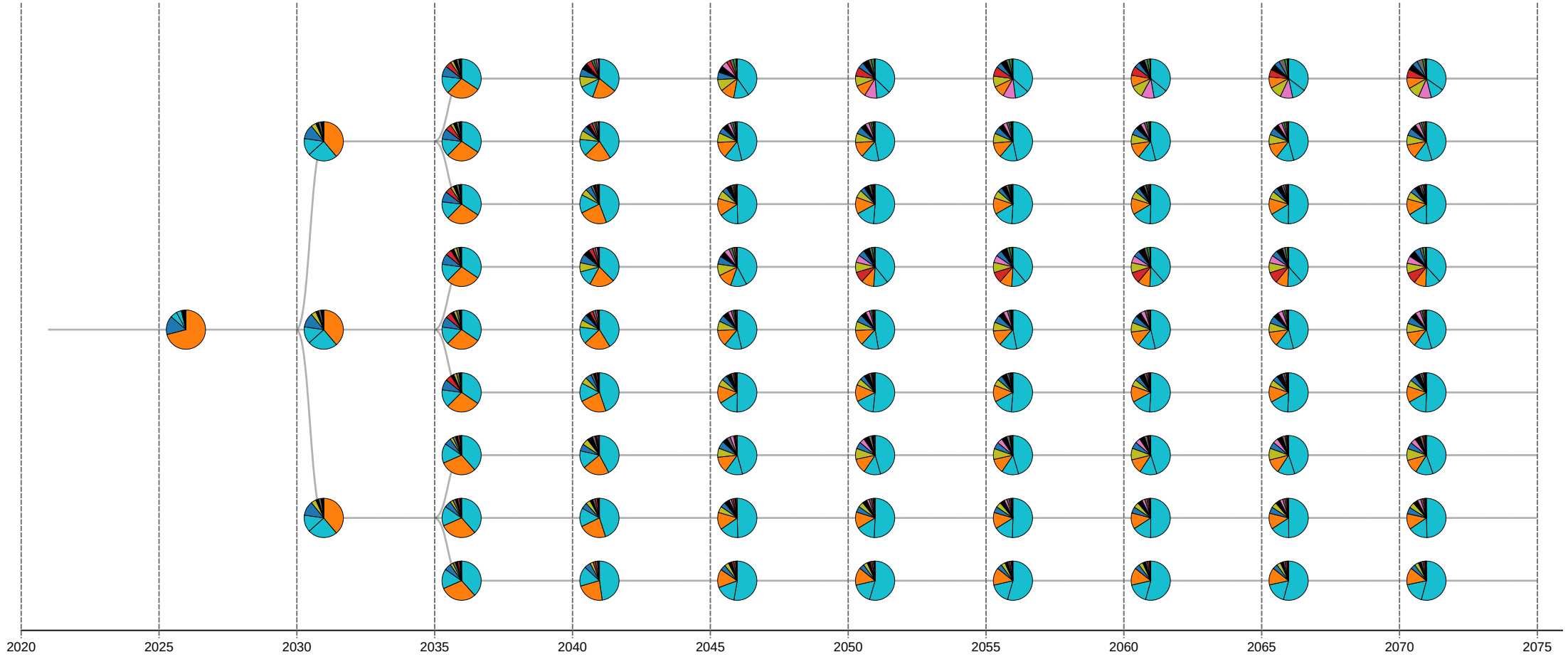
Utilisation (Thames Water)

Pie charts show the breakdown of option utilisation by option category.



