# 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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# **Document history**

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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.

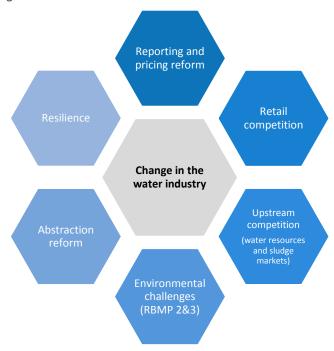


Figure 2-1 Summary of expected changes in the water industry

Summary of Data Collected and Recommendations for its use to Assess the Water Sector in Yorkshire Kelda Group

# 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.

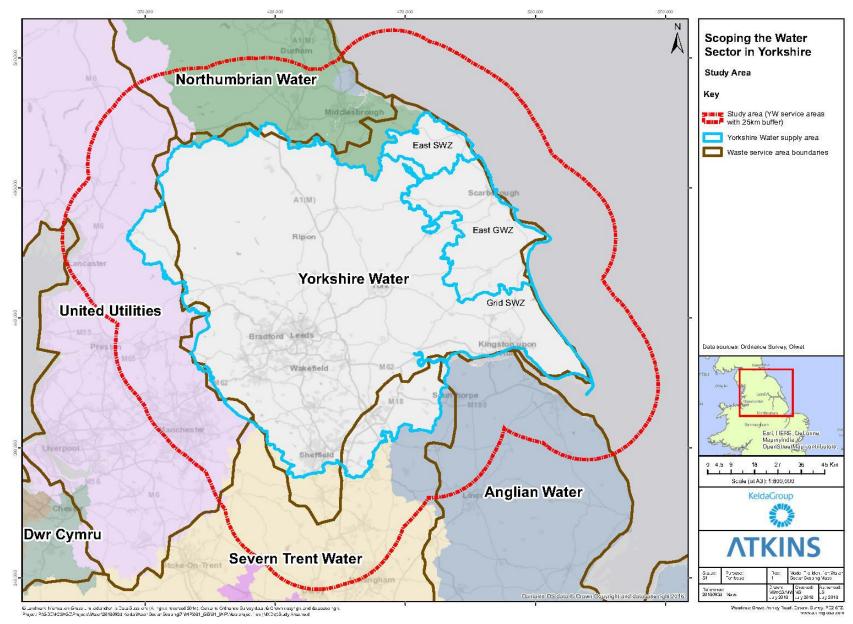


Figure 2-2 Study area

# 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

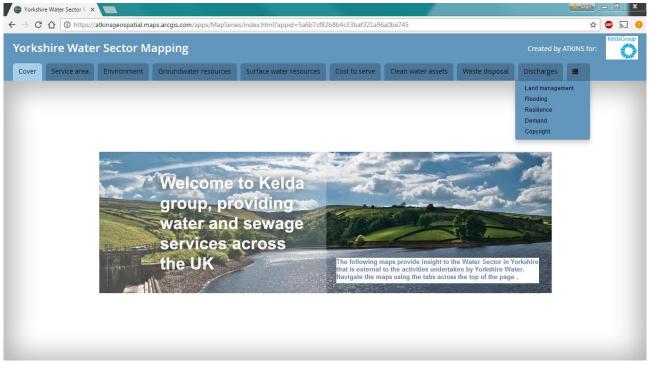


Figure 3-1 Web map cover page

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.

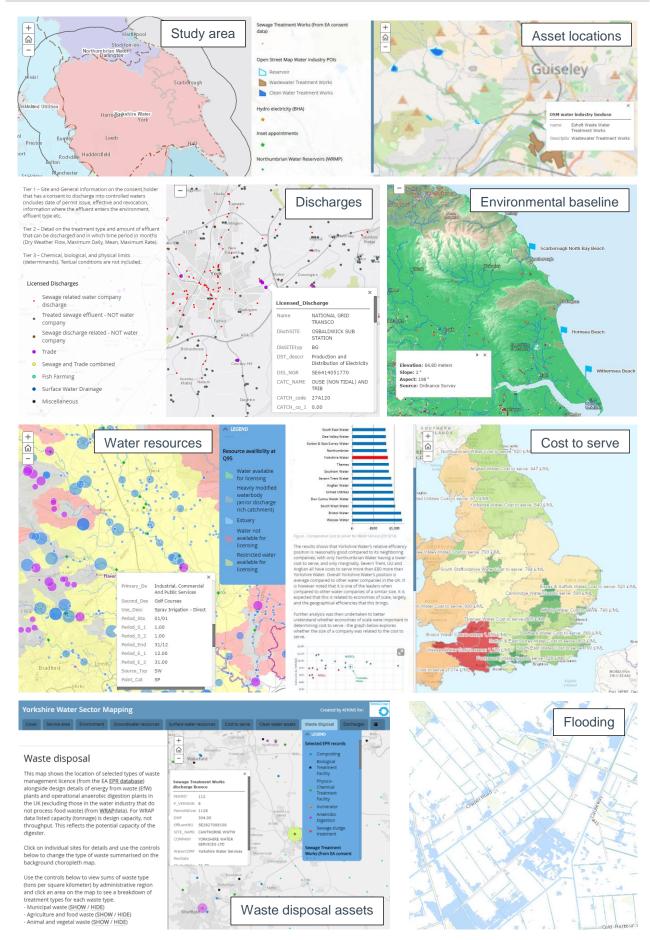


Figure 3-2 Selected example output from the web maps

# 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 1<sup>st</sup> of April 2017. This can be extended by 1 year at a cost of £360 (fee is to cover the box.com license cost).

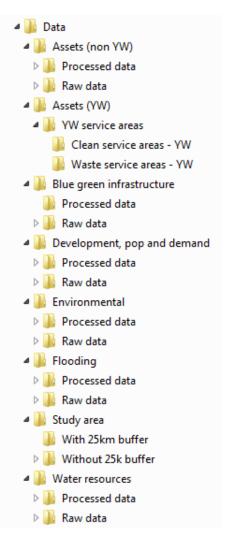


Figure 3-3 File Structure

# 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 availibility

- EA Abstraction licence details
- Source Protection Zones
- Drought resilience
- BGS 625k Hydrogeological map
- Catchment Abstraction Managemnt 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
- NNFCC 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 (agrements 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, poulation growth and demand

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

### Flooding

- Flood alerts and warning areas (EA)
- Flood Maps (includinf flood zones 1, 2 and 3; defence locations, areas benifiting from defences, flood storage areas)
- Historic flood map
- Groundwater flooding suseptibility \*
- 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.

