

**FLOOD CONSEQUENCE ASSESSMENT
& DRAINAGE STRATEGY REPORT**
PREMIER INN MERTHYR TYDFIL
DUFFRYN ROAD
PENTREBACH
CF48 4BB

PREPARED FOR:



JOB NO: P24-0081
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1. INTRODUCTION

- 1.1 This report has been prepared on behalf of Premier Inn Hotels Ltd. to accompany an application seeking permission for the construction of an extension of bedrooms to the existing Premier Inn hotel and associated hard and soft landscaping works.
- 1.2 This report assesses flood risk associated with the development proposals, generally following guidance set out in Welsh Government's "Technical Advice Note 15 (TAN15)", which provides guidance to local planning authorities (LPA's), developers, the public and Natural Resources Wales (NRW) on development and flood risk in Wales.
- 1.3 The report also details a strategy for the disposal of foul and surface water runoff from the development generally following guidance set out in the Welsh Government's "Statutory standards for sustainable drainage systems", which provides advice on designing, constructing, and maintaining surface water drainage systems in Wales.
- 1.4 Strategic Flood Consequence Assessment are studies that provide an assessment of the extent and nature of flood risk in the local area, allowing more detailed examination of the likely appropriateness of developing sites. The following reports are available on Merthyr Tydfil County Borough Council (MTCBC) website.
 - Welsh Assembly Government (WAG) Technical Advice Note 15 – Development and Flood Risk (TAN15)
 - Merthyr Tydfil County Borough Council Replacement Local Plan (2016- 2031)
 - Merthyr Tydfil County Borough Council – Merthyr Tydfil Strategic Flood Consequence Assessment June 2018
 - Merthyr Tydfil County Borough Council – Local Flood Risk Management Strategy April 2024

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2. SITE AND DEVELOPMENT CHARACTERISTICS

Site Location

- 2.1 The Premier Inn Merthyr Tydfil is located on Duffryn Road, Pentrebach as shown on *Figure 1*, below.

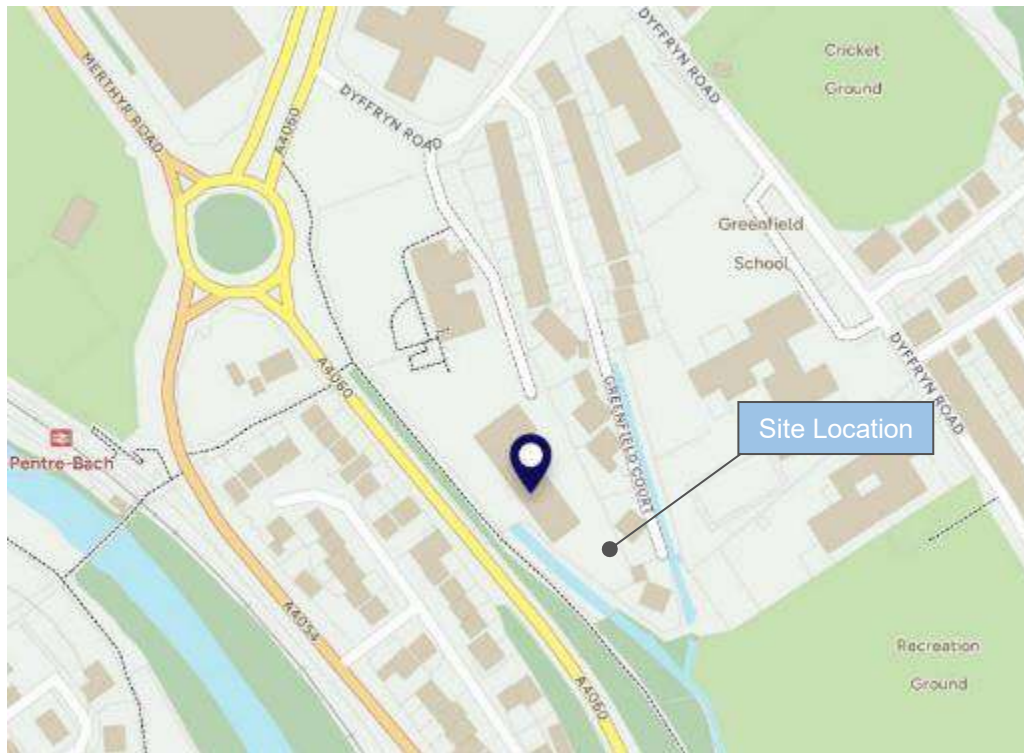


Figure 1: Site Location

- 2.2 The site is centred on Ordnance Survey grid reference SO 06187 03793 and co-ordinates X: 306187; Y: 203793. The site's post code is CF48 4BB.

Site Description

- 2.3 The site comprises of the Premier Inn Merthyr Tydfil hotel, Pentrebach House Table restaurant and its adjoining parking and circulation area.
- 2.4 Vehicular access is gained from the A4060.

Topography

- 2.5 The topographical survey included in *Appendix A*, shows that the site, is relatively flat with levels around the existing hotel building typically between 145.50mAOD and 145.90mAOD. The existing ground floor level of the hotel is shown to be 145.90mAOD.

Existing Ground Conditions

- 2.6 A site investigation was completed in 2019 by Enzygo and the ground conditions were noted to comprise of Made Ground over soft Alluvium becoming medium dense to dense sand and gravel below 3m bgl.

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- 2.7 The site investigation undertaken confirms the published geology and identifies the following strata:
- Made Ground – 0.5 to 1.0m thick strata of asphalt over dense black / grey mudstone gravel with occasional limestone and tarmac fragments between 0.5 – 1.0m thick.
 - Alluvium – 1.4 to 1.7m thick strata of soft brown and grey very silty clay with occasional gravel.
 - Alluvium – >1.1m thick strata of medium dense, becoming dense with depth brown sand and gravel.
- 2.8 Groundwater was encountered during subsequent monitoring in December 2018 and January 2019 at depths of at least 2.0m below ground.
- 2.9 The site investigation states that the site is shown to be at risk of groundwater flooding at surface from the superficial deposits. This is likely from fluvial flooding.
- 2.10 The site investigation conducted a preliminary soakaway test which gave a soil infiltration value of $1 \times 10^{-3} \text{m/s}$ within the alluvium but it is considered that the soil infiltration rate is representative of the deeper sand and gravel soils, which are below groundwater depth. Based on the clayey nature of the shallow Alluvium and shallow groundwater within the underlying sand and gravels it is not considered that soakaway drainage is feasible.
- 2.11 *Figure 2* below shows mapping obtained from the British Geological Society (BGS) which identifies the bedrock geology beneath the site to comprise of South Wales Middle Coal Measures Formation – comprising of mudstone, siltstone and sandstone.

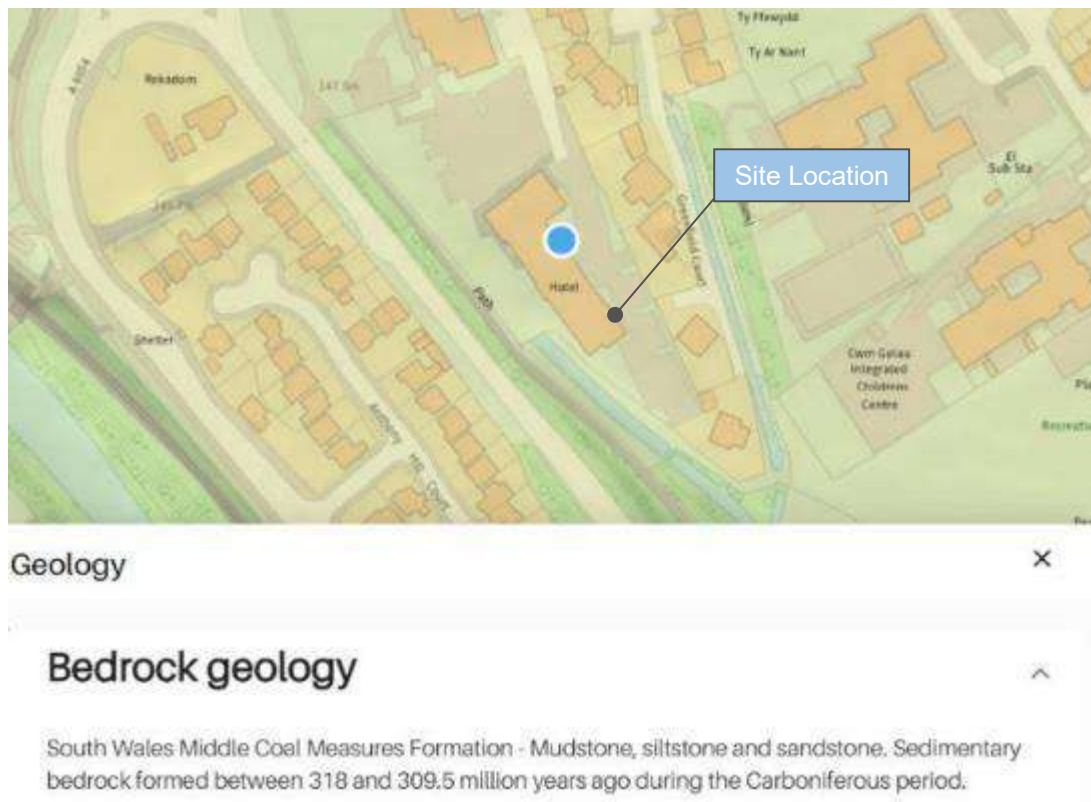


Figure 2: BGS Geology Viewer

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Existing Drainage Arrangements

- 2.12 Figure 3 below shows an extract from sewer records provided by Welsh Water. A copy of the Welsh Water records are included in *Appendix B*.

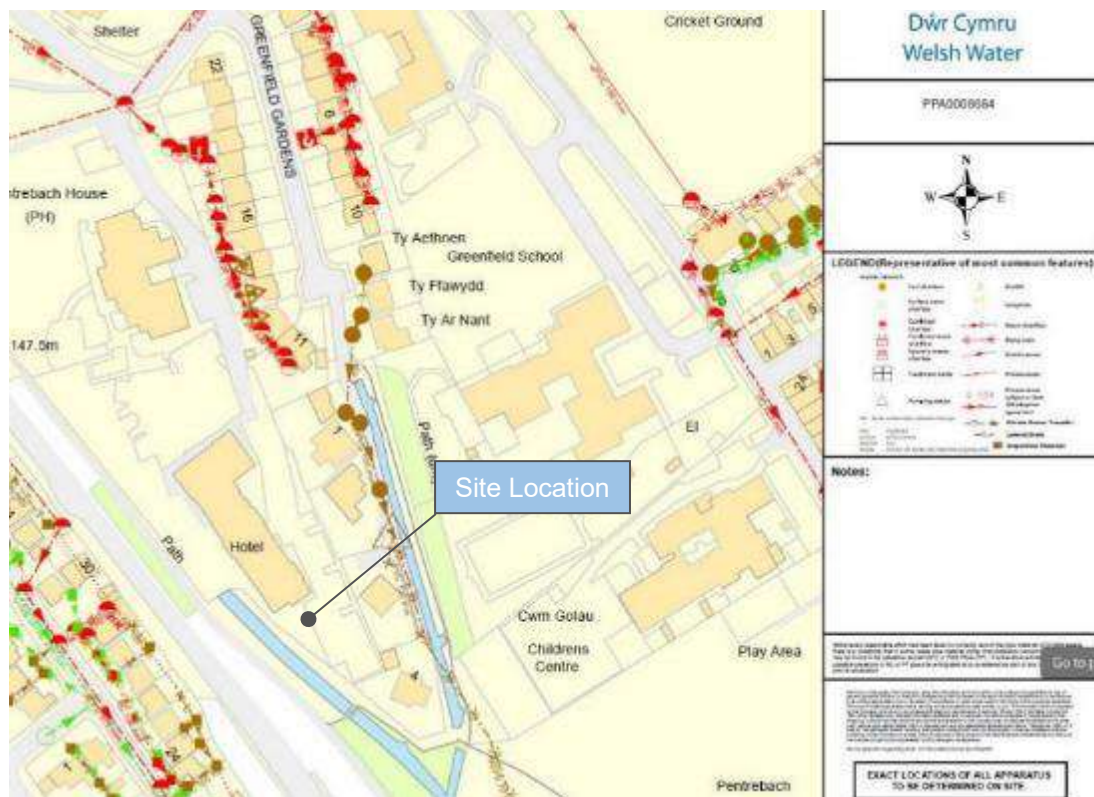


Figure 3: Welsh Water sewer records

- 2.13 The topographical survey of the site in *Appendix A* shows that foul water flows are discharged to a Welsh Water combined sewer to the north of the site. Foul water flows from the existing restaurant building are discharged to the sewer via gravity with flows from the existing hotel pumped along a rising main from a package pumping station located on the east side of the hotel building.
- 2.14 There are two existing surface water outfalls into a watercourse / ditch running along the western boundary of the site. It is understood that the ditch discharges into the River Taff approximately 450m to the south of the site.
- 2.15 Surface water from the existing hotel building is collected by rainwater gutters which discharge below ground via rainwater down pipes. Runoff from the parking areas is collected by a network of trapped gullies and drainage channels. Surface water runoff is discharged off site via a traditional network of below ground pipework to one of the two outfalls into the existing watercourse / ditch to the west of the hotel. Following receipt of a CCTV survey of the existing networks it was observed that the southern outfall passes through a petrol interceptor immediately upstream of the headwall. A copy of the CCTV survey drawing identifying the headwall is included in *Appendix A*.

Development Proposals

- 2.16 It is proposed to construct a new extension extending south from the western end of the existing hotel building. A site plan and floor plans showing the development proposals are included in *Appendix C*.

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3. FLOOD RISK PLANNING POLICY & GUIDANCE

- 3.1 The Welsh Assembly Government (WAG) has published an updated version of the Technical Advice Note 15 – Development and Flood Risk (TAN15) in 2025. This document has superseded the 2004 version of TAN15. The note requires that the risks of flooding are given full consideration by the planning system. These risks should be considered in the preparation of Strategic Flood Consequences Assessments (SFCAs) for Development Plans and in undertaking detailed Flood Consequences Assessments for planning applications.
- 3.2 The fundamental principles of the TAN are to restrict new development in Zone 3 subject to limited exceptions to ensure that decision makers have taken flood risk matters into consideration in all other zones.
- 3.3 Whether a development should proceed or not will depend upon whether the consequences of flooding can be safely managed, including its effects on flood risk elsewhere.
- 3.4 There are requirements that must be in place for any development that is permitted to be located in flood risk areas. In all circumstances, developers and planning authorities should ensure the following conditions are met:
- No increase in flooding elsewhere
 - Occupiers aware of flood risk
 - Escape/evacuation routes present
 - Flood emergency plans and procedures agreed and in place
 - Flood resistant and resilient design
 - Acceptable consequences for type of use (see detailed guidance below)
- 3.5 The Flood Consequences Assessment should establish if suitable avoidance and mitigation measures can be incorporated, in a manner compatible with the placemaking aims of Planning Policy Wales, within the site design to ensure that development is safe and there is:
- minimal risk to life;
 - minimal disruption to people living and working in the area;
 - minimal potential damage to property;
 - minimal impact of the proposed development on flood risk generally; and
 - minimal disruption to the sustainable management of natural resources.
- 3.6 The Flood Map for Planning and the Flood Risk Assessment Wales (FRAW) map together make up the Wales Flood Map. The Flood Map for Planning is the starting point for consideration of flood risk in the planning system. The map uses flood zones to indicate the degree to which land is at risk of flooding from rivers, the sea, surface water and small watercourses. This TAN outlines the actions that should be taken when considering development in the different flood zones. *Figure 4* sets out the definition of the main zones. Zone 1, and Zones 2, 3 and the TAN 15 Defended Zones are collectively referred to as 'flood risk areas'.

Zone	Flooding from rivers	Flooding from the sea	Flooding from surface water and small watercourses
1	Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year		
2	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 200 (0.5%) chance of flooding in a given year, including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change
TAN15 Defended Zones	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard).	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard).	Not applicable.

Figure 4: Definition of Flood Map for Planning Flood Zones

- 3.7 As particular flooding consequences may not be acceptable for certain development types, the precautionary framework of TAN15 identifies the vulnerability of different land uses to flooding. Thus, development types have been sub-divided into three categories, as shown in *Figure 5* below.

Vulnerability category	Types
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites, caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries. Especially vulnerable industrial development (e.g. power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites. Emergency services, including: ambulance stations, fire stations, police stations, command centres, emergency depots. Buildings used to provide emergency shelter in time of flood.

Less vulnerable development	General industrial, employment, commercial and retail development. Transport and utilities infrastructure. Car parks. Mineral extraction sites and associated processing facilities (excluding waste disposal sites). Public buildings including libraries, community centres and leisure centres (excluding those identified as in Highly Vulnerable category and emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities (excluding hydro generation).
Water compatible development	Boatyards, marinas and essential works required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

Figure 5: TAN 15 Development Vulnerability Categories

- 3.8 TAN 15 advises that Planning Authorities should prioritise all types of development to Zone 1. Applications for all types of development, change of use or conversion are acceptable in principle in Zone 1. However, applications for new development on Greenfield sites are not appropriate in Defended Zone 1 unless they are allocated in development plans. On brownfield sites in Zone 1, redevelopment proposals should not over intensify use neither should they reduce the area's ability to absorb flood water nor cause problems with flooding elsewhere.
- 3.9 Planning applications in Zone 2 require careful consideration and must be consistent with the acceptability considerations set out in Section 11 of TAN15. They must also be accompanied by a FCA which clearly describes the flood risk, and the risks must be acceptable. Applications for new highly vulnerable development on greenfield land are only appropriate where the site has been allocated in adopted Development Plans. Proposals for redevelopment on brownfield land of any vulnerability will need to assist, and be consistent with, the Development Plan strategy to regenerate an existing settlement or achieve key economic or environmental objectives.
- 3.10 In Zone 3 allocations for highly vulnerable new development must not be made as the risks and consequences of flooding are not considered acceptable for these types of development. Allocations for less vulnerable new development should only be made in exceptional circumstances. Exceptional circumstances are addressing national security or energy security needs, reasons of public health or to mitigate the impacts of climate change which have a clear locational need and cannot be located elsewhere.

3.11 SFCA's are studies that provide an assessment of the extent and nature of flood risk in the local area, allowing more detailed examination of the likely appropriateness of developing sites. The following reports are available on Merthyr Tydfil's County Borough Council's website:

- Merthyr Tydfil County Borough Council Replacement Local Plan (2016- 2031)
- Merthyr Tydfil County Borough Council – Merthyr Tydfil Strategic Flood Consequence Assessment June 2018
- Merthyr Tydfil County Borough Council – Local Flood Risk Management Strategy April 2024

3.12 The following section of this report reviews flood risk associated with sources of flooding identified within these reports.

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4. SOURCES OF FLOODING

Historic Flooding

- 4.1 The MTCBC's Strategic Flood Consequence Assessment states that there are some localised historic flood extents throughout the Hoover site along both the left and right banks of the River Taff as a result of the December 1979 event. These remain close to the riverbanks and do not exceed beyond 20m of the main river.
- 4.2 There are no Natural Resource Wales records of flooding along the Nant Graig or Nant Canaid. The MTCBC data records past flooding due to canal overload during October 2010 at Upper Abercanaid. There are also two areas of flooding within the west of the Hoover Site that were caused by the flooding of ordinary watercourses during 1899.
- 4.3 *Figure 6* below shows the recorded flood outlines dataset for the site from the Flood Map for Planning on the Natural Resources Wales (NRW) website. It shows that the south end of the existing development may have experienced some historic flooding likely associated with the adjacent drainage ditch to the south west.

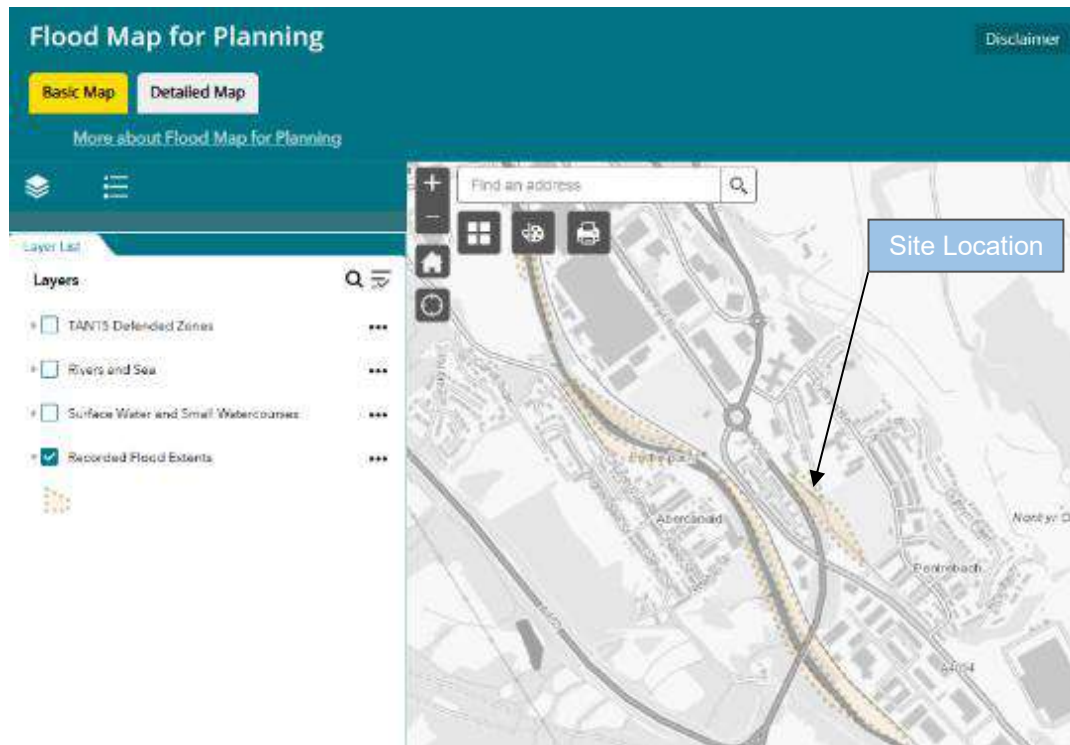


Figure 6: NRW Historic Flood Map

- 4.4 Further interrogation of the mapping indicates that the flood extents are associated with a December 1979 flood event as shown in *Figure 7* below. The Merthyr Tydfil County Borough Council (MTCBC) Flood Risk Management Plan Summary document prepared in December 2015 notes a total of 189 residential properties were flooded within Pentrebach, Troedyrhiw and Rhydycar plus a number of commercial properties. The flooding was attributed to the inability of local drainage systems to cope with storm water flow and a collapsed culvert in Rhydycar. No subsequent recorded flood events have affected the hotel site. The accuracy of flood extent mapping is considered to be low so it is unclear if the site would have been affected during the 1979 event.

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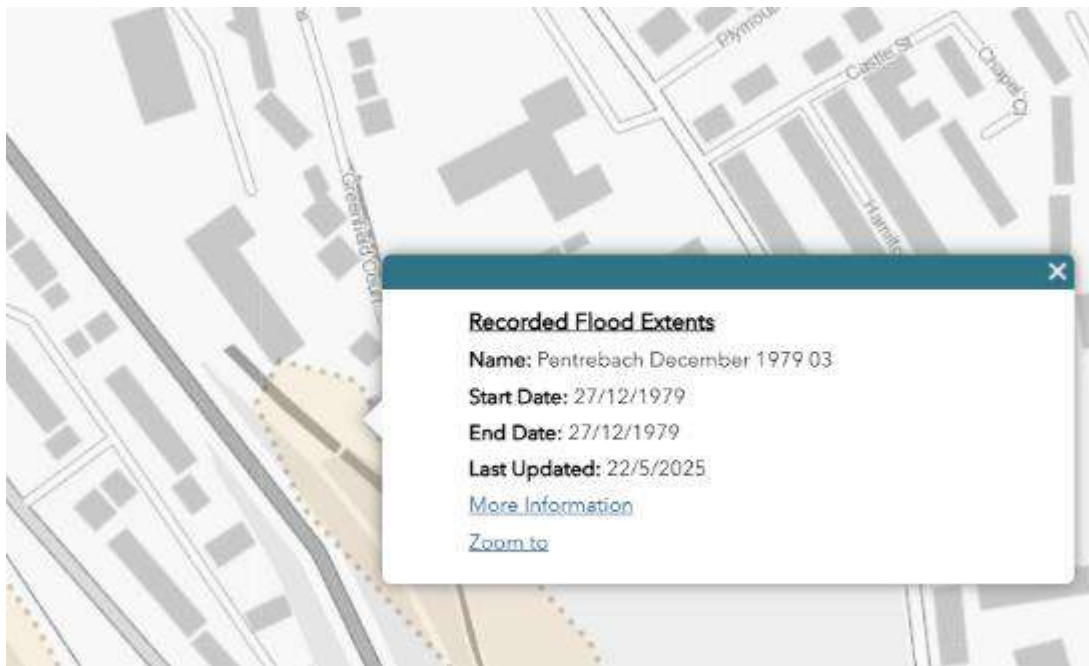


Figure 7: NRW Risk of Fluvial / Tidal Flooding Map

- 4.5 Subsequent to the publication of the Flood Risk Management Plan, a Section 19 Flood Investigation Report prepared by MTCBC reviews the causes of flooding in Pentrebach during Storm Dennis in February 2020. It is reported that 31 properties were flooded during this storm event as a result of a blocked culvert. The location of the flooding was within a residential estate approximately 500m downstream of the hotel site with the hotel remaining free from flooding during this event.
- 4.6 The Section 19 report includes a table of proposed works to repair the damage caused by Storm Dennis and alleviate the effect of future storm events. The table includes proposed works to the Plymouth Feeder as it crosses Maestaff Street 260m downstream of the hotel site. This is understood to be the closest downstream culvert to the site with the works shown to include the following as shown in Figure 8.

