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Surface Water Drainage Design Strategy

**Site Redevelopment
Link Road Huyton, Liverpool**

Link Recycling, Link Road, Huyton, Liverpool

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Introduction

Design Coordination Limited has been instructed to undertake the drainage design for the proposed redevelopment of an existing industrial site at Link Road In Huyton, Liverpool.

The purpose of this report is to outline the proposed design strategy undertaken for the proposed site redevelopment.

Existing Conditions

The site covers an area of approximately 0.45 hectares (ha) and is located at National Grid Reference (NGR) 345002, 390225. A location plan and an aerial image are included in Appendix A.

Ground Conditions

The ground conditions of the site are believed to be unsuitable for soakways to be considered due to the presence of clay which is unsuitable for the use of soakaway design.

Local Drainage

Public sewer records show the site benefits from both foul and surface water drainage in addition to an existing combined public sewers at the entrance to the site along Link Road with an existing private surface water sewer shown up to the entrance of the redevelopment site.

Surface Water Drainage Design & Maintenance Strategy

The proposed strategy for the surface water drainage from the redeveloped site is to design the individual building to have a flow control manhole within their demise which will limit the pass forward flow to an agreed rate.

The proposed discharge rate for the redeveloped site will be based on the existing 1 in 2 year 15 minute discharge rate with 50% betterment being applied.

The existing 1 in 2 year rate for the site is 48.3 l/s, which will be reduced to 50% resulting in the proposed pass forward rate of 24 l/s for the new surface water design to be agreed with the LLFA and United Utilities.

The drainage design incorporates oversized pipes and manholes within the drainage network to provide sufficient attenuation storage.

The drainage network is designed to achieve the following criteria :

- Criteria 1, 1 in 30 year with 0% climate change allowance with no surcharging of the below ground drainage network
- Criteria 2, 1 in 100 + 40% climate change allowance with no flooding above ground,
- Criteria 3, some localised flooding allowed within the service yards for exceedance events above the 1 in 100 + 40% climate change allowance.

The system is designed to ensure no flooding occurs off site for the 1 in 100 year + 40% climate change allowance scenario, and in accordance with the previously agreed discharge rates.

The below ground drainage network will incorporate a fuel separator within the system to contain any flows from service yards and car parking areas which present any oil or fuel spills.

The final outfall manholes will be fitted with proprietary flow control devices to limit the flows to the agreed rates, and be installed with an over flow pipe to avoid flooding should a blockage occur.

The final outfall manhole should be periodically inspected (every 3 – 6 months) to ensure there are not any blockages present or flooding within the manhole and to ensure this is working as originally intended.

The site levels are proposed to direct any overland flood flows from the site towards the existing site access road which is assumed to follow the existing formed topography of the site.