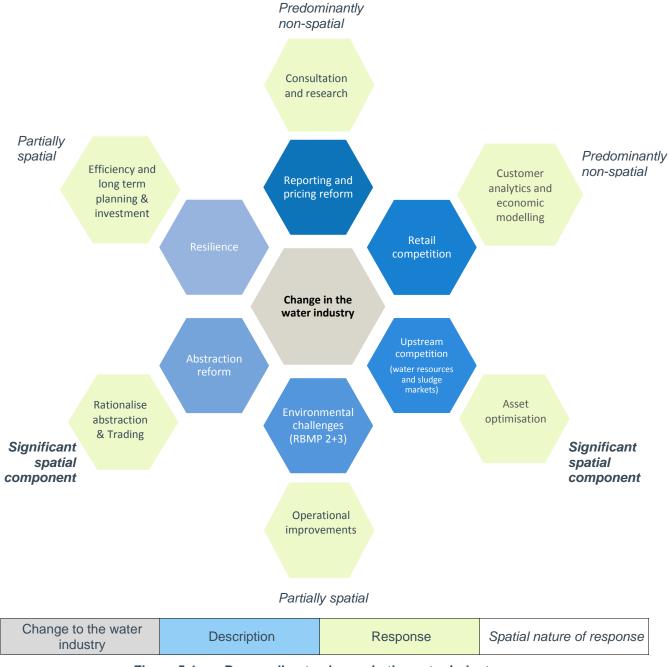


Figure 5-1 Responding to change in the water industry

# 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 19<sup>th</sup> of December 2016<sup>1</sup>, 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.

lan 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.

<sup>1</sup> 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 form 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/optimise 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 prosed 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

Atkins, 2016, A Review of the Water Rights Trading Process, REF: 20160938OG/001

Defra, 2011. Water for Life

https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/228861/8230.pdf

Environment Agency, 2016, UK Government response to consultation on reforming the Water Abstraction Management System

https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/492411/abstraction-reform-govt-response.pdf

