Development off Croston Road, Farington Moss Flood Risk Assessment

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Flood Risk Assessment

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1 Introduction

1.1 Basis of Report

AECOM has been commissioned by Lea Hough and HCA to undertake a Flood Risk Assessment (FRA) for a proposed residential development in Leyland, Lancashire. The site location is shown in the plan in Appendix A1 and the current development proposals are as shown on the plan in Appendix A2.

This study has been undertaken in accordance with the National Planning Policy Framework (Communities and Local Government; March 2012) (NPPF), and the supporting Technical Guidance to the National Planning Policy Framework (Communities and Local Government; March 2012) (referred to hereafter as the Technical Guidance).

1.2 Purpose of Study

The objective of this report is to assess four main issues in relation to flood risk:

- Acceptability of the proposed development in accordance with planning policy;
- Risk to the proposed development and users of the proposed development from all forms of flooding;
- Risk of increasing flooding elsewhere due to the proposed development (resulting from increased surface water runoff, changes in flood routing through the proposed development and loss of flood plain storage); and
- Appropriate mitigation measures to limit the impact of flooding on the proposed development and off-site flooding.

1.3 Sources of Information

The assessment is based on desk-top study of information from the following sources:

- Environment Agency Online Flood Maps (August 2012);
- Envirocheck Flood Screening Report (August 2012);
- Central Lancashire Strategic Flood Risk Assessment (Scott Wilson, 2007); and
- Drainage Strategy Report (AECOM, 2011).

In addition to the desk-top study, a site visit was carried out (See Photographs in Appendix A3) and consultation was undertaken with the following parties:

- The Environment Agency (EA);
- South Ribble Borough Council (SRBC);
- Lancashire County Council (LCC) and
- United Utilities (UU).

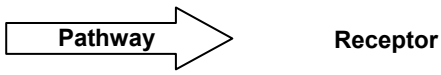
1.4 Flood Risk

Flood risk takes account of both the probability and the consequences of flooding:

Flood risk = probability of flooding x consequence of flooding

Probability is usually interpreted in terms of the return period, e.g. 1 in 100 and 1 in 200 year event etc. In terms of probability, there is a 1 in 100 (1%) chance of one or more 1 in 100 year floods occurring in a given year. The consequence of flooding depends on how vulnerable a receptor is to flooding.

The components of flood risk can be considered using the source-pathway-receptor model:



Sources constitute flood hazards, which are anything with the potential to cause harm through flooding (e.g. rainfall, extreme sea levels, river flows and canals). Pathways represent the mechanism by which the flood hazard would cause harm to a receptor (e.g. overtopping and failure of embankments and flood defences, inadequate drainage and inundation of floodplains). Receptors comprise of the people, property, infrastructure and ecosystems that could potentially be affected should a flood occur.

2 Planning Policy Context

2.1 National Planning Policy

The NPPF and the associated Technical Guidance is the current guide on national planning policy in respect to flood risk. Together these documents provide guidance on how to evaluate sites with respect to flood risk.

A summary of the requirements of the NPPF and the Technical Guidance is provided below.

2.1.1 Sources of Flooding

The NPPF Technical Guidance requires an assessment of flood risk to consider all forms of flooding, and lists six forms of flooding that should be considered as part of a flood risk assessment. These forms of flooding are listed in Table 1, along with an explanation of each form of flooding.

Table 1: Potential Forms of Flooding

Flooding From Rivers (Fluvial Flooding)
Watercourses flood when the amount of water in them exceeds the flow capacity of the river channel. Flooding can either develop gradually or rapidly, depending on the characteristics of the catchment. Land use, topography and the development can have a strong influence on flooding from rivers.
Flooding From the Sea (Tidal Flooding)
Flooding to low-lying land from the sea and tidal estuaries is caused by storm surges and high tides. Where tidal defences exist, they can be overtopped or breached during a severe storm, which may be more likely with climate change.
Flooding from Land (Pluvial Flooding)
Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. In developed areas, this flood water can be polluted with domestic sewage where foul sewers surcharge and overflow. Local topography and built form can have a strong influence on the direction and depth of flow. The design of development down to a micro-level can influence or exacerbate this. Overland flow paths should be taken into account in spatial planning for urban developments. Flooding can be exacerbated if development increases the percentage of impervious area.
Flooding from Groundwater
Groundwater flooding occurs when groundwater levels rise above ground levels (i.e. groundwater issues). Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). Chalk is the most extensive source of groundwater flooding.
Flooding from Sewers
In urban areas, rainwater is frequently drained into sewers. Flooding can occur when sewers are overwhelmed by heavy rainfall, and become blocked. Sewer flooding continues until the water drains away.
Flooding from Other Artificial Sources (i.e. reservoirs, canals, lakes and ponds)
Non-natural or artificial sources of flooding can include reservoirs, canals and lakes. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

2.1.2 Flood Zones

For river and sea flooding, the NPPF Technical Guidance uses four Flood Zones to characterise flood risk which are also used by the EA. These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences, and are detailed in Table 2.

Table 2: Flood Zones (Adapted from the NPPF Technical Guidance, Table 1)

Flood Zone	Definition
1	Low probability (less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%))
2	Medium probability (between 1 in 100 and 1 in 1,000 annual probability of river flooding (1%-0.1%)or between 1 in 200 and 1 in 1,000 annual probability of sea flooding(0.5%-0.1%) in any year).
3a	High probability (1 in 100 or greater annual probability of river flooding (>1%) in any year or 1 in 200 or greater annual probability of sea flooding (>0.5%) in any given year).
3b	This zone comprises land where water has to flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 20 (5%), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

The Flood Zones do not take into account the projected effects of climate change (discussed further in Section 3.1.5) and may not represent potential flooding from smaller watercourses.

2.1.3 Vulnerability

The NPPF Technical Guidance classifies the vulnerability of developments to flooding into five categories. These categories are summarised in Table 3.

Table 3: Flood Risk Vulnerability Classification (Adapted from the NPPF Technical Guidance, Table 2)

Flood Risk Vulnerability Classification	Examples of Development Types
Essential Infrastructure	- Transport Infrastructure - Utility Infrastructure (e.g. grid and primary sub stations, water treatment works and wind turbines)
Water Compatible	- Flood Control Infrastructure - Water and Sewerage Infrastructure - Navigation Facilities
Highly Vulnerable	- Emergency Services which are required in times of flood - Basement Dwellings - Mobile home parks - Installations requiring hazardous substances consent
More Vulnerable	- Hospitals and other health services - Residential Establishments - Educational Establishments - Landfill and hazardous waste management facilities - Caravan and camping sites
Less Vulnerable	- Commercial Establishments (e.g. shops, restaurants and offices) - Emergency Services which are not required in times of flood - Agriculture and forestry land

Based on the vulnerability of a development, the Technical Guidance states what Flood Zone(s) the development is appropriate within. The flood risk vulnerability and Flood Zone ‘compatibility’ of developments is summarised in Table 4.

Table 4: Flood Risk Vulnerability and Flood Zone Compatibility (Extract from the NPPF Technical Guidance, Table 3)

Flood Risk Vulnerability Classification		**Essential Infrastructure**	**Water Compatible**	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**
Flood Zone	**1**	✓	✓	✓	✓	✓
	2	✓	✓	Exception Test required	✓	✓
	3a	Exception Test required	✓	×	Exception Test required	✓
	3b	Exception Test required	✓	×	×	×

Key to Table 4: ✓ Development is appropriate × Development should not be permitted

2.1.4 The Sequential Test, Exception Test and Sequential Approach

The Sequential Test is a risk-based test that should be applied at all stages of development and aims to steer new development to areas with the lowest probability of flooding. It should be demonstrated that there are no other suitable sites in lower flood risk zones. For strategic sites, this is applied by the Local Planning Authority by means of a Strategic Flood Risk Assessment (SFRA).

The SFRA and NPPF may require the Exception Test to be applied to certain forms of new development. The test considers the vulnerability of the new development to flood risk and, to be passed, must demonstrate that:

i. There are sustainability benefits that outweigh the flood risk;
ii. The new development is safe and does not increase flood risk elsewhere.

The Sequential Approach is also a risk based approach to development. In a development site located in several Flood Zones or with other flood risks, the sequential approach directs the most vulnerable types of development towards the areas of least risk within the site.

2.1.5 Climate Change

The NPPF and Technical Guidance make it a planning requirement to account for climate change in the proposed design. The recommended allowances are summarised in Table 5 below.

Table 5: Climate Change Allowances (Extract from the NPPF Technical Guidance, Table 5)

Parameter	**1990 to 2025**	**2025 to 2055**	**2055 to 2085**	**2085 to 2115**
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Note: A new set of climate change projections (known as UKCP09) were published in 2009, however guidance on their application in flood risk and coastal management has not yet been produced by Defra

2.1.6 Sustainable Drainage

The key planning objectives in the NPPF are to appraise, manage and where possible, reduce flood risk. Sustainable Drainage Systems (SUDS) provide an effective way of achieving some of these objectives, and the NPPF and Part H of the Building Regulations (Office of the Deputy Prime Minister, 2002) directs developers towards the use of SUDS wherever possible.

The Floods and Water Management Act 2010 also reinforces the requirements for SUDS to be implemented where practicable. When fully implemented, the above act requires Local Authorities to act as SUDS Approval Bodies, which will be responsible for reviewing drainage designs and ensuring that the development incorporates SUDS where practicable.

Part H of the Building Regulations state that surface water should be discharged from a development in accordance with the following hierarchy as far as practicable:

1) By infiltration to the ground;
2) To a watercourse;
3) To a public sewer.

2.2 Local Planning Policy

Local planning policy and guidance relating to flood risk has been considered as part of this assessment.

Current planning policy, used to manage development in the SRBC area, is set out in the Core Strategy Development Plan Documents of the Central Lancashire Local Development Framework (LDF).

Policy 29: Water Management states the following aims:

"Improve water quality, water management and reduce the risk of flooding by:

(a) Minimising the use of potable mains water in new developments;

(b) Working with the regional water company and other partners to promote investment in sewage water treatment works to reduce the risk of river pollution from sewage discharges;

(c) Working with farmers to reduce run-off polluted with agricultural residues into watercourses;

(d) Appraising, managing and reducing flood risk in all new developments, avoiding inappropriate development in flood risk areas particularly in Croston, Penwortham, Walton-le-Dale and southwest Preston;

(e) Pursuing opportunities to improve the sewer infrastructure, particularly in Grimsargh, Walton-le-Dale and Euxton, due to the risk of sewer flooding;

(f) Managing the capacity and timing of development to avoid exceeding sewer infrastructure capacity;

(g) Encouraging the adoption of Sustainable Drainage Systems;

(h) Seeking to maximise the potential of Green Infrastructure to contribute to flood relief."

3 Background Information

3.1 Development Site

The existing site covers approximately 12.8 ha of 'greenfield' land in Farington Moss, Leyland, Lancashire. The site location and boundary is shown in the plans in Appendix A1.

The site is irregular in shape but is generally bound by Bannister Lane to the North, the rear of the houses on Croston Road to the east, Hough Lane to the south, and Flensburgh Way to the west.

The site is divided by field boundary hedges and fences, and by a network of land drains. The south east corner of the site is bisected by the road named Heatherleigh.

3.1.1 Flood Zone

With reference to the EA Flood Zone Map included in Appendix 4, it can be seen that the site is located entirely within Flood Zone 1, suggesting a low risk of fluvial flooding.

3.1.2 Topography

From the Topographical Survey provided (Appendix A5) it can be seen that the site is relatively flat, ranging in height from approximately 25.0mAOD in the north east to approximately 23.0mAOD on the west and 23.5mAOD on the south. There are a number of land drains within the site which range in depth from between 0.5m and 1.5m.

3.1.3 Hydrology

The site is located approximately 200m to the west of the River Lostock; the nearest EA designated 'Main River'. There is a network of land drains and culverts serving to drain the site and surrounding area, details of which are set out in Section 4.1.2.

3.1.4 Geology and Hydrogeology

With reference to the Phase 1 Geo-environmental Desk Study Report for the site (AECOM, 2012), the published 1:50,000 scale geological maps of the area produced by the BGS - Sheet 75, Preston, Drift Edition (1950) and Solid Edition (1982) – indicate the site is underlain by Glacial Till overlying the Sidmouth Mudstone Formation of the Mercia Mudstone Group. The Sidmouth Mudstone is classified as a Secondary B Aquifer, while the overlying Glacial Till is classified as Unproductive Strata. The site is not located within a Source Protection Zone. Peat is indicated to be present to the immediate northwest of the site.

The report notes that there is a possible presence of shallow groundwater, and soft ground related to the presence of Made Ground and Peat (on extreme western boundary) of the site.

3.2 Development Proposals

The current development proposal is for between 300 and 350 new residential properties and associated infrastructure to be developed on the site. The current masterplan for the development is shown in Appendix A2. It can be seen that the current proposal is influenced by the existing field boundaries and the existing water features within the site.

3.2.1 Lifetime of the Development and Climate Change Allowance

The NPPF requires climate change to be taken into account in drainage design and the assessment of flood risk. The EA recommend that residential developments should be designed for a 100 year lifetime, and that educational, retail and commercial developments should be designed for a 60 year lifetime.

As the proposals are for a residential development the lifetime shall be taken as 100 years. Therefore, in accordance with the NPPF Technical Guide (Table 5), an allowance for a 30% increase in rainfall intensity should be incorporated in any drainage design for the proposed development, and an increase of 20% on peak river flows will be allowed in any assessment of watercourses.

3.2.2 Flood Risk Vulnerability and Flood Zone Compatibility of the Development

The vulnerability classifications of developments to flooding, as defined by the NPPF Technical Guide are outlined in Section 2. From Table 3 it can be seen that general residential development is considered to be 'More Vulnerable'.

In accordance with Table 4, it can be seen that More Vulnerable development is considered appropriate in the planning context for location in Flood Zone 1.

Although the proposed development is considered compatible with its location on this basis, it must still be subject to appropriate flood risk assessment and implementation of appropriate mitigation measures to ensure it is safe and does not cause an increase in flood risk elsewhere.

3.2.3 Sequential and Exception Tests

The requirements for the Sequential and Exception Tests were outlined in Section 2.

The Sequential Test is considered to be passed for the proposed development by virtue of the fact that the site is located entirely in Flood Zone 1.

As the proposed development has been shown to be ‘compatible’ with its location, there is no requirement for the Exception test to be applied.

4 Drainage Assessment

This drainage assessment seeks to demonstrate that the proposed development is able to discharge foul and surface water flows without increasing the flood risk both on and off site. The strategy will need to be confirmed by the developer at the detailed design stage and prior to construction. This assessment considers the following:

- Existing drainage arrangements;
- Potential discharge arrangements;
- Climate change; and
- The mitigation measures needed for surface water and foul water disposal.

This section builds on the drainage assessment work undertaken previously by AECOM and reported in the Drainage Strategy Report (December 2011), but should be considered to supersede that report with respect to this development site, as further information on the most appropriate drainage arrangements for the site has been established through the current study.

4.1 Existing Surface Water Drains and Sewers

4.1.1 Public Sewers and Highway Drains

The UU public sewer records (Appendix 6) indicate that there is 225mm diameter surface water highway drain in Heatherleigh (within the site) which flows west, then south west into a 450mm diameter surface water public sewer in the southern part of Heatherleigh (to the south of the site).

In Hugh Lane there is a short 225mm diameter surface water public sewer flowing east which discharges into a 900mm private surface water culvert, also flowing east. This culvert turns and continues in a south-easterly direction through private land, towards the River Lostock at its crossing beneath Leyland Lane at Earnshaw Bridge. During consultation, LCC confirmed that any culvert beneath the highway would be the responsibility of LCC as riparian owner. LCC are not able to confirm the source of the 900mm culvert or the available capacity within it, although stated that it was possibly installed 20-30 years ago as part of attempt to encourage development of the area.

4.1.2 Land Drainage

From inspection during the site visit and review of the Topographical Survey (Appendix A5) it has been determined that there is a network of land drains within the site. The drains are open channels/ditches ranging in depth from approximately 0.5m to approximately 1.5m and are culverted beneath access tracks in a number of locations within the site. Some of the drains are broken in places by infill, but the majority connect to form a network of land drainage serving the site. Figure 1 identifies the approximate locations of the drains within the site and the possible inflows and outflows.

Based on the topography of the site, it can be assumed that the land drains receive natural surface water flows from the greenfield land within the site.

In the south west corner of the site two pipes were identified by the topographical survey – a 450mm diameter pipe and a 750mm diameter pipe. There was no indication given by the survey as to the connectivity of these pipes outside of the site, therefore it is unclear if they are incoming or outgoing pipes. However, the topographical survey has identified levels within the drains across the site which suggests that the general fall of the network is towards the south west corner of the site.

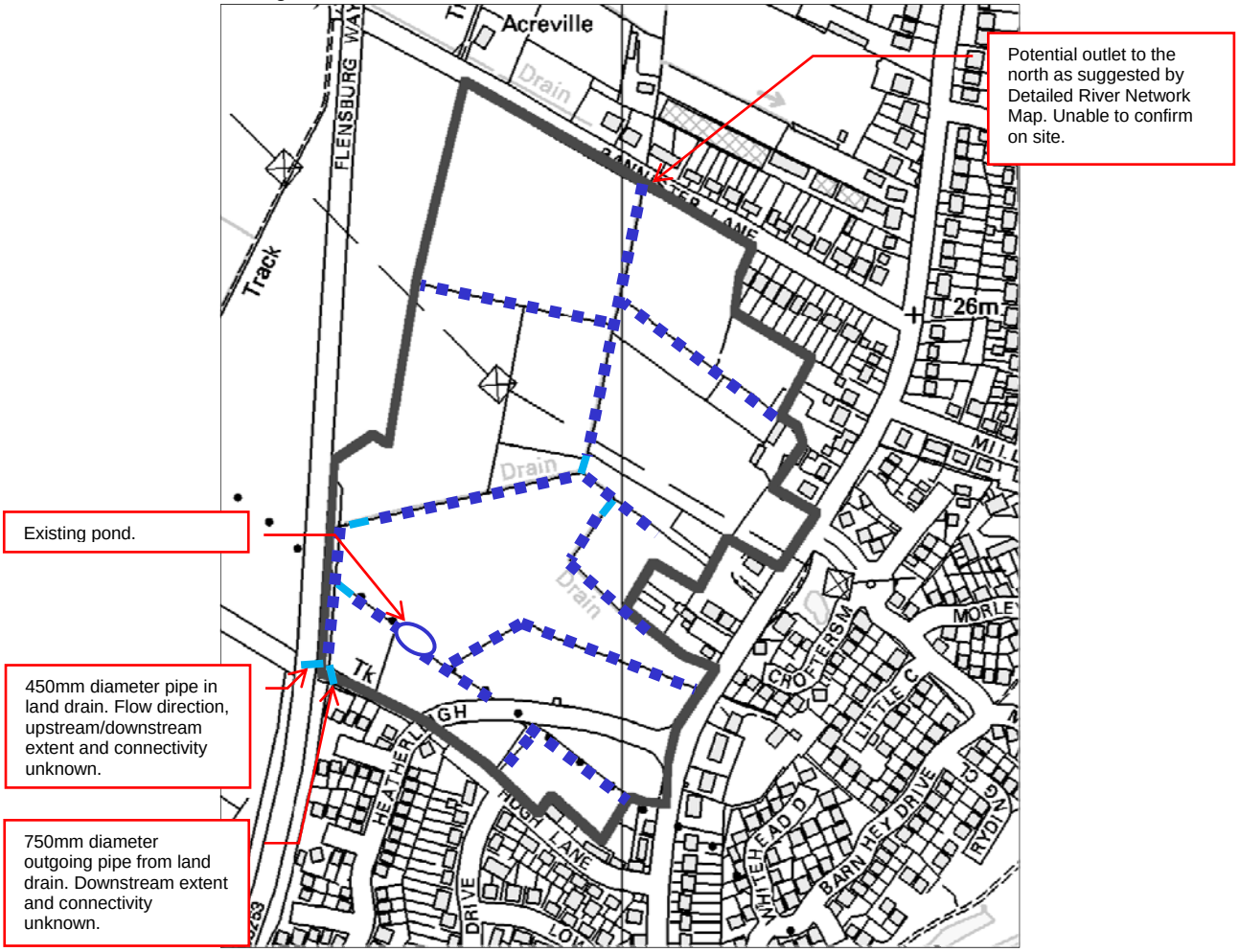
Inspection of the pipes during the site visit confirmed that water within the drain on the west of the site was flowing out of the site via the larger 750mm diameter pipe. Water flowing in this general direction was noted towards the centre of the site also. Consultation with LCC has confirmed that any culvert in the land immediately to the south of the site, by the principle of riparian ownership, would be the responsibility of LCC. They do not hold any records of assets in this location and are therefore unable to confirm connectivity. Although the 450mm diameter pipe enters the land drain from the direction of Flensburgh Way, LCC do not have any record of a link between the site and the drainage on Flensburgh Way. The EA confirmed they do not hold any record of the pipes in the south west corner of the site. It should be recognised that the absence of any record does not guaranteed there is no such infrastructure on site.

The EA Detailed River Network Map within the Envirocheck Flood Screening Report (Appendix A4) suggests that the land drainage network is limited to two drains which confluence towards the centre of the site, with the subsequent watercourse flowing towards the northern boundary of the site. The Detailed River Network Map suggests that the drain joins with a further network of land drains and culverts to the north of Bannister Lane before eventually discharging into the River Lostock to the rear of the properties on Riverside Road.

During the site visit it was not possible to confirm if this drainage path was existent and if surface water was flowing out of the site via this network to the north. The drain to the north of the site was filled with standing water with no clear direction of flow.

In summary, there is an existing network of land drains within the site which are assumed to drain the greenfield site. At this stage it has not been possible to confirm all outlets and/or inlets to the network, with the exception of a 750mm diameter outlet pipe in the south west corner of the site. Further investigation will be required at detailed design to confirm the inflows and outflows from the site and make suitable allowances in the design of the surface water management system.

Figure 1: Location of Drains on Site and Potential Inlet/Outlet Locations



Key to Figure 1:

- Site Boundary
- Land Drain confirmed by Topographical Survey (Appendix A5) and inspection on site
- Culvert confirmed by Topographical Survey (Appendix A5) and inspection on site

4.2 Proposed Surface Water Management Arrangements

This section sets out the current proposals for management of surface water.

It is envisaged that a holistic approach to the management of surface water within the site should be taken, so that both the proposed surface water drainage system and the existing land drain system on the site are considered in a way which will ensure no risk of flooding either on site or off site.

4.2.1 Methods of Surface Water Disposal

Part H of the Building Regulations states a hierarchy of how surface water disposal from the site should be managed. This hierarchy should be followed where practicable, and is listed below:

1) Infiltration
2) Watercourses
3) Public Sewers

4.2.1.1 Infiltration

As would be expected at this stage in the development programme, detailed ground investigations have not yet been undertaken within the Site, and therefore the potential for infiltration has not yet been established. However, with reference to the geological and hydrogeological context set out in Section 3.1.4, the ground conditions at the site are considered unlikely to be suitable for disposal of surface water by infiltration.

It is recommended that permeability testing in accordance with the method prescribed in BRE Digest 365 should be undertaken as part of the ground investigations on the site to confirm if there is any potential for infiltration.

It should be noted that discharging surface water to the ground would require Land Drainage Consent under the Land Drainage Act 1991 and will require discussion with the local authorities Groundwater and Contaminated Land Team in order to ensure that sensitive aquifers do not become polluted.

4.2.1.2 Watercourses

As described in Section 4.1, there are a number of existing land drains within the site which have been confirmed to leave the site via a 750mm diameter pipe in the south west of the site. Existing inflows to the drains have not been confirmed and there is the potential for there to be more than one outflow location. However, the existing site is assumed to drain naturally to these land drains and they can be seen to provide a flow out of the site. They are therefore likely to be the most appropriate point of surface water discharge for the drainage system serving the new development. The drainage design must ensure that the rate of discharge from the site is not increased by the new development, to ensure that there is no increase in flood risk downstream.

4.2.1.3 Public Sewers

Given the options for surface water disposal detailed above, it is unlikely that discharge of surface water to the public sewer will be necessary or acceptable to UU.

4.2.2 Attenuation and Storage Requirements

In order to ensure that there is no increase in surface water flows leaving the site, and thereby ensure that there is no increased risk of flooding downstream, the drainage design must ensure that flows from the proposed drainage system into the land drains are no greater than the existing greenfield flows.

This will be achieved by limiting flows from the proposed surface water drainage system to the equivalent ‘greenfield’ runoff rate and providing appropriate storage within the system.

4.2.2.1 Existing Runoff Rate

As agreed with the EA during initial discussions, the existing runoff rate from the site has been calculated using the methodology set out in the Institute of Hydrology Report No. 124 – Flood Estimation for Small Catchments (the IOH124 method). This methodology gives a greenfield runoff rate based on the site area, soil type and annual rainfall based on the location of the site within the United Kingdom.

For sites less than 50 ha in area, it is recommended that 50 ha is used as the area in calculations, and the result scaled down as appropriate. Using the 'Rural Runoff calculator' in the computer package WinDes by Microdrainage, the greenfield runoff for a 50 ha site has been calculated as shown in Appendix B1. Scaling this down provides an estimate of the average annual greenfield runoff rate for the site of **QBAR = 6.38 l/s/ha**.

