

Land south of Monmouth Road, Raglan

Flood Consequences Assessment & Drainage Strategy

May 2025

Project Information	
Project:	Land south of Monmouth Road, Raglan
Report Title:	Flood Consequences Assessment & Drainage Strategy
Client:	Richborough
Instruction:	The instruction to undertake this Flood Consequences Assessment & Drainage Strategy was received from Dean Knight of Richborough.
File Ref:	15719-FCA & Drainage Strategy-04

Approval Record	
Author:	Megan Williams BSc (Hons) MSc MCIWEM
Checker:	Aled Williams BSc (Hons) MCIWEM C.WEM
Approver:	Mike Wellington BEng (Hons) MSc CEng CEnv FICE FCIWEM C.WEM IMaPS MAPM

Document History		
Revision	Date	Comment
01	04/03/2024	First issue
02	26/03/2024	Second issue – updated following Client review
03	10/04/2024	Third issue – updated following Client review
04	30/05/2025	Fourth issue – updated with new TAN15 guidance

The copyright in this document (including its electronic form) shall remain vested in Waterco Limited (Waterco) but the Client shall have a licence to copy and use the document for the purpose for which it was provided. Waterco shall not be liable for the use by any person of the document for any purpose other than that for which the same was provided by Waterco. This document shall not be reproduced in whole or in part or relied upon by third parties for any use whatsoever without the express written authority of Waterco.

This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

Contents

Introduction	1
Existing Conditions	1
Development Proposals	2
Flood Zone Category and Policy Context.....	3
Consultation	4
Sources of Flooding and Probability.....	4
Surface Water Management	7
Construction, Operation and Maintenance.....	12
Other Considerations	13
Foul Drainage	13
Conclusions	14
Recommendations.....	15

Appendices

Appendix A	Location Plan and Aerial Image
Appendix B	Topographical Information
Appendix C	Historical BGS Borehole Record and Location Plan
Appendix D	DCWW Sewer Plan & Correspondence
Appendix E	Illustrative Parameter Plan
Appendix F	NRW Mapping
Appendix G	Greenfield Runoff Rates
Appendix H	MicroDrainage Simulations
Appendix I	Maintenance Schedules
Appendix J	Concept Designers Risk Assessment

Tables

Table 1 – Pollution Hazard Indices11

Table 2 – SuDS Mitigation Indices11

Introduction

Waterco has been instructed to prepare a Flood Consequences Assessment (FCA) and Drainage Strategy in respect of a proposed residential development at land south of Monmouth Road, Raglan, Monmouthshire, NP15 2LB.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified flood risk. This report has been prepared in accordance with the guidance contained in Planning Policy Wales (PPW) and Technical Advice Note 15 (TAN15): Development, flooding and coastal erosion.

This report also includes a Drainage Strategy. The aim of the Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment. This report has been prepared in accordance with the Welsh Government 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems' (2018) – herein referred to as 'the Statutory Standards for SuDS'.

Existing Conditions

The site covers an area of approximately 4.5 hectares (ha) and is located at National Grid Reference (NGR): 341627, 207669. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed March 2024) shows that the site comprises agricultural land. The site is bordered by Monmouth Road to the north, agricultural land to the east, an unnamed watercourse with agricultural land beyond to the south, and Station Road to the west. Access to the site is provided from Station Road to the west.

Local Topography

A topographical survey has been undertaken by Infomap Surveys and Mapping in September 2017. The topographical survey shows that the site slopes from approximately 46metres Above Ordnance Datum (m AOD) in the north to approximately 38.4m AOD in the south.

Topographic levels to m AOD have also been derived from a 1m resolution NRW composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data generally corroborates the topographical survey.

Topographical Information is included in Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the south-eastern extent of the site is underlain by superficial deposits of Alluvium, generally comprising clay, silt, sand and gravel. No superficial deposits are identified across the majority of the site.

The site is identified as being underlain by bedrock of the Raglan Mudstone Formation consisting of interbedded siltstone and mudstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

The closest historical BGS borehole record (BGS reference SO40NW45) is located approximately 370m south of the site. The borehole record is included in Appendix C. The borehole record indicates that topsoil was identified from ground level to approximately 0.15metres below ground level (m.bgl). Stiff silty clay was observed from 0.15m.bgl to the base of the borehole at 1.65m.bgl. Occasional grey-green mottling (Raglan Marl Group) was also present between 0.15m.bgl and 1.65m.bgl.

According to NRW's Aquifer Designation data, obtained from the BGS GeoIndex online mapping [accessed February 2024], the superficial Alluvium deposits are classified as a Secondary A Aquifer. Secondary A Aquifers are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'. The underlying Raglan Mudstone Formation is also classified as a Secondary A Aquifer.

The Cranfield University 'Soilscapes' map [accessed March 2024] indicates that the northern extent of the site is underlain by '*Slightly acid loamy and clayey soils with impeded drainage*'. The remainder of the site is underlain by '*Loamy and clayey floodplain soils with naturally high groundwater*'.

Local Drainage

Public sewer records have been obtained from Dwr Cymru Welsh Water (DCWW) and are included in Appendix D. The DCWW sewer records show that there are no public sewers crossing the site. There is a 6inch (150mm) public foul sewer located approximately 180m north-east of the site within Monmouth Road that flows north-west. There is also a 150mm public combined sewer located approximately 95m west of the site within the grounds of Raglan VC Primary School that flows south-west. Cover and invert levels have not been provided.

Development Proposals

The proposed development is for a residential development comprising up to 54no. dwellings, with associated access roads, driveways, multi-use Amphitheatre, and community facility. An illustrative parameter plan is included in Appendix E.

The proposed development will introduce hardstanding areas in the form of buildings, driveways and roads. Hardstanding is assumed to comprise 12,467m² or 28% of the total site area. The remaining permeable, soft landscaped areas will occupy 32,533m² or 72% of the total site area.

The residential development (including all dwellings, gardens, driveways and access roads) will cover approximately 2ha. The proposed community facilities will cover approximately 0.14ha. The total

developable site area is therefore 2.14ha. The remaining site areas will be occupied by public open space.

Flood Zone Category and Policy Context

Flood Zone Category

The NRW 'Flood Map for Planning' (Appendix F), shows that the site is located within Flood Zone 1, meaning it has a less than 0.1% annual probability of flooding.

Development Vulnerability Classification

The proposed residential development is considered to be 'highly vulnerable' development in accordance with Figure 4 of the Welsh Government's Technical Advice Note 15 – Development, flooding and coastal erosion (TAN15).

TAN15 states that Applications for all types of development, change of use or conversion are acceptable in principle within Flood Zone 1.

Local Policy

The Monmouthshire County Council Adopted Local Development Plan, adopted February 2014, contains the following policies related to flood risk and drainage:

'...Policy SD3 – Flood Risk

Proposals for highly vulnerable development or emergency services will not be permitted in areas which may be liable to flooding, unless the residential development is for the conversion of upper floor within defined settlement boundaries or the proposal is to extend an established tourism, leisure or educational establishment. Less vulnerable built development will be permitted within defined settlements or on sites allocated for uses such as employment. Development proposals within a floodplain will be required to demonstrate that:

- a) The development is or can be protected by approved engineering works and / or other flood protection measures;*
- b) Such remedial measures would not cause flooding or significantly increases the risk of flooding elsewhere;*
- c) The development, including any remedial measures, can be sympathetically assimilated into the environment in terms of its siting, scale, design and landscaping;*
- d) The development does not interfere with the ability of the Environment Agency or other bodies to carry out flood control works or maintenance; and*
- e) The nature conservation interest of the water course corridor is protected and, where practicable, enhanced.*

Development resulting in additional surface water run-off and leading to an increased risk of flooding will only be permitted where adequate protection and mitigation measures are included as part of the proposal.

...Policy SD4 – Sustainable Drainage

Development proposals will be expected to incorporate water management measures, including Sustainable Urban Drainage Systems (SUDS), to reduce surface water run-off and minimise its contribution to flood risk elsewhere.'

Local guidance documents including the Monmouthshire County Council Flood Risk Management Plan (FRMP) (February 2016) and the Monmouthshire County Council Preliminary Flood Risk Assessment (PFRA) (November 2011 and its 2017 addendum) have been reviewed and inform this report.

Consultation

A pre-planning opinion request was submitted to NRW in January 2024. In their response, NRW have stated that:

'Unfortunately, we do not currently have the resources available to progress this request for pre app advice at present and therefore, we are currently unable to provide a site-specific preliminary opinion on this proposal.'

Correspondence with the Sustainable Drainage Approval Body (SAB) was provided by the Client in January 2024. Conclusions from the SAB consultation indicate a preference for use of the southern extent of the site as a flood storage area.

A pre-development enquiry request was submitted to DCWW in January 2024. In their response (Appendix D), DCWW have stated that:

'We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system...

We are content that foul only flows from the proposed development can be suitably treated at the receiving Waste Water Treatment Works.

We can advise that Raglan WwTW has a phosphate permit and there is sufficient headroom capacity to accommodate this proposed development. You will need to discuss this matter further with the local planning authority.'

Sources of Flooding and Probability

Fluvial

The nearest watercourse is an unnamed watercourse which flows south-west along the southern boundary

of the site. The unnamed watercourse is culverted under Station Road immediately south of the site. Other watercourses in the area include Barton Brook which is located approximately 60m west of the site at its nearest point. Barton Brook flows south to its confluence with Nant Wilcae (watercourse) approximately 360m south of the site. There is also a ditch located along the northern and western boundaries of the site as evidenced by the topographical survey. The ditch flows south-east along the western boundary and joins the unnamed watercourse at the southern boundary of the site.

The NRW 'Flood Map for Planning' included in Appendix F shows that the site is located within Flood Zone 1, meaning it has a less than 0.1% annual probability of fluvial flooding. The flood extent outlined on the NRW map shows that the site is not at risk of fluvial flooding from Barton Brook.

The NRW 'Historic Flood Risk' map (Appendix F) shows that the site is not located within a historical flood extent. However, anecdotal information from the Council reveals that flooding has occurred on Station Road west of the site. The flooding was attributed to the Station Road culvert, immediately south of the site, exceeding its capacity.

Any potential flooding of the Station Road culvert south of the site would likely back up behind the culvert inlet where insufficient culvert capacity exists. Flooding would occur upstream of the culvert inlet before reaching a level of approximately 38.7m AOD which would be sufficient to overspill onto Station Road. The NRW 'Flood Risk from Surface Water & Small Watercourses' map (Appendix F) provides an indication of the potential flood extent.

Land upstream of the culvert has been designated as open space with all residential development situated outside of the flood extent and above 38.7m AOD (all built development is situated at or above 38.9m AOD).

The risk of fluvial flooding is therefore considered to be very low across the majority of the site. The southern extent of the site is at potential risk of fluvial flooding should Station Road culvert exceed its capacity; however no development is proposed within the flood extent.

Tidal

The site is situated at a minimum of approximately 38.5m AOD and is significantly above sea level. The risk of tidal flooding is therefore considered to be very low.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The NRW 'Flood Risk from Surface Water & Small Watercourses' map (Appendix F) shows that the majority of the site, including all developable areas, is located within Flood Zone 1, meaning it has a less than 0.1% annual probability of flooding. The southern extent of the site is shown to be located within surface water Flood Zones 2 and 3. Surface water Flood Zone 2 is defined as having between a 0.1% to 1% (1 in 1000 to 1

in 100) annual probability of flooding, including the effects of climate change. Surface water flood Zone 3 is defined as having greater than 1% annual probability of flooding, including the effects of climate change.

The surface risk identified is associated with the unnamed watercourse along the southern boundary of the site. When the Station Road culvert exceeds its capacity, flooding to the lower southern extent of the site could occur immediately upstream of the culvert inlet. The risk from this watercourse has been considered in the fluvial flooding section above. All properties and access roads will be located outside of the surface water flood extent.

It can be concluded that the risk of surface water flooding across the majority of the site is very low. The lower southern extent of the site is at risk of surface water flooding, however no development is located in this area. The area at risk of flooding will be used as an amphitheatre style multi-functional green space which will serve as a flood storage area and community space. Signage will be displayed in this area to alert site users of the flood risk.

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The DCWW sewer records show that there is a 150mm public foul sewer located approximately 180m north-east of the site within Monmouth Road that flows north-west. There is also a 150mm public combined sewer located approximately 95m west of the site within the grounds of Raglan VC Primary School that flows south-west.

Any potential flooding arising from the 150mm public foul sewer in Monmouth Road north of the site would be directed west within Monmouth Road and intercepted by the drainage ditch along the northern boundary of the site. The 150mm public foul sewer in Monmouth Road serves a limited upstream catchment (approximately 5 properties) and as such, the likelihood of an exceedance event is very low.

Any potential flooding arising from the 150mm public combined sewer 95m west of the site would be directed south, away from the site, following the local topography.

It can therefore be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

As described above, the site is underlain by the Raglan Mudstone Formation. The impermeable nature of the underlying geology would limit the vertical migration of groundwater.

The PFRA states *'The risk of groundwater flooding is considered to be low, and it is not considered to be a significant issue within the catchment.'*

There are no records of groundwater flooding affecting the site. It can therefore be concluded that the risk of groundwater flooding is very low.

Artificial Sources

There are no canals in the immediate vicinity of the site. The online NRW 'Flood Risk from Reservoirs' map shows that the site is not at risk of flooding from reservoirs. It can therefore be concluded that the risk of flooding from artificial sources is very low.

