

Darwen Three Day Market Demolition

Flood Risk Assessment
June 2017



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1. Executive Summary

- 1.1.1 Capita was appointed on behalf of Blackburn with Darwen Borough Council to provide a Flood Risk Assessment (FRA) for the proposed demolition of the existing Three Day Market building and conversion into public realm ahead of intended high quality public realm to be installed at a later date under a separate planning permission.
- 1.1.2 The assessment has been undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).
- 1.1.3 The assessment has:
- Investigated all reasonably foreseeable potential risks of flooding to the site,
 - Considered the impact the development may have elsewhere with regards to flooding; and
 - Considered outline design proposals to mitigate any potential risk of flooding determined to be present.
- 1.1.4 The total impermeable area for the proposed site layout is anticipated to be circa 0.32ha. As the existing building is to be demolished and replaced with hard standing there will be no net increase in the drained impermeable area of this site. Also as hardstanding typically has a lower percentage impermeability than roofs there will be a slight reduction in the runoff rates and volumes leaving the site after completion of the proposed works
- 1.1.5 The surface water drainage outline design strategy for the development site post demolition is for the former Three Day Market building footprint to be covered with impermeable asphalt surfacing and the level in the centre of the former building raised to provide a fall to the edges of the former building footprint. The runs of existing slot-drain are to be replaced with surface dished channels that collect the surface runoff and convey it to new road gullies. The road gullies discharge the stormwater to existing surface and combined water manholes Ex.SW.MH1 and Ex.CW.MH1, via existing and new connections. See Existing Drainage Layout drawing CS092723-CAP-HDG-XX-DR-D-0001.
- 1.1.6 The access road and service area will continue to be drained by the existing gullies and channels that is assumed to ultimately discharge to the United Utilities sewer under the adjacent Railway Road via combined manhole Ex.CW.MH1.
- 1.1.7 The report concludes that:
- The proposed development is located within Flood Zones 1 & 2. The proposed public realm, in accordance with Table 2.1 of the NPPF Technical Guidance has a Water-compatible Development classification which is suitable for all flood zones. Therefore, in accordance with the above Table 2.2, no Exception Test is required and the development should be permitted.

- The proposed development is at high risk of pluvial flooding. With up to 900mm of surface water flowing at over 0.25m/s east to west across the site (from Railway Road to Croft Street) for the 1 in 30yr probability storm event or greater.
- There will be slight reduction in the risk of Surface Water Flooding from the site. Also the demolition of the Three Day Market building will provide additional above ground stormwater storage space in extreme events that will help mitigate the impact of flooding on the adjacent remaining Darwen Covered Market buildings.
- The Environment Agency: Flood risk from reservoirs shows that the site is at risk of flooding from a failure of the Earnsdale reservoir. And the proposed demolition of the existing building and conversion to public realm (water compatible development) will help to mitigate the consequence of any reservoir flooding.
- The BwDBC SFRA highlights that the site is not within an area susceptible for groundwater flooding. The site is therefore considered to be at low risk from groundwater flooding.
- Any overflow from the local surface water sewers caused by blockage or failure will flow southwest away from the site along the existing pluvial flow paths towards Croft Street and Market Street.
- This section of the Darwen culvert is at the northern end of a long and winding river Darwen culvert that runs below the centre of Darwen. Therefore, any blockage of the culvert is likely to happen up near the mouth of the culvert away from the site. It is therefore considered that the risk of flooding from the site due to failure of the River Darwen culvert is low. Any overflow from the Darwen culvert should flow southwest away from the site along Croft Street towards Market Street which is at a lower elevation than the site.
- The site is potentially at risk of combined sewerage flowing across the site if there is a blockage/failure of the United Utilities combined sewer in Railway Road above the site. The consequence of this failure can be mitigated by maintaining the existing onsite drainage system supplemented by new collection equipment. The likelihood of this sewer blocking or failing is considered to be low.
- The overall risk of flooding to the site due to blockage or failure of the surrounding drainage infrastructure is considered to be low.
- The site which is located adjacent to the culverted section of the River Darwen has been subject to several historical flood events. The most recent being January 2008 where high water levels in the River Darwen prevented effective drainage with flood water emerging from manholes; One of which is located near to the site. However, any overflow from this manhole should flow southwest away from the site along Croft Street towards Market Street which is at a lower elevation than the site.
- Given the site constraints and characteristics it is not practical to mitigate the existing site flooding risks to a low level. However as the proposed removal of the existing Three Day Market and the site converted to Public Realm (water compatible development) the proposed works will help to reduce the risk to persons and property on the site and reduce the risk and mitigate the effect of flooding downstream.

1.1.8 The report recommends the following:

- Groundwater levels are monitored during any further ground investigation works to determine site specific groundwater levels and a reassessment of the risk and any required mitigation measures undertaken.
- Wherever possible keep and reuse the existing surface water drainage systems supplemented by new gullies where required.
- The existing egress points from the site should be maintained post demolition to allow a safe egress from the site to the higher ground on Railway Road should a flooding incident occur.
- A suitable maintenance strategy should be adopted to ensure the drainage system is checked and cleaned regularly. The routine maintenance and cleansing regime should be documented.

1.1.9 Therefore, if the principles set out within of this report are followed and developed at detailed design stage by the design engineer, the proposed new public realm can be considered to be appropriate and at lower risk of flooding.

2. Introduction

2.1 Project Background

- 2.1.1 Capita was appointed on behalf of Blackburn with Darwen Borough Council to provide a Flood Risk Assessment (FRA) for the proposed demolition of the existing Three Day Market building and conversion into public realm ahead of intended high quality public realm to be installed at a later date under a separate planning permission.
- 2.1.2 The FRA provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk.
- 2.1.3 The report is based on current available information and preliminary discussions.
- 2.1.4 Proposals contained or forming part of this report represent the design intent and maybe subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.
- 2.1.5 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Capita shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Capita.

2.2 Scope of Flood Risk Assessment

- 2.2.1 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) and Blackburn with Darwen Borough Council (BwDBC) as Lead Local Flood Authority (LLFA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).
- 2.2.2 The assessment will:
- Investigate all reasonably foreseeable potential risks of flooding to the site,
 - Consider the impact the development may have elsewhere with regards to flooding and;
 - Consider outline design proposals to mitigate any potential risk of flooding determined to be present.

3. Legislation, Policy and Guidance

3.1 National Policies

3.1.1 NPPF (National Planning Policy Framework) sets out the Government's national policies on different aspects of land use planning in England.

3.1.2 Section 10: Meeting the challenge of climate change, flooding and coastal change states that "Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimension of sustainable development".

3.1.3 Paragraph 100 of NPPF states:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Local plans should be supported by Strategic Flood Risk Assessments and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies such as lead local flood authorities and internal drainage boards. Local Plans should apply a sequential, risk based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change by:

- Applying the Sequential Test;
- If necessary, applying the Exception Test;
- Safeguarding land from development that is required to reduce the causes and impacts of flooding; and
- Where climate change is expected to increase the flood risk so that some existing development may not be suitable in the long-term, seeking opportunities to facilitate the relocation of development, including housing to more sustainable locations.

3.1.4 The Sequential Test is applied by the Local Planning Authority to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed.

3.1.5 If following the application of the Sequential Test, it is not possible or consistent with wider sustainability objectives for the development to be located in zones of lower probability of flooding; the Exception Test can be applied. This test provides a method of managing flood risk while still allowing necessary development to occur.

3.1.6 As the proposal is to replace the existing building with public realm. Using Table D2 from NPPF Technical Guidance, this site's Flood Risk Vulnerability classification Water-compatible Development. See below for table extract.

Table 3.1: NPPF Technical Guidance Table 2

Water-compatible Development	<p>Flood control infrastructure.</p> <p>Water transmission infrastructure and pumping stations.</p> <p>Sewage transmission infrastructure and pumping stations.</p> <p>Sand and gravel working.</p> <p>Docks, marinas and wharves.</p> <p>Navigation facilities.</p> <p>Ministry of Defense - defense installations.</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation).</p> <p>Lifeguard and coastguard stations.</p> <p>Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category, <i>subject to a specific warning and evacuation plan.</i></p>
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3.1.7 Using NPPF Technical Guidance Table 3, as shown below, as a simple chart, it shows as a simple check whether the development should or shouldn't be permitted and whether further information will be required for the planning application.

Table 3.2: NPPF Technical Guidance Table 3

Flood Risk Vulnerability Classification (See Table D2)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (See Table D1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	x	Exception Test required	✓

	Zone 3b 'Functional Flood Plain'	Exception Test required	✓	✗	✗	✗
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3.1.8 The proposed public realm, in accordance with Table 2.1 has a Water-compatible Development classification, and therefore, in accordance with the above Table 2.2, is permitted in all flood zones.

3.1.9 The impacts of climate change on flooding from land, rivers and sea must be assessed as part of a Flood Risk Assessment (FRA). Sensitivity ranges, as shown in NPPF Technical Guidance – Table 5, provide precautionary values to uncertainty on climate change and its impacts on rainfall intensities, river flow, and wave height. Table 2.3 below replicates NPPF Technical Guidance Table 5:

Parameters	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	+5%	+ 10%	+ 20%	+ 40% Residential
Peak River Flow	+ 10%	+ 20%		
Offshore wind speed	+ 5%		+ 10%	
Extreme wave height	+ 5%		+ 10%	

3.2 Local Policy

3.2.1 The Blackburn with Darwen Borough Council Local Plan Part 2 was adopted in 2015 with Policy 9 relation to climate change and flood risk, including:

“Climate Change

2. Development will be required to demonstrate that it has taken full account of issues relating to climate change. Planning permission will not be granted for development which would either lead to an unacceptable contribution to climate change by virtue of carbon emissions, be itself at high risk from the effects of climate change, or cause an increase in the level of risk from the effects of climate change in another location.

3. Development will be required to demonstrate that it will not be at an unacceptable risk of flooding. Where appropriate this will include a requirement to demonstrate that there is no sequentially preferable location in which the development could take place, and if necessary, that the development complies with the Exception Test.

4. Development with the potential to create significant amounts of new surface water run-off will be expected to consider and implement where required, sustainable drainage systems (SuDS) or other options for the management of the surface water at source.”

3.2.2 The Blackburn with Darwen Borough Council Strategic Flood Risk Assessment Level 2 requires that where the risk of flooding has been fully assessed and justified by a Flood Risk Assessment conducted in accordance with the requirements set out in the NPPF Technical Guidance.

3.2.3 A site specific Flood Risk Assessment is required for:

- Proposals of 1 hectare or greater in Flood Zone 1 and Critical Drainage Areas as defined by the SFRA.
- All proposals for new development in Flood Risk Zones 2 and 3.

3.2.4 The Flood Risk Assessment should also address, if required, the sequential and exception tests as set out in National Planning Policy.

3.2.5 Item 9 on Table 6-2 ‘Recommended Policy Guidance, of the Blackburn with Darwen Borough Council Strategic Flood Risk Assessment Level 2- Volume 1 Guidance - states “In critical drainage areas that are susceptible to surface water flooding, develop measures to manage, and where possible, reduce the existing risk”.

4. Existing Site Characteristics

4.1 Site Location

- 4.1.1 The site is located within Darwen town centre and is bounded to the northwest Darwen Covered Market and a multi-storey car park, to the south and east by Church Street and Railway Road, and to the west by Croft Street and Parliament Street.
- 4.1.2 The approximate centre of the subject site is located at Ordnance Survey National Grid Reference 369304, 422263. An indicative postcode for the site is BB3 2RE. Figure 1 below shows the location of the site in Darwen town centre



Figure 3: Aerial Image of Darwen Town Centre

- 4.1.3 A site location plan and existing site topographical survey is presented in Appendix A.

4.2 Site Description

- 4.2.1 The subject site is irregular shape in plan; covering an area of approximately 0.32ha.
- 4.2.2 The site area is currently occupied by a hexagonal covered market building and covered connection to the main market. The majority of the site is made up of impermeable, concrete surfaces used for vehicular access routes, pedestrian routes or service areas. An aerial image of the site is shown in Figure 2 below:

