

**Appendix 11k:
ATKINS - Water Sector
Scoping - Summary and
Recommendations Report**



Summary of Data Collected and Recommendations for its use to Assess the Impact of Anticipated Changes to the Water Sector on Yorkshire Water

Yorkshire Water Sector Scoping Project

Kelda Group

January 2017

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1. Executive summary

This Project has provided Kelda Group with detailed insight into the water sector in and around the Yorkshire Water service area. The project has overseen the collection of approximately 250 datasets which can be viewed and interrogated using online maps. Additionally full copies of the original and processed datasets are available via the projects online file store. This report gives an overview of these datasets and provides examples of how they could be used alongside existing Yorkshire Water datasets to better understand possible future impacts associated with expected changes in the water industry, with particular regard to abstraction and market reforms.

2. Introduction

2.1. Anticipated changes in the water industry

The Water Act 2014 has created the framework for a competitive, innovative and resilient water industry with a clear focus on customer service. Its implementation signals the beginning of changes that could profoundly reshape the water industry in England and Wales over the coming years. This is already evidenced in new guidance issued by Ofwat and the Competition Markets Authority on the Revised Special Water Mergers Regime process, the more recent release of Ofwat’s consultation on ‘Water 2020: Regulatory framework for wholesale markets and the 2019 price review’, Defra’s proposed water abstraction reforms and the opening up of the non-household retail market in 2017 as well as announcements from HM Treasury regarding extending this to opening up household retail competition. Significant expected changes in the water industry are summarised in Figure 2-1.



Figure 2-1 Summary of expected changes in the water industry

2.2. Project objectives

The anticipated changes to the UK water industry, outlined above, represent a risk to incumbent water companies but if handled correctly they may also create a host of new strategic opportunities. Water companies must balance these opportunities against regulatory, operational and financial risks - as well as possible impacts on customer service and perception.

In light of the expected changes this project collected and presented data to provide Kelda Group with a better understanding of the Water Sector in Yorkshire that is external to the activities covered by Yorkshire Water. Accordingly a large amount of data has been collected across the Yorkshire Water service area and in areas within 25 km of this, see Figure 2-2.

This report summarises the data collected and makes brief recommendations on how it may be analysed in a further stage of work to inform Kelda Group's understanding of its prospects, e.g. growth opportunities, and vulnerabilities, e.g. business risks, in light of impending changes to the water industry. Identifying these opportunities and risks early and reacting proactively may be key to maximising benefits and avoiding negative outcomes. Accordingly assessment of this data will provide part of the foundation from which a plan can be developed to strategically position Yorkshire Water ahead of its rivals.

