

Welcome to the Lark Water Summit

Water For Tomorrow and River Lark Catchment Partnership



Water for Tomorrow

- a Catchment Based Approach

Ukwuori Fadayiro (Rivers Trust)

04.11.2022



Water for Tomorrow Project

Interreg funded project delivering at Catchment Level in 5 locations across FR & EN

- The project aims to develop innovative **tools and data** processes;
 - to improved **our water systems visibility**
 - offer **decision-support strategies** for a more efficient **short term** and
 - **long-term** planning of water resources

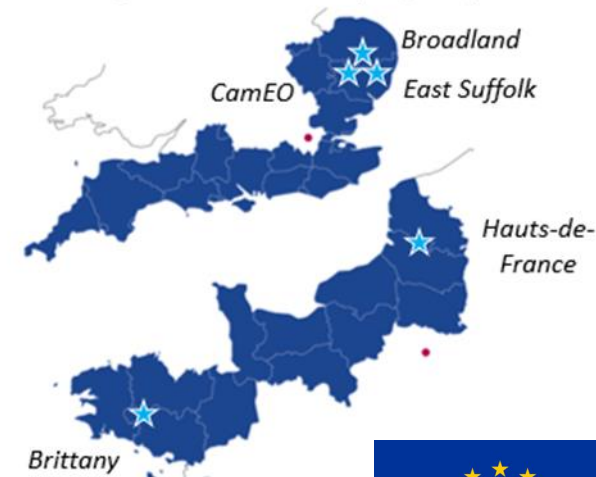


France (Channel Manche) England

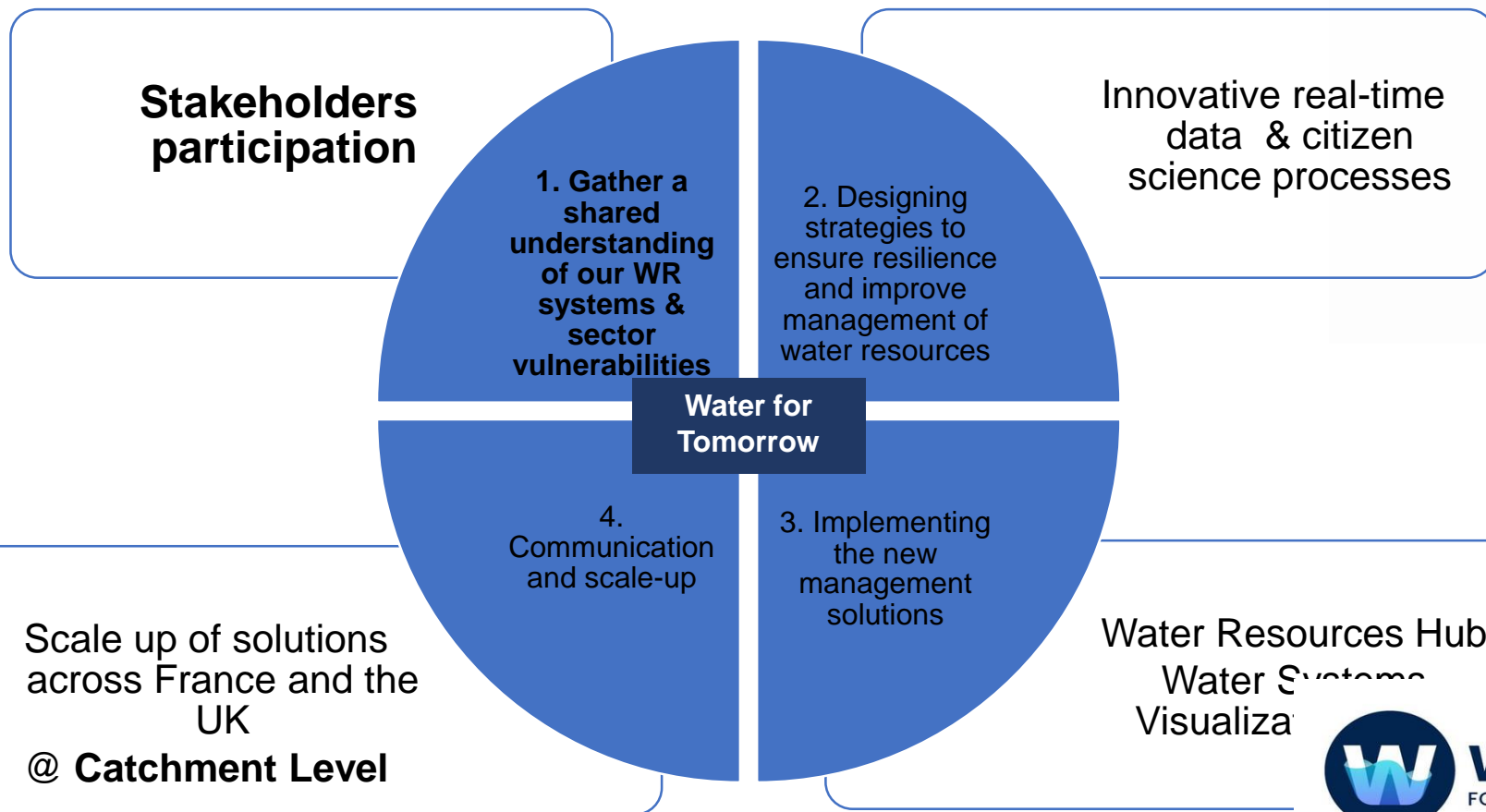
Water For Tomorrow

European Regional Development Fund

FCE Programme Area: 5 project pilots



The **Catchment Based Approach (CaBA)** is a **community-led approach** that engages people and groups from across society to help improve our precious water environments.



2021 - 22 WfT Project Timeline

JULY - DEC 2021

*Stakeholder
engagement
across sectors*

JAN 2022

JUNE 2022

OCT 22 – DEC 22

*Stakeholder
engagement on WfT
WR management
tools*

Integration of participatory models

- *Agriculture*
- *eNGO*
- *Industry*
- *Regulator*
- *Water company*
- *Other (Public, consultants & experts)*

APRIL - JUNE 2021

*Stakeholder
engagement*

JULY 22 - SEPT 2022

*Citizen Science
Analysis of WR
management options
being developed*



Stakeholder engagement workshop 06.2021

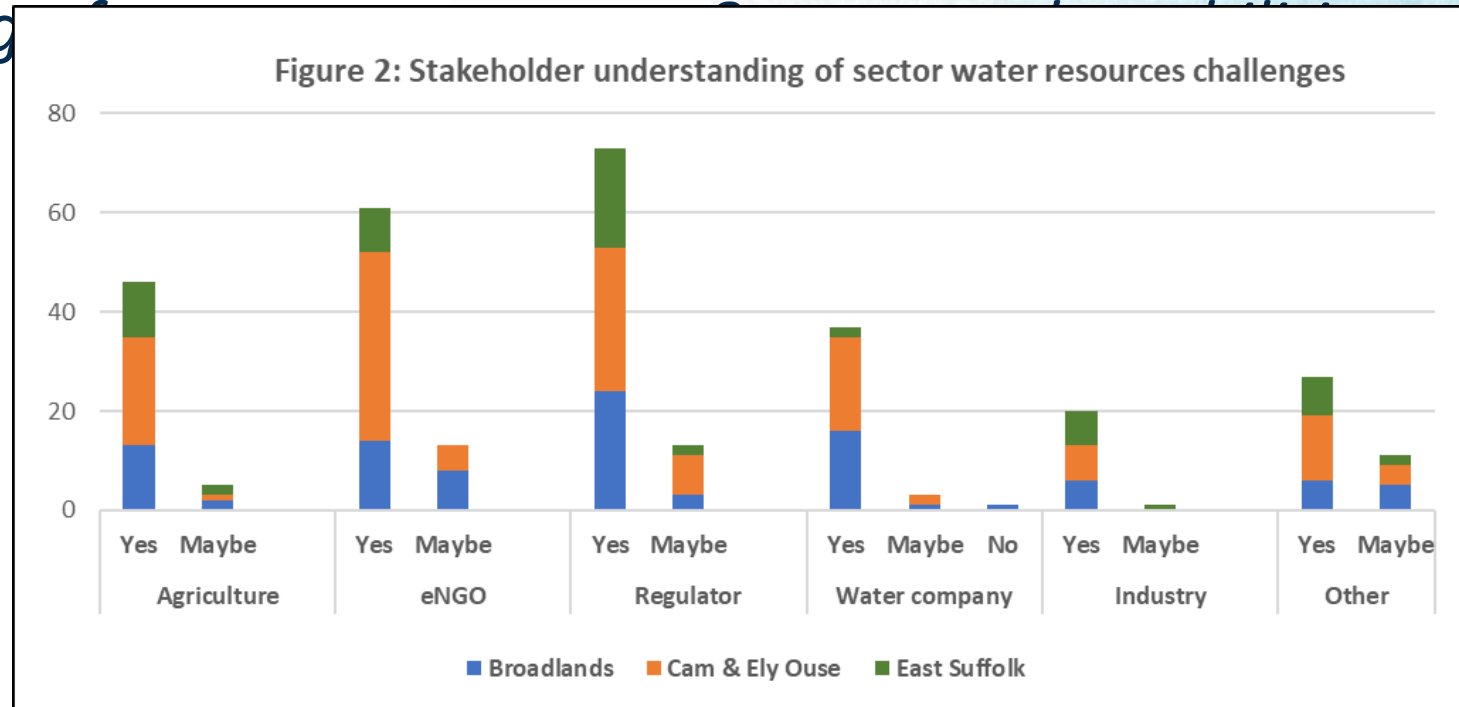
To gather a shared understanding

Number of attendees: 86

Organisations represented: 60

Findings:

1. Range of challenges facing stakeholders is broad.
2. An understanding of WR challenges and vulnerabilities across all sectors



Catchment Based Approach (CaBA) on project phases



- Individual **sector interviews** and engaging with **catchment partnerships** within the Broadlands, CamEO & East Suffolk
- Working with community groups and citizens to develop capacity at catchment level
- Interactive participatory models published on the project website <https://water-for-tomorrow.com/> remains open for continuous engagement with the WfT project team & *vice versa*.

WfT project is running to March 2023 – please get in touch should you wish to know more.



Usage details for the period:

April 1, 2022 - September 30, 2022

Custom Date Range

Set a Custom Date Range

Start Date:

4/1/2022

End Date:

9/30/2022

Update Report

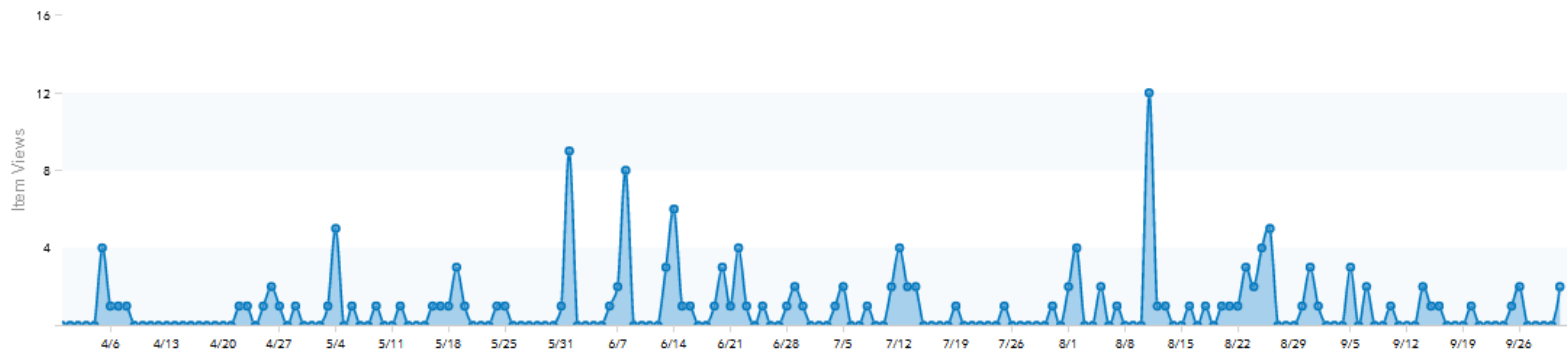
Item Views this Period

159

Avg Item Views Per Day

0.87

Usage Time Series



France (Channel
Manche) England

Water For Tomorrow

European Regional Development Fund



Usage details for the period:
April 1, 2022 - September 30, 2022

Custom Date Range

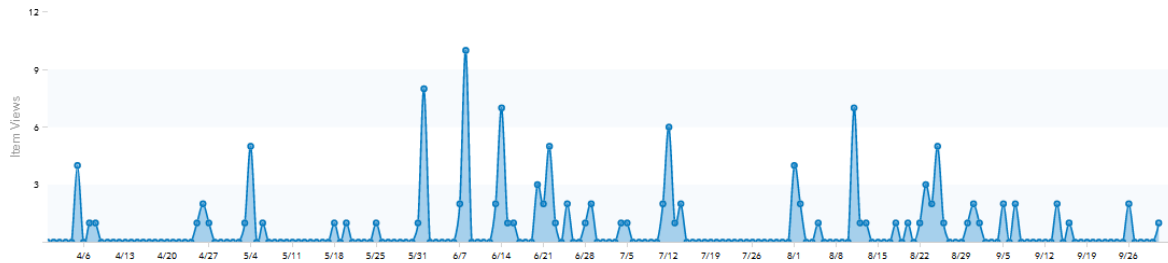
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Start Date: End Date:

