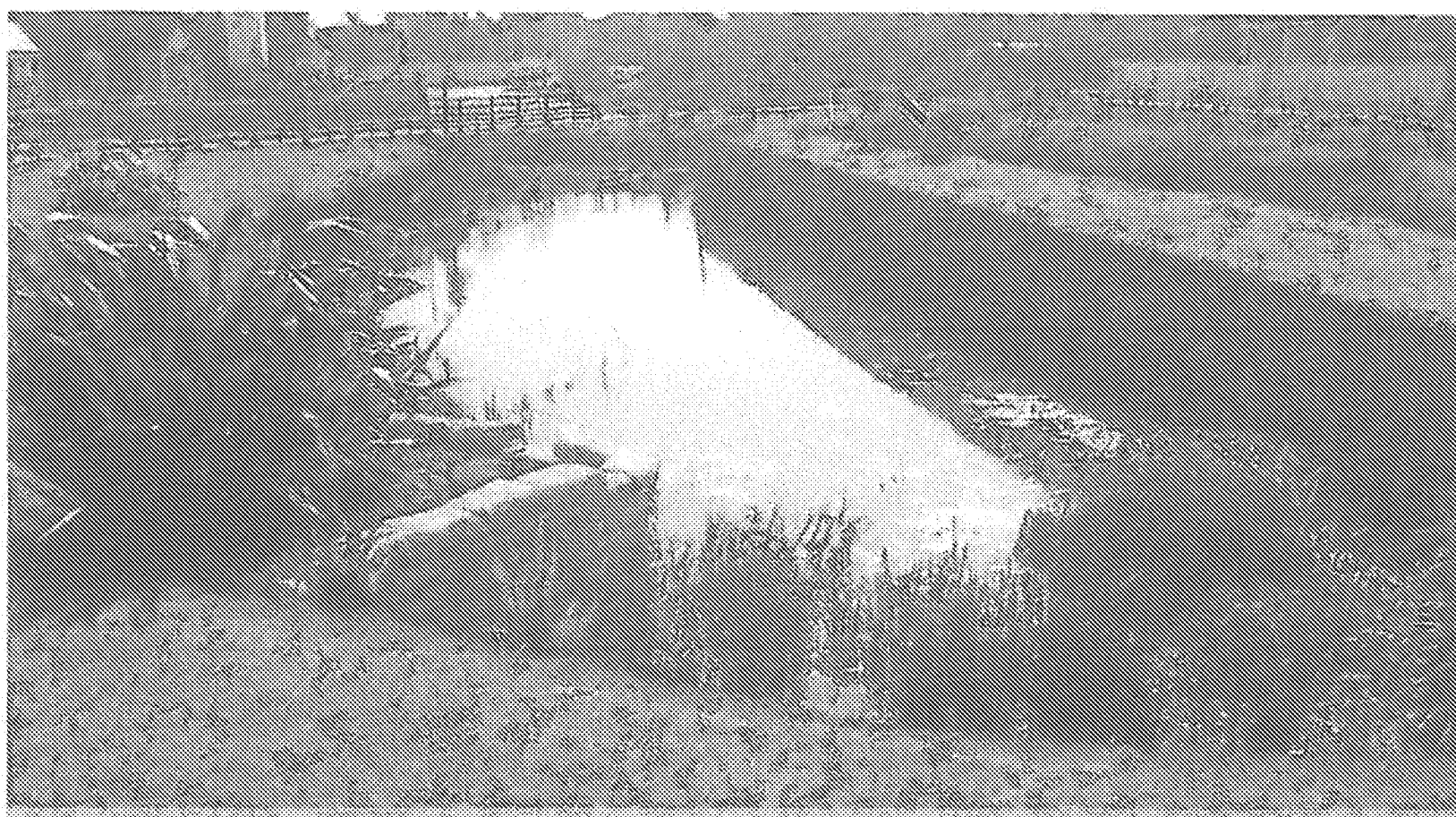




Stage 2 Flood Risk Assessment

172 Fitzalan Road, Arundel, BN18 9JZ

Client

Mr S. Hedger
172 Fitzalan Road
Arundel
BN18 9JZ
Ref: 11935
Date: March 2022

Consulting Engineers

GTA Civils Ltd
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Issue	Issue Date	Checked By	Checked By
Preliminary Issue	17 March 2022	JP	MR