4.2.2.2 Attenuation Requirements

In order to maintain the existing greenfield runoff rate from the site into the land drains, all discharges should be limited to the rate calculated above. It is likely that the most appropriate strategy would be for the proposed development to be divided into a number of smaller surface water drainage systems, each with a separate discharge, in order to mimic the natural/existing drainage patterns as closely as is reasonably practicable.

The limit of discharge from each of the new drainage systems will be the 'equivalent' greenfield runoff rate for that area, based on the greenfield runoff rate of 6.38 l/s/ha and the proposed impermeable area within each catchment. The limiting discharge for each drainage system can be calculated as follows:

Q = QBAR.A (l/s)

Where: QBAR = Greenfield runoff rate (l/s/ha) = 6.38 l/s/ha

A = Proposed impermeable area (ha)

In order to estimate the likely attenuation requirement, from the proposed masterplan layout in Appendix A2, it has been estimated that approximately 40% of the developed site may be impermeable. The total contributing impermeable area from the proposed site is therefore estimated to be **5.12 ha** (40% of the total site area).

Assuming flows will be restricted to the average annual greenfield runoff rate of 6.38l/s/ha, and taking into account the sites proposed impermeable area of 6ha, the total surface water flows from the drainage system into the land drains should be restricted to **32.67 l/s** (5.12 x 6.38).

4.2.2.3 Estimated Required Storage Volume

A volume of storage will be required within each surface water drainage system in order to ensure the discharge limit is adhered to whilst ensuring the required level of performance is maintained.

As prescribed within Building Regulations, surface water should be stored within the drainage system either below ground or within formal above ground systems for the 1 in 30 year storm event with an allowance for climate change (as discussed in Section 3.2.1). In excess of this up to the 1 in 100 year plus climate change events, ponding is tolerated above ground providing it is within the boundaries of the site and is controlled and accommodated in areas such as formal landscaping or car parks.

Attenuation storage could be in the form of a detention basin, retention basin, geo-cellular storage modules, a formal concrete tank or other appropriate SUDS systems. The location of storage should be formally agreed at detailed design, with appropriate consideration of the requirements to prevent flooding of buildings and provision of safe access/egress routes.

Currently, it is proposed that the existing pond and a new pond will be used to provide surface water storage.

The volume of attenuation storage required has been estimated using the computer package WinDes by Microdrainage, based on the estimated impermeable area and discharge limit from Section 4.2.2.2. In accordance with the NPFF an increase in rainfall intensity to account for climate change projections has been allowed for. The calculations assume all surface water enters the attenuation tank within 4 minutes and doesn't allow for storage within the pipes. The estimated required attenuation volumes required are below with calculations included in Appendix B2.

1 in 30 year + climate change event: 1982 – 2972 m^3

1 in 100 year + climate change event: 2796 – 4017 m^3

These volumes are considered to be a conservative figure and do not take account of storage within the sewerage network, time of entry, or time of concentration. Through detailed design it is likely that this volume can be reduced. Also, the volumes of storage will not necessarily be required in one place as storage can be provided within interim drainage components. The calculations should be revisited at detailed design based on the actual impermeable area and agreed discharge limits from each subcatchment.

4.2.2.4 Land Drains

The existing land drains within the site, as described in Section 4.1, may pose a risk of flooding to the development if the existing capacity is not sufficient to convey extreme events.

The capacity of the land drains and the inflows and outflows from the site will be confirmed at detailed design, which will allow a holistic assessment of the available storage capacity within the site. Additional attenuation and therefore additional storage may be required if it is determined that the existing land drains pose a risk of flooding (up to the 1 in 100 year plus climate change event) once inflows and outflows are confirmed.

As described in Section 4.2.2, within the proposals for the site, it is envisaged that many of the drains will be retained and will function as a part of the surface water drainage system. It is therefore recommended that a holistic approach to the management of surface water and the mitigation of flood risk from the land drains is taken at the detailed design stage. This will allow the drainage system for the site, including any required modifications to the land drains and requirements for attenuation and storage, to be designed so as to ensure that: (a) flows do not leave the site at a rate which is greater than the current rate of discharge; and (b) that there is adequate storage within the system to ensure that there is no risk of flooding from the land drains or drainage system up to the 1 in 100 year plus climates change rainfall event. The design should take account of any existing or proposed culverts to ensure that afflux flooding does not occur.

Any additional storage could be provided within the proposed drainage system by limiting the discharge further, or could be provided by creating new ponds within the land drains or widening the existing land drains.

4.2.2.5 Sustainable Drainage Systems (SUDS)

As outlined in Section 2, the NPPF and Part H of the Building Regulations direct developers towards the use of SUDS wherever possible. The EA encourages the use of SUDS where practicable, and their use is encouraged by SRBC.

In order to protect the receiving aquifer, watercourse or sewer from pollution, CIRIA Report C522 (Sustainable Urban Drainage Systems – Design Manual for England and Wales, 2000) suggests an approach for setting the level of treatment that surface water runoff will pass through before being discharged. The CIRIA report suggests that one level of treatment is provided for residential developments, two levels of treatment are provided for non-residential developments and three levels of treatment are provided for industrial developments.

Table 5 outlines the type of SUDS that could potentially be used on the Site. It should be noted that not all SUDS methods are suitable or necessary for all developments. Many factors, such as available space and ground conditions, will influence the choice of methods for a particular development. Further Ground Investigations such as boreholes and infiltration tests may be necessary to determine the suitability of the Site for SUDS applications.

The current development masterplan (Appendix A2) proposes to retain and utilise existing many of the existing drainage features of the site such as the pond and land drains. A new pond is proposed to provide surface water storage volume. Opportunities for further SUDS components which are appropriate to the site and development will be explored at detailed design stage.

If utilised these systems must be maintained correctly to ensure their safe operation and that flood risk to the site or off-site is not increased. Design guidance for SUDS is currently provided by CIRIA Report C979 (The SUDS Manual) but further guidance on design of adoptable SUDS is expected to be published following the creation of SUDS Approval Bodies under the Flood and Water Management Act 2010.

Table 5: Capability of different SUDS techniques (Extract from CIRIA C697, Table 1.7)

Technique	Description	Management Train Suitability						Water Quantity				Water Quality								Environmental Benefits		
		Prevention	Conveyance	Pre-treatment	Source control	Site Control	Regional Control	Conveyance	Detention	Infiltration	Water Harvesting	Sedimentation	Filtration	Adsorption	Biodegradation	Volatilisation	Precipitation	Uptake by plants	Nitrification	Aesthetics	Amenity	Ecology
Water butts, site layout and management	Good housekeeping and design practices.	■	▲		■			▲	▲	■	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Pervious pavement	Allow infiltration of rainwater into underlying construction/soil.	■			■	▲			■	■	▲	■	■	■	■	■				▲	▲	▲
Filter drain	Linear drains/ trenches filled with a permeable, often with a perforated pipe at the base of the trench.		■		■	▲		■	■				■	■	■	■						
Filter strips	Vegetated strips of gently sloping ground designed to drain water from impermeable areas and filter out silt and other particulates.			■	■			▲	▲	▲		■	■	■	■					▲	▲	▲
Swales	Shallow vegetated channels that conduct and/or retain water (and can permit infiltration when underlined). The vegetation filters particulates.		■		■	■		■	■	▲		■	■	■	■			▲		▲	▲	▲
Ponds	Depressions used for storing and treating water. They have a permanent pool and bankside emergent and aquatic vegetation.					■	■		■	▲	■	■	■	■	■	■	■	■	■	■	■	■
Wetlands	As ponds, but the runoff flows slowly but continuously through aquatic vegetation that attenuates and filters the flow. Shallower than ponds.		▲			■	■	▲	■	▲	■	■	■	■	■	■	■	■	■	■	■	■
Detention Basin	Dry depressions designed to store water for a specified retention time.					■	■		■			■	▲	▲	■			■		▲	▲	▲
Soakaways	Sub-surface structures that store and dispose of water via infiltration.				■					■			■	■	■							
Infiltration Trenches	As filter drains, but allowing infiltration through trench base and sides.		▲		■	■		▲	■	■			■	■	■	■						
Infiltration basins	Depressions that store and dispose of water via infiltration.					■	■		■	■			■	■	■	■				▲	▲	▲
Green roofs	Vegetated roofs that reduce runoff volume and rate.	■		■	■				■				■	■	■	■	■	■	■	■	■	■
Bioretention areas	Vegetated areas for collecting and treating water before discharge downstream, or to the ground via infiltration.				■	■			■	■		■	■	■	■	■	■	■	■	■	■	■
Sand filters	Treatment devices using sand beds as filter media.			■		■	▲		■	▲			■	■	■	■	■					
Silt removal devices	Manhole and/or proprietary devices to remove silt.			■								■										
Pipes, subsurface storage	Conduits and their accessories as conveyance measures and/or storage. Water quality can be targeted using sedimentation and filter media.		■			■		■	■			▲	▲	▲								

Key	
■	Recommended
▲	Some opportunities, subject to design

4.2.2.6 Highway Drainage

Use of SUDS for highway drainage will be explored at the detailed design stage.

Currently for collection of the surface run-off from the highways, it is anticipated that a conventional kerb and gully system will be used, however, combined kerb drainage systems could be used as an alternative to provide additional online storage upstream of the main attenuation features.

A petrol interceptor and silt trap with refuse screen may be required to be incorporated in the highway drainage design should there be large areas of car parking. These elements are included in order to maintain the runoff water quality entering the downstream watercourse, and assist the maintenance regime for the attenuation feature. The requirements for petrol interceptors is set out in the EA published Pollution Prevention Guidelines – Use and Design of Oil Separators in Surface Water Drainage Systems (PPG3).

4.2.2.7 Design Standard and Consents

Surface water drainage systems for the development shall be designed in accordance with The Building Regulations Part H or to Sewers for Adoption standard where adoption is proposed. Highway drainage should be designed in accordance with the Design Manual for Roads and Bridges or to Sewers for Adoption standard where adoption is proposed.

The surface water drainage strategy shall be confirmed at detailed design stage and shall ensure that the site is adequately drained without posing a risk of flooding on-site or off-site. The proposals shall be approved by SRBC (or the approving body at the time of submission) and should be agreed in principle with the EA also.

Flood Risk Consent may be required from the Lead Local Flood Authority (LCC) under the Land Drainage Act 1991 for any works which may affect the flow in the land drains within the site.

4.3 Existing Foul Drains and Sewers

The UU public sewer records (Appendix A6) indicate that within the site there is a 675mm diameter combined public sewer running from north to south across the western edge of the site. This existing public sewer is subject to an easement of 4m either side of the pipe.

There is a 150mm diameter combined public sewer in Bannister Lane, which runs westwards and joins a 450mm diameter combined public sewer flowing south in Croston Road.

There are no known existing private foul drainage within the site.

4.4 Proposed Foul Drainage Arrangements

It is anticipated that foul flows from the developed site will be discharged to a nearby public sewer.

4.4.1 Discharge Locations

It is assumed that foul flows will be discharged to either the 675mm diameter combined public sewer within the site or to the 450mm diameter combined public sewer in Croston Road. Early discussions with UU suggested that the foul drainage should be split between different connection points to the existing public sewers. The most appropriate discharge points for foul flows should be considered once the development proposals for the site are progressed.

An initial examination of the topographical survey and the sewer records indicates that foul drainage is likely to be achievable by gravity, however the requirement for a pumping station cannot be ruled out at this stage.

4.4.2 Design

Sewers for Adoption assumes a peak foul flow rate of 4000 litres per dwelling per day. Assuming 350 houses this equates to a peak foul flow rate of approximately 16l/s. During initial discussions, UU suggested a typical foul flow rate of 0.05l/s per dwelling was an appropriate allowance. This would equate to a flow rate of17.5l/s allowing for 350 houses. The peak foul flow rate from the development is therefore expected to be in the region of 16l/s-17.5l/s.

Foul drainage across the site should be designed as a separate system and. All new foul sewerage should be designed in accordance with Building Regulations Part H and Sewers for Adoption where sewers are to be adopted.

4.4.3 Consent

Formal consent from UU will be required to discharge foul flows from the development to their public sewer network, which should be sought prior to the development of the Site. A formal enquiry should be submitted to UU at detail design with information about the development proposals and estimated peak flow rate from the site. UU will then be able to undertake a detailed assessment of the local sewerage network to determine whether any network reinforcement would be required for the development.

During consultation with UU, they highlighted potential capacity restrictions relating to the local Wastewater treatment Works which will require addressing. Work with UU will be advanced at the detailed design stage to ensure that any network reinforcement required to provide foul drainage for the site will can be put in place.

5 Flood Risk Assessment

In accordance with the NPPF, flood risk must be assessed for all sources of flooding and development of the Site should be carried out in such a way as to mitigate any potential flood risk to both the proposed development and third parties and their property. This Section identifies all possible sources of flooding and assesses the flood risk associated with each source of flooding.

5.1 Tidal Flooding

The Site is not located near the coast or any tidally influenced watercourse, and is at a height of approximately 23-25mAOD. Based on this information, the flood risk from tidal flooding is considered to be low and acceptable.

5.2 Fluvial Flooding

5.2.1 River Lostock

The site is located approximately 200m west of the River Lostock which flows from north to south through the area. The River Lostock is classified as a Main River by the EA. The River Lostock lies in a relatively deep cut channel, as was observed during the site visit (See photographs in Appendix 3).

The EA Flood Zone Map within the Envirocheck Flood Screening Report (Appendix A4) shows the current 1 in 100 year (1%) and 1 in 1000 year (0.1%) flood extents from the River Lostock to be confined to the area immediately surround the watercourse channel.

From the EA Historic Flood Map (Appendix A4) it can be seen that there are no historical records of flooding affecting the site. No significant historical flooding events which may have affected the site are recorded within the Central Lancashire SFRA. All significant historical flooding events within the wider local area appear to have been addressed by flood alleviation measures.

The British Geological Survey (BGS) Geological Indicators of Flooding map (Appendix A4) gives an indication of past flooding events based on information from fluvial deposits. The map indicates that the area around the River Lostock and an area to the north west of the site have been affected by flooding in the past, but gives no indication that any flooding has affected the site itself.

Within the Central Lancashire SFRA an assessment of future flood risk from larger watercourses, including the River Lostock, has been made. This was assessed by hydraulic modelling with the application of a 20% additional flow to account for the projected impact of climate change (See Section 2.1.5). From the plans within the SFRA it can be seen that the modelled climate change flood extents for the River Lostock to the east of the Site, are confined to the area immediately surrounding the watercourse channel.

Based on the above, the risk of direct fluvial flooding to the proposed development from the River Lostock is considered to be low and acceptable.

During public consultation there was anecdotal evidence that flooding had occurred recently in Bispham Avenue (approximately 200m north east of the site). The source of the flooding was not confirmed, but review of the EA flood map (in Appendix A4) confirms that this area is on the fringes of an area considered to be at risk of fluvial flooding and flooding may therefore be expected in this location. The proposed development will not lead to any increase in flows in the River Lostock. Therefore the risk of the proposed development increasing fluvial flood risk from the River Lostock is low and acceptable.

5.3 Pluvial Flooding

The RMS flood maps within the Envirocheck Flood Screening Report for the Site (Appendix A4) give an indication of susceptibility to flooding from overland flows (pluvial flooding). They are based on a 10m resolution digital terrain model, which has been subjected to various rainfall scenarios, taking into account minor watercourses and likely ground conditions.

Based on these parameters, the maps suggest that much of the Site is susceptible to pluvial flooding from 1 in 75, 1 in 100 and 1 in 1000 year return period events. However, as the RMS Flood Maps are created by relatively simple modelling of rainfall events against existing ground level data, and do not take account of any positive drainage systems.

The EA provided a copy of two surface water flood maps: The 'Flood Map for Surface Water' which takes account of underground drainage and typical storm events using typical national figures; and the 'Areas Susceptible to Surface Water Flooding' map which assumes drainage systems are full to capacity. These maps are included in Appendix A7. The EA are unable to say which map is more accurate, but it should be recognised that both are based on broad assumptions which mean they are not a definitive source of information. As the data is more current, it is likely that the maps are more accurate than the RMS Flood Maps discussed above.

The Flood Map for Surface Water suggests that the lower area between Flensburgh Way and the north west of the site is susceptible to relatively shallow surface water flooding, with surface water impacting on limited areas of the site during the 1:200 year event. It is noted that the surface water flooding appears to be constrained to the land drains, ponds and lower areas within the site, as would be expected by overland flow. The Areas Susceptible to Surface Water Flooding map suggests a greater extent for the surface water flooding to the north west of the site, suggesting the western extent of the site is susceptible to surface water flooding. In general, the maps show that relatively shallow pluvial flooding could be expected in the lower parts of the site.

The drainage design should take account of any natural falls which may introduce pluvial flows to the development from outside of the Site and the possibility of pluvial flow routes within the site. These additional areas should be allowed for when designing the drainage system in that locality in order to ensure that any such pluvial flows are conveyed safely away from the development by the drainage system, thus reducing the risk of pluvial flooding.

During public consultation there was anecdotal evidence that flooding had occurred recently in Bispham Avenue (approximately 200m north east of the site). Consultation with SRBC Engineers also suggested that some locations within the residential area between the site and the River Lostock had recently experienced flooding. The source of the flooding was not confirmed, but review of the EA Surface Water Flood Map (Appendix A7) confirms that certain locations within this area, but particularly Bispham Avenue, are considered to be at risk of pluvial flooding and flooding may therefore be expected in these locations. It is recognised that development of the site must be undertaken in such a way that flooding in these locations is not increased.

Redeveloping the Site could introduce new overland flows as a result of increased impermeable area, which could potentially cause an increased risk of flooding from overland flows to properties on-site and off-site. Therefore, landscaping and drainage of the Site should be designed to dispose of any runoff resulting from increased impermeable area which will mitigate any increase in risk from this source of flooding.

Finished floor levels on the development should be located 150mm above external ground levels to ensure any pluvial flows which do occur cannot enter properties.

Assuming design in accordance with the above, the risk of flooding on-site from overland flow is considered to be low and acceptable.

5.4 Groundwater Flooding

The BGS Groundwater Flood Data map within the Envirocheck Flood Screening Report (Appendix A4) gives an indication of susceptibility to groundwater flooding based on BGS data recorded for the area. The map indicates that the Site has a 'moderate' to 'high' susceptibility to groundwater flooding.

During this site visit, it was noted that the ground was generally wet with isolated patches of standing water; however the weather was relatively wet over the period surrounding the visit. The water level in the land drains on the site was approximately 0.5m to 1m below the local ground level, with some water appearing to be standing at this level. During

public consultation there was anecdotal evidence that the gardens of Bannister Lane and Hugh Lane suffered from waterlogged gardens.

With reference to the hydrological context set out in Section 3.1.4, it can be seen that there is currently considered to be a possible presence of shallow groundwater. The results of intrusive ground investigations on the site prior to detailed design would be expected to give a more accurate indication of the current groundwater levels.

Based on the information available, groundwater levels are potentially high and may present a risk to the development from groundwater flooding. However, high groundwater levels are not an unusual hazard on a development site and can be mitigated. Measures that can be utilised to achieve this are detailed in Section 6.1.

As impermeable area will be reduced by the development, with these areas served by a positive drainage system directly discharging to the land drains within the site, the risk of the development leading to an increase in local groundwater levels is considered negligible. The risk of the development causing increased groundwater flooding elsewhere is therefore low and acceptable.

5.5 Flooding from Drains and Sewers

5.5.1 Existing Public Sewers

The existing public sewerage infrastructure in the vicinity of the site is as described in Section 4. There are a number of public sewers in the roads surrounding the site and a 675mm diameter combined pubic sewer running through the western side of the site. There is understood to be only one manhole on this public sewer within the site, and one just outside the site.

UU have confirmed that they do not have any records of DG5 reportable flooding issues (due to network capacity) within the immediate vicinity of the site. They note however that they only record and check those incidents which are reported to them and that this information does not include for any flooding due to operational issues.

UU are responsible for maintaining their assets, therefore the probability of a public sewer failing and causing flooding which affects the site is considered low. The consequence of public sewer flooding is also considered low as the flooding that would be experienced is likely to be shallow and affect only a relatively small area. There is an easement in place around the public sewer within the site which will be respected by the development proposals and will ensure that public sewer flooding would not immediately affect properties. If flooding were to occur it is likely that it would enter the land drain on the west of the site, rather than flooding properties.

There are currently no proposals to discharge surface water to the public sewers and all foul water discharges will be in accordance with the requirements of UU who will be required to confirm that the existing network has the capacity to receive the anticipated foul flows without causing flooding.

The risk of flooding to the development from existing public sewers is therefore considered to be low and acceptable, and the proposed development should have no impact on flood risk from public sewerage.

5.5.2 Existing Surface Water Drainage

The existing known private and highway drainage infrastructure in the vicinity of the site is as described in Section 4.

During public consultation there was anecdotal evidence that flooding had occurred recently in Bispham Avenue (approximately 200m north east of the site). Consultation with SRBC Engineers also suggested that some locations within the residential area between the site and the River Lostock had recently experienced flooding. The source of the flooding was not confirmed, but there is a potential for this flooding to be associated with existing surface water drainage. However, LCC reported that they were not aware of any recent flooding events in the local area.

Due to the topography of the area, this flooding is unlikely to affect the proposed development itself; however it must be ensured that the proposed development does not increase the risk of flooding outside of the site. This is discussed in Section 5.5.4 below.

5.5.3 Proposed Surface Water Management

Changing the drainage regime within the site, an increase in impermeable area, and a projected increase in rainfall due to climate change has the potential to increase surface water flows off the site. However, appropriate attenuation and storage of surface water within the drainage system will ensure that the rate at which surface water leaves the site is no greater than the current rate.

In consultation, LCC Highways Engineers concurred that provided this principle is followed there should be no increase in surface water from the site and therefore no increase in flood risk downstream.

It was demonstrated in Section 4 that safe discharge of surface water is possible, with the implementation of appropriate attenuation and storage, and use of SUDS where practicable. Surface water drainage for the development will be designed in accordance with appropriate legislation and guidance.

Assuming that the drainage system will be designed and constructed to the above standards and in accordance with the principles set out in Section 4, the risk of flooding on-site and off-site from surface water drainage is considered to be low and acceptable.

However a residual risk remains from blockage of the drainage system or exceedance of its capacity. Mitigation, as described in Section 6.2, reduces the impact of these risks further.

5.5.4 Proposed Foul Drainage

Subject to full consent from UU, foul waste water will be discharged to the public sewers around the site. The system will be designed in accordance with the requirements of UU, including the point(s) of connection to the public sewer, to ensure that there is no detrimental impact on the existing public sewer system.

Foul drains for the development will be designed to Building Regulations Part H. Assuming that the drainage system will be designed and constructed to these standards; the risk of flooding on-site and off-site from foul drains is considered to be low and acceptable.

At this stage the requirement for a pumping station in order to achieve a foul discharge to the public sewer cannot be ruled out. In the event of failure, overflow from a pumping station could pose a flood risk. However, any pumping station should be designed to Sewers for Adoption standard which allows for the provision of emergency storage and telemetry to warn of high levels/pump failure. Regular inspection and maintenance should ensure the pumping station remains in a suitable condition. Assuming implementation of the above, the risk to the site and off-site from pumping station failure is considered to be low and acceptable.

However, a residual risk remains from blockage of the drainage system or exceedance of its capacity. Mitigation, as described in Section 6.2, reduces the impact of these risks further.

5.6 Flooding From Land Drainage

As described in Section 4.1, there is a network of existing land drains within the site which are assumed to accept natural surface water flows from within the existing site. Inspection on site has determined that there are pipes from outside of the site connecting to these drains, but it has not been possible at this stage to confirm all inflows and outflows. There is a 750mm diameter pipe in the south west corner of the site which *has* been confirmed as an outgoing pipe due to the observed flow within the drain. The drains have been shown by the topographical survey to be approximately 0.5m to 1.5m deep.

Although it has been confirmed that flow from the network of drains does leave the site, the capacity of the outgoing pipe is currently unknown. We are currently awaiting formal consultation responses which may provide this information, but

further investigation will be required prior to detailed design if this information cannot be established through consultation. As any inflows to the drains from outside the site have also not been confirmed, it is not possible to make a quantitative assessment of flood risk from the drains at this stage.

As noted in Section 5.2.1, the EA Historic Flood Map (Appendix A4), the BGS Geological Indicators of Flooding map (Appendix A4) and the Central Lancashire SFRA give no indication that any flooding has affected the site in the past. However, although the flows within the drains are expected to be relatively moderate, during extreme rainfall events it is possible that the drains on site will become overloaded, leading to flooding which affects the site. In addition to the general flows in the drains, there are a number of culverted sections which may limit flows within the drains and lead to afflux flooding upstream of the culverts. In the event of flooding from the drains occurring, this could pose a flood risk to the new development. The land drains therefore require further consideration to ensure that they have the capacity to hold water up to the 1 in 100 year + climate change event. The EA also note the requirement to quantify the 1 in 20 year flows to confirm that the surrounding land is not functional flood plain.

As described in Section 4.2, within the proposals for the site, it is envisaged that many of the drains will be retained and will function as a part of the surface water drainage system. It is therefore recommended that a holistic approach to the management of surface water and the mitigation of flood risk from the land drains is taken at the detailed design stage.

Initial consultation with the EA confirmed that they would support a holistic approach to surface water management which included consideration of the capacity of the existing land drains at the detailed design stage. Consultation responses indicate that modelling of existing land drains may be required by the council but it is envisaged that this will be undertaken at detailed design stage if required.

