



Southern Water

Budds Farm STC

Flood Risk Assessment

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Project: Ringmer WTW

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APPENDIX A

Existing Site Layout

APPENDIX B

Proposed Site Layout

1. BACKGROUND

This document presents the findings of a Flood Risk Assessment (FRA) undertaken for a development within the site boundary of Budds Farm STC in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25) and PPS25: Development and Flood Risk Practice Guide. The FRA has been prepared to support the planning application for the proposed development.

The WTW site is located adjacent to the Solent River.

This document outlines the extent of flood risk to the site and identifies relevant issues together with any mitigation measures that will allow development to proceed without:

- Exposing the site to a high risk of flooding
- Increasing the flood risk to neighbouring sites.

The assessment of flood risk has been based on:

- Existing Site Layout (Appendix A)
- Proposed Site Layout (Appendix B)
- Latest Environment Agency Flood Maps (25th April 2017)
- Partnership of Urban South Hampshire, Strategic Flood Risk Assessment Final Report, December 2007

We are not aware of any previous flood risk assessments having been undertaken at this site.

2. DESCRIPTION OF THE EXISTING SITE

The National Grid Reference of the site is SU 7099 4055

Site address:
SOUTHMOOR LANE
BUDDS FARM
HAVANT
HAMPSHIRE
PO9 1JW

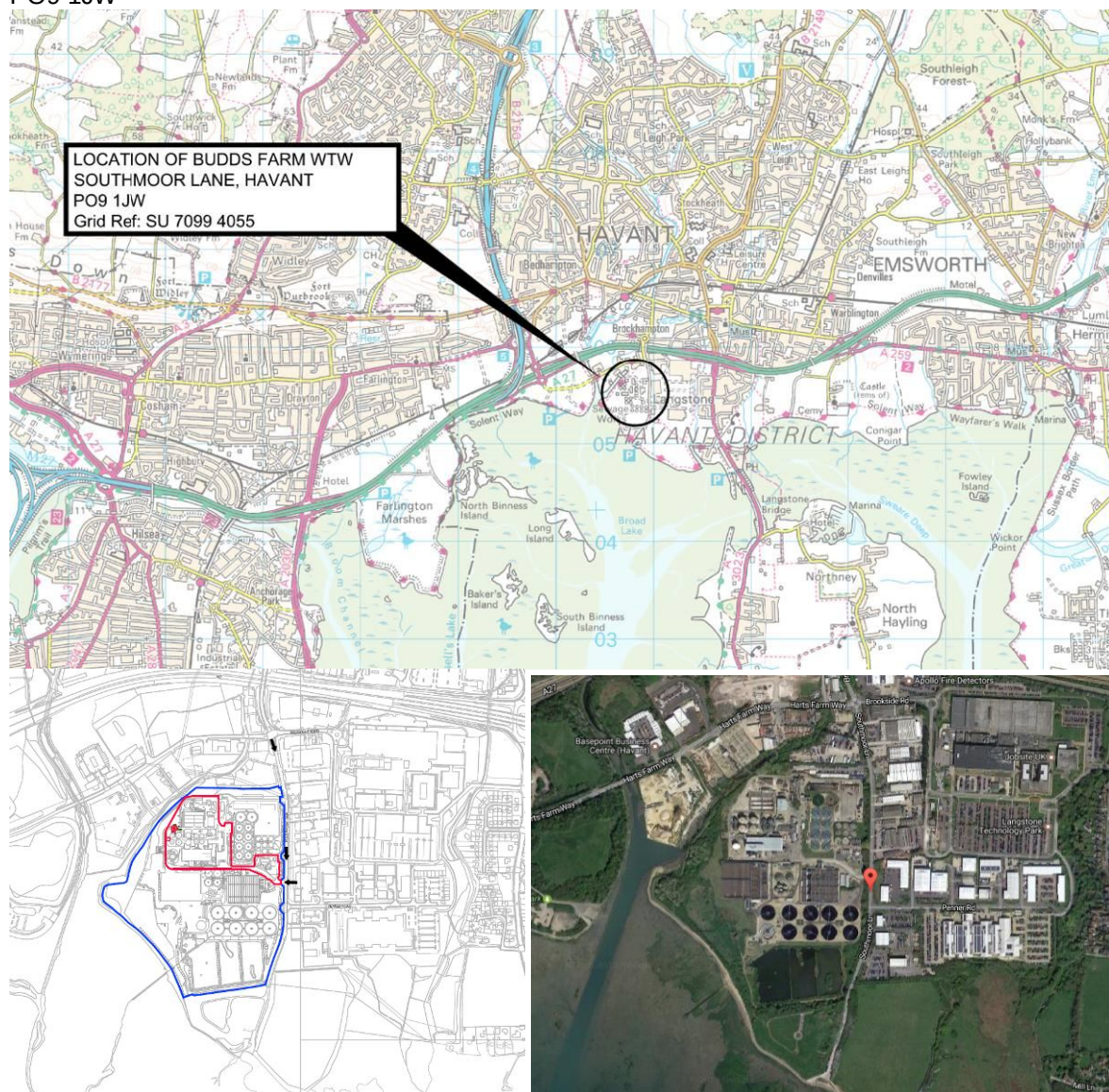


Figure 1. Location of Budds_Farm WTW/STC

The Budds Farm WTW site, which is owned and operated by Southern Water, covers a total area of approximately 206,000m². The existing site consists of a range of tanks and buildings (associated with the waste water treatment and sludge treatment process), impermeable surfacing and grassed areas.

The proposed development requiring planning permission covers a total area of approximately 270m² which corresponds to <1% of the total site and operational treatment works.

Development requiring planning permission is 1No. Anaerobic Digester and 1No. Centrifuge Feed Pumping station Kiosk. Approx 50% of the new digester approx 215m² will replace existing hard standing and the existing centrifuge feed pump kiosk approx. 35m² shall be extended 34% to approx 53m² Kiosk.

Surface water from parts of the existing site hardstanding is drained to site drainage which is returned to the head of the waste water treatment works. It is proposed all drainage from new hardstanding shall connect into the existing site drainage.

