Daglingworth Stream & Gumstool Brook Water Resources Situation

1 June 2021

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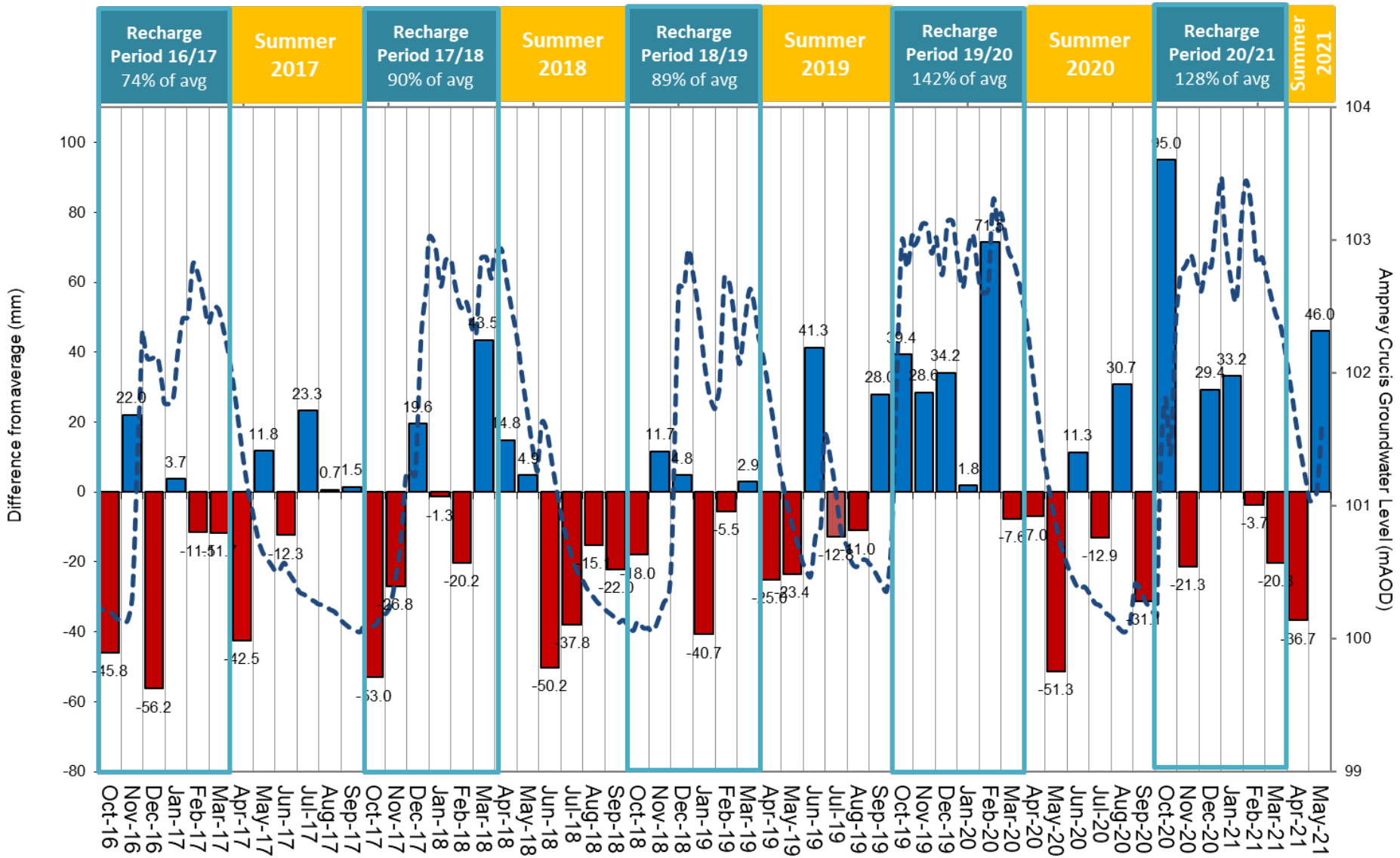
Water resources situation

