Yorkshire Water

Cudworth Wastewater Treatment Works

Flood Risk Assessment

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Prepared for:
Yorkshire Water

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1. INTRODUCTION

The Morgan Sindall Grontmij JV was commissioned by Yorkshire Water to promote a number of improvements to their existing wastewater treatment works at Cudworth, near Barnsely. The treatment works is located adjacent to Cudworth Dyke, which is a tributary of the River Dearne; the confluence is just downstream of the treatment works.

The location of the treatment works is shown in Figure 1.



Figure 1: Site Location

The driver for the scheme is quality and the treatment works is required to meet a new effluent discharge consent, which is to take effect from December 2012. The existing assets are of insufficient capacity to meet the new limits of 3mg/l and 10 mg/l for ammonia and BOD respectively

The existing filter beds are to be demolished and the principal elements of the proposed work comprise: -

- Inlet works
- Primary settlement tank
- 4 lane activated sludge plant
- 2 final settlement tanks
- Tertiary sand filters
- 2 surplus activated sludge tanks
- Sludge thickening facilities within a new building
- Thickened surplus activated sludge storage tank

In addition to the above principal items, there are connecting pipelines, manholes, chambers and control equipment.

Details of the existing and proposed works are included in Appendix A.

The flood risk assessment was essentially a desk study, which was undertaken in accordance with the guidance contained in PPS25 (March 2010). We utilised information provided by Yorkshire Water, including photographs, existing and proposed general arrangements and spot levels across the site; the information is included in Appendix A. No detailed survey or hydraulic modelling of the watercourses in the vicinity of the treatment works was undertaken.

2. REQUIREMENTS FOR A FLOOD RISK ASSESSMENT

2.1 PPS25: Development and Flood Risk

To strengthen and clarify the key role of the planning system in managing flood risk and contributing to adopting the impacts of climate change, PPS25 was published in 2006 and revised in March 2010.

PPS25 sets out policies for planning authorities to: -

- Ensure flood risk is properly taken into account at all stages of the planning process;
- Prevent inappropriate development in areas at high risk of flooding;
- Direct development away from areas at highest risk, and;
- Ensure that new developments take climate change into account and do not increase flood risk elsewhere.

PPS25 sets out the guidelines for undertaking flood risk assessments and the Environment Agency aims to ensure that all future developments are assessed with these guidelines in mind.

2.2 The Sequential Test

PPS25 provides guidance on the assessment of flood risk and how it may be addressed or mitigated. The guidance advises, inter alia, planning authorities in their planning decisions to use a risk based search sequence to avoid flood risk wherever possible and managing flood risk elsewhere.

The risk based approach operates through a sequential test with planning authorities giving priority to sites in low risk zones before those at higher risk.

The flood zones refer to the probability of river and coastal flooding, ignoring the presence of defences. Table D.1 in Annex D of PPS25 defines the flood risk zones as: -

Zone 1: Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year (<0.1%). All uses of land are appropriate in this zone.

Zone 2: Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year. Water–compatible, less vulnerable and more vulnerable uses of land and essential infrastructure are appropriate in this zone.

Zone 3a: High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. Water–compatible and less vulnerable uses of land are appropriate in this zone.

Zone 3b The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the planning authority and the Environment Agency, including water

conveyance routes. Only the water-compatible uses and the essential infrastructure that has to be there should be permitted in this zone.

3. FLOOD RISKS – POTENTIAL SOURCES OF FLOODING

3.1 Flooding Mechanisms

Whilst there has been no reported flooding at the treatment works, the theoretical flooding mechanisms associated with the site are: -

- Fluvial
- Surface water
- Groundwater
- Sewers

The above risks are dealt with in the following sections.

3.2 Fluvial

With reference to the Environment Agency's website, the existing treatment works is in flood zone 1 with a low probability of flooding; the flood map is shown in Figure 2.