3. DESCRIPTION OF THE PROPOSED LAND USE

The proposed development entails the construction of new process units and supporting infrastructure on the existing Sludge Treatment Centre. The site layout of the proposed works is shown in Appendix B.

Elements of the proposed works will require planning approval, an application for which will be submitted to the Hampshire County Council. These items are as follows:

- **Digester No.5**
Diameter: Approx. 16500mm
External Height: Approx. 16700mm
Material & Finish: Digester: Matt Grey Corrugated Cladding as per 4No. Existing digesters.
Stairway: Galvanised Steel
Activities & Process: Anaerobic Digestion



Figure 2: Existing Digester finish to be replicated.

- **Centrifuge Feed Pump Kiosk**
Width: Approx. 8150mm
Length: Approx. 6500mm
Height: Approx 4150mm
Material & Finish: External Sating finish (Gelcoat) BS4800 14-C-39
Activities & Process: Centrifuge Feed Pumps.

The Digester and Kiosk will have a combined floor area of approximately 270m².

The remainder of the works are to be carried out under Southern Water's permitted development rights. The proposed permitted development works include:

SAS Thickening

- Replace the existing 5 No. drum thickeners with 5 No. drum thickeners of a larger capacity within existing building.
- New thickeners to be located on existing elevated platform. Modify platform penetrations to suit new thickener units.
- Extend existing elevated platform by the addition of a GMS platform to provide access to new thickener units.
- Provide dedicated flocculation tanks upstream of each new thickener unit.
- Provide dedicated sludge collection tank immediately downstream of each new thickener unit.
- Replace thickener feed pumps associated with each thickener unit and modify pipework to suit new layout.
- Replace thickened sludge transfer pumps associated with each thickener unit and modify pipework to suit new layout.

Sludge Digestion

- Modify site road layout to accommodate new digester.
- Modify control of existing feed system to accommodate additional digester.
- Install external mixer system to digester.
- Install recirculation pump, heat exchanger and associated pipework adjacent to the new digester
- Install hot water pipework between existing heat exchanger/boiler building and new heat exchanger
- Provide interconnecting pipework between existing digester feed system and new digester and from new digester to the existing post digestion tanks.
- Provide interconnecting pipework between the new digester and the existing biogas system.