Assuming a holistic approach to surface water management within the development, the details of which will be confirmed at the detailed design stage, it is envisaged that any flood risk from the land drains within the site will be mitigated to a level which is low and acceptable.

5.7 Flooding from Artificial Waterbodies

The EA publish a Risk of Flooding from Reservoirs map which indicates the area which could be flooded in the event of reservoir failure. The map currently indicates that the Site and surrounding area is not at risk of flooding from reservoir breach. No significant artificial waterbodies have been identified in the vicinity of the Site.

From the above it is concluded that the risk of flooding to the proposed development from artificial sources is low and acceptable, and the proposed development should have no adverse impact on flood risk from artificial waterbodies.

5.8 Summary

The flood risk assessment has identified potential flood risk from a number of sources. It has been demonstrated that appropriate development in consideration of these potential flood risks can reduce the risk to the development from the majority of sources to a level which is low and acceptable.

There remains a potential risk of groundwater flooding (which can be confirmed by ground investigation at the detailed design stage) and a risk of flooding from failure of the drainage infrastructure. However, mitigation measures to ensure that the proposed developed is not subject to an unacceptable risk of flooding from these sources are discussed in Section 6.

6 Flood Risk Mitigation

This section demonstrates that it is possible to further mitigate the remaining residual flood risks identified in the previous section. The mitigation measures outlined below are designed to protect both the users of the building and the building itself from the effects of flooding.

6.1 Groundwater Flooding Mitigation

Measures that can be utilised to mitigate the risk of groundwater flooding on a Site include raised finished floor levels, flood resilient and resistant construction, appropriate flood routing through the site, installing appropriate positive drainage and placing less vulnerable types of development (e.g. car parks, green spaces) in any areas found to be at greater risk of groundwater flooding.

The details of any necessary groundwater mitigation strategy should be considered further at the detailed design stage when more detailed ground investigation data is available. Based on adopting appropriate mitigation measures the risk of flooding from groundwater is considered to be low and acceptable.

6.2 Residual Risk of Flooding from Drainage

There is a residual risk of flooding from blockage or restriction within the proposed drainage systems, including any SUDS, if poorly maintained. Regular inspection and maintenance will be undertaken to ensure drainage infrastructure, remains in a serviceable condition.

There is also a residual risk of flooding to the buildings on-site if the capacity of the surface water drainage system is exceeded. Finished floor levels on any new building should therefore be located at least 150mm above external ground levels to account for this.

Assuming implementation of the above, the residual risk of flooding from the proposed drainage systems is considered to be low and acceptable.

6.3 Summary

Potential mitigation measures for risks identified in Section 5 have been discussed above. Implementation of these measures will further ensure the proposed development is not subject to an unacceptable risk of flooding.

7 Conclusion

7.1 Conclusions

AECOM has prepared this FRA on behalf of Lea Hough and HCA, in accordance with the NPPF to support an outline planning application for the development of 300 to 350 dwellings on greenfield land off Croston Road, Farington Moss.

The FRA has considered all potential sources of flooding to the site, including sea, river, groundwater, land drainage, overland flow, artificial sources, water mains and foul and surface water drainage arrangements. Climate change has also been considered, which is expected to increase the peak rainfall intensity by 30%, increase the peak river flow by up to 20% over the lifetime of the development.

In undertaking this FRA AECOM have consulted with all appropriate agencies: the EA, SRBC, LCC and UU to request information relevant to flood risk and confirm their requirements. Initial discussions have been undertaken but we are currently awaiting formal consultation responses which may provide further information with regards to local drainage and flood risk. AECOM has also undertaken site visits to gain an appreciation of the site features in regards to flood risk and obtain information to support this document.

Based on the Environment Agency Flood Zone Map, the proposed development is located in Flood Zone 1. The proposed development is classified as More Vulnerable development by the NPPF Technical Guidance, and is therefore considered appropriate in the planning context for development in Flood Zone 1, subject to appropriate mitigation measures being implemented for any identified flood risk. The Sequential Test is considered to be passed for the proposed development by virtue of the fact that it is in Flood Zone 1 and the Exception Test is not applicable in this case.

Within the report it has been demonstrated that safe and effective disposal of foul and surface water from the Site is possible, provided any proposed systems is appropriately designed and maintained. There is a potential risk of flooding from the land drains within the site which is not possible to quantify at this stage, but considering this during detailed design of the proposed surface water drainage system will ensure that there is no unacceptable risk of flooding from these features. The appropriate attenuation and storage of surface water within the proposed drainage system for the site will ensure that the flow leaving the site is not increased; thereby ensuring that existing surface water flooding experienced locally is not increased by the development.

The developer will need to agree the proposed drainage arrangements in advance of construction with SRBC, United Utilities and/or the EA as necessary. Wherever possible, the developer will use Sustainable Drainage Systems (SUDS) to manage surface water runoff. The suitability of the site for the use of SUDS can be determined fully from the results of ground investigations and infiltration testing.

At this stage, based on the findings to date, AECOM considers that the flood risk from all sources, to and from the proposed development site can be mitigated to a level which is low and acceptable. The mitigation measures and recommendations outlined within this report are designed to protect people and property on and off site from the effects of flooding.

The findings of this report are subject to change following receipt of formal consultation response, but at this stage it is not considered likely that any further significant flood risks are likely to be identified which cannot be mitigated by appropriate detailed design.

7.2 Recommendations

The following is a summary of the recommendations made within the report to ensure the development is not subject to an unacceptable risk of flooding:

- Finished Floor Levels should be located minimum 150mm above external ground levels.
- Foul disposal and any new connections to the public sewer system will require consent from United Utilities. United Utilities permission/consent should be sought prior to the redevelopment.
- The potential for infiltration should be investigated, along with an assessment of groundwater levels, as part of any detailed ground investigations.

- The inflows and outflows to/from the existing land drains within the site should be confirmed and the capacity of any incoming/outgoing pipe confirmed.
- Surface water discharge from the site should be no greater than the existing rate of discharge.
- Surface water flows from the proposed drainage system should be restricted to the equivalent Greenfield runoff rate.
- Surface water should be stored within the drainage system either below ground or in formal above ground systems for the 1 in 30 year storm event with an allowance for climate change. In excess of this up to the 1 in 100 year plus climate change event, surface water should be stored below ground or in controlled areas such as car parks and landscaped features.
- The surface water management proposals for the site must include for assessment of the capacity within the existing land drains within the site, with further storage and attenuation provided if necessary to ensure there is no risk of flooding from these up to the 1 in 100 year plus climate change event.
- Landscaping and drainage of the site should be designed to route flows away from the proposed buildings, towards the less vulnerable open areas.
- Regular inspection and maintenance should be undertaken to ensure drainage infrastructure, including the land drain and SUDS, remains in a suitable condition.

References

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4. C522 – Sustainable Urban Drainage Systems – Design Manual for England and Wales; CIRIA; 2000.
5. C697 – The SUDS Manual; CIRIA; 2007.
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9. EA online Flood Zone Map; accessed August 2012.
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12. Topographical survey plan; RPS; March 2012.
13. Drainage Strategy Report; AECOM; December 2011.
14. Phase 1 Geo-environmental Desk Study Report; AECOM; September 2012.

Appendices

Appendix A: Site Information

A1 Site Location Plans

A2 Development Masterplan

A3 Site Photographs

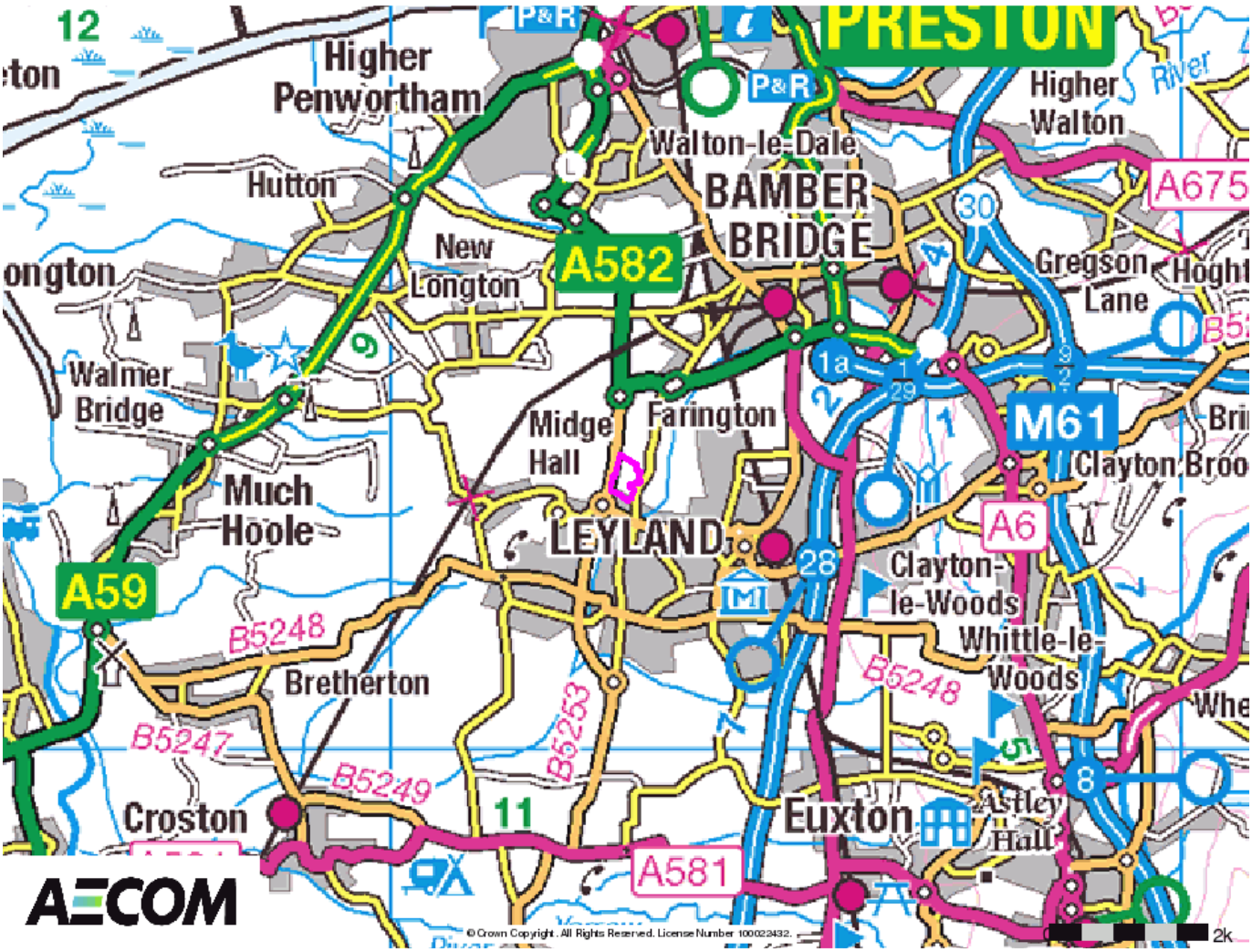
A4 Envirocheck Flood Screening Report

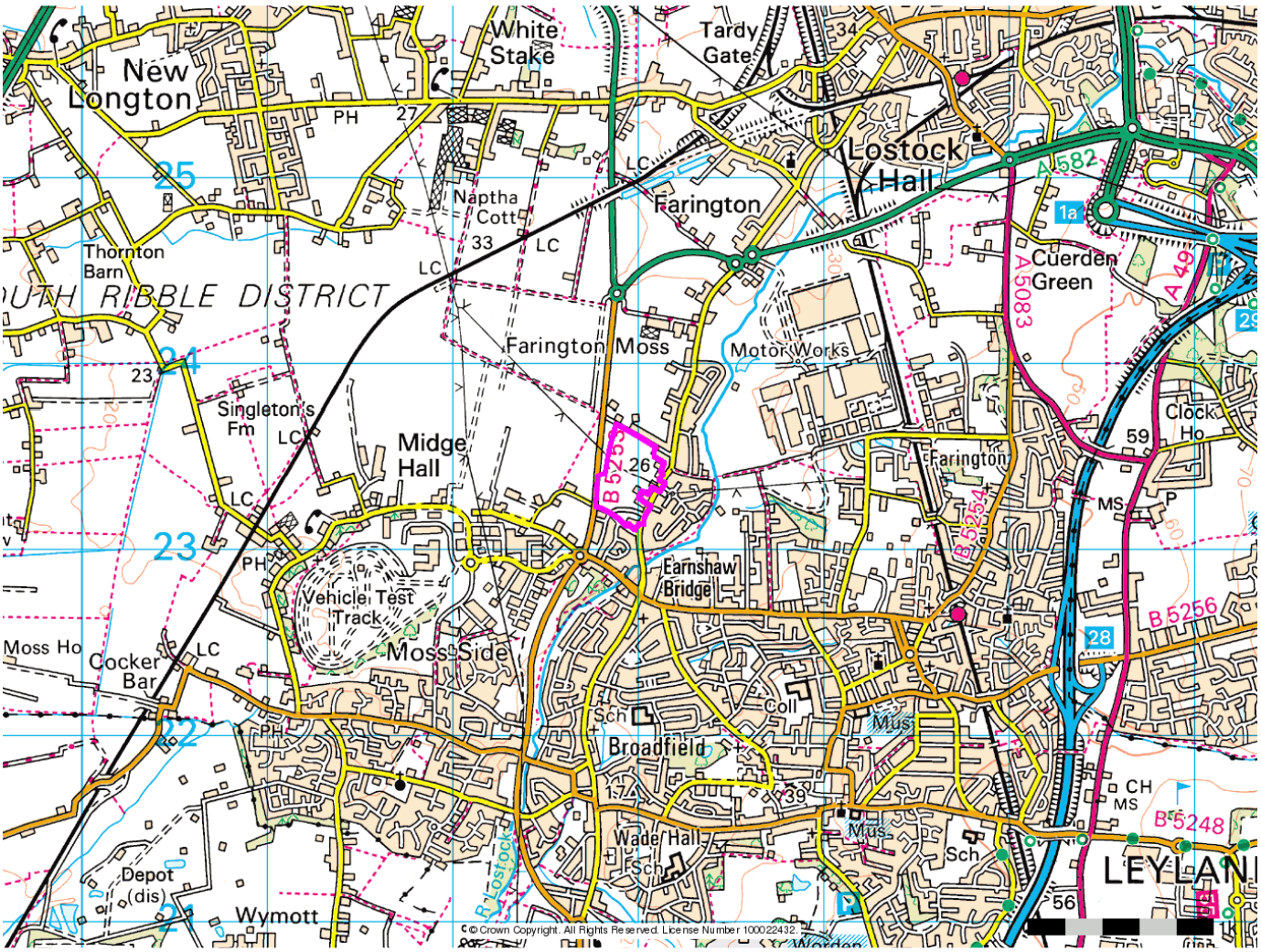
A5 Topographical Survey Plan

A6 United Utilities Sewer Records

A7 Environment Agency Surface Water Flood Maps

A1 Site Location Plans





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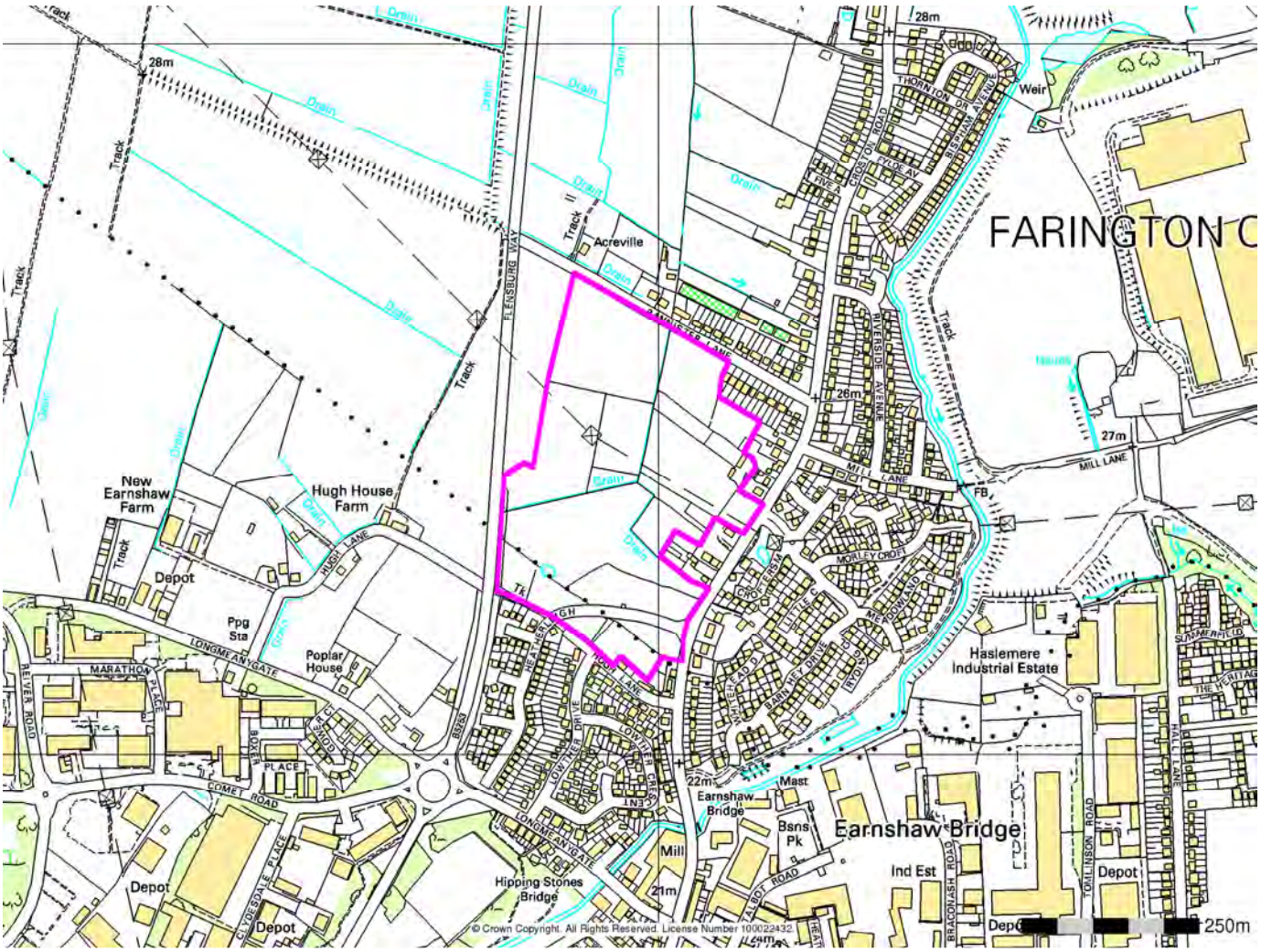

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KEY

- Green space housing
- Eastern development fringe frontage
- Urban grain continuation (Bannister Lane)
- New village street
- Family market housing
- Arrival frontage with landmark building
- Urban grain continuation (Croston Road)
- Housing served off Hugh Lane
- * Landmark buildings site

KEY

1. Proposed alterations to existing junction
2. Proposed primary access to new development
3. Proposed additional access, with highway improvements
4. Emergency link (possible future connection)
5. Green lung at primary access point
6. Landmark building
7. Existing play area
8. Retained pond
9. Proposed pond
10. Existing electricity pylon
11. Proposed green walk linkage
12. Small area of development served off Hugh Lane. Buildings to front out towards Heatherlea
13. Small area of development served off Bannister Lane with upgraded road and turning facillity.

Baldwin Design Consultancy Ltd

Town Farm, 17 Orford Close, Golborne, Warrington, Cheshire. WA3 3WP Tel: 01942 719513 e-mail: graham.baldwin@bdc.gb.com

N

A - 09/11/11 - Highway engineers comments incorporated
B - 23/05/12 - Masterplan updated to reflect planners comments
C - 25/07/12 - Masterplan updated to reflect planners comments

Project Title:
Residential development

Address:
Croston Road,
Leyland.

Drawing:
Parameters Plan

Drawing No:
LH/CR/MP/01

Drawn:	Date:
SB	Date: 28/10/10
Scale:	Paper Size:
1:1000	A1

A3 Site Photographs

Photograph 1: View north on Banister Lane.

Photograph 2: View south on Banister Lane.

Photograph 3: View within north western sector of site.

Photograph 4: View south along drain within north western sector of site.

Photograph 5: Standing water within north western sector of site.

Photograph 6: View along land drain on north western boundary of site.

Photograph 7: View within north western sector of site.

Photograph 8: View on water in land drain in northern sector of site.

Photograph 9: View on water in land drain in northern sector of site.

Photograph 10: View along land drain towards Bannister Lane 0from north western sector of site.

Photograph 11: View along land drain towards Bannister Lane 0from north eastern sector of site.

Photograph 12: View along land drain towards Bannister Lane 0from north eastern sector of site.

Photograph 13: Standing water in land drain within northern sector of site.

Photograph 14: View towards Bannister Lane from north eastern sector of site.

Photograph 15: View towards rear of houses at Bannister Lane / Croston Road junction in north eastern corner of site.

Photograph 16: View towards Croston Road across south east of site.

Photograph 17: View along field boundary in southern sector of site.

Photograph 18: View on land drain upstream of pond.

Photograph 19: View along land drain upstream of pond showing infill.

Photograph 20: View on pond from upstream end.

Photograph 21: View on pond.

Photograph 22: View on downstream side of pond.

Photograph 23: View on land drain downstream of pond.

Photograph 24: View onto land drain on south western boundary of site.

Photograph 25: View along field boundary in south western sector of site.

Photograph 26: View along land drain in south western sector of site.

Photograph 27: View on land drain in south western corner of site.

Photograph 28: View on pipes in south western corner of site.

Photograph 29: View from River Lostock footbridge looking north along river.

Photograph 30: View from River Lostock footbridge during rainfall event showing overland flow into river.