Key Updates

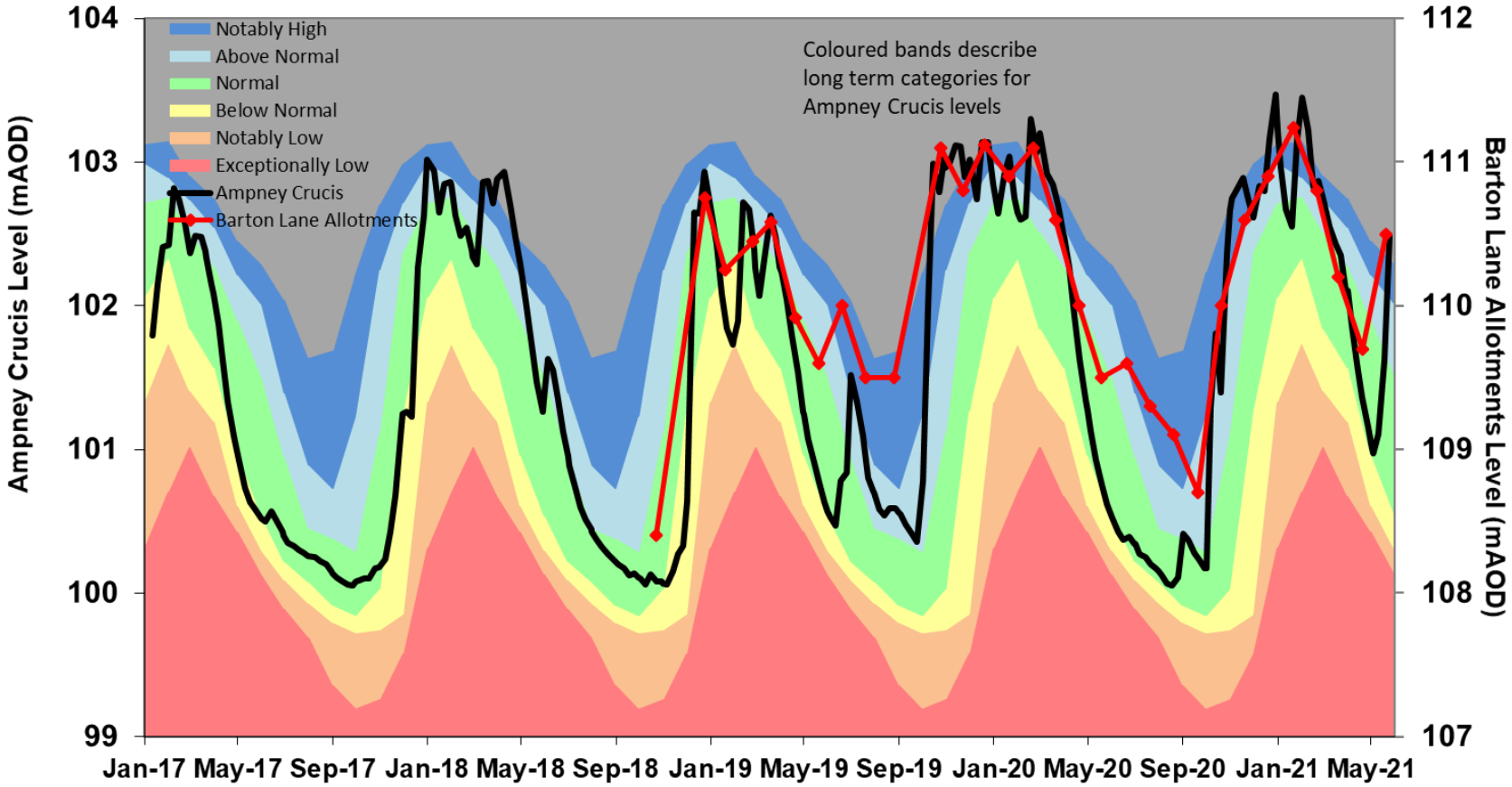
- Rainfall, groundwater levels, river flows & groundwater abstraction
- Update on work & future plans for Circencester sewerage system

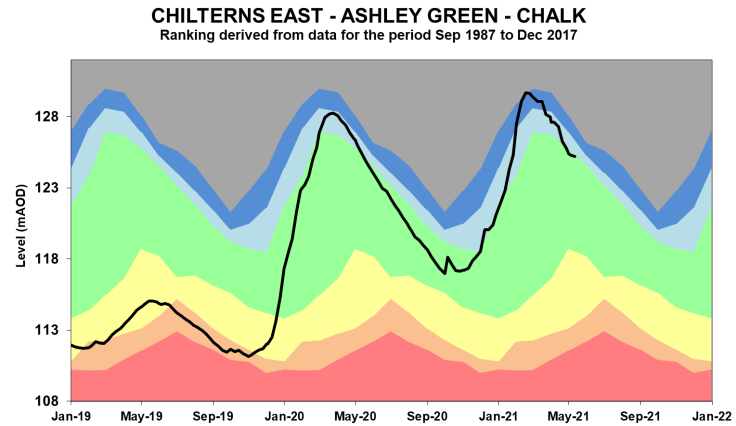
Rainfall, aquifer recharge & groundwater levels