Area	Works
Nant yr Odyn (mountainside adjacent to Duffryn Fawr)	Culvert inlet improvement works and installation of sacrificial trash screen upstream of the inlet
Dyffryn, Pentrebach	Culvert inlet improvement works and installation of sacrificial trash screen upstream of the inlet. Installation of flood monitoring station at culvert inlet.
Plymouth Feeder, Pentrebach	Improvement works to 100m section of Plymouth Feeder at Maestaff Street. Installation of flood monitoring station at Maestaff Street bridge.

Figure 8: Details of the proposed relief work planned / being carried out in Pentrebach

- 4.7 The following images in *Figures 9 and 10* were taken in November 2021 on Google Street View and identify that works were undertaken at Maestaff Street bridge. It is considered that this will reduce the potential risk of flood water backing up from this culvert during a storm event.



Figure 8: View of improvement works at Maestaff Street Bridge (looking north west)



Figure 9: View of improvement works at Maestaff Street Bridge (looking south east)

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Fluvial Flooding

- 4.8 The flood zone map in *Figure 10* has been taken from the Flood Map for Planning on the Natural Resources Wales (NRW) website and shows the site area to be within Flood Zone 1; defined as land considered to have a less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year. Therefore, it shows the site and the surrounding area to not be at risk of flooding from Rivers.

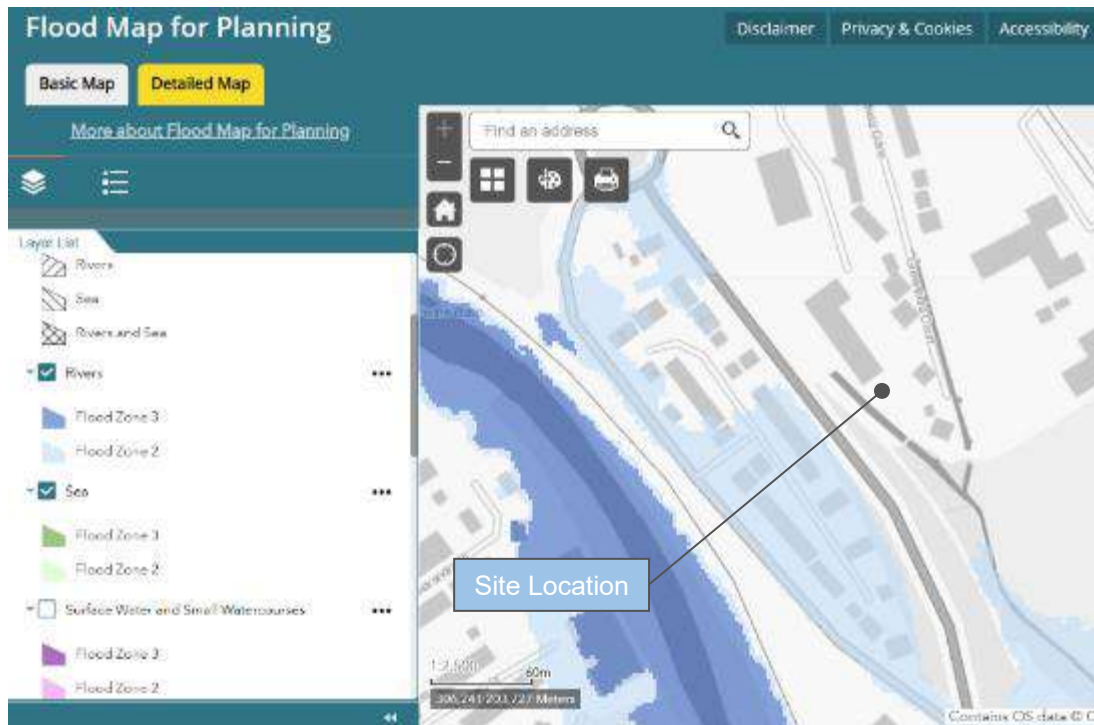


Figure 10: NRW Risk of Fluvial / Tidal Flooding Map

- 4.9 However, it is noted that the drainage ditch to the south west of the site boundary would likely fall under the 'surface water and small watercourses' flood extents and the risk of flooding from this source is discussed below.

Surface Water Flooding

- 4.10 The SFCA states that surface water flooding occurs as a result of direct rainfall accumulating in an area that is unable to drain away.
- 4.11 *Figure 11* shows the Natural Resources Wales Detailed Flood Map for Planning (FMfP), with the location of the site identified. The Flood Zones within the FMfP shows the undefended risk of flooding from Surface Water & Small Watercourses.

Flood Zone 3 displays the extent of flooding from:

- Surface water & small watercourses with a 1% (1 in 100) chance or greater of happening in any given year, including an allowance for climate change.

Flood Zone 2 displays the extent of flooding from:

- Surface water & small watercourses with less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance of happening in any given year, including an allowance for climate change.

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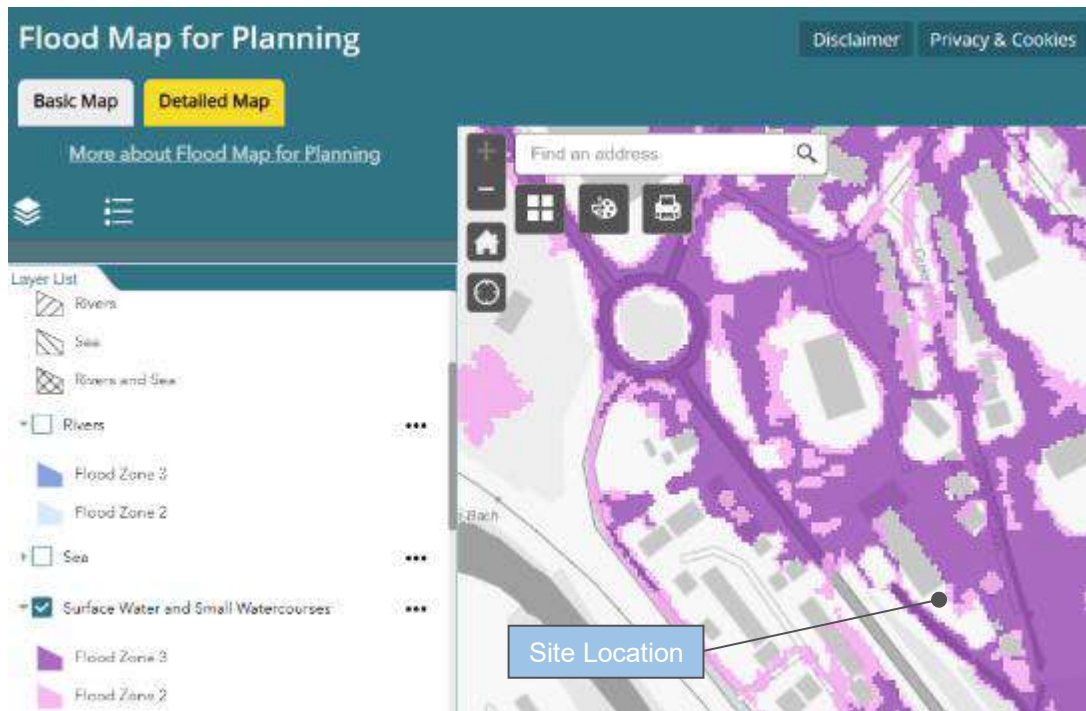


Figure 11: NRW Detailed Flood Map for Planning - Surface Water & Small Watercourses

- 4.12 It shows areas of the site to be at high risk of surface water flooding. However, the area of the proposed extension is shown to lie outside of the extents of the flooding shown. An area of high risk is shown along the route of the drainage ditch / watercourse to the south west of the site boundary.
- 4.13 The SFCA states that large amounts of surface water flooding are predicted at Pentreback near Abercanaid as shown in *Figure 9*, with a large area of the village flooded during the 3.3% AEP event, as well as Duffryn Road that borders Greenfield Special School. Throughout the upper Abercanaid area, surface water flooding affects large parts of the Hoover site (north west), with water ponding in the 3.3% AEP event due to a topographic depression where the existing factory sits. Some flooding is also predicted along the A4054 in this area during the 3.3% AEP event.

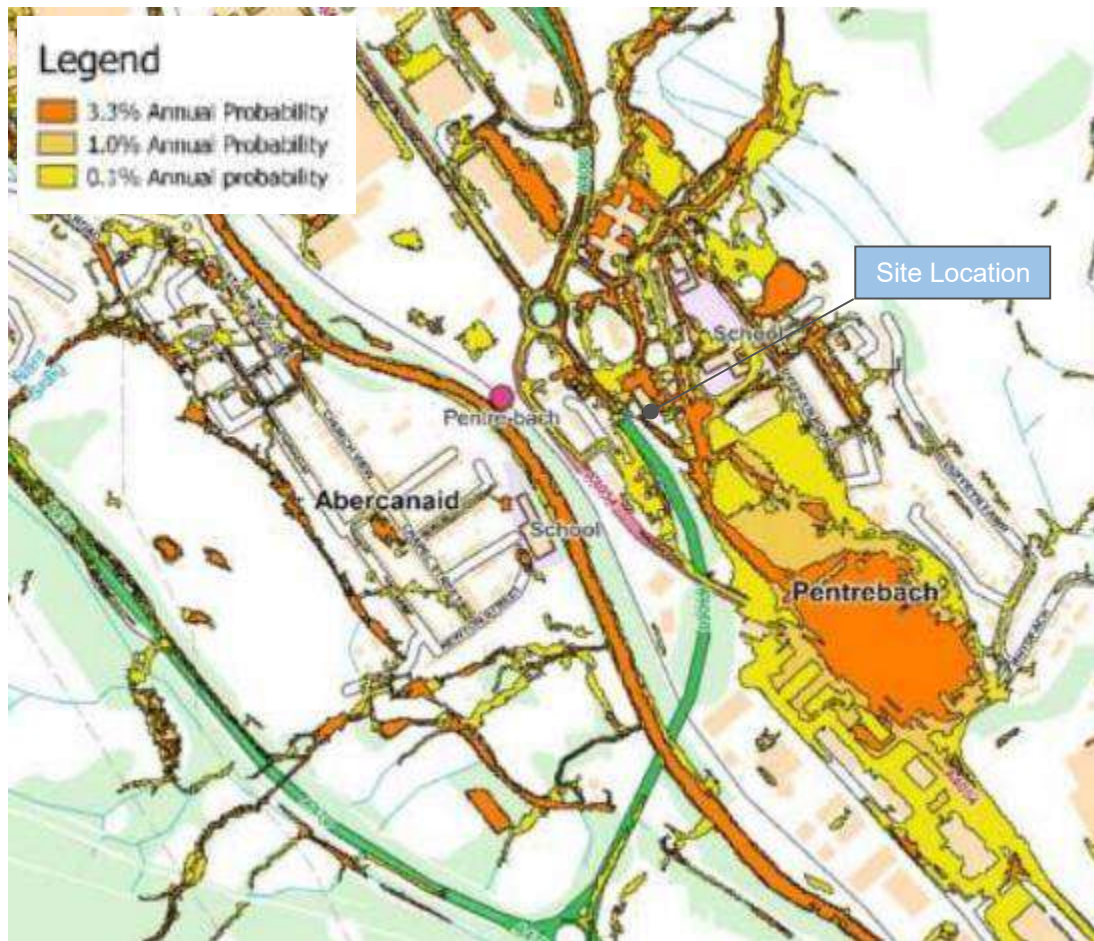


Figure 9: Surface Water Flood Map for Abercanaid MTCBC SFCA

- 4.14 The SFCA advises that surface water risk seems predominantly a result of existing topographic depressions rather than overland flow routes though the site as shown in *Figure 9*. Therefore, this risk should be mitigated against through development as the topography will be altered from its existing state, ensuring that depressions are not created where surface water can pond.
- 4.15 To assess the impact of surface water flood risk in more detail, a Flood Screening Report has been obtained from Envirocheck. A copy of the report is included in *Appendix J*.
- 4.16 The Envirocheck report includes mapping illustrating the anticipated surface water flood depths, velocities, and resulting hazards that may affect the development. Below is a review of these maps and an assessment of the extent to the which the development could be affected by surface water flood risk in the future under the following headings.

Flood Depths

- 4.17 In order to account for climate change, the site has been assessed against the 0.1% (1 in 1000 year) AEP event flood depth mapping representing the future extent of Flood Zone 3. *Figure 10* below illustrates that during such an event the site could flood to depths of up to 0.9m around the northern and eastern elevations of the existing hotel building. At the southern end of the existing hotel, predicted flood levels are lower with depths of up to 300mm.

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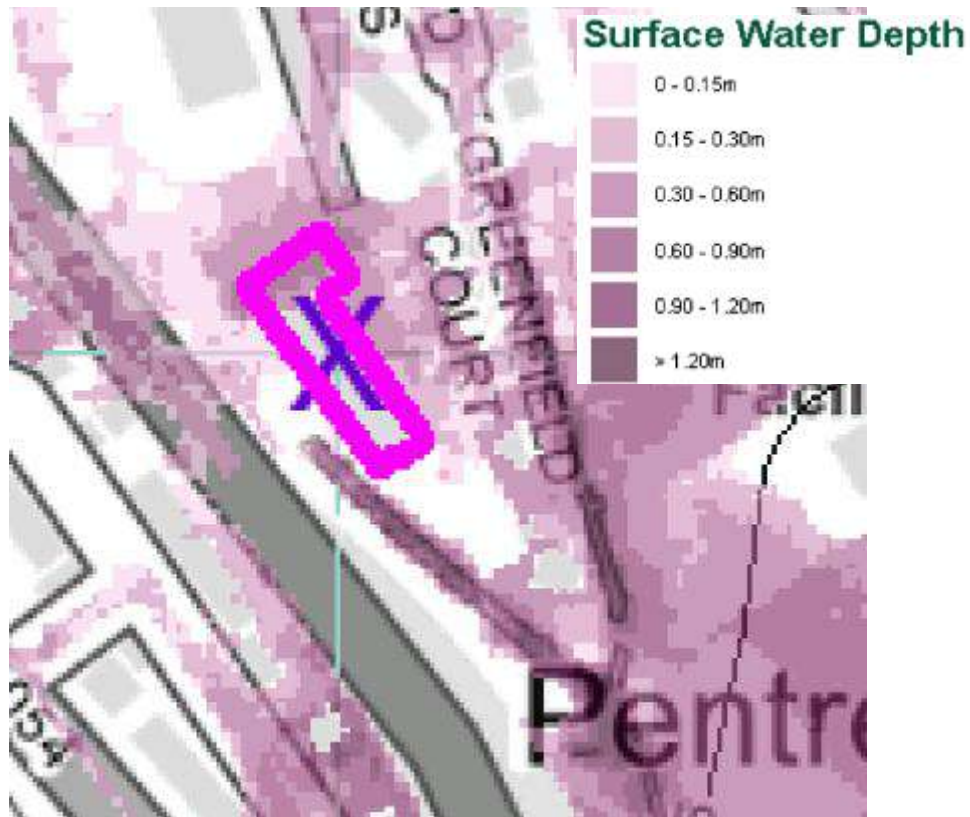


Figure 10: 0.1% AEP (1 in 1000 year) flood depth map (Flood Screening Report)

- 4.18 The existing car park to the south of the hotel building is shown to not be affected by the predicted climate change flood extents. Since the hotel extension will be constructed over this area, it can be considered that the predicted flood depths would be acceptable.

Flood Velocities

- 4.19 In order to account for climate change, the site has been assessed against the 0.1% (1 in 1000 year) AEP event flood velocity mapping representing the future extent of Flood Zone 3. Figure 11 below illustrates that during such an event the site flood water velocities of between 0.50 and 2.00m/s are predicted along the eastern elevation of the hotel. At the southern end of the existing hotel, predicted flood velocities are lower at between 0.25 and 1.00m/s.
- 4.20 As with the flood depth mapping, the existing car park to the south of the hotel building is shown to not be affected by the predicted climate change flood extents. Since the hotel extension will be constructed over this area, it can be considered that the predicted flood velocities would be acceptable.

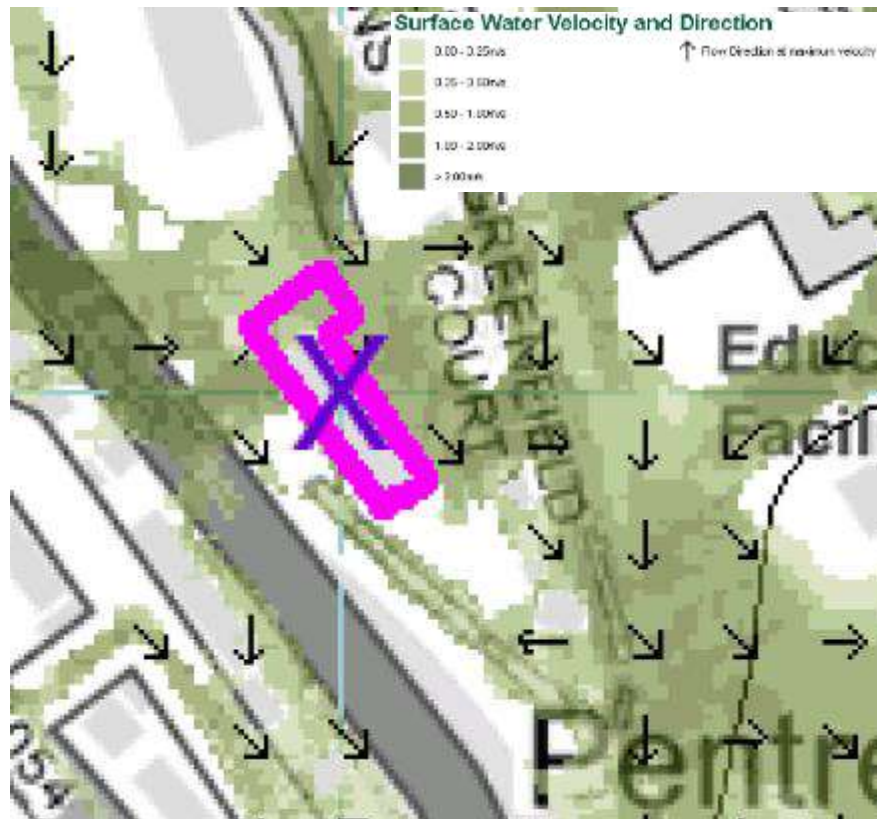
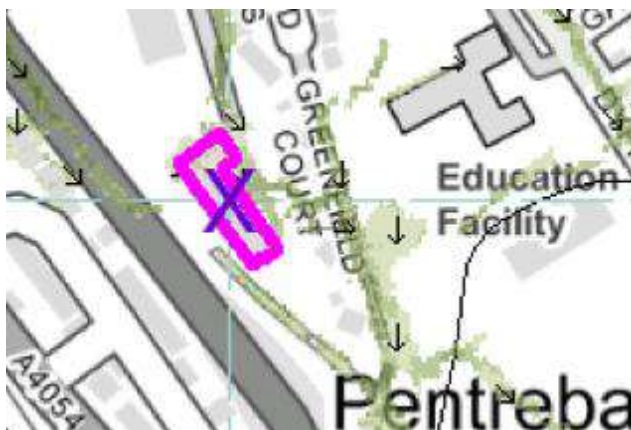


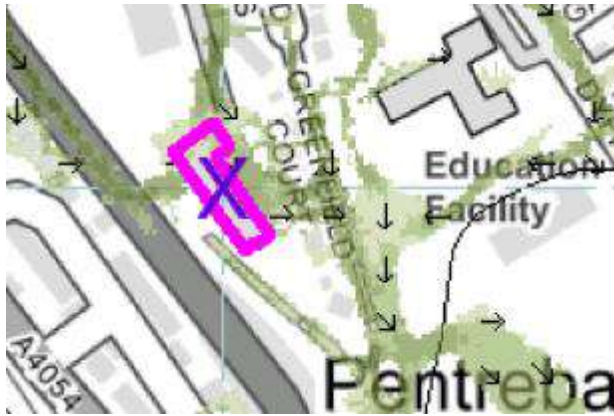
Figure 11: 0.1% AEP (1 in 1000 year) flood velocity map (Flood Screening Report)

- 4.21 The velocity mapping in the Flood Screening Report also illustrates how surface water flooding would develop in the surrounding area. Below are the velocity maps for the 30, 100 and 1000 year return periods together with a brief explanation against each map.



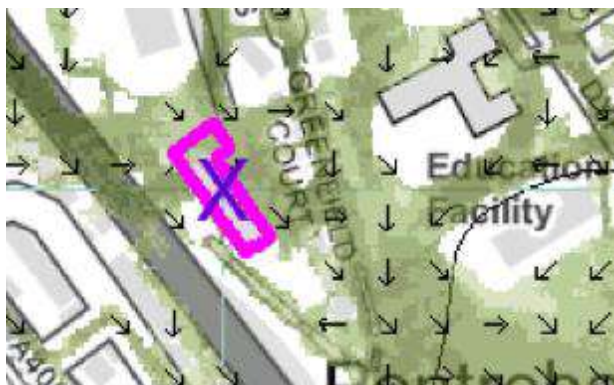
30 year Return Period

Surface water flooding appears to develop from a low point along the hotel's eastern elevation as the capacity of existing surface water drainage is exceeded before flowing off site to the east into Greenfield Court and then south into the watercourse. There appears to be some overflow from the A4060 towards the northern end of the hotel. An overflow from the existing drainage ditch is identified to flood into the playing fields of the school to the east.



100 year Return Period

Surface water flooding along the A4060 appears to contribute to increased levels of flooding around the existing hotel building with additional flows contributing from the north. Flows directions arrows do not suggest flows are backing up from the two ditches in close proximity to the site. No out of channel flooding of the ditch to the south west is identified but the overflow into the playing fields is shown to increase.



1000 year Return Period

Surface water flooding around the northern end of the existing hotel is predicted to increase further. Flood water is then shown to back up into the existing ditch alongside the site, but it does not overflow into the car park. The overflow into the playing fields is shown to inundate this area.

Figure12: Flood Velocity Maps to Illustrate Development of Surface Water Flooding

- 4.22 To ensure the development will not increase the risk of surface water flooding the extension will be located outside of the high risk surface water flood zones. Therefore, it not anticipated that the development would cause any increase in flood risk elsewhere, provided that the extension is constructed to match existing general levels closely, it would not cause any obstruction to flood flows. Additionally, attenuation and restriction of runoff rates would be provided. Sustainable Drainage Systems (SuDS) will also be provided for the site which will be able to minimise the rate of discharge, volume and environmental impact of surface water runoff.

Groundwater Flooding

- 4.23 The SFCA advises that groundwater flooding occurs as a result of high water tables in the soil, and typically occurs in low-lying areas with permeable soils and bedrock.
- 4.24 The SFCA states that downstream of the Abercanaid and Hoover site, the soils are mostly free draining with localised areas of slowly draining acid soils. The bedrock is made up of sedimentary mudstone and siltstone, which is considered as moderately permeable. The SFCA states that it is unlikely that groundwater flooding will be the dominant flooding mechanism.
- 4.25 An intrusive site investigation has confirmed groundwater levels to be approximately 2m below ground level, the majority of the site is covered by hardstanding and there is no basement development proposed which would normally be at a higher risk from groundwater flooding. On this basis, the development is considered to be at a low probability of flooding from this source, although appropriate sump / pump techniques may need to be used to de-water excavations during construction.

Sewer Flooding

- 4.26 The SFCA advises that sewer flooding occurs because if an existing drainage system having insufficient capacity to drain rainfall, consequently causing the release of water at manholes. Sewer flooding can also occur should there be a fault/ failure at an existing drainage system.
- 4.27 The SFCA states that the responsible authority for sewer flooding at the study area is Welsh Water. Welsh Water has confirmed that there are no records of sewer flooding or capacity issues within the vicinity of the site. Therefore, the site is not at risk of flooding from this source and no measures are deemed necessary to mitigate the risk of sewer flooding.