# Appendix A. Data registry

Category	Broad data category	Data	Description	Web link	Quote	Collection status	Output status
				http://maps.environment-			
availability		EA national dataset	Water can be shotracted (taken) from groundwater, surface water, or fold water. An abstraction knows detail of what is permitted such so how much water is allowed to be abstracted and at what from Read more about water distraction it ences. https://www.gov.uk/pidacoc/water-enaugement-abstract-or-impound-water	agency gov.uk/wiyby/wiybyContro llar?w.8576838g=3551348.ccale- 18layerGroups-default8.ep-map 8textonly-off8lang-e8topic-wa- ter abstractions#e-4645488y=45 181384g-1,2,3,5,10,8scale-5		Completed	on esri online
	Large abstraction Icences (-0.5 MI)(day)	Source Protection Zones (59%)	ONLY are defined around large and public gastable ground-relative about 2000. The pupper of DPEs is to provide additional particular to subappear deformed services from the public of the public and particular to subappear deformed ground-relative good provided by the public of the	https://data.gov.ub/dataset/court a_protection_tooks_merged1		Completed	on esti oriline
	Drought resilience	Assis: Water UK National Water Resources Long Term Planning Framework - modelled output of Yel assessment	substance names it common faces require and a solution requirement of the second of th			Completed	na
	Groundwater	BGS 625k Hydrogeological map of England and Wales	Generation (gliptal politiquis) amps data based on MGSV published popular maps of the UK (Notth and South), Bedrock related themes created by preventionation of 15 Good atte name the 2005 of the dotte bedrock decidence of the UK (Notth and South). Bedrock related themes created by preventional stated themes digitized from 1977 force addition. Quaternamy map (North and South).  The geological private (or polygood) are shelded or attributed with a name (based on their titlibutate/geophicul, chromotrategraphical or conformation of the Company	http://www.bgs.ac.uk/products/d igitalmaps/digmapgb 625.html		Completed	on esri online
9		Groundwater modelling data from EA Water Resources GIS	The Water Resources GIS (WRGIS) is the central system where abstraction, discharge, natural flows and complex impacts information from the CAMSLagers is uploaded. The WRGIS uses this information to calculate the current resource availability for each water body at four flow percentiles. It incorporates coded calculations based on an integrated surface water / groundwater database of round 1000 water bodies,	http://randd.defra.gov.uk/Docum ent.aspx?Document=12211 Thel		Not feasible - data not available due to	na
2		(may already be held by YW)  EA CAMS data	combined with many other map layers in standardised formats.  Data provided following request to the EA - Shows Current flow restrictions at specific assessment points	mpactofWaterAbstractionReform. pdf		copyright Completed	on esri online
Water resource	Areas of water scarcity in Yorkshire	CAMS reports	Asstraction Concess strategies for CAMS areas in Yorkshore (others available at link provided) - Americation - Americation - Americation - Americation - American - A	https://www.gov.uk/government/ collections/water-abstraction- licensing-strategies-cams-process		Completed	na
		WRMAPs from adjacent water companies - to determine opportunities for increased trading	All WMAPs contain sections on ficence trading - both current and as a topply option.	https://www.maic.co.uk/pourt- bornel-environment/current- WMMP acque http://comporate.unitedutilities.co. m/materrescourcesplan.acque https://www.seventrent.com/fut uniffluture-labra.acd, strategy/water-resources- management-pluma- partiespluma-pluma- partiespluma-pluma- partiespluma-pluma- siconnectic gue- commente four commitment/our pland-water-resource- management-four pland-water-resource- management-four pland-water-resource- management-four		Completed	na
		Surface Water Resource Availability and Abstraction Reliability		https://data.gov.sk/dataset/water-			
		Cycle 2	This dataset indicates whether, and for what percentage of time, additional water may be available for consumptive abstraction (subject to assessment of local risks) for each Water Framework Directive Cycle 2 water body.	resource-availability-and-abstraction- reliability-cycle-21		Completed	on esri online
	External pressures	65A results	Scalandiad Addresclane. Sick is a programmen of work that identifies in, eventigates and claims environmental risks or problems caused by under the control of the control	bttes://data.gov.uk/slataset/lengt h.of-river-affected-twn-restoring- sustainable-abstraction-database		Completed	on esri online
			10001004 TA 95 3 Verlake Wilder Service   New 2014   Non-Timber Company   License reduction, change of purpose, addition of few condition   Plant Term   20054000 St 50 27   Verlake Wilder Services   November 2000 Wilder Company   License reduction   License reduction   Plant Term   Plant Te				
		OS Points of Interest	2005-54000 St 52 37 Yenterber Stater Services   Invented 2000   Violate Conquery   Leavest reduction   PHS	www.ordnancesurvey.co.uk/busin ess-and- programment/products/points.nd.	Oute received: £4301 for study area. £7300 with the 25im	Quote collected	na
		OS Points of Interest	Indicated   M.E. 27   Vinders House Source   Numeric 2000   Numeric Company   Americ melastics   Post	www.ordnancesurvey.co.dk/busin oss-and- government/products/points-of- interest.html https://www.nwl.co.uk/your-	Quote received: £4300 for study area, £7800 with the 25km buffer (both excl VAT)		
		OS Points of Interest	Internation	government/products/points-of- interest.html https://www.rwl.co.uk/your- home/environment/current- WRMP.aspx		Completed	on esri online
ssets		OS Points of Interest  OS Points of Interest  Relevant published WRMP data	The control of the part   The most compare from the part   The p	government/products/points-of- interest.html https://www.rwl.co.uk/your- home/environment/current-			
rater industry assets	Location and owners/operation of reservoirs outside of YW control		Points of instruct" in the most comprehense, location based directory of all public and privately-counted businesses, education and festious seasons in the limit.  Points of instruct" in the most comprehense, location based directory of all public and privately-counted businesses, education and festious seasons in the limit.  All inservant in fourthern supply areas of footer them becomes zeroe diplosed from Table 3.1.1 in fruit WMAP  All coveres of graded from table for diplosed from the diplosed from Table 3.1.1 in fruit WMAP  Inservant September 1. The seasons diplosed from the diplosed from Table 3.1.1 in fruit WMAP  Severan Tirect  -Approx WYW locations digitated from figure 2.1	Coverment (products) points on Interest throis Interest Intere		Completed	on esri online
; water industry assets		helevert published WRMP data  Que Virent May shapefue, attributes searched for lay- words - www.opentreetrap.org (dataset is suplimentary	Points of interest" is the most comprehense, location based directory of all public and privately-cowned businesses, education and felicium services in interest.  All sources in Sources supply are all Fooder Water Resource Zone digitised from Table 3.1.1 in four WAMP  All sources supply are all Fooder Water Resource Zone digitised from Table 3.1.1 in four WAMP  All sources supply restricted.  Seeina Transf.  Seeina Transf.  Seeina Transf.  Seeina Transf.  Seeina Transf.  12 Central Lincoleshire  12 Central Lincoleshire  13 Central Lincoleshire  Tentral Water Seeina Seei	elementario prinche i potenti di commentario di com		Completed Completed Completed	on est ordine na on est ordine
ng water industry assets		Release published WRMF data  Commission of the second of t	Points of instruct* in the most comprehense, location based directory of all public and privately-counted businesses, education and feltour sentence. It has been most comprehense, location based directory of all public and privately-counted businesses, education and feltour sentence is the first.  All inservants against from table on page 17 of final WAMP  All inservants in fourthern supply area of Golder Water Resource Zinne diplosed from Table 1.1.1 in final WAMP  All contracts of the first o	elementary framewhich points ad- mount than the control of the control of the control thank and the control t		Completed Completed Completed Completed Completed	on est ordine  na  on est ordine  on est ordine
Existing water industry assets		helevert published WRMP data  Que Virent May shapefue, attributes searched for lay- words - www.opentreetrap.org (dataset is suplimentary	Angian Water  Angian Water Trans  To Understinding is a major of the world, created by the public. It is the to use under an open ficure.  Angian Water  Ang	elementary framewhich points ad- mount than the control of the control of the control thank and the control t		Completed Completed Completed Completed Completed	on est ordine  na  on est ordine  on est ordine
Existing water industry assets		Relevant published WRMP duta  Open Street Majo shagefiles, attributes searched for lay words, was opentivertenap oig (dutant in supplementary and for General Relevance).	Points of instruct* in the most comprehense, location based directory of all public and privately-counned businesses, education and lettour sender in the limit.  Points of instruct* in the most comprehense, location based directory of all public and privately-counned businesses, education and lettour sender in the limit.  All concerns digital from table on page 17 of final WRMP  All concerns digital from table on page 17 of final WRMP  All concerns digital from table on page 17 of final WRMP  All concerns digital from table on page 17 of final WRMP  Included URINEs  Included UR	Community of the Commun		Completed  Completed  Completed  Completed  Completed	on est ordine  as an est ordine  on est ordine  on est ordine
Existing water industry assets		Relevant published WRMP data  Count Oriest May shapedies, an inhoras searched for key words: views operativeness, original for the supplementary and not comprehensived.  WED Like Watercolles, data available from EA Geodore (now data goo)	Points of instruct* in the most comprehense, location based directory of all public and privately-counned businesses, education and lettour senses in the limit.  Provided of instruct* in the most comprehense, location based directory of all public and privately-counned businesses, education and lettour senses in the limit.  All instructions in fourthern supply area of finder where heavening zone digitated from Table 1.1 in find WMAND  All concerns in fourthern supply area of finder where heavening zone digitated from Table 1.1 in find WMAND  Instruction of the sense of t	Seam-main franchic (point ad- main throat		Completed  Completed  Completed  Completed  Completed  Completed	on est ordine  na  on est ordine  on est ordine  on est ordine  on est ordine
Existing water industry assets	reservoirs autiside of YW control	Relevant published WRMP data  Ower Street Map shapefiles, attributes careched for lary and for congreteration and of congreteration	Angular Votes:  Angular Votes: Angul	Community of the Commun		Completed  Completed  Completed  Completed  Completed  Completed  Completed  Completed	on est ordine
Existing water industry assets	reservoirs outside of vivi control	Goes Sovert Map shapeflers, attributes searched for key and not comperficacions! [Excluser it is supplementary and not comperficacions and not comperficacions. In competitor and not competitate and not compet	Anglian Water  Anglia	Community of the Commun	boder ged VATI	Completed  Completed	on est ordine
Existing water industry assets	reservoirs autiside of YW control	Goes droved Majo shapefales, attributes searched for key and on Comprehensivel (Major Standards Searched For key and on Comprehensivel) (Major Standards Searched For key and on Comprehensivel) (Major Standards Searched For Searched Searc	Parties of instructs* in the most comprehensive, location based directory of all public and privately-cowned basinesses, education and balloure Notices and Section States 17 of the most comprehensive, broad to be added to the comprehensive state of the comprehensi	Community from the control of con		Completed	on est ordine  on est ordine

