Roding Beam Ingrebourne and Mardyke Abstraction Licensing Strategy

A licensing strategy to manage water resources sustainably

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LIT 2459

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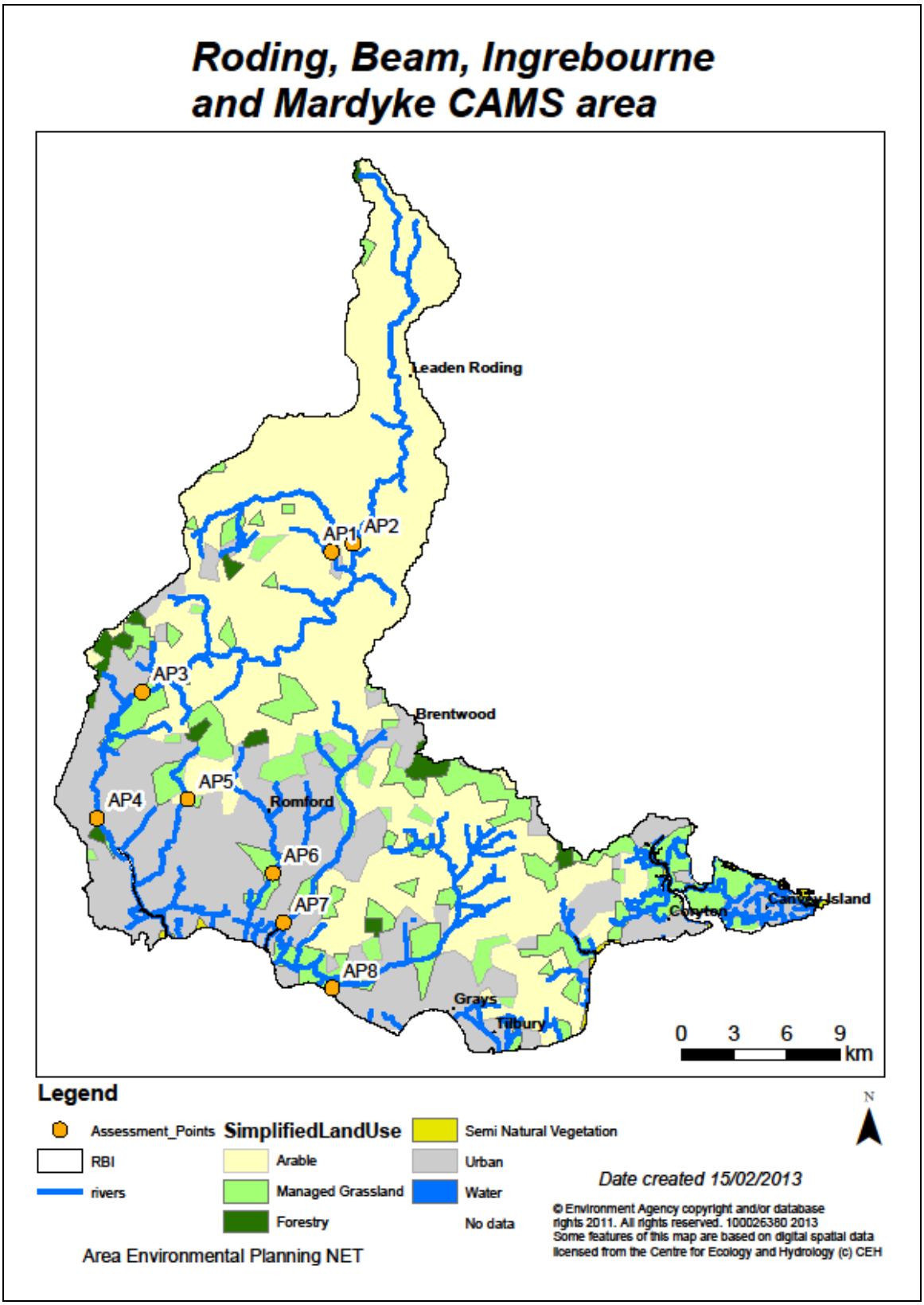


Map 1 Roding Beam Ingrebourne and Mardyke Catchment Abstraction Management Strategy (CAMS) area.

Foreword

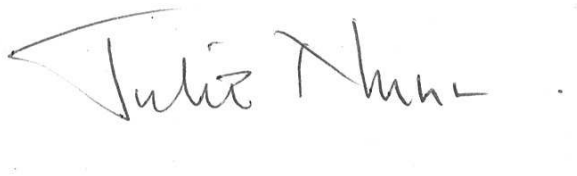
Water is the most essential of our natural resources. Our health, food, energy, security and environment depend on investment in water resources management. It is our job to ensure that we manage this finite resource effectively and sustainably.

The Roding, Beam, Ingrebourne and Mardyke (RBIM) catchment responds quickly to rainfall. Not only does this mean that the catchment is prone to very high water levels following extremely wet weather, it also means that river flows can become very low during prolonged dry periods.

Many parts of the catchment are rural and farmers rely on wet winters to fill their reservoirs. The two consecutive dry winters of 2010/11 and 2011/12 led to a real risk that farmers would be unable to irrigate their crops. In light of this, we are working closely with our partners and communities to adapt to climate change and to help plants and wildlife within rivers become more resilient to extreme weather conditions.

The RBIM catchment includes important wetland habitats. The Ingrebourne Marshes is the largest and one of the most diverse freshwater marshland in Greater London. Water levels are important for these habitats and need to be carefully managed.

The latest population growth and climate change predictions show that pressure on water resources is likely to increase in the future. This licensing strategy sets out how we will manage water resources in the RBIM catchment, including existing abstraction licences and water availability for further abstraction.



Julie Nunn
North East Thames Manager (Interim)

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1. About the Licensing Strategy

This **Licensing Strategy** sets out how water resources are managed in the Roding Beam Ingrebourne (RBI) and Mardyke (RBIM) catchment. It provides information about where water is available for further abstraction and an indication of how reliable a new abstraction licence may be.

This strategy was produced in February 2013 and it supersedes the RBI strategy issued in 2006 Mardyke strategy issued in 2007.

How CAMS contributes to achieving environmental objectives under the (WFD) Water Framework Directive.

The Water Framework Directive's main objectives are to protect and enhance the water environment and ensure the sustainable use of water resources for economic and social development.

Catchment Abstraction Management Strategies (CAMS) set out how we will manage the water resources of a catchment and contribute to implementing the WFD.

CAMS contribute to the WFD by:

- providing a water resource assessment of rivers, lakes, reservoirs, estuaries and groundwater referred to as water bodies under the WFD;
- identifying water bodies that fail flow conditions expected to support good ecological status;
- preventing deterioration of water body status due to new abstractions;
- providing results which inform River Basin Management Plans (RBMPs).

When is an abstraction licence required?
You need a licence from us if you want to abstract more than 20 cubic metres (4 000 gallons) of water per day from a:

- river or stream
- reservoir, lake or pond
- canal
- spring or
- an underground source

Whether or not a licence is granted depends on the amount of water available after the needs of the environment and existing abstractors are met and whether the justification for the abstraction is reasonable.

If you want to apply for an abstraction licence or make changes to a licence that you already have then, please contact us:

- by telephone on 03708 506 506
- by email at enquiries@environment-agency.gov.uk
- or visit our website at http://www.environment-agency.gov.uk

Sustainable abstraction
This licensing strategy has been produced using evidence and information gathered during the Catchment Abstraction Management Strategy (CAMS) process. Through this process we consider the impact of abstractions at all flows. This helps to manage future abstraction more sustainably.

