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DRAINAGE STRATEGY & FLOOD RISK ASSESSMENT

NOVARTIS – PHASE 1&2
HORSHAM, WEST SUSSEX

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for

NOVARTIS – PHASE 1&2
HORSHAM, WEST SUSSEX

Client:
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CONTENTS

Appendices

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1.0 Executive Summary

Following the granting of outline planning permission (Ref: DC/18/2687), Arch Associates has been appointed by Lovell Partnerships to prepare the detailed foul and surface water drainage strategy and flood risk assessment.

The 2.69ha site is bound by Parsonage Road to the north and Wimblehurst Road to the West. The site contains an existing 1930s Art Deco building, which is situated along the eastern boundary. The existing railway line encompasses the southern boundary. Under the new proposals, 206 dwellings will be erected with associated access, parking and landscaping.

The proposed foul water drainage system will discharge to an existing Southern Water foul water manhole within Parsonage Road, which is noted to be contain 225mm diameter incoming/outgoing sewers and flow in an westerly direction. Due to the existing topography, approximately 60 dwellings located to the south of the site will discharge to a new on-site package pumping station that will pump the flows back up to a manhole situated near to the main entrance of the heritage building. At this point, it will meet the foul water drainage collected via gravity from the rest of the site, so that one singular gravity connection into the existing Southern Water foul water manhole will be made within Parsonage Road.

The proposed surface water strategy consists of a gravity sewer system, a SuDS management train in the forms of tanked permeable paving, cellular attenuation crate system and flow control units. The surface water run-off from the development will be attenuated via cellular attenuation crate systems and will discharge into an existing Southern Water public storm water manhole at a restricted flow rate of 44.5 l/s. The proposed surface water strategy is discussed in more detail in Section 3.2.

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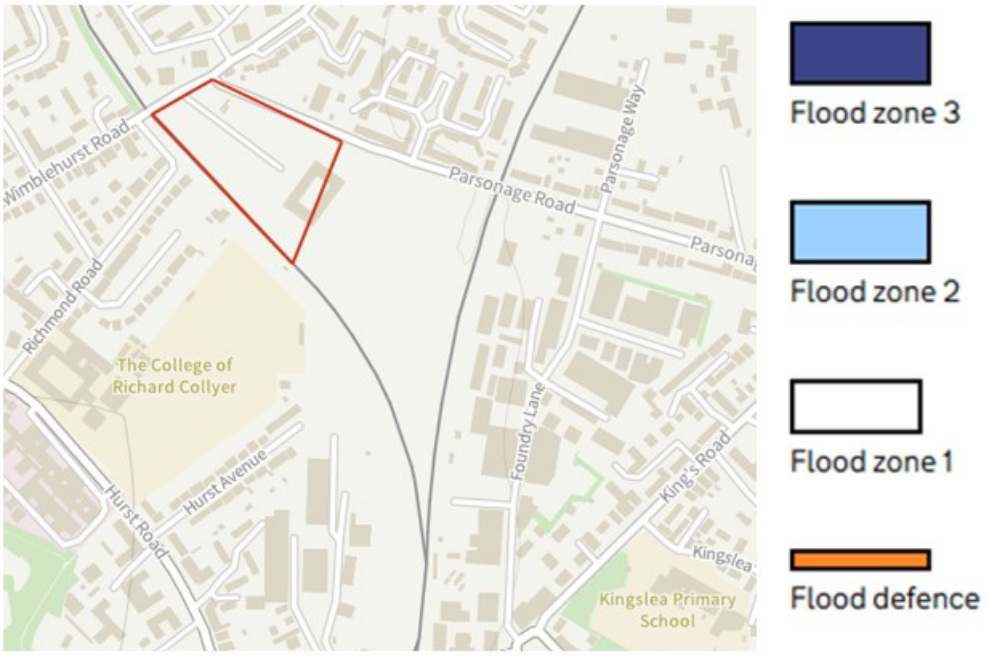
2.0 The Site

The site currently comprises areas of both soft and hard landscaping, with the singular heritage building on-site being retained and renovated under the proposed works. Buildings on site previously associated with pharmaceutical works have since been demolished. The proposed site is bound by Parsonage Road to the north and Wimblehurst Road to the West. The site contains an existing 1930s Art Deco building, which is situated along the eastern boundary. The existing railway line encompasses the southern boundary. Under the new proposals, 206 dwellings will be erected with associated access, parking and landscaping.