Flooding from Artificial Sources

- 4.28 Flooding from artificial sources, is most likely to result from burst water mains or from infrastructure failure in an artificial watercourse or water body, i.e., canals or other water features such as reservoirs. These systems are maintained, improved, and regularly inspected by relevant authorities so flood risk from these sources is generally considered to be low.
- 4.29 Flood maps associated with large reservoirs that hold over 25,000 cubic meters of water are available on the NRW website. The maps help to identify areas that could potentially be affected by reservoir flooding and display a realistic worst-case scenario of the largest area that may be flooded if a reservoir were to fail and release the water it holds. *Figure 13* below shows a Reservoir Flood Map taken from the NRW's website. The map shows the site and surrounding area to be within an area at risk of reservoir flooding.



Figure 13: NRW Reservoir Flood Map

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- 4.30 The SFCA states that areas such as Upper Abercanaid and Abercanaid and within the Hoover site and large parts of the A4054 road network are shown to be inundated during a reservoir flood event. Depths are largely greater than 2m and affect exiting development on both sides of the River Taff, including industrial and residential areas. Flood velocities are higher throughout Upper Abercanaid at greater than 2m/s, however, are shown to reduce at Abercanaid, with velocities ranging from 0.5m/s to 2m/s, dropping to 0.0m/s-0.5m/s further west.
- 4.31 It should be noted that reservoir flooding is a rare event with a very low probability of occurrence. Current reservoir regulation, which has been further enhanced by the Flood and Water Management Act (2010), ensures that all reservoirs are properly maintained and monitored in order to detect and repair any problem.
- 4.32 As there are no canals that could reasonably affect the site, no further assessment of flood risk is required in relation to canal flooding and no measures are deemed necessary to manage flood risk from this source.
- 4.33 Flood patterns associated with burst water mains would typically be similar to surface water flood patterns and would generally be limited to existing roads where water main infrastructure is normally located. The floor level of the extension should be raised above proposed road levels to protect it from potential flooding caused by burst water mains.

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5. JUSTIFYING THE LOCATION OF THE DEVELOPMENT

- 5.1 The Natural Resources Wales (NRW) website shows the site area to be within Flood Zone 1, which is a land assessed to not be at risk of fluvial flooding. As discussed in *Section 4*, and as illustrated in the extracts from the Flood Map for Planning and surface water flood risk maps, the proposed extension lies within land shown to be at a low risk of flooding.

6. DRAINAGE STRATEGY

Surface Water Drainage Policy & Guidance

- 6.1 National and local drainage policies on surface water drainage require development to use Sustainable Drainage Systems (SuDS) to minimise the rate of discharge, volume, and environmental impact of surface water runoff. SuDS are a collective approach to managing surface water that takes account of water quantity (flooding), water quality (pollution) biodiversity (wildlife and plants) and amenity. They mimic nature and typically manage rainfall close to where it falls. They are also used to transport (convey) surface water, slow runoff down (attenuate) before it enters watercourses. They provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground, evaporate from surface water's or transpire from vegetation (known as evapotranspiration).
- 6.2 Strategic Policy EnW4: Environmental Protection of Merthyr Tydfil's Replacement Local Development Plan (2016-2031) advises that development proposals will be required to incorporate measures to improve water quality where opportunities exist. It also notes that all new developments of more than 1 dwelling house, or where construction is 100m² or more, will require SuDS for surface water that meets the statutory sustainable drainage standards set by Welsh Government. Approval from the SuDS Approval Body (SAB) will be required before construction takes place. In accordance with Standard S3 (Water Quality), treatment for surface water run-off should be provided in order to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers. Under the standards, the aim should be to ensure the SuDS effectively manage sediment and other pollutants, ensuring discharges from the systems are of an acceptable quality and will not cause a pollution risk.
- 6.3 The Flood and Water Management Act 2010 (Schedule 3), which came into effect in Wales on 7 January 2019 requires all construction work in Wales with drainage implications, of 100m² or more to have SuDS to manage on-site surface water. The SuDS must be designed and constructed in accordance with the Welsh Government Standards for Sustainable Drainage. The current standards are reviewed under the following headings with an assessment provided of how the development could be designed to meet the associated requirements.

Standard S1 - Surface Water Runoff Destination

- 6.4 The suggested procedures for managing surface water runoff from new developments in Wales are set out in the February 2015 Welsh Government Consultation Document "*Interim non-statutory standards for sustainable drainage (SUDS) in Wales – designing, constructing, operating and maintaining surface water drainage systems*".

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- 6.5 Standard S1 of the Consultation Document sets out a hierarchy for the disposal of surface water runoff. The methods of disposal are summarised in *Table 1* below with an assessment of each method's suitability also provided.

Table 1: Surface Water Runoff Destination Assessment

Surface Water Runoff Destination	Assessment
Level 1: Consider collection of surface water runoff for re-use	The existing hotel is not currently served by a rainwater harvesting system. Therefore, since the proposed development comprises a small extension adjoining the existing hotel building, it is not considered appropriate to retrofit a system to the existing hotel or incorporate a new system for the extension. Therefore, it is not considered appropriate to use rainwater harvesting for the disposal of roof water runoff.
Level 2: Consider disposal of surface water runoff to ground by infiltration.	As reported in <i>Section 2</i> of this report, the site is underlain by made ground overlying cohesive materials comprising clays associated with alluvial deposits. Furthermore, groundwater was encountered at shallow depths during subsequent monitoring. Therefore, it is not considered appropriate to utilise infiltration drainage techniques for the disposal of surface water runoff.
Level 3: Consider discharge of surface water runoff to a surface water body.	The site is drained by an existing surface water drainage network comprising of below ground pipework, which discharges to a surface water drainage ditch to the south-west of the site. Surface water flows from the new development could be discharged to the existing system, however flows would need to be managed so as not to cause an increase in surface water flood risk both on the site and elsewhere in the catchment.
Level 4: Consider discharge of surface water runoff to a surface water sewer, highway drain, or another drainage system.	It has been established that it would be appropriate to discharge surface water runoff to the site's existing surface water drainage system. Therefore, it is not necessary to consider the discharge of surface water runoff to a surface water sewer.
Level 5: Consider discharge of surface water runoff to a combined sewer.	It has been established that it would be appropriate to discharge surface water runoff to the site's existing surface water drainage system, therefore, it is not necessary to consider the discharge of surface water runoff to a combined sewer.

Standard S2 - Surface water runoff hydraulic control

- 6.6 Standard S2 of the Consultation Document advises that consideration should be given to the use of Sustainable Drainage Systems (SuDS) to prevent any discharge of surface water from new development for rainfall events less than 5mm in depth and prevent runoff from the first 5mm of rainfall for larger events. The SuDS considered to achieve this requirement are listed in *Table 2* below with an assessment of each methods suitability also provided.

Table 2: Assessment of SuDS Methods considered to prevent any discharge of surface water for rainfall events less than 5mm in depth and prevent runoff from the first 5mm of rainfall for larger events.

System	Assessment
Green Roofs	The roof of the extension will match the pitched roof profile of the existing hotel. Therefore, the use of green roofs is not considered appropriate for the management of surface water runoff.
Rainwater Harvesting	The existing hotel is not currently served by a rainwater harvesting system. Therefore, since the proposed development comprises a small extension adjoining the existing hotel building, it is not considered appropriate to retrofit a system to the existing hotel or incorporate a new system for the extension. Therefore, it is not considered appropriate to use rainwater harvesting for the disposal of roof water runoff.
Soakaway / Infiltration Systems	As reported in <i>Section 2</i> of this report, the site is underlain by made ground overlying cohesive materials comprising clays associated with alluvial deposits. Furthermore, groundwater was encountered at shallow depths during subsequent monitoring. Therefore, it is not considered appropriate to utilise infiltration drainage techniques for the disposal of surface water runoff.
Infiltration Trenches	
Permeable Pavements	No new car parking spaces are proposed. The underlying ground conditions have also been established to be unsuitable for infiltration drainage techniques. Therefore, it would not be appropriate to incorporate permeable paving.
Swales	A new area of landscaping will be created to the south of the proposed extension as part of the development. This area will be suitable to incorporate a shallow detention basin to manage surface water runoff generated by the extension roof. In addition, there are additional landscaping areas around the proposed extension where it will be possible to incorporate rain gardens for further treatment of surface water runoff from the building's roof.
Detention Basins	
Bio Retention Areas & Rain Gardens	
Ponds	

- 6.7 In *Table 1*, it was established that it would be appropriate to discharge surface water runoff to the site's existing surface water drainage system, but flows would need to be managed so as not to cause an increase in surface water flood risk both on the site and elsewhere within the catchment. The Consultation Document sets out requirements for managing runoff from previously developed sites. It advises that where there is sufficient detail to enable an accurate simulation model to be built to represent the drainage system and contributing areas, the accepted discharge rate should usually be the greenfield 1:100 year peak runoff rate, but where this is not possible, betterment should be a reduction to less than 70% of the existing peak system discharge rate and lower wherever practicable.
- 6.8 The development comprises a small extension to the existing hotel building, therefore, substantial alterations to the site's existing surface water drainage system could not be justified and it would not be considered practicable to limit flows from the existing site to the greenfield 1 in 100 year peak runoff rate but it should be possible to achieve a reduction of the existing 1 in 100 year discharge rate as part of the surface water drainage scheme for the new extension.
- 6.9 Greenfield runoff rates and volumes have been estimated using the ReFH2 Rural Runoff method in the MicroDrainage Software Package. The design results are included in *Appendix D* and are based on the drained area for the outfall serving the new extension of 0.149 Ha as shown on the drained areas plan in *Appendix E*. The calculated rates and volumes for a variety of storm events up to the 1 in 100 year return period are summarised in *Table 2*.

Table 2: Estimated Runoff Rates & Volumes

Return Period (Year)	Greenfield		Brownfield			
			Pre-development		Post-development	
	Peak Runoff Rate (l/s)	6hr Runoff Volume (m³)	Peak Runoff Rate (l/s)	6hr Runoff Volume (m³)	Peak Runoff Rate (l/s)	6hr Runoff Volume (m³)
2	2.2	27.8	11.4	62.8	10.6	58.5
30	5.0	55.1	19.0	104.7	17.7	97.5
100	6.3	68.6	22.8	125.5	21.2	116.9
100+40%	N/A	N/A	N/A	N/A	29.7	163.6

- 6.10 Table 2 also shows the estimated brownfield runoff rates and volumes in the pre (0.160 Ha) and post-development (0.149 Ha) situations, which have been established using the Modified Rational Method Formula based on rainfall profiles generated using the FEH rainfall model within the MicroDrainage Software Package. The Modified Rational Method calculations and rainfall profiles are included in *Appendix F*. The runoff rate and volume in the post-development climate change situation were calculated to be lower than those in pre-development situation as a result of the development's reduction in drained areas.
- 6.11 The runoff rates and volumes in the post-development situation are shown to be greater than runoff rates and volumes in the greenfield situation for all return periods as a result of the proposed building and hardstanding areas totalling 0.149 Ha.
- 6.12 To achieve a reduction to less than 70% of the existing 1 in 100 year discharge rate it is proposed to introduce a flow control chamber to the existing surface water drainage system with a new underground attenuation tank and detention basin, provided upstream, which would provide the dual function of draining runoff from the extension as well as storing and attenuating excess runoff associated with extreme storm events. The network of pipework is shown on the proposed drainage layout plan included in *Appendix G*.
- 6.13 Roof water from the proposed extension will be captured by a combination of rainwater gutters and downpipes that would discharge directly into rain gardens or filter drains upstream of a connection to a detention basin. The basin would allow runoff to pass through the base into the geocellular attenuation tank.
- 6.14 The below ground attenuation tank and detention basin are the maximum practicable size to permit continued vehicular access to the car park spaces to the north of the extension as well as allowing the existing trees to be retained along the boundaries of the site. An orifice flow control device has been designed to limit flows to a maximum discharge rate of 15.9 l/s to prevent an increase in the risk of surface water flooding on the site.
- 6.15 The surface water drainage network shown on the proposed drainage layout plan included in *Appendix G* has been simulated for the 1 in 2 year, 1 in 30 year and 1 in 100 year storm return periods with climate change also applied to the 100 year storm return period. The simulation results are included in *Appendix H*, while Table 3 below

summarises the analysed peak discharge rates for each storm event and compares these to the peak discharge rates determined in the existing situation.

Table 3: Comparison of Discharge Rates & Volumes

Return Period	Pre-development		Post-development		
	Peak Runoff Rate (l/s)	6hr Runoff Volume (m ³)	Peak Runoff Rate (l/s)	6hr Runoff Volume (m ³)	Post Development Peak Discharge Rate as % of Pre-Development Peak Discharge Rate
2	11.4	62.8	6.6	57.1	57.9%
30	19.0	104.7	10.8	94.4	56.8%
100	22.8	125.5	13.4	113.6	58.8%
100+40%	22.8	125.5	15.3	159.2	67.1%

- 6.16 The above table confirms that the surface water drainage scheme would comply with Standard S2 of the Consultation Document as a reduction to less than 70% of the existing peak system discharge rate would be achieved. Furthermore, the post-development site would discharge less volume of water to the ditch in comparison to the existing situation for all return periods with the exception of future climate change.
- 6.17 The simulation results included in *Appendix H* confirm that there would be no surface water flooding during any of the modelled events up to and including a 1 in 100 year event with a 40% allowance for climate change.
- 6.18 In the event of exceedance of the SuDS system's capacity, the detention basin is designed with a 300mm freeboard, which would provide approximately 19m³ of additional storage capacity. Any residual surface water channelled off-site over the western boundary towards the drainage ditch as shown on the proposed drainage layout plan included in *Appendix G*. The finished floor level of the extension is raised above surrounding car park levels so there would no risk of the building being affected by such overland flows.

Standard S3 - Water Quality

- 6.19 Standard S3 advises that 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. Where possible, surface water runoff should be managed using interception, sedimentation, and treatment components close to its source, which could be fulfilled by filter drains, rain gardens and a detention basin as part of the SuDS management train, as illustrated in *Figure 11* below.

SuDS component	Interception ⁽¹⁾	Close to source/Primary Treatment	Secondary Treatment:	Tertiary Treatment:
Rainwater harvesting	Y			
Filter strip	Y	Y		
Swale	Y	Y	Y	
Filter trench	Y		Y	
Permeable pavement	Y	Y		
Bioretention	Y	Y	Y	
Green roof	Y	Y		
Detention basin	Y	Y	Y	
Pond		Y ⁽²⁾	Y	Y
Wetland		Y ⁽²⁾	Y	Y
Infiltration system (soakaways/trenches/blankets/basins)	Y	Y	Y	Y
Proprietary treatment systems, including catchpits and gullies		Y ⁽³⁾	Y ⁽³⁾	Y ⁽³⁾

Figure 11: Indicative suitability of SuDS components within a management train

6.20 The Standard sets out requirements for treatment of runoff from different land use types and identifies surface water runoff from non-residential roofs to be a low pollution hazard level as shown in *Figure 12* below.

Land Use	Pollution Hazard Level	Requirements for discharge to surface waters, including coasts and estuaries	Requirements for discharge to groundwater
Residential roofs	Very Low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, homezones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple Index Approach (1) Note: Additional measures may be required for discharges to protected resources (2)	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple Index Approach (1) Note: Additional measures may be required for discharges to protected resources (2)	Simple Index Approach (1) Note: Additional measures may be required for discharges to protected resources (2) Risk Screening (3) must be undertaken first to determine whether consultation with Natural Resources Wales is required.
Trunk roads and motorways	High	Follow the guidance and risk assessment process set out in HD45/09 (Highways Agency, 2014)	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, manufactured, stored, or	High	Discharges may require an environmental licence or permit. Secure pre-permitting advice first from Natural Resources Wales. Risk assessment is likely to be required.(4)	

Figure 12: Treatment requirements and design strategies for discharges of surface water runoff to surface waters, from different land use types.

6.21 *Figure 12* identifies it to be suitable to use the Simple Index Approach set out in the CIRIA C753 SuDS Manual 2015 for the assessment of appropriate levels of treatment to surface water runoff using SuDS for residential development.

6.22 *Table 4* below identifies that the proposed SuDS components would have a total pollution mitigation index equal to or exceeding the recommended pollution hazard index using the Simple Index Approach thus confirming the SuDS components could provide suitable treatment to surface water runoff from the development.

Table 4: Pollution Mitigation Assessment

Use	Pollution Hazard Index			SUDS Component	Mitigation Index		
	TSS	Metals	TPH		TSS	Metals	TPH
Commercial Roof	0.3	0.2	0.05	Rain Garden	0.5	0.6	0.6
				Filter Drain	0.4	0.4	0.4
				Detention Basin	0.25	0.25	0.3
Total	0.3	0.2	0.05	Total (min)	0.5	0.6	0.6

- 6.23 In line with CIRIA C753 guidance, the mitigation indices for the detention basin have been halved as a result of reduced inflow concentrations within the surface water runoff passing through rain gardens and filter drains upstream.
- 6.24 All surface water runoff also passes through an existing by-pass separator downstream of the flow control chamber which currently provides treatment of existing car park runoff and will further enhance treatment of the new flows generated by the extension.
- 6.25 The area draining from the car park will be reduced by 39% from 1,122m² down to 687m² as part of the development. As well as passing through the existing petrol interceptor, surface water runoff from the car park will also be diverted through a filter drain running beneath a rain garden to the east of the hotel extension. On this basis, it is considered that the risk of pollution from the existing car park would be reduced as a result of the development.

Standards S4 & S5 - Amenity & Biodiversity

- 6.26 Standard S4 advises that the design of the surface water management system should maximise amenity benefits, while Standard S5 advises that the design of the surface water management systems should maximise biodiversity benefits.
- 6.27 The proposed development could maximise the opportunity for biodiversity and amenity benefits through the creation of new areas of landscaping, as well as using SuDS for managing surface water runoff from the development in the form of a detention basin and rain gardens.

Standard S6 – Design of drainage for Construction, Operation and Maintenance and Structural Integrity

- 6.28 Standard S6 deals with designing robust surface water drainage systems so they can be easily and safely constructed, maintained, and operated, taking account of the need to minimise negative impacts on the environment and natural resources.
- 6.29 An implementation, management and maintenance plan has been included in *Appendix I* of this report to address the requirements of Standard S6.

7. FOUL WATER DRAINAGE STRATEGY

- 7.1 This section of the report outlines an approach for the disposal and management of foul water runoff from the development.
- 7.2 As reported in *Section 2* of this report, foul water generated by the existing hotel is drained by a traditional network of below ground pipework which discharges to a Welsh Water combined sewer to the north of the development via a private foul water pumping station located to the east of the hotel building.
- 7.3 A foul water drainage strategy has been developed for the scheme and is shown on the drainage strategy drawing included in *Appendix G*. In summary, the extension would be provided with a new foul water drainage system comprising of a traditional gravity network of below ground pipework. This would discharge to the existing 150mm dia. private foul water drainage network on site upstream of the private pumping station.
- 7.4 A CCTV survey of the existing pumping station has confirmed that the diameter of the wet well is 3m. As the anticipated daily inflow will be 12.2m³ and the capacity below the invert level of the upstream manhole is 17.2m³, there will not be any requirement to increase the capacity of the wet well to accommodate the hotel extension.
- 7.5 It is anticipated that the peak flow rate will not be increased as a result of the development subject to a detailed survey to be undertaken following receipt of any planning permission. Should it be deemed necessary to upgrade it following a survey of the pumping station, Welsh Water will be consulted to ensure there are no detrimental impacts on their public sewer network resulting from any additional flows.
- 7.6 On occupation of the development, it is recommended that the as-built drainage system is maintained by Premier Inn Hotels Ltd.'s appointed management company in accordance with the regime set out in the table below.

Table 3: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / silt in catchpits and dispose of oils / petrol residues using safe standard practices.	As required.
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	

Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

8. SUMMARY & CONCLUSIONS

- 8.1 Natural Resources Wales's (NRW's) Risk of Fluvial / Tidal Flooding map shows the site to be located in Flood Zone 1, which is a land assessed to not be at risk of fluvial flooding. The proposed extension is also shown to lie within an area of the development at a low risk of surface water flooding and is considered to be at low risk of flooding from all other sources in the SFCA. However, new development can increase the volume and rate at which surface water runoff is discharged from a site when compared to the existing situation, which can cause an increase in flood risk both on the site and elsewhere within the catchment.
- 8.2 The development comprises a small extension to the existing building. Given the scale of development proposed, substantial alterations to the site's existing surface water drainage system could not be justified, and it would not be considered practicable to limit flows from the existing site to the greenfield 1 in 100 year peak runoff rate. Therefore, it is proposed to introduce a flow control chamber to the existing surface water drainage system with a new detention basin and below ground attenuation tank provided upstream, which would provide the dual function of draining runoff from the extension as well as storing and attenuating excess runoff associated with extreme storm events.
- 8.3 Roof water from the proposed extension will be captured by a combination of rainwater gutters and downpipes that would discharge directly into rain gardens or filter drains upstream of a connection to a detention basin. The basin would allow runoff to pass through the base into the geocellular attenuation tank.
- 8.4 The surface water drainage proposals would reduce peak discharge rates from the site to less than 70% of the existing peak system discharge rate. In the event that the capacity of the surface water drainage network was exceeded, surface water would be channelled off-site in a westerly direction towards the drainage ditch. The finished floor level of the extension is raised above surrounding car park levels so there would be no risk of buildings being affected by such overland flows.
- 8.5 The proposed surface water drainage scheme can be easily and safely constructed, maintained and operated ensuring the site and areas downstream would not be affected by surface water runoff during construction as well as ensuring there would be no significant reduction in its performance over the lifetime of the development.
- 8.6 The proposed extension would be provided with a new foul water drainage system comprising of a traditional gravity network of below ground pipework that would discharge to the existing private foul water network serving the hotel. The existing hotel is served by a private foul water pumping station will have capacity to accommodate foul flows from the new development.
- 8.7 In terms of flood risk and drainage strategy, it is concluded that the development can be occupied and operated safely and that there will be no increase in the level of flood risk to the site or neighbouring sites thus fulfilling the aims of national and local planning policy.