Sludge Dewatering

- Install new centrifuge feed pipework between new centrifuge pump and dewatering plant
- Replace existing 2 No. centrifuge units with new larger capacity units
- Provide new elevated platform to accommodate new centrifuge plant with access from existing structure
- Provide new sludge cake conveyors between new centrifuge units and the existing conveyor system feeding the cake silo

Chemical Dosing

- Upgrade poly dosing plant serving the drum thickeners
- Extend concrete bund to accommodate new poly batching and make-up tanks in thickener building.
- Upgrade poly dosing plant serving the centrifuges

Notably, all permitted development listed above fall upon existing hardstanding or within existing buildings.

4. ASSESSMENT OF EXISTING FLOOD RISK

Flooding can occur from a number of sources as shown in Table 1. For this site, flooding from all of the sources apart from the sea was considered possible.

Source	Description
Flooding from rivers	River flows which exceed the flow capacity of the river channel (or culverts) can cause flooding from rivers.
Flooding from the sea	High tides and/or storm surges can cause flooding from the sea.
Flooding from land	Intense rainfall that cannot soak into the ground or enter drainage systems can quickly run off the land and result in local flooding.
Flooding from groundwater	Ground water flooding occurs when water levels in the ground rise above surface elevations.
Flooding from sewers	Sewer flooding can occur when combined systems are overwhelmed by heavy rainfall, when sewers become blocked or when sewers are of inadequate capacity.
Flooding from reservoirs, canals and other artificial sources	Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level.

Table 1. Possible sources of flooding.

5. FLOOD ZONES

Planning policy statement 25 (PPS25) defines three flood zones as shown in Table 2.

Flood zone	Annual probability of flooding
1: Low Probability	Less than 1 in 1000 year (<0.1%) for river or sea flooding
2: Medium Probability	Between 1 in 1000 year (0.1%) and 1 in 100 year (1%) for river flooding or Between 1 in 1000 year (0.1%) and 1 in 200 year (0.5%) for sea flooding
3a: High Probability	1 in 100 year (1%) or greater for river flooding or 1 in 200 year (0.5%) or greater for sea flooding
3b: The Functional Floodplain	Land where water has to flow or be stored in the times of flood. There is not a strict definition of annual probability of flooding in this zone, but 1 in 20 year (5%) or greater should provide a starting point for consideration.

Table 2. Flood zones as defined by PPS25.

In accordance with <https://flood-map-for-planning.service.gov.uk>:

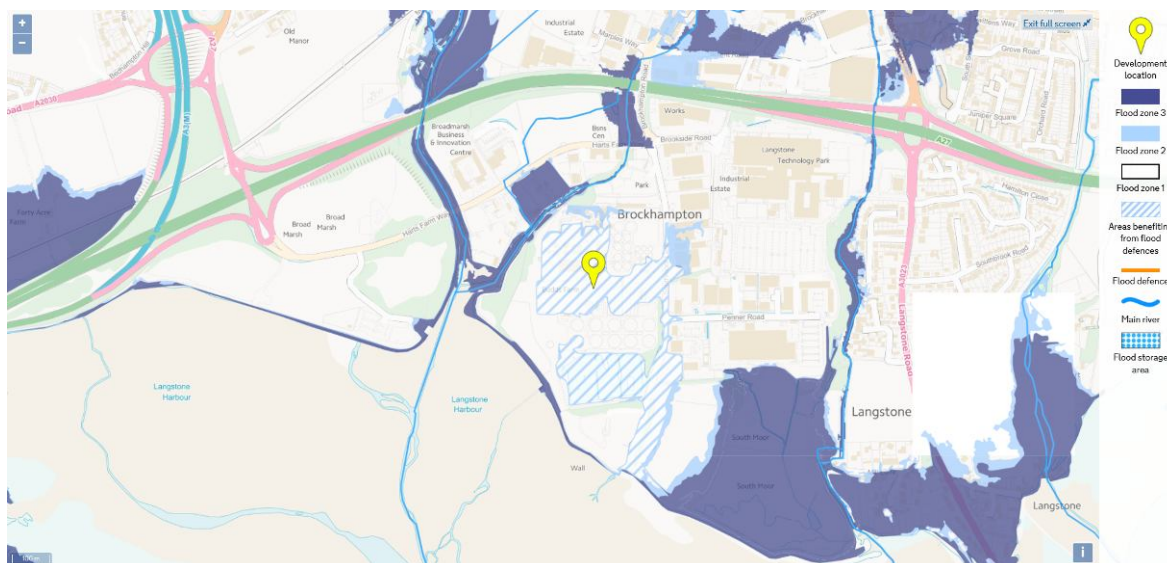


Figure 3: Budds Farm STC - Flood Zone Classification, extract taken 25/04/17.