Item Views this Period
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Avg Item Views Per Day
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Usage Time Series



Usage details for the period:
April 1, 2022 - September 30, 2022

Custom Date Range

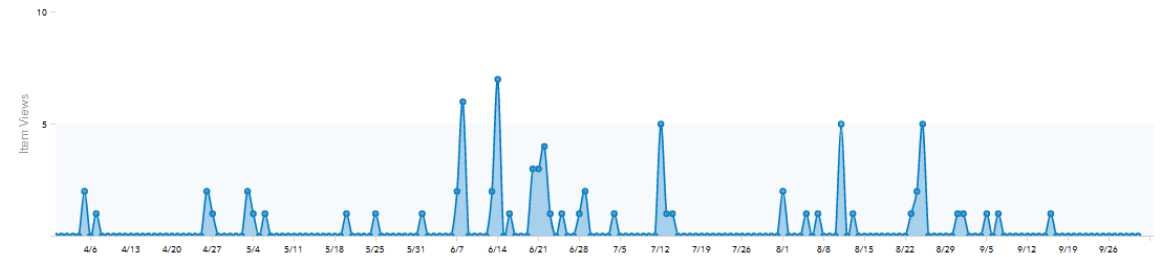
Set a Custom Date Range

Start Date: End Date:

Item Views this Period
77

Avg Item Views Per Day
0.42

Usage Time Series



In conclusion.....



The potential legacy of the WfT project is to develop WR management strategies using catchment level data-sets to produce outputs that drive/support local solutions, at catchment scale.

WfT is a project being delivered with a Catchment Based Approach.

Funded by an **International** organization, being delivered with colleagues at a **regional** scale (East of England) while deliveries and outputs are at **catchment** level.

Thank you.



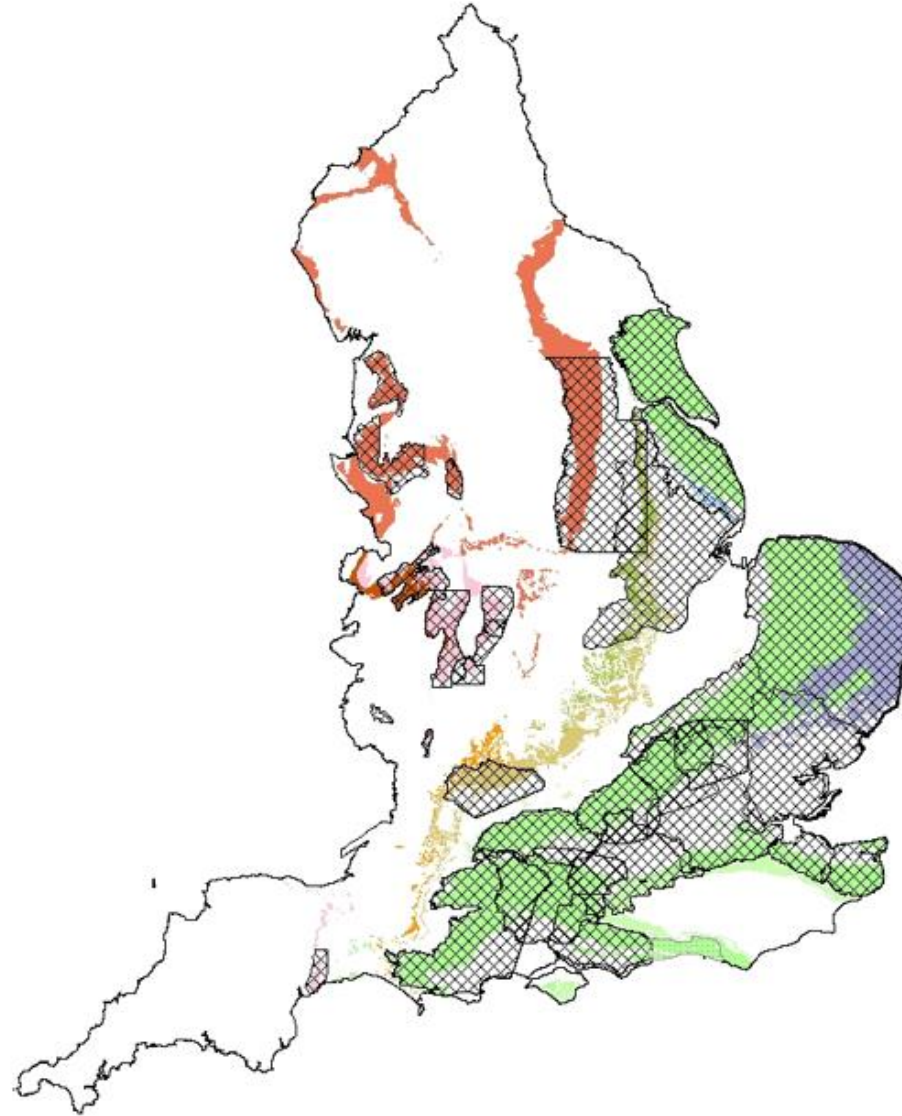
RLCP's CaBA Water Management Initiative

- Provide an information platform to explain the catchment's water balance to stakeholders
- Animate the basin water management challenges
- Support stakeholders to address their water management concerns



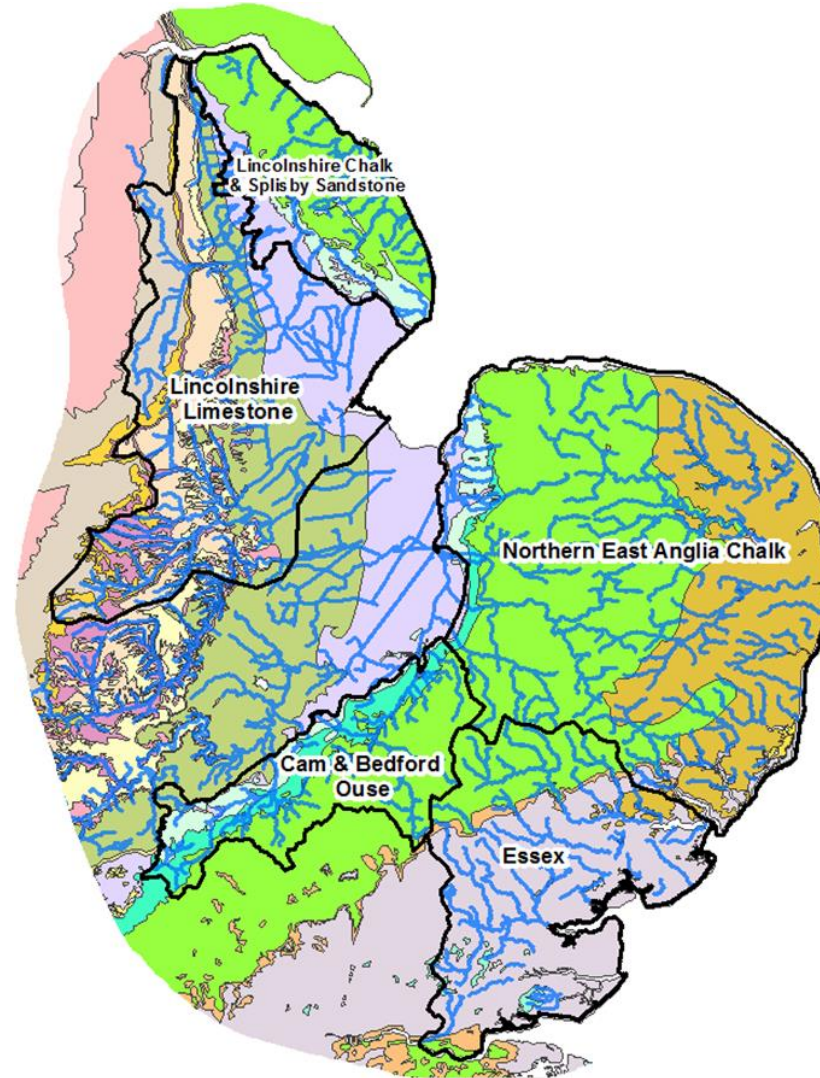
Groundwater Modelling Assets Held by the Environment Agency

- ➔ 30+ numerical groundwater models
- ➔ 72% of groundwater abstraction licences by volume
- ➔ Strategic 'top down' approach initiated by Directors in the mid-1990s
- ➔ In partnership with stakeholders – single framework for 'UK Ltd'
- ➔ Use of the best national datasets
- ➔ 12.5 FTEs

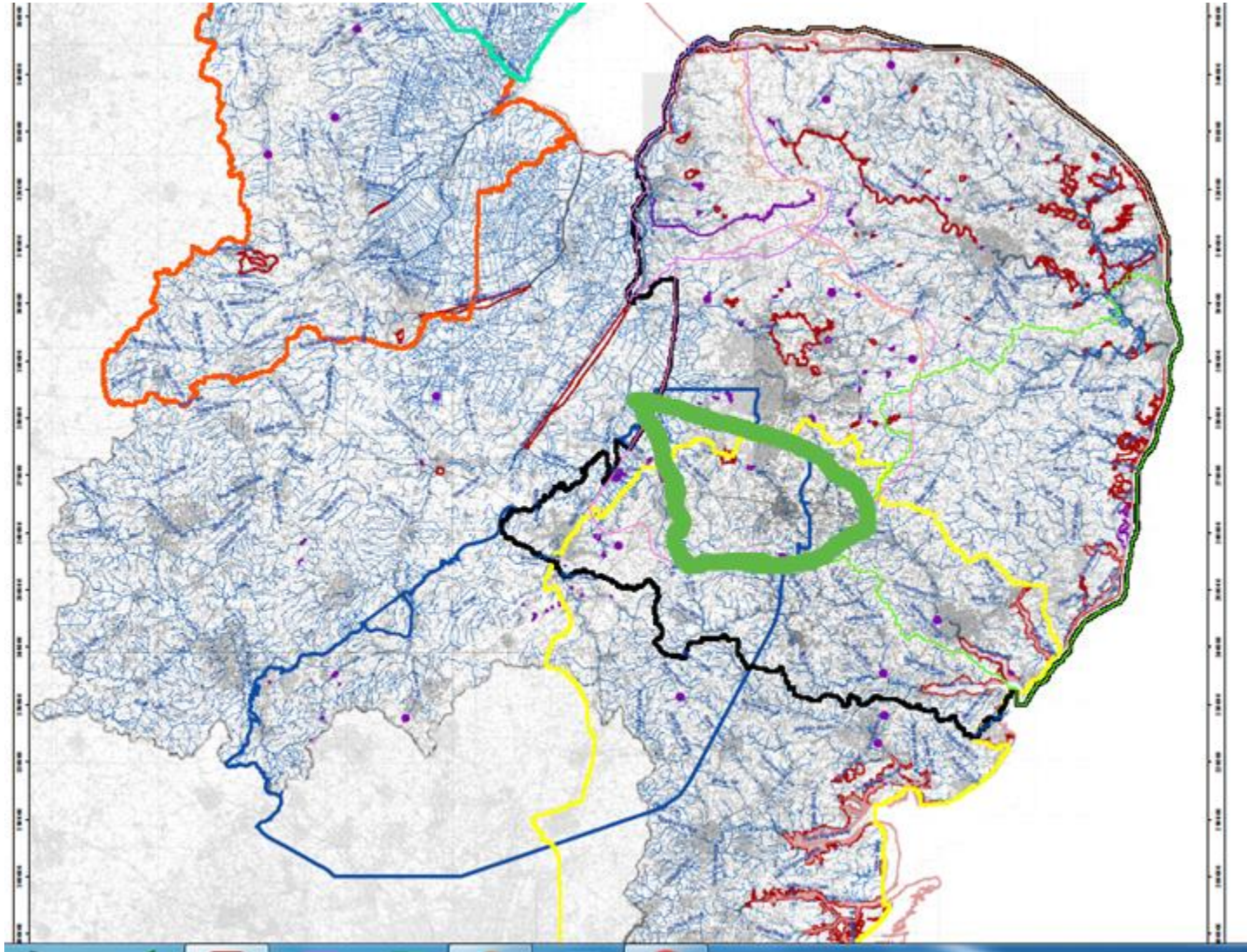


Groundwater Modelling Assets in East Anglia and Lincs & Northants

- Coordinated framework of models
- Staged development between 1999 and 2015
- >£20M remaining asset value
- Groundwater modelling team to be custodians of the asset management plans



