FLOOD RISK ASSESSMENT
3901/FRA

Cliff Road
Darfield
Barnsley
S73 9HR

Proposed Residential Development

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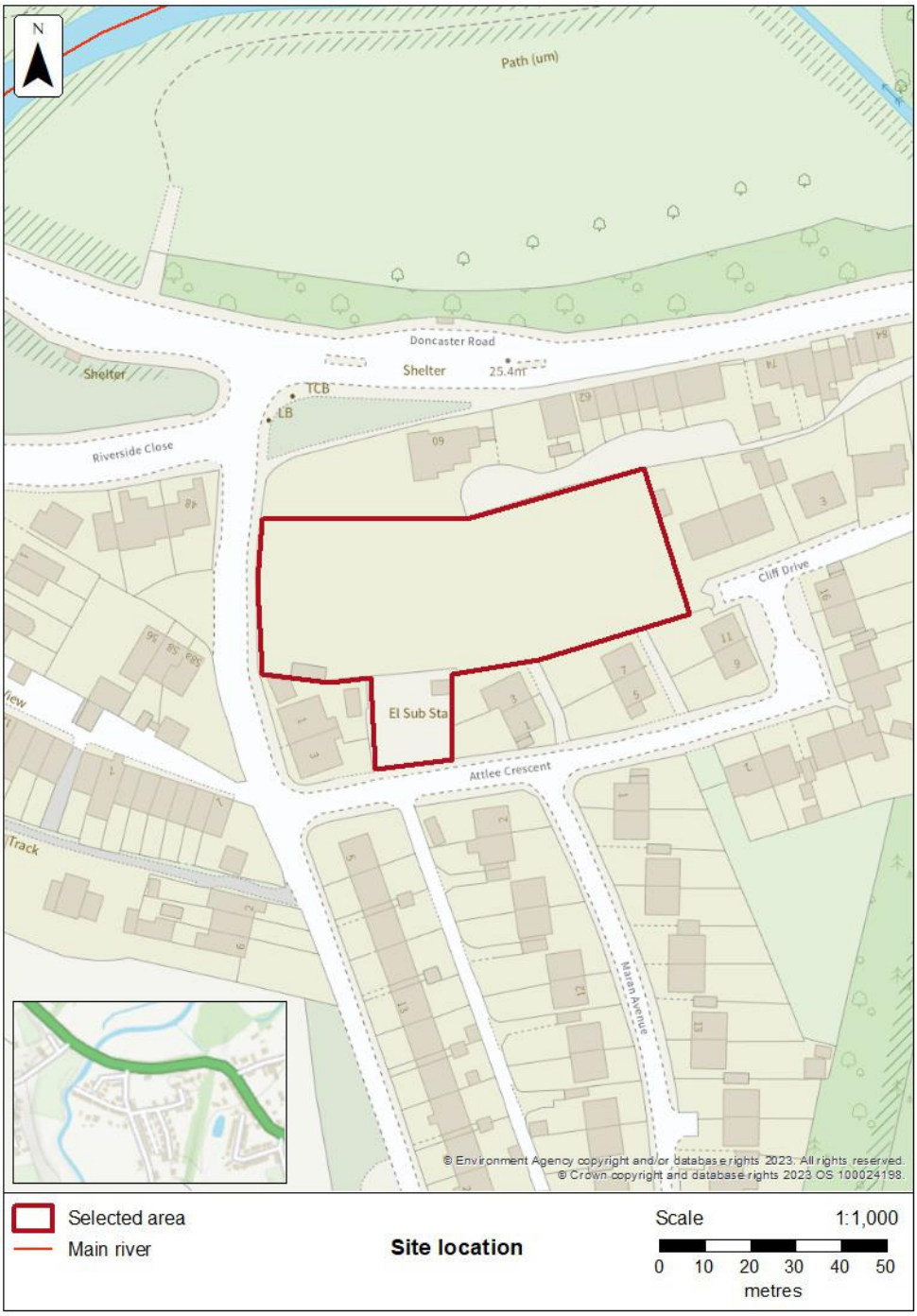
1. Development site