Category	Broad data category	Data	Description	Web link	Quote	Collection status	Output status
	and and and	Sewer Treatment Works locations from EA discharge licence	Lescription Including DWF info	. THE SAME	coore	Completed	on esri online
ts		data	Thousang UTT 110	http://www.ofwat.gov.uk/regulat		Competed	OI EII OIIIE
	Details of any large scale private	Inset appointment data from Ofwat	Insets appts for Northumbrian, UU, Severn Trent and Anglian geocoded from spreadsheet taken from Ofwat website (data range: 1998-2016)	ed-companies/licences/ http://www.ofwat.gov.uk/publica		Completed	on esri online
Se	networks (supply and drainage)			tion/register-of-new- appointments-and-variations- granted-to-date/			
as		Collection of details on other large private networks, including drainage, e.g. National Rail	Railways from mastermap - (rail landtake data held in OS MasterMap)			Completed	na
>	Anaerobic Digestion deployment in the UK		There are now 316 operational AD plants in the UK, including 47 biomethane-to-grid plants, and a further 454 AD projects under	Extract of Report: http://www.nnfcc.co.uk/publicati			
يز		NNFCC Report - Anaerobic Digestion deployment in the UK	development. Understanding this deployment landscape is vital for investors, developers and policymakers allike.  NNFCC monitors AD activity and has published the third annual report on AD Deployment in the UK. The report provides a comprehensive	ons/ad-deployment-in-the-uk- extract/at_download/file	The report costs £595 + VAT = this includes the full April 2016 PDF report and accompanying	Quote collected	na
n			regional breakdown of sector development in Scotland, Wales, Northern Ireland and the 10 regions of England, providing detailed information on feedstock requirements, installed capacity and output type (combined heat & power or biomethane-to-grid) for every project.	Explanation about cost: http://www.nnfcc.co.uk/bioenerg	Excel spreadsheet.		
P			Operational anaerobic digestion plants in the UK (excluding those in the water industry that do not process food waste). Facilities are defined	y/ad-deployment-report			
· <u>=</u>		WRAP site survey data and ES data request on waste	as:  - Commercial AD AD sites that import feedstock, often set up 3rd party contracts.				
ē	WASTE - Non water company operational AD sites (i.e.		-industrial AD – AD sites that use their own water as feedstock. Many of these are effluent treatment sites and handle large evolunce of liquid.  Part of integrated water might AD – AD is named as one process amongst other treatment processes on a site. In some cases AD is treating organic water fractions (not source segregated material).	http://www.wrap.org.uk/content/		Completed	on esri online
<del>a</del>	commercial waste / biomass plants plants)		Demonstration AD – AD sites that process feedstock for demonstration or feasibility purposes.     On-farm AD - AD sites that process slurries, manures, crops or crop residues produced on-farm.	operational-ad-sites		. ,	
3			The output for there include:  - Heat and/or Power ( CHP) — where the biogas which is burned on-site to generate heat, power or both  - Siomethane to Cirid (BiC) — where the biogas is upgraded and biomethane is injected into the national gas grid				
Existing water industry assets	WASTE - Commercial energy from waste plants	WRAP site survey data and ES data request on waste management licences	Shows a full list of operational energy from waste (EIW) plants in the UK. Plants are categorised by technology type and waste type. Attributes include: Address, County council, Year of operation, Capacity (tonnes per annum), Output type, Output capacity (MWe - mega watt electricity)	http://www.wrap.org.uk/content/		Completed	on esri online
	waste paints	The state of the s	and Output capacity (MWth - mega watt thermal).	list-energy-waste-sites			
			All operations of regulated waste management facilities have to provide us with details of the quantities and types of waste they deal with it, as waste received into an advance sent on from de to to other facilities or processes. In this data is used to monitor compliance but has historically been used by the EC_DEFRA and local authorities to assist in planning for new waste facilities and for monitoring against statutory targets. We have provided this data in an interrographic formust since 2006. The distasts is calabrilly arey and holds the data from a round 2000 regulated				
Ω .	WASTE -	EA Waste Data Interrogator	have provided this data in an interregatable format since 2005. The dataset is calendar year and holds the data from around 6,000 regulated sites. Operator waster returns are public register information unless a claim for commercial confidentiality has been accepted. In these case th data is provided but the site details are not. This is so that the data can be included in aggregated figures but cannot be attributed to a	https://data.gov.uk/dataset/wast e-data-interrogator-2014		Completed	on esri online
	<ul> <li>Solid organic wastes which could be suitable for treatment in sewage sludge AD (food waste to be</li> </ul>		particular site. Data supplied does not include details of waste producers. INFORMATION WARNING Details of operators who have claimed commercial confidentiality are not provided. Attribution statement: 80 Environment. Agency copyright and/or database right 2016. All rights reserved.				
	counted for separately given possible ABPR regulatory issues)		A waste management licence is a legal document issued under the Environmental Protection Act 1990. A licence authorises the treatment				
		Environmental Permitting Regulations - Waste Sites	isosping or disposal of waste in or on the land. Once we have issued a licence neither the activities nor the area of land may be changed unless the licence is modified. The Environmental Permitting Regulations regulating waste sites came into force on 6 April 2008. The new regime combines a number of earlier permitting / licensing regimes. Other related datasets available are: - Pollution Prevention and Control (PPC) -	https://data.gov.uk/dataset/envir onmental-permitting-regulations- waste-sites		Completed	na
			Authorised Treatment Facilities (End of Life Vehicles) - Water Quality and Pollution Control (Discharge Consents) - Waste Electrical Electronic Equipment (WEEE)ERV water is the table for granted permits. EPR Waste Applications holds details of applications that did not or have not yet resulted in a permit or permit variation.	***************************************			
	WASTE - Tankered liquid wastes						
	which are not treated by YW		Following a request from Kelda Group this information is not collected	NA		ne Loved from scope	na
	WASTE - Sludge treatment assets just outside of YW area	Data to be gathered through consultation with YW staff, interrogation of waste licence data and regional WASC sources (PRD9 and PR14 business plans; historic June Return	Following a request from Kelda Group sludge treatment assets just outside of YW area	NA	NA.	Removed from scope	na
		data).	and covers all substances that are controlled. These data are a taken from the Environment Agency's Public Register and contains three tiers of				