We now assess water resources at a sub-catchment level called waterbodies. This means that we can provide more detailed information on the availability of water resources in the RBIM CAMS area compared to the scale used in the previous strategy.

Within this strategy we also outline where we may need to reduce current rates of abstraction and our approach to time limited licences.

The background, aims and principles of CAMS, the over arching principles we use when managing abstraction licences and links with other initiatives are detailed in our document: Managing Water Abstraction. You should read Managing Water Abstraction when reading this catchment specific licensing strategy.

2. RBIM CAMS area

The Roding, Beam, Ingrebourne and Mardyke (RBIM) catchment lies in south-east England. Its area is approximately 784 km^2. The catchment is situated to the east of the River Thames basin and includes parts of Essex and east London. The southern boundary is the River Thames. The area extends from Barking to Canvey Island in the south, and to Takeley in the north.

Densely populated urban centres in the lower catchment support a significant manufacturing and industrial base. The upper catchment is predominantly rural with prominent agricultural activity. Map 1 shows the RBIM catchment.

Large sections of the coast are designated internationally important sites as candidate Special Areas of Conservation (cSACs), Special Protection Areas (SPAs) and Ramsar sites. The estuarine waters of the Thames, Crouch and Roach support a wide range of recreational activities and wildlife habitats.

There are also significant wetland assets within the RBIM catchment, i.e.:

- Roding Valley Meadows Site of Special Scientific Interest (SSSI) - traditional hay meadows, flood meadows and marsh.
- Ingrebourne Marshes SSSI - the largest and one of the most diverse freshwater marshland in Greater London.
- Inner Thames Marshes SSSI is a stronghold for water voles and ditch wildlife.

The Mardyke catchment was covered under the South Essex CAMS in the first cycle. The area covered previously under RBI CAMS was extended to include the Mardyke as it falls within the Thames River Basin's boundary.

All the rivers in the RBIM CAMS area are relatively small. The headwater catchments comprise field drainage channels and small streams rather than main rivers. The hydrology is primarily influenced by the impermeable geology of the area, which prevents any hydraulic interaction between surface water and groundwater in the Chalk aquifer below. Consequently, rainfall, run-off and discharges (largely from sewage treatment works) dictate flows and levels in these rivers. There are extensive gravel deposits closer to the River Thames but very few in the upper parts of the catchment, leaving little scope for surface water interaction with these minor gravel aquifers. The chalk aquifer becomes exposed in the southern part of the Mardyke catchment allowing more interaction between the surface and groundwater.

The RBIM catchment typically demonstrates a quick response to rainfall and is prone to flooding after large storm events or prolonged periods of heavy rainfall. Conversely, headwaters can dry up and flows can drop significantly during prolonged dry spells. The impact of run-off on flow in rivers is greater in the lower, more urban half of the catchment compared to the rural, upper catchment where rainfall is more likely to be intercepted and taken up by vegetation.

The groundwater aquifer cannot be considered as a distinct hydrogeological unit as it only represents a small section of Chalk that is part of the larger regional London Basin. Groundwater flow is generally in a southerly direction towards Dagenham. Hence most of the groundwater aquifer within the catchment is managed under the London CAMS. The exception is the northern part of the catchment, where groundwater flows in an easterly direction and therefore any abstractions located in this area are more likely to impact Essex resources. Hence it is covered under Essex CAMS. The Mardyke sub-catchment is not covered by the groundwater model that was developed to improve our understanding of the water resource within the London Basin and therefore it is assessed on its own merits. Division between the three groundwater units is shown on Map 3.

Considerable amounts of new housing and development are expected over the next 6-10 years in the catchment, which will lead to increase in demand for water to meet residential and business requirements.

This strategy will seek to consider all of the demands and to provide a consistent, structured and sustainable approach to water resources management within the RBIM catchment.

3. Water resource availability of the RBIM area

3.1 Resource assessment

Resource assessment is at the heart of abstraction management. To manage water effectively we need to understand how much is available and where it is available, after considering the needs of the environment. We have a monitoring network to measure river flows and groundwater levels. We use this data along with our knowledge of human influences and environmental needs to establish a baseline of water availability for each water body that builds into a picture for the catchment. The main components of this assessment that help us to understand the availability of water resources are:

- a resource allocation for the environment known as the Ecological Flow Indicator (EFI);
- the Fully Licensed (FL) scenario - the situation if all abstraction licences were being used to full capacity;
- the Recent Actual (RA) scenario – the amount of water, which, has actually been abstracted on average over the previous six years.

River flows change naturally throughout the year, so we want to protect flow variability in our rivers from low to high flow conditions. We use flow statistics to help to do this. Flow statistics are expressed as the percentage of time that flow is exceeded. Resource availability is calculated at four different flows, Q95 (lowest), Q70, Q50 and Q30 (highest).

This information gives a realistic picture of what the current resource availability is within a given water body. Water bodies are sub-catchment surface water units or ground water units on which we carry out assessments and map results.

NB: *Natural flows for CAMS AP water bodies have been taken from information provided in the CAMS ledgers. Natural flows for other water bodies have been derived based on simple interpolation between, or downstream of, CAMS APs, based on catchment area, or on calculations from Low Flows 2000.*

3.2 Resource availability

3.2.1 Surface water

If you want to abstract water, you need to know what water resources are available within a catchment and where abstraction for consumptive purposes is allowed. To show this we have developed a classification system which indicates:

- the relative balance between the environmental requirements for water and how much is licensed for abstraction;
- whether water is available for further abstraction;
- areas where abstraction may need to be reduced.

The availability of water for abstraction is determined by the relationship between the fully licensed and recent actual flows in relation to the EFI. The results mapped onto these water bodies are represented by different water resource availability colours showing the availability of water resource for further abstraction. The water resource availability colours are green, yellow and red.

In addition to these water resource availability colours we've classified some surface water bodies as 'high hydrological status' which are coloured blue on the maps. In these water bodies very little actual abstraction occurs and they show virtually undisturbed, or close to natural, flow conditions.

Another category of water body are Heavily Modified Water Bodies (HMWB). These can be classified for many reasons but for water resources they are classified if they may contain a lake

and/or reservoir that influences the downstream flow regime of the river. The downstream 'flow modified' water bodies are also classified as heavily modified.