Budds Farm STC is a Flood Zone 3 benefiting for Sea Defences. Land and property in this flood zone would have a high probability of flooding without the local flood defenses. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

Potential sources of flooding to the site

The Flood Map (shown in Figure 3) provides a high level overview of the likely flood risk to a specific area or region and only considers current fluvial and current tidal flood risk. Therefore each of the possible sources of flood risk will be now considered in more detail.

5.1. Flooding from rivers & flooding from the sea

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defenses in the area. These defenses reduce, but do not completely stop the chance of flooding as they can be overtopped, or fail.

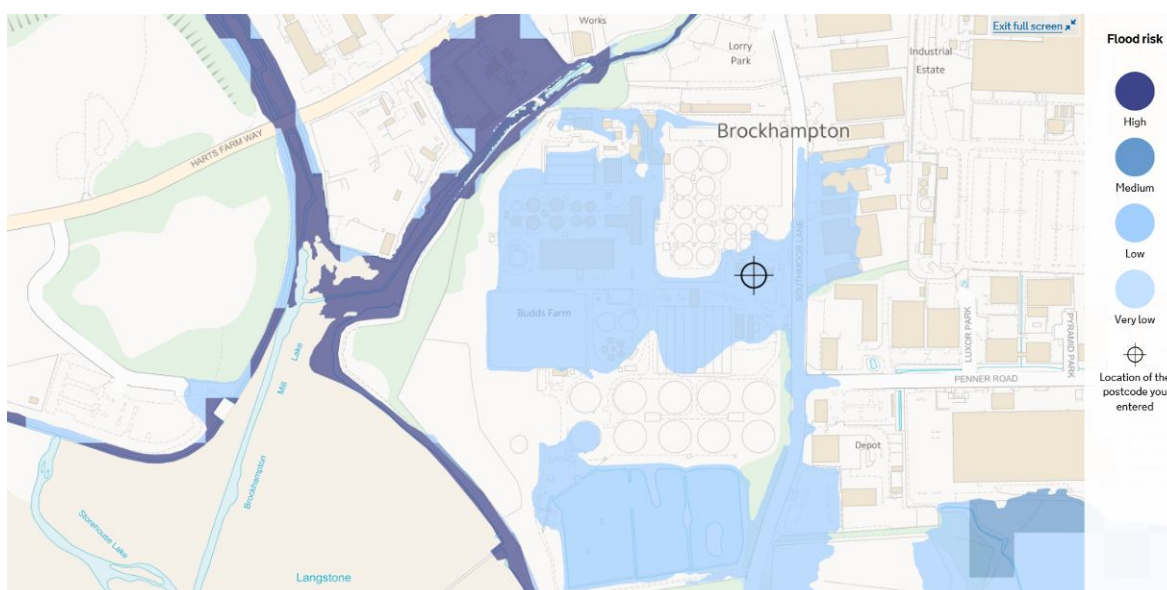


Figure 4: Flood Risk from River or the Sea Map, extract taken from

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=470910&northing=105486.5&address=10091829001&map=SurfaceWater>

5.2. Flooding from land

The surface water flooding map as shown below indicates the site is at very low to low risk of surface water flooding in the areas of development requiring planning permission. Low risk means that each year this area has a chance of flooding of between 0.1% and 1%.

