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FLOOD RISK ASSESSMENT AND SURFACE WATER DRAINAGE STRATEGY

ELBRIDGE FARM RECYCLING CENTRE, BOGNOR REGIS

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GENERAL NOTES

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1 INTRODUCTION

1.1 Background

This report has been prepared in support of a Planning Application for the lateral extension and increase in permitted volumes of the existing materials recycling facility and waste transfer station at Elbridge Farm Recycling Centre, Bognor Regis, West Sussex.

The majority of the site is within Flood Zone 1, with a very small area of land in the northwest, adjacent to the Elbridge Rife within Flood Zones 2 and 3. Regardless, as the site is over 1 hectare (ha) in size, a Flood Risk Assessment (FRA) is required in accordance with the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG).

1.2 Scope of the assessment

The majority of the site is located within Flood Zone 1, as defined by the Environment Agency (EA), meaning it has less than a 0.1% chance of flooding in any year. Land within Flood Zones 2 and 3 has between a 0.1% to 1% chance and greater than 1% chance, respectively, of flooding in any given year.

This FRA considers the likelihood of flooding to and from the site. Consideration is given to the risk from fluvial flooding and rainfall events with a return period of 1 in 100 years, unless otherwise stated, and includes an adjustment for the effects of potential future climate change.

1.3 Data sources

The following data sources were used in this assessment:

GP Planning Ltd

- Site Location Plan – GPP/RS/BR/EXT/22/01
- Site Layout Plan - GPP/RS/BR/EXT/22/02 Rev06

Craddys

- 2014 FRA for Elbridge Farm, Bognor Regis. Document Reference: 9819w0001
- 2022 FRA for Elbridge Farm, Bognor Regis. Document Reference: 9819w0001e

Ordnance Survey (OS)

- 1:25,000 scale series mapping

British Geological Survey (BGS)

- Geological maps, 1:50,000-scale (England & Wales)

Environment Agency (EA)

- Flood risk maps from rivers and surface water
- Product 4 data

West Sussex County Council (WSCC)

- Preliminary Flood Risk Assessment (PFRA)
- Local Flood Risk Management Strategy (LFRMS)
- Surface Water Management Plan

Arun District Council (ADC)

- Strategic Flood Risk Assessment (SFRA)
- Arun Local Plan 2011-2031 (July 2018)

2 PROPOSED DEVELOPMENT

The current site accepts waste that is sorted and then re-exported for a variety of uses. Inert Construction and Demolition waste is screened to remove large fractions and concrete, which is crushed for use as secondary aggregate.

A Planning Application for the increase in permitted volumes at the site was submitted in March 2022, which was accompanied by an FRA by Craddys (ref: 9819w0001e, dated 13/06/2022). This Application was subsequently withdrawn.

A revised Planning Application is being prepared for the lateral extension of the existing materials recycling facility and waste transfer station. There are no changes planned to the recycling operation except to increase tonnages with the volume of processed material to increase from the present 30,000 tonnes.

The majority of the development will use existing buildings on-site with the addition of offices, storage sheds, parking and security. The proposed eastern extension will be used for the storage of recycled aggregate and for inert material tipping and processing. The proposed extension area will be solely for inert material, surrounded by a perimeter soil screening bund, in aid of visual screening and dust protection – see the Site Layout Plan in *Appendix 3419/FRA/A2*.

Hafren Water has been commissioned to produce the requisite FRA and a Drainage Strategy in support of the Planning Application.

3 BASELINE CONDITIONS

3.1 Location and setting

The site is approximately 1.5 ha in extent and comprises an existing materials recycling facility/waste transfer station.

It is situated approximately 2 km northwest of Bognor Regis town centre at National Grid Reference (NGR) SU 91361 02136, and postcode PO21 5EF. The location of the proposed development is shown on *Drawing 3419/FRA/01.*

The site is accessed off the A259 between Chichester and Bognor Regis. It is attached to Elbridge Farm Business Centre, where a number of industrial units bound the southwest of the site. The Elbridge Rife watercourse parallels the northern site boundary, with agricultural grassland to the northeast. Residential dwellings are located to the southeast of the site.

3.2 Topography

LiDAR data has been obtained for this area to produce a contour map of the site (*Drawing 3419/FRA/04*). A topographic survey was also produced in 2022 (*Appendix 3419/FRA/A6*). The topography of the site is relatively flat, with an average height around 4 metres Above Ordnance Datum (mAOD), with low points of approximately 3 mAOD in the northwest adjacent to the watercourse. The site is higher in the southern corner of the site at approximately 5 mAOD.

3.3 Ground conditions

The nearest British Geological Society (BGS) borehole to the site, for which records exist, is located approximately 100 m southwest of the site, close to the A259 (BGS ref SU90SW43). The borehole log shows that beneath topsoil , clay extends to 1 m, below which are 1.3 m of raised beach deposits of pale grey silt. Further silt of a very sandy composition at a depth of 2.2 m overlays chalk bedrock. Groundwater was not encountered in this borehole.

Classifications of the Cranfield National Soil Resources Institute show that the predominant soil type in the area surrounding the site is 'Loamy' (Soilscape 6), which is typically a free-draining, slightly acid loamy soil.

Superficial deposits at the site and the surrounding area are indicated by the BGS to comprise Alluvium, namely sand and gravel, locally with lenses of silt, clay or peat. The deposit is of Quaternary age.

The EA classifies the Alluvium as a Secondary 'A' aquifer, which is defined as layers that can provide water at a local scale and may form an important source of baseflow to rivers. The bedrock is classified as a Principal Aquifer.

According to EA mapping, the site is in a location with medium groundwater vulnerability, referring to the likelihood of pollutants reaching the groundwater. The site is not located within a Source Protection Zone (SPZ).

3.4 Hydrology

The hydrological characteristics of the site and its environs have been derived from Ordnance Survey maps, Google Earth imagery and a site walkover on 8th November 2022.

3.4.1 Watercourses

The Elbridge Rife is the closest watercourse to the site, which parallels its northwestern boundary. This watercourse forms part of a wider network that flows into the Aldingbourne Rife. This watercourse flows south through Bognor Regis before discharging into the English Channel.

3.4.2 Waterbodies

There are a number of waterbodies in the local area, the nearest of which is located approximately 1 km northeast of the site. Waterbodies in the area appear to be hydraulically connected to the watercourse network.

Several artificial reservoirs/recreational ponds exist close to the site, which were formed and maintained for ecological value.

4 BACKGROUND AND KEY DOCUMENTS

4.1 National Planning Policy and Guidance

This FRA has been undertaken in accordance with the statutory requirements of the NPPF and PPG regarding development and flood risk.

The NPPF requires developments to:

- Consider climate change over the longer term to avoid increased vulnerability to the range of impacts arising from climate change
- Ensure new development does not increase flood risk elsewhere
- Avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk
- Where development is necessary, make it safe without increasing flood risk elsewhere and direct the most vulnerable development to areas of lowest flood risk
- Be supported by an appropriate site-specific Flood Risk Assessment, where one is required
- Ensure development is appropriately flood resilient and resistant

Major development should incorporate sustainable drainage systems (SuDS), which should meet the Technical Standards for SuDS. Major development, according to Section 2 of Statutory Instrument 2015 Nº 595, Town and Country Planning of England, includes the winning and working of minerals or the use of land for mineral-working deposits, also waste development.

4.1.1 Flood zone and vulnerability classifications

EA mapping shows that the majority of the site lies within Flood Zone 1 ('Low' probability of fluvial and tidal flooding). This zone comprises land assessed as having less than a 1 in 1000 (0.1%) annual probability of river flooding or sea flooding. However, very restricted areas to the north are designated as Flood Zones 2 and 3.

In accordance with the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG), all planning applications for proposed developments within Flood Zones 2 or 3 or over 1 ha in size must be accompanied by an FRA. The proposed site boundary is 1.5 ha.

'Waste treatment' facilities are considered to be 'Less Vulnerable' in accordance with the NPPF and PPG. Despite a small northwestern section of the site located in Flood Zone 2, the

majority of the site is located within Flood Zone 1. However, according to Table 3 of the PPG, it is considered appropriate for 'Less Vulnerable' development to be located within Flood Zone 2. The Sequential Test is therefore considered to be passed, and the Exception Test does not need to be applied for this location.

4.2 Local Policies and Guidance

4.2.1 Strategic Flood Risk Assessment Level 1 & 2

The NPPF states that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA), which refines information regarding the probability of flooding, taking all sources of flooding and the impacts of climate change into account. SFRA's provide the foundation for applying the Sequential Test, on the basis of the Flood Zones.

Arun District Council has produced a hybrid Level 1 and Level 2 SFRA, which was completed by JBA Consulting in August 2016. Some key points relevant to the site include:

- Arun District has a history of documented flood events; flood records indicate that the main source of risk is from surface water and groundwater sources
- The site is not identified to be at risk of flooding according to Flood Risk Mapping within the SFRA. The site does not feature on the large-scale historical flood map within the SFRA
- Site-specific FRAs should include an assessment of mitigation measures required to safely manage flood risk along with the promotion of Sustainable Drainage Systems (SuDS) to create a conceptual drainage strategy
- Mapping has been produced as part of the SFRA and is included in *Appendix 3419/FRA/A1*. The mapping shows that the site is not within an area identified to be at risk from tidal or river flooding (including a consideration of climate change), from flooding 'from land' (surface water), or within a Groundwater Emergence Zone. Mapping also shows that the site is not in the vicinity of any historical sewer flooding incidents

The SFRA does not raise any concerns for this site.

4.2.2 Preliminary Flood Risk Assessment

Preliminary Flood Risk Assessments (PFRA's) were a requirement of the Flood Risk Regulations (2009) and were produced by Lead Local Flood Authorities (LLFA's). Their purpose is to provide information on significant historical flood events and summarise future flood risk from all sources of flooding.

The PFRA for West Sussex County Council was last updated in May 2011. Historical incidents of flooding have been recorded across the study area, however there are no records of flooding affecting the development site.

The PFRA does not raise any concerns for this development.

4.2.3 Local Flood Risk Management Strategy

The Local Flood Risk Management Strategy (LFRMS) for WSCC was completed in December 2013. The document provides guidance for new developments on the responsibilities of private landowners in flood risk and important considerations for the planning and implementation of SuDS.

The LFRMS does not hold any records of historical flooding at the site.

Chapter 2 'Responsibilities outside of the Flood and Water Management Act 2010' contains information relevant to the development site as follows:

'*Flood Risk should not be increased elsewhere as a result of development.*'

'*Flooding from new development cannot be allowed to impact on third parties.*'

These points will be considered within the surface water drainage design to ensure the development conforms with West Sussex Council strategy.

4.2.4 Local Development Framework

A Local Development Framework (LDF) is a spatial planning strategy for district councils in England and Wales. The LDF comprises of Local Development Documents (including Local Plans), Supplementary Planning Documents (SPD's), Statements of Community Involvement and other documents as required.

4.2.5 Arun Local Plan 2011-2031

The Arun Local Plan 2011-2031 was adopted in 2018 by the Council and sets out a spatial vision, objectives and a sustainable strategy for delivering the necessary growth of the District over the period 2011-2031.

Policy 18.3 - Flooding and 18.4 - Sustainable Drainage Systems, contain information relevant to the development site as follows:

'*Development proposed within Bognor Regis should reduce run-off and implement Sustainable Urban Drainage Systems (SUDS) where applicable.*'

'Opportunities for incorporating a range of SUDS must be taken wherever possible.'

'Proposals for both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design.'

This policy has been considered throughout this assessment.

4.2.6 LLFA Policy

West Sussex LLFA Policy for the Management of Surface Water was published in November 2018. This policy set out the requirements that the LLFA has for drainage strategies and surface water management provisions associated with planning applications for development. Some key points relevant to the site include:

Policy 5.6.2 – '*Discharge to a watercourse or surface water sewer must be restricted to the estimated mean greenfield runoff rate (Q1) by means of a controlled outflow.*'

This policy will be considered as part of the surface water drainage strategy.

5 CLIMATE CHANGE

In May 2022 the EA published an update on climate change allowances for both peak river flows and peak rainfall intensity. The site is within the Arun and Western Streams Management Catchment.

5.1 Peak river flows

The guidance specifies different allowances that should be made in terms of peak river flow depending on River Basin District and peak rainfall intensity. A range of climate change allowances for peak river flow is provided, ('Upper end', 'Higher central' and 'Central') depending on the nature of the development. Peak river flow allowances for this catchment are as follows:

3419/FRA/T1: Arun and Western Streams Management Catchment - peak river flow allowances			
	Central	Higher	Upper
2020's	11%	16%	27%
2050's	13%	19%	36%
2080's	25%	36%	64%

5.2 Peak rainfall intensity

Climate change allowances for peak rainfall intensity have also been specified for each management catchment and for different development lifetimes. The guidance states to: '*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.*'

Peak rainfall allowances for this catchment are as follows:

3419/FRA/T2: Arun and Western Streams Management Catchment - peak rainfall allowances				
	30-yr return period		100-yr return period	
	Central	Upper	Central	Upper
2050's	20%	35%	20%	45%
2070's	25%	40%	25%	45%

Despite the proposed site use being classified as 'Less Vulnerable', the 'Upper' estimate has been selected and a climate change allowance of 40% will be applied within the drainage strategy.

6 FLOOD RISK AT THE SITE

6.1 Potential sources of flooding

The risk of flooding to the site has been assessed by examining the likelihood (frequency or return period) of flooding and the consequences of flooding (fatalities, property damage, disruption) which typically depend on flood depth, velocity, speed of onset and duration. A qualitative assessment of the consequences of flooding to the site has been made from a range of potential flood sources:

- Fluvial flow
- Tidal
- Pluvial (Surface water run-off)
- Groundwater flow
- Sewer and/or water mains leakage

6.2 History of flooding at the site

There are no records of the site flooding in the past.

6.3 Fluvial flooding

Fluvial (river) flooding occurs when a watercourse cannot accommodate the volume of water draining into it from the surrounding catchment.

The site is located predominantly in Flood Zone 1 with a small section in the northwest of the site designated as Flood Zones 2 and 3 – see *Drawing 3419/FRA/03*.

Product 4 data has been obtained from the EA and is included in *Appendix 3419/FRA/A4*. Maps have been provided, which show modelled flood extents for various return periods.

Modelled flood levels and velocities at three nodes in the vicinity of the site have been provided and summarised in *Table 3419/FRA/T3* below:

3419/FRA/T3: Undefended Modelled Levels [mAOD]						
Node Point	Grid Reference	2009 JFLOW - Fluvial		2009 TUFLOW - Tidal		
		1% AEP [1 in 100-yr]	0.1% AEP [1 in 1000-yr]	1% AEP [1 in 100-yr]	0.5% AEP [1 in 200-yr]	0.1% AEP [1 in 1000-yr]
1	491305 102131	2.55	2.64	2.57	2.74	3.06
2	491367 102211	2.41	2.47	2.57	2.74	3.06
3	491309 102191	2.04	2.13	2.57	2.74	3.06

According to the topographic survey presented in *Appendix 3419/FRA/A6*, the lowest point on-site is at approximately 2.75 mAOD. This level is above predicted flood levels for the 1% and 0.1% AEP fluvial return periods, and the 1% and 0.5% AEP tidal return periods.

For the 0.1% tidal event, flood depths on-site adjacent to the Elbridge Rife could reach 0.31 m. However the vast majority of levels on-site exceed 3.06 mAOD and would not be affected by flooding. Considering the site's low vulnerability, and the extreme and unlikely nature of such a flood event, this level of risk is considered to be acceptable.

The proposals will not affect ground levels and no new buildings are proposed. Therefore, it is not anticipated that flood waters will encroach on the proposed development and there will be no impact on the current flood regime, or any loss in floodplain storage as a result of the development.

Furthermore, the Elbridge Rife was observed on a site visit (8th November 2022) following several weeks of heavy rainfall. At the time, the watercourse was approximately 3 m below the site level, this, after a period of heavy rainfall.

Therefore, based on the above, the potential for fluvial flooding at the site is considered to be low and mitigation measures are not required.

6.4 Surface water flooding

Surface water (pluvial) flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground, but instead lies on or flows over the ground. This can typically happen following high rainfall storm events when a drainage system is unable to accommodate the amount of surface run-off, or when ground profiles are uneven and facilitate ponding.

The EA's 'Risk of Flooding from Surface Water' mapping (shown on *Drawing 3419/FRA/02*) shows that the site has been identified to be at low to medium risk of surface water flooding where the site borders the Elbridge Rife, likely due to topographical low points in this location. No built development is proposed in this area, and it is not intended to alter ground levels in post-development.

There are no records of surface water flooding affecting the site and the risk of flooding by surface water is considered to be low.

6.5 Groundwater flow and levels

Groundwater flooding occurs when the watertable rises to meet the ground surface. It is most likely in areas above an aquifer where water levels can rise following prolonged rainfall.

The SFRA indicates that the area is underlain for the most part by chalk, which makes groundwater emergence a possibility. However, BGS borehole SU90SW43 reached a depth of 5.9 m and groundwater was not struck.

Given no buildings will be constructed with a basement and there are no records of groundwater flooding affecting the site, the risk of flooding posed by groundwater is considered to be extremely low.

6.6 Flooding from sewers and drains

Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding can also occur because of blockage, poor maintenance, structural failure or surcharging of the system due to high water levels in a receiving watercourse.

The site does include an existing on-site drainage system which has been in place since the inception of the development. Were this system to breach capacity, flows would follow the topography of the site and enter the Elbridge Rife.

There is no intention for a surface water connection to the public sewerage system, and no additional foul flows are proposed. The SFRA holds no records of sewer flooding at or in the vicinity of the site.

Therefore, the risk of sewer flooding is considered to be low.

6.7 Flooding from reservoirs, canals and lakes

Reservoir and canal flooding occur after the failure or breaching of a dam wall or canal embankment and is rare in the UK due to regulatory inspections and maintenance.

There are no reservoirs with a storage capacity in excess of 25,000 cubic metres (m^3) in the Arun District, and there are no canals, lakes or other artificial features in the vicinity of the site. It is therefore considered that the risk of flooding from reservoirs, canals and lakes is low.

7 SURFACE WATER MANAGEMENT

7.1 Existing surface water drainage infrastructure

Existing roof and hardstanding areas are currently formally drained to an on-site surface water drainage system, which was installed at the inception of the site. It is shown on Drawing 9819-0050 in *Appendix 3419/FRA/A3*. Surface water run-off is conveyed by concrete drainage channels to buried chambers, followed by a series of treatment points: a collection chamber, an alarmed oil interceptor, then a holding tank (2 m in diameter and 3 m deep.)

The collection chamber is emptied regularly by a suction tanker. Water is drawn from the holding tank and used for dust suppression on-site. Remaining water within the holding tank flows northwestwards into a French drain along the western site boundary, which provides attenuation and filtration. The French drain flows northeastwards, to a point where it discharges into the Elbridge Rife. A second collection chamber is located to the northwest of the Roll on Roll Off (Ro Ro) shed. This discharges to the French Drain, thence the watercourse.

A perimeter drain exists on the eastern site boundary (on the western side of the fence) comprising a 150 mm diameter geotextile-wrapped pipe, within a gravel filled trench. Water is conveyed within this drain northwestwards, where it connects to the western perimeter French drain. However, the granular nature of the sub-surface is such that it is considered highly likely that a large proportion of the water infiltrates directly to ground from the French drain.

All of the current inert recycling area is permeable and free-draining. The access road is impermeable but not formally drained.

7.2 Proposed surface water drainage

7.2.1 Principles of the Surface Water Drainage Strategy

The existing surface water drainage arrangements shown on the drawing in *Appendix 3419/FRA/A3* will remain and continue to serve the existing roof and hardstanding areas, along with the site access road.

However, to ensure that discharge from the site does not exceed greenfield run-off rates, it is proposed to provide additional surface water attenuation in the form of underground cellular storage, with an orifice plate installed on the final manhole of the drainage network, before it discharges into the Elbridge Rife.

Within the proposed eastern extension area (0.843 ha), the ground surface will remain permeable, and there is therefore no requirement for formal drainage. However, a perimeter swale will be created within the site, at the foot of the screening bund. This will provide additional storage and promote infiltration to ground as shown on *Drawing 3419/FRA/05*.

The existing and proposed drainage network has been modelled using InfoDrainage 2023.0. The proposed swale has not been included within the model.

7.2.2 Greenfield run-off rates

Surface water flows from the site will be attenuated to pre-development (greenfield) run-off rates, ensuring the sites natural run-off regime is maintained as far as possible.

The calculated greenfield run-off rate for the impermeable area (0.737 ha) is shown on the InfoDrainage Results in *Appendix 3419/FRA/A5* and summarised in *Table 3419/FRA/T4* below:

3419/FRA/T4: Greenfield run-off rates	
Storm event	Greenfield run-off rate (l/s)
1-year	1.5
Q_{BAR}	1.7
30-year	3.9
100-year	5.5

To ensure betterment, it is intended to restrict discharge from the site to the Q_{BAR} rate for the impermeable area to 1.7 l/s. However, to reduce the risk of blockage, in accordance with EA best practice, an allowable discharge rate of 5 l/s has been used.

Discharge from the site is currently unrestricted, and the rate and volume of run-off discharging into the Elbridge Rife currently increases with rainfall intensity. Post-development, flow from the impermeable area will be restricted to 5 l/s for all rainfall events, providing significant betterment over the existing situation.

7.2.3 InfoDrainage modelling

InfoDrainage 2023.0 was used to model the existing network, along with proposed attenuation to ensure the discharge rate of 5 l/s is not exceeded. An indicative drainage layout is shown on *Drawing 3419/FRA/05*, with full InfoDrainage results included in *Appendix 3419/FRA/A5*.

The existing drainage network was simulated in InfoDrainage, based on the Existing Drainage drawing (*Appendix 3419/FRA/A3*). The following additions were made:

- Underground attenuation tank beneath the proposed car park. A total of 110 crates of size1 m x 1 m x 1 m (total 11 m x 10 m) equating to 104.7 m^3 of storage
- Additional manholes and pipework to connect the attenuation tank to the existing network
- A 0.041 m diameter orifice plate within the final (existing) manhole before discharge into the Elbridge Rife (Manhole (5) within the model)

The drainage strategy has included a 40% allowance for climate change.

The model results show that no flooding occurs on-site during the 1 in 1-year, 30-year or 100-year storm events.

For the critical storm for the 1 in 100-year + 40% climate change event, the modelling shows some flooding to occur. The maximum flooded volume for this event is approximately 222 m^3.

The storage capacity of the trench surrounding the French Drain has not been considered within the model. Based on a 0.8 m depth, 0.7 m width, 120 m length and a conservative 10% available storage volume within the gravel, an additional 6.7 m^3 of flood water could be stored. Therefore, a total flooded volume of up to 215 m^3 is possible on-site.

Surface water run-off from the site is currently unrestricted, with no attenuation provided. Therefore, the proposed updates to the surface water drainage network provide significant betterment in terms of reducing downstream flood risk.

Furthermore, an indeterminate amount of infiltration occurs within the French drains and will continue to be re-used on-site. These two factors will significantly reduce the volume of surface water within the surface water drainage network.

Considering the above and the 'low vulnerability' of the site, this level of flood risk post-development is considered to be acceptable.

7.2.4 Sustainable Drainage Systems (SuDS) and run-off water quality

Due to the proven free-draining nature of the subsurface, it is possible that infiltration methods of water disposal will be feasible. However, as a conservative measure, the surface water drainage design has currently assumed no infiltration.

Due to the nature of site operations in areas of hardstanding, above ground surface water storage and SuDS is not practical, therefore underground attenuation is proposed. Water will continue to be re-used from the holding tank (Manhole (3) within the InfoDrainage model),

and potentially also from the attenuation tank itself. This will further reduce the volume of water being discharged into the Elbridge Rife.

The existing oil interceptor shown in *Appendix 3419/FRA/A3* will remain. This will continue to remove oil and other pollutants and reduce the risk of pollutants discharging into the Elbridge Rife.

The existing French Drains will remain along the northern site boundary and through the site, adjacent to the weighbridge. As set out in Section 7.2.3, these will provide additional storage not accounted for within the model and also provide water quality benefits.

In the proposed extension area, the existing permeable surface and sub-soil will be retained. Therefore, there is no need for formal drainage in this area. However, to provide some storage and promote infiltration, a grassed swale will be created at the foot of the screening bund. The swale will also have water quality and ecological benefits.

7.3 Designing for exceedance

The surface water drainage system has been designed to minimise the risk of flooding to the site and surrounding area in the event of exceedance of the system capacity during extreme storm events. Based upon the local topography, exceedance flows would be conveyed towards attenuation features, manholes and the watercourse network, and would thus not cause an increase in flood risk to the site or elsewhere.

8 ADOPTION AND MAINTENANCE

Since 6th April 2015, SuDS are a planning requirement for all 'Major Development'. In addition, LLFA's became statutory consultees with effect from 15th April 2015. Local Planning Authorities (LPA's), in considering Planning Applications, will consult the relevant LLFA on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate; and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for the on-going maintenance of SuDS over the lifetime of the development.

8.1 Adoption

All surface water drainage infrastructure and SuDS features will remain privately owned by the landowner.

8.2 Maintenance

Typical maintenance regimes for attenuation tanks, swales, flow control structures and filter drains are included in *Appendix 3419/FRA/A7*.

9 SUMMARY AND CONCLUSIONS

A Planning Application has been prepared for the lateral extension of the existing materials recycling facility and waste transfer station. There are no changes planned to the recycling operation except to increase tonnages with the volume of processed material to increase from the present 30,000 tonnes.

The site is located predominantly in Flood Zone 1, with a small section of the perimeter within Flood Zones 2 and 3. Flood level data has been obtained from the EA. The majority of the site is above all modelled flood levels. Maximum flood depths for the 1 in 1000-year tidal flood event have been modelled to be 3.06 mAOD, which could equate to 0.31 m depth of flooding in isolated locations adjacent to the watercourse on-site. No built development is proposed in this location, and there will be no loss in floodplain storage, therefore mitigation measures are not required. The site is therefore considered to be at low risk of flooding.

The site is considered to be at low risk of flooding from all other sources.

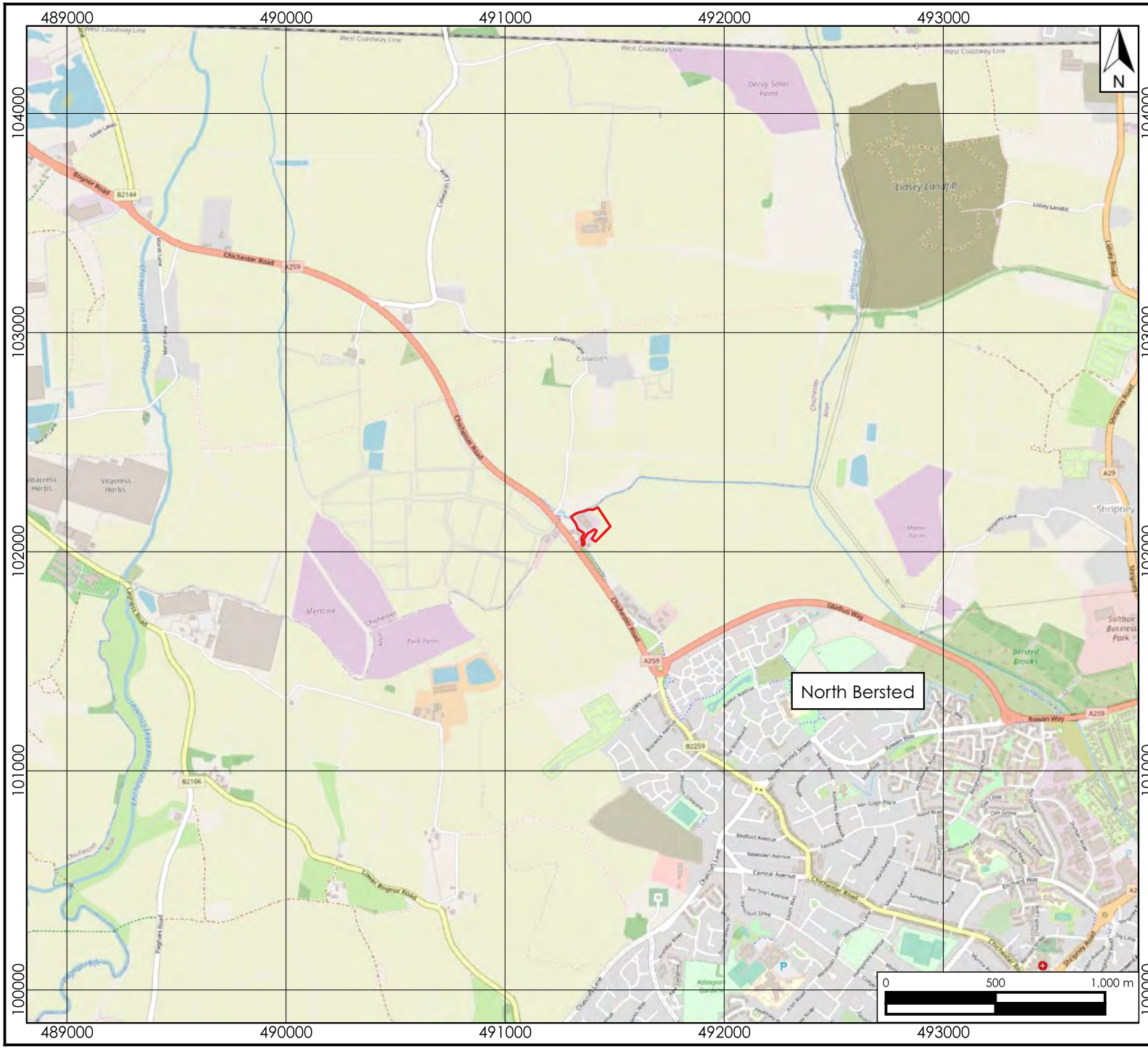
Surface water within the existing site is currently managed within a drainage system, with water conveyed unrestricted to the Elbridge Rife watercourse. To ensure the drainage system will not increase the rate and volume of surface water run-off leaving the site, underground cellular storage is proposed, along with a new orifice plate which will restrict flows to 5 l/s. The InfoDrainage model anticipates some flooding on-site during the 1 in 100-year + climate change flood event, however the model does not consider water re-use on-site, or the storage and infiltration capacity of the filter drains.