APPENDIX A
TOPOGRAPHICAL SURVEY

APPENDIX B
WELSH WATER SEWER RECORDS

APPENDIX C
PROPOSED SITE PLAN & FLOOR PLANS



1 Proposed Site Plan
Scale: 1:500

G	13/08/25	Plant room and external compound amendments	IB	RW
F	11/06/25	Updates to reorientate extension	SB	RW
E	27/05/25	Parking spaces updated	SC	
Rev	Date	Description	By	Chk

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Drawing
PROPOSED SITE PLAN

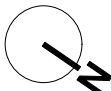
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Drawing No. 6153-PL 011	Revision G	Status PLANNING	

Ecological enhancements:

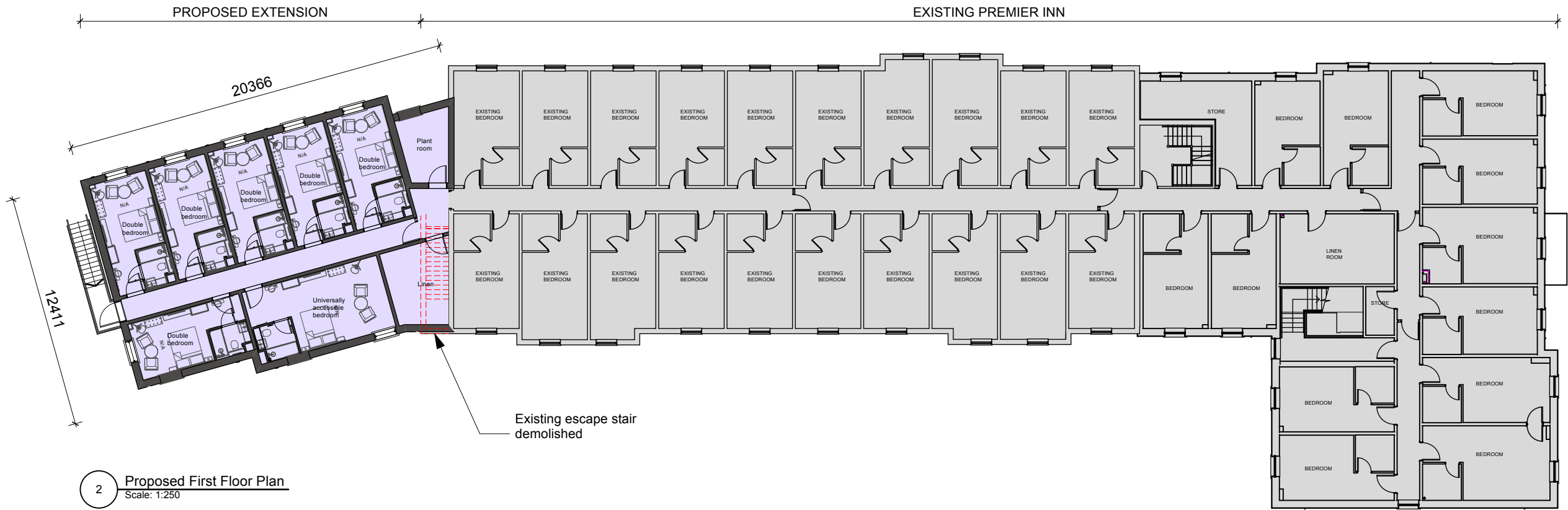
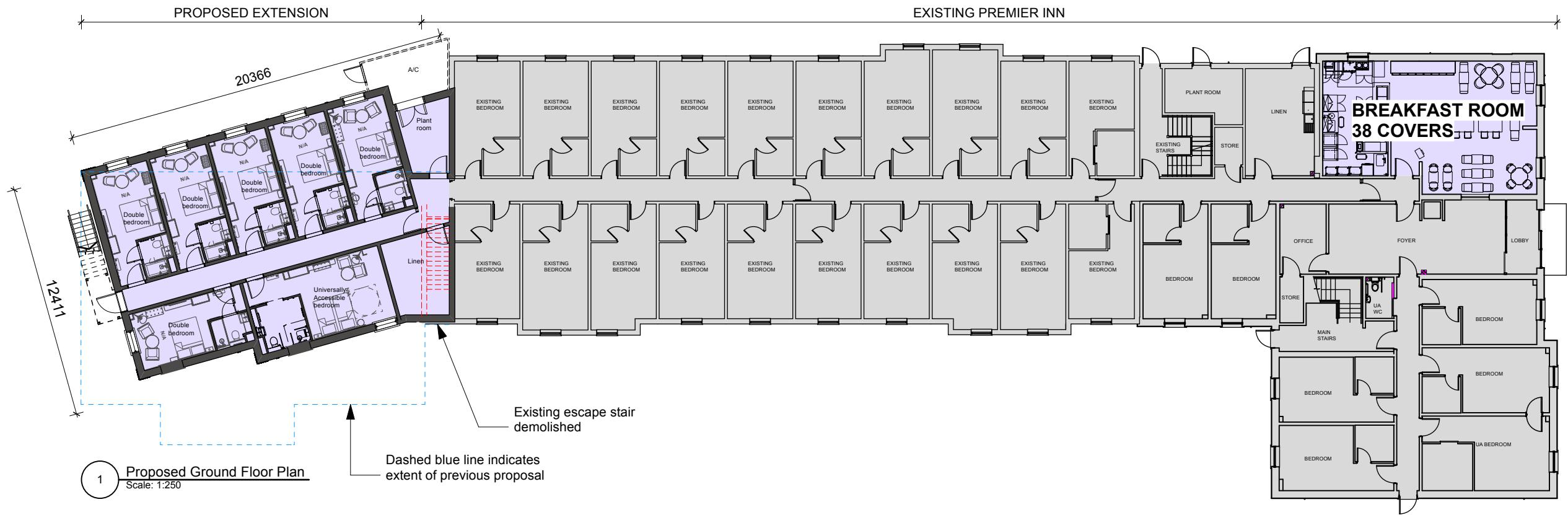
- Hedgehog house
- Hibernacula
- Insect house

Notes:

Proposed Parking:	97
Proposed Hotel:	GEA - 2482m ² GIA - 2328m ²
Net Additional Rooms:	13
Total Rooms:	75



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C	13/08/25	Plant room and external compound amendments	IB	RW
B	11/06/25	Updates to reorientate extension	SB	RW
A	27/01/25	Extension rotated, bedrooms removed to reduce massing;		RW
Rev	Date	Description	By	

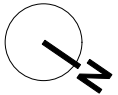
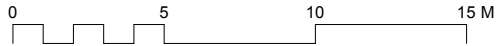
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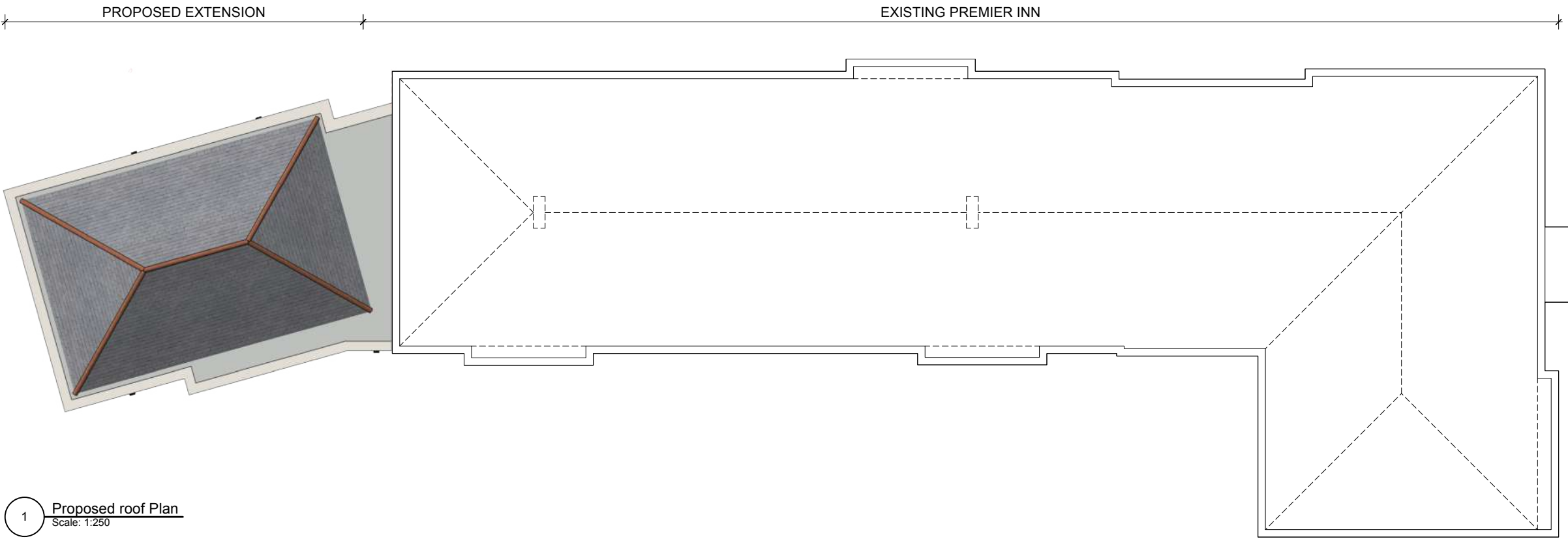
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Drawing
PROPOSED FLOOR PLANS

Scale	1:250	Date	16/05/24	Drawn	CF	Checked	PM
Drawing No.	6153-PL 110 C						Revision
Status	PLANNING						





1 Proposed roof Plan
Scale: 1:250

B	20/08/25	Plant room and external compound amendments	IB	RW
A	11/06/25	Updates to reorientate extension	SB	RW
Rev	Date	Description	By	Chk



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Drawing

PROPOSED ROOF PLAN

Scale

1:250

Drawing No.

6153-PL

Date

16/05/24

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PM

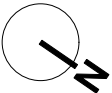
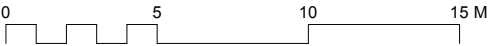
Status

PLANNING

Revision

111

B



APPENDIX D
GREENFIELD RUNOFF RATES & VOLUMES

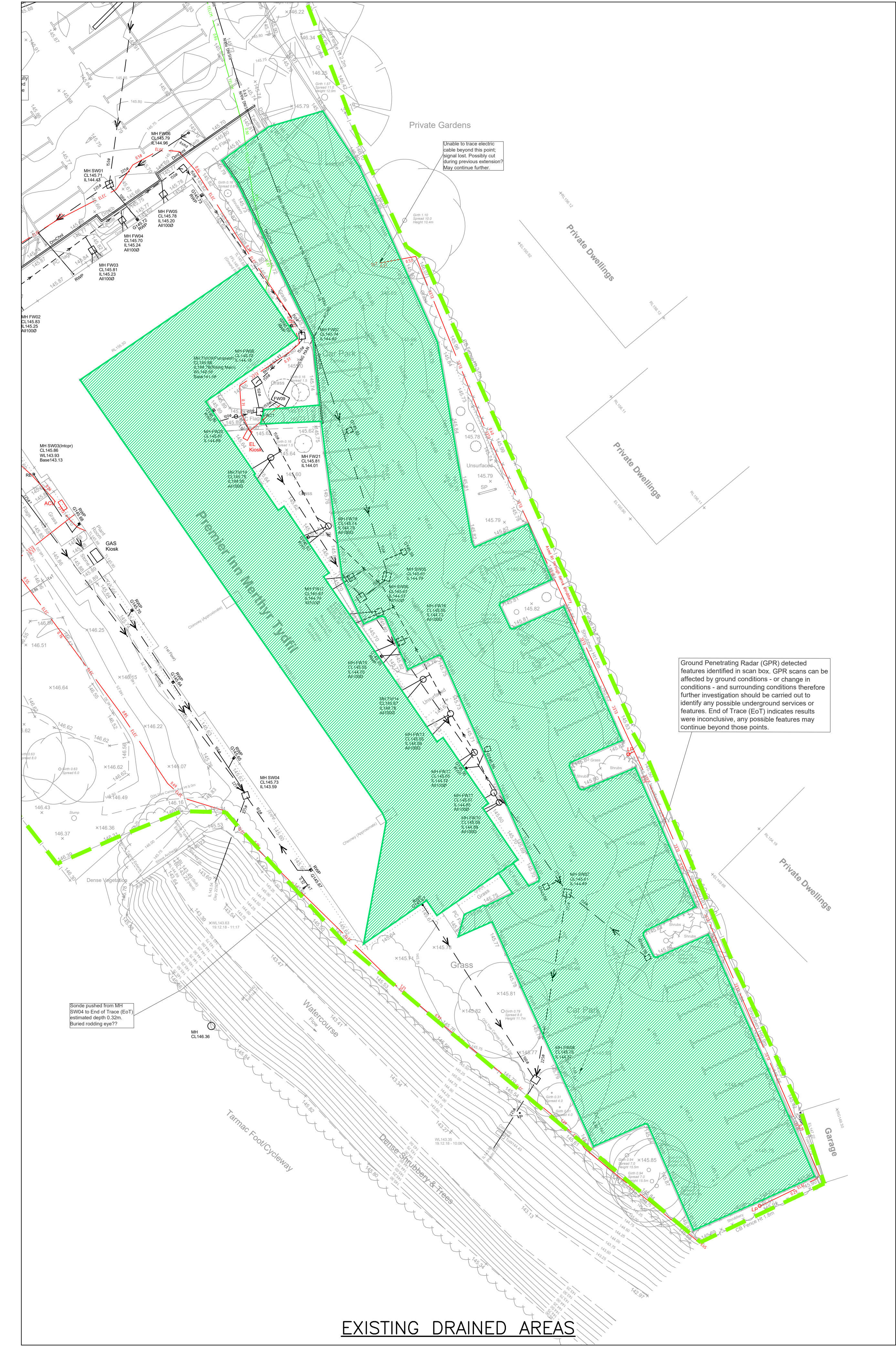
Simpson Associates		Page 1
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 08/05/2024 16:14 File	Designed by Louis.LeBellego Checked by	
Micro Drainage	Source Control 2019.1	
ReFH2 Rural Runoff Peak Flows Input Return Period (Years) 100 FEH Rainfall Version 2013 Site Location GB 306202 203750 SO 06202 03750 Data Type Point Season Summer Country England/Wales/Northern Ireland Area (ha) 0.142 SAAR (mm) 1518 BFIHOST 0.351 FARL 0.000 SPRHOST 0.000 URBEXT (2000) 0.0000 Results Return Period Rural Urban (Years) (l/s) (l/s) User 6.3 6.3 Q1 1.9 1.9 Q2 2.2 2.2 Q5 3.2 3.2 Q10 3.9 3.9 Q30 5.0 5.0 Q50 5.5 5.5 Q75 6.0 6.0 Q100 6.3 6.3 Q200 7.3 7.3 Q1000 10.9 10.9		
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Simpson Associates		Page 1																														
1 Market Place Mews Henley-on-Thames RG9 2AH																																
Date 08/05/2024 16:16 File	Designed by Louis.LeBellego Checked by																															
Micro Drainage Source Control 2019.1																																
ReFH2 Greenfield Runoff Volume Input <table><tr><td>Return Period (Years)</td><td>2</td></tr><tr><td>Storm Duration (min)</td><td>360</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td></tr><tr><td>Site Location</td><td>GB 306202 203750 SO 06202 03750</td></tr><tr><td>Data Type</td><td>Point</td></tr><tr><td>Season</td><td>Summer</td></tr><tr><td>Country</td><td>England/Wales/Northern Ireland</td></tr><tr><td>Area (ha)</td><td>0.142</td></tr><tr><td>SAAR (mm)</td><td>1518</td></tr><tr><td>BFIHOST</td><td>0.351</td></tr><tr><td>FARL</td><td>0.000</td></tr><tr><td>SPRHOST</td><td>0.000</td></tr><tr><td>URBEXT (2000)</td><td>0.0000</td></tr></table> Results <table><tr><td>Percentage Runoff (%)</td><td>58.02</td></tr><tr><td>Greenfield Runoff Volume (m³)</td><td>27.806</td></tr></table>			Return Period (Years)	2	Storm Duration (min)	360	FEH Rainfall Version	2013	Site Location	GB 306202 203750 SO 06202 03750	Data Type	Point	Season	Summer	Country	England/Wales/Northern Ireland	Area (ha)	0.142	SAAR (mm)	1518	BFIHOST	0.351	FARL	0.000	SPRHOST	0.000	URBEXT (2000)	0.0000	Percentage Runoff (%)	58.02	Greenfield Runoff Volume (m³)	27.806
Return Period (Years)	2																															
Storm Duration (min)	360																															
FEH Rainfall Version	2013																															
Site Location	GB 306202 203750 SO 06202 03750																															
Data Type	Point																															
Season	Summer																															
Country	England/Wales/Northern Ireland																															
Area (ha)	0.142																															
SAAR (mm)	1518																															
BFIHOST	0.351																															
FARL	0.000																															
SPRHOST	0.000																															
URBEXT (2000)	0.0000																															
Percentage Runoff (%)	58.02																															
Greenfield Runoff Volume (m³)	27.806																															
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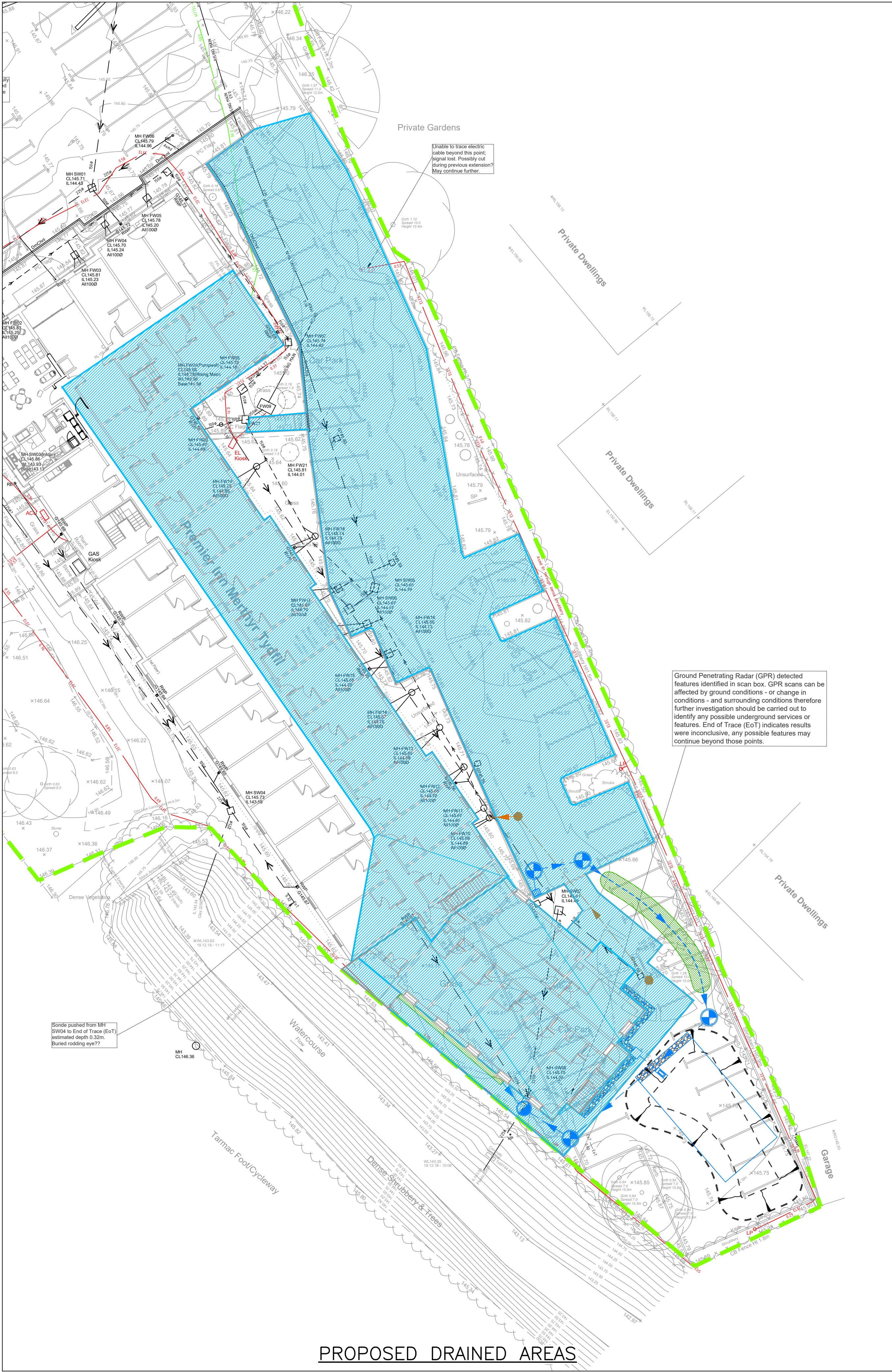
Simpson Associates		Page 1																														
1 Market Place Mews Henley-on-Thames RG9 2AH																																
Date 08/05/2024 16:15 File	Designed by Louis.LeBellego Checked by																															
Micro Drainage Source Control 2019.1																																
ReFH2 Greenfield Runoff Volume Input <table><tr><td>Return Period (Years)</td><td>30</td></tr><tr><td>Storm Duration (min)</td><td>360</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td></tr><tr><td>Site Location</td><td>GB 306202 203750 SO 06202 03750</td></tr><tr><td>Data Type</td><td>Point</td></tr><tr><td>Season</td><td>Summer</td></tr><tr><td>Country</td><td>England/Wales/Northern Ireland</td></tr><tr><td>Area (ha)</td><td>0.142</td></tr><tr><td>SAAR (mm)</td><td>1518</td></tr><tr><td>BFIHOST</td><td>0.351</td></tr><tr><td>FARL</td><td>0.000</td></tr><tr><td>SPRHOST</td><td>0.000</td></tr><tr><td>URBEXT (2000)</td><td>0.0000</td></tr></table> Results <table><tr><td>Percentage Runoff (%)</td><td>63.47</td></tr><tr><td>Greenfield Runoff Volume (m³)</td><td>55.125</td></tr></table>			Return Period (Years)	30	Storm Duration (min)	360	FEH Rainfall Version	2013	Site Location	GB 306202 203750 SO 06202 03750	Data Type	Point	Season	Summer	Country	England/Wales/Northern Ireland	Area (ha)	0.142	SAAR (mm)	1518	BFIHOST	0.351	FARL	0.000	SPRHOST	0.000	URBEXT (2000)	0.0000	Percentage Runoff (%)	63.47	Greenfield Runoff Volume (m³)	55.125
Return Period (Years)	30																															
Storm Duration (min)	360																															
FEH Rainfall Version	2013																															
Site Location	GB 306202 203750 SO 06202 03750																															
Data Type	Point																															
Season	Summer																															
Country	England/Wales/Northern Ireland																															
Area (ha)	0.142																															
SAAR (mm)	1518																															
BFIHOST	0.351																															
FARL	0.000																															
SPRHOST	0.000																															
URBEXT (2000)	0.0000																															
Percentage Runoff (%)	63.47																															
Greenfield Runoff Volume (m³)	55.125																															
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Simpson Associates		Page 1
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 08/05/2024 16:15 File	Designed by Louis.LeBellego Checked by	
Micro Drainage		Source Control 2019.1
ReFH2 Greenfield Runoff Volume Input Return Period (Years) Storm Duration (min) FEH Rainfall Version Site Location Data Type Season Country Area (ha) SAAR (mm) BFIHOST FARL SPRHOST URBEXT (2000) 100 360 2013 GB 306202 203750 SO 06202 03750 Point Summer England/Wales/Northern Ireland 0.142 1518 0.351 0.000 0.000 0.0000 Results Percentage Runoff (%) Greenfield Runoff Volume (m³) 65.88 68.555		
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APPENDIX E
DRAINED AREA PLAN



EXISTING DRAINED AREAS

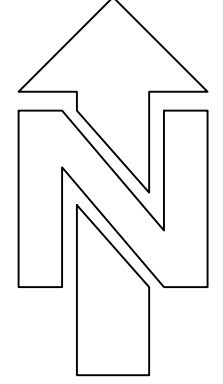


PROPOSED DRAINED AREAS

DRAINED AREAS LEGEND

- Extent of existing impermeable drained areas = 1,600m²
- Extent of new impermeable drained areas = 1,467m²

Reduction of impermeable drained areas = 113m²



P4	UPDATED TO LATEST SITE PLAN LAYOUT.	MW	29.08.25
P3	UPDATED TO LATEST SITE PLAN LAYOUT.	MW	11.07.25
P2	UPDATED TO LATEST SITE PLAN LAYOUT.	GPH	02.12.24
P1	ISSUED TO ACCOMPANY PLANNING APPLICATION.	GPH	13.05.24
MK	REVISION	BY	DATE

DRAWING STATUS

PRELIMINARY

DRAWING TITLE

DRAINED AREAS PLAN

PROJECT

MERTHYR TYDFIL
PREMIER INN
DUFFRYN ROAD
PENTREBACK, CF48 4BB



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London, Henley-on-Thames and Gloucester

Drawn	GPH	Chkd	AR	Scales	1:200 @ A1	Date	MAY 2024
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Purpose of Issue
PLANNING

Drawing Number	P24-0081-SK100	Revision	P4
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APPENDIX F
BROWNFIELD RUNOFF RATES & VOLUMES

P24-0081 - PI Merthyr Tydfil - Modified Rational Method Runoff Calculations (Pre Development)

Peak Runoff Rate = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{peak})

Runoff Volume = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{avg}) x Storm Duration

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)	Rainfall Data
2	1.00	25.648	6.543	0.160	11.4	62.8	FEH
30	1.00	42.752	10.906	0.160	19.0	104.7	FEH
100	1.00	51.245	13.073	0.160	22.8	125.5	FEH

P24-0081 - PI Merthyr Tydfil - Modified Rational Method Runoff Calculations (Post Development)

Peak Runoff Rate = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{peak})

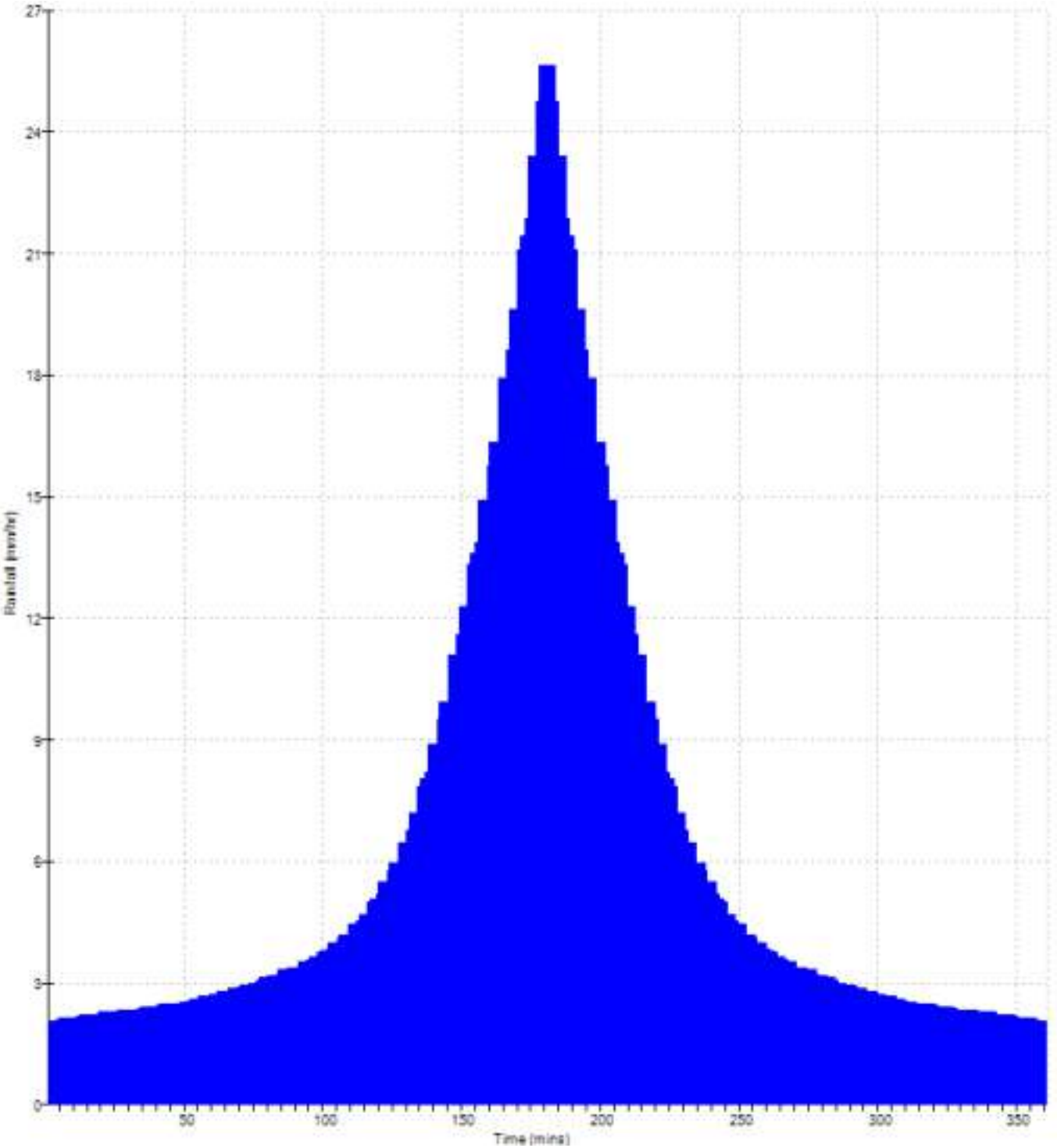
Runoff Volume = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{avg}) x Storm Duration