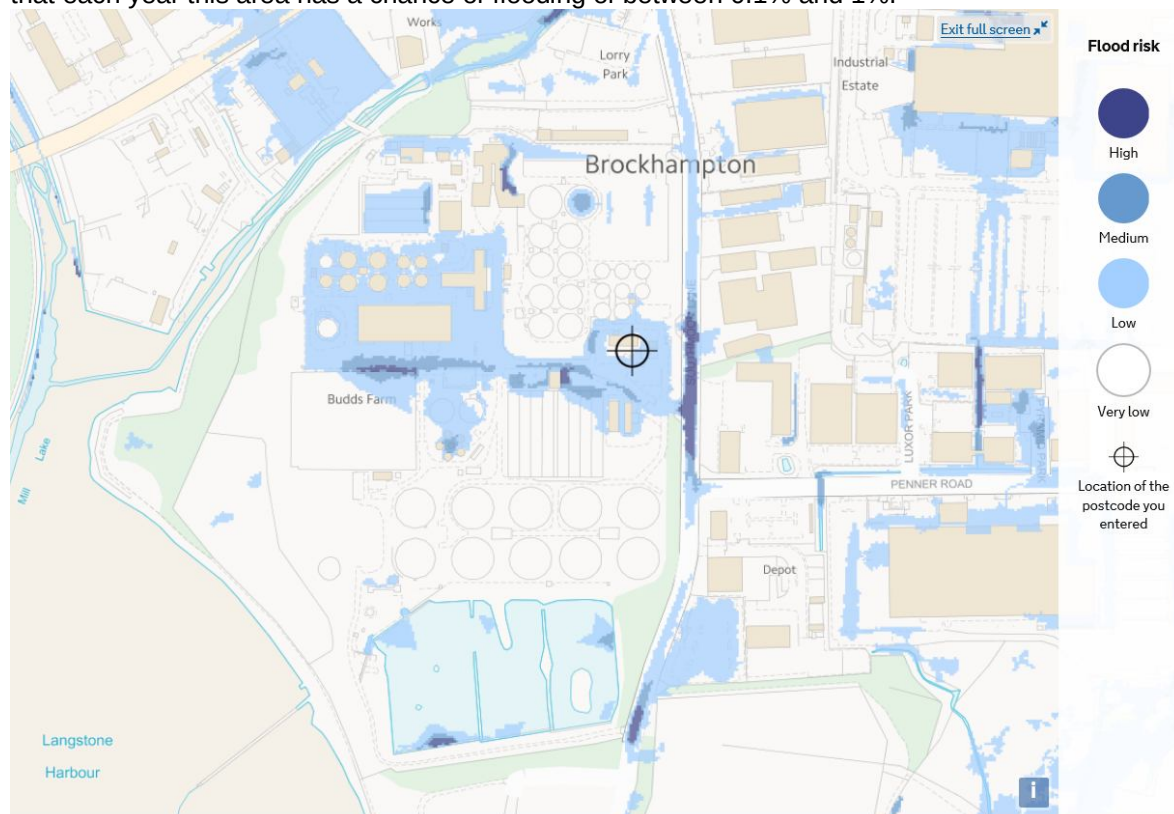


Figure 5: Flood Risk from Rivers or the sea Map, extract taken from <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=470910&northing=105486.5&address=10091829001&map=SurfaceWater>

5.3. Flooding from groundwater

There is no historical record of flooding to the site (from ground water) this source of flood risk was not considered further.

5.4. Flooding from sewers

The site is a waste water and sludge treatment works. There is no historical record of flooding to the site (from sewers) this source of flood risk was not considered further.

5.5. Flooding from reservoirs, canals and other artificial sources

There is no historical record of flooding to the site, from reservoirs, canals and other artificial sources.