The proposed extension area is currently permeable and free-draining and will remain so post-development. A swale is proposed along the inside of the screening bund, to encourage infiltration and provide water quality benefits.

All on-site surface water drainage infrastructure will remain privately owned. A maintenance schedule for the on-site drainage has been provided.

On consideration of the above, and on implementation of this strategy, it is considered that the development will be appropriate in terms of flood risk and can be suitably drained for the development lifetime.

DRAWINGS



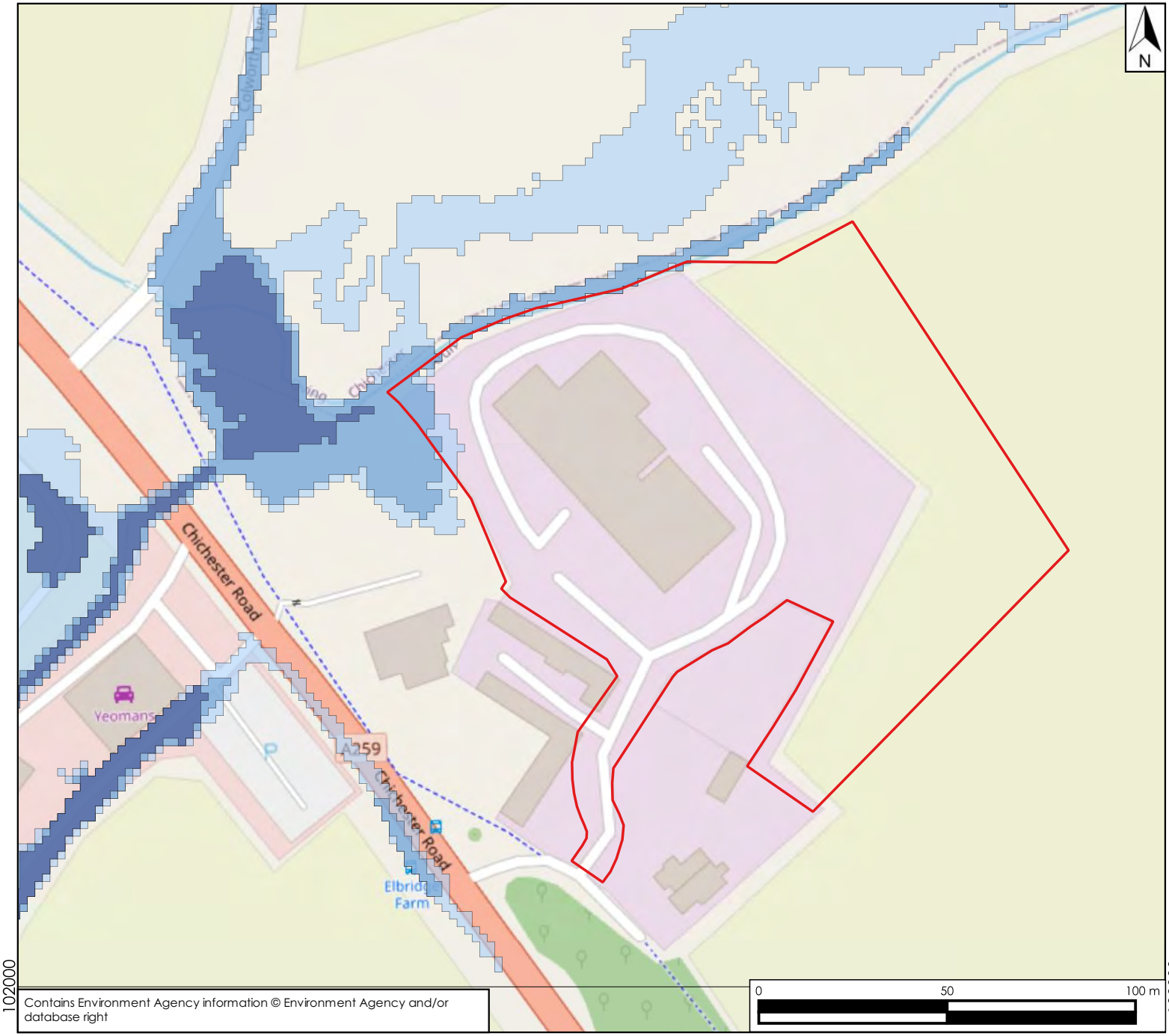
Key

Site Boundary

Scale correct at A4

Client	Recycle Southern Ltd
Title	Site Location
Project	Elbridge Farm Recycling Centre
Drawing	3419/FRA/01
Version	1
Date	Mar 2023
Scale	1:25,000

hafrenwater
environmental water management
Barkers Chambers • Barker Street • Shrewsbury • Shropshire • SY1 1SB
www.hafrenwater.com • Tel. 01743 355 770



Key

- Site Boundary
- High Risk
- Medium Risk
- Low Risk

Scale correct at A4

Client	Recycle Southern Ltd
Title	Pluvial Flood Risk
Project	Elbridge Farm Recycling Centre
Drawing	3419/FRA/02
Version	1
Date	Mar 2023
Scale	1:1,500

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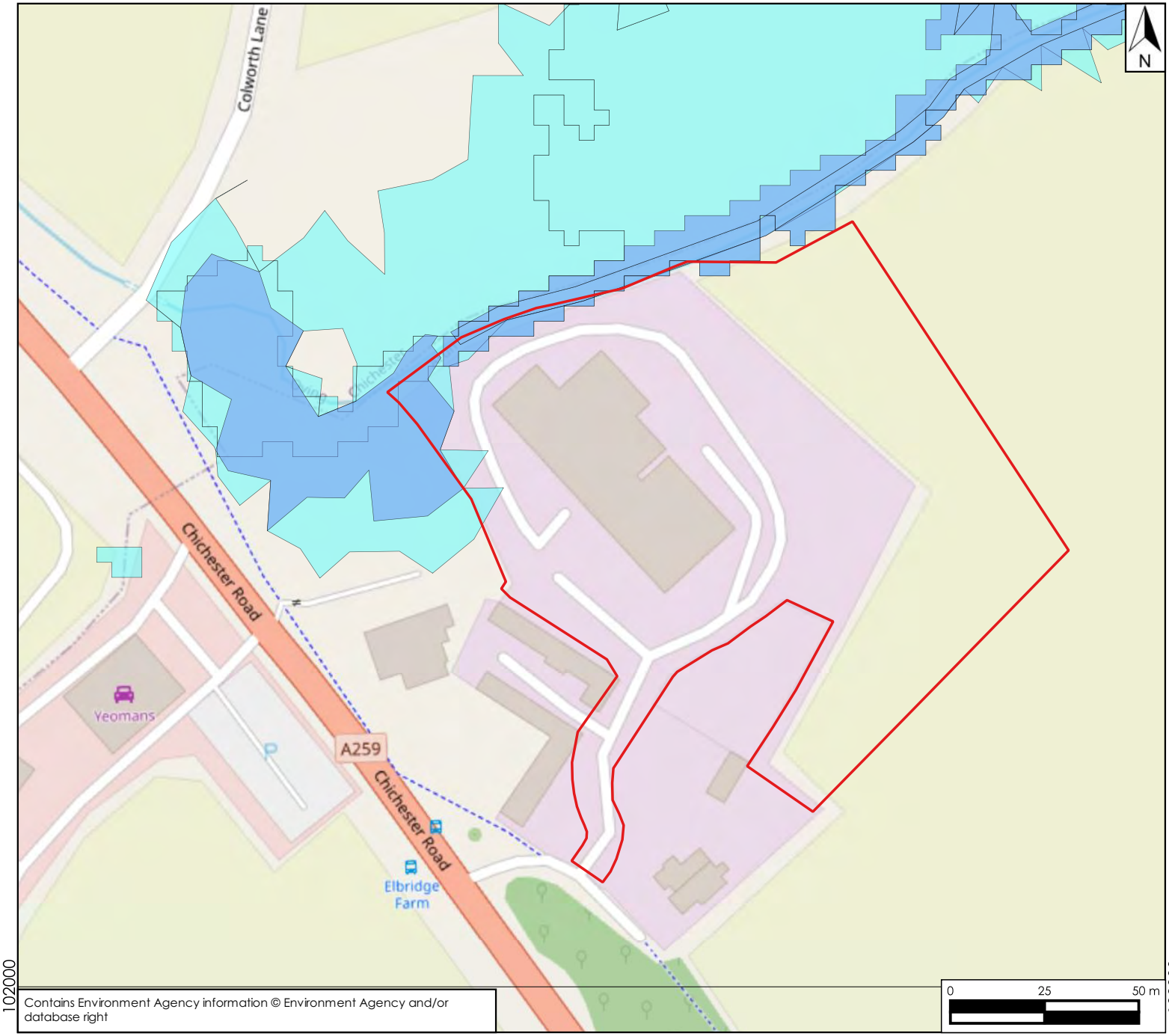

Key

- Site Boundary
- Flood Zone 2
- Flood Zone 3

Scale correct at A4

Client	Recycle Southern Ltd
Title	Fluvial Flood Risk
Project	Elbridge Farm Recycling Centre
Drawing	3419/FRA/03
Version	1
Date	Feb 2023
Scale	1:1,500

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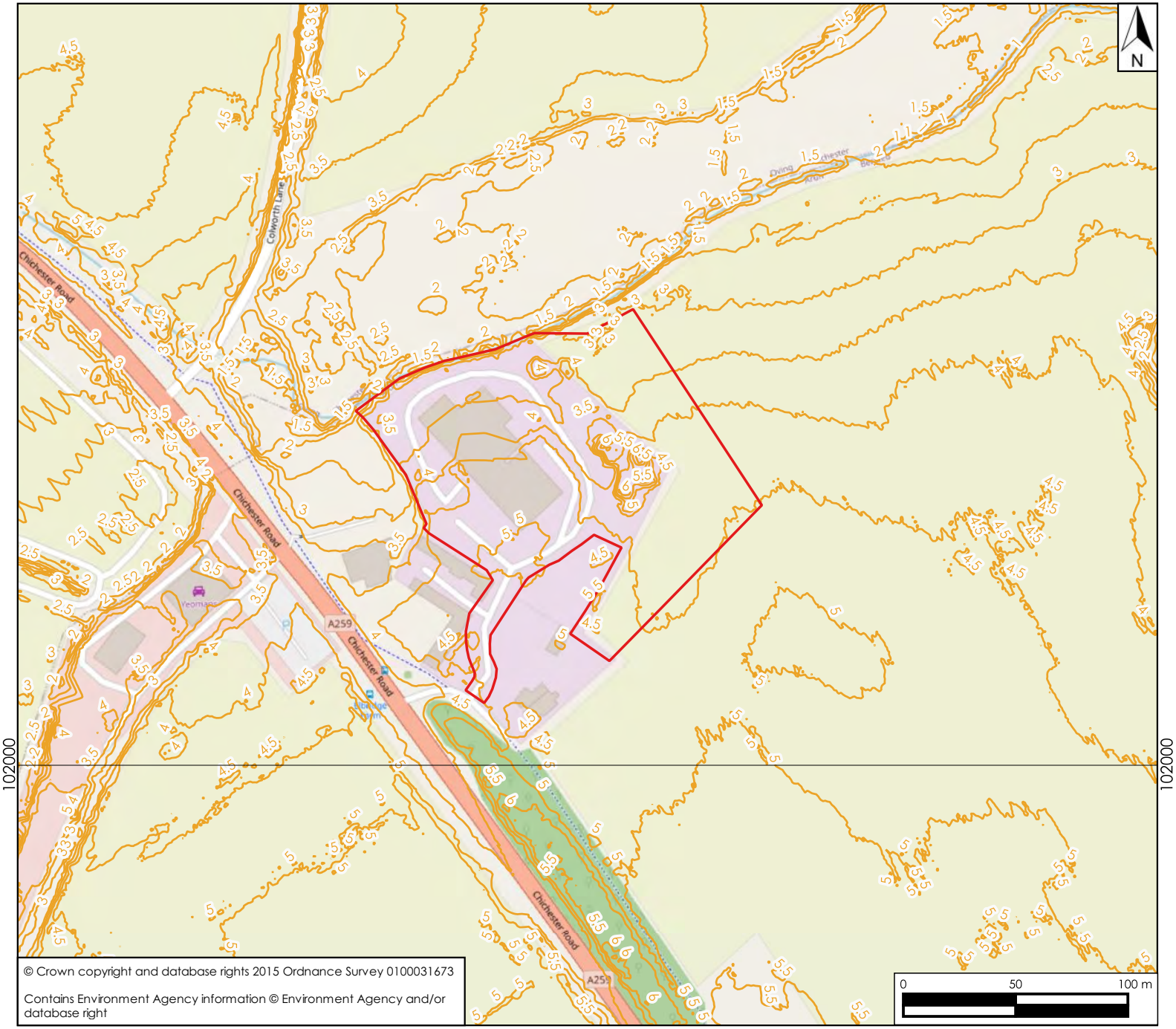

Key

Site Boundary

0.5m Contour

Scale correct at A4

Client	Recycle Southern Ltd
Title	0.5m contours
Project	Elbridge Farm Recycling Centre
Drawing	3419/FRA/04
Version	1
Date	Mar 2023
Scale	1:2,500

hafrenwater
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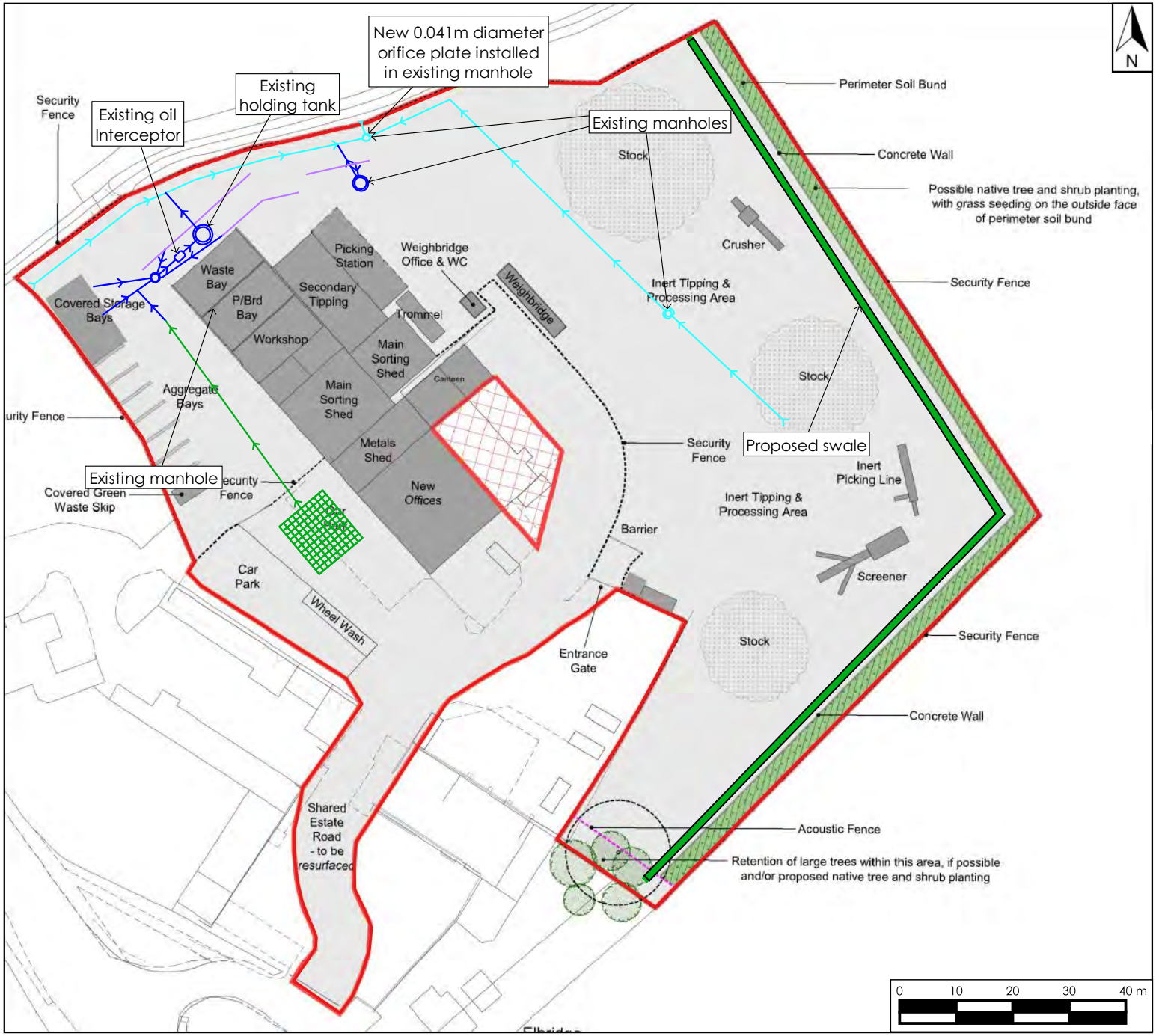
www.hafrenwater.com • Tel. 01743 355 770



Key

- Proposed Attenuation Tank
- Proposed Swale
- Proposed Pipework
- Existing Pipework
- Existing Drainage Channel
- Existing Filter Drain

Scale correct at A4

Client	GP Planning
Title	Indicative Surface Water Layout
Project	Elbridge Farm
Drawing	3419/FRA/05
Version	1
Date	Mar 2023
Scale	1:1,000

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APPENDIX 3419/FRA/A1

SFRA Mapping

Arun District Council SFRA

Map A1-T - Actual and Residual Flooding from the Sea

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- Actual Defended Tidal Flood Risk (0.5% AEP, 2006)
- Residual Defended Tidal Flood Risk (0.1% AEP, 2006)
- Coastal Risk Area

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_A1-T.wor

Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map A2-F - Flood Depth - Actual risk of Flooding from Rivers

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

Arun District Boundary

Actual Risk Flood Depths (m) (1% AEP, 2006)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- > 2.25
- Unknown

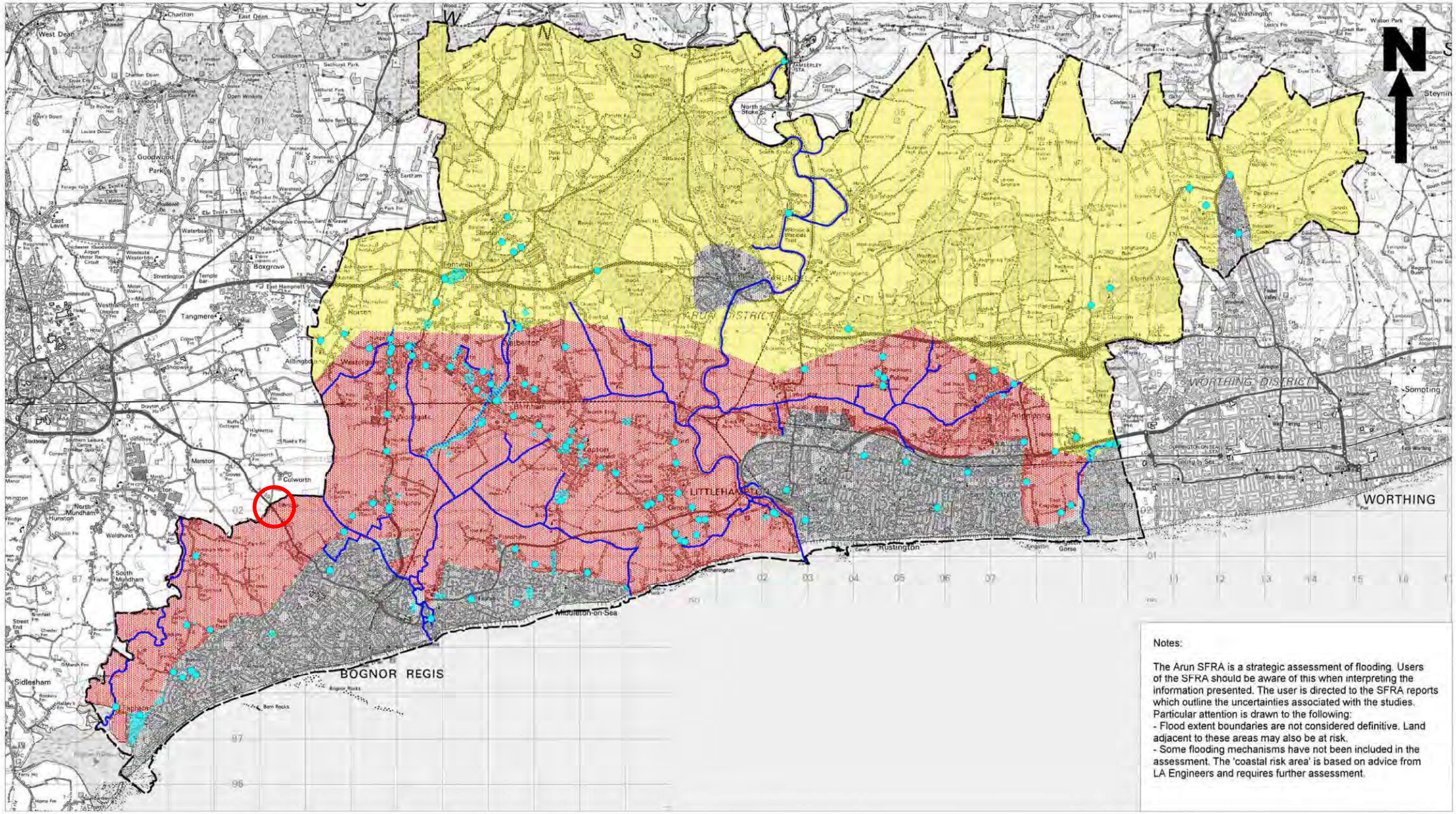
0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_A2-F.wor



Notes:

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- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map L - Areas Prone to Flooding from the Land

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- Main River

Historic Surface Water Flooding

- Area
- Point

Risk of Flooding from Land

- Low to Medium
- Medium to High
- Urban

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_L.wor

Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map S - Historic Incidents of Flooding from Sewers

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- Historic Incidents of Sewer Flooding

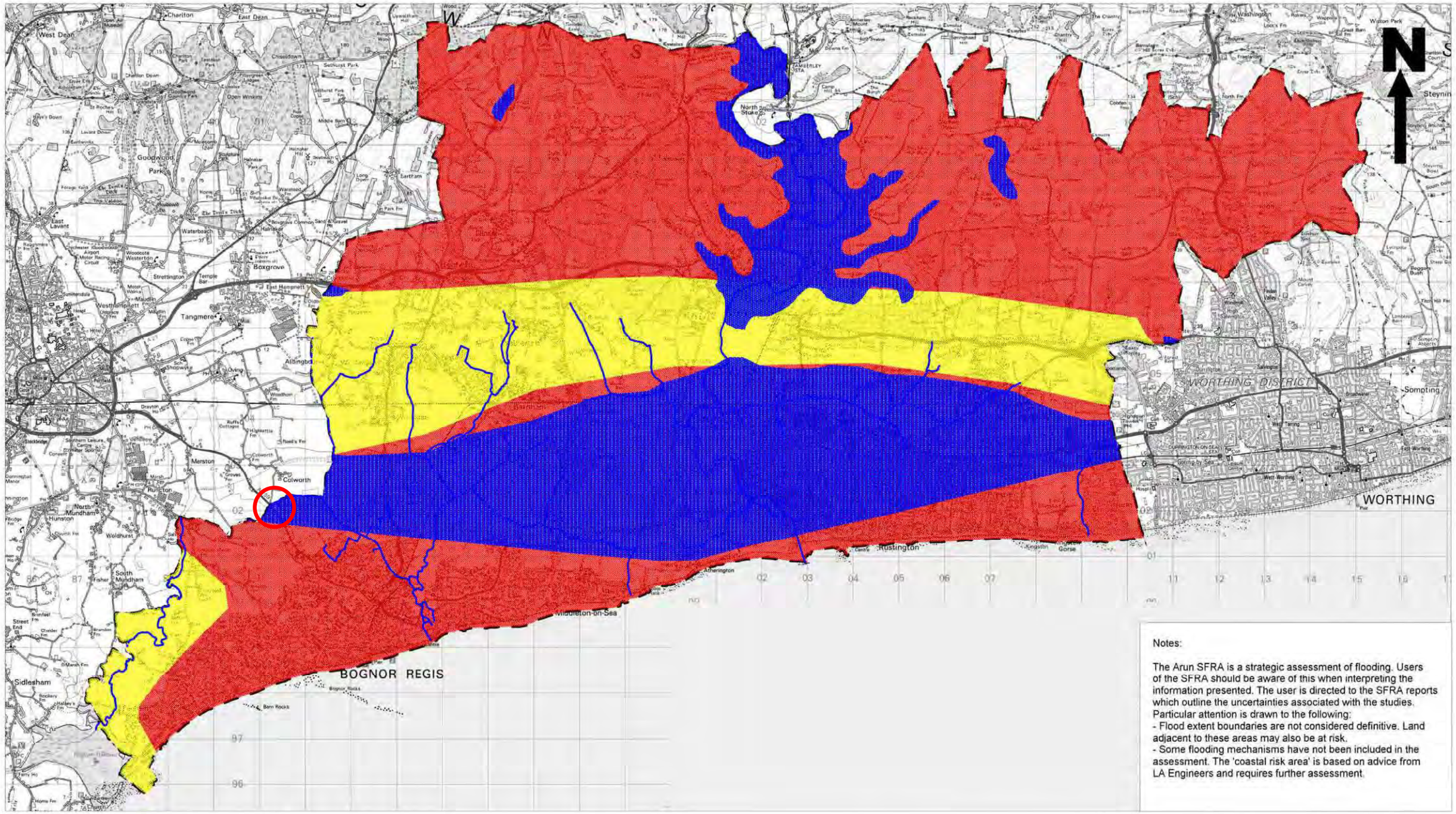
0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_S.wor



Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map G1 - Indicative Risk of Groundwater Flooding

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- Main River
- Groundwater Emergence Zones

Groundwater Flood Risk

- High
- Medium

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_G1.wor

Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map H - Historic Flood Events

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

Arun District Boundary

Historic Flood Events - Points

- Coastal
- Tidal
- Fluvial
- Surface Water
- Sewer
- Failure
- Unknown

Historic Flood Events - Areas

- Coastal
- Tidal
- Fluvial
- Surface Water
- Unknown

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_H.wor

Arun District Council SFRA

Map C1-F - Actual River Climate Change Extents (with defences)

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- 2056 Climate Change River Flood Extents (1% AEP Defended)
- 2106 Climate Change River Flood Extents (1% AEP Defended)

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_C1-F.wor

Arun District Council SFRA

Map C1-T - Actual Sea Climate Change Extents (with defences)

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Legend

- Arun District Boundary
- 2056 Climate Change Tidal Flooding Extents (0.5% AEP, defended)
- 2106 Climate Change Tidal Flooding Extents (0.5% AEP, defended)
- Coastal Risk Area

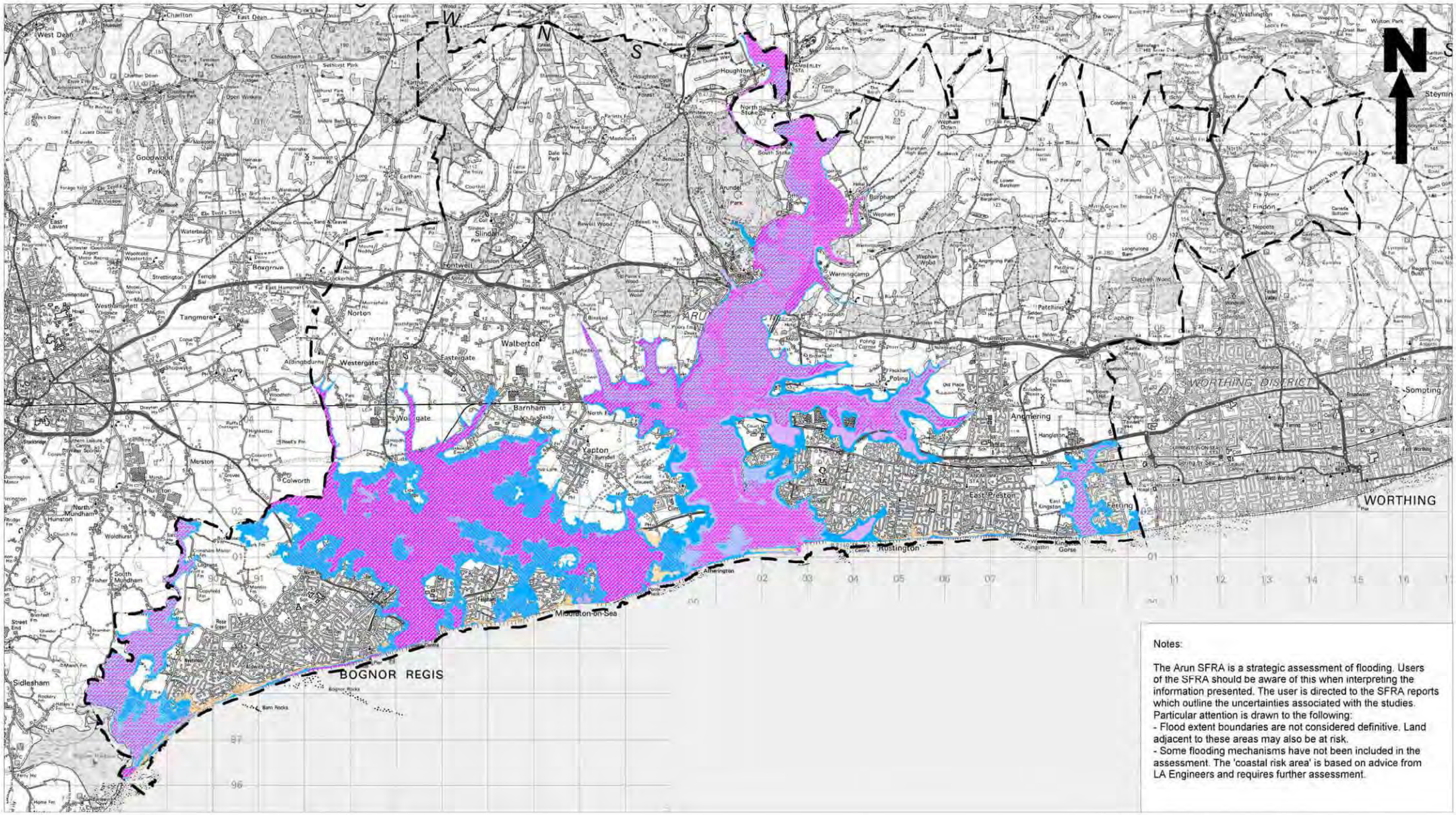
0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_.wor



Notes:

The Arun SFRA is a strategic assessment of flooding. Users of the SFRA should be aware of this when interpreting the information presented. The user is directed to the SFRA reports which outline the uncertainties associated with the studies. Particular attention is drawn to the following:
- Flood extent boundaries are not considered definitive. Land adjacent to these areas may also be at risk.
- Some flooding mechanisms have not been included in the assessment. The 'coastal risk area' is based on advice from LA Engineers and requires further assessment.