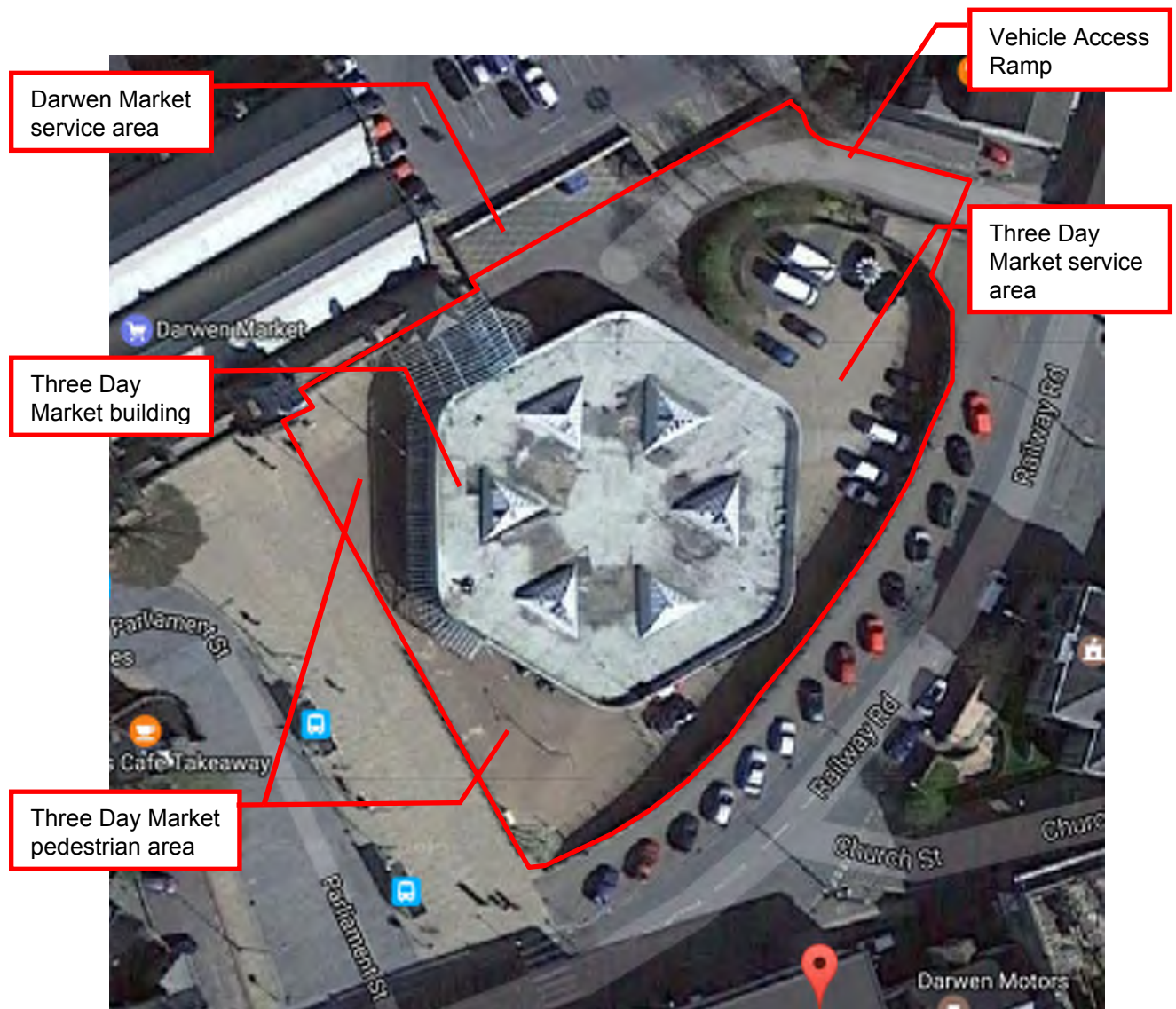


Figure 4: Darwen Three Day Market Aerial Image

4.3 Topography

- 4.3.1 A topographical survey has been carried out on the site, all information relating to levels presented in this report have been taken from this topographical survey.
- 4.3.2 The topography of the site generally slopes to the west-northwest at a shallow gradient the lowest point on the site at the gully near the western corner of the site at a level of 153.92m.
- 4.3.3 The adjacent Railway Road falls at a steep gradient from circa 160m AOD north of the site down to c.156m at the western corner of the site.
- 4.3.4 The topographical survey drawing is enclosed in Appendix A.

4.4 Geotechnical and Hydrogeological Setting

- 4.4.1 The Capita Phase 1 Geo-Environmental Desk Study report states that given the previously developed nature of the site, the majority of the site area is likely to be directly underlain by Made Ground deposits imported to level the site and facilitate the previous development; these may comprise materials of unknown provenance, quality and composition. The Groundsure report also identified 2no areas of potentially infilled ground corresponding to a pond and reservoir in the north and eastern parts of the site.
- 4.4.2 The site is indicated to be underlain by natural Glaciofluvial deposits comprising sand and gravel.
- 4.4.3 Beneath the superficial deposits the site is indicated to be underlain by solid strata of the Pennine Lower Coal Measures Formation comprising Mudstone, Siltstone and Sandstone. The BGS Lexicon describes this formation as “Interbedded grey mudstone, siltstone, pale grey sandstone and common coal seams”.
- 4.4.4 An inferred fault is recorded running adjacent to the western boundary of the site in an approximately northwest-southeast orientation.
- 4.4.5 A copy Capita Phase 1 Geo-Environmental Desk Study report included in Appendix B
- 4.4.6 The Environment Agency’s website Groundwater Protection Map shows that the Application site is located outside any Groundwater source protection zone.
- 4.4.7 According to information presented in the Groundsure Report, the underlying superficial deposits and the bedrock are classified as a ‘Secondary A’ aquifer.
- 4.4.8 The site has been classified as having a high leaching potential, owing to the presence of variable Made Ground. Information for Made Ground is based on fewer observations than elsewhere and as such a worst case vulnerability scenario is assumed.
- 4.4.9 The site is indicated to have the potential for groundwater flooding to occur at the surface.
- 4.4.10 There are no groundwater or potable abstraction licenses within 500m of the subject site and
- 4.4.11 The site is not located within in a groundwater source protection zone.

4.5 Hydrology

- 4.5.1 The nearest surface watercourse/feature to the subject site, as shown on OS mapping and Detailed River Network maps presented in the Groundsure Report is the River Darwen which is culverted adjacent to the western corner of the site.
- 4.5.2 According to the Groundsure Report there are no licensed surface water abstraction records within a 500m search buffer of the site.


4.6 Historical Land Uses

- 4.6.1 The desk study report contains a review of the historical mapping of the site and the surrounding land use. With reference to the available historical maps, prior to c1891 the site was occupied by Municipal Buildings, an open market and a pond. Since then various covered market buildings have occupied the site and the former pond area is now filled in.
- 4.6.2 The history of the surrounding land comprised residential properties to support previous industry including numerous mills, mining and unspecified works. The land use has gradually become more commercial.
- 4.6.3 Historical and current contaminative land uses in the surrounding area include railway sidings, surrounding works, factories and warehouses.
- 4.6.4 The following potentially contaminative land uses have been identified on the site itself and the surrounding land and comprise:
- General Made Ground/in-filled ground (i.e. potentially poor quality/contaminated materials);
 - Infilled reservoir and pond formerly located in the north east of the site (i.e. potentially poor quality/contaminated materials);
 - Car parking (i.e. possible fuel/oil leakages/spillages); and
 - Works and mills located on surrounding parcels of land (i.e. hydrocarbons, chemical/fuel/solvent storage and use).

4.7 Existing Drainage

- 4.7.1 The topographical survey drawing in Appendix A shows that the existing hard standing areas are drained by a combination of Gullies and Drainage Channels. These gullies and channel outlets discharge to a private surface water drainage system that that was surveyed by a MetroRod CCTV unit on 06.06.2017.

- 4.7.2 The MetroRod Darwen Three Day Market CCTV Inspection Report 340928 shows that there are existing private foul and surface water systems serving the site. The foul water system below the building collects the foul discharges in a very shallow inspection chamber MHF1 (250mm to invert) below the north-eastern section of the building. MHF1 then connects by a 150mm diameter clay pipe to a very shallow (300mm to invert) combined chamber MHC1 located adjacent to the northeast elevation of the building. MetroRod have confirmed that the very shallow depths of these chambers are accurate.
- 4.7.3 MHC1 also has connections from the three existing gullies that drain the west end of the east access road into the site and the northern section of the Three Day Market service yard area, and a rainwater pipe gully that receives water from the northeast half of the covered connection to the Darwen Covered Market building. MHC1 is shown discharging in a north-easterly direction and is assumed to discharge to the United Utilities combined sewer running under Railway Street.
- 4.7.4 The topographical survey shows that there is also two drainage channels that pick up the runoff from the sloping access road from railway street that were not picked up in the CCTV survey. It is assumed that these connect to the sewer pipe coming from MHC1.
- 4.7.5 The CCTV survey report sketch plan indicates that the Three Day Market roof runoff is discharged to a several inspection chambers located within the building. These inspection chambers are also shown to receive connections from three slot drain runs that are positioned against the east, southeast and south building elevations. These slot drains collect the runoff from the Three day Market service yard area and the southeast half of the western pedestrian area.
- 4.7.6 The internal inspection chambers connect below the building slab to an internal manhole MHS3 located within the building adjacent to the entrance from the covered walkway. MHS3 is connected to MHS2 located below the covered walkway by a 150mm diameter clay pipe.
- 4.7.7 Manhole MHS2 then discharges in a west-southwest direction to a buried chamber MHS1 adjacent to the adjacent Covered Market Hall façade. A plotting the 11.23m pipe length on the topographical drawing shows that this buried chamber is within the site boundary (contrary to the position shown on the MetroRod survey results sketch plan. It is assumed that this surface water chamber discharges to the nearby River Darwen culvert.
- 4.7.8 A copy of the CCTV survey results sketch plan is shown in Figure 3 below: a copy of the full CCTV report is enclosed in Appendix B.

		<small>WATER & SEWERAGE IN ENGLAND 01273 835100 WWW.WATER-AND-SEWERAGE.CO.UK</small>	
Site Drawings/Photos			
<small>Job Number</small> 34463625	<small>Submitted by (Operator)</small> MR JORDAN GRIMES	<small>Drawn by</small> KARVIVYEN	<small>Date</small> 06/06/2017

This sketch is not to scale and does not represent the exact routing of the drainage system



Figure 5: MetroRod CCTV Survey Results Sketch Plan

4.7.9 The public sewer records have been obtained from United Utilities for the development site and immediate surrounding area along with Information received from Blackburn with Darwen Borough Council Highways department on the existing Highways Drainage assets in the vicinity of the site. These records plus CCTV survey reports indicate that the following sewers are located in the vicinity of the site:

- A 900mm diameter circular concrete combined sewer runs down the centre of Railway Road and Church Street to the east and south of the site. The sewer runs at depths ranging from 4.3m at manhole 34463687 at the junction of Railway Road and Green Street East to 2.68m (IL=153.83m) at manhole 34463625 at the junction of Church Street and Parliament Street.

- A 450mm circular vitrified clay surface water sewer runs along the south side of Church Street east-northeast to west-southwest from the junction with Railway Road to the junction with Parliament Street. Where the sewer discharges to the culverted section of the River Darwen that runs under Parliament Street. This sewer runs at a depth of 2.5 to 3m bgl.
- A 1m diameter circular concrete surface water sewer flows west-southwest to east-northeast below Croft Street southwest of the site. The sewer runs approximately 2.1m bgl and discharges to the culverted section of the River Darwen that runs under Parliament Street. However, this appears to be the Peggy Brook Culvert shown on Capita drawing CS058234-SK-001

4.7.10 The Environment Agency River Maps show that there is a culverted section of the River Darwen that runs south to north approximately 35m to the west of the site. However, Capita drawing CS058234-SK-001 shows the as surveyed alignment of this culverted section of the River Darwen as being much closer to the Three Day Market site, running adjacent to the west corner of the site boundary. An extract of CS058234-SK-001 showing the surveyed alignment of the culverted section of the River Darwen in the location of the Three Day Market site is shown in Figure 4 below. Copy of the full CS058234-SK-001 drawing is included in appendix A.

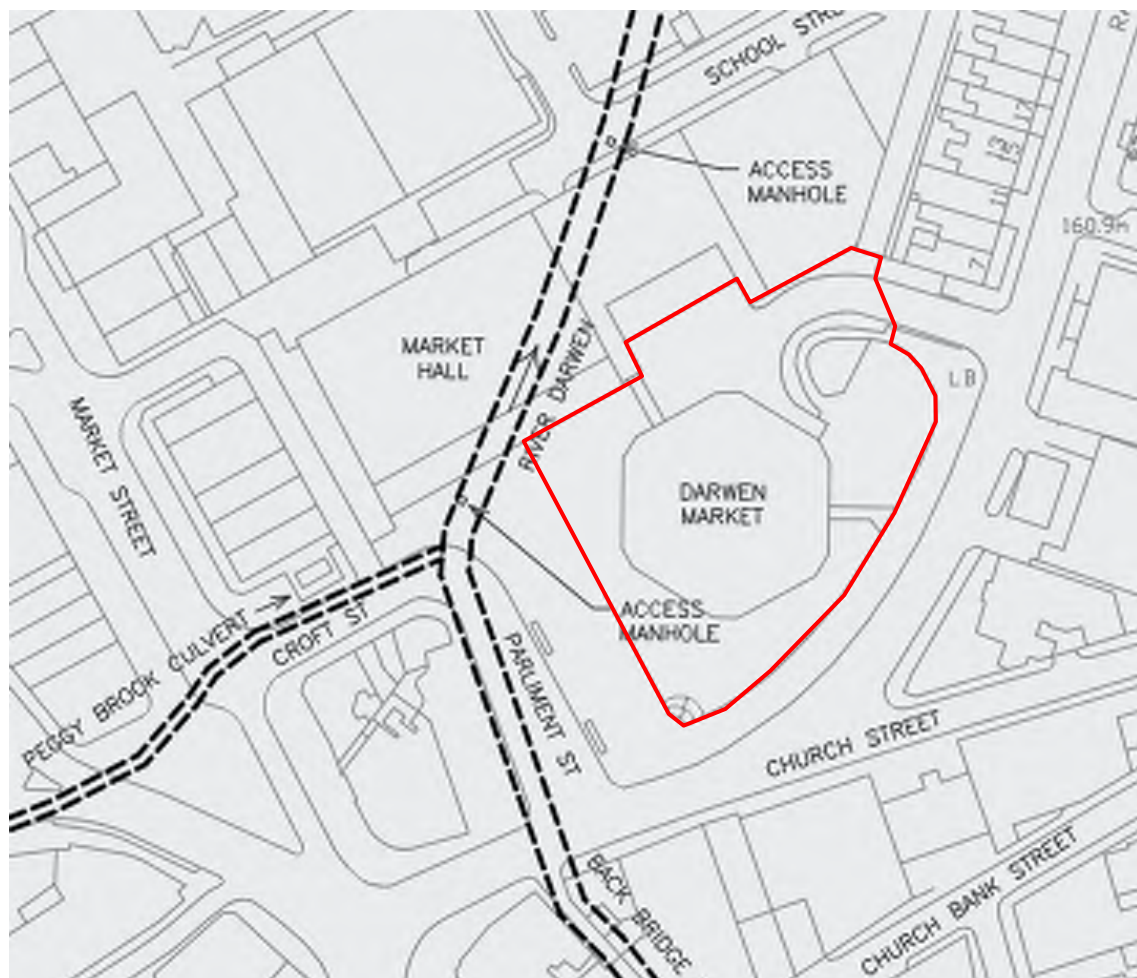


Figure 6: As Surveyed Alignment of the River Darwen Culvert

- 4.7.11 Figure 4 also indicates that the River Darwen culvert has an access manhole adjacent to the junction of Croft Street and Parliament Street. Should the capacity of this section of the culvert be exceeded then it is likely that river water will overflow out of this access shaft.
- 4.7.12 No further public or private sewers were observed in the vicinity of the proposed site.
- 4.7.13 There may be existing surface and foul sewers present within the development areas that served the previous uses of the sites. However, information concerning these have not been provided at the time of writing this report and therefore it is assumed that all previous onsite drainage will be made redundant.
- 4.7.14 The public sewer records, Blackburn with Darwen Highways sewers asset plans and the CCTV report are enclosed in Appendix B.
- 4.7.15 Figure B9-2 'Critical Drainage Areas', of the Blackburn with Darwen Borough Council Strategic Flood Risk Assessment Level 2- Volume 2 Figures & Site Assessments - shows that the proposed development area is within the Darwen critical drainage area. See Figure 5 below. A full-size version of Figure 5 is enclosed in Appendix A.

