



Hydrotec and Engineering Consultants

Develop Design Deliver

Drainage Strategy and SuDS

Adjacent to 17 Prospect Place

Heywood, Rochdale

September 2024

CLIENT:

Mr Naeem Shaukat

Reference: 24/IPS/drainage/SuDS/Prospect Place/Heywood

INSTRUCTION:

Hydrotec and Engineering Consultants was commissioned by Mr Naeem Shaukat to carry out a drainage strategy and SuDS design for the proposed residential development adjacent to 17 Prospect Place, Heywood, Rochdale, OL10 4JQ.

SCHEME:

Erection of a new block of three numbers of terraced dwellings with rear gardens.

REQUIREMENT:

Surface water drainage strategy and SuDS design for the proposed residential development to assist the planning application's requirement.

DOCUMENT REVIEW & APPROVAL

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Executive Summary

A flood risk assessment (FRA) and surface water drainage strategy were conducted to assist the planning application's requirement for the proposed development on the land adjacent to 17 Prospect Place, Heywood, Rochdale, OL10 4JQ. The national grid reference number of the development site is SD 85900 11113 ("the Site"). The proposed development is the erection of a block of three terraced dwellings with associated rear gardens.

The present FRA and surface water drainage strategy of the Site were made with the available information including the latest Environment Agency's (EA) flood maps, the latest FEH hydrological data, topographical elevation data (LiDAR), soil map data and sewer maps data of United Utilities.

The present investigation suggests that the Site is in flood zone 1 and therefore the Site is considered to be out of fluvial and coastal flood risk.

The Site is at a very low surface water flood risk - according to the EA's flood map; moreover, the hydrological and topographical elevation data suggest that the impact of the overland flow from the Site's surroundings would be minimal. In addition, the Site is not at risk of groundwater or reservoir flows. The Site is also not considered to be a foul water flood risk.

The attenuation storage calculation was performed for the generated surface water runoff within the Site and no external flow was taken into account from the surrounding areas. The investigation was made at 20% AEP, 10% AEP, 3.3% AEP and 1% AEP including climate change allowance to assist the sustainable drainage systems (SuDS) design. The attenuation requirements for the whole site at 3.3% AEP and 1% AEP are 0m³ and 0m³; and with climate change allowance 0m³ and 1m³, respectively.

The proposed development would not increase the impervious surface area, rather it would reduce the impervious land by approximately 38% compared to the existing condition. Thus, it would provide better sustainable drainage to the Site itself or its surrounding areas. In addition, the proposed eco-friendly layout design and rear gardens would assist in a better drainage system. Due to the space restrictions, it would not be appropriate for soakaway design to attenuate excess runoff and it would not be suitable for the discharge of excess runoff to Millers Brook because

of third-party land ownership. There is no existing surface water sewer drainage network adjacent to the Site and therefore the excess surface water runoff would be discharged to the combined sewer drainage system next to the Site.

There would be pervious pavement on the proposed path next to 17 Prospect Place and each dwelling would utilise water butt, reducing the surface water runoff. The rear garden would contain grassland with permeable topsoils, assisting water quality improvement by reducing the suspended solid and silt materials.

United Utilities has given a consent agreement in principle that the existing sewer drainage system has sufficient capacity to accommodate the outfall from the proposed development. In the proposed sewer drainage network, the diameter of the drainage pipes would be 100mm and the gradient of the pipes would be 1 in 80 or more to assist in gravity flow. The cover level of the proposed manhole would be ground level and the invert level would be set up to provide the required gradient.

The Site is not a risk to surface water drainage and therefore the finished ground floor level of the proposed dwellings would be at the ground level, however, it is highly recommended to raise the finished ground floor level by an additional 150mm from the ground level. The access and egress from the Site during any flooding incident would be at Prospect Place located in front of the Site.

The generated wastewater flow by the proposed development was estimated to be 0.016 litres/sec. It should, however, be mentioned that the final formal consent agreement from United Utilities will be obtained before utilising the proposed development.

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Abbreviations

AEP	Annual Exceedance Probability
CCA	Climate Change Allowance
DWF	Dry Weather Flow

DTM	Digital Terrain Model
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	meter Above Ordnance Datum
NGR	National Grid Reference
OS Map	Ordnance Survey Map
SuDS	Sustainable Drainage Systems

1 Introduction

The flood risk and sustainable drainage are important aspects of any new and existing development sites. The flood, which is being enhanced in the recent time due to the global climate change effects, could make vulnerable the properties, communities, and many aspects of human life. Therefore, it is important nowadays to assess the flood risk of any new developments; and the National Planning Policy Framework¹ (NPPF) guidelines have given the authority to the Environment Agency² (EA) and local planning authority (LPA) to make sure that any developments should be considered the flood risk assessment from all possible sources for the planning authorisation. These are not only securing the minimum risk at the proposed development site but also reducing the risk to the other existing developments.

Generally, a new development would provide an improvement with better facilities to the users and the communities, but it should also make a satisfaction that the proposed development would not and should not deteriorate to on-site and/or off-site other existing developments in the surrounding areas during its design life. Therefore, it has been a policy of the NPPF, lead local flood authority (LLFA), LPA, water utility companies and other relevant authorities to assess and manage the sustainable surface water drainage systems of all possible sources for a proposed development before granting the planning permission. Thus, the aim of the present drainage assessment is to assist planners and designers with the design of blue-green sustainable drainage systems for the proposed residential development and reduce the flood risk to other existing developments in the surrounding areas.

1.1 Background of the project site

The proposed development (hereafter “the Site”) is the erection of a block of three terraced dwellings with associated rear gardens. According to the NPPF guidelines, the proposed development would therefore be classified as a more vulnerable category in terms of flood risk vulnerability classification³. The Site is located on the land adjacent to 17 Prospect Place,

¹ [National Planning Policy Framework - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279674/NPPF_2012.pdf)

² [Flood risk assessments if you're applying for planning permission - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279674/NPPF_2012.pdf)

³ [National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279674/NPPF_2012.pdf)

Heywood, Rochdale, OL10 4JQ. The national grid reference number (NGR) of the Site is SD 85900 11113. The geographical boundary of the project site lies within Rochdale Council’s remit who is the lead local flood authority (LLFA), providing advice and guidance for sustainable drainage systems (SuDS) for this development site. The existing conditions of the Site comprise a hard and compact surface surrounded by Prospect Place on the north and west sides; whereas there is a path on the south side, the rear side of the existing dwellings.

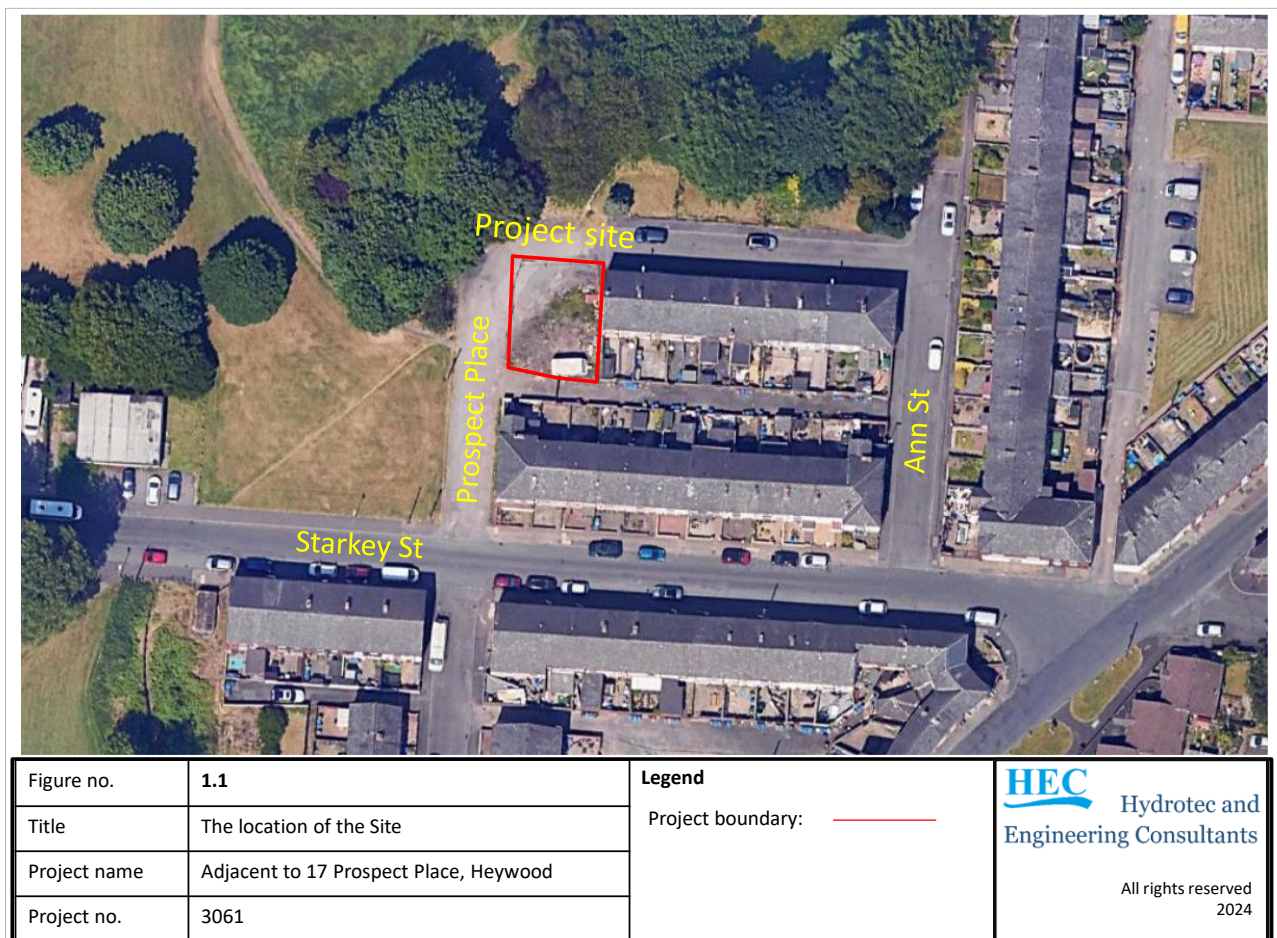


Figure 1.1: The location and existing condition of the proposed development site.

Generally, the adjacent areas consist of predominantly residential houses and Millers Brook is situated to the north, approximately 20m away from the Site. A part of Millers Brook is culverted passing through the west side northeasterly and then becomes an open channel, see also a culvert inspection report in Appendix II. Most of the northwestern side is covered with grassland and some trees and shrubs.

A satellite photograph of the existing condition of the project site is shown in Figure 1.1, and the layout of the proposed development is given in Figure 1.2 in addition to the detailed layouts of the proposed development in Appendix I. The total land surface of the proposed development is approximately 200m², and therefore it would be classified as a minor development⁴ - according to the Environment Agency's Standing Advice.

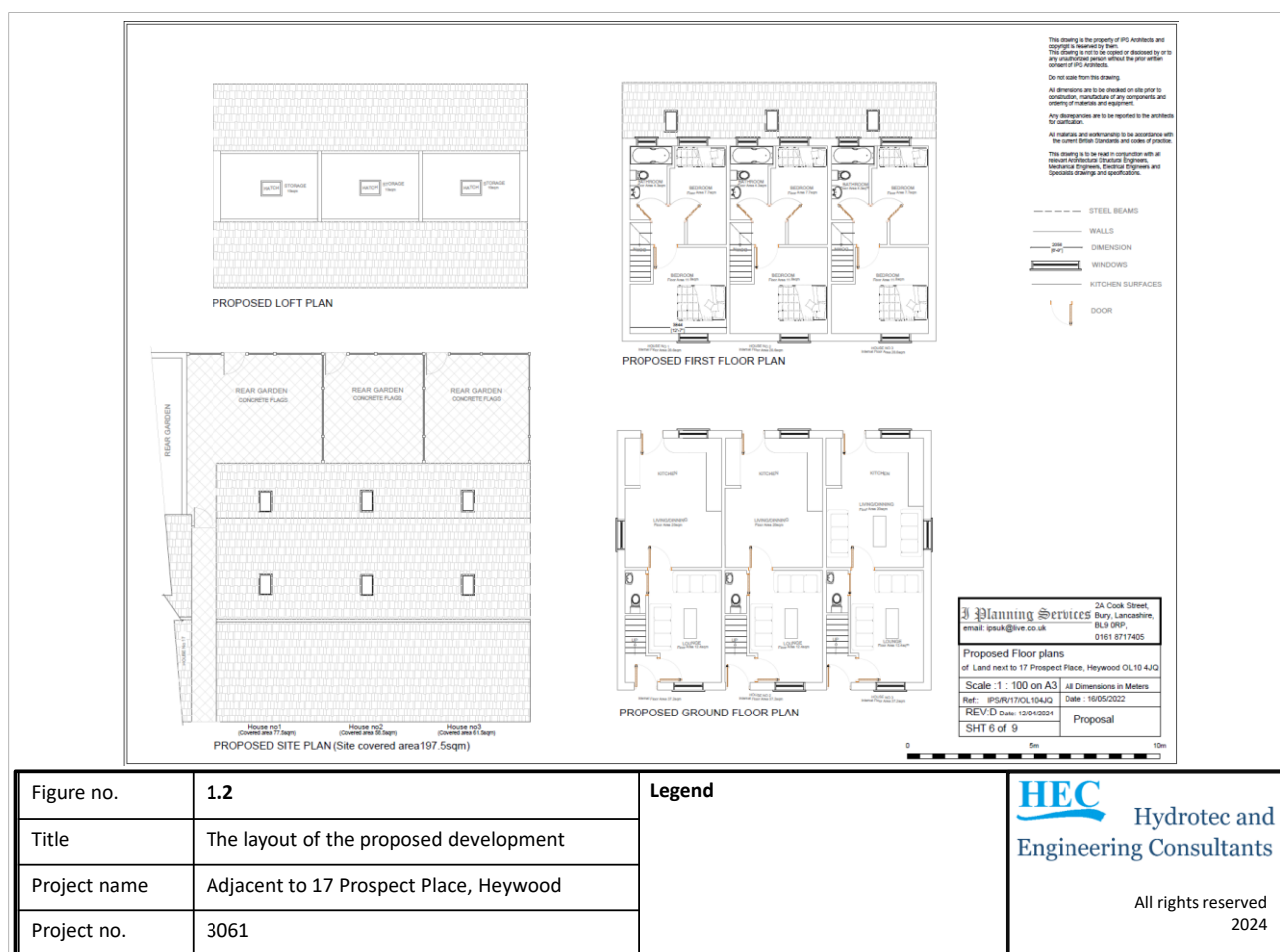


Figure 1.2: The layout of the proposed development.