- Groundwater level rises due to rainfall during autumn & winter recharge periods.
- Above average rainfall in 2019/20 produced high groundwater, but hot, dry spring in 2020 resulted in lower levels.
- Winter 2020/21 was wet:
  - Dec ~140% of average & Jan ~175% in Cotswolds
- Followed by three dry months, then a very wet May

Deep Great Oolite & shallow Gravel groundwater

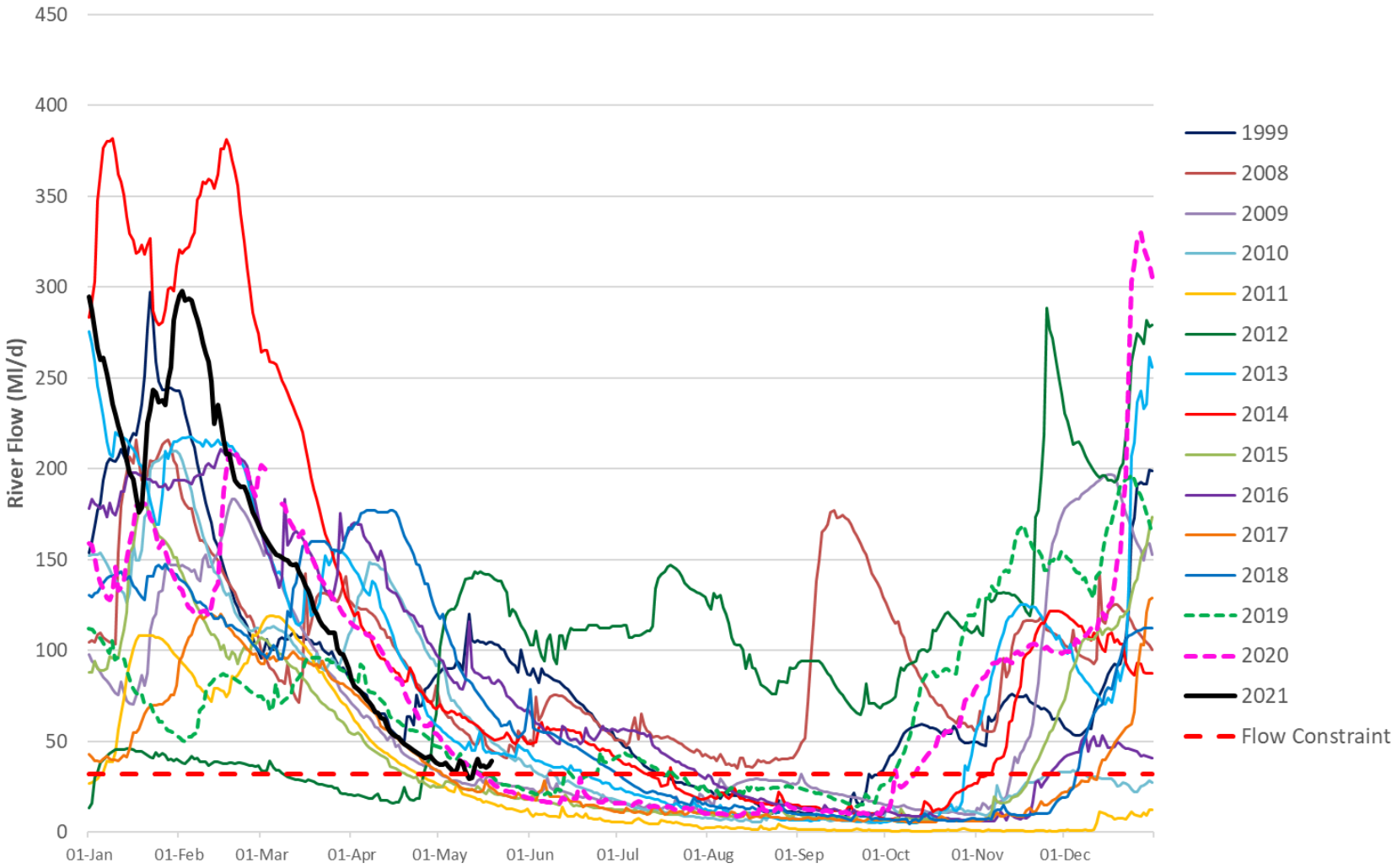




- Pattern of groundwater fluctuations in the Great Oolite & Gravel aquifers is remaining consistent
- Groundwater levels started to decline in Feb 2021, falling faster in dry April but then reached exceptionally high levels for the time of year following a wet May. This is quite different to groundwater patterns in the Chalk aquifer
- Levels are expected to decline into summer 2021 following the normal seasonality with flow in the River Churn, Daglingworth Stream & Gumstool Brook also declining

