



Ipsen NDP Wrexham

Flood Consequence Assessment
and Drainage Strategy

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This document has been produced by Land Studio on behalf of Lovelock Mitchell Architects. The contents of the document are intended for submission with a planning application related to the redevelopment proposals at Ipsen Wrexham. Land Studio has prepared this report in accordance with the instructions of the above-named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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Introduction

1.0

1.0 Introduction

1.0 Introduction

Land Studio have been appointed by Lovelock Mitchell Architects to produce a Flood Consequence Assessment and Drainage Strategy in support of a planning application for the proposed development on the existing Proserve Logistics site adjacent to Ipsen, Wrexham Industrial Estate.

This report records the results of a flood consequence assessment and has been carried out in accordance with Planning Policy Wales (PPW) and Technical Advice Note 15 (TAN15). This report considers the risk of various sources of flooding to the site and the consequent risk of flooding to the downstream receptors (such as people, property, habitats, infrastructure and statutory sites).

This report also reviews the existing drainage situation and proposes a foul and surface water strategy for the development in line with the Sustainable Drainage (SuDS) Statutory Guidance, TAN 15 and Welsh Water requirements.

In preparation of the report and performance of any other services, Land Studio has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions reached in this report are valid only to the extent that the information provided was accurate and complete. Land Studio cannot accept liability for the accuracy or otherwise of any information derived from third party sources.

1.1 The Site

The development is located at the existing Proserve Logistics site within Wrexham Industrial Estate off Ash Road North. Proserve vacated the site in 2018 with the building demolished in late 2018 and the site used as storage and parking since. Car parking on the site is still in use. The grid reference for the centre of the development is SJ 37566 50127 and the site location can be found in Figure 1.

The boundary of the existing Proserve Logistics site extends to 2.43ha which includes the existing car park, landscaping strip to Ash Road North and existing outfall drainage structure and pond. The redline boundary for the development, which excludes the car park which will remain as existing is 2.0ha of which has an impermeable area of 1.1ha.

The proposed development site is bound by an industrial unit to the south with associated car parking and landscaping. Ash Road North and Ipsen Biopharm units are located to the West and with Ash Road South and Hauck Group industrial units to the north. An area of ancient woodland is located to the east of the site.



Figure 1: Site Location

1.0 Introduction

1.2 The Proposed Development

The development will consist of a new industrial building with associated external pavement and car parking alongside amenity space which includes a water feature with additional storm water attenuation and landscaping to the front of the site.

The proposed site and redline boundary is indicated in Figure 2 and can be found in Appendix 1.

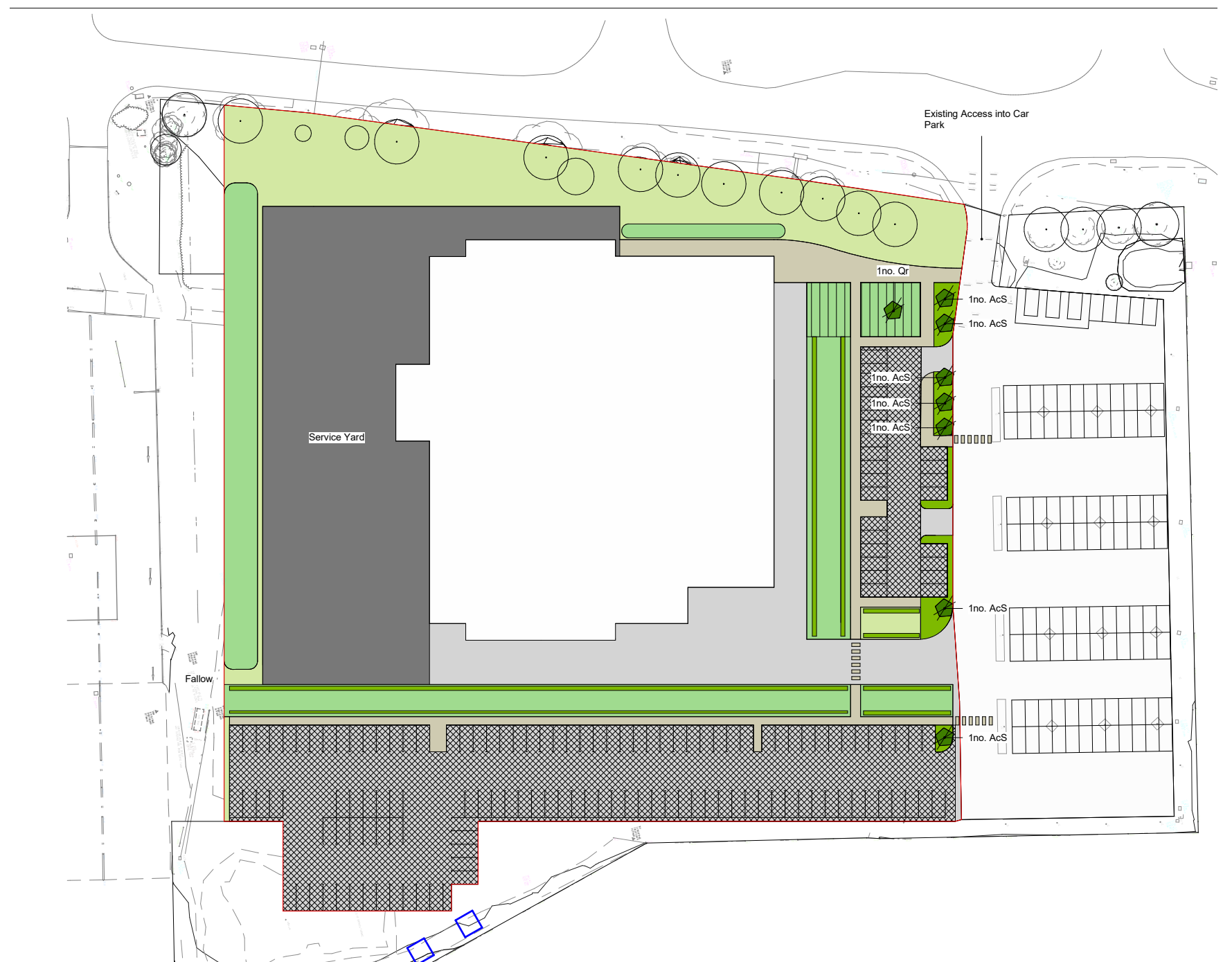


Figure 2: Proposed Development Plan

Planning Policy and Guidance

2.0

2.0 Planning Policy and Guidance

The following legislation and planning guidance has been reviewed and considered in preparation of the proposed flood risk assessment and drainage strategy.

2.1 Planning Policy Wales (PPW)

Planning Policy Wales (PPW) sets out the Governments planning policies for Wales and how these are expected to be applied. TAN 15 provides technical guidance which supplements the policy within PPW and seeks to ensure that flood risk is taken into account at all stages in the planning process and is appropriately addressed.

National policy requires that planning applications for new developments should incorporate sustainable drainage systems (SuDS) to appropriate operational standards and with maintenance arrangements in place unless there is clear evidence that this would be inappropriate.

Section 6.6 of the PPF 11th Edition dated January 2021 states that the planning system protects water features and fosters sustainable water management as key attributes of attractive and resilient places to live and is closely aligned with securing the multiple benefits of green infrastructure. The outcome of which should make a contribution towards achieving the requirements imposed by EU Water Framework Directive along with Welsh Government Policy for the integrated planning and management of water both in the urban and rural areas.

Any developments discharging domestic sewage should connect to the foul sewer where it is reasonable to do so. Developments proposing the use of non-mains drainage schemes will only be considered acceptable where connection to the main sewer is not feasible. Non mains drainage schemes should be subject to as assessment of their effects on the environment, amenity and public health in the locality.

All developments should reduce, and must not increase, flood risk on and off the development itself.

2.2. Technical Advice Note 15: Development and Flood Risk

TAN 15 sets out a precautionary framework to guide planning decisions in areas at high risk of flooding. The aim of the framework is to direct new developments away from those areas which are at high risk of flooding and where developments are considered in high risk flood areas only those developments which can be justified should be located in such areas.

The aim of TAN15 is also to ensure that flood risk is considered at all stages in the planning process and to direct development run-off away from the areas at highest risk.

Development Advice Maps are provided by Natural Resources Wales (NRW) based on Environment Agency's extreme flood outlines and British Geological Survey drift data. These indicate the level of risk associated fluvial, coastal and surface water on the location of the site and how to assess the consequences of flooding on the site.

A new version of TAN15 and the Flood Maps for Planning (which will replace the Development Advice Maps) will come into force in June 2023 after being delayed from December 2021. Whilst these are not yet policy the Flood Maps for Planning have been taken into account when writing this document

2.3. Statutory National Standards

The approach outlined in the Welsh Government Sustainable Drainage Systems Standards for Wales (SuDS Standards) 2018 and the CIRIA SuDS Manual seek to manage the quality and quantity of rainwater runoff close to where it falls and to bring not just drainage design solutions but also amenity benefits to site users and encourage biodiversity.

The Flood and Water Management Act 2010 (Schedule 3) came into effect in Wales on 7th January 2019. This requires all new developments of more than one dwelling or where the area covered by construction work equals or exceeds 100 square metres to include Sustainable Drainage Systems (SuDS) features that comply with the national standards and to be approved before construction can commence from the SuDS Approval Body (SAB).

The following SuDS Standards are to be complied with to ensure that the most effective drainage scheme is delivered for protecting and enhancing both the natural and built environment. Developers should demonstrate compliance with these standards in submitting planning applications.

- *Principles to meet the standards*
- *S1. Surface water runoff destination*
- *S2. Surface water runoff hydraulic control*
- *S3. Water Quality*
- *S4. Amenity*
- *S5. Biodiversity*
- *S6. Operation, Maintenance and Management*

Review of Baseline Data

3.0

3.0 Review of Baseline Data

3.1 Flood Risk

Flood risk is a combination of the probability and the potential consequence of flooding. Areas at risk of flooding are those at risk of flooding from any source now or in the future.

The key aims of this flood consequence assessment are to:

- Assess the flood risk to the development and to demonstrate the feasibility of designing the development so that the risk of flooding is acceptable.
- Assess the potential impact of the development on flood risk elsewhere and demonstrate that this can be mitigated by using sustainable drainage systems.

TAN15 requires that all sources of flooding are considered including: flood risk from rivers (fluvial), flood risk from the sea or tidally influenced rivers, surface water flood risk (pluvial), groundwater flood risk and flood risk from sewers, drains or artificial sources. Each source will be assessed in turn.



Figure 3: NRW Watercourses (01.03.23)

3.2 Flood Risk from Rivers and Seas (Fluvial and Tidal)

The site is not located in proximity of any tidal waterway or within proximity of the sea. The closest main river is approximately 520m to the east of the site, the location of this is indicated in blue in Figure 3 with the dashed purple line an ordinary watercourse.

The Flood Maps for Planning provided by Natural Resources Wales indicates that the site is in a Flood Zone 1 and therefore has a low risk of flooding from rivers or seas.

Flood Zone 1 is land that has been assessed as having a less than 1 in 1000 annual probability of river flooding (<0.1% therefore the site is at a low risk of flooding. This is indicated by no hatching in Figure 4.

3.3 Recorded Flood Events

The Flood Maps for Planning indicate there are no recorded flood events at the site.



Figure 4: Flood Risk from Rivers and Sea Flooding (dated 21.02.23)

3.4 Flood Risk from Surface Water (Pluvial)

Overland flow occurs when the infiltration capacity of the ground or capacity of the drainage systems is exceeded in a storm event. This can result in water travelling over land or ponding.

The Flood Maps for Planning provided by Natural Resources Wales indicates that there are small areas of surface water flooding within the site indicated as Flood Zone 2 which are related to the existing basin at the discharge location at landscaping adjacent to Ash Road North.

This is indicated in light pink hatch in Figure 5.