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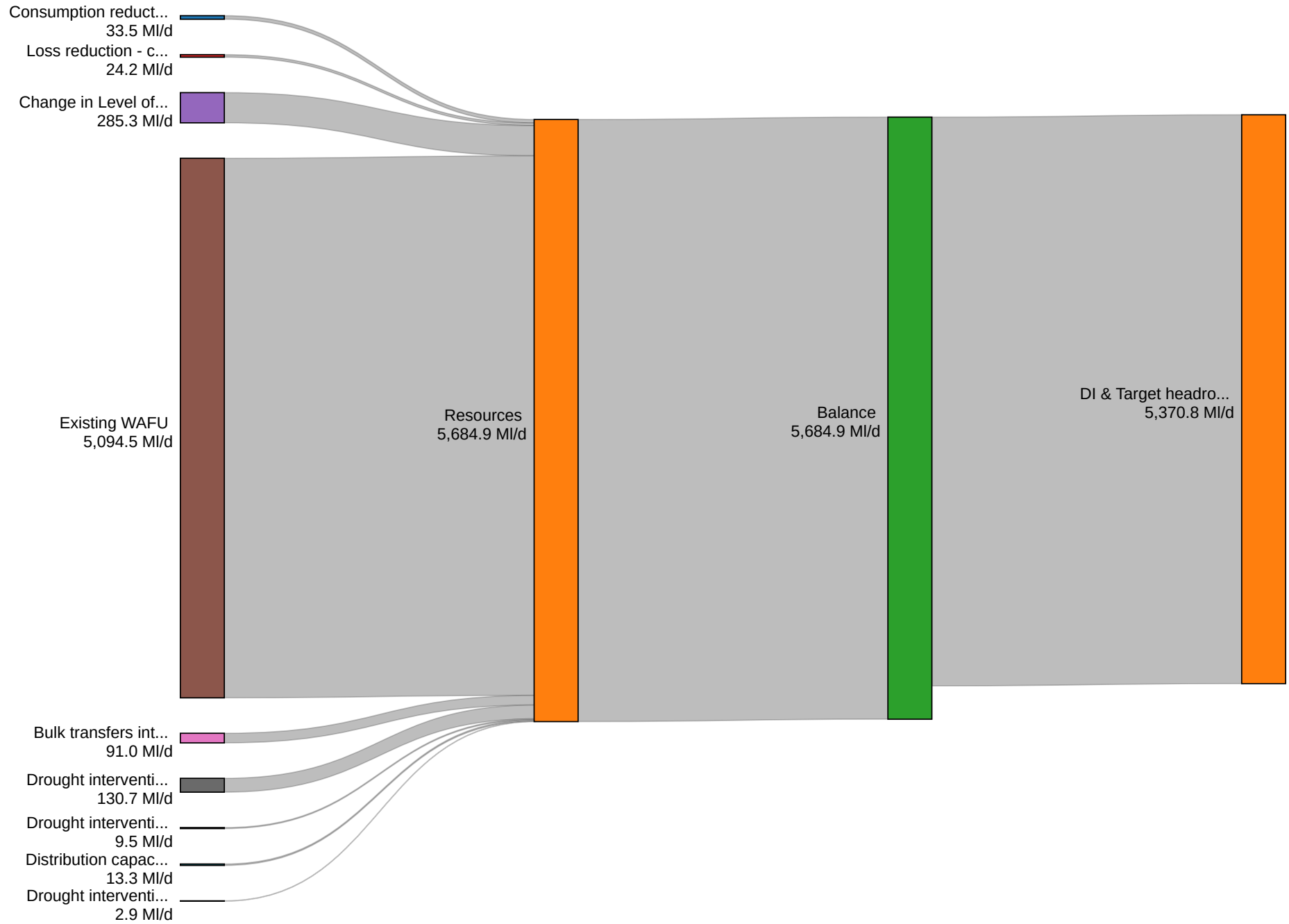