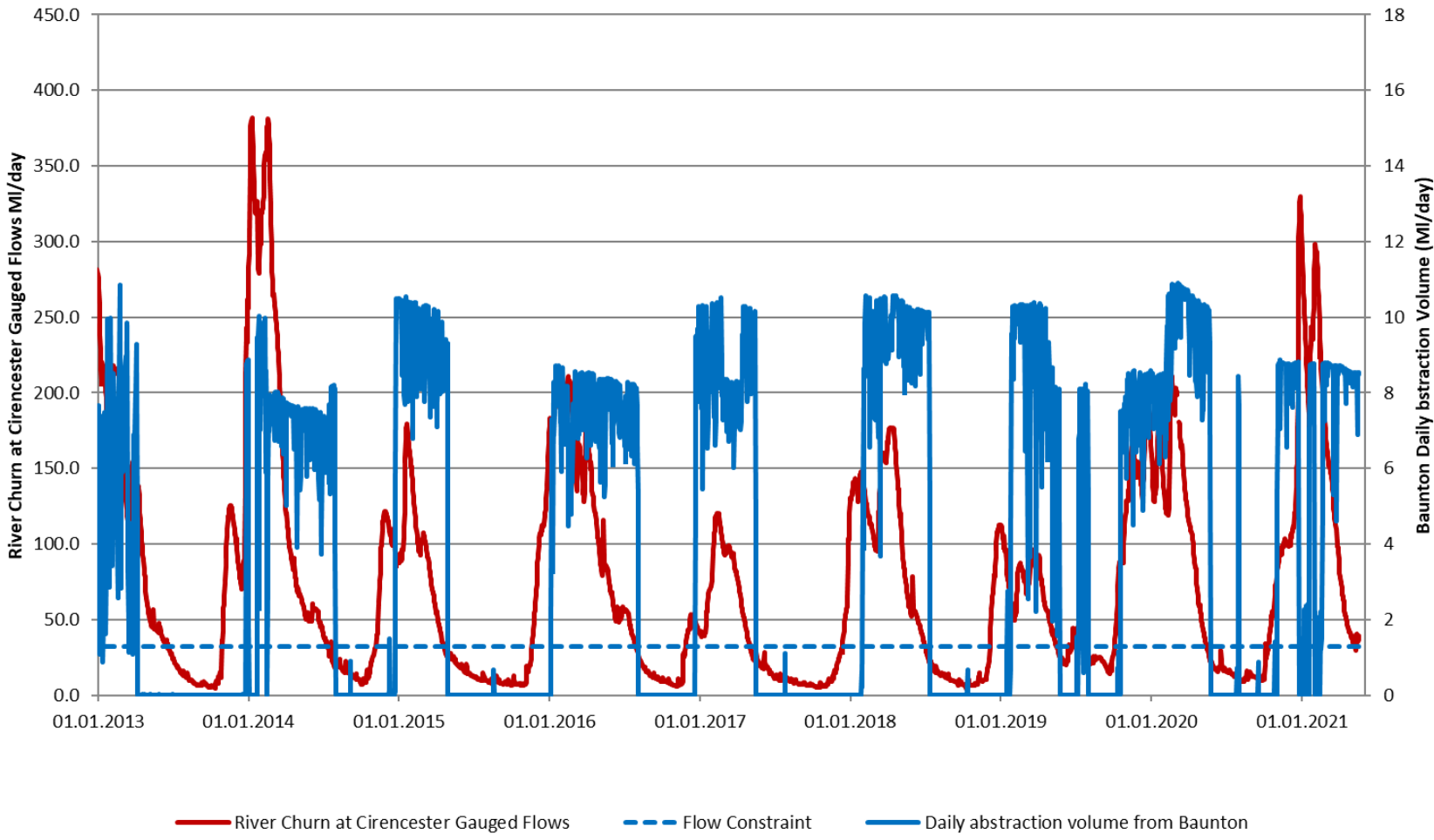
Flow in the River Churn

- River Churn flows follow general pattern of groundwater levels
- Declining flows in summer & autumn as groundwater levels fall
- Higher winter flows when groundwater levels are high, with the river flow also increasing in response to rainfall-runoff
- This general pattern is seen in 2021 and will likely continue in the remainder of the year
- Despite the wet winter & high groundwater levels, below average rainfall in Feb, March & April caused rapid decline in river flows
- The wet May has temporarily interrupted the decline in river flow