2 Potential sources of the flood risk

The proposed development is the erection of a block of three terraced dwellings with associated rear gardens; thus, it is a requirement by LLFA to ensure the provision of appropriate flood risk

⁴ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51>

assessment and sustainable drainage of the surface water within the development, to promote safe and resilient communities, assisting by Environment Agency⁵ (EA) and LLFA.

2.1 Fluvial and coastal flood risk

The Environment Agency's flood map⁶ indicates that the Site is located in flood zone 1, a risk of flooding less than 0.1% AEP (Annual Exceedance Probability), i.e. less than 1 in 1000-year flood event for the fluvial or coastal flows (Figure 2.1).

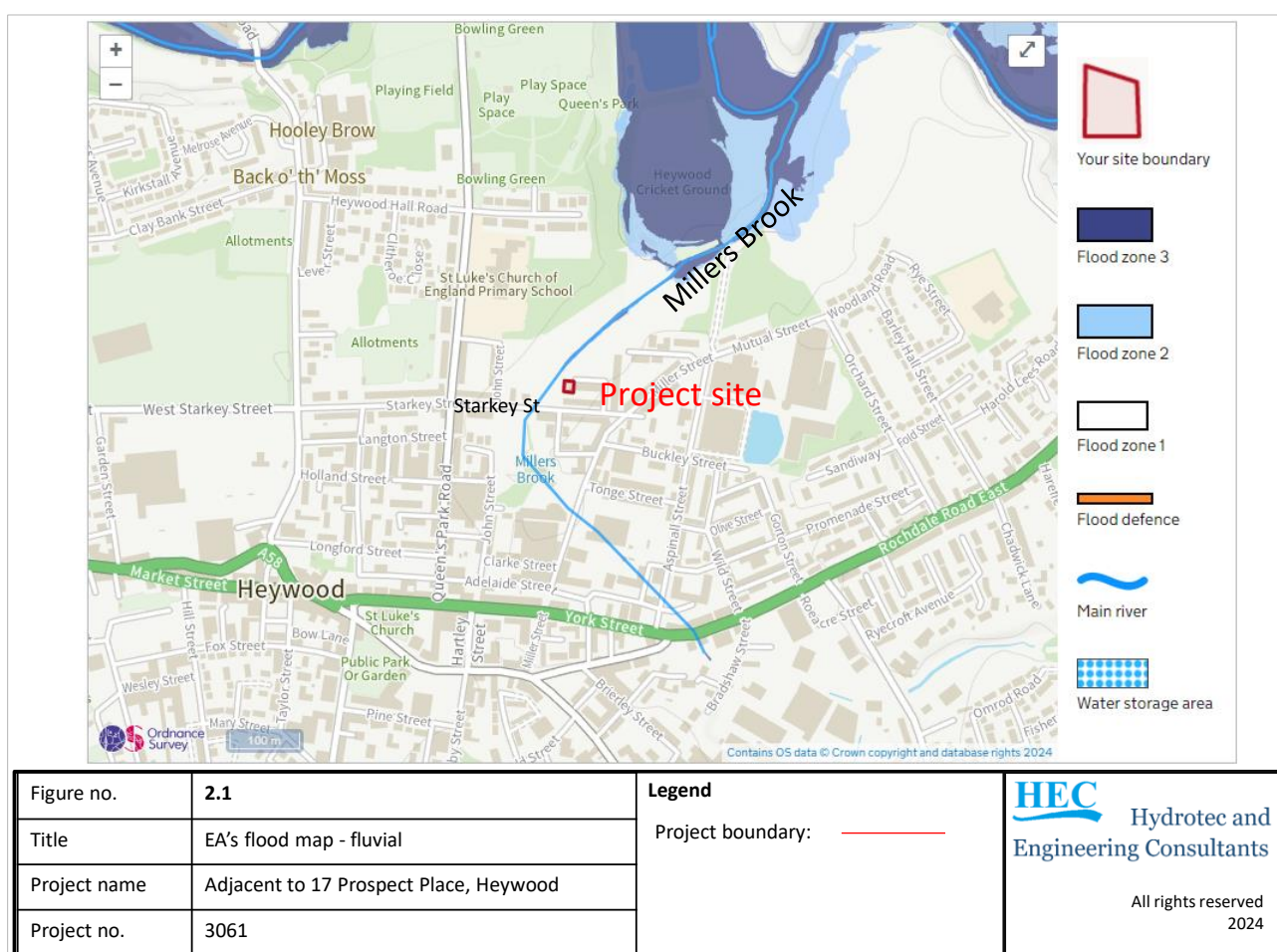


Figure 2.1: The fluvial and coastal flood risk at the Site - flood zone 1, the land having flood risk less than 0.1% AEP fluvial or coastal flows (reference – EA's flood map⁷).

⁵ [Flood risk assessments if you're applying for planning permission - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/flood-risk-assessments-if-youre-applying-for-planning-permission)

⁶ [Flood map for planning - GOV.UK \(flood-map-for-planning.service.gov.uk\)](https://www.gov.uk/government/publications/flood-map-for-planning)

⁷ [Flood map for planning - GOV.UK \(flood-map-for-planning.service.gov.uk\)](https://www.gov.uk/government/publications/flood-map-for-planning)

Therefore, the proposed development site is considered to be out of either fluvial or coastal flows. In addition, the EA's flood map⁸ suggests that the Site is not at flood risk from the reservoir or groundwater flows (Figure 2.2).

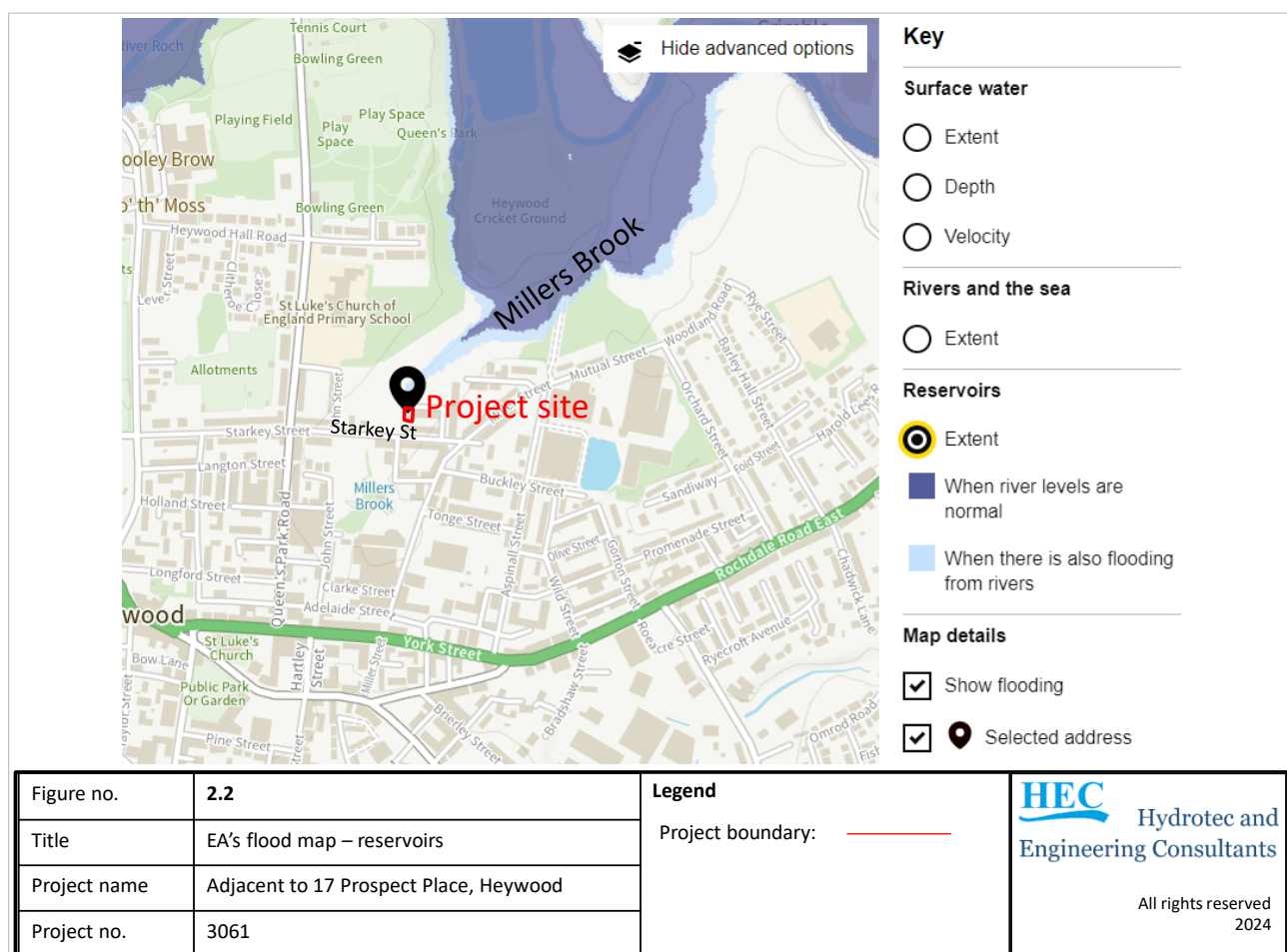


Figure 2.2: Groundwater/reservoir flow at the Site – a very low flood risk against the reservoir or groundwater flows (reference – EA’s flood map⁹).

2.2 Surface water drainage

The guidance of the Environment Agency and LLFA based on the national planning policy framework¹⁰ (NPPF) recommends avoiding the increase in surface water flooding through requirements for sustainable drainage systems (SuDS) and minimising the impervious surface

⁸ [Check the long term flood risk for an area in England - GOV.UK \(flood-warning-information.service.gov.uk\)](https://www.gov.uk/flood-warning-information.service.gov.uk)

⁹ [Check the long term flood risk for an area in England - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

¹⁰ Op. cit.

area. Moreover, the NPPF para 167 suggests that “when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.” Therefore, the surface water drainage measures should have a neutral or better effect on the risk of flooding both on and off the site, taking into account rain falling on the site and runoff from adjacent areas.

NPPF, LLFA and EA’s guidance takes a presumption against development in a 1 in 30-year hydrological event to the surface water drainage. Development should only be allowed in an area at risk from a 1 in 100-year (with climate change allowance (CCA)) if surface water drainage is manageable without any major risk to the development itself or other surrounding areas. It should be shown that in such cases surface water flows can be contained within the development and any flooding flood volumes do not affect third-party lands, flood the property, or obstruct the key access/egress routes.

Therefore, to achieve the guidance’s requirements for the surface water drainage at the Site, the surface water flooding mechanism at the on-site and off-site was assessed with appropriate consideration.

The EA’s surface water flood map¹¹ (Figure 2.3) indicates that the Site would stay at a very low flood risk to surface water drainage (i.e. a very low risk means that each year this area has a chance of flooding of less than 0.1% AEP). Therefore, the Site would be considered to be a very low hazard to surface water drainage.

