Flood Risk Assessment for Planning

Prepared for:
Richard Tillyer

Location:
Land north east side of Trout Lane
Yiewsley
West Drayton
Middlesex
UB7 7RT

September 2017

Our reference:
87355-Beard-TroutLn



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Client:	Richard Tillyer
Location:	Land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex, UB7 7RT
Application:	Retrospective application for car sales and car storage
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Lead Consultant:	Mrs Emma Jeffery
Authorisation:	Mr Edward Bouet

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Key Facts

Flood Risk Posed:

- EA Flood Zone 3 (High Risk).
- Fluvial flood risk from the Fray's River.
- Risk of pluvial flooding would appear to be very low.
- Risk of groundwater and sewer surcharge flooding would appear to be low.

Flood Risk Management:

- The application is retrospective and aerial imagery shows the hardstanding present on site in 2006, and the land used for car sales and storage in 2010.
- The portable building and timber framed building will be secured to their hardstanding by a number of mounting points.
- The site is surrounded by palisade fencing, which allows the free passage of floodwater across the site, while preventing the cars from floating off the site and becoming a floating debris hazard.
- Safe escape will be provided by a comprehensive flood warning and evacuation plan, which will be prepared in liaison with the Emergency Planners and tied in with the local Emergency Plans for the area.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Introduction

Unda Consulting Limited have been appointed by Richard Tillyer (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at Land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex, UB7 7RT (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The site appears to be located within Flood Zone 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

Given that the proposed application site is located in Flood Zone 3 (High Risk of flooding from rivers or the sea), and includes change of use, the applicant is required to submit a FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

Existing Situation

Site Usage:

The site is occupied by existing hardstanding and is used for car sales and storage. The planning application is retrospective. Aerial imagery shows the hardstanding present on site in 2006, and the land used for car sales and storage in 2010.

Detailed existing site plans are provided in the report Appendix.



Figure 1: Site location plan and immediate surrounding area in 2010 (Source: Google Earth, historic aerial imagery from June 2010)

Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of our full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 2.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

EA 2m LiDAR remotely sensed digital elevation data suggests that the ground topography on site ranges from approximately 26.9mAOD to 27.5mAOD.

Proposed Development

The retrospective planning application is for the use of the land for car sales and car storage and includes a portable building and timber framed structure with polycarbonate sheeting.

Detailed proposed site plans are provided in the report Appendix.



Figure 2: Existing site (Source: Bing maps)

Assessment of Flood Risk

Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Flood Zone	Definition
Zone 1 **Low Probability**	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 **Medium Probability**	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a **High Probability**	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b **The Functional Floodplain**	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

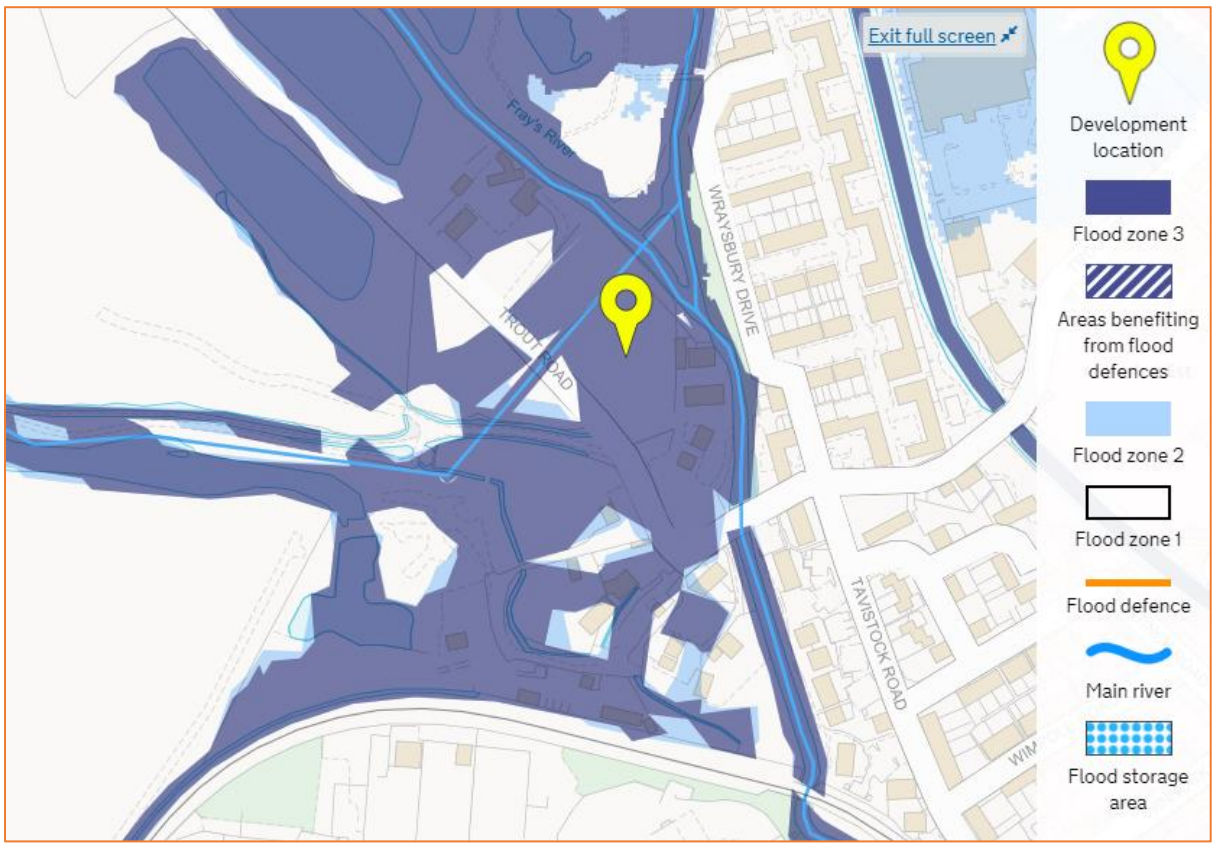


Figure 3: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having at least a 1 in 100 annual probability of river flooding.

The risk would appear to be fluvial, and originate from the Fray's River, which borders the site approximately 7m to the north east at its closest proximity and the Trout Lane Drain which is approximately 12m to the north west of the site.

Fluvial (Fray's River):

Frays River is a semi-canalised short river in England that branches off the River Colne at Uxbridge Moor and rejoins it at West Drayton. The river is believed to be a man-made diversion of waters from the River Colne to feed watermills around Uxbridge. The name is originates from John Fray who owned Cowley Hall beside the river in the fifteenth century. Other names for the river are the Uxbridge and Cowley Mill Stream, the Cowley Stream or the Colham Mill Stream.

The Frays River leaves the River Colne between the north-west of Uxbridge, Greater London and east of Denham, Buckinghamshire at Denham Weir. It passes Cowley and Yiewsley on the east bank where it is joined by the Pinn. It is also crossed by the Slough Arm of the Grand Union Canal which is carried on an aqueduct. It rejoins the River Colne at West Drayton. Little Britain is a lake between the Frays River and the River Colne.

The River Pinn runs through Pinner, Eastcote and Ruislip: the latter derives its name from "Rush leap" - this being a reference to the width of the river in the area. It then runs through Ickenham and onto Uxbridge, where it passes through the grounds of RAF Uxbridge and Brunel University. The Pinn continues on to Cowley where it joins the Frays River at Yiewsley.