		EA discharge data request	data for all active permits. Ther 1 – Site and General Information on the consent holder that has a consent to discharge into controlled waters. Consent holder and the discharge address and type.nb The date of permit issue, effective and revocation. Information where the effluent enters the environment (such as sewage disposal works) for each holder that has been granted a permit. Data is also held on the effluent type	https://data.gov.uk/dataset/cons ented-discharges-to-controlled-		Completed	on esri online
a	Owners of major discharge licences and identification of dominant industries with effluent discharges	EA doctorage data request	e.g. Swayae effluent, Overflow. The location of the grid reference is supplied for the effluent and the outlet location in OS Nation Grid Reference format. The 2 – Effluent Further detail is provided on the amount that can be discharged and in which time period in months. This is stored as Dny Weather Flow, Maximum Daily, Mean, Maximum Rate. Further data about the permit type and treatment type from lookup lists	ented-discharges-to-controlled- waters-with-conditions		Completed	on esti onine
2	industries with effluent discharges into the water environment (Eg agriculture)		are provided. Tier 3 – Determinand Limits: Determinands are the substances and numerical limits that make up the effluent. This could include				
<u>=</u>		YW Trade Effluent Consent data	Daniel Rowe (YW Trade Effluent and Network Protection Team) agreed to provide the following data: a spreadsheet that contains: location (preferably XXY or NOK Sor is can easily be put into GIS - else address will suffice), volume, qualify detail; if possible (not critical) and charge. Despite several chase emails the data was not received and the issue has been infalt with lond harding to follow up internally.			Requested	na
asi		YWS PR14 water quality monitoring	pospine several classe remains the data was not included and the south his been not with a point starting to lockow up minimary.  Following second progress meeting it was agreed with Kelda this data would not be included - decision may be revisted later depending on scope of abstraction trading project extension.			Removed from scope	na
2	Other discharges Pollution incidents (non YW)	Canal and Rivers Trust - Outfall/Discharge Points (data.gov)  Pollution incidents dataset from EA		https://data.gov.uk/dataset/outfa II-discharge-points us-pollution-incident-sources-		Completed	on esri online
ਰ	Pollution incidents (non YW)	Pollution incidents dataset from EA	Category 1 and 2 pollution incidents by source to air, land and water.	2010		Completed	on esn omine
ıt			Under the Town and Country Planning (General Development Procedure) Order 1995 Local Planning Authorities have to consult with the Environment Agency about all applications they receive to develop hand within 250 matrics of landfill sites (including any land that has been used as a landfill site within the past 30 years or is likely to be used as one in the mera fruincy. The Hostoric Landfill dataset was created to help the past of the second of the second second process of the second process of th				
<u>e</u>			used as a landfill site within the part 30 years or is likely to be used as one in the near future). The Historic Landfill dataset was created to heir fulfill our statutory responsibility to Local Planning Authorities by supplying information on the risks posed by landfill sixes for development within 250m. The data is the most comprehensive and consistent rational historic landfill dataset and defines the location of, and provides				
ב	Pollution risks	Historic landfill	specific attributes for, known historic (closed) landfill sites, i.e. sites where there is no PPC permit or waste management licence currently in force. This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where this licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued. Historic Landfill includes all relevant historic	https://data.gov.uk/dataset/histo ric-landfill1		Completed	on esri online
ō			information for the sites that both local authorities and the Environment Agency have collected over the years. The data is available in ESRI shape file format, with the boundaries digitised from a base scale of ±1:0,000 and an associated attribute table comprising 34 fields. The polygons and attributes describe where the sites were becated, when they were used, who used them and what was deposited. This means				
÷			here are name and address fields, licensee and operator information, license issue and surrender dates, first and lack injust dates, and waste types, together with some intorical comments. Attribution statement: © Environment Agency copyright and/or database right 2015. All rights reserved. Contain information © Local Authorities.				
Environmental baselin			reserved. Lontaxis information to Local Authorities	https://data.gov.uk/dataset/auth orised-landfills			
ш		Authorised Landfill Sites	Landfill sites originally form the Environment Agency. Captured at 1:10k scale. Used as a planning constraint The European Mining Waste Directive (2006/21/EC) (requires Member States to create an inventory of closed or abandoned mine waste	http://environment.data.gov.uk/d s/catalogue/ll/catalogue		Completed	on esri online
		Closed Mining Waste Facilities	The European Mining Waste Directive (2006/21/EC) requires Member States to create an inventory of closed or abandoned mine waste facilities causing serious environmental impacts, and to make this inventory available to the public. A waste facility means any area designated for the accumulation or depost of extractive waste.	https://data.gov.uk/dataset/inventory.of-closed-mining-waste- facilities?		Completed	on esri online
		Sensitive Areas - Eutrophic coastal areas Sensitive Areas - Eutrophic lakes	Collected and saved on FTP for completeness - not relevant for web mapping.			Completed	na on esri online
	WFD Sensetive Areas					Completed	
	(bothing waters excluded as listed under hydrological baseline)	Sensitive Areas - Eutrophic Rivers	This dataset consists of 3 shapefiles showing the extent of Urban Wastewater Treatment Directive (91/271/EEC) (UWWTD) sensitive areas	https://dots.com.uk/datacet/coori		Completed	
		Sensitive Areas - Eutrophic Rivers	[outrophic]. The UNWTO describes eutrophication as "the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorous, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned."	https://data.gov.uk/dataset/sensi tive-areas-eutrophic-rivers		Completed	on esri online
			isotropich, The UWWTD describes outrophications at the enrichment of water by nutrients, especially compounds of nitropic anadigr inposphorous, causing an accelerated growth of alga and higher timer of plant list to produce an undersized size of textiments to the balance of organisms present in the water and to the quality of the water concerned: one of the production of the production of the production of the production of the UK, the Directives implemented through the UKma'd Material Frakment Regulations 1959. Useful when Begulations up the Ukma'd balance along unrapping			Completed	on esri online
	Diffuse pollution pressures and	Sensitive Areas - Eutrophic Rivers  Sensitive Areas - Eutrophic Rivers  Sensitive Areas - Nitrate rivers	jourspiels, The LWWTD doctions entrophications. It the enrichment of water by nutrients, specially composed in fringes and for importance, causing encourage of part of part importance and the problem or an understand entransies to the abstance of the problem or an understand entransies. The abstance of the problem or an understand entransies of the abstance of the problem of the problem or an understand entransies. The abstance of the problem of the pr			Completed	na
