Flood Risk Assessment and Drainage Strategy Report

at

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for

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Executive Summary

The proposal is for the construction of a new training facility with external hard standing areas on a former car park in now derelict land adjacent the current Electricity North West facility at Whitebirk, Blackburn. The site is bounded by other existing industrial & office buildings, a police station and railways lines.

The development holds a Flood Zone 2 classification, i.e. land assessed as having a less than a 1 in 100 (>1%) and more than a 1 in 1000 (<0.1%) annual probability of river flooding in any year. The flooding is from the Knuzden Brook some 100m to the south of the development site.

The development target has been assessed against the National Planning Policy Framework ‘Sequential Test’. Taking into consideration that the application is for a private training facility in flood zone 2, tables 1, 2 & 3 have been appraised to confirm that development is appropriate.

The minimum finished floor level has been set at 600mm above the 1 in 100 year event at 126.03m AOD. This is still some 140mm above the enhanced 1 in 1000 year event.

The surface water collected from these buildings will continue to drain into a private on site drainage system that discharges to the nearby local watercourse, a tributary of Knuzden Brook. As part of the development, the overall impermeable areas will reduce and so the peak rate of runoff will also reduce such that the development will not increase from the pre-development scenario. Sustainable Drainage Systems (SUDS) to retain and reduce the peak surface water runoff rate to the downstream watercourse is to be considered in the form of rainwater harvesting but is not essential to satisfy this strategy.

There is no residual flood risk from the development site to the surrounding district due to the reduction in peak storm water flow rates to the watercourse. The development does not therefore increase the risk of flooding to other adjacent neighbourhoods. Drainage design will be in accordance with British Standard guidance with no flooding up to the 30 year storm event. Out of chamber or gully flooding for the extreme 100 year plus climate change event may occur and is classed as exceedance flows. Any exceedance flood water will be contained within the development site and directed away from the buildings to the external hard paved and soft landscaped areas. Appropriately sized petrol separators will be included on the outlet from external areas to prevent pollution risk.
Foul water generated by the development will be discharged by gravity to the existing private foul drainage network within the adjoining ENWL facility site, which ultimately connects to the public sewer.

During the extreme flood events a safe dry access route is assured through the adjoining ENWL facility. Safe access for the Emergency Services and egress for the occupiers is assured for higher order storm events up to and including the 100-year event due to the increased ground levels to the east side of the site.
1.0 Introduction

Thomasons has been appointed by Electricity North West Limited (ENWL) to prepare this Flood Risk Assessment (FRA) and Drainage Strategy Report to support a planning application for the proposed construction of a new Training Centre at Whitebirk Industrial Estate, Blackburn. The assessment has been undertaken in line with the new National Planning Policy Framework (NPPF) Flood Risk Guidance Document 2012.

This Report has been commissioned by ENWL and is specific to their interests in the Training Centre redevelopment as described by the Architectural plan enclosed in Appendix A. This report may not be assigned.

The report has been commissioned to identify likely flooding issues associated with the proposed development, any likely constraints that could be imposed and to advise on the technical feasibility of proving drainage for the development proposals. Post planning and as the detailed design progresses, the information and details within this report may have to be refined, modified and updated to suit requirements and obligations of the Local Planning Authority, Environment Agency, United Utilities and other statutory authorities. The Flood Risk Assessment and Drainage Strategy Report will include the following scope of works:

- Identify available data relating to flood risk at the site.
- Determine whether the site is at risk from flooding, including from breach or overtopping of any existing flood defences, surface water flooding and/or ground water flooding.
- Identify available data relating to drainage at the existing site, including historical discharges.
- Discuss Sustainable Drainage Systems (SUDS) as an option for reducing surface water flood risk.
- Determine any potential increase in surface water runoff as a result of the proposed development.
- Devise an appropriate outline foul and surface water drainage strategy to deal with any increase in surface water runoff and include for climate change. This will also include hydraulics calculations where appropriate.
- Prepare the Flood Risk Assessment and Foul & Surface Water Drainage Strategy report.
- Assess mitigation measures & off site impacts and define any residual risks.
2.0 **Development Description and Location**

2.1 **Existing Site Description**

The Electricity North West Limited (ENWL) Training Centre site (Red Line boundary) is situated within the Whitebirk Business Park and encompasses an existing ‘brownfield’ site made up of flexible hardstanding and earth mounding. The total ‘Red Line’ area is some 2.12 Hectares.