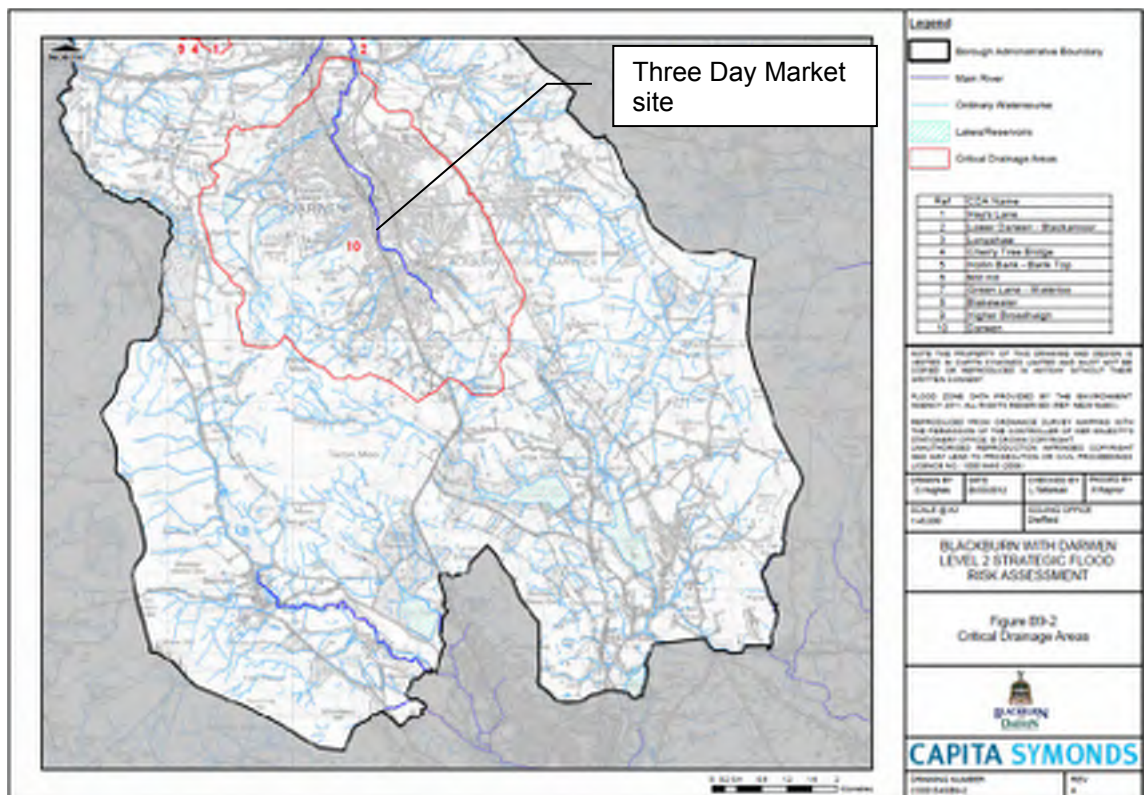


Figure 5: BwDBC Level 2 SFRA – Vol 2 – Figure B9-2 Critical Drainage Areas

5. Hydrological Assessment

5.1 Summary of Flood Risk

- 5.1.1 This study assesses the risk from different types of flooding to the Darwen Three Day Market site and the risk of flooding generated by the demolition of the Three Day Market building and conversion to public realm, taking into consideration climate change, as well as how flood risks should be managed. From the evidence collated and subsequent negotiations the main types of flooding that may apply to the proposed development site are as follows: Fluvial Flooding from overflowing of the culverted section of the River Darwen, Pluvial flows travelling across the site and flooding caused by the failure of Earnsdale reservoir. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the Client, LLFA and Environment Agency requirements.

5.2 Fluvial Flooding (Rivers and Streams)

- 5.2.1 The site is located approximately adjacent to a stretch of the culverted section of the River Darwen.
- 5.2.2 Flooding to the site from rivers and seas is indicated on the Environment Agency – Flood Map for Planning in Figure 6 and it can be seen that the majority of the site is covered with turquoise shading that is classified as Flood Zone 2. Flood Zone 2 is land assessed as having medium risk of flooding with an annual probability of river or sea flooding of between 1 in 100 (1% AEP) and 1 in 30 (33.3%AEP). Therefore, the risk of fluvial flooding at the site is considered medium.

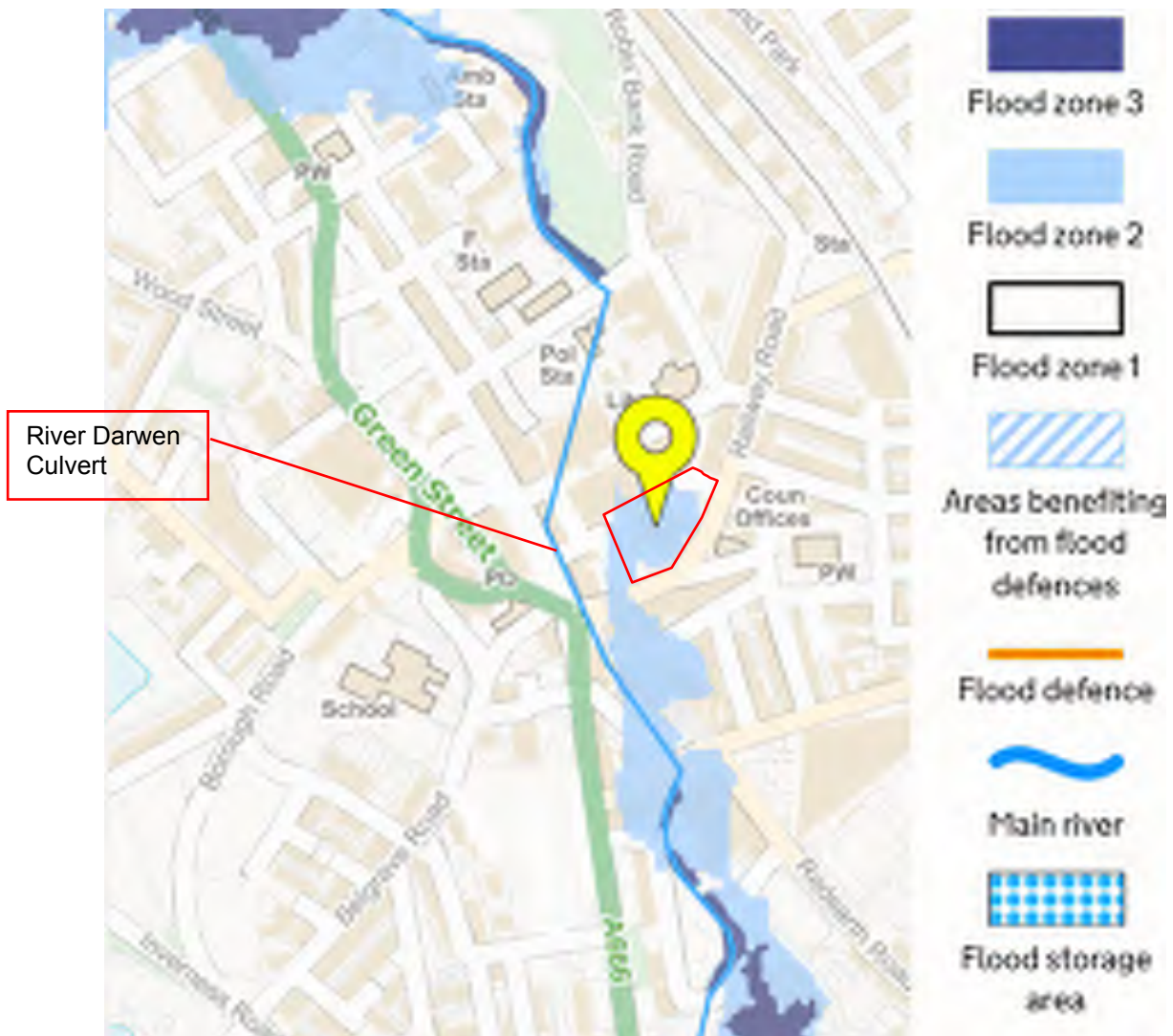


Figure 6: Flood Map for Panning (Flooding from Rivers and Seas)

- 5.2.4 From Figure 6 it can be seen that the proposed development is located within Flood Zones 1 & 2. The proposed public realm, in accordance with Table 2.1 of the NPPF Technical Guidance has a Water-compatible Development classification, which is suitable for all zones. Therefore, in accordance with the Table 5.1 below, no Exception Test is required and the development should be permitted.

Table 3.2: NPPF Technical Guidance Table 3

Flood Risk Vulnerability Classification (See Table D2)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (See Table D1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	x	Exception Test required	✓
	Zone 3b 'Functional Flood Plain'	Exception Test required	✓	x	x	x

5.3 Surface Water Flooding to the site

5.3.1 Surface water (Pluvial) flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

5.3.2 From the Environment Agency: Flood risk from surface water map:

- Where a site is located in a dark blue shaded zone, this indicates that the site is at high risk of flooding where there is an annual chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is located in a blue shaded zone, this indicates that the site is at medium risk of flooding where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is located in a turquoise shaded zone; this indicates that the site is at low risk of flooding where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).

- Where a site is located in a white (unshaded) area; this indicates that the site is at very low risk of flooding where there is a chance of flooding of less than 1 in 1000 (0.1% AEP).

5.3.3 Pluvial flooding risk to the site from surface water is indicated in Figure 7 and it can be seen from the dark blue shading within the development area boundary that there is a high risk of pluvial flooding.

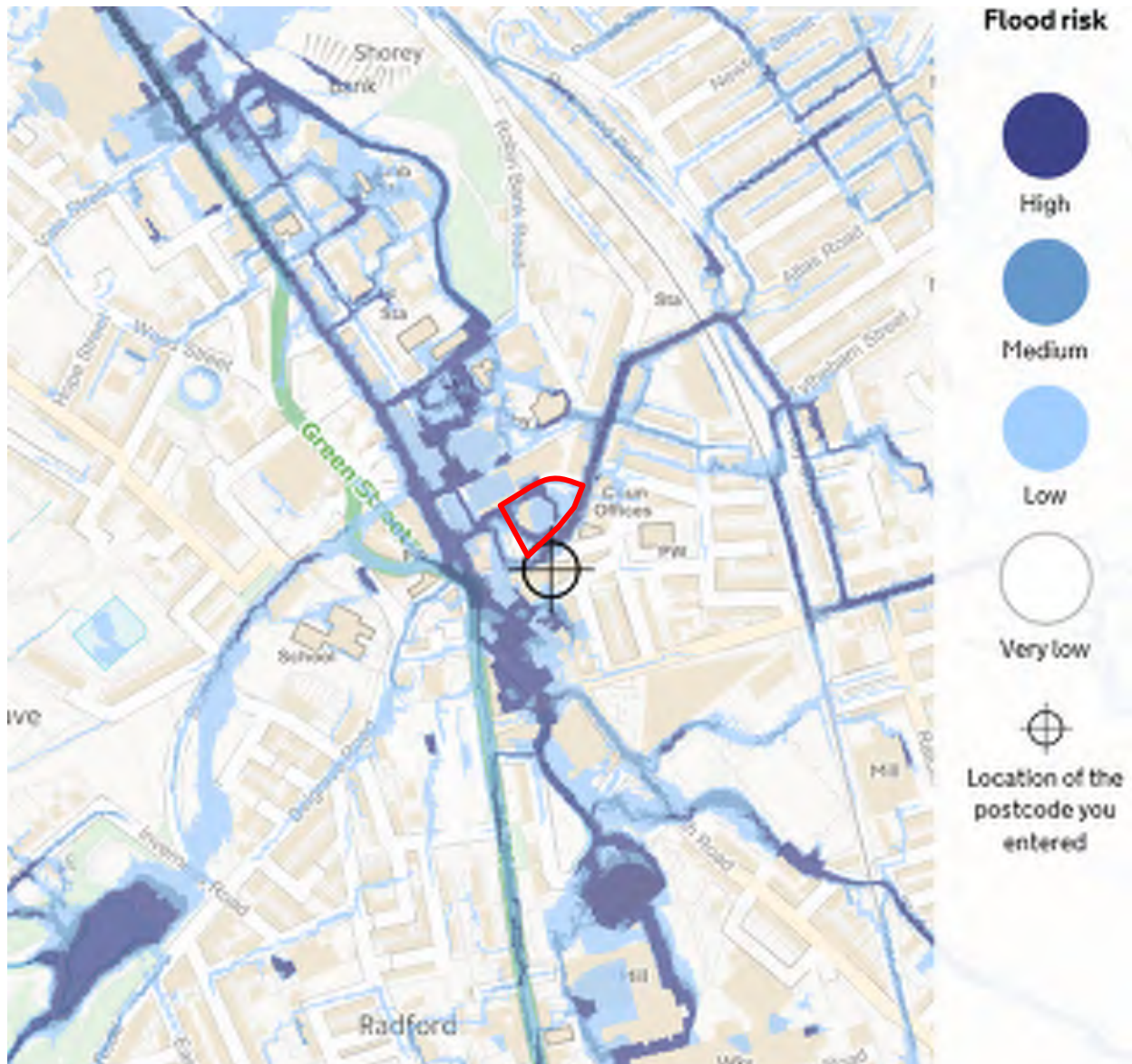


Figure 7: Environment Agency Map (Flood risk from surface water)

5.3.4 Further, a review of the EA detailed Surface Water Flooding- depth and velocity maps, shows that there could be up to 900mm of surface water flowing at over 0.25m/s east to west across the site (from Railway Road to Croft Street) for the 1 in 30yr probability storm event or greater.