The Northern East Anglia Chalk 'NEAC' GW Model



Environment Agency

Northern East Anglia Chalk Groundwater
Investigation Final Report

Lark Catchment

Volume 1: Main Text and Appendices



Amec Foster Wheeler Environment & Infrastructure UK Limited

August 2016

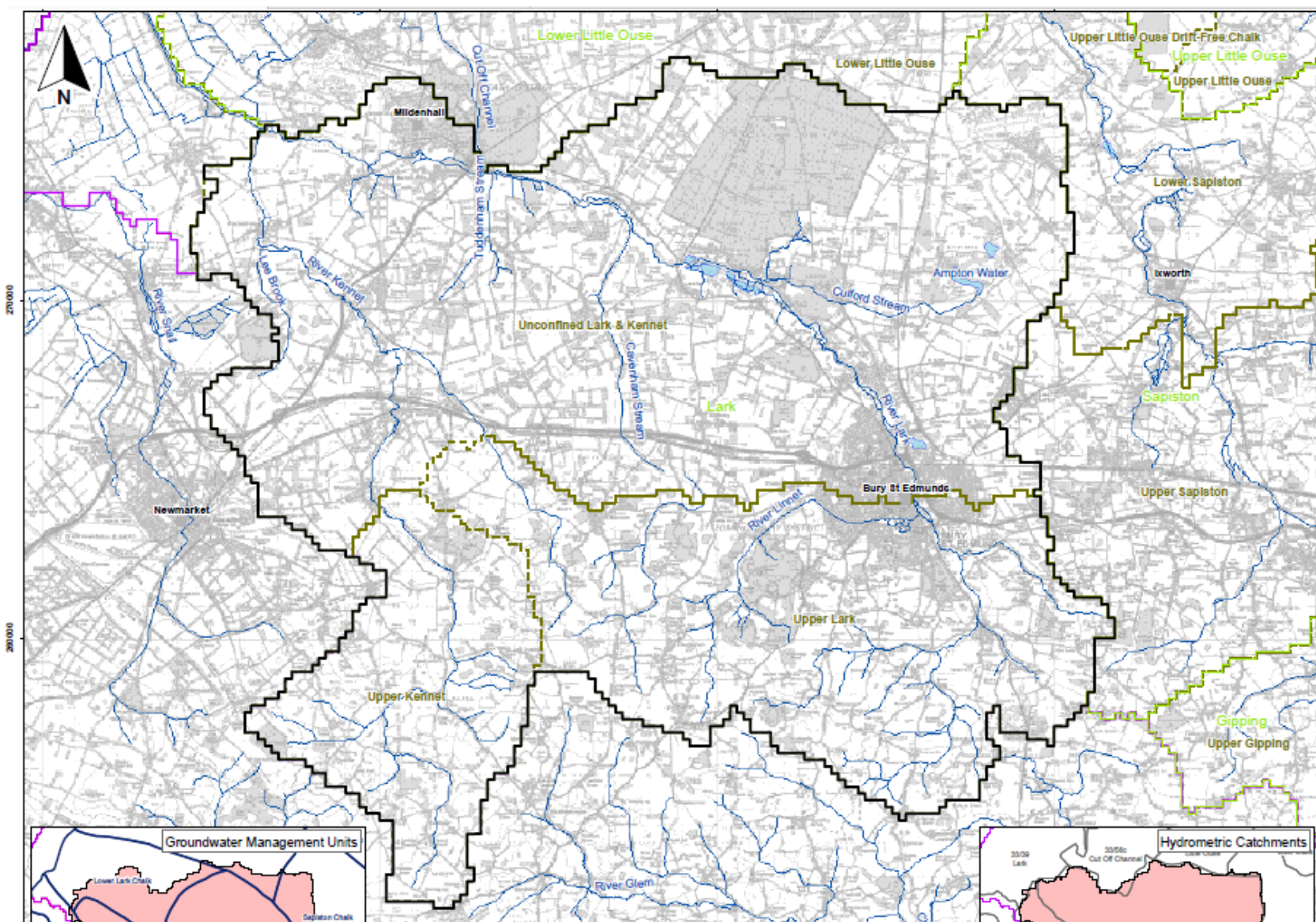
External Technical Advisor
(Anglian Region)

Interim Model Sign Off for
the North East Anglian
Chalk (NEAC) Model

21st October 2011

Issue No 2
49308013 / MARP0002





**Catchment
Based Approach**



Interreg
France (Channel) England

Water For Tomorrow

European Regional Development Fund

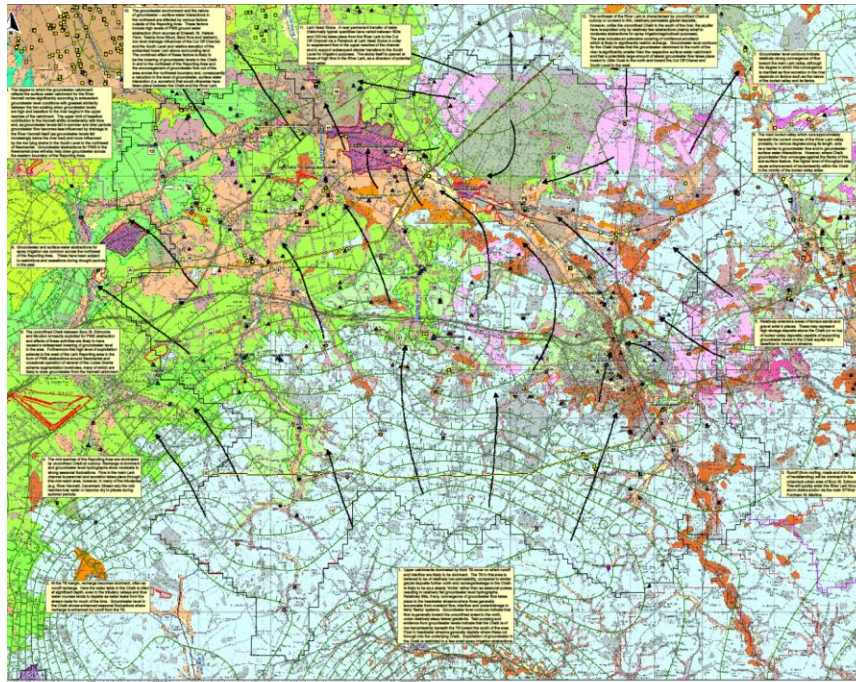


Licensed Abstraction Quantities in the Lark Reporting Area (2008)

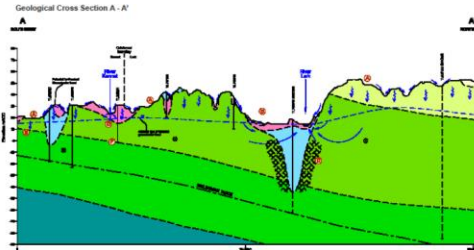
	Groundwater		Surface Water	
	Annual (Thousand m ³ per Annum)	Equivalent Daily over 365 days (MLD)	Annual (Thousand m ³ per Annum)	Equivalent Daily over 365 days (MLD)
PWS	17,329	47.5	0	0
Agricultural (Spray irrigation)	759	2.1 (4.1 based on 183 day period)	2,209	6.1 (12.1 based on 183 day period)
Agricultural (general)	4,416	12.1	1,176	3.2
Industrial	3,628	9.9	23	0.1
Other including hydroelectric	31	0.1	39,787	109
Total excluding hydroelectric	26,164 <i>(21,754)</i>	71.7 <i>(59.6)</i>	3,408	9.4

¹ Totals not accounting for aggregate quantities.

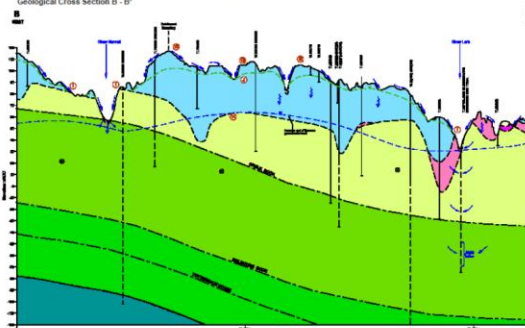
² Totals in *italics* have aggregates taken into account and represent the allowable FL licensed abstraction quantity



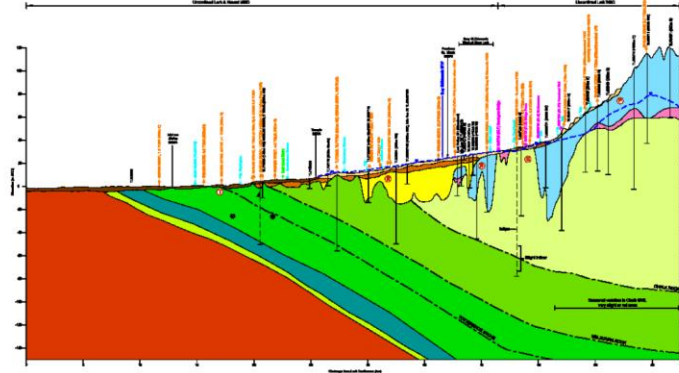
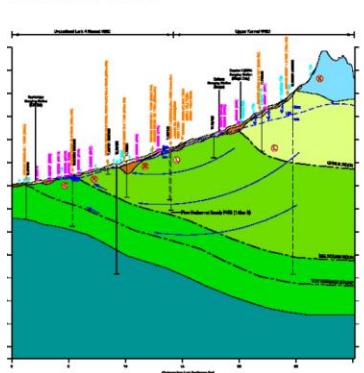
Conceptual Long Profile - River Lark



Geological Cross Section A - A'



Geological Cross Section B - B'



1) Conceptual Cross Section, Unconfined Lark and Kennet WSD
 Unconfined chalk with highly permeable, high recharge with variable low conductive components and potential for perched groundwater in 10m to 15m. Runoff recharge is likely to be significant at this height.

2) River Lark flow is maintained by sand and gravel and chalk headwater low conductive groundwater flow features are seen near the River Lark where surface water flow is dominated by topography and groundwater flow and high transmissivity in the chalk and high infiltration. Runoff recharge is likely to be significant at this height.

3) The average summer groundwater level is below the base of the River Kennet and is frequently above particularly during droughts. Groundwater is confined along much of the river due to groundwater flow confinement. This is similar to the situation at the Kennet WSD (see Kennet Long Profile).

4) Hydraulic conductivity groundwater in the chalk and the River Lark is enhanced by the natural position and solid type (all thickness or thin) material of the chalk valley. The bottom valley can act as a barrier to groundwater flowing north, which is likely to represent areas of relatively high transmissivity chalk.

5) Towards the end of the Reporting Area, groundwater flow may be toward the neighbouring subsurface (chalk and chalk lenses), other than interglacial till. This flow is likely to occur again after the River Lark is built to its current level.

6) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

7) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

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16) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

17) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

18) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

19) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

20) Runoff recharge from the River Lark is likely to occur again after the River Lark is built to its current level.