Envirocheck® Report:

Flood Screening Report Datasheet

Order Details:

Order Number:
40567498_1_1

Customer Reference:
60273452

National Grid Reference:
352950, 423390

Slice:
A

Site Area (Ha):
12.79

Search Buffer (m):
1000

Site Details:

Site off Croston Road
LEYLAND

Client Details:

Mr M Wilson
AECOM Ltd
AECOM House
Moss Lane
Altrincham
Cheshire
WA15 8FH

Contents

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Report Version v47.0

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Flooding from Rivers or Sea without Defences	pg 1		1	n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
RMS Flood Data					
RMS 75 year Flood Return	pg 2	2	1	n/a	n/a
RMS 100 year Flood Return	pg 2	1		n/a	n/a
RMS 1000 year Flood Return	pg 2	1		n/a	n/a
BGS Flood Data					
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Historic Flood Events					
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EA / CEH Flood Data

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SE (NE)	174	1	353340 423551
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A7SW (SE)	180	1	353163 423006
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				

RMS Flood Data

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A6NE (S)	0	2	352950 423387
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A6NE (S)	0	2	352949 423244
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A6SE (SW)	207	2	352730 423023
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A6NE (S)	0	2	352950 423387
	RMS 1000 year Flood Return Flood Type/Depth: 1000 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A6NE (S)	0	2	352950 423387

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential Code: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment.	A10SE (NW)	51	3	352789 423623
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential Code: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment.	A11SW (NE)	127	3	353286 423547
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A6NE (S)	0	3	352950 423387
	BGS Groundwater Flooding Susceptibility Flooding Type: High Susceptibility to Groundwater Flooding	A10SE (W)	0	3	352900 423401
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A11NW (NE)	224	3	353200 423751
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A11SE (NE)	291	3	353400 423601
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A7NE (E)	296	3	353400 423201
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A7SW (S)	303	3	353000 422801
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A7NE (SE)	311	3	353350 423101
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A11NW (N)	328	3	353150 423901
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A7SW (S)	372	3	353100 422751
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A2NE (S)	559	3	352900 422551
	BGS Groundwater Flooding Susceptibility Flooding Type: High Susceptibility to Groundwater Flooding	A6SW (SW)	567	3	352400 422801
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A2NE (S)	617	3	352850 422501
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A11NE (NE)	641	3	353500 424051
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A14SE (N)	674	3	352950 424351
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A2NE (S)	726	3	352800 422401
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A3SW (S)	880	3	353200 422251
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderate Susceptibility to Groundwater Flooding	A1NE (SW)	888	3	352200 422551
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A16SW (NE)	892	3	353800 424101
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A15NW (N)	902	3	353100 424551
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A12NW (NE)	920	3	353900 424001

BGS Flood Data

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A2SE (S)	932	3	352750 422201
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A16SW (NE)	962	3	353850 424151
	BGS Groundwater Flooding Susceptibility Flooding Type: Moderately High Susceptibility to Groundwater Flooding	A5SW (SW)	996	3	351850 422851

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A6NE (S)	0	1	352951 423380
2	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7NW (E)	0	1	352969 423383
3	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A7NW (E)	0	1	352969 423383
4	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	11	1	353017 423615
5	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	14	1	353017 423615
6	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	70	1	353026 423675

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (NE)	87	1	353085 423666
8	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	88	1	353028 423694
9	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	100	1	353030 423709
10	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (N)	101	1	353030 423709
11	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	108	1	352923 423777
12	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	108	1	352923 423777

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (NE)	128	1	353216 423601
14	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (NW)	173	1	352760 423801
15	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (NW)	173	1	352760 423802
16	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (NW)	173	1	352760 423802
17	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (NE)	185	1	353256 423649
18	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SW (NE)	186	1	353256 423649

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	**Detailed River Network Lines** River Type: Primary River River Name: River Lostock Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A7SW (S)	196	1	353097 422942
20	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	213	1	352765 423856
21	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11NW (N)	230	1	353041 423850
22	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11NW (NE)	230	1	353130 423812
23	**Detailed River Network Lines** River Type: Primary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A11SE (E)	230	1	353361 423536
24	**Detailed River Network Lines** River Type: Primary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A11SE (E)	233	1	353367 423527

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
25	**Detailed River Network Lines** River Type: Primary River River Name: River Lostock Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A11SE (E)	233	1	353379 423482
26	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	243	1	352928 423915
27	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	243	1	352928 423915
28	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: W/C 1 M6 TO STANSFIELD LANE Water Course Reference: BRIS	A11SE (E)	244	1	353377 423534
29	**Detailed River Network Lines** River Type: Primary River River Name: River Lostock Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A11SE (NE)	250	1	353335 423637
30	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Currently Undefined Water Course Name: BOUNDARY BROOK (LEYLAND) Water Course Reference: BOUX	A7NE (E)	313	1	353428 423218

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
31	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	333	1	352779 423994
32	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	333	1	352779 423994
33	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	351	1	352811 424021
34	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A10NE (N)	367	1	352782 424031
35	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SE (E)	444	1	353580 423541
36	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SE (E)	450	1	353586 423538

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
37	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference:	A11SE (E)	450	1	353589 423525
38	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Currently Undefined Water Course Name: BOUNDARY BROOK (LEYLAND) Water Course Reference: BOUX	A7NE (E)	469	1	353597 423222
39	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11SE (E)	479	1	353619 423427
40	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	499	1	353140 424115
41	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	499	1	353074 424137
42	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	526	1	353204 424097

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
43	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	526	1	353234 424085
44	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A11NE (NE)	543	1	353352 424032
45	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SE (N)	568	1	352657 424200
46	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SE (N)	568	1	352657 424200
47	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8NW (E)	574	1	353718 423312
48	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8NW (E)	582	1	353719 423255

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8NW (E)	592	1	353730 423260
50	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	624	1	353023 424285
51	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	625	1	353110 424271
52	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	625	1	353026 424285
53	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SE (NE)	662	1	353364 424163
54	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SE (NE)	663	1	353373 424160

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
55	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SW (NW)	710	1	352440 424235
56	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8NW (E)	711	1	353837 423185
57	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	712	1	353049 424368
58	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A8NW (E)	715	1	353842 423188
59	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SW (N)	721	1	352962 424393
60	**Detailed River Network Lines** River Type: Primary River River Name: Bannister Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: BANNISTER BROOK Water Course Reference: BANN	A3NW (S)	734	1	353204 422404

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
61	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A9NE (NW)	750	1	352138 423799
62	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A15SE (NE)	754	1	353550 424155
63	**Detailed River Network Lines** River Type: Primary River River Name: River Lostock Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Flood Risk Management Indicative/Statutory Main River Water Course Name: RIVER LOSTOCK Water Course Reference: LOST	A15SE (NE)	754	1	353550 424155
64	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	775	1	352680 424426
65	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	775	1	352680 424426
66	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SW (NW)	782	1	352307 424208

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
67	**Detailed River Network Lines** River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14SW (NW)	782	1	352307 424208
68	**Detailed River Network Lines** River Type: Secondary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A5NE (W)	826	1	351952 423357
69	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	852	1	352696 424508
70	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	852	1	352696 424508
71	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13SE (NW)	855	1	352118 424066
72	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	903	1	352705 424563

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
73	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A14NE (N)	903	1	352705 424563
74	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13SE (NW)	924	1	352154 424247
75	**Detailed River Network Lines** River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A13SE (NW)	924	1	352154 424247
76	**Detailed River Network Lines** River Type: Tertiary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A9SW (W)	957	1	351832 423520
77	**Detailed River Network Lines** River Type: Secondary River River Name: Drain Hydrographic Area: D011 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Drain (ditch, Reen, Rhyne, Drain) Flood Risk Management Status: Other Rivers Water Course Name: Not Supplied Water Course Reference: Not Supplied	A5NW (W)	964	1	351815 423372
78	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A7NW (E)	0	1	352969 423383
79	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A6NE (SW)	0	1	352773 423239
80	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A7NW (SE)	0	1	352996 423277

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
81	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SW (N)	14	1	353017 423615
82	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A11SW (N)	70	1	353026 423675
83	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SW (N)	88	1	353028 423694
84	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A10NE (NW)	90	1	352807 423729
85	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SW (N)	101	1	353030 423709
86	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (N)	108	1	352923 423777
87	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A11SW (NE)	128	1	353216 423601
88	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (NW)	173	1	352760 423802
89	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A10NE (NW)	173	1	352760 423801
90	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SW (NE)	186	1	353256 423649
91	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (N)	213	1	352765 423856
92	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11NW (N)	230	1	353041 423850
93	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SE (E)	233	1	353367 423527
94	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (N)	243	1	352928 423915
95	**Detailed River Network Nodes** River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D011	A11SE (E)	244	1	353377 423534
96	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A11NW (NE)	251	1	353208 423778
97	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SE (NE)	253	1	353335 423637
98	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A10NE (N)	284	1	352826 423955
99	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A7NE (E)	313	1	353428 423218
100	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (N)	333	1	352779 423994
101	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A10NE (N)	351	1	352811 424021

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
102	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A10NE (N)	367	1	352782 424031
103	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A11SE (E)	444	1	353580 423541
104	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A11SE (E)	450	1	353586 423538
105	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A11SE (E)	451	1	353586 423549
106	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SW (N)	459	1	352997 424121
107	**Detailed River Network Nodes** River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D011	A7NE (E)	469	1	353597 423222
108	**Detailed River Network Nodes** River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D011	A11SE (E)	479	1	353619 423427
109	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SW (N)	499	1	353074 424137
110	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A14SW (NW)	513	1	352610 424113
111	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SW (N)	526	1	353204 424097
112	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SW (N)	529	1	353234 424085
113	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A11NE (NE)	543	1	353352 424032
114	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A14SE (N)	568	1	352657 424200
115	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A8NW (E)	574	1	353718 423312
116	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SW (N)	579	1	353217 424152
117	**Detailed River Network Nodes** River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D011	A8NW (E)	582	1	353719 423255
118	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A14SE (N)	589	1	352621 424206
119	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A8NW (E)	592	1	353730 423260
120	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SW (N)	625	1	353026 424285
121	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SE (NE)	663	1	353373 424160
122	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A10NW (NW)	672	1	352291 423999

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
123	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A14SW (NW)	710	1	352440 424235
124	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SW (N)	712	1	353049 424368
125	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A8NW (E)	715	1	353842 423188
126	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SW (N)	721	1	352962 424393
127	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SE (NE)	749	1	353408 424238
128	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A9NE (NW)	750	1	352138 423799
129	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A15SE (NE)	754	1	353550 424155
130	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15NW (N)	764	1	352961 424437
131	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SE (NE)	769	1	353384 424276
132	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A14NE (N)	775	1	352680 424426
133	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A14NE (N)	781	1	352668 424428
134	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A14SW (NW)	782	1	352307 424208
135	**Detailed River Network Nodes** River Node Type: Pseudo (general) Hydrographic Area: D011	A14SW (NW)	789	1	352338 424250
136	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A8NW (E)	792	1	353896 423099
137	**Detailed River Network Nodes** River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D011	A5NE (W)	826	1	351952 423357
138	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SE (NE)	828	1	353462 424298
139	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A15SE (NE)	842	1	353396 424353
140	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A14NE (N)	852	1	352696 424508
141	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A13SE (NW)	855	1	352118 424066
142	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A14NE (N)	903	1	352705 424563
143	**Detailed River Network Nodes** River Node Type: Source Hydrographic Area: D011	A8NE (E)	920	1	354027 423086

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
144	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A13SE (NW)	924	1	352154 424247
145	**Detailed River Network Nodes** River Node Type: Junction Hydrographic Area: D011	A5NW (W)	964	1	351815 423372
146	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A10SE (NW)	127	1	352721 423559
147	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A10SE (NW)	128	1	352698 423513
148	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A10SE (W)	134	1	352667 423460
149	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	175	1	352602 423328
150	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	185	1	352591 423317
151	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	217	1	352559 423301
152	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	217	1	352559 423301
153	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	232	1	352542 423284
154	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6NW (W)	273	1	352499 423227
155	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A10SW (NW)	369	1	352504 423692
156	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A10SW (W)	443	1	352372 423565
157	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A6SW (SW)	503	1	352365 422934
158	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A12SW (E)	561	1	353668 423662
159	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A11NE (NE)	569	1	353633 423756
160	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A2NW (SW)	597	1	352485 422707
161	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A9SE (W)	665	1	352140 423567
162	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A2NW (SW)	738	1	352306 422658
163	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A2NW (SW)	767	1	352389 422565
164	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A12NW (NE)	799	1	353763 423994

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
165	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A12NW (NE)	815	1	353744 424048
166	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A15NW (N)	845	1	353193 424462
167	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A1NE (SW)	850	1	352236 422571
168	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A1NE (SW)	868	1	352215 422565
169	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A5SE (SW)	869	1	352049 422747
170	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A15NW (N)	878	1	353175 424507
171	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A5SE (SW)	879	1	352011 422790
172	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A15NW (N)	881	1	353048 424542
173	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A1NE (SW)	906	1	352173 422551
174	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A2SW (SW)	927	1	352405 422363
175	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A15NW (N)	937	1	353129 424580
176	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A15NW (N)	942	1	352980 424614
177	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D011	A5SW (SW)	946	1	351936 422787

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (SE)	174	4	353195 423031
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	178	4	353065 422946
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	178	4	353075 422951
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Significant Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	179	4	353358 423521
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	180	4	353085 422956
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	184	4	353005 422921
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	184	4	353045 422931
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	212	4	353003 422893
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	212	4	353102 422928
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (SE)	213	4	353200 423001
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (S)	214	4	353100 422925
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (NE)	215	4	353340 423551
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	224	4	353350 423551
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (SE)	224	4	353165 422951

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7SW (SE)	235	4	353200 422967
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (NE)	244	4	353320 423651
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	251	4	353390 423431
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7NE (E)	256	4	353400 423387
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	256	4	353395 423406
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	260	4	353400 423401
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	263	4	353394 423544
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	263	4	353392 423551
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	263	4	353398 423529
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (E)	269	4	353409 423501
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A7NE (E)	270	4	353415 423351
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7NE (SE)	271	4	353340 423156
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A7NE (SE)	275	4	353380 423206
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11SE (NE)	344	4	353399 423716

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11NE (NE)	489	4	353485 423851
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A11NE (NE)	494	4	353487 423856
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A11NE (NE)	517	4	353500 423876
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2NE (S)	528	4	352700 422651
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A11NE (NE)	579	4	353500 423968
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	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2NW (SW)	612	4	352618 422601
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A2NW (SW)	630	4	352600 422591
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A3NW (S)	648	4	352990 422456
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A15SE (NE)	677	4	353501 424096
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A15SE (NE)	693	4	353507 424111
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	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A15SE (NE)	719	4	353500 424147
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A15SE (NE)	726	4	353529 424136

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A3NW (S)	749	4	353254 422405
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	749	4	353350 422451
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SE (S)	753	4	352950 422351
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A2NW (SW)	754	4	352550 422476
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	766	4	353475 422506
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	770	4	353475 422501
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	772	4	353485 422506
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (S)	776	4	353351 422420
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SE (S)	777	4	352939 422328
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	795	4	353517 422501
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A2NW (S)	819	4	352555 422399
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	844	4	353550 422465
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: No Result Source: Environment Agency, Head Office Catchment Area: Douglas	A3NE (SE)	883	4	353630 422481
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A15SE (NE)	911	4	353615 424301

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SE (S)	912	4	352850 422201
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SE (S)	920	4	352806 422201
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SW (S)	967	4	352520 422251
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Moderate Source: Environment Agency, Head Office Catchment Area: Douglas	A2SW (S)	976	4	352515 422243
	National Flood Risk Assessment (NaFRA) Flood Risk Assessment Code: Low Source: Environment Agency, Head Office Catchment Area: Douglas	A2SW (S)	995	4	352500 422229

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Postcode Sector Flood Insurance Claim Ratings Insurance Rating: Low Flood Insurance Claim Rating Postcode Sector: PR26 6	A6NE (S)	0	4	352950 423387

EA / CEH Flood Data	Version	Update Cycle
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	May 2012	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	May 2012	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	May 2012	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	May 2012	Quarterly
Flood Defences Environment Agency - Head Office	May 2012	Quarterly
RMS Flood Data	**Version**	**Update Cycle**
RMS 75 year Flood Return Risk Management Solutions - North West Catchment	December 2008	As notified
RMS 100 year Flood Return Risk Management Solutions - North West Catchment	December 2008	As notified
RMS 1000 year Flood Return Risk Management Solutions - North West Catchment	December 2008	As notified
BGS Flood Data	**Version**	**Update Cycle**
BGS Geological Indicators of Flooding British Geological Survey - National Geoscience Information Service	February 2011	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	February 2011	Annually
EA Detailed River Network Data	**Version**	**Update Cycle**
Detailed River Network Lines Environment Agency - Head Office	March 2012	Annually
Detailed River Network Nodes Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage Environment Agency - Head Office	March 2012	Annually
EA Historic Flood Events Data	**Version**	**Update Cycle**
Historic Flood Events Environment Agency - Head Office	May 2012	Quarterly
Historical Flood Liabilities Landmark Information Group Limited	December 1999	Not Applicable
EA National Flood Risk Assessment Data (NaFRA)	**Version**	**Update Cycle**
National Flood Risk Assessment Environment Agency - Head Office	October 2011	Annually
Flood Insurance Risk Data	**Version**	**Update Cycle**
Postcode Sector Flood Insurance Claim Ratings Crawford and Company	June 2012	Quarterly

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Centre for Ecology and Hydrology	
British Geological Survey	
Risk Management Solutions	

Useful Contacts

Contact	Name and Address	Contact Details
1	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
2	**Landmark Information Group Limited** Legal and Financial, The Smith Centre, Fairmile, Henley-on-Thames, Oxon, RG9 6AB	Telephone: 0844 844 9966 Fax: 0844 844 9980 Email: info@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk
3	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
4	**Landmark Information Group Limited** 5 - 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Telephone: 01392 441761 Fax: 01392 441709 Email: cssupport@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk
-	**Landmark Information Group Limited** The Smith Centre, Henley On Thames, Oxfordshire, RG9 6AB	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

RMS Flood Data Information

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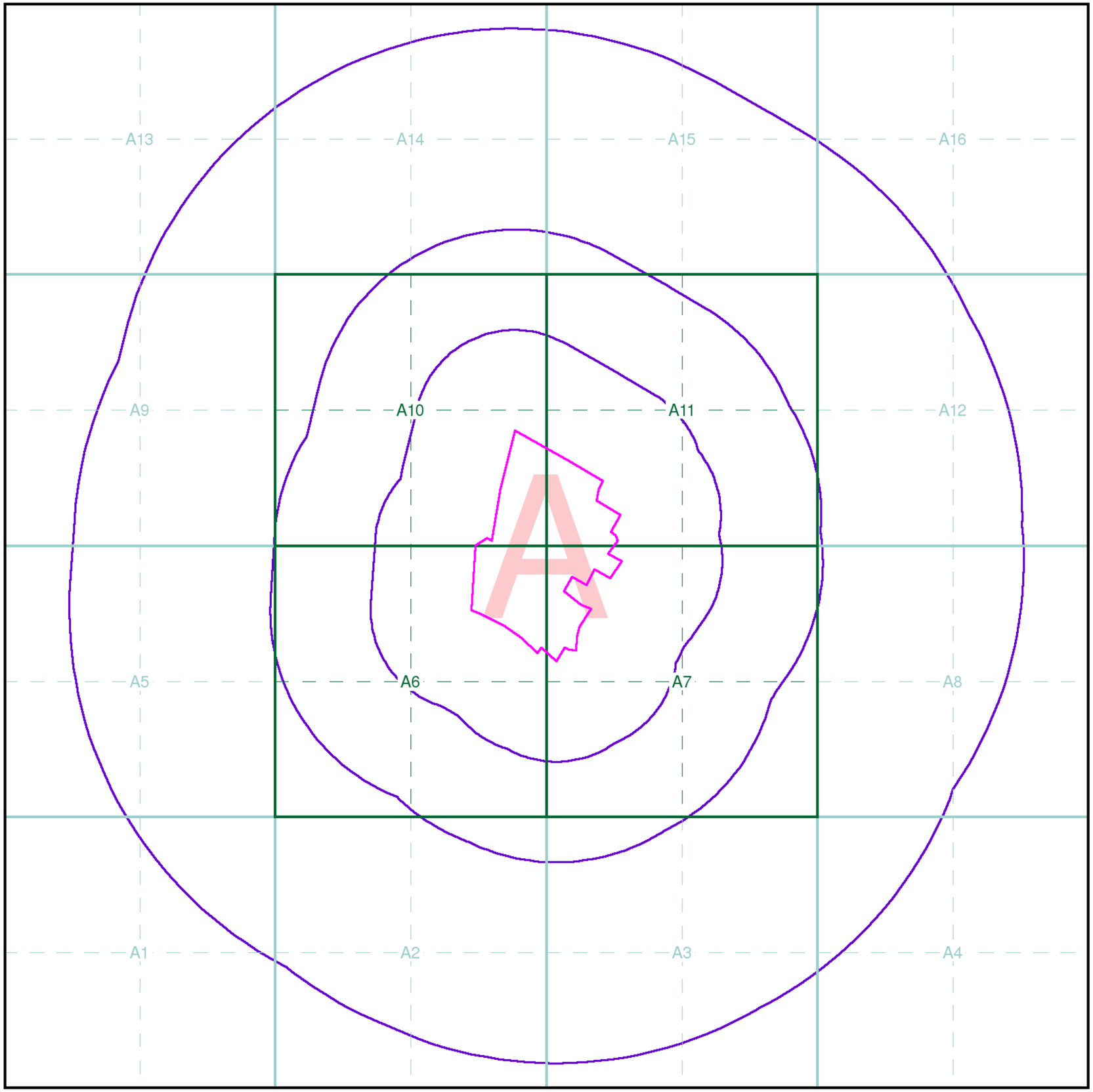


Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Licensed Partner

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr M Wilson, AECOM Ltd, AECOM House, Moss Lane, Altrincham, Cheshire, WA15 8FH

Order Details

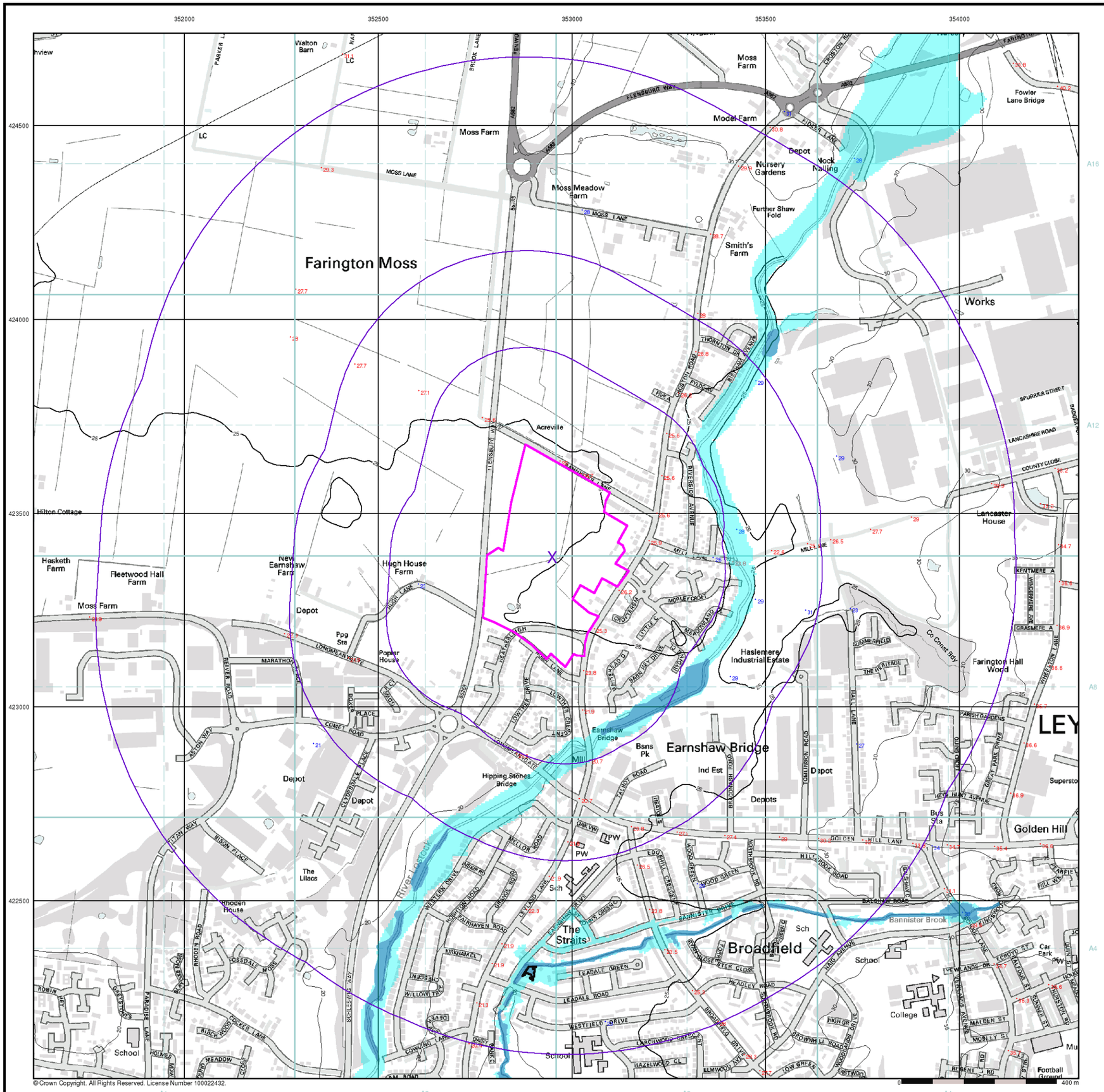
Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

Full Terms and Conditions can be found on the following link:
http://www.landmarkinfo.co.uk/Terms/Show/430

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



AECOM

EA Flood Data Map (1:10,000)

General

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

Environment Agency Flood Data

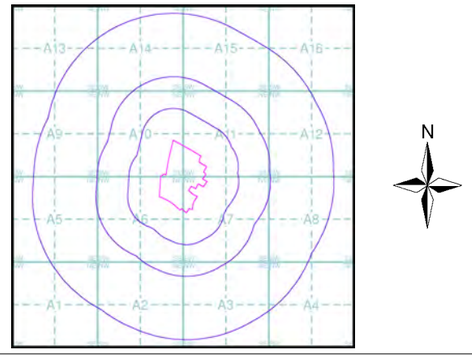
- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in metres)

Standard Contour — 105 — 100 — 95 — *167.8 Spot Height

Index Contour — *45.8 Air Height

EA Flood Data Map - Slice A



Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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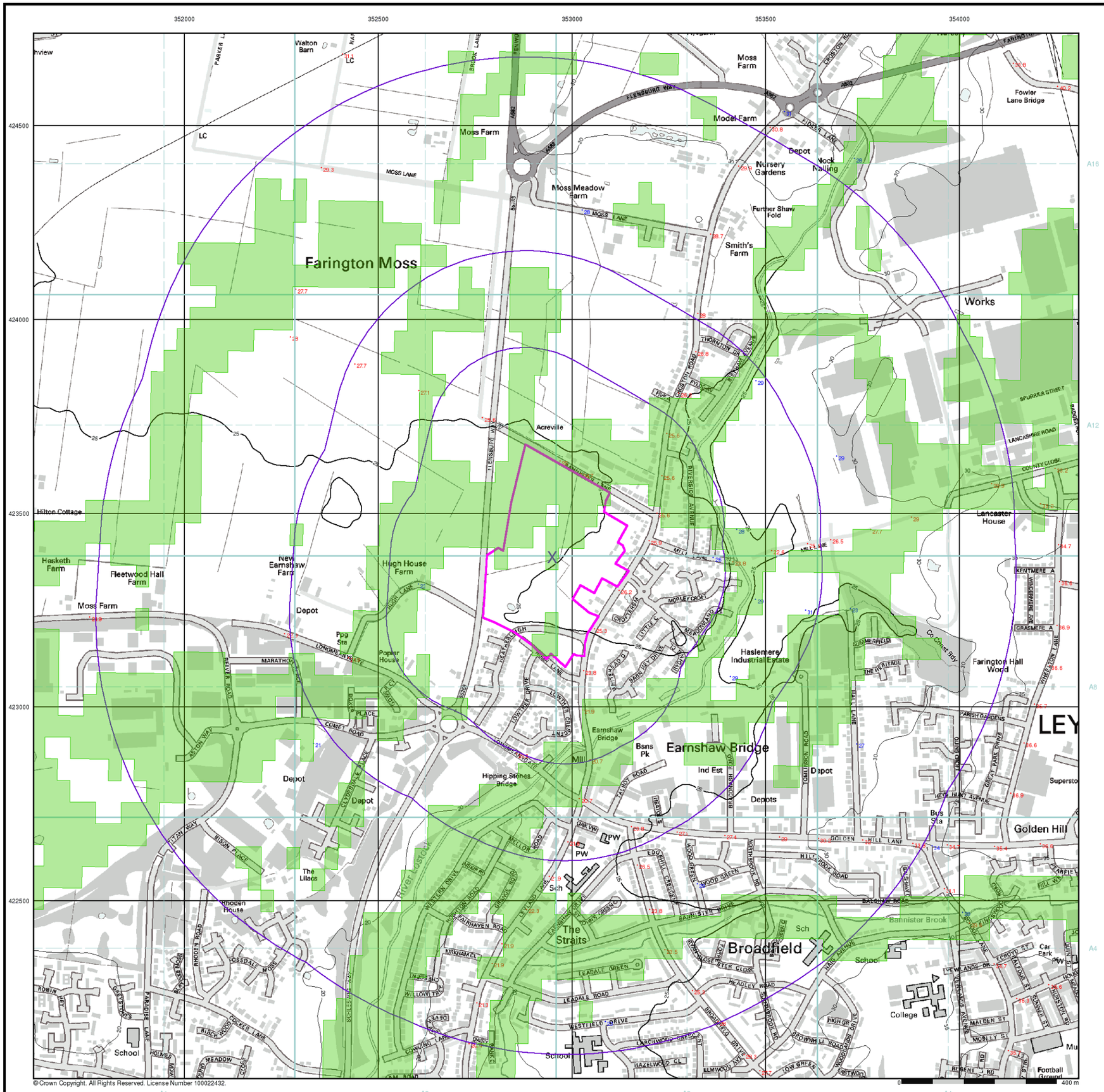