	Diffuse pollution pressures and areas of diffuse pollution	Sensitive Areas - Nitrate rivers	jourspiels, The LWWTD doctions endiphications. It the enrichment of water by nutrients, specially composed in fringes and logical productions, care just accurate and great the first and implies them of plant in the product an environment of the states of the production and environment of the states or in the production of the production of the states or in the production of the production of the states or in the states or in the production of the states or in the states or in the production of the states or in the states of the states or in the states of the states or in the states of the states o	tive-areas-eutrophic-rivers		Completed  Completed  Completed	on esri online na na
		Seniothre Areas - Notratis rivers RBAMPs	jourspiels, The LWWTD doctions entrophications. It the enrichment of water by nutrients, specially composed in fringes and for importance, causing encourage of part of part importance and the problem or an understand entransies to the abstance of the problem or an understand entransies. The abstance of the problem or an understand entransies of the abstance of the problem of the problem or an understand entransies. The abstance of the problem of the pr	tive-areas-eutrophic-rivers		Completed	na
		Sensitive Areas - Nitrate rivers	jourspiels, The LWWTD doctates engine projections in the enrichment of water by nations, specially composed in Trigger and (or projections, custing in Contrasted growth of large and inhighter from of plant files produce) an understanded estimations to the behaviors of the badance of high projections, and contrasted growth of large and the projection and understand estimations. The badance of the subsequent of the subsequen	tive-areas-eutrophic-rivers		Completed Completed Completed	na na on esri online
	areas of diffuse pollution	Seniothre Areas - Notratis rivers RBAMPs	jourspells. The LWWTD describes endephications. The enrichment of water by nations, specially composed of infrage and/or proposition, carries of the product an underlined and infrage and of the product an underlined and includes to the behavior of the product an underlined and includes to the behavior of the product an underlined and includes the second of the product and underlined and the second of the product and underlined and the product and underlined and the product and underlined and the product and the product and underlined and the product and underlined and underlined and the product and underlined and the product and the product and underlined and the product and underlined and the product and underlined and the product and the pro	tive-areas-eutrophic-rivers		Completed Completed	na na
		Seniothre Areas - Notratis rivers RBAMPs	jourspels.) The UNWITE describes environisheations. This enrichment of water by warriers, separating compared for integers and/or expension presents in the superior and water by the purpose and understands distributions to the balance or described the product of the product of the purpose of the product of the purpose of the purpose of the product of the purpose o	tive-areas-eutrophic-rivers		Completed Completed Completed	na na on esri online
	areas of diffuse pollution	Sendina Area: Norther frees MANPs  Countryide Stewardship Scheme data (ESS and MSS)  Countryide Stewardship Scheme data (ESS and MSS)  Conservation and enhancement scheme agreements	jourspels, The LWWTD doctime emphysication at The enrichment of water by nationate, popularly composed of implaye and gift emphysions, causing in extracted angle with an gift and in liquid the size price an available extraction described in the business of the business of the size	Table amends extraophic cheers  Intelligible of the control of the		Completed Completed Completed Completed Completed	na na on esti ordine on esti ordine
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	areas of diffuse pollution  Land management  Camate change	Controlled Annual Mitorial filters  18867-  Controlled Stewardship Scheme data (ESS and HSS)  Contempode Stewardship Scheme data (ESS and HSS)  Contempode Stewardship Scheme data (ESS and HSS)  Contempode of Mitorial Mitorial Scheme Agriculture  Contempode of Mitorial Mitorial Scheme Agriculture  Contempode of Mitorial Mitorial Scheme Agriculture  Contempode of Mitorial	journeyable. The LWWITD describes enveloprisations at the envelopment of water by wateries, specially companied, and inclination of the second control of the product of wateries and control of the second control of the product of the second control of the second control of the product of the second control	The action entirely in control of the control of th	(see tab 3 for sample data).  - LCM 2007 25m raster, in study area (YW area with 25m buffer minus sea), unlimited commercial users, £2,915	Completed	na na contraine on eart ordine
	areas of diffuse pollution  Land management  Camate change	Constitute News. Nitrotal flows  188474.  Countrycide Snewardship Scheme data (ESS and NSS)  Conservation and enhancement scheme agreements  Land management institutes  Enationmental Snewardship Scheme Options  Child Indian Rose data for droughts  CHI future Ro	journeyable. The LWWITD describes enveloprisations at the envelopment of water by wateries, specially companied, and inclination of the second control of the product of wateries and control of the second control of the product of the second control of the second control of the product of the second control	The action entirely in control of the control of th	(see tab 3 for sample data).  - LCM 2007 25m raster, in study area (YW area with 25m buffer minus sea), unlimited commercial users, £2,915 - 27,055 km 21 instelly area (WM area with 25m buffer minus sea), Land Cover Map 2007 Vector, unlimited commercial sea.	Completed	na na contraine on eart ordine
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Category	Broad data category	Data	Description	Web link	Quote	Collection status	Output status
					4		,
line		Integrated Hydrological Units of the United Kingdom (Carchments) from EA Glocatore (data gov)	This dataset is part of Integrated Hydrodogical Units (IHA) of the UK, a set of prographical inference units for hydrodogical purposes including final from assurement and hydrometric data collection. This dataset was derived from the Integrated Hydrodogical Form Model. A Confidentier represent the Unit was superame from sections codes, which is no unique produced and confidence of the outletter of the outletter universe with brown names. While Sections do not covering, Confirments can evering because one Catchinent Confidence Confidence for all september sections. This your currently covered from that most play and deserve where the generatives and manse with suchdard destructions visible. If Northern Visibal.	https://data.gov.uk/dataset/integ rated hydrological-units-of-the- united-kinedo-cachments		Completed	on esri online
Se		Blue flag beach locations	Blue flag beaches	http://www.blueflag.global/		Completed	on esri online
a		Bathing Waters	Water quality at designated bathing water sites in England is assessed by the Environment Agency. From May to September, weekly assessments measure current water quality, and at a number of sites daily pollution risk forecasts are issued. Annual ratings classify each site as	https://environment.data.gov.uk/ bwq/profiles/		Completed	on esri online