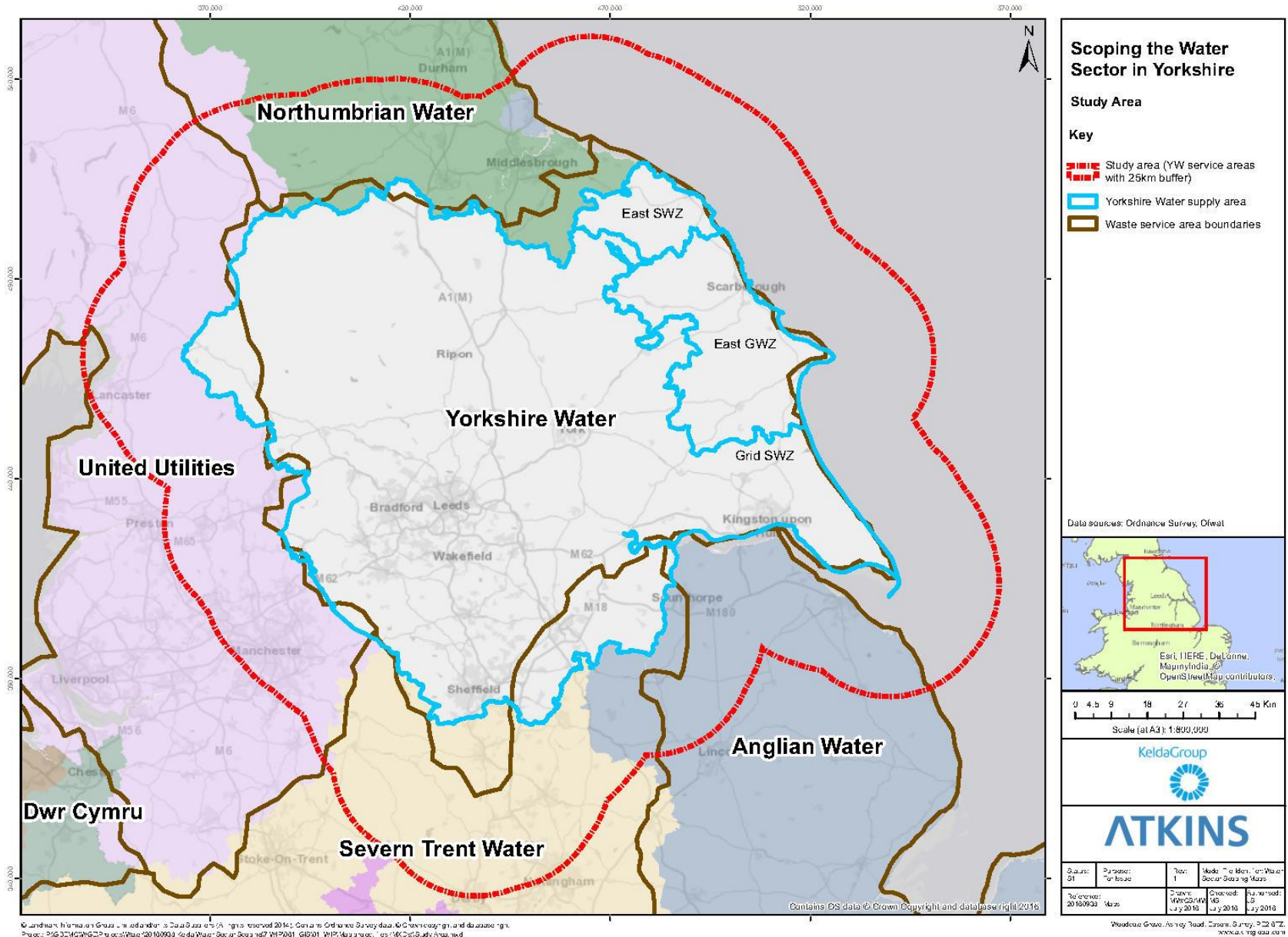


Figure 2-2 Study area

3. Data presentation

3.1. Web maps

A series of web maps have been created to provide secure but easy access to the majority of the collected data. They are accessible via a single secure link, provided below, and present the data on tabs under the following headings:

- Service area
- Environmental baseline
- Groundwater resources
- Surface water resources
- Cost to serve
- Clean water assets
- Waste disposal
- Discharges
- Land management
- Flooding
- Resilience
- Demand

WEBMAPS: Click [HERE](#)
USERNAME: KeldaGroup
PASSWORD: YorkshireWaterSector16

Full web link:

<https://atkinsgeospatial.maps.arcgis.com/apps/MapSeries/index.html?appid=5a6b7cf82b8b4c33baf321a96a0be745>