Modelled flood levels:

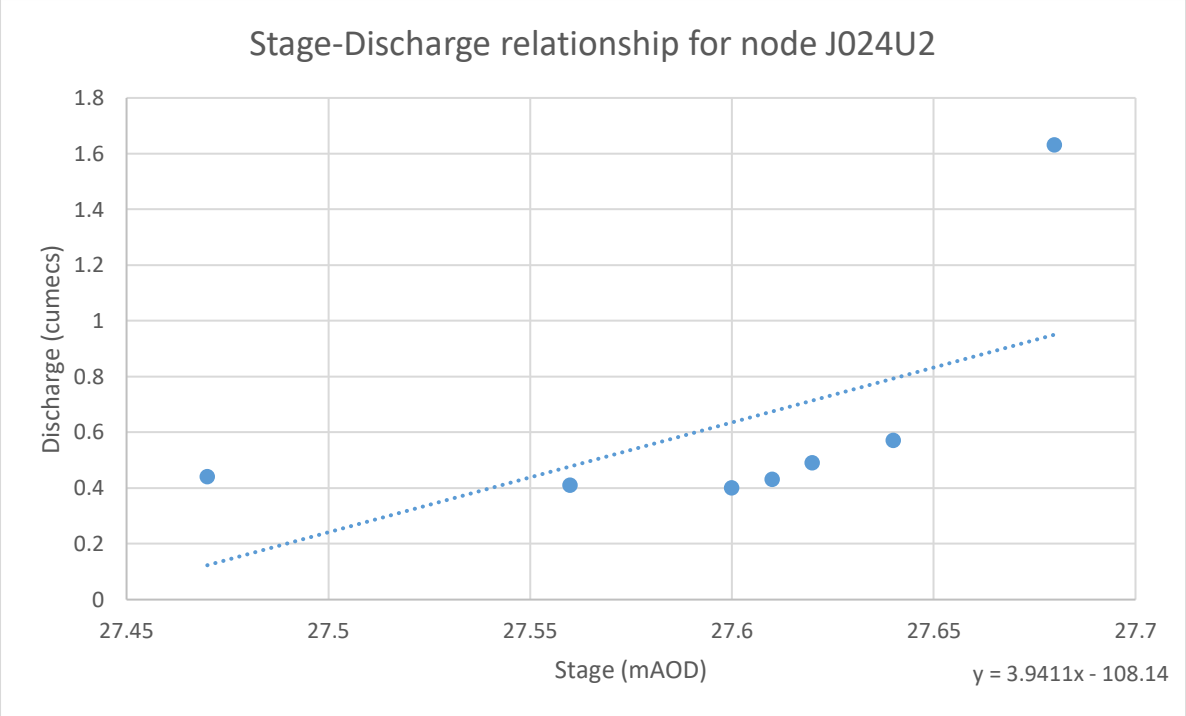
The EA has provided peak in-channel flood levels from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

The highest nearby node will be used as a conservative approach, which is node J024U2. A modelled 1:00 year flood level of 27.64mAOD has been provided for this node. Comparison with topographic site levels (26.9mAOD to 27.5mAOD) confirms that the site is entirely below the modelled flood level.

The EA has also provided modelled defended flood outlines from the Lower Colne Modelling and Mapping Study. The site is shown to be partially within the 1:20 year defended flood outline, and entirely within the modelled 1:100 year defended flood outline.

It should be noted that the flood risk data provided by the EA does not include an allowance for climate change. Based on the new guidelines for climate change allowances (February 2016), for 'less vulnerable' development in Flood Zone 3 the central and higher central allowances should be used to assess climate change. The site falls within the Thames River Basin District, where the central allowance to 2115 is 25% and higher central allowance us 35%.

As such, in line with EA guidance a Stage-Discharge relationship is derived from the modelled flood levels and flows provided, and then interpolated / extrapolated to estimate a flood level for a 25% increase and 35% increase in flows.



A 1:100 year flow of 0.57m^3/s has been provided by the EA. Increasing this by 25% and 35% gives a flow of 0.71m^3/s and 0.77m^3/s respectively. As such, the stage-discharge relationship is extrapolated to give a 1:100 year climate change flood level of 27.62mAOD and 27.63mAOD respectively for the central and higher central allowances.

Comparison of the modelled 1:100 year flood level with allowance for climate change with topographic site levels (26.9mAOD to 27.5mAOD) confirms that the site is entirely below the in-channel design flood level (up to 0.73m below the in-channel flood level).

Flood defences:

The EA has confirmed that the defences along the Fray's River are classified as high ground and walls. The Fray's River has a regulator which restricts flow downs the Frays River and increases the standard of protection in west West Drayton. No design standard has been provided by the EA. In addition, the Trout Lane Ditch is a 250m flood relief channel built as part of the Lower Colne Scheme in 2002.

Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the

flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

The site would not appear to be defended to a significant degree.

Historical flood events:

According to EA data flooding occurred in the local area in 1987, 1988, 2009, 2013, 2014 and 2016.

The site is shown to be entirely outside of all of these historic flood extents.

Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that the EA to not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Surface Water Flood Map suggests that the site lies within an area of "Very Low" risk of surface water flooding.

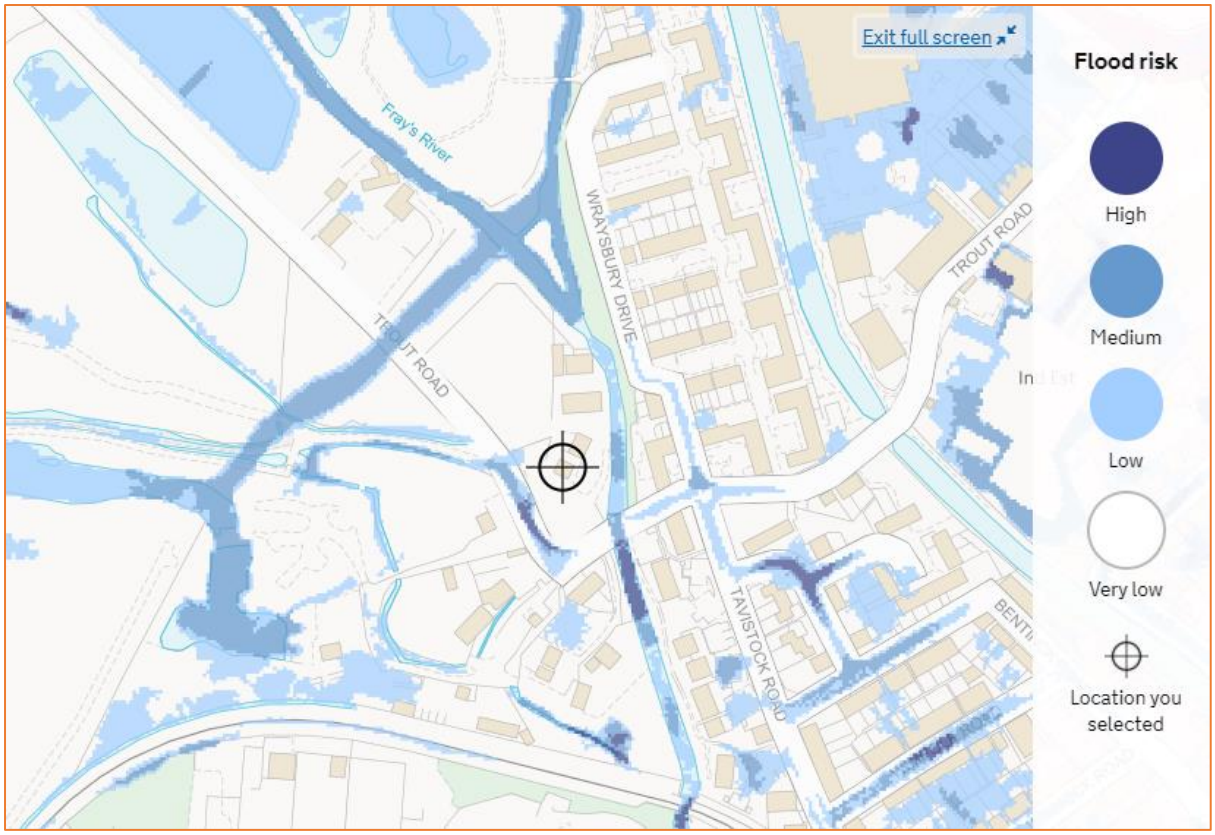


Figure 4: Extract from Environment Agency Surface Water Flood Map (Source: EA)

Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

According to the Hillingdon SFRA Very large water bearing gravel deposits lie within the southern area of Hillingdon's boundary. These can pose a risk of groundwater flooding, especially where property is close to main rivers such as the Frays River, River Colne, River Crane, River Pinn, and the Yeading Brook where shallow groundwater levels may be high.

Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes

records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site is partially within the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

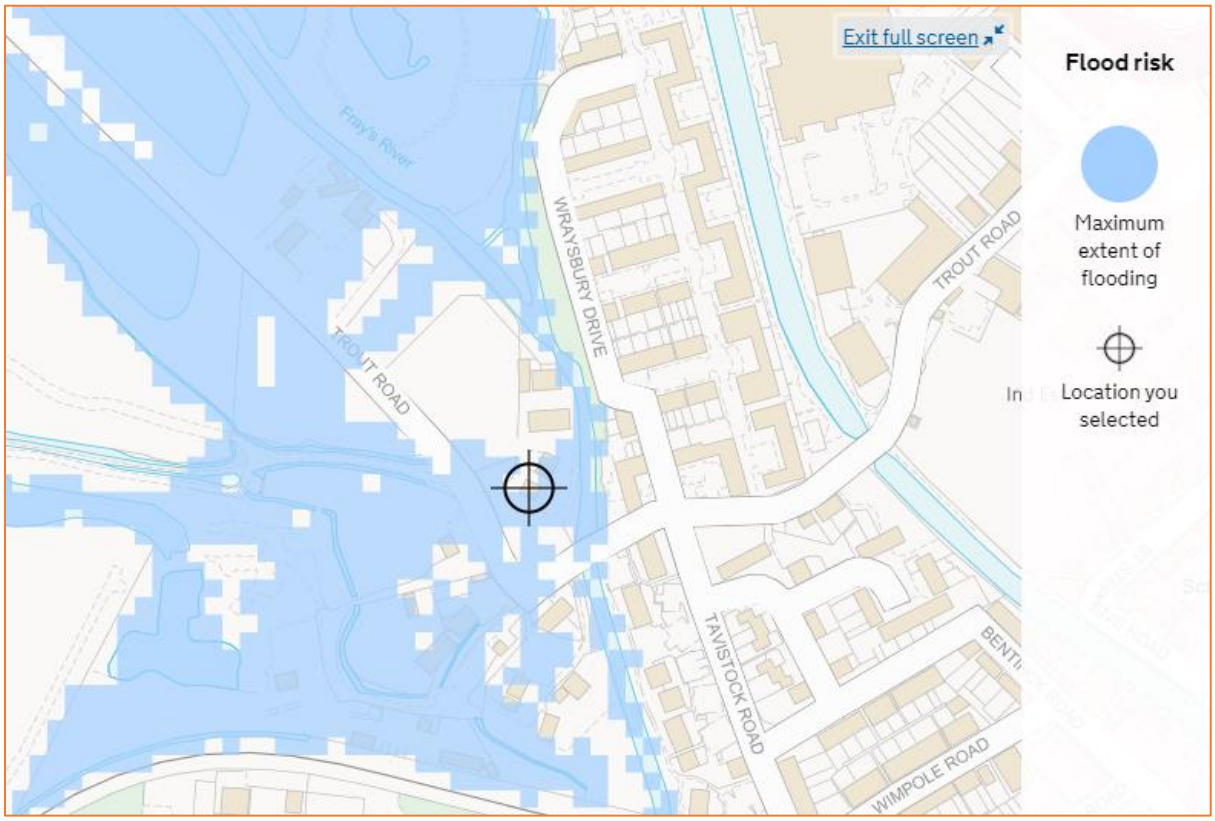


Figure 5: Extract from Environment Agency Reservoir Flood Map (Source: EA)

Flood Risk Management

Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The retrospective application is for use of the land for car sales and car storage.

Post development, the site will be classified as "less vulnerable".

EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m^2. It should not be applied if an additional dwelling is being created, e.g. a self-contained annex or additional commercial unit.

Physical Design Measures:

The planning application is retrospective, the site has been used for car sales and storage already for a number of years.

There is an existing portable building and timber framed structure with polycarbonate sheeting on site. To stop these structures from potentially floating away and becoming a debris hazard during an extreme flood event, the structures will be secured to the ground by a number of mounting points.

In addition, the car sales and storage area is already surrounded by palisade fencing, which allows the free passage of floodwater across the site, while preventing the cars from floating off the site and becoming a floating debris hazard.

Safe Escape:

The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea).

Comparison of modelled in-channel flood levels with topographic site levels shows the site and main roads in proximity to the site are below the in-channel 1:100 year plus climate change flood levels, and as such safe escape will be provided by a comprehensive flood warning and evacuation plan, which will be prepared in liaison with the Emergency Planners and tied in with the local Emergency Plans for the area.

No 'more vulnerable' or residential uses are proposed and as such, the site will be closed to staff and customers upon receipt of an extreme flood warning.

Owners, occupants and tenants should follow the warning and evacuation procedure detailed in the following section.

Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The site lies close to the edge of an Environment Agency Flood Alert/Warning Area. The EA issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings Direct service at https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.

To further conform to the EA Standing Advice, the applicant has agreed to subscribe to the EA's flood warning service.

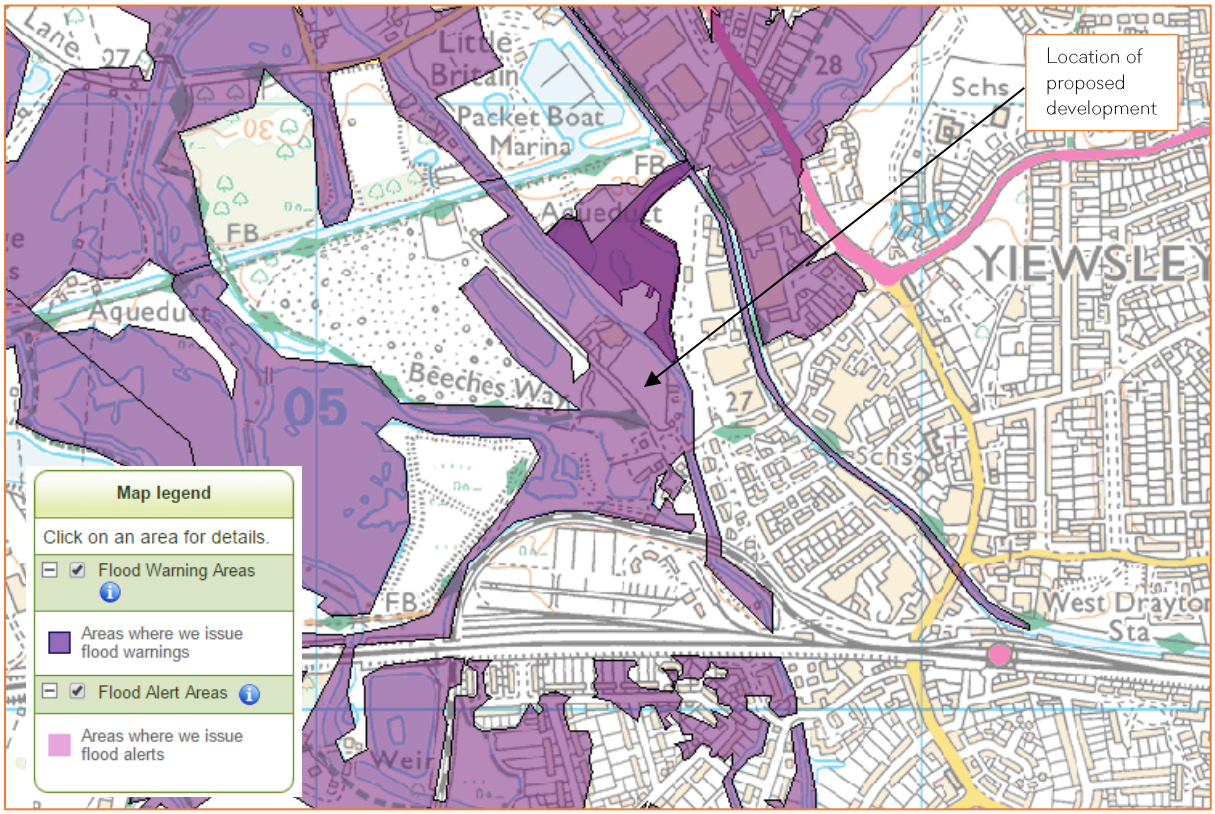


Figure 6: Environment Agency Flood Warning Areas (Source: EA)

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 2: Flood Warnings

Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.

- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

Off-Site Impacts:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea), but the only retrospective increase in built footprint is a portable building and a timber framed structure with polycarbonate sheeting.

As such, there will be no unacceptable loss of floodplain storage from the site.

Surface Water Drainage:

The retrospective application does not increase the amount of hardstanding or impermeable surfaces on site. As such, there will be no change to the existing drainage arrangements. Due to the nature of this proposed development, a full Surface Water Drainage Strategy is not required at this stage of planning.

Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available. The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will be classified as "less vulnerable".

The proposed application is considered to be suitable within Flood Zone 3.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	X	Exception Test required	✓	✓
Zone 3b	Exception Test required	X	X	X	✓

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Conclusion

Unda Consulting Limited have been appointed by Richard Tillyer (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at Land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex, UB7 7RT (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The planning application is for the retrospective application for car sales and car storage.

The site is occupied by existing hardstanding and is used for car sales and storage. The planning application is retrospective. Aerial imagery shows the hardstanding present on site in 2006, and the land used for car sales and storage in 2010. The retrospective planning application is for the use of the land for car sales and car storage and includes a portable building and timber framed structure with polycarbonate sheeting.

The site usage is considered to be "less vulnerable" under the NPPF.

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having at least a 1 in 100 annual probability of river flooding. The risk would appear to be fluvial, and originate from the Fray's River, which borders the site approximately 7m to the north east at its closest proximity and the Trout Lane Drain which is approximately 12m to the north west of the site.

According to EA data flooding occurred in the local area in 1987, 1988, 2009, 2013, 2014 and 2016. The site is shown to be entirely outside of all of these historic flood extents.

The EA has provided peak in-channel flood levels from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012). Comparison of the modelled in-channel 1:100 year flood level with topographic site levels confirms that the site is entirely below the modelled flood level.

The EA has also provided modelled defended flood outlines from the Lower Colne Modelling and Mapping Study. The site is shown to be partially within the 1:20 year defended flood outline, and entirely within the modelled 1:100 year defended flood outline.

It should be noted that the flood risk data provided by the EA does not include an allowance for climate change. Based on the new guidelines for climate change allowances (February 2016), for 'less vulnerable' development in Flood Zone 3 the central and higher central allowances should be used to assess climate change. The site falls within the Thames River Basin District, where the central allowance to 2115 is 25% and higher central allowance us 35%.

Comparison of the modelled 1:100 year flood level with allowance for climate change with topographic site levels confirms that the site is entirely below the in-channel design flood level (up to 0.73m below the in-channel flood level).

The EA Surface Water Flood Map suggests that the site lies within an area of "Very Low" risk of surface water flooding.

Additionally, the risk of flooding posed to the site by groundwater and sewer surcharge flooding would appear to be low.

In summary:

- EA Flood Zone 3 (High Risk).
- Risk of pluvial flooding would appear to be very low.
- Risk of groundwater and sewer surcharge flooding would appear to be low.
- The portable building and timber framed building will be secured to their hardstanding by a number of mounting points.

- The site is surrounded by palisade fencing, which allows the free passage of floodwater across the site, while preventing the cars from floating off the site and becoming a floating debris hazard.
- Safe escape will be provided by a comprehensive flood warning and evacuation plan, which will be prepared in liaison with the Emergency Planners and tied in with the local Emergency Plans for the area.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix

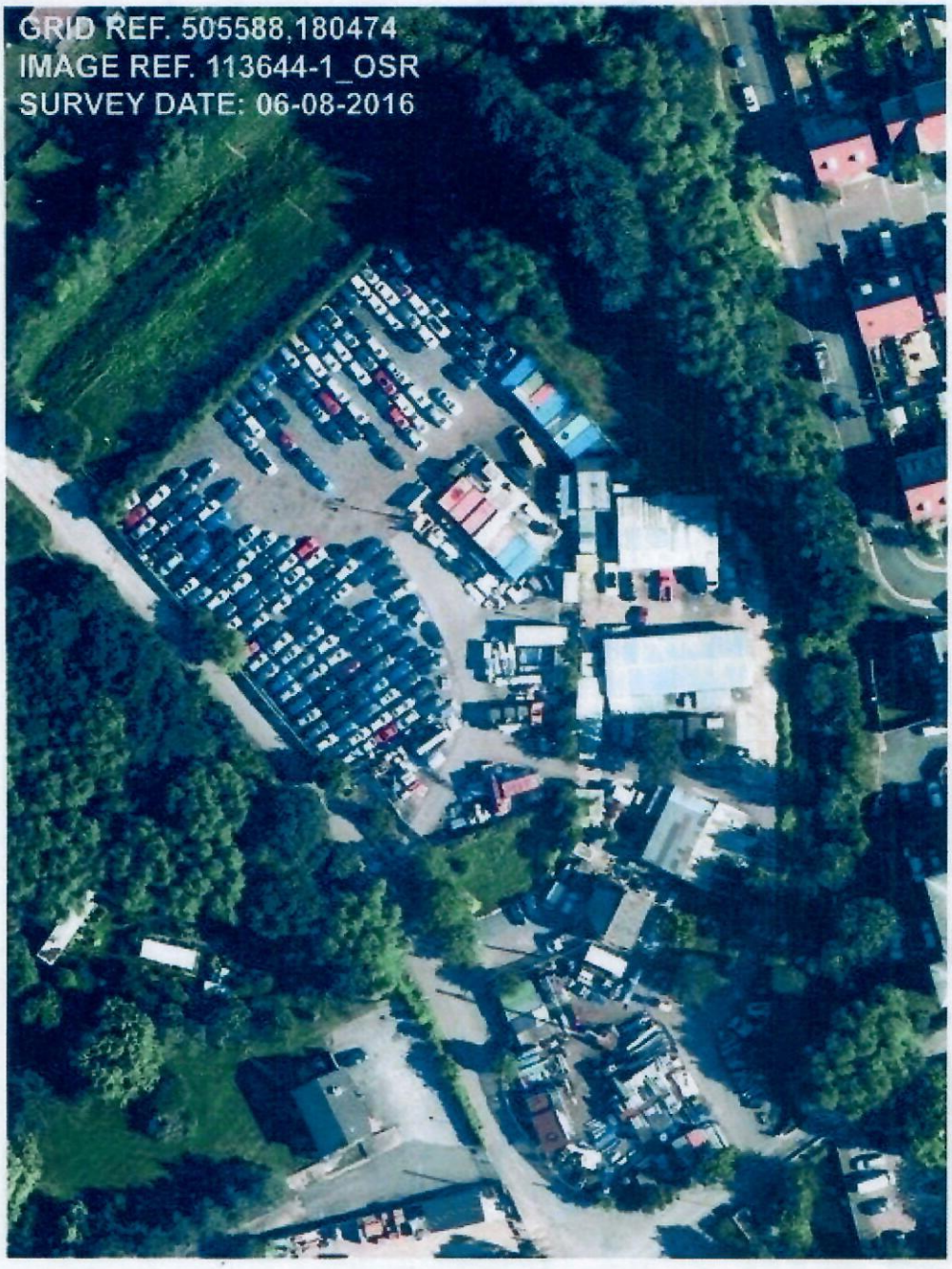
Pages 22 - 25: Aerial photos of the site in 2006, 2007, 2013 and 2016 (4 Pages);

Pages 26 - 35: Environment Agency Product 4 data (10 Pages).