Flow in River Churn & abstraction flow constraint operation

- River flow generally falls below 32 Ml/d almost every year
- With flow <32 Ml/d, groundwater pumped from Baunton for public supply stops; requirement of Thames Water's licence from EA
- This general pattern will continue in 2021, but the wet May has temporarily interrupted the decline in river flow and delayed Baunton abstraction being switched off



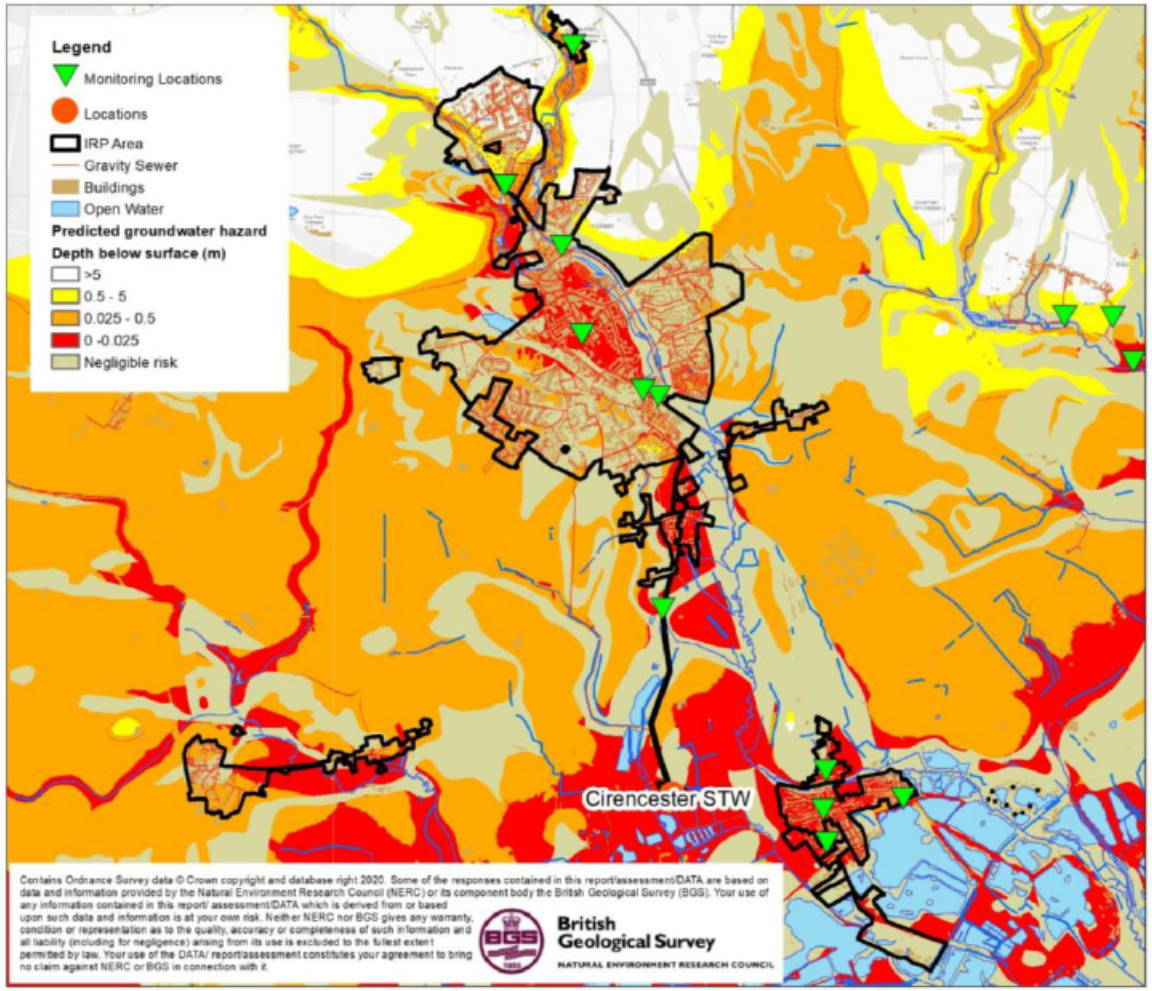
Daglingworth Stream & Gumstool Brook monitoring