Generally, the surface water overland flow is highly affected by the topographical features which define hydrological sub-catchments. For a better understanding of the surface water runoff around the Site, the hydrological sub-catchments were obtained from the Flood Estimation Handbook¹² (FEH22) and the data are presented in Figure 2.4.

¹¹ [Your long term flood risk assessment - GOV.UK \(check-long-term-flood-risk.service.gov.uk\)](https://www.gov.uk/check-long-term-flood-risk/service.gov.uk)

¹² [Map - FEH Web Service \(ceh.ac.uk\)](https://www.ceh.ac.uk/map)

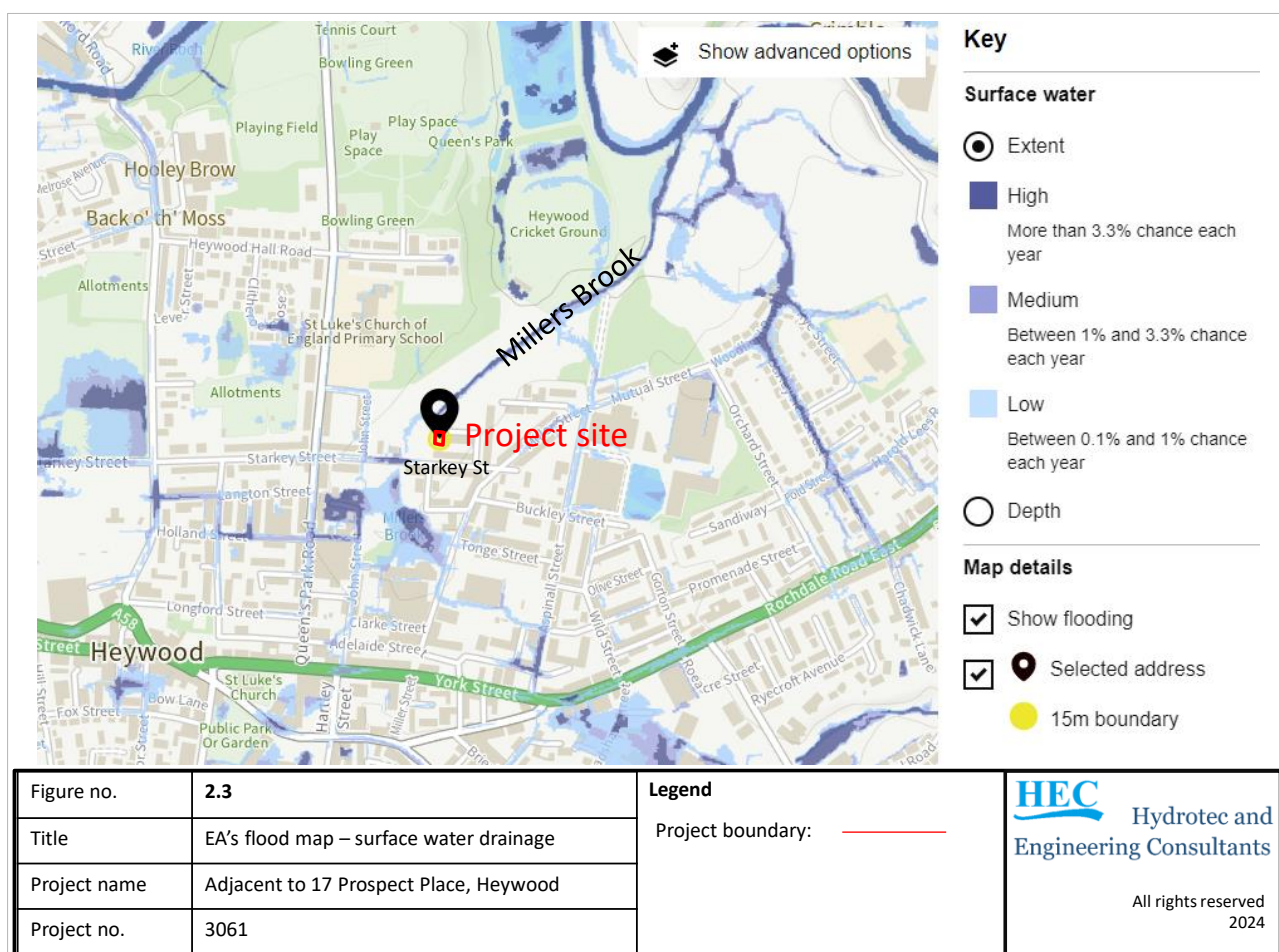


Figure 2.3: Surface water drainage at the Site – a very low flood risk against the surface water flow (reference – EA’s flood map¹³).

The hydrological sub-catchments that could have a possible impact on the Site are presented in Figure 2.4, and the indicative flow paths of the surface water runoff are shown in the blue arrow lines. The Site is located in a hydrological sub-catchment which drains the overland flow northeasterly into Miller Brook located in the north, approximately 20m away. The two upstream sub-catchments of Miller Brook convey the overland flow into the culverted section of the Brook located at the upstream of the Site. The total surface area of the two sub-catchments is approximately 3.0km² and therefore it is more likely that most of the overland flow would be contained in the culvert section, tanking into the consideration of the existing drainage infrastructures in the upstream. Moreover, the Site is located at the edge of the sub-catchment and the contributing surface area of this sub-catchment, which could have a possible impact on

¹³ [Check the long term flood risk for an area in England - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

the Site, is very small. Subsequently, the impact of the overland flow from this sub-catchment would be very minor. The adjacent sub-catchment located in the east would convey the overland flow northerly into River Roch and stay away from any overland flow contribution to the Site. The far eastern sub-catchment would also drain the surface water runoff northerly through local drains and would not have any impact of the overland flow to the Site. The sub-catchment located on the north side would convey the overland flow into the River Roch and would not have any impact on the Site. The far western sub-catchment would drain the surface water runoff northerly into River Roch through the local channels and would not have any impact on the Site. Finally, three southern sub-catchments would drain the overland flows southerly and would stay out of the Site. Thus, the effective overland flow contribution to the Site from the adjacent areas would be minimal.

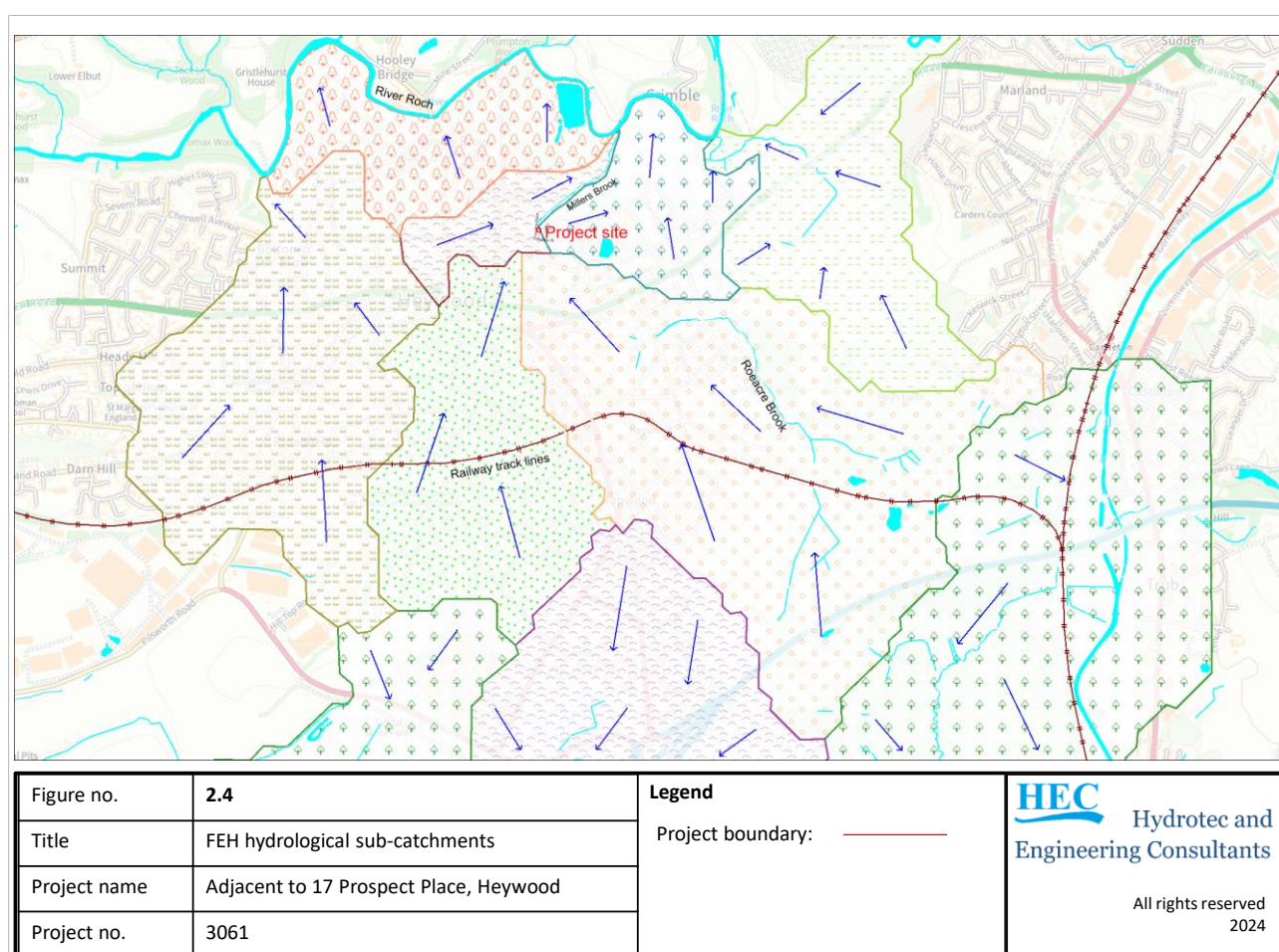


Figure 2.4: The hydrological sub-catchments around the Site (indicative overland flow paths in blue arrow lines); reference of the FEH22¹⁴.

¹⁴ op. cit.

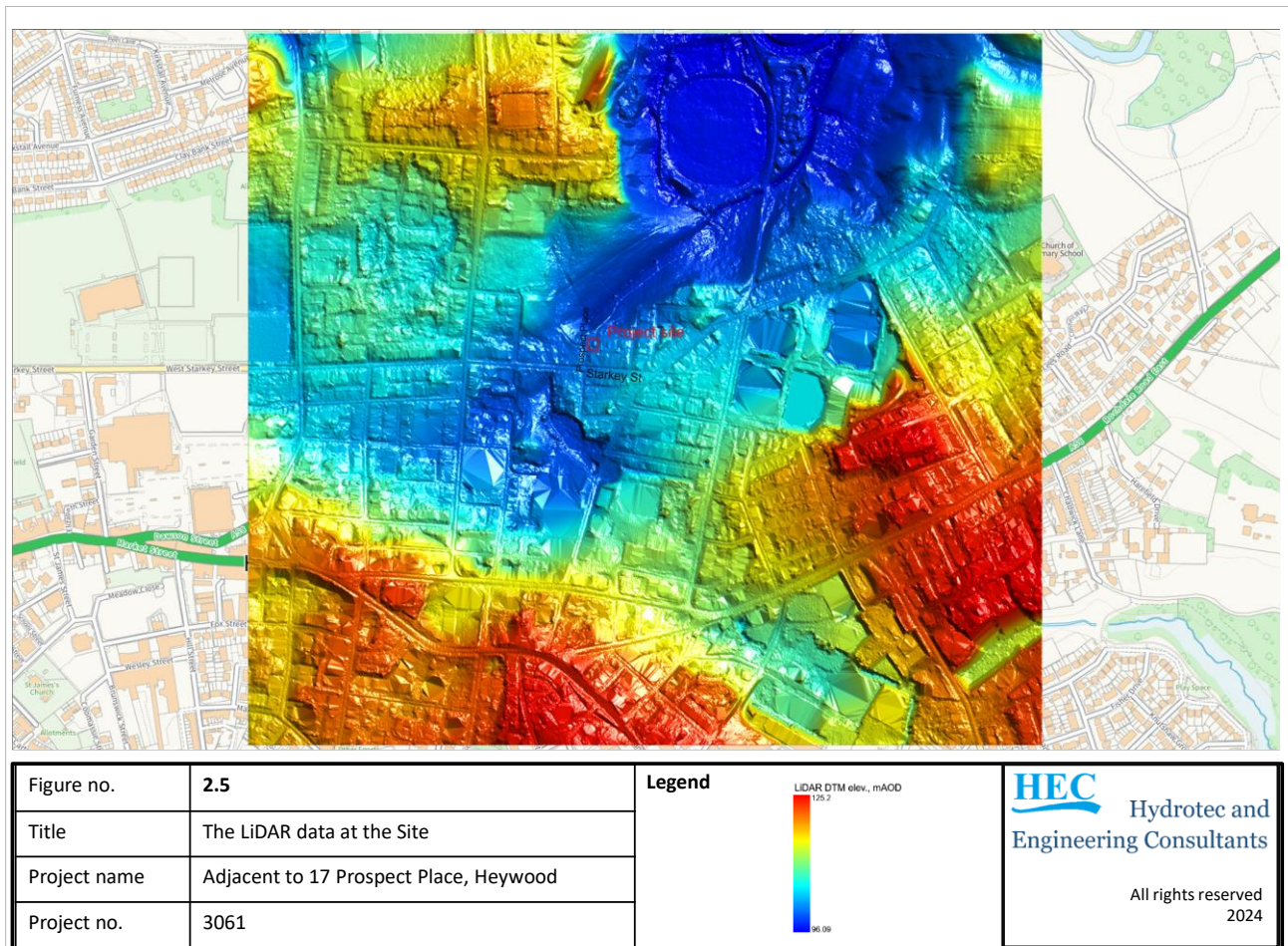


Figure 2.5: The LiDAR topographical elevation at the Site.

