



Lovelock Mitchell Architects

Proposed Development at Ipsen Biopharm, Wrexham Industrial Estate, Wrexham

**Flood Consequence Assessment &
Outline Surface Water Drainage
Strategy**

October 2017



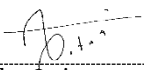
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October 2017

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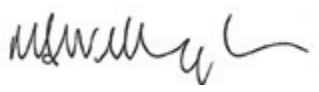
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1 Introduction

1.1 Appointment

OPUS International Consultants (UK) Ltd (Opus) were appointed by Lovelock Mitchell Architects (LMA) to undertake a Flood Consequence Assessment (FCA) and an outline surface water drainage strategy (DS) for the proposed building extension at Ipsen Biopharm, Wrexham Industrial Estate, Wrexham.

The outline surface water drainage strategy is intended to review the options for surface water drainage in support of a planning application for the proposed development.

1.2 Policy Context

This FCA & DS has been prepared in accordance with the relevant national, regional and local requirements and guidance of the following publications and organisations:

- Technical Advice Note (TAN) 15: Development and Flood Risk dated October 2004 issued by Welsh Government
- Wrexham County Borough Council
- Building Regulations 2010 (Part H3)
- Sewers for Adoption 7th Edition
- Planning Policy Wales (Edition 9, November 2016) issued by Welsh Government
- Wrexham County Borough Council, Local Flood Risk Management Strategy (LFRMS), April 2013.
- Welsh Ministers Standards for Foul Sewers and Lateral Drains
- The new Sustainable Drainage Systems (SuDs) Manual C753, CIRIA
- RainScape - Dwr Cymru Welsh Water
- SuDs Wales

1.3 Planning Policy Wales Vulnerability testing and Technical Advice Note 15

The general approach of the Planning Policy Wales (PPW), supported by the Technical Advice Note 15 (TAN15) is to follow a precautionary framework approach when determining the suitability of land for development in flood risk areas, with the intention of steering development away from areas of high risk of flooding to the lowest flood risk areas.

Where development has to be considered in high risk areas (zone C) only those developments which can be justified on the basis of the tests outlined in section 6 and section 7 of the TAN15 guidance are to be located within such areas.

Table 2 of TAN15 guidance confirms the 'Flood risk vulnerability classification' of a site, depending on the proposed usage. This classification is subsequently applied to Development Advice Map (DAM) containing three zones (A, B and C with subdivision into C1 and C2) to determine whether:

- The proposed development is suitable for the zone in which it is located
- The appropriate planning tests that need to be demonstrated in relation to the proposed development.

1.4 Limitations

The findings and opinions conveyed via this report are based on information obtained from a variety of sources, as detailed, which OPUS believes are reliable. Nevertheless, OPUS cannot and does not guarantee the authenticity or reliability of the information it has relied upon from these sources.

This report has been written on behalf of the Client and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of OPUS. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill. OPUS disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above contract.

This report has been prepared by OPUS with all reasonable skill and care within the terms of the Contract with the Client, and taking into account of the information made available by the Client, as the manpower and resources devoted to it by agreement with the Client.

The findings of this drainage strategy have been based on data available at the time of the study and on the review of available information that has been undertaken to date. They relate to the current development proposals as outlined in Section 2.3. OPUS do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

2 Existing Site and Development Proposals

2.1 Site Location

The proposed development is located within the existing Ipsen Biopharm site, which is located on the Wrexham Industrial Estate, Wrexham. The site is centred at NGR 337504m, 350354m the site location plan is bounded in red on Figure 1.0 below.