3.5 Flooding from Reservoirs

The site is not located in proximity of any reservoirs and the Flood Maps for Planning indicate there is no risk of flooding from Reservoirs.



Figure 5: Flood Risk from Surface Water Flooding (dated 21.02.23)

3.0 Review of Baseline Data

3.6 Flooding from Groundwater

Groundwater flooding occurs as a result of water rising up from the underlying superficial deposits, bedrock or from springs. Site investigation has not been carried out for review at this stage so potential for groundwater flooding will need to be assessed once available. The site has been developed previously and there is no known groundwater flooding. It is likely that groundwater flooding is to be low.

3.7 Flooding from Sewers and Drains

If the capacity of the sewers or private drains are exceeded in an extreme event, or a blockage occurs, surcharging of the drainage network can result in flooding. Welsh Water sewer records have been purchased (extract indicated in Figure 6). These indicate there are no public sewer assets within the vicinity of the site boundary with the closest sewers in Ash Road North and Ash Road South. Welsh Water pre development enquiry has been undertaken which hasn't indicated any flooding in these sewers. All private drainage is to be removed within the site therefore flooding from sewers and drains is deemed to be low.

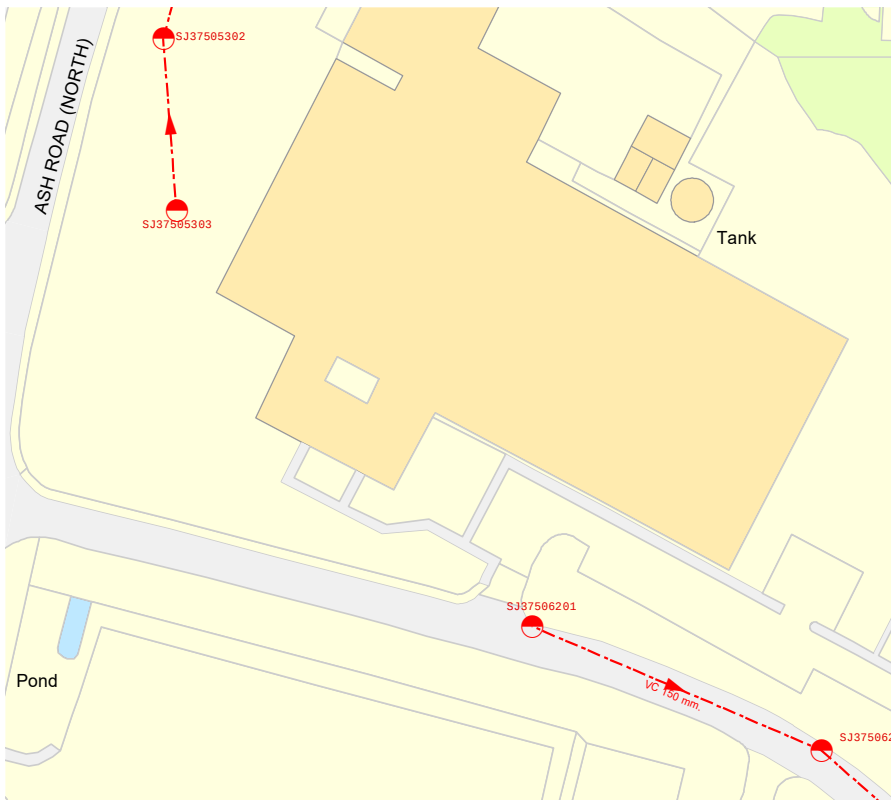


Figure 6 Extract from Welsh Water public sewer records

3.8 Existing Drainage

Separate private foul and surface water networks exist within the site.

The surface water network serves the existing car parking and buildings which have been demolished. An existing pond and outfall structure is located in the north west corner of the site, indicated in orange in Figure 7. A 450mm pipe discharges into this pond from the existing site drainage, indicated in cyan.

Once water reaches a sufficient level in the pond it discharges through a concrete headwall located on the boundary of the site allowing discharge into a short length of underground culvert outside the site boundary in the road verge and into a catchpit manhole at end of culvert in Ash Road South. The water then discharges through a 375mm diameter surface water pipe across the Ash Road South/North junction, indicated in blue Figure 7, to a manhole within the pavement outside the Ipsen West site. At this point the discharge combines with the wider Ipsen surface water drainage and discharges into a culverted watercourse indicated in green.

An existing private foul pump station from the previous site is located in the north west corner of the site. Indicated by a red circle in Figure 7.

The outfall location from this, whilst assumed to the combined sewer in the north, indicated in brown on Figure 7, has not been confirmed. The condition of this pump station and rising main precludes its reuse in the proposed scheme.

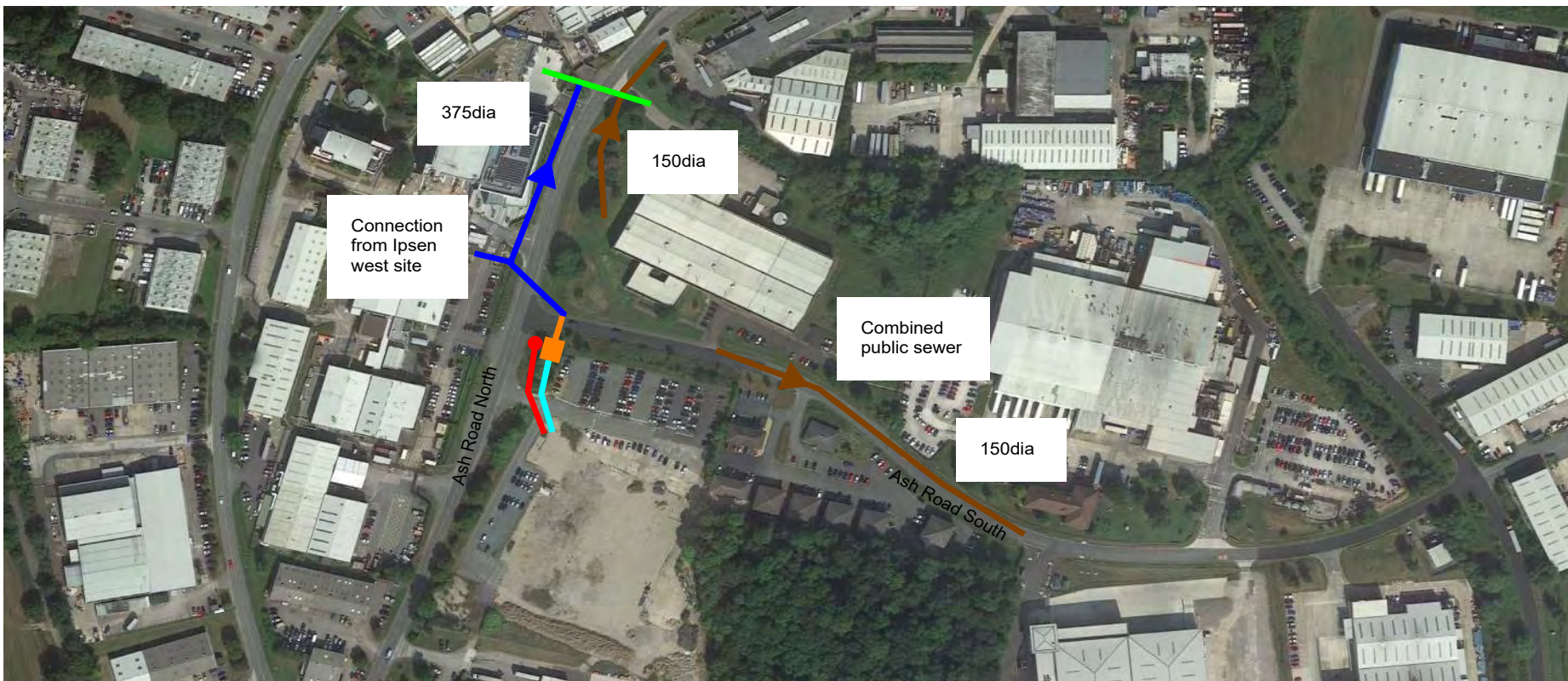


Figure 7 Existing drainage

3.0 Review of Baseline Data

3.8 Site Topography

The existing levels on the site are relatively flat across the site at around 36.80 AOD with levels to the north, east and south boundaries lower than the site. The levels to Ash Road North are higher than the site with levels around 37.20 AOD at the existing entrance. A copy of the topographical information is included in Appendix 2.

3.9 Geological Setting

Site investigation has been undertaken to inform the foundation design. Drilling records indicate under a 500mm layer of gravel, brick, concrete and metal (demolition rubble from the building) there was a layer of made ground of stiff brown slightly sandy slightly gravelly CLAY to approximately 2m below existing ground levels. Beneath this is a layer of Glacial Till of stiff slightly sandy slightly gravelly CLAY.

Falling Head Permeability Tests were undertaken within one of the boreholes. Results indicated infiltration rates of 6.53×10^{-8} m/s and 3.28×10^{-7} m/s. Records from the site investigation and falling head test are included within Appendix 3.

Assessment of Flood Risk and Mitigation Measures

4.0

4.0 Assessment of Flood Risk and Mitigation Measures

4.1 Assessment of Flood Risk

The development site is in a Flood Zone 1 and is at low risk of flooding from all sources of flooding. The proposed useage of the development indicates that the site is “less vulnerable”. Therefore using Table 2: Flood Risk vulnerability and flood zone incompatibility the site does not need to complete an exception test.

Whilst the risk of flooding from all sources is low the following mitigation in the design of the new development should be taken into account.

4.2 Access and Egress

The site access is from Ash Road North. The proposed buildings are to have finished floor levels 150mm above the proposed external works levels with threshold drainage if required and falls away from the building to direct water away from the buildings in accordance with Building Regulations Part H.

4.3 Sustainable Drainage

Planning policy promotes sustainable management of surface water runoff from a new development or redevelopment, and the use of SuDS is required. The design of these features are to include an allowance for climate change.

Further details of what surface water drainage measures are to be included for can be found in Section 5.0.

4.4 Maintaining Exceedance Events

Exceedance events are storm or flood events that go beyond what can be practicably quantified and flows from such events will need to be directed through the proposed development, away from any high risk areas, such as building thresholds and towards low risk areas such as car parks and sustainable drainage features and then off site.

4.5 Maintenance

To ensure flooding does not occur from the private drainage systems regular maintenance of both the foul and surface water networks will need to be undertaken. An example of the type of maintenance required can be found in Section 7.0.

4.6 Flood Risk Conclusion

With flooding from all existing sources being classed as low and the implementation of flood mitigation measures in the form of sustainable positive drainage features and safe access and egress it is therefore deemed that the proposed development will not have a material impact on the hydrology of the existing land and that all foreseeable sources and receptors of flood risk as a result of the development have been considered.

Surface Water Drainage

5.0

5.0 Surface Water Drainage

5.1 Standard S1 - Surface Water Runoff Destination

In accordance with Standard S1 the aim is to ensure that runoff is treated as a resource and managed in a way that minimises negative impact of the development on flood risk, receiving water quality and associated ecology.

The following hierarchy is therefore reviewed with Priority Level 1 preferred.

- Priority Level 1 - Reuse: Solutions that reuse rainwater prior to discharge include rainwater harvesting for on-site non-potable use (flushing toilets for example) or for landscape maintenance. Whilst rainwater harvesting may be suitable for this type of development the design of the above ground system is to be a syphonic system which does not include for reuse within the building. The use of SuDS features within the landscape would however help with irrigation of these areas. There is no known foreseeable demand for non-potable water at the site or need by the water authority for harvesting of water to reduce stresses on the main water supplies.

- Priority Level 2 - Discharge to ground: Disposal of surface water through infiltration (soakaways and permeable surfaces direct to ground) has been reviewed. A falling head test permeability calculation was undertaken during site investigation at 2.5m below existing ground level. This indicated an infiltration rate of 3.28×10^{-7} m/s. Shallow infiltration testing hasn't been undertaken to date. Site investigation logs indicate that there is made ground up to 2.0m deep and clay substrate below this. Infiltration has at this stage not been included for within the design although further investigations will be undertaken at shallow depths where the use of permeable surfacing is proposed.