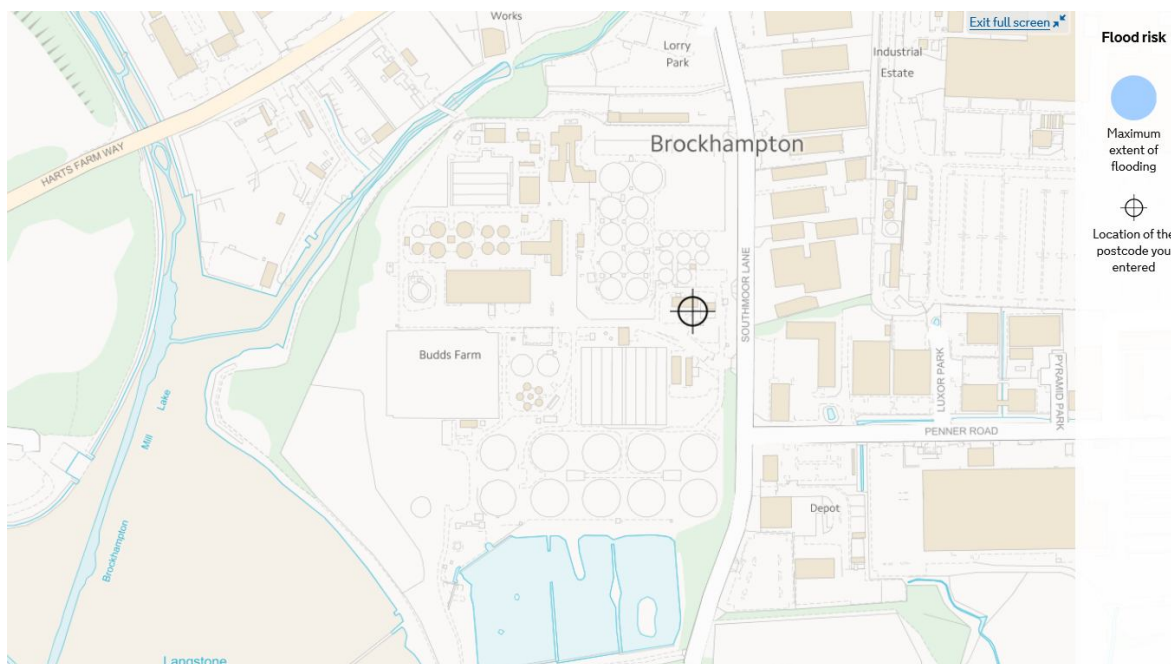


Figure 6: Flood Risk from Reservoirs, extract taken from <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=470910&northing=105486.5&address=10091829001&map=SurfaceWater>

6. RELEVANT POLICY

6.1. Planning Policy Statement 25

Planning Policy Statement 25: Development and Flood Risk (PPS25) is the relevant planning policy when assessing flood risk in England. The objective of PPS25 is to ensure that flood risk is taken into account at all stages in the planning process to direct development away from areas of high risk, where appropriate. The most relevant parts of PPS25 are the classification of the development, modification of existing ground levels, sequential test and exception test. Each of these aspects is discussed in more detail below.

6.1.1. Classification

Sewage treatment plants are classified Less Vulnerable (according to Table D2, PPS25) if adequate pollution control measures are in place.

Less Vulnerable land uses can be located in Flood Zone 3a (or better), provided adequate pollution control measures are in place. Where they are located in Flood Zone 3b, they need to be protected to 1 in 20 year standard of protection to move them from Flood Zone 3b to Flood Zone 3a.

Budds Farm WTW and STC is within Flood Zone 3a, however in accordance with Southern Water's technical specification the proposed works will be protected against a 1:100 event as discussed in Section 5.

Installations requiring hazardous substance consent are classified as 'Highly Vulnerable (according to Table D2, PPS25). Highly Vulnerable land uses should be located in Flood Zone 1. Highly Vulnerable Installations can be located in Flood Zone 2 but an Exception Test is required.

The proposed development will include the installation 1No. Anaerobic Digester & 1No. Centrifuge Feed Pump Kiosk which does not require a hazardous substances consent.

6.1.2. Modification of Ground Levels

It is proposed local existing ground levels shall be retained. Local levels for the development requiring planning permission is as follows:

- Digester No.5 : GL 2.9m AOD
- The Centrifuge Feed Pumping Station: GL 2.9m AOD and Slab Level 3.05m AOD

The WTW is located to the East of Langstone Harbour in an industrial area. The western boundary from Brockhampton Creek and along the edge of Langstone Harbour benefits from Flood Defences. Defences consist of rock filled box gabions, steel sheet piling with pre-cast concrete revetments and timber revetments protecting an embankment min 5.65m AOD in accordance with drawings A80384.0017 and A80384.0018 Sea Defences - Budds Farm WTW.

The sea defences is designed for the following criteria;

- Highest Astronomical Tide: 2.47m AODN
- Maximum Wave height 1.1metres
- Return period of Max Wave Height: 1 in 10 years

Extract taken from Budds Farm WTW - Sea Defences - Health & Safety Manual - Volume 1, 13th November 1998, prepared by A Butcher (Ref 80384b68).

Notably, since the design of the sea defences the EA has reviewed the tidal levels as presented in the Partnership for Urban South Hampshire, Strategic Flood Risk Assessment Final Report, December 2007. http://www.push.gov.uk/final_sfra_report.pdf extracts shown below.