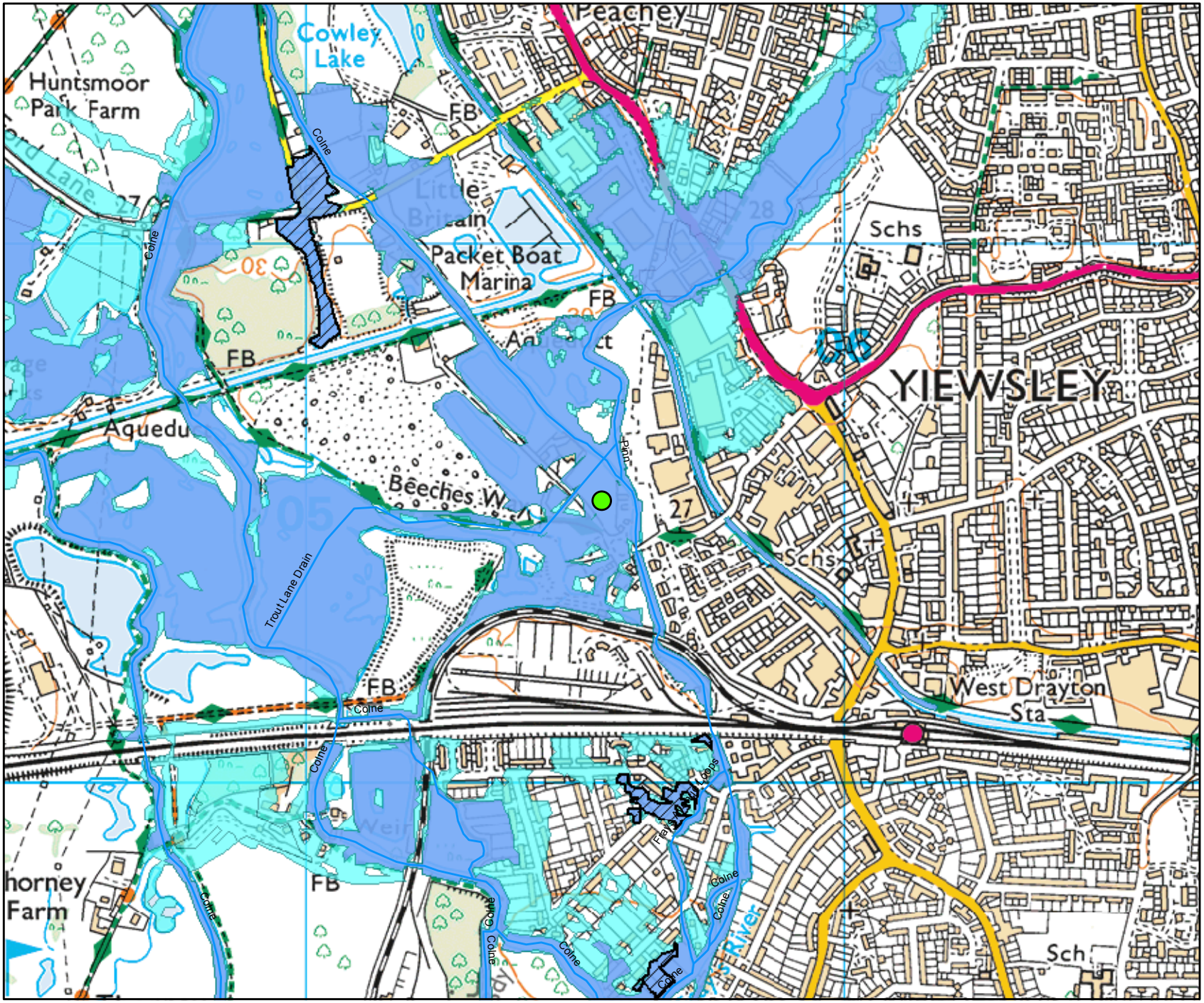

GRID REF. 505588, 180474
IMAGE REF. 100656-1
SURVEY DATE: 29-01-2006


GRID REF. 505588, 180474
IMAGE REF. 50501799
SURVEY DATE: MAY 2007


GRID REF. 505588, 180474
IMAGE REF. GM09B3F -
SURVEY DATE: 20-04-2013


GRID REF. 505588,180474
IMAGE REF. 113644-1_OSR
SURVEY DATE: 06-08-2016

Flood Map for Planning centred on the land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex UB7 7RT - Ref: 87355, 18/08/2017 - HNL56105BC



Environment Agency
2 Bishops Square Business Park
St Albans Road West
Hatfield
Hertfordshire
AL10 9EX

0 125 250 500
Metres

Legend

Main Rivers

Flood Map for Planning

- Flood Storage Area
- Areas Benefiting from Flood Defences
- Flood Zone 3
- Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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Hertfordshire
AL10 9EX

0 45 90 180
Metres

Legend

Main Rivers

Defended Flood Outlines

- 1 in 2 (50%) Defended
- 1 in 5 (20%) Defended
- 1 in 10 (10%) Defended
- 1 in 20 (5%) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences.
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Hertfordshire
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0 45 90 180
Metres

Legend

Main Rivers

Defended Flood Outlines

- 1 in 50 (2%) Defended
- 1 in 100 (1%) Defended
- 1 in 100+20% (*CC) Defended
- 1 in 1000 (0.1%) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).
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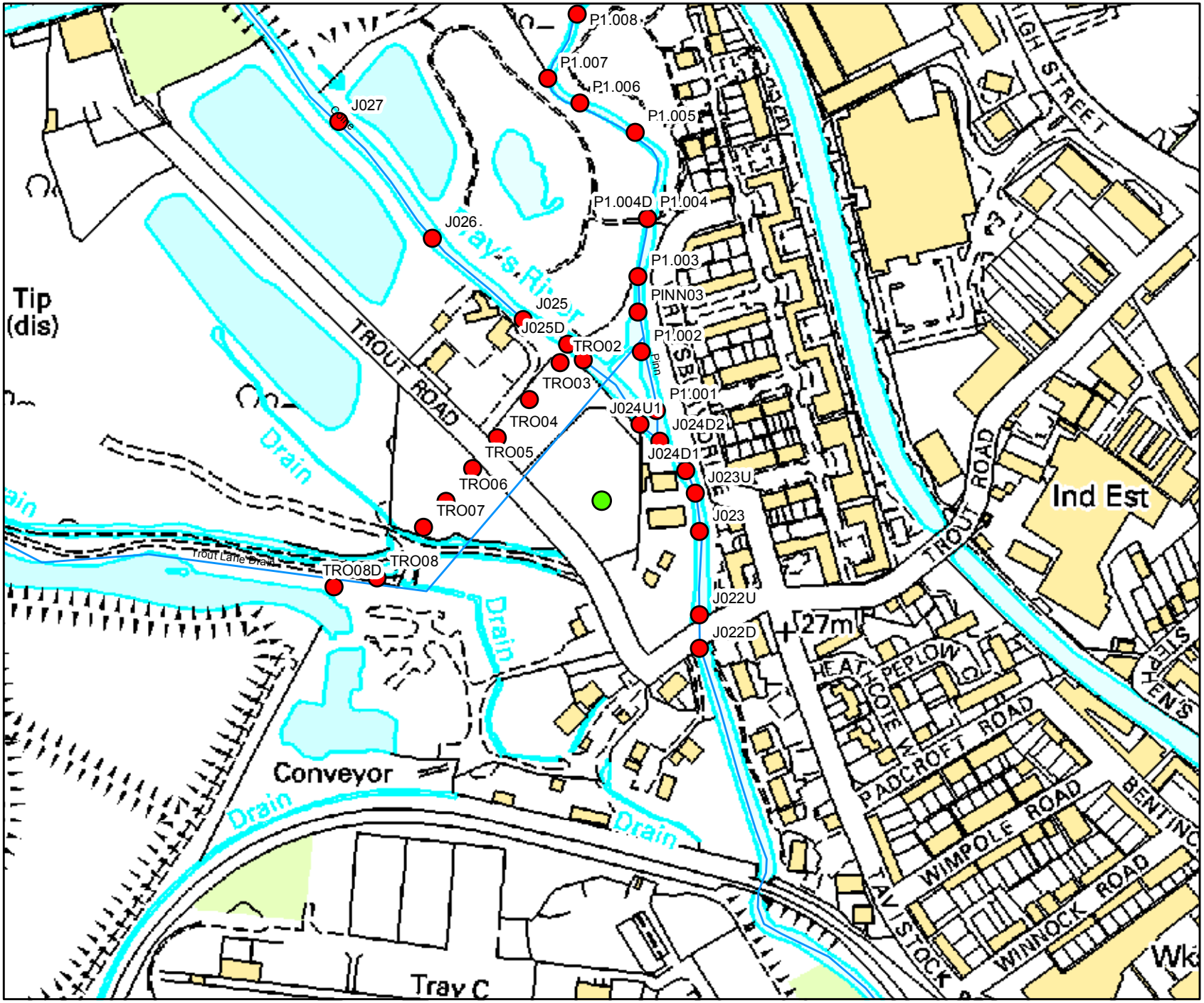
Detailed FRA centred on the land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex UB7 7RT - Ref: 87355, 18/08/2017 - HNL56105BC