Whitebirk Business Park is located some 2km to the west of Blackburn Town Centre. Access to the site is from the A6119 Whitebirk Drive, which leads south east and joins with the M65 motorway some 500m to the south east of the site. The industrial estate is made up of various commercial and industrial developments, car showrooms, garden centres and the Lancashire Constabulary Eastern Division Headquarters. A local railway line runs east to west alongside the northern boundary. The southern boundary includes a tributary of the Knuzden Brook to which it merges with some 100m south of the site.

The site has been topographically surveyed and indicates generally a flat elevation with a nominal gradient to the south at 125.6m AOD.

The site can be located at approximate National Grid Reference 370190, 429145.

Figure 1 below identifies the overall site location details. Further details of the layout can be seen on the Red Line Plans in Appendix A.
2.2 Development Proposals

The proposed development encompasses the construction of a new training facility for ENWL with a new two storey training centre and associated car parking & hard paved areas. To the rear there will a large external training area located on compacted gravel.

Access to the facility will be off Dyneley Road to the south west of the site. The proposed site layout plan is included within Appendix A.

The proposed finished floor level of the development buildings are likely to be in the order of 126.03m AOD.

The generally accepted development design life for a development such as the proposed distribution facility for the assessment of flood risk is 50 years. This assessment therefore considers flood risk over the period 2012 to 2062.

2.3 Planning Policy Requirement

The flood maps provided by the Environment Agency locate the site within Flood Zone 2, i.e. land as having an annual probability of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%) in any year. As a requirement of the new National Planning Policy Framework, the proposed development has to satisfy the requirements of the Sequential Test and where applicable the Exception Test.

Sequential Test:

Under the NPPF, Flood Zone 2 is defined as medium probability flood risk. The proposed development is for a training centre, which in line with Table 2 is classified as ‘Less Vulnerable’.

Placing both these criteria into Table 3 (Flood Risk Vulnerability and Flood Zone ‘Compatibility’), Less Vulnerable development in Flood Zone 2 determines that ‘Development is Appropriate’. Therefore the Exception Test is not required.

It must be noted however that issues relating to offsite impacts need to be satisfied.
3.0 Definition of Flood Hazard

3.1 Sources of information

The NPPF requires the developer to consider the impact of runoff generated by the proposed development onto the downstream catchment, and to assess the risk of runoff from the surrounding district impacting on the developments footprint. Further, the report is to consider flood risk from all other sources. This section defines the flood risk receptors and anticipated flood risk. Section 4 then discusses in further the probability of flooding from defined sources and the likely impacts.

3.2 Flooding from Sea (Tidal)

The development site is outside the risk of tidal flooding due to its inland location and high ground levels.

3.3 Flooding from Rivers and Watercourses (Fluvial)

At its closest point to the red line boundary, Knuinden Brook is located some 100m to the south of the site flowing generally in a west to south-westerly direction. This is classed by the Environment Agency as ‘Main River’. According to the Environment Agency flood maps there is also a small unnamed tributary watercourse flowing in a westerly direction along the southern boundary of the site and then flowing south and outfalling into Knuinden Brook. A review of the historic drainage plans would indicate this to be an historic watercourse emanating from the higher ground to the east.

The historic maps of the site would also indicate a smaller culverted watercourse flowing north to south through the centre of the site and outfalling into the larger tributary of Knuinden Brook. However no indication of this has been located on the site following detailed drainage investigations and a review of the topographical survey.

Environment Agency Flood Zones

Figure 2 below locates the site on the Environment Agency’s indicative flood plain map. It is clear from this that the red line boundary could lie within the current statistical fluvial floodwater model footprint generated by Knuinden Brook. The site lies within ‘Flood Zone 2 Classification’ in accordance with the NPPF Guidance. i.e. probability of annual fluvial
flooding of less than 1 in 100 (>1%) but more than 1 in 1000 in any one year (<0.1%). The risk from fluvial flood water is therefore requires further consideration.

Figure 2 – The Environment Agency’s Indicative 100-year Flood Plain Map

3.4 Sewers and Private Drainage

The United Utilities (UU) sewer records have not been reviewed as part of this assessment. It is believed that there are no public sewers located within the perimeter of the development site. Further investigation is required to confirm this is the case.

Reviewing the historic drainage plans for the ENWL estate, it is noted that there are a number of surface water drains within the site all flowing in a southerly direction and assumed to outfall into the adjacent watercourse. There are also a number of other surface water drains passing through the eastern part of the site from the adjoining ENWL site and again outfalling into the southern watercourse.