- Priority Level 3 - Discharge to watercourse: The existing drainage discharges to a culverted watercourse located to the north via a surface water drainage network which serves the wider Ipsen site surface water drainage only. It is therefore proposed to reuse this connection for the proposed development.

- Priority Level 4 and 5 - Discharge to sewer: There are no known public surface water sewers within the vicinity of the site. Combined sewers exist within Ash Road South north of the site. As the existing site discharges via a private surface water drain outside of the redline boundary which discharges to watercourse it is proposed to reuse this system for discharge from the development.

5.2 Standard S2 - Surface Water Runoff Hydraulic Control

The aim of Standard S2 is to manage surface water runoff from and on a site to protect people on the site from flooding from the drainage system for events up to and including the 1 in 100 year return period with an allowance for climate change.

The existing site is a brownfield development which has in part a working below ground surface water drainage system that services the existing car park which is to remain in the scheme. The original system which serviced the buildings is not fully known and therefore can not be modelled to confirm the existing discharge rate.

The pre development brownfield and greenfield have been calculated. Greenfield calculations have been undertaken using the IH124 method in Causeway Flow. This has been undertaken for a pre-development site area of 1.2ha. This indicates a QBar rate of 0.2l/s.

Brownfield calculations have also been undertaken as the. Using the Modified Rational Method in Causeway Flow this calculates the approximate existing pipe flow rate at the outfall which can be compared to the Colebrook-White equation for the 450mm pipework identified on site.

The brownfield rate for the Modified Rational Method (MRM), based on a site area of 1.2ha indicates a rate of 150.7l/s for with the actual outfall connection having a capacity of 237l/s (450mm pipe @ 1:185).

To enable a gravity fed discharge into the existing 450mm outfall pipework any attenuation will need to be kept as shallow as possible.

It is therefore proposed to discharge at 10l/s which is a 94% betterment on existing brownfield discharge rate (MRM) and allows a gravity fed connection to be achieved.

Calculations can be found in Appendix 4.

5.3 Sustainable Drainage Systems (SuDS)

Sustainable Drainage Systems (SuDS) are systems which are designed to manage both the environmental risks resulting from the urban runoff, storage and collection of surface water before discharge and to contribute, wherever possible, to environmental enhancement.

The SuDS objectives are to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

Due to the restriction on discharge rate from the site surface water attenuation will need to be provided. A review of potential sustainable drainage systems has been undertaken to identify what could be included for at this site.

These are included in Table 2 below.

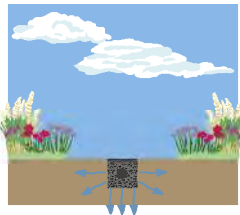
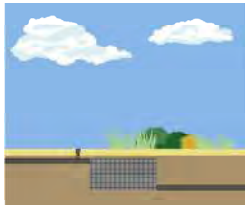
	Solution	Advantages	Disadvantages	Suitability at Ipsen NDP
Traditional Soakaways 	Excavations either filled or lined with brickwork, precast concrete or polyethylene rings/perforated structures to allow surface water runoff to be stored and discharged directly to ground.	- Minimal land take. - Reduces the volume of runoff. - Effective at pollutant removal if filled - Contributes to groundwater recharge. - Simple and cost-effective. - Easy performance observation. - Can be retrofitted. - Easy to maintain.	- Soakaways need to be located away from sub-structure to prevent adverse effect on foundations. - Not suitable in poor draining soils. - Requires testing on site prior to design - Not appropriate for draining polluted runoff. - Increase risk of groundwater pollution. - No amenity or biodiversity. - Limited to small catchments.	Falling head permeability tests were undertaken at depth which indicated infiltration was not possible on the site. Shallow testing has not been undertaken.
Permeable Paving and/or subbase attenuation 	Porous paving allows runoff to infiltrate through the surface to the sub-base layer. Water can then either be infiltrated into ground or conveyed into storage within the subbase and/or downstream drainage systems.	- Provides attenuation at source. - Provides low level water treatment. - If designed for infiltration contributes towards groundwater recharge. - Easy to install and retrofit. - Simple to maintain if lined and can be used where groundwater is sensitive. - Subbase attenuation can be utilized without porous surfacing.	- Some surfacing not suitable in some heavily trafficked or turning areas. - If subbase attenuation used with block paving this requires regular maintenance to prevent clogging with dirt. - Requires increased build up in some situations although dependant on CBR values - Coordination with services essential to ensure routes provided through the subbase attenuation.	Permeable paving is to be installed within the new car parking. Subbase attenuation will be used to store water prior to discharge. Made ground is present on the site but it may be possible to infiltrate in parts of the site at shallow depth as there are areas of existing parking which already drain via infiltration.
Detention Basins 	Provides both storm water attenuation and treatment in large grassed depressions either formed into community facilities or subtly through depressions in the land.	- The retention time promotes good removal of pollutants through sedimentation. - Can be used where groundwater is vulnerable. - Good community acceptability. - High ecological, and amenity benefits. - Runoff from each rain event is detained and treated in the pool.	- No reduction in run-off volume. - High land take required. - Depths can be constrained by external levels.	A detention swale/basin is proposed on the site which will be used for conveyance but also retention in high storm events.
Wetland 	Shallow, extended detention, pond wetland, pocket wetland, submerged gravel wetland. Wetlands provide stormwater attenuation and treatment and comprise of shallow ponds/marshy areas covered in aquatic vegetation.	- Good pollutant removal. - If lined can be used where groundwater is vulnerable. - Good community acceptability. - Good ecological and amenity benefits. - Wetlands can detain flows for an extended period to allow sediments to settle and to remove contaminants - Must be incorporated within the landscape plans to give maximum benefit.	- High land take if used for full attenuation system. - Requires baseflow to keep areas wet. - Little reduction in run-off volume. - Not suitable for steep sites.	A SuDS feature with a permanent water level is not proposed although the swale along Ash Road North could incorporate wet areas where biodiversity could be enhanced.
Swales 	Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where ground conditions allow.	- Can be incorporated into landscaping design. - Good removal of pollutants. - Reduces run-off rates and volumes. - Low cost drainage feature.	- Not suitable for steep sites. - Land take required to fit swales in.	Swales can be utilised on this site for both-conveyance and attenuation as part of the treatment train.
Modular geocellular systems 	Underground plastic geocellular systems which are either wrapped or allowed to infiltrate dependent on ground conditions.	- Modular and flexible. - Dual usage (infiltration if possible and/or storage). - High void ratios. - Can be installed beneath trafficked and soft landscaped areas. - Light and easily installed. - Can slow discharge of water downstream. - Flexible as they can be kept shallow over a larger plan area or small plan area but deeper	- Difficult to maintain if installed under the building footprint. - If infiltration is possible, then this needs to be more than 5m away from the building's sub-structure. - Size restricted to unit size. - No treatment of water to improve water quality. - No amenity impact - No biodiversity impact	Geocellular tanks will be incorporated on the site as volumes required to discharge at greenfield rates without pumping require shallow tanks with a greater void ratio.

Table 2 SuDS Solutions

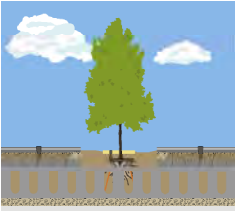
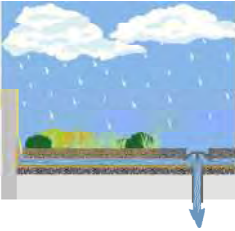
	Solution	Advantages	Disadvantages	Suitability at Ipsen NDP
Tree Pit 	Runoff collected by the system on the surface filters through the vegetation and underlying soils. The filtered runoff is either collected using an underdrain system or, if the site conditions allow, fully or partially infiltrated into the surrounding soils.	- Intercepts precipitation and allow water to evaporate from leaf surfaces. - Dissipates rainfall-runoff energy. - Facilitates infiltration and groundwater recharge, because of their more extensive root systems. - Provide shade and can reduce runoff temperatures. - Provide further amenity and biodiversity benefits.	- Only small volumes of attenuation can be provided if space is limited.	Tree pits could be incorporated within the scheme however it is unlikely that this solution would be used on this site as other green SuDS are possible.
Rain Gardens 	Shallow landscaped depressions that can reduce runoff rates and volumes. Runoff collected by the system ponds temporarily on the surface and the filters through the vegetation and underlying soils. The filtered runoff is either collected using an underdrain system or, if the site conditions allow, fully or partially infiltrated into the surrounding soils.	- Can reduce runoff rates and volumes. - Treat pollution through the use of engineered soils and vegetation. - Can provide attractive landscape features that are self-irrigating and fertilising. - Can provide habitat and biodiversity. - Cools the local microclimate due to evapotranspiration. - Easy to Retrofit - Small so minimal land take.	- Potential trip/wheel hazard, disabled access issues so needs to be incorporated adequately within the landscape design. - Not suitable for steep sites as water retention features unless stepped. - Impact on volume reduction can be limited. - Requires landscaping and management - Susceptible to clogging if not maintained.	A raingarden is to be incorporated in the landscaping at the entrance of the site to collect hardstanding areas in this location.
Rainwater Harvesting 	Rainwater collection from roofs to supply toilets. Harvested rainwater is stored substituted for potable water mains supply, reducing both site discharge and water consumption.	- Reduces demand on mains water. - Can provide source control of stormwater runoff.	- Use is dependent on demand requirements, contributing surface area, and seasonal rainfall characteristics. - Cannot be used as surface water attenuation as assumed to be full during high storm events. - Potential requirement for pumping. - Possible risk to public health with standing water if designed as above ground and not managed properly.	Full rainwater harvesting is not proposed above ground within this facility. Syphonic drainage is proposed for the collection of roof drainage.
Green/Brown Roof 	Multi-layered system that covers the roof of a building with vegetation cover/ landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows.	- Mimics greenfield state of building footprint for high density developments. - Slows down the water in the downstream system. - Good removal of pollutants. - Ecological benefits. - Contributes towards insulation of the building. - Contributes towards sound absorption. - Reduces the time it takes for water to enter the drainage system therefore would reduce storage requirements in short term events.	- Additional weight on the structure. - Not always appropriate for steep roofs. - Maintenance of roof vegetation required. - Does not remove the need of other forms of attenuation due to the calculations need to assume green roof is saturated in high storm events. - Additional cost to building and maintaining.	The main buildings are unlikely to have green or blue roofs. Any external structures if required such as bike stores, garages, bin stores could incorporate a green roof to slow water down to the other green SuDS features.

Table 2 SuDS Solutions

5.0 Surface Water Drainage Strategy

5.5 Standard S3 - Water Quality

Standard S3 addresses the drainage design requirements to minimise the potential pollution risk posed by the surface water runoff to the receiving water body.

The quality of runoff from the site to support and protect the natural environment effectively has been reviewed. Where practical treatment systems have been designed to be close to the source of runoff and reviewed in accordance with Water Quality design criteria set in Chapter 4 and Water Quality Management: Design Methods in Chapter 26 of The SuDS Manual CIRIA C753 2015.

Table G3.1 of the Statutory National Standards for Sustainable Drainage indicates the proposed development is medium pollution hazard level with simple index approach outlined in Table 26.2 of The SuDs Manual CIRIA C753. These are indicated for our site in Table 3.

Pollution hazard indices for different land use classifications				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roof	Low	0.3	0.2	0.05
Non residential car parking	Low	0.5	0.4	0.4
Commercial yard and delivery areas	Medium	0.7	0.6	0.7

Table 3: Pollution Hazard Indices
Extract taken from CIRIA C753 Table 26.2

To deliver adequate treatment the selected SuDS components will have a total pollution mitigation index that equals or exceeds the pollution hazard index. The scheme uses a number of SuDS components in series through capture, conveyance and storage while delivering interception and pollution risk management. The individual mitigation indices are indicated in Table 4.