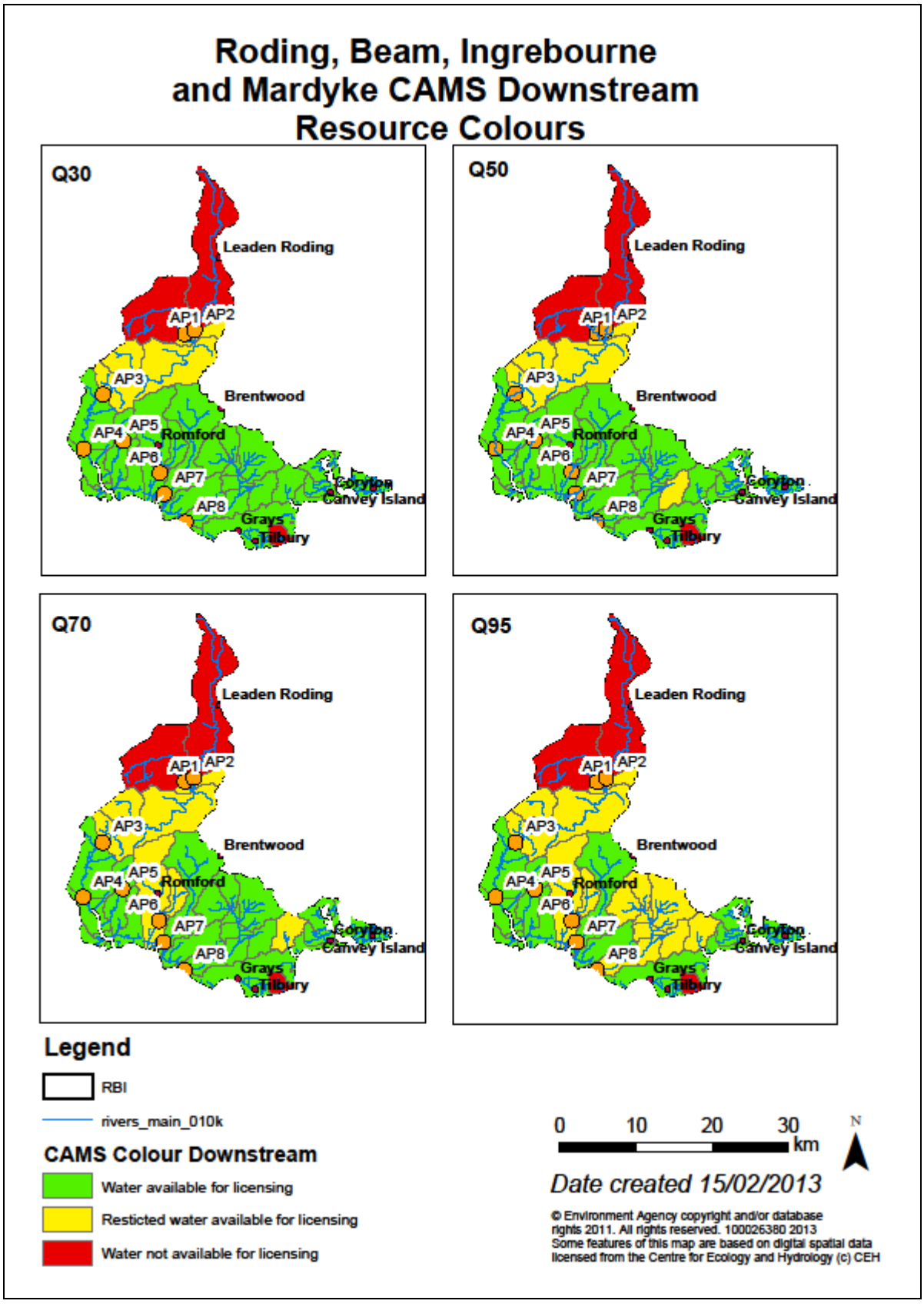
We will add any conditions necessary to protect flows to a new licence during the licence determination procedure. We'll base these on the water resource availability colours from high to low flows. Table 1 lists the implications for licensing for each water resource availability colour.

In cases where there is a flow deficit (RA is below the EFI) or risk of a flow deficit (FL below the EFI), there may be water available for abstraction at higher flows. This means that water may be scarce at low flows, but may be available to abstract at medium or high flows. A licence may still be granted but with conditions which protect the low flows. This usually takes the form of a Hands Off Flow (HOF) condition on a licence which requires abstraction to stop when the river flow falls below a certain amount. A river may also be heavily supported by flows from a reservoir and may have unnaturally high 'low' flows and that the river environment is most vulnerable at medium flows.

When assessing water availability we have to consider downstream requirements i.e. existing licences and environmental needs. The water availability status reflects requirements of the most vulnerable catchment either at the AP or downstream. The most impacted (vulnerable) AP is called critical AP in the CAMS terminology. Map 2 shows the water resource availability colours in RBIM area.

Water resource availability colour	**Implication for licensing**
High hydrological regime	There is more water than required to meet the needs of the environment. However, due to the need to maintain the near pristine nature of the water body, further abstraction is severely restricted.
Water available for licensing	There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts.
Restricted water available for licensing	Full Licensed flows fall below the EFIs. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.
Water not available for licensing	Recent actual flows are below the EFI. This scenario highlights water bodies where flows are below the requirement to meet Good Ecological Status (as required by the Water Framework Directive). No further consumptive licences will be granted. An economic appraisal of flow recovery and ecological benefit will be carried out. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.
HMWBs	These water bodies have a modified flow that are influenced by reservoir compensation releases or they have flows that are augmented. These and are often known as 'regulated rivers'. They may be managed through an operating agreement, often held by a water company. The availability of water is dependent on these operating agreements. More detail is provided in section 4.2.1.

Table 1 Implications of water resource availability colours.



Map 2 Water resource availability colours for RBIM CAMS including downstream requirements.