Focusing on Langstone Harbour and a 1 in 100 and 1 in 200 tidal event as per guidance which supports PPS25 which states that the minimum acceptable standard of protection for new developments should be:

- 100 years (1% annual probability) for fluvial flooding
- 200 years (0.5% annual probability) for coastal flooding

The estimated levels considering 2025 tidal levels are estimated to reach 3.3m and 3.2m AOD.

In conclusion, by retaining the existing ground levels and presence existing sea defences means the risk of sea flooding to site remains unchanged.

Budds Farm WTW and STC is low risk meaning that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defenses in the area (min 5.52m AOD).

6.1.3. Sequential Test

The Sequential Test aims to steer new development to areas at the lowest probability of flooding.

Given the nature of the redevelopment, i.e. WTW on an existing site it is not practicable to relocate the works to an area with a lower probability of flooding.

6.1.4. Exception Test

Sewage Treatment plants are classified as Less Vulnerable therefore an exception test is not required.

6.2. Southern Water

Southern Water also has an internal policy on flood risk (SW MED 4001). Their internal policy states:

New & refurbished assets shall be designed, selected, located and installed to be protected from flooding. Critical (as defined by MED 4001) retained assets shall be protected from flooding.

Particular consideration shall be given to the location of: Motor Control Centres, electrical equipment, generators, fuel storage tanks and other non-submersible assets.

The return periods for flood protection shall generally be in accordance with the table below; however a cost / benefit analysis shall be undertaken by the Contractor to determine the most economic level of flood protection. Where a lower return rate is proposed, this shall be submitted to the Purchaser for Acceptance via the Deviation process.

Return Period	Application
1:30	Minimum protection for all assets
1:100	Protection where flooding could lead to significant customer impact, examples include, but not limited to:
	a. Loss of water supply for an extended period i.e. 1-2 weeks) b. Pollution of a watercourse for an extended period i.e. 1-2 weeks) c. Flooding of key areas i.e. shopping centres, hospitals, etc
1:200	Protection where flooding could lead to a major customer impact, examples include, but not limited to:
	a. Widespread loss of water supply resulting in rota cuts or standpipes b. Widespread flooding i.e. town centres, several hundred properties, etc

Table 3: MED 4001, Section 2.11.2 Flooding

Budds Farm WTW and STC is strategic site therefore Southern Water require it to be protected to the 1 in 100 year standard of protection in accordance with the table above.

7. IMPLICATIONS FOR THE PROPOSED DEVELOPMENT

7.1. Proposed Layout

Please refer to Appendix B for details on the proposed works at Budds Farm WTW and STC. To comply with Southern Water's Specification (MED4001) and exceed PPS25 the works has been designed such that all plant deemed susceptible to operational risk will be located at or above a Peak Flood Level of 2.9m AOD.

No compensatory storage is required by PPS25 (since the site is at risk of tidal flooding) and none is proposed to compensate for the development of this portion of the site.

Anaerobic Digester

The proposed Anaerobic Digester and associated equipment will be within the 1:100 year flooding Zone.

The main structure shall be an enclosed tank with a coping level of outlet chamber approx. +14.650m above ground level (2.9mAOD). Subsequently, in the event of a flood the Digester is not deemed susceptible to operational risk i.e. Flood water shall not enter the digester.

Conversely, the recirculation pump, mixer, heat exchanger, anti foam dosing unit and associated electrical panels not rated for immersion shall be located above the peak flood level.

Centrifuge Feed Pump Kiosk

The proposed Centrifuge Feed Pump Kiosk shall be located on a raised slab 3.05mAOD. All junction boxes and panels will be at least 0.9m above this level and as such will not be affected by a 1:100 year event.

The pumps will be located on support stool ensuring the motors are clear of the flood level. Any electrical equipment not rated for immersion will be located above the peak flood level.

7.2. Surface Water Drainage

New roads and areas of hardstanding shall be adequately drained to prevent accumulation of surface water. The new drainage system shall maintain distinction between 'clean' (surface water) and 'dirty' (contaminated surface water) areas. Surface water from 'Clean' areas shall be discharged to land. Surface water, run-off or wash-down water from 'dirty' areas will be collected and discharged into the treatment process. Any potential spillage from chemical or fuel delivery enclosures will be captured within bunded enclosures.

7.3. Land Drainage Consent

No works are proposed within 35m of the nearest watercourse, therefore no Land Drainage Consent from the EA will be required.