Indicative SuDS mitigation indices for discharges to surface water			
Type of SuDs Component	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5

Table 4: SuDS Mitigation Indices
Extract taken from CIRIA C753 Table 26.3

The car parking, service yard and access roads will pass through the permeable paving and swale before entering the geocellular tank. Additonal oil separation may be required from the service yard within the below ground system.

Depending on the roof drainage design it may be possible to discharge into the swale before entering the geocellular tank. Additional proprietary treatment may be required which will be included at detailed design stage.

5.6 Attenuation Volumes

On site attenuation will be required prior to discharge at 7.7l/s,

In accordance with statutory authorities requirements the system will be designed up to and including the 1 in 100 year plus 30% climate change event.

The proposed impermeable area equates to 1.24ha for the new development. An attenuation volume of between 680m3 and 996m3 will be required within the site.

The following attenuation features are proposed to be incorporated within the site which take into account storage volumes and treatment train required.

- Permeable paving to car parking areas with voided subbase attenuation. These areas should be laid to minimum gradients to get maximum storage volume within the subbase. Pipework will be laid in the base of the subbase to convey water downstream to a grassed swale.

- Swales are to be constructed for collection of water from the pavements and service yard to store water at source but also treat and convey water to the downstream system.

- Geocellular tanks will be required to storage the required volumes. These will need to be kept shallow to prevent pumping of the surface water being required.

- Raingardens to the entrance of the site will be utilised to collect any pavement surface water.

The proposed surface water drainage scheme can be found on drawing 330-LST-XX-XX-DR-D-0001 in Appendix 5.

5.7 Standard S4 - Amenity

Standard S4 addresses the design of SuDS components to maximise where possible the provision of high quality, attractive public spaces which bring wellbeing and health benefits.

The landscape areas around the entrance to the building, which will include a raingarden will be designed for use by the building users during breaks from work by providing good landscaping with seating.

5.8 Standard S5 - Biodiversity

Standard S5 addresses the design of SuDS components to create ecologically rich blue and green corridors in developments and the design of SuDS features should maximise biodiversity benefits.

By providing landscaping and swales between the existing woodland at the east and the front of the site the landscape buffer provides a corridor to help increase biodiversity in and around the site.

Foul Water Drainage Strategy

6.0

6.0 Foul Water Drainage

6.1 PAC Response on Foul Drainage

In response to the PAC dated 30.06.23 Natural Resources Wales have advised that in order to determine the application the LPA should be provided with information on foul drainage management, likely flows and drawings indicating foul connection points. This would enable an environmental permit for the relevant wastewater treatment plant to be reviewed against the conservation objectives for water quality and confirmation that there is capacity in the system to accommodate the flows as identified in their latest guidance/planning advice under the section titled “What does this mean for development proposals involving connection to the public wastewater treatment works” and if provided NRW would have no objection to the proposals.

Sections 6.2 to 6.5, along with Appendix 5, provide the information required to enable a decision on foul discharge to be made by the LPA.

6.2 Foul Water Discharge

The previous site was industrial with both domestic and effluent foul discharging to the combined public sewer system which stopped in 2018. An existing foul pump station is located in the north west corner of the site with the outfall location believed to be the combined public sewer to the north of the site. Survey work was undertaken but unable to confirm this.

The final outfall of the combined public sewer network adjacent to the site is believed to be the Dwr Cymru/Welsh Water Five Fords treatment works.

It is proposed that both domestic foul and process drainage will discharge via a new on site private pumping station managed by Ipsen with a proposed discharge via gravity from a demarcation chamber on the boundary of the site to the combined public sewer system at manhole SJ37506201 in Ash Road South.

The process system will require on site storage tanks to restrict flow into the downstream domestic foul system in accordance with Dwr Cymru Welsh Water requirements.

6.3 Dwr Cymru/Welsh Water Consultations

A pre development enquiry and initial trade effluent application has been submitted to Dwr Cymru Welsh Water who have confirmed that it is acceptable in principle for discharge of 1l/s domestic foul and 4l/s trade effluent into the public combined sewer in Ash Road South.

A formal S106 application will be required to make the foul connection at manhole SJ37506201.

A formal trade effluent license will also be required for the discharge into manhole SJ37506201.

6.4 Proposed Foul Water Flows

Using British Water Flows and Loads 4 domestic foul drainage flow rates have been calculated. Based on a population of 36 this gives a total load of $2.7\text{m}^3/\text{day}$ which equates to an average daily flow of 0.03l/s.

Calculations for discharge of effluent from the process waste water for the entire site (2 modules) equates to a maximum discharge of 60,000l/day. Whilst the average daily flow equates to 0.69l/s the maximum daily discharge could be 4l/s. This is in accordance with the Welsh Water discharge requirements.

Calculations can be found in Appendix 4.

6.5 Development Impact on SAC

The site is located within the catchment of the River Dee which is classified as a SAC. The proposed development is a commercial development with no overnight accommodation with the new development reducing phosphates from the Proserve development which ceased in 2018. The Proserve site accommodated 60 office and administrative staff plus lorry drivers in addition to full canteen facilities. The new site will include a maximum of 36 people including 24 full time staff members at any one time working on a 24/7 shift pattern. Many of the staff will be drawn from the existing staff. Where this is not possible Ipsen do operate a sustainable business model which requires local recruitment and are recognised by the Welsh Assembly Government and the Local Authority as a local employer. 42.3% of the current Ipsen workforce are already served by residential connections to existing public sewers discharging to the Five Fords treatment plant within the SAC river catchment. The staff in the proposed facility will therefore likely be from inside the SAC catchment therefore should have no additional impact on the SAC.

If location of staff and water quality requirements at the Five Fords treatment plant are not acceptable then Ipsen can install phosphorous reduction technologies within a treatment plant within the site boundary before the proposed discharge to the public sewer system.

The proposed foul water drainage scheme within the site and discharge location can be found on drawing 330-LST-XX-XX-DR-D-0001 in Appendix 5.

Management, Maintenance and Operation

7.0

7.0 Management, Maintenance and Operation

7.0 Standard S6 - Design of drainage for construction, operation and maintenance, and structural integrity

Standard S6 deals with designing robust surface water drainage systems so they can be easily and safely constructed, maintained and operated, taking into account the need to minimise negative impacts on the environment and natural resources. All elements of the drainage system will be designed so that they can be constructed easily, safely and cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon. The drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance. The design of the proposed surface water drainage system is to follow the good practice contained in SuDS Standards and the CIRIA SuDS manual.

Any parties involved with the disposal of any waste materials from the underground drainage system should hold appropriate management licenses to undertake any such activities. Disposal of any site materials is required to be made in accordance with current legislation and guidance. The SuDS features will be privately maintained by Ipsen and not offered for adoption to Welsh Water.

Figure 8 taken from tables from the SuDS manual note the likely maintenance requirements for the SuDS features of this project.

CIRIA C753 Table 20.15 Operation and maintenance requirments for pervious pavements		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vaccuming	Once a year after autumn leaf fall or reduced frequency as required based on observations of clogging or as manufacturers requirements
Occasional Maintenance	Stabilise and mow adjacent areas	As required
	Removal of weeds or management using spraying directly	As required but minimum once a year
Remedial Actions	Remediate any landscape which through vegetation maintenance of sil slip has been raised to within 50mm of the level of the paving	As required
	Remedial works to any depressions or rutting detrimental to the structural performance or hazard of the user, and replace lost jointing material	As required
	Rehabilitation of surface and upper structure by remedial sweeping	Every 10 -15 years or as required if infiltration performance is reduced due to significant clogging
Monitoring	Initial Inspection	Monthly for 3 months after installation
	Inspect evidence of poor operation and/or weed growth - if required take remedial action	3 monthly, 48hrs after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

CIRIA C753 Table 17.1 Operation and maintenance requirments for swales		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove Litter and Debris	Monthly, or as required
	Cut grass- to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hrs	Monthly, or as required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
Occasional Actions	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	6 Monthly
	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike toposoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

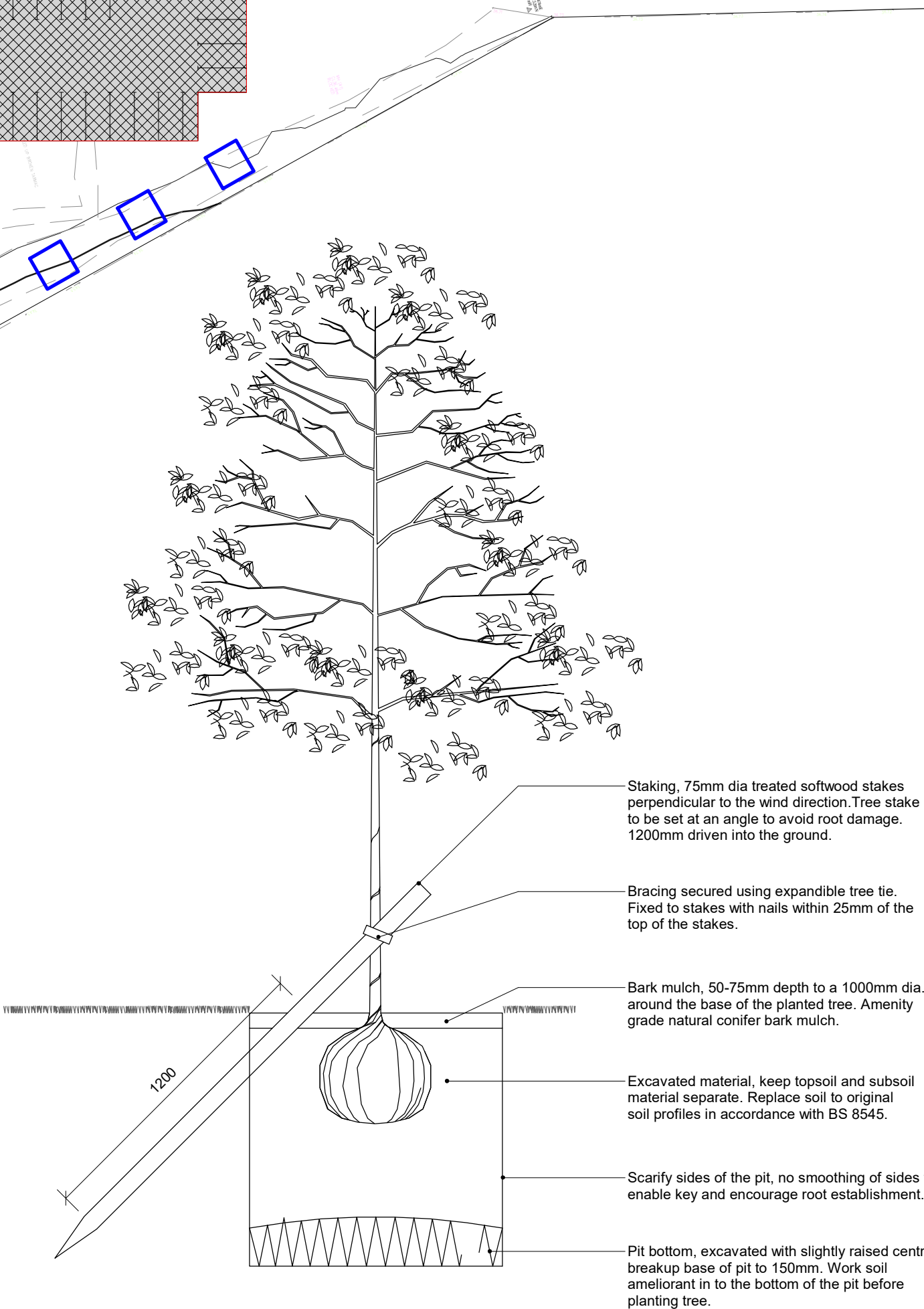
CIRIA C753 Table 21.3 Operation and maintenance requirments for storage tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect, check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build up and remove if neccessary	Every 5 years or as required

Figure 8 Typical Maintenance Requirements

Appendices

8.0

Appendix 1 - Proposed Site Plan



The Planting Notes should be read in conjunction with all landscape drawings, the notes below set out the aims and objectives of the new landscape scheme.