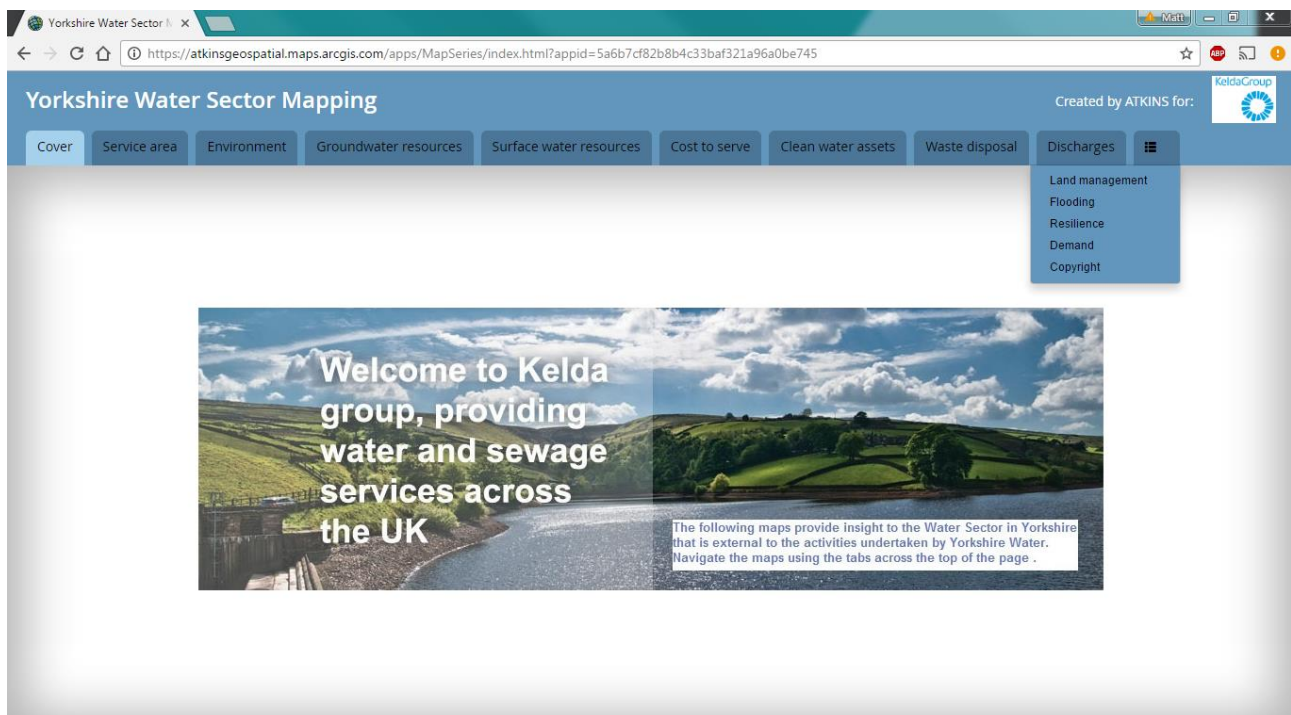


Figure 3-1 Web map cover page

Selected example output from the web maps is provided in Figure 3-2. The maps are compatible with all main stream web browsers and have been tested on Kelda Group systems. They will be kept 'live' until the end of 2017 with any maintenance chargeable at the rates for additional work set out in the projects contract. Following this period it is suggested that certain datasets presented on the maps will need to be updated if further use of the maps is expected.

Summary of Findings and Recommendations for the Assessment of the Water Sector in Yorkshire Kelda Group

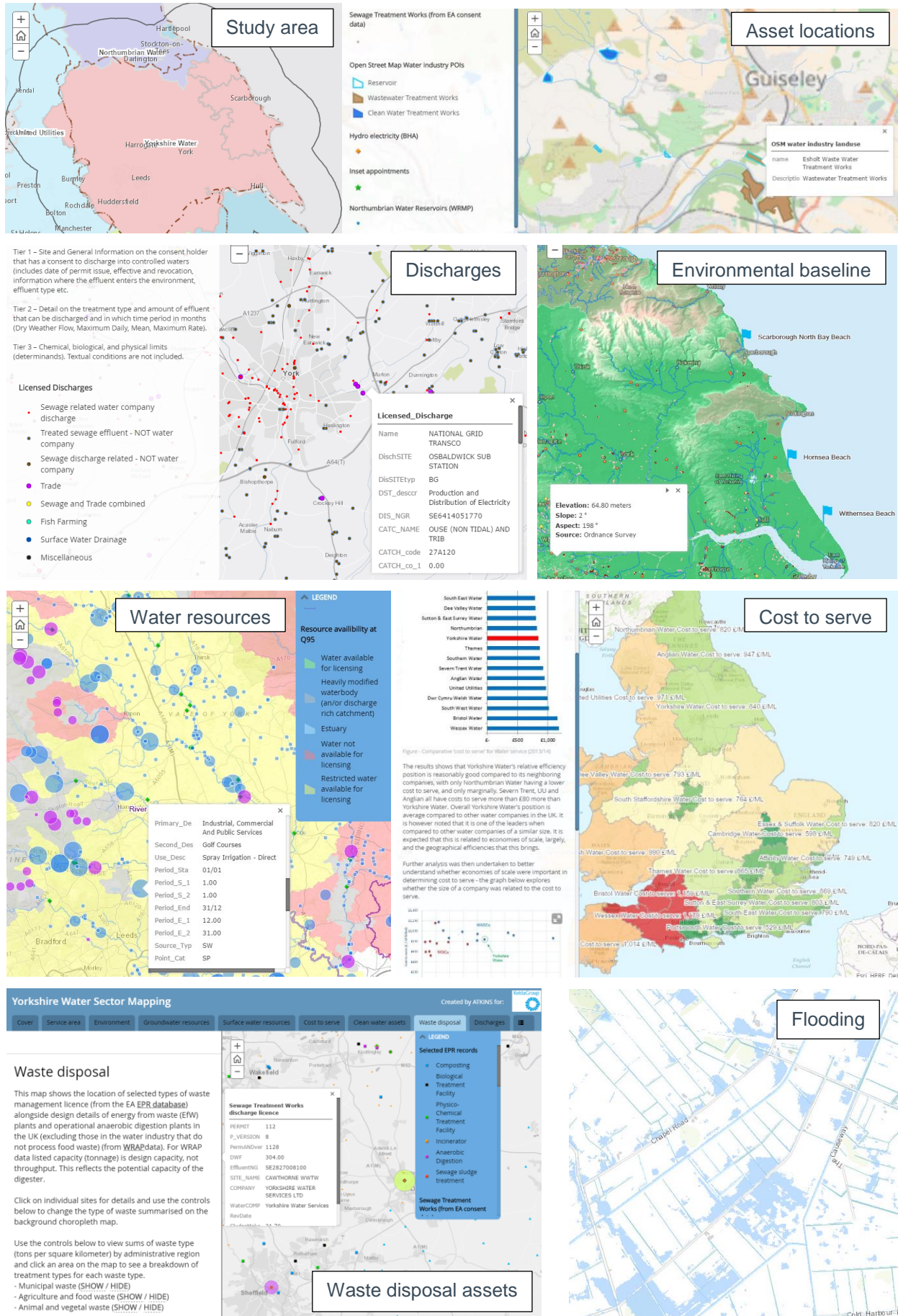


Figure 3-2 Selected example output from the web maps

3.2. File store

At the outset of the project the Kelda Group project team were given individual accounts to access the projects file sharing platform (enterprise Box.com accounts). The box file structure is shown in Figure 3-3. The file store contains all data collected by the project team in both a raw (as originally received) and processed form (quality assured and converted to usable format). Processed datasets are typically in either a Microsoft Excel or an ESRI ArcView Shapefile format (.shp). Raw datasets are typically in Excel, Access or Shapefile format. It should be noted that ESRI Shapefiles need to be opened in specialist GIS software to be viewed or in a web browser using the projects web maps.