Summary of Potential Flooding & Mitigation

It can be concluded that the risk of flooding from all sources to the developable area of the site is very low. The southern extent of the site is at risk of fluvial and surface water flooding resulting from an exceedance event of Station Road culvert. In the event of the Station Road culvert exceeding its capacity, flood waters could reach a level of 38.7m AOD on site before spilling over onto Station Road. All development (properties, gardens and roads) will be situated at or above 38.9m AOD and a minimum of 0.2m above the flood extent.

In accordance with Building Regulations, finished floor levels should be set 150mm above surrounding ground levels.

The area at risk of flooding in the southern extent of the site will be used as an amphitheatre style multi-functional green space which will serve as a flood storage area and community space. Signage will be displayed in this area to alert site users of the flood risk. The provision of the amphitheatre will provide flood risk betterment through the removal of material (lowering of ground levels) in the flood extent as to provide additional flood storage during storm events.

TAN15 Compliance

The site is shown in Flood Zone 1 on the NRW Flood Risk from Rivers Map. The southern extent of the site is shown to be located within surface water Flood Zones 2 and 3 on the NRW Flood Risk from Surface Water and Small Watercourses Map. All development (properties, gardens and roads) will be situated within surface water Flood Zone 1 and a minimum of 0.2m above the surface water flood extent. As such, the site is considered to comply with Sections 10 and 11 of TAN15.

Surface Water Management

The proposed development will introduce approximately 12,467m² of hardstanding in the form of buildings, driveways and access roads. The introduction of hardstanding area will result in an increase in surface water runoff rates and volumes. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

In order to establish the proposed limited discharge rate, existing greenfield runoff rates have been estimated using the ICP SUDS method in MicroDrainage. A summary of the greenfield runoff rates for a range of events

is provided as Appendix G. The 1 in 1 year greenfield runoff rate for the 2.14ha developable site area is 5.2 l/s. A discharge rate of 5.2 l/s is therefore proposed.

Discharge Method

Standard S1 of the Statutory Standards for SuDS sets out the following hierarchy of drainage options:

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water body;

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer.

Priority Level 1: Surface water runoff collected for use

In line with section G1.4 of the Statutory Standards for SuDS, rainwater harvesting is not proposed for this site as it is not a viable/ cost-effective part of the solution for managing surface water runoff on the site, taking account of the potential water supply benefits of such a system.

Section G1.6 of the Statutory Standards for SuDS states that; in most cases, rainwater harvesting alone will not be adequate to deal with the site drainage and provision will be required for an overflow to a Level 2 or lower priority runoff destination. As downstream provision of attenuation storage will be required to accommodate for rainwater harvesting system overflows, rainwater harvesting is not considered a cost-effective solution for managing surface water runoff.

However, rainwater butts will be installed where possible to encourage external water re-use.

Priority Level 2: Surface water runoff is infiltrated to ground

As described above, the site is underlain by the Raglan Mudstone Formation. Due to the impermeable nature of the underlying geology, soakaways are unlikely to be feasible on site.

Infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of soakaways.

Priority Level 3: Surface water runoff is discharged to a surface water body

Where infiltration is not suitable, a connection to watercourse is the next consideration. The nearest watercourse is the unnamed watercourse located along the southern site boundary. Discharge to this watercourse at a limited discharge rate of 5.2 l/s appears to be feasible. Based on an invert level of the watercourse of approximately 37.92m AOD upstream of the Station Road culvert, and all developable areas being sited at or above 39.5m AOD, a gravity connection appears feasible.

A discharge rate of 5.2 l/s would provide a flood risk reduction over the existing situation. The existing

greenfield runoff rates are 10.4 l/s during the 1 in 30 year storm event and 12.9 l/s during the 1 in 100 year storm event. During the 1 in 30 year event, a 50% runoff reduction is achieved. During the 1 in 100 year event, a runoff reduction of 60% is achieved.

Attenuation Storage

In order to achieve a limited discharge rate of 5.2 l/s, attenuation storage will be required. An attenuation storage estimate has been provided using MicroDrainage and is included in Appendix H. An estimated storage volume of 1,143m³ will be required to accommodate the 1 in 100 year plus 30% Climate Change (CC) event. The storage estimate is based on a discharge rate of 5.2 l/s, storage within a tank or pond structure, an approximate impermeable drainage area of 1.25ha, a design head of 1m and hydro-brake flow control.

The attenuation volume is provided for indicative purposes only and should be verified at the detailed design stage.

Attenuation storage will be provided in an attenuation pond located in the southern extent of the site, however, on land north of the surface water / fluvial flood extent. A 1m deep pond with a base (invert) area of 970m², 1 in 3 side slopes and a total surface area of 1,330m² (at the top water level) will provide 1149.8m³ of attenuation storage, sufficient to accommodate the 1 in 100 year plus 30% CC event. A 300mm freeboard from the top water level to the top bank level should also be provided.

Sustainable Drainage Systems

In addition to an attenuation pond, the following sustainable drainage system will be implemented to provide further runoff reduction, water quality and amenity / biodiversity benefits.

Raingarden

Raingardens are constructed at ground level, with a gravel infill and an underdrain to collect filtrated water. They can be topped with plants / greenery to offer additional amenity and biodiversity benefits. Runoff rates are reduced through the filtration process and runoff volume reduced through uptake by plants.

A typical cross section through a rain garden, extracted from the SuDS Manual (2015), is provided in Figure 1 for reference.

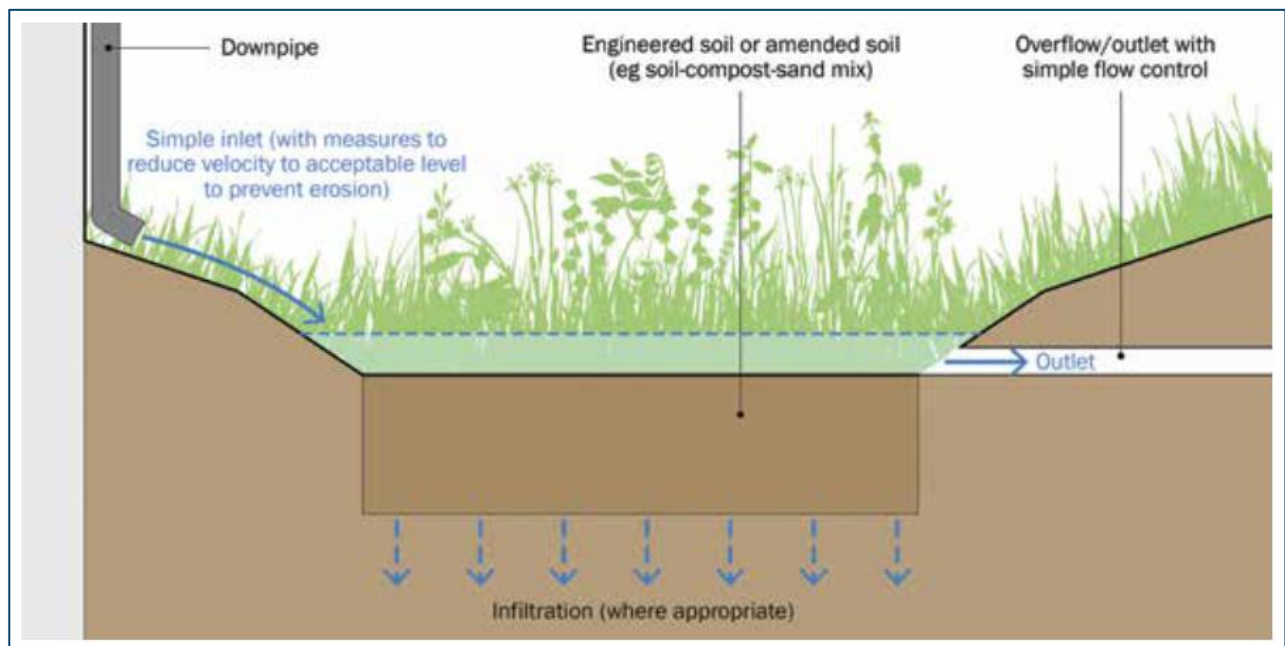


Figure 1 - SuDS Manual (2015) – ‘Figure 18.2 Section through a simple rain garden with outlet pipe’

Rain gardens will be placed within landscaped areas peripheral to the access road. The rain gardens will be linked hydraulically to the site’s drainage system i.e. via piped connections to road gullies. The outflow from the raingardens will flow into the proposed attenuation pond.

Swales

A swale will be located in the eastern extent of the site, adjacent to the access road / landscaped edge.

Swales are shallow, flat bottomed, vegetated open channels which will provide flow conveyance and treatment, together with amenity and biodiversity benefits. The swale will discharge to the proposed attenuation pond.

Permeable Paving

Permeable paving is proposed for all property driveways. The permeable surfacing will be laid with a suitable sub-grade depth and will be formally under-drained to the downstream attenuation storage feature.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 30% CC event. Storm events in excess of the 1 in 100 year plus 30% CC event should be permitted to produce temporary shallow depth flooding within the landscaped areas. Finished floor levels will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

Surface Water Treatment

The Statutory Standards for SuDS sets out the following guidance for surface water treatment:

S3 - Surface water quality management

Treatment for surface water runoff should be provided to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers.

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, with individual property driveways, residential car parks and low traffic roads classified as having a 'low' pollution hazard level. Table 1 demonstrates the pollution hazard indices associated with each land use.

Table 1 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual Property Driveways, Residential Car Parks, Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

* Indices values range from 0-1.

Runoff from roads will be directed to raingardens, a swale and an attenuation pond. Driveways will be formed from permeable surfacing. Table 2 demonstrates that permeable surfacing provides sufficient treatment for individual property driveways. The attenuation pond provides sufficient treatment for all other land uses. Additional treatment will be provided by the proposed raingardens and swale.

Table 2 – SuDS Mitigation Indices

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Pond	0.7	0.7	0.5
Swale	0.5	0.6	0.6
Raingardens (Bioretention systems)	0.8	0.8	0.8

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

Amenity

The Statutory Standards for SuDS provide the following guidance in relation to Standard S4 – Amenity:

‘The design of the surface water management system should maximise amenity benefits.’

The proposed development will include permeable paved driveways, an attenuation pond, raingardens and a swale which will maximise the amenity value of the proposed drainage system.

Biodiversity

The Statutory Standards for SuDS provide the following guidance in relation to Standard S5 – Biodiversity:

‘The design of the surface water management system should maximise biodiversity benefits.’

Provision of raingardens, a swale and an attenuation pond will maximise the biodiversity value of the proposed drainage system.

Construction, Operation and Maintenance

Standard S6 of the Statutory Standards for SuDS states;

S6 – Design of drainage for Construction, Operation and Maintenance

- 1) All elements of the surface water drainage system should be designed so that they can be constructed easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).
- 2) All elements of the surface water drainage system should be designed to ensure maintenance and operation can be undertaken (by the relevant responsible body) easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).
- 3) The surface water drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance.

All drainage systems will be readily accessible for maintenance access. The drainage system (shared drainage features) will be offered for adoption to the SAB who will then be responsible for maintenance. Maintenance of permeable paving on individual property driveways will be the responsibility of individual property owners.

Maintenance schedules for an attenuation pond, permeable paving, swales and bioretention systems (applicable to the raingardens) are included in Appendix I.

Other Considerations

Maintenance access to the watercourse on the southern site boundary and ditches on the northern and western boundaries will be retained. An Ordinary Watercourse Consent may be required for any works over or in the vicinity of the watercourses / ditches, for example for the formation of access road crossings over the ditches on the northern and western site boundaries.

Foul Drainage

Foul flows should be discharged to the public foul sewer in Monmouth Road approximately 180m north-east of the site (manhole chamber S041078902890). This has been agreed in principle with DCWW. DCWW have stated that:

'...I have since reviewed the CSO data and it appears to be a low risk asset, therefore I am content that we can accommodate your connection point with no detriment to the environment.'

The cover level and invert levels of manhole S041078902890 in Monmouth Road are not known, however a review of the wider topography indicates that a pumped solution will be necessary.

Provision should be made in the southern extent of the site (outside of the flood extent) for a foul pumping station. In accordance with Sewer Sector Guidance, a minimum 15m easement is required from the wet well of a pumping station to any habitable dwellings. The pump station compound will require tanker access from an adopted road.

Storage will be required to accommodate for pump failure. In accordance with Sewer Sector Guidance, the storage requirement is 160 litres per dwelling. Provision of standby pumps, an automated pump exercise regime and a pump failure alarm system would limit the risk of pump failure.

Conclusions

The proposed development is for a residential development comprising up to 54no. dwellings with associated access roads, driveways and community facility.

The NRW 'Flood Map for Planning' (Appendix F), shows that the site is located within Flood Zone 1, meaning it has a less than 0.1% annual probability of flooding.

The risk of flooding from all sources has been assessed and the flood risk to the majority of the site, including all developable areas, is considered to be very low. The southern extent of the site is considered to be at risk of fluvial and surface water flooding associated with the Station Road culvert exceeding its capacity.

In the event of the Station Road culvert exceeding its capacity, flood waters could reach a level of 38.7m AOD on site before spilling over onto Station Road. All development (properties, gardens and roads) will be situated at or above 38.9m AOD and a minimum of 0.2m above the flood extent.

The area at risk of flooding in the southern extent of the site will be used as an amphitheatre style multi-functional green space which will serve as a flood storage area and community space. The provision of the amphitheatre will provide flood risk betterment through the removal of material (lowering of ground levels) in the flood extent as to provide additional flood storage during storm events.

The proposed development will introduce impermeable drainage area in the form of buildings and access. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used and attenuation provided on site to accommodate storm events up to and including the 1 in 100 year plus 30% climate change event.