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)	Rainfall Data
2	1.00	25.648	6.543	0.149	10.6	58.5	FEH
30	1.00	42.752	10.906	0.149	17.7	97.5	FEH
100	1.00	51.245	13.073	0.149	21.2	116.9	FEH
100+40	1.00	71.743	18.302	0.149	29.7	163.6	FEH

Rainfall profile

Storm duration (mins) 360

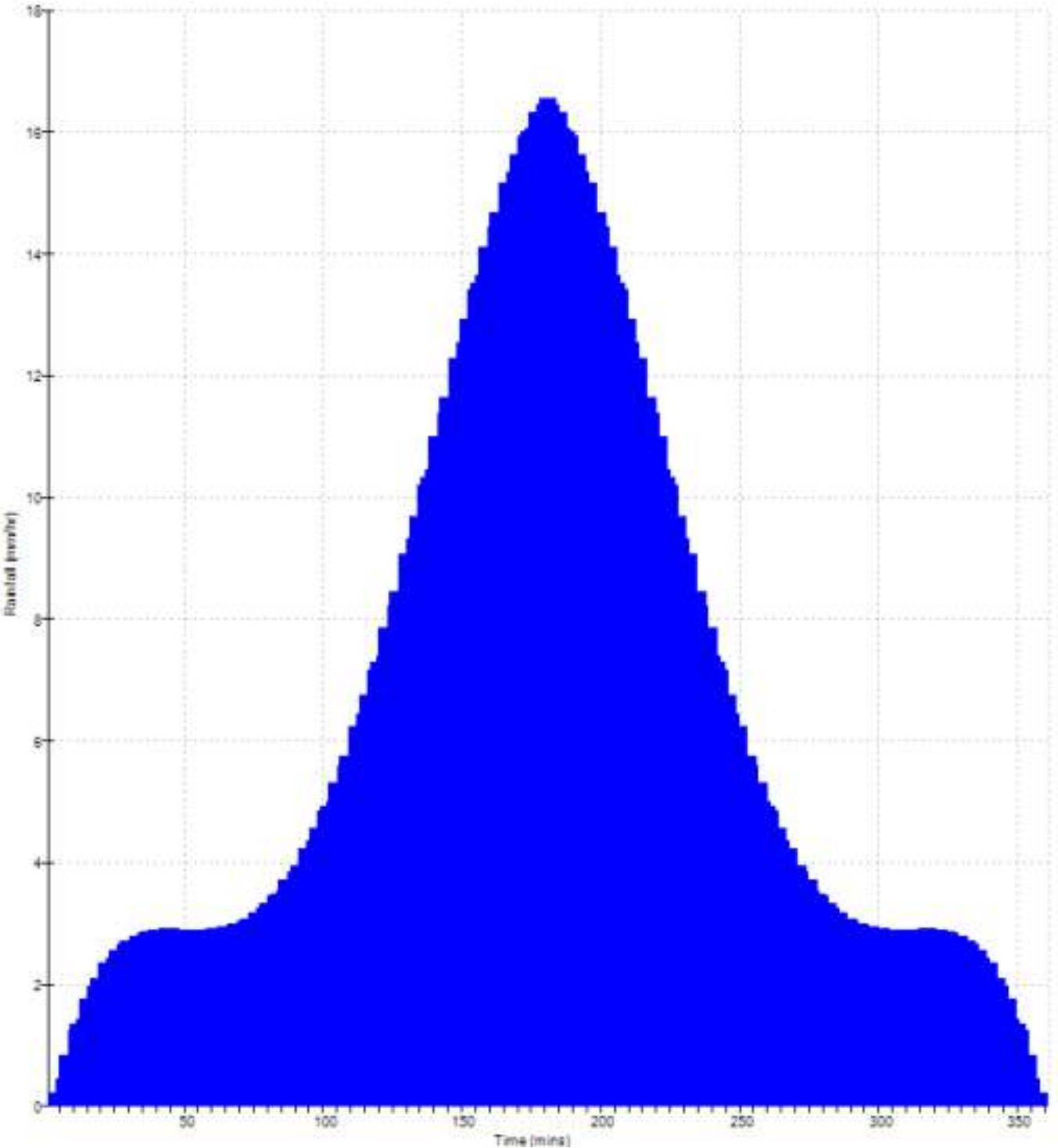
	FEH Data	
FEH Rainfall Version		2013
Site Location	GB 306202 203750 SO 06202 03750	
Data Type		Point
Peak Intensity (mm/hr)		25.648
Ave. Intensity (mm/hr)		6.543
Return Period (years)		2.0



Rainfall profile

Storm duration (mins) 360

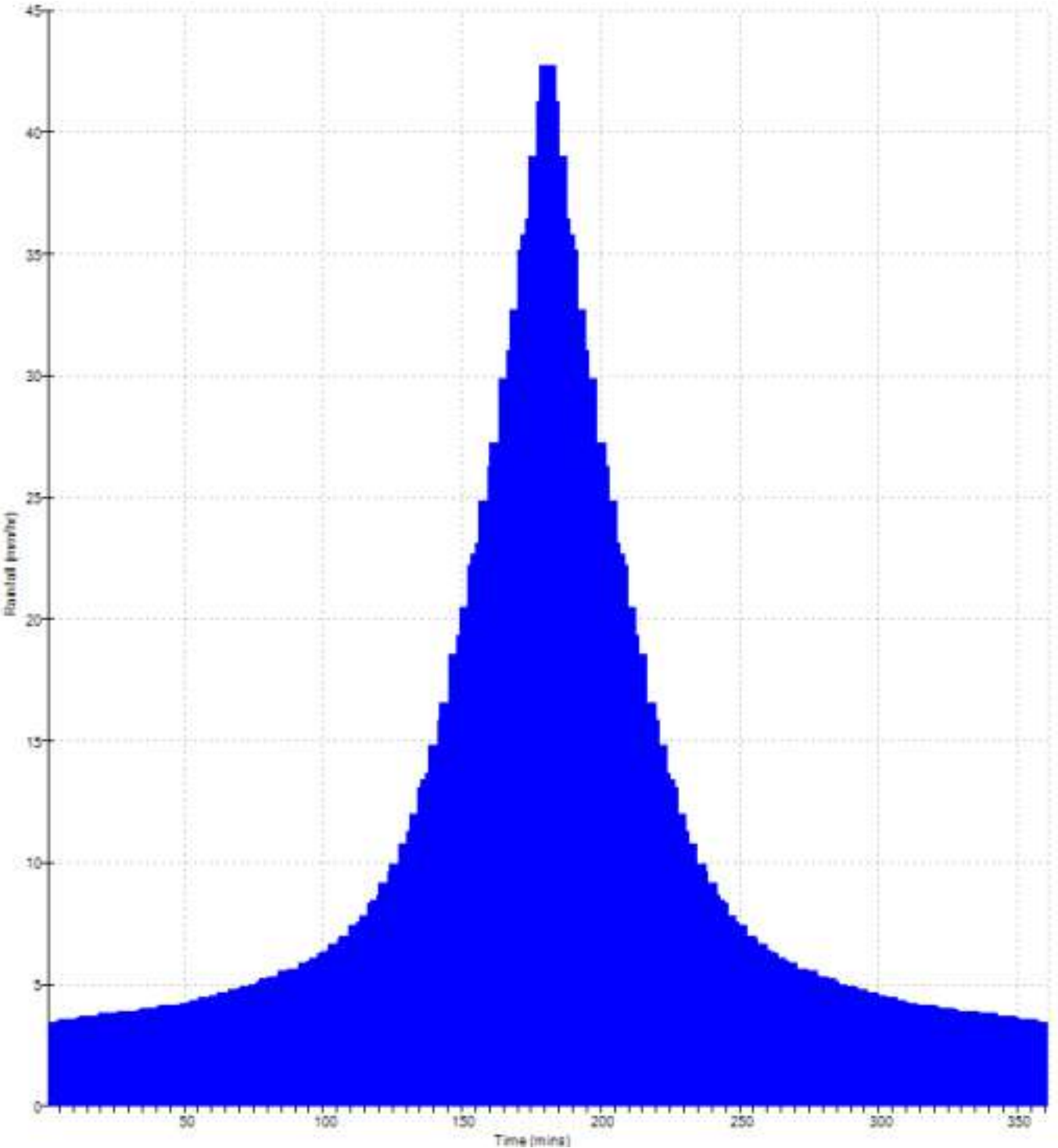
FEH Data	
FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Peak Intensity (mm/hr)	16.548
Ave. Intensity (mm/hr)	6.543
Return Period (years)	2.0



Rainfall profile

Storm duration (mins) 360

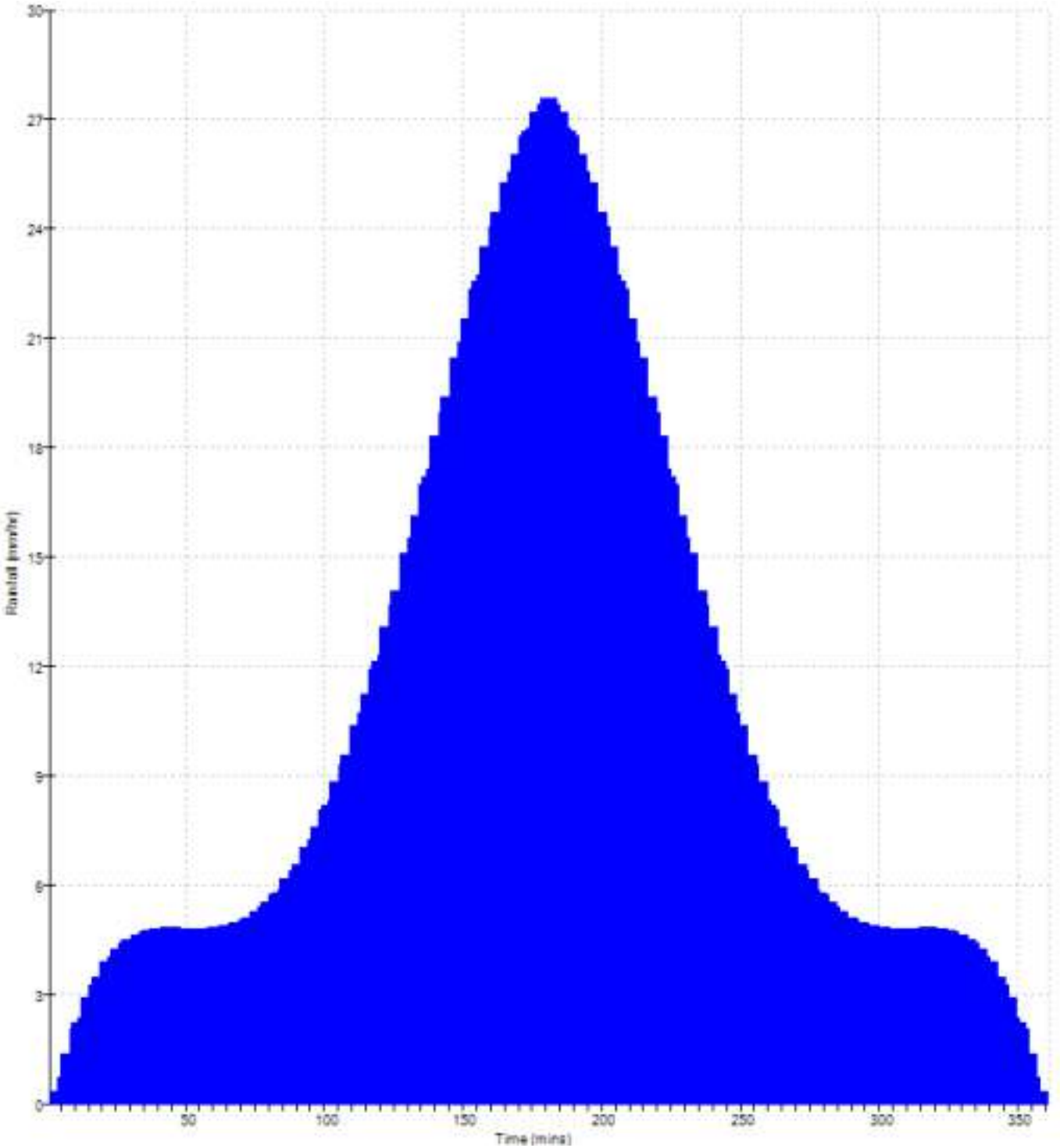
FEH Data	
FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Peak Intensity (mm/hr)	42.752
Ave. Intensity (mm/hr)	10.906
Return Period (years)	30.0



Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Peak Intensity (mm/hr)	27.583
Ave. Intensity (mm/hr)	10.906
Return Period (years)	30.0

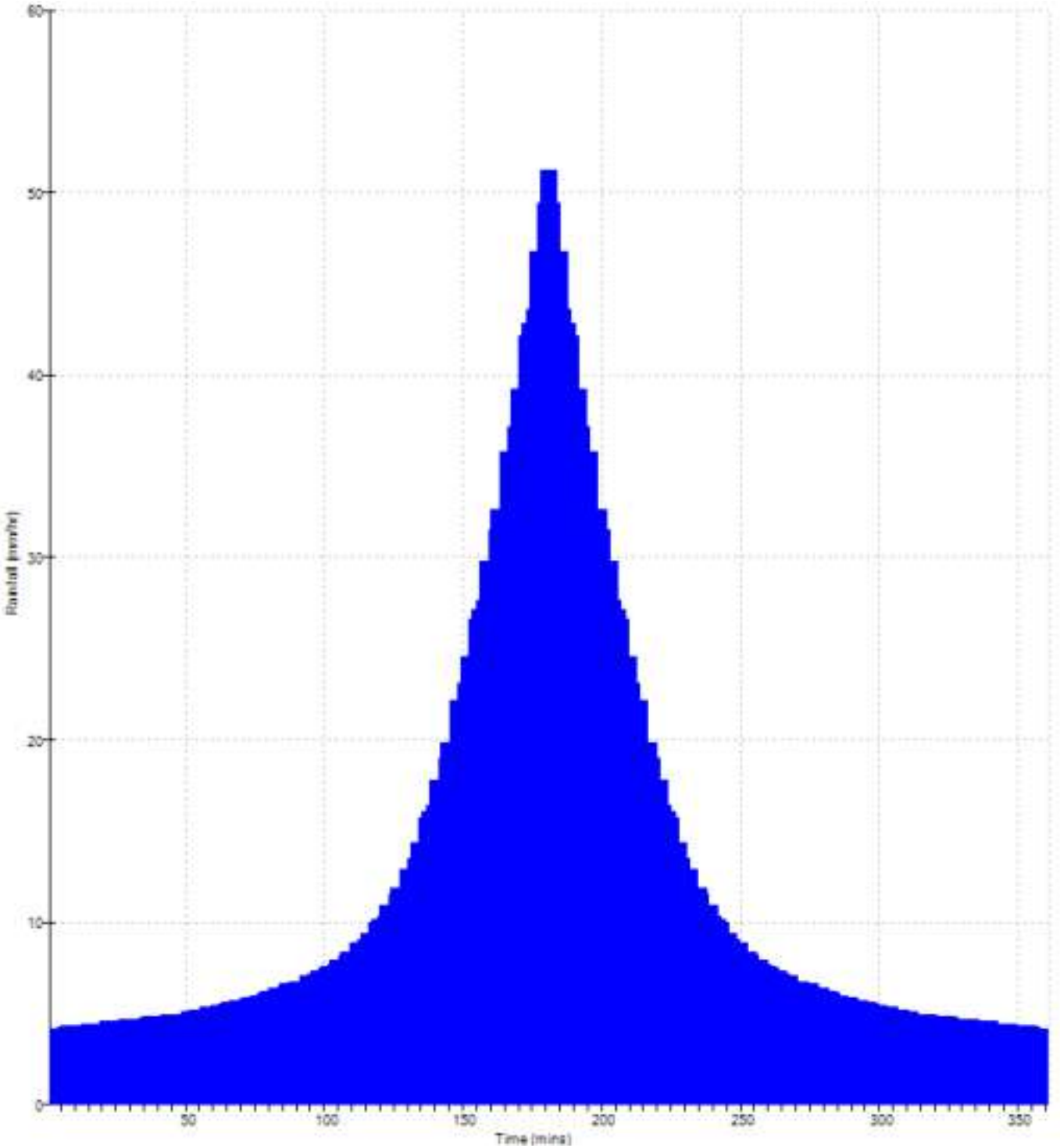


Rainfall profile

Storm duration (mins) 360

FEH Data

FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Peak Intensity (mm/hr)	51.245
Ave. Intensity (mm/hr)	13.073
Return Period (years)	100.0

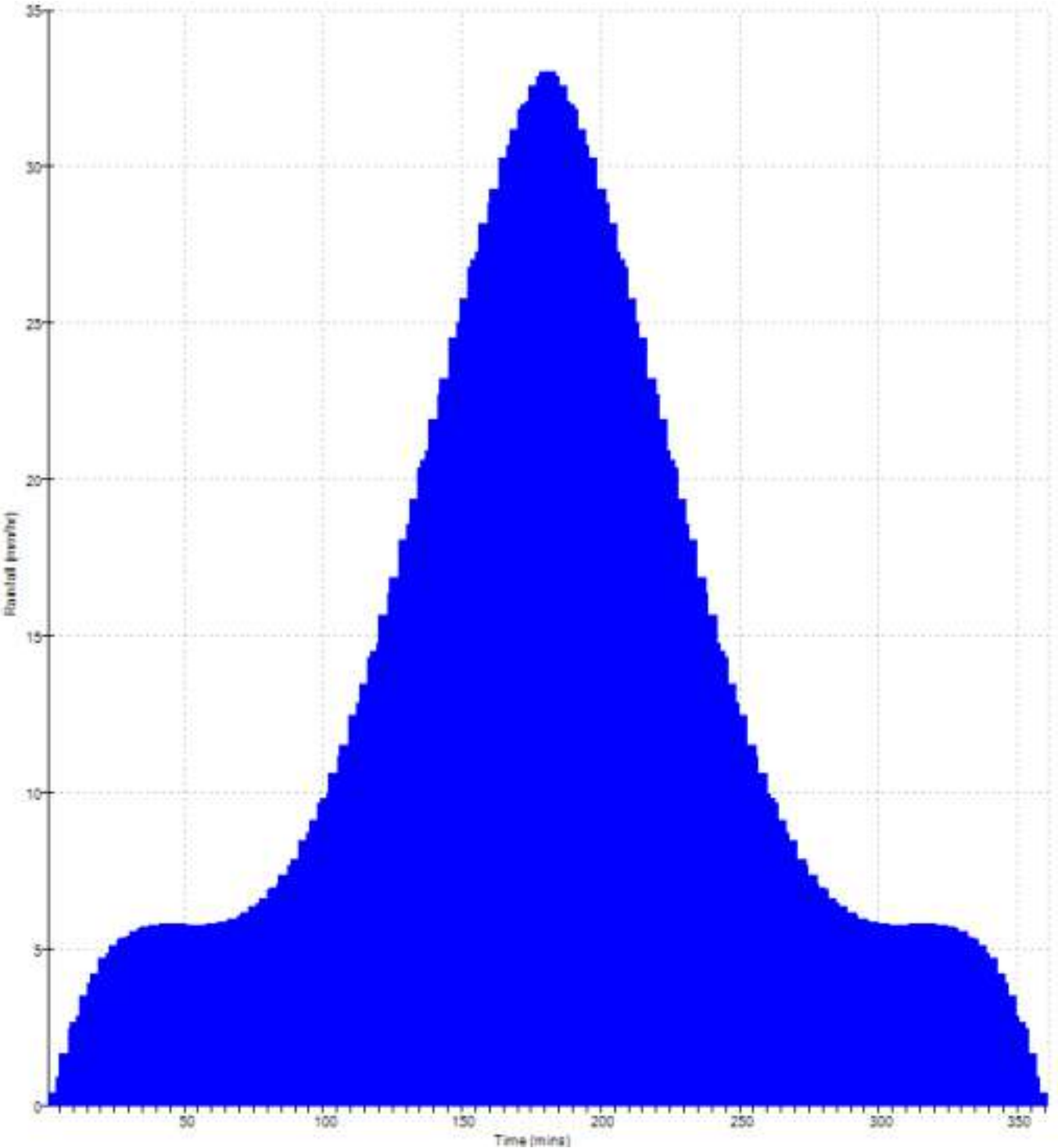


Rainfall profile

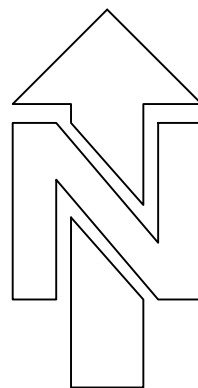
Storm duration (mins) 360

FEH Data

FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Peak Intensity (mm/hr)	33.062
Ave. Intensity (mm/hr)	13.073
Return Period (years)	100.0



APPENDIX G
DRAINAGE STRATEGY PLAN

DRAWING STATUS

PRELIMINARY

DRAWING TITLE

DRAINAGE STRATEGY
PLAN

PROJECT

MERTHYR TYDFIL
PREMIER INN
DUFFRYN ROAD
PENTREBACK, CF48 4BB



London, Henley-on-Thames and Gloucester

PURPOSE OF ISSUE

Drawing Number

P24-0081-SK101

Revision

P3

APPENDIX H
MICRODRAINAGE RESULTS

Simpson Associates		Page 1
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 04/09/2025 14:49 File P24-0081 SW NETWORK (POST CCT...	Designed by Matthew.Walsh Checked by	
Micro Drainage	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.114	4-8	0.035

Total Area Contributing (ha) = 0.149

Total Pipe Volume (m³) = 1.812

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	2.716	0.030	90.5	0.111	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	1.365	0.010	136.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	1.393	0.010	139.3	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	6.928	0.030	230.9	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	6.496	0.030	216.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	3.145	0.020	157.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	46.19	5.03	144.500	0.111	0.0	0.0	0.0	1.65	116.8	18.5
1.001	46.14	5.04	144.470	0.111	0.0	0.0	0.0	1.34	95.0	18.5
1.002	46.08	5.06	144.410	0.123	0.0	0.0	0.0	1.33	94.0	20.5
1.003	45.73	5.17	144.400	0.130	0.0	0.0	0.0	1.03	72.8	21.5
1.004	45.42	5.28	144.370	0.130	0.0	0.0	0.0	1.06	75.2	21.5
1.005	45.30	5.32	144.340	0.130	0.0	0.0	0.0	1.25	88.4	21.5

Simpson Associates		Page 2
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 04/09/2025 14:49 File P24-0081 SW NETWORK (POST CCT...	Designed by Matthew.Walsh Checked by	
Micro Drainage	Network 2019.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	2.069	0.015	137.9	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	5.460	0.400	13.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	46.15	5.04	144.420	0.019	0.0	0.0	0.0	0.85	15.1	3.2
1.006	45.22	5.34	144.330	0.149	0.0	0.0	0.0	3.56	141.6	24.3

Manhole Schedules for Storm											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
Catchpit	145.580	1.080	Open Manhole	1200	1.000	144.500	300				
Catchpit	145.650	1.180	Open Manhole	1200	1.001	144.470	300	1.000	144.470	300	
Rain Garden	145.750	1.340	Open Manhole	1200	1.002	144.410	300	1.001	144.460	300	50
Catchpit	145.750	1.350	Open Manhole	1200	1.003	144.400	300	1.002	144.400	300	
Basin / Tank	145.750	1.380	Open Manhole	1200	1.004	144.370	300	1.003	144.370	300	
Catchpit	145.750	1.410	Open Manhole	1200	1.005	144.340	300	1.004	144.340	300	
Rain Garden	145.750	1.330	Open Manhole	1200	2.000	144.420	150				
Flow Control	145.600	1.280	Open Manhole	1200	1.006	144.330	225	1.005	144.320	300	
								2.000	144.405	150	
	144.430	0.500	Open Manhole	0		OUTFALL		1.006	143.930	225	

No coordinates have been specified, layout information cannot be produced.