AECOM

RMS 75 year Return Flood Map (1:10,000)

General

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

RMS 75 year Return Flood Data

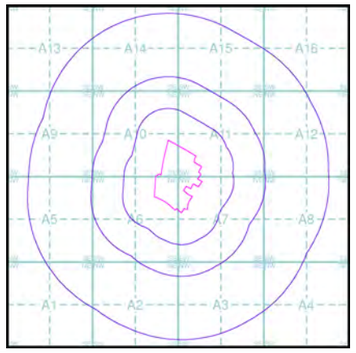
Flood Depth (mm)	Flood Type: Defended Flood	Flood Type: Undefended Flood	Pluvial & Minor River Flood (flood depth n/a)
0 - 200			
201 - 500			
501 - 2000			
2001 +			

Contours (height in metres)

Standard Contour 105 100 95 — *167.3 Spot Height

Index Contour — *45.8 Air Height

RMS 75 year Return Flood Map - Slice A



Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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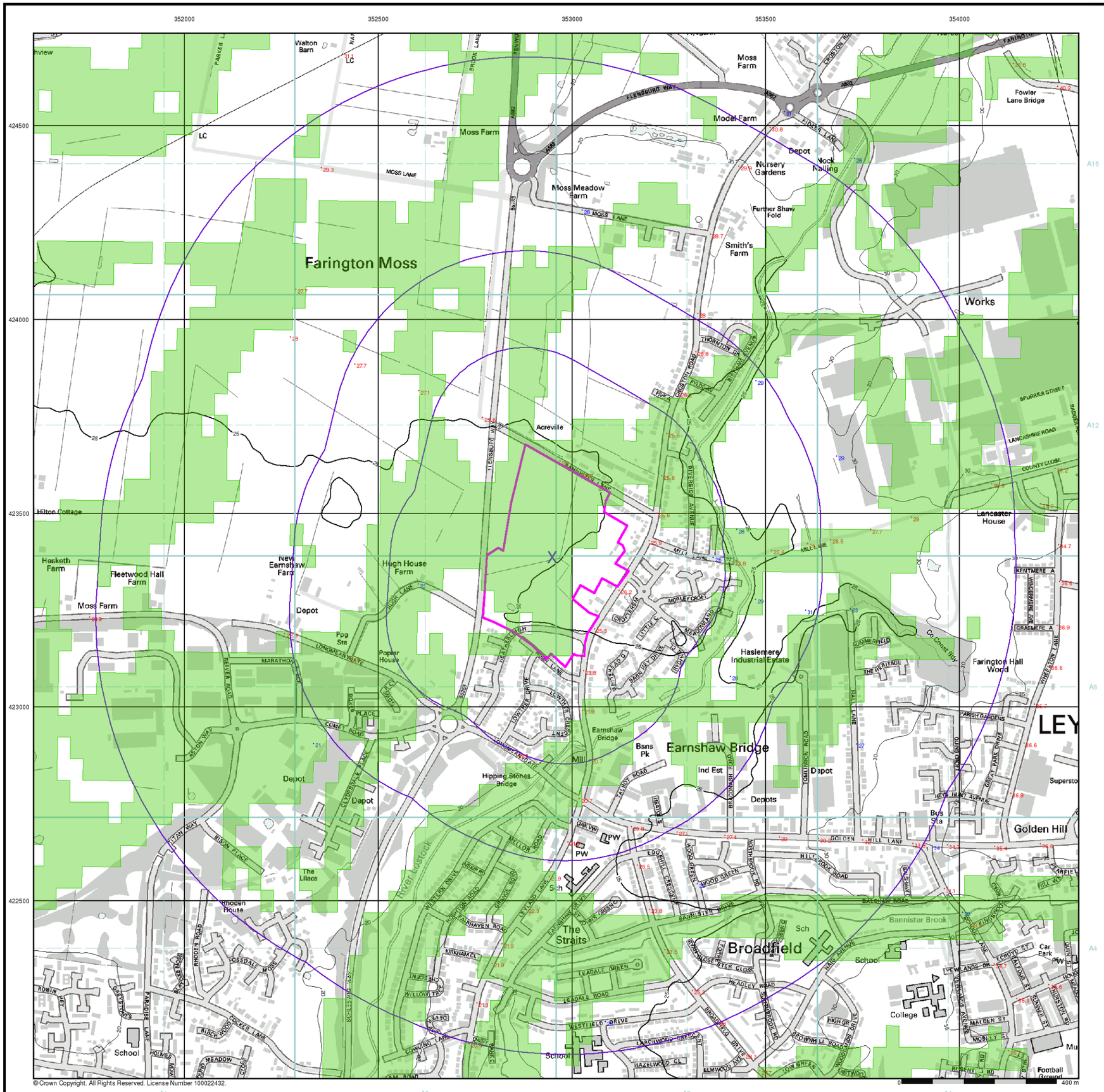


AECOM

RMS 100 year Return Flood Map (1:10,000)

General

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

RMS 100 year Return Flood Data

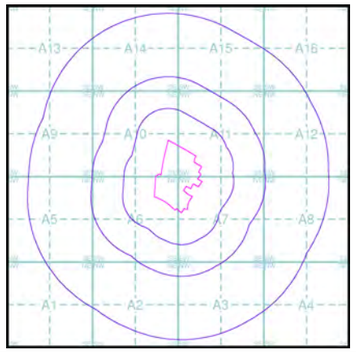
Flood Depth (mm)	Flood Type: Defended Flood	Flood Type: Undefended Flood	Pluvial & Minor River Flood (flood depth n/a)
0 - 200			
201 - 500			
501 - 2000			
2001 +			

Contours (height in metres)

Standard Contour 105 100 95 — 167.3 Spot Height

Index Contour — 45.8 Air Height

RMS 100 year Return Flood Map - Slice A



Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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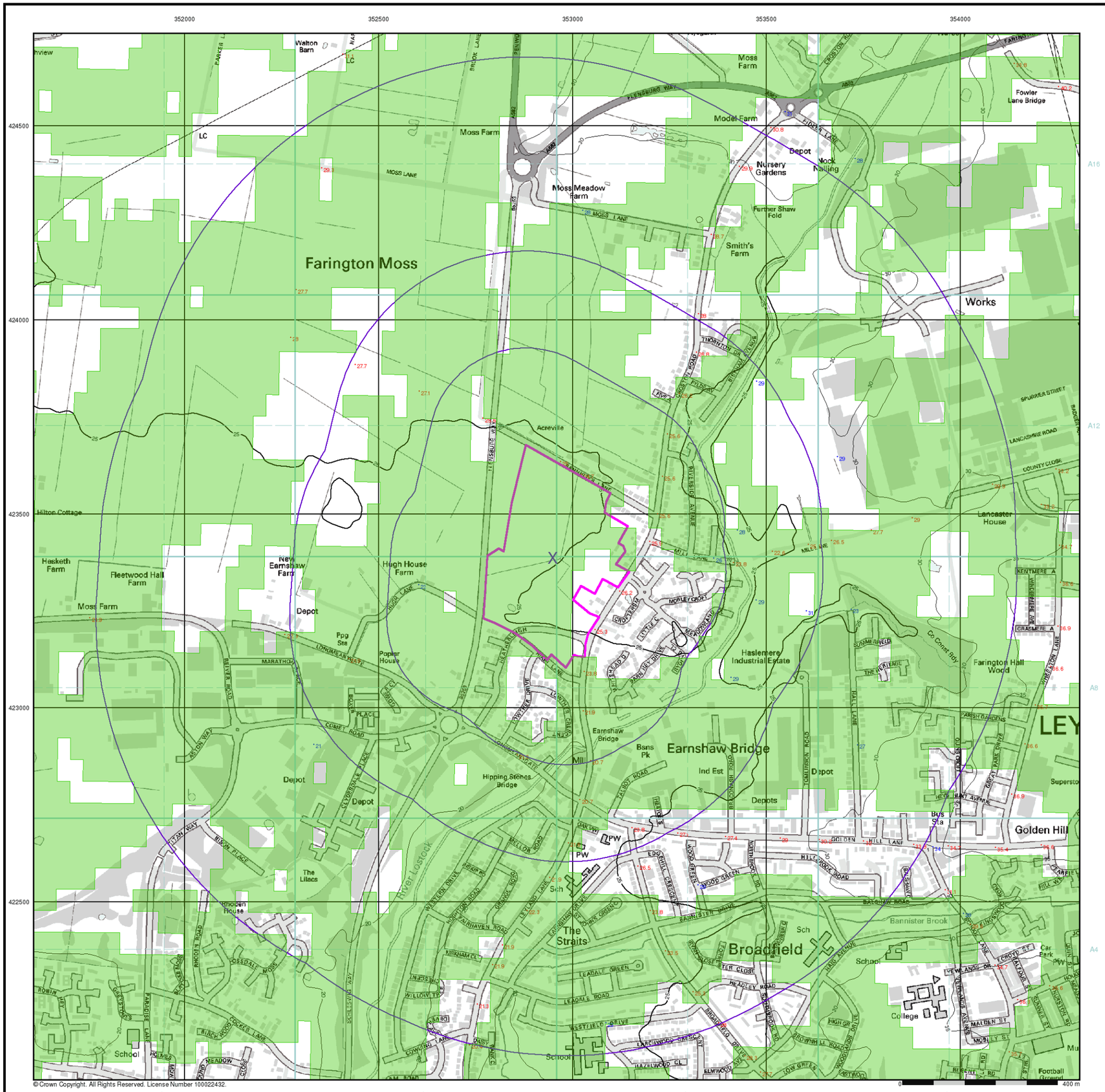


AECOM

RMS 1000 year Return Flood Map (1:10,000)

General

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

RMS 1000 year Return Flood Data

Flood Depth (mm)	Flood Type: Defended Flood	Flood Type: Undefended Flood	Pluvial & Minor River Flood (flood depth n/a)
0 - 200			
201 - 500			
501 - 2000			
2001 +			

Contours (height in metres)

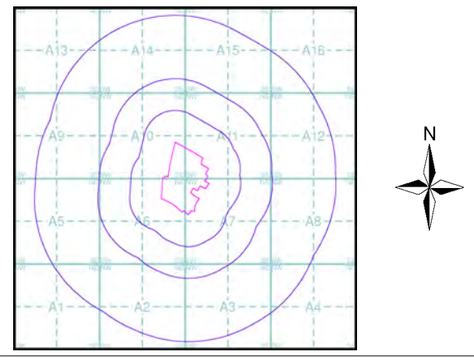
Standard Contour 105 100 95

Index Contour

167.3 Spot Height

45.8 Air Height

RMS 1000 year Return Flood Map - Slice A



Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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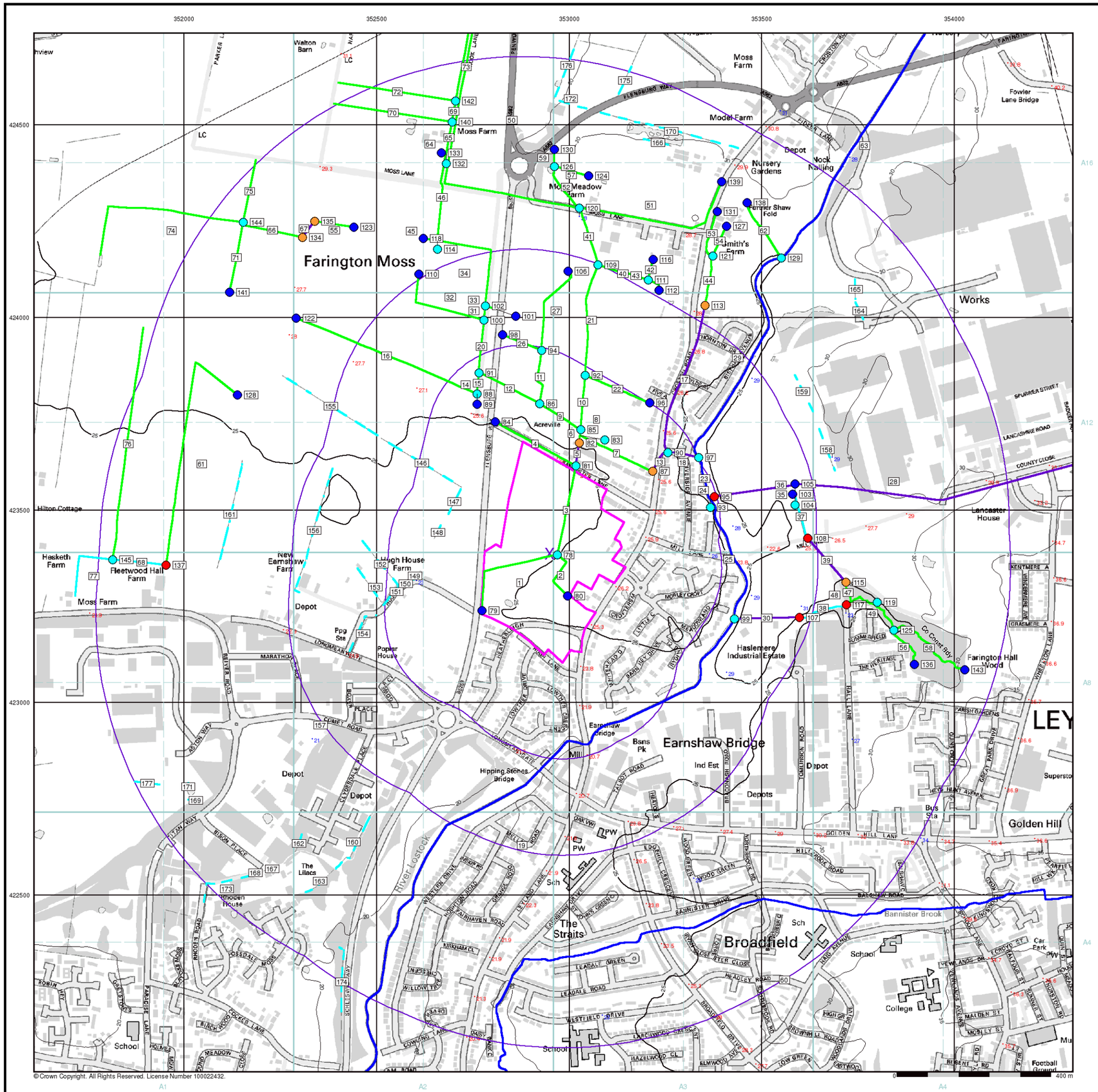


AECOM

EA Detailed River Network Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

EA Detailed River Network Data

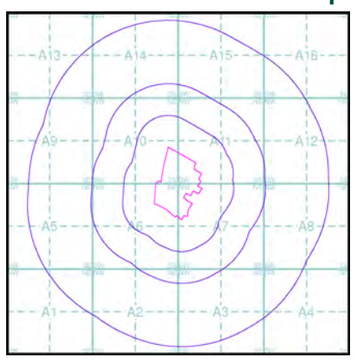
- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Source
- Junction
- Sink
- Non-interactive Node
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature
- Not assigned River feature
- Pseudo Node (general)
- Pseudo Node (High Water Mark)
- Pseudo Node (OS MasterMap polygon boundary)

Contours (height in metres)

Standard Contour 105
Index Contour 100 95

167.3 Spot Height
45.8 Air Height

EA Detailed River Network Map - Slice A



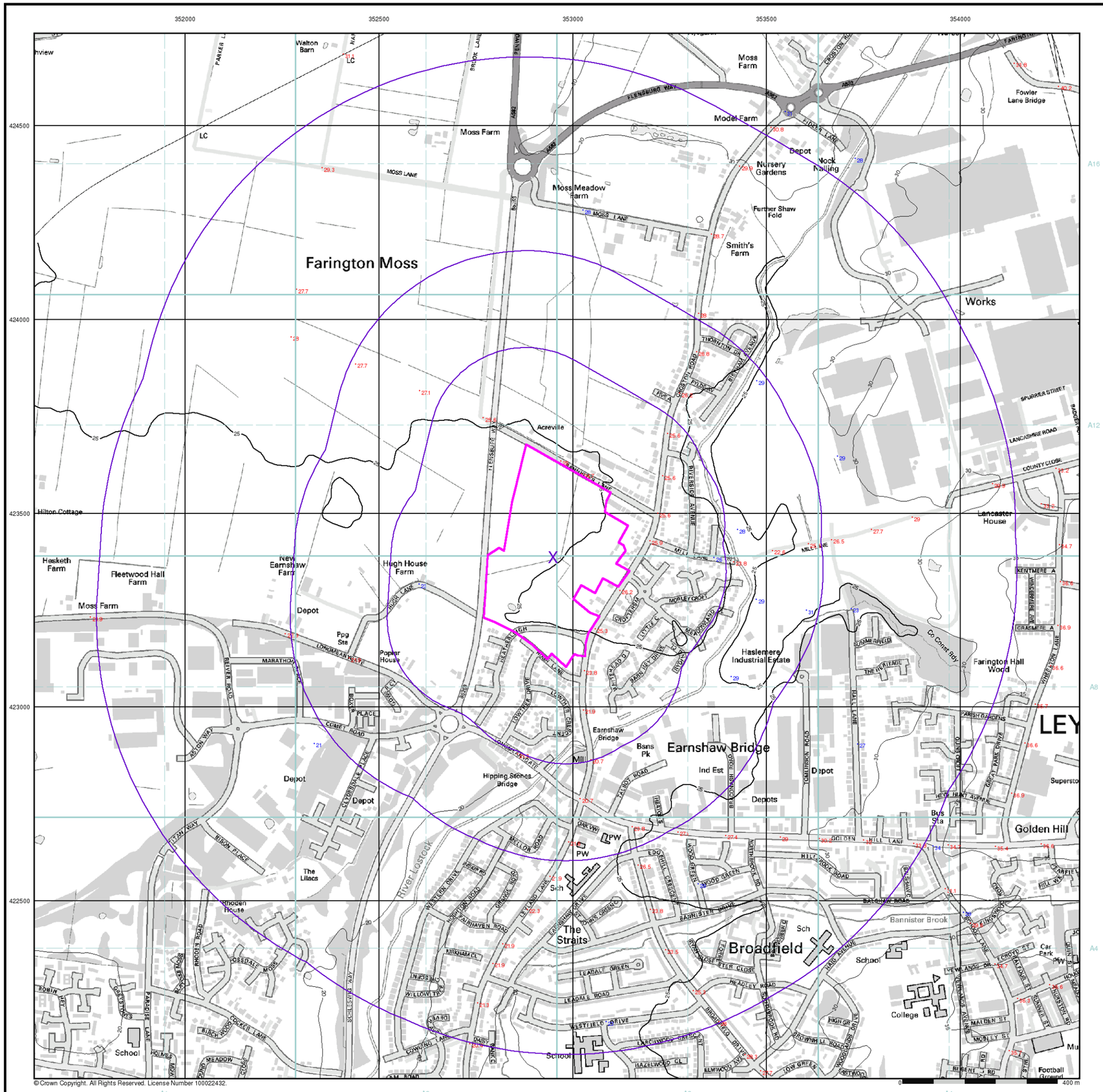
Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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



AECOM

EA Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

EA Historic Flood Events Data

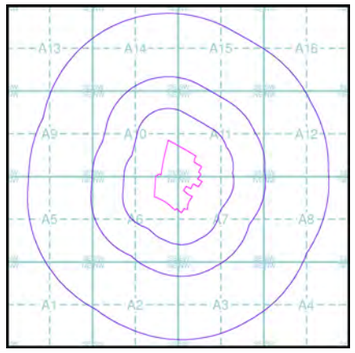
- Channel Capacity Exceeded (no raised defences)
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Unknown
- Historical Flood Liabilities

Contours (height in metres)

Standard Contour 105 100 95 — Spot Height 167.3

Index Contour — Air Height 45.8

EA Historic Flood Map - Slice A



Order Details

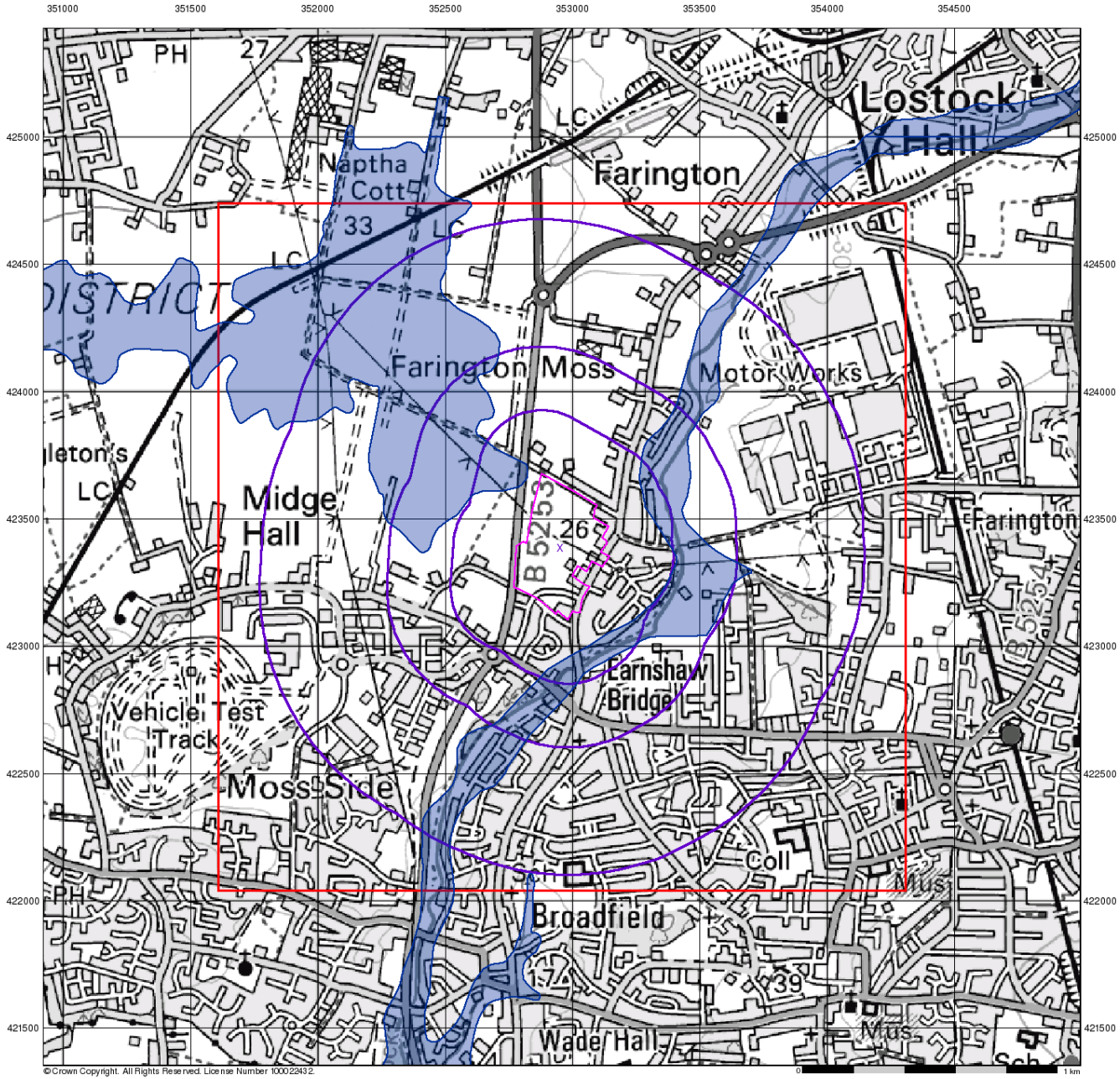
Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

Landmark Information Group

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



AECOM

BGS Flood Data (1:50,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Slice | Map ID