The nearest foul water drainage is within the ENWL site.
The live drainage passing through the site is small diameter pipes and serves the adjoining plot only. It is not considered therefore that the drainage networks will be a flood risk generator to the development site.

3.5 Groundwater

Intrusive site investigations have recently been carried out at the site. Several boreholes were sunk in the area of the development and they indicated that the ground water levels are around 3-4m below ground level. Therefore, it is not anticipated that ground water is a flood risk to the development site.

3.6 Surface Flooding (Overland Flow)

The general fall of the area is north to south towards the watercourses. The east site is owned by ENWL and is known to include a full drainage network. It is therefore considered that overland flood flow risk from pluvial runoff, sewers and culverts is minimal.

The Strategic Flood Risk Assessment (SFRA) does not identify the site as being at risk from surface water flooding nor is there any record of any historical flooding.

3.7 Artificial Sources

The nearest artificial water feature is the Leeds and Liverpool Canal, located at its closest point some 350m to the south of the development site. Due to this distance it would not be a flood risk generator to the site.

3.8 Summary

Table 3.8 below summarises the flood risk from various sources and indicates the ones that require further consideration.
Table 3.8 – Flood Risk Summary

<table>
<thead>
<tr>
<th>Source</th>
<th>Flood Risk</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>Tidal</td>
<td>Low</td>
<td>No Risk</td>
</tr>
<tr>
<td>River &amp; Watercourse</td>
<td>Medium</td>
<td>Development site in Flood Zone 2 (Medium risk) form fluvial flood impact as identified on flood maps and requires further investigation.</td>
</tr>
<tr>
<td>Surface (Overland Flood Flow)</td>
<td>Low</td>
<td>Relatively flat with no major natural overland falls towards the site.</td>
</tr>
<tr>
<td>Sewers and On Site Drainage</td>
<td>Low</td>
<td>Flooding from any private drainage runs passing through the site is speculated to be localised to the covers and so the risk is low. New drainage will be designed in line with current guidance to prevent flooding.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Low</td>
<td>Information provided indicates ground water levels some 3-4m below ground level.</td>
</tr>
<tr>
<td>Artificial Sources</td>
<td>Low</td>
<td>The one artificial source is not considered to be a flood risk to the development site.</td>
</tr>
</tbody>
</table>

4.0 Assessment of Flood Risk on Development Site (Probability)

It is a requirement of the new NPPF that site specific Flood Risk Assessments be undertaken for all sites, including those in Flood Risk Zone 2 with an area greater than one hectare, to ensure that downstream flood risk is not exacerbated by runoff from the developed site.

4.1 Strategic Flood Risk Assessment (SFRA)

SFRA’s assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB’s) or local planning authorities should prepare SFRA’s in consultation with the Environment Agency.

Blackburn and Darwen Borough Council produced in 2008 the Level 1 Strategic Flood Risk Assessment (SFRA) for the area in accordance with PPS 25 criteria (Planning Policy Statement 25: Development and Flood Risk). The purpose of the SFRA is to assess and
map all known sources of flood risk including fluvial, surface water, sewer, groundwater and all impounded water bodies, taking into account future climate change predictions.

A summary of the main elements from the SFRA associated with the development sites are detailed below. The full report can be obtained from the Blackburn and Darwen Council website (www.blackburn.gov.uk). No specific flood risk drawings were prepared with the SFRA. It is not known at this time when the Level 2 SFRA will be completed.

4.2 Assessment of Flood Risk on Proposed Development

As discussed in previous sections, the Environment Agency has indicated that the development site would lie within the current statistical fluvial floodwater model footprint generated from the Knuzden Brook 1000-year fluvial flood event (0.1% probability of occurrence).

The Environment Agency have been consulted and have provided the flood data from the Knuzden Brook Strategic Flood Risk Mapping Study (2008). Full details of the study can be found in Appendix C and summarised below.

**Table 4.2 – Peak Flood Levels**

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Peak Flood Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q100</td>
<td>125.43m AOD</td>
</tr>
<tr>
<td>Q1000</td>
<td>125.89m AOD</td>
</tr>
</tbody>
</table>

It is suggested that the developer’s topographic model is more detailed than the base survey adopted by the Environment Agency; consequently the pre development flood plain perimeter is redefined based on the flood levels in Table 4.2 above. The developer submits drawing 6307-FRA-001 (located in Appendix B) as a replacement for the Environment Agency’s Indicative 100 year Flood Plain Map, the latter reproduced as Figure 2 in section 3.3, for the development footprint. It is clearly evident that although the Q1000 year return period event does extend into the site it is not as extensive as the Environment Agency flood maps suggest.