A review of the UK Government's Flood-Warning Information Services mapping online indicates that the site is entirely within Flood Zone 1 and therefore is at very low risk of flooding from tidal and fluvial services, including the nearby watercourses Boldings Brook to the west and Channells Brook to the north. Refer to the image above.

A review of the UK Government's surface water flood risk map indicates that the site is largely within an area that does not report any surface water flooding. The mapping indicates that there is an extent of flooding for the 1 in 1000 year event (shown above), which substantially decreases within the 1 in 100 year event and again in the 1 in 30 year event. Consideration has been given to these areas within the detailed design to prevent ponding within this areas and the overland flow routes have been identified (refer to Appendix 6). Buildings would remain safe due to the FFLs being set at a minimum of 150mm above the proposed external ground levels. The site is not located nearby to any reservoirs and so is not subject to flooding from this source.

2.1 Existing Site Topography and Drainage

The site is generally flat and comprises shallow slopes with an overall gradient fall from north-east to south-west. The topography survey shows the highest spot level within the site is circa 58.99.50mAOD adjacent to the existing access off Parsonage Road, and the lowest spot is circa 55.56mAOD located adjacent to the railway line along the southern boundary of the site.. Refer to the topographical and utility survey in Appendix 2.

Review of the Southern Water asset plan confirms that there are existing surface and foul water main sewers present outside the site. A run of an existing 225mm diameter foul water main sewer is present along Parsonage Road, travelling in a north-westerly direction. Regarding the storm water sewers, there is a somewhat parallel run to the foul water sewer within parsonage road, also travelling in a north-westerly direction. The diameter for this sewer is 300mm. The asset plan does not identify any public sewers within the site boundary.

The asset plan also shows a diverted storm water run that travels just outside of the eastern boundary in a south-westerly direction. This run varies in size, changing from a 600mm diameter pipe to a 750mm diameter pipe, which then reverts back as it travels to the south-east. There is a small length of 375mm diameter pipe that connects into a manhole within the railway line footprint. Refer to the drainage drawings in Appendix 6. A 3.5m easement has been applied either side of the public storm sewer external face and works within the easement have been kept to a minimum where feasible. Refer to the Southern Water Sewer Plan in Appendix 3.

Arch Associates are appointed to consider applications on the wider Novartis site, which has existing brownfield runoff rates as given below. These rates are equivalent to a previously consented outline scheme (Ref: DC/18/2687, granted on 11/02/2020).

Wider Site Brownfield Runoff		
Storm Return Period	Rainfall Rate (mm/hr)	Existing Flow Rate (l/s)
1 in 1 Year	29.648	392
1 in 2 Year	38.338	506
1 in 30 Year	72.682	961
1 in 100 Year	94.179	1245
1 in 100 Year + 40%	131.851	1743

Phase 1&2 Site (Prorated) Brownfield Runoff		
Storm Return Period	Rainfall Rate (mm/hr)	Existing Flow Rate (l/s)
1 in 1 Year	29.648	130
1 in 2 Year	38.338	169
1 in 30 Year	72.682	320
1 in 100 Year	94.179	415
1 in 100 Year + 40%	131.851	581

Since the National Standards for SuDS was published in June 2025, the discharge rate for the wider Novartis site has been reviewed against the guidance to ensure compliance. As per 3.18 of the National Standards for SuDS guidance, the peak allowable discharge rate from the development to surface waters or sewers for the 50% AEP event shall be limited to the equivalent 50% AEP greenfield runoff rate, or 3 l/s/ha, whichever is the greater. The UK SuDS tool for greenfield runoff rate estimation has been used to establish a 50% AEP greenfield runoff rate of 26.6 l/s. Refer to Appendix 9 for greenfield runoff rate calculation.

As noted in 3.21.1 of the National Standards for SuDS guidance, a relaxation factor of up to 5 times the greenfield runoff rate can be applied for previously developed (brownfield)

sites. This increases the flow rate to 133 l/s for the wider Novartis site. The new prorated maximum discharge rate for Phase 1&2 will now be 44.5 l/s.

The proposed surface water strategy on this site seeks to limit the proposed flow rate in all storm events up to the 1 in 100 year event plus climate change to the 50% AEP greenfield runoff rate with a 5 times relaxation factor, which equates to 44.5 litres per second.

A CCTV survey undertaken by Murphy Geospatial Ltd on 2nd December 2024 provides greater clarity on the existing Southern Water surface water outfall manhole that the drainage design discharges to. Refer to the CCTV report presented in Appendix 4.