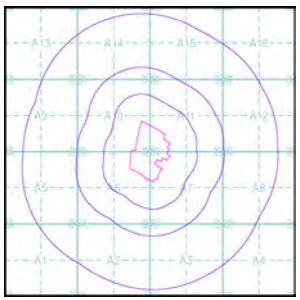
BGS Geological Indicators of Flooding

Coastal

Inland

Bodies of Water

BGS Flood Data Map - Slice A



N

Order Details

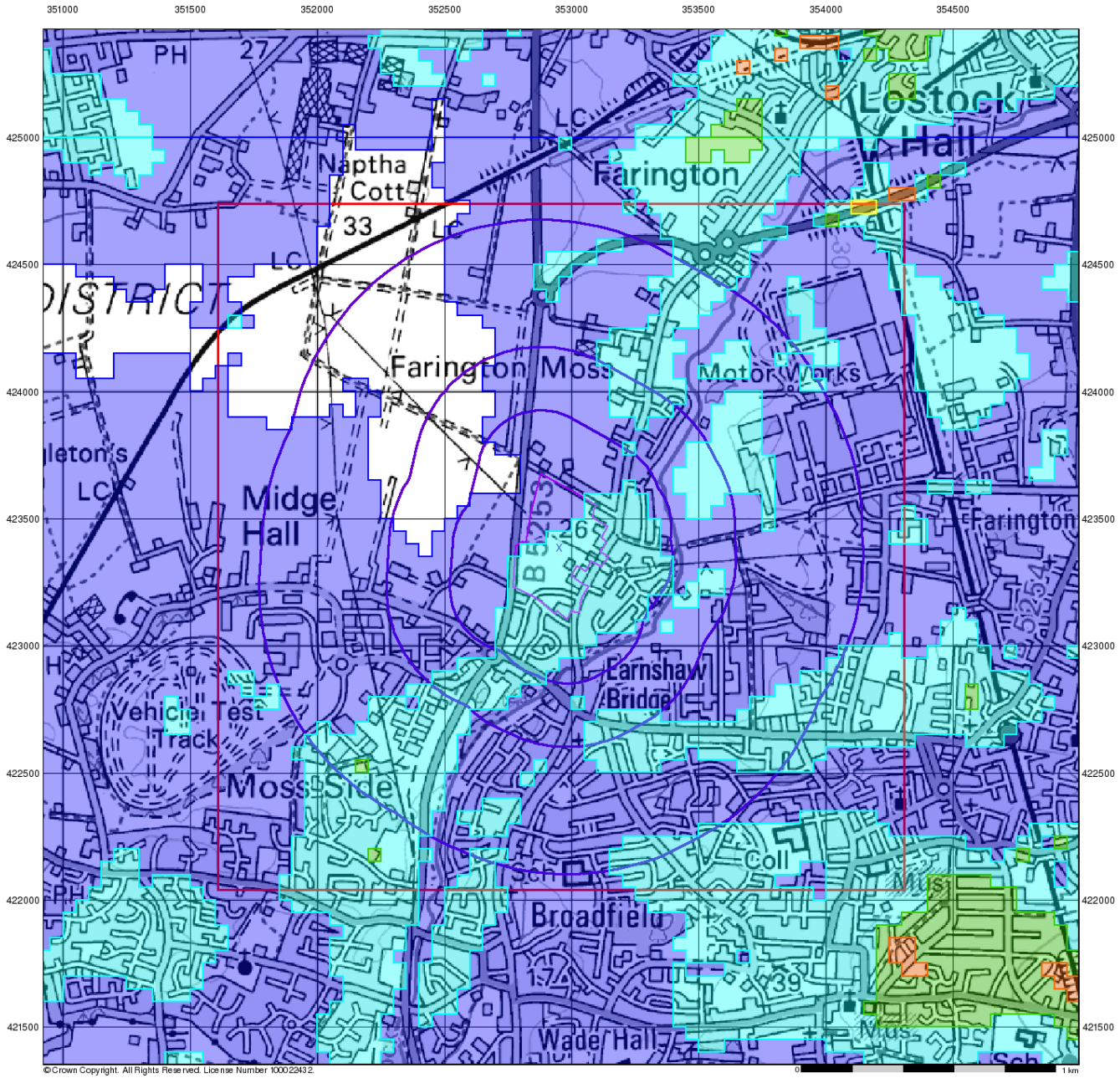
Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

Landmark Information Group

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



AECOM

BGS Flood Data (1:50,000)

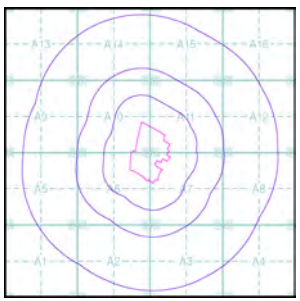
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

BGS Groundwater Flooding Susceptibility

- High Susceptibility
- Moderately High Susceptibility
- Moderate Susceptibility
- Low Susceptibility
- Negligible Susceptibility

BGS Flood Data Map - Slice A



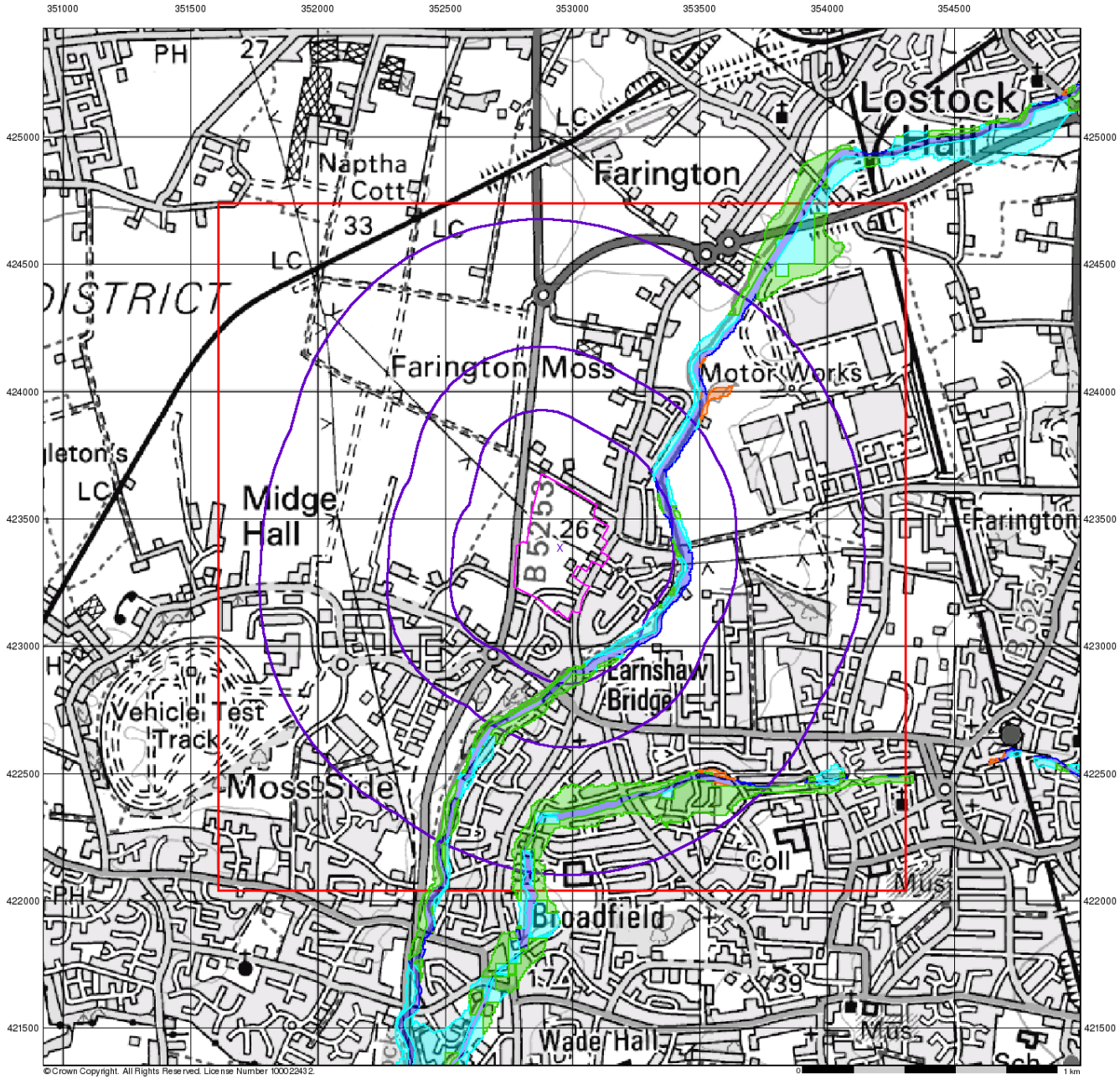
Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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



EA NaFRA Data (1:50,000)

General

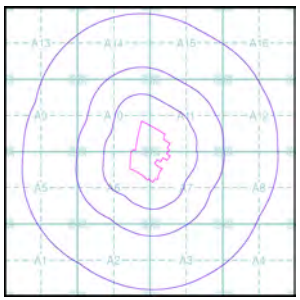
Specified Site | Specified Buffer(s) | Bearing Reference Point

Slice | Map ID

National Flood Risk Assessment (NaFRA)

- Significant Risk
- Moderate Risk
- Low Risk
- No Result

EA NaFRA Data Map - Slice A



Order Details

Order Number:	40567498_1_1
Customer Ref:	60273452
National Grid Reference:	352950, 423390
Slice:	A
Site Area (Ha):	12.79
Search Buffer (m):	1000

Site Details

Site off Croston Road, LEYLAND

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

The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against all relevant Engineers and Architects drawings and all other specialist documentation provided.

This drawing is not intended to show details of ground conditions or ground contaminants. Each area of ground relied upon to support any structure depicted (including drainage) must be investigated by the Contractor. Any suspect or fluid ground, contaminates on or within the ground, should be further investigated by a suitable expert.

Sketch proposals are for illustrative purposes only & as such are subject to detailed site investigation including ground conditions/contaminants, drainage, design & planning/density negotiations. Sketch proposals may be based upon enlargements of OS sheets & visual estimations of existing site features, accuracy will therefore need to be verified by survey. Sketch proposals have not been considered in respect of CDM Regulations.

Do not scale. Work to given dimensions only.

Notes:

SURVEY KEY

AV	AIR VALVE	I/R	IRON RAIL
BL	BOLLARD	KO	KERB OUTLET
BM	BENCH MARK	LB	LETTER BOX
BN	BEACON	LP	LAMP POST
BS	BUS STOP SIGN	L/L	LARCH LAP
BT	BRITISH TELECOM COVER	MH	MANHOLE
B/W	BARBED WIRE	MK	MARKER POST
CB	CONTROL BOX	MG	MULTI GIRTH
CCTV	CLOSED CIRCUIT TV	NP	NAME PLATE
CL	COVER LEVEL	OHC	OVERHEAD CABLE
C/I	CORRUGATED IRON	P	POST
C/L	CHAIN LINK	PM	PARKING METER
CONC	CONCRETE	P/R	POST AND RAIL
CPS	CONCRETE PAVING SLABS	P/W	POST AND WIRE
COL	COLUMN	RE	RODDING EYE
C/B	CLOSE BOARDED	RD	ROAD SIGN
CNP	CHESTNUT PALING	RWP	RAIN WATER PIPE
C/P	CONCRETE PANEL	SC	SCRAPE COCK
CTV	CABLE TV	SF	SUPPLY FUSEL
D	DIAMETER	SP	SIGN POST
DP	DOWN PIPE	S/R	STEEL RAILING
DPC	DAMP PROOF COURSE	ST	STUMP
EB	ELECTRICITY BOX	SV	STOP VALVE
EC	ELECTRICITY COVER	SW	SURFACE WATER
EP	ELECTRICITY POLE	TAC	TACTILE PAVING
ER	EARTH ROD	TCB	TELEPHONE CALL BOX
FL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHT
FH	FIRE HYDRANT	TLC	TRAFFIC LIGHT SERVICE COVER
FW	FOUL WATER	TP	TELEPHONE POLE
GL	GROUND LIGHT	TW	TOP OF WALL LEVEL
GM	GAS METER	U/L	UNABLE TO LIFT
GP	GATE POST	VC	UNKNOWN VALVE COVER
GV	GAS VALVE	VP	VENT PIPE
GY	GULLY	WCL	WINDOW CILL LEVEL
IC	INSPECTION COVER	WHL	WINDOW HEAD LEVEL
IL	INVERT LEVEL	WL	WATER LEVEL
INV	DITCH INVERT LEVEL	WM	WATER METER
		W/M	WIRE MESH
		WO	WASH OUT VALVE

1. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CONFIRMED BY SPECIALISTS IF CRITICAL.
2. SURVEY GRID & LEVELS RELATED TO ORDNANCE SURVEY NATIONAL GRID, OBTAINED THROUGH POST PROCESS GPS OBSERVATIONS BASED ON STATION P50 (352924.066E, 423576.410N). SCALE FACTOR 0.99963 HAS BEEN USED.
3. CONTOURS ON FROZEN LAYER.

Station	Easting	Northing	Level
D1	352801.626	423124.061	25.530
D2	353001.994	423610.180	24.677
D3	353223.093	423496.281	25.752
D4	353149.098	423323.469	26.128
D5	353035.866	423175.493	24.601
D6	352947.458	423204.964	24.757
D7	352846.056	423194.233	23.927
D8	352753.383	423236.592	24.117
D9	352764.727	423392.704	24.219
D10	352775.003	423578.551	24.269
D11	352946.239	423160.033	24.308
D70	352902.274	423143.575	23.976
D71	352774.888	423239.340	23.828
P1	353159.283	423530.612	25.707
P2	353005.868	423565.998	25.222
P3	352945.265	423648.781	24.910
P4	352896.857	423674.903	24.776
P5	353038.378	423525.357	24.849
P6	353099.762	423477.748	25.068
P7	353139.566	423436.117	25.205
P8	353012.677	423411.176	25.546
P9	352928.373	423440.751	24.037
P50	352924.066	423576.410	23.755
RPS1	353062.243	423383.886	25.475
RPS2	353014.789	423300.271	25.098
RPS3	352984.739	423379.621	24.908
RPS4	352941.507	423393.711	23.924

Rev	Date	Amendment	Drawn	Check
B	14.6.12	AREA TO REAR OF No 428 SURVEYED.	PMC	

For guidance only. Do not scale off this drawing

1:20 – 1:100 – 1:50 – 1:25 – 1:10 – 1:5 TO SCALE @ A0

RPS
Riverside House, Coppidbeck Drive, Linford Wood, Milton Keynes MK14 6GF
T 01908 668 888 F 01908 668 899 E rpsmkx@rpsgroup.com W www.rpsgroup.com

Client:

Project: CROXTON ROAD, LEYLAND, LANCASHIRE.

Title: TOPOGRAPHICAL SURVEY

Status: FINAL Checked: DR/PMC

Drawn: PMC/DR Date: 06/03/2012 Scale: 1/500@ A0

Drawing Ref:

Job No: JKK7177 Drg No: 1 Rev: B

The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against all relevant Engineers and Architects drawings and all other specialist documentation provided.

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Do not scale. Work to given dimensions only.

Notes:

SURVEY KEY

AV	AIR VALVE	I/R	IRON RAIL
BL	BOLLARD	KO	KERB OUTLET
BM	BENCH MARK	LB	LETTER BOX
BN	BEACON	LP	LAMP POST
BS	BUS STOP SIGN	L/L	LARCH LAP
BT	BRITISH TELECOM COVER	MH	MANHOLE
B/W	BARBED WIRE	MK	MARKER POST
CB	CONTROL BOX	MO	MULTI ORIFICE
CCTV	CLOSED CIRCUIT TV	NP	NAME PLATE
CL	COVER LEVEL	OHC	OVERHEAD CABLE
C/I	CORRUGATED IRON	P	POST
C/L	CHAIN LINK	PM	PARKING METER
CONC	CONCRETE	P/R	POST AND RAIL
CPS	CONCRETE PAVING SLABS	P/W	POST AND WIRE
COL	COLUMN	RE	RODDING EYE
C/R	CLOSE BOARDED	RS	ROAD SIGN
CHP	CHESTNUT PALING	RWP	RAIN WATER PIPE
C/W	CONCRETE WALL	SC	SOFFIT CLOSE
D	DOUBLE	SF	SOFFIT LEVEL
DT	TREE DIAMETER	SP	SIGN POST
DP	DOWN PIPE	S/R	STEEL RAILING
DPC	DAMP PROOF COURSE	ST	STUMP
EB	ELECTRICITY BOX	SV	STOP VALVE
EC	ELECTRICITY COVER	SW	SURFACE WATER
EP	ELECTRICITY POLE	TAC	TACTILE PAVING
ER	EARTH ROD	TCB	TELEPHONE CALL BOX
FL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHT
FH	FIRE HYDRANT	TLC	TRAFFIC LIGHT SERVICE COVER
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GM	GAS METER	U/L	UNABLE TO LIFT
GP	GATE POST	VC	UNKNOWN VALVE COVER
GV	GAS VALVE	VP	VENT PIPE
GY	GULLY	WCL	WINDOW CILL LEVEL
H	HYDRAULIC COVER	WHL	WINDOW HEAD LEVEL
IL	INVERT LEVEL	WL	WATER LEVEL
INV	DITCH INVERT LEVEL	WM	WATER METER
		W/M	WIRE MESH
		WO	WASH OUT VALVE

1. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CONFIRMED BY SPECIALISTS IF CRITICAL.
2. SURVEY GRID & LEVELS RELATED TO ORDNANCE SURVEY NATIONAL GRID. OBTAINED THROUGH POST PROCESS GPS OBSERVATIONS BASED ON STATION PS0 (352904.066E, 423576.410N). SCALE FACTOR 0.99963 HAS BEEN USED.
3. CONTOURS ON FROZEN LAYER.

Station	Eastings	Northings	Level
D1	352801,828	423726,961	25,530
D2	353005,994	423610,180	24,677
D3	353223,093	423490,261	25,752
D4	353149,098	423323,469	26,128
D5	353035,866	423175,493	24,601
D6	352947,458	423204,964	24,757
D7	352845,956	423194,233	23,927
D8	352753,363	423236,892	24,117
D9	352764,727	423392,704	24,219
D10	352775,003	423578,551	24,269
D11	352946,239	423160,033	24,309
D70	352902,274	423143,575	23,978
D71	352774,888	423239,340	23,828
P1	353159,283	423530,612	25,707
P2	353005,868	423565,968	25,222
P3	352945,285	423648,781	24,910
P4	352898,857	423674,903	24,776
P5	353038,378	423525,357	24,849
P6	353099,762	423477,748	25,068
P7	353139,066	423435,117	25,205
P8	353072,677	423411,176	25,548
P9	352928,573	423460,751	24,037
P50	352924,066	423576,410	23,705
RPS1	353062,243	423383,886	25,475
RPS2	353014,789	423360,271	25,098
RPS3	352984,739	423379,621	24,908
RPS4	352941,507	423393,711	23,924

Rev	Date	Amendment	Drawn	Check
B	14.6.12	AREA TO REAR OF No 428 SURVEYED.	PMC	

For guidance only. Do not scale off this drawing

1:20 • 200mm 400mm 600mm 800mm 1000 1200 1400 1600 1800 2000
1:100 • 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m
1:50 • 1m 2m 3m 4m 5m
1:5 • 100mm 200mm 300mm 400mm 500mm
TO SCALE @ A1

RPS
Argyle House, Capital Drive, Linford Wood, Milton Keynes MK14 6QP
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Client:

Project: CROXTON ROAD, LEYLAND, LANCASHIRE.

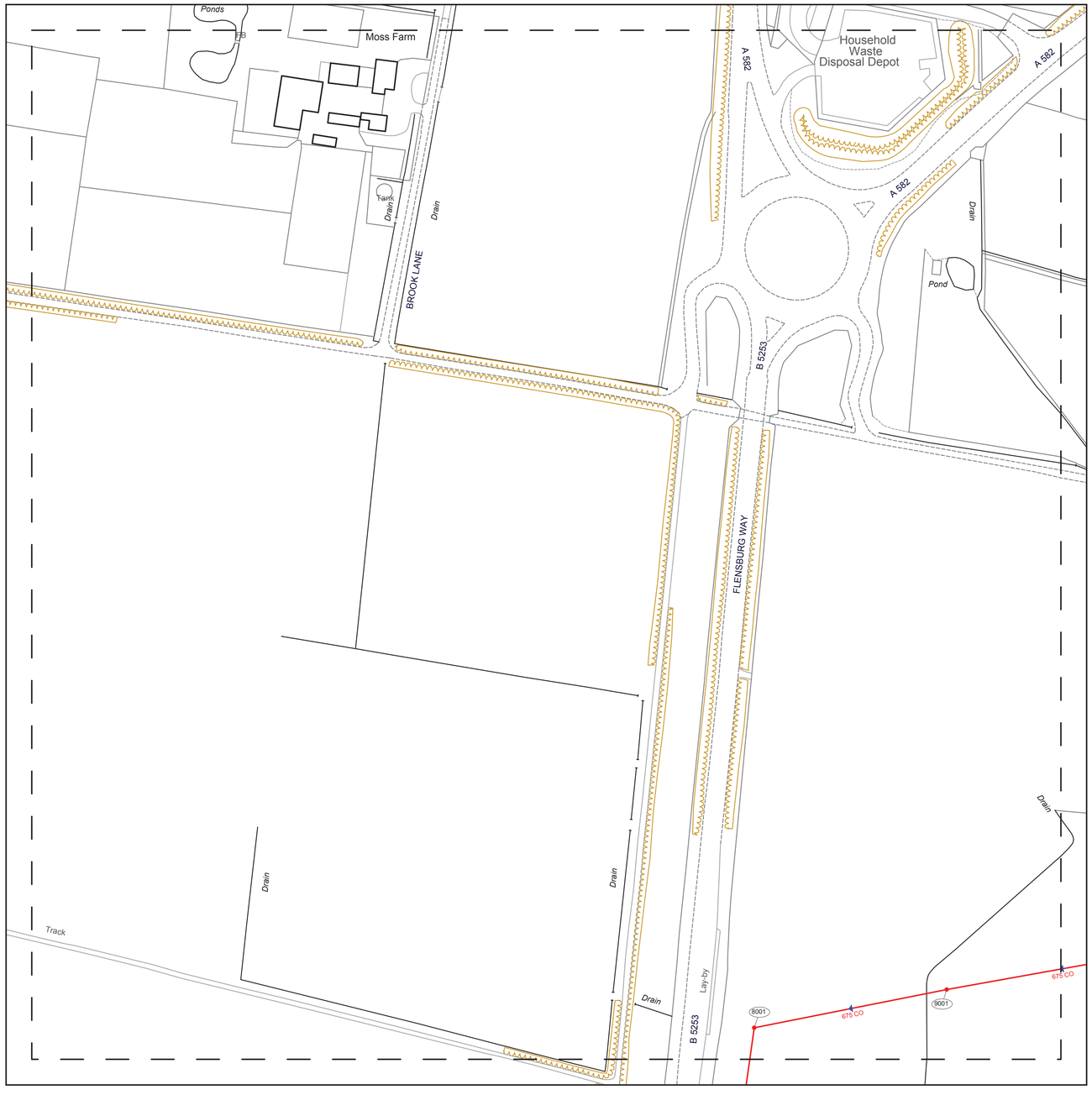
Title: TOPOGRAPHICAL SURVEY

Status: FINAL Checked: DR/PMC

Drawn: PMC/DR Date: 06/03/2012 Scale: 1/500@ A0

Drawing file:

Job No: JKK7177 Drg No: 2 Rev: B



Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
8001	25.81	C	M	21.47	675		C	CO	539	86.18
9001	25.79	C	M	21.64	675		C	CO	681	95.31

OS Sheet No: SD5224SE

Scale 1:1250 Date: 14-Dec-2011

Printed by: Lea Robertson

WASTE WATER SYMBOLOGY

MANHOLE
FOUL SURFACE COMBINED DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F	Foul	T	Transition
S	Surface	O	Overflow
C	Combined	U	Unspecified

MANHOLE / NODE TYPE

M	Manhole	Z	Ghost in Rising Main
J	Junction	C	Cascade
L	Lamphole	Y	Gulley
H	Hatchbox	E	Ejector
R	Rodding Eye	O	Oil Injector
F	Outfall	I	Inlet
V	Combined Sewer Overflow	B	Hydrobrake
		T	Vent Column
P	Pumping Station	X	Valve
S	Soakaway	U	Unspecified
D	Dual Function Manhole	Q	Expediency Node
		G	Ghost (to allow pipe bends)
W	Treatment Works		