All works to be carried out by qualified Tree Surgeon outside of bird nesting season and inline with Arboricultural Report.

- Existing trees and boundary vegetation to be retained are protected by Tree Protection Fencing prior to any site works

- Before commencing works, the Landscape Contractor is responsible for checking for below ground services in the vicinity of the planting works. Give notice of any that may be affected and obtain instructions before proceeding.

- All planting beds to be bare ground, free of grass, weeds, removing all litter debris and stones.

- Apply approved herbicide, leave for a minimum of 14 days. Remove all arising's from Site.

- All container plants to be well watered in their container prior to planting

- No planting should occur when the ground is frozen or water logged

- Planting areas to have a 450mm depth of clean imported topsoil as per Remediation Strategy (topsoil to BS 3882:2015). Grass areas to have 300mm min clean capping layer. Before laying topsoil, lightly cultivate and loosen the surface a minimum of 300mm. Do not use topsoil for the new tunnel.		Proposed Rain Garden Planting Mix To rain garden area at the main entrance. Refer to schedule D for details.
---	---	---

- Plant materials to confirm to National Plant Specification. All plants to originate within the UK. Planting operations to be in accordance with BS 4428 : 1989.

- New tree planting in grass areas to be in a 0.6m radius, weed free circle, refer to tree pit detail for more information.

- All shrub planting is to be planted in to a weed free bed a minimum 100mm wider than the planting area, plants to be set 100mm back from any fence or wall

- Planting pits to be dug to a minimum depth of 1000mm for trees and 400mm for shrub planting. The sides of all pits are to be loosened avoiding smooth sides

* All planting mixes to be planted in species groups as noted in the schedule

- All tree and hedge planting to have Mycorrhizal Fungi with Gel dusted to bareroots or added to pit to encourage healthy establishment

- All bare root whips to have Tubex (or equivalent) Combi-tube Standard Tree shelter 750mm high x 150mm dia fitted to a 25x25x900mm timber stake, as per manufacturers recommendations.

- All plants to be thoroughly watered in immediately after planting

- During the establishment period visit at eight weekly intervals from April- December to carry out the following to planting areas:

- Control weed growth. Maintaining a weed free area around each plant during the first few years will allow quick establishment of the plants and reduce the likelihood of dieback.

- Prune dead and broken branches/shoots

- Check stakes and ties. Adjust or replace as necessary

- Litter picking of beds

- The weed free areas to be maintained as weed free for the first 5 years following planting with mulch woodchip material, all areas topped up to maintain a 50mm depth for the maintenance period. Occasional spraying with a contact herbicide in accordance with the manufacturers instructions may be required.

- The proposed planting has been specified to be contextually appropriate species that following the establishment period will thrive without irrigation and will continue to do so in those conditions likely as a result of climate change, i.e. typically warmer and wetter conditions.

However, during the first year after planting it may be necessary to water all plants in prolonged periods of dry weather. This usually occurs during May - September. All planting areas should be watered to field saturation using clean fresh water on a weekly basis in these cases.

following planting.

- Remove crossing branches and branches that grow back towards the centre of the tree

- As young trees grow, remove lower branches gradually to raise the crown and retain a clear stem, remove any branches crossing boundary fences

- Remove multiple leaders on evergreens and other trees where a single leader is desirable.

1m. All hedges to be trimmed every year to ensure dense vegetation. Hedge cutting to take place during November - February (outside bird nesting periods).

Native Species	Plant Name	Specification	% mix	Area/m ²	density per m ²	Total Plants
	<i>Fagus sylvatica</i> 'Purpurea'	1+1 bare root, 40-60cm whip	-	437	5	2185
	Total Area	437				2,185
Schedule C - Wildflower Meadow Mix						
Native Species	Plant Name	Specification	% mix	Area/m ²	Grants per m ²	Total grants
	Emergence EM3	Special General Purpose Meadow Mixture	100	1890	4	7560
	Total Area (m2)	1890				-
Schedule D - Rain Garden Mix						
Native Species	Plant Name	Specification	% mix	Area/m ²	density per m ²	Total Plants
	Wet Meadow Grass Mix	Emergence EM8 or equal approved	100	1850	5g/m ²	-
	<i>Allium sphaerocephalon</i> 'Drumstick'	2L, container grown, full pot	10	18.1	5	91
	<i>Allium stipitatum</i> 'Mount Everest'	2L, container grown, full pot	10	18.1	5	91
	Britia Golden Bee	9cm pot	20	36.2	4	145
	<i>Malina</i> Transparent	9cm pot	10	18.1	4	72
	<i>Molinia</i> Heidezwerg	9cm pot	10	18.1	4	72
	<i>Molinia caerulea</i> 'Edith Dudzisz'	2L, container grown, full pot	10	18.1	4	72
	<i>Sedum amronia</i>	2L, container grown, full pot	20	36.2	4	145
	<i>Stipa tenuissima</i>	2L, container grown, full pot	10	18.1	5	91
	Total (m2)	181				778

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This drawing is to be used as part of a Landmark drawing Package in conjunction with all the relevant
aspects of the Comprehensive Development Control Regulations.
Only fixed dimensions are to be taken from this drawing. Dimensions should not be scaled from this drawing,
as scaling of this drawing cannot be assured.
All dimensions are to millimetres unless specified otherwise.
The accuracy of this drawing cannot be assured.
The contractor is to check and checking all dimensions, services and setting
out related to the works shown on this drawing.
All coordinates are to be dimensional points to enable easy cross referencing on site.
Setting out points shall be marked and all dimensions and coordinates should be checked by the
Contractor.
There is not a technical representation of surface patterns, contractors are to follow the line of direction
specified on drawings. Where no line of direction is given contractor to contact the Landmark Architect before
proceeding.
All levels should be checked on site and conformable to the design office.
If in doubt ask

	Existing Trees retained
	Existing tarmac surfacing to car park
	Proposed Trees Refer to schedule A for details.
	Proposed Wildflower Meadow Mix Refer to schedule C for details.
	Proposed Wet Meadow Grass Mix To swales throughout site Refer to schedule D for details.
	Proposed Rain Garden Planting Mix To rain garden area at the main entrance. Refer to schedule D for details.
	Proposed Single Species Hedge To planting bed along swales to the north and east of building. Refer to schedule B for details.
	Proposed Paving To pathways in car park and main entrance. Product: Arto linear paving blocks by Tobemore or equally approved. Colour: Carbon and Platinum (combination)
	Proposed Concrete Surfacing to Service Yard To service yard south of building.
	Proposed Asphalt Surfacing to Car Park To engineers specification.
	Proposed Permeable Asphalt Surfacing to Car Park To engineers specification.
	Proposed Hibernica Sro. hibernica located to the south east of the site area constructed with local materials

Client: Ipsen NDP		land studio
Project: Ipsen NDP, Wrexham		
Drawing Title: Landscape Strategy		
Job No: 330 Drawing No: LST-XX-XX-DR-L-0100		
Drawn By: HA	Date: 06.04.23	
Checked By: LS/SR	Date: 05.05.23	
Drawing Scale: As indicated		Sheet Size: A1
Rev: P04	Status: S3 - FOR REVIEW	

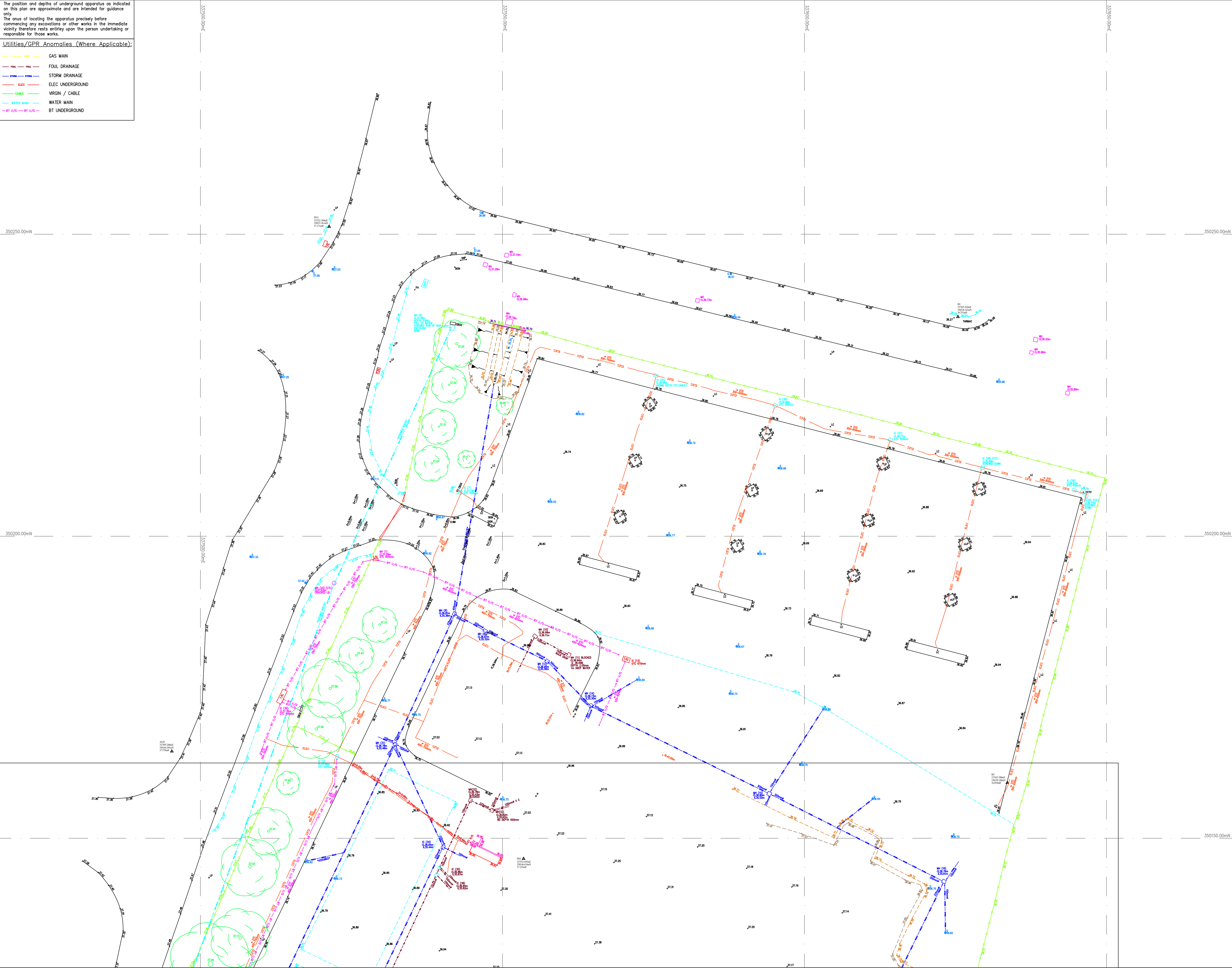
land|studio

Appendix 2 - Topographical Survey

The position and depths of underground apparatus as indicated on this plan are approximate and are intended for guidance only.
The onus of locating the apparatus precisely before commencing any excavations or other works in the immediate vicinity therefore rests entirely upon the person undertaking or responsible for those works.