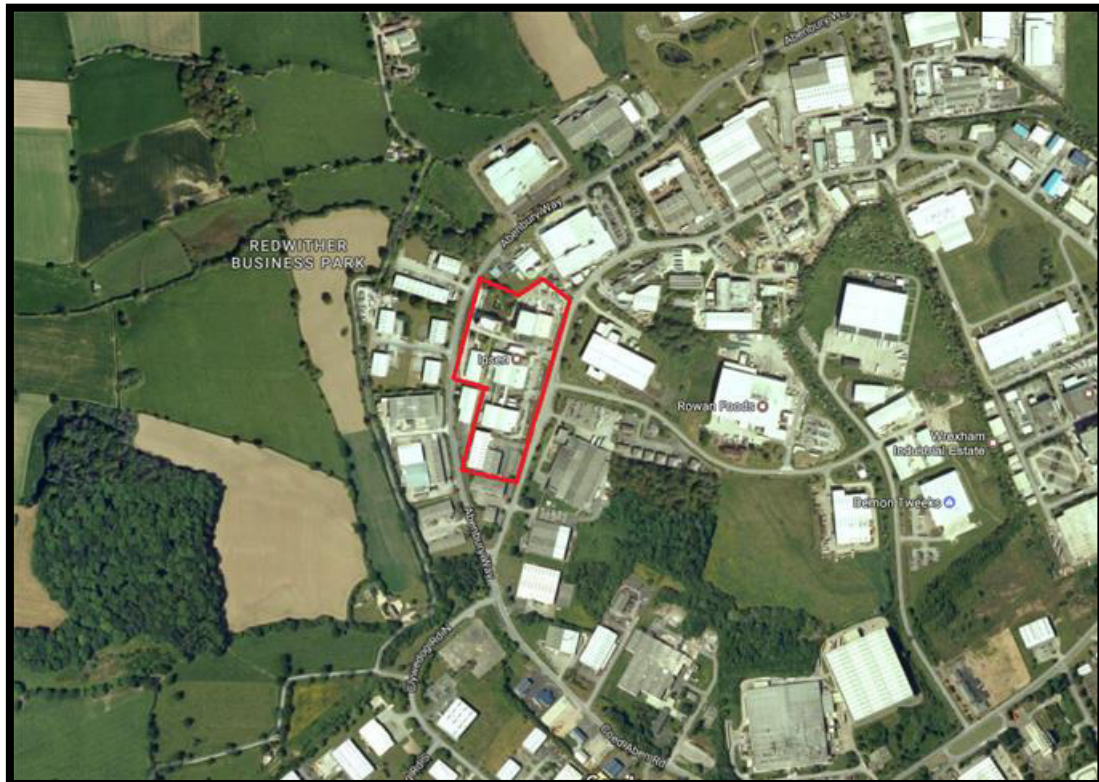


Figure 1.0: Site Location
(Image Source: Google Earth Imagery)

2.2 Site Description

The total site area covers and approximate area of 3.9ha which is currently well developed with numerous buildings, hardstanding and parking areas. The site is bounded to the west by Abenbury Way and to the east by Ash Road North which also serves as the sites primary access. Existing industrial buildings are situated to the north and south. A small watercourse runs in an easterly direction towards the site, from which point it is culverted below the site and beyond.

A topographic survey was commissioned for this project and undertaken in September 2017 by PM Surveys UK, with the data provided in Appendix A. The topographical survey shows that current site levels vary between 39mAOD and 37mAOD, and the site slopes from west to east towards Ash Road North.

2.3 Proposed Development

It is proposed to demolish the existing Unit 55 building and replace with a new building along with providing alterations to existing hardstanding and car park area. The proposed works will encompass an area of approximately 0.18ha (see proposed development plan in Appendix B).

2.4 Geology and Hydrogeology

Site investigations undertaken by Groundsolve Ltd show the ground conditions in the vicinity of unit 55 and Unit 9 to be comprised of approx. 0.4m to 1.5m of made ground underlain by glacial till.

The made ground generally comprised of hardcore fill and the glacial till was described as being soft, quickly becoming very stiff, brown, locally mottled grey clay, with frequent silt laminations.

Groundwater was recorded to be at a depth of 2.85m.

A copy of the borehole logs are provided within Appendix C for reference.

2.5 Hydrology

The NRW flood maps show an unnamed watercourse running in an easterly direction towards the western boundary of the site, from which it point it is culverted across the site. This watercourse is one of the tributaries of the Redwither Brook.

The catchment size is 0.45 km² (45.6ha), as shown in the Figure 1 below:

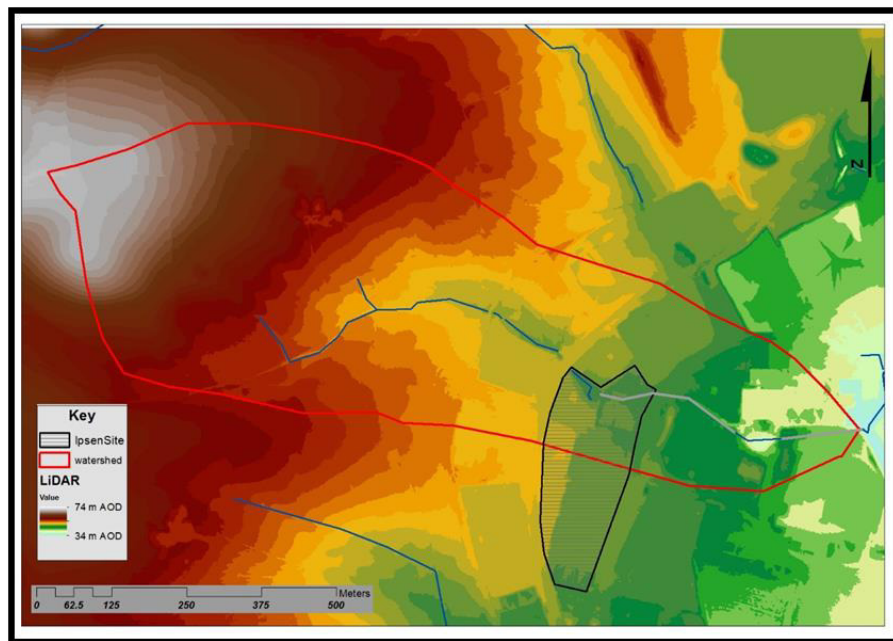


Figure 1 Catchment Plan. Source: Lle Geoportal for Wales

The full Hydrology and Hydraulic modelling report is included in Appendix D.

2.6 Existing Drainage

The site is currently well developed and is well served by existing foul and surface water drainage system.

The site is currently crossed by a small unnamed watercourse which runs from West-Northwest to East and through a small greenfield area and a pond. Flow levels at this pond are controlled by a weir, followed by a culvert entrance headwall and inlet grating arrangement. The watercourse is culverted under the parking area and crosses Ash Road N.

Surface water drainage in the vicinity of the existing Unit 55 Building being redeveloped drains to existing surface water drains on site which then outfall to the existing culverted watercourse crossing the site to the north of the building.

Details of the existing drainage on site is shown on the existing topographic survey information contained with Appendix A.

3 Assessment of Flood Risk

3.1 Natural Drainage

3.1.1 Fluvial Flooding Risk

A review of the information available on the online NRW fluvial Flood Risk Maps has been undertaken and it is noted that the site is located on land identified as Flood Zone A. In accordance with the TAN15, Flood Zone A is defined as little to no risk of fluvial or tidal/ coastal flooding. The Figure 2.0 below shows the NRW flood zone map.

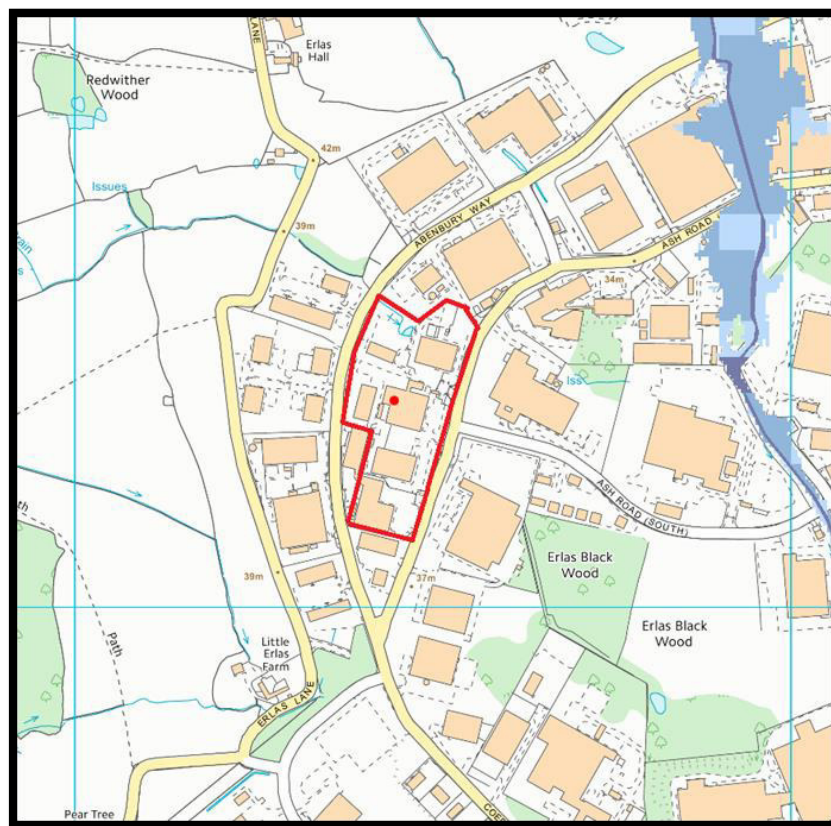


Figure 2.0: NRW Fluvial Flood Risk Map
(Source <http://data.wales.gov.uk/apps/floodmapping/>)

Initial consultations have been undertaken with NRW in July 2017, to enquire about flooding information for this site. (See Appendix E (Ref: CAS-35192-K9H0)). NRW advised the following;

- *The site lies entirely in Zone A as defined by Welsh Government's Development Advice Map (DAM) referred to under TAN15 Development and Flood Risk*
- *Although NRW have no exact records, there is likely to be an unnamed watercourse which runs in culvert beneath the site*
- *The potential flood risks associated with this watercourse have not been assessed as part of the NRW Flood Map exercise (See figure 2.0 above), as such NRW would advise that the potential flood risks are unknown and unquantified*