All methods of surface water discharge have been assessed. Where soakaways are not feasible, discharge of surface water to the unnamed watercourse south of the site at the 1 in 1 year greenfield runoff rate of 5.2 l/s appears to be the most practical option. A gravity connection appears to be achievable.

Attenuation storage will be required on site in order to restrict surface water discharge to 5.2 l/s. Attenuation can be provided in the form of an attenuation pond, located in the southern extent of the site, however outside of the flood extent.

The attenuation pond, in conjunction with permeable surfacing, raingardens and a swale will provide treatment to runoff.

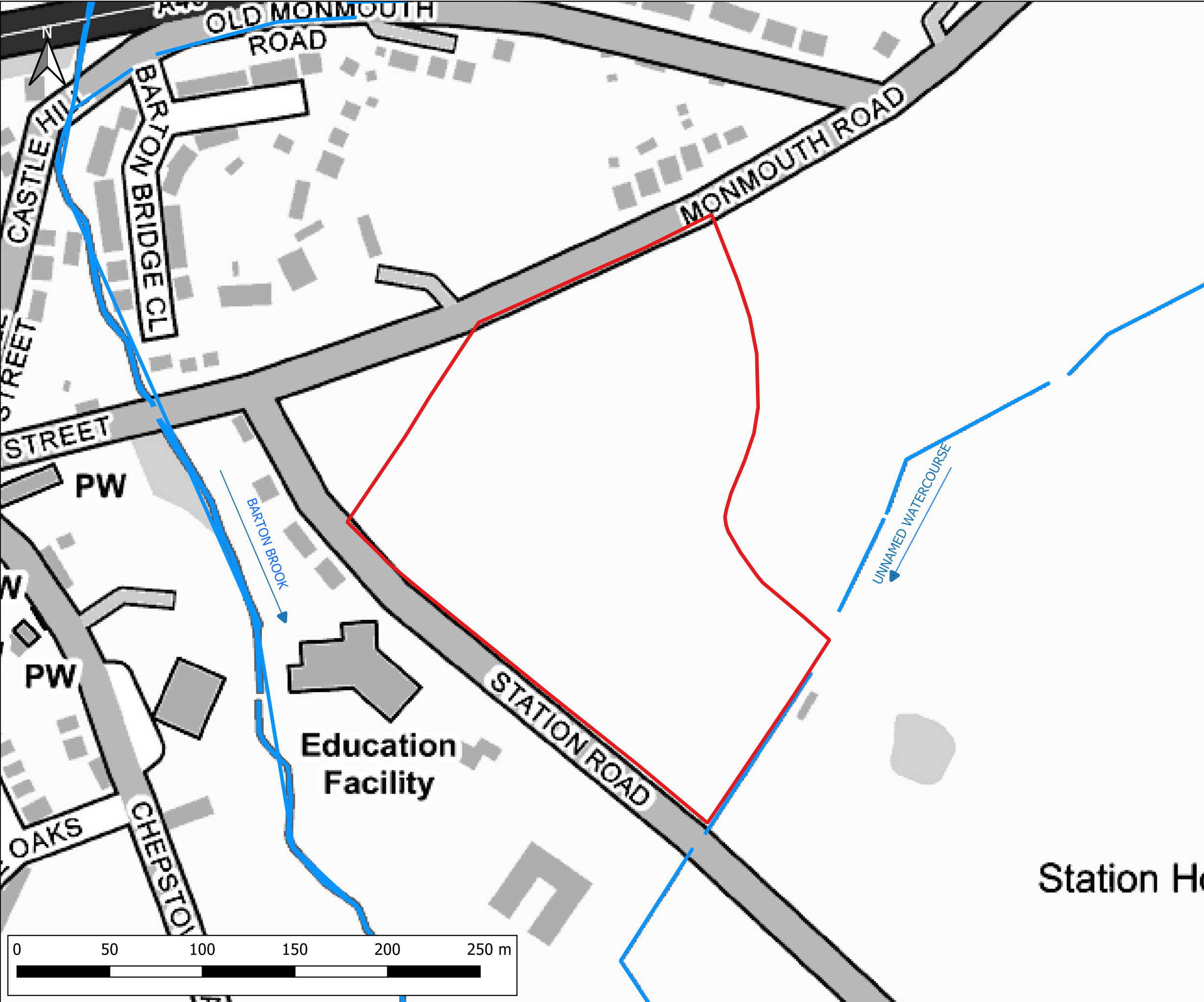
Foul flows will be discharged to the public foul sewer in Monmouth Road, as agreed with DCWW. A pumped solution will be required.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix J.

Recommendations

1. Submit this Flood Consequences Assessment and Drainage Strategy to the Planning Authority in support of the Planning Application.
2. Set finished floor levels 150mm above surrounding ground levels.
3. Undertake BRE 365 infiltration testing to determine the suitability of infiltration techniques.
4. Verify the attenuation volumes included in this report when undertaking detailed drainage design.
5. Undertake Detail Design.

Appendix A Location Plan and Aerial Image



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies

CLIENT:

Richborough

www.waterco.co.uk

SCHEME:

Land south of Monmouth Road, Raglan

PLOT TITLE:

Location Plan

PLOT STATUS:		FINAL		DATE:	26-03-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:		
MJW	AW	MW	1:2000		
PLOT NAME:				REVISION:	
_Location_Plan				-	



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

CLIENT:

Richborough

www.waterco.co.uk

SCHEME:

Land south of Monmouth Road,
Raglan

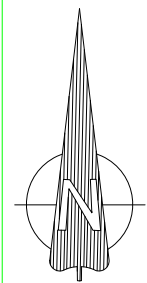
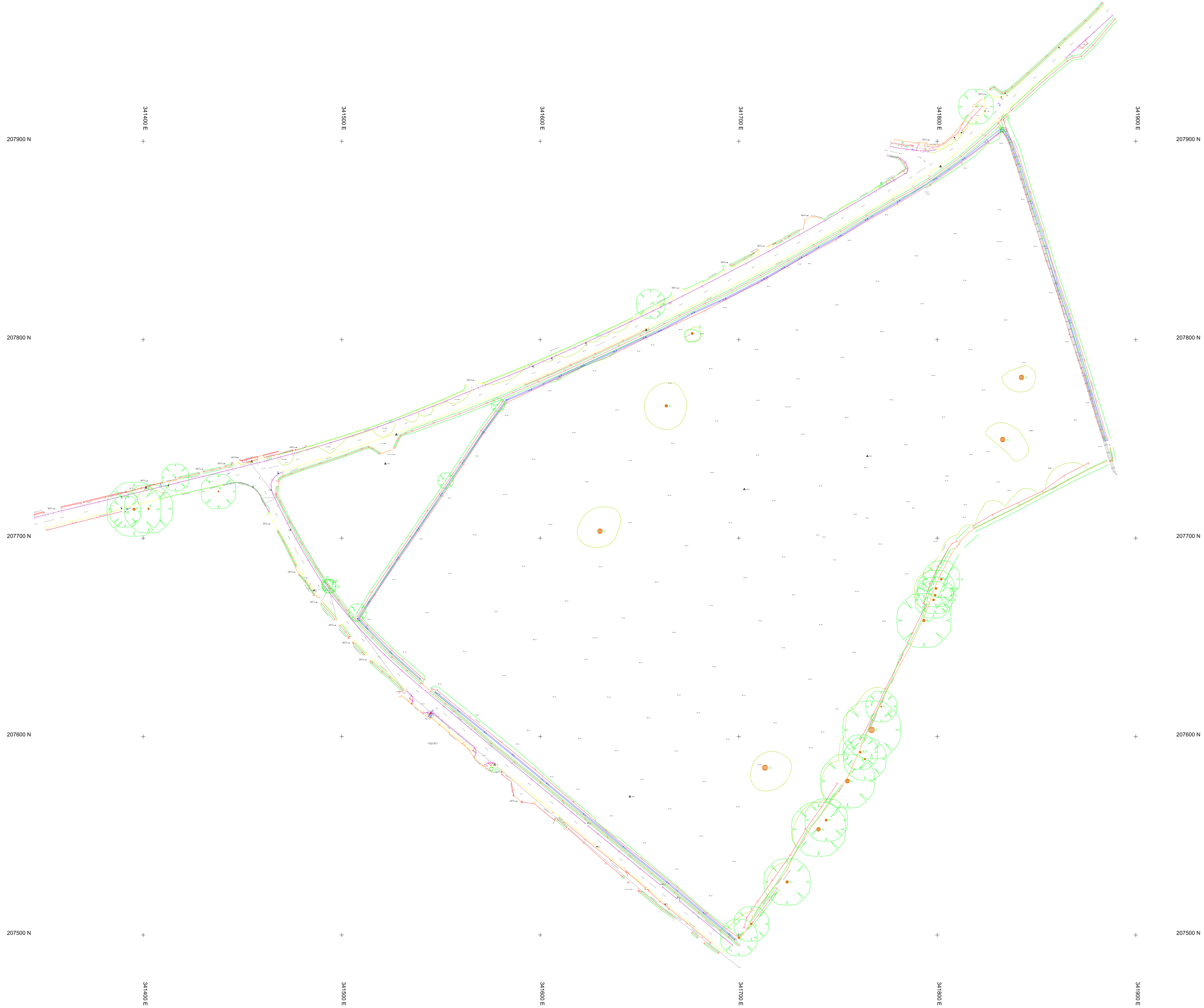
PLOT TITLE:

Aerial Plan

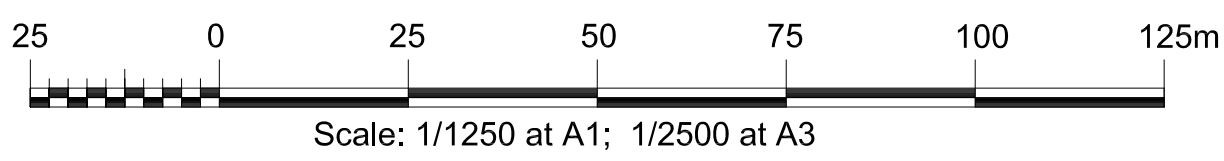
PLOT STATUS:		FINAL		DATE:	26-03-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:		
MJW	AW	MW	1:2000		
PLOT NAME:				REVISION:	
_Aerial_Plan				-	

Appendix B Topographical Information

Coordinate Table				
Station	Description	Easting	Northing	Height
C1	Control Station	341545.016	207611.944	39.895
T10	Control Station	341507.686	207607.369	39.924
T2	Control Station	341454.663	207738.640	42.576
T3	Control Station	341401.484	207725.390	41.145
T4	Control Station	341406.045	207973.696	41.977
T5	Control Station	341577.060	207585.894	39.080
T6	Control Station	341653.398	207604.913	46.826



SURVEYED BY GNSS TO OSNG. LEVEL DATUM OSGM02.



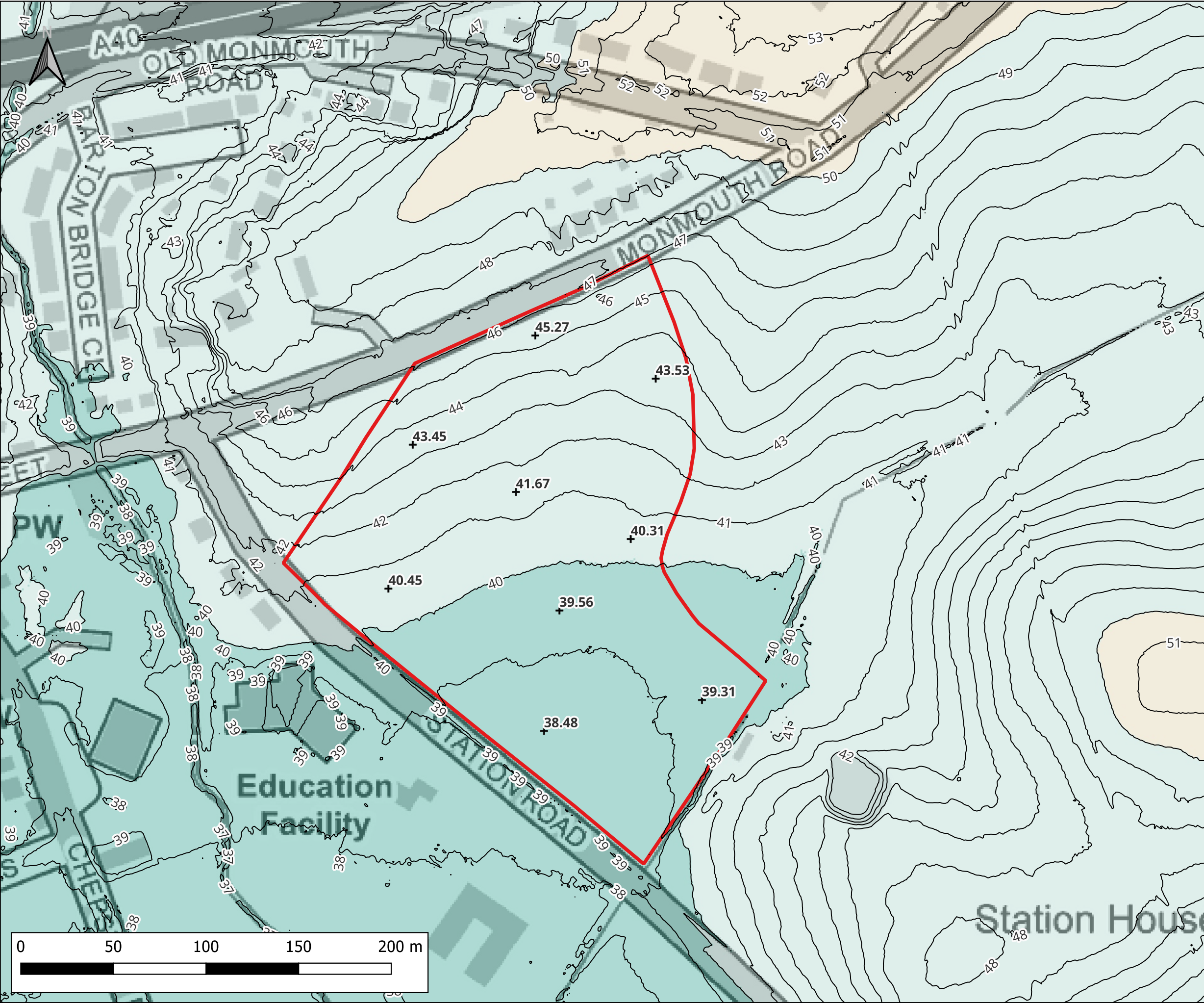
Client		Project		 SURVEYS AND MAPPING CHARTERED SURVEYORS  Seymour House Sunnyside Road North Weston-super-Mare North Somerset BS23 3PZ Tel: 01534 644000 fax 01534 644000 E-mail: mail@infomapsurveys.co.uk Website: www.infomapsurveys.co.uk 
WATERCO CONSULTANTS LTD LON PARCWR BUSINESS PARK RUTHIN LL15 1NJ		TOPOGRAPHIC SURVEY AT RAGLAN MONMOUTHSHIRE		
Surveyed: S.M. Date: 22.09.2017 Scale: 1/1250 at A1; 1/2500 at A3		Apprd: R.J.FLEW File Ref: 1586		

DRAWING REFERENCE	
ISM/RAGLAN LAND SURVEY	
OVERALL PLAN	

DRAWING REFERENCE

ISM/RAGLAN LAND SURVEY

OVERALL PLAN



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site boundary
- 1m Contour
- Site Levels (m AOD)

Ground Elevations (m AOD)

- <= 40.0
- 40.0- 50.0
- 50.0 - 60.0
- 60.0 - 70.0
- > 70.0

Inset Map: Shows the location of the site (green box) relative to Raglan, Castle, and Kinocoe.