Utilities/GPR Anomalies (Where Applicable):

- GAS — GAS MAIN
- FOL — FOUL DRAINAGE
- STORM — STORM DRAINAGE
- ELEC — ELEC UNDERGROUND
- VIRGIN / CABLE — VIRGIN / CABLE
- WATER MAIN — WATER MAIN
- BT U/G — BT U/G
- BT UNDERGROUND — BT UNDERGROUND



Site Grid North

Symbols/Abbreviations (Where Applicable):

- + AV: AIR VALVE
- + BB: BELISHA BEACON
- BH: BOREHOLE
- + BM: BENCHMARK
- B/S: BUS STOP
- + CAM: CAMERA
- + CS: CABLE STAY
- CATV: C.A.T.V. INSPECTION CHAMBER
- + CBOX: ELECTRICITY BOX, CABLE BOX, ETC.
- + C.C.T.V: 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
- LB: LETTER BOX
- LC: LIGHTING COLUMN
- LP: LAMP POST
- LP/BS: LAMP POST/BUS STOP
- MH: MANHOLE (SQUARE)
- MH: MANHOLE (ROUND)
- + MKR: MARKER
- P: POST
- + RE: ROODING EYE
- + R/S: ROAD SIGN
- + S/P: SIGN POST
- + SNP: STREET NAME PLATE
- + ST: STOP
- + SV: STOP VALVE
- + TCB: TELEPHONE CALL BOX
- + TL: TRAFFIC LIGHT
- TP: TELEGRAPH POLE
- TP/EP: TELEGRAPH POLE/ELECTRIC POLE
- + T/IC: TELECOM INSPECTION COVER
- + WO: WATER OUTLET
- + WM: WATER METER
- ×: DEFINED POINT
- △: CONTROL POINT
- : TREE (CONIFEROUS)
- : TREE (DECIDUOUS)
- : FOLIAGE
- : HEDGE
- DPC 99.99m: DAMP PROOF COURSE LEVEL
- EL 99.99m: EAVES LEVEL
- FL 99.99m: FLOOR LEVEL
- RL 99.99m: RIDGE LEVEL
- SL 99.99m: SOFFIT LEVEL
- 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

SITE LAYOUT:

Revision Information

Rev	Date	Description
C	23/01/2023	Post Demolition survey update
B	27/02/2018	Surveyors notes added
A	16/01/2018	Additional data added

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 query to PM Surveys UK Ltd.

NOTES

Ordnance Survey Bench Mark Used

Location	Type	Value (m)
1		
2		

PM Surveys UK Ltd
Unit 3, Queensferry Industrial Estate
Pentre
Flintshire, CH5 2DJ
Tel: 01244 952477
Email: info@pmsurveys.co.uk

Client Info

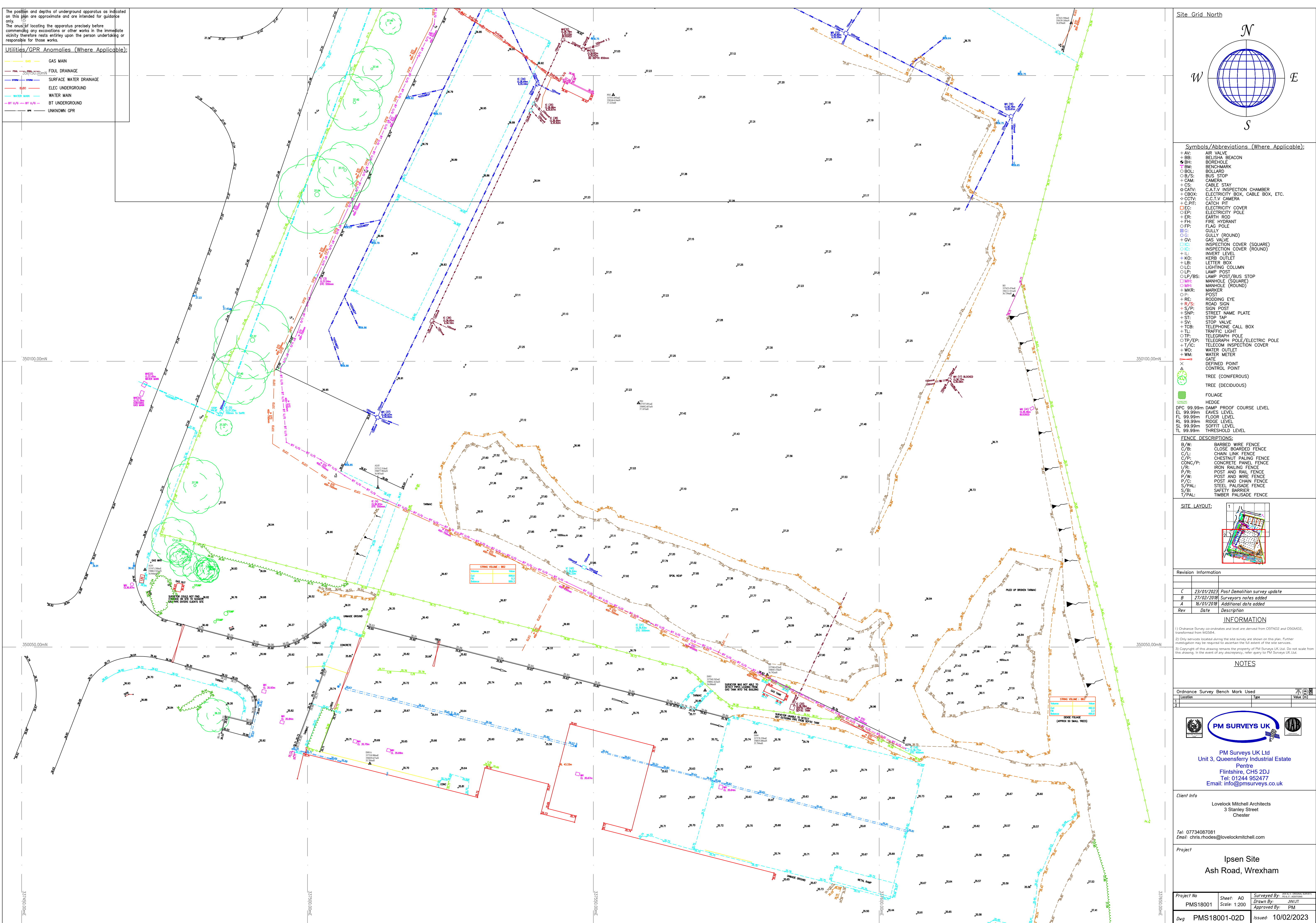
Lovelock Mitchell Architects
3 Stanley Street
Chester

Tel: 07734087081
Email: chris.modes@lovelockmitchell.com

Project

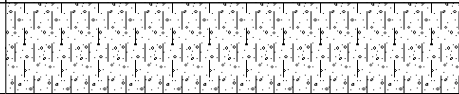
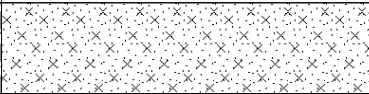
Ipsen Site
Ash Road, Wrexham

Project No	Sheet: A0	Surveyed By:
PMS18001	Scale: 1:200	Drawn By: PM
Dwg	PMS18001-01D	Issued: 10/02/23



Appendix 3 - Ground Investigations

GroundSolve Ltd				Cable Percussion Drilling Record				CP01			
Project Name: Ipsen East Site, Wrexham				Client: Ipsen Biopharm Ltd.				Date: 08/02/2023 - 09/02/2023			
Location: Wrexham Industrial Estate				Contractor: Cheshire Drilling				Co-ords: E337579.76 N350152.44			
Project No. : 2867				Crew Name: GC and DB				Drilling Equipment: Dando 2000			
Borehole Number CP01		Hole Type CP		Level 37.12m AoD		Logged By JP		Scale 1:50		Page Number Sheet 1 of 2	
Well	Water Strikes	Sample and In Situ Testing		Depth (m)	Level (m)	Legend	Stratum Description				
		Depth (m)	Type								
		0.30	D	0.50	36.62		Very dense greyish brown sandy angular to subangular fine to coarse GRAVEL of brick, concrete, and metal. (MADE GROUND)	1			
		1.00	D								
		1.20	SPT								
		2.00	D	1.85	35.27		Stiff reddish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of quartzite. (GLACIAL TILL)	2			
		2.00	SPT								
		3.00	SPT								
		4.00	U				Less mottling and no gravel from 8.00m bgl.	8			
		5.00	B								
		5.00	D								
		5.00	SPT								
6.00	U				Less mottling and no gravel from 8.00m bgl.	8					
7.50	SPT										
9.00	D				Less mottling and no gravel from 8.00m bgl.	8					
9.00	U										

GroundSolve Ltd				Cable Percussion Drilling Record				CP01			
Project Name: Ipsen East Site, Wrexham				Client: Ipsen Biopharm Ltd.				Date: 08/02/2023 - 09/02/2023			
Location: Wrexham Industrial Estate				Contractor: Cheshire Drilling				Co-ords: E337579.76 N350152.44			
Project No. : 2867				Crew Name: GC and DB				Drilling Equipment: Dando 2000			
Borehole Number CP01		Hole Type CP		Level 37.12m AoD		Logged By JP		Scale 1:50		Page Number Sheet 2 of 2	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		10.50	SPT	N=20 (3,3/4,5,5,6)	13.00	24.12		Stiff reddish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of quartzite. (GLACIAL TILL)			
		12.00 12.00	D U								
		13.50 13.50	D SPT	N=12 (2,3/2,3,3,4)							
		15.00	SPT	N=17 (3,3/4,4,4,5)							
					15.45	21.67		End of Borehole at 15.450m			

FALLING HEAD TEST PERMEABILITY CALCULATION

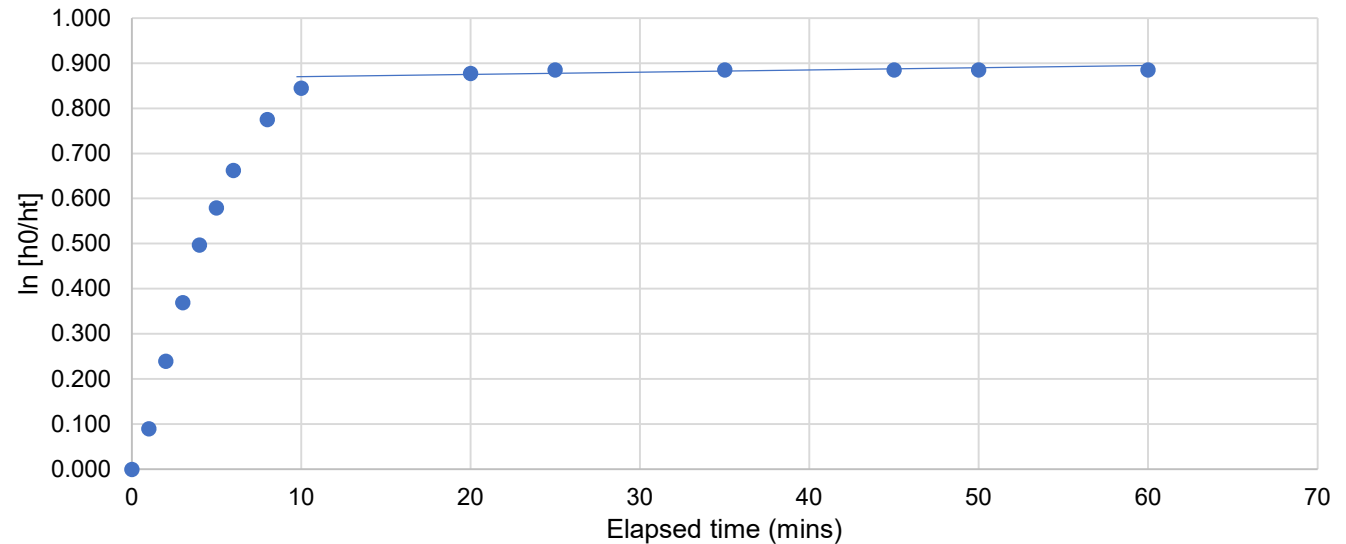
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	Ipsen East Site
Project Name	2867
Borehole	CP01
Date	08/02/2023

BH Depth (m)	3.00
Casing Depth (m)	1.80
Casing Dia (m)	0.15
Casing Height (m)	0.24