The intensity and magnitude of the overland flow and path on the ground surface would have a significant effect due to the ground elevation. Therefore, for an understanding of the complexity of the overland flow mechanisms, the topographical elevation around the Site was assessed based on the recent LiDAR¹⁵ (Light Detection and Ranging) DTM (Digital Terrain Model) data (Figure 2.5).

The LiDAR elevation data suggest that the ground level in the far southern area is relatively higher and bulging in shape, and therefore only a part of this area would contribute surface water runoff towards the north. However, due to the existing infrastructures and drainage networks in the upstream, most of the overland flow would be contained locally and would not have any impact at the Site. Moreover, the ground level at the Site is relatively higher compared to the

¹⁵ [Defra Data Services Platform](#)

adjacent area, particularly the northwestern side, and therefore any overland flow from the adjacent southern area would flow relatively quickly to the lower ground level. Subsequently, there would be less surface water hazard to the Site.

Therefore, the contributing surface water runoff from the off-site to the Site would be relatively low and subsequently, the Site would not be considered any off-site surface water flood risk. Thus, the surface water runoff generated at the proposed development would mainly be from the rainfall on the Site. Subsequently, a drainage strategy for this excess generated surface water runoff would be required to be managed by sustainable drainage systems (SuDS), according to the LLFA guidance.

2.3 Sewer flood risk

The proposed development is the erection of a block of three terraced dwellings and each dwelling would contain two bedrooms. Therefore, the proposed development would generate foul water flow by the occupants.

The sewer drainage network data (see also Appendix III) obtained from United Utilities indicate that the existing sewer drainage network systems around the Site are combined, i.e. conveying surface and foul water flow through the same pipe. There is no record of the sewer system next to the Site, however, there is a 300mm in diameter combined sewer under Ann Street conveying flow southerly to Starkey Street which conveys the flow with 450mm in diameter sewer westerly.

The land owner of the proposed development has made an application to United Utilities (United Unitilites' reference number 06141935) and it has been given a consent agreement in principle that the existing sewer drainage system has sufficient capacity to accommodate the generated wastewater flow by the proposed dwellings. In addition, United Utilities has provided the location of the outfall for each dwelling (see a photograph of the sewer outfall location in Appendix V).

Since the proposed drainage layout is to be newly developed to the Site and there are no details of the invert level of the outfall, the cover level of the proposed manholes would be at the ground level whereas the invert level would be set up to provide the gradient of the pipes 1 in 80 or more.

For estimation of the generated foul water by the proposed development, the standard guidelines of foul water design were followed. The foul water generation would be highly variable during the days or nights and throughout the year. Considering the standard guidelines from the Sewer for Adoption¹⁶, the typical average dry weather flow (DWF) for this type of catchment is considered to be 150 litres per person per day. It is assumed that each two-bedroom dwelling would have 3 occupants. Therefore, the generated foul water by each dwelling would become 0.005 litres/sec. There are a total of 3 dwellings and consequently, the excess generated foul water by this development would become 0.016 litres/sec. It should be noted that the final formal confirmation of the consent agreement from United Utilities will be obtained before occupying the proposed dwellings.

3 Flood attenuation storage requirement

The proposed development is the erection of a block of three terraced dwellings with associated rear gardens. The proposed development is therefore classified as a more vulnerable category - according to the NPPF flood risk vulnerability classification¹⁷. The surface area of the proposed development is approximately 200m² and therefore it would be classified as a minor development¹⁸.

At present, the ground surface on the Site is mostly concrete pavement and compacted gravel, see also a recent photograph in Figure 3.1.

¹⁶ [Sewerage Sector Guidance-approved documents | Water UK](#)

¹⁷ [National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK \(www.gov.uk\)](#)

¹⁸ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51>



Figure 3.1: The photograph of the existing ground surface condition at the Site.

The total surface area of the proposed development site is approximately 200m². The permeable and impermeable surface areas of the pre-development and post-development are given in Table 3.1. The total impervious surface area of the proposed development is approximately 125m², containing the main building and patios. Thus, the impervious area due to the proposed development would be reduced by 75m², i.e. approximately 38% of the total area. The proposed development would therefore slightly modify the existing land surface with a permeable area, and it would provide better sustainable drainage systems with the proposed drainage strategy. Thus, there would not be any deterioration of the excess surface water hazard due to the proposed development.

The proposed development would have a very minor impact on the generated surface water runoff due to the impermeable land surface. However, to comply with the NPPF's local plan policy guidance, the development proposal should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. Subsequently, a

reduction of the generated runoff including climate change allowance in the calculations would be managed on-site.

Table 3.1: The surface area of the pre-development and post-development at the Site.

Development	Permeable area, m ²	Impermeable area, m ²
Existing	0	200
Proposed	75	125

Table 3.2: The cumulative depth-duration rainfall at 20% AEP, 10% AEP, 3.3% AEP and 1% AEP at the Site.

Duration, mins	Rainfall depths, mm			
	20% AEP	10% AEP	3.3% AEP	1% AEP
15	10.11	12.65	16.65	20.94
30	13.88	17.55	23.30	29.66
45	16.49	20.75	27.76	35.66
60	18.45	23.35	31.16	40.19
90	21.80	27.06	35.42	45.06
120	24.52	29.88	38.50	48.43
180	28.66	34.44	43.58	54.31
240	31.90	38.01	47.62	59.09
300	34.61	40.95	51.03	63.20
360	36.96	43.49	54.01	66.88
420	39.02	45.75	56.69	70.30
480	40.86	47.78	59.13	73.46
540	42.53	49.63	61.38	76.43
600	44.06	51.34	63.47	79.23

In order to calculate the generated surface water runoff at the Site, the hydrological data were obtained from the Flood Estimation Handbook¹⁹ (FEH22). The cumulative rainfall depths were

¹⁹ [Map - FEH Web Service \(ceh.ac.uk\)](http://map-feh.web-service.ceh.ac.uk).

calculated and the values at 1 in 5-year (20% AEP), 1 in 10-year (10% AEP), 1 in 30-year (3.3% AEP) and 1 in 100-year (1% AEP) are provided in Table 3.2 up to 600mins (i.e. 10.0 hrs).

The proposed development is for residential use and, therefore, the design life of the development would be 100 years. Thus, the NPPF's guidance suggests the upper-end allowance for peak rainfall in climate change consideration. The upper-end peak rainfall allowances at the Site in the 2070s epochs are 40% and 45% at 3.3% AEP and 1% AEP, respectively - according to the Environment Agency's climate change allowance guidelines²⁰. Subsequently, for the climate change allowance (CCA), the peak rainfall was increased by 25%, 25%, 40% and 45% at 20% AEP, 10% AEP, 3.3% AEP and 1% AEP, respectively.

One of the main objectives of the surface water attenuation storage is that during the storm event, the generated surface water runoff within the Site would be retained on-site for some time. Therefore, the peak flow in the watercourses and/or drainage networks would not be increased substantially to ease the flood risk in the downstream. However, it is an acceptable policy of the LLFA with regard to the greenfield runoff rate to allow some discharge from the development site into the nearby watercourses and/or drainage network systems to reduce the cost and land space for the attenuation storage within the development site.

In the present calculation, the greenfield runoff rates were considered based on the HR Wallingford tools²¹, however, the total surface area of the Site is less than the minimum area requirement (i.e. 0.10 hectares) for these tools. Therefore, the minimum greenfield runoff rate of 5.0 litres/sec was adopted. This value is also recommended by HR Wallingford tools for SuDS design and this would assist in reducing the sedimentation and blockage of the drainage pipes.

²⁰ [Flood risk assessments: climate change allowances - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/flood-risk-assessments-climate-change-allowances)

²¹ [Online tools for sustainable drainage systems \(SuDS\) \(uksuds.com\)](https://uksuds.com/)

Table 3.3: Surface water attenuation storage requirement at 20% AEP, 10% AEP 3.3% AEP and 1% AEP including climate change allowance at the Site.

Return periods	Storm duration, mins	Greenfield runoff rate, l/s	Volume of the surface water runoff, m ³		
			Total runoff	Attenuation req.	Attenuation req. with CCA
20% AEP	15	5.00	1	-3	-3
	30	5.00	1	-8	-7
	45	5.00	1	-12	-11
	60	5.00	1	-17	-16
	90	5.00	0	-27	-26
	120	5.00	0	-36	-35
	180	5.00	-2	-56	-55
	240	5.00	-4	-76	-75
	300	5.00	-7	-97	-95
	360	5.00	-9	-117	-115
10% AEP	15	5.00	2	-3	-2
	30	5.00	2	-7	-6
	45	5.00	2	-11	-10
	60	5.00	2	-16	-15
	90	5.00	1	-26	-24
	120	5.00	1	-35	-34
	180	5.00	-1	-55	-53
	240	5.00	-3	-75	-73
	300	5.00	-5	-95	-93
	360	5.00	-8	-116	-113
3.3% AEP	15	5.00	3	-2	-1
	30	5.00	3	-6	-4
	45	5.00	4	-10	-8
	60	5.00	4	-14	-12
	90	5.00	3	-24	-21
	120	5.00	2	-34	-31
	180	5.00	1	-53	-50
	240	5.00	-1	-73	-69
	300	5.00	-3	-93	-89
	360	5.00	-5	-113	-109
1% AEP	15	5.00	4	-1	1
	30	5.00	5	-4	-2
	45	5.00	5	-8	-5
	60	5.00	5	-13	-9
	90	5.00	5	-22	-18
	120	5.00	4	-32	-27
	180	5.00	3	-51	-46
	240	5.00	1	-71	-66
	300	5.00	-1	-91	-85
	360	5.00	-3	-111	-105

The attenuation storage requirements for the proposed development were calculated at 20% AEP, 10% AEP, 3.3% AEP and 1% AEP including climate change allowance²² and the results are presented in Table 3.3. In Table, the 4th column is the total runoff volume (m³) generated by the Site; the 5th column is the total runoff volume (m³) required for attenuation, considering the 5.0 litres/sec greenfield runoff and the last column 6th is the total runoff volume (m³) required for attenuation with climate change allowance.

Thus, the attenuation storage requirements for the Site (i.e. surface area 200m²) at 3.3% AEP and 1% AEP are 0m³ and 0m³; and with climate change allowance 0m³ and 1m³, respectively.