CLIENT:			
Richborough			
 www.waterco.co.uk			
SCHEME:			
Land south of Monmouth Road, Raglan			
PLOT TITLE:			
LiDAR Plan 1m Resolution Data from Environment Agency			
PLOT STATUS:	DATE:		
FINAL	26-03-2024		
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:2000
PLOT NAME:			REVISION:
_LiDAR_Plan			-

Appendix C Historical BGS Borehole Record and Location Plan



LOG for BOREHOLE No. 4

Fig. 4

Location No. 4622 RAGLAN-NEWPORT TRUNK ROAD.
Carried out by powered augering.
Date June, 1965

Sheet 1 of 1

SO40NW45

Borehole Diameter: 12 in. 4 1/2 in. 0.319

Description	Reduced Level: ft.	Legend	Sample	Depth ft. in.	Thickness ft. in.	Standard Penetration test	
						Depth and Penetration ft. in.	No. of Blows (N)
Ground Level (Ft. above N.D.)	143.3			0 0	0 6		
TOPSOIL	142.8			0 6			
Brownish-red stiff silty CLAY graduating to a weak MARL with increasing depth. Occasional grey-green mottling (Raglan Marl Group)		x	1	(15.2)			
		x	2		5 0		
		x	3		pene- trated	4 6	
	137.8	x	4	5 6		12	46
END OF BOREHOLE				(11.5 ft.)			

Note: Water began to enter
borehole at a depth of 3ft.6in.

Scale 1 in. = 5 ft.

● Disturbed Sample

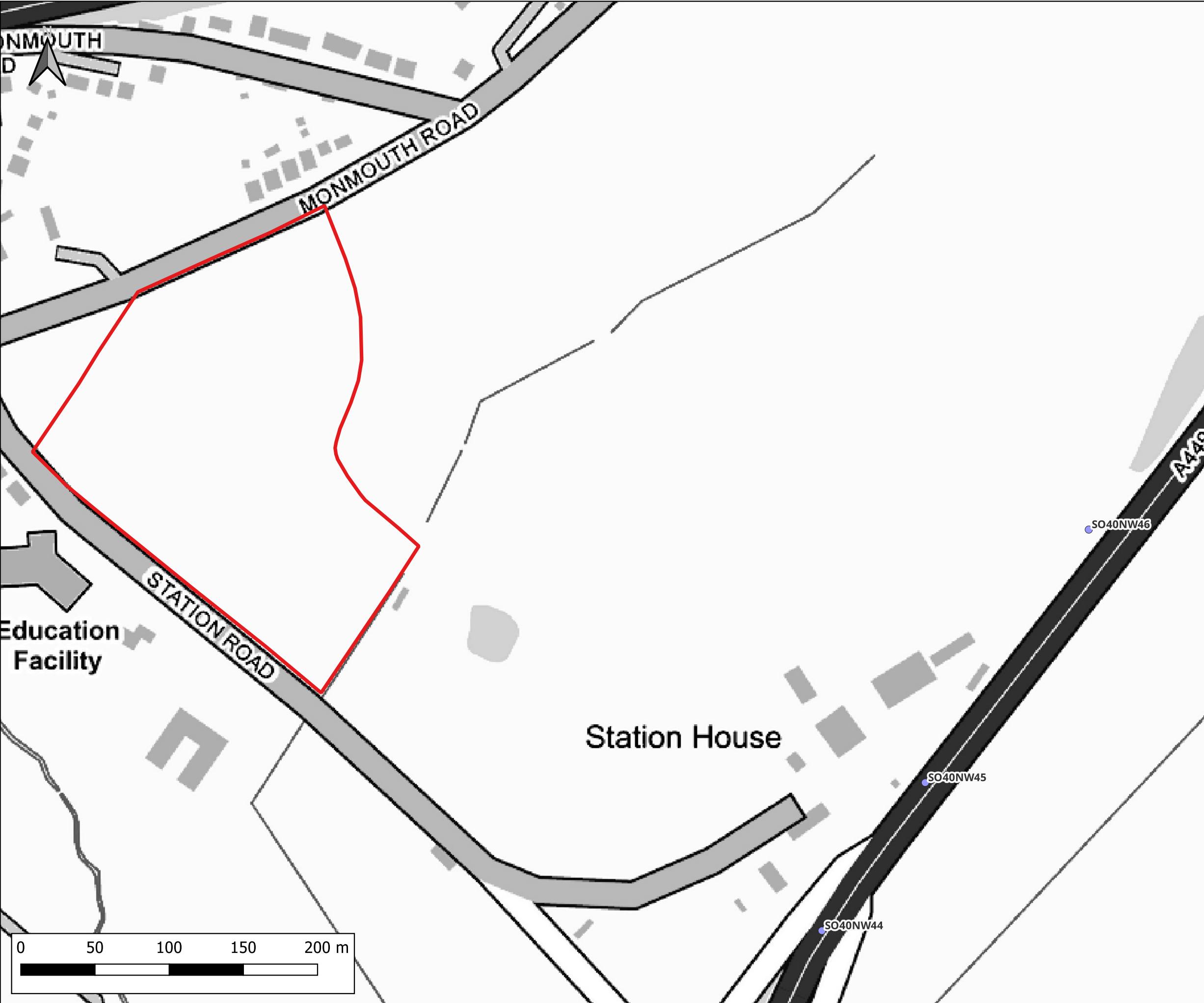


Bulk Sample

▬ Tube or Core Sample
(Length to scale)

△ Water Sample

SOIL MECHANICS LTD., 65 Old Church Street, London, S.W.3.



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Historical BGS Borehole Record

CLIENT:

Richborough

www.waterco.co.uk

SCHEME:

Land south of Monmouth Road,
Raglan

PLOT TITLE:

Historical BGS Borehole Location Plan
Data from British Geological Survey (BGS)

PLOT STATUS:		DATE:	
FINAL		26-03-2024	

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:2500

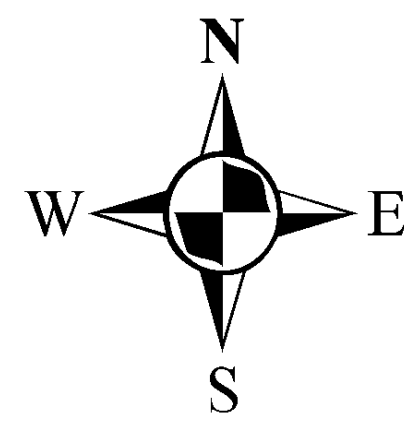
PLOT NAME:	REVISION:
15719_BGS_Borehole_Location_Plan	-

Appendix D DCWW Sewer Plan & Correspondence



Dŵr Cymru
Welsh Water

PPA0002452



LEGEND (Representative of most common features)

- | | | | |
|--|----------------------------|--|-------------------------|
| | Sluice Valve | | Gravity Sewer |
| | Air Valve SINGLE | | Rising Main |
| | Tap | | Outfall |
| | Pressure Reducing Valve | | Pumping Station |
| | Meter | | Lampole |
| | Bulk Meter | | Combined Sewer Overflow |
| | Fire Hydrant | | Special Purpose Chamber |
| | Cap | | Treatment Works |
| | Non Dwr Cymru | | Private Sewer Transfer |
| | Existing Distribution Main | | Lateral Drain |
| | | | Inspection Chamber |

NB: Sewer symbol colour indicates the sewer type.

RED - Combined

GREEN - Surface Water

BROWN - Foul

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases, pipe material (other than Asbestos Cement or Pitch Fibre (PF)) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyl gives this information as to the position of its underground apparatus by way of general guidance only on the basis of the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the Company's apparatus and any check of location is advised before carrying out any excavations made entirely on your. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Streetworks Act 1991 and of the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Reproduced by permission of Ordnance Survey on behalf of
HMSSO. © Crown copyright and database right 2008.
All rights reserved.
Ordnance Survey Licence Number: 100019204.

Map Ref: 341704,207706
Map scale: 1:1250
Printed by: Parker David
Printed on: 18/10/2017

Miss Megan Williams
Waterco
Unit 8
Eden Court Lon Parcwr Industrial Estate
Ruthin
Denbighshire
LL15 1NJ

Date: 08/02/2024
Our Ref: PPA0008527

Dear Miss Williams

Grid Ref: 341639 207662

Site Address: Monmouth Road, Raglan

Development: Residential Development 15719 Land south of Monmouth Road

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

Firstly, we note that the proposal relates to 30 residential dwellings on Land South of Monmouth Road, Raglan and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

PUBLIC SEWERAGE NETWORK

The proposed development site is located in the immediate vicinity of a separate/mixed sewerage system, comprising, foul and surface water public sewers, which drains to Raglan Wastewater Treatment Works (WwTW) via Raglan Sewerage Pumping Station (SPS).

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site.

Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

SURFACE WATER DRAINAGE

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Monmouthshire Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note and our Developer Services website at <https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems>.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

FOUL WATER DRAINAGE – SEWERAGE NETWORK

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the combined sewer between manholes SO40173703 and SO41074601 located to the East of St Cadocs Church.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water Industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com

SEWAGE TREATMENT

We are content that foul only flows from the proposed development can be suitably treated at the receiving Waste Water Treatment Works.

We can advise that Raglan WwTW has a phosphate permit and there is sufficient headroom capacity to accommodate this proposed development. You will need to discuss this matter further with the local planning authority.'

POTABLE WATER SUPPLY

Capacity is currently available in the water supply system to accommodate the development. Initial indications are that a connection can be made from the '180mm diameter watermain along Monmouth Road. We reserve the right however to reassess our position as part of the formal application for the provision of- new water mains -under Section 41 and Section 51 of the Water Industry Act (1991) to ensure there is sufficient capacity available to serve the development without causing detriment to existing customers' supply as demands upon our water systems change continually.



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at developer.services@dwr-cymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Owain George
Planning Liaison Manager
Developer Services

Please Note that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.

Megan Williams

From: Matthew Lord <Matthew.Lord@dwrcymru.com>
Sent: 27 February 2024 10:32
To: Megan Williams
Subject: FW: 15719 - Land south of Monmouth Road, Raglan (reference: PPA0008527)

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Dear Megan

I refer to your email below and apologies for the delay in my response.

The reason for the recommended connection point is to avoid flows passing through the combined sewer overflow.

I have since reviewed the CSO data and it appears to be a low risk asset, therefore I am content that we can accommodate your connection point with no detriment to the environment.

Many Thanks



Matthew Lord

Lead Development Planning Officer | Developer Services | Dwr Cymru Welsh Water

Linea | Cardiff | CF3 0LT | T: 0800 917 2652 | www.dwrcymru.com

From: Megan Williams <megan.williams@waterco.co.uk>
Sent: Monday, February 26, 2024 11:57 AM
To: Services Developer <developer.services@dwrcymru.com>
Subject: RE: 15719 - Land south of Monmouth Road, Raglan (reference: PPA0008527)

***** External Mail *****

Dear Sir/Madam,

Please can you advise when we can expect to receive a response in relation to application reference PPA0008527.

Kind regards,

Megan Williams BSc (Hons) MSc MCIWEM
Environmental Consultant

☎ 01244 668122

✉ megan.williams@waterco.co.uk

We're recruiting! For more information, please take a look at our [website](#).



For email confidentiality, limitations and company details please see our [disclaimer webpage](#). Registered in Wales under company no. 3577754. Waterco Ltd, Eden Court, Ruthin LL15 1NJ. Please click for our [GDPR policy](#).

From: Megan Williams
Sent: Friday, February 9, 2024 9:20 AM
To: 'Services Developer' <developer.services@dwrcymru.com>
Subject: 15719 - Land south of Monmouth Road, Raglan (reference: PPA0008527)

Good morning,

I have recently received a pre developer response relating to a proposed residential development at land south of Monmouth Road, Raglan (your reference - PPA0008527).