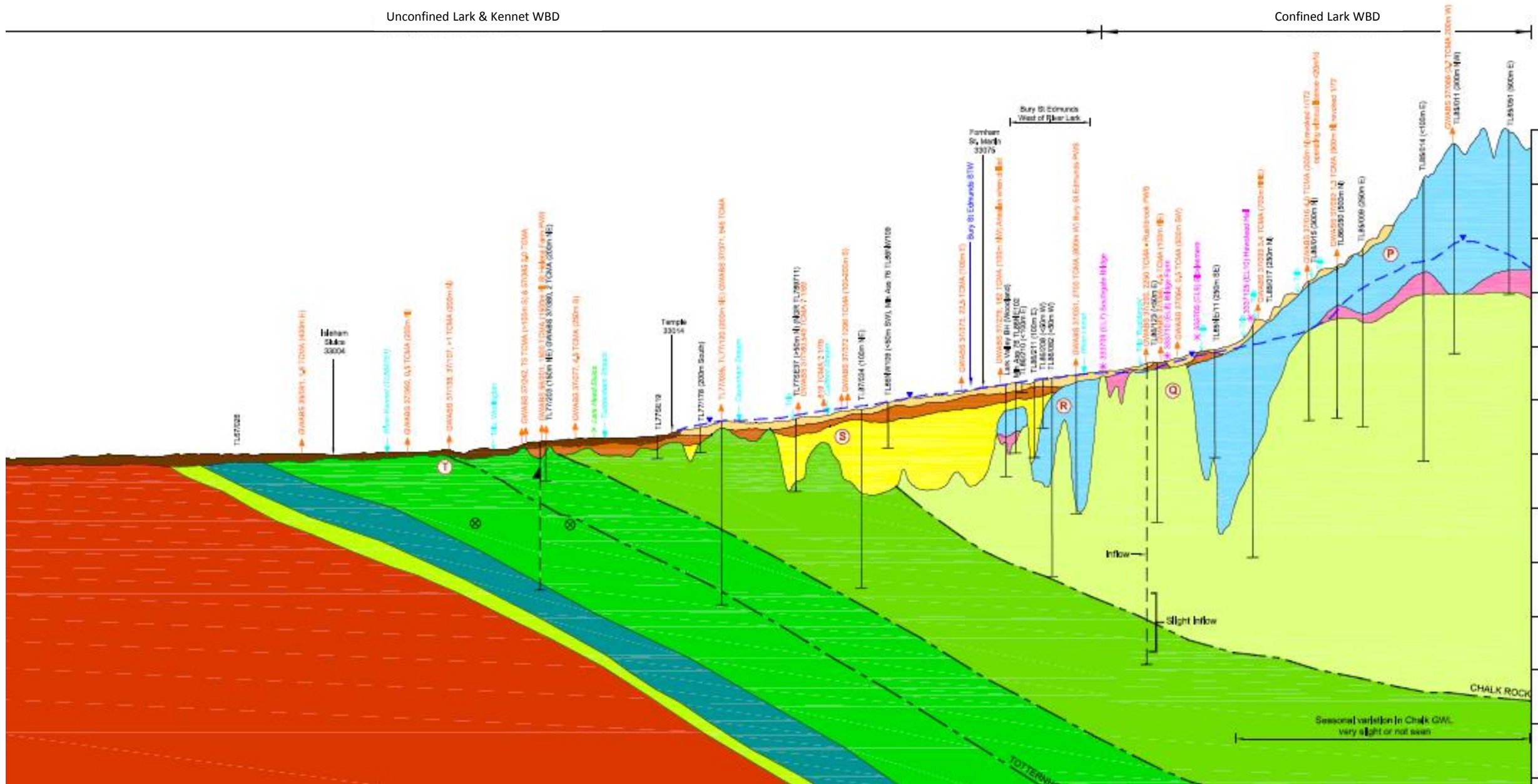
NEAC Lark Catchment Conceptual Map and Cross-Sections