Arun District Council SFRA

Map C2-T - Tidal Flood Zones with Climate Change

ARUN DISTRICT COUNCIL

CAPITA SYMONDS

Legend

- Arun District Boundary
- Future Flood Zone 3b (2056)
- Future Flood Zone 3b (2106)
- Future Flood Zone 3a (2056)
- Coastal Risk Area
- Future Flood Zone 3a (2106)
- Future Flood Zone 2 (2056)
- Future Flood Zone 2 (2106)

0 2 4

Kilometres

Scale at A3: 1:80,000

Date: 31/01/2008

Map_C2-T.wor

APPENDIX 3419/FRA/A2

Site layout plan

N

Pond

Security Fence

Elbridge Farmhouse

Covered Storage Bays

Waste Bay

P/Brd Bay

Workshop

Picking Station

Secondary Tipping

Main Sorting Shed

Main Sorting Shed

Canteen

Metals Shed

New Offices

Weighbridge Office & WC

Weighbridge

Trommel

Aggregate Bays

Security Fence

Covered Green Waste Skip

Security Fence

Car Park

Car Park

Wheel Wash

A 259

Chichester Road

Shared Estate Road - to be resurfaced

Elbridge Farm Cottages

Entrance Gate

Barrier

Perimeter Soil Bund

Concrete Wall

Possible native tree and shrub planting, with wildflower seeding on the outside face of perimeter soil bund

Stock

Crusher

Inert Tipping & Processing Area

Security Fence

Stock

Security Fence

Inert Picking Line

Inert Tipping & Processing Area

Screener

Stock

Security Fence

Concrete Wall

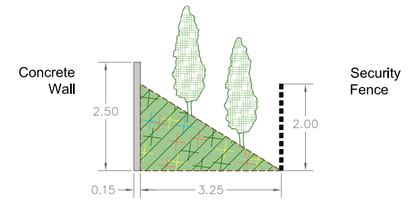
Acoustic Fence

Retention of large trees within this area, if possible and/or proposed native tree and shrub planting

KEY

- Planning Application Boundary
- Not within Planning Application Boundary
- Security Fence - 2 meter high
- Concrete Wall to protect bund - 2.5 meter high
- Acoustic Fence - 3.5 meter high
- Native Tree and Shrub planting
- Wildflower seeding

PERIMETER SOIL BUND



A mix of native tree and shrub planting with wildflower seeding

Scale - 1:100 at A2

0 1 2 3 4 5

Rev	Description	Initial	Date
11	Planning application boundary amendment to north, Canteen area reduced. Example of trees added to perimeter soil bund.	KD	20/03/23
10	Amendment to perimeter soil bund. Concrete wall added.	KD	16/03/23
09	Acoustic fence added.	KD	08/02/23
08	Inner impermeable fence added.	KD	03/02/23
07	Security fence shown on the inside of 8m native tree and shrub planting.	KD	05/12/22
06	Tree / hedgerow planting inside the security fence to the northern boundary removed. Perimeter soil bund stopped at the southern boundary turn, retention of large trees within this area.	KD	01/12/22
05	Details from proposed landscape plan added to site layout plan. Covered grass waste skip added.	KD	23/11/22
04	Perimeter soil bund updated. Refer to proposed landscape plan.	KD	16/11/22
03	Additional aggregate bays added.	KD	17/10/22
02	Perimeter soil bund added.	KD	17/10/22
01	Add wheel wash and relocate screener / stock sightly north east.	KD	14/09/22

GPP GP PLANNING LTD

Planning Consultants

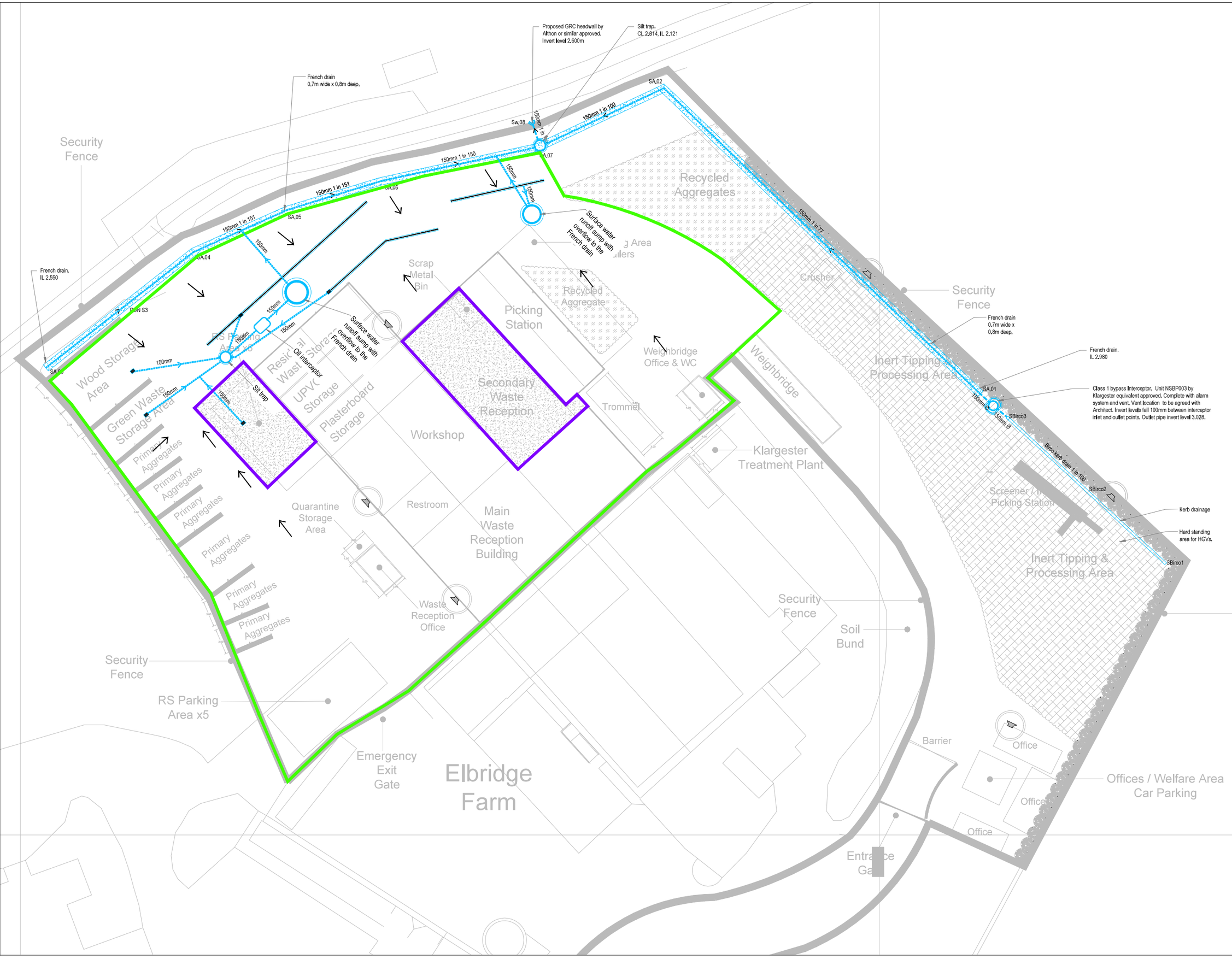
T: 01604 771123 E: Info@gpplanning.co.uk W: www.gpplanning.co.uk
iCon Environmental Innovation Centre, Eastern Way,
Daventry, Northamptonshire, NN11 0QB
Registered in England No. 6019666

TITLE:	Proposed Extension Area at Elbridge Farm, Chichester Road, Bognor Regis Site Layout Plan		
CLIENT:	RECYCLE SOUTHERN LIMITED		
Ordnance Survey Licence: Reproduction from the Ordnance Survey Map with sanction of the Controller of Her Majesty's Stationery Office © Crown Copyright, Licence number 51206561. For identification purposes only.			
DRAWN BY:	KD	CHECKED BY:	CS
DRAWING NO.:	GPP/RS/BR/EXT/22/02	REV NO.:	11
SCALE:	1:500 at A2	DATE:	12 Sept 2022
SCALE BAR:	0 5 10 20		

ORIGINAL A2 SIZE SHEET

APPENDIX 3419/FRA/A3

Existing Surface Water Drainage (Drainage Arrangement)



IF YOU HAVE A QUERY CALL US

SCALING FROM THIS DRAWING OR OBTAINING DIMENSIONS ELECTRONICALLY MAY NOT PROVIDE ACCURATE INFORMATION AND SHOULD BE AVOIDED. WORK ONLY FROM FIGURED DIMENSIONS.

GENERAL NOTES

DRAWINGS AND SPECIFICATIONS: This drawing is to be read in conjunction with all relevant Architects, Engineers and Specialists drawings together with the specification.

PIPE DIAMETERS. All private drains to be 150mm diameter unless stated otherwise.

KEY

- Proposed private surface water drain
- Proposed French drain, 0,7m wide x 0,8m deep stone filled trench with a perforated 150mm diameter land drain at the bottom.
- Proposed kerb drain
- Proposed drainage channel
- Proposed 'Type 4', Rectangular brick chamber
- Proposed 'Type 2', precast concrete ring overflow chamber
- Permeable pavement which allows water infiltration. Minimum stone depth 0.4m.
- Bunded concrete pad with a sealed drainage system and a sump for collecting water for treatment.

C D M : SIGNIFICANT HAZARDS

THE FOLLOWING HEALTH AND SAFETY HAZARDS ARE IDENTIFIED BY THE DESIGNER AS ABNORMAL IN PURSUANCE OF THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2007.

RISK DURING CONSTRUCTION:

- No abnormal risks have been identified relating to this design element.

OPERATION / MAINTENANCE RISKS:

- No abnormal risks have been identified relating to this design element.

RISKS DURING DEMOLITION / DECOMMISSIONING / DISMANTLING / ALTERATIONS:

- No abnormal risks have been identified relating to this design element.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY COMPETENT & ADEQUATELY RESOURCED CONTRACTOR(S) WORKING TO SAFE SYSTEMS OF WORK.

REV	REVISION DETAILS	DATE
C	BACKGROUND LAYOUT CHANGED. SEALED DRAINAGE INDICATED.	13.06.22
B	LOCATION OF OIL INTERCEPTOR CHANGED.	09.01.15
A	1ST ISSUE.	06.01.15

CRADDYS

63 MACRAE ROAD, EDEN OFFICE PARK, HAM GREEN
BRISTOL, BS20 0DD

TEL : 01275 371 333
email : info@craddys.co.uk www.craddys.co.uk

PROJECT TITLE
PROPOSED WTS AND MRF DEVELOPMENT AT ELBRIDGE FARM, CHICHESTER ROAD BOGNOR REGIS

DRAWING TITLE
DRAINAGE ARRANGEMENT

CLIENT
RECYCLE SOUTHERN LIMITED

STATUS
INFORMATION

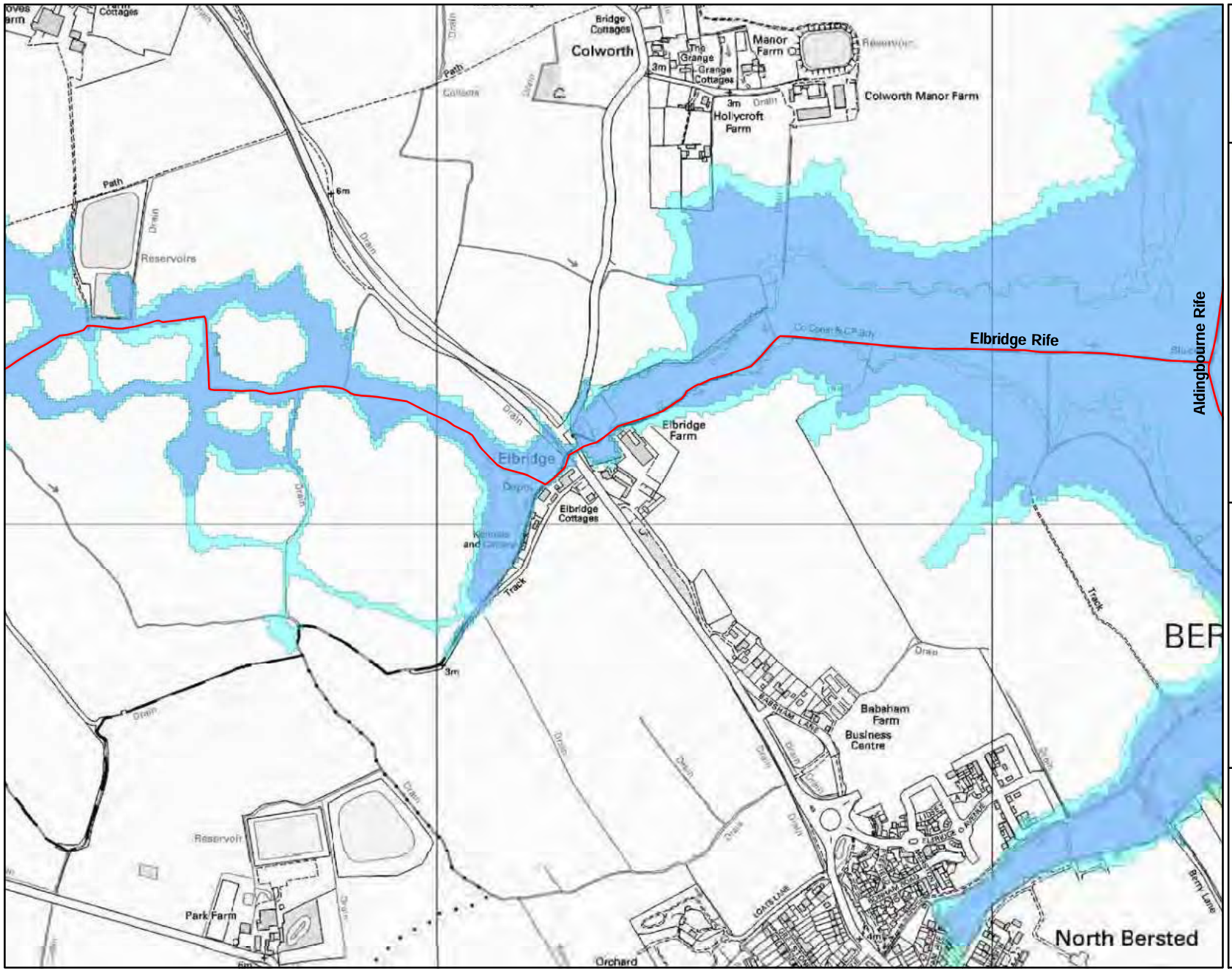
SCALE	DRAWN	CHECKED	APPROVED
1:200 AT A1	CS	CAP	PJF

DRG SIZE	DRAWING NUMBER	REV
A1	9819-0050	C

APPENDIX 3419/FRA/A4

EA Product 4 Data

Flood Map for Planning Centered on Elbridge Farm, Chichester Road, Bognor Regis - Created 10/03/2014 [Ref: SSD/3141/KW]



Legend

- Main River
- Flood Zone 3
- Flood Zone 2

1:10,000 *

*when printed at A4.

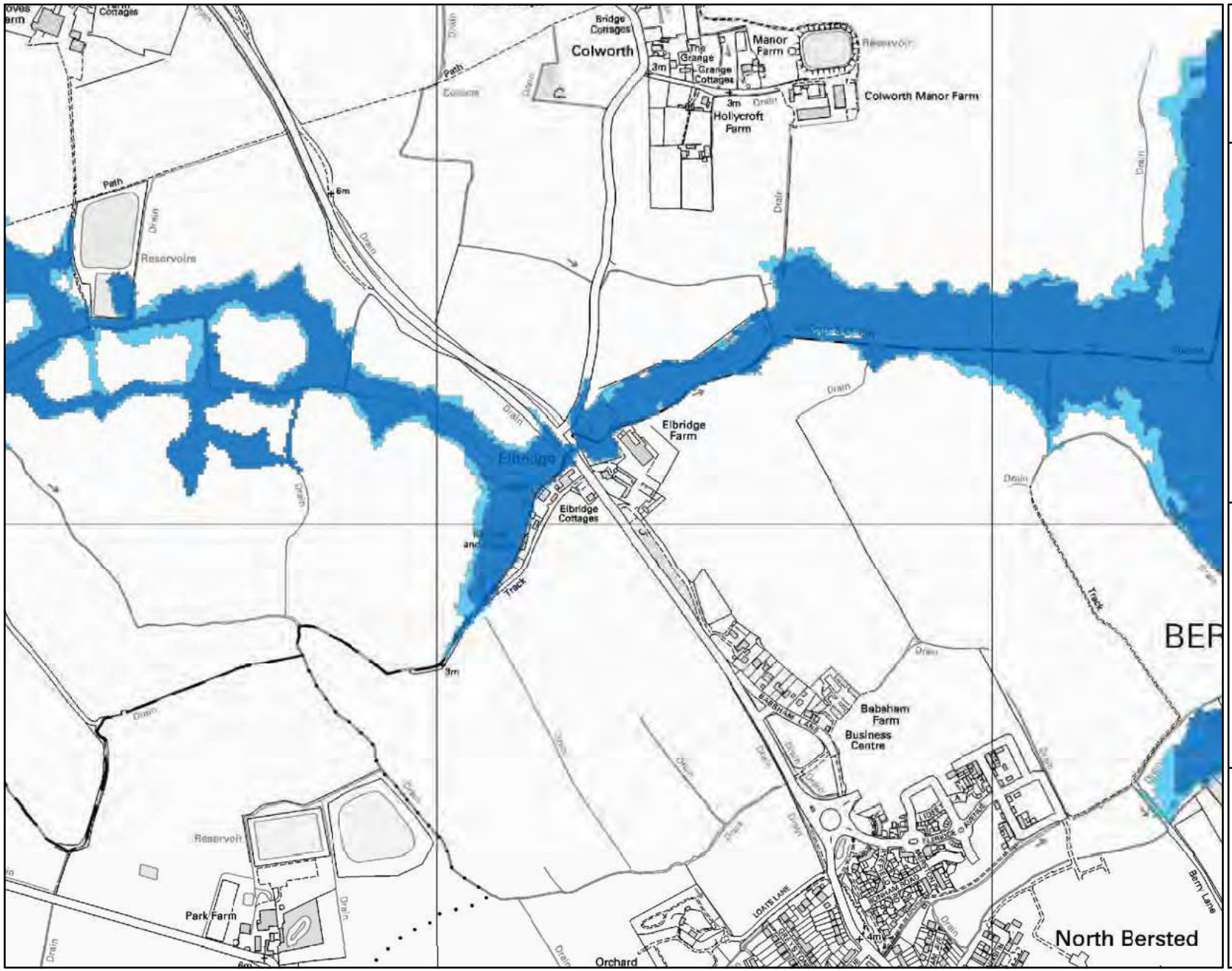
N

0 260 520

Meters

Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

2009 JFLOW Fluvial Outlines Centered on Elbridge Farm, Chichester Road, Bognor Regis - Created 10/03/2014 [Ref: SSD/3141/KW]



Environment Agency

Legend

- Fluvial 1% [1in100yr]
- Fluvial 0.1% [1in1000yr]

1:10,000 *

*when printed at A4.

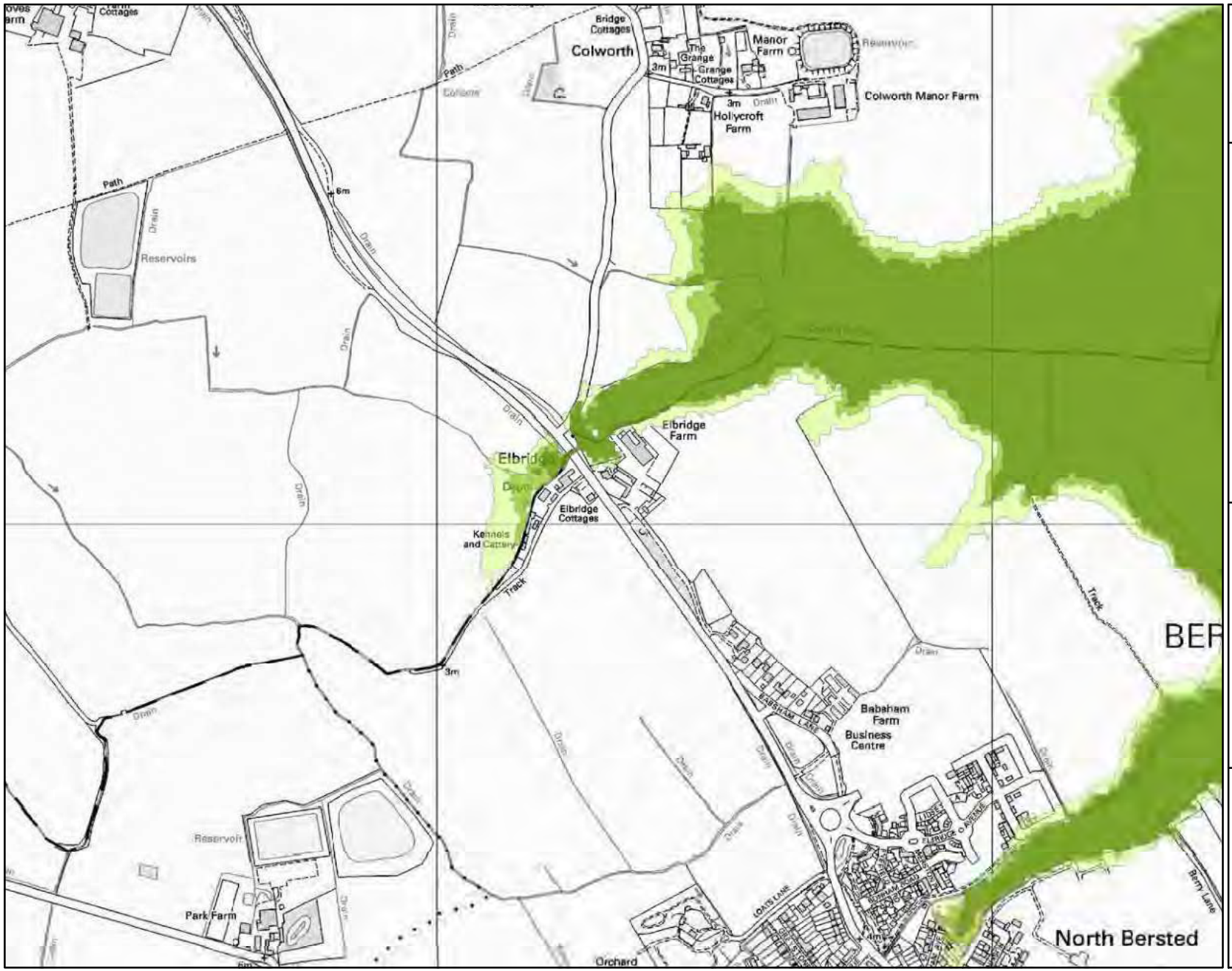
N

0 260 520

Meters

Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

2009 TUFLOW Tidal Outlines Centered on Elbridge Farm, Chichester Road, Bognor Regis - Created 10/03/2014 [Ref: SSD/3141/KW]



Environment Agency

Legend

- Tidal 1% [1in100yr]
- Tidal 0.5% [1in200yr]
- Tidal 0.1% [1in1000yr]

1:10,000 *

*when printed at A4.

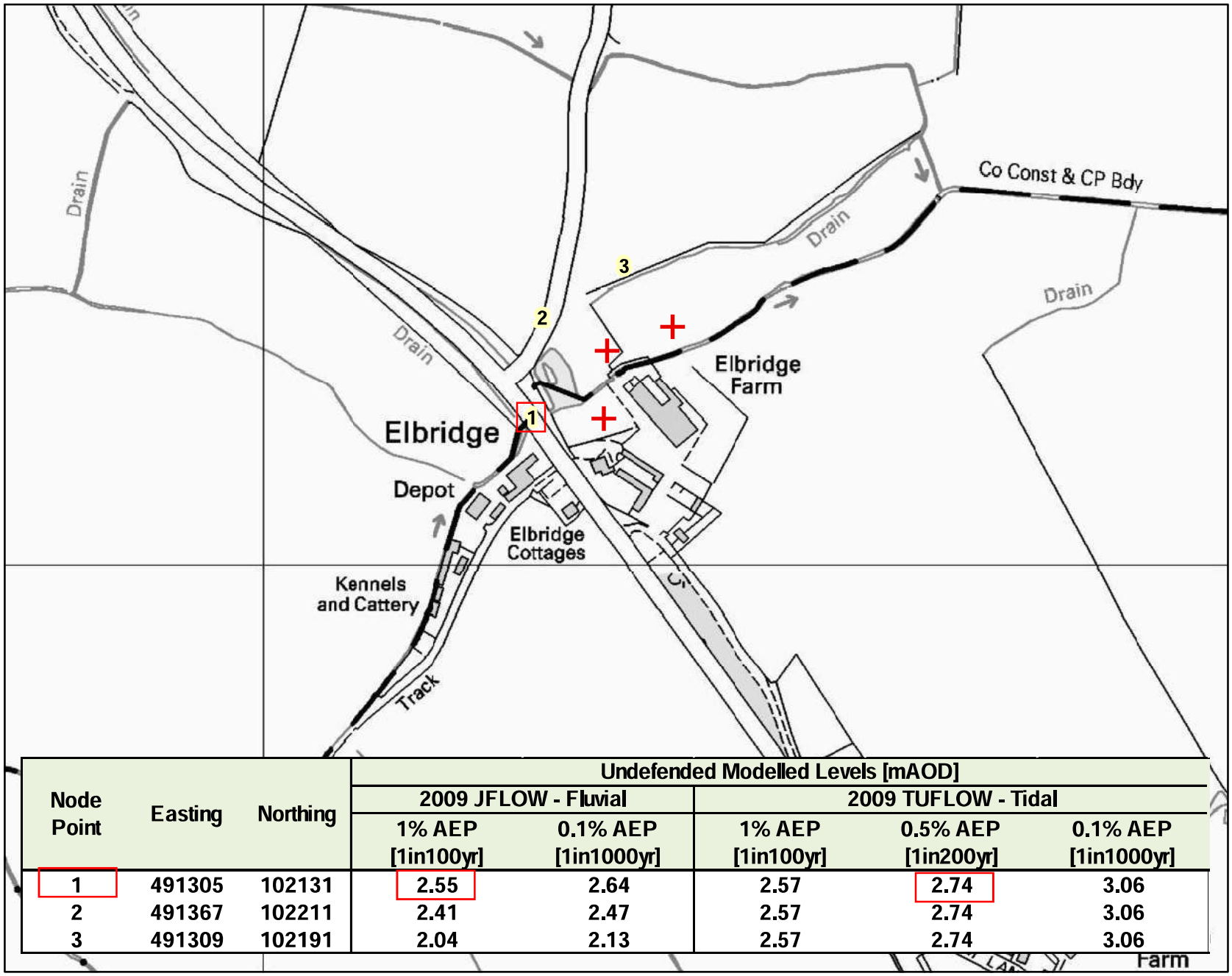
N

0 260 520

Meters

Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled Levels Centered on Elbridge Farm, Chichester Road, Bognor Regis - Created 10/03/2014 [Ref: SSD/3141/KW]



Node Point	Easting	Northing	Undefended Modelled Levels [mAOD]				
			2009 JFLOW - Fluvial		2009 TUFLOW - Tidal		
			1% AEP [1in100yr]	0.1% AEP [1in1000yr]	1% AEP [1in100yr]	0.5% AEP [1in200yr]	0.1% AEP [1in1000yr]
1	491305	102131	2.55	2.64	2.57	2.74	3.06
2	491367	102211	2.41	2.47	2.57	2.74	3.06
3	491309	102191	2.04	2.13	2.57	2.74	3.06

Environment Agency

Legend

1 + Node Point

1:5,000 *

*when printed at A4.