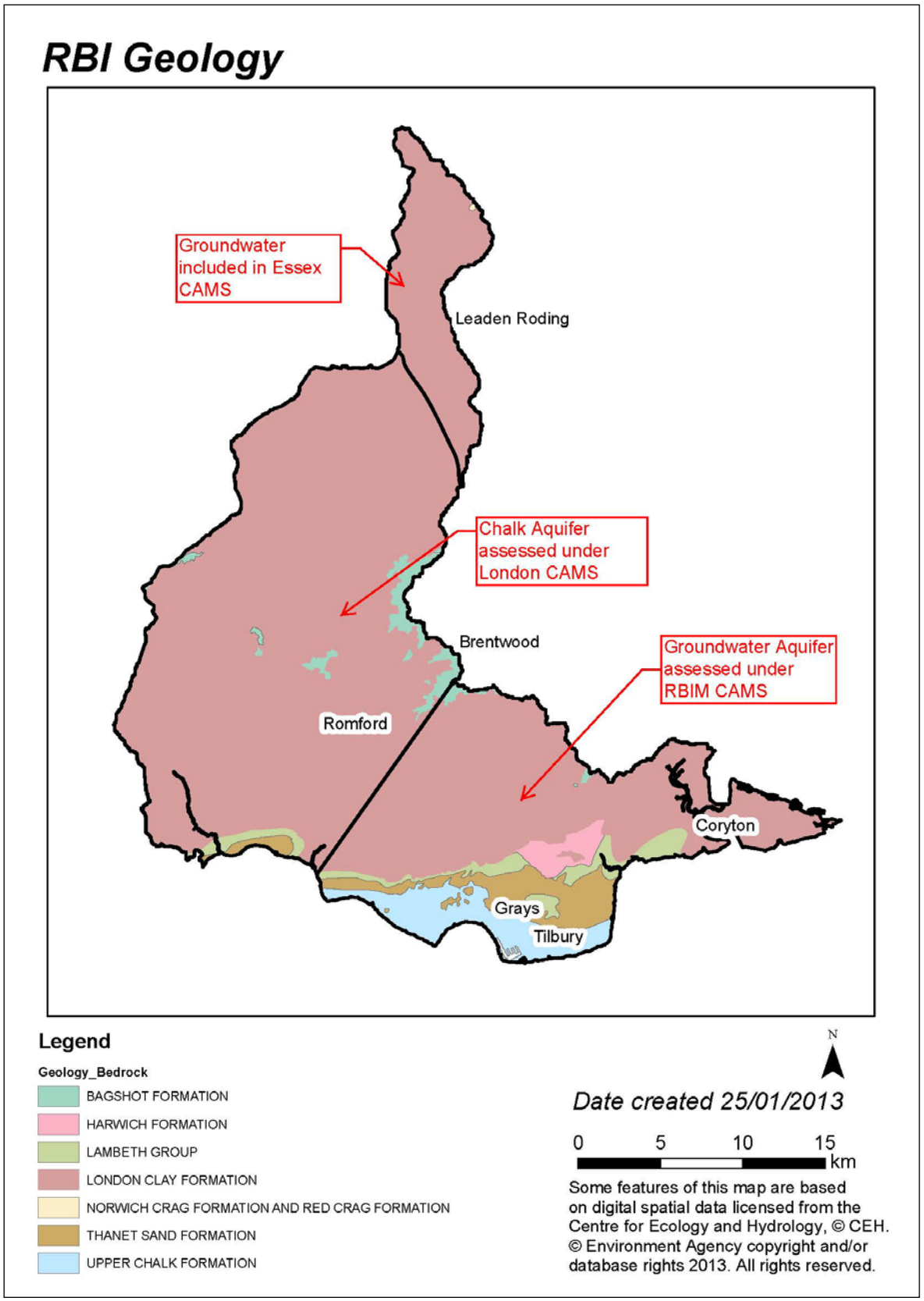
3.2.2 Groundwater

Most of the RBIM catchment chalk aquifer is overlain by London Clay. This aquifer is recharged in the unconfined areas north of the RBIM catchment. There is no interaction between surface and groundwater.

Groundwater availability in the western and central part of the catchment is assessed under London CAMS. Abstractions located north of Abbess Roding impact water availability in Essex, because groundwater flows in an easterly direction in this area as opposed to southerly or south-easterly like in the remaining part of the catchment. Hence abstractions in the northern part of RBIM are assessed under the Essex CAMS.

In Mardyke, the status of the surface waterbody also applies to the groundwater immediately beneath and in continuity with it. The exception to this is water stored in the confined chalk aquifer lying underneath the London Clay This part of the confined chalk is already impacted upon by existing abstractions. Hence it has no water available for further consumptive abstraction licensing.

The boundary between the three areas is shown on Map 3.



Map 3 Geology of the RBIM catchment including division between confined aquifer assessed under Essex CAMS and the one covered by the RBIM CAMS.

3.3 Resource reliability

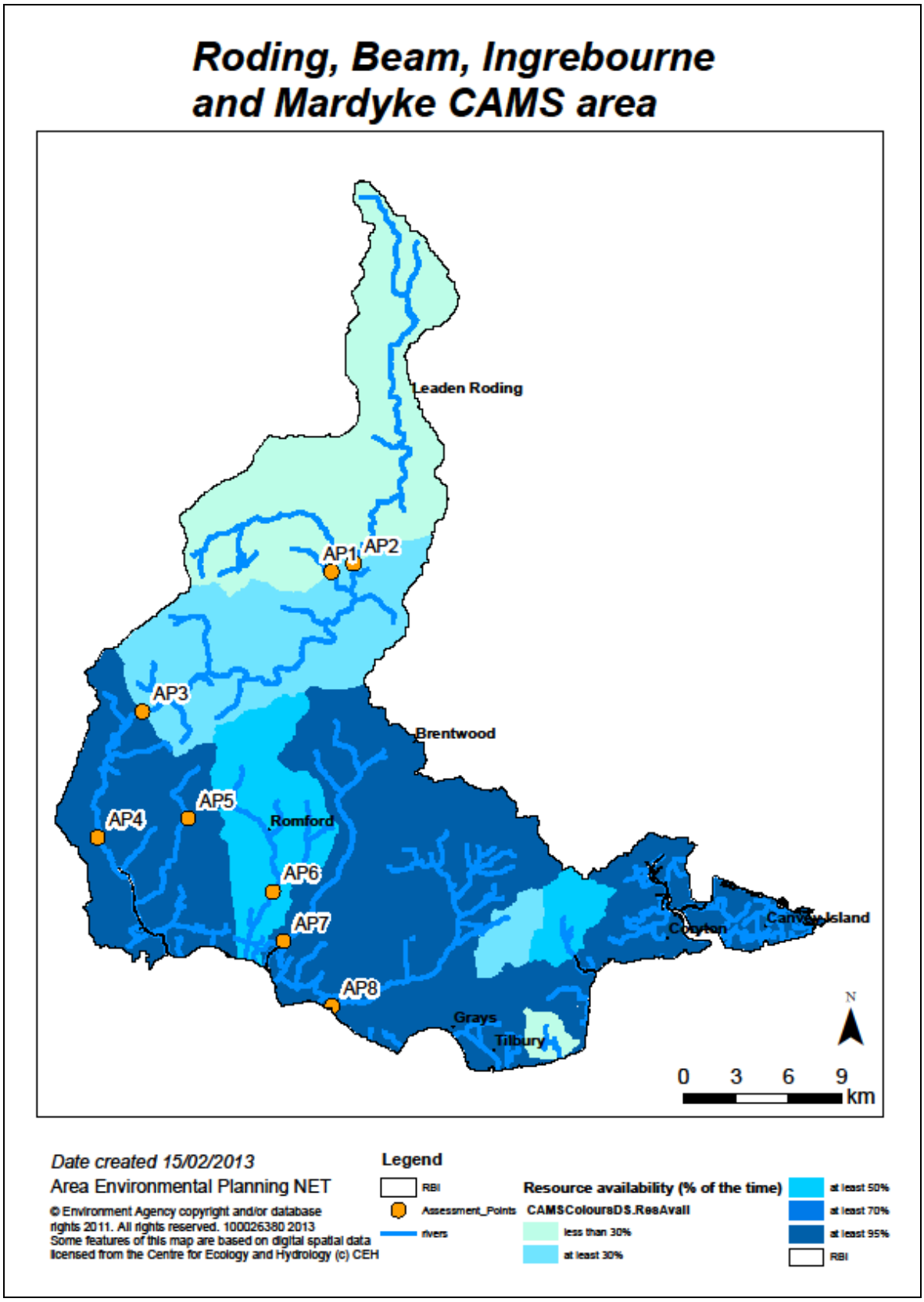
If you want to apply for a licence, it is worth considering that in some areas a new, consumptive abstraction may not be 100% reliable. Reliability information is based on CAMS resource availability colours and is a way of presenting the reliability of new abstractions at all flows.

The availability of water for abstraction within a river varies greatly from high to low flows. By assessing the quantity of water available at different flows it is possible to see when there is a surplus or deficit of water and the associated reliability of an abstraction. This is an indication only, actual reliability of a licence will be discussed on application.

Table 2 shows the resource availability colour associated with the percentage reliability of consumptive abstraction. Map 4 gives an indication of the resource reliability in CAMS area expressed as percentage of time.

Resource	Percentage of the time additional consumptive resource may be available
	Consumptive abstraction available **less than** 30% of the time.
	Consumptive abstraction available **at least** 30% of the time.
	Consumptive abstraction available **at least** 50% of the time.
	Consumptive abstraction available **at least** 70% of the time.
	Consumptive abstraction available **at least** 95% of the time.
	Not assessed

Table 2 Percentage reliability of consumptive abstraction.