7.4. Pollution Control

The risk of pollution is unchanged by the proposed development.

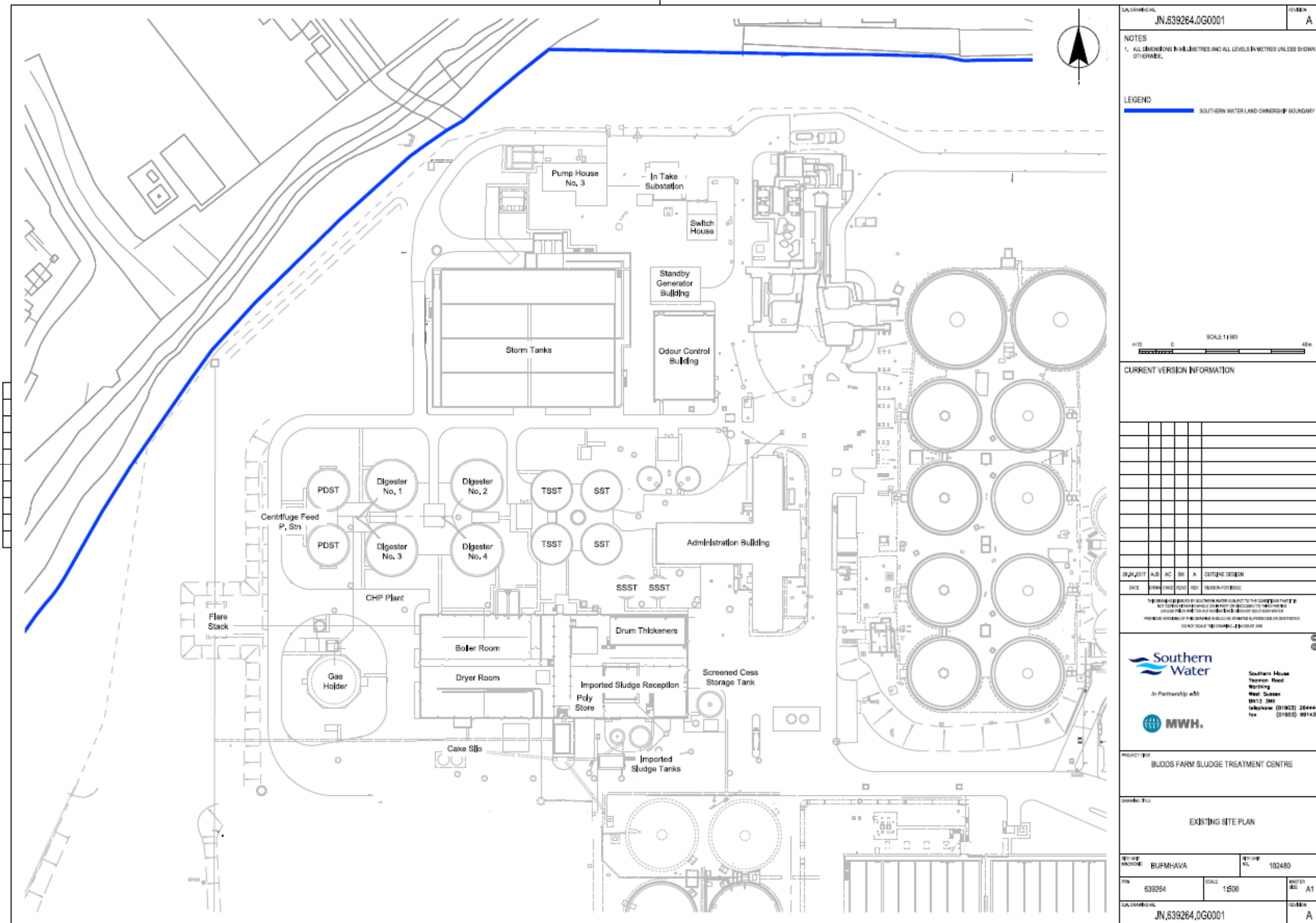
7.5. Managing Residual Risk

Budds Farm WTW and STC is within an EA Flood Warning Area and therefore could sign up to receive a flood warning in the event of a predicted flooding.

APPENDIX A

Existing Site Layout





APPENDIX B

Proposed Site Layout