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0 45 90 180
Metres

Legend

Main Rivers

Defended Flood Outlines

Node Results

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https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

All flood levels are given in metres Above Ordnance Datum (mAOD)
All flows are given in cubic metres per second (cumecs)

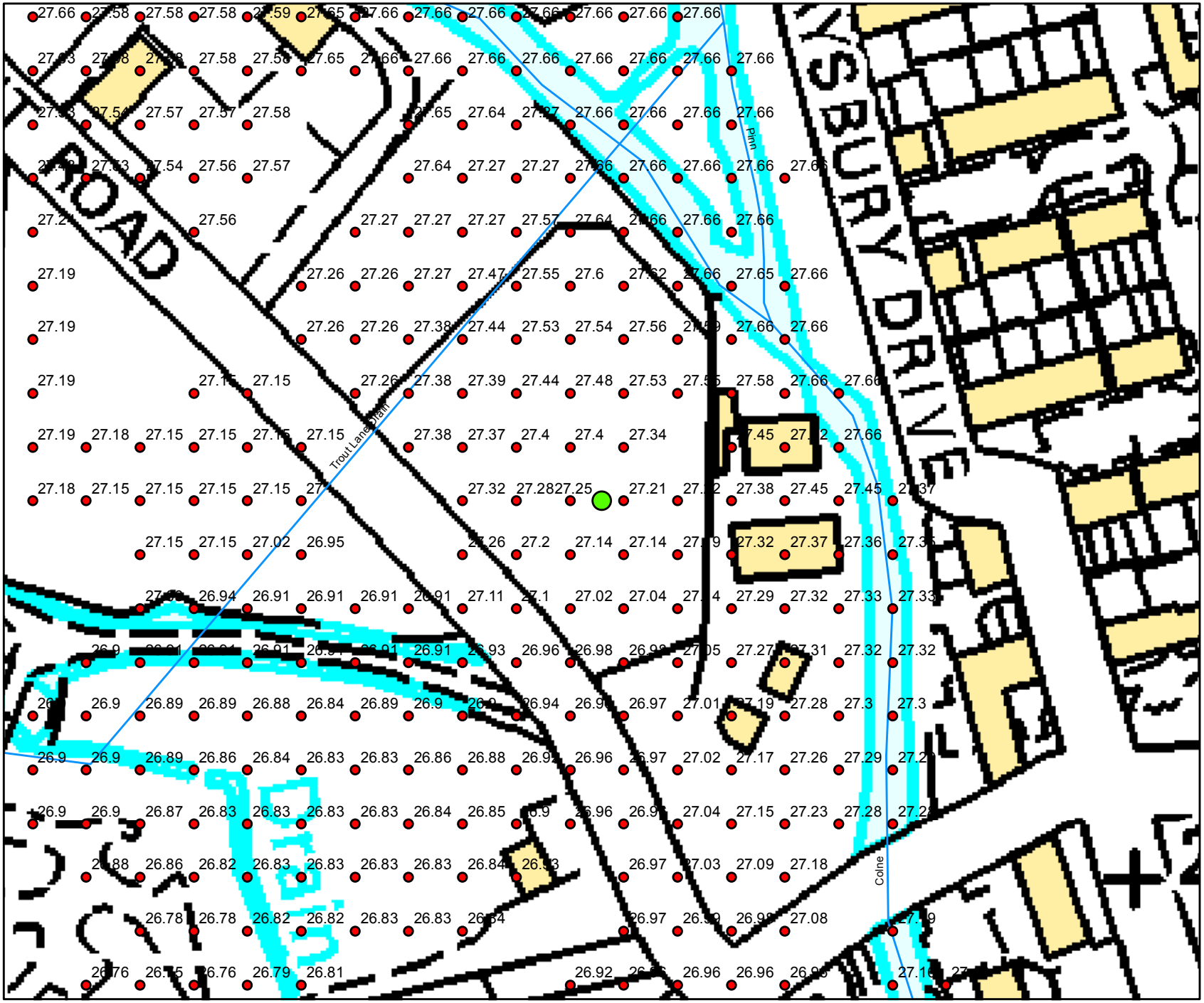
MODELLED FLOOD LEVEL

			Return Period							
Node Label	**Easting**	**Northing**	**2 yr**	**5 yr**	**10 yr**	**20 yr**	**50 yr**	**100 yr**	**100 yr + 20%**	**1000 yr**
J022D	505617	180424.00	27.07	27.13	27.15	27.17	27.18	27.18	27.19	27.20
J022U	505617	180446.00	27.13	27.19	27.22	27.23	27.25	27.25	27.27	27.28
J023	505617	180500.00	27.19	27.25	27.28	27.30	27.31	27.31	27.33	27.34
J023U	505614	180525.00	27.23	27.30	27.32	27.34	27.35	27.36	27.38	27.39
J024D1	505608	180540.00	27.46	27.55	27.59	27.61	27.62	27.63	27.66	27.68
J024D2	505591	180559.00	27.48	27.56	27.60	27.61	27.63	27.64	27.67	27.68
J024U1	505578	180570.00	27.48	27.56	27.60	27.61	27.63	27.64	27.67	27.68
J024U2	505541	180612.00	27.47	27.56	27.60	27.61	27.62	27.64	27.66	27.68
J025	505502	180638.00	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
J025D	505531	180622.00	27.47	27.56	27.60	27.61	27.62	27.64	27.66	27.68
J026	505443	180691.00	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
J027	505382	180767.00	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
P1.001	505589	180579.00	27.48	27.56	27.60	27.61	27.63	27.64	27.67	27.68
P1.002	505579	180617.00	27.48	27.56	27.59	27.61	27.63	27.64	27.66	27.68
P1.003	505577	180666.00	27.57	27.67	27.71	27.74	27.76	27.78	27.80	27.82
P1.004	505583	180704.00	27.63	27.75	27.79	27.83	27.86	27.88	27.90	27.93
P1.004D	505583	180704.00	27.63	27.75	27.79	27.83	27.86	27.88	27.90	27.93
P1.005	505575	180760.00	27.68	27.81	27.85	27.89	27.92	27.93	27.95	27.98
P1.006	505539	180779.00	27.73	27.85	27.90	27.93	27.96	27.98	28.00	28.03
P1.007	505518	180795.00	27.75	27.87	27.91	27.95	27.98	28.00	28.02	28.05
P1.008	505537	180837.00	27.81	27.96	28.01	28.05	28.09	28.11	28.13	28.16
PINN03	505577	180643.00	27.48	27.56	27.59	27.61	27.63	27.64	27.66	27.68
TRO02	505526	180610.00	27.08	27.14	27.16	27.17	27.21	27.23	27.27	27.30
TRO03	505506	180586.00	27.08	27.13	27.15	27.16	27.20	27.23	27.27	27.30
TRO04	505485	180561.00	27.08	27.13	27.15	27.16	27.20	27.22	27.26	27.29
TRO05	505469	180541.00	27.04	27.07	27.09	27.09	27.12	27.13	27.15	27.17
TRO06	505452	180520.00	27.04	27.07	27.08	27.09	27.12	27.13	27.15	27.17
TRO07	505437	180503.00	27.04	27.07	27.08	27.09	27.11	27.13	27.15	27.16
TRO08	505407	180470.00	27.02	27.05	27.05	27.06	27.07	27.09	27.10	27.10
TRO08D	505379	180464.00	27.02	27.05	27.06	27.06	27.08	27.09	27.10	27.10