N

0 130 260

Meters

Contact Us: National Customer Contact Centre, PO BOX 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

APPENDIX 3419/FRA/A5

InfoDrainage Calculations

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflows Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Catchment Area

Type : Catchment Area

Area (ha)	0.38

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (1)

Type : Catchment Area

Area (ha)	0.22

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (2)

Type : Catchment Area

Area (ha)	0.138

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junctions Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)
Manhole	Manhole	491361.899	102107.590	4.500	1.000
Simple Junction	Simple Junction	491360.940	102186.610		
Manhole (2)	Manhole	491325.653	102157.329	3.090	1.200
Manhole (3)	Manhole	491332.726	102163.224	3.030	3.000
Manhole (4)	Manhole	491359.806	102173.511	2.940	1.440
Manhole (5)	Manhole	491362.466	102180.973	2.940	3.200
Simple Junction (1)	Simple Junction	491357.140	102179.179		
Manhole (1)	Manhole	491353.503	102116.084	3.578	1.008
Simple Junction (2)	Simple Junction	491329.024	102169.703		
Simple Junction (3)	Simple Junction	491309.209	102158.236		
Simple Junction (5)	Simple Junction	491373.794	102183.554		
Manhole (6)	Manhole	491404.342	102149.756	4.198	1.171

Name	Invert Level (m)	Chamber Shape	Diameter (m)	Manhole Locked
Manhole	3.500	Circular	1.200	☐
Simple Junction				
Manhole (2)	1.890	Circular	1.200	☐
Manhole (3)	0.030	Circular	2.000	☐
Manhole (4)	1.500	Circular	1.200	☐
Manhole (5)	-0.260	Circular	1.200	☐
Simple Junction (1)				
Manhole (1)	2.570	Circular	1.200	☐
Simple Junction (2)				
Simple Junction (3)				
Simple Junction (5)				
Manhole (6)	3.027	Circular	1.200	☐

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Manhole	Inlet	Catchment Area	(None)	No Restriction
Simple Junction	Inlet (1)	Pipe (3)	(None)	No Restriction
Manhole (2)	Inlet	Catchment Area (1)	(None)	No Restriction
	Inlet (1)	Pipe (1) (1)	(None)	No Restriction
Manhole (3)	Inlet	Pipe (4)	(None)	No Restriction
Manhole (4)	Inlet	Catchment Area (2)	(None)	No Restriction
Manhole (5)	Inlet (1)	Pipe (6) Pipe (9)	(None)	No Restriction
Simple Junction (1)	Inlet	Pipe (5) Pipe (2) (1)	(None)	No Restriction
Manhole (1)	Inlet	Pipe (1)	(None)	No Restriction
Simple Junction (2)	Inlet	Pipe (2) Pipe (7)	(None)	No Restriction
Simple Junction (5)	Inlet	Pipe (8) (1)	(None)	No Restriction

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junctions Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Manhole	Outlet	Pipe	Free Discharge
Manhole (2)	Outlet	Pipe (4)	Free Discharge
Manhole (3)	Outlet	Pipe (2)	Free Discharge
Manhole (4)	Outlet	Pipe (5)	Free Discharge
Manhole (5)	Outlet	Pipe (3)	Orifice
	Diameter (m)	0.041	
	Coefficient of Discharge	0.600	
	Invert Level (m)	1.000	
Simple Junction (1)	Outlet	Pipe (6)	Free Discharge
Manhole (1)	Outlet	Pipe (1) (1)	Free Discharge
Simple Junction (2)	Outlet	Pipe (2) (1)	Free Discharge
Simple Junction (3)	Outlet	Pipe (7)	Free Discharge
Simple Junction (5)	Outlet	Pipe (9)	Free Discharge
Manhole (6)	Outlet	Pipe (8) (1)	Free Discharge

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedence Level (m)	3.800
Depth (m)	1.000
Base Level (m)	2.600
Number of Crates Long	11
Number of Crates Wide	10
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	1
Total Volume (m^3)	104.700

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Free Discharge

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Connections Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Name	Length (m)	Connection Type	Slope (1:x)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
Pipe	3.617	Pipe	72.350		0.6	150	4.500	3.500
Pipe (4)	9.207	Pipe	23.609		0.6	150	3.090	1.890
Pipe (3)	6.067	Pipe	19.572		0.6	150	2.940	1.000
Pipe (6)	5.620	Pipe	18.733		0.6	150	3.000	1.300
Pipe (5)	6.264	Pipe	31.318		0.6	150	2.940	1.500
Pipe (1)	9.649	Pipe	320.809		0.6	150	3.800	2.600
Pipe (1) (1)	56.461	Pipe	83.040		0.6	150	3.578	2.570
Pipe (2)	7.462	Pipe	173.196		0.6	150	3.030	1.500
Pipe (2) (1)	29.671	Pipe	189.089		0.6	150	3.000	1.457
Pipe (7)	22.893	Pipe	66.745		0.6	150	3.000	1.800
Pipe (9)	11.618	Pipe	33.194		0.6	150	0.000	1.350
Pipe (8) (1)	45.557	Pipe	27.163		0.6	150	4.198	3.027

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Flow Restriction (L/s)
Pipe	3.800	3.450	
Pipe (4)	3.030	1.500	
Pipe (3)	0.000	0.690	4.9
Pipe (6)	2.940	1.000	
Pipe (5)	0.000	1.300	
Pipe (1)	3.578	2.570	
Pipe (1) (1)	3.090	1.890	
Pipe (2)	0.000	1.457	
Pipe (2) (1)	0.000	1.300	
Pipe (7)	0.000	1.457	
Pipe (9)	2.940	1.000	
Pipe (8) (1)	0.000	1.350	

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022			
	Designed by CH	Checked by CL	Approved By	hafrenwater environmental water management
Report Details Type: Manhole Schedule Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Manhole	4.500 3.500	Diameter / Length: 1.200					Manhole - Access not Required
E:491361.899 N:102107.590	1.000		{a} Pipe	Pipe	3.500	Diam/Width:150	Not Applicable
Simple Junction		Diameter / Length: 1.200	{1} Pipe (3)	Pipe	0.690	Diam/Width:150	Simple Junction - Access not Required
E:491360.940 N:102186.610							Not Applicable
Manhole (2)	3.090 1.890	Diameter / Length: 1.200	{1} Pipe (1) (1)	Pipe	1.890	Diam/Width:150	Manhole - Access not Required
E:491325.653 N:102157.329	1.200		{a} Pipe (4)	Pipe	1.890	Diam/Width:150	Not Applicable
Manhole (3)	3.030 0.030	Diameter / Length: 2.000	{1} Pipe (4)	Pipe	1.500	Diam/Width:150	Manhole - Access not Required
E:491332.726 N:102163.224	3.000		{a} Pipe (2)	Pipe	1.500	Diam/Width:150	Not Applicable
Manhole (4)	2.940 1.500	Diameter / Length: 1.200					Manhole - Access not Required
E:491359.806 N:102173.511	1.440		{a} Pipe (5)	Pipe	1.500	Diam/Width:150	Not Applicable

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Manhole Schedule Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Manhole (5)	2.940 -0.260	Diameter / Length: 1.200	{1} Pipe (6)	Pipe	1.000	Diam/Width:150	Manhole - Access not Required
E:491362.466 N:102180.973	3.200		{2} Pipe (9)	Pipe	1.000	Diam/Width:150	
			{a} Pipe (3)	Pipe	1.000	Diam/Width:150	Not Applicable
Simple Junction (1)		Diameter / Length: 1.200	{1} Pipe (5)	Pipe	1.300	Diam/Width:150	Simple Junction - Access not Required
E:491357.140 N:102179.179			{2} Pipe (2) (1)	Pipe	1.300	Diam/Width:150	
			{a} Pipe (6)	Pipe	1.300	Diam/Width:150	Not Applicable
Manhole (1)	3.578 2.570	Diameter / Length: 1.200	{1} Pipe (1)	Pipe	2.570	Diam/Width:150	Manhole - Access not Required
E:491353.503 N:102116.084	1.008		{a} Pipe (1) (1)	Pipe	2.570	Diam/Width:150	Not Applicable
Simple Junction (2)		Diameter / Length: 1.200	{1} Pipe (2)	Pipe	1.457	Diam/Width:150	Simple Junction - Access not Required
E:491329.024 N:102169.703			{2} Pipe (7)	Pipe	1.457	Diam/Width:150	
			{a} Pipe (2) (1)	Pipe	1.457	Diam/Width:150	Not Applicable

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022			
	Designed by CH	Checked by CL	Approved By	
Report Details Type: Manhole Schedule Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Simple Junction (3)		Diameter / Length: 1.200					Simple Junction - Access not Required
E:491309.209 N:102158.236			{a} Pipe (7)	Pipe	1.800	Diam/Width:150	Not Applicable
Simple Junction (5)		Diameter / Length: 1.200	{1} Pipe (8) (1)	Pipe	1.350	Diam/Width:150	Simple Junction - Access not Required
E:491373.794 N:102183.554			{a} Pipe (9)	Pipe	1.350	Diam/Width:150	Not Applicable
Manhole (6)	4.198 3.027	Diameter / Length: 1.200					Manhole - Access not Required
E:491404.342 N:102149.756	1.171		{a} Pipe (8) (1)	Pipe	3.027	Diam/Width:150	Not Applicable

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflow Summary Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Manhole		Time of Concentration	0.380	100	0	100	0.380
Catchment Area (1)	Manhole (2)		Time of Concentration	0.220	100	0	100	0.220
Catchment Area (2)	Manhole (4)		Time of Concentration	0.138	100	0	100	0.138
TOTAL		**0.0**		**0.737**				**0.737**

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Network Design Criteria Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	500.00
Max. Slope (1:x)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☑

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022			
	Designed by CH	Checked by CL	Approved By	
Report Details Type: Outfall Details Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Simple Junction	Free Discharge		

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Title Rainfall Analysis Criteria	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England and Wales
M5-60 (mm)	19.2
Ratio R	0.347
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0
30.0	0
100.0	0
100.0	40

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Title UK and Ireland Rural Runoff Calculator	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.737
SAAR (mm)	868.0
Soil	0.3
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	1.7	1.7	1.5	3.9	5.5

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflows Summary Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Critical Storm

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow (m^3)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Winter	0.38	216.7	100.248
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Winter	0.22	125.3	57.981
Catchment Area (2)	FSR: 100 years: +40 %: 15 mins: Winter	0.14	78.6	36.348

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junctions Summary Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Manhole	FSR: 100 years: +40 %: 15 mins: Winter	4.500	3.500	4.540	1.040	216.7	40.767	39.636	72.7	100.209	Flood
Simple Junction	FSR: 100 years: +40 %: 960 mins: Summer		0.000	0.725	0.035	5.0			5.0	529.436	OK
Manhole (2)	FSR: 100 years: +40 %: 240 mins: Winter	3.090	1.890	3.191	1.301	42.7	101.890	100.532	18.4	332.331	Flood
Manhole (3)	FSR: 100 years: +40 %: 240 mins: Winter	3.030	0.030	3.130	3.100	18.4	109.707	100.281	10.2	234.942	Flood
Manhole (4)	FSR: 100 years: +40 %: 960 mins: Summer	2.940	1.500	3.052	1.552	7.9	113.245	111.617	2.7	127.135	Flood
Manhole (5)	FSR: 100 years: +40 %: 960 mins: Summer	2.940	-0.260	3.046	3.306	9.9	109.690	106.070	5.0	531.842	Flood
Simple Junction (1)	FSR: 100 years: +40 %: 960 mins: Summer		0.000	3.052	1.752	9.9			9.9	578.677	Surcharged
Manhole (1)	FSR: 100 years: +40 %: 120 mins: Winter	3.578	2.570	3.624	1.054	37.2	46.976	45.836	16.8	165.201	Flood
Simple Junction (2)	FSR: 100 years: +40 %: 360 mins: Winter		0.000	3.105	1.648	9.8			9.8	314.536	Surcharged
Simple Junction (3)	FSR: 100 years: +40 %: 360 mins: Winter		0.000	3.105	1.305	1.1			0.0	0.045	Surcharged
Simple Junction (5)	FSR: 100 years: +40 %: 960 mins: Summer		0.000	3.046	1.696	0.7			0.0	0.183	Surcharged
Manhole (6)	FSR: 100 years: +40 %: 960 mins: Summer	4.198	3.027	3.046	0.019	0.0	0.022	0.000	0.0	0.037	OK

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Stormwater Controls Summary Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 100 years: +40 %: 120 mins: Winter	4.043	4.043	1.443	1.443	71.0	130.091	25.363	0.000	37.2	159.240	-24	Flood

Critical Storm

Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by: CH	Checked by: CL	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Hafren Water: Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

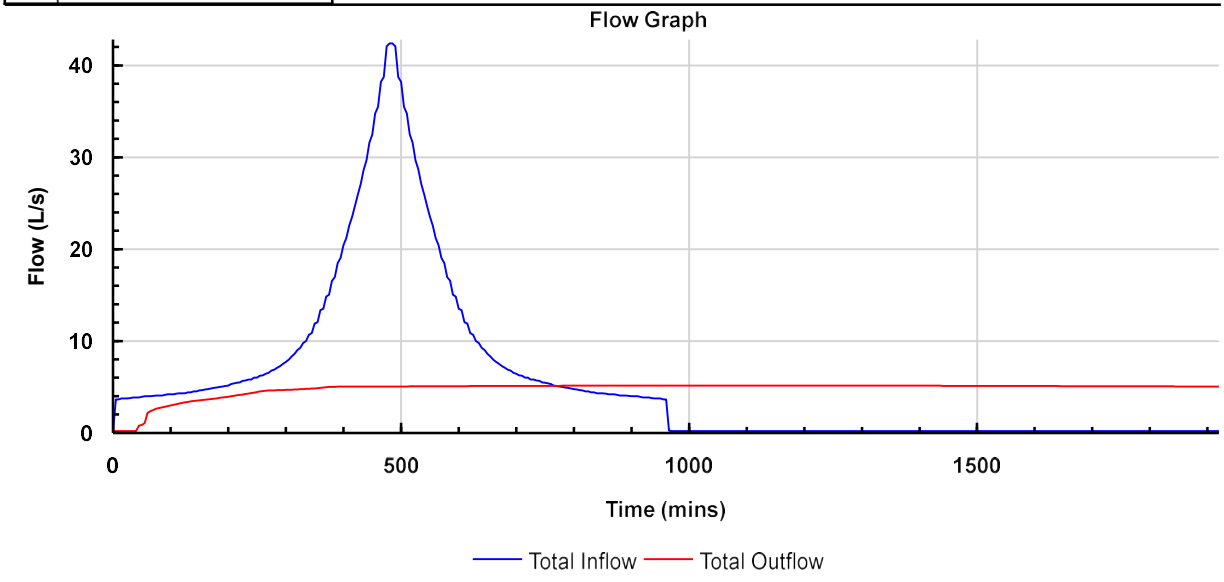
Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Manhole	Cellular Storage	4.5	4.540	0.150	100.207	4.1	3.48	72.7	Flood
Pipe (4)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	Manhole (2)	Manhole (3)	3.1	3.095	0.150	24.913	2.0	0.95	35.0	Flood
Pipe (3)	FSR: 100 years: +40 %: 960 mins: Summer	Pipe	Manhole (5)	Simple Junction	2.9	3.046	0.036	529.436	1.5	0.12	5.0	Flood
Pipe (6)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	Simple Junction (1)	Manhole (5)	3.0	2.951	0.150	14.414	1.7	0.55	22.6	Surcharged
Pipe (5)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	Manhole (4)	Simple Junction (1)	2.9	2.950	0.150	8.256	1.7	0.96	30.7	Flood
Pipe (1)	FSR: 100 years: +40 %: 120 mins: Winter	Pipe	Cellular Storage	Manhole (1)	3.8	4.043	0.150	152.510	2.1	3.79	37.2	Flood
Pipe (1) (1)	FSR: 100 years: +40 %: 480 mins: Winter	Pipe	Manhole (1)	Manhole (2)	3.6	3.594	0.150	265.045	1.0	0.89	17.3	Flood
Pipe (2)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	Manhole (3)	Simple Junction (2)	3.0	3.033	0.150	13.700	1.0	1.32	17.8	Flood
Pipe (2) (1)	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	Simple Junction (2)	Simple Junction (1)	3.0	3.053	0.150	616.696	0.7	0.87	11.2	Surcharged
Pipe (7)	FSR: 30 years: +0 %: 360 mins: Summer	Pipe	Simple Junction (3)	Simple Junction (2)	3.0	3.045	0.150	0.000	0.0	0.03	0.7	Surcharged
Pipe (9)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	Simple Junction (5)	Manhole (5)	0.0	2.945	0.150	0.000	0.1	0.07	2.1	Surcharged
Pipe (8) (1)	FSR: 100 years: +40 %: 960 mins: Summer	Pipe	Manhole (6)	Simple Junction (5)	4.2	3.046	0.150	0.000	0.0	0	0.0	OK

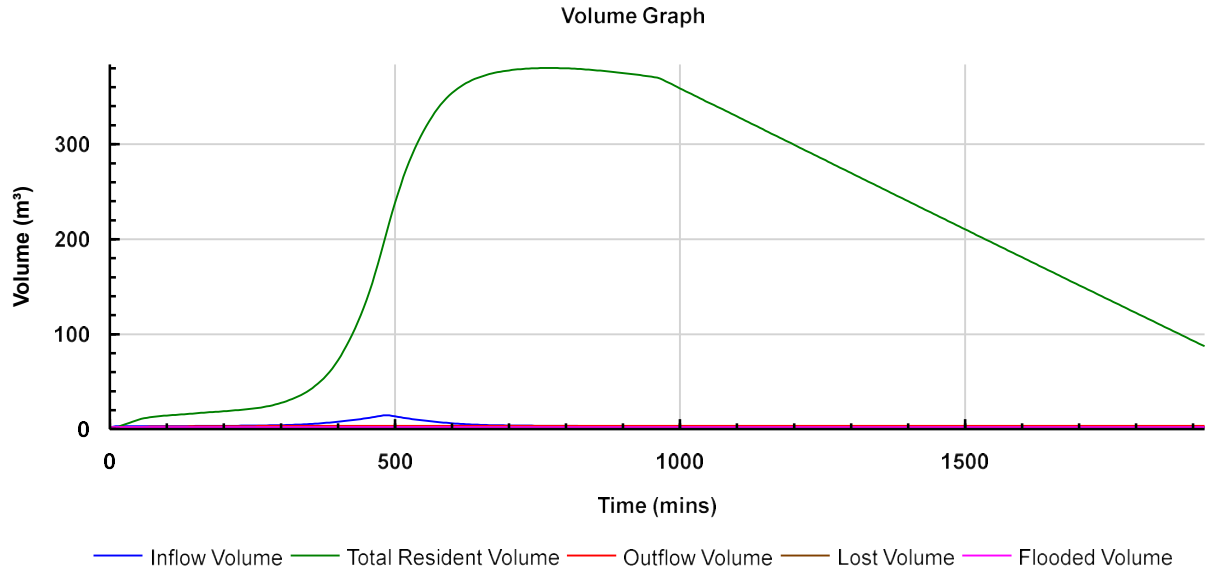
Phase
FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Simple Junction			5.0	529.436
TOTAL	42.4	622.656	5.0	529.436

Graphs





Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflow Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

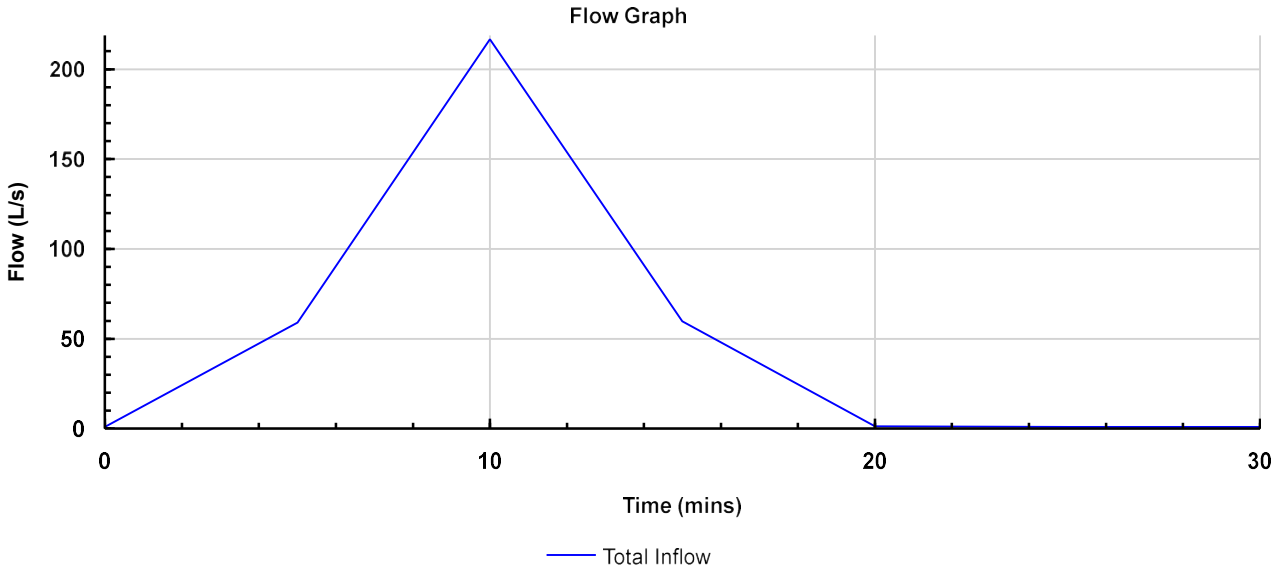
Catchment Area
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	216.7
Total Inflow Volume (m^3)	100.248

Graphs



Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflow Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

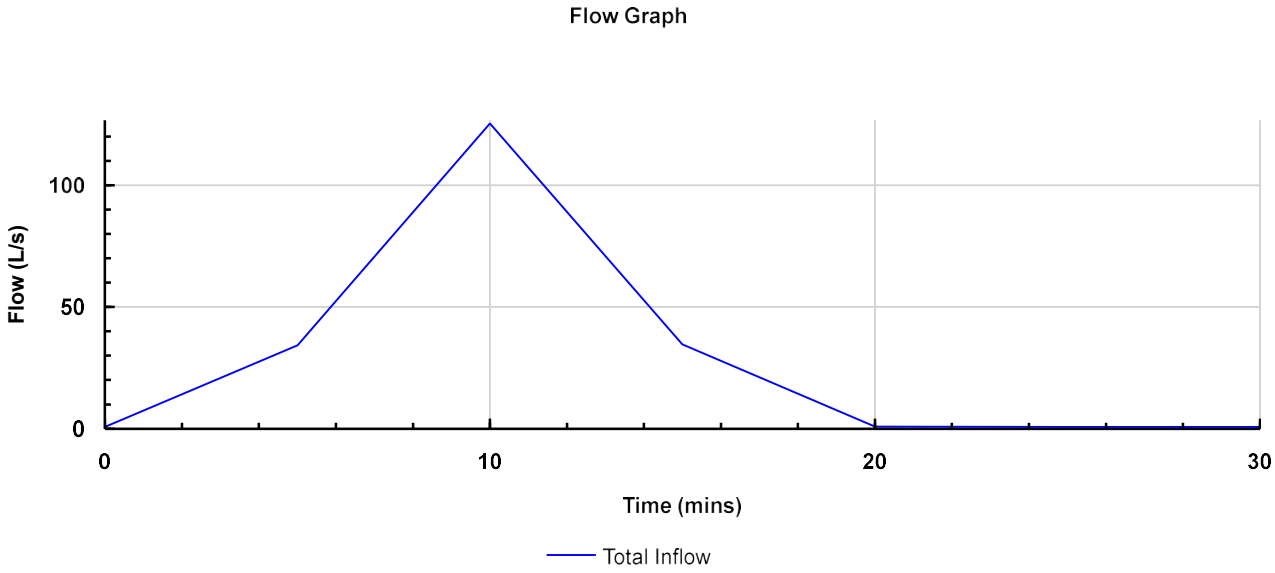
Catchment Area (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	125.3
Total Inflow Volume (m^3)	57.981

Graphs



Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Inflow Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

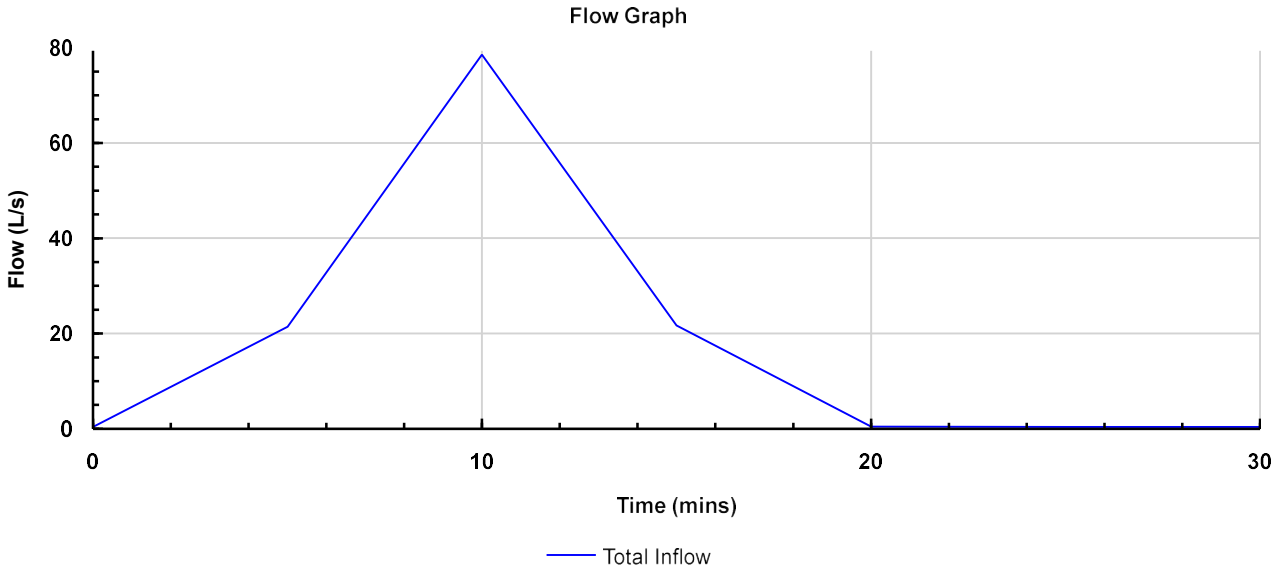
Catchment Area (2)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	78.6
Total Inflow Volume (m^3)	36.348