Conceptual Long Profile - River Lark

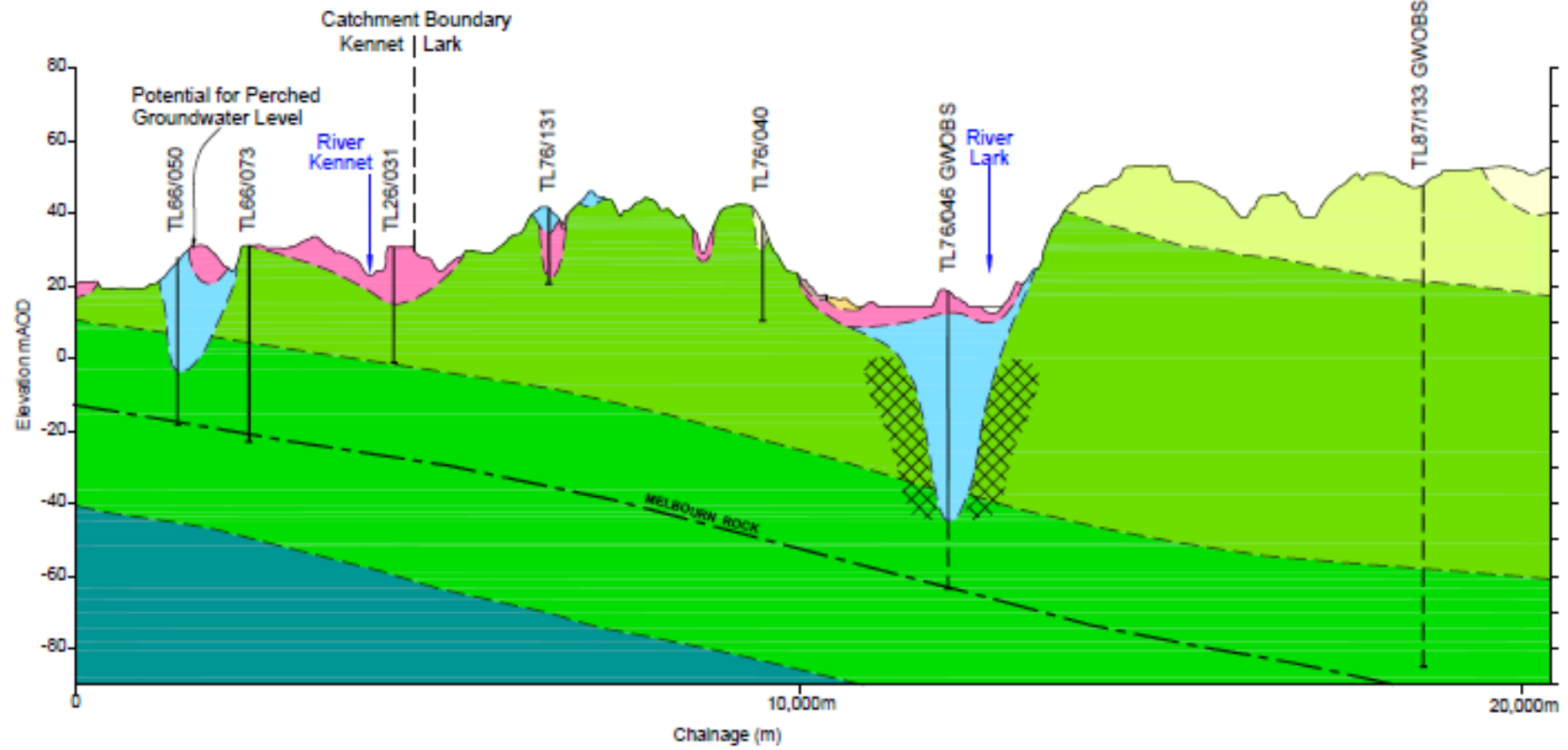
Unconfined Lark & Kennet WBD

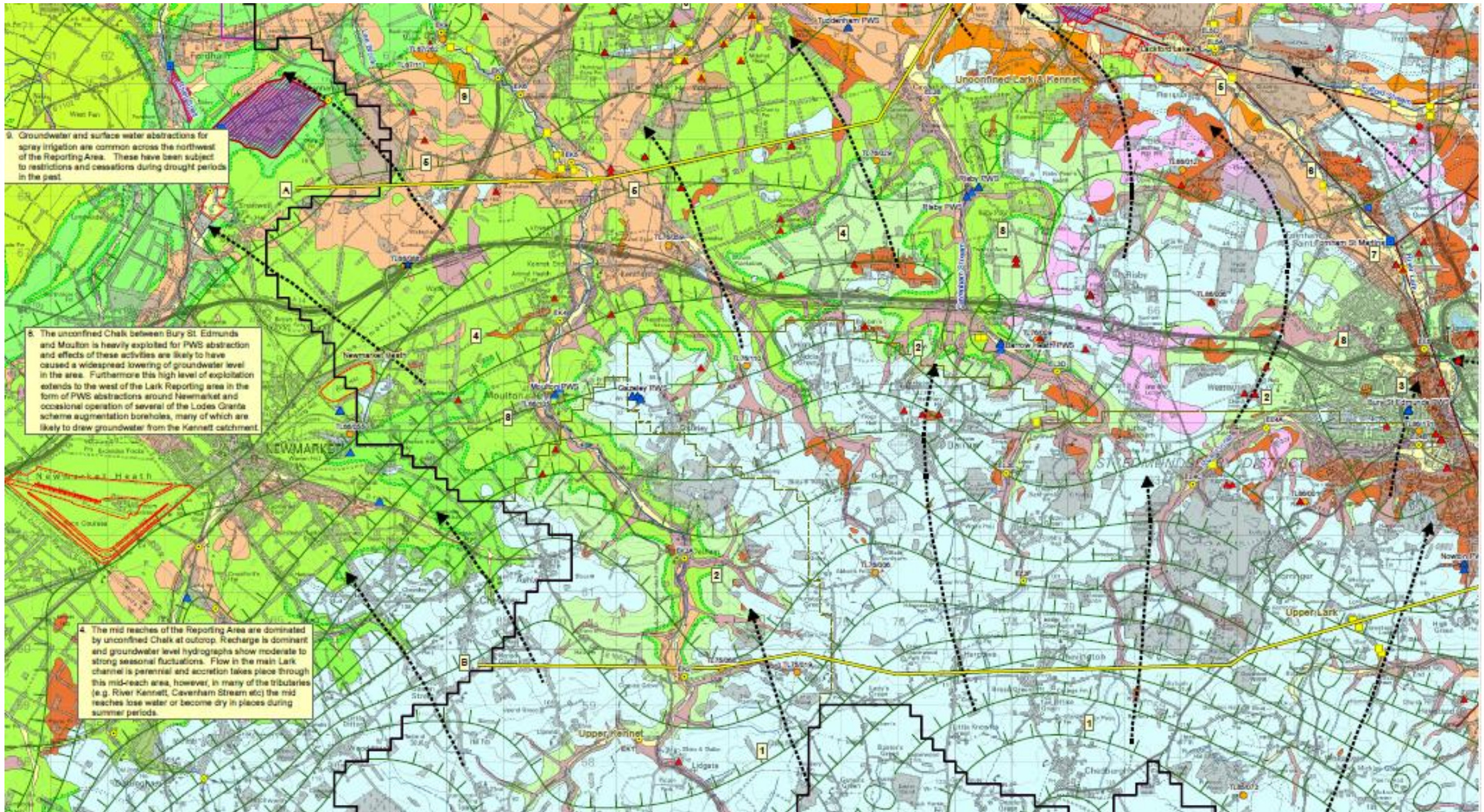
Confined Lark WBD

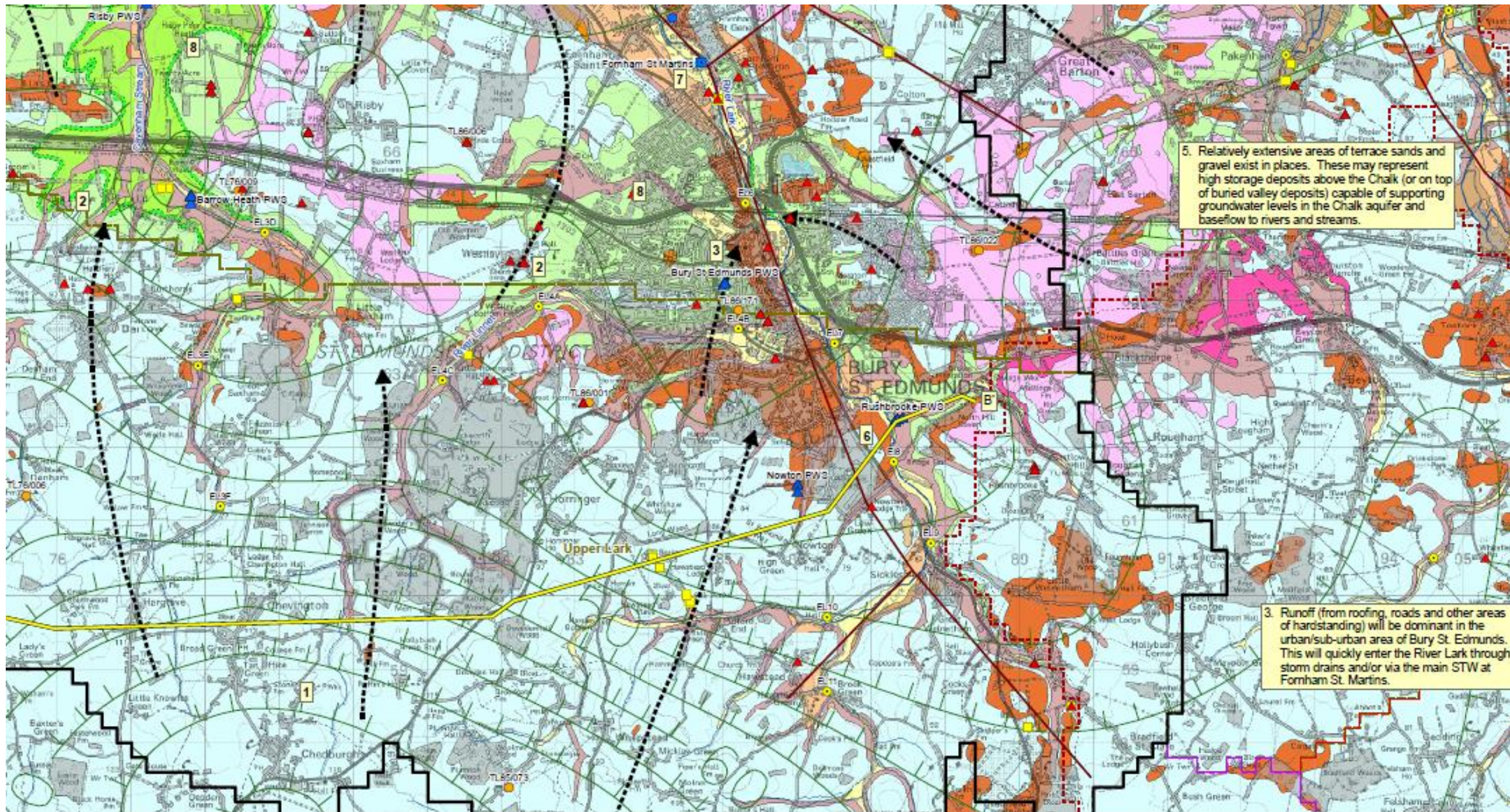


A
SOUTHWEST

A'
NORTHEAST





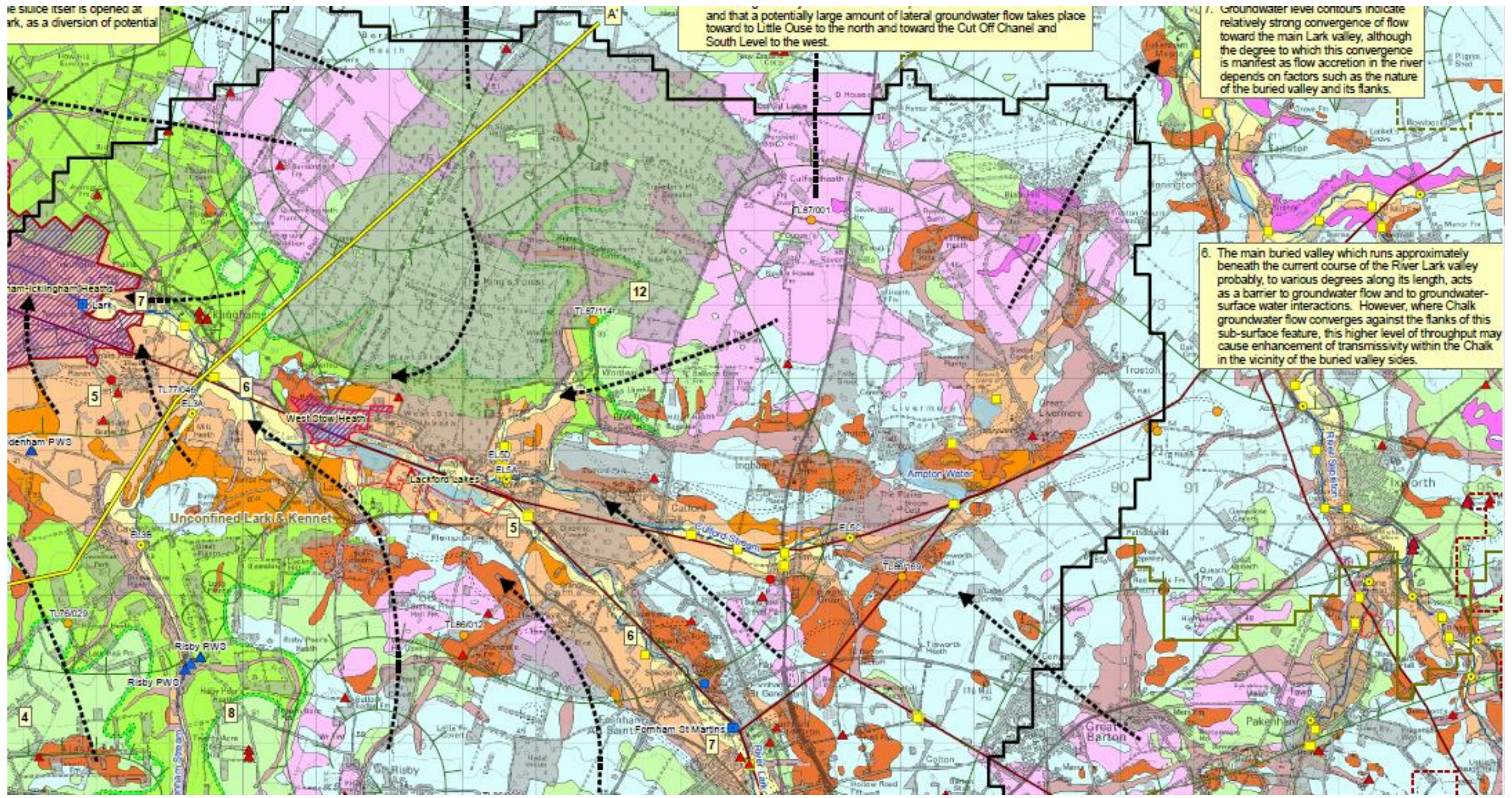


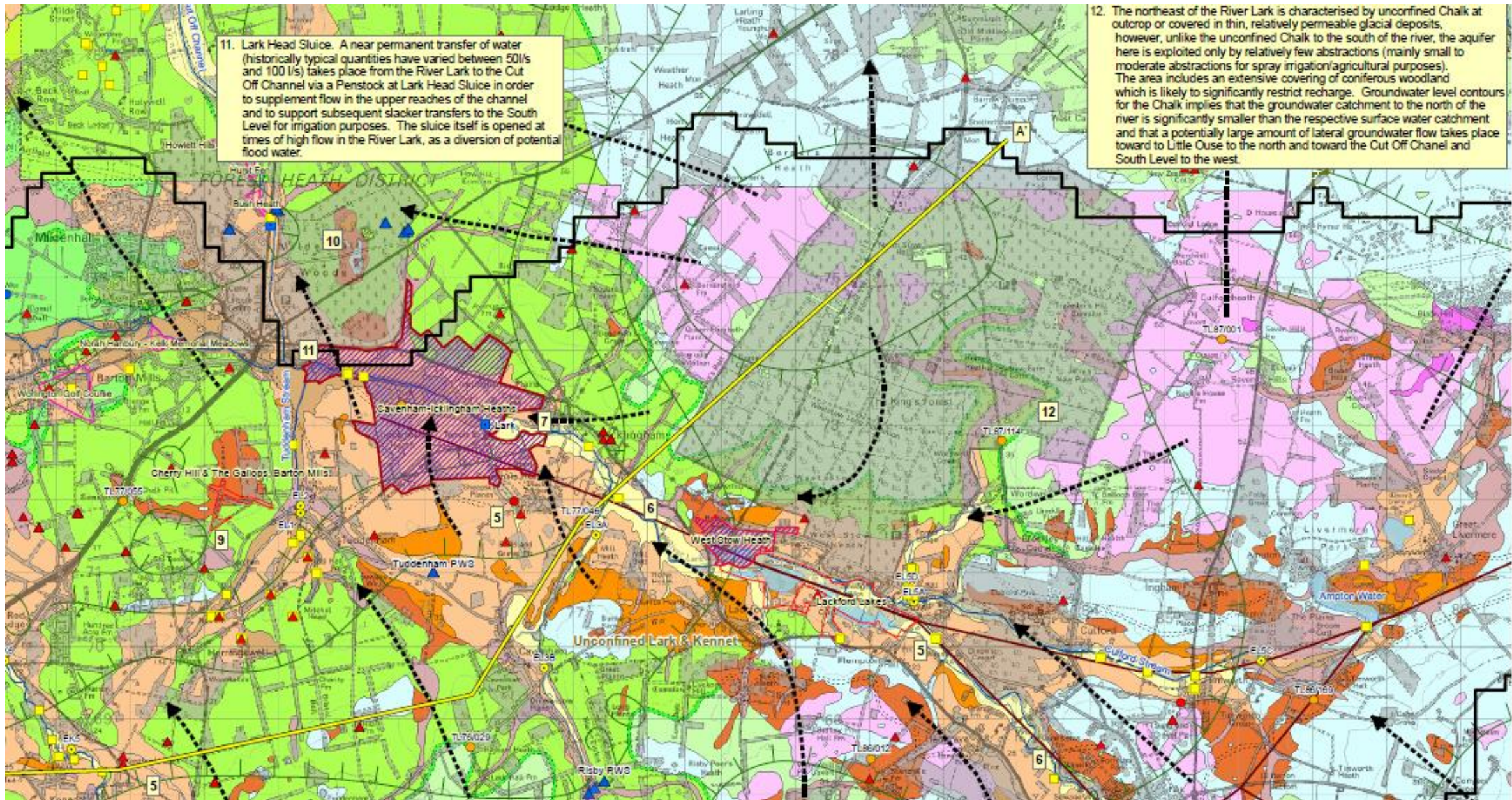
the sluice itself is opened at
Lark, as a diversion of potential

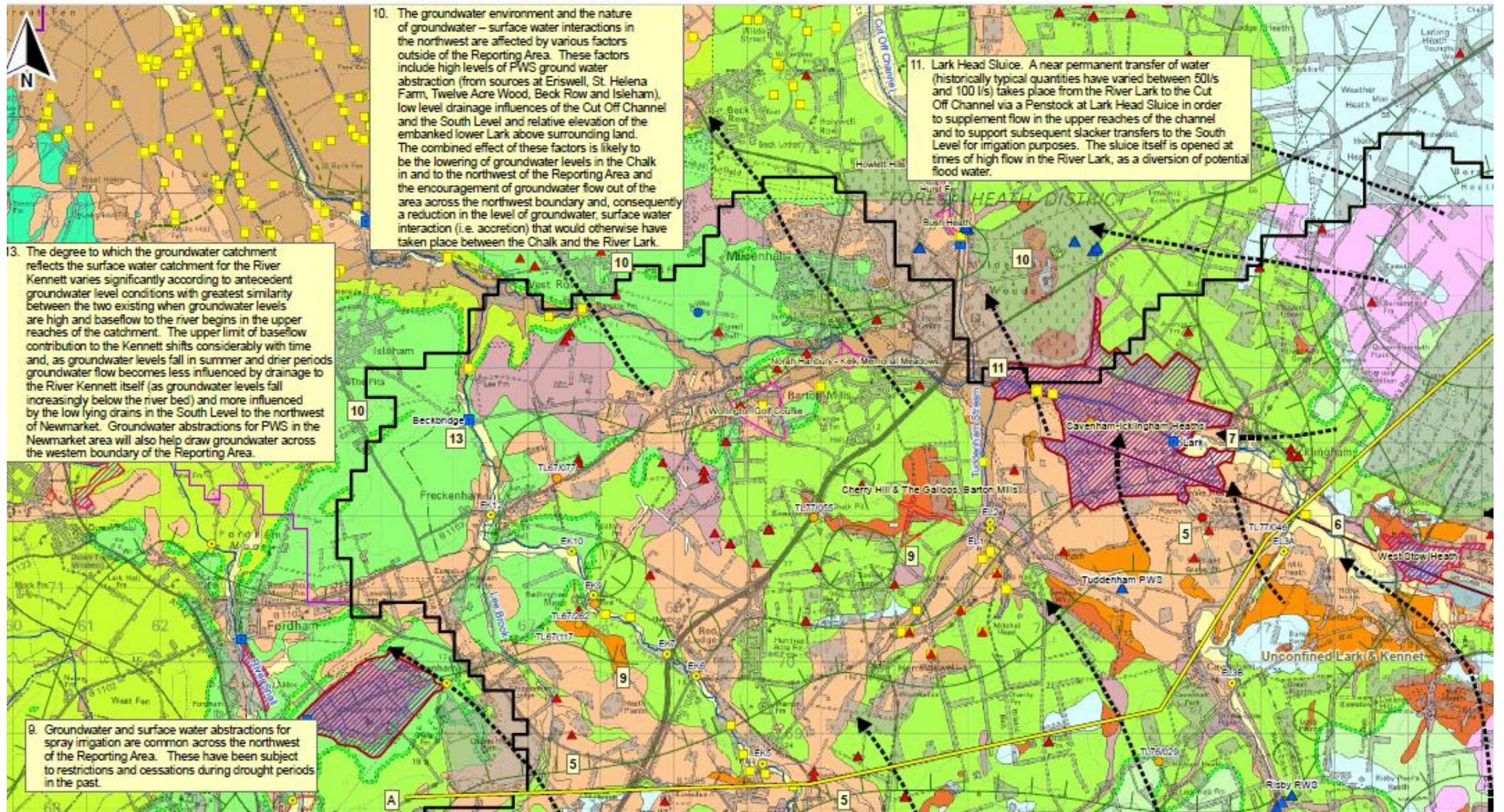
and that a potentially large amount of lateral groundwater flow takes place
toward to Little Ouse to the north and toward the Cut Off Chanel and
South Level to the west.