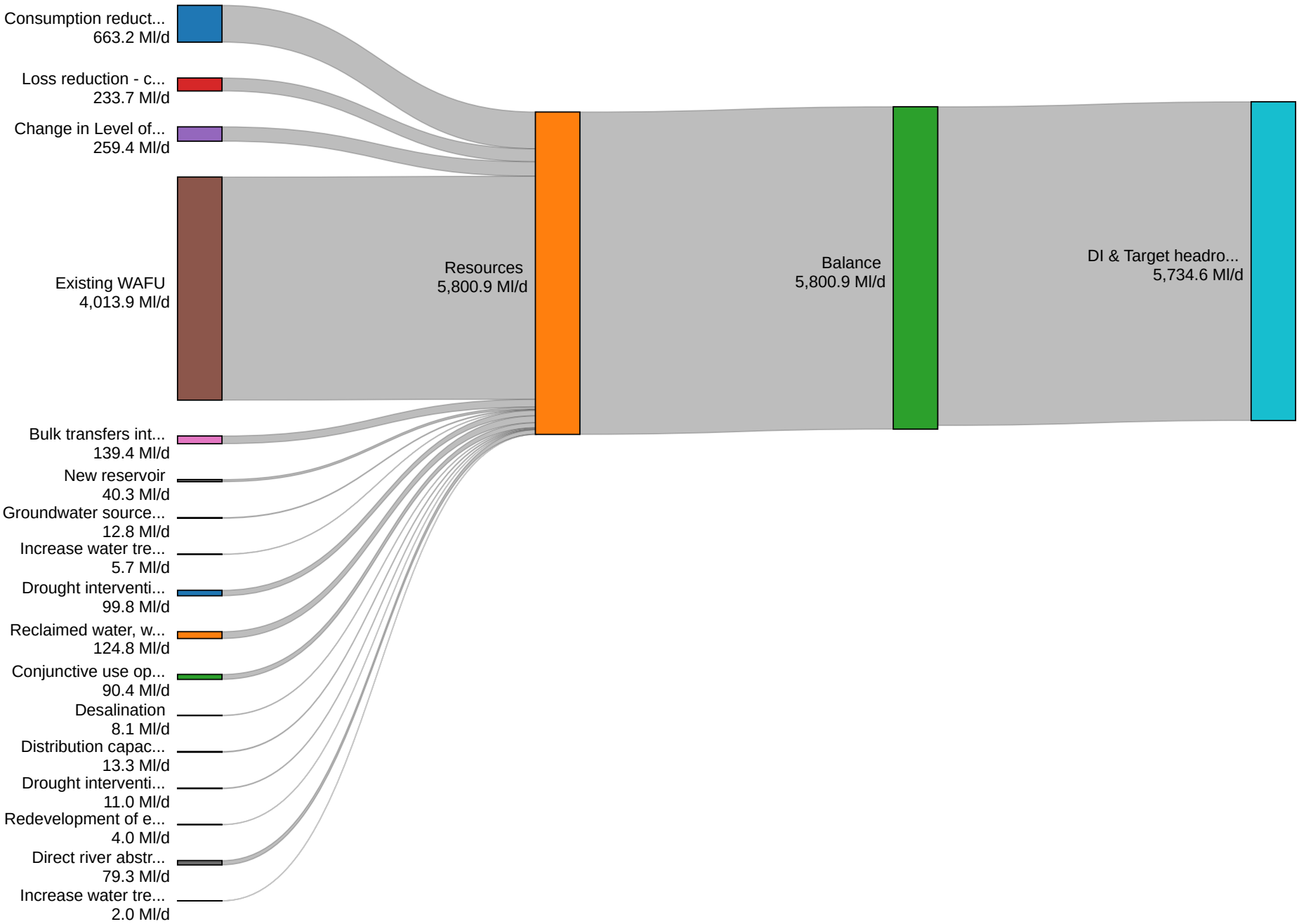
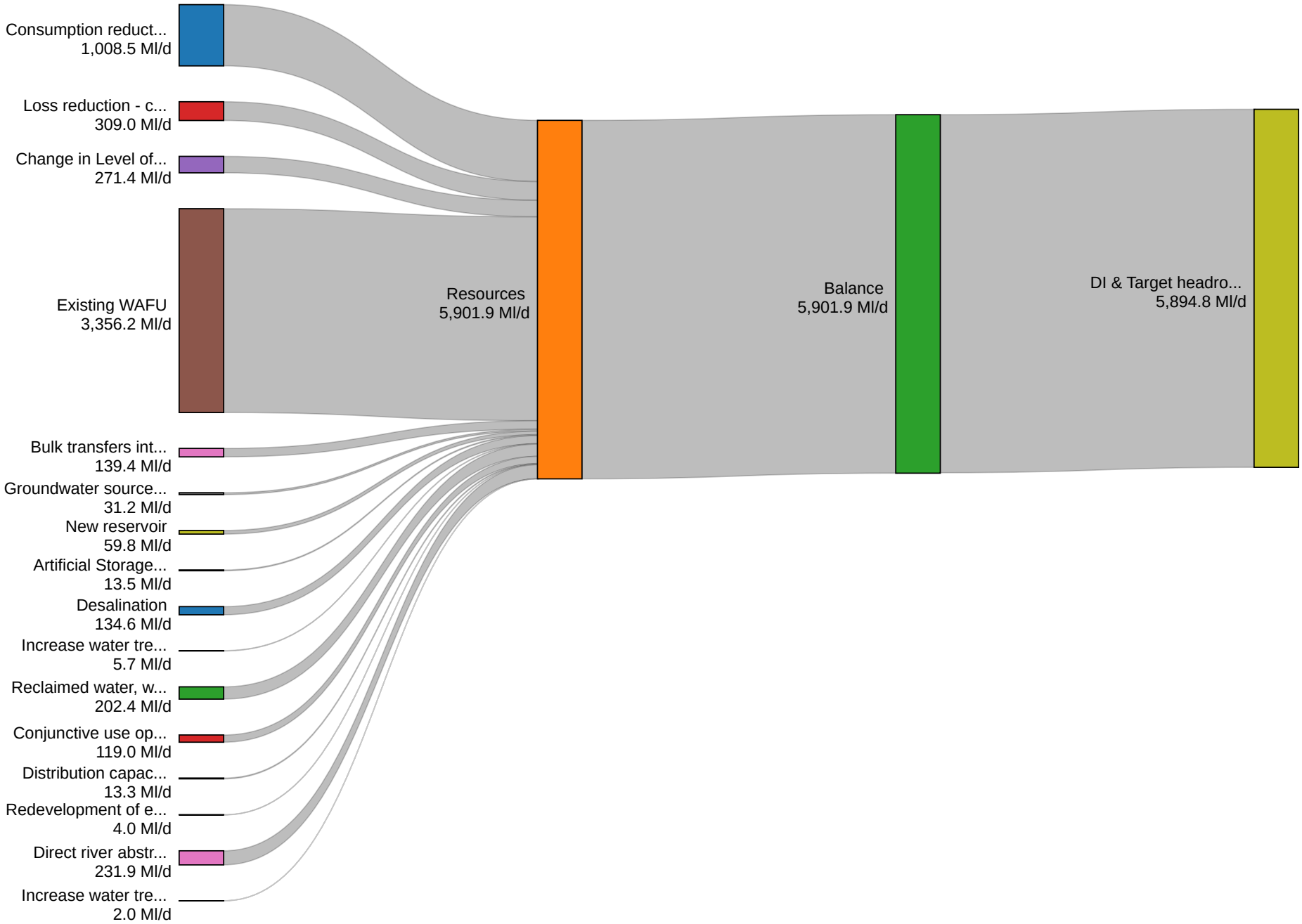