- *In this instance, the existing flood map information (flooding from rivers and the sea) may not be accurately representing flood risk at the site.*

NRW advised that the flood consequence assessment for the site should include the following;

- Further details of the condition and size of the exiting watercourse culvert that crosses the site
- Hydraulic modelling of the relevant watercourses to establish the current level of flood risk in this area, including how the site, and the development, could be affected by flooding should there be a blockage at the culvert inlet or within the culvert structure itself.
- demonstration that the development will not affect the integrity of the culvert and any mitigation measures that may be required to ensure that the development is adequately protected from potential flood risks associated with this watercourse

Sections 3.1.1.1 to 3.1.1.3 below summarise of the existing watercourse condition assessment, Hydraulic modelling with blockage analysis undertaken and an assessment of the proposed mitigation measures to allow a build over of the existing culvert.

3.1.1.1 Existing Watercourse Condition Assessment

A CCTV condition survey has been undertaken by Metro Rod, to assess the condition of the existing culvert running through the Ipsen Biopharm site. This survey was undertaken to assist with the hydraulic modelling and identify any mitigation measures required (include survey in Appendix F).

The survey indicated that the culvert starts at the outlet of the surface water pond near the site's north western Boundary. The first section of culvert Manhole C3 to C2 is a 32m long 750mm diameter concrete pipe. Downstream of Manhole C2 the culvert changes diameter to 900mm diameter concrete pipe. The final manhole C1 is situated on the North East site boundary with Ash Road (North).

Condition of Existing Culvert

Pond inlet to Manhole C2

The condition survey indicated that the 750mm diameter culvert between manholes C3 and C2 is generally in good, clean and serviceable condition. The survey highlighted areas of concrete spalling has occurred exposing the reinforcement bars. This is believed not to have a detrimental effect on the culvert. There is some minor encrustation / debris deposits at a single pipe joint. There is only a minor restriction to the flow and therefore no works are required, (refer to the Metro Rod Wincan report – page 4, in Appendix F).

Manhole C2 to C1

The culvert leaves the manhole C2 as a 750mm diameter culvert. Located approximately 1.5m downstream of manhole C2, the culvert size increases to a 900mm diameter. The survey shows that the mortar / concrete makeup section has failed and is allowing ground water to enter the culvert (see Metro Rod Wincan report page 1- Appendix F). The next defect is located 3.10m downstream of the manhole chamber there is either an open joint or an incoming pipe connection which needs repairing. The remainder of the culvert is clean and serviceable with no repairs required.

Alignment

The proposed development consists of replacing the existing Unit 55, with a total area of 916m², with a new building of 1792m², this represents an extension of the footprint from 916m² to 1792m². Part of the new footprint extension is proposed to be located over approximately 15m of the existing culvert between the Manhole sections C2 and C1 (see Culvert Alignment –Appendix G).

3.1.1.2 Hydraulic Modelling

Opus have undertaken a hydraulic modelling assessment to the existing watercourse and culvert system, the Technical Modelling Report is included in Appendix D of this report. A summary of the findings is listed below:

- Water is predicted to pond upstream of the spill/culverts increasing the water level in the existing greenfield area (pond) only. The existing and proposed car parking and buildings on the site are not affected for the modelled events
- The footbridge is predicted to overspill at flow events greater than (1.0% AEP), although it is noted the excess flows will remain in the greenfield area and not affect other parts of the site.
- The culverts have sufficient capacity up to 0.1% AEP with water levels rising up to 20.3 cm at the pond area only, without affecting other parts of the site.

Blockage Scenarios

- The 30% and 60% blockage scenarios have demonstrated that the existing culvert has sufficient capacity to drain the 1.0% AEP flow without causing any fluvial flooding on the site.

On the basis of the results of the hydraulic modelling, the Flood Zone A classification of the site can be confirmed. The modelling results also indicate that the existing and proposed development on site will remain at little or no risk of fluvial flooding from the watercourse and the culvert system on site.

3.1.1.3 Proposed Mitigation Measures to Allow a Build over the Existing Culvert

The footprint of the new building will be sited over the alignment of the existing culvert, and there are mitigation measures proposed to enable this without affecting the flood risk, culvert structure or its accessibility.

Culvert repairs

Pond to Manhole C2

The 750mm diameter culvert between the pond and Manhole C2 requires no urgent repairs. It is recommended that the sections of exposed reinforcement bars are monitored to maintain a record, if the concrete spalling increases, a localised concrete repair could be undertaken.