7. Groundwater level contours indicate
relatively strong convergence of flow
toward the main Lark valley, although
the degree to which this convergence
is manifest as flow accretion in the river
depends on factors such as the nature
of the buried valley and its flanks.

8. The main buried valley which runs approximately
beneath the current course of the River Lark valley
probably, to various degrees along its length, acts
as a barrier to groundwater flow and to groundwater-
surface water interactions. However, where Chalk
groundwater flow converges against the flanks of this
sub-surface feature, this higher level of throughput may
cause enhancement of transmissivity within the Chalk
in the vicinity of the buried valley sides.





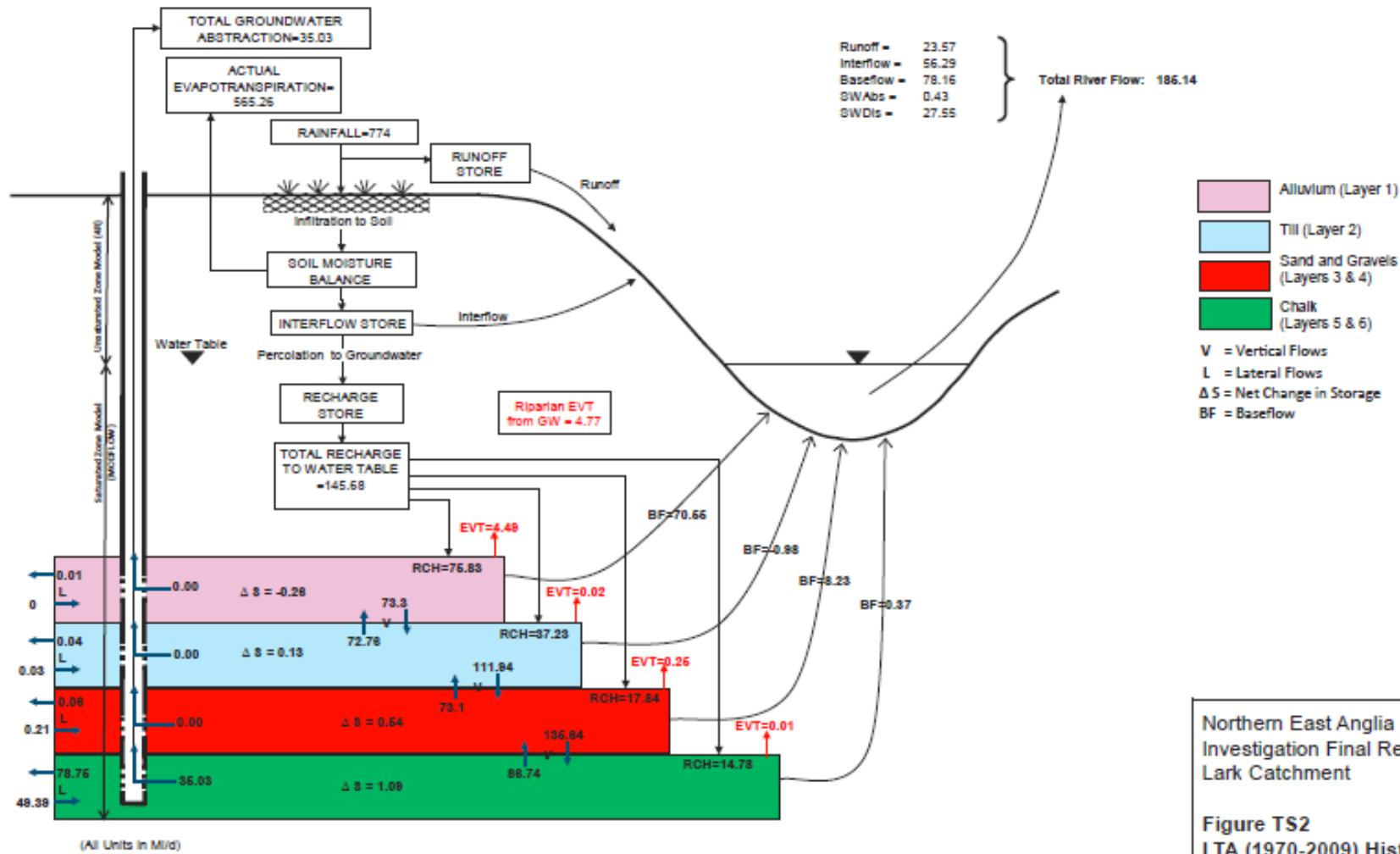


10. The groundwater environment and the nature of groundwater – surface water interactions in the northwest are affected by various factors outside of the Reporting Area. These factors include high levels of PWS ground water abstraction (from sources at Eriswell, St. Helena Farm, Twelve Acre Wood, Beck Row and Isleham), low level drainage influences of the Cut Off Channel and the South Level and relative elevation of the embanked lower Lark above surrounding land. The combined effect of these factors is likely to be the lowering of groundwater levels in the Chalk in and to the northwest of the Reporting Area and the encouragement of groundwater flow out of the area across the northwest boundary and, consequently a reduction in the level of groundwater, surface water interaction (i.e. accretion) that would otherwise have taken place between the Chalk and the River Lark.

11. Lark Head Sluice. A near permanent transfer of water (historically typical quantities have varied between 50l/s and 100 l/s) takes place from the River Lark to the Cut Off Channel via a Penstock at Lark Head Sluice in order to supplement flow in the upper reaches of the channel and to support subsequent slacker transfers to the South Level for irrigation purposes. The sluice itself is opened at times of high flow in the River Lark, as a diversion of potential flood water.

13. The degree to which the groundwater catchment reflects the surface water catchment for the River Kennett varies significantly according to antecedent groundwater level conditions with greatest similarity between the two existing when groundwater levels are high and baseflow to the river begins in the upper reaches of the catchment. The upper limit of baseflow contribution to the Kennett shifts considerably with time and, as groundwater levels fall in summer and drier periods groundwater flow becomes less influenced by drainage to the River Kennett itself (as groundwater levels fall increasingly below the river bed) and more influenced by the low lying drains in the South Level to the northwest of Newmarket. Groundwater abstractions for PWS in the Newmarket area will also help draw groundwater across the western boundary of the Reporting Area.

9. Groundwater and surface water abstractions for spray irrigation are common across the northwest of the Reporting Area. These have been subject to restrictions and cessations during drought periods in the past.



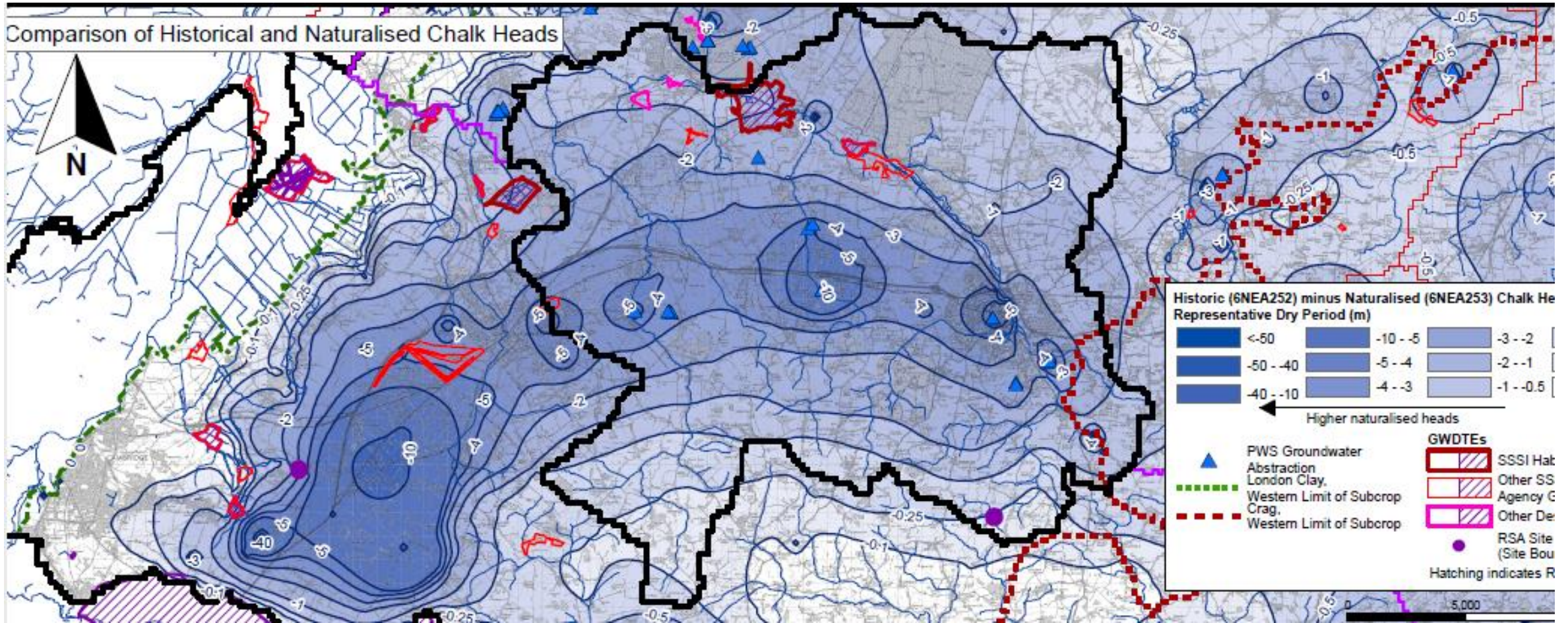
Northern East Anglia Chalk Groundwater Investigation Final Report
 Lark Catchment

Figure TS2
 LTA (1970-2009) Historical Water Balance for the Lark Reporting Area

Table 3 Summary of LTA Abstraction Impacts on Water Resources In the Lark Reporting Area