1 Introduction

- 1.1 This FRA report has been prepared for Mr. S. Hedger in relation to the proposed development at 172 Fitzalan Road, Arundel, BN18 9JZ. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.2 GTA Civils & Transport Limited was appointed by the client to provide a Flood Risk Assessment (FRA) as required by the Environment Agency and Arun District Council in order to achieve Planning Approval at said property.
- 1.3 This report will take the form of a formal Flood Risk Assessment in accordance with the 2021 National Planning Policy Framework (NPPF) and the current Planning Practice Guidance (PPG). Reference has been made to the EA's Flood Risk Standing Advice – 'advice for minor extensions' page, namely:- <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions>.

2 Existing Site & Flood Risk Profile

- 2.1 The application site is located in Littlehampton, which is administered by Arun District Council (ADC). The site comprises a dwelling house and garden. A site location map and aerial view are shown in Appendix A.
- 2.2 Hydrology: The River Arun flows in a broadly southwest direction very close to the site's west boundary. The English Channel is approximately 5.3km to the south.
- 2.3 Sewers: Southern Water's sewer records are shown in Appendix C. There is no public storm sewer in this vicinity and the site is served by a 150mm dia. public foul sewer that flows northeast past the west/rear elevation.
- 2.4 Existing Sewers: Southern Water's sewer records show a 300mm combined surface water and foul sewer flowing south below Fitzalan Road – refer to Appendix D. Near the site's access on Selborne Road a 225mm combined sewer (head of run) flows east. The site is also served by a 225mm dia storm sewer that flows southwards to the west.
- 2.5 Coastal/Tidal flooding: the EA's fluvial flood map in Appendix B indicates that the site is in Flood Zone 3 (FZ3), 'High Risk' of tidal flooding. Tidally affected sites in FZ3 are liable to flood with an annual expectation of over 0.5% (greater than once every 200 years on average). The orange line along the west boundary denotes a flood defence structure.
- 2.6 The EA has provided modelled outputs (levels and depths) for the undefended storm events (0.5%, 0.5% + 20%CC and 0.1%). The undefended scenario is considered unduly conservative given the fact that flood defences are in situ for the foreseeable future. A model that assumes no defences place is unrealistic. That said, as there is no breach modelling available, this has to be considered.
- 2.7 The mean 0.5% + CC depth is 0.94m – refer to the flood depths table in Appendix B.
- 2.8 Surface water flooding: this occurs when excess rainwater does not infiltrate into the ground or is not intercepted. The EA's Online 'Surface Water Depth - Low Risk Scenario' (1 in 1000 years) Flood Map (see Appendix B) shows the site is clear of flooding from this source.
- 2.9 Artificial sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix B shows that the site is liable to flood when a reservoir suffers a catastrophic breach – at the same time as a river flood event.
- 2.10 Historic: the site is removed from affected areas of recorded flood incidents – according to the EA's

Historic Flood Map in Appendix B.

- 2.11 In conclusion, the flood risk profile of this site is 'High', due to the risk of flooding from the tidal River Arun. The predicted flood depth in the critical storm is 0.94m.