The finished floor level for proposed development building is therefore set at a minimum of 126.03m AOD to provide a 600mm freeboard over the Q100 year return period event. It is clearly evident from reviewing the downstream flood data that the long length of culvert
under Blakewater Road is the causing the Q1000 to rise. This minimum FFL also provides at least 140mm of freeboard over the enhanced flood event, which is still in line with current Environment Agency guidance.

Other flood risk sources such as groundwater and overland flows have been considered and have been found not to be a flood risk generator to the site.

5.0 **Climate Change**

Runoff generated by the new development will be directed to new and existing private and drainage networks. Calculations within this report and all future detailed design for the new drainage layout will include an allowance for climate change increases on rainfall estimates as directed by NPPF.

6.0 **Outline Drainage Strategy**

6.1 **Existing Drainage**

**Public Sewers**

As discussed earlier in the report it is speculated that there are no public sewers in close vicinity of the development site.

**Private Drainage**

As discussed in section 3.4, the current site was previously developed and there still exists a drainage channel through the old tarmac car park with connection to a 450mm diameter surface water drain that ultimately outfalls to the adjacent watercourse. There are also a number of surface water drains passing through the site from the adjoin ENWL facility.

The existing development site was predominately impermeable with the surface water runoff directed a single network to the adjacent watercourse. Drainage layout plan 6307-FRA-002 in Appendix B indicates the approximate layout of the existing surface water drainage with the impermeable area allocated to it.
6.2 **Correspondence with Statutory Authorities**

The statutory authorities have not been consulted at this time with regard to the proposed drainage strategy. The site is ‘brownfield’ and fully impermeable with direct connection to the adjacent watercourse and there is no link with the public sewers.

6.3 **Existing Runoff**

The existing site is currently fully developed and impermeable and therefore in terms of runoff characteristics is considered to be ‘brownfield’.

Table 6.3 below indicates the maximum flows possible from the existing development based on the indicated pipe size and speculated pipe gradient at full bore capacity.

**Table 6.3 – Existing Peak Surface Water Flow Rates**

<table>
<thead>
<tr>
<th>Impermeable Area</th>
<th>Pipe Size &amp; Gradient</th>
<th>Peak Flow Rate @ 75mm/hr (typical of 30yr event)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5600m²</td>
<td>450mm dia @ say 1:200</td>
<td>117l/s</td>
</tr>
</tbody>
</table>

6.4 **Surface Water Drainage Strategy**

The NPPF and Building Regulations states that “Surface water arising from a developed site should as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

The surface water drainage strategy for the development is to discharge via gravity and unrestricted into the existing drainage infrastructure with outfall to the adjoining watercourse, to mimic the pre development scenario. The impermeable area with direct connection to the drainage is calculated at 5000m². This is 600m² (11%) less than the predevelopment impermeable area and so provides a net benefit to the surrounding district.

Surface water runoff from the roof areas will be directed to the below ground gravity network via a gravity drainage system. This water is considered to be clean and without contamination, and may be discharged directly to the drainage infrastructure and ultimately the local watercourse without treatment.
External hardstanding areas will be directed via gullies and channel drains to the underground network where subject to confirmation from the Environment Agency and the local Building Control it may then pass through appropriately sized and specified petrol separator in line with PPG 3 guidance (Pollution Prevention Guideline 3).

Sustainable Drainage Systems will be considered in terms of rainwater harvesting for the new development but are not essential to satisfy this strategy.

The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance, i.e. up to the 30 year storm return period criterion. Flooding could occur on a local scale beyond this criterion due to runoff exceeding the capacity of the minor system during extreme events and it can only be addressed on a site specific basis. Building Regulations states that properties should be protected against flooding from extreme events (1 in 30 year) and that flood pathways are identified when the drainage system is exceeded.

In the case of this development, exceedance flows will be all those over and above the 30 year design criterion set by Building Regulations guidance. Using storage within the external hardstanding and soft landscaping areas would be achievable and would direct flood water away from the new properties with flows directed back into the surface water drainage network as the water levels in the drainage network recedes.

Any future drainage calculations carried out as part of a site wide drainage strategy or for the development layouts themselves must include the appropriate increase in rainfall to satisfy the future climate change allowances.