Manhole C2 to C1

This culvert section requires the following repair to be undertaken in the medium term:

- At the pipe connection / open joints resulting in water ingress.

There are a few possible options that could be considered to repair this section of culvert:

We would recommend that, the length of culvert be lined for a short length between the manhole chamber and approximately 3m downstream. Pressure grouting may be required to infill the void at the change of culvert diameter to seal the culvert from ground water.

Foundation Design

The current architect's drawings included with this report (see Appendix B), shows the new unit 55 building crossing over the existing culvert alignment. Approximately 15m length of the existing culvert will be covered by the North West corner of the building. The manhole C2 is currently shown to be outside of the proposed building footprint.

The proposed building will have traditional spread pad foundations founded at a depth of 2.0m. Manhole C2 (closest to the building) has a depth to invert of 2.15m and the downstream manhole C1 has an invert level of 2.47m.

We would recommend that the proposed foundations are designed so that no additional lateral or vertical loadings are applied to the culvert, which would involve the following:

- Positions of pad foundations not to clash with the culvert.
- Increase the depth of the pad foundations adjacent to the culvert below its existing invert level, so no lateral loadings are imposed. This would increase the foundations depth to between 2.5 and 3.0m.
- Provide a concrete surrounded to culvert.

Future Access

The location of any additional buildings, containers, or pipework stored externally around the building should be considered so the access to the manhole chamber C2 is maintained to allow future access and maintenance or repairs.

The above mitigation measures will ensure that there is no future damage or increase in the risk to the existing culvert and at the same time access to repair, maintain and monitor the existing culvert is available at all times.

On the basis of the above the proposed development which includes a build over the existing culvert will not affect the hydraulic performance of the culvert or increase the flood risk to the site.

3.1.2 Surface Water Flooding

A review of the information available on the online NRW Flood Risk Maps has been undertaken and it is shown that the northern part of the site may be susceptible to surface water flooding (see Figure 3.0 below).

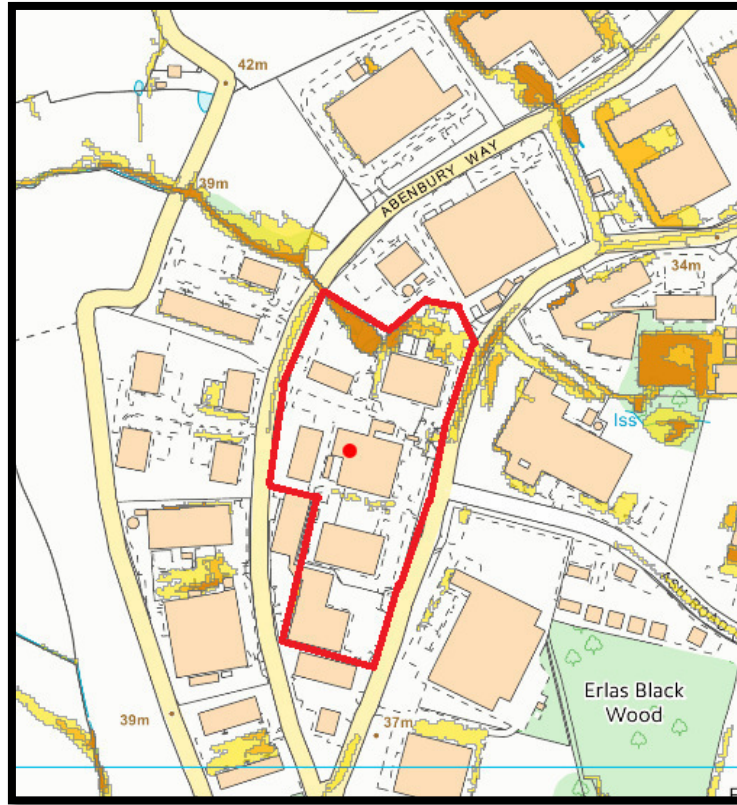


Figure 3.0: NRW Surface Water Flood Risk Map
(Source <http://data.wales.gov.uk/apps/floodmapping/>)

The surface water flood risk, in accordance with the NRW surface water flood risk map, is considered to be low in the vicinity of the proposed redevelopment work. Low risk is described as having a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%) year event.

Following a review of the topographic survey it has been noted that the overland flows depicted on the NRW surface water flood map follow the natural contours of the site and would run in an easterly direction across the site towards Ash Road North.

The existing building (Unit 55) is shown not to be affected by the possible surface water flooding and the footprint of the proposed replacement building would encroach minimally. The finished floor level (FFL) of the proposed building should not be lower than the existing building FFL and the external works should be designed to ensure gradients fall away from the building to ensure the low risk of surface water flooding in this area is maintained.

In addition, the existing surface water drainage system on site will ensure that the risk of surface water flooding is kept low.