3 Proposed Development & Mitigation

- 3.1 The proposed development is to extend the dwelling to the west (rear). The nett increase in footprint (roofed) area is approximately 25m². The proposed scheme drawings are shown in Appendix D.
- 3.2 As summarised in section 2.14 above, the flood risk profile of the building is 'High'. Both the building and external areas are liable to flood in the critical 1 in 200 years storm event.
- 3.3 For full compliance of flood risk policies, *new buildings*' (habitable accommodation) lowest floor levels must be set at least 0.3m above the critical flood level over its expected lifetime. Domestic extensions' lowest floor level can run through (at the same level), provided 'appropriate mitigation' is proposed.
- 3.4 Flood Resilience flood mitigation is proposed. The modelled flood depth of 0.94m is too great for resistance (barrier systems) to be safe. Standard construction can withstand hydraulic pressure up to 0.7m in height only. Above this level the water pressure is likely to cause a local hazardous failure – or partial collapse. For this reasoning, the ground floor and up to 1.24m (wall surfaces) will be constructed using **flood resilient materials and techniques**. The water will find its way into the building via the junctions between floor and walls and around the doors.
- 3.5 The document "Improving the Flood Performance of New Buildings - Flood Resilient Construction" published by DEFRA/Environment Agency is a good source of information on resilient techniques. It is conceded that the principles set out in this will have to be modified to suit a non-residential building.
- 3.6 Flood resilient construction may include - and not necessarily limited to the following:
 - Solid concrete floor with either no screed or waterproof screed;
 - Altro or similar durable flooring with integral skirting;
 - Cladding to the external walls to be durable/flood-proof up to 1.24m above floor level, this defined as the "critical level";
 - Electrical distribution to be routed down from the ceiling; sockets placed above the critical level;
 - Waterproofing installed up to the critical level; waterproofing will be tied in to the ground floor slab as appropriate; details will be provided at detailed design, to comply with building regulations;
 - Plasterboard, if used, will be installed horizontally to minimise the number of sheets damaged;
 - Any wood fixings below the critical level will be robust and/or protected by suitable coatings to minimise damage;
 - Boilers and meter cupboards will be placed above the critical level;
 - Non-return valves shall be fitted to the foul water drainage network.

- 3.7 Safe Access To Dry Land: In order to comply with the NPPF, all occupants must be able to make their way, unassisted by the Emergency Services, to dry land. This is known as 'safe access to dry land' and it does not have to be dry, just not *hazardous* (safe).
- 3.8 The access/egress of the site is liable to flood to depths of over 0.95m. This depth would be hazardous to all users, whether able bodied or not. Because the flood threat is tidal and because there is refuge at high level, it is contended that occupants can reside safely at high level for the brief predicted duration of such a tidal flood. This refuge is deemed to be 'dry land' because of the short term nature of the flooding.
- 3.9 A build over agreement will be needed due to the proximity of the public sewer – refer to section 2.4 above and the sewer records in Appendix C. This will be organised with Southern Water at the next stage.
- 3.10 Conclusion: this proposed development will not increase the flood risk of this site – or that of neighbouring properties. It complies fully with the EA's Flood Risk Standing Advice for Minor Developments.