- There is a record of stream flow observations on the Daglingworth Stream & Gumstool Brook from 2014 to 2021
- Simple description, e.g. flow, slow flow, dry plus photographs
- The record has some gaps, but is a valuable record that is now a Citizen Science activity
- It would be sensible to have a plan in place to ensure that the record can continue to be maintained, as well as combine with the shorter, more recent groundwater level record from Barton Lane allotments

Water resources & drainage: Long term plans for Cirencester

Root cause & work completed to date

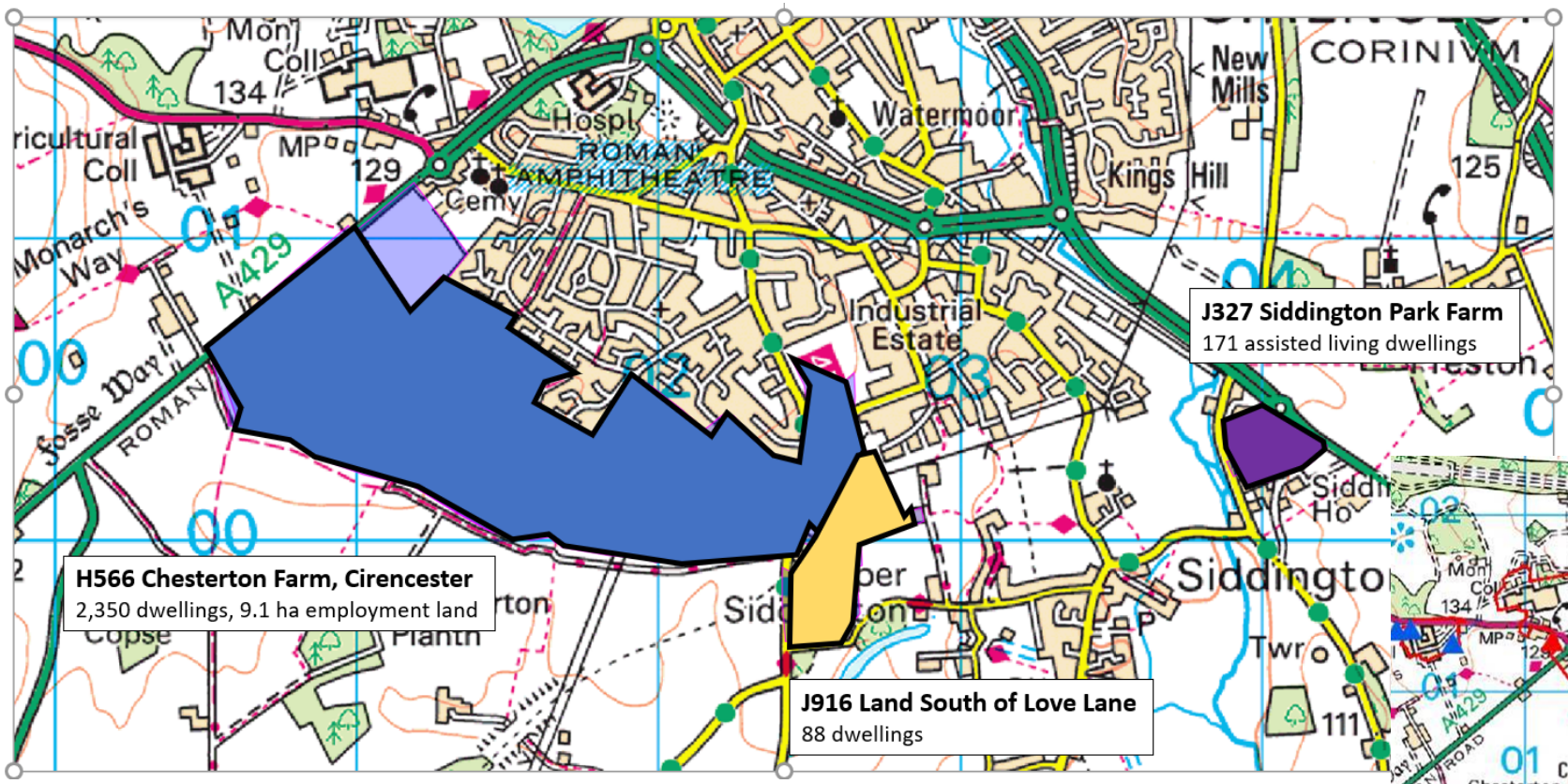
- Groundwater is likely to be a significant source of uncontrolled escape of untreated or partially treated sewage affecting our customers.
- Influenced by river flooding, inundating sewers from above via manholes, intense rainfall-runoff & river management
- Resolution with numerous root causes is complex and will require all stakeholders responsible for drainage to work together.
- Enhanced monitoring is key to the control of impact from groundwater infiltration. Depth monitors already installed.
- “Quick fixes” already delivered, plus extensive sewer rehabilitation in Cirencester & South Cerney to reduce groundwater infiltration.
- Groundwater Impacted System Management Plan (GISMP) to develop short, medium & long term plans https://www.thameswater.co.uk/about-us/regulation/drainage-plans.