Map 4 Water resource reliability expressed as percentage of time available. Back

4. How we manage abstractions in the RBIM catchment

4.1 Principles

The document Managing Water Abstraction outlines the over-arching principles that we follow in managing our water resources. How we apply these principles in the RBIM catchment is outlined in this section. If you want to abstract water it outlines where water is available for further abstraction and the principles we follow in assessing your application for a licence.

Abstraction licence application process
Anyone wanting to take more than 20m^3/day from a 'source of supply' (river, stream, lake, well, etc) must have an abstraction licence. The application process for abstraction is similar to the planning process in that we may require the application to be advertised and may require supporting environmental information. When considering the application we check that the quantities applied for and the purpose of the abstraction are reasonable, that there is sufficient water available to support it and that the potential impacts on the environment and other water users are acceptable. Depending on the outcome of our investigations we will issue a licence either as applied for, or with conditions that restrict the abstraction to protect the environment or other users. In certain cases we may have to refuse the application. Any applicant who is not happy with our determination (decision) has the right to appeal against it.

Each application is determined on its own merits
Whilst this document may say that water is available for further abstraction, this does not guarantee that all applications will be successful. We'll determine each application upon its own merits and any local impacts.

A licence does not guarantee that water is available, or that its quality is appropriate for its intended use
It's important to understand that when we issue a licence we do not guarantee the supply of water. We have to protect the environment and rights of other abstractors. To do this we may add constraints to licences. Licence holders needs to understand the implications of this as it affects the reliability of supply. For example, in drier years it's more likely that conditions will come into effect and abstraction is more likely to be stopped. It is up to the abstractor to satisfy themselves that the quality of abstracted water is suitable for their needs.

Abstractions are managed to protect the environment.

No ecological deterioration
We assess the impact of new applications for water to make sure that the resultant river flows:

- will maintain a good ecology or if the ecology is not good, will not deteriorate the ecology of our rivers further;
- will maintain the near pristine condition of high hydrological regime water bodies.

We'll also take action if necessary to limit the increase in current abstraction, if we think this will lead to deterioration of the ecology or the near pristine condition of our high hydrological regime water bodies.

These principles apply to the water body in which the abstraction is located and also to all downstream water bodies that may be affected by any reduction in abstraction related flow. Doing this means that we will maintain the water body status as reported in the River Basin Management Plans (2009) and ensure compliance with the European Union Water Framework Directive.

Water efficiency and demand management
We need to make the best use of our existing water resources. Adopting water efficiency and demand management measures can help us achieve this goal. Water efficiency is one of the tests that will need to be satisfied before we grant a new licence or renew a time limited licence. We will promote the wise and efficient use of water and actions to limit demand (and reduce leakage) to curb the growth in abstraction and limit the impact on flows and any consequent impact on the ecology.

Building Design
The South East is densely populated with household water use being the highest in the country at 164 litres per capita consumption (PCC) against a national average of 148 PCC. Throughout the area we are working closely with local authorities to ensure water conservation and efficient water use is embedded within their strategic spatial planning policies. One way this can be achieved is by designing all new homes and business units to achieve a minimum water efficiency level. Water efficiency and the reduction in household water demand are crucial elements of good water resource management planning especially as the South East is under increased pressure from climate change and population growth.

Sustainable drainage systems (SuDS) are a positive way of controlling surface water runoff as close to its origin as possible, before it is discharged to a watercourse or the ground. They involve moving away from traditional drainage systems to softer engineering solutions such as permeable paving. The benefits are reduced flood risk, improved water quality and increased groundwater recharge. This water can also be collected and reused for non-potable purposes.

Water audits
All businesses can use their water wisely. By investing a little time and money in implementing a simple water management plan, an organisation could reduce its water consumption by up to 80%, releasing money to be invested in other parts of the business and establishing 'green' credentials. Water audits allow the volume of water used during an average year to be calculated and suggest ways to reduce water use and therefore costs.

Waterwise
Waterwise is a UK Non-governmental Organisation (NGO) focused on decreasing water consumption in the UK and building the evidence base for large scale water efficiency. www.waterwise.org.uk/pages/save-water.html

Environment Agency
The Environment Agency provides a range of free guidance on water efficiency, including best practice case studies for agriculture, business, industry, public sector and the domestic consumer. Consult www.environment-agency.gov.uk/savewater.

We encourage farmers to improve water security. There is currently no abstractor group in RBIM catchment along the lines of ESWAG (East Suffolk Water Abstractors Group) or BOWAG (Broadland Water Abstractors Group) in the other Eastern counties. Water Resources communications to farmers are currently handled either individually, or by consultation with individual area NFU branches, which is inefficient. We will seek to set up an abstractors group which includes the Mardyke to improve communications and relationships between farmers and the Agency.

Water companies
For local water efficiency advice, contact your water company along side leakage rates and water metering targets.

- Thames Water Utilities www.thameswater.co.uk/
- Affinity Water www.affinitywater.co.uk

Water Regulations Advisor Service
WRAS provides advice on the Water Supply (Water Fittings) Regulations which prevents waste, misuse, undue consumption or contamination of wholesome water. Consult www.wras.co.uk or telephone 01495 248454.

Water in the School benchmarks
Water in the School is a website supported by a number of water companies aimed at National Curriculum Key Stage 2 and 3 pupils and their teachers. It provides a wealth of information for pupils on how to make savings. Consult www.waterintheschool.co.uk

Hospitals
Water UK has collaborated with NHS Estates and Watermark to produce *Water Efficient Hospitals*, an information pack to help hospitals use water wisely and save money by cutting both water and energy bills. Consult www.water.org.uk/index.php?cat=3-4701

UK Irrigation Association (UKIA)
The UKIA provides information on irrigation to its members and runs technical workshops. Consult www.ukia.org

DEFRA's Rural Development Service (RDS)
DEFRA's Rural Development Service provides grants for agricultural water resources management schemes under its Rural Enterprise Scheme. Consult www.defra.gov.uk/rural/rdpe/ or telephone 0845 9335577.

Linking Environment & Farming (LEAF)
LEAF promote and develop integrated farm management, this includes whole farm water savings. Consult www.leafuk.org

An Anglian Region Water Efficiency Group
The group consists of the Environment Agency, water companies and other relevant organisations. The group's primary objective is to develop and share best practice of water efficiency and to raise awareness of the need for and opportunities to achieve water efficiency.

Impoundments
Applications for impoundments will be dealt with on a case-by-case basis. An impoundment is a dam, weir or other construction in an inland water that obstructs or impedes flow and/or raises water levels. Impoundments have to be carefully assessed because they can cause significant changes to river habitats, fish movement, morphology and sediment transport. Any new application for an impoundment needs to be accompanied by an assessment for potential ecological and morphological effects.

Hydropower
Water abstraction for hydropower schemes is non-consumptive, with all water used returned to the watercourse. Hands off Flows and maximum abstraction volumes are determined in line with the Environment Agency's Hydropower Good Practice Guidelines and based on the assessment of environmental risk for each scheme. For further information please refer to our website.

Ground source Heat Pumps
Anyone wishing to abstract for ground source heat pumps should refer to the relevant information on our website.

4.2 Abstraction restrictions

When issuing a licence we have to protect the environment and rights of other abstractors. To do this we may add conditions to licences.

Hands off flow conditions
To protect the environment we may issue a licence with a condition referred to as a 'Hand-Off Flow' (HOF). This specifies that if the flow in the river drops below that which is required to protect the environment abstraction must stop, hence 'Hands-Off Flow'.