Situation 4 - 2026 (Thames Water)



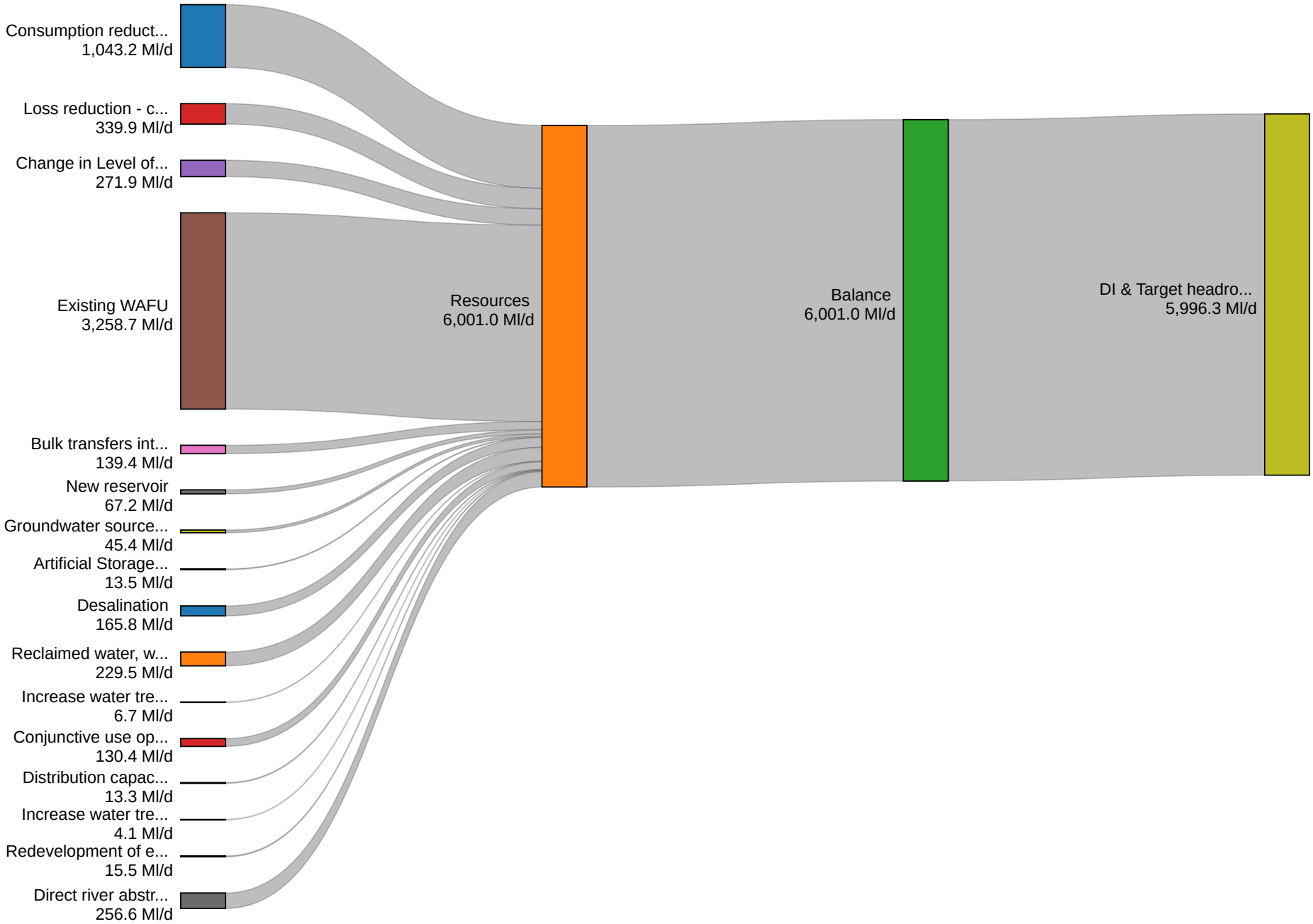
Situation 4 - 