Please advise if you would consider a foul connection to the public foul sewer in Monmouth Road north-east of the site (manhole chamber S041078902890)?

Kind regards,

Megan Williams BSc (Hons) MSc MCIWEM
Environmental Consultant

 01244 668122
 megan.williams@waterco.co.uk



We're recruiting! For more information, please take a look at our [website](#).

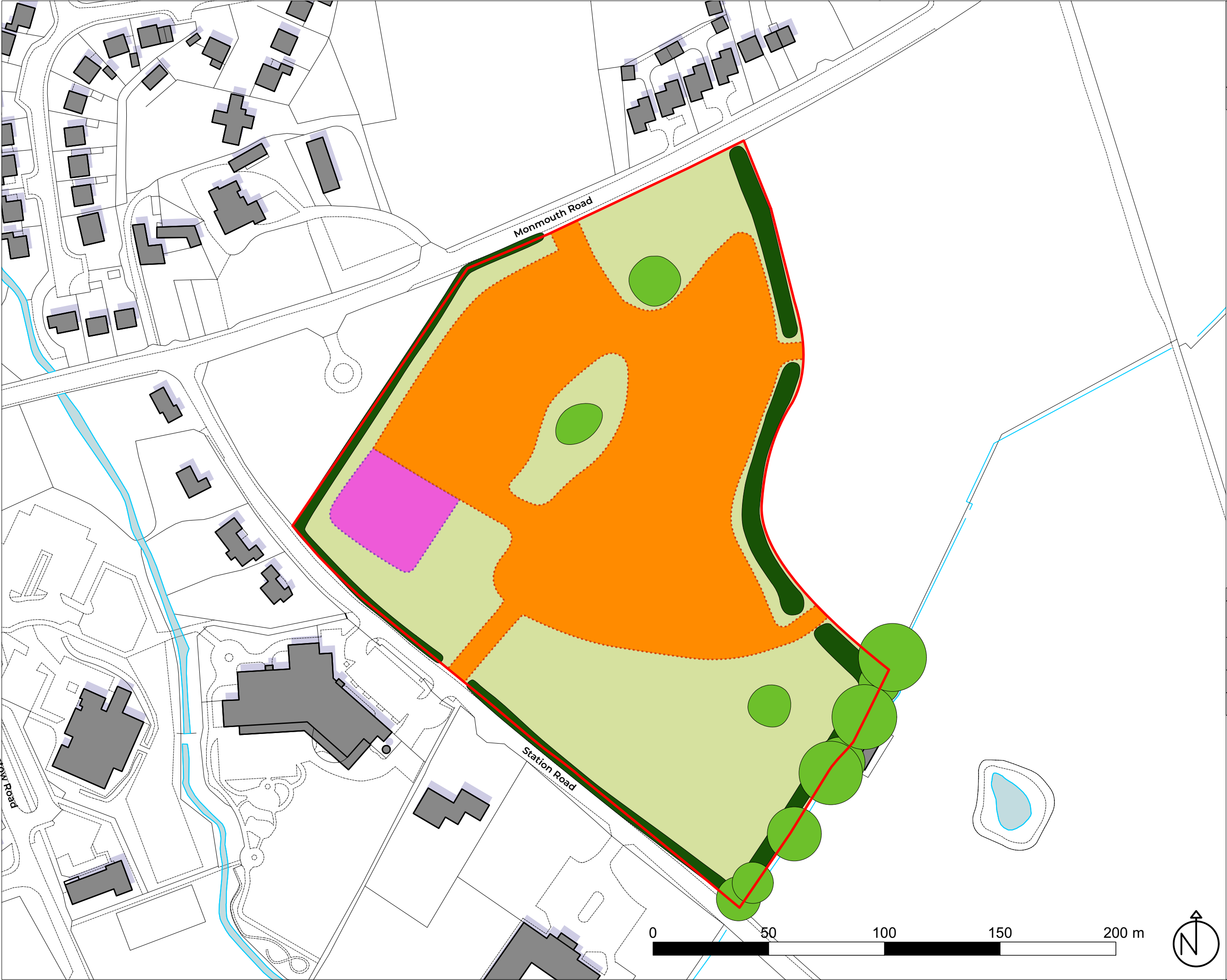


For email confidentiality, limitations and company details please see our disclaimer webpage. Registered in Wales under company no. 3577754. Waterco Ltd, Eden Court, Ruthin LL15 1NJ. Please click for our GDPR policy.

_____ Dwr Cymru Welsh Water is firmly committed to water conservation and promoting water efficiency. Please log on to our website www.dwrcymru.com/waterefficiency to find out how you can become water wise. Mae Dwr Cymru Welsh Water wedi ymrwymo i warchod adnoddau dwr a hyrwyddo defnydd dwr effeithiol. Mae cyngor i' ch helpu i ddefnyddio dwr yn ddoeth yn www.dwrcymru.com/waterefficiency

***** This email and any file attached is confidential. If you are not a named recipient or believe you may have received this email in error please delete from your system and promptly inform the sender. Dwr Cymru Cyf (trading as Welsh Water) is a company registered in England and Wales, number 02366777, registered office Linea, Fortran Road, St Mellons, Cardiff CF3 0LT. Mae'r neges e-bost yma ac unrhyw ffeil sydd ynghlwm wrthi'n gyfrinachol. Os nad chi yw'r derbynnydd a enwir, neu os ydych chi'n credu eich bod wedi derbyn y neges yma ar gam, dylech ei dileu o'ch system ar unwaith a hysbysu'r anfonwr. Cwmni sydd wedi ei gofrestru yng Nghymru yw Dŵr Cymru Cyf (yn masnachu fel Dŵr Cymru), ei rif cofrestredig yw 02366777, , ac mae ei swyddfa gofrestredig yn Linea, Heol Fortran, Llaneirwg, Caerdydd, CF3 0LT. *****

Appendix E Illustrative Parameter Plan



Do not scale from this drawing.

This drawing is for planning purposes only. It is not intended to be used for construction purposes. The accuracy of this drawing may be reliant upon survey information provided by third parties. Whilst all reasonable efforts are used to ensure drawings are accurate, **edge** Placemaking Group Ltd accept no responsibility or liability for any reliance placed on, or use of, this plan by anyone for purposes other than those stated above or for errors arising from third party information.

This drawing and the works depicted are the copyright of **edge** Placemaking Group Ltd.

PRELIMINARY

- Site boundary
- Residential development
- Community facilities
- Green space
- Landscaped edge
- Existing trees

Rev.	Date	Description
Land south of Monmouth Rd RAGLAN		
Illustrative Parameter Plan		
Job ref: 237	Drawing number: SK01	Revision: -
Scale: 1:1,500 @ A3		Date: December 2023

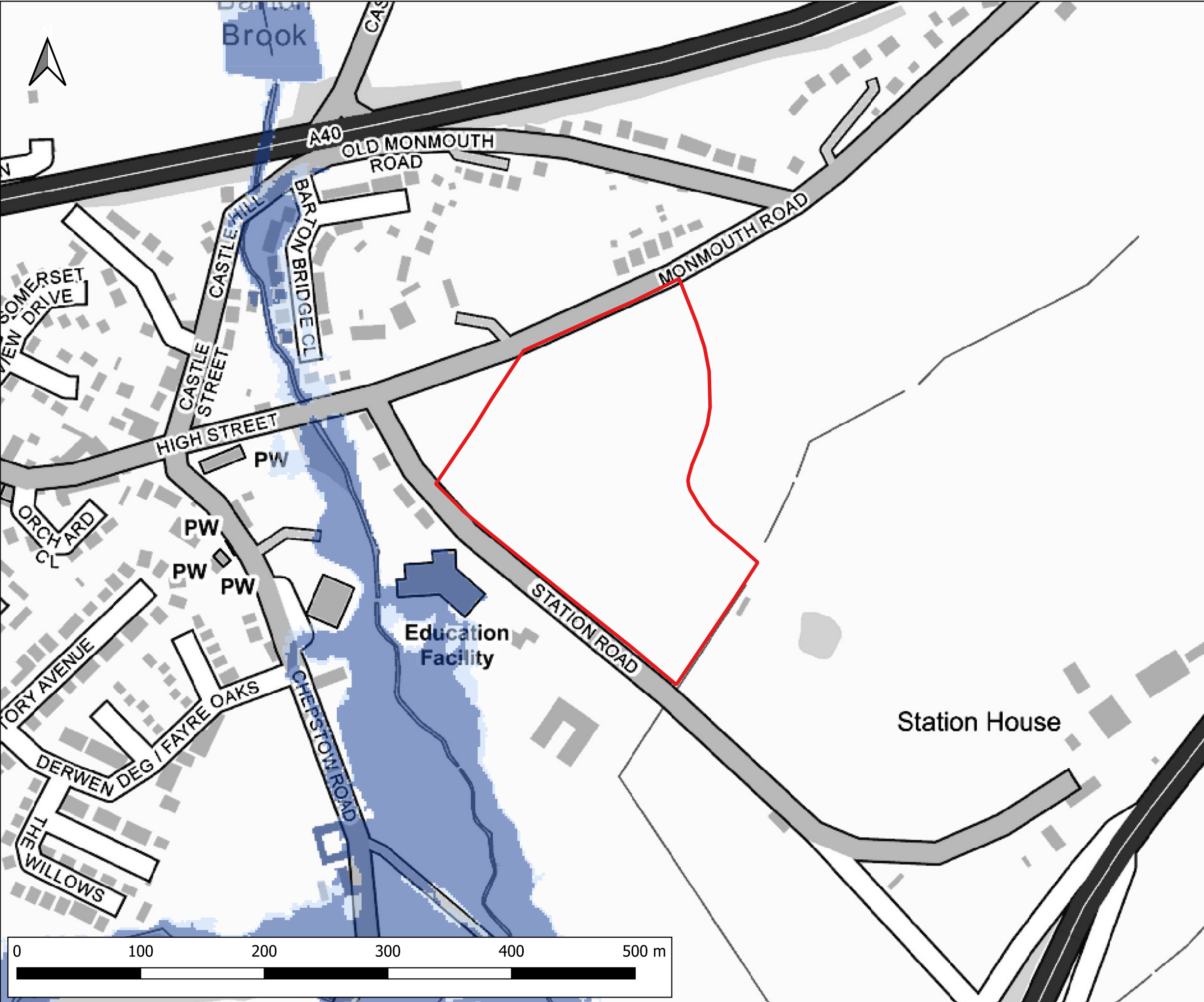
part of
edge Placemaking Group Ltd

Company Reg No 11447550 VAT No 299072069

Suite 2
7 Buttermarket
Thame
Oxfordshire
OX9 3EW

01865 522395
 enquiries@edgeUD.co.uk
 www.edgeUD.co.uk

Appendix F NRW Mapping



Notes:

- 1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise
- 2) Flood Zone 3 displays the extent of flooding from rivers with a 1% AEP or greater of flooding in a given year including and allowance for climate change and the sea with a 0.5% AEP or greater of flooding in a given year including and allowance for climate change
- 3) Flood Zone 2 displays the extent of flooding from rivers with a less than 1% AEP but greater than or equal to 0.1% AEP of flooding in a given year including and allowance for climate change and the sea with a less than 0.5% AEP but greater than or equal to 0.1% AEP of flooding in a given year including and allowance for climate change

LEGEND

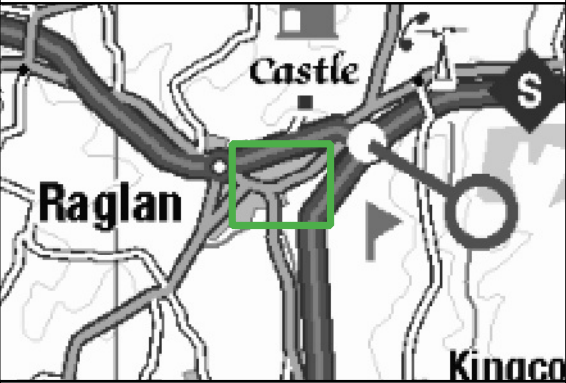
Site Boundary

Flood Map for Planning

Flood Zone 1

Flood Zone 2

Flood Zone 3



CLIENT:

Richborough

waterco
www.waterco.co.uk

SCHEME:

Land south of Monmouth Road,
Raglan

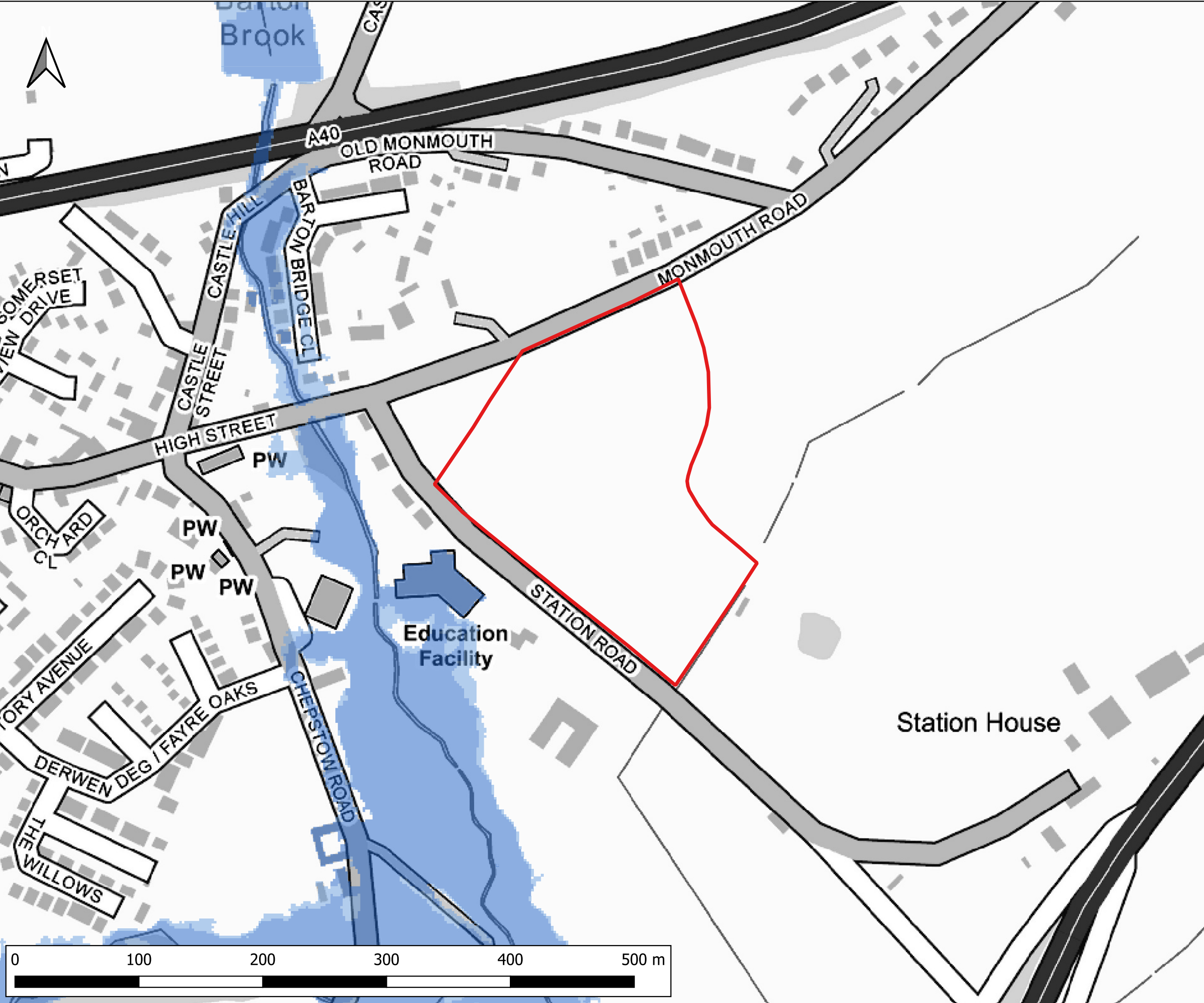
PLOT TITLE:

NRW Flood Map for Planning (Rivers and Sea)
Data published November 2024

PLOT STATUS:	FINAL	DATE:	29-05-2025
--------------	-------	-------	------------

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	NJ	1:3000

PLOT NAME:	REVISION:
15719_NRW_FMfP	-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Flood Zones - Rivers

Flood Zone 1

Flood Zone 2

Flood Zone 3

CLIENT:

Richborough



www.waterco.co.uk

SCHEME:

Land south of Monmouth Road,
Raglan

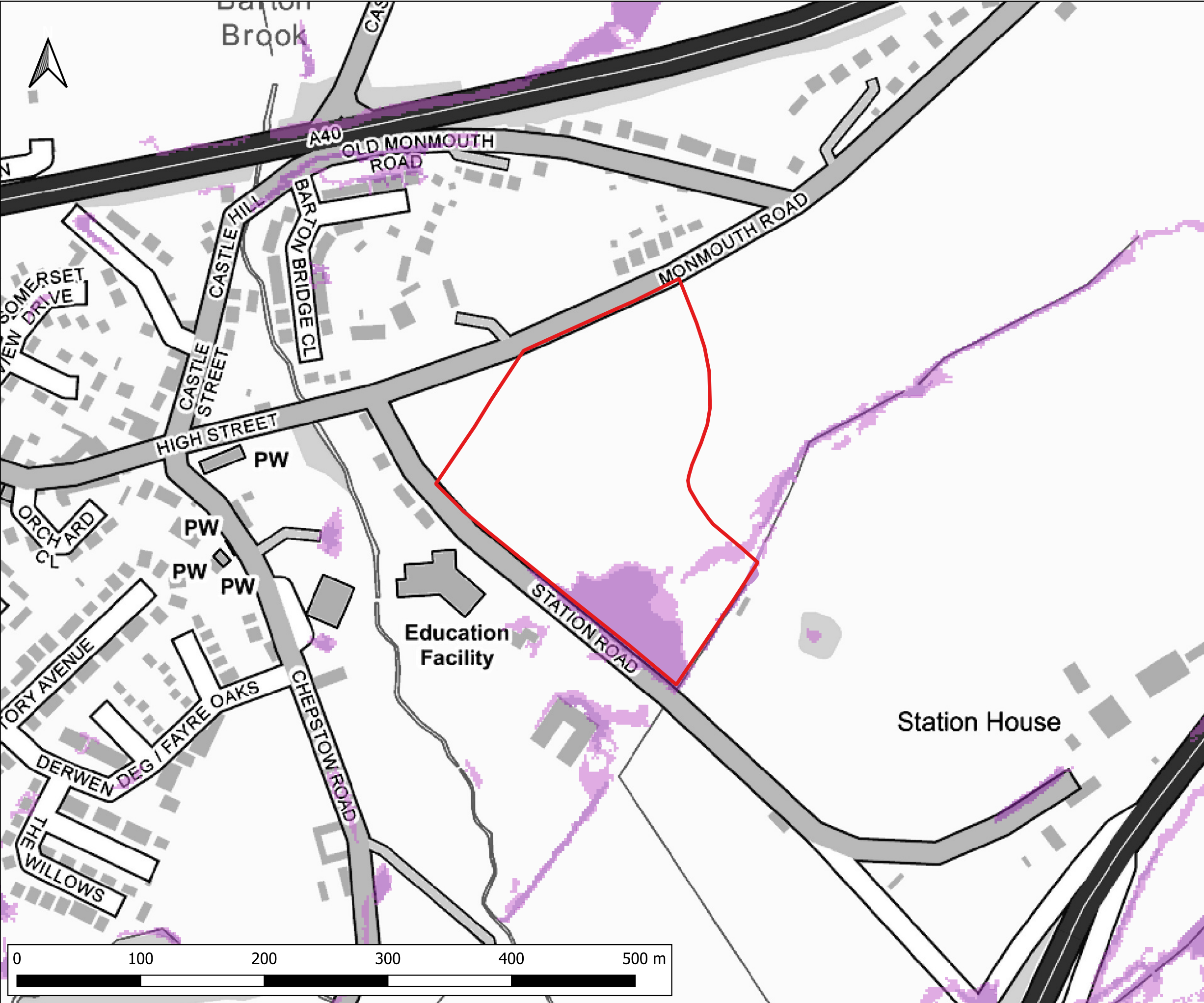
PLOT TITLE:

NRW Flood Risk from Rivers
Data published November 2024

PLOT STATUS:		FINAL		DATE:	29-05-2025
--------------	--	-------	--	-------	------------

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	NJ	1:3000

PLOT NAME:	REVISION:
15719_NRW_Flood_Risk_from_Rivers	-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

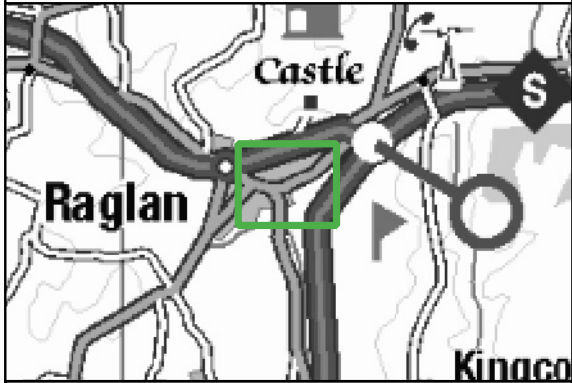
Site Boundary

Flood Zones - Surface Water
& Small Watercourses

Flood Zone 1

Flood Zone 2

Flood Zone 3



CLIENT:
Richborough



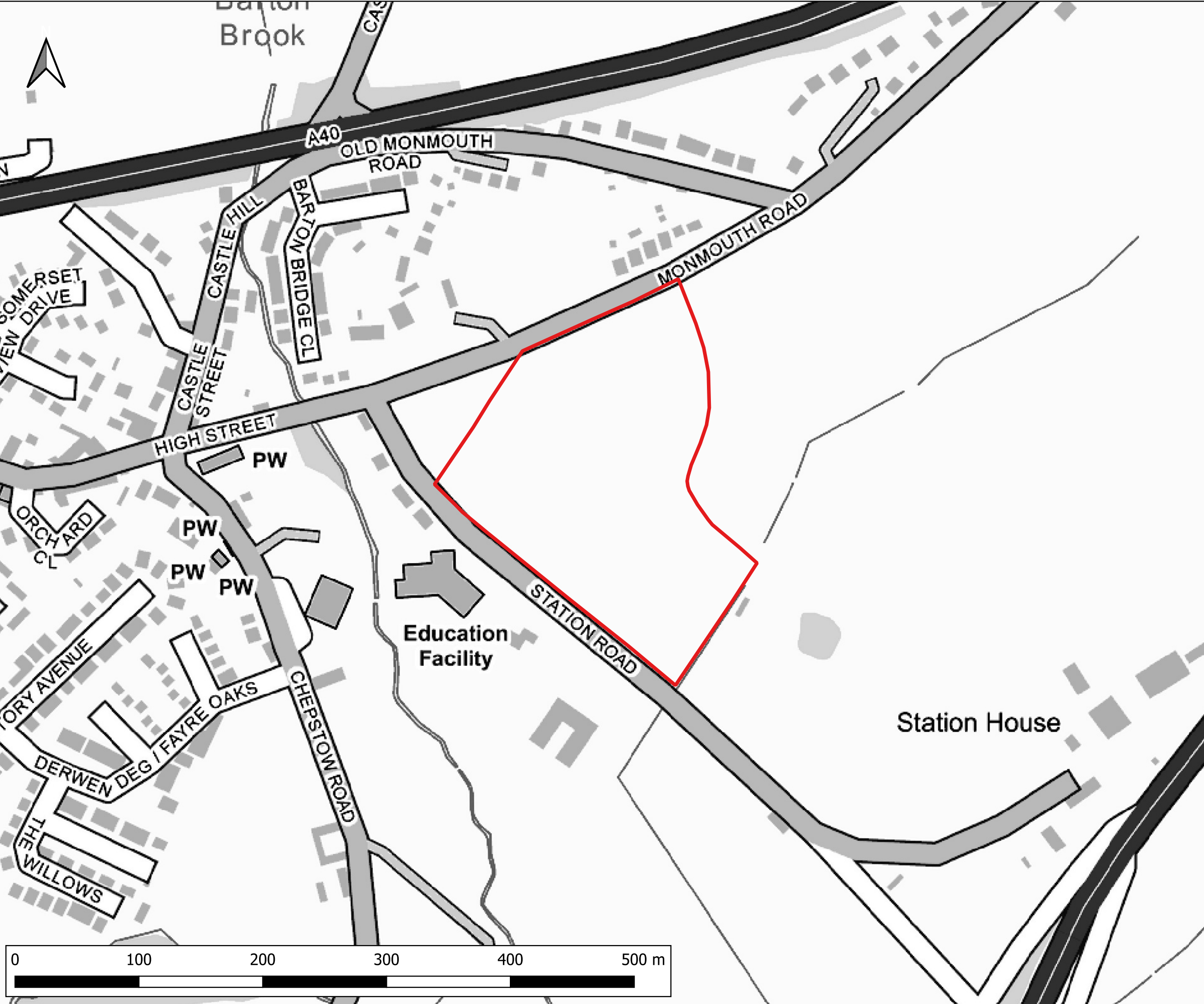
SCHEME:
Land south of Monmouth Road,
Raglan

PLOT TITLE:
NRW Flood Zones - Surface Water & Small
Watercourses
Data published November 2024

PLOT STATUS: FINAL
DATE: 29-05-2025

DRAWN: AM
CHECKED: JJ
APPROVED: NJ
PLOT SCALE AT A3: 1:3000

PLOT NAME: 15719_NRW_Flood_Risk_from_Surface_Water
REVISION: -



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Flood Zones - Sea

Flood Zone 1

Flood Zone 2

Flood Zone 3

CLIENT:

Richborough

www.waterco.co.uk

SCHEME:

Land south of Monmouth Road,
Raglan

PLOT TITLE:

NRW Flood Risk from the Sea
Data published November 2024

PLOT STATUS:		FINAL		DATE:	29-05-2025
--------------	--	-------	--	-------	------------

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	NJ	1:3000

PLOT NAME:	REVISION:
15719_NRW_Flood_Risk_from_the_Sea	-

Appendix G Greenfield Runoff Rates

Waterco Ltd		Page 1																								
Eden Court	15719																									
Lon Parcwr Business Park	Greenfield Runoff Rates																									
Denbighshire LL15 1NJ	ICP SUDS																									
Date 26/02/2024	Designed by MW																									
File	Checked by AW																									
XP Solutions	Source Control 2020.1.3																									
<u>ICP SUDS Mean Annual Flood</u> Input <table><tr><td>Return Period (years)</td><td>100</td><td>Soil</td><td>0.300</td></tr><tr><td>Area (ha)</td><td>2.140</td><td>Urban</td><td>0.000</td></tr><tr><td>SAAR (mm)</td><td>1000</td><td>Region Number</td><td>Region 9</td></tr></table> Results l/s <table><tr><td>QBAR Rural</td><td>5.9</td></tr><tr><td>QBAR Urban</td><td>5.9</td></tr><tr><td>Q100 years</td><td>12.9</td></tr><tr><td>Q1 year</td><td>5.2</td></tr><tr><td>Q30 years</td><td>10.4</td></tr><tr><td>Q100 years</td><td>12.9</td></tr></table>			Return Period (years)	100	Soil	0.300	Area (ha)	2.140	Urban	0.000	SAAR (mm)	1000	Region Number	Region 9	QBAR Rural	5.9	QBAR Urban	5.9	Q100 years	12.9	Q1 year	5.2	Q30 years	10.4	Q100 years	12.9
Return Period (years)	100	Soil	0.300																							
Area (ha)	2.140	Urban	0.000																							
SAAR (mm)	1000	Region Number	Region 9																							
QBAR Rural	5.9																									
QBAR Urban	5.9																									
Q100 years	12.9																									
Q1 year	5.2																									
Q30 years	10.4																									
Q100 years	12.9																									
©1982-2020 Innovyze																										