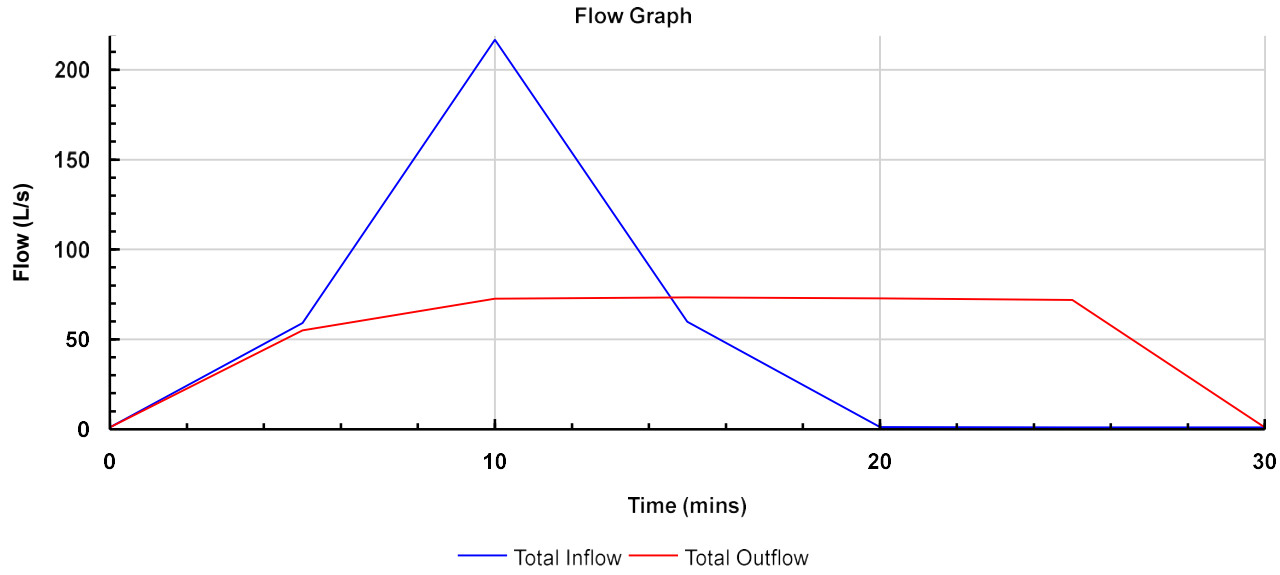
Graphs

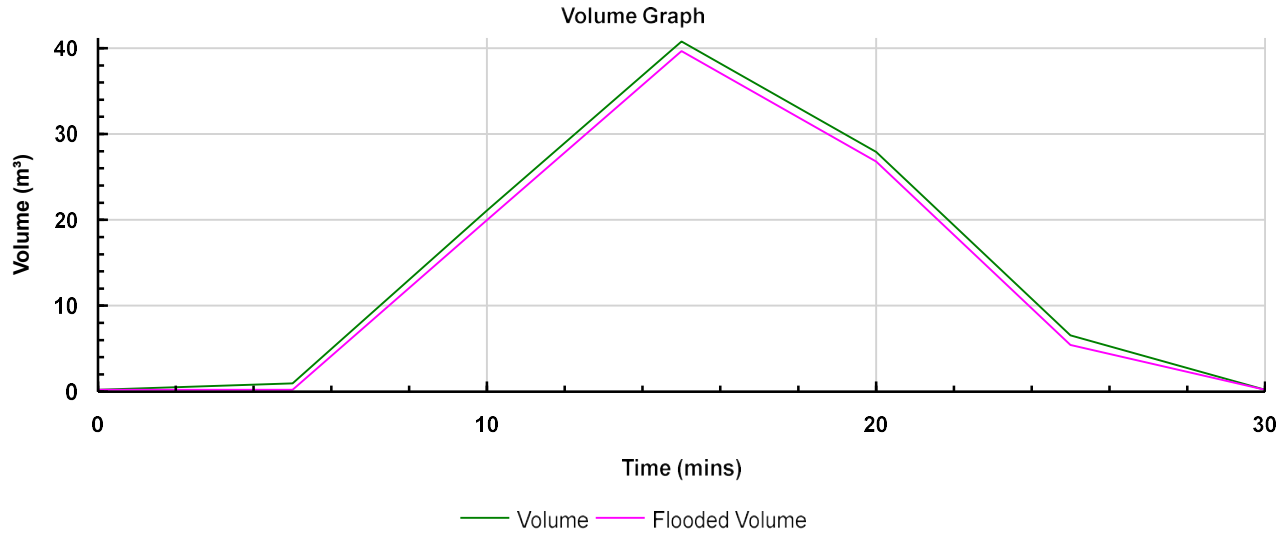


Manhole
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

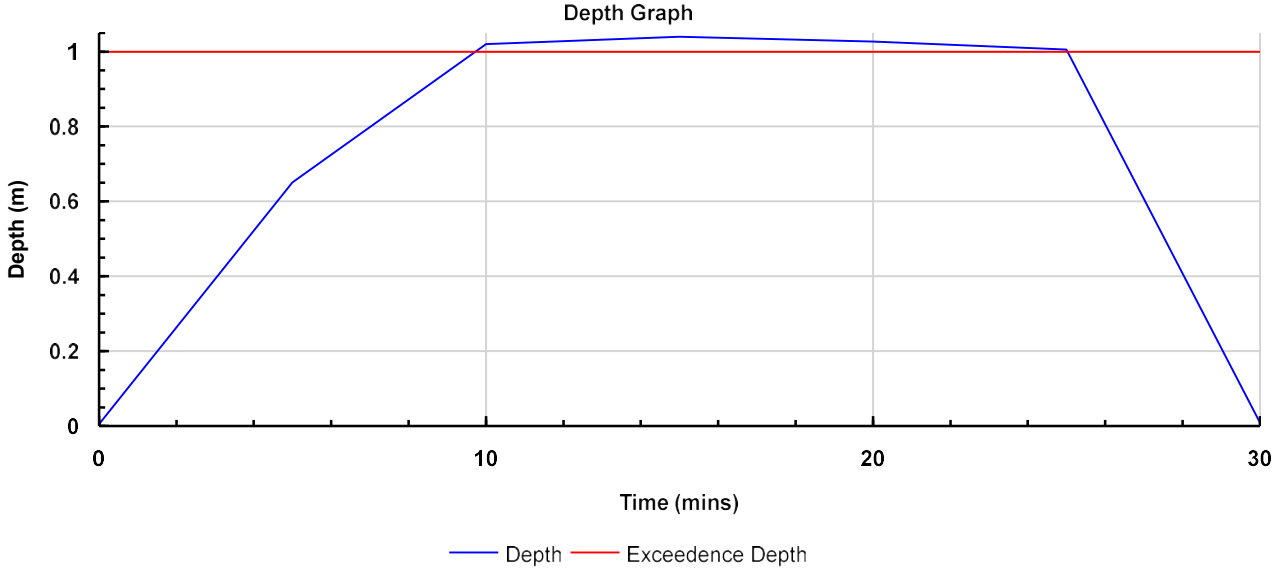
Type : Manhole

Graphs





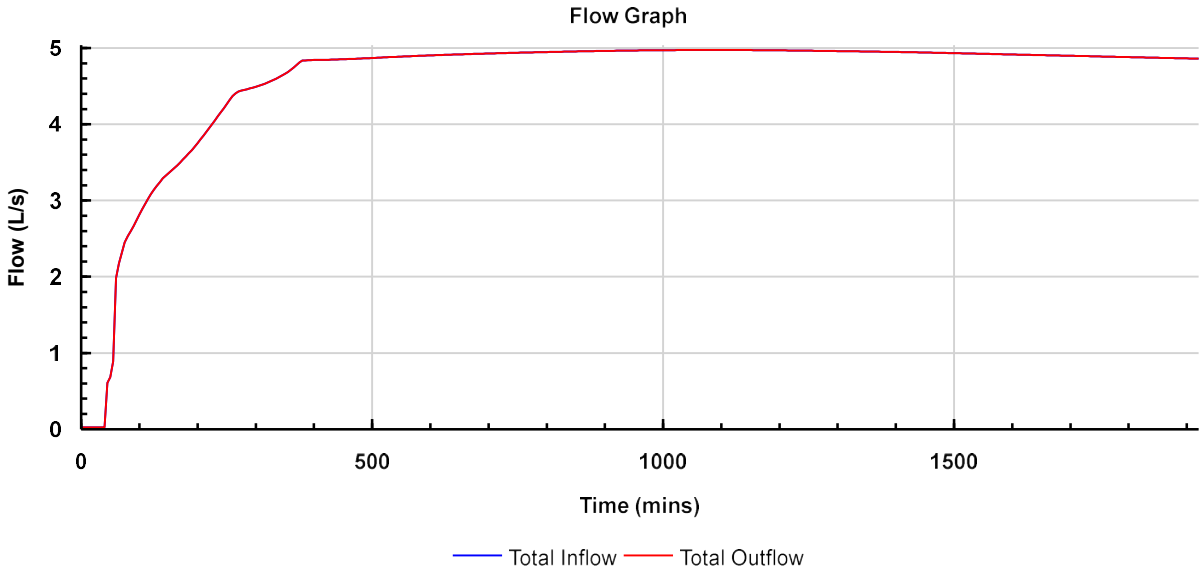
Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junction Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

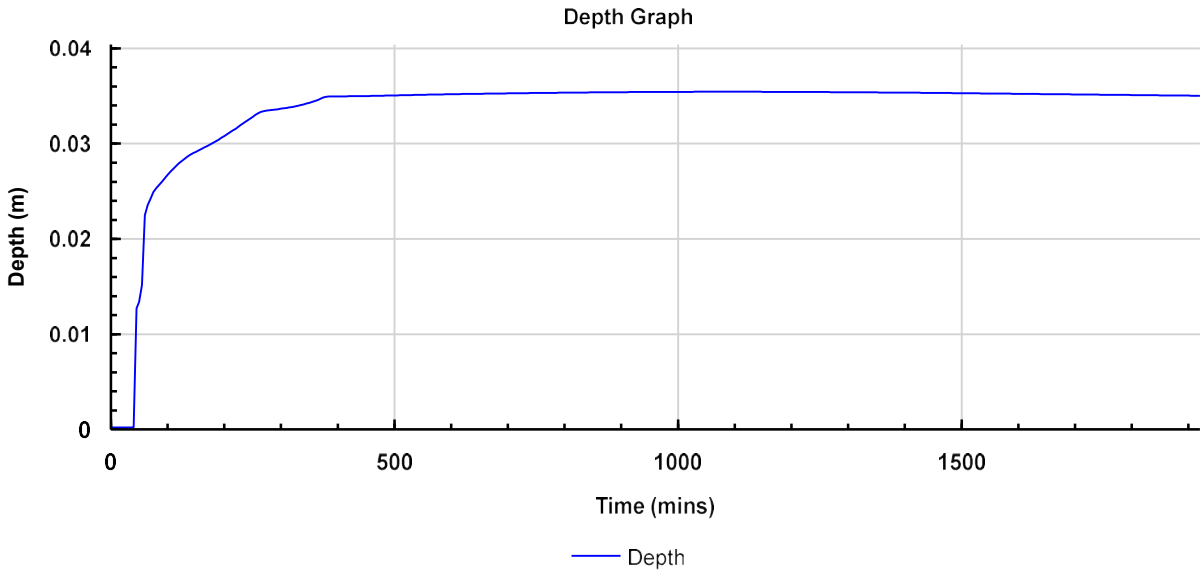


Simple Junction
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Type : Simple Junction

Graphs

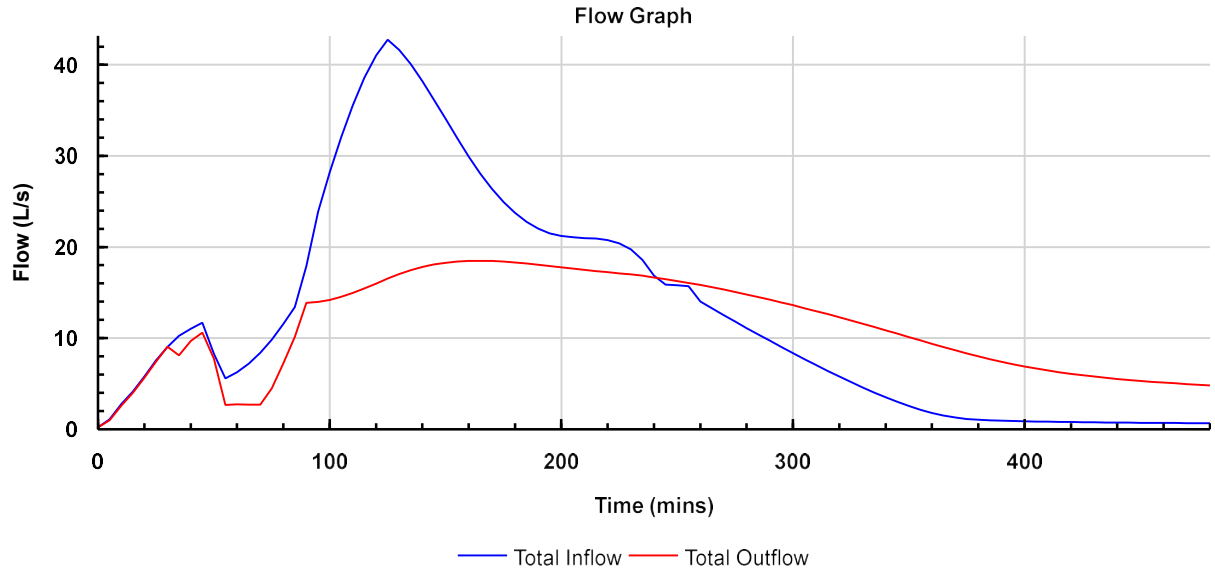


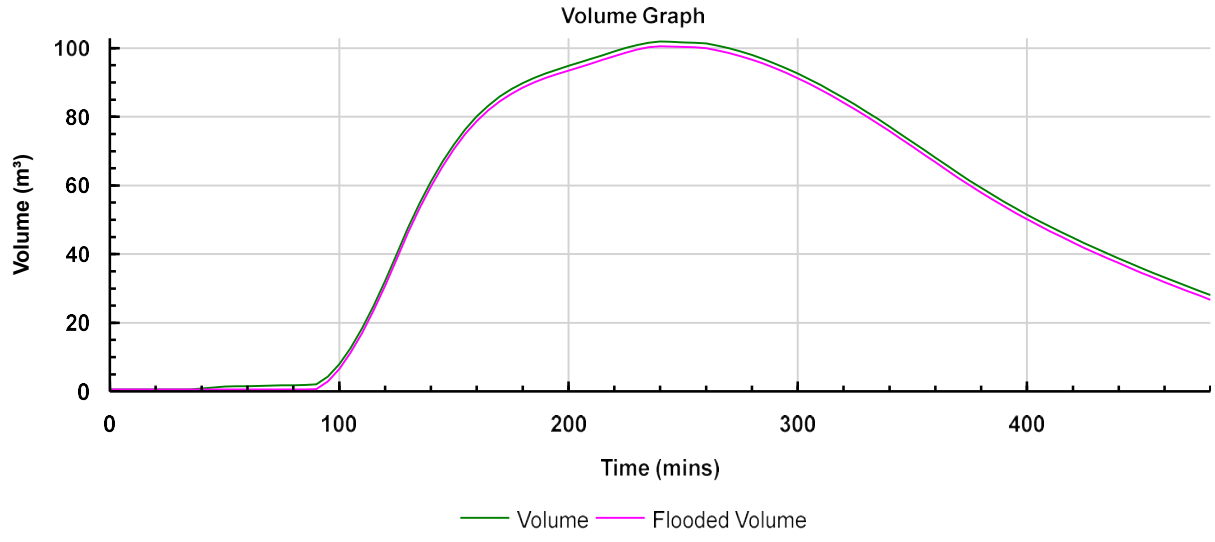


Manhole (2) Type : Manhole

Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter

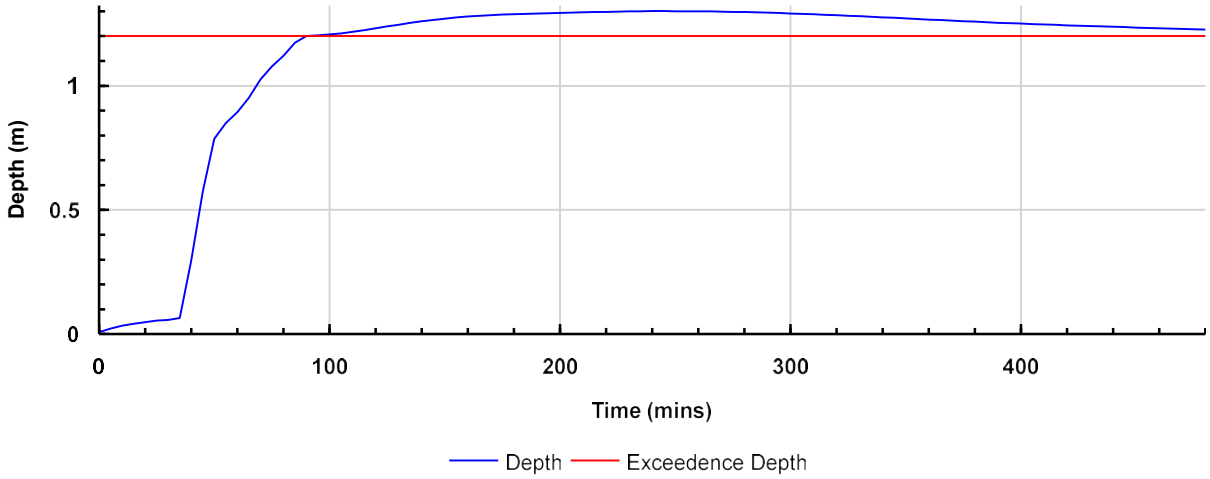
Graphs





Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022			
	Designed by CH	Checked by CL	Approved By	
Report Details Type: Junction Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB			

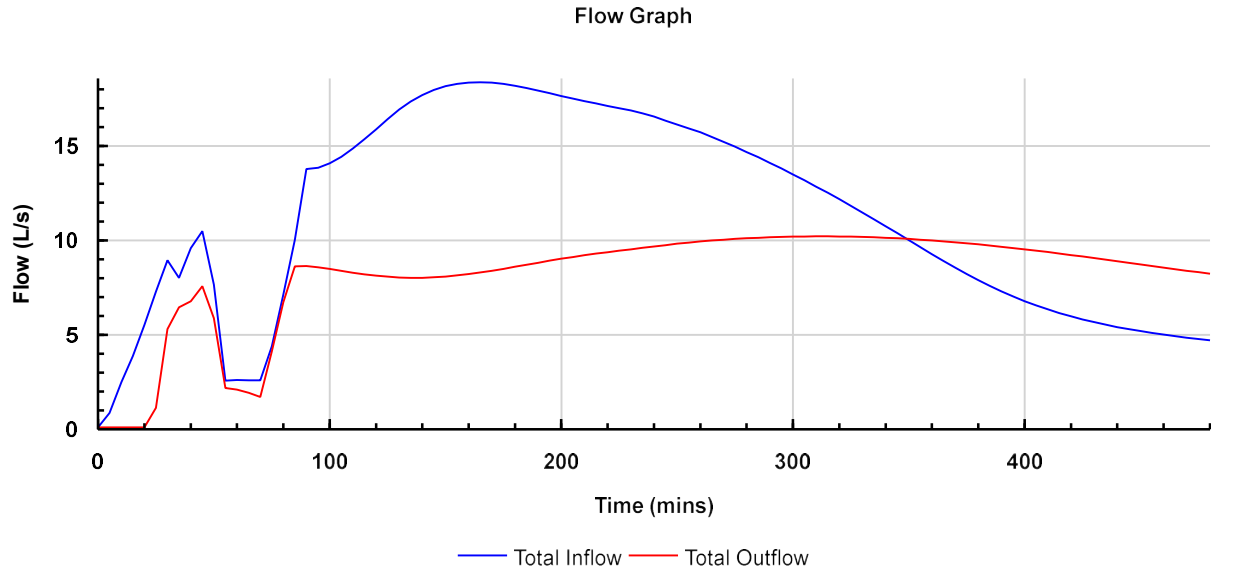
Depth Graph

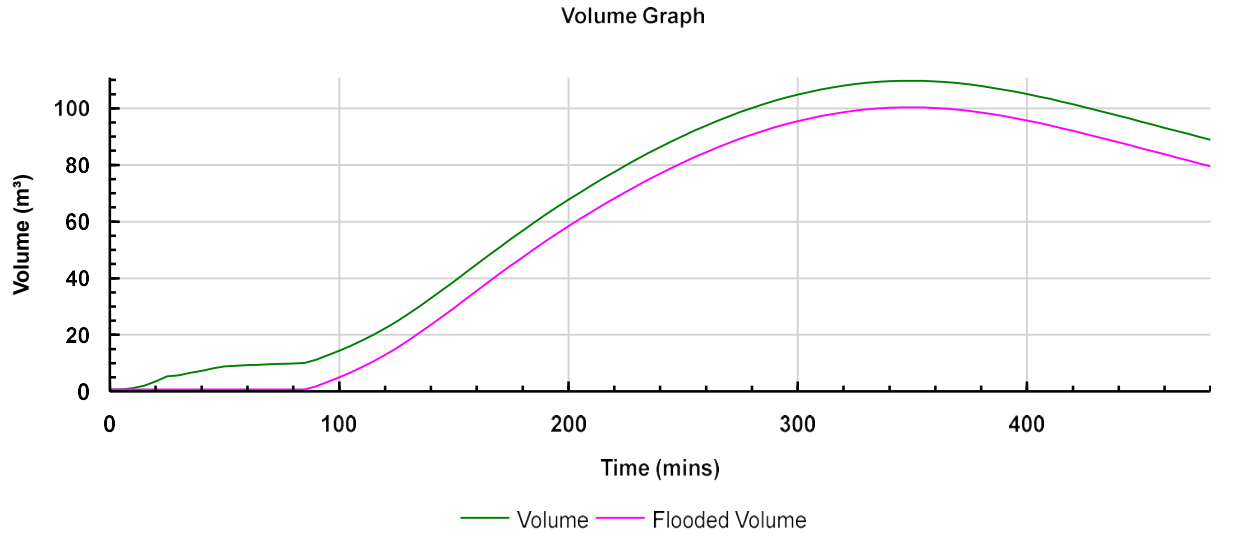


Manhole (3)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter

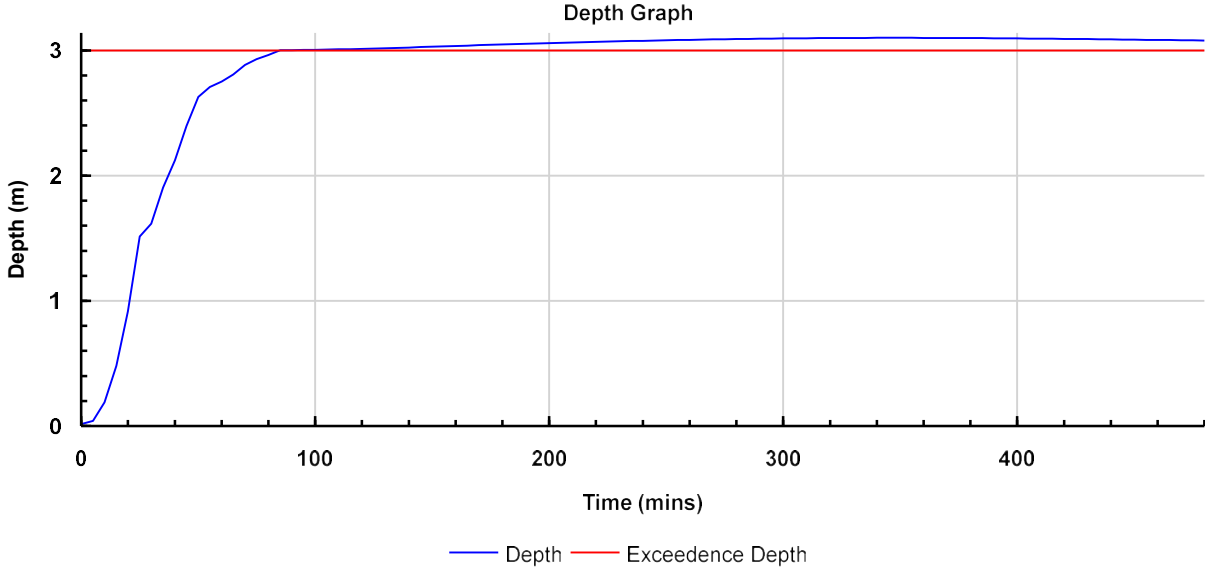
Type : Manhole

Graphs





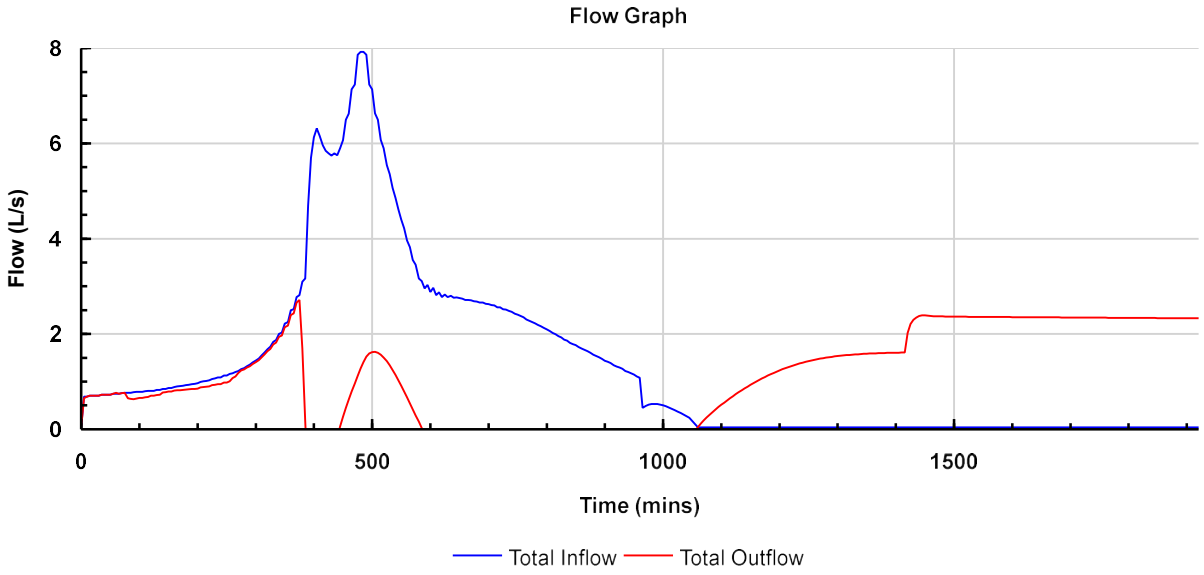
Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junction Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

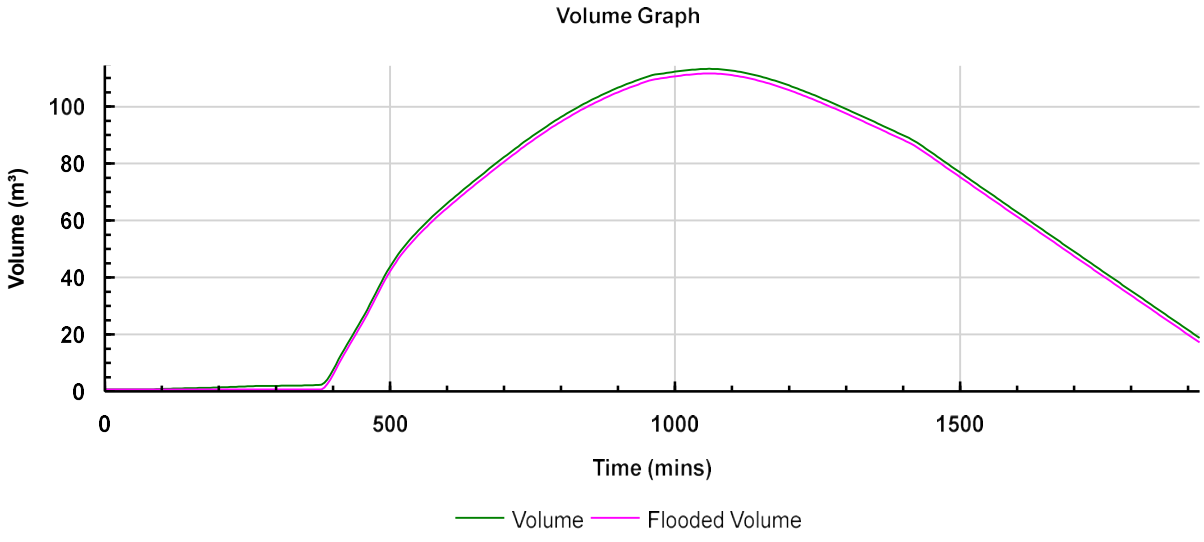


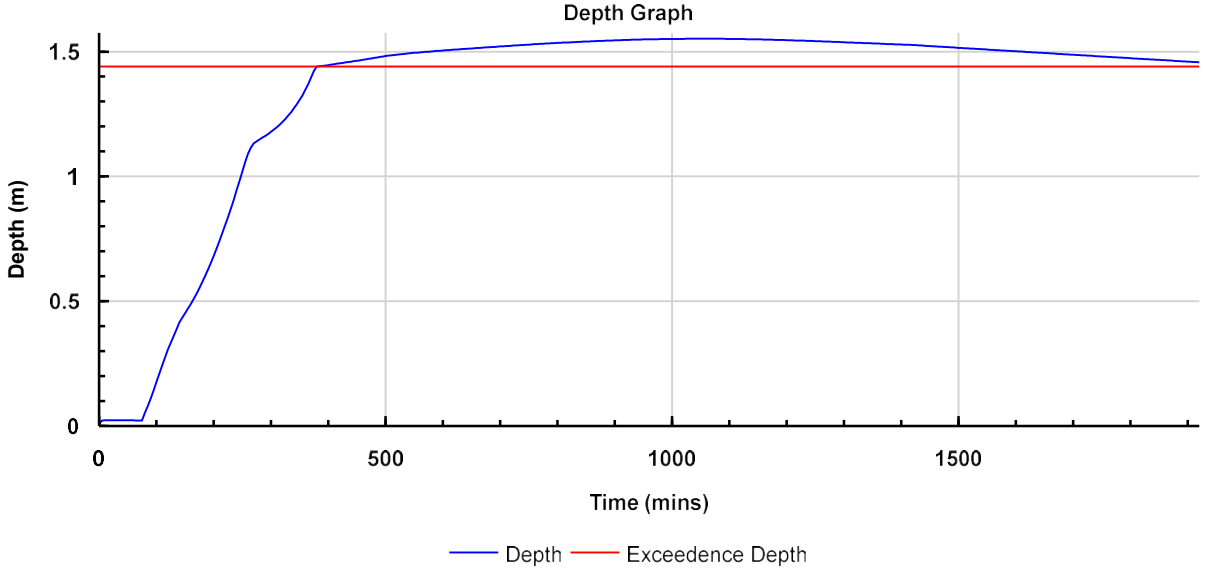
Manhole (4)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Type : Manhole