Geology

BGS online mapping indicates that the bedrock beneath the site is Upper Tunbridge Wells Sand, which comprises sandstone and mudstone. The mudstone is present adjacent to the existing 1930s Art Deco building, with the rest of the site comprising sandstone and mudstone. BGS mapping suggests that no Superficial Deposits are present.

A site-specific ground investigation has been carried out by Leap Environmental Ltd in May 2021. The site investigation report confirms the BGS findings of the Upper Tunbridge Wells Sands. The extract of the Ground Investigation below highlights the depths and descriptions of the geology that was encountered within exploratory holes, including the depth of Made Ground on site.

Depth From (m AOD)	Depth To[17] (m)	Soil Type	Description
GL (56.58 / 57.52)	0.15 / 0.4 (56.18 / 57.12)	TOPSOIL	Dark brown silty clay TOPSOIL.
GL / 1.2 (57.28 / 56.01)	0.2 / 4.05 (56.14 / 52.88)	MADE GROUND	Variable MADE GROUND generally comprising grey demolition fill of fine to coarse and cobbles of brick and concrete and occasional blacktop with localised pockets of black gravel of crystalline rock and areas of red sandy gravelly fill with gravel of fine to coarse brick and concrete
GL / 1.2 (56.42 / 56.08)	0.5 / 2.0* (55.92 / 54.36*)	REWORKED SOIL[18]	Reworked soils comprising grey to brown clayey silt or silty clay occasionally with fragments of fine to coarse brick or concrete pockets containing frequent reworked sandy siltstone or silty sandstone fine to coarse gravel was noted in locations TP118, TP132 and TP136.
0.15 / 2.0 (57.68 / 54.70)	0.6* / 3.1* (57.23* / 54.52*)	Interbedded CLAY & SILT	Interbedded firm becoming very stiff mottled grey to brown and silty CLAY and clayey SILT.
0.8 / 4.05 (56.51 / 52.88)	6.0 / 13.55 (51.37 / 43.38)	Interbedded MUDSTONE, SILTSTONE & SANDSTONE	Extremely weak to very weak reddish brown to dark grey interbedded occasionally laminated ferruginous MUDSTONE, SILTSTONE and SANDSTONE. Occasionally thin coal beds and minor deposits encountered within the sandstone strata.
2.6 / 7.3 (54.77 / 49.12)	20.5* (36.63*)	Interbedded MUDSTONE, SILTSTONE & SANDSTONE	Weak reddish brown to dark grey interbedded laminated ferruginous MUDSTONE, SILTSTONE and SANDSTONE. Occasionally thin coal beds and minor deposits encountered within the sandstone strata.

During the trial hole tests, shallow groundwater levels were encountered. 3no. soakage tests were undertaken in March 2021 for establish an infiltration rate for the site, however the results were not compliant with BRE365 due to the water level not falling to 75% of the maximum water depth. In 2no. cases, the tests were abandoned as the water level remained unchanged for 5 hours. The extract below summaries the soakage test results.

Test Location	Soakage Rate		Comments
	m/s	l/m²/min	
TP126A	1.67E-07	0.0088	Water level did not fall to 75% of the maximum water depth and as such the results are not compliant with BRE DG365 requirements.
TP138	-		Water level remained unchanged for 5 hours at which point the test was abandoned.
TP147	-		Water level remained unchanged for 5 hours at which point the test was abandoned.

To complete testing, an additional pit was filled to 1.0mbgl and an infiltration rate of 1.47 x 10^{-7} m/s was established. The recommendations given by Leap Environmental LTD note that due to the high groundwater table and low infiltration rate, the soils present on site are not suitable for drainage via infiltration and that the drainage strategy should involve the surface water being discharged off site via piped system.

3.0 Proposed Foul and Surface Water Drainage

3.1 Foul Water

The new foul water gravity system will be integrated with the existing Southern Water foul water manhole located within Parsonage Road. Due to the existing topography, approximately 60 dwellings located to the south of the site will discharge to a new on-site package pumping station that will pump the flows back up to a manhole situated near to the main entrance of the heritage building. At this point, it will meet the foul water drainage collected via gravity from the rest of the site, so that one singular gravity connection into the existing Southern Water foul water manhole will be made within Parsonage Road.