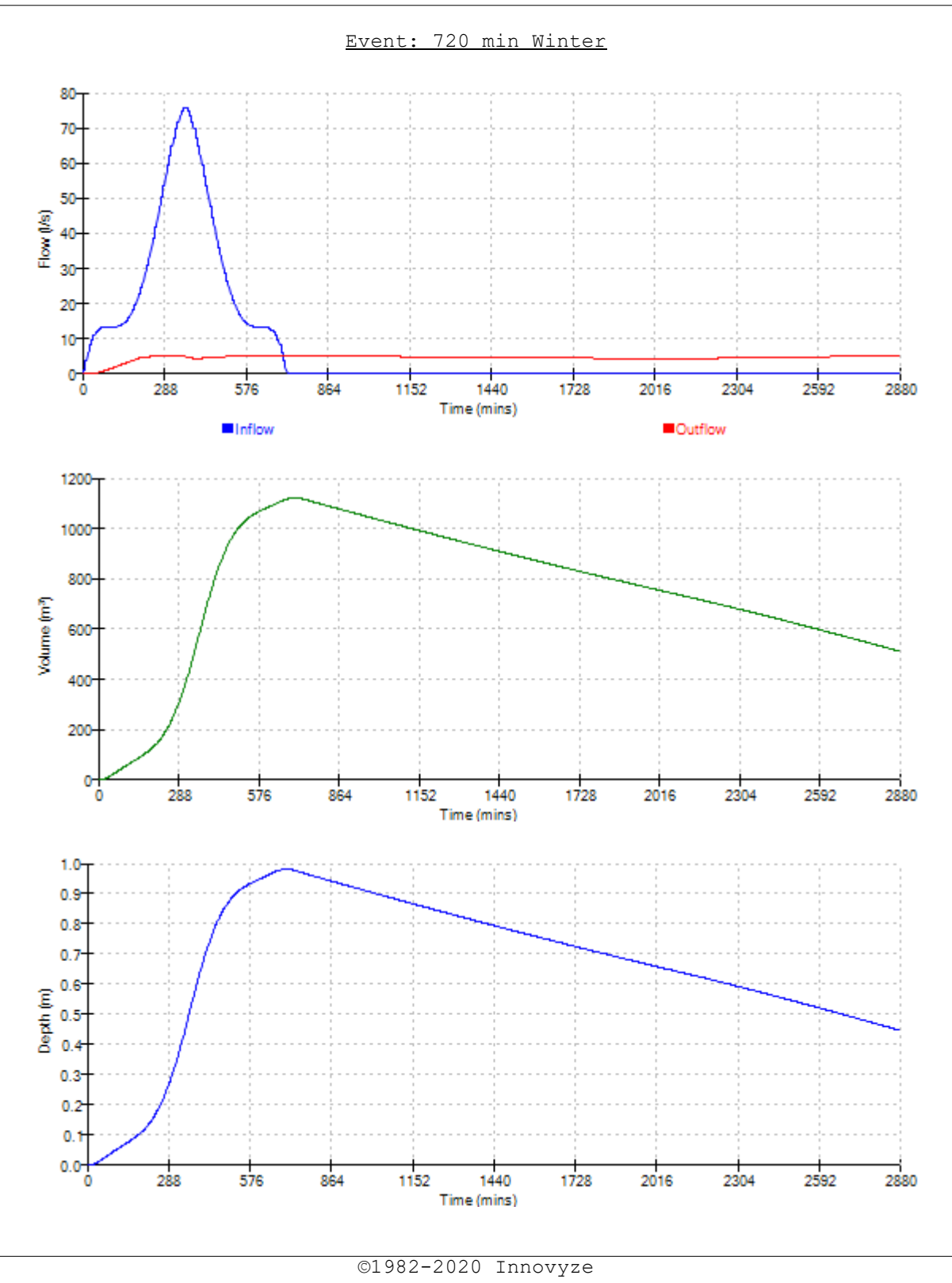
Appendix H MicroDrainage Simulations

Waterco Ltd				Page 1	
Eden Court		15719			
Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year plus 30% CC			
Date 26/02/2024		Designed by MW			
File		Checked by AW			
XP Solutions		Source Control 2020.1.3			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.297	0.297	5.2	339.9	O K
30 min Summer	9.407	0.407	5.2	465.9	O K
60 min Summer	9.533	0.533	5.2	609.5	O K
120 min Summer	9.664	0.664	5.2	759.2	O K
180 min Summer	9.749	0.749	5.2	856.3	Flood Risk
240 min Summer	9.809	0.809	5.2	925.3	Flood Risk
360 min Summer	9.887	0.887	5.2	1014.5	Flood Risk
480 min Summer	9.933	0.933	5.2	1067.4	Flood Risk
600 min Summer	9.962	0.962	5.2	1100.4	Flood Risk
720 min Summer	9.980	0.980	5.2	1121.0	Flood Risk
960 min Summer	9.995	0.995	5.2	1138.8	Flood Risk
1440 min Summer	9.989	0.989	5.2	1131.8	Flood Risk
2160 min Summer	9.959	0.959	5.2	1096.6	Flood Risk
2880 min Summer	9.935	0.935	5.2	1070.2	Flood Risk
4320 min Summer	9.909	0.909	5.2	1039.8	Flood Risk
5760 min Summer	9.895	0.895	5.2	1023.6	Flood Risk
7200 min Summer	9.892	0.892	5.2	1020.3	Flood Risk
8640 min Summer	9.895	0.895	5.2	1024.0	Flood Risk
10080 min Summer	9.903	0.903	5.2	1032.5	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	109.737	0.0	304.7	16	
30 min Summer	75.557	0.0	400.6	31	
60 min Summer	49.818	0.0	600.3	62	
120 min Summer	31.407	0.0	741.3	122	
180 min Summer	23.892	0.0	808.2	182	
240 min Summer	19.590	0.0	818.3	242	
360 min Summer	14.650	0.0	808.2	362	
480 min Summer	11.821	0.0	799.2	482	
600 min Summer	9.966	0.0	792.4	602	
720 min Summer	8.646	0.0	786.6	720	
960 min Summer	6.878	0.0	776.8	960	
1440 min Summer	4.960	0.0	763.2	1440	
2160 min Summer	3.587	0.0	1543.3	1820	
2880 min Summer	2.870	0.0	1530.8	2216	
4320 min Summer	2.136	0.0	1411.2	3024	
5760 min Summer	1.761	0.0	2107.9	3864	
7200 min Summer	1.537	0.0	2296.1	4688	
8640 min Summer	1.388	0.0	2478.3	5536	
10080 min Summer	1.283	0.0	2616.0	6360	
©1982-2020 Innovyze					

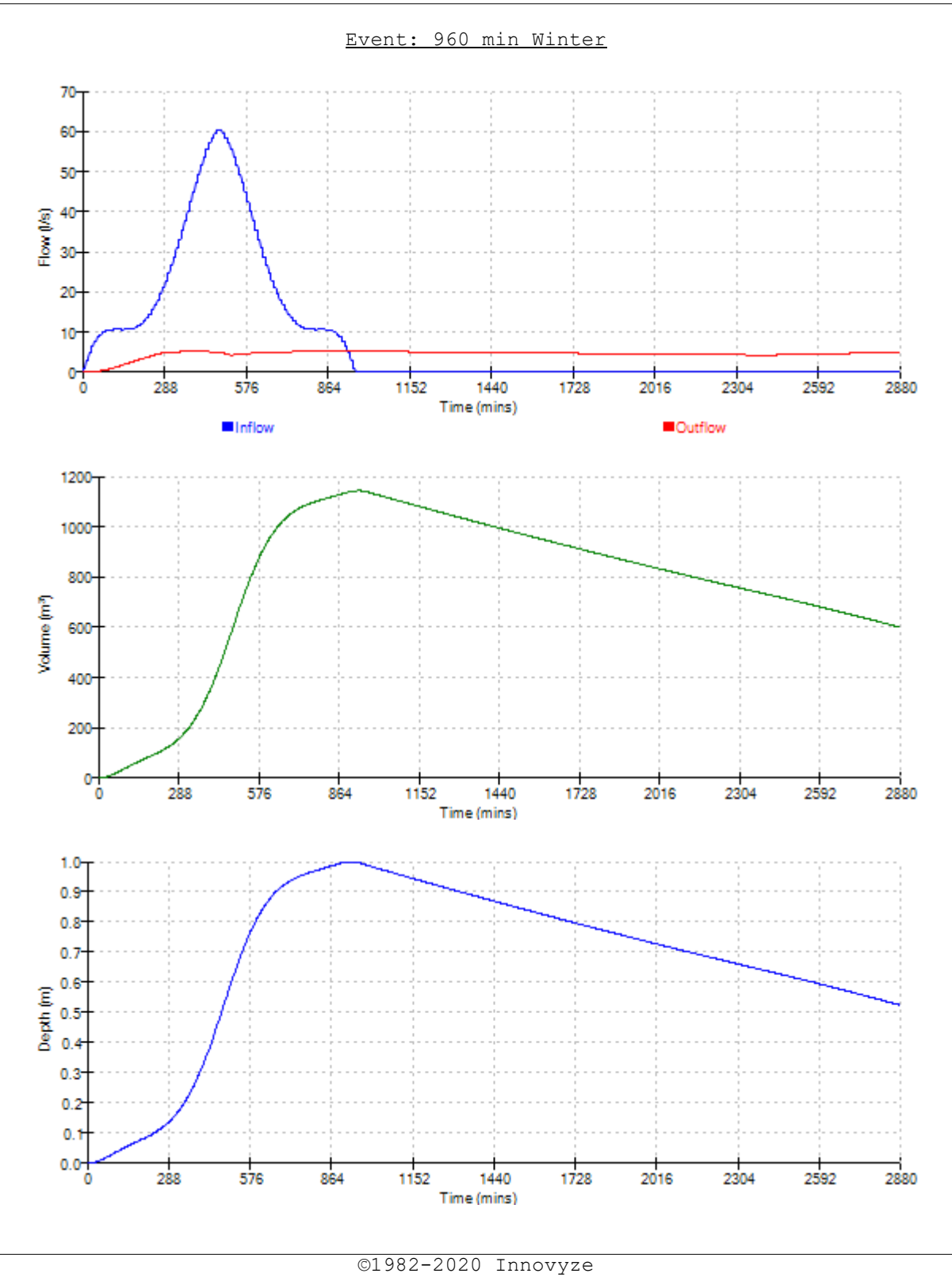
Waterco Ltd				Page 2	
Eden Court		15719			
Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year plus 30% CC			
Date 26/02/2024		Designed by MW			
File		Checked by AW			
XP Solutions		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+30%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	9.297	0.297	5.2	339.8	O K
30 min Winter	9.407	0.407	5.2	465.7	O K
60 min Winter	9.533	0.533	5.2	609.3	O K
120 min Winter	9.663	0.663	5.2	758.9	O K
180 min Winter	9.748	0.748	5.2	856.2	Flood Risk
240 min Winter	9.809	0.809	5.2	925.3	Flood Risk
360 min Winter	9.887	0.887	5.2	1015.1	Flood Risk
480 min Winter	9.934	0.934	5.2	1068.7	Flood Risk
600 min Winter	9.964	0.964	5.2	1102.4	Flood Risk
720 min Winter	9.982	0.982	5.2	1123.8	Flood Risk
960 min Winter	9.999	0.999	5.2	1143.3	Flood Risk
1440 min Winter	9.997	0.997	5.2	1140.7	Flood Risk
2160 min Winter	9.963	0.963	5.2	1102.0	Flood Risk
2880 min Winter	9.932	0.932	5.2	1066.4	Flood Risk
4320 min Winter	9.889	0.889	5.2	1016.7	Flood Risk
5760 min Winter	9.853	0.853	5.2	975.8	Flood Risk
7200 min Winter	9.828	0.828	5.2	947.2	Flood Risk
8640 min Winter	9.809	0.809	5.2	925.8	Flood Risk
10080 min Winter	9.796	0.796	5.2	910.3	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Winter	109.737	0.0	304.7	16	
30 min Winter	75.557	0.0	400.6	31	
60 min Winter	49.818	0.0	600.3	62	
120 min Winter	31.407	0.0	741.4	120	
180 min Winter	23.892	0.0	808.6	180	
240 min Winter	19.590	0.0	818.8	240	
360 min Winter	14.650	0.0	808.5	356	
480 min Winter	11.821	0.0	799.3	474	
600 min Winter	9.966	0.0	792.3	590	
720 min Winter	8.646	0.0	786.4	706	
960 min Winter	6.878	0.0	776.3	934	
1440 min Winter	4.960	0.0	762.8	1384	
2160 min Winter	3.587	0.0	1543.6	2008	
2880 min Winter	2.870	0.0	1533.9	2276	
4320 min Winter	2.136	0.0	1422.1	3200	
5760 min Winter	1.761	0.0	2108.1	4152	
7200 min Winter	1.537	0.0	2296.7	5048	
8640 min Winter	1.388	0.0	2480.4	5968	
10080 min Winter	1.283	0.0	2634.4	6864	
©1982-2020 Innovyze					