3.1.3 Flooding from the Canals

The site is remote from any canals and on this basis the risk of flooding is negligible.

3.1.4 Flooding from the Sea

The site is located inland and not close to the sea or a river which is tidally influenced. On this basis, the risk of flooding from the sea or high tides to the proposed development is negligible.

3.1.5 Flooding from Reservoirs

The NRW online maps show that the site does not lie within the reservoir flood map and risk of flooding to the proposed development is negligible.

3.1.6 Flooding from Groundwater

The results of the site investigations undertaken by Groundsolve Ltd indicated that ground water was recorded at 2.85m bgl. On this basis the risk of groundwater flooding to the proposed development is low (see Appendix C)

3.2 Artificial Drainage

3.2.1 Adopted Drainage

A review of the Dwr Cymru Welsh Water (DCWW) sewer records has been undertaken. The sewer records show that within the vicinity of the site there is no adopted drainage systems and the nearest adopted public foul sewers are located within Ash Road North and Abenbury Way. On this basis the risk of flooding from adopted drainage to the proposed development is negligible.

3.2.2 Proposed Redevelopment

In accordance with Sewers for Adoption, the new surface water drainage system will need to be designed with sufficient capacity for a 1 in 30 year storm event and the site should be able to accommodate up to the 1 in 100 year + 30% climate change water level within the site without causing flooding elsewhere.

The surface water drainage system of the proposed development will ensure that the above design criteria are satisfied to ensure that there are no surface water flood risk to the proposed development.

The layout of the site should be arranged so that excess runoff can be temporarily retained externally on roadways, car parking and landscaped areas on the site, until it has the opportunity of entering the underground drainage system.

3.2.3 Highway Drainage

Highway drainage is situated within Abenbury Way and Ash Road North, however, due to the topography of the area should there be a blockage or failure of the highway drainage systems, any over land flows would be contained within the boundary of the highway and drain away from the site.

3.3 Flooding Elsewhere

Based on information reviewed from the NRW website and the findings of the hydraulic model, the site is at low risk of flooding and the site lies in Flood Zone A. It is therefore concluded that the proposed development will neither cause any loss of floodplain nor increase flood risk elsewhere.

3.4 Climate Change

In accordance with Section E, Appendix 1 of TAN15, an assessment should be undertaken on the effects of climate change will have on the long term sustainability of the development.

It is the joint aim of NRW and Local Planning Authorities, to actively encourage a reduction in the discharge of storm water as a condition of approval for new developments. In addition, all drainage systems should be sized to accommodate for the runoff arising from a 1 in 100 year rainfall event, and should include a further allowance to account for the future effects of climate change.

A 30% climate change allowance is required to be incorporated in the drainage design for the development.

4 Proposed Surface Water Drainage Strategy

4.1 Surface Water Drainage Guidance and Policy

The **Welsh Government Planning Policy Wales** guidance states the following “*flood risk is a material planning consideration*” and the **Technical Advice Note 15: Development and Flood Risk (TAN15, 2004)** also states that “*surface water is a material consideration and explains that development should not create additional runoff compared with the undeveloped situation and re-development schemes should also aim to reduce run-off where possible.*”

The aim of a surface water drainage strategy is to focus on the capture and management of surface water within the site boundary and ensure compliance with the requirements and guidance of the following publications and organisations:

- The LLFA of Wrexham County Borough Council.
- Building Regulations 2010 (Part H3)
- Sewers for Adoption 7th Edition
- Welsh Ministers Standards for Foul Sewers and Lateral Drains
- The new Sustainable Drainage Systems (SuDs) Manual C753, CIRIA
- Technical Advice Note 15 (TAN15, Welsh Government)
- RainScape - Dwr Cymru Welsh Water
- SuDs Wales

In accordance with the above, surface water drainage systems are required to consider quantity, quality, amenity and biodiversity whilst preventing any likelihood of flooding to the site or adjacent sites. Part H3 of the Building Regulations 2010 guidance recommends that surface water runoff shall discharge to one of the following, listed in order of priority:

1. an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
2. a watercourse, or where that is not reasonably practicable,
3. a sewer.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

4.2 Scheme Proposals

4.2.1 Ground Infiltration Techniques

A review of the following ground investigation report has been undertaken (See Appendix C for extracts)

The ground investigation report has indicated the underlying ground consists of a very stiff, locally mottled grey clay which would not be favourable for the use of infiltration drainage systems.

At this stage, the option of using soakaways for surface water drainage at the site has been discounted, however, it is recommended that further site investigations are undertaken at the site including soakaway testing in accordance with BRE365 requirements to prove that the use of infiltration drainage systems are unsuitable.