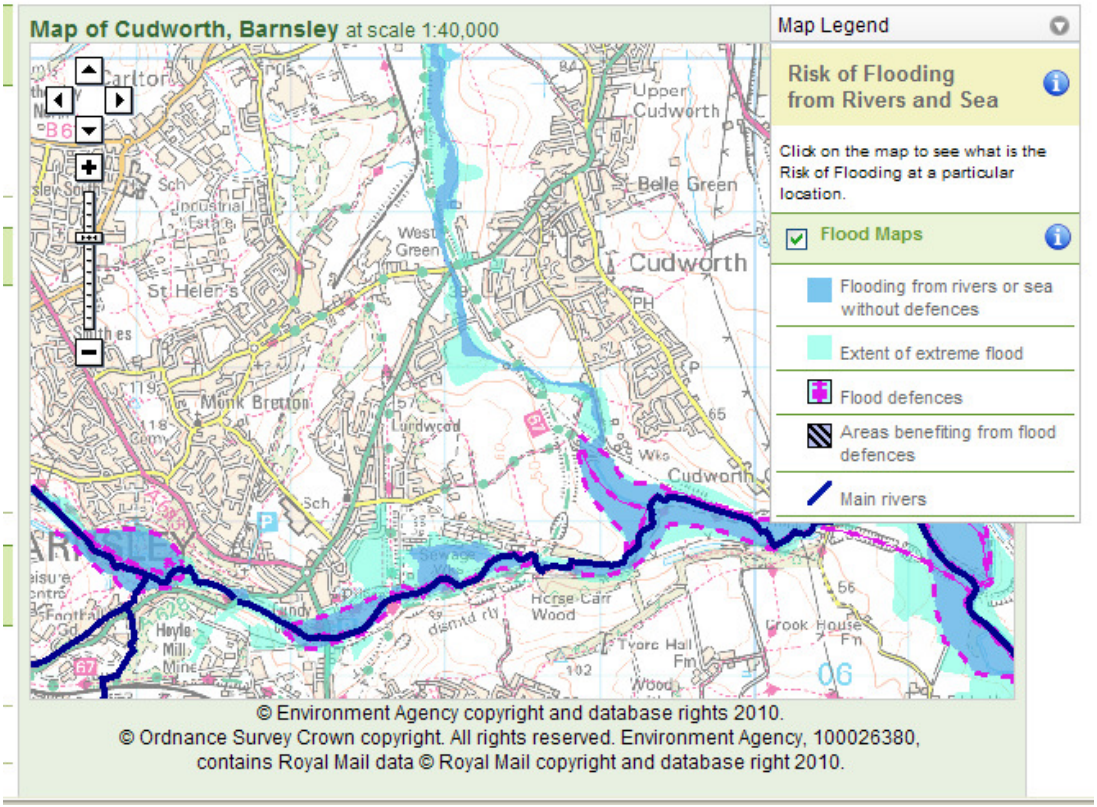


Figure 2: Indicative Floodplain Map (Environment Agency)

With reference to Table D2 in PPS25, the proposed development can be classified as "Less Vulnerable" and is acceptable in all flood zones with the exception of 3b (functional floodplain).

There is no history of flooding from the nearby watercourse and with reference to Figure 3, the site did not flood during June 2007. The dismantled railway embankment to the south/south west of the treatment works provides protection downstream of the treatment works. Upstream, the ground on the left bank rises more sharply and the flooding is confined to the right bank. This is evident from Figure 3 and a review of the Ordnance Survey maps.



Figure 3: Flooding in the vicinity of the Site (June 2007)

3.3 Surface Water

There is a risk of overland flow but the land falls towards the river and the depth of any flooding would be limited. There is a risk of surface water impounding behind the railway embankment but again this would flow to the river and would not threaten the treatment works.

3.4 Groundwater

The British Geological Society's website suggests that the site is at little risk of groundwater flooding.

3.5 Sewers

Foul sewage is conveyed to the works by a gravity sewer. The peak flow to the works is limited and surplus flows are discharged upstream of the treatment works. The transfer sewer to the works is sized to convey the peak flow and, hence, the risk of sewer flooding is small. There is a storm tank on site to contain surplus flows prior to discharge to the watercourse.

4. MITIGATION MEASURES

4.1 Risks to the Development

Given that the site is in flood zone 1, the fluvial flood risks are not significant. In any case the works can withstand some flooding without damage or adverse effects to its operation. Any flood sensitive equipment, such as the control kiosks, will be located on 300mm high plinths to protect them from surface flooding.

4.2 Risks from the Development

Surface water runoff from the proposed access road, hardstandings and paved areas will be conveyed to the inlet of the works and, following treatment, will be discharged through the existing consented outfall.

5. CONCLUSIONS AND RECOMMENDATIONS

It is proposed to undertake improvements to the existing wastewater treatment works at Cudworth. These are required to meet a more stringent discharge consent which comes into effect in December 2012. The proposed improvement works include a primary settlement tank, an activated sludge plant and tertiary filters.