The proposed foul water drainage strategy has been designed in accordance with the Sewerage Sector Guidance – Appendix C and Part H of the Building Regulations. Refer to Appendix 6 – Drainage Strategy Drawing for details.

A pre-development enquiry request will be made with Southern Water in due course to establish the capacity of the existing sewer network within the vicinity area and whether this proposal would be acceptable, and to identity any incidents of localised flooding caused by their existing drainage regime. The hydraulic design for the discharge rate for the foul wastewater design has been calculated in accordance with Sewerage Sector Guidance – Appendix C which states design flow rates for dwellings should be 4000l/day. Therefore, the discharge rate for the proposed residential development of 250 dwellings equates to a peak foul discharge rate of approximately 9.5 litres/second.

3.2 Surface Water

Given the site topography, high groundwater table and infiltration rates obtained during the ground investigation (refer to Appendix 4), drainage via infiltration is not a viable solution. There are no nearby watercourses to outfall into, therefore it is proposed that the new surface water drainage will be attenuated through the use of tanked permeable paving and cellular attenuation crate systems before discharging into an existing Southern Water public storm water manhole at a restricted flow rate of 44.5 l/s. The tanked permeable paving and cellular attenuation tanks will be lined with an impermeable membrane to avoid collecting groundwater and losing storage capacity.

The total site area is circa 26,900m^2, which comprises both soft and hard landscaping. The existing impermeable area equates to approximately 10,250m^2 and the post-development impermeable area will be approximately 14,250m^2, resulting in an increase

of surface water volume leaving the site. With a 10% increase in the impermeable area to account for Urban Creep, the impermeable area increased to 15,675m^2.

The proposed surface water strategy consists of a gravity sewer system, a SuDS management train in the forms of tanked permeable paving, cellular attenuation crate system and flow control units. Refer to Appendix 6 – Drainage Strategy Drawings for details.

The storage volume and relevant levels of the attenuation tanks can be seen with the Drainage Strategy Drawings in Appendix 6. The crates are be Hydro-International Stormbloc / Stormbloc Extra / PolyStorm Xtra or similar approved. The proposed attenuation storages have been designed to attenuate the 1 in 100 year storm + 45% climate change + 10% urban creep storm event. Refer to Appendix 7 for the drainage calculations.

The proposed SuDS will provide a correct level of water treatment determined based on the SEPA's Water Quality SuDS Assessment undertaken, refer to the section on SuDS Treatment Train Components.

Overland/surface exceedance flows due to extreme events or blockage of drainage systems would naturally flow towards the south-western site boundary, toward the railway mirroring the existing conditions. The buildings would remain safe due to the FFL being set at a minimum of 150mm above the proposed ground levels.

SuDS Treatment Train Components

As shown on the proposed drainage layout, the rainwater falling on impermeable roofs will be collected and directed to the gravity system. Rainwater falling on the external

hard surfacing, including the roads, driveways and car park, will similarly be directed into the gravity system.

Based on the guidance in CIRIA C753, the following analysis has been undertaken with the relative mitigation indices for the proposed levels of treatment taken from CIRIA C753 Tables 26.3 (surface waters) and Table 26.4. The resultant assessment is summarised within the Tables below.

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Low Traffic Roads*	Low	0.5	0.4	0.4
	Pollution Mitigation Indices			
Rain Garden		0.8	0.8	0.8
Sufficiency		**Sufficient**	**Sufficient**	**Sufficient**

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Parking*	Low	0.5	0.4	0.4
	Pollution Mitigation Indices			
Porous Paving		0.7	0.6	0.7
Sufficiency		**Sufficient**	**Sufficient**	**Sufficient**

*Given the varied land use across the proposed site, the contributing land use type with the highest pollution index is selected for the assessment of each pollution mitigation component.

4.0 Maintenance of SUDS features:

The maintenance regime of the surface water drainage system and its components is outlined within the accompanying Arch Associates Limited SuDS Maintenance Manual.

5.0 Protection of the Drainage System During Construction:

All building materials on site shall be stored on a flat surface, and that the manufacturer's recommendations regarding storage are being followed Which may include avoid extended exposure to sunlight, protection from damage etc.

Runoff shall be prevented from entering the constructed pipe systems and tanks during the construction with measures including capping off the pipe openings and covering the tanks with geotextile and membrane protection sheets.

The excavated trenches in which tanked systems are constructed should be kept free of both groundwater and surface water runoff, and pumping system shall be put in place should the ingress of groundwater encountered.