Simpson Associates		Page 4
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 04/09/2025 14:49	Designed by Matthew.Walsh	
File P24-0081 SW NETWORK (POST CCT...	Checked by	
Micro Drainage	Network 2019.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	Catchpit	145.580	144.500	0.780	Open Manhole	1200
1.001	o	300	Catchpit	145.650	144.470	0.880	Open Manhole	1200
1.002	o	300	Rain Garden	145.750	144.410	1.040	Open Manhole	1200
1.003	o	300	Catchpit	145.750	144.400	1.050	Open Manhole	1200
1.004	o	300	Basin / Tank	145.750	144.370	1.080	Open Manhole	1200
1.005	o	300	Catchpit	145.750	144.340	1.110	Open Manhole	1200
2.000	o	150	Rain Garden	145.750	144.420	1.180	Open Manhole	1200
1.006	o	225	Flow Control	145.600	144.330	1.045	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	2.716	90.5	Catchpit	145.650	144.470	0.880	Open Manhole	1200
1.001	1.365	136.5	Rain Garden	145.750	144.460	0.990	Open Manhole	1200
1.002	1.393	139.3	Catchpit	145.750	144.400	1.050	Open Manhole	1200
1.003	6.928	230.9	Basin / Tank	145.750	144.370	1.080	Open Manhole	1200
1.004	6.496	216.5	Catchpit	145.750	144.340	1.110	Open Manhole	1200
1.005	3.145	157.3	Flow Control	145.600	144.320	0.980	Open Manhole	1200
2.000	2.069	137.9	Flow Control	145.600	144.405	1.045	Open Manhole	1200
1.006	5.460	13.7		144.430	143.930	0.275	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		144.430	143.930	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	3
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
Return Period (years)	2	Summer Storms	Yes
FEH Rainfall Version	2013	Winter Storms	Yes
Site Location	GB 306202 203750 SO 06202 03750	Cv (Summer)	1.000

Simpson Associates		Page 5
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 04/09/2025 14:49 File P24-0081 SW NETWORK (POST CCT...	Designed by Matthew.Walsh Checked by	
Micro Drainage	Network 2019.1	

Synthetic Rainfall Details

Cv (Winter) 0.840 Storm Duration (mins) 30

Simpson Associates		Page 6
1 Market Place Mews Henley-on-Thames RG9 2AH		
Date 04/09/2025 14:49 File P24-0081 SW NETWORK (POST CCT...	Designed by Matthew.Walsh Checked by	
Micro Drainage	Network 2019.1	

Online Controls for Storm

Orifice Manhole: Flow Control, DS/PN: 1.006, Volume (m³): 1.6

Diameter (m) 0.084 Discharge Coefficient 0.600 Invert Level (m) 144.330

Storage Structures for Storm

Filter Drain Manhole: Rain Garden, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.300
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	144.410	Cap Volume Depth (m)	0.000
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	11.3		

Complex Manhole: Basin / Tank, DS/PN: 1.004

Cellular Storage

Invert Level (m)	144.370	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	57.8	57.8	0.400	57.8	70.6	0.401	0.0	70.6

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.300
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	144.370	Cap Volume Depth (m)	0.400
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	5.5		

Tank or Pond

Invert Level (m) 145.150

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	44.6	0.600	115.0

Complex Manhole: Rain Garden, DS/PN: 2.000

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	145.100	Cap Volume Depth (m)	0.300
Trench Width (m)	0.5	Cap Infiltration Depth (m)	0.000
Trench Length (m)	15.0		

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1 Market Place Mews Henley-on-Thames RG9 2AH		
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Micro Drainage	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	Catchpit	15 Summer	2	+0%	30/30 Summer				144.613	-0.187
1.001	Catchpit	15 Summer	2	+0%	30/60 Summer				144.589	-0.181
1.002	Rain Garden	180 Summer	2	+0%	30/30 Summer				144.579	-0.131
1.003	Catchpit	180 Summer	2	+0%	30/30 Summer				144.578	-0.122
1.004	Basin / Tank	180 Summer	2	+0%	30/30 Summer				144.575	-0.095
1.005	Catchpit	180 Summer	2	+0%	30/30 Summer				144.572	-0.068
2.000	Rain Garden	180 Summer	2	+0%	2/180 Summer				144.572	0.002
1.006	Flow Control	240 Summer	2	+0%	2/120 Summer				144.571	0.016

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	Catchpit	0.000	0.30		18.5	OK	
1.001	Catchpit	0.000	0.33		18.4	OK	
1.002	Rain Garden	0.000	0.20		11.3	OK	
1.003	Catchpit	0.000	0.22		11.8	OK	
1.004	Basin / Tank	0.000	0.11		6.1	OK	
1.005	Catchpit	0.000	0.12		5.9	OK	
2.000	Rain Garden	0.000	0.15		1.7	SURCHARGED	
1.006	Flow Control	0.000	0.07		6.6	SURCHARGED	

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1 Market Place Mews Henley-on-Thames RG9 2AH		
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Micro Drainage	Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	Catchpit	120 Summer	30	+0%	30/30 Summer				144.931	0.131
1.001	Catchpit	120 Summer	30	+0%	30/60 Summer				144.929	0.159
1.002	Rain Garden	120 Summer	30	+0%	30/30 Summer				144.928	0.218
1.003	Catchpit	120 Summer	30	+0%	30/30 Summer				144.926	0.226
1.004	Basin / Tank	120 Summer	30	+0%	30/30 Summer				144.921	0.251
1.005	Catchpit	120 Summer	30	+0%	30/30 Summer				144.917	0.277
2.000	Rain Garden	120 Summer	30	+0%	2/180 Summer				144.916	0.346
1.006	Flow Control	120 Summer	30	+0%	2/120 Summer				144.914	0.359

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	Catchpit	0.000	0.37		22.5	SURCHARGED	
1.001	Catchpit	0.000	0.39		21.8	SURCHARGED	
1.002	Rain Garden	0.000	0.40		22.5	SURCHARGED	
1.003	Catchpit	0.000	0.45		23.5	SURCHARGED	
1.004	Basin / Tank	0.000	0.20		10.6	SURCHARGED	
1.005	Catchpit	0.000	0.19		9.5	SURCHARGED	
2.000	Rain Garden	0.000	0.35		3.8	SURCHARGED	
1.006	Flow Control	0.000	0.12		10.8	SURCHARGED	

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Micro Drainage	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	Catchpit	60 Summer	100	+0%	30/30 Summer				145.243	0.443
1.001	Catchpit	120 Summer	100	+0%	30/60 Summer				145.229	0.459
1.002	Rain Garden	120 Summer	100	+0%	30/30 Summer				145.228	0.518
1.003	Catchpit	120 Summer	100	+0%	30/30 Summer				145.226	0.526
1.004	Basin / Tank	120 Summer	100	+0%	30/30 Summer				145.220	0.550
1.005	Catchpit	120 Summer	100	+0%	30/30 Summer				145.218	0.578
2.000	Rain Garden	120 Summer	100	+0%	2/180 Summer				145.209	0.639
1.006	Flow Control	120 Summer	100	+0%	2/120 Summer				145.217	0.662

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	Catchpit	0.000	0.64	39.3	SURCHARGED	
1.001	Catchpit	0.000	0.48	27.1	SURCHARGED	
1.002	Rain Garden	0.000	0.52	29.1	SURCHARGED	
1.003	Catchpit	0.000	0.57	30.1	SURCHARGED	
1.004	Basin / Tank	0.000	0.39	20.8	SURCHARGED	
1.005	Catchpit	0.000	0.30	15.3	SURCHARGED	
2.000	Rain Garden	0.000	0.44	4.7	SURCHARGED	
1.006	Flow Control	0.000	0.15	13.4	SURCHARGED	

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1 Market Place Mews Henley-on-Thames RG9 2AH		
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Micro Drainage	Network 2019.1	

Summary Wizard of 360 minute 2 year Summer I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Discharge Vol (m³)
1.000	Catchpit	360 minute 2 year Summer I+0%	145.580	144.571	-0.229	0.000	0.13		43.603
1.001	Catchpit	360 minute 2 year Summer I+0%	145.650	144.567	-0.203	0.000	0.14		43.567
1.002	Rain Garden	360 minute 2 year Summer I+0%	145.750	144.567	-0.143	0.000	0.15		48.245
1.003	Catchpit	360 minute 2 year Summer I+0%	145.750	144.566	-0.134	0.000	0.17		50.956
1.004	Basin / Tank	360 minute 2 year Summer I+0%	145.750	144.563	-0.107	0.000	0.11		50.940
1.005	Catchpit	360 minute 2 year Summer I+0%	145.750	144.565	-0.075	0.000	0.11		50.935
2.000	Rain Garden	360 minute 2 year Summer I+0%	145.750	144.563	-0.007	0.000	0.12		7.459
1.006	Flow Control	360 minute 2 year Summer I+0%	145.600	144.563	0.008	0.000	0.07		58.391

PN	US/MH Name	Pipe Flow (l/s)	Status
1.000	Catchpit	7.9	OK
1.001	Catchpit	7.9	OK
1.002	Rain Garden	8.4	OK
1.003	Catchpit	8.8	OK
1.004	Basin / Tank	6.1	OK
1.005	Catchpit	5.8	OK
2.000	Rain Garden	1.3	OK
1.006	Flow Control	6.4	SURCHARGED

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1 Market Place Mews Henley-on-Thames RG9 2AH		
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Micro Drainage	Network 2019.1	

Summary Wizard of 360 minute 30 year Summer I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow	
							Cap.	(l/s)
1.000	Catchpit	360 minute 30 year Summer I+0%	145.580	144.765	-0.035	0.000	0.21	
1.001	Catchpit	360 minute 30 year Summer I+0%	145.650	144.763	-0.007	0.000	0.22	
1.002	Rain Garden	360 minute 30 year Summer I+0%	145.750	144.760	0.050	0.000	0.23	
1.003	Catchpit	360 minute 30 year Summer I+0%	145.750	144.759	0.059	0.000	0.26	
1.004	Basin / Tank	360 minute 30 year Summer I+0%	145.750	144.755	0.085	0.000	0.17	
1.005	Catchpit	360 minute 30 year Summer I+0%	145.750	144.757	0.117	0.000	0.16	
2.000	Rain Garden	360 minute 30 year Summer I+0%	145.750	144.755	0.185	0.000	0.19	
1.006	Flow Control	360 minute 30 year Summer I+0%	145.600	144.757	0.202	0.000	0.10	

PN	US/MH Name	Discharge Vol (m³)	Pipe Flow	
			(l/s)	Status
1.000	Catchpit	72.649	12.6	OK
1.001	Catchpit	72.609	12.4	OK
1.002	Rain Garden	80.425	13.1	SURCHARGED
1.003	Catchpit	84.964	13.9	SURCHARGED
1.004	Basin / Tank	84.998	8.9	SURCHARGED
1.005	Catchpit	85.004	8.3	SURCHARGED
2.000	Rain Garden	12.440	2.1	SURCHARGED
1.006	Flow Control	97.444	9.0	SURCHARGED

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Summary Wizard of 360 minute 100 year Summer I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow	
							Cap.	(l/s)
1.000	Catchpit	360 minute 100 year Summer I+0%	145.580	145.088	0.288	0.000	0.25	
1.001	Catchpit	360 minute 100 year Summer I+0%	145.650	145.085	0.315	0.000	0.28	
1.002	Rain Garden	360 minute 100 year Summer I+0%	145.750	145.084	0.374	0.000	0.31	
1.003	Catchpit	360 minute 100 year Summer I+0%	145.750	145.082	0.382	0.000	0.34	
1.004	Basin / Tank	360 minute 100 year Summer I+0%	145.750	145.077	0.407	0.000	0.20	
1.005	Catchpit	360 minute 100 year Summer I+0%	145.750	145.072	0.432	0.000	0.21	
2.000	Rain Garden	360 minute 100 year Summer I+0%	145.750	145.070	0.500	0.000	0.23	
1.006	Flow Control	360 minute 100 year Summer I+0%	145.600	145.069	0.514	0.000	0.14	

PN	US/MH Name	Discharge Vol (m³)	Pipe Flow (l/s)	Status
1.000	Catchpit	87.068	15.6	SURCHARGED
1.001	Catchpit	87.037	15.6	SURCHARGED
1.002	Rain Garden	96.413	17.2	SURCHARGED
1.003	Catchpit	101.872	18.1	SURCHARGED
1.004	Basin / Tank	101.934	10.8	SURCHARGED
1.005	Catchpit	101.935	10.7	SURCHARGED
2.000	Rain Garden	14.904	2.5	SURCHARGED
1.006	Flow Control	116.820	12.3	SURCHARGED

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Summary Wizard of 360 minute 2 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Discharge Vol (m³)
1.000	Catchpit	360 minute 2 year Winter I+0%	145.580	144.558	-0.242	0.000	0.08		43.608
1.001	Catchpit	360 minute 2 year Winter I+0%	145.650	144.531	-0.239	0.000	0.09		43.578
1.002	Rain Garden	360 minute 2 year Winter I+0%	145.750	144.520	-0.190	0.000	0.10		48.269
1.003	Catchpit	360 minute 2 year Winter I+0%	145.750	144.519	-0.181	0.000	0.11		50.988
1.004	Basin / Tank	360 minute 2 year Winter I+0%	145.750	144.517	-0.153	0.000	0.10		50.999
1.005	Catchpit	360 minute 2 year Winter I+0%	145.750	144.515	-0.125	0.000	0.10		50.983
2.000	Rain Garden	360 minute 2 year Winter I+0%	145.750	144.516	-0.054	0.000	0.08		7.458
1.006	Flow Control	360 minute 2 year Winter I+0%	145.600	144.515	-0.040	0.000	0.06		58.406

PN	US/MH Name	Pipe Flow (l/s)	Status
1.000	Catchpit	5.1	OK
1.001	Catchpit	5.1	OK
1.002	Rain Garden	5.5	OK
1.003	Catchpit	5.8	OK
1.004	Basin / Tank	5.3	OK
1.005	Catchpit	5.0	OK
2.000	Rain Garden	0.9	OK
1.006	Flow Control	5.5	OK

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Micro Drainage	Network 2019.1	

Summary Wizard of 360 minute 30 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow	
							Cap.	(l/s)
1.000	Catchpit	360 minute 30 year Winter I+0%	145.580	144.691	-0.109	0.000	0.14	
1.001	Catchpit	360 minute 30 year Winter I+0%	145.650	144.689	-0.081	0.000	0.15	
1.002	Rain Garden	360 minute 30 year Winter I+0%	145.750	144.688	-0.022	0.000	0.16	
1.003	Catchpit	360 minute 30 year Winter I+0%	145.750	144.686	-0.014	0.000	0.18	
1.004	Basin / Tank	360 minute 30 year Winter I+0%	145.750	144.679	0.009	0.000	0.16	
1.005	Catchpit	360 minute 30 year Winter I+0%	145.750	144.682	0.042	0.000	0.15	
2.000	Rain Garden	360 minute 30 year Winter I+0%	145.750	144.680	0.110	0.000	0.13	
1.006	Flow Control	360 minute 30 year Winter I+0%	145.600	144.682	0.127	0.000	0.09	

PN	US/MH Name	Discharge Vol (m³)	Pipe Flow	
			(l/s)	Status
1.000	Catchpit	72.663	8.3	OK
1.001	Catchpit	72.633	8.2	OK
1.002	Rain Garden	80.463	8.8	OK
1.003	Catchpit	85.013	9.3	OK
1.004	Basin / Tank	85.068	8.5	SURCHARGED
1.005	Catchpit	85.069	7.6	SURCHARGED
2.000	Rain Garden	12.430	1.4	SURCHARGED
1.006	Flow Control	97.471	8.1	SURCHARGED

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Micro Drainage	Network 2019.1	

Summary Wizard of 360 minute 100 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow	
							Cap.	(l/s)
1.000	Catchpit	360 minute 100 year Winter I+0%	145.580	144.806	0.006	0.000	0.17	
1.001	Catchpit	360 minute 100 year Winter I+0%	145.650	144.804	0.034	0.000	0.18	
1.002	Rain Garden	360 minute 100 year Winter I+0%	145.750	144.802	0.092	0.000	0.20	
1.003	Catchpit	360 minute 100 year Winter I+0%	145.750	144.801	0.101	0.000	0.23	
1.004	Basin / Tank	360 minute 100 year Winter I+0%	145.750	144.797	0.127	0.000	0.16	
1.005	Catchpit	360 minute 100 year Winter I+0%	145.750	144.793	0.153	0.000	0.16	
2.000	Rain Garden	360 minute 100 year Winter I+0%	145.750	144.792	0.222	0.000	0.17	
1.006	Flow Control	360 minute 100 year Winter I+0%	145.600	144.791	0.236	0.000	0.11	

PN	US/MH Name	Discharge Vol (m³)	Pipe Flow (l/s)	Status
1.000	Catchpit	87.077	10.2	SURCHARGED
1.001	Catchpit	87.033	10.2	SURCHARGED
1.002	Rain Garden	96.395	11.2	SURCHARGED
1.003	Catchpit	101.853	11.8	SURCHARGED
1.004	Basin / Tank	101.920	8.8	SURCHARGED
1.005	Catchpit	101.929	8.4	SURCHARGED
2.000	Rain Garden	14.914	1.9	SURCHARGED
1.006	Flow Control	116.828	9.5	SURCHARGED

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 306202 203750 SO 06202 03750
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.114	4-8	0.035

Total Area Contributing (ha) = 0.149

Total Pipe Volume (m³) = 1.812

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	2.716	0.030	90.5	0.111	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	1.365	0.010	136.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	1.393	0.010	139.3	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	6.928	0.030	230.9	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	6.496	0.030	216.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	3.145	0.020	157.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	46.19	5.03	144.500	0.111	0.0	0.0	0.0	1.65	116.8	18.5
1.001	46.14	5.04	144.470	0.111	0.0	0.0	0.0	1.34	95.0	18.5
1.002	46.08	5.06	144.410	0.123	0.0	0.0	0.0	1.33	94.0	20.5
1.003	45.73	5.17	144.400	0.130	0.0	0.0	0.0	1.03	72.8	21.5
1.004	45.42	5.28	144.370	0.130	0.0	0.0	0.0	1.06	75.2	21.5
1.005	45.30	5.32	144.340	0.130	0.0	0.0	0.0	1.25	88.4	21.5

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	2.069	0.015	137.9	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	5.460	0.400	13.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	46.15	5.04	144.420	0.019	0.0	0.0	0.0	0.85	15.1	3.2
1.006	45.22	5.34	144.330	0.149	0.0	0.0	0.0	3.56	141.6	24.3

Manhole Schedules for Storm											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
Catchpit	145.580	1.080	Open Manhole	1200	1.000	144.500	300				
Catchpit	145.650	1.180	Open Manhole	1200	1.001	144.470	300	1.000	144.470	300	
Rain Garden	145.750	1.340	Open Manhole	1200	1.002	144.410	300	1.001	144.460	300	50
Catchpit	145.750	1.350	Open Manhole	1200	1.003	144.400	300	1.002	144.400	300	
Basin / Tank	145.750	1.380	Open Manhole	1200	1.004	144.370	300	1.003	144.370	300	
Catchpit	145.750	1.410	Open Manhole	1200	1.005	144.340	300	1.004	144.340	300	
Rain Garden	145.750	1.330	Open Manhole	1200	2.000	144.420	150				
Flow Control	145.600	1.280	Open Manhole	1200	1.006	144.330	225	1.005	144.320	300	
								2.000	144.405	150	
	144.430	0.500	Open Manhole	0		OUTFALL		1.006	143.930	225	

No coordinates have been specified, layout information cannot be produced.

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	Catchpit	145.580	144.500	0.780	Open Manhole	1200
1.001	o	300	Catchpit	145.650	144.470	0.880	Open Manhole	1200
1.002	o	300	Rain Garden	145.750	144.410	1.040	Open Manhole	1200
1.003	o	300	Catchpit	145.750	144.400	1.050	Open Manhole	1200
1.004	o	300	Basin / Tank	145.750	144.370	1.080	Open Manhole	1200
1.005	o	300	Catchpit	145.750	144.340	1.110	Open Manhole	1200
2.000	o	150	Rain Garden	145.750	144.420	1.180	Open Manhole	1200
1.006	o	225	Flow Control	145.600	144.330	1.045	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	2.716	90.5	Catchpit	145.650	144.470	0.880	Open Manhole	1200
1.001	1.365	136.5	Rain Garden	145.750	144.460	0.990	Open Manhole	1200
1.002	1.393	139.3	Catchpit	145.750	144.400	1.050	Open Manhole	1200
1.003	6.928	230.9	Basin / Tank	145.750	144.370	1.080	Open Manhole	1200
1.004	6.496	216.5	Catchpit	145.750	144.340	1.110	Open Manhole	1200
1.005	3.145	157.3	Flow Control	145.600	144.320	0.980	Open Manhole	1200
2.000	2.069	137.9	Flow Control	145.600	144.405	1.045	Open Manhole	1200
1.006	5.460	13.7		144.430	143.930	0.275	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		144.430	143.930	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	3
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
Return Period (years)	2	Summer Storms	Yes
FEH Rainfall Version	2013	Winter Storms	Yes
Site Location	GB 306202 203750 SO 06202 03750	Cv (Summer)	1.000

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Synthetic Rainfall Details

Cv (Winter) 0.840 Storm Duration (mins) 30

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Online Controls for Storm

Orifice Manhole: Flow Control, DS/PN: 1.006, Volume (m³): 1.6

Diameter (m) 0.084 Discharge Coefficient 0.600 Invert Level (m) 144.330

Storage Structures for Storm

Filter Drain Manhole: Rain Garden, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.300
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	144.410	Cap Volume Depth (m)	0.000
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	11.3		

Complex Manhole: Basin / Tank, DS/PN: 1.004

Cellular Storage

Invert Level (m)	144.370	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	57.8	57.8	0.400	57.8	70.6	0.401	0.0	70.6

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.300
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	144.370	Cap Volume Depth (m)	0.400
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	5.5		

Tank or Pond

Invert Level (m) 145.150

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	44.6	0.600	115.0

Complex Manhole: Rain Garden, DS/PN: 2.000

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	145.100	Cap Volume Depth (m)	0.300
Trench Width (m)	0.5	Cap Infiltration Depth (m)	0.000
Trench Length (m)	15.0		

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	Catchpit	120 Summer	100	+40%	100/15 Summer	100/60 Summer			145.581
1.001	Catchpit	60 Summer	100	+40%	100/15 Summer				145.574
1.002	Rain Garden	120 Summer	100	+40%	100/15 Summer				145.529
1.003	Catchpit	120 Summer	100	+40%	100/15 Summer				145.472
1.004	Basin / Tank	120 Summer	100	+40%	100/15 Summer				145.466
1.005	Catchpit	120 Summer	100	+40%	100/15 Summer				145.460
2.000	Rain Garden	120 Summer	100	+40%	100/15 Summer				145.457
1.006	Flow Control	120 Summer	100	+40%	100/15 Summer				145.456

PN	US/MH Name	Surcharged		Flooded		Pipe		Level	
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded	
1.000	Catchpit	0.781	1.481	0.66		40.6	FLOOD	5	
1.001	Catchpit	0.804	0.000	1.00		56.3	FLOOD RISK		
1.002	Rain Garden	0.819	0.000	0.75		42.4	FLOOD RISK		
1.003	Catchpit	0.772	0.000	0.85		44.8	FLOOD RISK		
1.004	Basin / Tank	0.796	0.000	0.43		22.8	FLOOD RISK		
1.005	Catchpit	0.820	0.000	0.38		19.2	FLOOD RISK		
2.000	Rain Garden	0.887	0.000	0.57		6.2	FLOOD RISK		
1.006	Flow Control	0.901	0.000	0.17		15.3	FLOOD RISK		