2040 (Thames Water)



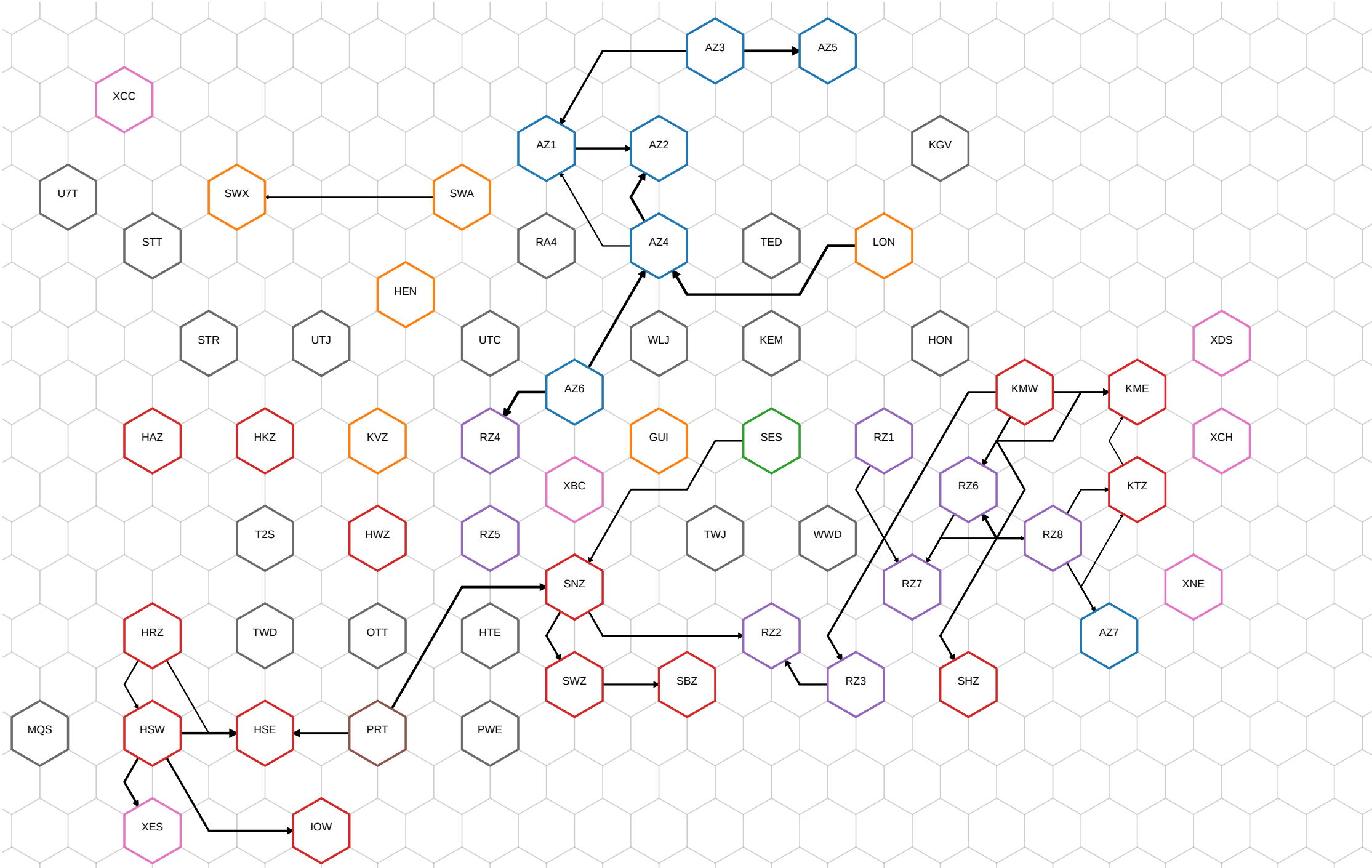
Situation 4 - 2050 (Thames Water)