It is important to note that the file store contains all data collected by the project whereas the web maps do not. This is particularly true for the largest and most complex datasets where it has been necessary to generalise or simplify the data to enable it to load sufficiently quickly on the web maps. This is also true for data that was not available in a spatial format, e.g. due to data protection it could not be georeferenced and so only generalised tabular data was available.

The projects file sharing platform will be kept 'live' only until the Kelda Group project team are able to download the data onto the Kelda Group network and no longer than to the 1st of April 2017. This can be extended by 1 year at a cost of £360 (fee is to cover the box.com license cost).

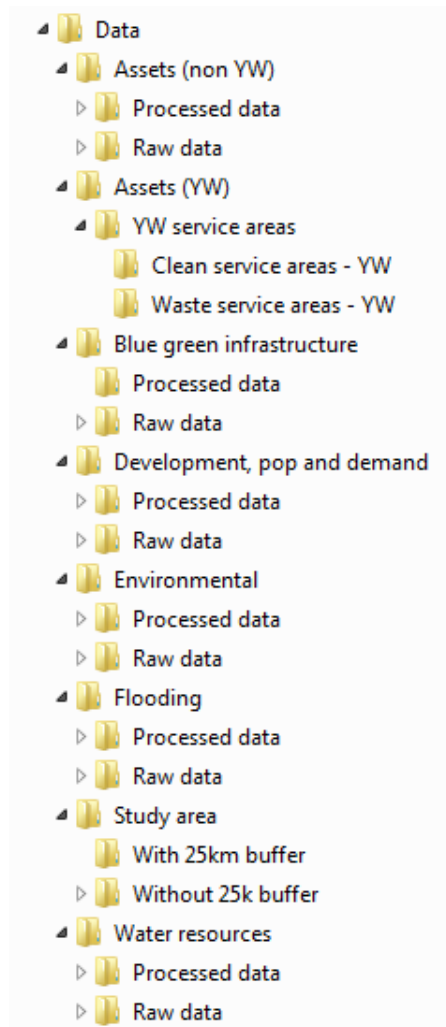


Figure 3-3 File Structure

4. Metadata

Comprehensive metadata including detailed descriptions and previews of the project data are provided in the projects data registry (Appendix A and also provided in Microsoft Excel format). A summary of the data is given below – items marked with an asterix (*) have had quotes obtained but have not been purchased.

Table 4-1 Summary of project data

Water resources availability

- EA Abstraction licence details
- Source Protection Zones
- Drought resilience
- BGS 625k Hydrogeological map
- Catchment Abstraction Management Strategy data
- WRMP data
- Restoring Sustainable Abstraction sites

Existing water industry assets

- Water asset data from OS points of interest *
- WRMP data
- Open StreetMap water asset data
- WFD Lake Waterodies
- Lakes, Reservoirs, Ponds and fisheries (Canals and River Trust)
- Cost to serve
- EA Discharge data (reveals WWTW locations)
- Inset appointments
- NNFC Report - Anaerobic Digestion deployment in the UK*
- WRAP data - identifies operational anaerobic digestion plants in the UK
- EA Waste Data Interrogator (quantities, types of waste and treatment process) (enables identification of sludge treatment centres)
- Environmental Permitting Regulations - Waste Sites

Environmental baseline

- Pollution incidents (EA)
- Landfill sites
- Sensitive Areas (Eutrophic areas)
- River Basin Management Plans
- Environmental Stewardship Scheme Options
- Countryside Stewardship Scheme site locations (ELS and HLS)
- Conservation and enhancement scheme agreements (agreements between Natural England and owners/occupiers of SSSIs)
- CEH future flows for droughts
- UKCP09 gridded data
- Landcover - (OS MasterMap, Corine)
- Integrated Hydrological Units of the United Kingdom (Catchments)
- Blue flag beaches
- Bathing waters and areas affecting bathing waters
- Statutory main rivers and OS Open Rivers
- OS Terrain 50 (topography)

Blue Green infrastructure

- Local plans
- CIRIA case studies

Development, population growth and demand

- Local plans
- Developer requests to Yorkshire Water
- National Infrastructure Planning Projects
- Hydro Electricity plants (British Hydropower Association)

Flooding

- Flood alerts and warning areas (EA)
- Flood Maps (including flood zones 1, 2 and 3; defence locations, areas benefiting from defences, flood storage areas)
- Historic flood map
- Groundwater flooding susceptibility *
- Shoreline management plans
- Internal drainage boards assets

4.1. Copyright and data limitations

Before processing or making any interpretations based on the datasets collected by this project it is important that the metadata is understood. Links to metadata for each dataset are provided in the data register (Appendix A), this explains how each dataset was sourced and what its limitations are. For example it may not be appropriate to view some datasets at very detailed map scales, e.g. 1:5,000 m, if they were developed from data only accurate to 1:50,000 m.