- End of Report -

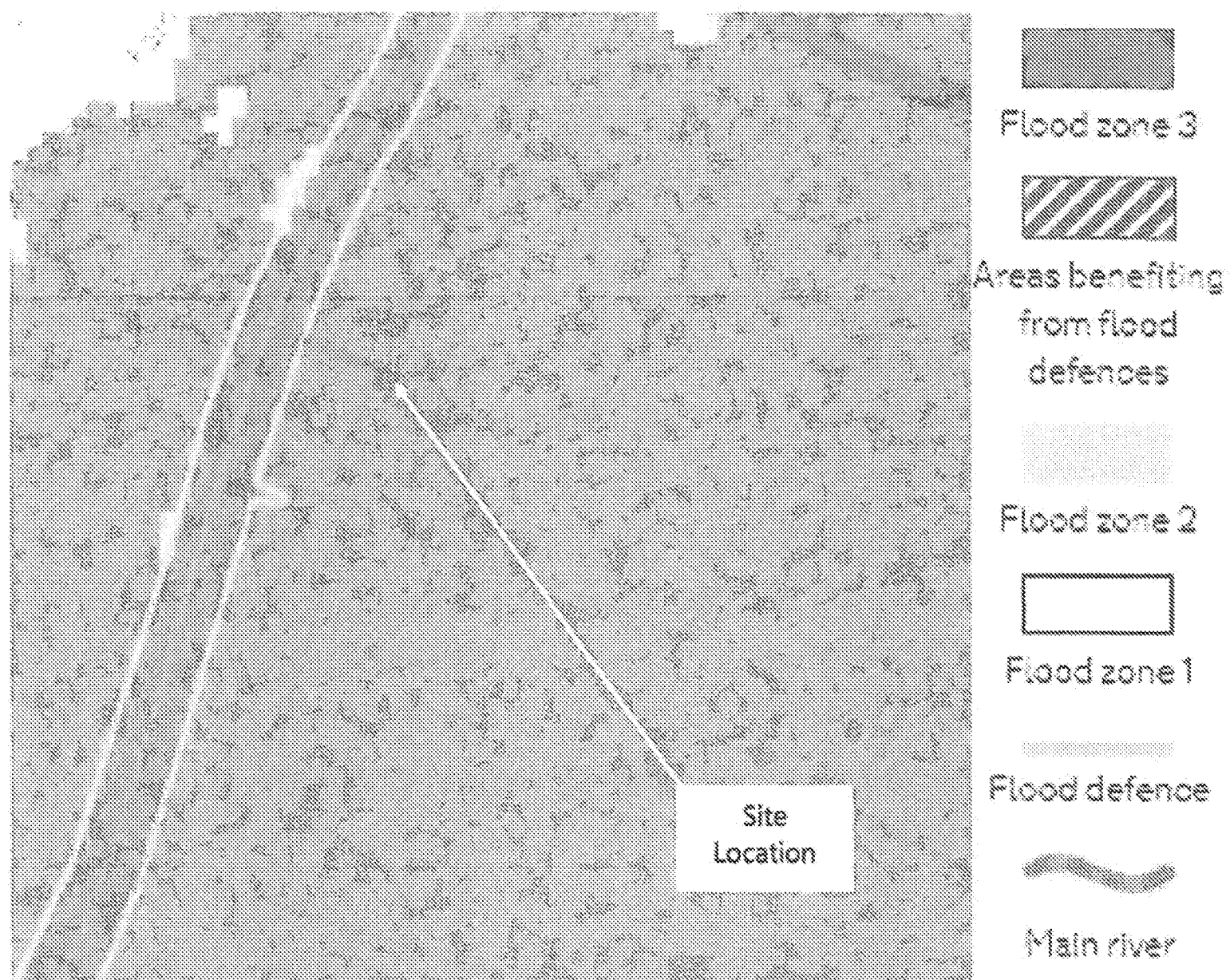
Site Location Map & Aerial Photo





Appendix B

Environment Agency Flood Data



EA's Online Flood Map for Planning (Rivers and Seas)

The site is located in Flood Zone 3 (FZ3) and benefits from a flood defence structure

Node Point	Easting	Northing	TIDAL Depths taken from 2010 ISIS/TUFLOW model [m]		
			UNDEFENDED		
			0.5% AEP [1in200yr]	0.1% AEP [1in1000yr]	0.5% AEP [1in200yr] +CC [2115]
1	501997	106892	0.27	0.33	0.91
2	502005	106877	0.30	0.36	0.94
3	502013	106889	0.35	0.41	0.99
4	502015	106873	0.29	0.35	0.93



Surface water flood risk: water depth in a low risk scenario
Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm

EA's Online Surface Water Flood Depth Map in a 'Low Risk Scenario'
(1 in 1000 years storm event)

The site is removed from this source of flooding



Maximum extent of flooding from reservoirs:

-  when river levels are normal
-  when there is also flooding from rivers

EA's Online Flood Risk from Reservoirs – Flood Depth - Map

The site is liable to flood in the event of a reservoir breach – but only during a river flood event



The site is removed from the nearest flood record

Appendix C

Southern Water Sewer Records

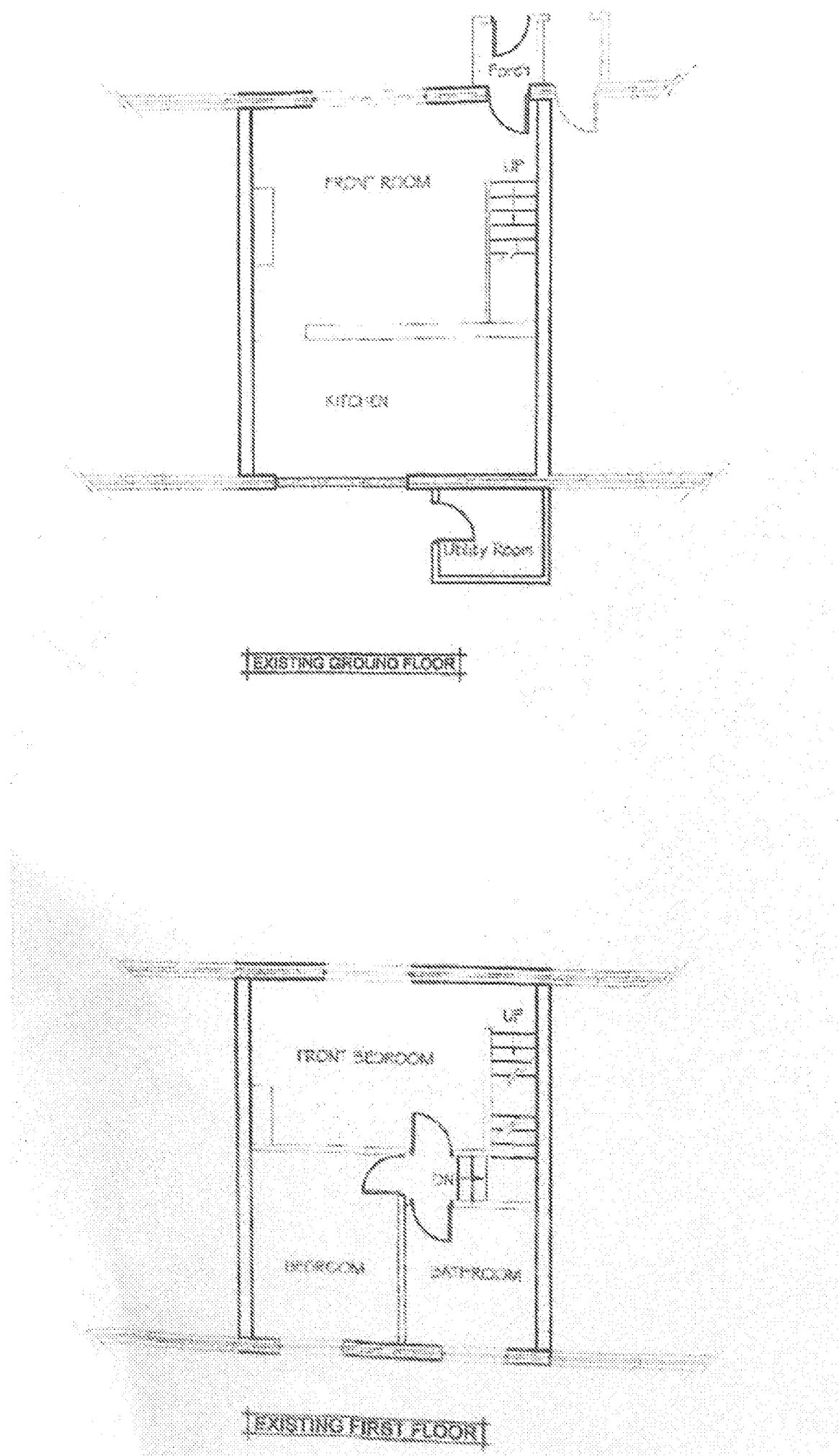
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0401	F	1.80	0.15	
0503	F	4.79	2.05	
0504	F	6.91	5.07	
0505	F	5.11	3.32	
0506	F	3.99	1.90	
0507	F	4.03	1.96	
1401	F	1.72	-0.27	
1502	F	2.09	0.00	
1504	F	2.88	0.00	
1505	F	4.72	2.46	
2501	F	2.77	0.00	
2502	F	2.65	0.00	
2503	F	2.85	0.00	
2504	F	2.89	0.00	
3301	F	2.29	1.63	
3302	F	2.10	1.77	
3303	F	2.30	1.92	
3305	F	0.00	0.00	