		Areas Affecting Bathing Waters (aka BW 201)	excellent, good, sufficient or poor based on measurements taken over a period of up to four years.  This dataset is appropriate for technical assessment of waters where bathing potential is taken into account by the Environment Agency.	https://data.gov.uk/dataset/areas affecting-bathing-waters		Completed	on esri online
Environmental baseline	Hydological baseline mapping	Statutory main rivers (104)	The standary ratio feet reg is 1 10,000 rate apart (project) plant at the define standary autonoment design dut by the froironment depends are son from The data is the England for y. Make men' are smally legal retirement on from the come of the sen a roal sentences of application. The youther certain standards from the contract or register the flow of when it, not one of the chance (W has beginned power, but not aduly, to carry or maintenance, improvement or constructions who in adequated main from: We have power to regulate the activities of them string invers and their foliage is used for the investment Permitting Regulation. However, the Water Resources for activities of them string invers and their foliage is used for the investment of Permitting Regulation. How Water Resources are activities of them string invers and their foliage is used for the investment of Permitting Regulation (I and Confidence) and and confidence of the string inversal that the substring in the string investment of the standard foliage is an extra the string in the	https://data.gov.uk/dataset/statu. tory-main-river-map1		Completed	on esri online
Vi.		OS Terrain® 50	copyright and/or database right 2016. All rights reserved. © Crown copyright and database rights 2014 Ordnance Survey 100024198 It is supplied both as a set of 50m gridded digital terrain model (OS Terrain 50 grid) and 10m contours and spot heights (OS Terrain 50 contours).	https://www.ordnancesurvey.co.u k/business-and- government/products/terrain- 50.html		Completed	on esri online
Ë		OS High Water Polyline	Part of CS boundary line product	https://www.ordnancesurvey.co.u k/business-and- government/products/boundary- line.html		Completed	on esri online
		OS Open Rivers	betaversion	k/business-and- government/products/os-open- rivers.html		Completed	on esri online
		EA detailed river network	Not yet available as open data - availibility pending	https://data.gov.uk/dataset/detail ed-river-network-afa036		Not feasible	na
Blue green infrastructure	Examples in the Yorkshire region (e.g. SUDS, greywater recycling, community water schemes)	Desk study including consultation with and examination of publications from Local Councils. Regional guidance	Information contained in Local Plans collected from Local Authorities and saved on FTP. Details of eight case study collected from CIRIA and			Completed	na
	Economic and resources pressures (e.g. housing schemes or plans for	documents may also be informative.  Local plans and regional development plans	available on FTP - See LA data request tab for details.  Developer requests collected from YW. Local Plans collected from councils - mostly pdfs see LA data request tab for details.			Completed	on esri online
latio	new large industry/infrastructure)						
Development, poulation growth and demand	Demand forecasts	Assessment of relevant WRMIP data from YW and adjacent water companies	Forecast Supply/Demand balance for 2040 as percentage of current DO by WRZ (it is noted that page 6 of the Anglian WRMP has a more detailed breakdown for the Anglian region)			Completed	on esri online
opm wth 8	National Infrastructure Planning Projects	In the Yorkshire and Humber region details of National Infrastructure Planning Projects	NIP projects for Yorkshire & Humber, North East and North West geocoded.	http://infrastructure.planninginsp ectorate.gov.uk/projects/yorkshir e-and-the-humber	-	Completed	on esri online
grov	Administritive areas	OS Open Boundary-Line British Hydropower Association - Hydro Electricity plants (eg	This data is used to display data from the EA waste data interegattor	http://www.british-		Completed	on esri online
Δ	Hydro Electricity	location/attributes of: Fairfield Mill, Gayle Mill, Thurgoland Mill, Garnett Hydro, Loxley WTW and Yore Mill)	All Yorkshine data downloaded	hydro.org/downloads/UK Installa tions/BHA6202011.pdf		Completed	on esri online
		EA Geostore:  Flood Alert and Warning Areas	The Expendent has find the description process for many years at least of flooding from does not the least for many years and find a description of the least for many process and an inflood on the description of the least find the	http://maps.anvironment- agency.gov.uk/wiyby/wiybyContro liber?topic-defa- ultra.langp&ep-map&cyale-S&v =331500&y=181500x>-331500&y =181500&lg-1_2,&scale-5		Completed	on esri online
			Flood Alert Area: Home or busines in these Areas can be provided with Flood alerts, these are issued when flooding is possible. Flood alerts cover larger Areas than Flood warnings and are issued more frequently. Flood alerts aflow those in these Areas to be prepared for flooding and to take action.	http://maps.environment. agency.gov.uk/wiboy/wiybyContro lier?topic-dwa&layeefroups-defa ulit⟨= o&ep-map&ccale=5&v =531500&y=181500#v=531500&y =1815008lg=1.2.&scale=5		Completed	on esri online
			Areas Benefitting from Defences - This dataset shows those areas that benefit from the presence of defences in a 1 in 100 [154] chance of flooding each year from rivers; or 1 in 200 (0.5 %) chance of flooding each year from the sea. If the defences were not there, these areas would flood in a 1 in 100 [154]? In 1200 (0.5 %) or larger flooding incident, floot that we do not show all areas that benefit from all flood defences.	https://data.gov.uk/dataset/flood- map-for-planning-rivers-and-sea- areas-benefiting-from-defences		Completed	on esri online
			Rood Defences - product AfA006. This dataset shows, flood defences protecting against river floods with a 1 per cent (1 in 100) chance of happening each year, or sea floods with a 0.5 per cent (1 in 200) chance of happening each year, together with some, but not all, defences	https://data.gov.uk/dataset/spati al-flood-defences-including-		Completed	on esri online
			which protect against smaller floods. Flood defences that are not yet shown, and the areas that benefit from them, will be gradually added.  Rood Storage Areas - Rood Storage Areas shows those areas that a cat a balanting exernoir, storage basin or balanting point. Their purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also diskly the timing of a 1-  storage that the storage of the st	standardised-attributes https://data.gov.uk/dataset/flood- storage-areas-part-of-flood-map-		Completed	on esri online
	Prooding		peak so that its volume is discharged over a longer time interval.  Flood Zones 2 - This is the Environment Agencies best estimate of the areas of land at risk of flooding, when the presence of flood defences are	afa031 https://data.gov.uk/dataset/flood-			
			ignored and covers fand between Zone 3 and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year. This dataset also includes those areas defined in Flood Zone 3.  Rood Zone 3 - This is the Environment Agencies best estimate of the areas of land at risk of flooding, when the presence of flood defences are	map for planning-rivers and sea- flood-zone-2 https://data.gov.uk/dataset/flood-		Completed	on esri online