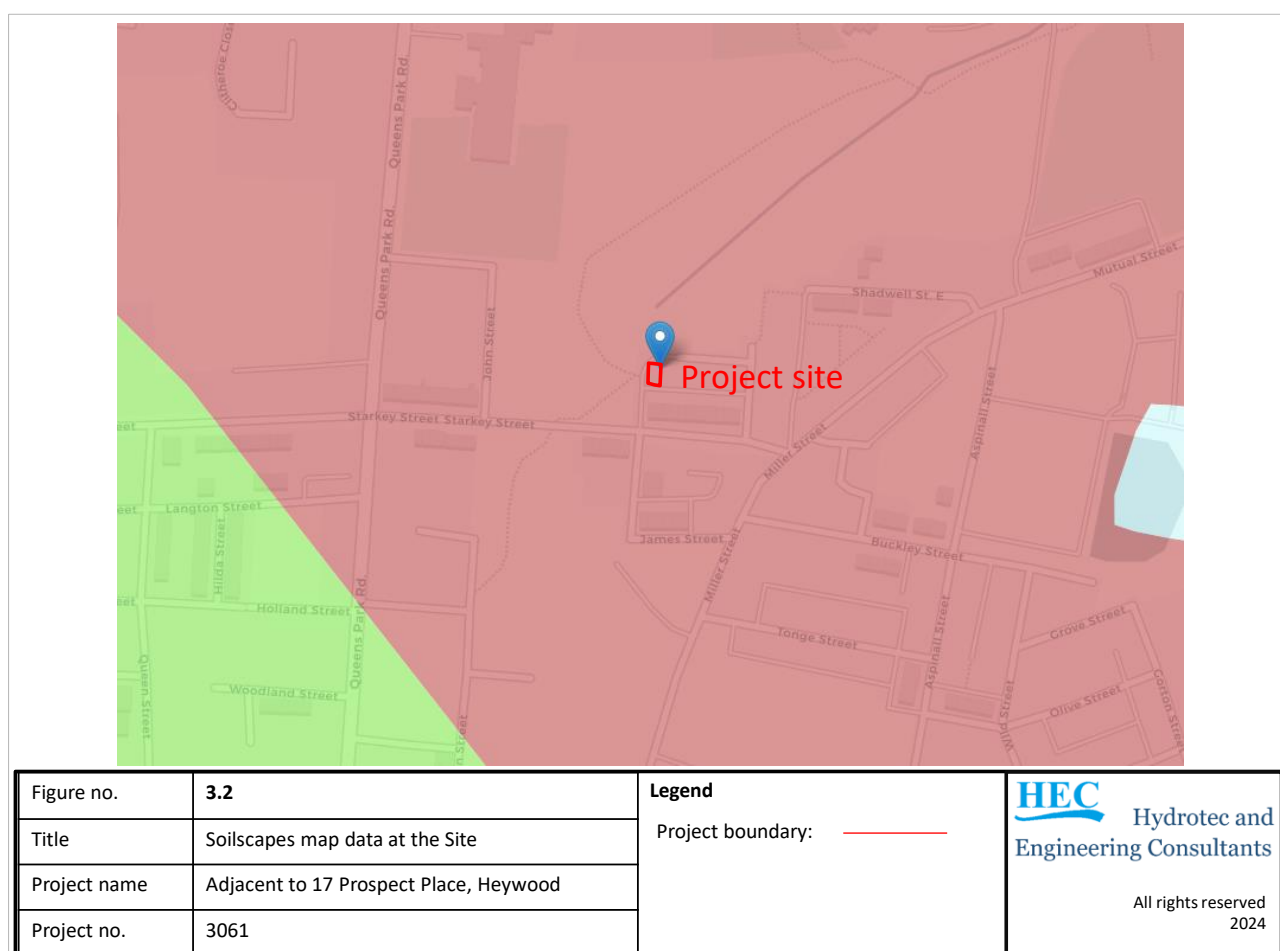


Figure 3.2: The soil types beneath the Site – freely draining and slightly acid-sandy soils (reference - Soilscapes map data of Cranfield University²³).

²² [Peak rainfall climate change allowances by management catchment - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

²³ [Soilscapes soil types viewer - National Soil Resources Institute. Cranfield University \(landis.org.uk\)](https://landis.org.uk)

To assess the feasibility of the attenuation for the generated surface water runoff through underground infiltration, the soil types beneath the Site were assessed based on the Soilsmap data of Cranfield University²⁴. Generally, soil types beneath the Site are freely draining and slightly acid-sandy soils (Figure 3.2) and, therefore, the infiltration rate on the permeable area would be relatively good. However, due to the space constraint for the individual dwelling, it would not be appropriate to implement a soakaway design to attenuate the surface water. It should be mentioned that an infiltration rate of 36mm/hr was applied to the permeable surface in the calculation of the attenuation storage requirement (Table 3.3). It should, however, be noted that there is no in-situ soil percolation data available at the project site during the publication of the report.

At present, all the on-site surface water runoff is discharged either in the existing drainage network and/or nearby overground. The proposed development would not increase impermeable land rather it would reduce the existing impermeable surface by 38%. However, to comply with the NPPF's local plan policy and LLFA guidelines and to improve the sustainability of the wider drainage systems, environmental impact and local biodiversity in the surrounding areas – in the proposed surface water drainage strategy, standard size of water butt (approximately 250 litres, see a sample in Appendix VI) for collecting roof water for each dwelling would be utilised for general washing in addition to irrigation to the rear garden and patio pot plantation.

There is a culverted watercourse of Millers Brook which is approximately 16m away to the west of the Site (more than the Environment Agency's requirement of 8m) and the open section of Brook is situated approximately 20m away from the Site to the north. Because of the third-party land ownership, it would not be suitable to discharge the excess surface water runoff from the Site in the Brook. Thus, the excess surface water runoff would be discharged to the combined sewer system.

²⁴ <https://www.landis.org.uk/>

4 SuDS layout design

The proposed development is the erection of a block of three terraced dwellings with associated rear gardens. The surface water runoff would therefore be slightly modified, however, the proposed development would reduce the impermeable surface by approximately 38%. Thus, this reduction of the impermeable land would provide better sustainable drainage to the Site itself or its surrounding areas. Because of the space restriction for each dwelling, it would not be suitable to implement a soakaway design. Moreover, due to the third-party land ownership – it would not be appropriate to discharge the excess runoff in Miller Brook. The proposed path adjacent to 17 Prospect Place would be permeable pavement, assisting surface water infiltration (see an example of typical pervious pavement in Appendix VIII).

There is no surface water sewer around the Site, and therefore, the excess surface water runoff would be discharged to the existing combined sewer at the rear side of the dwellings.

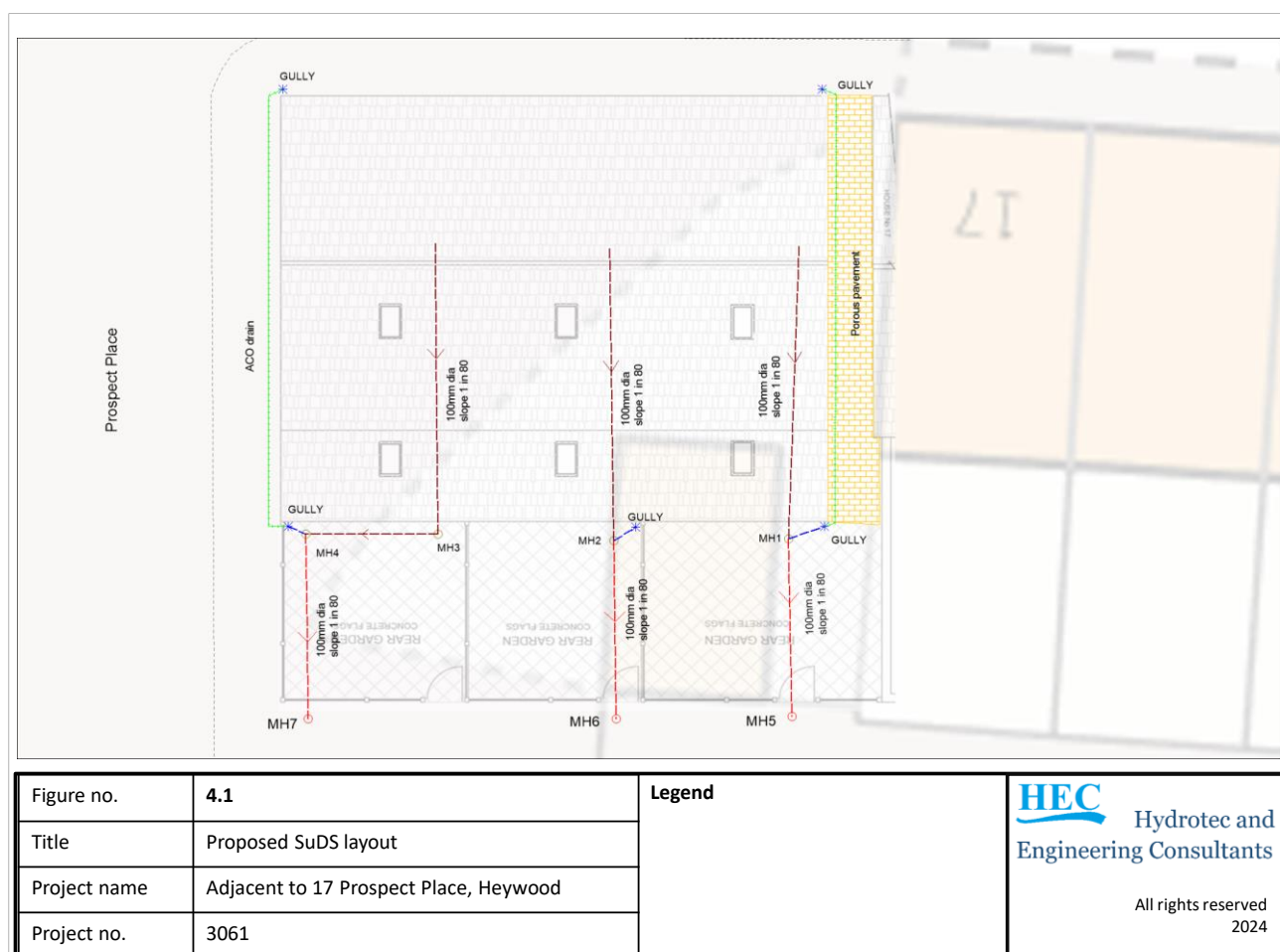


Figure 4.1: The drainage layout at the Site.

In addition, the proposed layout of the development is considered a well-thought, eco-friendly and sustainable drainage system including grassland on the rear side with permeable topsoils, assisting water quality improvement by reducing the suspended solid and silt materials.

In the proposed sewer drainage network - the diameter of the pipes would be 100mm and pipes would be connected with manholes and gullies. The gradient of the drainage pipes would be 1 in 80 or more to assist in gravity flow (see Figure 4.1 and Appendix IV). The cover level of the manholes would be the ground level whereas the invert level would be set to provide the required gradient to assist in the gravity flow.

5 Finished floor level and access/egress from the Site

The proposed development, which is the erection of a block of three terraced dwellings with associated rear gardens, is classified as a more vulnerable category, according to the NPPF flood risk vulnerability classification²⁵. Moreover, the proposed development is to be classified as a minor development²⁶.

The Site would not have a flood risk from fluvial flow. Moreover, the surface water drainage would have a very low risk and would have a minimal impact on the Site. Therefore, the finished ground floor level of the proposed dwellings would be on the ground level, however, it is highly recommended to raise the finished ground floor level by an additional 150mm freeboard from the ground level.

There would not be any issues with the access and egress from the proposed development site during evacuation and emergency vehicles' movement. Prospect Place, which is located in front of the Site, would be used as an access and egress during any unexpected flooding incident.

²⁵ [National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51)

²⁶ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51>

6 Conclusions

A flood risk assessment and surface water drainage strategy were conducted to assist the sustainable drainage systems (SuDS) design for the proposed development on the land adjacent to 17 Prospect Place, Heywood, Rochdale, OL10 4JQ. The proposed development is the erection of a block of three terraced dwellings with associated rear gardens. The Site lies within Rochdale Council's remit who is the LLFA, providing advice and guidance for sustainable drainage systems for this development site.

The present flood risk assessment and drainage strategy for SuDS, which are the requirements for the planning application, were made with available information including the latest EA's flood maps data, FEH hydrological data, topographical elevation data (LiDAR), soil map data and sewer network data of United Utilities.

The present investigation suggests that the Site is in flood zone 1 and, therefore, the Site is considered to be out of fluvial and coastal flood risk.

The proposed development site is a very low risk from the surface water flow - according to the EA's flood map²⁷. Moreover, the hydrological and topographical elevation data around the Site indicate that the impact of the surface water runoff from the surrounding areas would be minimal. Thus, the surface water attenuation storage requirement for the Site would only be the generated overland flow by the Site, and the overland flow from the surrounding areas was not considered. In addition, the Site is not at risk to the groundwater or reservoir flows.

The surface water attenuation storage requirements were calculated at 20% AEP, 10% AEP, 3.3% AEP and 1% AEP including climate change allowance²⁸. The cumulative rainfall depths at these events were estimated from the latest FEH22 rainfall-runoff model data²⁹. For the whole site, the attenuation storage requirements at 3.3% AEP and 1% AEP are 0m³ and 0m³; with climate change allowance 0m³ and 1m³, respectively.

²⁷ Op.cit.

²⁸ Op.cit.

²⁹ Op. cit.

The soil types beneath the Site are freely draining and slightly acid-sandy soils with reference to the Soilsmap map data³⁰. Therefore, it would be suitable to attenuate the excess surface water through infiltration.

The proposed development would not increase the impermeable land compared to the existing condition rather it would reduce the impermeable land by approximately 38%. Due to the space restrictions, it would not be suitable for a soakaway design for each dwelling and it would not be suitable for excess surface water runoff to discharge to Millers Brook because of third-party land ownership. There is no existing surface water sewer around the Site and therefore excess surface water runoff would be discharged to the combined sewer system of United Utilities.

However, each dwelling would use a standard-size water butt for the collection of roof water and would utilise it for general washing and irrigation to the rear garden and pot plantation. The proposed path adjacent to 17 Prospect Place would be utilised by porous pavement.

Therefore, the proposed eco-friendly layout design and landscape amenities would significantly improve the surface water drainage sustainability, environment and local biodiversity, and water quality compared to the existing conditions.