5.4 Surface Water Flooding from the site

- 5.4.1 Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. The proposed surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event. With the 1 in 100-year storm event plus 40% for climate change attenuation volume to be contained within the site boundary.
- 5.4.2 Where additional hard surfaces are introduced for example roads, car parks, building roofs and temporary site accommodation the development may have the potential to increase flood risk.
- 5.4.3 As the existing building is to be demolished and replaced with hard standing there will be no net increase in the drained impermeable area of this site. Also as hardstanding typically has a lower percentage impermeability than roofs there will be a slight reduction in the runoff rates and volumes leaving the site after completion of the proposed works. Therefore, there will be a small reduction in the risk of downstream flooding upon completion of the works.

5.5 Reservoir Flooding

- 5.5.1 A review of the Environment Agency: Flood risk from reservoirs shows that the site is at risk of flooding from a failure of the Earnsdale reservoir located 2.1km west of the site. Further, a review of the EA Flood risk from reservoirs - Flood depth map shown in Figure 8 below, shows that the site could be flooded to a depth of over 2m from a failure of the Earnsdale Reservoir.

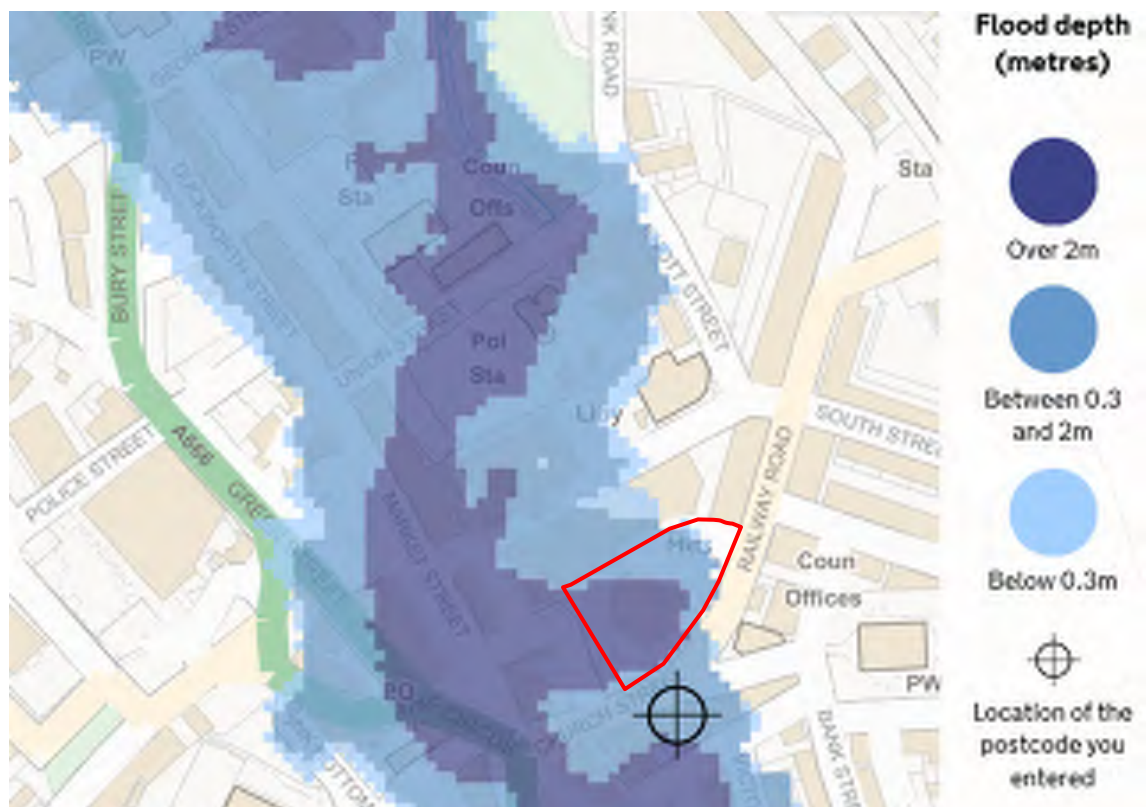


Figure 8: Environment Agency Map (Flood risk from reservoirs – Flood Depth)

- 5.5.2 However, a review of the EA Flood risk from reservoirs - Flood speed map shows that the inundation of the site from a failure of the Earnsdale Reservoir will be between 0.5 to 2m/s for the majority of the site. Therefore there should be sufficient time for anyone present on the site at the time of flooding from a failure of the Earnsdale Reservoir to safely egress the site to the adjacent higher ground on Railway Road.
- 5.5.3 Again the proposed demolition of the existing building and conversion to public realm (water compatible development) will help to mitigate the consequence of any reservoir flooding by providing additional flood storage space.

5.6 Groundwater Flooding

- 5.6.1 The SFRA indicates that flooding records do not show instances of Groundwater flooding, however this is due to the nature of the recordings and are unlikely to have been diagnosed as Groundwater flooding. The SFRA does highlight areas susceptible to Groundwater flooding and indicates that the site is not within an area susceptible for groundwater flooding.
- 5.6.2 The Groundsure report undertaken as part of the Capita Phase 1 Geo-Environmental Desk Study indicates to have the potential for groundwater flooding to occur at the surface with a moderate confidence rating. This assessment is based purely on the presence of bedrock and superficial aquifers below the site.
- 5.6.3 The BGS records do not indicate any history of groundwater flooding incidents at the site
- 5.6.4 The site is therefore considered to be at low risk from groundwater flooding.

5.7 Public Sewers or Highway Drainage Flooding (Infrastructure Failure)

- 5.7.1 There are public sewers maintained by United Utilities within the vicinity of the site. As well as the Culverted Sections of the River Darwen and Peggy Brook where it joins the Darwen that are maintained by Blackburn with Darwen Borough Council as Lead Local Flood Authority.
- 5.7.2 As the local surface water sewers are at inverts lower than the site and any overflow caused by blockage will flow southwest away from the site along the existing pluvial flow paths towards Croft Street and Market Street.
- 5.7.3 This section of the Darwen culvert is towards the end of a long and winding river Darwen culvert. Therefore, and blockage of the culvert is likely to happen up near the mouth of the culvert that is located 280m upstream of the site. It is therefore considered that the risk of flooding from the site due to failure of the River Darwen culvert is low. Any overflow from the Darwen culvert should flow southwest away from the site along Croft Street towards Market Street which is at a lower elevation than the site.

5.7.4 The combined sewer in Railway Road is at a higher elevation than parts of the site and a blockage or failure of this 900mm diameter sewer northeast of the site could cause sewerage to overflow and flow across the site as it follows the pluvial flow path towards Croft Street west of the site. However, this is a relatively large bore sewer fed by smaller upstream sewers, runs at a fairly steep gradient of 1 in 79 as it runs along Railway Road, and is maintained by United Utilities. Therefore, the likelihood of this sewer blocking or failing is considered to be low.

5.7.5 The overall risk of flooding to the site due to blockage or failure of the surrounding drainage infrastructure is considered to be low.

5.8 Historical Flooding

5.8.1 There are a number of flooding incidents noted in or around the location of the site on *Table 2-1: Historical fluvial flood events affecting the Darwen and Blakewater catchments* in the Blackburn with Darwen Borough Council – Level 2 - SFRA. A summary of the recorded historical fluvial flood events affecting in or around the location of the site is given in table 5.1 below:

Date	Location	Comment
08/1891	River Darwen	Widespread flooding in district
10/11/1936	Middle Darwen	Waterfalls area
18/07/1964	Redearth Road, Carr Street, Watery Lane, Grimshaw Street	Flooding. Due to a breach in a river wall Mill – possibly due to debris collection in columns Blackburn Road flooded Breach in river wall upstream Town Centre & Market Hall flooding from Kebbs Brook caused by blockage
21/01/2008	River Darwen	High levels in the Darwen prevent effective drainage with flood water emerging from manholes.

6. Proposed Development

- 6.1.1 The proposal is for the existing hexagonal Three Day Market building shown on the topographical survey drawing in appendix A to be demolished. The area previously covered by the building will then be surfaced in asphalt hard standing as a temporary public realm. With the existing pedestrian and market service areas unchanged.
- 6.1.2 The centre of the proposed site is located at National Grid Coordinates: 422243m North; 369308m East.
- 6.1.3 See Blackburn with Darwen Borough Council Three Day Market - Proposed Demolition - Location Plan in Appendix C and Figure 2 above.

7. Drainage Strategy

7.1 Proposed Surface Water Drainage

- 7.1.1 As the site is located within the Darwen critical drainage area. Blackburn with Darwen guidance for critical drainage areas states that any new development in the critical drainage area should be designed to not increase the discharge rate from the site and provide adequate capacity not to flood for the critical 1 in 30-year storm event. The exceedance volumes from run-off generated for up to the critical 1 in 100-year plus 40% allowance for climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services. With designed exceedance routes incorporated into the design to direct exceedance flows away from properties or vulnerable infrastructure and maintain safe egress from buildings.
- 7.1.2 In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration. Information taken from the Capita Phase 1 Geo-Environmental Desk Study report states that given the previously developed nature of the site, the majority of the site area is likely to be directly underlain by Made Ground deposits imported to level the site, and infill to the existing pond an reservoir, to facilitate the previous development; these may comprise materials of unknown provenance, quality and composition. The site is indicated to be underlain by potentially permeable natural strata of Glaciofluvial deposits comprising sand and gravel. Therefore, Capita have taken the precautionary approach and discounted infiltration as a viable method of surface water discharge at this site. However, this can be reviewed once an intrusive site investigation is completed.
- 7.1.3 Table 4.3 of the SuDS manual characterises the public realm as Very Low pollution risk. Therefore removal of gross solids and sediments only is required.
- 7.1.4 The surface water drainage outline design strategy for the development site post demolition is for the former Three Day market building footprint to be covered with impermeable asphalt surfacing and the level in the centre of the former building raised to provide a c.1 in 60 fall to the edges of the former building footprint. As the three runs of existing slot-drain adjacent to the southern eastern elevations of the building are likely to be destroyed by the demolition works it is proposed to replace these with surface dished channels that collect the surface runoff and convey it to new road gullies. The road gullies discharge to the existing slot drain connections that convey the stormwater to existing surface water manhole Ex.SW.MH1.
- 7.1.5 Also a new dished drainage channel run will be required adjacent to the former east elevation of the building that will convey the runoff to a new gully. The new gully will be connected directly to existing surface water manhole Ex.SW.MH1. Unless a convenient roadable existing connection can be identified during the demolition works.

- 7.1.6 In addition a new channel run will be placed adjacent to the former northwest edge of the building and will convey the runoff to the existing gully adjacent to the north corner of the former building that will continue to discharge to combined manhole Ex.CW.MH1 via the existing connection.
- 7.1.7 The access road and service area will continue to be drained by the existing gullies and channels that is assumed to ultimately discharge to the United Utilities sewer under the adjacent Railway Road via combined manhole Ex.CW.MH1.

7.2 Maintenance

- 7.2.1 A copy of the as built drainage layout should be provided in the Operations and Maintenance Manual.
- 7.2.2 A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 7.2.3 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm or flooding event.

8. Mitigation

8.1 Fluvial / Tidal / Reservoir Flood Mitigation

- 8.1.1 The development site lies partially within Flood Zone 2 and therefore at risk of fluvial flooding from the over flowing River Darwen culvert. As the existing Three Day Market building on the site is to be demolished and replaced with public realm. As long as the existing access to the higher ground on Railway Road is maintained this will reduce the overall risk to people and property. Furthermore the removal of the Three Day Market building will provide additional storage space for flood water, which will help to mitigate the impact of flooding on the adjacent remaining Darwen Covered Market buildings.

8.2 Surface Water Flooding to the site Mitigation

- 8.2.1 The Environment Agency Surface Water flood map for the area indicates that the site is at high risk of pluvial flooding as surface water flows generated upslope of the site flow across the site from Railway Street towards Market Street.
- 8.2.2 As the existing building is to be demolished and the site converted to Public Realm (Water Compatible Development) the proposed works will help to mitigate the consequence of any pluvial flooding (as long as the existing safe egress routes can be maintained from the site).
- 8.2.3 The EA Surface Water flooding map does not take into account off highway surface water drainage systems. The existing private surface water drainage system is operating on the site is to be maintained and this should mitigate some of lower order pluvial flooding events.

8.3 Surface Water Flooding from the site Mitigation

- 8.3.1 As the existing building is to be demolished and replaced with hard standing there will be no net increase in the drained impermeable area of this site. Also as hardstanding typically has a lower percentage impermeably than roofs there will be a slight reduction in the runoff rates and volume leaving the site after completion of the proposed works.
- 8.3.2 As the surface water drainage design strategy is for the development site post demolition is to wherever possible keep and reuse the existing surface water drainage systems supplemented by new gullies where required.
- 8.3.3 Given the above factors there will be slight reduction in the risk of Surface Water Flooding from the site. Also the demolition of the Three Day Market building will provide additional above ground stormwater storage space in extreme events that will help mitigate the impact of flooding on the adjacent remaining Darwen Covered Market buildings.