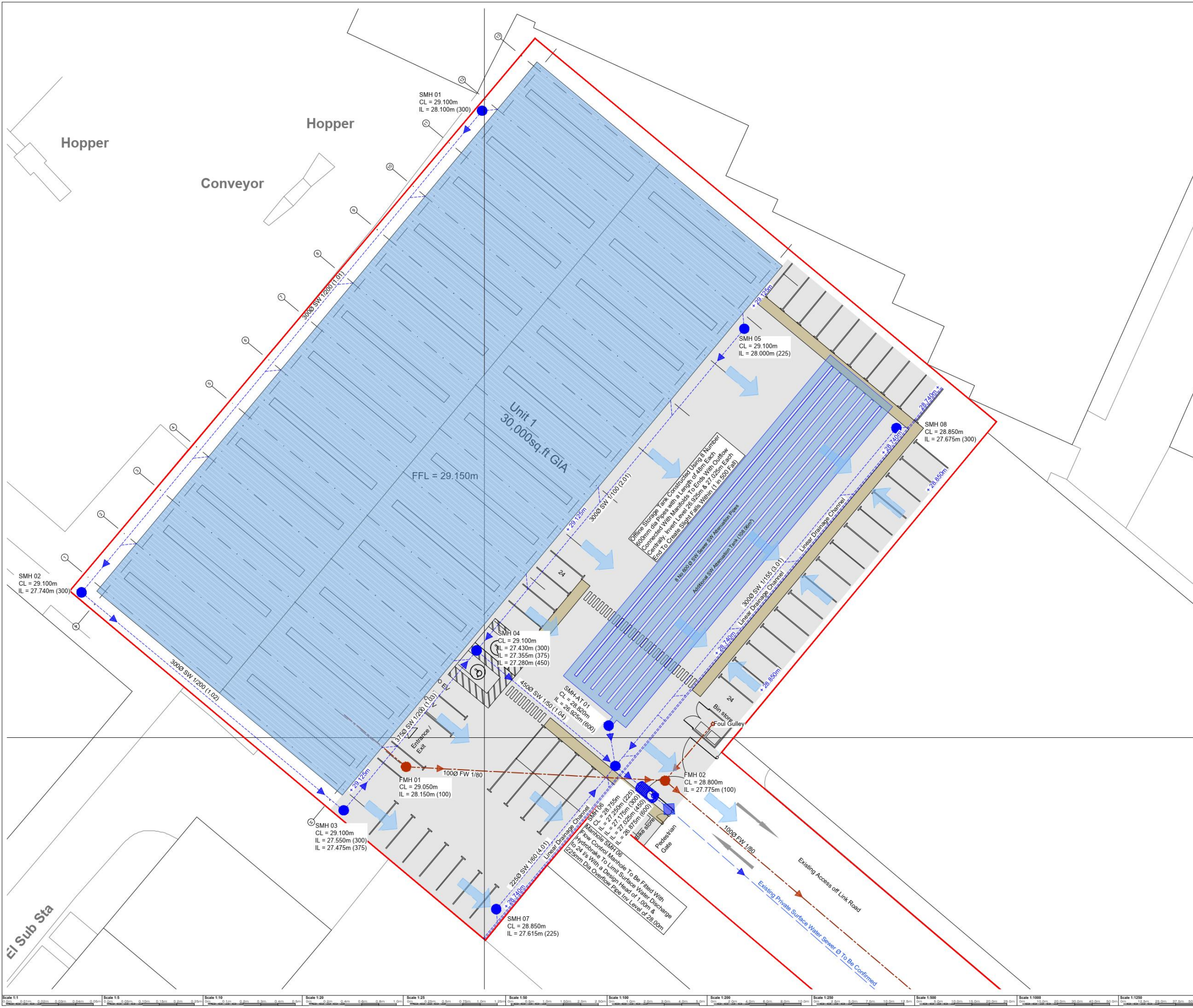
Flood Zone Category

The site is located within flood zone 1, meaning it has a less than 0.1% annual probability of flooding.

Development Vulnerability Classification

The proposed commercial development is considered to be 'less vulnerable' development.

Appendix A - Proposed Drainage Plan



DRAINAGE NOTES

- This drawing shall be read in conjunction with all other relevant drawings.
- Any ambiguities, omissions and errors on Drawings, shall be brought to the Engineers attention immediately.
- The Contractor shall confirm the location and level of existing drainage outfalls prior to commencement of the drainage works.
- Exact locations of proposed manholes and inspection chambers to be determined on site.
- All pipes built into the manhole inverts shall be installed with soffits levels. Unless shown otherwise, connections to road gullies shall be in 150mm nominal bore. Connections to other terminal fittings shall be in 100mm nominal bore pipe. Unless shown otherwise.
- Cover levels shown are approximate and shall be adjusted and confirmed on site by the Contractor. The Contractor shall control accurate line and level of pipe laying by use of an optical laser.
- The Contractor shall protect the pipeline from damage by site traffic during construction.
- Pipework and fittings shall comply with the following requirements except where noted otherwise:
 - All cast iron shall be of more than 3 storeys i.e. extending above ground + 3) to be 750mm below lowest branch, i.e. not 600mm below GFL. All other cast iron to be minimum 450mm below FFL.
 - All drains passing through walls or foundations to have 600mm long rocker pipes either side with concrete surround and soft joint at coupling.
 - All SVP and stub stack connections to have sealed access covers for rodding and clearing.
 - Pipework with less than 600mm cover from finished road level shall be protected with a 150mm C20 concrete bed and surround. Flexible joints shall be maintained at 3 metre centres in pipe joints with compressible sheet 15mm thick.
 - Trenches in highways and car parking areas shall be backfilled with Type 1 granular sub-base.
 - Soft spots in the trench formation shall be removed and replaced with granular bedding unless instructed otherwise.
 - Road gullies shall be constructed using a 900mm deep x 375mm diameter gully pot, surrounded by 150mm thickness C20 concrete, with rising eye and chained stopper.
 - Gully covers shall be Grade B captive hinged ductile iron to BS487 black coated.
 - Unless noted otherwise manhole covers shall be ductile iron to BS487 black coated with 600 x 600 square opening as follows:
 - Highways - Class D405
 - Car Parks - Class C250
 - Landscaped - Class B125
 - Connections in pipes between manholes runs shall be formed by using purpose made 45° junction fittings to BS65. Bent fittings shall be provided where appropriate to direct the flow into the main runs. Alternatively man pipes may be diamond cored to take lateral connections with a saddle fitting to BS65 and 150mm C20 concrete surround.
 - The Contractor shall confirm the location of all existing statutory undertakers apparatus and service connections by trial pits prior to opening up for the works.
 - All inlet and outlet pipes from manholes require rocker pipes in accordance with LJI standard Details.