3401	F	2.08	0.73	
3402	F	1.95	1.22	
3403	F	2.12	1.00	
3404	F	2.19	0.53	
3405	F	0.00	0.00	
3502	F	2.10	0.00	
3504	F	2.83	1.50	
3506	F	2.32	0.00	
3508	F	2.39	-0.43	
3509	F	2.31	0.00	
3510	F	2.42	0.00	
3512	F	0.00	0.00	
3513	F	0.00	0.00	
3514	F	0.00	0.00	
3515	F	0.00	0.00	
4401	F	2.27	0.55	
4502	F	2.79	0.00	
4503	F	1.98	0.00	
4504	F	2.20	1.23	
4505	F	2.24	0.99	
4506	F	2.20	1.31	
2551	S	2.81	0.00	
2552	S	2.68	0.00	
2553	S	2.85	0.00	
2554	S	2.79	0.00	
2556	S	2.86	0.00	
2557	S	2.57	0.00	
2561	S	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
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Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
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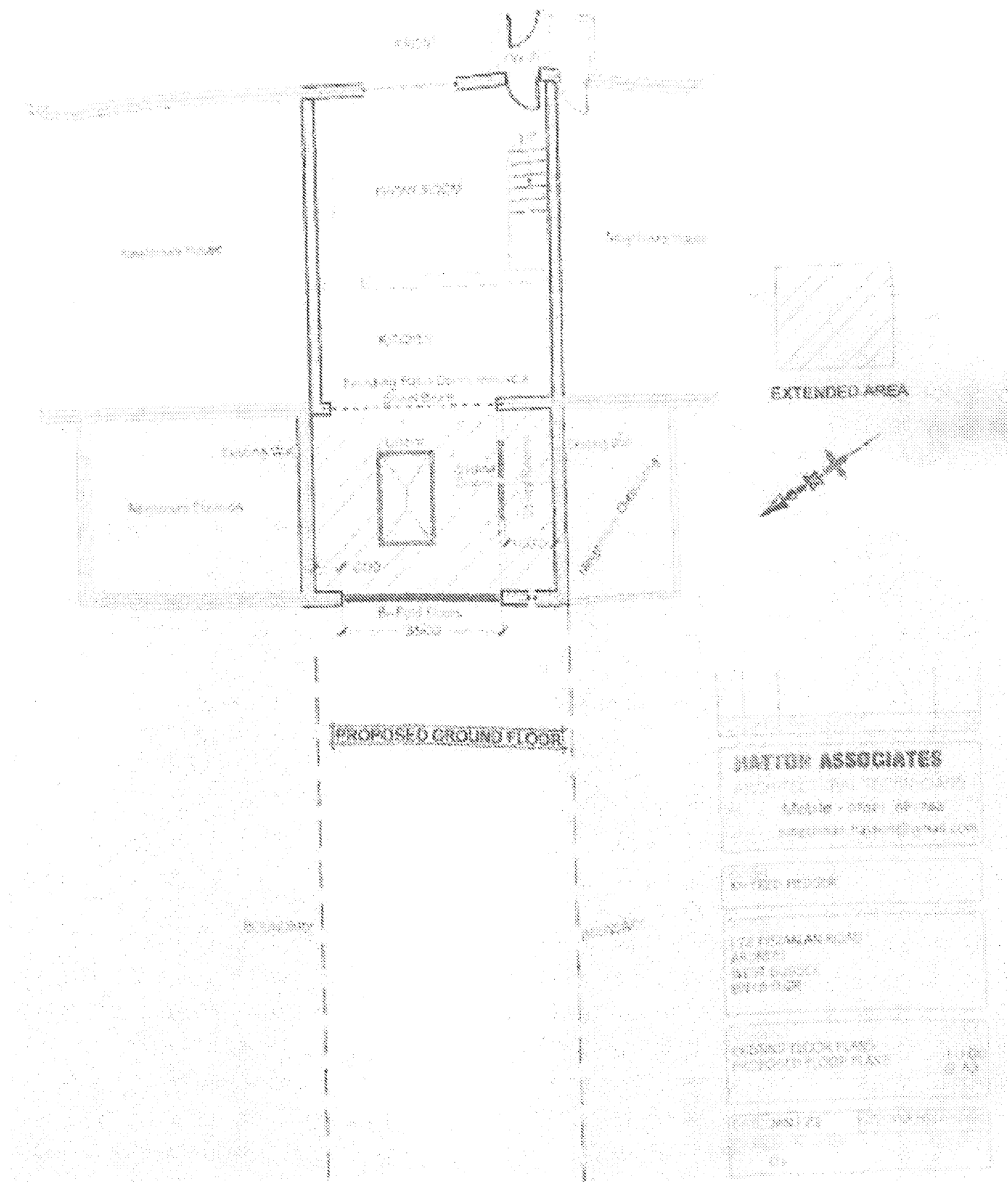
Appendix D