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Summary Wizard of 360 minute 100 year Summer I+40% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Event	US/CL (m)	Water Surcharged Flooded				
				Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)
1.000	Catchpit	360 minute 100 year Summer I+40%	145.580	145.389	0.589	0.000	0.35	
1.001	Catchpit	360 minute 100 year Summer I+40%	145.650	145.386	0.616	0.000	0.37	
1.002	Rain Garden	360 minute 100 year Summer I+40%	145.750	145.384	0.674	0.000	0.40	
1.003	Catchpit	360 minute 100 year Summer I+40%	145.750	145.382	0.682	0.000	0.45	
1.004	Basin / Tank	360 minute 100 year Summer I+40%	145.750	145.376	0.706	0.000	0.25	
1.005	Catchpit	360 minute 100 year Summer I+40%	145.750	145.369	0.729	0.000	0.26	
2.000	Rain Garden	360 minute 100 year Summer I+40%	145.750	145.368	0.798	0.000	0.30	
1.006	Flow Control	360 minute 100 year Summer I+40%	145.600	145.365	0.810	0.000	0.16	

PN	US/MH Name	Pipe		
		Discharge Vol (m³)	Flow (l/s)	Status
1.000	Catchpit	121.893	21.3	FLOOD RISK
1.001	Catchpit	121.862	21.0	FLOOD RISK
1.002	Rain Garden	135.014	22.7	SURCHARGED
1.003	Catchpit	142.672	23.8	SURCHARGED
1.004	Basin / Tank	142.694	13.6	SURCHARGED
1.005	Catchpit	142.657	13.2	SURCHARGED
2.000	Rain Garden	20.867	3.3	SURCHARGED
1.006	Flow Control	163.502	14.6	FLOOD RISK

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Summary Wizard of 360 minute 100 year Winter I+40% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 306202 203750 SO 06202 03750 Cv (Winter) 1.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Event	US/CL (m)	Water Surcharged Flooded				
				Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)
1.000	Catchpit	360 minute 100 year Winter I+40%	145.580	145.269	0.469	0.000	0.23	
1.001	Catchpit	360 minute 100 year Winter I+40%	145.650	145.267	0.497	0.000	0.24	
1.002	Rain Garden	360 minute 100 year Winter I+40%	145.750	145.265	0.555	0.000	0.27	
1.003	Catchpit	360 minute 100 year Winter I+40%	145.750	145.263	0.563	0.000	0.30	
1.004	Basin / Tank	360 minute 100 year Winter I+40%	145.750	145.257	0.587	0.000	0.24	
1.005	Catchpit	360 minute 100 year Winter I+40%	145.750	145.258	0.618	0.000	0.25	
2.000	Rain Garden	360 minute 100 year Winter I+40%	145.750	145.246	0.676	0.000	0.23	
1.006	Flow Control	360 minute 100 year Winter I+40%	145.600	145.256	0.701	0.000	0.15	

PN	US/MH Name	Pipe		
		Discharge Vol (m³)	Flow (l/s)	Status
1.000	Catchpit	121.882	13.9	SURCHARGED
1.001	Catchpit	121.850	13.8	SURCHARGED
1.002	Rain Garden	135.002	15.0	SURCHARGED
1.003	Catchpit	142.659	15.8	SURCHARGED
1.004	Basin / Tank	142.696	13.0	SURCHARGED
1.005	Catchpit	142.747	12.6	SURCHARGED
2.000	Rain Garden	20.851	2.5	SURCHARGED
1.006	Flow Control	163.582	13.7	SURCHARGED

APPENDIX I
IMPLEMENTATION, MANAGEMENT & MAINTENANCE PLAN

**DRAINAGE IMPLEMENTATION,
MANAGEMENT & MAINTENANCE PLAN**
*PREMIER INN MERTHYR TYDFIL
DUFFRYN ROAD
PENTREBACH
CF48 4BB*

PREPARED FOR:



JOB NO: P24-0081
DATE: 2nd December 2024
ISSUE NO: 1



DOCUMENT HISTORY

Issue No.	Description	Date
1	First issue.	02/12/2024

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1. INTRODUCTION

- 1.1 This report has been prepared by Simpson TWS on behalf of Premier Inn Hotels Ltd to provide details of the operation and maintenance requirements for the drainage proposals for the development.
- 1.2 Premier Inn Hotels Ltd have an established management team who are responsible for the management / maintenance of their commercial properties throughout the UK. The management team would ensure that the hotel's drainage system is operated and maintained in accordance with this plan.
- 1.3 On occupation of the development, this maintenance and management plan should be incorporated into the development's "Operation and Maintenance Manual" with the as-built drainage system operated and maintained in accordance with the requirements set out in the following section of this report to prevent a reduction in the performance of the drainage system over the lifetime of the development.
- 1.4 Premier Inn Hotels Ltd.'s appointed management company should ensure that the maintenance contractor tasked with carrying out any maintenance works provides a risk assessment and method statement that adopts best practice health and safety policies for maintenance personnel throughout the duration of any maintenance works. Measures may include:
 - Ensure the use of safe systems of work and procedures are followed.
 - Certificated operatives only to be used for all confined space entry.
 - Ensure appropriate PPE is worn at all times including the use of safety goggles, ear defenders and other relevant equipment when using high pressure jetting.
 - Do not work in weather conditions where flooding or surging is likely.
 - Erect barriers where appropriate and provide adequate lighting.
 - No operations to be carried out by operatives working alone.
 - Time maintenance to not conflict with other on-site activities.
 - Method statement to be prepared and approved prior to entry into confined space.

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2. DRAINAGE IMPLEMENTATION PLAN

2.1 This Implementation Plan sets out measures to be implemented during construction of the surface water drainage system for the scheme to ensure the site and areas downstream are protected from runoff during construction of the development. It is recommended that the plan is incorporated into the Contractor's Construction Health and Safety Plan with the development carried out in accordance with the measures proposed.

2.2 The surface water drainage network and associated flow control will be constructed at an early stage of the development's programme as part of the earthworks phase. During construction, this will assist in managing runoff and help settle out the high volumes of sediments created during construction.

2.3 It is not always possible to ensure that new impermeable areas are immediately connected to the drainage system. Therefore, the following additional measures will be implemented to ensure construction runoff is appropriately managed:

- Protective coverings would be used to help prevent runoff stripping material stockpiles.
- Plant and wheel washing would take place in a designated location. The area would be tanked and not allowed to discharge into the drainage system or infiltrate into the ground. Effluent should be treated as contaminated waste and disposed off site by a licensed waste management operator.
- Surfaces used as access roads and storage areas during construction should be swept regularly to prevent accumulation of dust and mud.
- Should groundwater be encountered in excavations, such water would not be discharged to the drainage system until the amount of suspended solids has been reduced through the controlled use of skips or tanks, which will act as stilling basins.
- To prevent contamination associated with the use of oils and hydrocarbons during construction, the Contractor would ensure that the following precautionary measures are employed during construction:
 - Regular maintenance of machinery and plant.
 - Use of drip trays.
 - Regular checking of machinery and plant for oil leaks.
 - Use of correct storage facilities.
 - Regular checks for signs of wear and tear on tanks.
 - Specific procedures are followed when refuelling.
 - Use of a designated area for refuelling.
 - Emergency spill kit to be located near refuelling area.
 - Regular emptying of bunds.
 - Tanks should be located in secure areas to stop vandalism.

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- 2.4 The above measures would help to ensure that untreated construction runoff would not be discharged to the surface water drainage system.
- 2.5 During construction, all components of the drainage system should be constructed in accordance with relevant drawings, specifications, and manufacturer's guidelines. Further to this Building Control should visit site on a regular basis to inspect completed works and ensure that the drainage system is installed correctly.
- 2.6 Upon completion, all underground pipework would be jet cleaned, and CCTV surveyed, areas of porous surfacing would be swept and cleaned and silt / debris present in the swales would be removed. The Contractor would be responsible for rectifying any significant defects identified at this stage and for a period of approximately 12 months thereafter. At the end of this period a further inspection will be carried out by the Contract Administrator and on completion of any outstanding remedial works, the drainage system would be handed over.

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3. DRAINAGE MANAGEMENT & MAINTENANCE PLAN

- 3.1 This Drainage Management & Maintenance Plan provides details of the plan proposed for maintenance and management of the drainage scheme associated with the proposed development.
- 3.2 On occupation of the development, it is recommended that each element of the as-built drainage system is maintained in accordance with the regime set out in the tables below.

Table 1: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / silt in catch-pits and dispose of oils / petrol residues using safe standard practices.	As required.
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	As required.
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

Table 2: Rain Gardens - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove litter and surface debris and weeds	Quarterly
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from 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 and vegetation above	As required but likely to be > 20 years
Monitoring	Inspect infiltration surface for silting and ponding time, record de-watering time of the facility	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

Table 3: Petrol Interceptor - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning of interceptor, inlets, and outlets of retained pollutants & silt.	Every 3, 6 or 12 months depending on site conditions (or following poor performance).
Remedial actions	Repair of erosion damage, or damage to tank.	As required.
	Interceptor repairs.	
Monitoring	Inspection of the tank for pollutants and silt.	Every 3, 6 or 12 months depending on site conditions (or following poor performance).
	Inspection of inlets and outlets	
	Inspection of areas receiving overflow, for evidence of erosion.	

Table 4: Flow Control Chamber - Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Cleaning off the flow control devices of any debris/ sediment.	As required
Remedial Actions	Flow control device repairs.	As required
	Repair of erosion damage, or damage to chamber.	
Monitoring	Inspection of the chamber for debris and sediment build up.	Monthly for first 3 months, thereafter, every 6 months and following severe storm events.

Table 5: Geocellular Storage Tank - Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
	Check surface of basin for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

Table 6: Attenuation Basin - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter, debris and trash removal.	Monthly.
	Grass cutting – for landscaped areas and access routes.	Monthly during growing season, or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring – before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from base.	Annually, or as required.
Occasional Maintenance	Re-seed areas of poor vegetation growth.	Annually, or as required.
	Prune and trim trees and remove cuttings.	Every 2 years, or as required.
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing.	As required.
	Re-level uneven surfaces and reinstate design levels.	
Monitoring	Inspect base for blockages, and clear if required.	Monthly.
	Inspect banksides etc for evidence of physical damage.	
	Inspect facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required

APPENDIX J
FLOOD SCREENING REPORT

EA/NRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Building
- Turning Reference Point

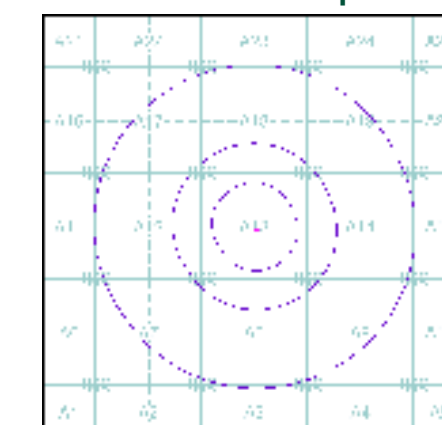
Flood Data

- Zone 1 flooding from Rivers or Sea without Defences (Zone 1)
- Flooding from Rivers or Sea without Defences (Zone 2)
- Area benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

EA/NRW Flood Data Map - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Study Area
- Boundary Reference Line

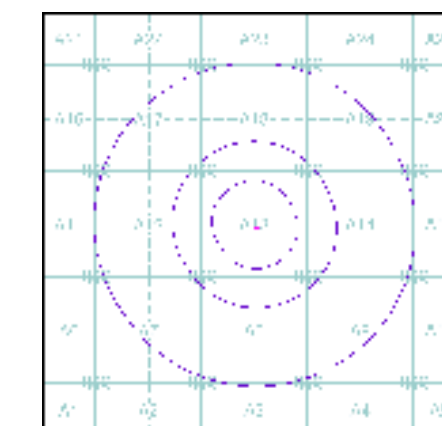
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.0m	0.0m - 0.0m	0.0m - 0.05m
0.1m - 0.2m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 0.4m	0.1m - 0.2m	0.1m - 0.2m
0.5m	0.2m - 0.3m	0.2m - 0.3m
	0.3m - 0.4m	0.3m - 0.4m
	0.4m	0.4m

Contours (height in metres)

- Standard Contour
- Water Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Study Area
- Nearest Reference Point

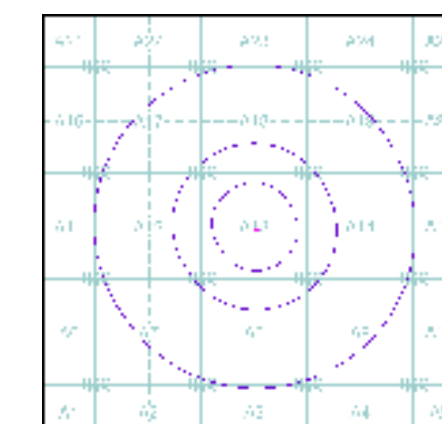
Modelled Flood Depth

Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number: 381117535_1_1
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 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

JBA 200 Year Return Flood Map (Un defended) (1:10,000)

General

- Specified Site
- Specified Study Area
- Search Buffer

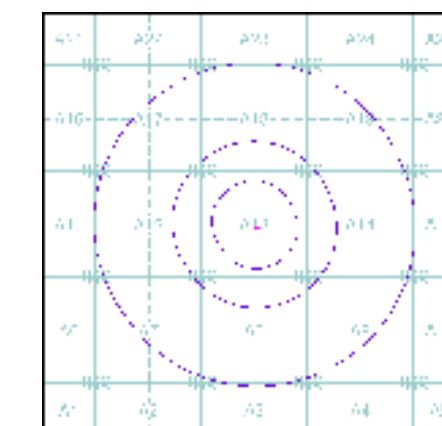
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.0m	0.0m - 0.0m	0.0m - 0.05m
0.1m - 0.2m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 0.4m	0.1m - 0.2m	0.1m - 0.2m
0.5m - 0.6m	0.2m - 0.3m	0.2m - 0.3m
0.7m - 0.8m	0.3m - 0.4m	0.3m - 0.4m
0.9m - 1.0m	0.4m - 0.5m	0.4m - 0.5m
1.1m - 1.2m	0.5m - 0.6m	0.5m - 0.6m
1.3m - 1.4m	0.6m - 0.7m	0.6m - 0.7m
1.5m - 1.6m	0.7m - 0.8m	0.7m - 0.8m
1.7m - 1.8m	0.8m - 0.9m	0.8m - 0.9m
1.9m - 2.0m	0.9m - 1.0m	0.9m - 1.0m
2.1m - 2.2m	1.0m - 1.1m	1.0m - 1.1m
2.3m - 2.4m	1.1m - 1.2m	1.1m - 1.2m
2.5m - 2.6m	1.2m - 1.3m	1.2m - 1.3m
2.7m - 2.8m	1.3m - 1.4m	1.3m - 1.4m
2.9m - 3.0m	1.4m - 1.5m	1.4m - 1.5m
3.1m - 3.2m	1.5m - 1.6m	1.5m - 1.6m
3.3m - 3.4m	1.6m - 1.7m	1.6m - 1.7m
3.5m - 3.6m	1.7m - 1.8m	1.7m - 1.8m
3.7m - 3.8m	1.8m - 1.9m	1.8m - 1.9m
3.9m - 4.0m	1.9m - 2.0m	1.9m - 2.0m
4.1m - 4.2m	2.0m - 2.1m	2.0m - 2.1m
4.3m - 4.4m	2.1m - 2.2m	2.1m - 2.2m
4.5m - 4.6m	2.2m - 2.3m	2.2m - 2.3m
4.7m - 4.8m	2.3m - 2.4m	2.3m - 2.4m
4.9m - 5.0m	2.4m - 2.5m	2.4m - 2.5m
5.1m - 5.2m	2.5m - 2.6m	2.5m - 2.6m
5.3m - 5.4m	2.6m - 2.7m	2.6m - 2.7m
5.5m - 5.6m	2.7m - 2.8m	2.7m - 2.8m
5.7m - 5.8m	2.8m - 2.9m	2.8m - 2.9m
5.9m - 6.0m	2.9m - 3.0m	2.9m - 3.0m
6.1m - 6.2m	3.0m - 3.1m	3.0m - 3.1m
6.3m - 6.4m	3.1m - 3.2m	3.1m - 3.2m
6.5m - 6.6m	3.2m - 3.3m	3.2m - 3.3m
6.7m - 6.8m	3.3m - 3.4m	3.3m - 3.4m
6.9m - 7.0m	3.4m - 3.5m	3.4m - 3.5m
7.1m - 7.2m	3.5m - 3.6m	3.5m - 3.6m
7.3m - 7.4m	3.6m - 3.7m	3.6m - 3.7m
7.5m - 7.6m	3.7m - 3.8m	3.7m - 3.8m
7.7m - 7.8m	3.8m - 3.9m	3.8m - 3.9m
7.9m - 8.0m	3.9m - 4.0m	3.9m - 4.0m
8.1m - 8.2m	4.0m - 4.1m	4.0m - 4.1m
8.3m - 8.4m	4.1m - 4.2m	4.1m - 4.2m
8.5m - 8.6m	4.2m - 4.3m	4.2m - 4.3m
8.7m - 8.8m	4.3m - 4.4m	4.3m - 4.4m
8.9m - 9.0m	4.4m - 4.5m	4.4m - 4.5m
9.1m - 9.2m	4.5m - 4.6m	4.5m - 4.6m
9.3m - 9.4m	4.6m - 4.7m	4.6m - 4.7m
9.5m - 9.6m	4.7m - 4.8m	4.7m - 4.8m
9.7m - 9.8m	4.8m - 4.9m	4.8m - 4.9m
9.9m - 10.0m	4.9m - 5.0m	4.9m - 5.0m

Contours (height in metres)

- Standard Contour
- Water Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA 200 Year Return Flood Map (Un defended) - Slice A



Order Details

Order Number: 38117535_1_1
Customer Ref: P24-0081
National Grid Reference: 306190, 203780
Slice: A
Site Area (Ha): 0.11
Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
TYDFIL, CF48 4BB

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Study Area
- Search Buffer

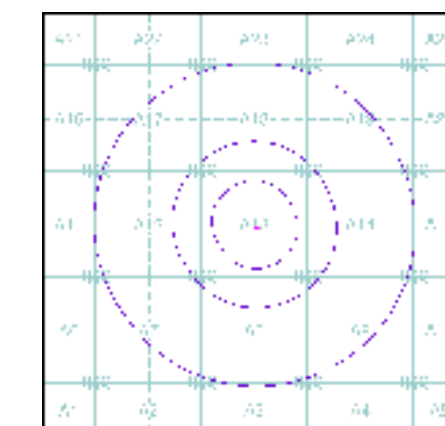
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.0m	0.0m - 0.0m	0.0m - 0.05m
0.1m - 0.2m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 0.4m	0.1m - 0.2m	0.1m - 0.2m
0.5m - 0.6m	0.2m - 0.3m	0.2m - 0.3m
0.7m - 0.8m	0.3m - 0.4m	0.3m - 0.4m
0.9m - 1.0m	0.4m - 0.5m	0.4m - 0.5m
1.1m - 1.2m	0.5m - 0.6m	0.5m - 0.6m
1.3m - 1.4m	0.6m - 0.7m	0.6m - 0.7m
1.5m - 1.6m	0.7m - 0.8m	0.7m - 0.8m
1.7m - 1.8m	0.8m - 0.9m	0.8m - 0.9m
1.9m - 2.0m	0.9m - 1.0m	0.9m - 1.0m
2.1m - 2.2m	1.0m - 1.1m	1.0m - 1.1m
2.3m - 2.4m	1.1m - 1.2m	1.1m - 1.2m
2.5m - 2.6m	1.2m - 1.3m	1.2m - 1.3m
2.7m - 2.8m	1.3m - 1.4m	1.3m - 1.4m
2.9m - 3.0m	1.4m - 1.5m	1.4m - 1.5m
3.1m - 3.2m	1.5m - 1.6m	1.5m - 1.6m
3.3m - 3.4m	1.6m - 1.7m	1.6m - 1.7m
3.5m - 3.6m	1.7m - 1.8m	1.7m - 1.8m
3.7m - 3.8m	1.8m - 1.9m	1.8m - 1.9m
3.9m - 4.0m	1.9m - 2.0m	1.9m - 2.0m
4.1m - 4.2m	2.0m - 2.1m	2.0m - 2.1m
4.3m - 4.4m	2.1m - 2.2m	2.1m - 2.2m
4.5m - 4.6m	2.2m - 2.3m	2.2m - 2.3m
4.7m - 4.8m	2.3m - 2.4m	2.3m - 2.4m
4.9m - 5.0m	2.4m - 2.5m	2.4m - 2.5m
5.1m - 5.2m	2.5m - 2.6m	2.5m - 2.6m
5.3m - 5.4m	2.6m - 2.7m	2.6m - 2.7m
5.5m - 5.6m	2.7m - 2.8m	2.7m - 2.8m
5.7m - 5.8m	2.8m - 2.9m	2.8m - 2.9m
5.9m - 6.0m	2.9m - 3.0m	2.9m - 3.0m
6.1m - 6.2m	3.0m - 3.1m	3.0m - 3.1m
6.3m - 6.4m	3.1m - 3.2m	3.1m - 3.2m
6.5m - 6.6m	3.2m - 3.3m	3.2m - 3.3m
6.7m - 6.8m	3.3m - 3.4m	3.3m - 3.4m
6.9m - 7.0m	3.4m - 3.5m	3.4m - 3.5m
7.1m - 7.2m	3.5m - 3.6m	3.5m - 3.6m
7.3m - 7.4m	3.6m - 3.7m	3.6m - 3.7m
7.5m - 7.6m	3.7m - 3.8m	3.7m - 3.8m
7.7m - 7.8m	3.8m - 3.9m	3.8m - 3.9m
7.9m - 8.0m	3.9m - 4.0m	3.9m - 4.0m
8.1m - 8.2m	4.0m - 4.1m	4.0m - 4.1m
8.3m - 8.4m	4.1m - 4.2m	4.1m - 4.2m
8.5m - 8.6m	4.2m - 4.3m	4.2m - 4.3m
8.7m - 8.8m	4.3m - 4.4m	4.3m - 4.4m
8.9m - 9.0m	4.4m - 4.5m	4.4m - 4.5m
9.1m - 9.2m	4.5m - 4.6m	4.5m - 4.6m
9.3m - 9.4m	4.6m - 4.7m	4.6m - 4.7m
9.5m - 9.6m	4.7m - 4.8m	4.7m - 4.8m
9.7m - 9.8m	4.8m - 4.9m	4.8m - 4.9m
9.9m - 10.0m	4.9m - 5.0m	4.9m - 5.0m

Contours (height in metres)

- Standard Contour
- Water Contour
- Sea Height
- Mean Low Water
- Mean High Water

JBA 1000 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

JBA Canal Failure Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Turning Reference Point

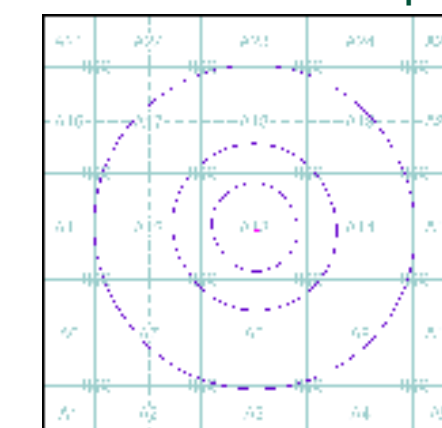
Flood Data

- Canal Failure
- Location

Contours (Height in metres)

- Standard Contour
- Minor Contour
- Sp. High
- Mean Low Water
- Mean High Water

JBA Canal Failure Flood Map - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

EANRW Surface Water 1000 Year Return Depth Map (1:10,000)

General
 [Symbol] Boundary Line [Symbol] Road/Highway [Symbol] Proposed Development Point

Surface Water Depth

0.0 - 0.1m
 0.1 - 0.2m
 0.2 - 0.3m
 0.3 - 0.4m
 0.4 - 0.5m
 0.5 - 0.6m
 0.6 - 0.7m

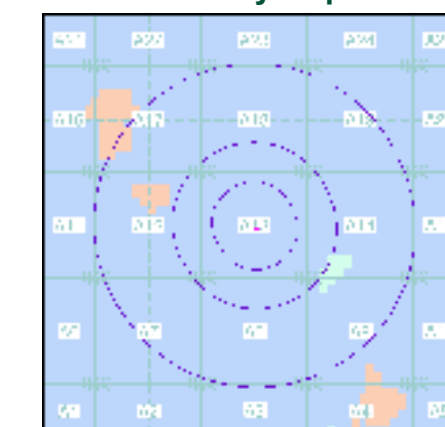
Contours (Height in metres)

Standard Contour
 Flood Contour
 Spill High
 [Symbol] Flooded Area
 [Symbol] Flooded Area

Suitability

See the suitability map for more details
 [Symbol] Suitable for use
 [Symbol] Suitable for use
 [Symbol] Suitable for use
 [Symbol] Suitable for use
 [Symbol] Suitable for use
 [Symbol] Suitable for use