SEWER SHAPE

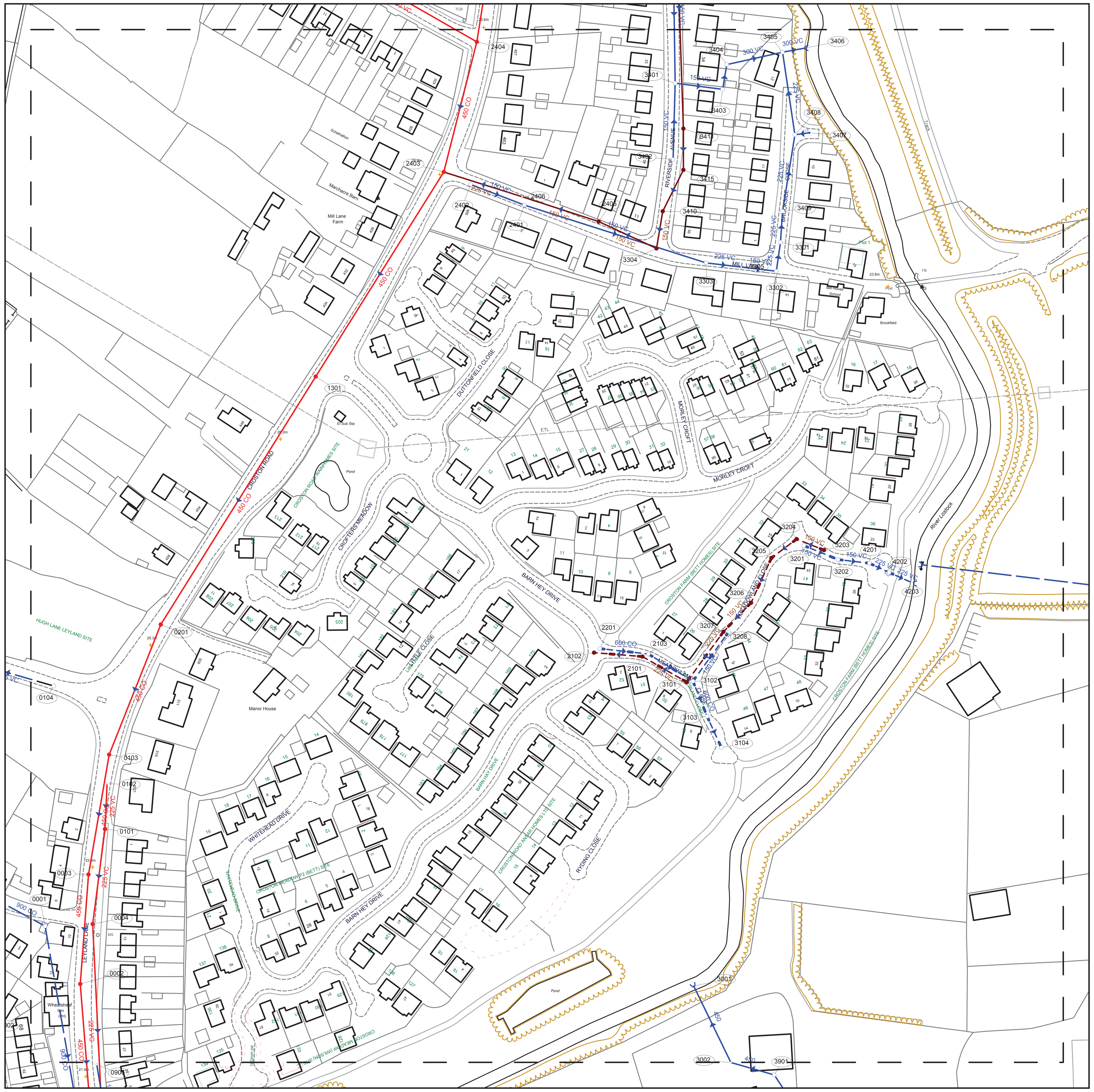
C	Circular	T	Trapezoidal
E	Egg	A	Arch
O	Oval	B	Barrel
F	Flat Top	H	Horseshoe
R	Rectangular	U	Unspecified
S	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
CI	Cast Iron
SI	Spun (Grey) Iron
CO	Concrete
CS	Concrete Segments (Bolted)
CS	Concrete Segments (Unbolted)
CC	Concrete Box Culvert
DI	Ductile Iron
GR	Glass Reinforced Concrete
GR	Glass Reinforced Plastic
PS	Plastic / Steel Composite
PV	Polyvinyl Chloride
PE	Polyethylene
RP	Reinforced Plastic Matrix
ST	Steel
VC	Vitrified Clay (All Clayware)
PP	Polypropylene
PF	Pitch Fibre
MA	Masonry - In Regular Courses
MA	Masonry - Randomly Coursed
U	Unspecified

OS Sheet No: SD5224SE
Scale 1:1250 Date: 14-Dec-2011
2 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



OS Sheet No: SD5323SW

Scale 1:1250 Date: 14-Dec-2011

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0001	22.9	S	M	21.08	900		C	CO		127.91
0002	22.84	C	M	20.27	450		C	CO	292	75.95
0003	23.62	C	M	21.46	450		C	CO	45	53.15
0004	23.4	C	M	21.45	225		C	VC	93	103.52
0101	23.9	C	M	22.01	225		C	VC	83	46.39
0102		C	G		225		C	VC		22.02
0103	24.49	C	M	20.69	450		C	CO	-76	58.86
0104	24.59	S	M	23.27	225		C	VC	141	46.64
0201	25.54	C	M	21.03	450		C	CO	199	67.78
1301	26.2	C	M	21.55	450		C	CO	272	141.51
2101		F	M		225		C	VC		23.5
2102		F	M							
2103		S	M		600		C	CO		25.23
2201		S	M		600		C	CO		23.65
2401	26.13	S	M	25.11	150		C	VC	162	92.35
2402		S	M		150		C	VC		27.86
2403	25.8	C	M	21.78	450		C	CO	508	116.81
2404	25.63	C	M	21.77	450		C	CO	-2167	65
2405		F	M		150		C	VC		38.9
2406		F	Q		225		C	VC		39.85
3001		S	F							
3002		S	G		450		C			41.15
3101		F	M		225		C	VC		24.67
3102		S	M		600		C	CO		18.36
3103		S	M		600		C	CO		16.62
3104		S	M							
3201		S	M		150		C	VC		17.89
3202		S	M		150		C	VC		15.27
3203		F	M		150		C	VC		14.31
3204		F	M		150		C	VC		15.2
3205		F	M		150		C	VC		23.83
3206		F	M		150		C	VC		19.36
3207		F	M		225		C	VC		30.22
3208		S	M		150		C	VC		29.66
3301		S	M		225		C	VC		15.03
3302	25.98	S	M	24.25	225		C	VC		14.14
3303	26.18	S	M	24.61	225		C	VC	156	17.12
3304	26.46	F	M	23.37	150		C	VC		30.87
3305		S	Q	24.5	150		C	VC	156	17.12
3401	25.28	S	M	23.55	150		C	VC		23.19
3402	25.89	S	M	24.13	150		C	VC	74	37.01
3403		S	M		150			VC		12.17
3404		S	M		300		C	VC		27.66
3405	25.35	S	M	22.94	300		C	VC	11	11.18
3406		S	F							
3407		S	L		150		C	VC		7.07
3408	25.65	S	M	23.43	225		C	VC	92	40.45
3409		S	M		225		C	VC		37.48
3410	26.25	F	M		150		C	VC		18.25
3411		F	M		150			VC		20
3415		F	M		150			VC		22.36
4201		S	M		225		C	VC		10.55
4202		S	M		225		C	VC		13.09
4203		F	F							
4205		F	F							

WASTE WATER SYMBOLOGY

MANHOLE: FOUL, SURFACE, COMBINED, DUAL

SIDE ENTRY MANHOLE

PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AV AIRVALVE
LH LAMP HOLE
CA CASCADE
OI OIL INTERCEPTOR
CK CONTROL KIOSK
PE PENSTOCK
CV CONTROL VALVE
RE RODDING EYE
GU GULLEY
SO SOAKAWAY
HA HATCHBOX
TB TUMBLING BAY
HE HEADWALL
UN UNSPECIFIED
HY HYDROBRAKE
VA VALVE
IN INLET
WO WASHOUT

GHOST NODE (inc. GN - Rising Main & GN - Dual Function)

EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)

CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul
S Surface
C Combined
T Transition
O Overflow
U Unspecified

MANHOLE / NODE TYPE

M Manhole
J Junction
L Lamphole
H Hatchbox
R Rodding Eye
F Outfall
V Combined Sewer Overflow
P Pumping Station
S Soakaway
D Dual Function Manhole
W Treatment Works
Z Ghost in Rising Main
C Cascade
Y Gulley
E Ejector
O Oil Injector
I Inlet
B Hydrobrake
T Vent Column
X Valve
U Unspecified
Q Expediency Node
G Ghost (to allow pipe bends)

SEWER SHAPE

C Circular
E Egg
O Oval
F Flat Top
R Rectangular
S Square
T Trapezoidal
A Arch
B Barrel
H Horseshoe
U Unspecified

SEWER MATERIAL

AC Asbestos Cement
BR Brick
CI Cast Iron
SI Spun (Grey) Iron
CO Concrete
CS Concrete Segments (Bolted)
CS Concrete Segments (Unbolted)
CC Concrete Box Culvert
DI Ductile Iron
GR Glass Reinforced Concrete
GR Glass Reinforced Plastic
PS Plastic / Steel Composite
PV Polyvinyl Chloride
PE Polyethylene
RP Reinforced Plastic Matrix
ST Steel
VC Vitrified Clay (All Clayware)
PP Polypropylene
PF Pitch Fibre
MA Masonry - In Regular Courses
MA Masonry - Randomly Coursed
U Unspecified

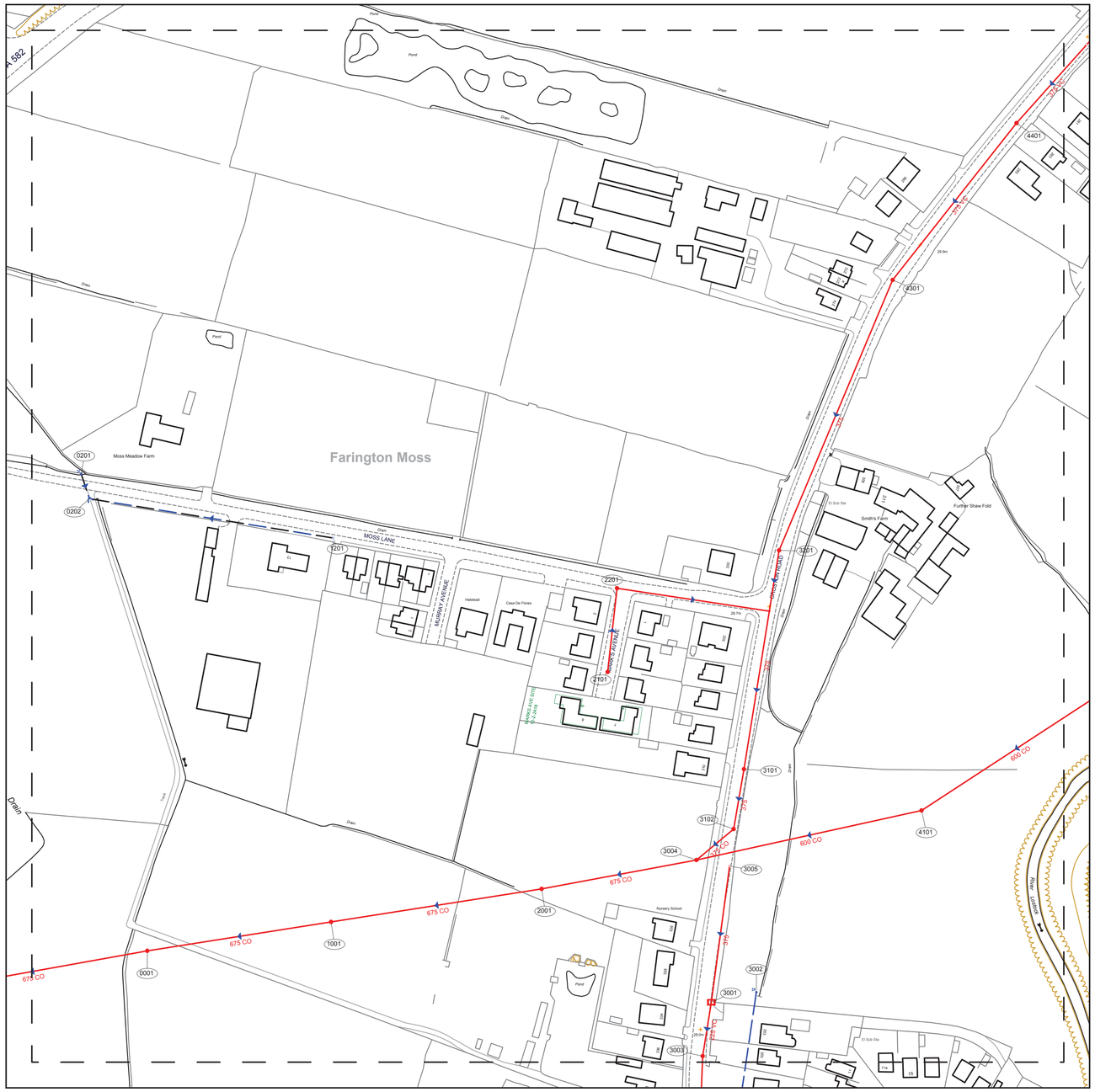
OS Sheet No: SD5323SW
Scale 1:1250 Date: 14-Dec-2011

55 Nodes

Sheet 1 of 1

United Utilities

SEWER RECORDS



Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0001		C	M		675		C	CO		113.33
0201		S	I							12.65
0202		S	F							
1001		C	M		675		C	CO		90.09
1201		S	G							119.52
2001	29.02	C	M	22.35	675		C	CO		103.25
2101		C	M							40.8
2201		C	M							74.58
3001		C	V	25.95	225		C	VC		26.4
3002		S	I							123.32
3003		C	M		225		C	VC		75.06
3004	29.24	C	M	22.46	675		C	CO	763	76.3
3005		C	G		375		C			66.52
3101	28.61	C	M	26.31	375		C			29.43
3102		C	M		375		C	CO		23.43
3200		F	J		375		C			77.53
3201	28.56	C	M	26.58	375		C			29.82
4101	28.51	C	M	22.55	600		C	CO		111.61
4301	29.6	C	M	26.9	375		C		444	142.08
4401	30.23	C	M	27.16	375		C	VC	372	96.83

OS Sheet No: SD5324SW

Scale 1:1250 Date: 14-Dec-2011

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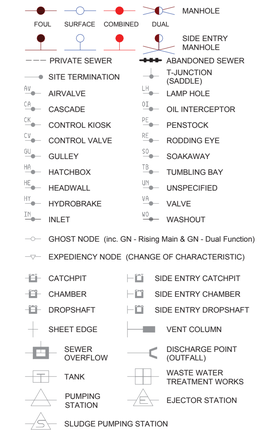
WASTE WATER SYMBOLOGY



Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F	Foul	T	Transition
S	Surface	O	Overflow
C	Combined	U	Unspecified

MANHOLE / NODE TYPE

M	Manhole	Z	Ghost in Rising Main
J	Junction	C	Cascade
L	Lamphole	Y	Gulley
H	Hatchbox	E	Ejector
R	Rodding Eye	O	Oil Injector
F	Outfall	I	Inlet
V	Combined Sewer Overflow	B	Hydrobrake
		T	Vent Column
P	Pumping Station	X	Valve
S	Soakaway	U	Unspecified
D	Dual Function Manhole	Q	Expediency Node
		G	Ghost (to allow pipe bends)
W	Treatment Works		

SEWER SHAPE

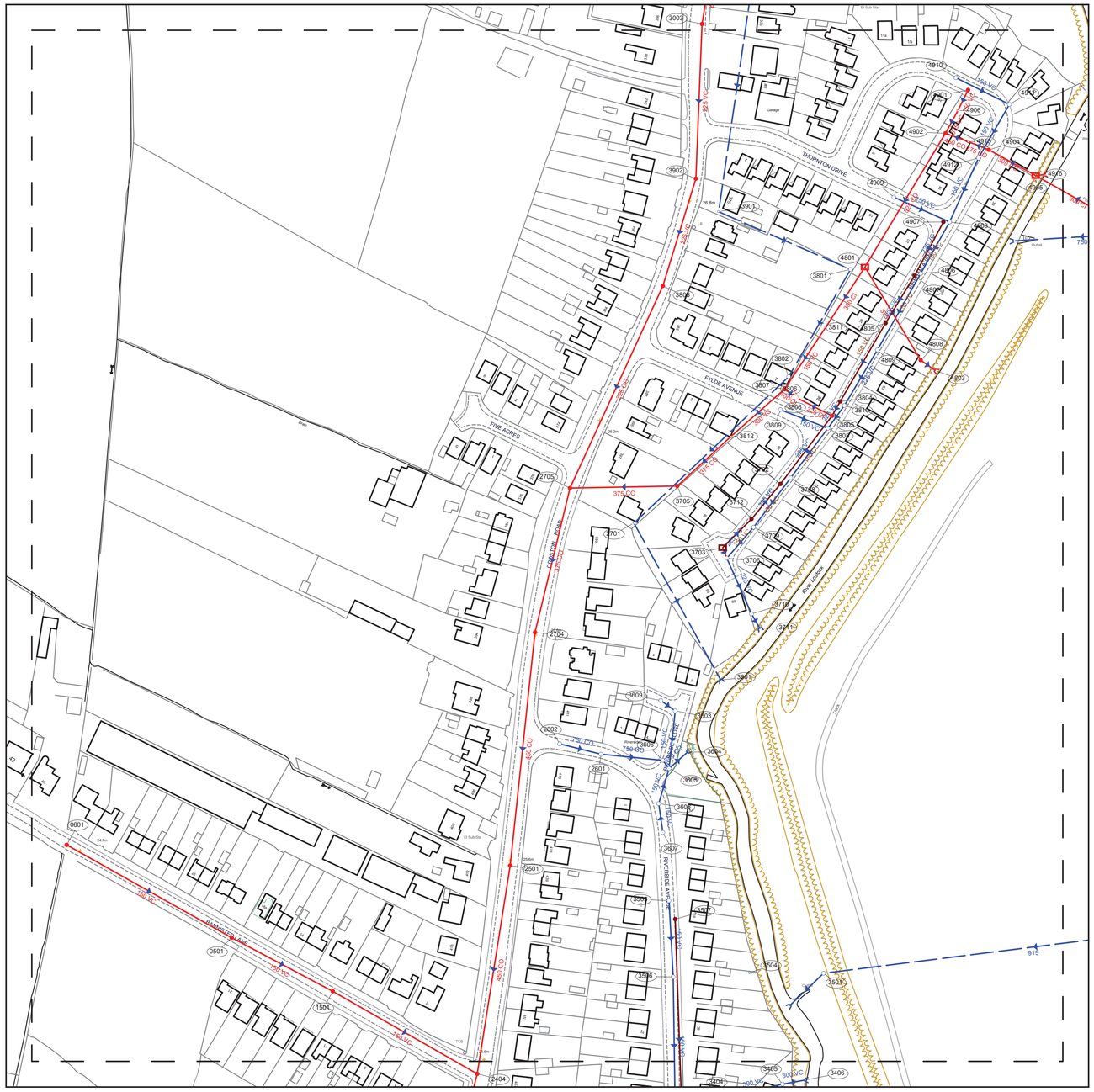
C	Circular	T	Trapezoidal
E	Egg	A	Arch
O	Oval	B	Barrel
F	Flat Top	H	Horseshoe
R	Rectangular	U	Unspecified
S	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
CI	Cast Iron
SI	Spun (Grey) Iron
CO	Concrete
CS	Concrete Segments (Bolted)
CS	Concrete Segments (Unbolted)
CC	Concrete Box Culvert
DI	Ductile Iron
GR	Glass Reinforced Concrete
GR	Glass Reinforced Plastic
PS	Plastic / Steel Composite
PV	Polyvinyl Chloride
PE	Polyethylene
RP	Reinforced Plastic Matrix
ST	Steel
VC	Vitrified Clay (All Clayware)
PP	Polypropylene
PF	Pitch Fibre
MA	Masonry - In Regular Courses
MA	Masonry - Randomly Coursed
U	Unspecified

OS Sheet No: SD5324SW
Scale 1:1250 Date: 14-Dec-2011
20 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0501		C	M		150		C	VC		55.47
0601		C	M		150		C	VC		91.79
1501		C	M		150		C	VC		80.62
2501	25.33	C	M	22.24	450		C	CO	218	102.26
2601		S	M		750		C	CO		30.15
2602	25.08	S	M	22.82	750		C	CO		20.62
2701		S	G							86.83
2704	25.38	C	M	22.56	450		C	CO	355	113.64
2705	25.63	C	M	23.01	375		C	CO	160	72.03
3501		S	M							22.49
3502		F	F							
3504		S	G							
3505	24.11	S	M		150		C	VC		37.05
3506	24.5	S	M	23.83	150		C	VC	279	67.01
3507		F	M		150			VC		117.07
3601		S	F							
3603		S	M		150		C	VC		28.16
3604		S	F							
3605	24.15	S	M	22.12	750		C	CO		12.04
3606		S	M		750		C	CO		5
3607	23.82	S	M	22.65	150		C	VC		14.14
3608		S	M		150		C	VC		17.72
3609	23.82	S	M	22.71	150		C	VC		8.6
3702		F	M		150		C	CI		41.4
3703		F	V		150		C	VC		19.74
3703		F	V		150		C	PVC		5.5
3705	24.63	C	M	23.58	375		C	CO	867	52.01
3706	23.59	S	M	22.59	225		C	VC		29.55
3708		S	M		225		C	VC		30
3709		S	M		225		C	VC		19.85
3710		S	M		225			VC		8.06
3711		S	F							
3712		F	M		150		C	VC		22.02
3801		S	M							60.03
3802		S	M							103.28
3803	26.41	C	M	24.18	225		C	CO	105	107.84
3804		F	M		150		C	CI		8.06
3805		C	M		225		C	CI		20.27
3806		C	P		100		C	CI		6.22
3807	24.7	C	M	23.17	300		C	VC	-112	34.71
3808	24.16	S	M	23.17	225		C	VC		30
3809		S	M		150		C	VC		24.7
3810		S	M		225		C	VC		13.6
3811		C	Q	23.98	150		C	VC	100	36.06
3812		C	Q	23.48	375		C	CO	-114	35.38
3901		S	G							69.86
3902	27	C	M	24.68	225		C	VC	109	54.41
4800		F	F							
4801		C	V	24.34	300		C	CI	97	34.8
4801		C	V		375		C			52.63
4803		O	F							
4805		F	M		150		C	VC		43.91
4806		S	M		225		C	VC		42.54
4807		F	M		150		C	VC		26.93
4808		O	M		375		C			8.6
4809		S	M		225		C	VC		31.38
4901	26.67	C	M	25.79	150		C	VC	39	11.18
4902	26.26	C	M	25.14	525		C	CO	252	75.67
4904	26.17	C	M	25.33	375		C	CO	108	10.77
4905		C	V	25.57	300		C	CO	118	25.96
4905		C	V		150		C	PE		4.27
4906		C	Q	25.5	375		C	VC	45	12.53
4907		F	M		150		C	VC		29.53
4908	25.67	S	M	24.39	225		C	VC		28.65
4909	26.09	S	M	24.46	150		C	VC	591	29.55
4910	26.62	S	M	25.43	150		C	VC	61	29.07
4911	26.21	S	M	24.93	150		C	VC		30.02
4912		S	M		150		C	VC		34.01
4913		C	Q	25.23	450		C	CO	130	11.7
4916		O	F							

WASTE WATER SYMBOLOGY

MANHOLE
FOUL SURFACE COMBINED DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F	Foul	T	Transition
S	Surface	O	Overflow
C	Combined	U	Unspecified

MANHOLE / NODE TYPE

M	Manhole	Z	Ghost in Rising Main
J	Junction	C	Cascade
L	Lamphole	Y	Gulley
H	Hatchbox	E	Ejector
R	Rodding Eye	O	Oil Injector
F	Outfall	I	Inlet
V	Combined Sewer Overflow	B	Hydrobrake
		T	Vent Column
P	Pumping Station	X	Valve
S	Soakaway	U	Unspecified
D	Dual Function Manhole	Q	Expediency Node
		G	Ghost (to allow pipe bends)
W	Treatment Works		

SEWER SHAPE

C	Circular	T	Trapezoidal
E	Egg	A	Arch
O	Oval	B	Barrel
F	Flat Top	H	Horseshoe
R	Rectangular	U	Unspecified
S	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
CI	Cast Iron
SI	Spun (Grey) Iron
CO	Concrete
CS	Concrete Segments (Bolted)
CS	Concrete Segments (Unbolted)
CC	Concrete Box Culvert
DI	Ductile Iron
GR	Glass Reinforced Concrete
GR	Glass Reinforced Plastic
PS	Plastic / Steel Composite
PV	Polyvinyl Chloride
PE	Polyethylene
RP	Reinforced Plastic Matrix
ST	Steel
VC	Vitrified Clay (All Clayware)
PP	Polypropylene
PF	Pitch Fibre
MA	Masonry - In Regular Courses
MA	Masonry - Randomly Coursed
U	Unspecified