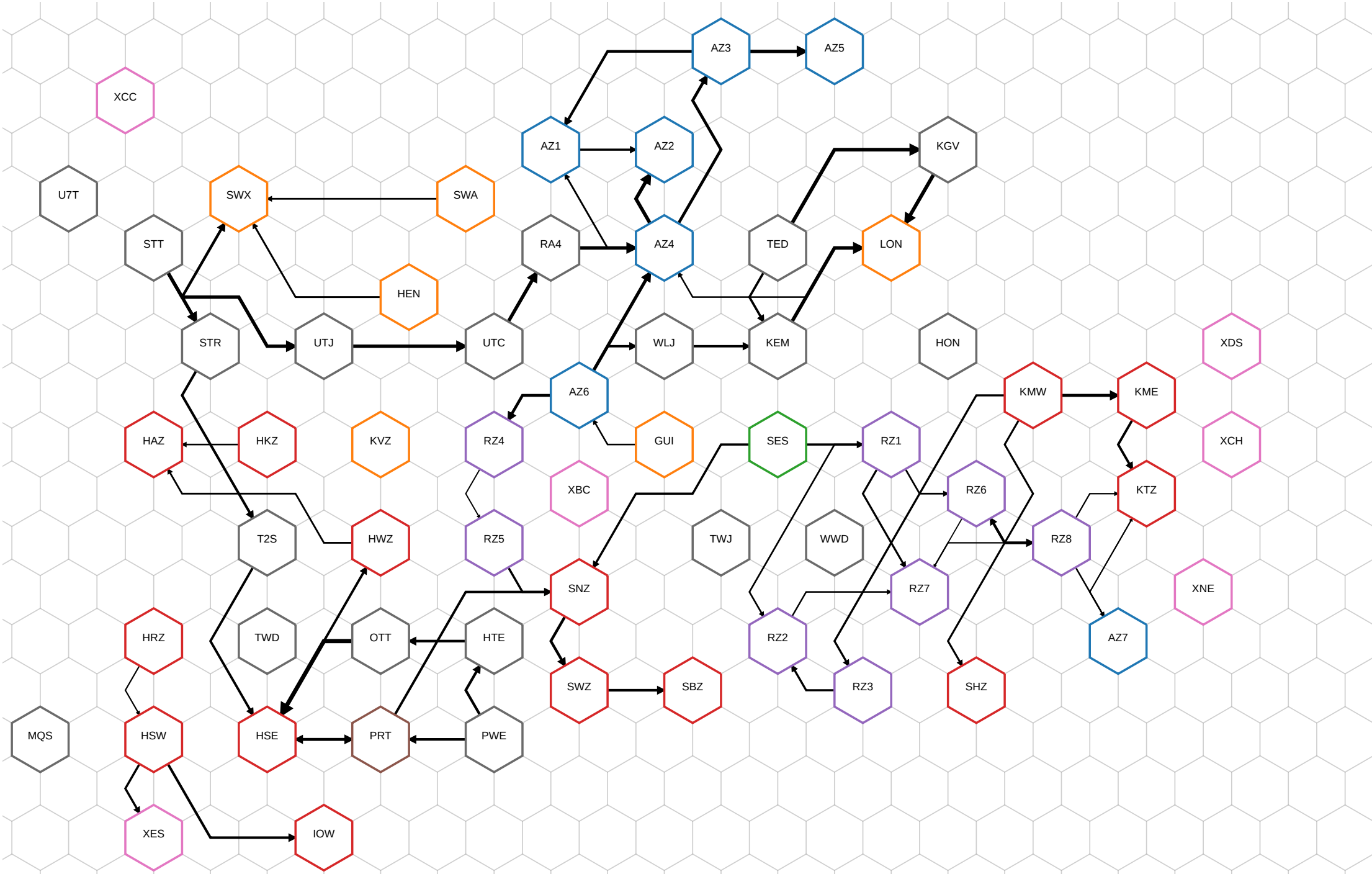
Situation 4 - 2075 (Thames Water)