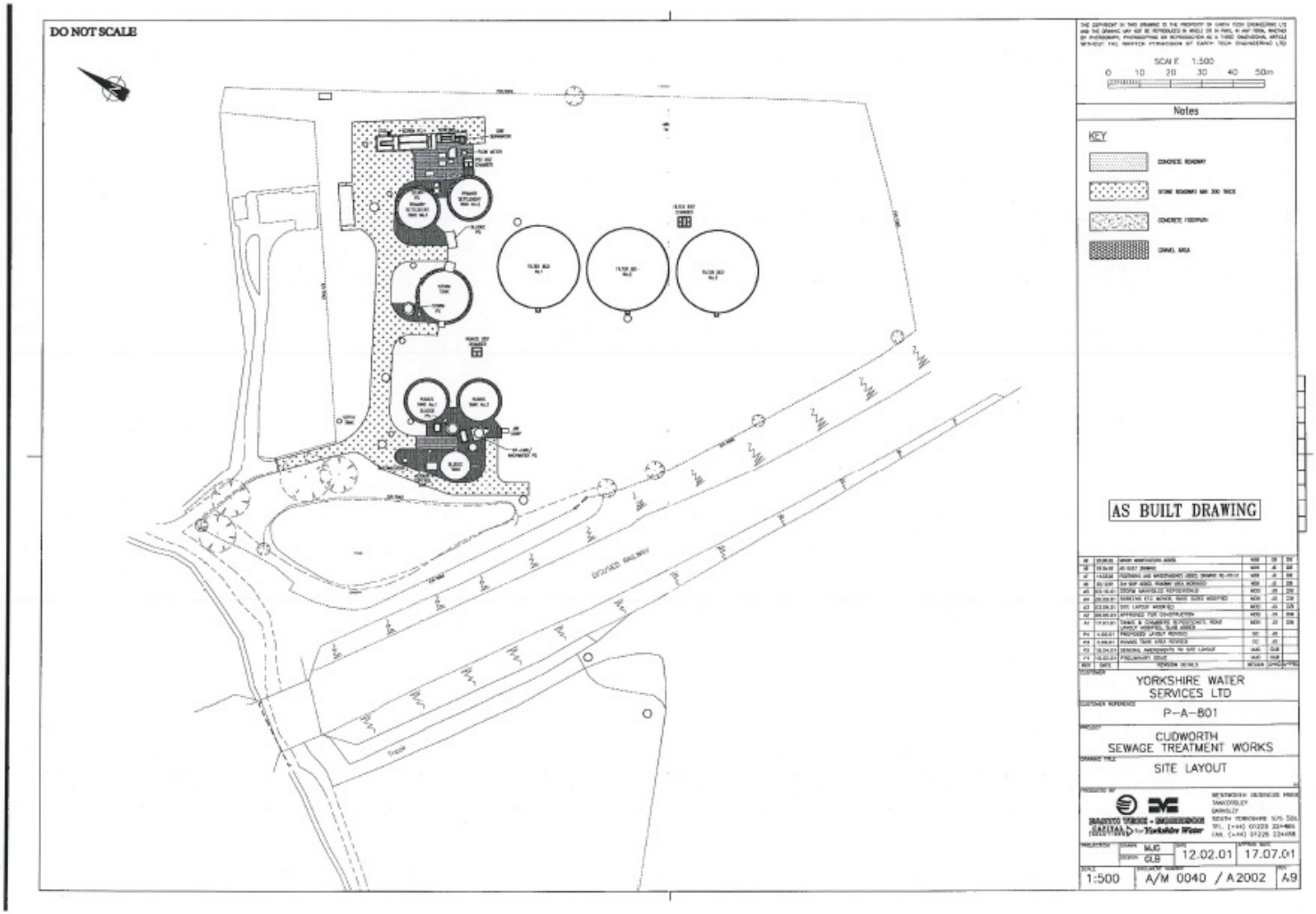
The assessment of flood risks at the site and those posed by the development was undertaken in accordance with PPS25. The site is in zone 1. The development can be classified “Less Vulnerable” and is appropriate for the flood zone.

No significant flood risks to the development were identified. The control kiosks would be located 300mm above ground level to militate against any surface flooding. Other than that, no mitigation measures are required.

The runoff from the paved areas would be conveyed to the inlet of the works and, following treatment, would be discharged through the consented outfall. Hence, the development would not increase the flood risks to others.