8.4 Reservoir Flooding Mitigation

- 8.4.1 The Environment Agency: Flood risk from reservoirs shows that the site is at risk of flooding from a failure of the Earnsdale reservoir.

- 8.4.2 As detailed above the proposed demolition of the existing building and conversion to public realm (water compatible development) will help to mitigate the consequence of any reservoir flooding.

8.5 Groundwater Flooding Mitigation

- 8.5.1 Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.
- 8.5.2 The risk of true groundwater flooding to this site is considered to be low, however it is recommended that groundwater levels are monitored during any further ground investigation works to determine site specific groundwater levels and a reassessment of the risk and any required mitigation measures undertaken.

8.6 Infrastructure Failure Mitigation

- 8.6.1 The site is potentially at risk of combined sewerage flowing across the site if there is a blockage/failure of the United Utilities combined sewer in Railway Road above the site.
- 8.6.2 The consequence of this failure can be mitigated by maintaining the existing onsite drainage system in good working order supplemented by robust new collection equipment.

8.7 Mitigated Flood Risk.

- 8.7.1 Given the site constraints and characteristics it is not practical to mitigate the existing site flooding risks to a low level. However, the proposed removal of the existing Three Day Market and the site converted to public realm (water compatible development) will help to reduce the risk to persons and property on the site and reduce the risk and mitigate the effect of flooding downstream.

9. Conclusions and Recommendations

9.1.1 The above flood risk assessment has:

- Investigated all reasonably foreseeable potential risks of flooding to the site,
- Considered the impact the development may have elsewhere with regards to flooding; and
- Considered outline design proposals to mitigate any potential risk of flooding determined to be present.

9.1.2 Upon assessing the flood risks to and from the proposed demolition of the existing Three Day Market building and replacement with new public realm the report concludes that:

- The proposed development is located within Flood Zones 1 & 2. The proposed public realm, in accordance with Table 2.1 of the NPPF Technical Guidance has a Water-compatible Development classification which is suitable for all flood zones. Therefore, in accordance with the above Table 2.2, no Exception Test is required and the development should be permitted.
- The proposed development is high risk of pluvial flooding. With up to 900mm of surface water flowing at over 0.25m/s east to west across the site (from Railway Road to Croft Street) for the 1 in 30yr probability storm event or greater.
- There will be slight reduction in the risk of Surface Water Flooding from the site. Also the demolition of the Three Day Market building will provide additional above ground stormwater storage space in extreme events that will help mitigate the impact of flooding on the adjacent remaining Darwen Covered Market buildings.
- The Environment Agency: Flood risk from reservoirs shows that the site is at risk of flooding from a failure of the Earnsdale reservoir. And the proposed demolition of the existing building and conversion to public realm (water compatible development) will help to mitigate the consequence of any reservoir flooding.
- The SFRA highlights that the site is not within an area susceptible for groundwater flooding. The site is therefore considered to be at low risk from groundwater flooding.
- Any overflow from the local surface water sewers caused by blockage or failure will flow southwest away from the site along the existing pluvial flow paths towards Croft Street and Market Street.
- This section of the Darwen culvert is towards the end of a long and winding river Darwen culvert. Therefore, and blockage of the culvert is likely to happen up near the mouth of the culvert c.180m upstream of the site. It is therefore considered that the risk of flooding from the site due to failure of the River Darwen culvert is low. Any overflow from the Darwen culvert should flow southwest away from the site along Croft Street towards Market Street which is at a lower elevation than the site.
- The site is potentially at risk of combined sewerage flowing across the site if there is a blockage/failure of the United Utilities combined sewer in Railway Road above the site. The consequence of this failure can be mitigated by maintain the existing onsite drainage

system supplemented by new collection equipment. Therefore, the likelihood of this sewer blocking or failing is considered to be low.

- The overall risk of flooding to the site due to blockage or failure of the surrounding drainage infrastructure is considered to be low.
- The site which is located adjacent to the culverted section of the River Darwen has been subject to several historical flood events. The most recent being January 2008 where high water levels in the Darwen prevented effective drainage with flood water emerging from manholes.
- Given the site constraints and characteristics it is not practical to mitigate the existing site flooding risks to a low level. However as the proposed removal of the existing Three Day Market and the site converted to Public Realm (water compatible development) the proposed works will help to reduce the risk to persons and property on the site and reduce the risk and mitigate the effect of flooding downstream.

9.1.3 Recommendations include:

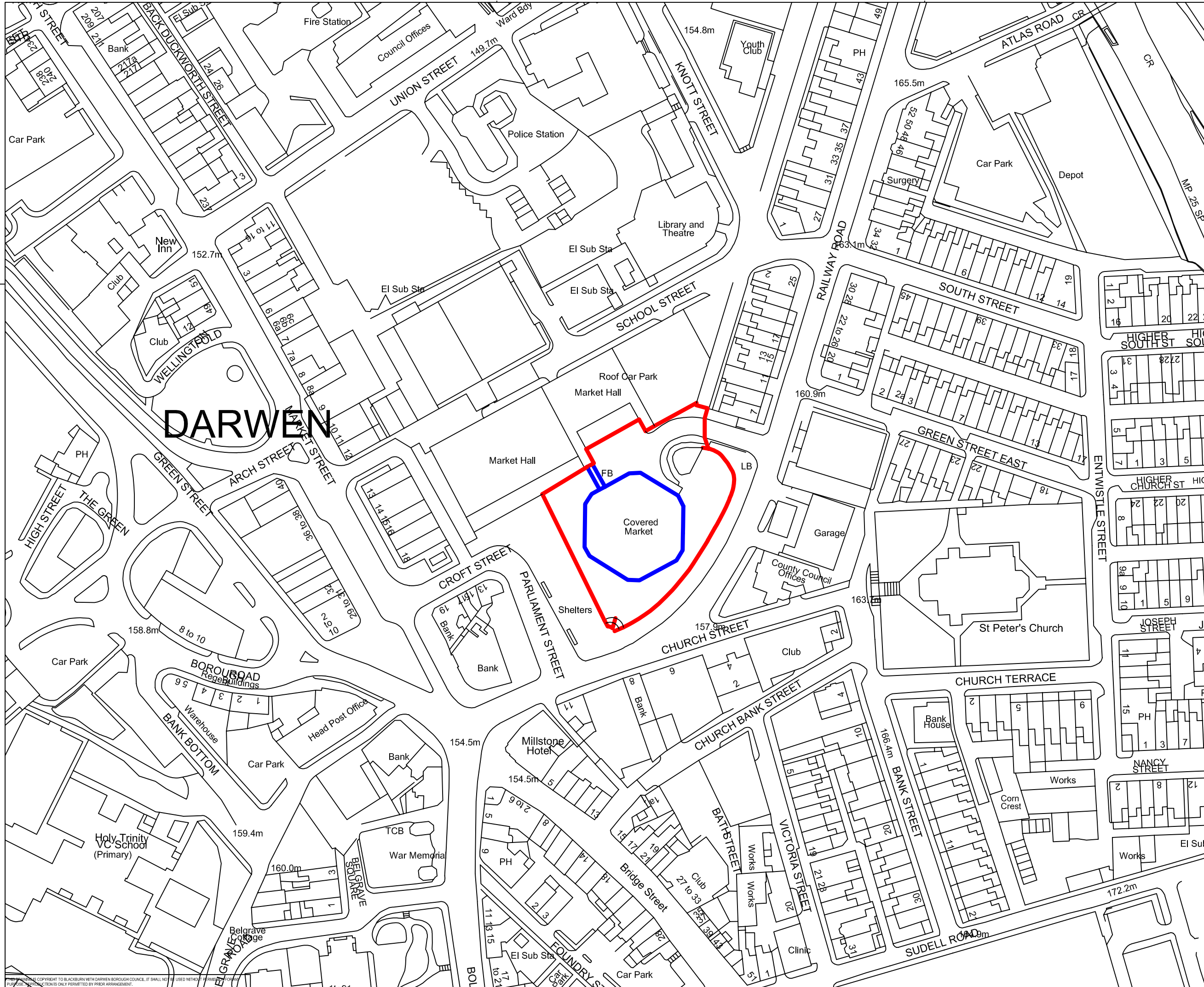
- Groundwater levels are monitored during any further ground investigation works to determine site specific groundwater levels and a reassessment of the risk and any required mitigation measures undertaken.
- Wherever possible keep and reuse the existing surface water drainage systems supplemented by new gullies where required.
- The existing egress points from the site should be maintained post demolition to allow a safe egress from the site to the higher ground on Railway Road should a flooding incident occur.
- A suitable maintenance strategy should be adopted to ensure the SuDS is checked and cleaned regularly. The routine maintenance and cleansing regime should be documented.

9.1.4 Therefore, if the principles set out within the previous sections of this report are followed and developed at detailed design stage by the design engineer, the proposed replacement of the Three Day Market building with public realm can be considered to be appropriate and at lower risk of flooding.

Appendix A

Existing Site Drawings

- A.1 BwDBC - Site Location Plan CS/001
- A.2 Topographical Survey Drawings
- A.3 River Darwen Culvert Location Plan CS058234-SK-001
- A.4 Post Demolition Existing Drainage Layout CS0927323-CAP-HDG-XX-DR-D-0001



DARWEN

NOTES:-

Key:

- Note blue line indicates building to be demolished
- Red line indicates site area.

REV	DESCRIPTION	DRAWN	CHK	APP	DATE
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TENDER

client
BLACKBURN WITH DARWEN B.C.
TOWN HALL
BLACKBURN BB1 7DY

project title
DARWEN 3 DAY MARKET
PROPOSED DEMOLITION

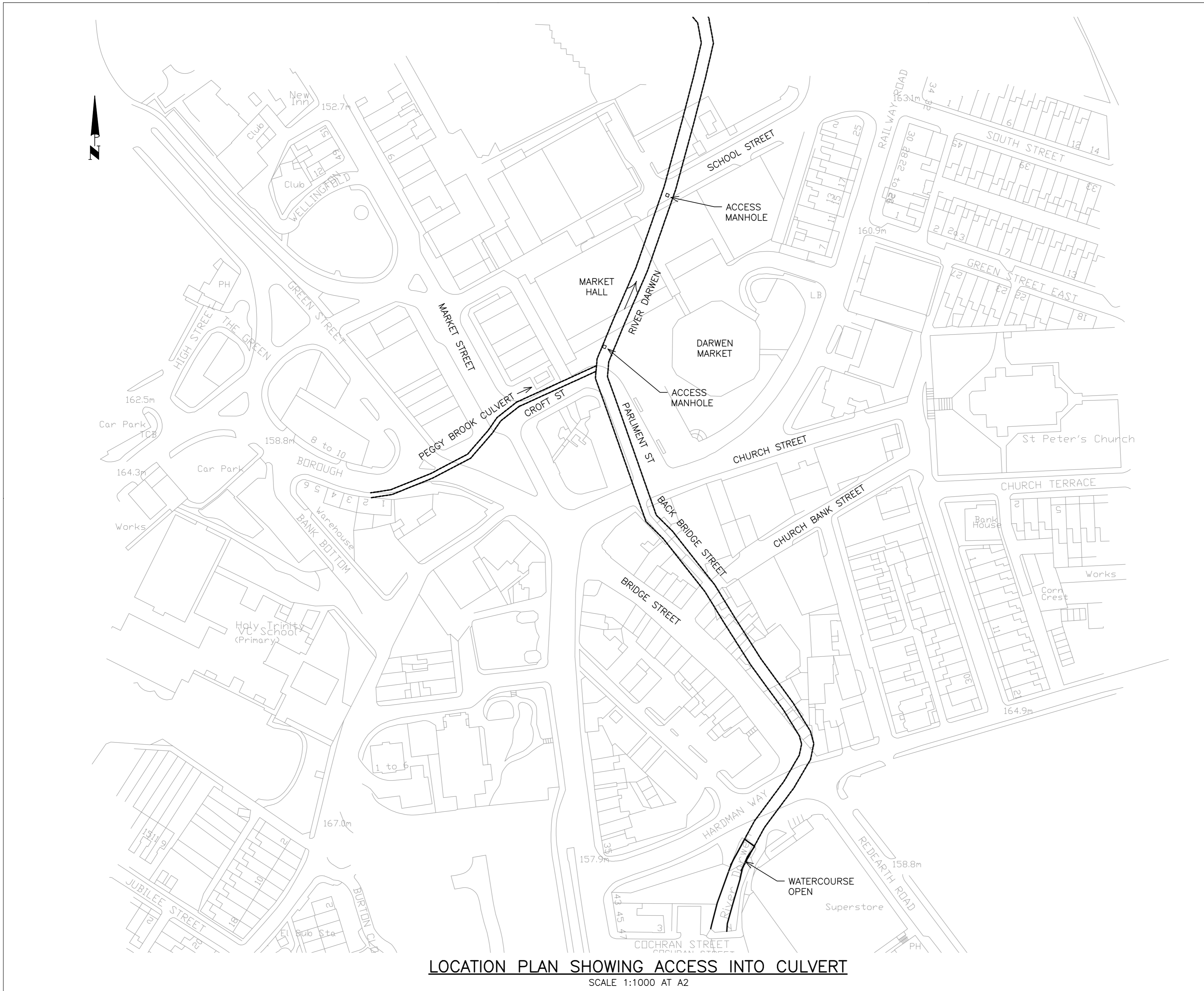
drawing title
LOCATION PLAN

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1:2500	WDP	WDP	AB	AB	05.10.16