MODELLED FLOWS

			Return Period							
Node Label	**Easting**	**Northing**	**2 yr**	**5 yr**	**10 yr**	**20 yr**	**50 yr**	**100 yr**	**100 yr + 20%**	**1000 yr**
J022D	505617	180424	6.20	6.70	6.95	7.01	7.09	7.17	7.34	7.46
J022U	505617	180446	6.20	6.70	6.95	7.01	7.09	7.17	7.34	7.46
J023	505617	180500	6.36	7.26	7.67	7.90	8.10	8.30	8.67	8.98
J023U	505614	180525	6.27	7.04	7.46	7.54	7.68	7.82	8.11	8.34
J024D1	505608	180540	6.27	7.04	7.46	7.54	7.68	7.82	8.11	8.34
J024D2	505591	180559	6.38	7.44	8.13	8.25	8.41	8.69	9.31	9.85
J024U1	505578	180570	0.44	0.41	0.41	0.44	0.49	0.57	1.85	1.76
J024U2	505541	180612	0.44	0.41	0.40	0.43	0.49	0.57	1.71	1.63
J025	505502	180638	0.92	1.03	1.16	1.24	1.58	1.25	2.14	2.18
J025D	505531	180622	1.33	1.50	1.56	1.70	2.03	1.88	2.32	2.56
J026	505443	180691	0.91	1.01	1.13	1.13	1.36	1.24	2.10	2.67
J027	505382	180767	0.53	0.41	0.40	0.43	0.49	0.55	1.61	3.23
P1.001	505589	180579	8.80	11.01	11.87	12.69	13.41	13.84	14.36	15.12
P1.002	505579	180617	9.59	11.87	12.76	13.57	14.32	14.72	15.21	15.89
P1.003	505577	180666	9.59	11.86	12.76	13.56	14.32	14.72	15.21	15.90
P1.004	505583	180704	9.59	11.88	12.77	13.57	14.32	14.72	15.21	15.89
P1.004D	505583	180704	9.59	11.88	12.77	13.57	14.32	14.72	15.21	15.89
P1.005	505575	180760	9.59	11.86	12.77	13.57	14.32	14.82	15.44	16.36
P1.006	505539	180779	9.59	11.88	12.77	13.56	14.33	14.82	15.44	16.39
P1.007	505518	180795	9.59	11.88	12.75	13.56	14.33	14.82	15.44	16.40
P1.008	505537	180837	9.59	11.86	12.75	13.58	14.33	14.86	15.66	16.94
PINN03	505577	180643	9.59	11.87	12.76	13.57	14.32	14.72	15.21	15.89
TRO02	505526	180610	3.46	4.47	5.01	5.13	5.33	5.51	5.86	6.10
TRO03	505506	180586	3.46	4.48	5.04	5.20	5.47	5.69	6.22	6.65
TRO04	505485	180561	3.46	4.45	4.91	5.19	5.47	5.71	6.31	6.80
TRO05	505469	180541	3.46	4.45	4.91	5.19	5.47	5.71	6.31	6.80
TRO06	505452	180520	3.46	4.37	4.85	5.04	5.24	5.34	5.47	5.71
TRO07	505437	180503	3.34	3.93	4.13	4.31	4.92	5.15	5.70	6.17
TRO08	505407	180470	3.34	3.93	4.13	4.31	4.92	5.15	5.70	6.17
TRO08D	505379	180464	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Detailed FRA centred on the land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex UB7 7RT - Ref: 87355, 18/08/2017 - HNL56105BC



Environment Agency
2 Bishops Square Business Park
St Albans Road West
Hatfield
Hertfordshire
AL10 9EX

0 15 30 60
Metres

Legend

Main Rivers

2D Node Results: Heights

1 in 100+20% (*CC) Defended

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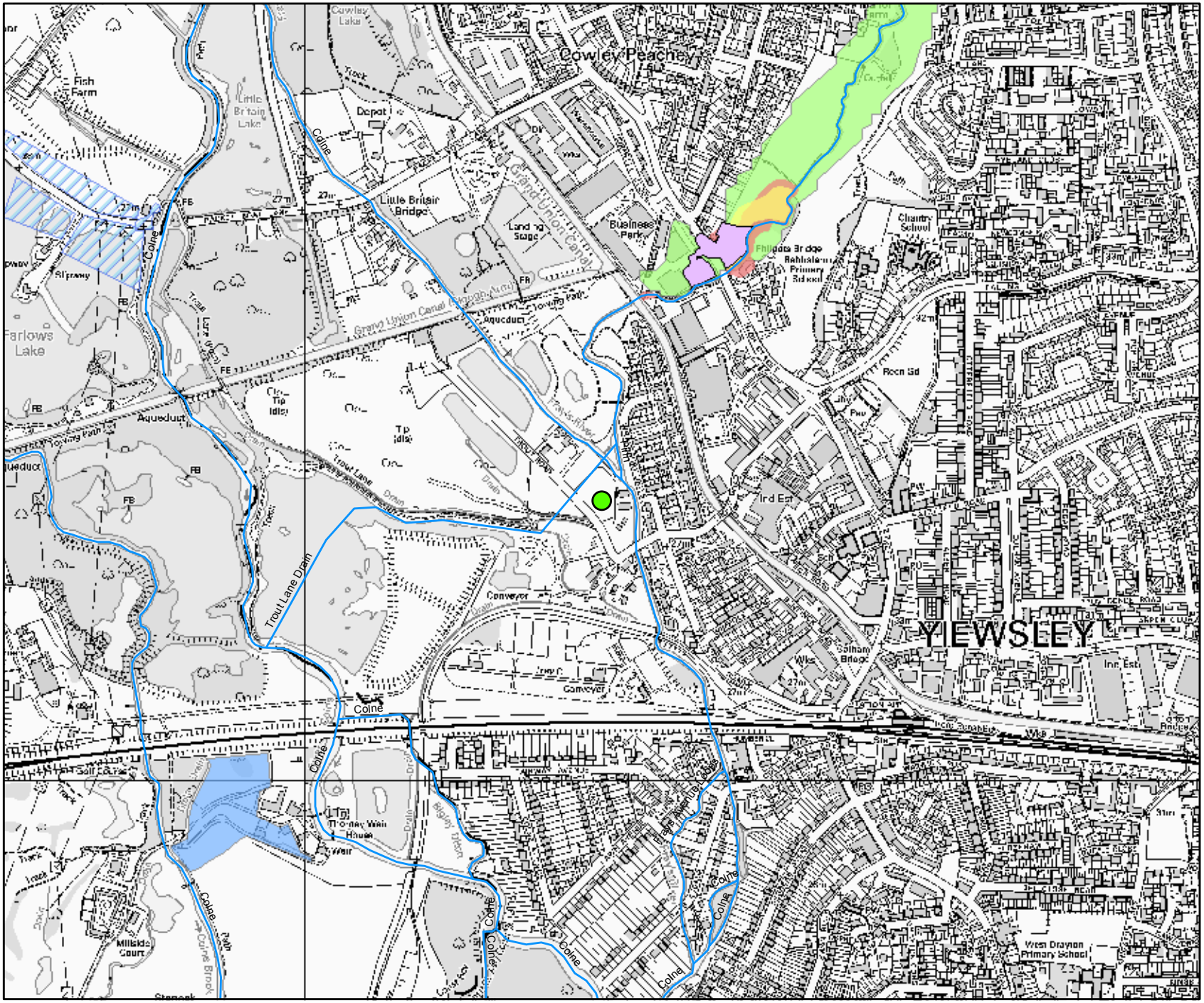
Historic Flood Map centred on the land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex UB7 7RT - Ref: 87355, 18/08/2017 - HNL56105BC