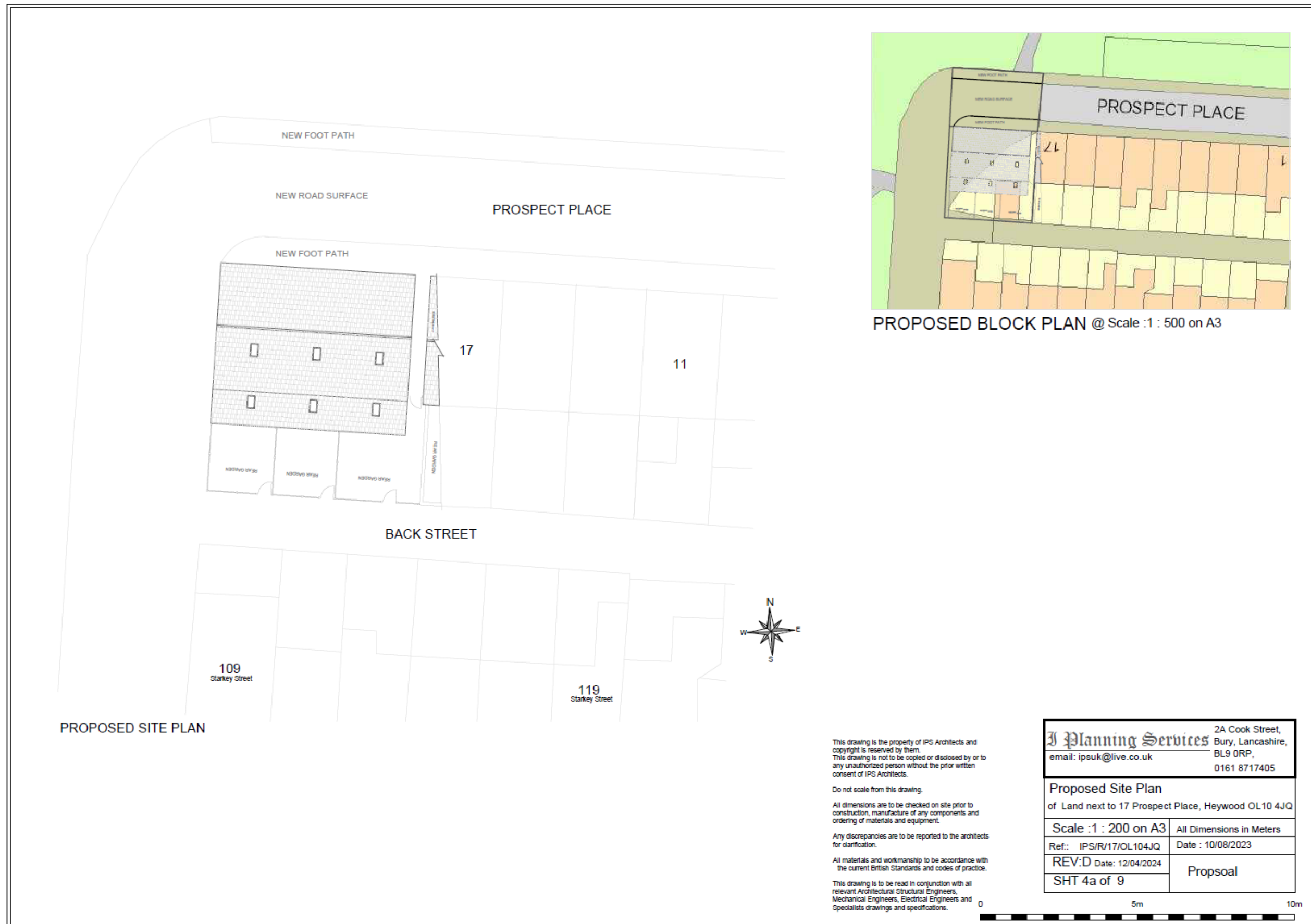
The Site is not considered to be a flood risk and therefore the finished ground floor level of the proposed dwellings would be at ground level. However, it is highly recommended to raise by an additional 150mm freeboard from the ground level. During any flooding incident, the access and egress from the Site would be at Prospect Place located in front of the Site.

The generated wastewater flow by the proposed development was estimated to be 0.016 litres/sec. It has been given a consent agreement in principle by United Utilities that there is sufficient capacity in the sewer drainage system to accommodate the generated wastewater flow by the proposed dwellings.

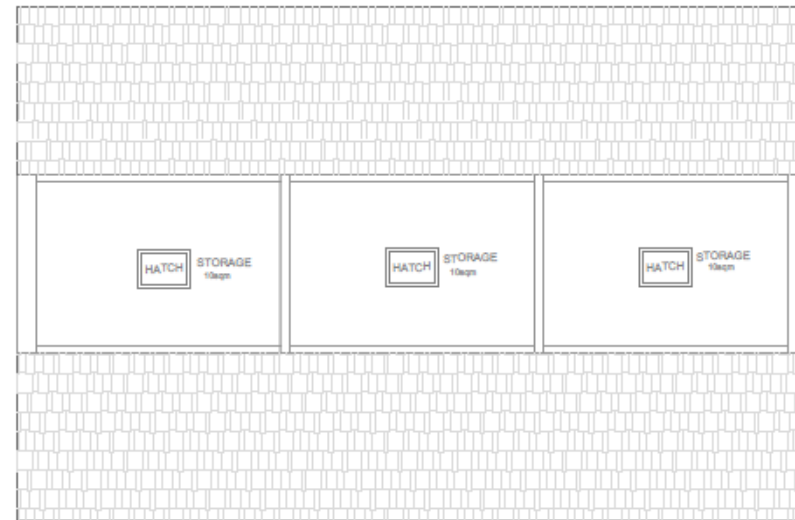
³⁰ Op.cit.

In the proposed drainage layout, the diameter of the pipes would be 100mm and the gradient of the pipes would be 1 in 80 or more to assist in gravity flow. It should be noted that the final formal confirmation of the consent agreement from United Utilities will be obtained before utilising the proposed development.

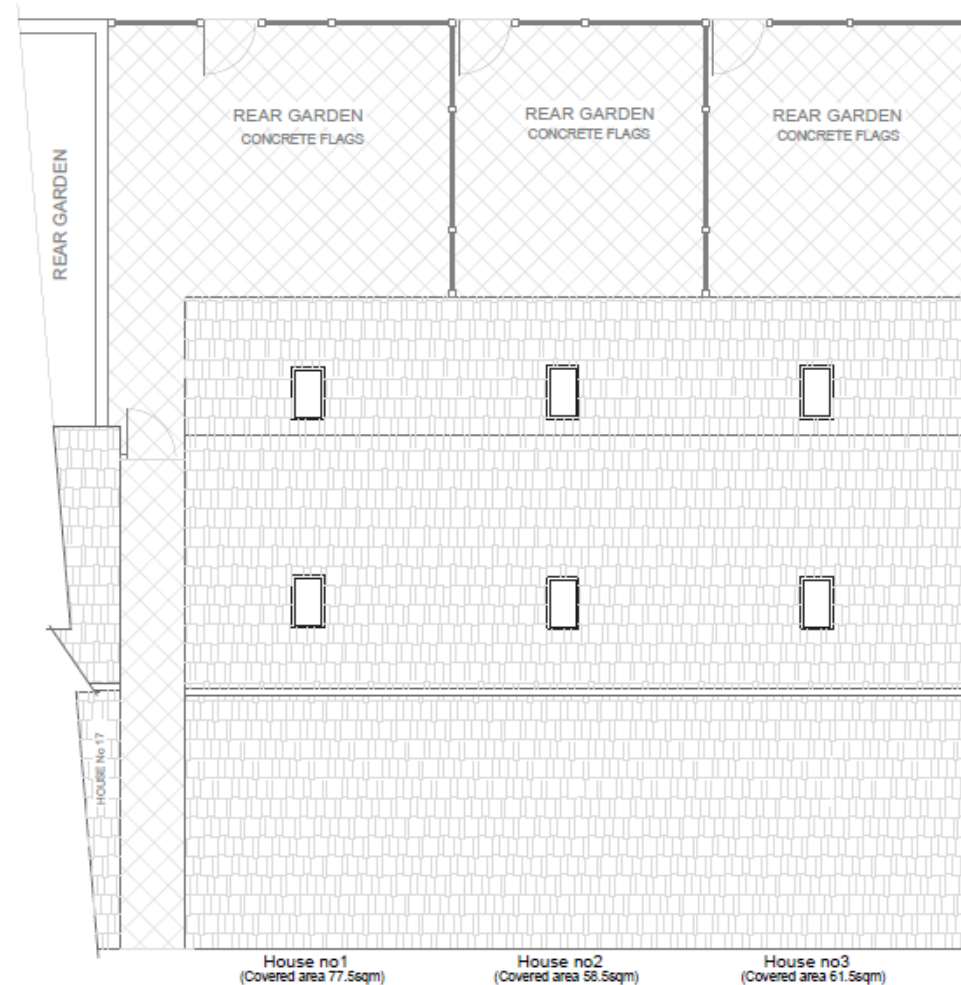
Appendix I: The layout of the proposed development.



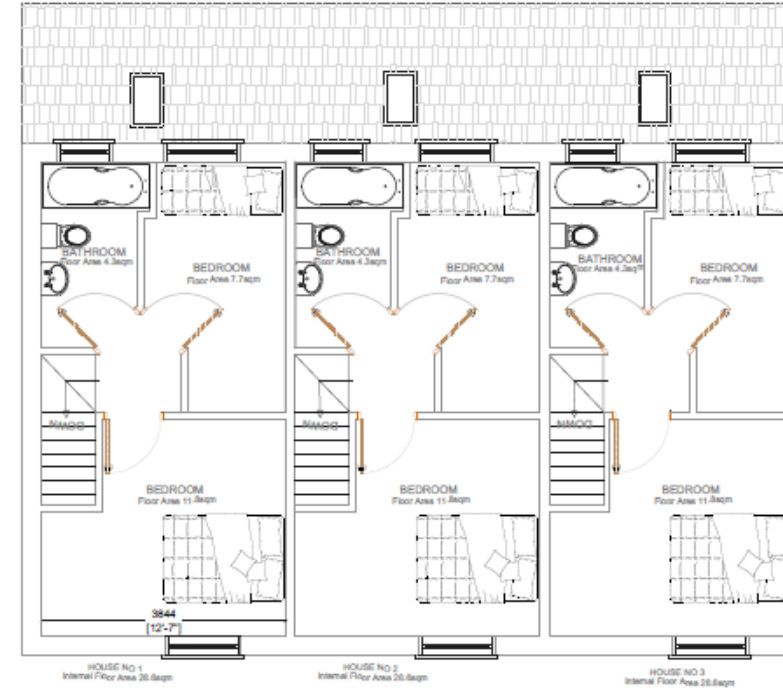




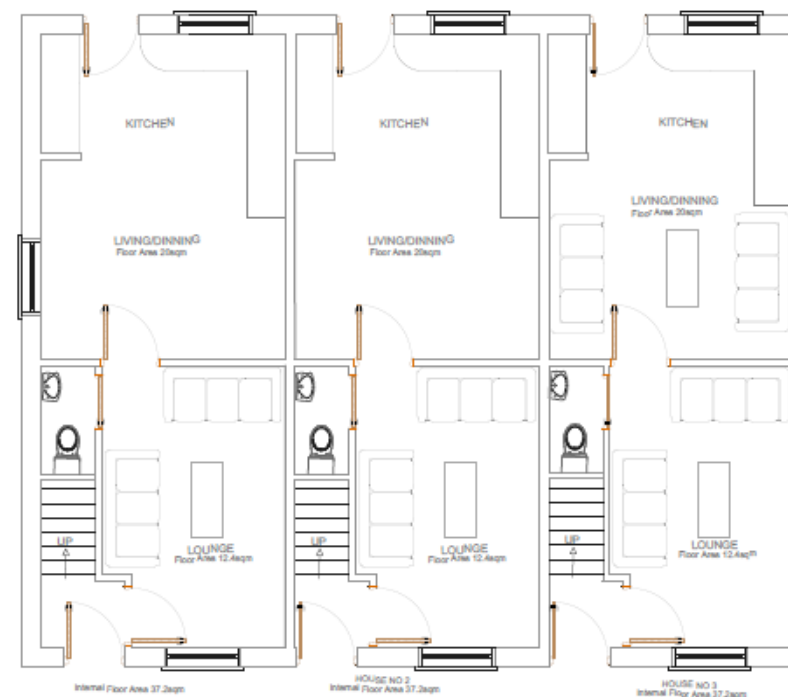
PROPOSED LOFT PLAN



PROPOSED SITE PLAN (Site covered area 197.5sqm)



PROPOSED FIRST FLOOR PLAN



PROPOSED GROUND FLOOR PLAN

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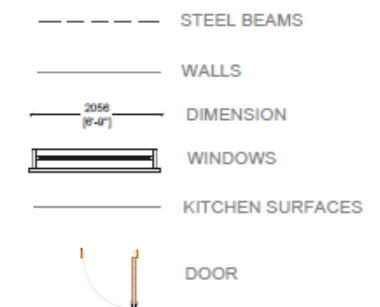
Do not scale from this drawing.