Copyright restrictions are also outlined in the metadata, with some of the datasets also having further details available as part of their download and so saved on the file sharing platform. These acknowledgements must accompany any reproduced material from the following organisations:

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5. Conclusion and Recommendations

This project has provided Kelda Group with detailed insight into the water sector in and around the Yorkshire Water service area. The project has overseen the collection of approximately 250 datasets which can be viewed and interrogated using online maps or downloaded from the projects online filestore.

Figure 5-1 provides a high level summary of the likely responses from water companies to the expected changes in the water industry and gives an indication as to the dominant spatial nature of that response, i.e. if it requires a geographic solution or not. This is useful since it steers our recommendations on potential assessments that could be undertaken with the spatial data collected on this project. Figure 5-1 reveals there are two changes to the water industry that will need responses with a significant spatial component; upstream competition and abstraction reform. Recommendations on how the data collected on this project could be used in these responses is explored further in the remainder of this section.



Change to the water industry	Description	Response	Spatial nature of response
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Figure 5-1 Responding to change in the water industry

5.1. Wholesale market reform

5.1.1. Upstream water resource markets

5.1.1.1. Summary of proposed water resource markets

Currently, water used for public supply in England and Wales is predominantly provided by integrated monopolies (large water companies), with limited trading taking place between incumbents. This has created concerns around how water is valued and allocated, prompting Ofwat to consider ways in which a more efficient 'upstream' water resources market could be developed.

The notes of the latest meeting of the Ofwat Water Resources Working Group, held on the 19th of December 2016¹, outline the main approach to upstream water resource markets that is currently under consideration, it involves the creation of two separate markets. New water providers will be able to enter the market either through a bidding process to supply water to existing incumbents (achieving long term certainty) or agree terms with independent retailers (possibly providing less certainty but greater returns). Accordingly two water resource markets are proposed that complement one another, these are:

1. **Bidding Markets** in England and Wales - whereby third parties (new entrants or out of area incumbents):
 - Bid to address demand/supply deficits. Where they can supply raw/treated water at least as efficiently as the costs of incremental capacity provided by the incumbent water company;
 - Can provide water, leakage solutions or demand reduction measures;
 - Typically long-term solutions – third party providers likely to commit to long-term contracts.
2. **Bilateral Market** in England – the Water Act 2014 makes changes to allow third parties to introduce water whereby third parties:
 - Can contract directly with independent retailers;
 - Will pay for access price to incumbent to use network and, if needed, treatment facilities;
 - Need not enter into a long-term contract with the retailer;
 - Incumbents may choose to enter into longer-term 'call-off' contract to ensure continuity of supply;
 - May incentivise retailers to search out more efficient water resources in order to compete more vigorously in the retail market.

Ian Pemberton, Principal Engineer at Ofwat, stated in the Water Resources Working Group in December 2016 that "International experience suggests that third-party brokers may play a significant role in aggregating and analysing data to identify opportunities". Similarly it is likely that incumbents will use similar techniques to identify both their opportunities and vulnerabilities. This type of assessment is explored in the following sub section.

5.1.1.2. Assessing the impact of upstream water resource markets

This project has collected a large amount of data on water resources not related to Yorkshire Water. In conjunction with data held by Yorkshire Water there are a number of opportunities for strategic assessment of upstream water resource markets, these are summarised on the following page under the heading of the market they relate to, i.e. bidding or bilateral.

¹ <http://www.ofwat.gov.uk/wp-content/uploads/2016/12/2016-12-13-WG5-All-slides.pdf>