EANRW Suitability Map - Slice A



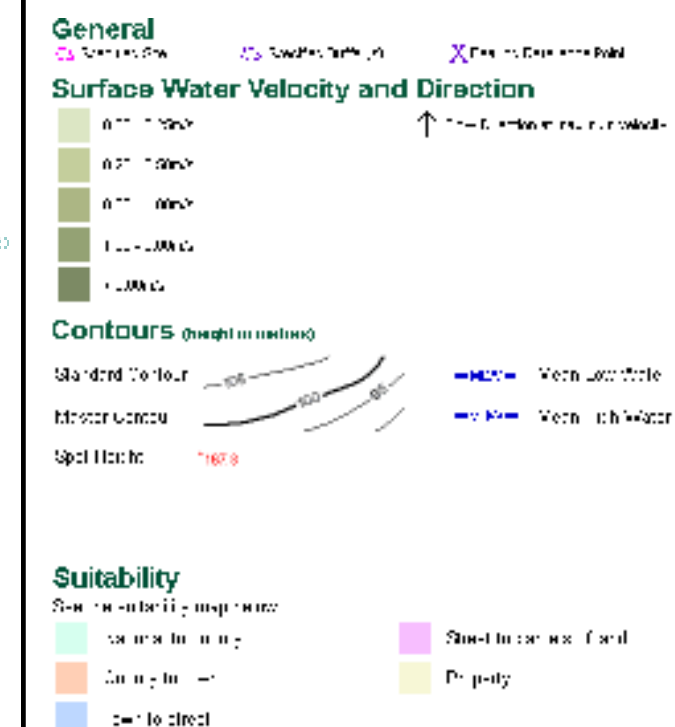
Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

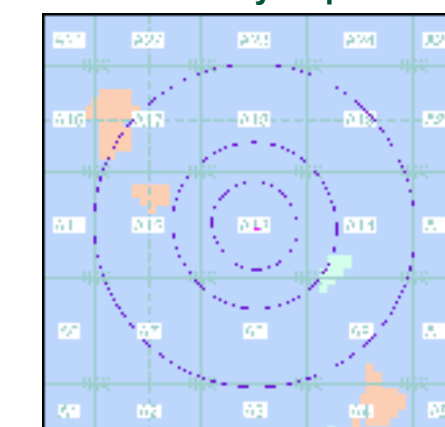
Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR TYDFIL, CF48 4BB

EANRW Surface Water 30 Year Return Velocity and Flow Direction Map (1:10,000)



EANRW Suitability Map - Slice A



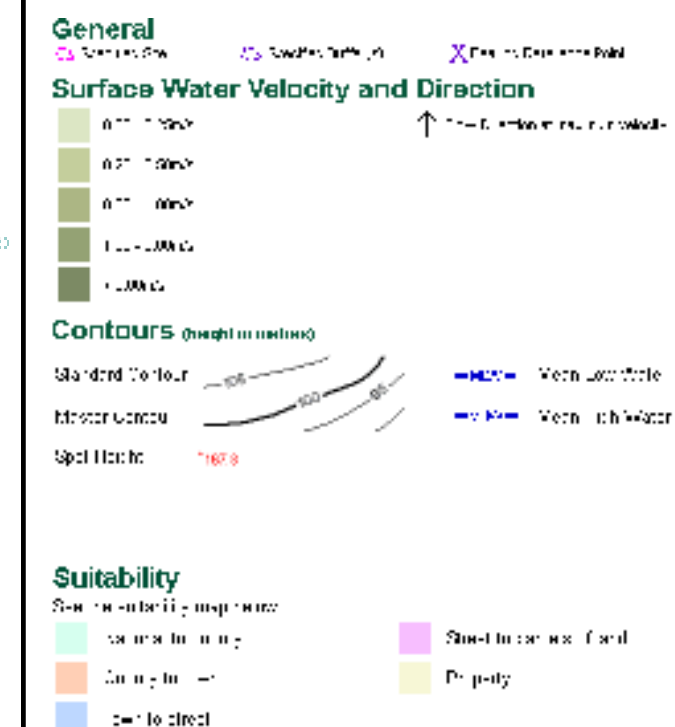
Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

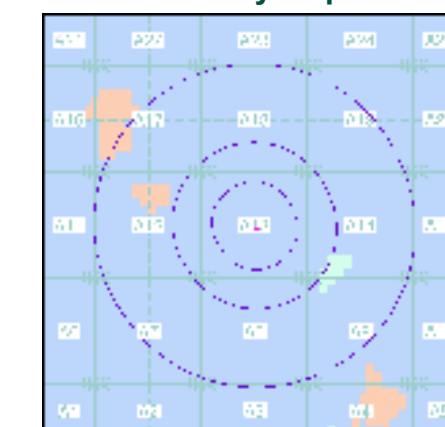
Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

EANRW Surface Water 100 Year Return Velocity and Flow Direction Map (1:10,000)



EANRW Suitability Map - Slice A



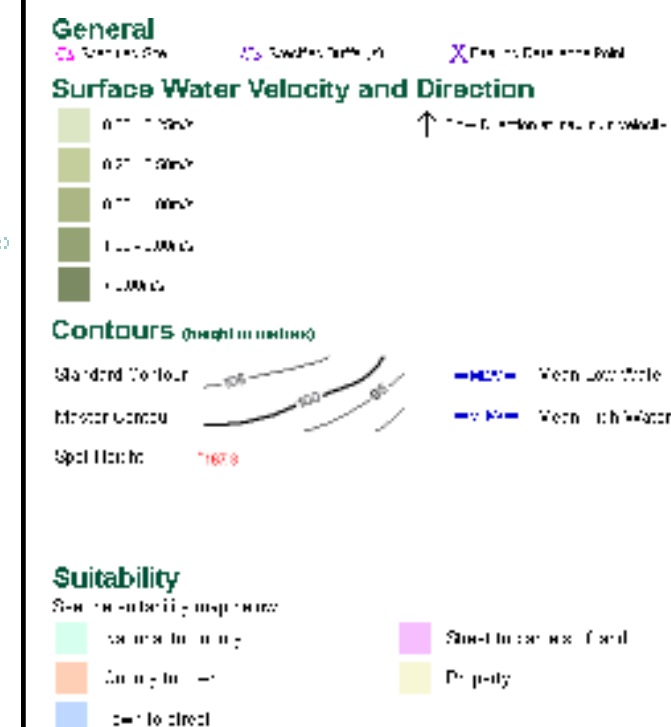
Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

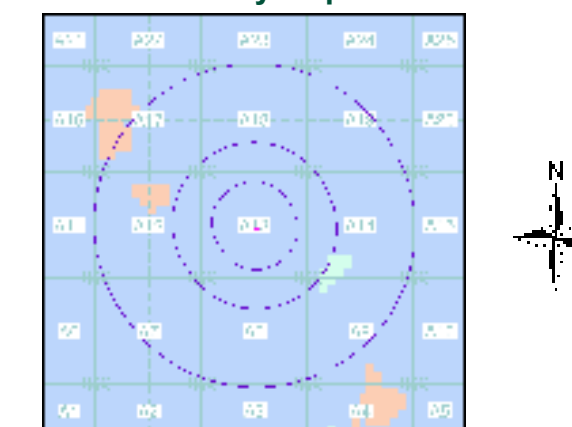
Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

EANRW Surface Water 1000 Year Return Velocity and Flow Direction Map (1:10,000)



EANRW Suitability Map - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB

EANRW Surface Water 30 Year Return Hazard Rating Map (1:10,000)

General

Search Area
 Search Buffer (m)
 Proposed Development Point

Surface Water Hazard Rating

Low (0.1 - 0.2%)
 Moderate (0.2% - 1%)
 Severe (1% - 10%)
 Extreme (>10%)

Contours (height in metres)

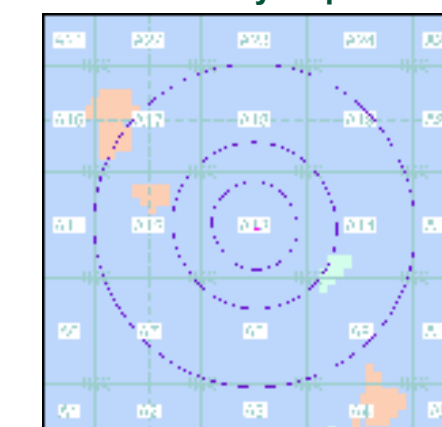
Standard contour 1m intervals
 Major contour 5m intervals
 Spot Height 167.9
 100m contour
 50m contour

Suitability

See the suitability map for more

Suitable for use
 Limited suitability
 Not suitable
 Shaded for use as field
 Property

EANRW Suitability Map - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR TYDFIL, CF48 4BB

EANRW Surface Water 1000 Year Return Hazard Rating Map (1:10,000)

General
 [Symbol] Boundary Line [Symbol] Road/Path/Drainage [Symbol] Proposed Development Point

Surface Water Hazard Rating

Low (0.1 - 0.2)
 Moderate (0.2 - 0.5)
 Severe (0.5 - 1.0)
 Extreme (>1.0)

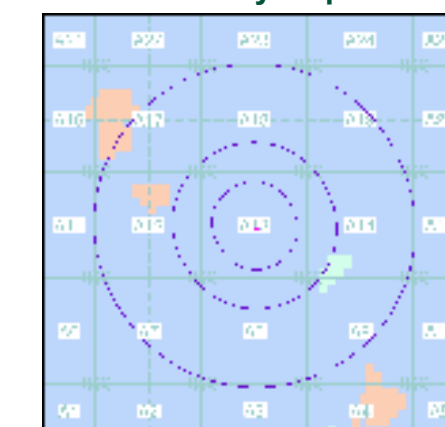
Contours (height in metres)

Standard Contour [Symbol] 100m Contour
 Major Contour [Symbol] 200m Contour
 Spot Height [Symbol] 167.9

Suitability

See the suitability map for more details.
 Suitable for [Symbol] [Symbol] [Symbol]
 Not Suitable for [Symbol] [Symbol] [Symbol]

EANRW Suitability Map - Slice A



Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR TYDFIL, CF48 4BB

OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer (m)
- X Bearing Reference Point

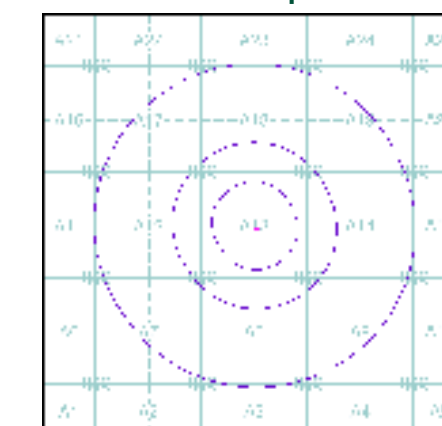
OS Water Network Data

- | | |
|----------------|---------------------------|
| — Canal | — Drain |
| — Reservoir | — Other |
| — Floodplain | — Lake |
| — Marsh | — Transfer |
| — Tidal River | — Lock or Flight Off take |
| — Inland River | — Sea |
| ● Junction | ● Source |
| ● Outlet | ● Other |
| ● Pseudo | |

Contours (height in meters)

- | | | |
|------------------|---------|-------------------------|
| Standard Contour | — 100 — | — MLW — Mean Low Water |
| Median Contour | — 100 — | — MHW — Mean High Water |
| Spot Height | 100.3 | |

OS Water Network Map - Slice A

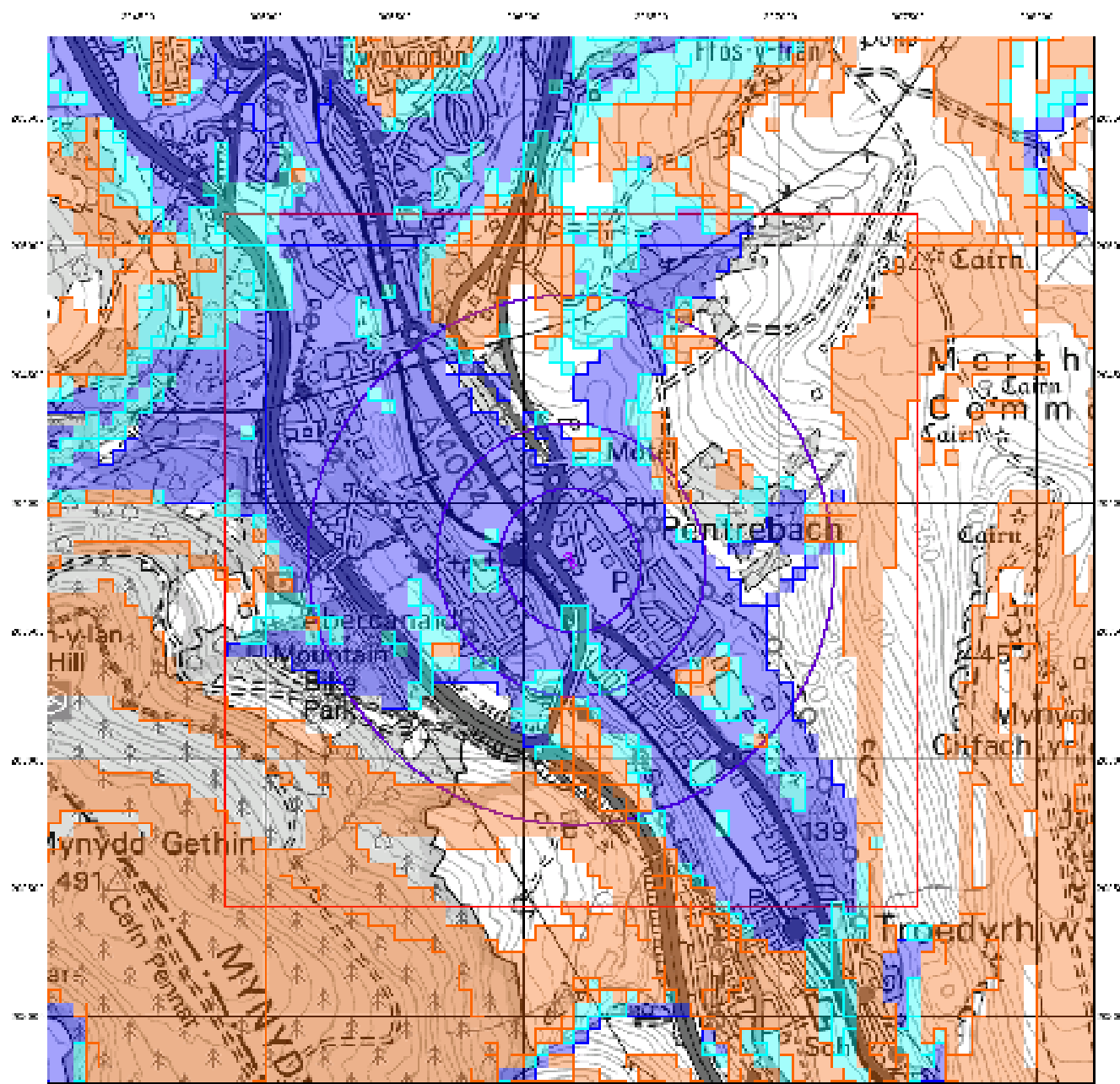


Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR
 TYDFIL, CF48 4BB



Envirocheck

LANDMARK INFORMATION GROUP

BGS Flood Data (1:50,000)

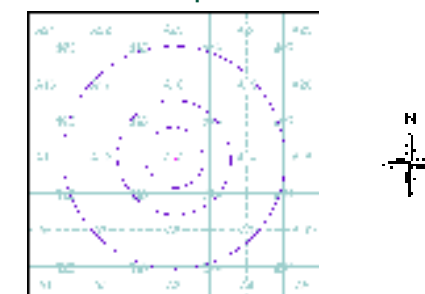
Ground

FLOODING
 FLOODING
 FLOODING

BGS Groundwater Flooding Susceptibility

HIGHLY SUSCEPTIBLE
 MODERATELY SUSCEPTIBLE
 LOWLY SUSCEPTIBLE

BGS Flood Data Map - Slice A



Order Details

Order Number: 381117535_1_1
Customer Ref: P24-0081
National Grid Reference: 306190, 203780
Slice: A
Site Area (Ha): 0.11
Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR TYDFIL, CF48 4BB

Landmark
LANDMARK INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

GeoSmart Information Groundwater Flood Map (1:50,000)

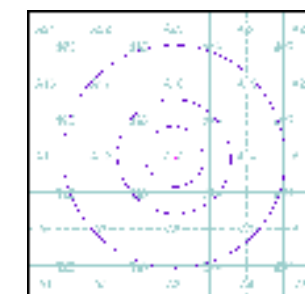
General

100m Search Buffer
 100m Search Buffer
 100m Search Buffer

GeoSmart Information Groundwater Flooding Risk

High
 Medium
 Low
 Very Low

GeoSmart Information Groundwater Flood Map - Slice A

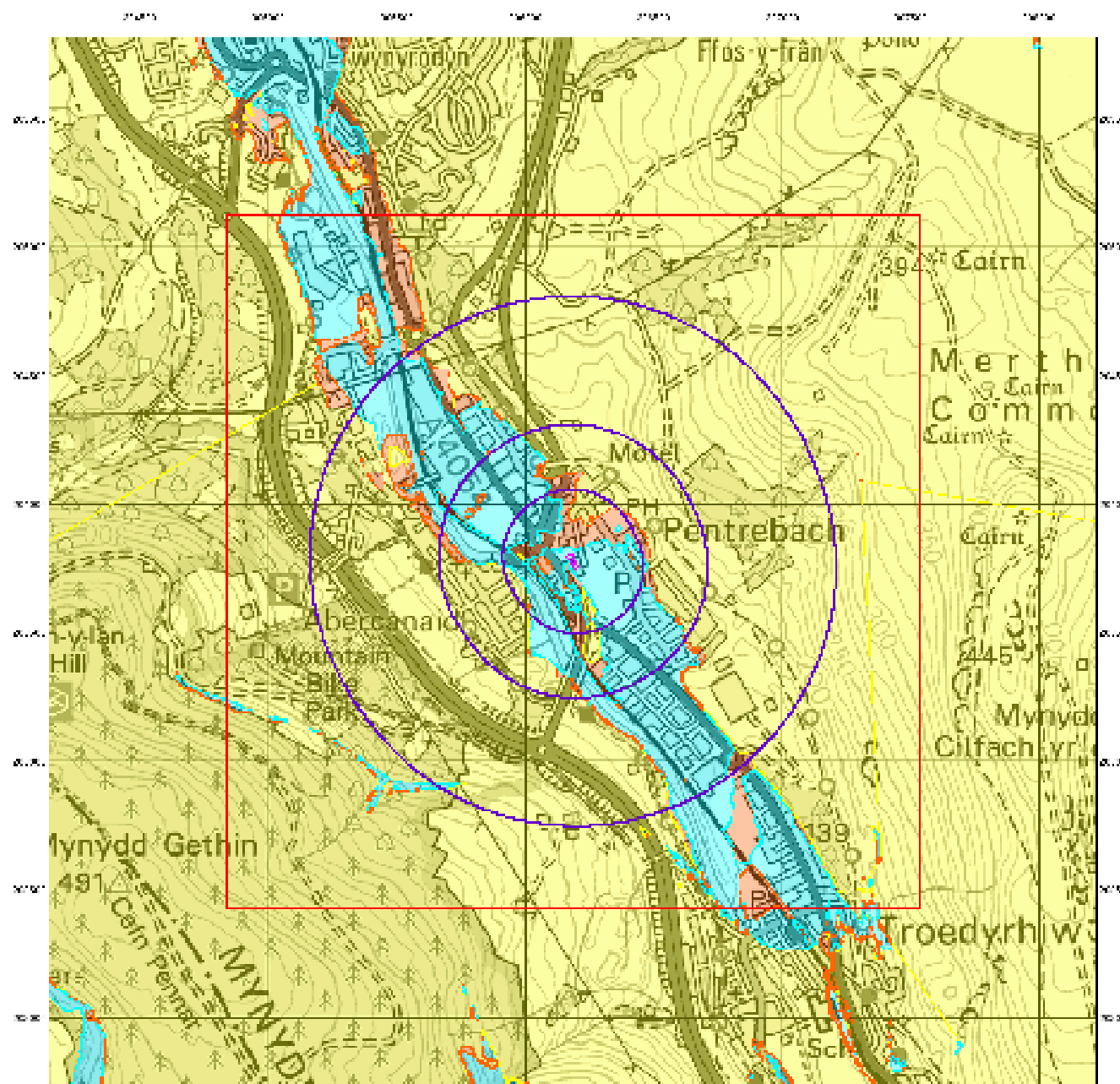


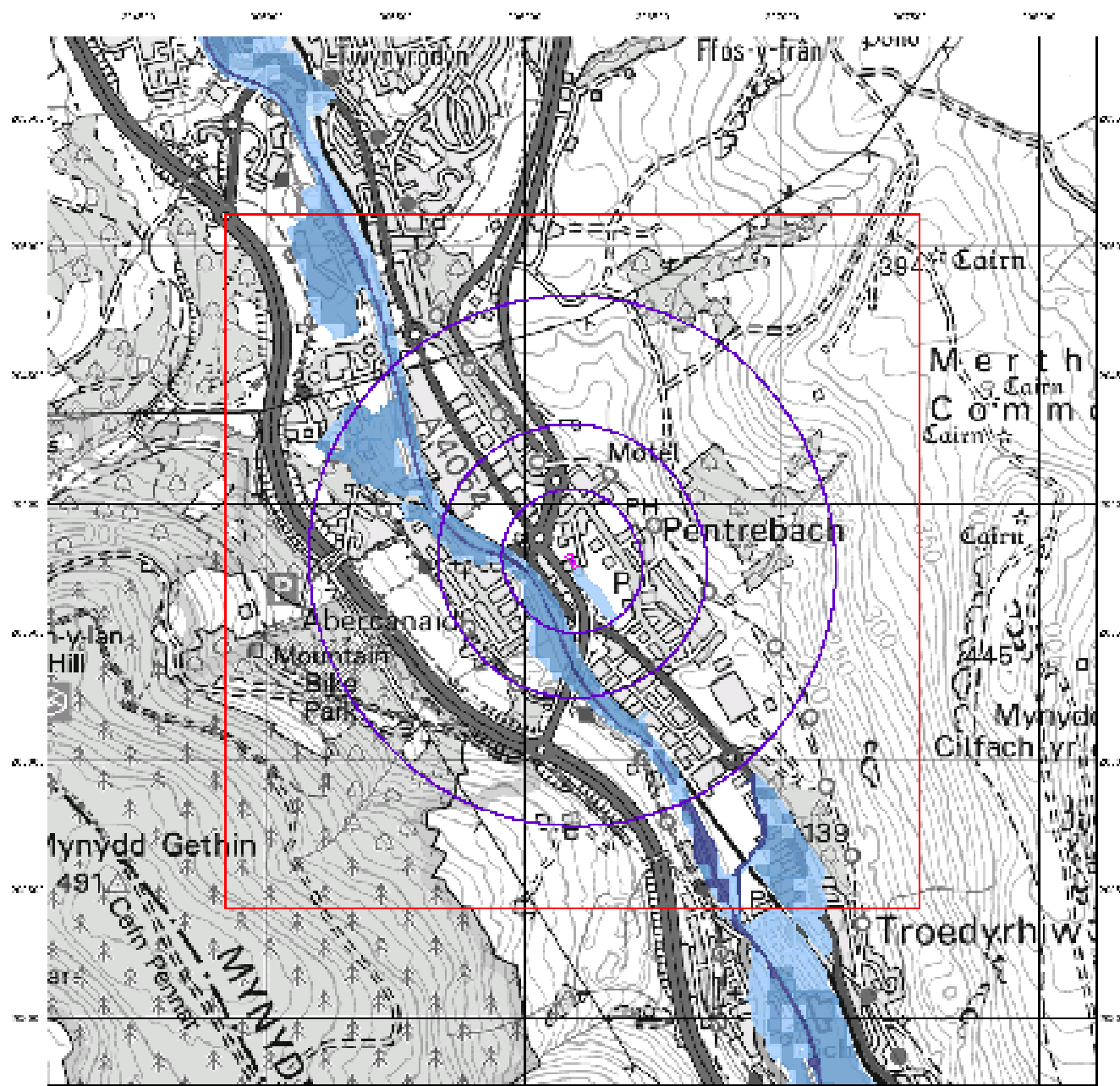
Order Details

Order Number: 381117535_1_1
 Customer Ref: P24-0081
 National Grid Reference: 306190, 203780
 Slice: A
 Site Area (Ha): 0.11
 Search Buffer (m): 1000

Site Details

Premier Inn, Pentrebach House, Pentrebach, MERTHYR TYDFIL, CF48 4BB





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EA/NRW RoFRS Data (1:50,000)

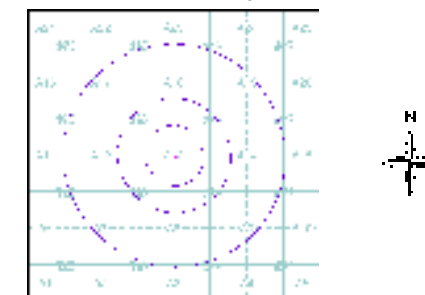
General

Address
 Road
 Water Feature
 Rail Station

Risk of Flooding from Rivers and Sea (RoFRS)

High
 Medium
 Low
 Very Low

EA/NRW RoFRS Data Map - Slice A



Order Details

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Site Details

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Landmark
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