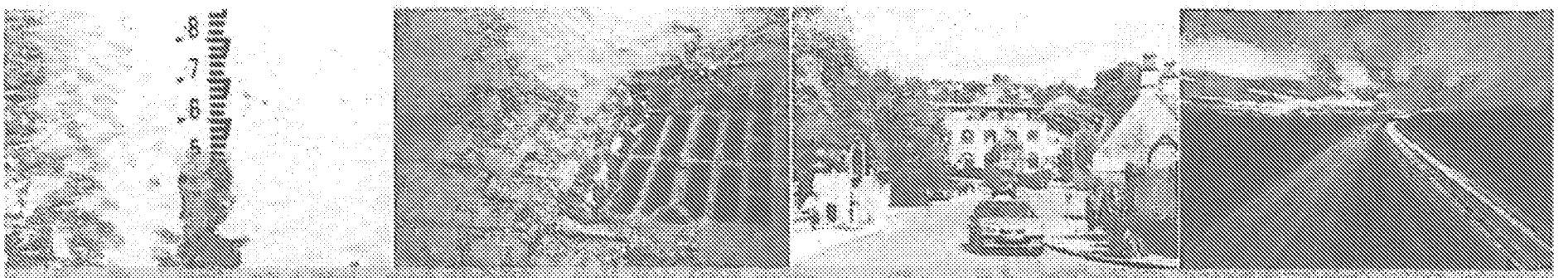
Proposed Scheme Drawings



Notes

- 1. This plan is a proposed floor plan for the proposed development.
- 2. The plan is based on the information provided by the client.
- 3. The plan is subject to the approval of the relevant authorities.
- 4. The plan is not to be used for any other purpose without the written consent of the client.
- 5. The plan is not to be used for any other purpose without the written consent of the client.





Civil Engineering - Transport Planning - Flood Risk

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[Redacted text]