Waterco Ltd		Page 4																																																																																																															
Eden Court	15719																																																																																																																
Lon Parcwr Business Park	Attenuation Storage																																																																																																																
Denbighshire LL15 1NJ	1 in 100 year plus 30% CC																																																																																																																
Date 26/02/2024	Designed by MW																																																																																																																
File	Checked by AW																																																																																																																
XP Solutions		Source Control 2020.1.3																																																																																																															
Model Details Storage is Online Cover Level (m) 10.000 Tank or Pond Structure Invert Level (m) 9.000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>1144.0</td><td>1.000</td><td>1144.0</td></tr></table> Hydro-Brake® Optimum Outflow Control <table><tr><td>Unit Reference</td><td>MD-SHE-0108-5200-1000-5200</td></tr><tr><td>Design Head (m)</td><td>1.000</td></tr><tr><td>Design Flow (l/s)</td><td>5.2</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>108</td></tr><tr><td>Invert Level (m)</td><td>8.995</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>150</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>1.000</td><td>5.2</td></tr><tr><td>Flush-Flo™</td><td>0.296</td><td>5.2</td></tr><tr><td>Kick-Flo®</td><td>0.641</td><td>4.2</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>4.5</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>3.7</td><td>1.600</td><td>6.5</td><td>5.000</td><td>11.1</td></tr><tr><td>0.200</td><td>5.1</td><td>1.800</td><td>6.8</td><td>5.500</td><td>11.6</td></tr><tr><td>0.300</td><td>5.2</td><td>2.000</td><td>7.2</td><td>6.000</td><td>12.1</td></tr><tr><td>0.400</td><td>5.1</td><td>2.200</td><td>7.5</td><td>6.500</td><td>12.6</td></tr><tr><td>0.500</td><td>4.9</td><td>2.400</td><td>7.8</td><td>7.000</td><td>13.0</td></tr><tr><td>0.600</td><td>4.5</td><td>2.600</td><td>8.1</td><td>7.500</td><td>13.4</td></tr><tr><td>0.800</td><td>4.7</td><td>3.000</td><td>8.7</td><td>8.000</td><td>13.9</td></tr><tr><td>1.000</td><td>5.2</td><td>3.500</td><td>9.4</td><td>8.500</td><td>14.3</td></tr><tr><td>1.200</td><td>5.7</td><td>4.000</td><td>10.0</td><td>9.000</td><td>14.7</td></tr><tr><td>1.400</td><td>6.1</td><td>4.500</td><td>10.5</td><td>9.500</td><td>15.1</td></tr></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	1144.0	1.000	1144.0	Unit Reference	MD-SHE-0108-5200-1000-5200	Design Head (m)	1.000	Design Flow (l/s)	5.2	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	108	Invert Level (m)	8.995	Minimum Outlet Pipe Diameter (mm)	150	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.000	5.2	Flush-Flo™	0.296	5.2	Kick-Flo®	0.641	4.2	Mean Flow over Head Range	-	4.5	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	3.7	1.600	6.5	5.000	11.1	0.200	5.1	1.800	6.8	5.500	11.6	0.300	5.2	2.000	7.2	6.000	12.1	0.400	5.1	2.200	7.5	6.500	12.6	0.500	4.9	2.400	7.8	7.000	13.0	0.600	4.5	2.600	8.1	7.500	13.4	0.800	4.7	3.000	8.7	8.000	13.9	1.000	5.2	3.500	9.4	8.500	14.3	1.200	5.7	4.000	10.0	9.000	14.7	1.400	6.1	4.500	10.5	9.500	15.1
Depth (m)	Area (m²)	Depth (m)	Area (m²)																																																																																																														
0.000	1144.0	1.000	1144.0																																																																																																														
Unit Reference	MD-SHE-0108-5200-1000-5200																																																																																																																
Design Head (m)	1.000																																																																																																																
Design Flow (l/s)	5.2																																																																																																																
Flush-Flo™	Calculated																																																																																																																
Objective	Minimise upstream storage																																																																																																																
Application	Surface																																																																																																																
Sump Available	Yes																																																																																																																
Diameter (mm)	108																																																																																																																
Invert Level (m)	8.995																																																																																																																
Minimum Outlet Pipe Diameter (mm)	150																																																																																																																
Suggested Manhole Diameter (mm)	1200																																																																																																																
Control Points	Head (m)	Flow (l/s)																																																																																																															
Design Point (Calculated)	1.000	5.2																																																																																																															
Flush-Flo™	0.296	5.2																																																																																																															
Kick-Flo®	0.641	4.2																																																																																																															
Mean Flow over Head Range	-	4.5																																																																																																															
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																																												
0.100	3.7	1.600	6.5	5.000	11.1																																																																																																												
0.200	5.1	1.800	6.8	5.500	11.6																																																																																																												
0.300	5.2	2.000	7.2	6.000	12.1																																																																																																												
0.400	5.1	2.200	7.5	6.500	12.6																																																																																																												
0.500	4.9	2.400	7.8	7.000	13.0																																																																																																												
0.600	4.5	2.600	8.1	7.500	13.4																																																																																																												
0.800	4.7	3.000	8.7	8.000	13.9																																																																																																												
1.000	5.2	3.500	9.4	8.500	14.3																																																																																																												
1.200	5.7	4.000	10.0	9.000	14.7																																																																																																												
1.400	6.1	4.500	10.5	9.500	15.1																																																																																																												
©1982-2020 Innovyze																																																																																																																	

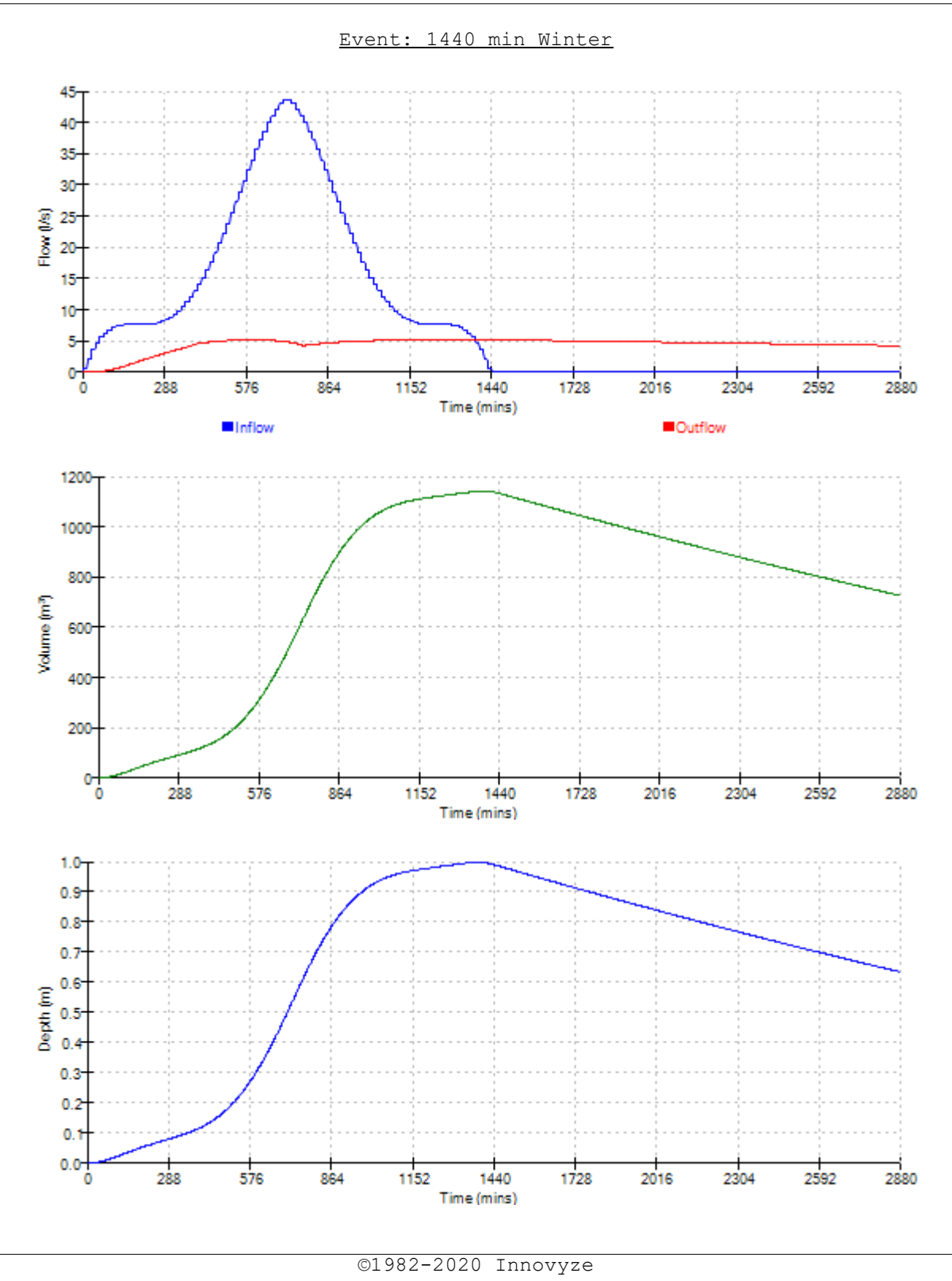
Waterco Ltd		Page 5
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15719	
	Attenuation Storage 1 in 100 year plus 30% CC	
Date 26/02/2024	Designed by MW	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	



Waterco Ltd		Page 6
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15719	
	Attenuation Storage 1 in 100 year plus 30% CC	
Date 26/02/2024	Designed by MW	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	



Waterco Ltd		Page 7
Eden Court	15719	
Lon Parcwr Business Park	Attenuation Storage	
Denbighshire LL15 1NJ	1 in 100 year plus 30% CC	
Date 26/02/2024	Designed by MW	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	



Appendix I Maintenance Schedules

Operation and Maintenance Requirements for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and move contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level or the paving	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and / or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Ref. Table 20.15, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Operation and Maintenance Requirements for Bioretention Systems

Maintenance Schedule	Required Action	Typical Frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate to determine if maintenance is necessary)	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Ref. Table 18.3, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Operation and Maintenance Requirements for Ponds and Wetlands

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season), or as required
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage, and / or physical damage.	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options.	Half yearly
	Check any mechanical devices e.g. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Remove sediment from any forebay	Every 1 – 5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate of Inlets, outlets and overflows	As required

Ref. Table 23.1 CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Operation and Maintenance Requirements for Swale

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as Required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swales treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oil or petrol residues using safe standard practices	As required

Ref. Table 17.1 CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Appendix J Concept Designers Risk Assessment

Project: Land south of Monmouth Road, Raglan
Client: Richborough Estates Ltd
Report Reference: 15719-FCA & Drainage Strategy-01

Project No: 15719

Prepared by: Megan Williams
Checked by: Aled Williams
Reviewed by: Mike Wellington

Date: 01/03/2024
Date: 04/03/2024
Date: 04/03/2024

Requirement:

The Construction (Design and Management) Regulations 2015 (CDM 2015) place an obligation on the Designer to take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under CDM. The Designer has undertaken this assessment to identify any extra-ordinary risks, or those that would not be expected on this particular project by an experienced and competent Contractor. The aim is to avoid needless paperwork and bureaucracy and ensure the assessment is project specific, relevant and proportionate to the risk.

DRA Summary

Each of the following risk areas has been considered using the question below. Is a risk present which is considered to be **extra-ordinary or unexpected** in this instance?

If **YES** - A detailed risk assessment is required at design stage

If **UNKNOWN** - Insufficient information has been provided at concept design stage and the risks are unknown. Further consideration must be given at design stage(s)

If **NO** - No further action is required.

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Unknown	The site is identified as being underlain by the Raglan Mudstone Formation consisting of interbedded siltstone and mudstone.
2	Hazardous Environment	Unknown	To be determined at detailed design stage
3	Existing Working Environment	No	The site comprises undeveloped agricultural land
4	Existing Services	Unknown	To be determined at detailed design stage
5	Proximity to Other Structure(s)	Unknown	Residential properties to the north, school to the west
6	Near Waterbody / flood risk	Yes	Southern extent of the site is located within Flood Zone B.
7	Proximity to Other Activities	Unknown	To be determined at detailed design stage
8	Sequence of Construction	Unknown	To be determined at detailed design stage
9	Access	Unknown	Access provided from Station Road to the west
10	Interfaces	Unknown	Undeveloped agricultural land. Further consideration required at detailed design stage.
11	Confined Space Working	Unknown	To be determined at detailed design stage
12	Maintenance Considerations	Unknown	Maintenace of drainage features required.
13	Working at Height	Unknown	To be determined at detailed design stage
14	Steep Slopes	No	Refer to LiDAR and topographical survey for further details
15	Demolition / Refurbishment / Repair	No	Site currently comprises undeveloped agricultural land
16	Welfare	Unknown	To be determined at detailed design stage
17	Occupational Health	Unknown	To be determined at detailed design stage
18	Environmental Issues	Unknown	To be determined at detailed design stage
19	Other Significant Hazards not Identified Above	Unknown	To be determined at detailed design stage
20	Residual Risk to Future Users	Unknown	To be determined at detailed design stage