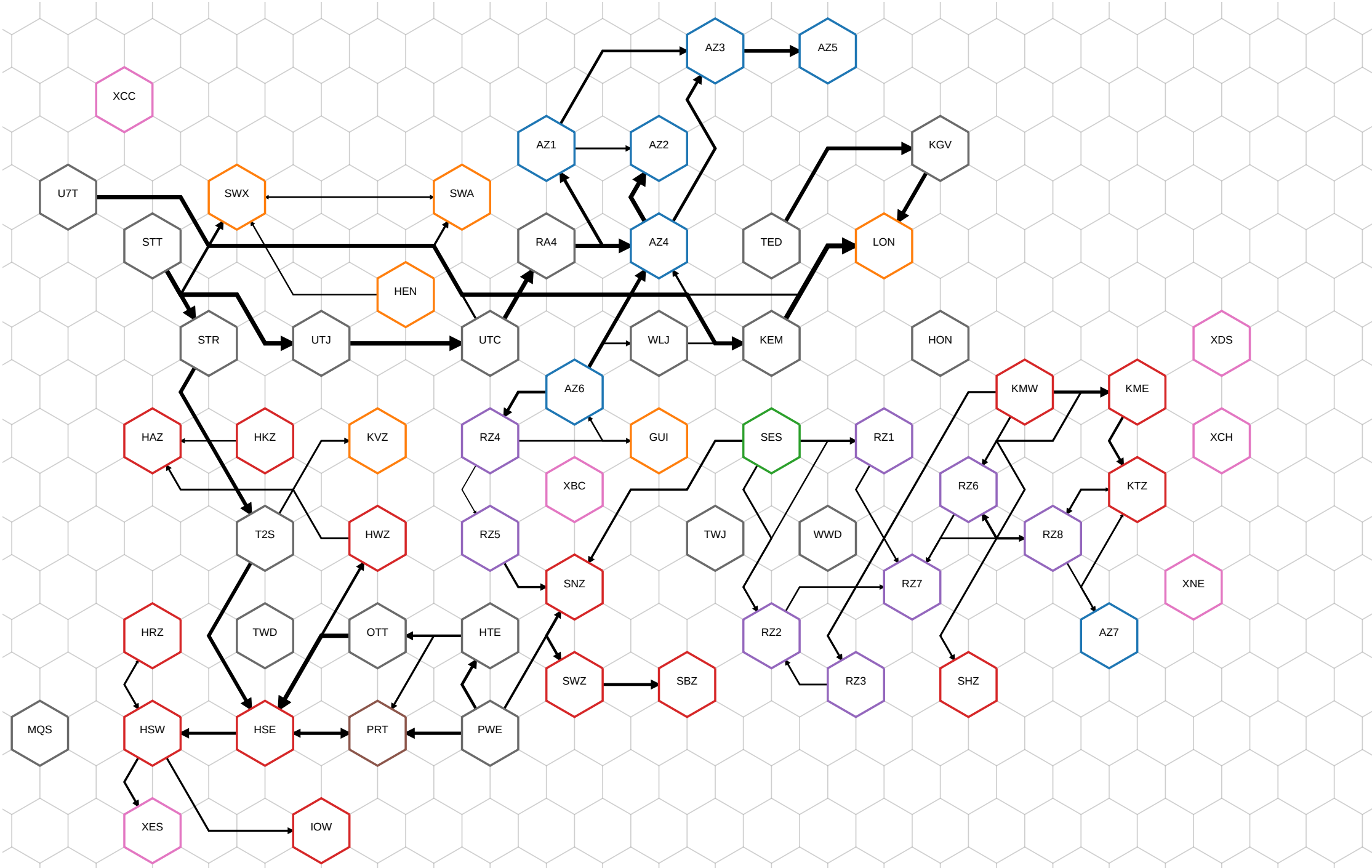
Situation 4 - 2026



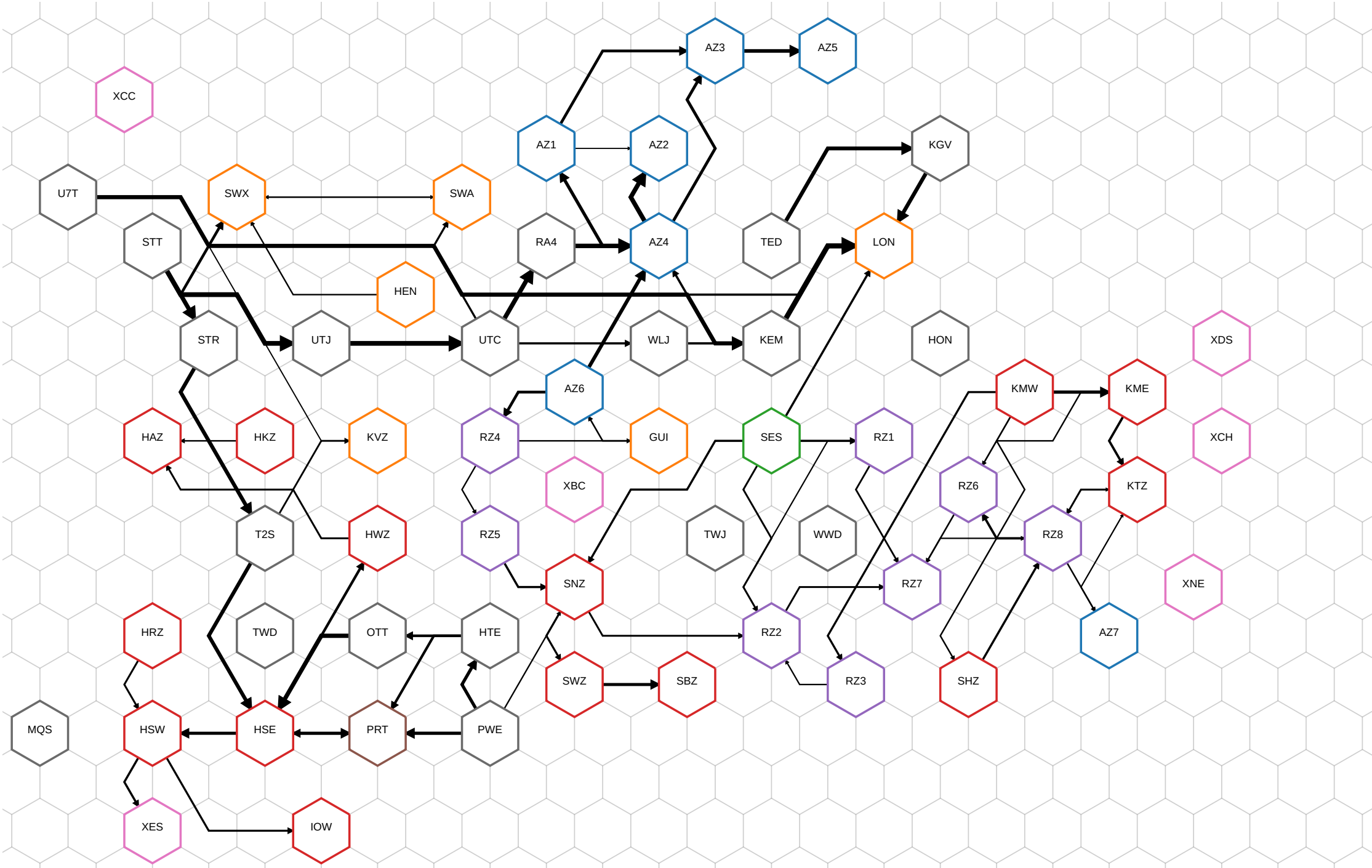
Situation 4 - 2040



Situation 4 - 2050



Situation 4 - 2075



Thames
Water