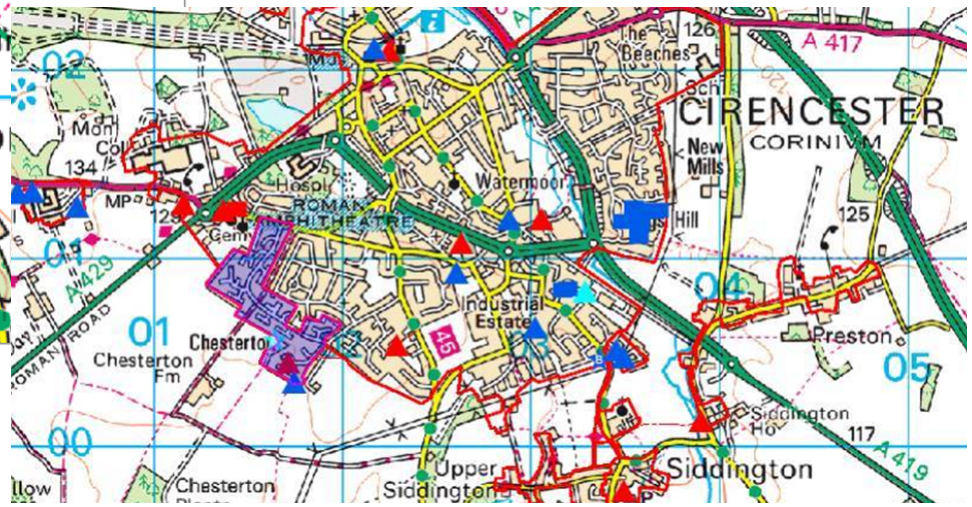


Cirencester Mitigation/Schemes in Progress

Location	Type of Project	Status
Beeches Road School Cirencester	Surface Water Management (removal from foul system)	Partnership project completed with Cotswold DC to removed roof drainage from foul system to soakaway. Further flood solution measures have been approved through first round of governance processes.
Stratton House Hotel Cirencester	Surface Water Management (removal from foul system)	Works were completed in the first week in May.
GCC Building, Cirencester	Surface Water Management (removal from foul system)	Listed on our SWM opportunities tracker, not yet progressed. We would be happy to partner with the LLFA flood group if a project is being developed here.
Chesterton Farm Development	Re-diverting flows direct to the STW	New foul sewer to serve Chesterton Farm development and remove flows from ~700 homes from the existing network. Construction of the project has commenced in June 2020 and is due to be completed by Autumn of 2021.
South Cerney, Station Road	Permanent over pumping system	Implementation of a permanent and less intrusive over pumping system in Station Road area in South Cerney to replace the temporary system. In detailed design, due for completion by March 2022.
ATAC Units	Event Mitigation	Operations are assessing opportunities to plan to install ATAC units (in situ treatment units) within the network to take the 'top of the flows' in the system, partially treat and pump to river. These will need to be agreed with the EA as part of our Groundwater Impacted System Management Plan mitigation.
Cirencester STW Upgrade	Storm Tank Capacity (2023) Flow to Full Treatment (2024)	Projects as part of the WINEP Programme are due to increase storm capacity (based upon industry guidance for sizing) and also increase flow to full treatment (capacity for treatment of flows) in this Asset Management Period. We agree the flow rates and design calculations with the EA as part of a permit change.

Cirencester – The Steadings (Chesterton Farm)





- Autumn 2021 completion – gravity sewer to lift SPS at Cirencester STW.
- Love Lane new development site flows can also be picked up by the new sewer.

The existing catchment of The Cranhams SPS will be diverted to the new sewer ~40l/s transferred from main system.

Long Term Drainage Plans for Cirencester

Groundwater Impacted System Management Plan (GISMP)

- Agreed with the EA, the key focus is to develop short, medium and long term plans to tackling infiltration https://www.thameswater.co.uk/about-us/regulation/drainage-plans. It includes:
    - review of historical & recent survey data to build evidence to support further interventions, recognising that our find and fix approach has not delivered the improvements we would have liked.
    - We are building evidence for lining large parts of the sewer network in high risk groundwater areas
    - We are not funded to deliver this in the 2020-25 period, apart from routine sewer maintenance.