Time limited licences

In recognition of changing pressures on water resources all new licences and variations (other than downward variations or minor variations having no environmental impact) will have a time limit imposed. This allows for the periodic review and changes to abstraction licences where circumstances have changed since the licence was granted.

Most licences within a CAMS have a common end date (CED) so they can be reviewed at the same time. When an application is made within six years of the CED, we will generally apply the subsequent CED to any licence granted. This is to avoid issuing shorter and shorter duration licences as the CED approaches. This means that the initial CED on a licence may be between six and 18 years duration. On replacement the normal duration will then be 12 years.

However, where we are uncertain about the long term impacts of an abstraction we will grant a short term licence during which time potential impacts are monitored.

28% of the licences in Roding, Beam and Ingrebourne (RBI) catchment and 8% in Mardyke catchment are time-limited. CEDs occur every twelve years. The next CED for the RBIM area is 31 March 2016 and the subsequent one is 31 March 2028.

Time-limited licences may be renewed with more restrictive terms and conditions to protect the environment, i.e.:

- Licensed quantity may be reduced to reflect actual abstraction rates;
- We will endeavour to provide licence holders notice of significant changes to their abstraction permission. These could include:
    - HOF may be imposed to protect river environment.
    - Existing HOF may be changed.
    - Increased monitoring of abstraction volume, and/or monitoring of surface/ groundwater levels.

A local flow gauging station will be used to set HOFs but if not appropriate then other local arrangements may be considered. The licence holder will be responsible for maintaining to British Standards any local monitoring arrangements.

Additional information about the replacement of time limited licences is available in Managing Water Abstraction.

4.2.1 Surface water

We assess surface water flows at Assessment Points (APs) which are significant points on the river, that is where two major rivers join. Where flows fall below the EFI, new abstractions may be subject to HOFs.

Table 3 gives an indication of how much water is available for further abstraction and the associated restrictions that we may apply to new and varied abstraction licences from the main river. Tributaries to the main river may be subject to different restrictions and quantities.

Each HOF is linked to an AP and is dependent on the resource availability at that AP. In some cases additional restrictions may apply to licences where there is a more critical resource availability downstream to protect the ecological requirements of the river. This is detailed in the last column of Table 3 if applicable.

All abstraction licence applications are subject to an assessment to take account of any local and downstream issues and may be subject to further restrictions.

Reading from top to bottom in Table 3 are the APs in the RBIM CAMS area. Reading across the columns you can see the potential HOF that may be applied to a licence and the number of days water may be available under this. In cases where there is water available at all flows we may apply a Minimum Residual Flow (MRF) to protect very low flows. We'll decide this on a case by case basis.

All abstraction licence applications are subject to an assessment to take account of any local and downstream issues and may be subject to further restrictions.

AP	Name	HOF Restriction (Ml/d)	Number of days per annum abstraction may be available	Approximate volume available at restriction (Ml/d) at the AP	Is there a gauging station at this AP?
1	Cripsey Brook	44.0	54	19.7	Yes
2	Upper Roding	85.0	32	43.1	Yes
3	Middle Roding	44.0	138	26.2	Yes
4	Lower Roding	29.1	255	17.3	Yes
5	Seven Kings	5.1	255	3.9	No
6	Beam	8.8	255	7.2	Yes
7	Ingrebourne	11.5	255	4.2	No
8	Mardyke	4.41	347	3.7	No

Table 3 HOFs for the assessment points of RBIM CAMS.

The HOF for RBIM catchment APs have been over-ridden from that supplied by the initial CAMS assessment method. The over-ride has been based on local knowledge and assessment in order to protect the wildlife and / or rights of the existing abstractors.

Summarising,

- New consumptive surface water abstractions in the Cripsey Brook and Upper Roding sub-catchments will be considered only at times of very high flows. Abstraction at very high flows may not provide a reliable source of water as they may not occur every year. An applicant will need to invest in a water storage reservoir to store water when it's available.
- New consumptive surface water licences in the remaining part of the catchment will be considered and issued with a HOF to protect the ecology and to ensure no derogation to other abstraction rights.
- Where there is no suitable flow gauging station by which to assess a surface water proposal then the applicant will be expected to monitor and submit flow data to support their proposal. The applicant will need to demonstrate their proposal will not impact the ecology and/or other abstraction rights. We would advise any such applicant to contact us first to discuss their proposal and individual monitoring requirements.
- Non-consumptive surface water licences or small consumptive licences that result in an overall net benefit to the water environment may be considered at all times subject to a local assessment.

Important local features that may affect water availability

European law provides a very high level of protection to two types of designated sites due to their special environment. These are:

• Special Areas of Conservation (SAC), which contribute to biodiversity by maintaining and restoring habitats and species;
• Special Protection Area (SPA), which provides protection to birds, and their nests, eggs and habitats

Ramsar sites and Sites of Special Scientific Interest (SSSI) also carry a high level of environmental importance. Further information can be found in Section 4.5 – Restoring Sustainable Abstraction.

4.2.2 Groundwater

New consumptive licences from the confined chalk aquifer underneath Roding, Beam and Ingreabourne sub-catchments will be considered, subject to the direction of groundwater flow and/or consideration of the policies in the Essex CAMS and/or the London CAMS.

In Mardyke subcatchment, the confined chalk waterbody has no water available for abstraction. Hence, no new consumptive abstractions will be granted in this area.

Where chalk is unconfined (see Map 3), water resource availability is the same as the surface water availability. New consumptive abstractions will be considered above the HOF value, subject to local assessment. As a general principle, it is up to the applicant to prove that their proposed abstraction will not have a negative impact upon ecology of the surface water features relying on base flow from the groundwater aquifer.

4.3 Opportunities for licence trading

We want to make it easier to trade water rights. A water rights trade is where a person sells all or part of their water right, as defined by their abstraction licence(s), to another person on a permanent or temporary basis. In the majority of cases a trade will involve a change in abstraction location and/or use which we will need to approve through the issue or variation of abstraction licences.

In licensing trades, as with new abstraction licences, we need to make sure that we do not cause any deterioration in WFD water body status both within the water body/ bodies) where the trade will take place or to downstream water bodies. The table below provides a guide to the potential for trading in water bodies of a particular CAMS water resource availability colour, as shown on Map 2.

CAMS water resource availability colour including downstream requirements	**Our approach to trading**
High hydrological regime	Opportunities for trading water rights will be limited
Water available for licensing	Allow trades of recent actual abstraction and licensed abstraction, but little demand for trading expected within water body as water available for new abstractions.
Restricted water available for licensing	Initially, we will allow trades of recent actual abstraction and licensed abstraction but post trade recent actual abstraction must remain sustainable. The current level of recent actual abstraction means there is a risk that in the future we may only be able to trade recent actual abstraction.
Water not available for licensing	We will only trade recent actual abstraction but no increase in recent actual abstraction is permitted in water body. Licensed abstraction will be recovered for the environment.
HMWBs	Opportunities for trading will depend on local operating agreements and local management.

Table 4 Trading opportunities.

To find out more about licence trading please go to our website.

4.4 New Authorisations

The Water Act 2003 brought all significant water abstraction under licensing control. This will result in trickle irrigation, dewatering of mines, quarries, engineering works and construction sites, abstractions related to Internal Drainage Districts, navigation abstraction and abstraction for ports and harbour authorities coming into the licensing regime.

As a result we'll be able to manage water resources more effectively by ensuring that all significant activities influencing the availability of water and its impact on the environment are undertaken in a sustainable manner.