Graphs



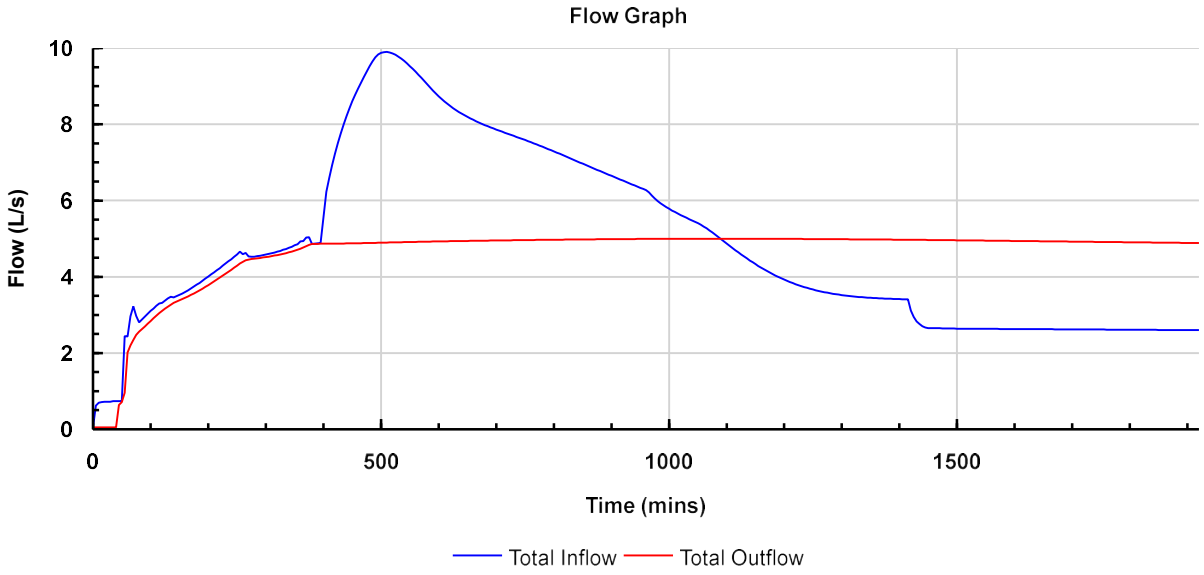


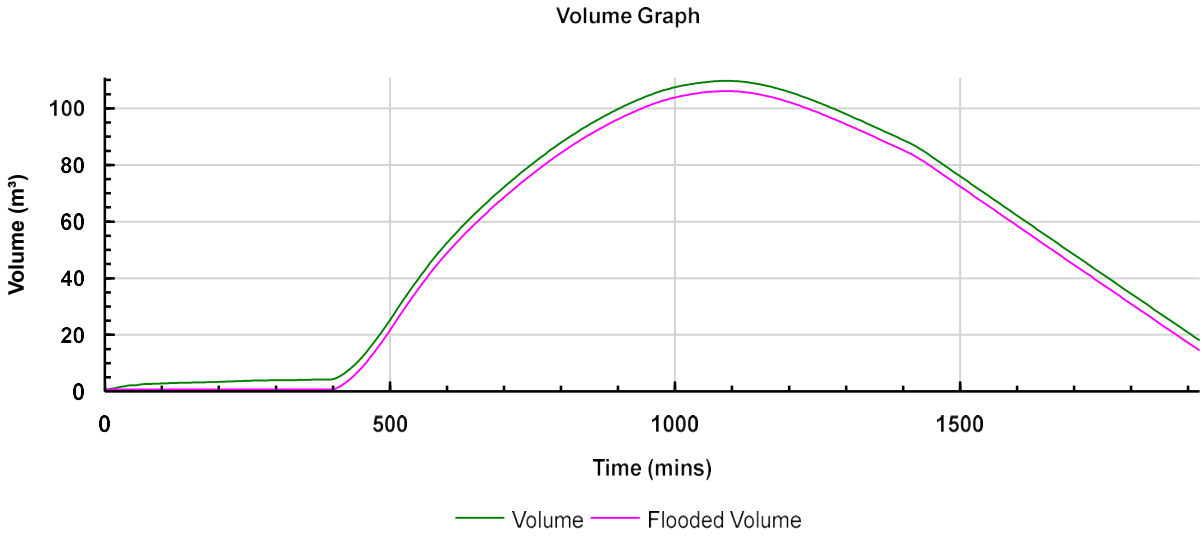

Depth Graph
Depth (m)
1.5
1
0.5
0
0
500
1000
1500
Time (mins)
Depth
Exceedence Depth

Manhole (5)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

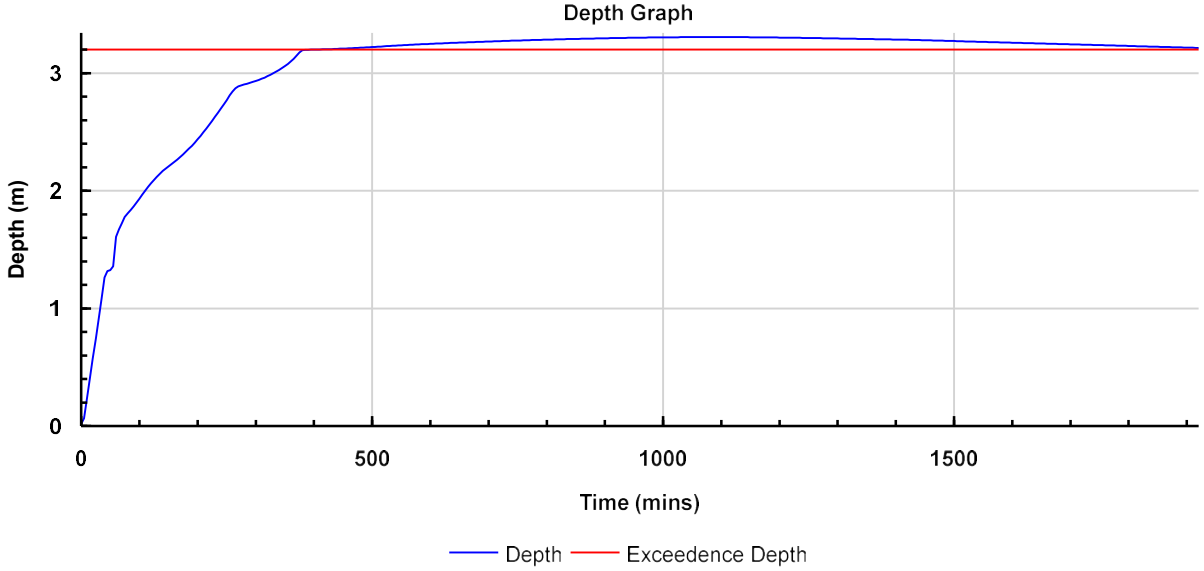
Type : Manhole

Graphs





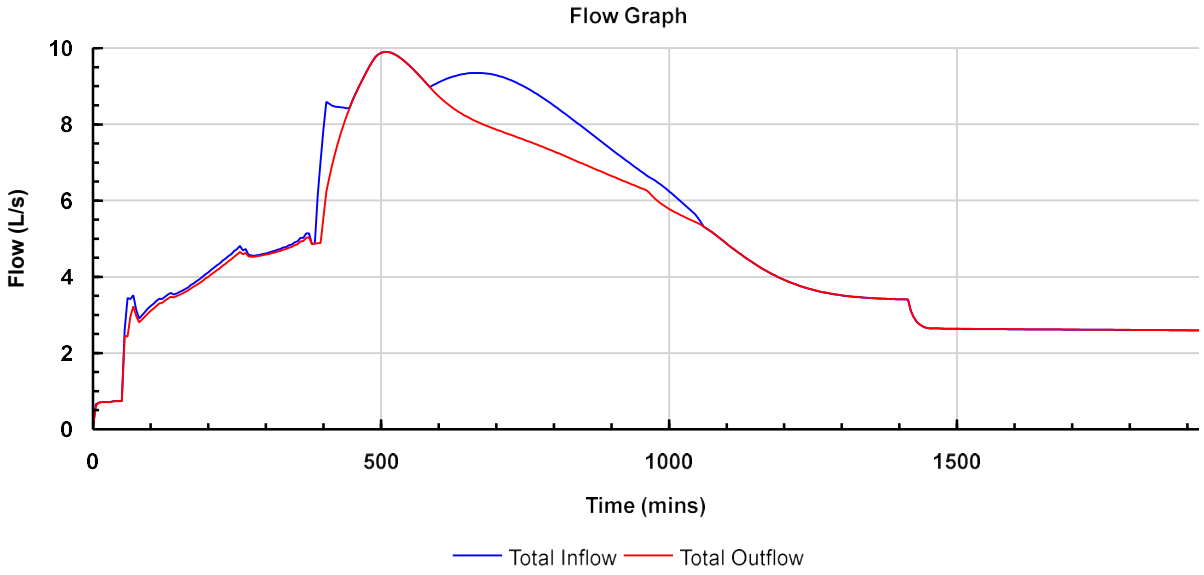
Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junction Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

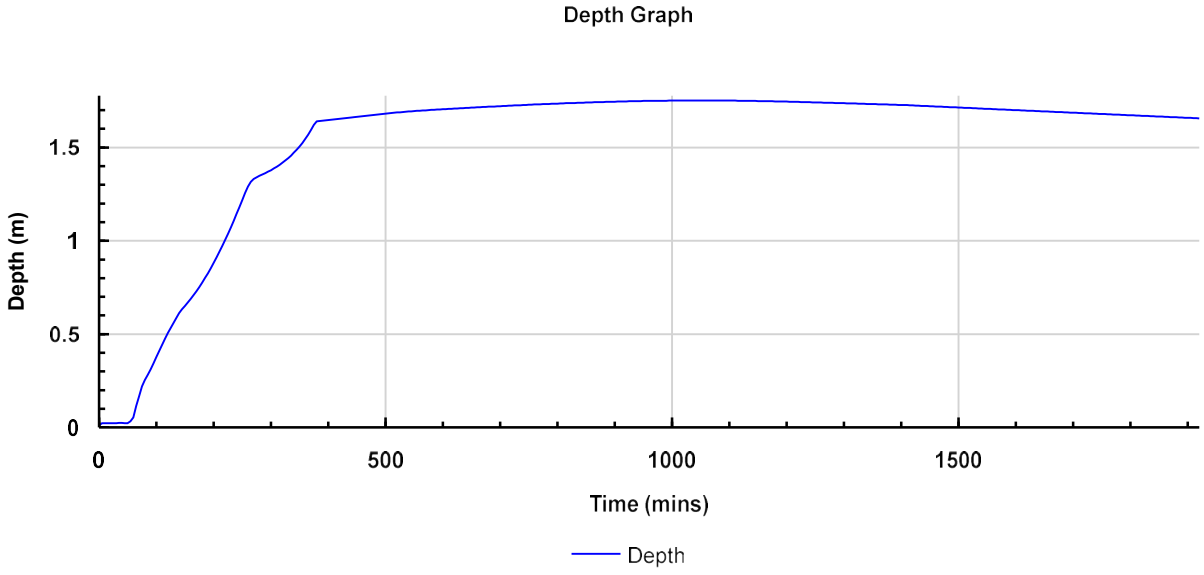


Simple Junction (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Type : Simple Junction

Graphs

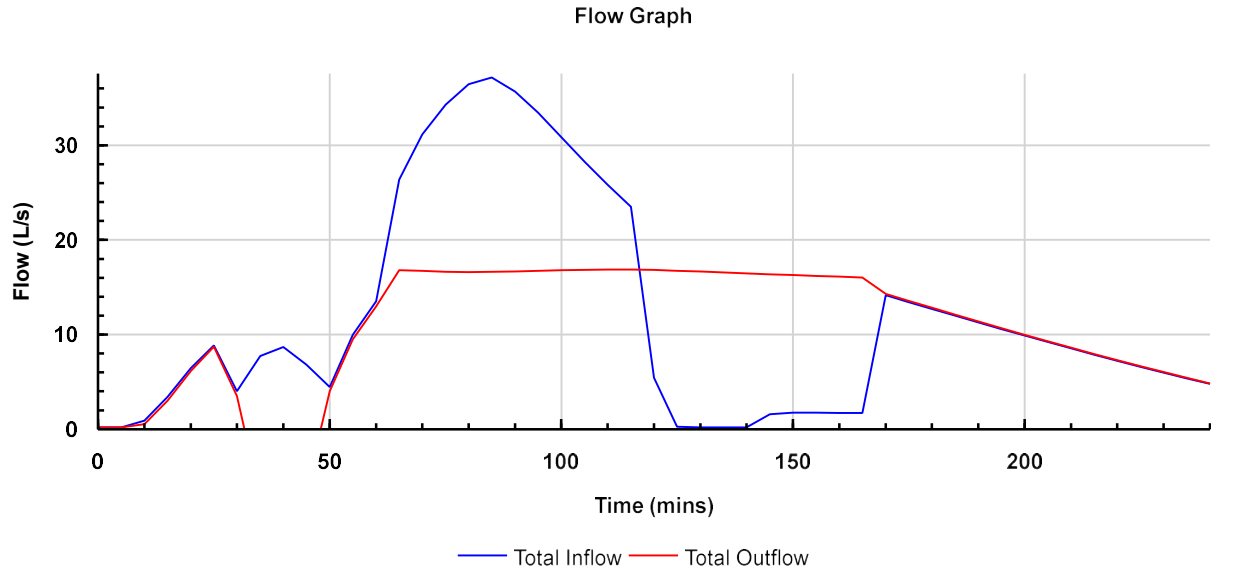


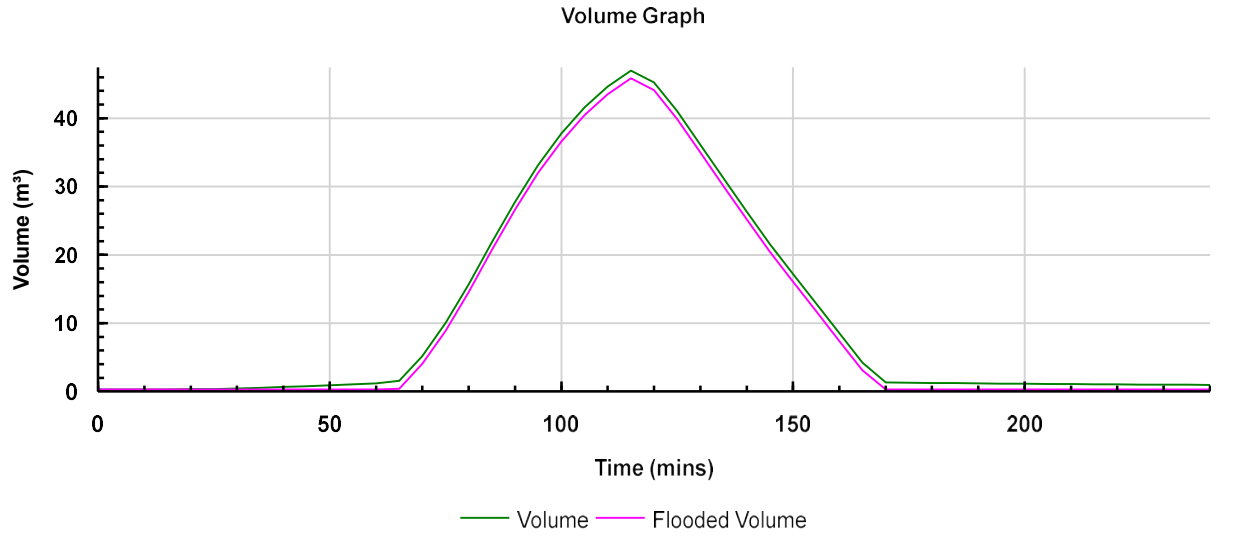


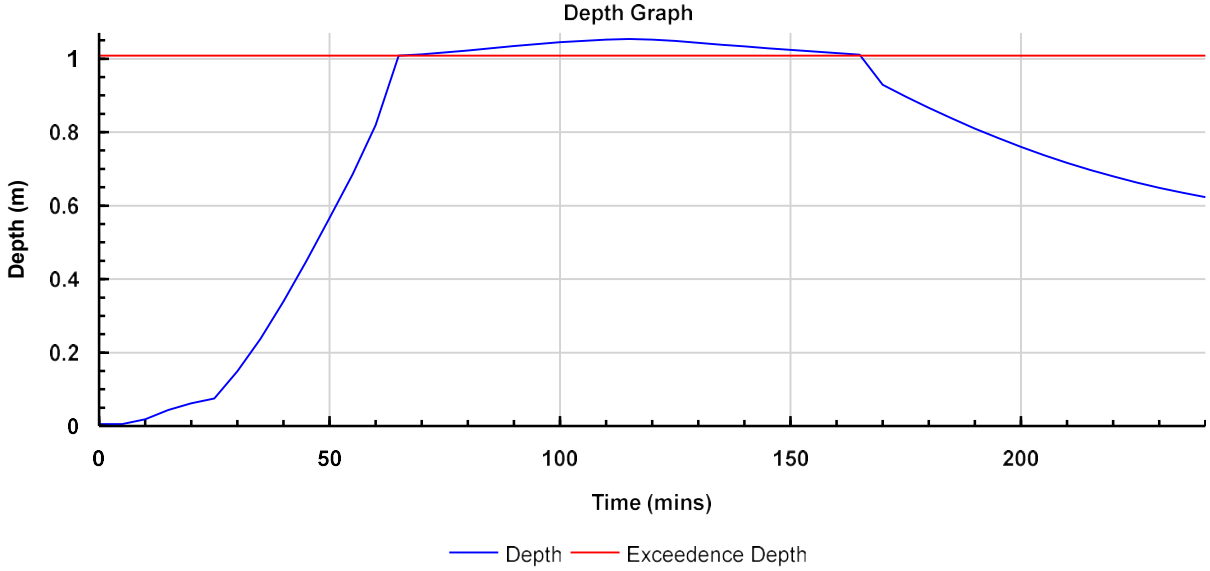
Manhole (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter

Type : Manhole

Graphs



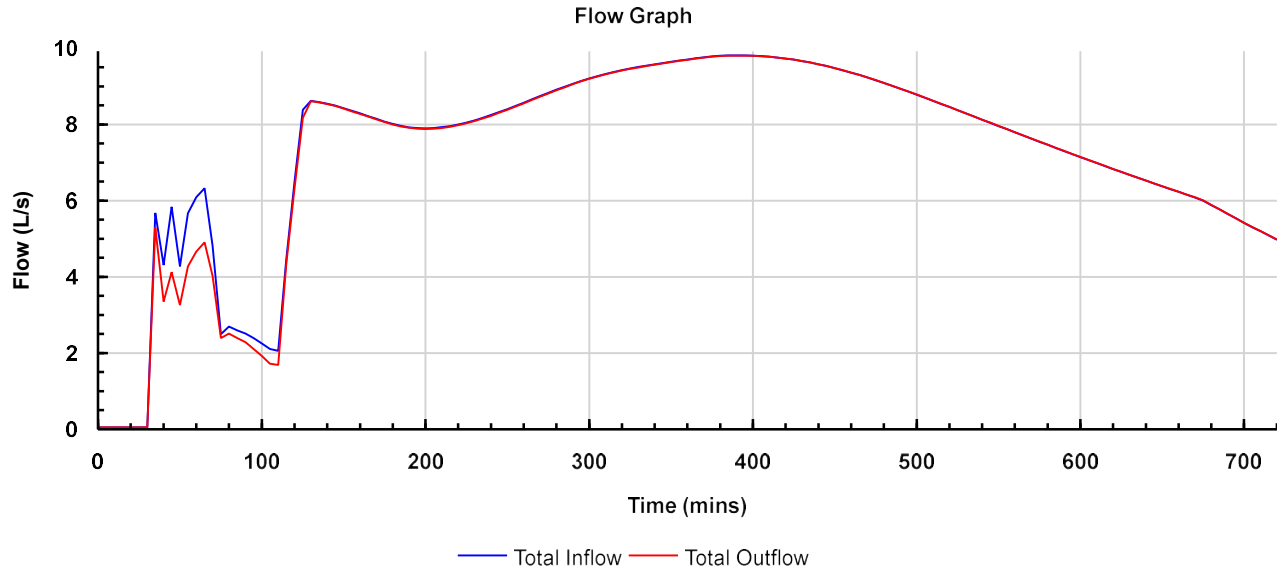


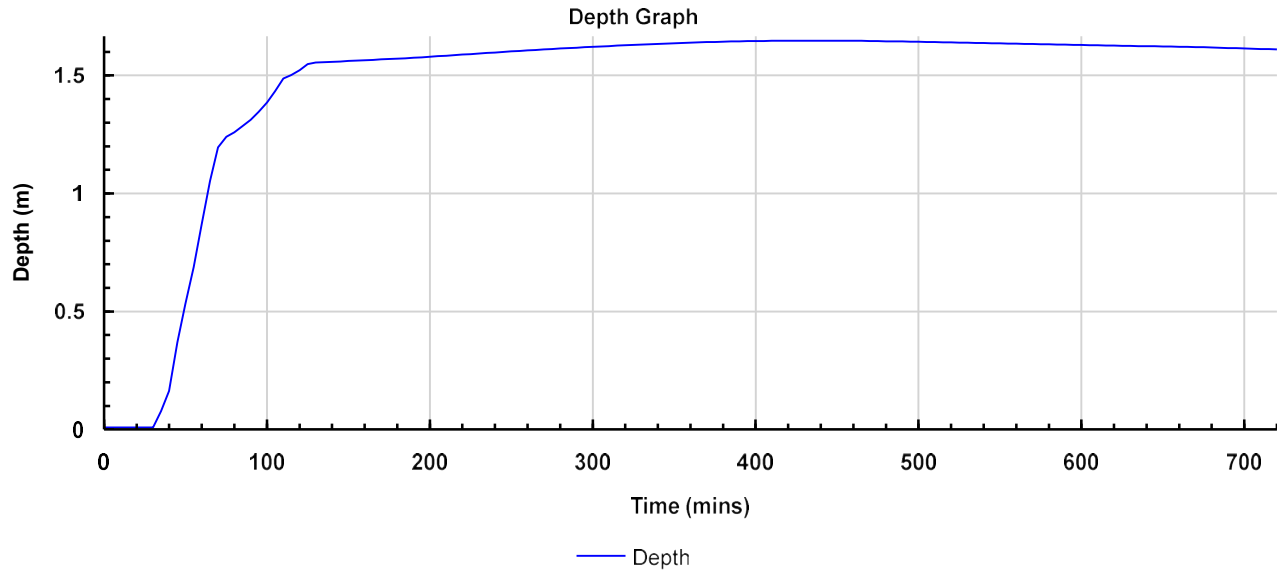

Depth Graph
Depth (m)
1
0.8
0.6
0.4
0.2
0
0
50
100
150
200
Time (mins)
Depth
Exceedence Depth

Simple Junction (2)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter

Type : Simple Junction

Graphs

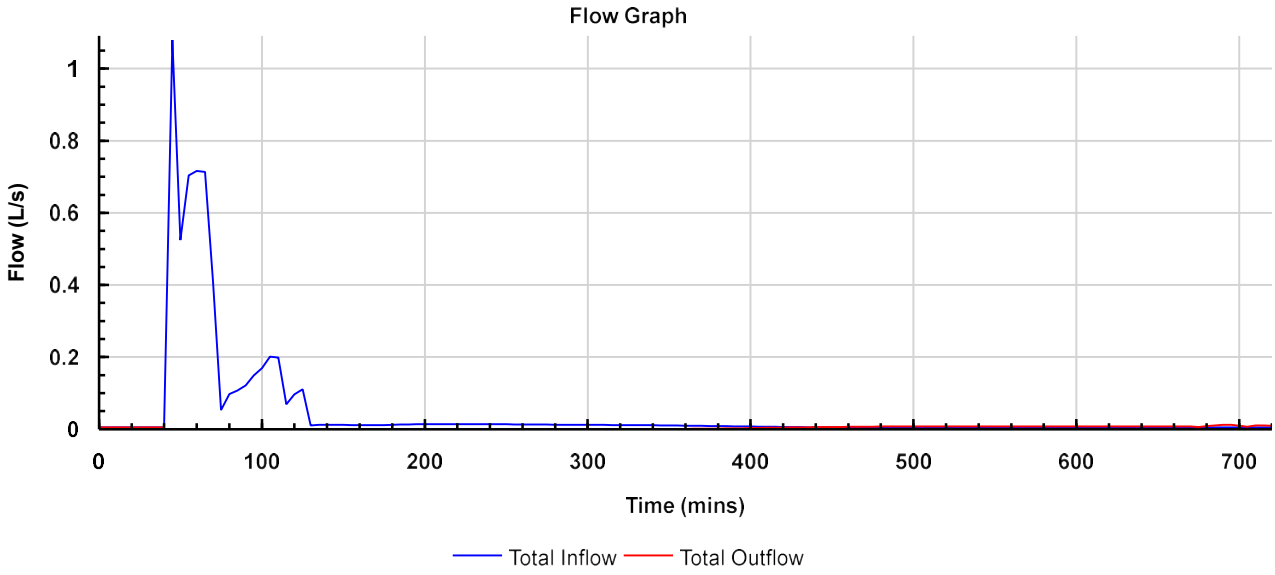


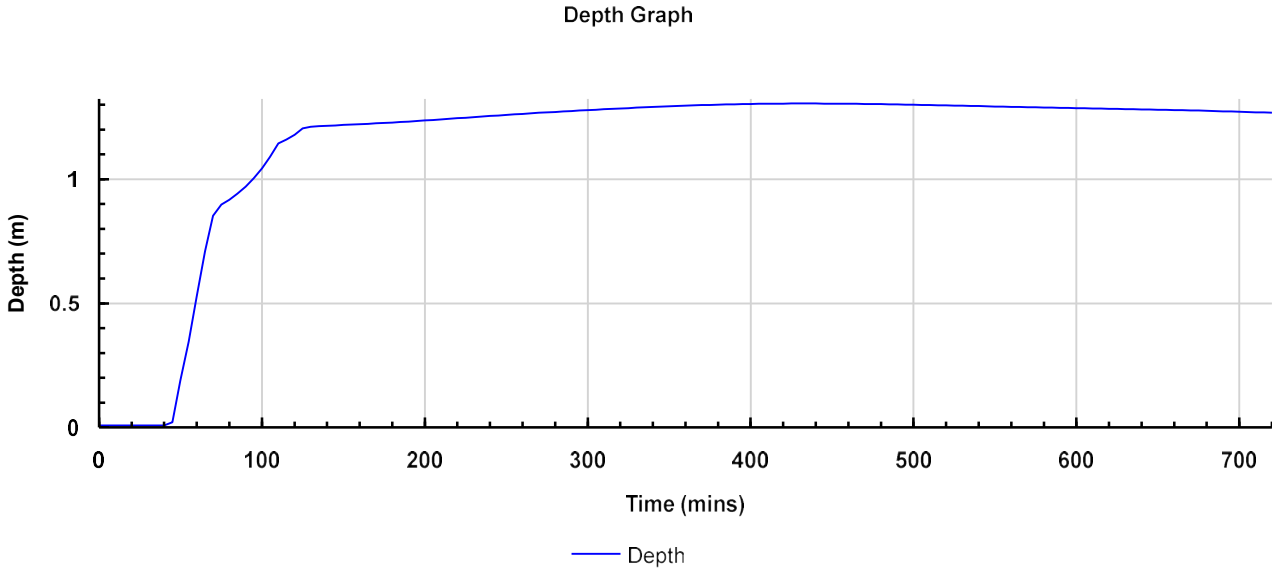


Simple Junction (3)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 360 mins: Winter

Type : Simple Junction

Graphs

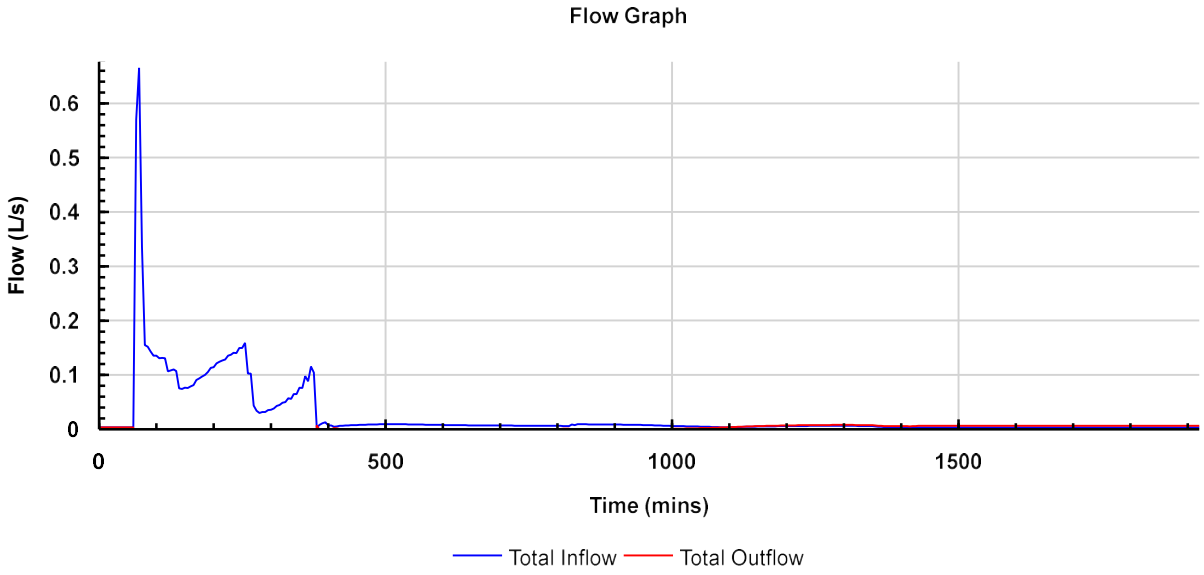


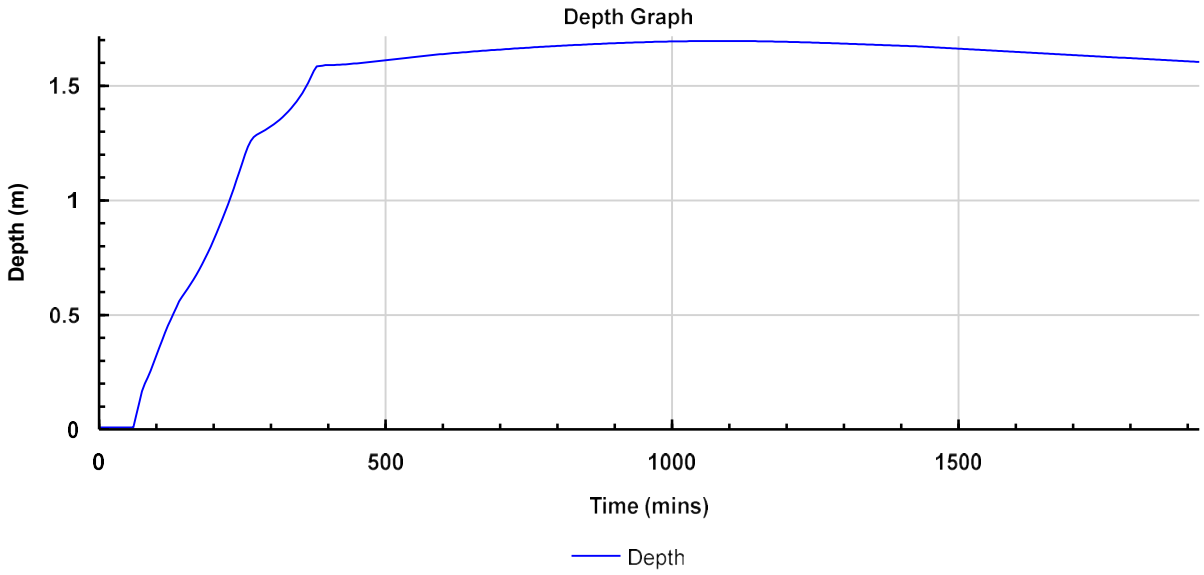


Simple Junction (5)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Type : Simple Junction