Bidding market

- **High resolution cost to serve** - For Yorkshire Water at a water resource zone level, or, if the data allows, a treatment works level, cost to serve could be calculated to allow Yorkshire Water to understand the true cost of water in their service area and the causes for any spatial variations.
- **Groundwater resource development potential** - A high level suitability map of groundwater resource development potential could be developed using variables such as distance to trunk main, abstraction availability by groundwater monitoring units, depth to groundwater (as it would impact capital costs [borehole installation] and operational costs [pumping]), distance to existing treatment works and aquifer productivity (using BGS data).
- **Surface water resource development potential** - A high level suitability map of surface water resource development potential could also be developed using CAMS data and proximity to existing trunk mains and treatment works.
- **Storage options** - The suitability maps for potential resource development for surface and groundwater resources (described above) could be combined and existing large non Yorkshire Water waterbodies within proximity to these that could potentially be filled by them and used as storage could be identified. This would use data collected on waterbodies which would not only provide an insight that reveals the distribution of potential water resource storage options across the region but could also define their volume which could be inferred from surface area. This would use data from the WFD waterbody dataset, Canals and Rivers Trust data (lakes, ponds, fisheries and reservoirs), OS MasterMap (open water) and Open StreetMap reservoir location data. The final step would be to pick out those storage options close to potential new water resources that were near large Yorkshire Water demands, e.g. large towns. These sites would be highlighted as potential bidding market competitor options. A cost assessment of these vs Yorkshire Waters current cost to serve in that area could then be undertaken.
- **WRMP review** - A review of the Yorkshire Water WRMP to identify any options that could be taken forward by competitors in the bidding market.
- **Defensive market strategy** – Using output from the above assessments options could be drawn up to defensively position Yorkshire Water against third party water supplies. For example the acquisition of potential water resource supply assets or the lowering of cost to serve in areas particularly vulnerable to competition.

Bilateral market

- **Identify large customers at risk of competition** – Yorkshire Waters billing data could be used to identify large commercial clients. This list could be ranked to identify those customers at the highest risk to competition where they are in proximity to areas suitable for surface or groundwater resource developments (as described above).
- **WRMP review** - A review of the Yorkshire Water WRMP to identify any options that could be taken forward by competitors in the bilateral market.
- **Aggressive market strategy** - Abstraction data could be used to identify particular industries and specific large potential customers that could be targeted by Yorkshire Water via the bilateral market. This could include water users outside of the existing Yorkshire Water service area.
- **Defensive market strategy** – Using output from the above assessments options could be drawn up to defensively position Yorkshire Water against bilateral market incursions and inset appointments. For example by providing special offers with extended contracts to key commercial customers or by engaging more with the developers of new large residential constructions earlier. Alternatively due to resource constraints there may be areas where it is advantageous for Yorkshire Water to encourage activity in the bilateral market, for example by supplying data to new market entrants.

5.1.2. Upstream sludge market

5.1.2.1. Summary of the process to treat sludge

The process to treat sludge (often referred to as biosolids) is summarised below:

- Sewage is taken away from homes and workplaces to sewage treatment works (STW).
- It is put into tanks where the heavier sewage (primary sludge) sinks to the bottom; the residual sewage is transferred to secondary treatment processes where, generally under aerobic conditions, the organics are broken down in a series of biological processes. The secondary process produces additional sludge (secondary sludge, made up of residual solids plus bacteria) which is removed in settlement tanks prior to the treated sewage being discharged.
- The primary sludge is transferred to a Sewage Treatment Centre (STC) (sometimes on the same site as the STW) where it is mixed with the secondary sludge. In the majority of cases the mixed sludge is then digested under anaerobic conditions. The digestion process breaks down a proportion of the organic material in the sludge reducing both volatile and solid concentrations enhancing reductions in pathogenic bacteria and odour.
- The digestion process results in a treated sludge, which can be used as a fertiliser substitute by the agricultural sector, and a biogas – (predominantly methane) which can be used to generate low carbon electricity or, subject to additional treatment, injected into the national gas grid.

5.1.2.2. Summary of proposed sludge market

Ofwat intend to change the way they regulate sludge to stimulate markets in sludge services. Ofwat believe this will enable and incentivise companies to pursue the best solutions in sludge treatment (increasing innovation and efficiencies) and so maximise benefits for customers, the environment and the companies themselves.

As new sludge service providers enter the market Ofwat anticipate that there would be: increased resilience in sludge services, with companies able to choose from a number of alternatives for treating, disposing of and recycling their sludge in both day-to-day operations and to lessen the effects of disruptions and reductions in cost to customers.

5.1.2.3. Assessing the impact of sludge markets

The following bullet points outline a possible approach to assessing the impact of Ofwat's proposed changes and identifying risks and opportunities to/for Yorkshire Water.

- **High resolution cost to serve** - For Yorkshire Water at a waste operating area level, or, if the data allows, a treatment works level (STC) cost to serve could be calculated to allow Yorkshire Water to understand the true cost of sludge treatment in their service area and the causes for any spatial variations.
- **Sewage Treatment Work (STW) locations** – STW locations in and around the study area have already been identified using OpenStreetMap, EA discharge data and Yorkshire Water's own asset dataset.
- **Sewage Treatment Centre (STC) locations** – Use the Environmental Permitting Regulations database to identify non-Yorkshire Water STC locations in or close to the study area. This approach has been tested and found to be accurate; it involves searching the dataset using particular criteria, these include identifying water company sites that also have 'CHP' or 'sludge treatment' in the site name or plant licence description or with a 'combustion of bio gas', 'sewage sludge treatment' or 'Landfill Gas Engine (<3 mW)' in the type description. Non water company STCs can also be identified in the same dataset. In addition to this dataset we would also use insight from Yorkshire Water staff.
- **Other waste management operations** – use WRAP, EA Waste Data Interrogator, EPR and NNFCC (if available) data to identify other waste management operations in the study area that could receive and treat water company sludge (noting that the co-digestion of, for example, food