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LOCATION PLAN SHOWING ACCESS INTO CULVERT
SCALE 1:1000 AT A2

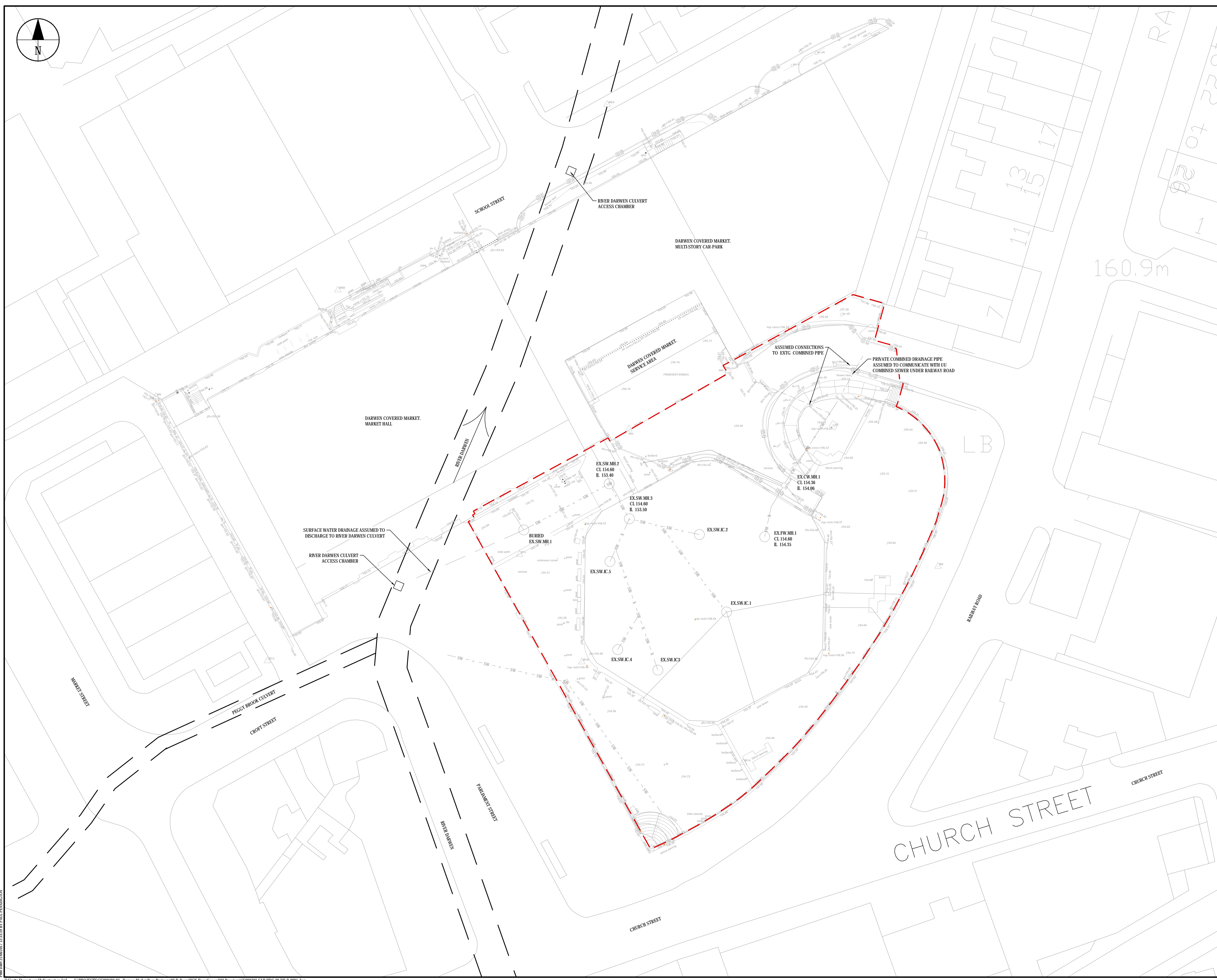
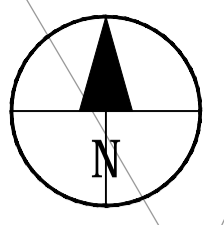
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status				
FOR INFORMATION				
client				
BLACKBURN WITH DARWEN B.C. TOWN HALL BLACKBURN BB1 7DY				
project title				
BACK BRIDGE STREET No. 6357 CULVERT STRENGTHENING WORKS				
drawing title				
LOCATION OF WORKS				
scale @ A1				
SHOWN	designed by	drawn by	checked by	approved by
		MB		21.10.13.
project no.				
CS/058234				
drawing no.				
CS058234-SK-001				revision
				INF

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 5. DRAINAGE DETAILS ARE SHOWN ON DRAWING [CS090114-CAP-HDG-00-DR-C-6001].
 6. ALL DRAINAGE TO BE IN ACCORDANCE WITH SPECIFICATIONS INCLUDED WITHIN APPENDIX 5. ALSO REFER TO DRAINAGE SCHEDULES.
 7. ALL KERBING TO BE IN ACCORDANCE WITH SPECIFICATIONS INCLUDED WITHIN APPENDIX 11/1.
 8. UNKNOWN INVERT LEVELS OF EXISTING DRAINAGE TO BE CONFIRMED AND REVIEWED PRIOR TO CONNECTIONS BEING MADE.
- KEY:**
- WORK EXTENTS BOUNDARY
 - EX.SW.MH.1 EXISTING PRIVATE SURFACE WATER DRAINAGE SYSTEM
 - EX.FW.MH.1 EXISTING PRIVATE FOUL WATER DRAINAGE SYSTEM
 - EX.CW.MH.1 EXISTING PRIVATE COMBINED WATER DRAINAGE SYSTEM
 - EXISTING DRAINAGE SYSTEM TO BE GRUBBED OUT, INCLUDING CONNECTED CHAMBERS.
 - EXISTING GULLY & CONNECTING PIPE

P1	PRP	FIRST ISSUE - FOR PLANNING	21.06.2017
Rev	Drawn	Checked	Approved
			Description
			Date

Purpose of Issue
S2 - INFORMATION

Classification
COMMERCIAL IN CONFIDENCE

Client
BLACKBURN WITH DARWEN BOROUGH COUNCIL

Project
DARWEN THREE DAY MARKET DEMOLITION

Drawing
POST DEMOLITION EXISTING DRAINAGE LAYOUT

Scale @ A1	Drawn	Checked	Approved
1:200	PRP	APN	AB

Project No.	Date
CS092723	21-JUN-17

Drawing Identifier	BS1192 Compliant
Project Originator - Zone - Level - File Type - Role - Number	revision
CS092723-CAP-HDG-XX-DR-D-0001	P1

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Appendix B

Existing Site Information

- B.1 Capita Phase 1 Geo-Environmental Desk Study report
- B.2 United Utilities Sewer Records
- B.3 The MetroRod Darwen Three Day Market CCTV Inspection Report
340928 CCTV Survey Report
- B.4 BwDBC Level 2 SFRA – Vol 2 – Figure B9-2 Critical Drainage Areas

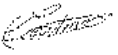
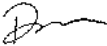
Darwen Markets

Phase 1 Geo-Environmental Desk Study

May 2017



Quality Management

Job No	CS/092513	Client	Blackburn with Darwen Council
Title	Phase 1 Geo-Environmental Desk Study		
Project	Darwen Markets		
Location	Darwen		
Document Ref	CS092513-P1DS-01	Issue / Revision	01
File reference	P:\CS092513 Darwen Markets GEO\10 Reports\01\CS092513-P1DS-01.docx		
Date	26 May 2017		
Prepared by	Elizabeth Yeatman	Signature (for file)	
Checked by	Andrew Watts	Signature (for file)	
Authorised by	Dan Mason	Signature (for file)	

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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
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1. Introduction

1.1 Background

1.1.1 Capita Real Estate & Infrastructure Ltd (“Capita”) was commissioned by Blackburn with Darwen Borough Council to undertake a Phase I Geo-Environmental Desk Study for their Darwen Markets site.

1.1.2 A site location and existing site layout plan is presented in Appendix A.

1.2 Proposed Development

1.2.1 The council are proposing demolition of one of the covered market buildings at the site as highlighted by the blue outline on the drawing in Appendix A. Proposed redevelopment plans for the area have not been made available however it is anticipated that any future development at the site is likely to be commercial in nature.

1.3 Objective and Scope of Work

1.3.1 The objective of this assessment was to collate and review the available Geo-Environmental information to determine potential constraints to future development such as ground contamination risks and geotechnical hazards.

1.3.2 To achieve the objective the following scope of work was defined and undertaken:

- A site visit to establish the site setting and visible ground conditions (photographs from a site reconnaissance are presented in Appendix B);
- Review of published and readily available information concerning the site:
 - Recent Ordnance Survey (OS) Map;
 - British Geological Survey (BGS) Published Maps;
 - A site-specific Groundsure Report (Appendix C);
 - OS Historical Map Archive (included in the Groundsure Report – Appendix C);
 - BGS Borehole logs (Appendix D);
 - A site-specific Coal Authority Report (Appendix E); and
- Develop a preliminary Conceptual Site Model (CSM) that relates the known and anticipated ground conditions at the site to the proposed development.
- Establish areas of potential concern based on identified risks and/or potential risks.
- Identify any actions (e.g. supplementary intrusive site investigation) required to reduce risks and/or minimise any uncertainties.

2. Site Characteristics

2.1 Site Location

- 2.1.1 The site is located within Darwen town centre and is bounded to the north by School Street, to the south east by Church Street and Railway Road, and to the west by Croft Street and Parliament Street.
- 2.1.2 The approximate centre of the subject site is located at Ordnance Survey National Grid Reference 369304, 422263. An indicative postcode for the site is BB3 1BG.
- 2.1.3 A site location and existing site layout plan is presented in Appendix A.

2.2 Site Description

- 2.2.1 With reference to the redline plan, the subject site is irregular shape in plan; covering an area of approximately 0.68ha.
- 2.2.2 The site area is currently occupied by a rectangular Market Hall building, a connecting hexagonal covered market building and a multi-storey car park. The majority of the site is made up of impermeable, concrete surfaces used for either vehicular access routes, pedestrian routes or car parking. The topography of the site generally slopes to the west-northwest. A drawing is presented in Appendix A detailing the layout of the site.
- 2.2.3 Photographs of the site taken during a walkover survey are presented in Appendix B.

2.3 Surrounding Land-use

- 2.3.1 To the **NORTH**, the subject site is bounded by the School Street, beyond which lie commercial premises and car parking.
- 2.3.2 To the **SOUTH EAST**, the subject site is bounded by Railway Road and Church Street, beyond which lie predominantly commercial premises and associated infrastructure.
- 2.3.3 To the **WEST**, the subject site is bounded by Croft Street and Parliament Street, beyond which lie further commercial premises.

3. Environmental Setting

3.1 Geology

- 3.1.1 The regional geological information pertaining to the site was gained from a review of the BGS Digital Geological Map of Great Britain (DiGMapGB-50; available as a Web Map Service). Additional reference has been made to a site-specific Groundsure Report (Appendix C).
- 3.1.2 Given the previously developed nature of the site, the majority of the site area is likely to be directly underlain by Made Ground deposits imported to level the site and facilitate development; these may comprise materials of unknown provenance, quality and composition.
- 3.1.3 The Groundsure report has identified 2no areas of potentially infilled ground corresponding to a pond and reservoir in the eastern half of the site.
- 3.1.4 The western margins of the site are indicated to be underlain by superficial drift deposits comprising Alluvium.
- 3.1.5 The eastern half of the site is indicated to be underlain by Glaciofluvial deposits comprising sand and gravel.
- 3.1.6 Beneath the superficial deposits the site is indicated to be underlain by solid strata of the Pennine Lower Coal Measures Formation comprising Mudstone, Siltstone and Sandstone. The BGS Lexicon describes this formation as "Interbedded grey mudstone, siltstone, pale grey sandstone and common coal seams".
- 3.1.7 An inferred fault is recorded running adjacent to the western boundary of the site in an approximately northwest-southeast orientation.
- 3.1.8 Additional Ground condition information pertaining to the area surrounding the subject site has been obtained from a search of the BGS GeoIndex service. The following exploratory logs have been identified and summarised below:
- SD62SE267 - a cable percussive borehole advanced in 1977, located roughly 140m south west of the site;
 - Made Ground – bricks, ashes, gravel and clay to 0.75mbgl
 - Medium dense to dense SAND and GRAVEL to 7.20mbgl
 - Firm becoming stiff silty sandy CLAY to 16.00mbgl
 - Highly weathered grey shaley MUDSTONE to 16.50mbgl(base not proven)
 - Water strikes were recorded at 3.75mbgl and 9.65mbgl
 - SD62SE266 - a cable percussive borehole advanced in 1977, located roughly 150m west of the site;
 - Made Ground – ash, bricks, cobbles and clay to 3.00mbgl
 - Medium dense to dense SAND and GRAVEL to 9.15mbgl
 - Firm becoming stiff laminated very silty CLAY to 23.00mbgl
 - Highly weathered grey shaley MUDSTONE to 24.00mbgl(base not proven)
 - Water strikes were recorded at 9.45mbgl and 23.00mbgl

- SD62SE4 – an historic borehole, located roughly 200m northwest of the site;
 - Loose earth to 0.91mbgl
 - Running sand to 5.18mbgl
 - Boulder clay to 6.40mbgl
 - Interbedded shale and sandstone (base not proven)
 - A cavity approximately 0.91m thick was recorded at 107.29mbgl.

3.1.9 The information provided in the boreholes provides an indication of the possible geology at the site and may provide an indication of the deeper ground conditions at the site. The borehole logs are reproduced in Appendix D.

3.1.10 The site is in an area where between 1 and 3% of properties are above the Action Level. Radon protective measures are therefore not considered necessary for new structures.