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Any discrepancies are to be reported to the architects for clarification.

All materials and workmanship to be accordance with the current British Standards and codes of practice.

This drawing is to be read in conjunction with all relevant Architectural Structural Engineers, Mechanical Engineers, Electrical Engineers and Specialists drawings and specifications.



Planning Services
2A Cook Street,
Bury, Lancashire,
BL9 0RP,
email: ipsuk@live.co.uk
0161 8717405

Proposed Floor plans
of Land next to 17 Prospect Place, Heywood OL10 4JQ

Scale : 1 : 100 on A3 All Dimensions in Meters

Ref.: IPS/R/17/OL104JQ Date : 16/05/2022

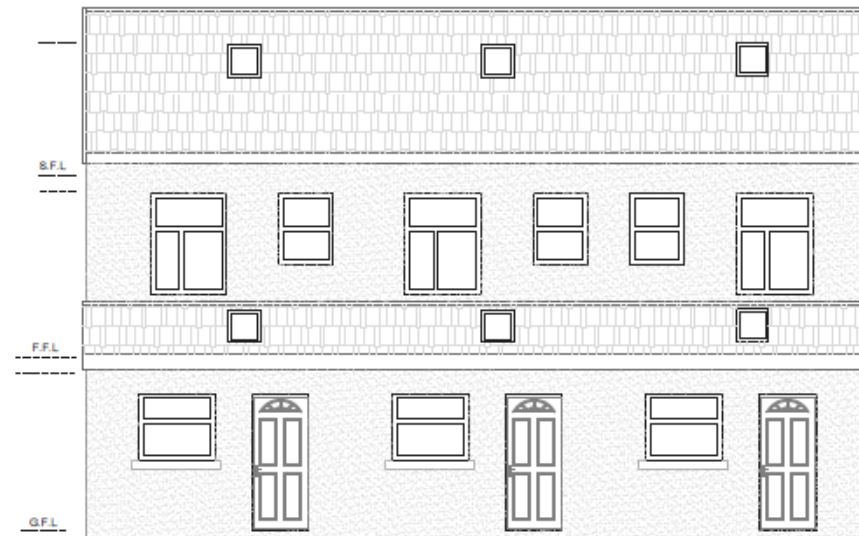
REV:D Date: 12/04/2024

SHT 6 of 9 Proposal

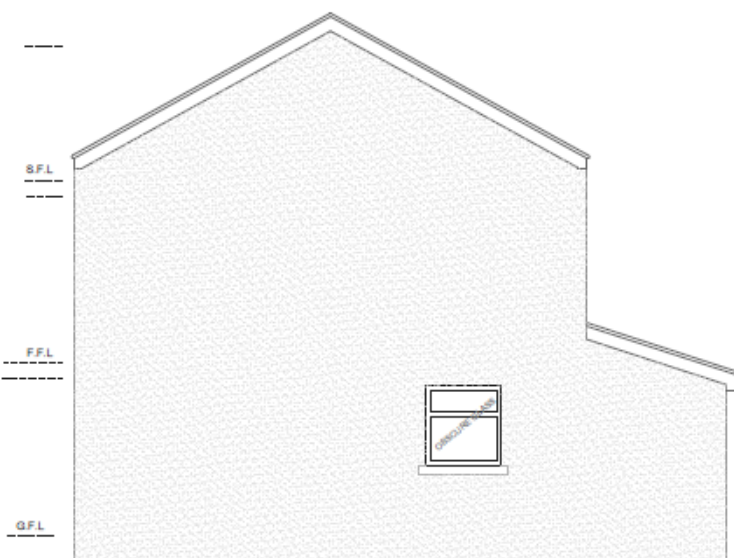




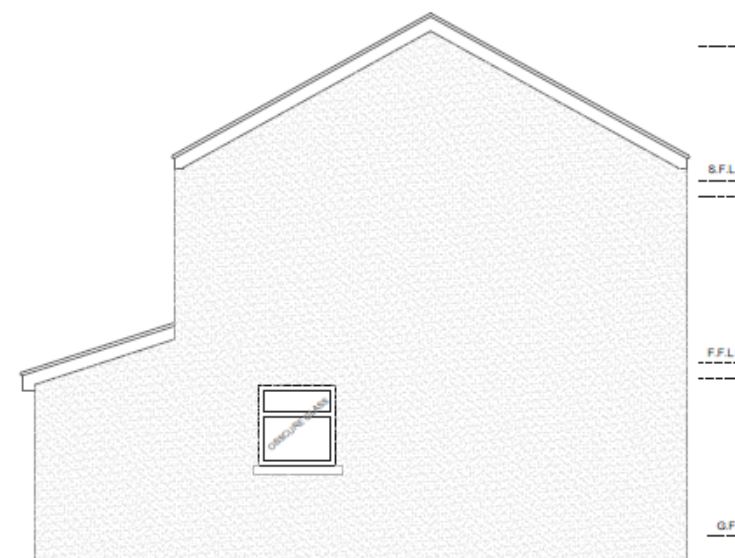
PROPOSED FRONT ELEVATION



PROPOSED REAR ELEVATION



PROPOSED REAR ELEVATION (WEST)



PROPOSED REAR ELEVATION (EAST)

NOTES:

- Walls to be finish with K-RENDER (Silicone K1) in white colour
- Roof tiles to be Natural slates to match surroundings
- Windows to be double glazed uPVC in black colour
- External doors to be uPVC in black colour to match windows
- Rainwater goods to be 114mm Square Plastic Gutter in black colour to match surroundings
- Rear garden boundary treatment to be wooden panels on a 300mm concrete slab in concrete posts
- Rear garden gate to be wooden gate

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Planning Services 2A Cook Street,
Bury, Lancashire,
BL9 0RP,
email: ipsuk@live.co.uk 0161 8717405

Proposed Elevations

of Land next to 17 Prospect Place, Heywood OL10 4JQ

Scale : 1 : 100 on A3 All Dimensions in Meters

Ref: IPS/R/17/OL104JQ Date : 16/05/2022

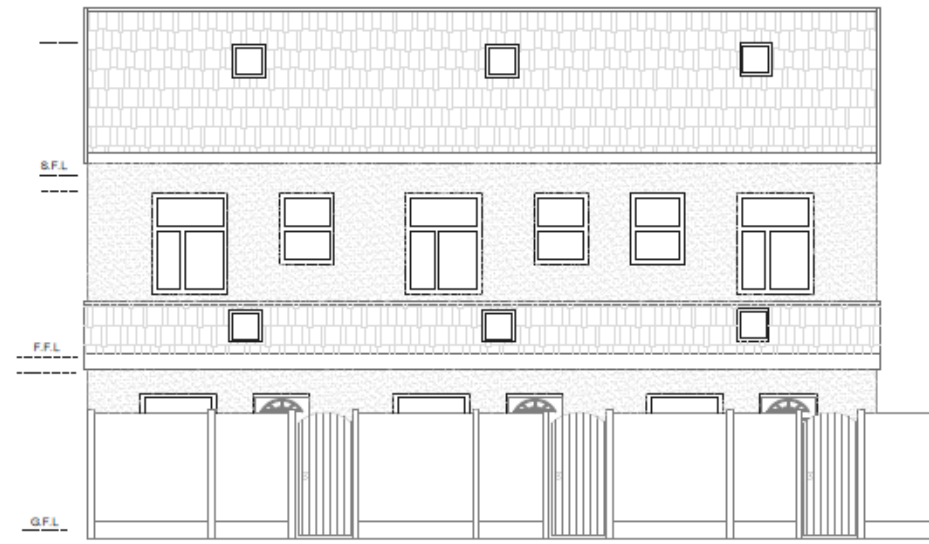
REV:D Date: 12/04/2024

SHT 7 of 9 Proposal

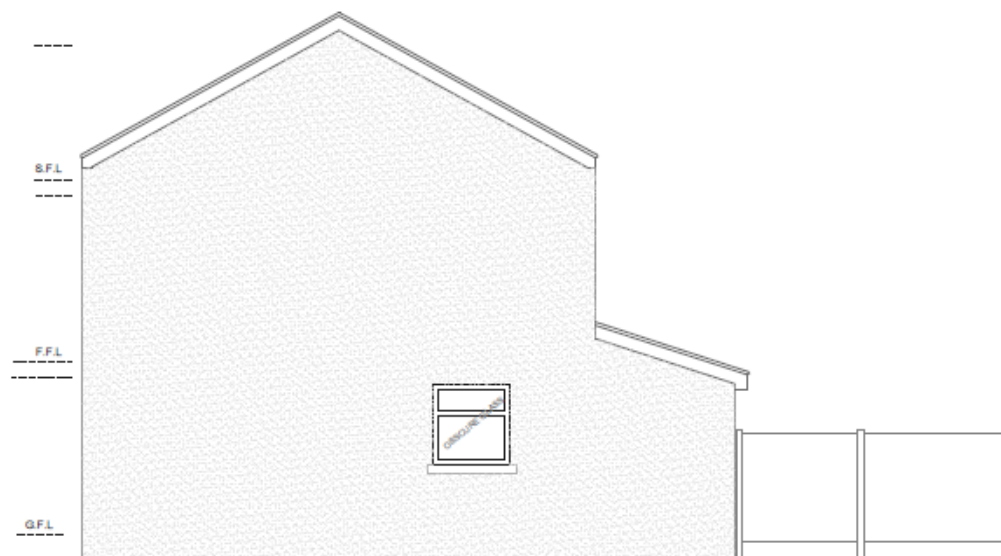




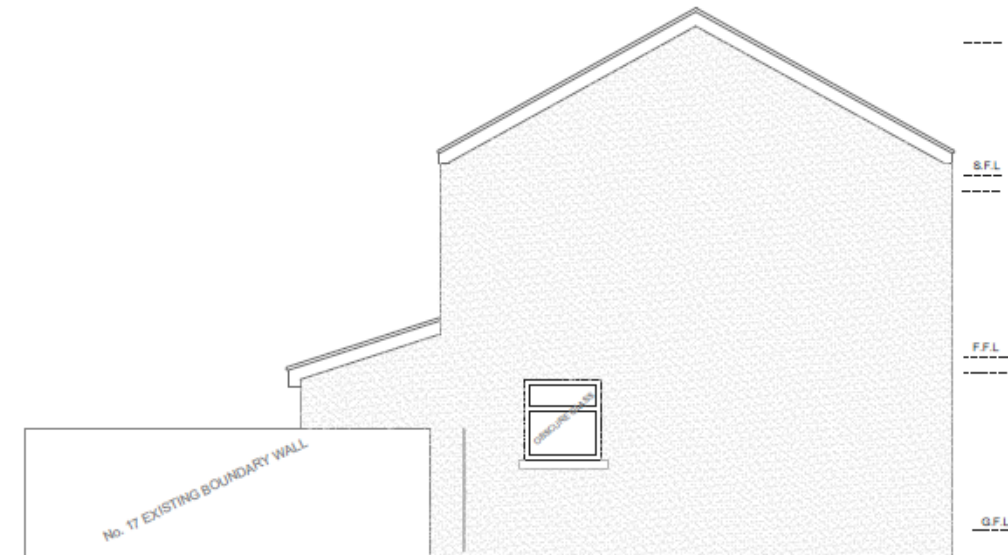
PROPOSED FRONT ELEVATION Incl. BOUNDARY



PROPOSED REAR ELEVATION Incl. BOUNDARY



PROPOSED REAR ELEVATION (WEST) Incl. BOUNDARY



PROPOSED REAR ELEVATION (EAST) Incl. BOUNDARY

NOTES:

- Walls to be finish with K-RENDER (Silicone K1) in white colour
- Roof tiles to be Natural slates to match surroundings
- Windows to be double glazed uPVC in black colour
- External doors to be uPVC in black colour to match windows
- Rainwater goods to be 114mm Square Plastic Gutter in black colour to match surroundings
- Rear garden boundary treatment to be wooden panels on a 300mm concrete slab in concrete posts
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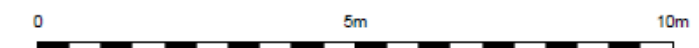
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Planning Services 2A Cook Street,
Bury, Lancashire,
BL9 0RP,
email: ipsuk@live.co.uk 0161 8717405

Proposed Elevations Incl. BOUNDARY
of Land next to 17 Prospect Place, Heywood OL10 4JQ

Scale : 1 : 100 on A3	All Dimensions in Meters
Ref: IPS/R/17/OL104JQ	Date : 16/05/2022
REV:D Date: 12/04/2024	Proposal
SHT 8 of 9	



Appendix II: Millers Brook’s culvert inspection report.



info@wmd-group.co.uk
Contact: 0800 024 8494
www.watermainsanddrains.co.uk

Date: 25/07/2023

Address: 17 Prospect Place, OL10 4JQ

Culvert Investigations:

WMD attended site on the request to investigate where a culvert ran at prospect place.