		The Flood Map  Association and the Conference of Environment Agency, copyright  Association (ed. 2015; 54 of gift), service of Crossic  copyright and disclasses right 2004 Ordeance Survey  100024198	ignored and covers land with a 1 in 100 (1%) or greater chance of flooding each year from Rivers; or with a 1 in 200 (0.5%) or greater chance of flooding each year from the Sea.  Risk of Flooding from Surface Water Extent: 0.1 percent annual chance - GIS layer showing the extent of flooding from surface water that	map-for-planning-rivers-and-sea- flood-zone-3		Completed	on esri online
			could result from a Bood with a G1.5K chance of happening in any given year.  The 3 risk of Booding distasts available from the EA have only been made available as a WMS (A Web Mag Service - a standard protocol for serving government on the painings cover the intent from an EA may prevent). This immost the data ca be viewed but not edited within is sufficient for this project. The EA have informed Attions that YW may be able to obtain the actual data via a direct data request as it is available to C4 A partners."	https://data.gov.uk/dataset/risk- of-flooding-from-surface-water- extent-0-1-percent-annual-chance		Completed	on esri online
			Nikk of Hooding from Surface Water Extent: 9 percent annual chance - GS layer showing the extent of flooding from surface water that could result from a flood with a SS chance of happening in any given year.	https://data.gov.uk/dataset/risk- of-flooding-from-surface-water- extent-1-percent-annual-chance		Completed	on esri online
Flooding			Bids of Flooding from Surface Water Extent: 3.3 percent aerousd chance - GGS layer showing the extent of flooding from surface water that could result from a flood with a 3.3% chance of happening in any given year.	https://data.gov.uk/dataust/risk. zd Excelling from surface waiter extent: 3-3-percent annual chance		Completed	on esri online
Floo		Historic Flood Map	As Super Counting the maximum center of all individual forceded FeVI On Clitics from in ser. In sea and approximate group and others again and fast have previously been subject to forced in fingular, factors began to 166 when profescors does to the financement again; carried collecting detailed information about fooding incident, although we may hold limited details about fooding incidents give though we may hold limited details about fooding incidents give to 166. This collection of their fooding incidents give to 166 miles and set in the collection of their fooding incidents give to 166 miles and set in the collection of their fooding incidents and set in the collection of their food on their fooding incidents and set in the collection of their fooding incidents and set in the collection of their fooding incidents and set in the collection of their fooding incidents and their fooding	https://data.gov.uk/dataset/histo ric-flood-map1		Completed	on esri online
		Areas to Benefit from New and Reconditioned Flood Schemes under the Medium Term Plan (14/15-19/20)	This data displays areas that would benefit from the presence of a new, or improvement of a current flood defence scheme as planned within the Medium Term Plan (i.e. covering the next 5 years; effectively a new dataset will be available annually). It does not directly indicate the likelihood of flooding to individual properties.	http://environment.data.gov.uk/d s/catalogue/index.jsp#/catalogue		Completed	na
	38 (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	Areas Susceptible to Groundwater Flooding	BIGS has produced the first national hazard distance for groundwater flooding. Based on geological and hydrogeological information, the signal distance he used to identify areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface.	http://www.bgs.ac.uk/products/h ydrogoclogy/ground-waterFloodin g.html https://data.gov.uk/dataset/grou ndwater-flooding-susceptibility	30p per km2. Subject to number of users, licence fee and data preparation fee. Study area with buffer (1 seat license for 1 year - 13472-44) and just study area (1 seat license for 1 year - 12808.55). There are a number of other options when it comes to licenses and number of very the data is available for, but have provided the two chaepest options.	Quote collected	na
		Local Councils (County Councils/Unitary/Borough/District): Records of historic floodine Section 19 investigations (of significant flood events)	See LA data request tab See LA data request tab			Completed Completed	on esri online
		Strategic Flood Risk Assessments Surface Water Management Plans Section 21 flood asset register (assets which have a significant	See LA data request tab See LA data request tab			Completed Completed	na na
		effect on flood risk) Coastal data:	See LA data request tab			Completed	na .
		Coastal Observatories - iCOASST mapping and national coastal defences	Coastal Defence inspection reports from the North East Coastal Observatory. ICOAST data only available in mapped format on their website - tables downloaded and added to ftp.	http://www.necoastalobservatory .co.uk/neco_gis/NECO_gis.aspx	anline mapping anly	Completed	na
		Potential coastal flood management schome details	See A Add a request tell.  Never that County (Group MICCI) has jurisdiction over the length of coastline from St Adds head in the north to Gibralar Point to the seath, a distinct of departmentally \$50 time.  An Address of Augmentation of the State of the County of the County of the Coastline.  Anomarie Management of the State is not a plan for a 150 per parisd indicating free our coastline should be managed, taking into account the water implication on the registerous provided the environment.		A STATE OF S	Completed	09
		Shoreline Management Plans	It provides a large-scale assessment of the risks accordate with costal processes and presents a policy famework to reduce these risks to people and the developed, historic and nutrial environment in a sustainable manner into the 2Dd century. The three existing SMPs cover an water of costifine executing from the Type to Transformagh Head, a feature of approximately 100scs.	https://northeastcoastalgroup.wo rdpress.com/links/north-east- smp2/ http://www.northeastsmp2.org.u	And the state of t	Completed	na
		Bequests to Lead Local Food Authorities	Seri A dispressed tab.	k/linalomp2.html	The distribution of the state o	Constant	
		Highways England: Locations of flooding on their assets (HADDMS Flood Event Register)	Joke LA daz request tab  The data contain the Highways England Area that the flood occurred, the road, the location (coordinates) and when it was reported.  Farh Internal Trainage Result is a local multic authority established in sees of coordinates are not in Finshort and Woles. They have			Completed	on esri online
	Internal drainage boards	Areas, assets and summary of operational activities collected from individual IDBs - www.ada.org.uk/idb members yorkshire.html	Each internal Orainage Board is a local public authority established in areas of special drainage need in England and Wales. They have permissive powers to manage water levels within their respective drainage districts. IDBs undertake works to reduce flood risk to people and property and manage water levels to meet local needs.	http://www.ada.org.uk/idb_mem bers_yorkshire.html		Completed	on esri online

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