waste with water company sludge is difficult but possible). This would be done with regard to forecast capacities of Yorkshire Water's current STCs and the sites proximity to suitably large third party assets. Ofwat considers that 'new entrants' outside of the water sector could provide more cost effective sludge treatment which would reduce the cost to customers. A similar exercise could also be undertaken to identify and rank third party waste sources that could be targeted for transfer to Yorkshire Water assets for treatment (using a similar method but also giving regard to the processes used at Yorkshire Water's existing STC sites).

- **STC / STW optimisation and identification of STWs at risk to competition** – for every STC in the study area (including Yorkshire Water's and adjacent water companies) calculate which STWs are closer to that STC than any other. Yorkshire Water STWs at risk of competition from other water companies could then be identified (those closer to a non Yorkshire Water STC than a Yorkshire Water STC) as could STWs that Yorkshire Water could compete for (those not operated by Yorkshire Water that are closer to a Yorkshire Water STC than to that of the operating company).
- **Severity of competition risk** – For each STW identified as being at risk to competition (both Yorkshire Water sites vulnerable to competition and sites operated by adjacent water companies that are vulnerable to competition from Yorkshire Water) we would calculate travel distances and use available STC capacity data from Yorkshire Water and the Environmental Permitting Regulations database to assess/rank the level of competition risk,
- **Aggressive strategy** – we would investigate where new STC capacity is needed/planned for Yorkshire Water and where this could be located that would also enable the STC to compete for sludge from STWs operated by adjacent water companies, particularly, if Yorkshire Water can provide the data, those that use STCs running close to capacity.

The assessment outlined would identify vulnerabilities in Yorkshire Water's current sludge treatment arrangements and opportunities for the company to increase/optimize its asset base and deliver an additional revenue stream (gate fees, revenue from biogas usage etc.).

5.2. Abstraction reform

5.2.1. Summary of proposed abstraction reforms

The Coalition Government committed to reform of the water abstraction management system in England in the Natural Environment White Paper, published in June 2011. The proposed direction, principles and process for reform was then set out in the Water White Paper, Water for Life, (Defra, 2011).

The UK and Welsh Governments published a joint consultation, "Making the Most of Every Drop", in December 2013. The purpose of the consultation was to seek views on a range of proposals for reforming the water abstraction management system in England and in Wales. A summary of consultation responses was published in July 2014.

In January 2016 the Environment Agency published the 'UK Government response to consultation on reforming the Water Abstraction Management System' (Environment Agency, 2016c). The remaining sections of this document set out the high level proposals for a new abstraction management system in England which is summarised in Box 1 (Environment Agency, 2016).

BOX 1 – Proposed abstraction reforms

- From the early 2020s replacement abstraction permits will be issued with **permitted volumes that reflect current business**. ‘Paper water’ (licensed abstraction volumes that have not been used) will be removed, subject to appeal, if they pose a risk to the environment.
- Hands-off flows and similar conditions will be **standardised** to simplify the system.
- At any time when flows are high, abstractors will be allowed to take water to store it. There will be **no seasonal permits**.
- All abstractors directly affecting surface water will have conditions on their permits that enable **flow based controls** to protect the environment. Those currently without flow-based controls will have new conditions on their permits.
- Abstractors will be able to trade water in a quicker and easier way in catchments where there are potential benefits. In these catchments, there will be a range of **preapproved water rights trades**, which means permit holders can trade more easily at times when the availability of water is low. In these catchments, surface water abstractors will be given shares of the catchment’s different water resources which will facilitate pre-approval of upstream trades. This will give abstractors more flexibility, helping them to cope during low flows and reveal the value of water to underpin decision making.
- No permits will be time limited, providing a fairer approach. The Environment Agency will take a **risk based catchment approach to permit reviews** and will consider all permits on a level playing field. The Environment Agency will publish catchment data and information so abstractors and others can understand the environmental risks in their catchment and the likelihood of a review being triggered. Catchment abstraction reviews will link to the overall management of catchments as a key natural asset working closely with local people. There will be reasonable notice given of potential permit changes to give abstractors time to adapt. There will be no compensation for permit changes.
- Currently **exempt abstractions will be brought under licensing control** (e.g. trickle irrigators).

5.2.2. Identification of water rights trading opportunities

Water rights trading, also referred to as abstraction licence trading, is where an individual or organisation makes all or part of their abstraction licence rights permanently or temporarily available to another individual or organisation. This means trading the rights to abstract water that are part of an abstraction licence, NOT the actual licence (with its accompanying conditions if any) or physical volumes of water. It enables a valuable resource to be reallocated to user(s) that value it most.