3.2 Coal Mining, Mineral Extraction and Subsidence

3.2.1 The Groundsure Report has identified the subject site is within an area which may be affected by coal mining activity and therefore a Coal Authority report has been obtained for the site and is presented in Appendix E.

3.2.2 The Coal Authority report has indicated that the site is in an area that could be affected by underground mining in 1no seam of coal at 140m to 150m depth, which was last worked in 1850. The report states that any movement in the ground due to coal mining activity should have stopped.

3.2.3 The property is not within an area that could be affected by present or likely future underground mining and there are no known coal mine entries within 20m of the site boundary.

3.2.4 The Coal Authority report describes 1no coal mining subsidence claim within 50m of the site. This appears to relate to the nearest mine entry located approximately 50m northeast of the site.

3.2.5 The risk from coal mining beneath the site is considered low due to the significant depth of the mine workings. The site is also considered outside the zone of influence of the nearest mine entry and therefore the risk from coal mining is not considered further.

3.2.6 Information in the Groundsure Report indicates that there is:

- “Negligible” risk from:
 - Soluble Rocks stability hazards.
- “Very Low” risk from:
 - Shrinking or swelling clay ground stability hazards; and
 - Collapsible Ground Stability Hazards.
- “Low” risk from:
 - Landslide ground stability hazards; and
 - Running Sand Hazards.
- “Moderate” risk from:
 - Compressible Ground hazards.

- 3.2.7 The moderate risk from compressible ground hazards likely relates to the reservoir/pond infill deposits indicated to be present on the site.

3.3 Hydrogeology

- 3.3.1 According to information presented in the Groundsure Report, the underlying superficial deposits and the bedrock are classified as Secondary A Aquifers. These are described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
- 3.3.2 The site has been classified as having a high leaching potential, owing to the presence of variable Made Ground. Information for Made Ground is based on fewer observations than elsewhere and as such a worst case vulnerability scenario is assumed.
- 3.3.3 The site is indicated to have the potential for groundwater flooding to occur at the surface.
- 3.3.4 There are no groundwater or potable abstraction licenses within 500m of the subject site and the site is not located within in a groundwater source protection zone.

3.4 Hydrology

- 3.4.1 The nearest surface watercourse/feature to the subject site, as shown on OS mapping and Detailed River Network maps presented in the Groundsure Report is the River Darwen which is culverted along the western boundary of the site.
- 3.4.2 According to the Groundsure Report there are no licensed surface water abstraction records within a 500m search buffer of the site.

3.5 Potential Flood Risks

- 3.5.1 The nearest surface water feature is the River Darwen which is culverted along the western boundary of the site.
- 3.5.2 The majority of the southern site area is situated in an Environment Agency Flood Zone 2; an annual probability of flooding of 1 in 1000 (0.1%) or greater chance of occurring in any year. The northern site area is not indicated to be at risk from flooding from rivers or the sea.
- 3.6 According to the Groundsure Report the site is considered to be within an area which has the potential for groundwater flooding of property at the surface (i.e. groundwater within the Secondary superficial and bedrock aquifers).

3.7 Landfill and Waste Management Activity

- 3.7.1 According to the Groundsure Report there are no current or historical landfill sites located within a 500m search buffer of the site.

- 3.7.2 There are 4no records of waste treatment, transfer or disposal sites located within a 500m radius of the site. The nearest entries are located 225m north of the site and relate to a refuse destructor.
- 3.7.3 There are 9no records of EA licensed waste sites within 500m of the site boundary. The nearest entry is located 96m southwest of the site and relates to an in-house storage facility for Crown Paints Ltd.

3.8 Environmental Permits, Incidents and Registers

- 3.8.1 There are no recorded historic IPC authorisations recorded within a 500m radius of the site.
- 3.8.2 There are 8no Part A(1) and IPPC Authorised Activities within 500m of the subject site. The entries all relate to fuel combustion or paper, pulp and board production for a paper company located 101m southwest of the site.
- 3.8.3 There are no planning hazardous substance consents within 500m of the site.
- 3.8.4 There are 34no discharge consents within 500m of the subject site; the nearest of these are located 3-5m northwest and 32m southwest and relate to sewerage discharges of storm overflow into the River Dee.
- 3.8.5 There are 12no EA recorded pollution incidents within 500m of the subject site; the nearest offsite records are located 212-214m south of the subject site, they both relate to an incident in 2003 involving the release of organic chemicals to the River Darwen resulting in a Category 3 (Minor) impact to controlled waters.

3.9 Industrial Land Use Information

- 3.9.1 Current Land Uses data presented in the Groundsure Report indicates that there are 45no industrial sites within a 250m search buffer of the subject site and these generally relate to commercial or light industrial processes and services including:
- Sale of consumer products;
 - Electrical features – sub stations;
 - Vehicle repair, testing and services;
 - Unspecified works or factories;
 - Manufacture of industrial and consumer products; and
 - Engineering services.

- 3.9.2 There are no petrol filling stations within influencing distance of the subject site.

3.10 Ecology

- 3.10.1 With respect to the specific definition of Contaminated Land, the site does not lie within 1000m of one of the following *sensitive* sites: National Nature reserve, Local nature Reserve, Marine Nature Reserve, Ramsar Site, Special Protection Area, World Heritage Site, Site of Specific Scientific Interest (SSSI) or a Special Area of Conservation.

3.11 Unexploded Ordnance

- 3.11.1 The Zetica regional unexploded bomb risk map for Lancashire indicated the risk of UXO on the site is low.
- 3.11.2 No evidence of bomb damage is visible on the historical maps.

4. Site History

4.1 Historical Map Review

4.1.1 The following summary of the site's history is based on a review of historical 1:10,560, 1:2,500, 1:1,056 and 1:500 scale Ordnance Survey maps as presented in the Groundsure Report (presented in Appendix C).

Summary of the Historical Development of the Site

Map Dates	Description	Comments
Pre 1849	River Darwen	The River Darwen runs through the site in a northeast-southwest orientation.
Pre c1891	Municipal Buildings & Reservoir	The north west of the site is occupied by Municipal Buildings. The north-eastern site area is occupied by a reservoir and the southern site area is labelled market square. The River Darwen has been partly culverted beneath the site. Croft Street is shown running east – west through the centre of the site.
c1954	Markets	A covered market is now shown in the southern site area and much of the earlier 'Municipal Building' is now labelled Market Hall with only the frontage remaining.
c1974	Car Park	A roof car park is shown in the area previously occupied by a reservoir. This is assumed to have been infilled. The southern market has been replaced with the current hexagonal market building.
c1981	Shelter/Council Office	A small shelter building, later labelled council office, has been developed in the south western corner of the site.

Summary of the Historical Development of the Surrounding Area.

Map Dates	Approximate Location	Description/comments
Pre 1891 - 1955	Surrounding 250m	The surrounding area comprises residential housing and associated infrastructure with a number of mills.
Pre 1891 - 1911	200m North West	Old Shaft
Pre 1870 - Present	200m North East	Darwen train station with sidings and a good shed.
1911 -1954	120-250m North	Electricity Works, saw mill, smithy and refuse destructor.
1954 - Present	Immediately West	Omnibus station
1955- Present	Surrounding 250m	Former industrial land use replaced predominantly with commercial properties.

NOTE: All locations are approximate; measured from the nearest site boundary.

4.2 Summary

- 4.2.1 With reference to the available historical maps, prior to c1891 the site was occupied by Municipal Buildings, an open market and a reservoir. Various covered market buildings have occupied the site and the former reservoir area is now occupied by multi-story car parking.
- 4.2.2 The history of the surrounding land comprised residential properties to support previous industry including numerous mills, mining and unspecified works. The land use has gradually become more commercial.
- 4.2.3 Historical and current contaminative land uses in the surrounding area include railway sidings, surrounding works, factories and warehouses.
- 4.2.4 The following potentially contaminative land uses have been identified on the site itself and the surrounding land and comprise:
- General Made Ground/in-filled ground (i.e. potentially poor quality/contaminated materials);
 - Infilled reservoir formerly located in the north east of the site (i.e. potentially poor quality/contaminated materials);
 - Car parking (i.e. possible fuel/oil leakages/spillages); and
 - Works and mills located on surrounding parcels of land (i.e. hydrocarbons, chemical/fuel/solvent storage and use).
- 4.2.5 On the basis of the historical information alone, the contamination potential for the subject site could be considered Moderate mainly based on the unknown local made ground deposits and potential reservoir infilling, however the historical review only provides an indication of the range of potential contamination sources / impacts that may have occurred throughout the site's development history and the risk rating does not necessarily mean that such sources exist.

5. Conceptual Site Model

5.1 Introduction

5.1.1 This section summarises the findings of the desk study in the form of a Geo-Environmental conceptual site model (CSM).

5.1.2 The CSM provides a qualitative evaluation of potentially active “*contaminant linkages*” at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one or more pathways:

- i) Potential sources of contamination: these include any actual or potentially contaminating materials and activities, located either on or in the vicinity of the site;
- ii) Potential pathways for contamination migration: these comprise the routes or mechanisms by which contaminants may migrate from the source to the receptor including environmental migration pathways and human health exposure pathways; and
- iii) Potential receptors of contamination: these include present and/or future land users, ecological systems, water resources and property.

5.2 Contamination Sources

5.2.1 Given the history of the site Made Ground is likely to be present across the entire subject site. The thickness of the Made Ground could potentially be highly variable (particularly in the area of the backfilled reservoir). Made Ground is also likely to have been imported to generate appropriate site levels and facilitate the various stages of historic development. The imported Made Ground is of unknown provenance, of variable strength and may be heterogeneous in composition.

5.2.2 The northeast of the site has been used for car parking; as such there is potential for small scale impacts to soil and groundwater to have occurred from fuel or oil spillages from vehicles.

5.2.3 Given the development history of the site, and the age of the former buildings, the presence of asbestos within Made Ground deposits cannot be discounted.

5.2.4 The development may be at risk from potential ground gas generation from the Made Ground deposits and materials used to infill the former reservoir in the northeast of the site. Notwithstanding, the gas generation potential typically associated with Made Ground is considered to be low (in line with Ciria C665).

5.2.5 The most significant off-site sources of potential contamination with the potential to have affected the subject site are:

- i) Mills located 50m north of the site;
- ii) Various works/warehouses located on surrounding land; and
- iii) Railway sidings to the northeast of the site.

- 5.2.6 Given the historical development on and off site, there is the potential for such sources to have affected the site, and it is possible that cross-boundary migration pathways would have been active at some stage. Vertical migration on the site could have been enabled by the superficial deposits.
- 5.2.7 On the basis of the above, it is feasible that contamination could potentially exist within the site footprint and could include substances such as:
- Heavy Metals and metalloids
 - Inorganic compounds (sulphates, cyanide)
 - Asbestos
 - Poly-Aromatic Hydrocarbons
 - Petroleum hydrocarbons

5.3 Pathways

- 5.3.1 Potential migration pathways are discussed below.

Airborne Migration Pathways

- Under the proposed development scenario the majority of the site will be covered by buildings / hard-standing; therefore dust generation in these areas is likely to be minimal and the particulate inhalation pathway is considered inactive.
- If peripheral landscaping is included within any future development proposals, dust generation is more likely to occur in these areas; although where vegetation is well established, dust generation is still relatively low.
- During development works, sub-surface soils could be exposed and therefore dust has the potential to be generated. Notwithstanding, typical dust suppression techniques would be employed during construction and events such as these would only result in short-period exposures linked to the development programme.
- Vapour inhalation pathways are potentially active irrespective of site status.

Aqueous Migration Pathways

- Leaching of contaminants in the shallow soils is likely to be negligible in areas of hard-standing (buildings, pavement etc.) where infiltration of rainfall is minimal however could potentially occur if any uncovered landscaping is proposed.
- The site is recorded as being directly underlain by Secondary A (bedrock) Aquifers and on this basis the aqueous migration of contamination laterally in deep groundwater could occur.
- The bedrock is anticipated to be overlain by Secondary A (superficial) Aquifer; as such vertical and lateral aqueous migration pathways in shallow groundwater are considered active. Therefore there may be a pathway between shallow/surface-derived contamination and deep groundwater.

Direct Contact Exposure Pathways

- Under the proposed development scenario, the majority of the site will be covered in some form of hard-standing (building floor slabs, road pavement, parking etc); therefore direct contact pathways will be inactive.
- If any areas of landscaping is proposed; direct contact with soils could readily occur.
- During the construction phase of the development, soils can become exposed at the surface and hence the direct contact pathways should be considered active for the

duration of the development programme and also during any later in-ground maintenance works.

- 5.3.2 Ground gas migration follows pressure gradients (i.e. from high to low pressure via the path of least resistance). Given the ground conditions, ground gas migration will be predominantly vertical, migrating from the theoretical source to the surface along the path of least resistance. Ground gas migration pathways are therefore considered active.

5.4 Receptors

- 5.4.1 With reference to Part 2a of the Environmental Protection Act (1990), the potential receptors to be considered in any contaminated land scenario can be summarised as follows:

Human Health

- The receptor group with the longest and most frequent exposure duration is likely to be the commercial workers associated with the sites use. Therefore “commercial workers” are considered the main receptor for the development.
- Construction workers/contractors could potentially be exposed to contaminants during the construction process, as would any maintenance workers (working in the ground) following completion of any development. We would however anticipate that the adoption of appropriate health and safety risk assessments and use of suitable personal protective equipment (PPE) will reduce risks to manageable levels.
- Adjacent workers and general public could also be at risk; though for exposure to occur, active cross-boundary migration pathways would be required.

Eco-systems

- There are no sensitive sites within influencing distance of the site.

Property (buildings, etc)

- Future development may comprise new structures and associated infrastructure; however these should be designed on the basis of a site specific geotechnical investigation which should include an appraisal of relevant risks including the potential for sulphate attack on buried concrete.