Graphs

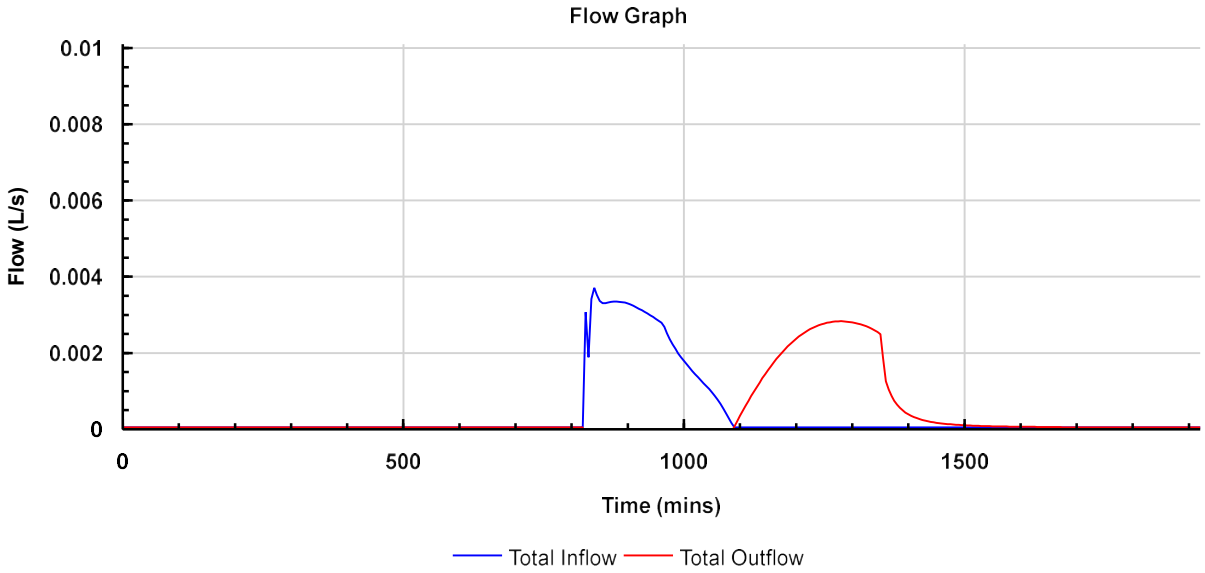


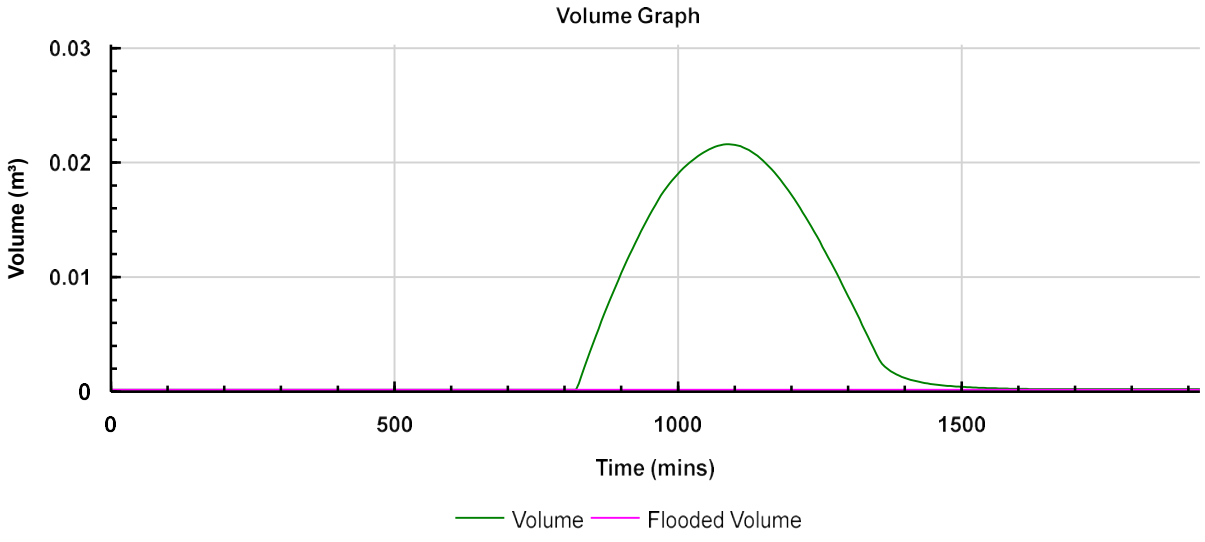


Manhole (6)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

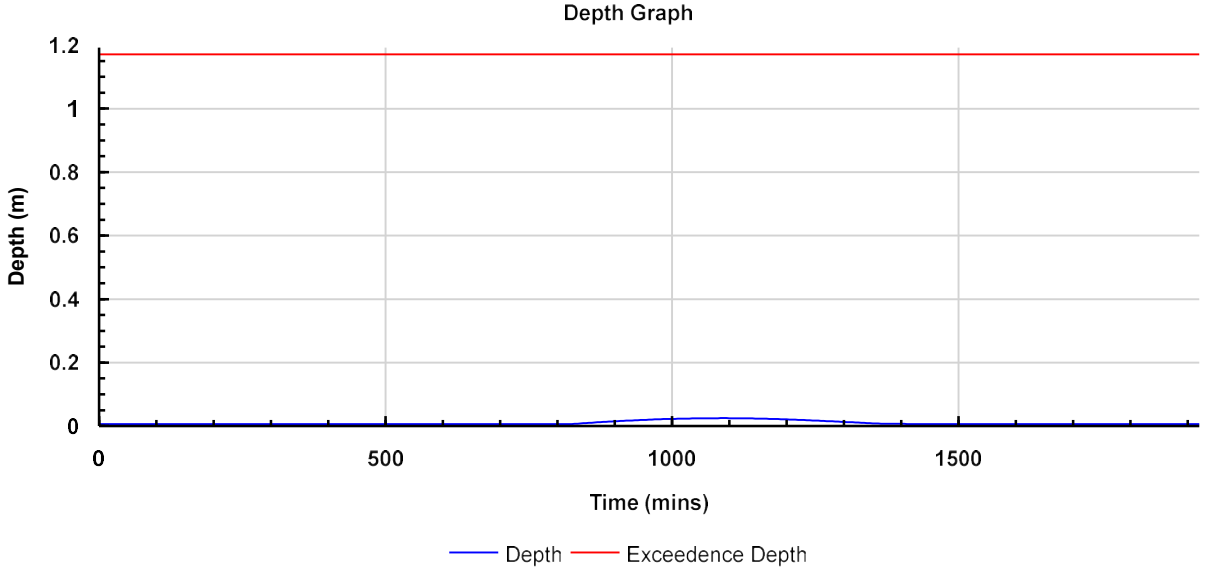
Type : Manhole

Graphs





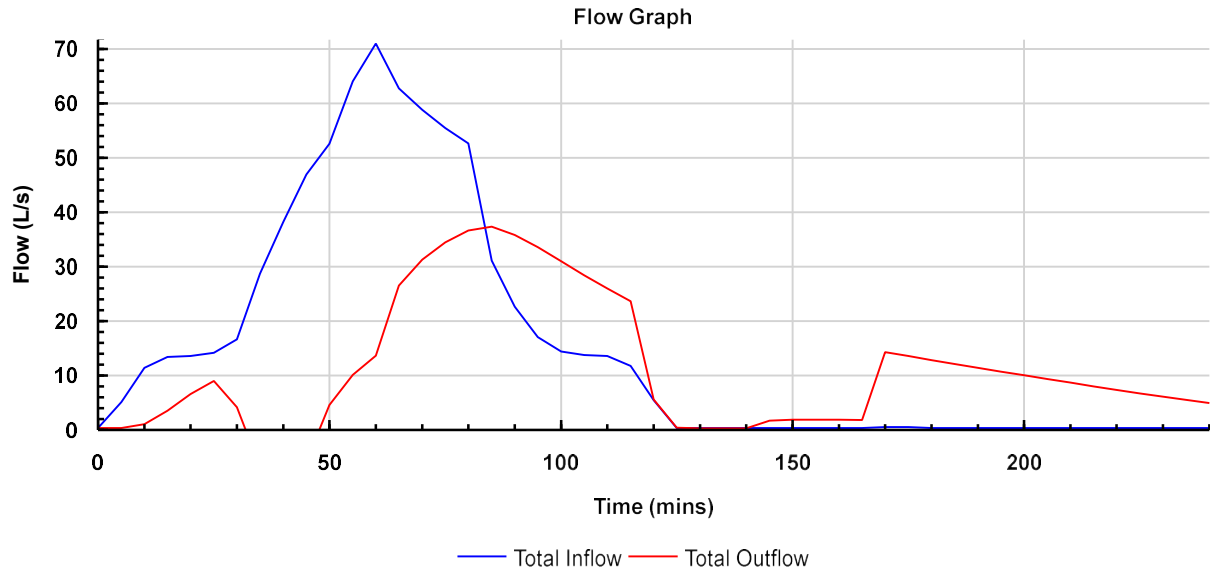
Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Junction Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		

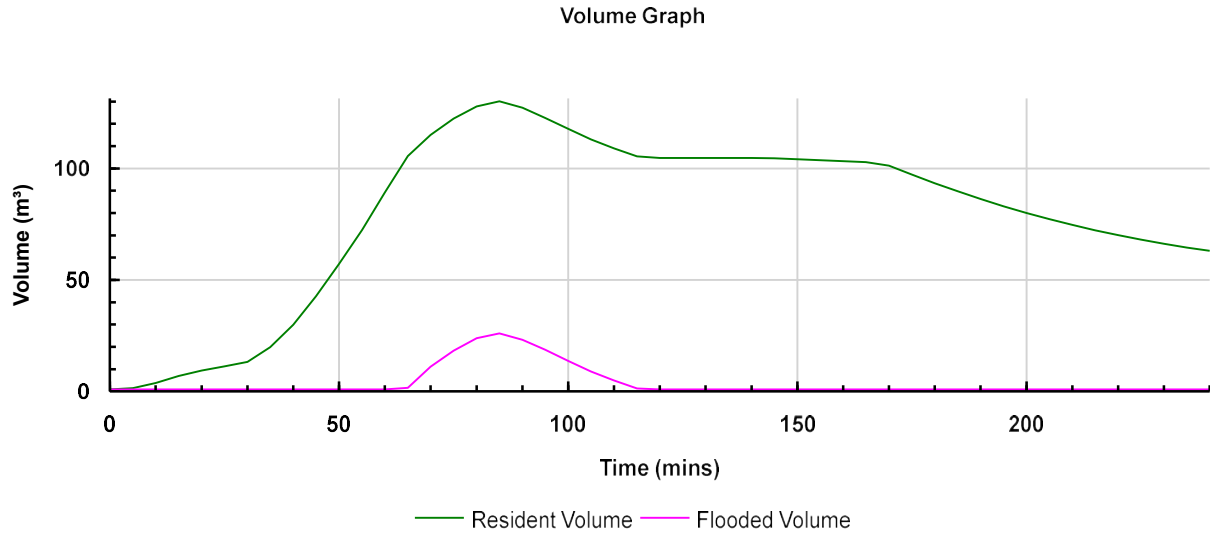


Cellular Storage
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter

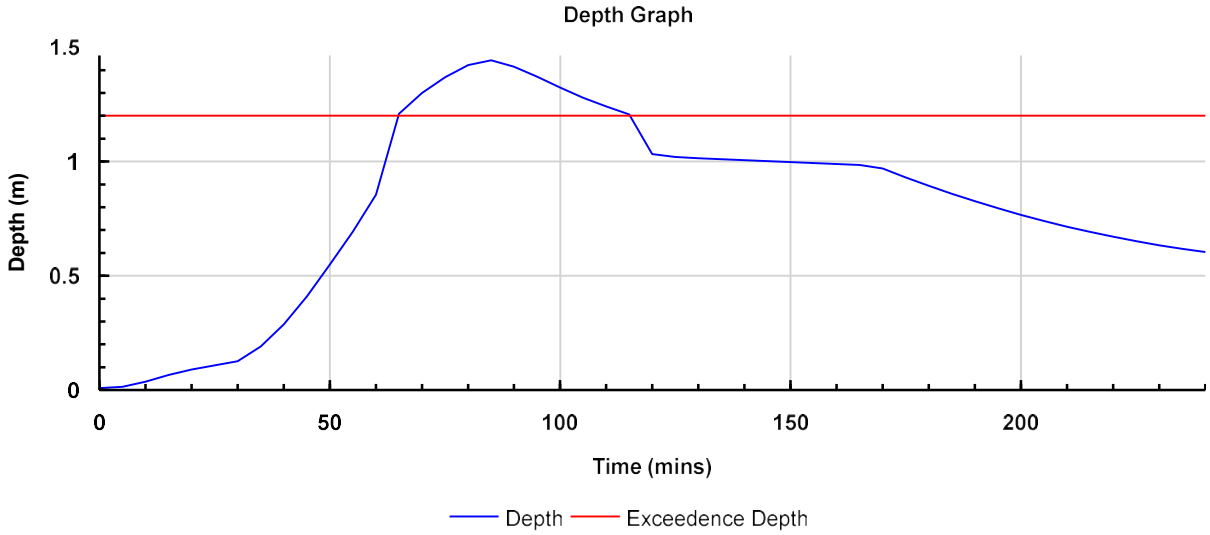
Type : Cellular Storage

Graphs





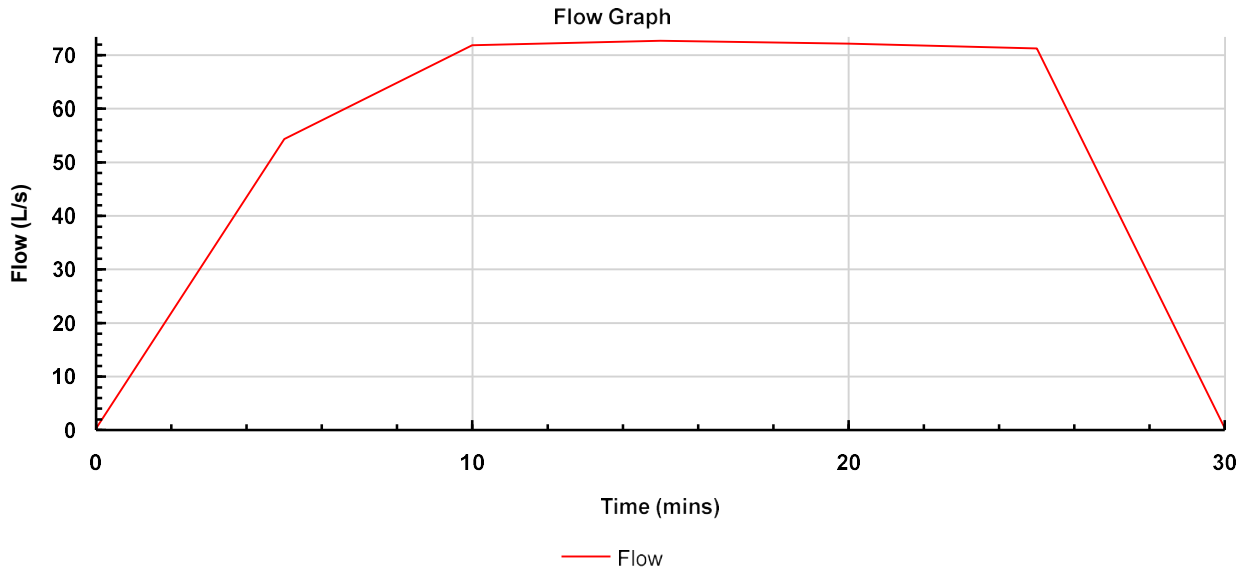
Elbridge Farm Recycling Centre: Indicative Surface Water Drainage Design	Date: 18/11/2022		
	Designed by CH	Checked by CL	Approved By
Report Details Type: Stormwater Control Results Storm Phase: Phase	Hafren Water Barkers Chambers, Barker Street Shrewsbury SY1 1SB		