Government are still developing their policies as to how to resolve some of the issues raised during the consultation process. Government will publish their proposals before new regulations are implemented and expect to do this at least 3 months before commencement so that we can issue guidance to those affected by the changes.

Where we have details of these abstractions we have included them in our assessments to consider how they impact on the catchment.

If you are undertaking one of these currently unlicensed forms of abstraction, you are advised to keep records of the volumes and times of abstraction, in order to build up a record of usage in advance of the licensing process.

4.5 Restoring Sustainable Abstraction

Where water abstractions cause or potentially cause actual flows to fall short of the EFIs and result in environmental damage, we may need to change or even revoke existing abstractions in order to achieve a sustainable abstraction regime. There is no licences investigated under RSA programme in the RBIM CAMS. Information on how licences in the RSA programme are dealt with can be found in our Step by Step guide on our website.

Investigation Water Framework Directive Water bodies

In addition to the RSA programme, we are investigating whether reduced water flow may be causing problems under the Water Framework Directive (WFD). About four per cent of rivers are failing to support WFD good ecological status due to pressures from over-abstraction.

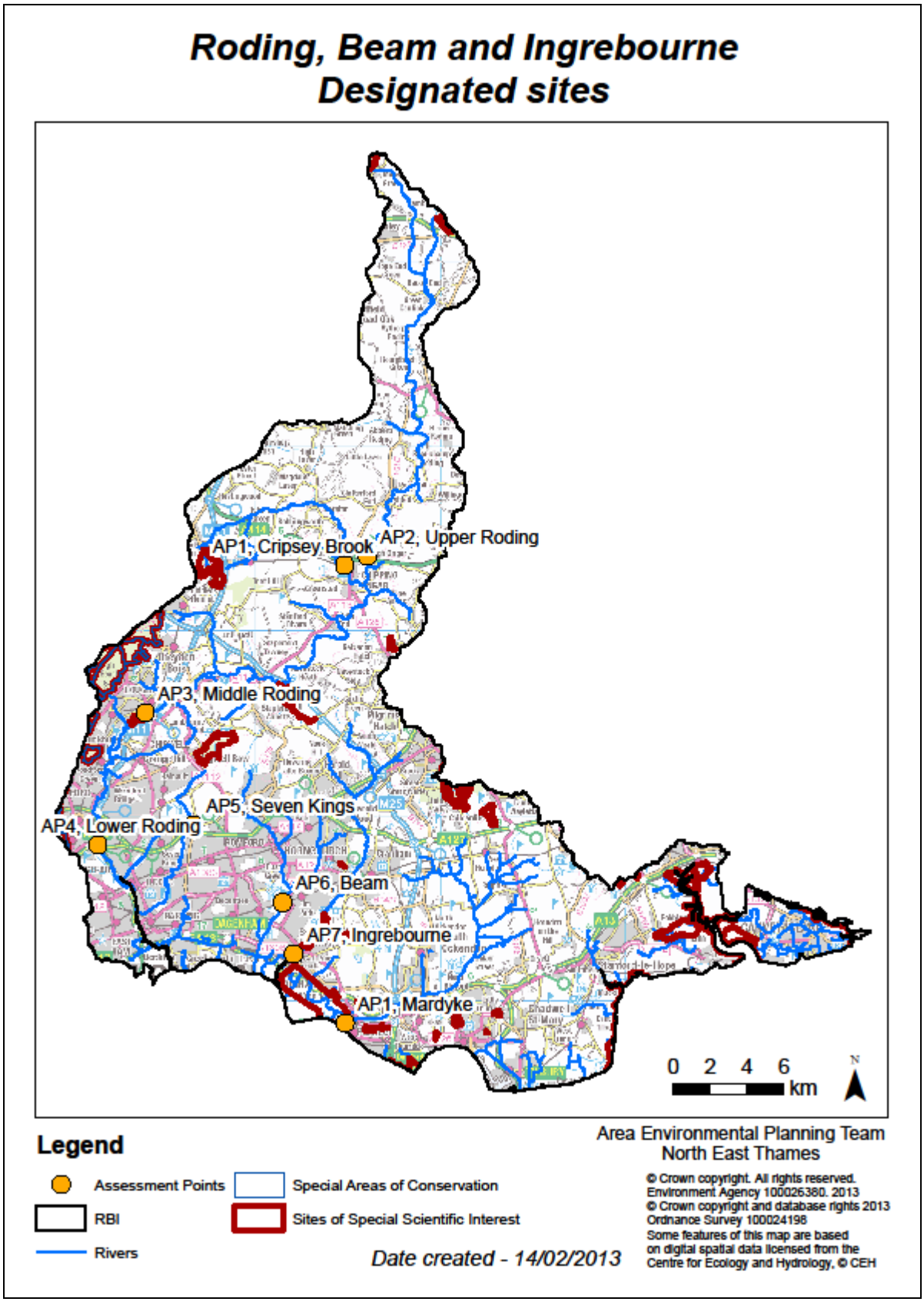
Habitats Directive
Under the Habitats Regulations we have assessed the effects of existing abstraction licences and will assess new applications to make sure they are not impacting on internationally important nature conservation sites. These sites are known as Special Areas of Conservation (SAC's) and Special Protection Areas (SPA's). If your current licence has been reviewed under this legislation to assess its impact you will already know about the review. If we have not contacted you yet then your licence is either not near a SAC/SPA or is not having an impact on these sites. If our assessment shows that a new application could have an impact on a SAC/SPA we have to follow strict rules in setting a time limit for that licence. These are:

• we may be able to grant the licence but only with a short time limit. This allows us to monitor the impact of the abstraction on a SAC/SPA and change the licence if necessary;
• if we can't determine that your application will not affect the site we have to either put conditions on the licence so that it cannot affect the site or refuse the application. If we grant the licence we may ask you to monitor its impact;
• if our assessment shows that there isn't an impact on the site we will manage the application according to the principles in this document.

There are numerous designated sites in the RBIM catchment that rely on water. Map 5 shows their location.

Some of these sites are:

- Roding Valley Meadows SSSI - traditional hay meadows, flood meadows and marsh.
- Ingrebourne Marshes SSSI - the largest and one of the most diverse freshwater marshland in Greater London.
- Inner Thames Marshes SSSI is a stronghold for water voles and ditch wildlife.
- Mucking Flats and Marshes SSSI - part of Thames Estuary and Marshes RAMSAR and SPA, feeding ground for internationally important numbers of wintering waterfowl.
- Grays Thurrock Chalk Pit SSSI - a range of woodland, scrub and calcareous grassland habitats that are important for the assemblage of invertebrate fauna they support (including Red Data book species of invertebrates).
- West Thurrock Lagoon and Marshes SSSI - one of the most important sites for wintering waders and wildfowl on the Inner Thames Estuary.
- Thorndon Park SSSI - semi-natural broad-leaved woodland and ancient parkland developed over Claygate and Bagshot Beds.



Map 5 Designated sites in RBIM CAMS area.

4.6 Protected rights and lawful use

As well as protecting the environment, we must consider existing abstractors rights. We are not allowed to grant a new licence or varied an existing one in such a way that would cause derogation to a protected right. We also have to consider lawful uses when determining new applications.

Existing full abstraction licences have a protected right to abstract. Transfer licences are considered a lawful use, but do not have protected rights.