4.2.2 Discharge to Watercourse

On the assumption that the use of infiltration techniques would not be suitable and given that the existing site currently drains surface water run-off to the existing surface water drainage system which outfalls to the existing culverted watercourse crossing the site we would advocate this method of surface water disposal is utilised for the proposed re-development.

4.2.3 Design Criteria, Proposed Runoff Rate and Attenuation Storage

The site is currently a developed area and the existing Unit 55, with total area of 916m², will be replaced by a new building of 1792m². This represents an increase of 876m² (0.08ha) of roof area, but the area where the proposed development is located is currently hardstanding and car parking areas. Therefore there is no net increase in the rate of discharge to the existing surface water drainage system.

Any new and existing surface water drains utilised as part of the re-development works will need to be designed to ensure they have sufficient capacity for a 1 in 30 year storm event and the site should be able to accommodate up to the 1 in 100 year + 30% climate change water level within the site without causing flooding elsewhere.

Further discussions need to be undertaken with WCBC's LLFA to agree a discharge rate to surface water into the culverted watercourse before detail design stage. This will also inform any surface water alleviation requirements.

4.2.4 Water Quality

The new SuDS Manual (CIRIA C753, November 2015) introduced a slightly different approach compared to the previous version for the water quality management of surface water. The manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source).
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e. the pollutant pathway).
- The sensitivity of the receiving environment (the environmental receptor).

The proposed land uses requiring surface water drainage for this site are as follows:

- Roof areas - surface water discharge to roof sump gulleys before draining to the below ground attenuation system prior to discharge at culverted water course.

Table 26.2 of the SuDS Manual C753 assigns pollution hazard indices for different land use classification. The roof water has hazard levels ranging from very low to low, with low levels of contamination. The proposed sump gulleys and catchpit manholes are deemed to be sufficient to remove the suspended sediments from the roof surface water for a development of this size and nature.

4.2.5 Residual Risks and Exceedance Flows and Runoff in Excess of Design Criteria

The outline surface water drainage scheme for this re-development is proposed to comply with the requirements of Sewers for Adoption, i.e. no surcharge in the 1 in 1 year event and no flooding in the 1 in 30 year event.

It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible. It is practicable to minimise the risk by careful design of the layout of the development such that internal flooding is avoided. Areas of hardstanding can be laid to fall away from buildings with flows directed to areas where damage and disruption to buildings, assets and operations will be minimized.

The amenity and landscaped areas can also be used to accommodate residual flows beyond the design 1 in 100 year and climate change event, without causing flooding elsewhere.

4.2.6 General Maintenance Regimes

The surface water drainage proposals for this site should include the following regular maintenance measures, in accordance with the CIRIA C753 SuDs Manual:

- Cleaning of the sump of the roof sump gulleys to improve the quality of the water
- Cleaning of gulleys, catchpits and petrol interceptors within the car parking and hardstanding areas
- Inspection, cleaning and maintenance of the below ground attenuation systems to remove any silt and debris in accordance with the manufacturer's instructions. Inspection, cleaning and maintenance of any hydrobrake flow control system and its sump to maintain effective drainage
- Inspection, clearing and maintenance of the inlet gratings and pond.

The frequency of the inspections, cleaning and maintenance are to be managed by the site owner and their maintenance team in accordance with the SuDS manual C753 Part E Chapter 32 and the manufacturer's instructions.

5 Recommendations & Conclusions

5.1 Recommendations

Before the detailed design stage, it is recommended that soakaway testing is undertaken in accordance with BRE365 guidance to verify the on-site infiltration potential of the underlying ground.

In the event that infiltration systems are proven to be unsuitable for the disposal of surface water run-off, then a discharge to the existing on-site drainage system should be pursued at an attenuated discharge rate to be agreed with WCBC's LLFA.

Despite the fact that hydraulic modelling shows that the culvert has the capacity to convey flows for the 1% AEP blockage scenario, it is recommended that the length of culvert identified in the above report be lined for a short length between the manhole chamber C2 and approximately 3.0m downstream. Pressure grouting may be required to infill the void at the change of culvert diameter to seal the culvert from ground water, also regular cleaning works and debris removal to the pond area and the culvert sections is continually undertaken to ensure the optimal hydraulic performance.

The proposed development foundations are positioned to prevent clashes with the culvert and the line of proposed foundations are designed and constructed so no lateral or vertical loadings are imposed on the culvert.

5.2 Conclusions

Further to the hydraulic modelling, the proposed site was found to be at little to no risk of fluvial flood risk. This modelling has also confirmed the flood zone A classification of the site and this site is therefore suitable for the proposed development.

Due to the location of the site, the risk of flooding from canals, reservoirs and tidal waters is considered to be negligible.