Reason for the survey was to establish if the culvert ran close to a site where building works will potentially be taking place.

Engineer surveyed the drain and found that from the point of discharge into Millers Brook, the culvert ran in a straight line upstream for as far as we could survey which was approx. 50m.

The culvert itself was in good condition and doesn't run close to the proposed site, it runs in a straight line and is approx. 16m away as it passes the site.

There was an RBC Drainage high risk flood sites programme carried out in 2016/17 on Millers Brook – I would like to think there would be information available to what works were carried out and to where they installed the new culvert but unsure where this information would be obtained – possibly from the local council ?

Photos Below:



info@wmd-group.co.uk

Contact: 0800 024 8494

www.watermainsanddrains.co.uk



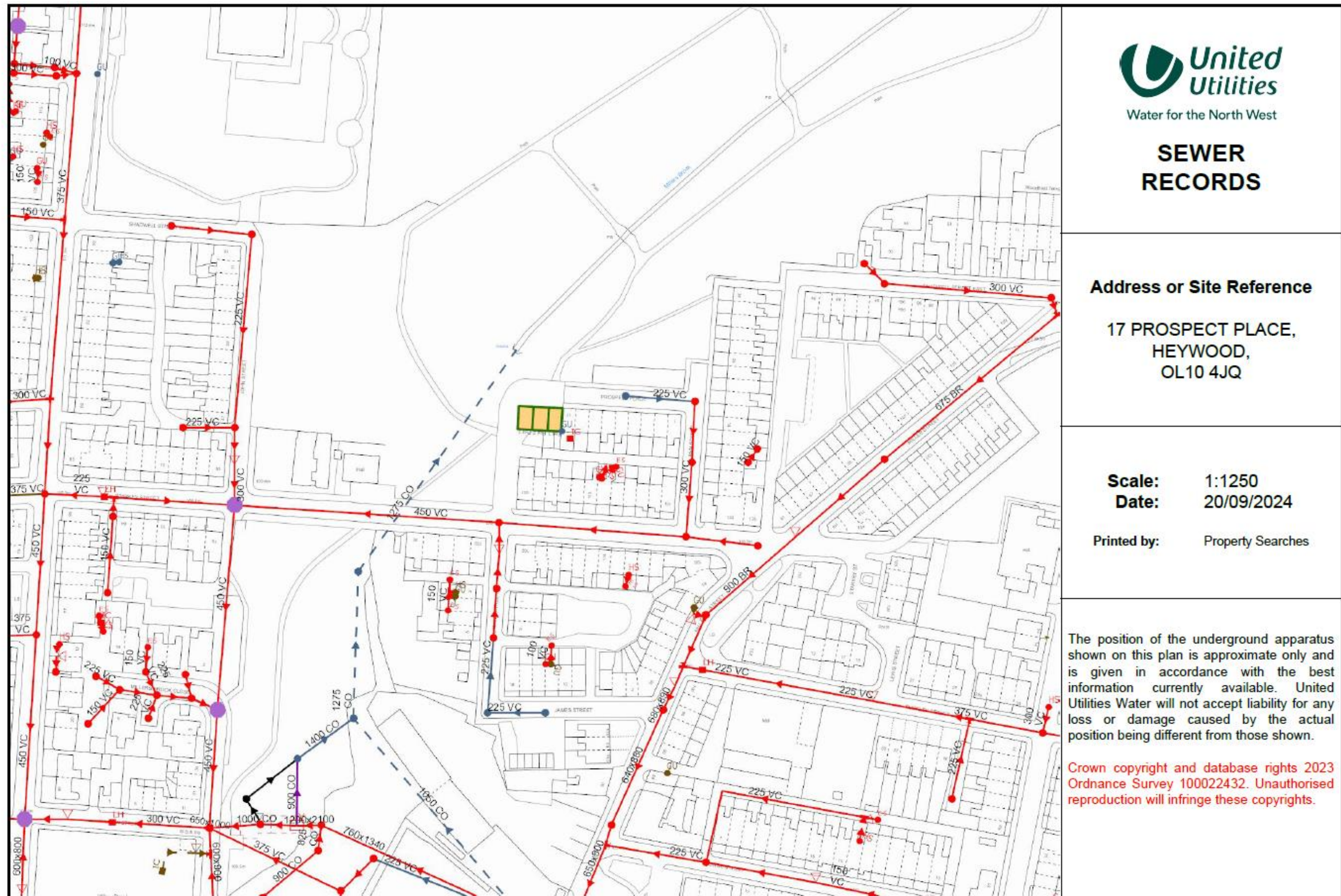


info@wmd-group.co.uk
Contact: 0800 024 8494
www.watermainsanddrains.co.uk





Appendix III: Sewer drainage network data at the Site, reference to United Utilities.



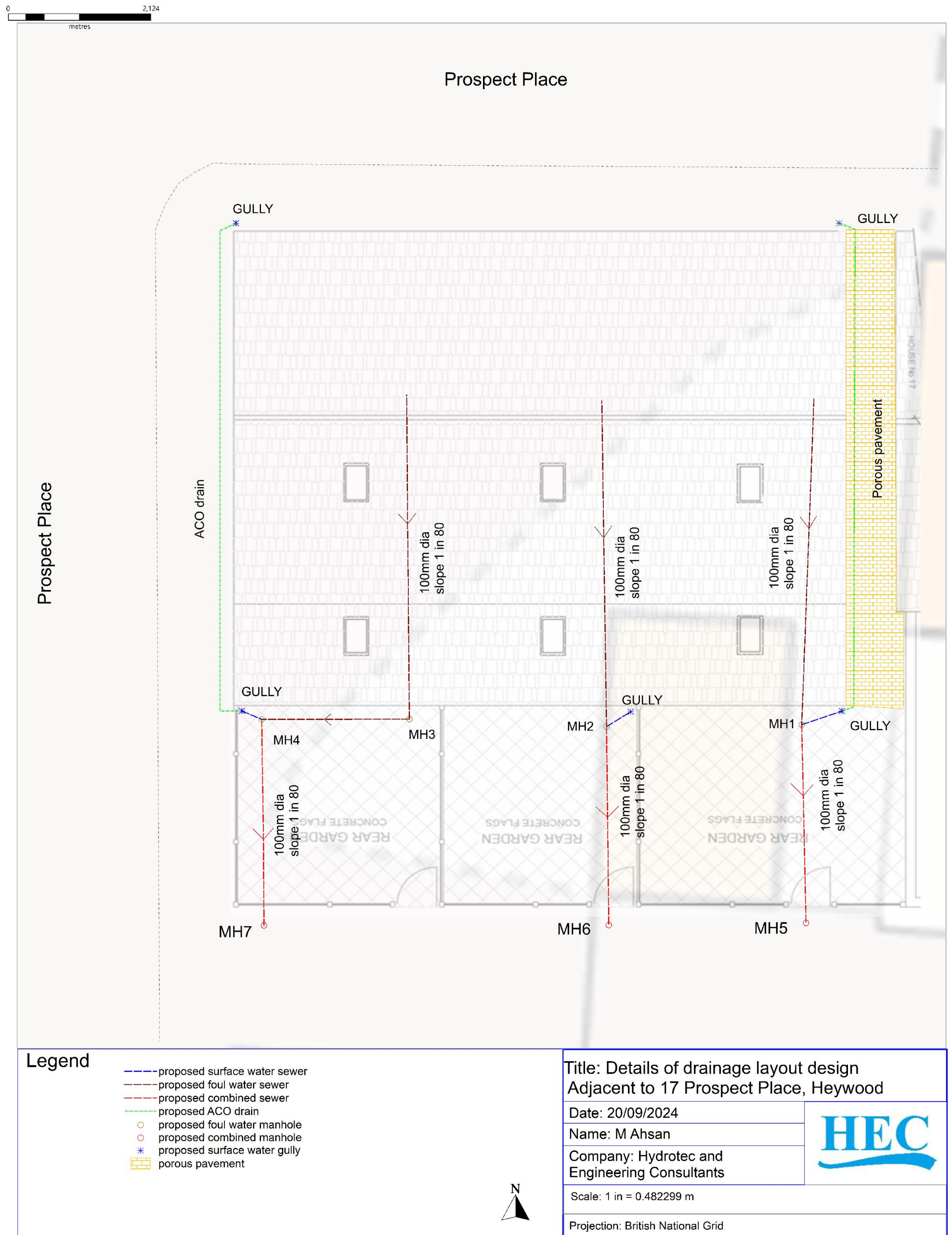
Wastewater Symbolology

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	DNM Network Monitoring Point
Drop Shaft	Change of Characteristic
Orifice Plate	

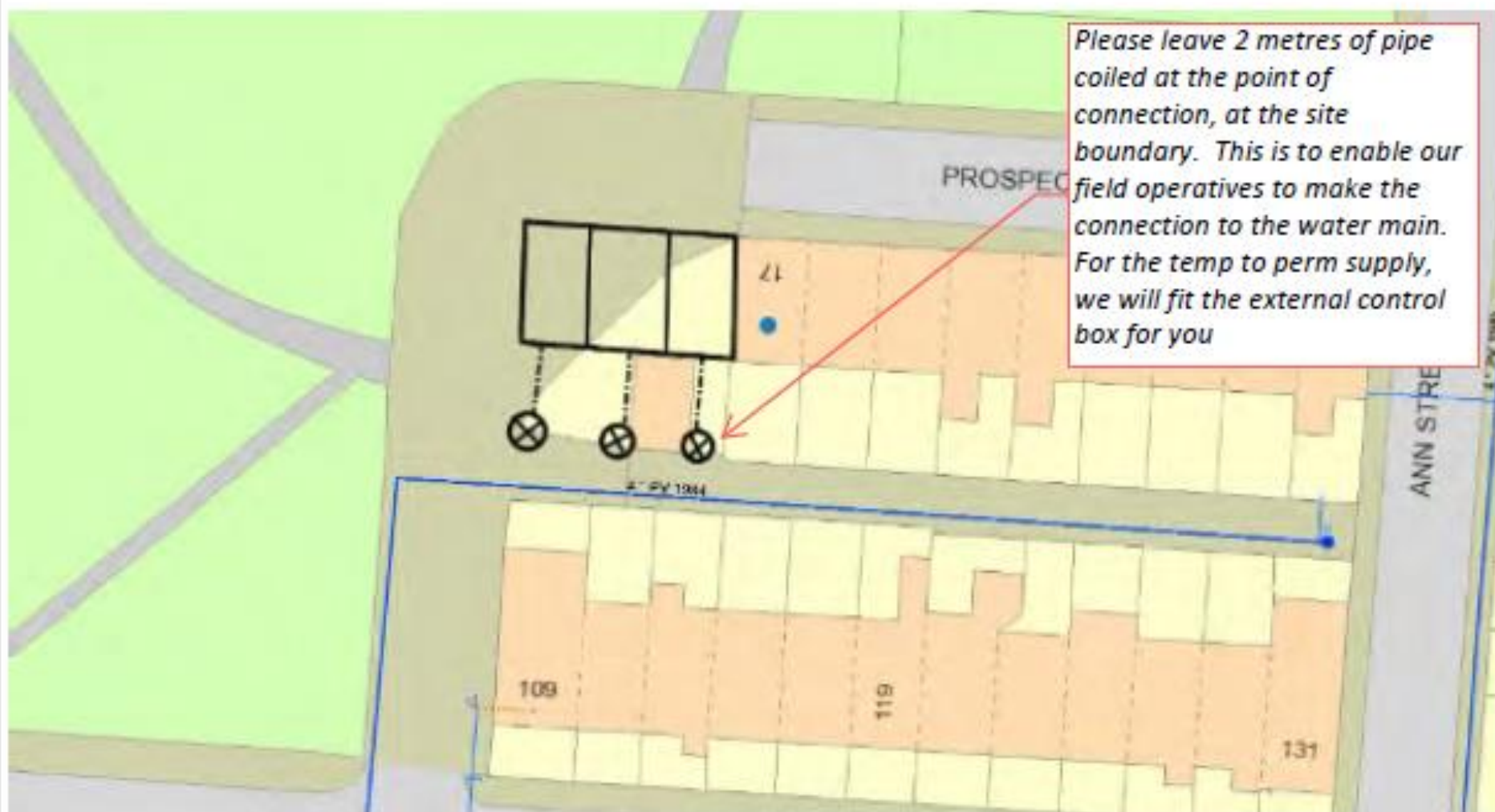
Appendix IV: Details of the drainage layout design at the Site.



Appendix V: Proposed location of the sewer outfall to United Utilities’s drainage system.

Images of your site

Your point of connection (digital)



Your point of connection (from survey)



Appendix VI: A typical vertical water tank for rainwater harvesting (capacity 250 litres).



Appendix VII: A typical ACO drain (channel drainage).



Appendix VIII: A typical cross-section of a previous paving system.