Controlled Water

- All groundwater is Controlled Water; therefore the groundwater beneath the site requires consideration and protection as a potential receptor of any site-derived contamination.
- Surface watercourses are also considered Controlled Water receptors; the River Darwen is culverted along the western boundary of the site and is therefore considered a plausible receptor.

5.5 Preliminary Risk Assessment

The following table presents the plausible contaminant linkages that apply to the site. An indicative qualitative assessment of the likelihood that a risk could be realised is provided in the table, constituting the Preliminary Risk Assessment (PRA) as outlined in CLR 11 (DEFRA & EA, 2004).

Summary of the preliminary risk associated with Potential Pollutant Linkages

Potential Receptor	Potential Source	Potential Pathway	Preliminary Risk*
Site Users – Commercial Workers	Contaminated soil, perched groundwater and groundwater	Particulate inhalation / dermal contact / ingestion	Moderate
		Vapour inhalation (indoor and outdoor)	Low
	Ground Gas	Migration through structures	Low to Moderate
Adjoining site users	Contaminated soil	Particulate inhalation (during construction only)	Low to Moderate
	Contaminated Groundwater	Vapour Inhalation	Low
Construction Workers / Maintenance Workers	Contaminated soil & perched groundwater	Particulate inhalation / dermal contact / ingestion / vapour inhalation.	Moderate
Property (future building)	Sulphate impacted soil & groundwater	Chemical Attack	Low to Moderate
	Ground Gas	Structural damage due to explosion of combustible gas	Low to Moderate
Controlled Water – Groundwater	Contaminated soil and perched groundwater	Leaching and migration of contaminants into the aquifer	Low
Controlled Water – River Darwen	Contaminated soil and groundwater	Surface migration with groundwater flow	Low to Moderate

* assuming no mitigation or remedial measures are implemented.

5.5.1 The development will comprise solely commercial land use and therefore hardstanding is expected to cover the majority of the site. We have therefore assumed that the risks of direct contact/exposure with/to contaminants and the risks from particulate inhalation are low.

5.6 Discussion

5.6.1 A review of the PRA indicates that, in general, the contamination potential for the site (with no specific mitigation measures) is considered to be in the majority of cases LOW to MODERATE.

- 5.6.2 This is largely due to the fact that there may be soil and shallow groundwater contamination associated with historic (particularly the infilled reservoir) and/or current land-uses. However the presence of majority hardstanding cover in the current and likely future development scenarios renders the majority of pathways between the site end-users and any contamination within the subsurface “inactive”.
- 5.6.3 Near surface contaminants could impact upon construction workers during redevelopment ground works activities, however, it is envisaged that appropriate health and safety risk assessment and personal protective equipment would provide appropriate mitigation and thus bring down the risk rating to an acceptable level.
- 5.6.4 A risk (low to moderate) exists from hazardous ground gas until proven otherwise, or is mitigated through the incorporation of appropriate gas protection measures into new buildings.
- 5.6.5 The environmental risk posed by the site to Controlled Water (groundwater and surface water) would only be significant if substantial, mobile, on-site ground contamination sources are confirmed to exist.
- 5.6.6 Risks to property including chemical attack will be mitigated by design.

6. Conclusion & Recommendations

6.1 Overview

- 6.1.1 This Phase 1 Geo-Environmental Desk Study Report presents an assessment of the geo-environmental information pertaining to the site based on readily available desktop/published information.
- 6.1.2 The objective of this assessment was to collate and review the available geo-environmental information to determine potential ground contamination risks associated with the Site in its current condition and evaluate potential geo-environmental constraints with regards to future development.

6.2 Conclusions

- 6.2.1 From the review of the available information, the identified historical land use of the site and surrounding area may have generated contamination impacts potentially comprising low level chemical contamination within the Made Ground or reservoir infill deposits.
- 6.2.2 The preliminary risk associated with any “active” Contaminant-Pathway-Receptor linkages is in the majority of cases considered to be Low to Moderate. Furthermore a potential risk exists from hazardous ground gas until proven otherwise or is quantified with appropriate recommendations for mitigation measures.
- 6.2.3 Given the sensitivity of the underlying Secondary Aquifers and the nearby River Darwen the environmental risk posed by the site to Controlled Water receptors would be significant if substantial, mobile, on-site ground contamination sources are confirmed to exist. Appropriate soil and groundwater testing and risk assessment should be undertaken during intrusive ground investigation.

6.3 Recommendations

- 6.3.1 Prior to demolition/redevelopment of the site, intrusive ground investigations are recommended to characterise the ‘baseline’ geo-environmental status of the site; sufficient to adequately define the risk associated with geotechnical and contamination ground abnormalities and allow a detailed Remediation Strategy to be developed if required.
- 6.3.2 The investigation strategy should include an “environmental” investigation; designed to interrogate the Phase 1 CSM, establish the status of the identified Source-Pathway-Receptor linkages and thereby reduced uncertainties in the PRA. Such investigations will need to be sufficiently detailed to adequately characterise the ground and groundwater (chemical) conditions and the ground gas regime to enable an appropriate level of contamination and gas risk assessment to be undertaken in line with the relevant guidelines and current industry standards.

- 6.3.3 Investigation for specific redevelopment should also include an assessment of the sites geotechnical properties, including investigations to establish the depths to competent bearing strata and to allow for the design of foundations, floor slabs and road pavement.
- 6.3.4 Investigation should be undertaken in line with BS5930 (2015) and BS10175 (2011) with the aim of determining the ground conditions, allowing sampling of soils for geotechnical and environmental testing. Such investigations will determine the need for mitigation against aggressive ground, establish the suitability of materials for re-use and characterise 'Waste' for future disposal.
- 6.3.5 The findings of the intrusive investigations and subsequent assessments will establish the need (or otherwise) for any mitigation measures necessary for the development to progress including whether land remediation is needed. In such an event, further site investigation maybe appropriate or risk assessment in order to develop a Remediation Strategy may be required. In this respect reference should be made to CLR11 (DEFRA & Environment Agency, 2004) and supporting guidance.

7. References

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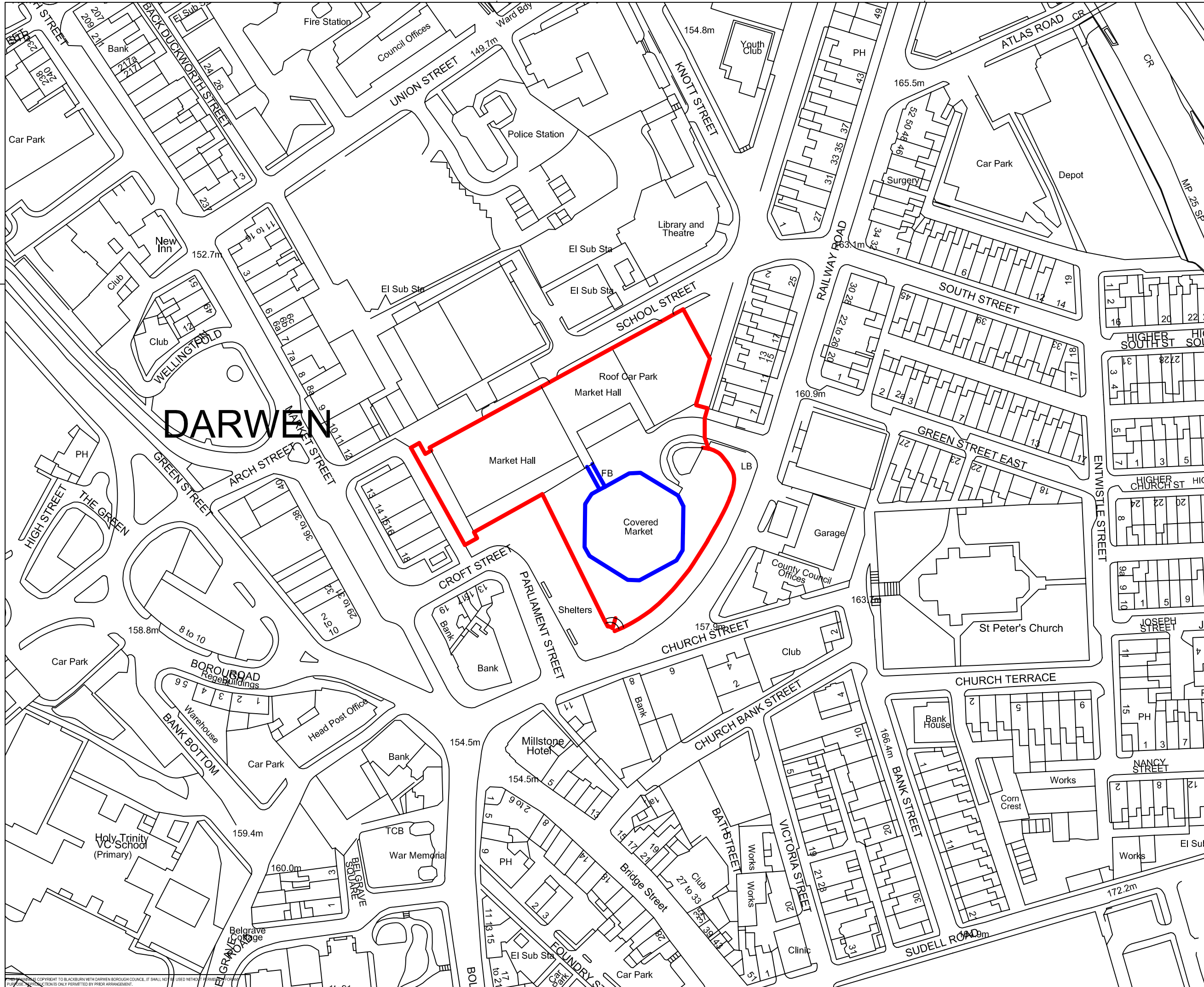
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Appendix A Figures & Drawings



DARWEN

NOTES:-

REV	DESCRIPTION	DRAWN	CHK	APP	DATE



TENDER

client
BLACKBURN WITH DARWEN B.C.
TOWN HALL
BLACKBURN BB1 7DY

project title
DARWEN 3 DAY MARKET
PROPOSED DEMOLITION

drawing title
LOCATION PLAN

scale @ A3	author	drawn by	checked by	approved by	date drawn
1:2500	WDP	WDP	AB	AB	05.10.16

CS/
drawing no. **001**

Do Not Scale From This Drawing

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Appendix B Photographs

Site/Project:
Darwen Markets

Project reference:
CS/092513

CAPITA

Real Estate and Infrastructure
The Observatory, Chapel Walks, Manchester, M2 1HL
Tel 0161 819 4200

www.capita.co.uk/property

Client:
Blackburn with Darwen Council

Date taken:
23/05/17

Plate 1.
View to the north west
of the main market
building.



Plate 2.
Link between main
market building and
hexagonal covered
market.



Site/Project:
Darwen Markets

Project reference:
CS/092513

CAPITA

Real Estate and Infrastructure
The Observatory, Chapel Walks, Manchester, M2 1HL
Tel 0161 819 4200

www.capita.co.uk/property

Client:
Blackburn with Darwen Council

Date taken:
23/05/17

Plate 3.



Plate 4.

View to the east of land adjacent to Church St/Railway Rd.



Site/Project:
Darwen Markets

Project reference:
CS/092513

CAPITA

Real Estate and Infrastructure
The Observatory, Chapel Walks, Manchester, M2 1HL
Tel 0161 819 4200

www.capita.co.uk/property

Client:
Blackburn with Darwen Council

Date taken:
23/05/17

Plate 5.
Car Parking off Railway
Road.



Plate 6.




Site/Project: Darwen Markets	Project reference: CS/092513	 Real Estate and Infrastructure The Observatory, Chapel Walks, Manchester, M2 1HL Tel 0161 819 4200 www.capita.co.uk/property
Client: Blackburn with Darwen Council	Date taken: 23/05/17	

Plate 7.
View to the northwest of service road off Railway Road.



Plate 8.
Roof top car park.



Site/Project: Darwen Markets	Project reference: CS/092513	<h1 style="margin: 0;">CAPITA</h1> <p style="margin: 0;">Real Estate and Infrastructure The Observatory, Chapel Walks, Manchester, M2 1HL Tel 0161 819 4200 www.capita.co.uk/property</p>
Client: Blackburn with Darwen Council	Date taken: 23/05/17	

Plate 9.
View to the southwest of School Street.



Plate 10.
School Street and commercial properties beyond.



Site/Project: Darwen Markets	Project reference: CS/092513	<h1 style="margin: 0;">CAPITA</h1> <p style="margin: 0;">Real Estate and Infrastructure The Observatory, Chapel Walks, Manchester, M2 1HL Tel 0161 819 4200 www.capita.co.uk/property</p>
Client: Blackburn with Darwen Council	Date taken: 23/05/17	

Plate 11.
 Basal car parking level
 off School Street.



Plate 12.
 View to the northeast of
 multistorey car parking
 off School Street.



Site/Project: Darwen Markets	Project reference: CS/092513	CAPITA Real Estate and Infrastructure The Observatory, Chapel Walks, Manchester, M2 1HL Tel 0161 819 4200 www.capita.co.uk/property
Client: Blackburn with Darwen Council	Date taken: 23/05/17	

Plate 13.
Interior of the main
market building.



Appendix C Groundsure Report



Groundsure

LOCATION INTELLIGENCE

Capita Property and Infrastructure
ACCOUNTS PAYABLE, PO Box 202,
DARLINGTON, DL1 9HB

Groundsure Reference: GS-3893090

Your Reference: 4800227826

Report Date 18 May 2017

Report Delivery Method: Email - pdf

Address: DARWEN MARKETS, DARWEN, BB3 1BG

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the requested. as

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

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Aerial Photograph Capture date: 26-Mar-2012
 Grid Reference: 369304,422263
 Site Size: 0.68ha

Report Reference: GS-3893090
 Client Reference: 4800227826