A low risk of surface water flooding was identified to the north of the re-developed building and this should be mitigated by ensuring the FFL of the new building is not set lower than the existing and that the external works are designed to ensure they fall away from building. This can also be mitigated by ensuring that the existing surface water drainage system is working effectively at all times.

Further consultations with the WCBC must be undertaken, to agree a suitable discharge rate for surface water at detailed design and to ensure that sustainable way without impacting on flood risk on water quality elsewhere.

The surveys undertaken have identified possible improvement works to the existing culvert beneath the proposed building. The mitigation measures proposed in this report would ensure that the proposed build over arrangement will not impact on existing or future flood risk. The mitigation measures will also be required to allow access to the culvert at all times for inspection, repair and maintenance.

Appendix A – Topographic Survey



Site Grid North

Symbols/Abbreviations (Where Applicable):

- +AV: AIR VALVE
- +BB: BELISHA BEACON
- +BH: BOREHOLE
- +BM: BENCHMARK
- +BOL: BOLLARD
- +BUS: BUS STOP
- +CAM: CAMERA
- +CS: CABLE STAY
- +CATV: CATV INSPECTION CHAMBER
- +CBOX: ELECTRICITY BOX, CABLE BOX, ETC.
- +CCTV: C.C.T.V CAMERA
- +C.PIT: CATCH PIT
- +EC: ELECTRICITY COVER
- +EP: ELECTRICITY POLE
- +ER: EARTH ROD
- +FH: FIRE HYDRANT
- +FP: FLAG POLE
- +G: GULLY
- +G: GULLY (ROUND)
- +GV: GAS VALVE
- +IC: INSPECTION COVER (SQUARE)
- +IC: INSPECTION COVER (ROUND)
- +IL: INVERT LEVEL
- +KO: KERB OUTLET
- +L: LETTER BOX
- +LC: LIGHTING COLUMN
- +LP: LAMP POST
- +LP/BS: LAMP POST/BUS STOP
- +MH: MANHOLE (SQUARE)
- +MH: MANHOLE (ROUND)
- +MKR: MARKER
- +OP: POST
- +RE: RODDING EYE
- +RS: ROAD SIGN
- +S/P: SIGN POST
- +SNP: STREET NAME PLATE
- +ST: STOP TAP
- +SV: STOP VALVE
- +TCB: TELEPHONE CALL BOX
- +TL: TRAFFIC LIGHT
- +TP: TELEGRAPH POLE
- +TP/EP: TELEGRAPH POLE/ELECTRIC POLE
- +T/C: TELECOM INSPECTION COVER
- +WO: WATER OUTLET
- +WM: WATER METER
- +X: GATE
- +X: DEFINED POINT
- +X: CONTROL POINT
- +X: TREE (CONIFEROUS)
- +X: TREE (DECIDUOUS)
- +X: FOLIAGE
- +X: HEDGE
- +X: DPC 99.99m DAMP PROOF COURSE LEVEL
- +X: EL 99.99m EAVES LEVEL
- +X: FL 99.99m FLOOR LEVEL
- +X: RL 99.99m RIDGE LEVEL
- +X: SL 99.99m SOFFIT LEVEL
- +X: TL 99.99m THRESHOLD LEVEL

FENCE DESCRIPTIONS:

- B/W: BARBED WIRE FENCE
- C/B: CLOSE BOARDED FENCE
- C/L: CHAIN LINK FENCE
- C/P: CHESTNUT PALING FENCE
- CONC/P: CONCRETE PANEL FENCE
- I/R: IRON RAILING FENCE
- P/R: POST AND RAIL FENCE
- P/W: POST AND WIRE FENCE
- P/C: POST AND CHAIN FENCE
- S/PAL: STEEL PALISADE FENCE
- S/B: SAFETY BARRIER
- T/PAL: TIMBER PALISADE FENCE

Revision Information

Rev	Date	Description

INFORMATION

1) Ordnance Survey co-ordinates and level are derived from OSTN02 and OSGB02, transformed from WGS84.

2) Only services located during the site survey are shown on this plan. Further investigation may be required to ascertain the full extent of the site services.

3) Copyright of this drawing remains the property of PM Surveys UK Ltd. Do not scale from this drawing. In the event of any discrepancy, refer only to PM Surveys UK Ltd.

NOTES

Ordnance Survey Bench Mark Used

Location	Type	Value (m)
1		
2		

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Project

Ipsen Biopharm

Project No	Sheet	Surveyed By
PMS17120	A0	DJ AL

Scale	Drawn By
1:200	JW

Approved By
PM

Dwg	Issued
PMS17120-A	27/09/17

Appendix B – Proposed Development Plan