It is concluded that the proposed development can proceed from a flood risk standpoint.

Appendix A
Existing and Proposed Works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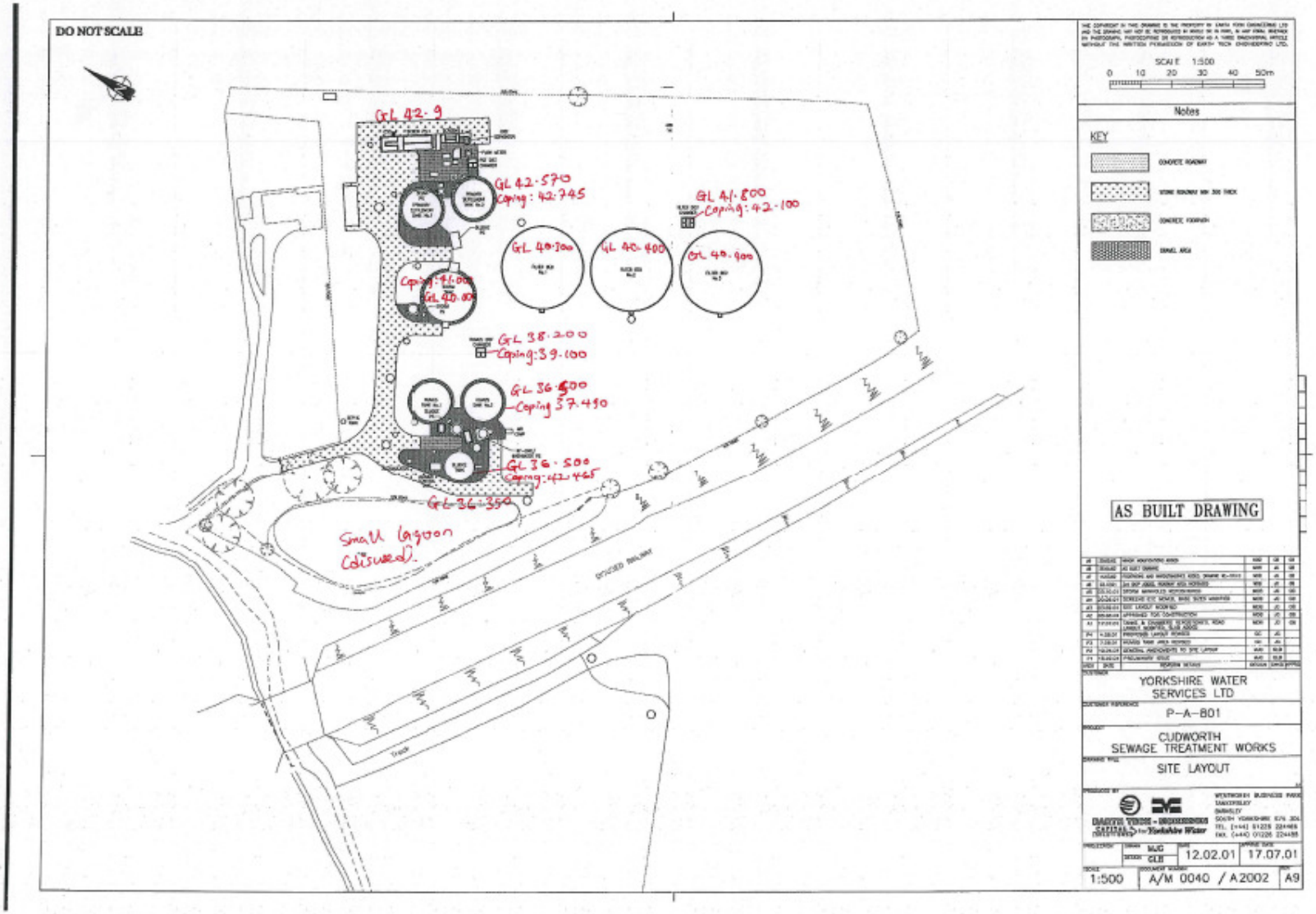
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Notes
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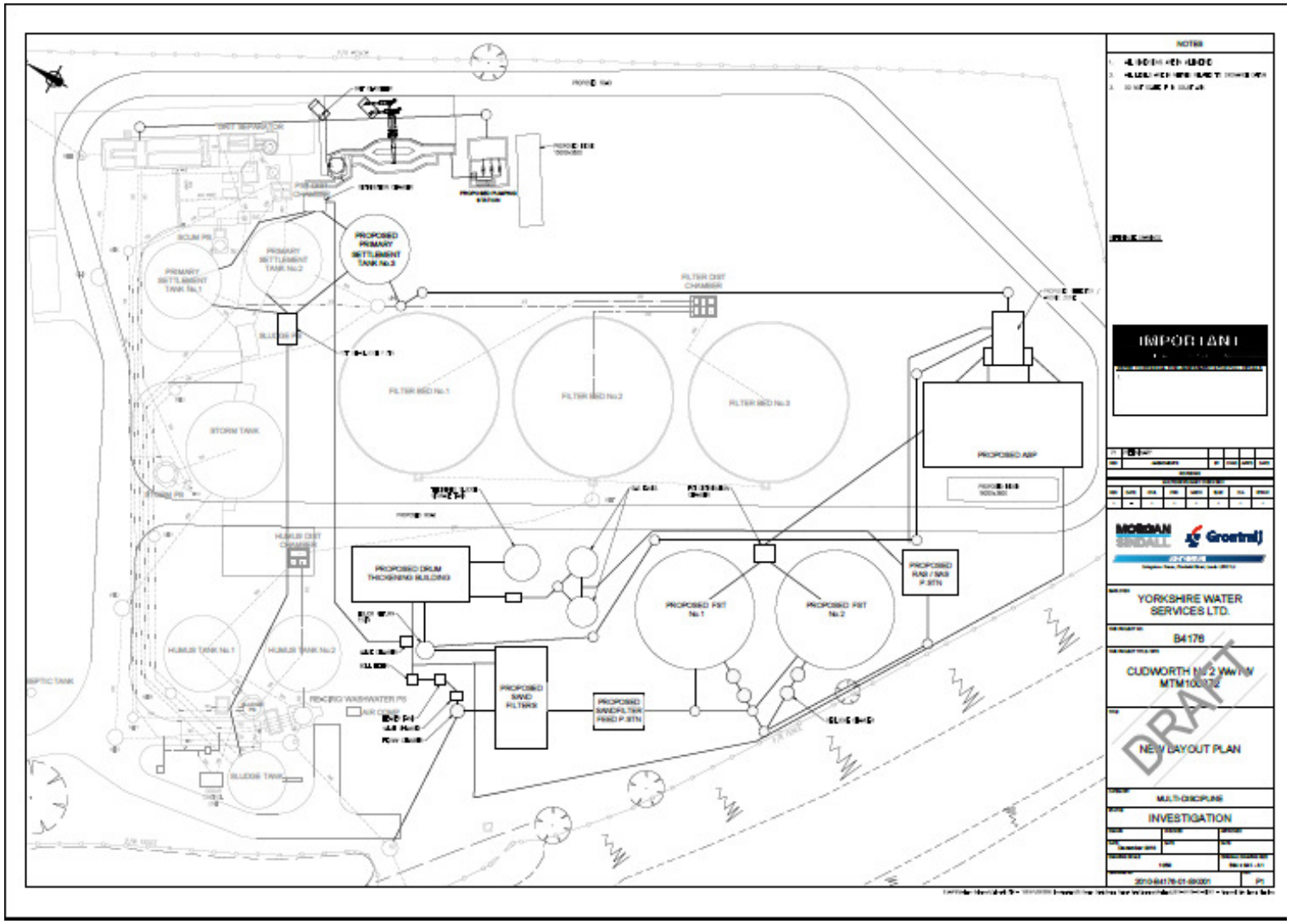
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PRIMARY SETTLEMENT TANK No.1
PRIMARY SETTLEMENT TANK No.2
FILTER BED No.1
FILTER BED No.2
FILTER BED No.3
PROPOSED ASP
PROPOSED DRUM THICKENING BUILDING
PROPOSED FST No.1
PROPOSED FST No.2
PROPOSED RAS / WAS P. STN
PROPOSED SAND FILTERS
PROPOSED SAND FILTER WASH P. STN
STORM TANK
HUMUS TANK No.1
HUMUS TANK No.2
SLUDGE TANK
IMPORTANT
MOUCHEL
Grontmij
YORKSHIRE WATER SERVICES LTD.
B4178
CUDWORTH No 2 WwTW
MTM100172
DRAFT
NEW LAYOUT PLAN
MULTI-DISCIPLINE
INVESTIGATION