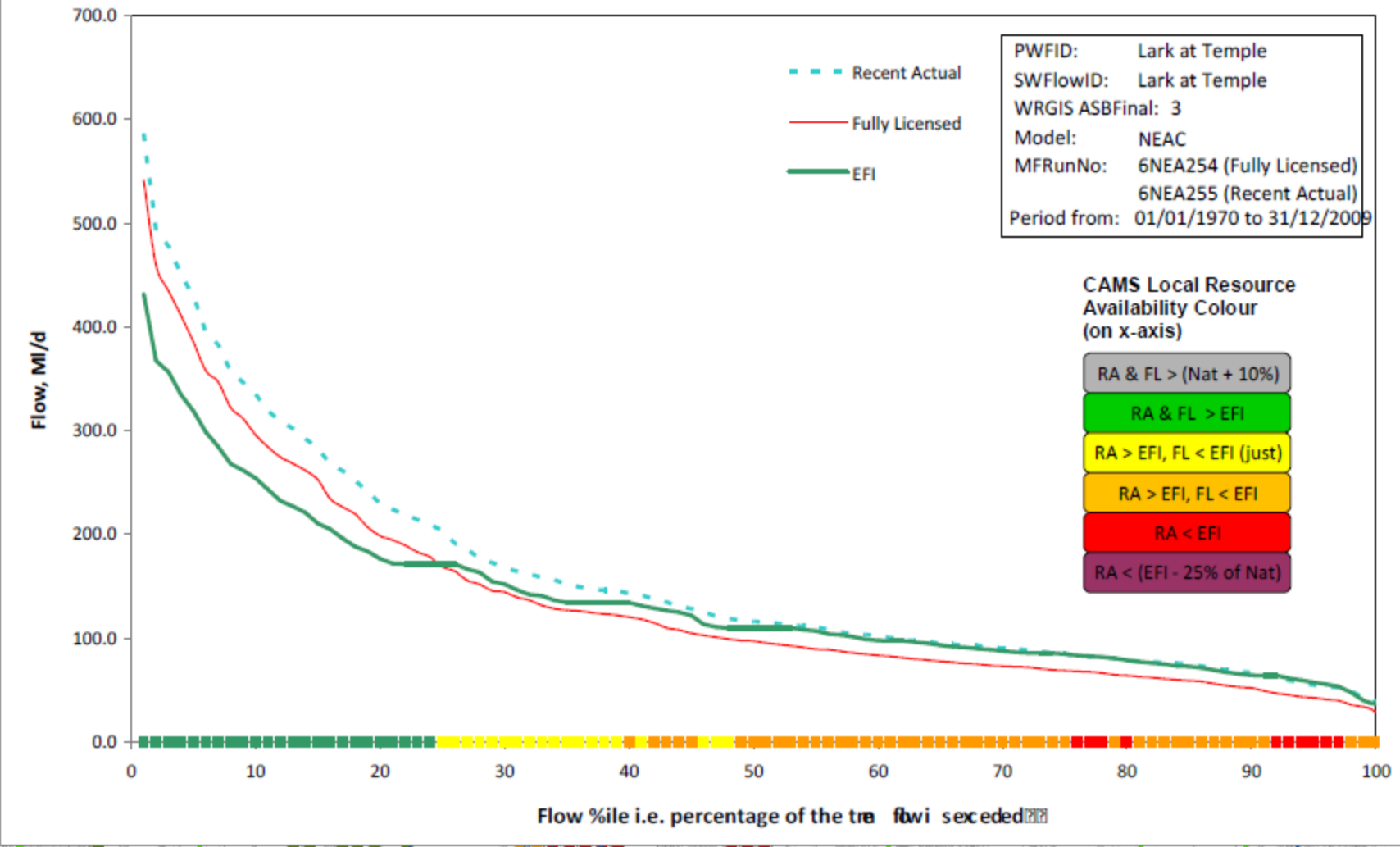
	Naturalised	Historical	Recent Actual	Fully Licensed
IMPACTS ON GROUNDWATER				
Saturated System				
Total Recharge to Water Table plus leakage from streams to groundwater (M/d)	156.2	157.8	158.6	159.3
Total Evapotranspiration from Water Table (M/d)	5.8	4.8	4.7	4.1
Total Groundwater Abstraction (M/d)	0.0	35.0	36.0	59.6
Total Groundwater Abstraction as a % of Recharge to Water Table plus leakage from streams to groundwater (%)	0	22	23	37
Chalk				
Recharge to water table in Chalk (infiltration plus runoff recharge) (M/d)	14.8	14.8	14.8	14.8
Leakage from streams to groundwater in the Chalk (M/d)	0.6	0.6	0.6	0.7
Vertical Downward Flow to Chalk (M/d)	130.5	135.6	136.0	138.6
Total recharge to Chalk (infiltration and runoff recharge direct to Chalk plus leakage from streams to Chalk plus vertical downward flow into the aquifer) (M/d)	146.0	151.1	151.4	154.1
Total input to Chalk (Total Recharge to Chalk (above) plus lateral inflow to Chalk) (M/d)	199.6	200.5	198.0	195.6
Lateral Groundwater Inflow to the Chalk (M/d)	53.7	49.4	46.6	41.5
Lateral Groundwater Outflow from the Chalk (M/d)	78.5	78.8	79.2	70.6
Net Lateral Groundwater Flow in the Chalk (positive=inflow) (M/d)	-24.8	-29.4	-32.6	-29.1
Effective Groundwater Input to the Chalk ¹ . Total Recharge to the Chalk plus vertical downward flow into the Chalk plus leakage from streams to groundwater plus net lateral groundwater flow in the Chalk from the Reporting Area (M/d)	121.1	121.7	118.8	125.0
Groundwater Abstraction from the Chalk (M/d)	0.0	35.0	36.0	59.6
Groundwater Abstraction from the Chalk as % of Effective Groundwater Resource in the Chalk (%)	0	29	30	48
IMPACTS ON FLOWS				
Surface water Abstractions (M/d)	0.0	0.4	1.1	4.7
Surface water Discharges (M/d)	0.0	27.5	33.7	33.7
Leakage from streams to groundwater (M/d)	11.4	12.7	12.8	13.6
Groundwater discharge to streams (M/d)	126.8	90.8	86.4	68.3
Baseflow (Groundwater discharge to streams minus leakage from streams to groundwater) (M/d)	115.4	78.2	73.6	54.6
Total River Flow (runoff plus interflow, plus baseflow plus surface water discharges minus surface water abstractions) (M/d)	195.3	185.1	186.0	163.5
Groundwater abstraction as % of Naturalised Total Flow (%)	0	18	18	31
Groundwater abstraction as % of Naturalised Baseflow (%)	0	30	31	52
Scenario Total Flow as a % of Naturalised (%)	100	95	95	84
Scenario Baseflow as a % of Naturalised (%)	100	68	64	47

Effective Groundwater Input to the Chalk ¹ . Total Recharge to the Chalk plus vertical downward flow into the Chalk plus leakage from streams to groundwater plus net lateral groundwater flow in the Chalk from the Reporting Area (M/d)	121.1	121.7	118.8	125.0
Groundwater Abstraction from the Chalk (M/d)	0.0	35.0	36.0	59.6
Groundwater Abstraction from the Chalk as % of Effective Groundwater Resource in the Chalk (%)	0	29	30	48



AP9 - Temple

Modelled Flow Duration Curves and Environmental Flow Indicator (hung from natural)

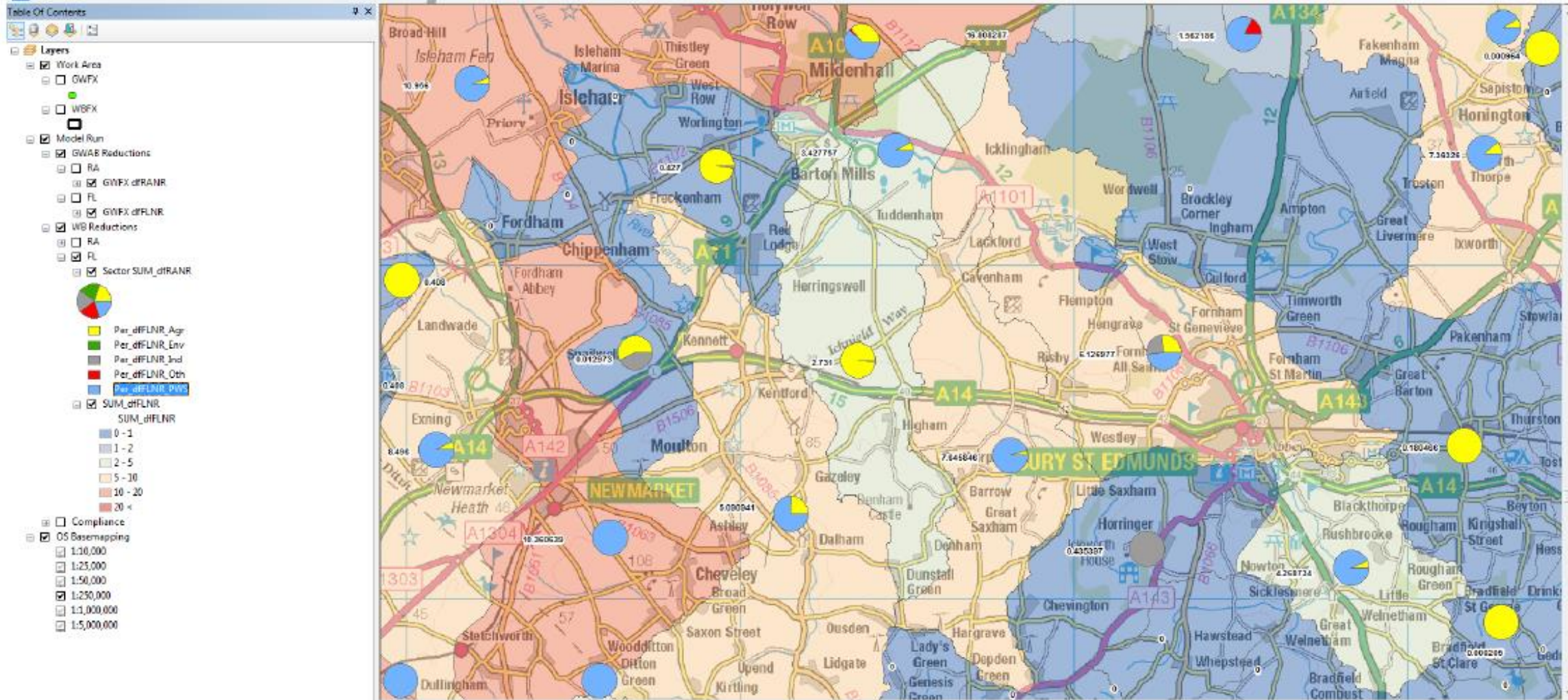


Lark Basin Water Management Challenges

- EA Regulatory Approach
- The competition for restricted basin resources
- The bigger picture (the WRE plan, government policy and initiatives...)