Environment Agency

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0 125 250 500
Metres

Legend

Main Rivers

Flood Event Outlines

- 2016
- 2014
- 2013
- 2009
- 1988
- 1987

The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.
Our historic flood event outlines do not provide a definitive record of flooding.
It is possible that there will be an absence of datain places where we have not been able to record the extent of flooding.
It is also possible for errors occur in the digitisation of historic records of flooding.

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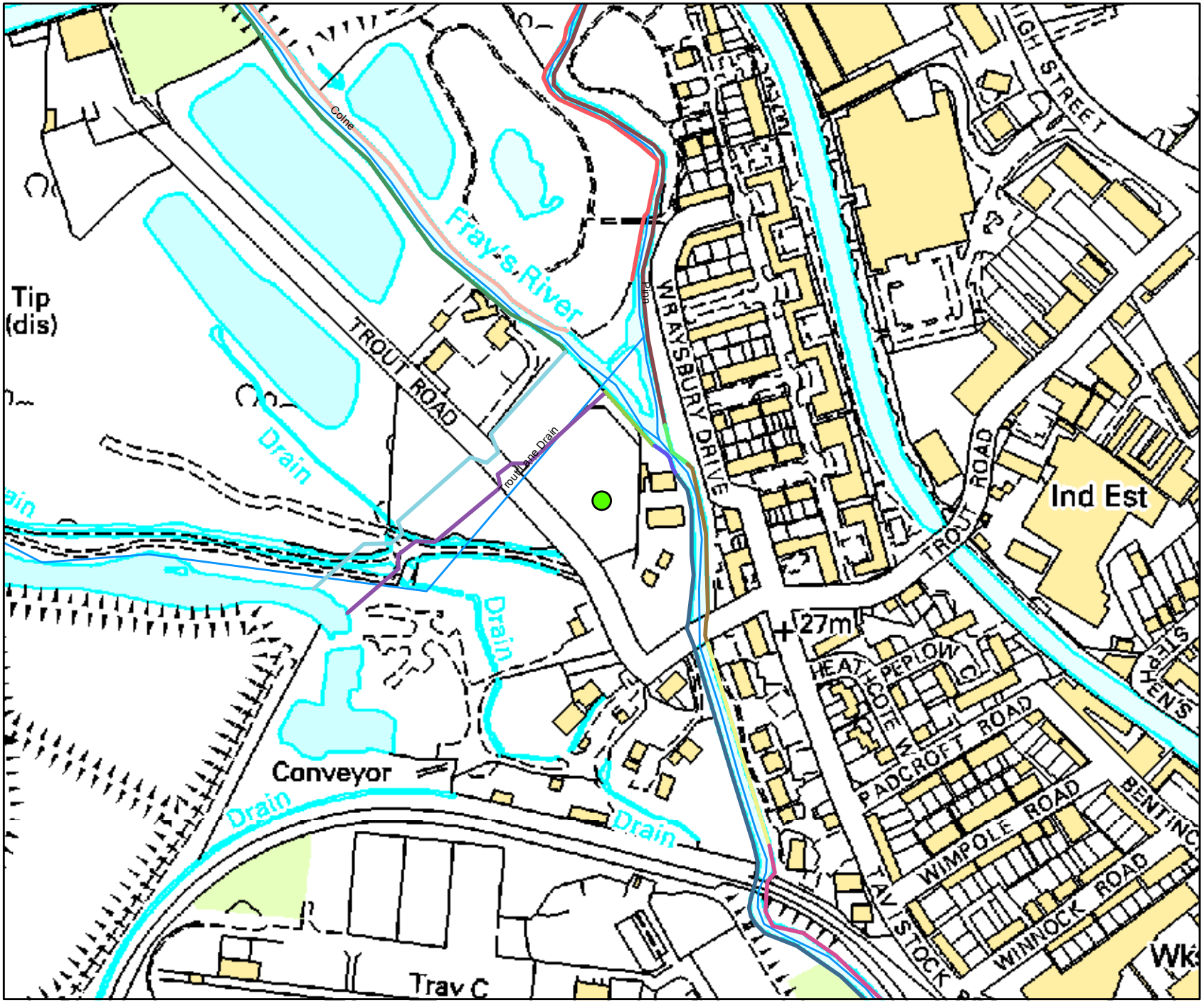
Structures and Defences centred on the land north east side of Trout Lane, Yiewsley, West Drayton, Middlesex UB7 7RT - Ref: 87355, 18/08/2017 - HNL56105BC



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Hertfordshire
AL10 9EX

0 45 90 180
Metres

Legend

Main Rivers

NAFRA_DEFENCE ASSET_ID	
9189	437990
9246	448679
12052	448978
35067	448979
37875	448983
153549	448984
	448986

The following information on defences has been extracted from the Asset Information Management System (AIMS)

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Environment Agency ref: HNL56105BC
Ref: 87355

The following information on defences has been extracted from the Asset Information Management System (AIMS)

Defences

Asset ID	Asset Type	Asset Protection	Asset Comment	Asset Description	Design Standard of protection (years)	Downstream Crest Level	Upstream Crest Level	Condition of Defences (1=Good, 5 = Poor)
9246	high_ground	fluvial	Natural Vegetated Channel	Natural Bank	5	No data	No data	3
12052	high_ground	fluvial	Natural vegetated channel	Natural Channel	80	26.45	27.6	3
9189	high_ground	fluvial	Natural Vegetated Banks	Natural Channel	5	No data	No data	3
437990	embankment	fluvial	No data	250m flood relief channel built as part of the lower colne scheme in 2002	No data	No data	No data	3
448679	embankment	fluvial	No data	250m flood relief channel built as part of the lower colne scheme in 2002	No data	No data	No data	3
448986	high_ground	fluvial	No data	No data	No data	No data	No data	No data
448984	wall	fluvial	No data	Right bank of frays regulator	No data	No data	No data	2
448978	wall	fluvial	No data	Sheet piled walls that form a regulator structure with P4 handrailling to the top. The regualator restricts flow down the frays and increase the standard of protection in west drayton	No data	No data	No data	2
448983	high_ground	fluvial	No data	No data	No data	No data	No data	No data
448979	high_ground	fluvial	No data	No data	No data	No data	No data	No data
153549	high_ground	fluvial	Combination of brick and cast insitu concrete bank protection	Bank protection.	80	27.19	27.48	3
37875	high_ground	fluvial	Natural vegetated channel	Natural Channel	80	30.85	27.19	2
35067	high_ground	fluvial	Natural vegetated channel	Natural Channel	80	26.99	27.44	3