Pipe
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Pipe

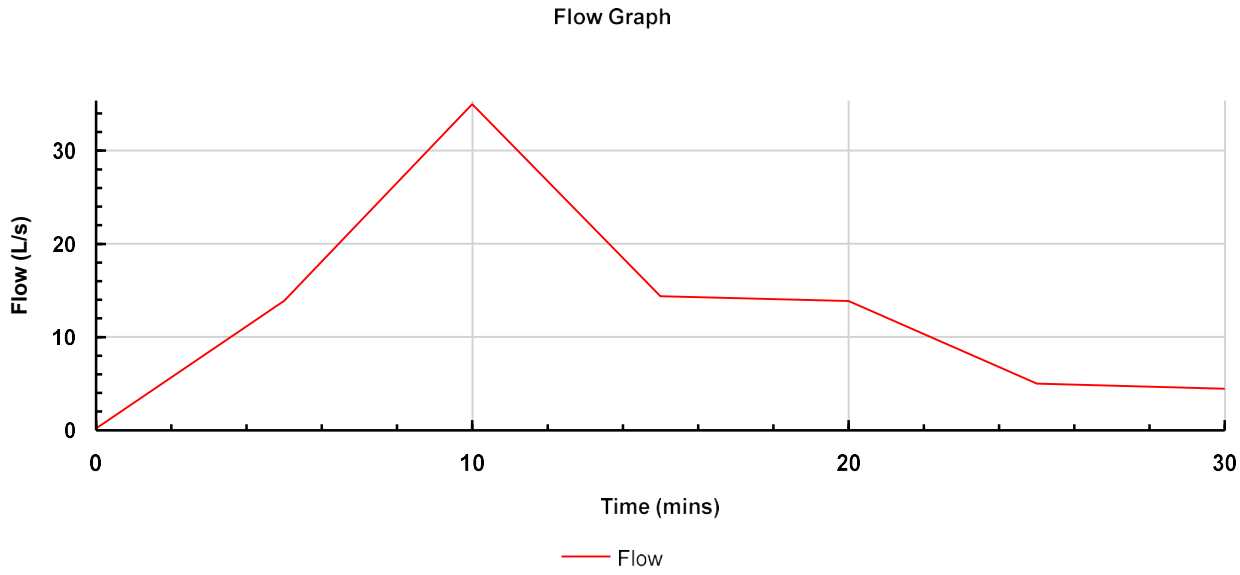
Graphs



Pipe (4)
Critical Storm: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

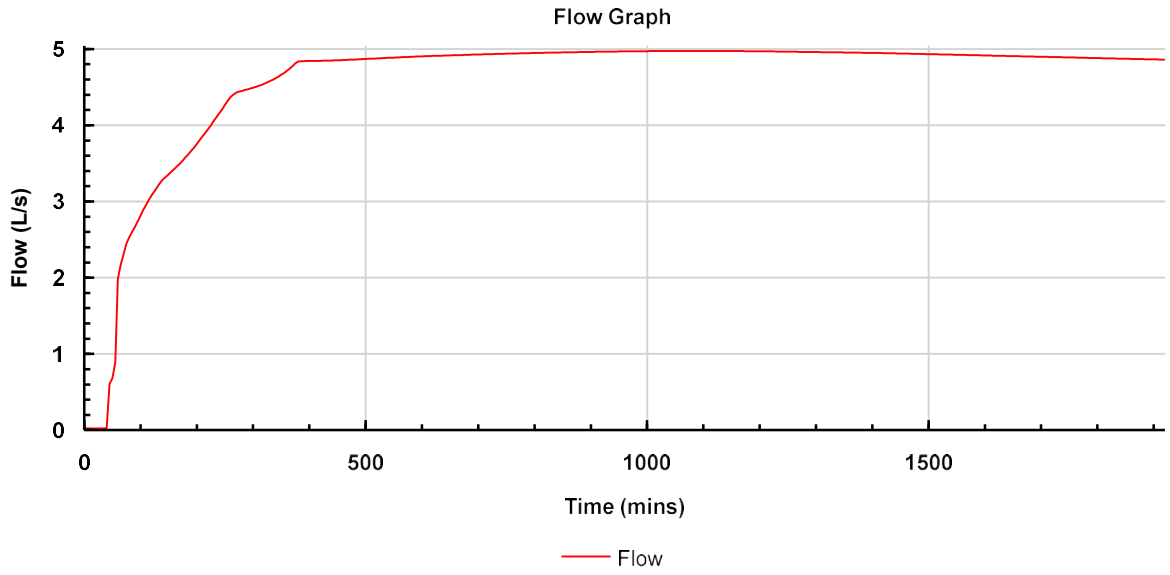
Graphs



Pipe (3)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

Type : Pipe

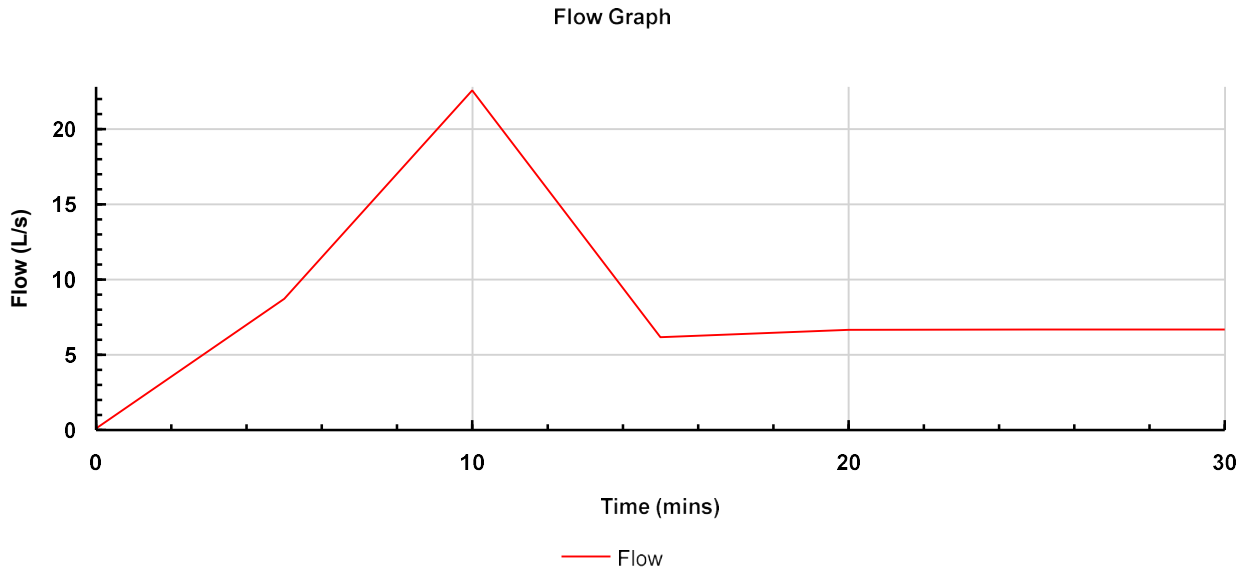
Graphs



Pipe (6)
Critical Storm: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

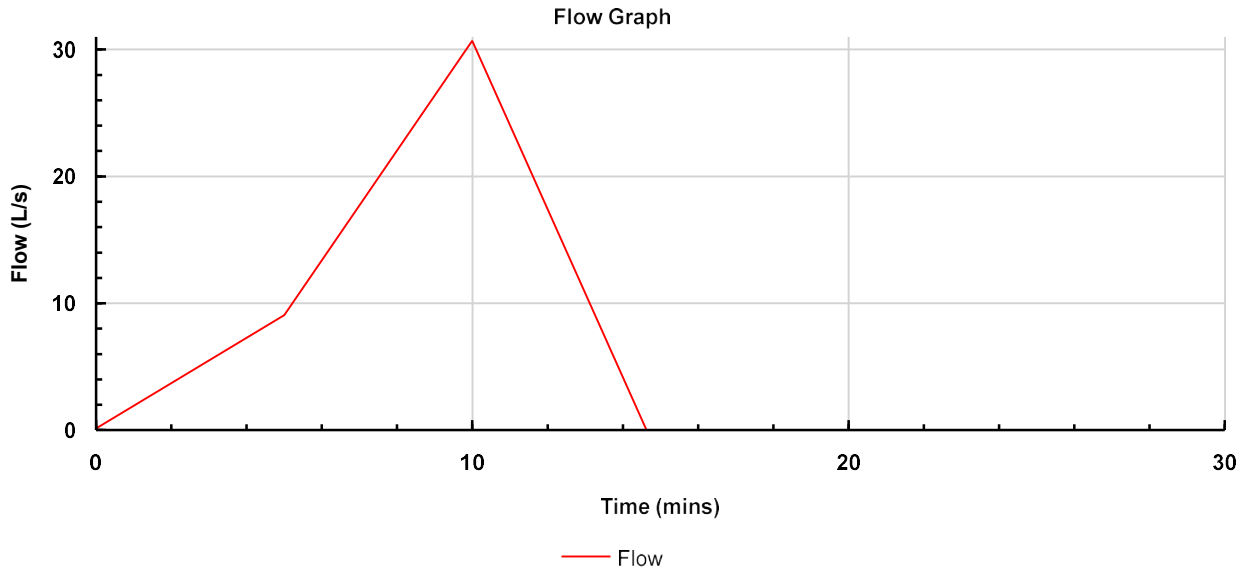
Graphs



Pipe (5)
Critical Storm: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

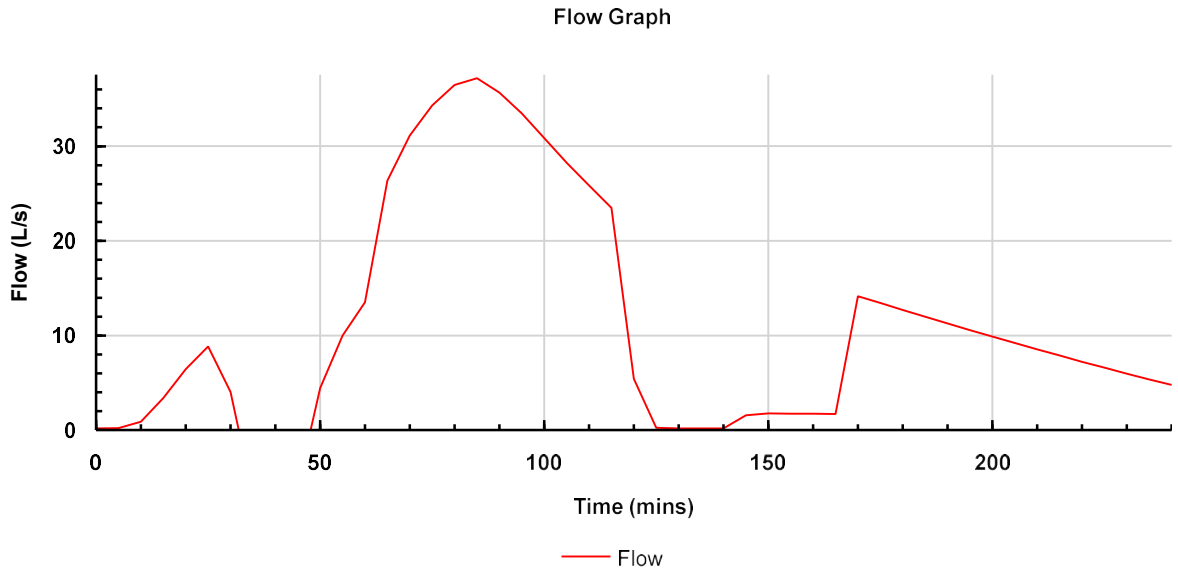
Graphs



Pipe (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 120 mins: Winter

Type : Pipe

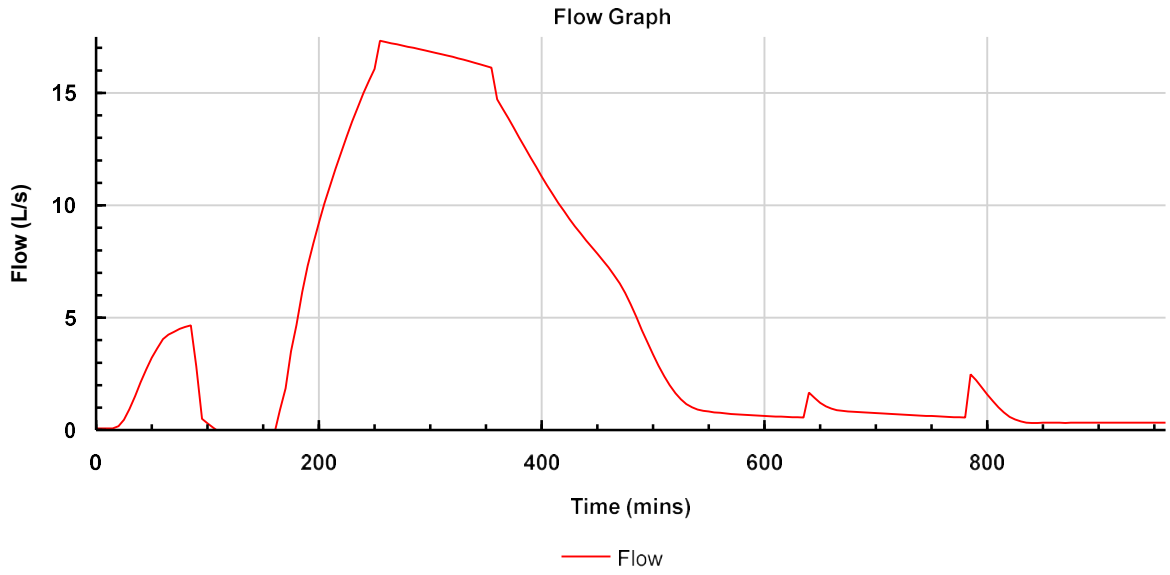
Graphs



Pipe (1) (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter

Type : Pipe

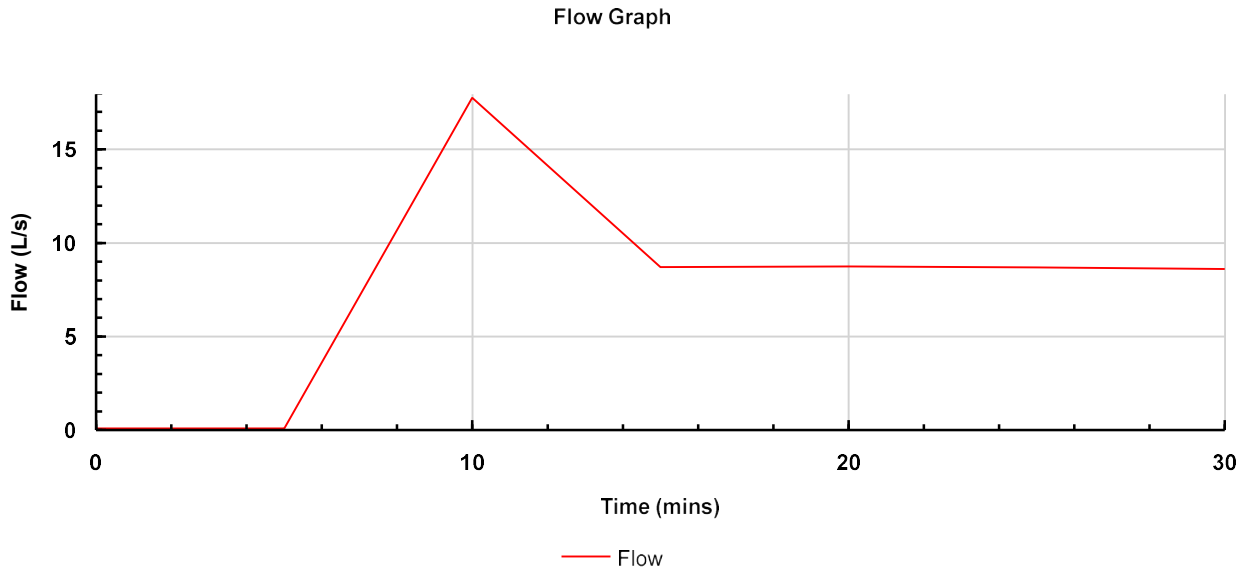
Graphs



Pipe (2)
Critical Storm: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

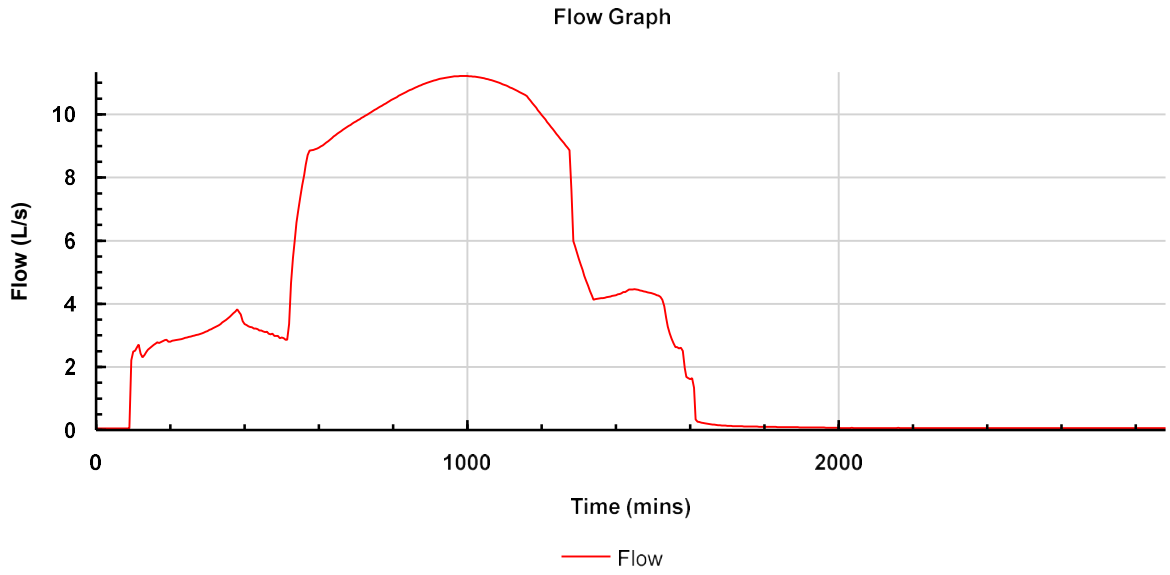
Graphs



Pipe (2) (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 1440 mins: Winter

Type : Pipe

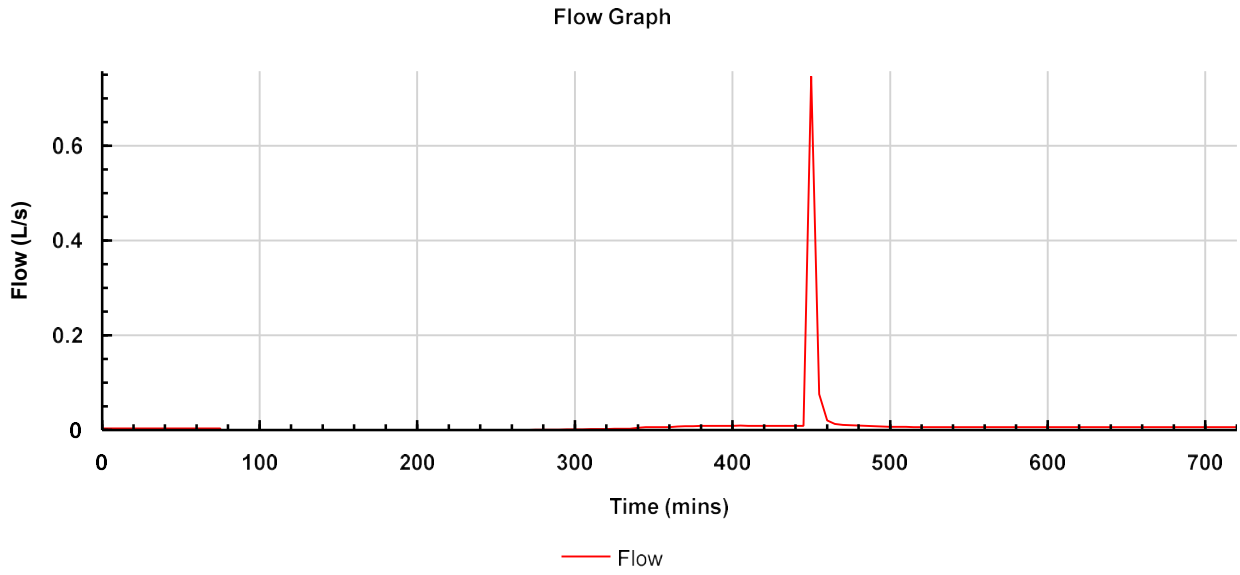
Graphs



Pipe (7)
Critical Storm: FSR: 30 years: Increase Rainfall (%): +0: 360 mins: Summer

Type : Pipe

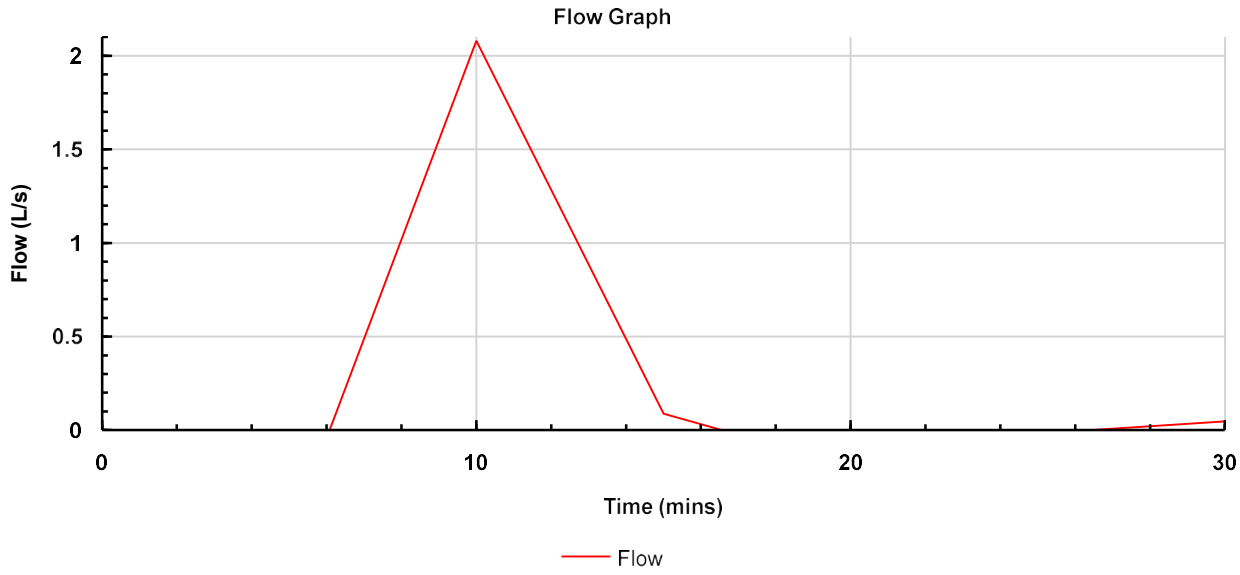
Graphs



Pipe (9)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Pipe

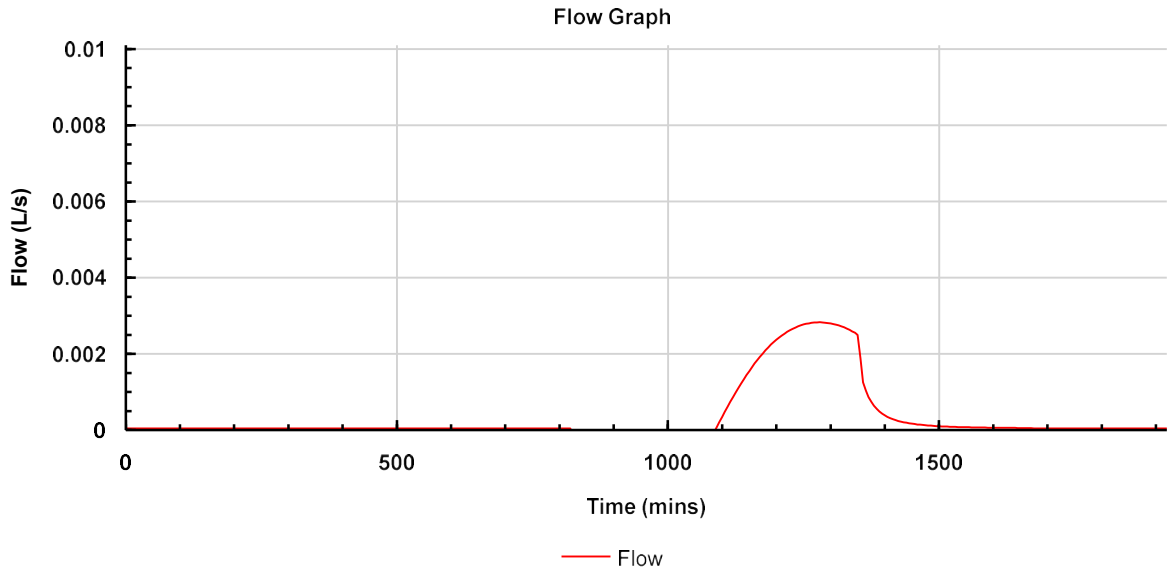
Graphs



Pipe (8) (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Summer

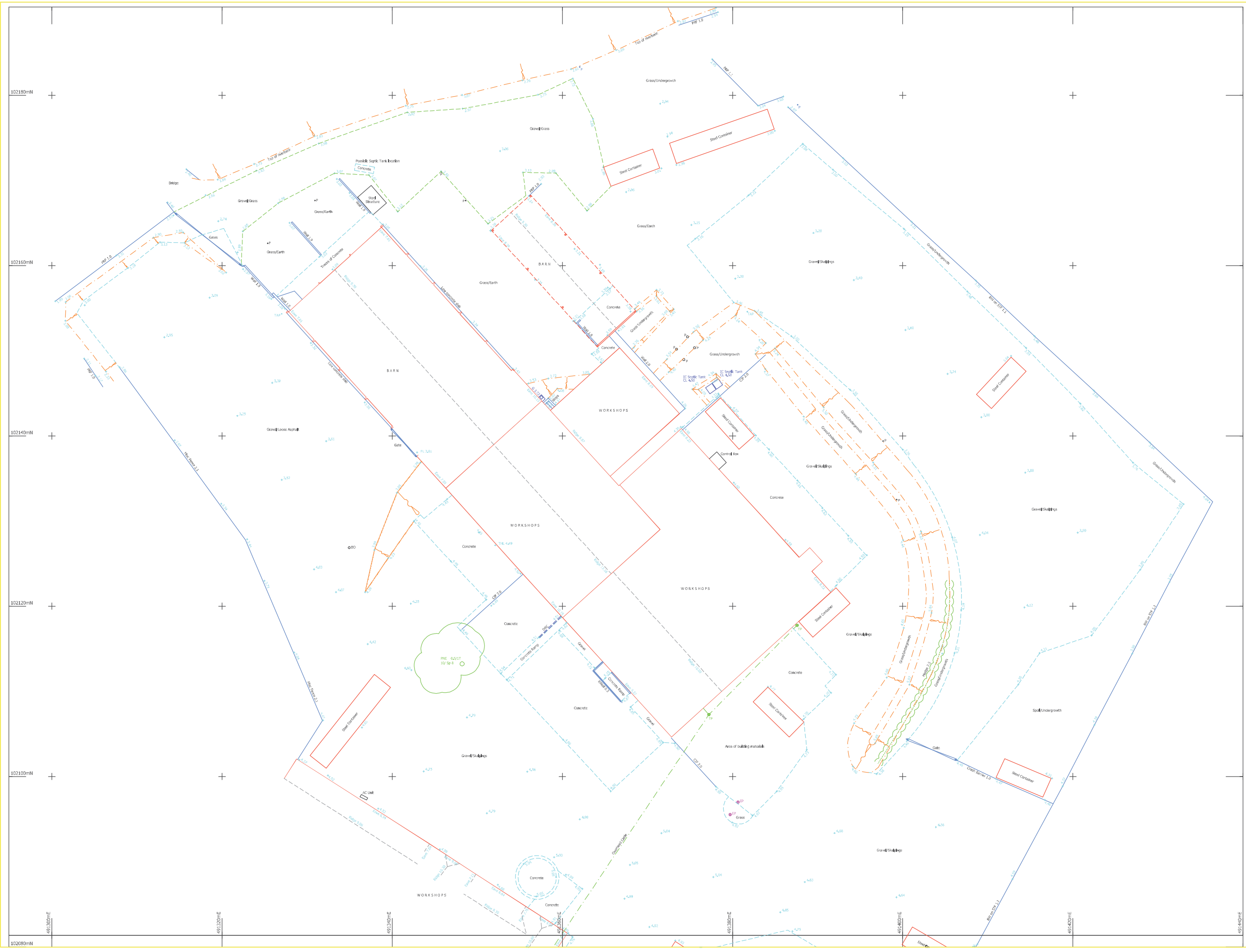
Type : Pipe

Graphs



APPENDIX 3419/FRA/A6

Topographical Survey



NOTES:

Trees:
Every effort has been made to identify and detail all trees on site but where trees are of critical importance we suggest the use of a specialist such as an arborist. Tree spread and heights are indicative.

GPS:
GPS levels and grid are obtained using industry standard guidelines and can vary according to the quality of the GPS network at the time of survey. Therefore all GPS detail is relative to the time and date of the survey.

LEGEND

TREE SPECIES INFORMATION

ALDER	ALD	LOCUST	LOC
ASH	ASH	LONDON PLANE	LPN
ASPEN	ASP	MAGNOLIA	MAG
BEECH	BCH	MAPLE	MPL
CEDAR	CED	OAK	OAK
CHERRY	CHY	PINE	PNE
CYPRESS	CYP	POPLAR	POP
ELM	ELM	PRUNUS	PNS
FIR	FIR	RHODODENDRONS	RDN
FRUIT	FRT	ROWAN	RWN
HAWTHORN	HAW	SILVER BIRCH	SIB
HAZEL	HAZ	SORBUS	SOR
HOLLY	HLY	SWEET CHESTNUT	SCH
HORSE CHESTNUT	HCH	SYCAMORE	SYC
HORNBEAM	HRM	WALNUT	WNT
LABURNUM	LRN	WILLOW	WLW
LARCH	LAR	YEW	YEW
LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Bole Size / No of Boles
Tree Height / Tree Canopy Spread

FENCE INFORMATION

BARBED WIRE FENCE	BWF
CORRUGATED IRON FENCE	CIF
CLOSE BOARD FENCE	CBF
CHAIN LINK FENCE	CLF
CHESTNUT PALING	CPF
CRASH BARRIER	CBR
HANDRAIL	HDL
IRON RAILINGS	IRF
LARCH LAP FENCE	LLF
MISCELLANEOUS FENCE	MSF
PALISADE FENCE	PSF
PICKET FENCE	PKF
POST AND CHAIN FENCE	PCF
POST AND RAIL FENCE	PRF
POST AND WIRE FENCE	PWF
STOCK WIRE FENCE	SWF
TRELLIS FENCING	TLF

LEVEL INFORMATION

BASEMENT LEVEL	BTL
BED LEVEL	BL
COVER LEVEL	CL
DAMP PROOF COURSE	DPC
FLOOR LEVEL	FL
INVERT LEVEL	IL
OUTFALL LEVEL	OL
THRESHOLD LEVEL	THL
FOUL WATER	FW
SURFACE WATER	SW
UNABLE TO LIFT	UTL
WATER LEVEL	WL

SURFACE INFORMATION

CONCRETE	Conc
BRICK PAVERS	BP
FLOWERBED	FB
PAVING SLABS	PS
RETAINING WALL	RWall
TACTILE PAVING	Tac

FEATURE INFORMATION

BOLLARD	BO	NOTICE BOARD	NB
BRITISH TELECOM BOX	BTB	POST	P
BRITISH TELECOM IC	BTIC	RAIN WATER PIPE	RWP
BUS STOP	BS	RAISED FLOWERBED	RFB
CABLE TELEVISION BOX	CATB	ROAD SIGN	RS
CABLE TELEVISION IC	CATV	RODDING EYE	RE
EARTHING ROD	ER	SERVICE MARKER POST	SMP
ELECTRICITY CABLE PIT	ELCP	SOIL VENT PIPE	SVP
ELECTRICITY CONTROL BOX	ECB	STOP COCK	SC
ELECTRICITY POLE	EP	STOP VALVE	SV
FIRE HYDRANT	FH	TELEGRAPH POLE	TP
INSPECTION COVER	IC	TELEPHONE CALL BOX	TCB
LAMP POST	LP	TRAFFIC SIGNAL	TS
LETTER BOX	LB	TRAFFIC SIGNALS IC	TSIC
LITTER BIN	BIN	WATER METER	WM
KERB OUTLET	KO	WATER TAP	Tap
NAME PLATE	NP		

Level Datum:
Levels are related to OS datum derived from GPS

Grid:
Grid is related to OSGB36 derived from GPS

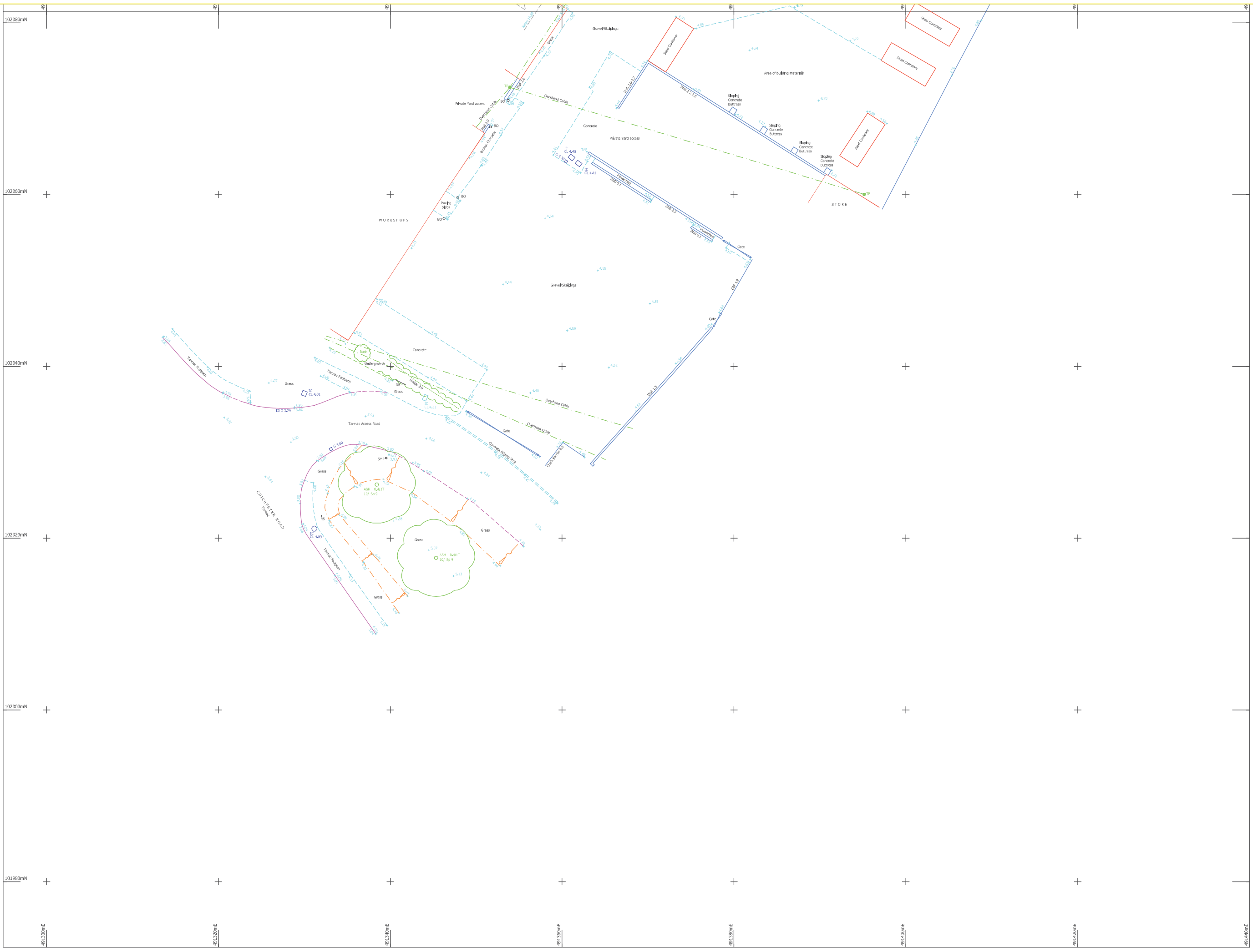
Northpoint:
The Northpoint position shown on this drawing has been located as accurately as possible, but is only indicative of true North

ENCOMPASS SURVEYS

Encompass Surveys Ltd
Unit 2B
Deer Park Farm Industrial Estate
Knowle Lane
Fair Oak, Eastleigh
Hampshire SO50 7PZ

Tel: 023 80692002 Email: info@encompass-surveys.co.uk
Fax: 023 80697125 Website: encompass-surveys.co.uk

Client:	G R Ayling Ltd		
Survey Location:	Elbridge Business Park, Chichester Road, Bersted		
Survey type:	Topographical	Scale:	1:200@A1
Drawing ref:	ENC-060114-4P4	Date:	January 2014
Drawn/QA:	SH/GL	Plot:	Plot 1 of 2



NOTES:

Trees:
Every effort has been made to identify and detail all trees on site but where trees are of critical importance we suggest the use of a specialist such as an arborist. Tree spread and heights are indicative.

GPS:
GPS levels and grid are obtained using industry standard guidelines and can vary according to the quality of the GPS network at the time of survey. Therefore all GPS detail is relative to the time and date of the survey.

LEGEND

TREE SPECIES INFORMATION

ALDER	ALD	LOCUST	LOC
ASH	ASH	LONDON PLANE	LPN
ASPEN	ASP	MAGNOLIA	MAG
BEECH	BCH	MAPLE	MPL
CEDAR	CED	OAK	OAK
CHERRY	CHY	PINE	PNE
CYPRESS	CYP	POPLAR	POP
ELM	ELM	PRUNUS	PNS
FIR	FIR	RHODODENDRONS	RDN
FRUIT	FRT	ROWAN	RWN
HAWTHORN	HAW	SILVER BIRCH	SIB
HAZEL	HAZ	SORBUS	SOR
HOLLY	HLY	SWEET CHESTNUT	SCH
HORSE CHESTNUT	HCH	SYCAMORE	SYC
HORNBEAM	HRM	WALNUT	WNT
LABURNUM	LRM	WILLOW	WLW
LARCH	LAR	YEW	YEW
LIME	LIM	SPECIES UNKNOWN	SPU
		COPPICED	COP

TREE ANNOTATIONS: Tree Species / Tree Bole Size / No of Boles
Tree Height / Tree Canopy Spread

FENCE INFORMATION

BARBED WIRE FENCE	BWF
CORRUGATED IRON FENCE	CIF
CLOSE BOARD FENCE	CBF
CHAIN LINK FENCE	CLF
CHESTNUT PALING	CPF
CRASH BARRIER	CBR
HANDRAIL	HDL
IRON RAILINGS	IRF
LARCH LAP FENCE	LLF
MISCELLANEOUS FENCE	MSF
PALISADE FENCE	PSF
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ELECTRICITY CONTROL BOX	ECB	STOP COCK	SC
ELECTRICITY POLE	EP	STOP VALVE	SV
FIRE HYDRANT	FH	TELEGRAPH POLE	TP
INSPECTION COVER	IC	TELEPHONE CALL BOX	TCB
LAMP POST	LP	TRAFFIC SIGNAL	TS
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Drawing ref:	ENC-060114-4P4	Date:	January 2014
Drawn/QA:	SH/GL	Plot:	Plot 2 of 2

APPENDIX 3419/FRA/A7

Maintenance Schedules

Sustainable Drainage Systems (SuDS):
Typical Maintenance Schedule

Attenuation Tank

Regular Maintenance	
Monthly	• Inspect and identify any areas that are not operating correctly. If required, take remedial action (for 3 months following installation)
Six Monthly	• Inspect and identify any areas that are not operating correctly. If required, take remedial action (following initial 3 month period)
Annually	• Remove sediment from pre-treatment structures
As Required	• De-silt as required
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

Sustainable Drainage Systems (SuDS):
Typical Maintenance Schedule

Filter Drain

Regular Maintenance	
Monthly	• Litter and debris removal • Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required
Six Monthly	• Not applicable
Annually	• Not applicable
Annually	• Remove nuisance and invasive vegetation • Inspect and document the presence of wildlife
As Required	• Repair erosion or other damage by re-turfing, reseeding or replacing filter material • Re-level uneven surfaces and reinstate design levels (typically every 60 month period) • Remove and replace top 300 – 500mm of gravel, clean and replace where required (typically every 60 month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

Sustainable Drainage Systems (SuDS):
Typical Maintenance Schedule

Flow Control Structures

Regular Maintenance	
Monthly	• Inspect and identify any areas that are not operating correctly. If required, take remedial action (for 3 months following installation)
Six Monthly	• Inspect and identify any areas that are not operating correctly. If required, take remedial action • Remove sediment from pre-treatment structures
Annually	• Not applicable
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

Sustainable Drainage Systems (SuDS):
Typical Maintenance Schedule

Swale

Regular Maintenance	
Monthly	• Litter and debris removal • Mow grasses (where required) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required • Inspect and document the presence of wildlife
As Required	• Repair erosion or other damage by re-turfing or reseeding • Re-level uneven surfaces and reinstate design levels (typically every 60 month period) • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface where required (typically every 60 month period) • Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip, where required • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order