Building on Atkins’ “Review of the Water Rights Trading Process” (Atkins, 2016) an assessment could be undertaken to identify potential trades that would be most beneficial to Yorkshire Water – for example to increase the licence capacity of sources identified in the WRMP as operating close to their deployable output or to create revenue from unused licensed abstraction volume that is available at under-utilised sources, for example by trading it, subject to conditions, to farmers for irrigation or to other users/industries. An assessment approach is outlined in the following bullets:

- **Map Yorkshire Water’s “paper water”** - Average annual ‘paper water’ (licensed abstraction volumes that have not been used) available at each Yorkshire Water source would be calculated and then mapped using licence details and historical average annual abstraction rates for each Yorkshire Water surface water source (data to be supplied by Kelda Group).

- **Identify opportunities for water rights trades:**

- **Permanent trade (purchase)** – The National Abstraction Licence Database (NALD) would be used to identify large third party abstractions (groundwater and surface water) around each Yorkshire Water source that is running close to capacity, with regard to its licence, that could potentially be part of a permanent trade (acquisition by Yorkshire Water).
- **Permanent trade (sell)** – Where Yorkshire Water’s abstractions have significant “paper water”, i.e. significant capacity on their licence above their actual abstraction – potential buyers in proximity to these sources could be identified from land use, land registry and abstraction data. It is noted that returns data for third party abstractions is not available; this assessment would therefore not go any further than identifying potential trades based on licence size and proximity to the Yorkshire Water source in question. At a later stage a further assessment could build on this work by consulting with these potential traders. It is noted that after abstraction reforms paper water will likely be reduced as licensed abstraction volumes will be more closely tied to current usage. After these reforms licenced volumes will still provide useful information in understanding the potential capacity of sources but the value of Yorkshire Water’s licences to third parties may reduce if their total licensed volume is reduced when excess licenced capacity, i.e. paper water, is subtracted from them. It is however noted that abstraction reforms are intended to make trading more straightforward and so easier to arrange, this also suggests the process would be more transparent and that subsequently the Environment Agency may then not need to interfere in the process so often – e.g. suggesting modifications to proposed trades.
- **Pre-arranged temporary trade** - Third party abstraction licences within a 5km upstream distance of each Yorkshire Water surface water abstraction could be identified – with the sum of their licenced volume boosting potable supplies at pre-defined peak times. A larger catchment network abstraction resilience scheme might also be considered that subsidised farmers to build up stores of water that could be released in times of drought. Locations for pilots of this could be identified using demand, abstraction and land use data.

- **Identify spatial nature of constraints to trading** – Constraints could be factored in to each of the types of water rights trade discussed above. For each type of trade those that are considered to be most viable could be identified by examining potential constraints and blocks to trading opportunities around Yorkshire Water abstractions (see Atkins Review of Water Rights Trading [Atkins, 2016]). This would provide a chance to better examine the scale of potentially viable opportunities across all of Yorkshire Water’s sources.

- **Estimate acceptability of trades to the Environment Agency** - Trading unused water brings the risk of environmental damage if it increases overall abstraction, by activating unused licence capacity. To avoid this, the Environment Agency will only allow trading of unused water as long as the sustainable limit is not reached. When reviewing abstraction licences the Environment Agency therefore has a sharp focus on recent actual abstractions and on ensuring no deterioration with regard to WFD regulations. With this in mind a final step could be undertaken to review the likely acceptability of each of the potential licence trades to the Environment Agency. Based on RBMP, CAMS (see Figure 5-2) and WFD status data. This could incorporate a traffic light ranking to show spatially the anticipated acceptability to the Environment Agency of each licence being involved in a trade. Other criteria could include, for example, checking the buyer’s abstraction point is in the same watercourse as the seller’s (and preferably downstream).



Figure 5-2 Water availability at very low flows (Q95) in the Swale, Ure, Nidd and Upper Ouse CAMS area

- **Natural capital** - Natural assets such as geology, soil, air, water and all living things provide a service which gives them a value, referred to as natural capital. The most obvious ecosystem services include the food we eat, the water we drink and the plant materials we use for fuel, building materials and medicines. There are also many less visible ecosystem services such as the climate regulation and natural flood defences provided by forests, the billions of tonnes of carbon stored by peatlands, or the pollination of crops by insects. Further work could be undertaken to understand the natural capital in each catchment in the Yorkshire Water service area. Knowing the value of the ecosystems may facilitate selling 'paper water' back to the Environment Agency so they can achieve environmental protection or recreational enhancement objectives. Similarly fishing clubs could also be interested in purchasing paper water to secure their stock. This exercise would provide Yorkshire Water with a positive public relations message which may offset the possibly small financial benefit they would bring – "YW gives X MLD to provide X ,Y and Z benefits for the environment and society". This approach may also help justify drought permit actions required when the company needs more water.

References

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Appendix A. Data registry

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