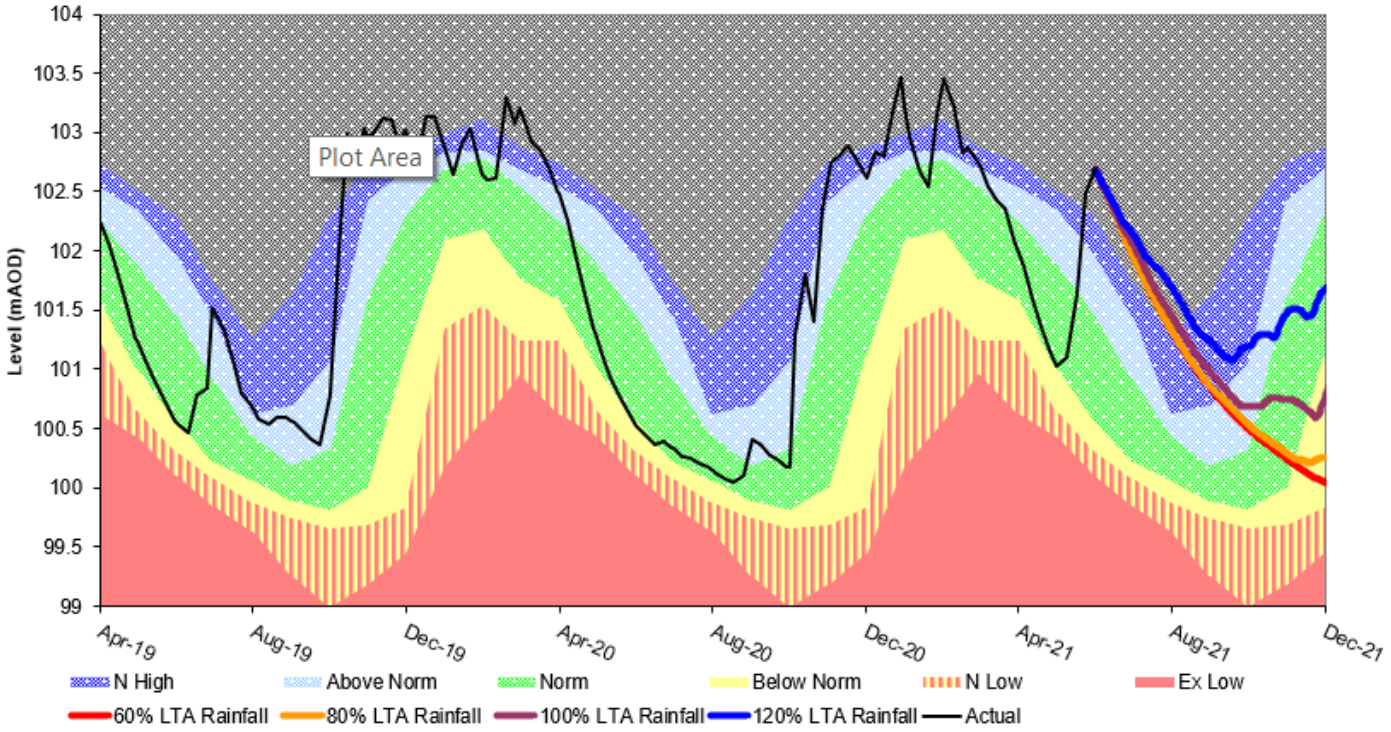
Drainage & Wastewater Management Plan (DWMP)

- Assess future capacity, in light of climate change, aligned with necessary infrastructure upgrades to 2050.
- Cirencester sewerage catchment has met the criteria to progress with optioneering, to be completed in draft by summer 2022 and will help us understand the current and future flood risk in this area.
- Stakeholder engagement is a major part of the DWMP process to identify partnership opportunities and ensure alignment of future plans (LLFA, LA, EA, Catchment Partnerships). For more information:

  https://www.water.org.uk/policy-topics/managing-sewage-and-drainage/drainage-and-wastewater-management-plans/

Water situation look ahead for the rest of 2021

- Groundwater in the Cotswolds is still more likely to remain at around normal levels or above into the summer and perhaps autumn 2021.
- Following significant winter recharge and exceptionally high groundwater levels, low river flows were considered less likely to occur in summer/autumn 2021.
- Updated groundwater projections from the start of June suggest above average levels will persist the summer, although current flows in the River Churn suggest that the flow constraint on groundwater abstraction is still expected to be triggered in the next few weeks. These projections will depend to a significant extent on summer rainfall.

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