6.5 Foul Water Drainage Strategy

Foul flows generated by the new development will be directed to the existing foul water drainage network within the adjoining ENWL facility where it then connects to the public sewer to the east.

All foul flows generated by the new development are considered to be domestic only with no trade effluent and are considered to be minor. Initial calculations at this time estimate the peak flows from the fully developed site to be in the order of 4 l/s.
It is not anticipated that any new drainage will be put up for adoption by the local sewage authority, in this case United Utilities. The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance.

7.0 Management Measures, Off Site Impacts and Residual Risk

7.1 Flood Risk Management Measures

The surface water drainage strategy for the new development site indicates the peak flows rates will reduce from the pre-development scenario due to the reduction in impermeable areas. The new private surface water networks will be designed in line with current British Standard guidance up to the 100 year storm return period including an allowance for climate change. Beyond the 30 year criterion, out of chamber flooding may occur with flood water directed away from the buildings to low lying areas.

The use of SUDS such as prevention measures (rainwater harvesting) will be considered and will help to reduce the runoff to the downstream catchment.

There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the onsite drains and drainage facilities such as the channels, gullies, pipes, manholes and all SUDS facilities.

The respective site users will be responsible for site cleanliness, gully emptying and drain cleansing to ensure that the surface water drainage system will always operate at its maximum efficiency.

Should any flooding occur from the new sewers and drains it will be directed away from the new developments to the external highways, play areas and soft landscaping areas.

The proposed FFL’s for all the development buildings are sited 600mm above the 100 year return period event of the adjacent Knuzden Brook.

The adjoining ENWL facility has higher ground levels the surrounding district and therefore access and egress arrangements to and from the new development, should exceedance flooding occur, will be through this site to the east.
Flooding from sources is deemed low and thus no further consideration of the risk is required.

7.2 Off Site Impacts

The development is on the periphery of the 1000-year level for the adjacent watercourse. Floodwater displacement will not therefore occur up to and including the 100-year plus climate change event.

The redevelopment of the site does not impair the hydraulic continuity of any watercourse and the current 'local hydraulics' of distributing watercourses / outfalls.

The development footprint does not cross or cover any existing or declared future catchment flood defences. Consequently, the applicant does not propose to augment or compromise the current catchment defences.

Surface water runoff will reduce slightly from the pre-development regime and utilises SUDS solutions where possible to assist in satisfying the site constraints.

By mimicking the pre-development peak runoff at its point of discharge into the adjacent watercourse by the reduction in impermeable areas and possible inclusion of SUDS, this will reduce surface water flooding impact onto the downstream catchments.

As there is no flood displacement or increased rate of runoff as part of this proposal into the adjacent sewers, the proposed development will therefore not increase flood risk onto its locality.

7.3 Residual Risk

With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

Flood risk to people and property can be managed but it can never be completely removed; a residual risk remains after flood management or mitigation measures have been put in place. The only known flood related risk that will remain will be the risk of out of manhole flooding on the private surface water drainage network within the site beyond the 30 year
design criterion. Should exceedance occur, out of chamber flood water will be directed to the external hardstanding areas and roads but will not be a flood risk generator.

The owner will be responsible for all future maintenance of the onsite drainage infrastructure.

There will be no residual risks to any of the neighbouring properties by any uncontrolled flood flows escaping from the proposed redevelopment.

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Associate for Thomasons

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Appendix A – Architect’s Site Plan

Proposed Site Plan: 12860-005
Appendix B – Thomasons Drainage Layout Proposals

6307-FRA-001: Existing Flood Extent
6307-FRA-002: Existing Drainage & Impermeable Area Plan
6307-FRA-003: Drainage Strategy & Impermeable Areas
Appendix C – Environment Agency Flood Data
Flood Zone 3: Shows the area that could be affected by flooding from rivers or the sea, if there were no defences. This area could be flooded:
- from the sea by a flood that has a 0.5% (1 in 200) chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) chance of occurring each year.

Flood Zone 2: Shows the additional extent of an extreme flood from rivers or the sea, if there were no defences. These outlying areas are likely to be affected by a major flood, that has up to a 0.1% (1 in 1000) chance of occurring each year.

Historic Flooding: We have no records of flooding at this location.

Other Information: Level (mOD) and flow (M3/s) information at node points taken from Knuzden Brook Strategic Flood Risk Mapping Study (2008).

See attached table for level and flow measurements at node points.
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Table 01

Data from Knuzden Brook Strategic Flood Risk Mapping Study (2008)