Materials

- Protection to drains and gully connections may be concrete bed and surround between cover depths of 450mm to 200m.
- All pipes and joints for use in drains shall comply with the manufacturers requirements.
- Clay Pipes
 - Clay pipes to be used for sewage shall be British Standard pipes and pipes for surface water shall be either 'British Standard' or 'British Standard'.
 - Surface Water' all manufactured to the requirements of BS EN 295 and BS651961. The pipes shall be Type 1 sockets and supplied complete with the manufacturer's recommended flexible joints, or with Type 2 sockets for cement mortar joints or plain ended pipes supplied with sleeve couplings.
 - Waterlight Flexible Joints for clayware pipes shall comply with BS EN 295 and BS651961.
- Concrete Pipes
 - Concrete pipes for general drainage shall comply with the requirements of BS EN 1916:2002 and BS6911-1:2002, except that they may be complete with waterlight flexible joints, as supplied by the manufacturer.
 - Waterlight flexible joints shall be so constructed as to tolerate a longitudinal movement of 10mm without breaking the seal.
- Unplasticised Polyvinyl Chloride (PVC-U) Pipes shall conform to BS EN 1401-1:2009, BS EN 1558-1:2003, BS5556:1999 and BS6460:2000 for pipes up to 1600mm nominal external diameter and to BS EN 1401-1:2009 for pipes above 200mm nominal external diameter.
- Pipe bedding and backfill of underground pipes shall be in accordance with BS EN 5955, Part 6 Installation of PVC-U pipework for gravity drains and sewers, or the BBA Certificate.
- Substrate material is defined as granular material in accordance with the recommendations of BS EN 5955, Part 6, 180 having a nominal particle size not exceeding 10mm or 14mm for 110mm and 160mm diameter pipes respectively, or that which passes the tests described in Appendix A of the above standard.
- Drains under buildings
 - Where drains are required to be laid under buildings, deep hardcore from within the foundation boundaries should be compacted prior to excavating the trench for the pipe. Suitable material should then be employed for the bedding and backfilling.
 - When trenches are dug from original ground, pipes may be laid and surrounded with appropriate material before the top layer of hardcore is placed. Where pipes pass through a wall or foundations of a building, they should be protected by a inlet or sleeve.
- Shallow drains - Where there is risk of damage, pipes laid at less than 600mm depth (but not under a road) should be protected by use of a paving slab or similar. A minimum 75mm cushioning layer of granular material must be laid between any slab and the crown of the pipe.
- Pipes laid under roads - The minimum cover under roads should be 0.6m from the top of the pipe. Where this is less than 0.6m additional protection is required i.e. reinforced bedding slabs.

Drainage Key

- Denotes: New Foul Water Manhole Chamber
- Denotes: New Surface Water Manhole Chamber
- Denotes: SW Bypass Point Interceptor (Kargaster VSP006)
- Denotes: Existing SW Public Sewer
- Denotes: Existing Foul Drainage (Public Sewer)
- Denotes: Existing & Proposed Overland Surface Water Flood Routes
- Denotes: Proposed Office Surface Water Attenuation Tanks

Surface Water Drainage Strategy - (Site Redevelopment)

The proposed strategy for the surface water drainage from the developed site will be to design the Building Redeveloped Site Building to have a flow control manhole within their domain which will limit the pass forward flow to a Reduced Rate to that of the existing Site Drainage.

The proposal looks to apply 50% betterment to the existing 1 in 2 year 15 minute rainfall which currently equates to 48.3 l/s total for the Redevelopment Site Area of 4548m² (0.4548 ha).

The proposed drainage design will adopt a discharge rate of 24.0 l/s pass forward (to be agreed with both the LFA & United Utilities) with the system being able to retain up to and including the 1 in 100 + 40% climate change allowance within the below ground piped network including the offline storage tank.

The drainage design incorporates oversized pipes and manholes within the drainage network to act as attenuation storage in addition to the offline storage tank located close to the final outfall manhole.

The drainage system has been designed to achieve the following criteria:

- Criteria 1: 1 in 30 year with 0% climate change allowance with no surcharging of the below ground drainage network.
- Criteria 2: 1 in 100 year + 40% with no flooding above ground.
- Criteria 3: some localised flooding allowed within the service yards for exceedance events above the 1 in 100 + 40% climate change allowance.

The system will be designed to ensure no flooding occurs off site for the 1 in 100 year + 40% allowance and in accordance with agreed final discharge rates.

The below ground surface water drainage system will incorporate petrol interceptors within the system to contain any flows from service yards and car parking areas in addition to the surface water from the roof which present any oil / fuel spills.

The final Outfall Manholes will be fitted with proprietary flow control devices to limit the flows to the agreed rates, and be installed with an overflow pipe to avoid flooding should a blockage occur. Overflow Levels will be set to be in Line With Surface Water Levels Within The Designed System for the 1 in 100 + 40% Scenario.

The final outfall manhole should be periodically inspected (every 3-6 months) to ensure there are not any blockages present or flooding within the manhole and to ensure this is working as originally intended.

The site levels will be designed to direct any overland flood flows from the site towards Riverbank Road which follows the existing formed topography of the site.

Drained Areas Schedule

Unit Building Roof	~ 2,880m ²
Unit Service Yard & Access Road	~ 2,278m ²