EA Indicative Abstraction Reductions to Comply with EFI Q95

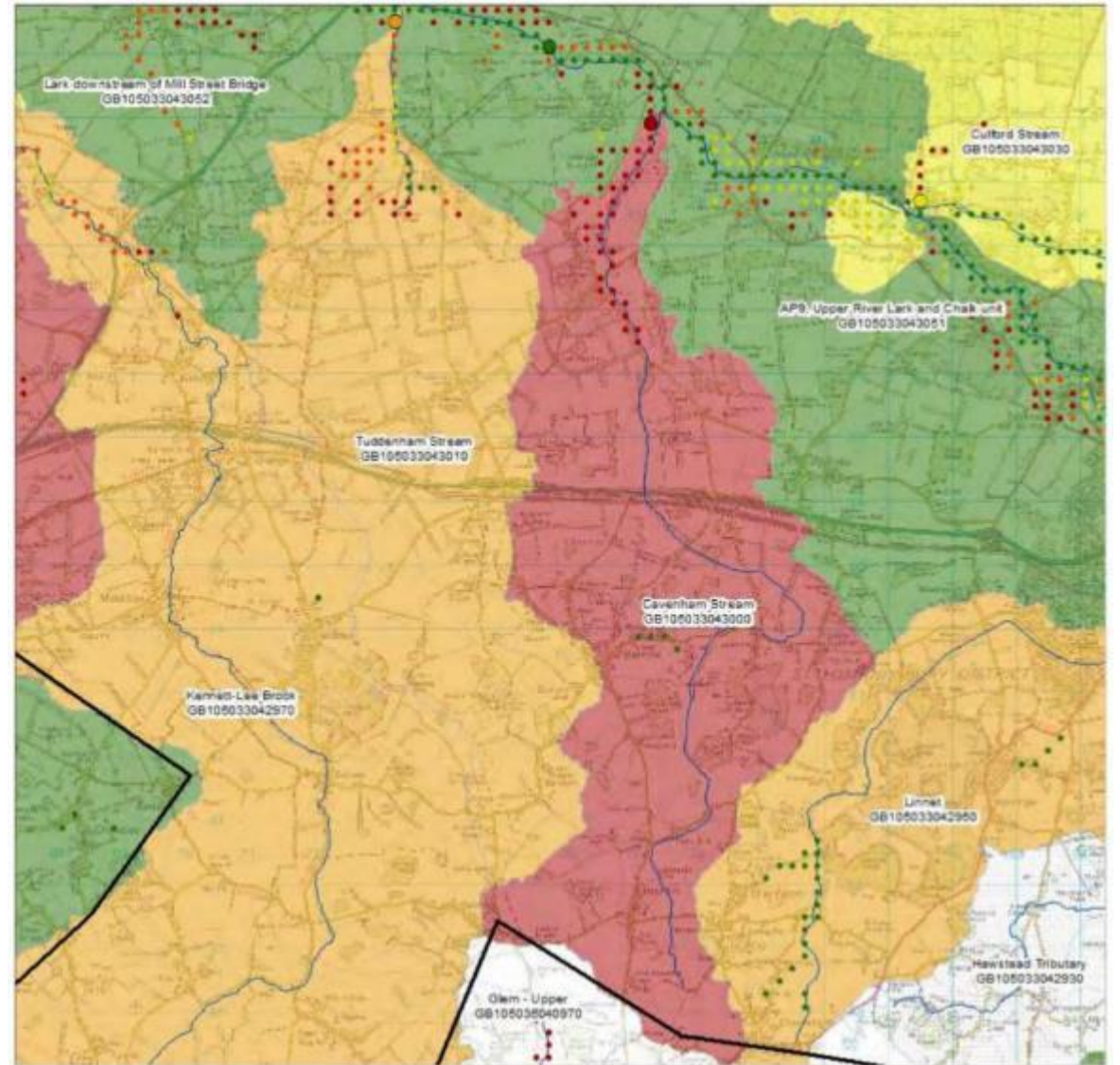


Water Resources in the Lark Catchment

Environmental & Policy Landscape

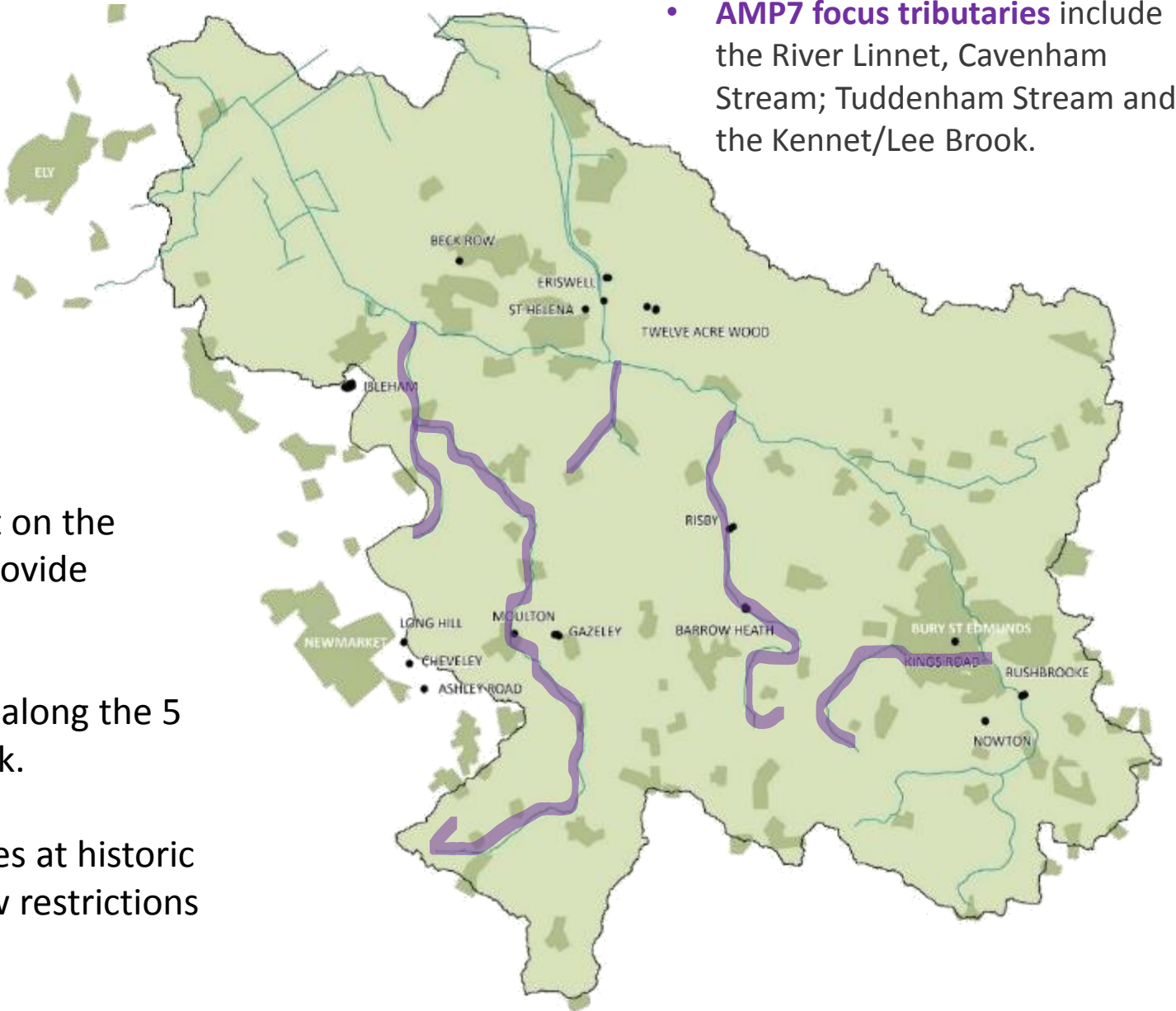


Understanding Abstraction Pressure in the Lark Catchment



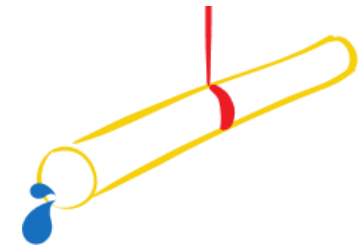
Environmental Planning and Delivery 2020-25

- River Flow Support – exploring flow support on the River Linnet and the River Kennett-Lee to provide resilience during low flow events.
- River Restoration – targeted enhancements along the 5 tributaries to the southwest of the main Lark.
- No Deterioration – planned to cap all licences at historic maximum, in addition to new hands-off flow restrictions to Bury and Rushbrooke sources.



- **AMP7 focus tributaries** include the River Linnet, Cavenham Stream; Tuddenham Stream and the Kennet/Lee Brook.

Sustainable abstraction beyond 2025



Medium-Term

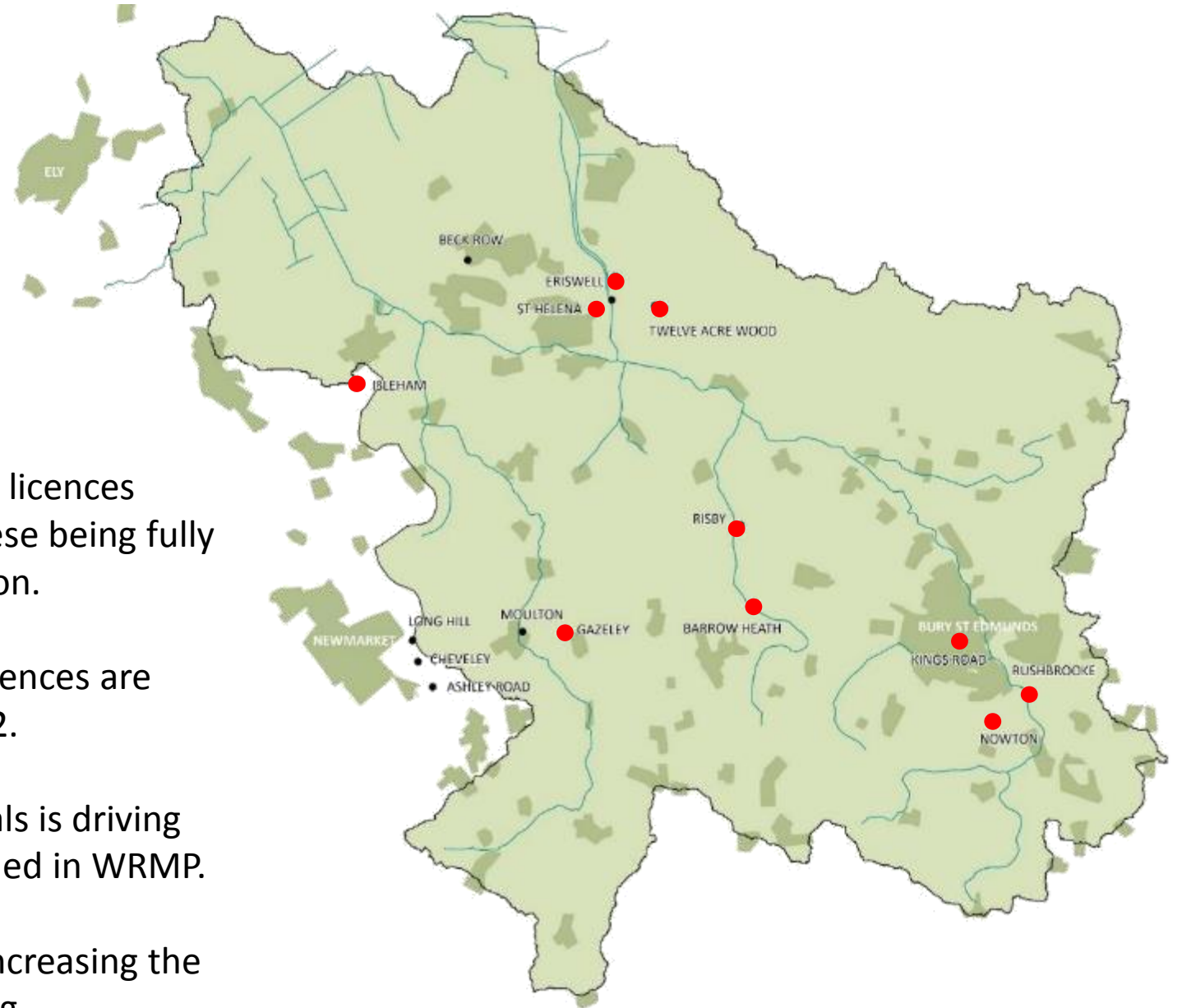
- Continuation of licence caps and reductions to abstractions (e.g. aggregated catchment licences on a or a tightening of the recent actual methodology)
- Potential new environmental obligations (e.g. new status for chalk abstraction)

Long-Term

- Development of a shared environmental ambition through the National Framework for Water Resources
- Hugely ambitious (e.g. overall national reduction of 1,200 - 2,200 million l/d may be needed by 2050)
- Better approach to environmental impact vs. cost

- Anglian Water's long-term planning for water resources is captured in the 25-year Water Resources Environment Plan (WRMP)
- We are continuing to work closely with the EA nationally, regionally and locally to drive the movement to a long-term environmental ambition and embed this in the next round of River Basin Management Plans (RBMPs).
- The aim is to set an ambitious target for 2050 and move away from the piecemeal licence cap approach.
- We continue to support WRE and Regional Planning to drive the best multi-sector solutions which have the best net benefit impact to the environment across the Anglian Region.

The Challenge of Time-Limited Licences (TLLs)



- Anglian Water have just over 200 abstraction licences across the region, with more than 50% of these being fully time-limited or having a time-limited condition.
- Within the Lark catchment, 10 abstraction licences are time-limited, expiring on 31st December 2022.
- Recent regulatory position on licence renewals is driving additional licence capping, earlier than planned in WRMP.
- Other abstractors will be similarly affected, increasing the need for multi-sector water resource planning.

Thank you for listening



The Farming Viewpoint:

- Why is farming important in the Lark?
- Why is water important for farming in the Lark?
- How is it currently organised?
- What are the problems?
- What are the solutions?



The Farming Viewpoint:

Why is farming important in the Lark?

- Farmers as land managers
- National food strategy
- Direct and indirect employment/economic activity
- Eco-system services



The Farming Viewpoint:

Why is water important for farming in the Lark?

- Soils favour root vegetables and other high value crops
- Rainfall patterns do not match crop requirements
- Climate change and weather patterns impacting future demand



The Farming Viewpoint:

How is it currently organised?

- Individual abstraction licences
- Storage reservoirs and immediate use
- Winter and summer
- Ground water and surface water
- Hands off Flow and Section 57 restrictions
- Review process



The Farming Viewpoint:

What are the problems?

- Environmental pressures
- ‘No deterioration’ measures
- Lack of security of supply
- Obstacles to forward planning, mitigation and investment
- A regulator constrained by an imperfect regulatory process



The Farming Viewpoint:

What are the solutions?

- Better understanding of the catchment
- Better understanding of sector needs
- Acceptance of farming as an essential need
- A regulatory framework which works for all
- A collaborative approach