L/D Ratio	8.00
Shape Factor	2.7156

Time (mins)	Depth to Water	ln (h ₀ /h _t)
0	0.09	0.000
1	0.34	0.090
2	0.71	0.240
3	0.99	0.370
4	1.23	0.497
5	1.37	0.580
6	1.50	0.663
8	1.66	0.775
10	1.75	0.845
20	1.79	0.878
25	1.80	0.886
35	1.80	0.886
45	1.80	0.886
50	1.80	0.886
60	1.80	0.886



α (gradient)	0.00001
Area of BH (m ²)	0.01767

Infiltration Rate, k	6.536E-08 m/s
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Notes	Calculated between 10 minutes and 60 minutes, as initial 10 minute surge likely not representative due to hydrostatic pressure forcing water up around edges of drill casing. Depth to water calculated from top of drill casing.
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FALLING HEAD TEST PERMEABILITY CALCULATION

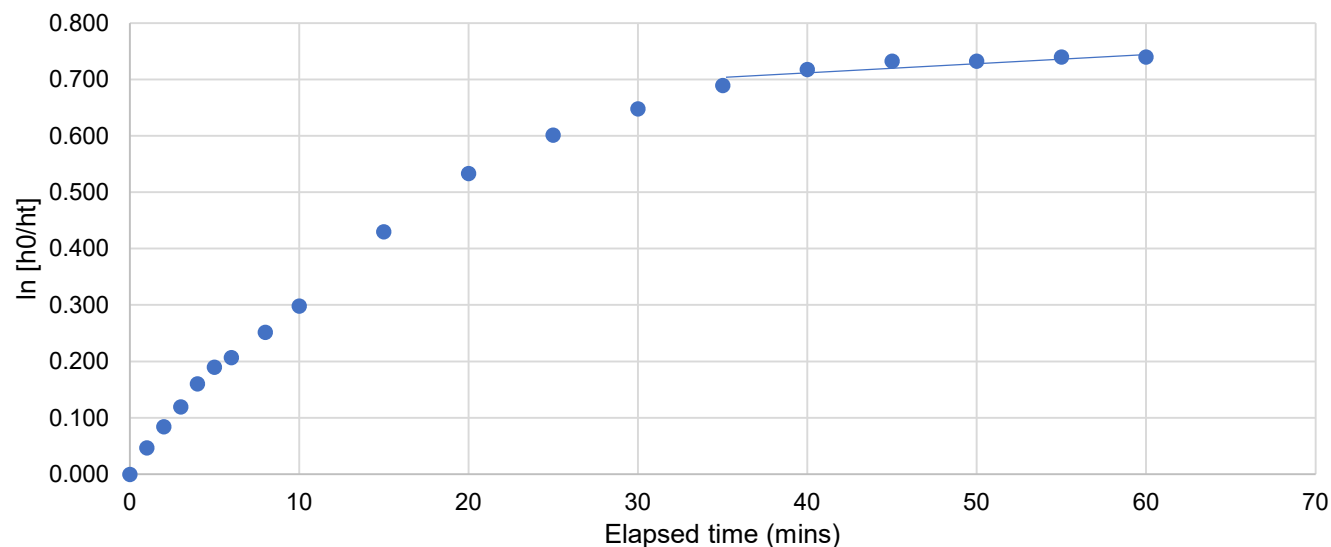
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	Ipsen East Site
Project Name	2867
Borehole	CP01
Date	08/02/2023

BH Depth (m)	3.00
Casing Depth (m)	2.50
Casing Dia (m)	0.15
Casing Height (m)	0.80

L/D Ratio	3.33
Shape Factor	1.6372

Time (mins)	Depth to Water	ln (h ₀ /h _t)
0	0.17	0.000
1	0.30	0.047
2	0.40	0.085
3	0.49	0.120
4	0.59	0.161
5	0.66	0.190
6	0.70	0.207
8	0.80	0.252
10	0.90	0.298
15	1.16	0.431
20	1.34	0.533
25	1.45	0.602
30	1.52	0.648
35	1.58	0.690
40	1.62	0.718
45	1.64	0.733
50	1.64	0.733
55	1.65	0.740
60	1.65	0.740



α (gradient)	0.00003
Area of BH (m ²)	0.01767

Infiltration Rate, k	3.276E-07 m/s
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Notes	Calculated between 35 minutes and 60 minutes, as initial 35 minute surge likely not fully representative due to hydrostatic pressure forcing water up around edges of drill casing. Depth to water calculated from top of drill casing.
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Appendix 4 - Hydraulic Calculations

Proposed Total Discharge									
Using British Water Flows and Loads 4					Flow Litre / Day		BOD Grams / Day		NH3
Description	No of units	Max Occupancy	Total	Per Head	Total	Per Head	Total	Per Head	Total
Domestic Foul - Industrial									
Module 1									
Full time staff	1	12	12	90	1080	38	456	5	60
Part time staff	1	6	6	45	270	25	150	3	18
Module 2									
Full time staff	1	12	12	90	1080	38	456	5	60
Part time staff	1	6	6	45	270	25	150	3	18
TOTAL LOAD			36		2700		1212		156
m3/day					2.7				
Average Daily Flow (l/s)					0.03				
Process Waste Water									
Module 1					30000				
Module 2					30000				
TOTAL LOAD			36		60000		0		0
m3/day					60				
Average Daily Flow (l/s)					0.69				

NDP Facility - Water Usage Summary

The following is an estimate of the water usage, and therefore waste water generation, within the New Drug Product facility.

The purpose of this summary is to provide an estimate of the worst case volume of waste water that may be generated within one module of the NDP facility, during the course of a week.

When requesting a drainage allowance, it should be noted that in the future, two modules will be running simultaneously, so the future waste water generation for the new site may be double the figures illustrated here.

The estimate is based on the WFI (Water for Injection) usage within the facility, as shown on the attached estimated production scheduling.

Every litre of WFI produced requires 1.3 litres of Towns Water as a feed source (so 0.3L wastage) therefore the Towns Water requirement for the WFI production is taken as the WFI volume multiplied by a factor of 1.3. This will all eventually be routed to the waste water system.

As there are various other unknown users, an estimate of additional water usage, of 2500L per day, has been added

The total volume of water sent to drain is therefore taken as the Towns Water usage, plus the additional water usage.

The key assumptions are as follows:

- There are 6 Parts Washer cycles run per week
- There are 6 Autoclave cycles run per week
- There are 7 Lyo CIPs (Clean in Place) run per week - one per batch (5 batches per week) and an allowance for two repeated CIPs
- There are 5 production batches run per week, with 6 hours of vial washing per batch
- Supply of Pure steam (and therefore supply of WFI to the Pure Steam Generator) to the filling line Air Handling Units and the main facility Air Handling Unit is continuous
- Water usage assumes facility at full future capacity

Day	WFI Usage (L)	Towns Water usage (L)	Additional water (L)	Total (L)
	Production schedule	WFI usage x 1.3	estimate	sum of TW + additional
1	25,202	32,763	2,500	35,263
2	22,400	29,120	2,500	31,620
3	22,400	29,120	2,500	31,620
4	24,494	31,842	2,500	34,342
5	20,882	27,147	2,500	29,647
6	11,044	14,357	2,500	16,857
7	6,300	8,190	2,500	10,690
Total Water to Drain - 1 module:				190,039
Average Daily water to Drain:				27,148
Minimum Requested Daily Allowance:				30,000

It should be noted that even with a daily discharge allowance of 30,000 litres of waste water, it will not be possible to discharge all waste waster generated, on certain days, leading to a potential backlog within the waste holding system, which would be an undesirable situation. 30,000L is therefore a minimum, and a greater allowable volume is preferred to allow each day's worth of waste water to be discarded with no holding period.

			Equipment																				
			1	2	3	4	5	6	8	9	10	10	11	12	13	14	15	16	8	9	10	12	14
			Vial Washer	Depyro tunnel	Filling Machine	Filling machine Isolator	LYO 1 ALUS	Lyo 1	Capper 1	ALUS 1 + Capper 1 Isolator	Tray Loader 1	LYO 2 ALUS	Lyo 2	Capper 2	ALUS 2 + Capper 2 Isolator	Tray Loader 2	Formulation Isolator	Formulation DFB	Parts Washer 6 runs per wk	Autoclave 6 runs per wk	WFI Generator	PSG	TOTAL WFI
Day	Time (of day)	Time from start																					
1 Mon	1:00																						
	2:00																	RUN IDLE				175	
	3:00	3																RUN IDLE				175	
	4:00	4																RUN IDLE	PW RUN			275	
	5:00	5																RUN IDLE	PW RUN			675	
	6:00	6																RUN IDLE	PW RUN			675	
	7:00	7																RUN IDLE				675	
	8:00	8																RUN IDLE				175	
	9:00	9																RUN IDLE				175	
	10:00	10																RUN IDLE				200	
	11:00	11																RUN IDLE				200	
	12:00	12																RUN IDLE				200	
	13:00	13																RUN IDLE				200	
	14:00	14																RUN IDLE	PW RUN			2000	
	15:00	15																RUN IDLE	PW RUN			2000	
	16:00	16																RUN IN USE	PW RUN			2000	
	17:00	17			PREP	PREP				PREP								RUN IN USE				200	
	18:00	18			PREP	PREP				PREP								RUN IN USE				200	
	19:00	19			PREP	PREP				PREP								RUN IDLE				175	
	20:00	20			PREP	PREP				PREP								FORMULATION				235	
	21:00	21			PREP	PREP				PREP								FORMULATION				235	
	22:00	22			PREP	PREP				PREP								FORMULATION				235	
	23:00	23	PREP	PREP	PREP	PREP	PREP	PREP	PREP	PREP								FORMULATION				175	25202
2 Tue	0:00		PREP	PREP	PREP	PREP	PREP	PREP	PREP	PREP								FORMULATION				175	
	1:00	1	PREP	PREP	PREP	PREP	PREP	PREP	PREP	PREP								FORMULATION				175	
	2:00	2	LOAD	LOAD	PREP	PREP	PREP	PREP	PREP	PREP								FORMULATION				275	
	3:00	3	LOAD	LOAD	PREP	PREP	PREP	PREP	PREP	PREP								FORMULATION				275	
	4:00	4	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE	PW RUN			675	
	5:00	5	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE	PW RUN			1449	
	6:00	6	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE				1449	
	7:00	7	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE				949	
	8:00	8	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE				949	
	9:00	9	LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE								RUN IDLE				949	
	10:00	10			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE				700	
	11:00	11			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE				175	
	12:00	12			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE				175	
	13:00	13			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE	PW RUN			275	
	14:00	14			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE	PW RUN			675	
	15:00	15			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE	PW RUN			2000	
	16:00	16			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE				2000	
	17:00	17			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IN USE				200	
	18:00	18			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IN USE				200	
	19:00	19			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IN USE				200	
	20:00	20			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IN USE				200	
	21:00	21			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								FORMULATION				235	
	22:00	22			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								FORMULATION				175	
	23:00	23	PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		PREP	PREP	PREP	PREP			FORMULATION				175	22400