OS Sheet No: SD5323NW

Scale 1:1250 Date: 14-Dec-2011

70 Nodes

Sheet 1 of 1

OS Sheet No: SD5323NW
Scale 1:1250 Date: 14-Dec-2011

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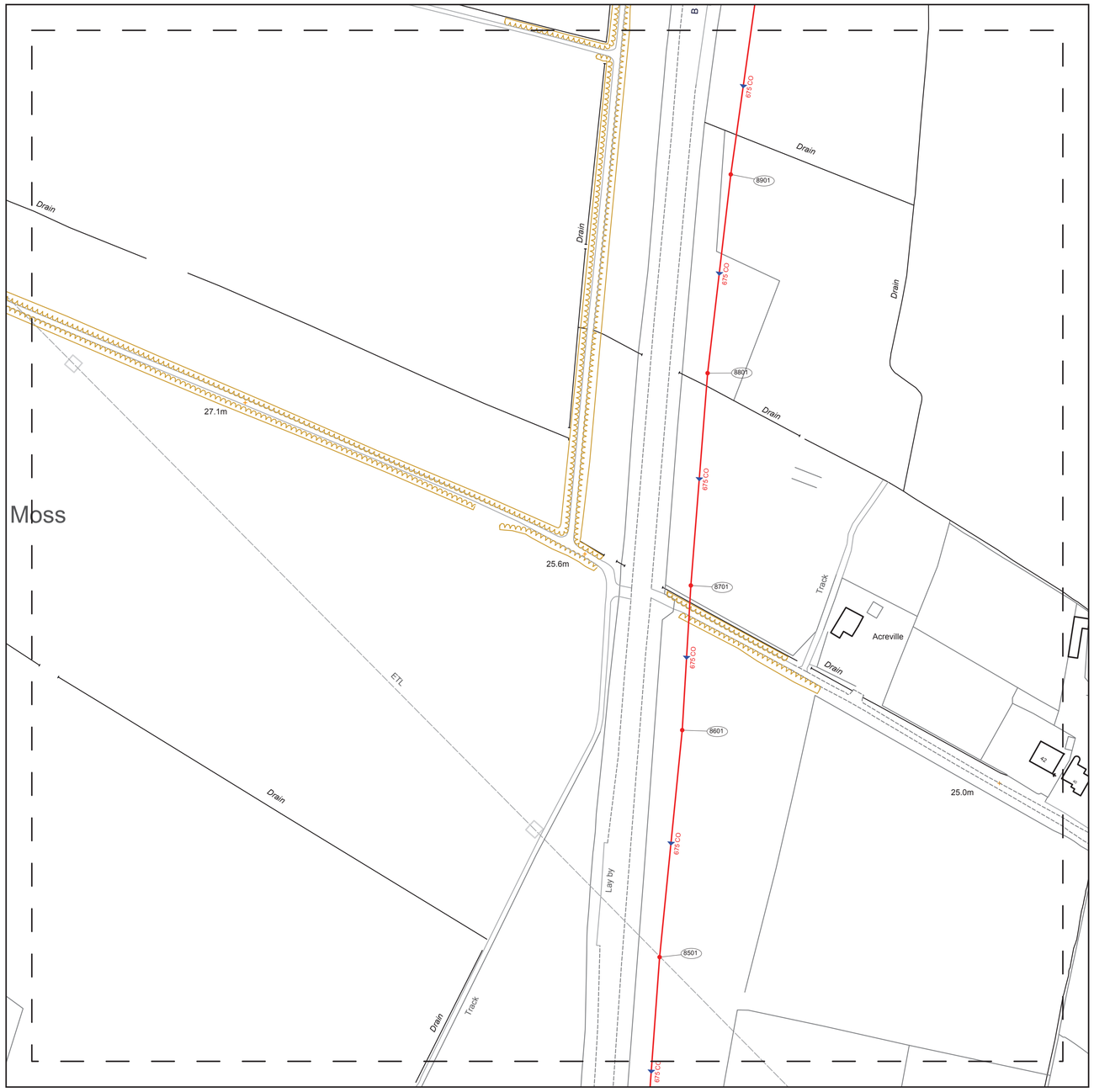
United Utilities
SEWER RECORDS



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8601	23.5	C	M	20.72	675		C	CO	428	110.57
8701	24.74	C	M	20.95	675		C	CO	351	70.26
8801	25.61	C	M	21.11	675		C	CO	688	103.26
8901	26	C	M	21.29	675		C	CO	606	97

OS Sheet No: SD5223NE

Scale 1:1250 Date: 14-Dec-2011

Printed by: Lea Robertson

WASTE WATER SYMBOLOGY

MANHOLE (FOUL, SURFACE, COMBINED, DUAL)
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul
S Surface
C Combined
T Transition
O Overflow
U Unspecified

MANHOLE / NODE TYPE

M Manhole
J Junction
L Lamphole
H Hatchbox
R Rodding Eye
F Outfall
V Combined Sewer Overflow
P Pumping Station
S Soakaway
D Dual Function Manhole
W Treatment Works
Z Ghost in Rising Main
C Cascade
Y Gulley
E Ejector
O Oil Injector
I Inlet
B Hydrobrake
T Vent Column
X Valve
U Unspecified
Q Expediency Node
G Ghost (to allow pipe bends)

SEWER SHAPE

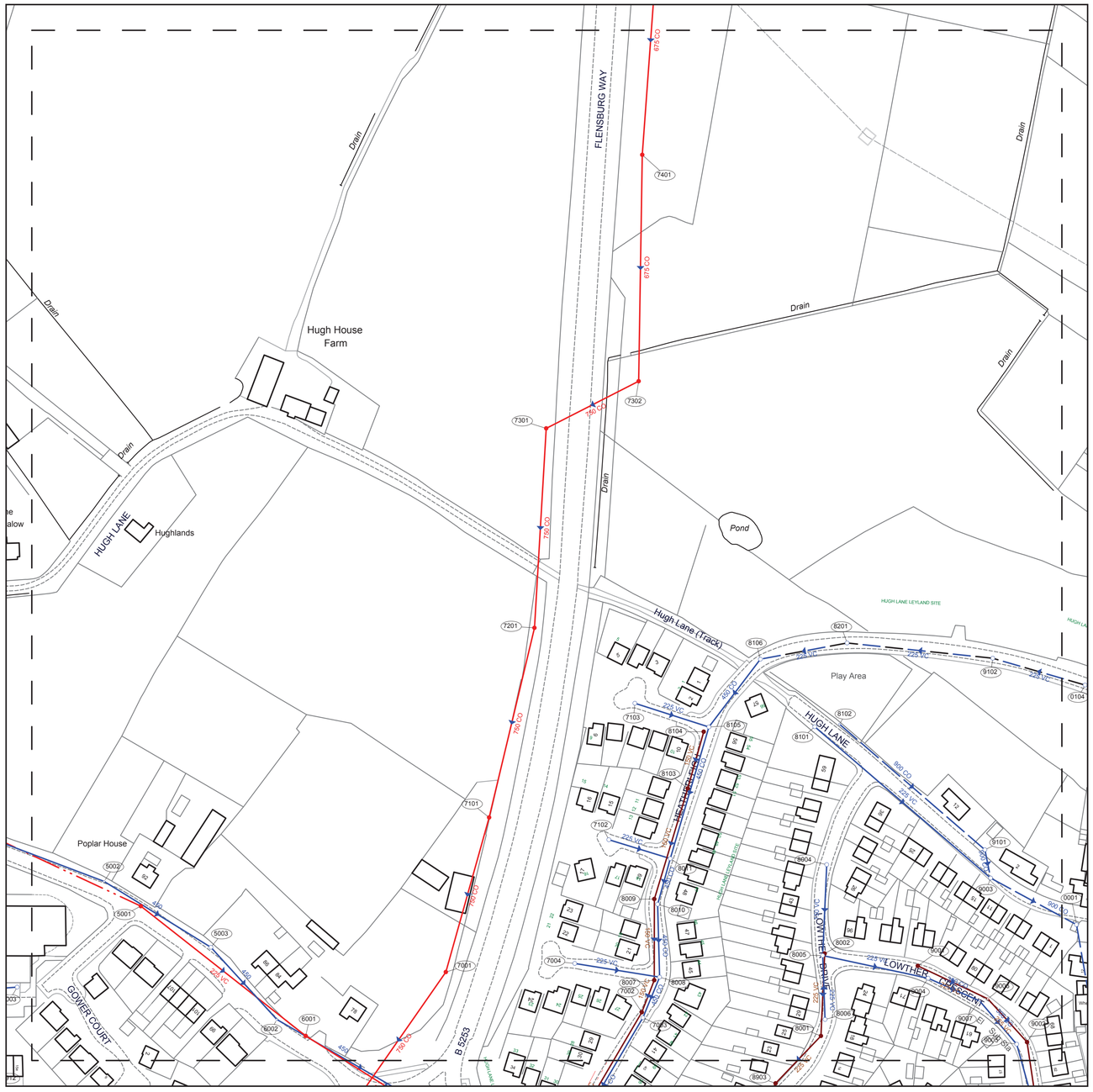
C Circular
E Egg
O Oval
F Flat Top
R Rectangular
S Square
T Trapezoidal
A Arch
B Barrel
H Horseshoe
U Unspecified

SEWER MATERIAL

AC Asbestos Cement
BR Brick
CI Cast Iron
SI Spun (Grey) Iron
CO Concrete
CS Concrete Segments (Bolted)
CS Concrete Segments (Unbolted)
CC Concrete Box Culvert
DI Ductile Iron
GR Glass Reinforced Concrete
GR Glass Reinforced Plastic
PS Plastic / Steel Composite
PV Polyvinyl Chloride
PE Polyethylene
RP Reinforced Plastic Matrix
ST Steel
VC Vitrified Clay (All Clayware)
PP Polypropylene
PF Pitch Fibre
MA Masonry - In Regular Courses
MA Masonry - Randomly Coursed
U Unspecified

OS Sheet No: SD5223NE
Scale 1:1250 Date: 14-Dec-2011
5 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



OS Sheet No: SD5223SE

Scale 1:1250 Date: 14-Dec-2011

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Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
5001	22.01	C	M	20.96	225		C	VC	261	101.83
5002		S	G		450		C			60.87
5003	22.14	S	M	20.19	450		C			47.42
6001	22.23	C	M	20.57	225		C	VC	297	92.11
6002		S	G		450		C			93.65
7001	22.3	C	M	19.23	750		C	CO		80.45
7002	22.29	F	M	20.88	150		C	VC	132	93.39
7003	22.3	S	M	20.21	450		C	CO	176	75.77
7004	22.28	S	M	20.93	225		C	VC	104	41.69
7101	22.82	C	M	19.31	750		C	CO	779	77.88
7102	22.77	S	M	21.48	225		C	VC	84	31.18
7103	23.61	S	M	22.23	225		C	VC	79	37.72
7201	23.57	C	M	19.56	750		C	CO	364	94.59
7301	23.48	C	M	19.67	750		C	CO	1212	96.96
7302	23.79	C	M	19.85	750		C	CO	296	50.36
7401	23.12	C	M	20.2	675		C	CO	439	109.85
8001	22.91	F	M	20.67	225		C	VC	177	31.83
8002	23.17	F	M	20.97	225		C	VC	133	40.04
8004	23.56	S	M	21.09	150		C	VC	94	44.15
8005	23.2	S	M	20.58	225		C	VC	90	52.31
8006	22.92	S	M	20.81	225		C	VC	163	31.02
8007	22.32	F	M	21.06	150		C	VC	93	16.67
8008	22.35	S	M	20.3	450		C	CO	236	21.25
8009	22.67	F	M	21.45	150		C	VC	101	39.38
8010	22.63	S	M	20.67	450		C	CO	96	35.34
8011	22.92	S	M	20.9	450		C	CO	100	23.02
8101	23.52	S	M	22.56	225		C	VC	122	112.56
8102		S	G		900		C	CO		93.11
8103	23.27	F	M	22.04	150		C	VC	95	56.07
8104	23.58	F	M	22.37	150		C	VC	87	28.57
8105	22.6	S	M	21.52	450		C	CO	107	66.56
8106	23.92	S	M	21.68	450		C	CO	298	41.29
8201	24.39	S	M	22.48	225		C	VC	74	42.81
9001	23.18	F	M	21.58	225		C	VC		37.58
9002	23.49	F	M	21.09	225		C	VC	121	80.89
9003	23.52	S	M	21.64	900		C	CO	85	47.41
9004	23.12	S	M	19.98	300		C	CO		27.31
9005	23.48	S	M	19.51	300		C	CO		63.32
9006		F	G		225		C	VC		28.32
9007		S	G		300		C	CO		27.66
9101	23.55	S	M	21.58	900		C	CO	-234	14.02
9102	25.1	S	M	22.94	225		C	VC	154	71.07

WASTE WATER SYMBOLOGY

MANHOLE
FOUL
SURFACE
COMBINED
DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
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SIDE ENTRY CHAMBER
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SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
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EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

- F Foul
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- C Combined
- T Transition
- O Overflow
- U Unspecified

MANHOLE / NODE TYPE

- M Manhole
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- F Outfall
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- B Hydrobrake
- T Vent Column
- X Valve
- U Unspecified
- Q Expediency Node
- G Ghost (to allow pipe bends)

SEWER SHAPE

- C Circular
- E Egg
- O Oval
- F Flat Top
- R Rectangular
- S Square
- T Trapezoidal
- A Arch
- B Barrel
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SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- CI Cast Iron
- SI Spun (Grey) Iron
- CO Concrete
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- CS Concrete Segments (Unbolted)
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- MA Masonry - In Regular Courses
- MA Masonry - Randomly Coursed
- U Unspecified

OS Sheet No: SD5223SE
Scale 1:1250 Date: 14-Dec-2011
42 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS

Request for Surface Water Flooding Information

Further to your request for information I am writing to explain the Environment Agency's role with respect to surface water flooding.

We have provided two national maps, under our Strategic Overview for flooding, to the Lead Local Flood Authority who are responsible for local flood risk, (i.e. surface runoff, ground water and ordinary watercourse), which alongside their existing local information will help them to determine what best represents surface water flood risk in your area.

We are not able to confirm if the Lead Local Flood Authority for your area has decided what best represents surface water flood risk.

Please find maps below which we have provided to Lead Local Flood Authorities:

- Areas Susceptible to Surface Water Flooding (2009)
- Flood Map for Surface Water (2010).

Flood Map for Surface Water is our new surface water flood map and provides a general indication of areas that may be at risk of surface water flooding. It takes broad account of underground drainage and typical storms which are likely to cause flooding, but these are only typical national figures and are not appropriate everywhere. The map indicates two depths of flooding: greater than 0.1m deep, and greater than 0.3m deep.

Areas Susceptible to Surface Water Flooding was produced in 2009 using a simple method that assumes that underground sewerage and drainage systems, and smaller over ground drainage systems are full to capacity. Generally these assumptions are oversimplifications, but in a few locations these assumptions are realistic. It shows three bands, indicating which are 'less to more' at risk of flooding from surface water.

Which map is right?
Generally the Flood Map for Surface Water is the more realistic dataset as it takes better account of typical conditions that lead to surface water flooding.

Lead Local Flood Authorities, will consider all the available data and agree, with the Environment Agency, Water Companies, Internal Drainage Boards and other interested parties, what surface water flood data best represents local conditions. This is known as **locally agreed surface water information.**

It's very important to remember that neither map can be considered accurate down to an individual property level. Our surface water flood mapping is useful for identifying broad areas at risk of surface water flooding, but it's vital that local knowledge and information is used to interpret the maps.

Environment Agency

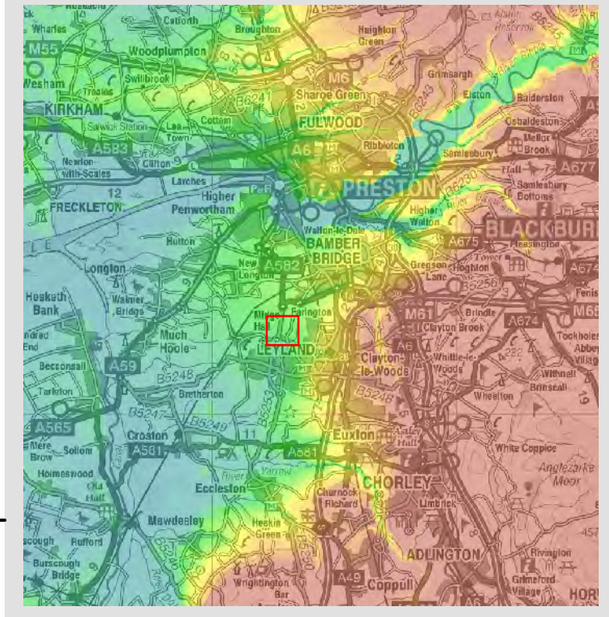
Flood Map for Surface Water - Croston Road, Farington Moss, Leyland

Produced: 7 September 2012
Our Ref: PRE5053

1 in 30 year:

Depth > 0.3m

Depth > 0.1m



Ground Elevation (mAOD)

High : 75

Low : -10

423500

423000

352500

353000

353500

Environment Agency

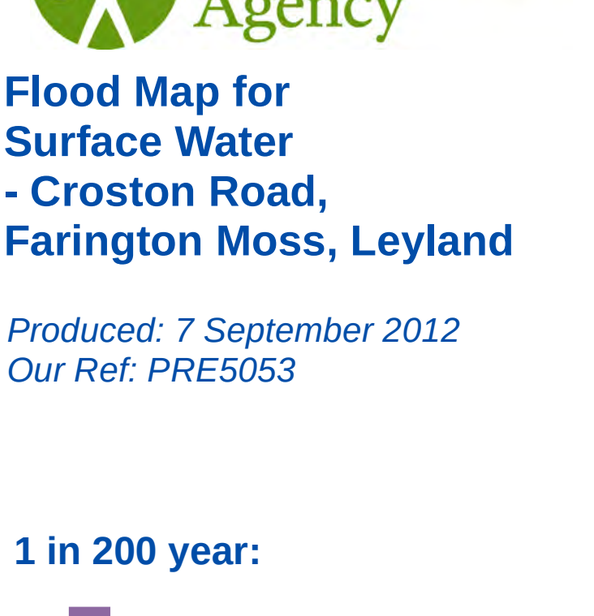
Flood Map for Surface Water - Croston Road, Farington Moss, Leyland

Produced: 7 September 2012
Our Ref: PRE5053

1 in 200 year:

Depth > 0.3m

Depth > 0.1m



Ground Elevation (mAOD)

High : 75

Low : -10

423500

423000

352500

353000

353500

N

28m

Drain

FLENSBURG WAY

Track

Acreville

BANNISTER LANE

CROSTON ROAD

THORNTON DR

BISPHAM AVENUE

FYLDE AV

FIVE A

RIVERSIDE AVENUE

26m

MILL LANE

MORLEY CROFT

CROFTE

LITTLE C

MEADOWLAND CL

BARN HEY DRIVE

RYDIN

FB

New Farm

Hugh House

Depot

Ppg

Poplar House

LONGMEANYGATE

HEATHERLEIGH

HUGH LANE

LOWER DRIVE

LOWTHER CRESCENT

B6253

COMET ROAD

PLACE

22m

Earnshaw Bridge

Mast

Bsns Pk

Ind Est

Haslemere Industrial Es

Mill

Hipping Stones

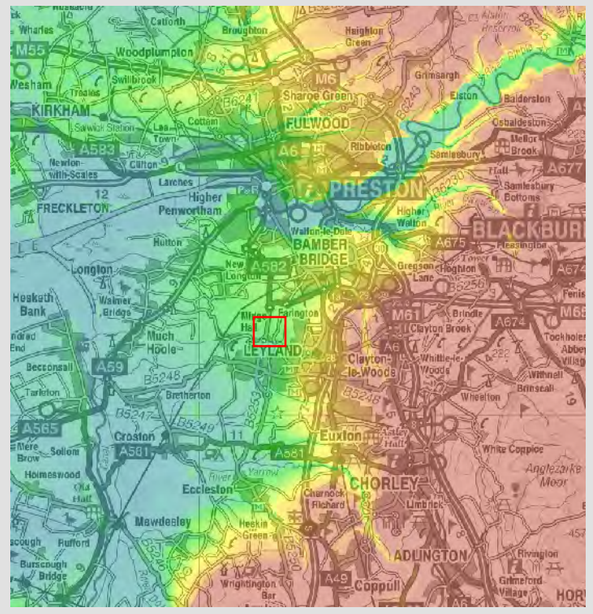
21m

Environment Agency

Areas Susceptible to Surface Water Mapping - Croston Road, Farington Moss, Leyland

Produced: 7 September 2012
Our Ref: PRE5053

More
Intermediate
Less



Ground Elevation (mAOD)
High : 75
Low : -10

423500
423000
352500
353000
353500

Appendix B: Calculations

B1 IoH124 Greenfield Runoff Calculations

B2 Initial Storage Estimates

B1 IoH124 Greenfield Runoff Calculations

AECOM Limited		Page 1
Marlborough House Upper Marlborough Road St Albans AL1 3UT		Micro Drainage
Date 07/08/2012 17:23 File	Designed by simsaj Checked by	
Micro Drainage	Source Control W.12.6	

IH 124 Mean Annual Flood

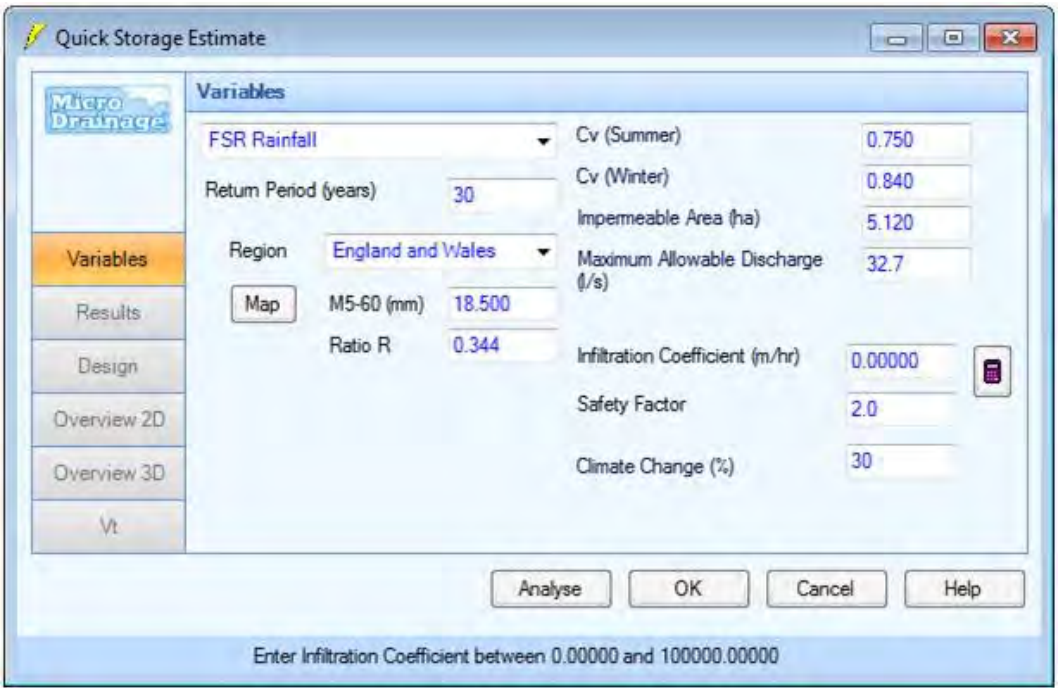
Input

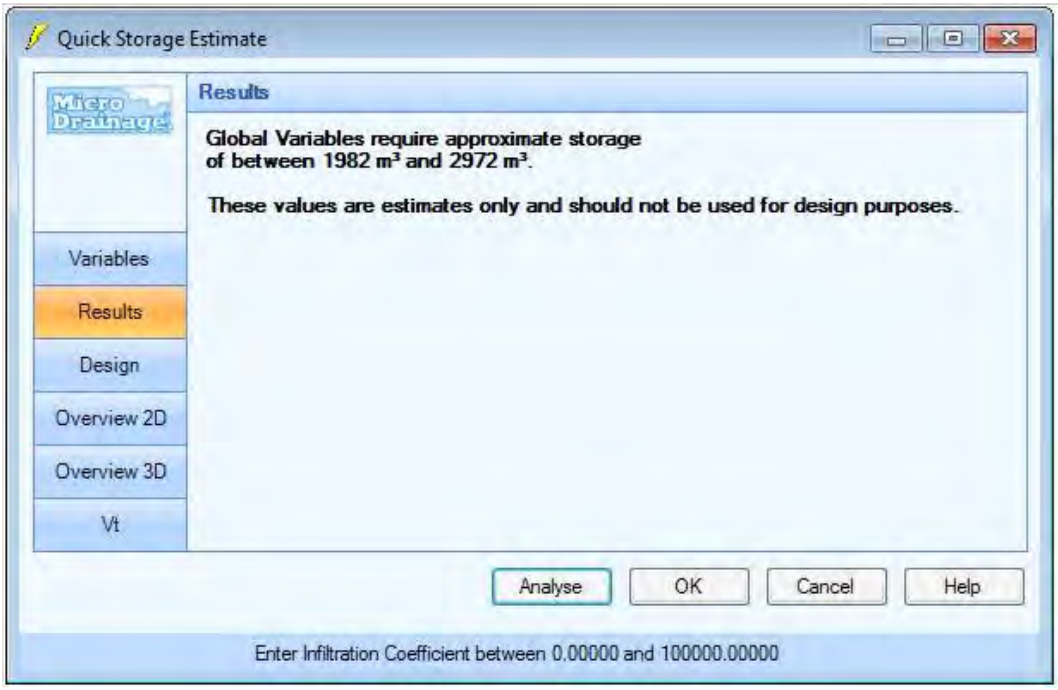
Return Period (years)	100	Soil	0.450
Area (ha)	50.000	Urban	0.000
SAAR (mm)	963	Region Number	Region 10

Results	l/s
QBAR Rural	319.0
QBAR Urban	319.0
Q100 years	663.6
Q1 year	277.5
Q2 years	297.1
Q5 years	379.6
Q10 years	440.3
Q20 years	501.6
Q25 years	523.2
Q30 years	540.9
Q50 years	590.2
Q100 years	663.6
Q200 years	752.9
Q250 years	781.6
Q1000 years	969.8

B2 Initial Storage Estimates

1 in 30 Year Storage Estimate





1 in 100 Year Storage Estimate