From April 2005 licensed abstractions of less than 20m^3/d no longer required a licence. These deregulated abstractions still have protected rights if they are being operated by the original licence holder. Abstractions under the threshold which have come about since 2005 are considered to be of a lawful use and we need to have due regard when determining new applications.

5. Strategy actions

In the first round of CAMS we highlighted where there was room for improvement as far as sustainable abstraction was concerned. A list of actions to be carried out before the next CAMS update was published in the first licence strategy document. Updates on the progress of those actions have been posted annually on the CAMS website.

Table 5 shows the progress or completion of measures arising from the1st round of RBIM CAMS.

Table 6 shows new actions proposed as a result of the latest assessment of resources.

Unsustainable abstraction risks and implications are considered through the Restoring Sustainable Abstraction programme.

Action	AP unit	Partner	Start	Finish	Progress
The resource availability status of the rivers within the Roding, Beam and Ingrebourne CAMS catchment will not have been compromised by the implementation of the licensing strategy given in the CAMS	All	Licence holders, new applicants, water companies, environmental groups	2006	-	Ongoing. River flows are sufficient to support aquatic life. Licences to abstract water are issued with conditions protecting the environment and rights of existing abstractors. The catchments are still open to new abstractions, subject to local assessments.
The resource availability status of the Upper Roding and Cripsey Brook will not deteriorate beyond the 'no water available' status	AP1 and AP2	Licence holders, water companies	2006	2013	The resource availability status didn't deteriorate beyond 'no water available' status. Water is still available for licensing in very high flows only.
New licences will be granted where there is a surplus of water available and the application satisfies the statutory determination requirements.	All	Applicants	2006	-	Ongoing.
Data required for the calculation of the environmental river flow objective will have been improved to provide the relevant biological data needed to determine the environmental weighting scores with more confidence	All	Environmental groups, consultants, water companies	2006	-	Ongoing. We reviewed Abstraction Sensitivity Bands of the water bodies. We also continue routine sampling programmes to monitor fisheries, macrophytes and macroinvertebrates to inform status of the river's ecology. Collected data also informed the CAMS review.
Regular visits to licence holders to ensure that conditions on the licence are met and comply with current legislation, and to encourage water efficiency by abstractors.	All	Licence holders	2006	-	Ongoing. We continue our programme of licence visits to ensure compliance with licence conditions. Efficiency test forms a part of the current application process.

The protected rights of existing abstractors and existing lawful users are not adversely affected or derogated.	All	Licence holders, other existing lawful abstractors	2006	-	Ongoing
All new licence applications in the catchment will be considered with regard to the RBI CAMS licensing policy.	All	Applicants	2006	-	Ongoing

Table 5 Progress on the actions from 1st round of RBIM CAMS.

Measures	AP unit	Partner	Start	Finish	Progress
We will continue routine sampling programmes to monitor fisheries, macrophytes and macroinvertebrates.	All	-	2013		Ongoing
We will approach different sectors to highlight resource issues within the RBIM CAMS and we will encourage the adoption of efficiency measures for the use of water with all new and existing licences.	AP1, AP2, AP3 and AP8	Licence holders, local authorities, developers.	2013	-	Ongoing
We will make licence holders aware of the economic and environmental benefits of using less water.	All	Licence holders, local authorities, developers.	2013	-	Ongoing
We will continue to collect data from our gauging stations, which monitor river flows and from our observation boreholes, which monitor groundwater levels. This data will be used in the CAMS review.	All	Local volunteer groups	2013	-	Ongoing
We will encourage farmers to improve water security. There is currently no abstractor group in RBIM catchment along the lines of ESWAG (East Suffolk Water Abstractors Group) or BOWAG (Broadland Water Abstractors Group) in the other Eastern counties.	AP1, AP2, AP3 and AP8	Farmers, Licence holders	2013	-	Ongoing
We will work with partners to restore our rivers to improve their aquatic plants and wildlife resilience to extreme weather conditions	All	Water companies, licence holders, government, environmental groups	2013	-	Ongoing
We will investigate further chalk aquifer so that interaction between groundwater and surface water flows is better understood. This will ensure that associated cross catchment issues are managed appropriately.	AP8	Consultants, water companies	2013	-	

Table 6 New actions rising from the latest assessment of resources in the RBIM CAMS.

Glossary of terms

Abstraction	Removal of water from a source of supply (surface or groundwater).
Abstraction licence	The authorisation granted by the Environment Agency to allow the removal of water.
Assessment Point Unit	Point at which the flow from upstream catchment is assessed.
Catchment	The area from which precipitation and groundwater will collect and contribute to the flow of a specific river.
Consumptive abstraction	Abstraction where a significant proportion of the water is not returned either directly or indirectly to the source of supply after use. For example for the use of spray irrigation.
Discharge	The release of substances (i.e. water, sewage, etc.) into surface waters.
Environmental flow indicator	Flow indicator to prevent ecological deterioration of rivers, set in line with new UK standards set by UKTAG.
Full licence	A licence to abstract water from a source of supply over a period of 28 days or more
Groundwater	Water that is contained in underground rocks.
Hands off flow	A condition attached to an abstraction licence which states that if flow (in the river) falls below the level specified on the licence, the abstractor will be required to reduce or stop the abstraction.
Hands off level	A river flow level below which an abstractor is required to reduce or stop abstraction.
Impoundment	An impoundment is a structure that obstructs or impedes the flow of inland water, such as a dam, weir or other constructed works.
Non-consumptive abstraction	Abstraction where all water is returned to the source a relatively short distance downstream of the abstraction point, e.g. fish farming.
Protected right	Means a right to abstract, which someone has by virtue of the small abstractions exemptions defined in the Water Act 2003 or by virtue of having an abstraction licence. The right protected is the quantity that can be abstracted up to that allowed by the exemption or the terms of the licence. The small abstraction exemptions defined by the Water Act 2003 are for domestic and agricultural purposes (excluding spray irrigation) not exceeding 20 m^3/d.
Surface water	This is a general term used to describe all water features such as rivers, streams, springs, ponds and lakes.
Transfer licence	A licence to abstract water from one source of supply over a period of 28 days or more for the purpose of; 1. transferring water to another source of supply; or, 2. transferring water to the same source of supply, but at another point, in the course of dewatering activities in connection with mining, quarrying, engineering, building or other operations (whether underground or on the surface); without intervening use.
Water body	Units of either surface water or groundwater at which assessments are completed for WFD.

List of abbreviations

AMP	Asset Management Plans
AP	Assessment Point
ASB	Abstraction Sensitivity Bands
AWB	Artificial Water body
CAMS	Catchment Abstraction Management Strategies
CED	Common End Date
Defra	Department of Environment Fisheries and Rural Affairs
EA	Environment Agency
EFI	Ecological Flow Indicator
FL	Full Licensed (scenario)
GES	Good Ecological Status
GW	Groundwater
HES	High Ecological Status
HMWB	Heavily Modified Waterbody
HoF	Hands off Flow
HoL	Hands off Level
LDE	Level Dependent Environment
maOD	Metres above ordnance datum
Q95	The flow of a river which is exceeded on average for 95% of the time.
RA	Recent Actual (scenario)
RSA	Restoring Sustainable Abstraction
RBMP	River Basin Management Plans
SAC	Special Areas of Conservation
SPA	Special Protection Areas
SSSI	Sites of Special Scientific Interest
SW	Surface water
WB	Water body
WFD	Water Framework Directive

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