Equipment

			1	2	3	4	5	6	8	9	10	10	11	12	13	14	15	16	8	9	10	12	14		
			Vial Washer	Depyro tunnel	Filling Machine	Filling machine Isolator	LYO 1 ALUS	Lyo 1	Capper 1	ALUS 1 + Capper 1 Isolator	Tray Loader 1	LYO 2 ALUS	Lyo 2	Capper 2	ALUS 2 + Capper 2 Isolator	Tray Loader 2	Formulation Isolator	Formulation DFB	Parts Washer 6 runs per wk	Autoclave 6 runs per wk	WFI Generator	PSG	TOTAL WFI		
3 Wed	Day	Time (of day)	Time from start																						
	0:00			PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		PREP	PREP	PREP	PREP	FORMULATION	RUN IDLE				175	175		
	1:00	1		PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		PREP	PREP	PREP	PREP	FORMULATION	RUN IDLE		PW RUN		275	175		
	2:00	2		LOAD	LOAD	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		PREP	PREP	PREP	PREP	FORMULATION	RUN IDLE		PW RUN		675	175		
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	5:00	5		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		LOAD	LOAD	STANDBY	RUN IN USE		RUN IDLE				949	175		
	6:00	6		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		LOAD	LOAD	STANDBY	RUN IN USE		RUN IDLE		AC RUN		949	175		
	7:00	7		LOAD	LOAD	FILL	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	LOAD	LOAD	STANDBY	RUN IN USE		RUN IDLE		AC RUN		1000	175		
	8:00	8				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE		AC RUN		1000	700		
	9:00	9				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				700	700		
	10:00	10				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				700	175		
	11:00	11				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				175	175		
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	14:00	14				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE		PW RUN		675	175		
	15:00	15				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE		PW RUN		675	700		
	16:00	16				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE		PW RUN		675	700		
	17:00	17				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				2000	700		
	18:00	18				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				2000	175		
	19:00	19				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE		AC RUN		2000	175		
	20:00	20				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IN USE		AC RUN		2000	175		
	21:00	21				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IN USE				575	175		
	22:00	22				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IN USE				275	175		
	23:00	23				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		RUN IDLE				175	175	22400	
4 Thu	0:00					STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		STANDBY	FD CYCLE	STANDBY	RUN IDLE		FORMULATION	RUN IDLE				175	175	
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	9:00	9		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD		RUN IDLE				474	700		
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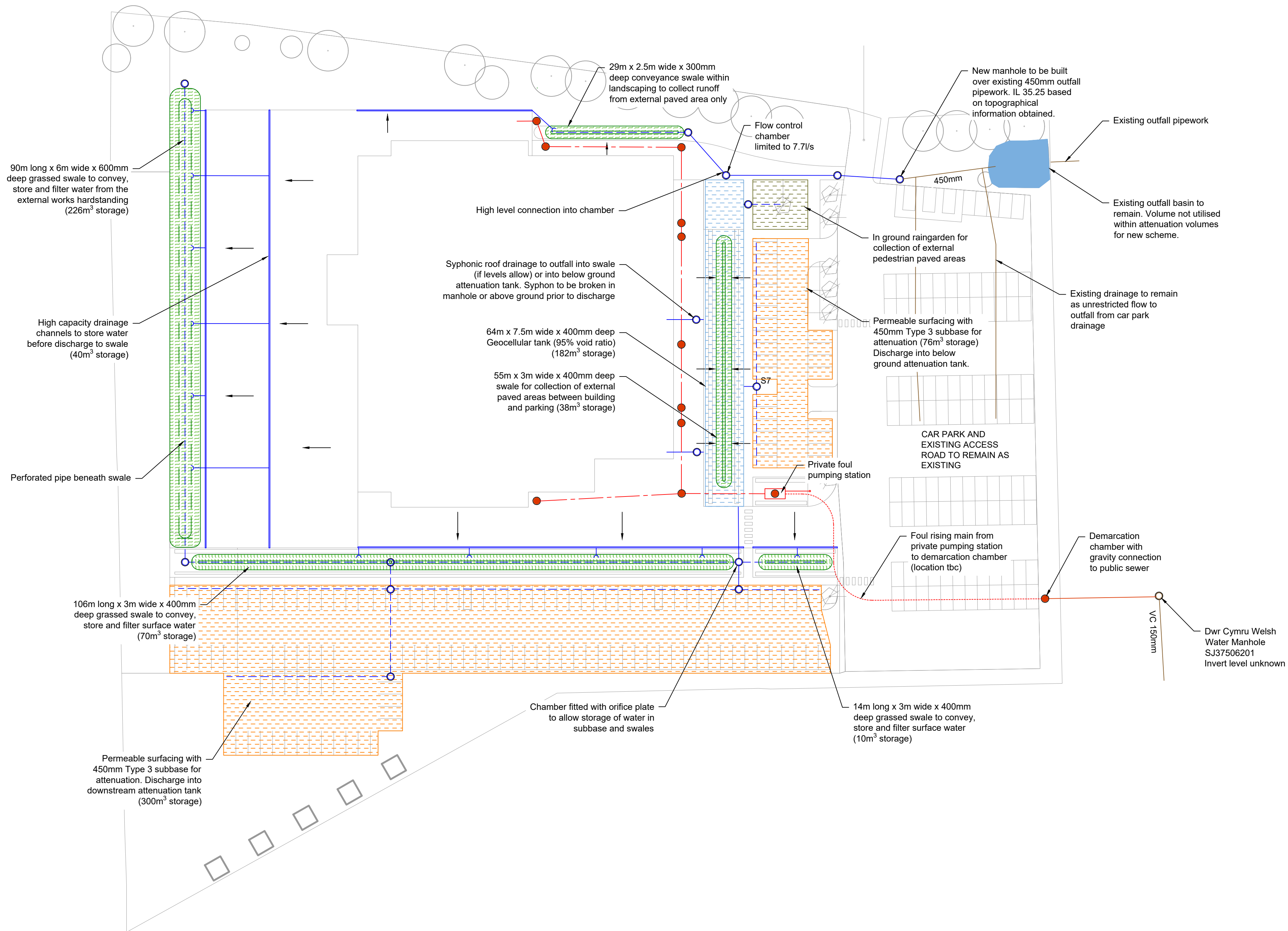
Equipment

			Equipment																				
			1	2	3	4	5	6	8	9	10	10	11	12	13	14	15	16	8	9	10	12	14
			Vial Washer	Depyro tunnel	Filling Machine	Filling machine Isolator	LYO 1 ALUS	Lyo 1	Capper 1	ALUS 1 + Capper 1 Isolator	Tray Loader 1	LYO 2 ALUS	Lyo 2	Capper 2	ALUS 2 + Capper 2 Isolator	Tray Loader 2	Formulation Isolator	Formulation DFB	Parts Washer 6 runs per wk	Autoclave 6 runs per wk	WFI Generator	PSG	TOTAL WFI
5 Fri	Day	Time (of day)	Time from start																				
		0:00			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY		FORMULATION	RUN IDLE			700	175	
		1:00			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY		FORMULATION	RUN IDLE			492	175	
		2:00			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY		FORMULATION	RUN IDLE			175	175	
		3:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	175	
		4:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	175	
		5:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	175	
		6:00		LOAD	LOAD	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	175	
		7:00		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	LOAD	LOAD	STANDBY	RUN IN USE						949	175	
		8:00		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	LOAD	LOAD	STANDBY	RUN IN USE						949	700	
		9:00		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	PREP	LOAD	STANDBY	RUN IN USE						1474	700	
		10:00		LOAD	LOAD	FILL	RUN IN USE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	PREP	LOAD	STANDBY	RUN IN USE						1474	175	
		11:00		LOAD	LOAD	FILL	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	LOAD	STANDBY	RUN IN USE						949	175	
		12:00				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE					949	175	
		13:00				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE					175	175	
		14:00				STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD	STANDBY	FD CYCLE	STANDBY	RUN IDLE					175	175	
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		16:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						700	700	
		17:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						700	700	
		18:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						175	175	
		19:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						2000	175	
		20:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						2000	175	
		21:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						2000	175	
		22:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						2000	175	
		23:00				STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE						671	175	20862
6 Sat		0:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IN USE			175	175	
		1:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IN USE			175	175	
		2:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IN USE			175	175	
		3:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IN USE			175	175	
		4:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IDLE			175	175	
		5:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IDLE			175	175	
		6:00			STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE			FORMULATION	RUN IDLE			175	175	
		7:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	175	
		8:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE		FORMULATION	RUN IDLE			175	700	
		9:00		PREP	PREP	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	PREP	FORMULATION	RUN IDLE			700	700	
		10:00		LOAD	LOAD	STANDBY	RUN IDLE	STANDBY	PREP	STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	PREP	FORMULATION	RUN IDLE			700	175	
		11:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	175	
		12:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	175	
		13:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	175	
		14:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	175	
		15:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	175	
		16:00		LOAD	LOAD	FILL	RUN IN USE	LOAD	LOAD	STANDBY	RUN IN USE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					949	700	
		17:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE	UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD					1474	700	
		18:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										700	175	
		19:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										175	175	
		20:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										175	175	
		21:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										175	175	
		22:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										175	175	
		23:00				STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE										175	175	11044

Equipment

			1	2	3	4	5	6	8	9	10	10	11	12	13	14	15	16	8	9	10	12	14
			Vial Washer	Depyro tunnel	Filling Machine	Filling machine Isolator	LYO 1 ALUS	Lyo 1	Capper 1	ALUS 1 + Capper 1 Isolator	Tray Loader 1	LYO 2 ALUS	Lyo 2	Capper 2	ALUS 2 + Capper 2 Isolator	Tray Loader 2	Formulation Isolator	Formulation DFB	Parts Washer 6 runs per wk	Autoclave 6 runs per wk	WFI Generator	PSG	TOTAL WFI
7 Sun	Day	Time (of day)	Time from start																				
		0:00			STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		1:00	1		STANDBY	RUN IDLE	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		2:00	2		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		3:00	3		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		4:00	4		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		5:00	5		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		6:00	6		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		7:00	7		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		8:00	8		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	700	
		9:00	9		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			700	700	
		10:00	10		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			700	175	
		11:00	11		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		12:00	12		SHUTDOWN	SHUTDOWN	STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		13:00	13				STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		14:00	14				STANDBY	FD CYCLE	STANDBY	RUN IDLE								RUN IDLE			175	175	
		15:00	15					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	700	
		16:00	16					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			700	700	
		17:00	17					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			700	175	
		18:00	18					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	
		19:00	19					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	
		20:00	20					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	
		21:00	21					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	
		22:00	22					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	
		23:00	23					UNLOAD	UNLOAD	UNLOAD	RUN IN USE	UNLOAD						RUN IDLE			175	175	6300

Appendix 5 - Proposed Drainage Strategy



- Notes
1. This drawing is the copyright of Land Studio. It must not be copied or reproduced without written consent and is to be read in conjunction with architectural and landscape architects drawings.
 2. Only figured dimensions are to be taken from this drawing. Dimensions should not be scaled from this drawing, as scaling of this drawing cannot be assured.
 3. All dimensions are to millimetres and all levels are metres above ordnance datum u.n.o.
 4. Any existing drainage information has been taken from third party information and must be checked prior to construction.
 5. Ground conditions are known to be of low permeability. Infiltration testing and contaminated land assessment to be undertaken to reduce volumes of attenuation where possible.
 6. Only main surface water design intent indicated. Additional drainage channels, gullies, chambers etc may be required during detailed design.
 7. Surface water to the existing 450mm outfall pipework (prior to existing basin) is to discharge at a rate of 7.7l/s (brownfield equivalent greenfield rate)
 8. Domestic and effluent foul drainage to discharge via a private pump station to a demarcation chamber on the site boundary with gravity discharge to the public sewer in Ash Road South. Restrictions if required to be confirmed by Dwr Cymru Welsh Water.

- KEY:
- Permeable surfacing with subbase attenuation in 30% void ratio
 - Open grassed swale
 - Below ground geocellular attenuation tank
 - In ground raingarden
 - Foul water manhole and pipework
 - Foul water rising main
 - Surface water manhole and pipework
 - Perforated pipework
 - Existing drainage pipework
 - Existing public sewer manhole
 - Proposed high capacity linear drainage channel/kerb drain
 - Existing open basin and outfall structure

P03	11.07.23	Updated to suit new site layout
P02	05.05.23	Updated to suit new site layout, foul outfall added
P01	06.04.23	Draft issue for planning
Rev	Date	Description

Client:
Ipsen
Project:
Ipsen NDP, Wrexham

Drawing Title:
Drainage General Arrangement

Drawing No:
330-LST-XX-XX-DR-D-0001

Drawn By: AW Date: 22.03.23

Checked By: LS Date: 11.07.23

Drawing Scale: 1:500 Sheet Size: A1

Rev: P03 Status: S3

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