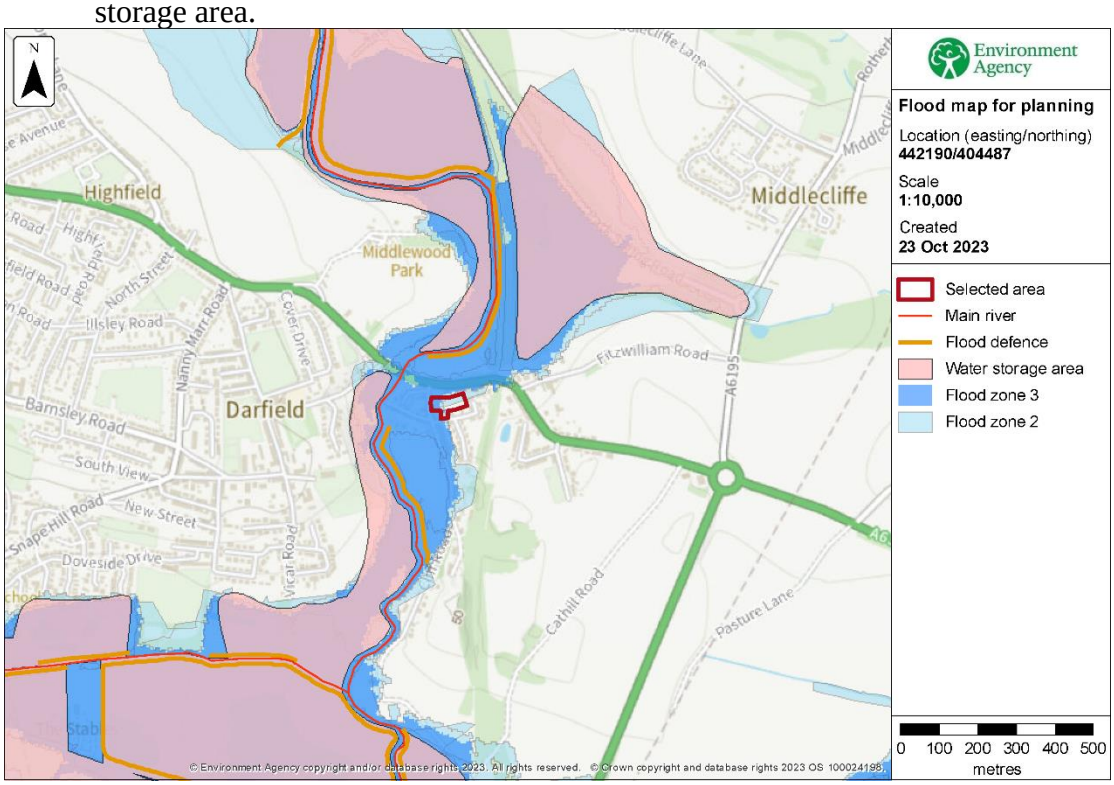
1.1. The development site is a vacant plot to the east of Cliff Road, and south of Doncaster Road, in Darfield, Barnsley. The river Dearne is about 100m west of the site.

1.2. The local area is predominantly residential in nature.

1.3. A location plan is shown below.



1.4. The western edge of the site is in flood zone 3 according to Environment Agency Mapping. The north edge is in flood zone 2. The site is outside of any water storage area.



2. Development proposals

2.1. The development proposal is construction of 10No. new detached dwellings.

2.2. The first five dwellings are to be accessed from a private drive off Cliff Road, and the other five from a private drive off Attlee Crescent to the south.

2.3. Being residential development, the vulnerability classification is “more vulnerable” with a lifetime considered to be 100 years.

3. Climate change

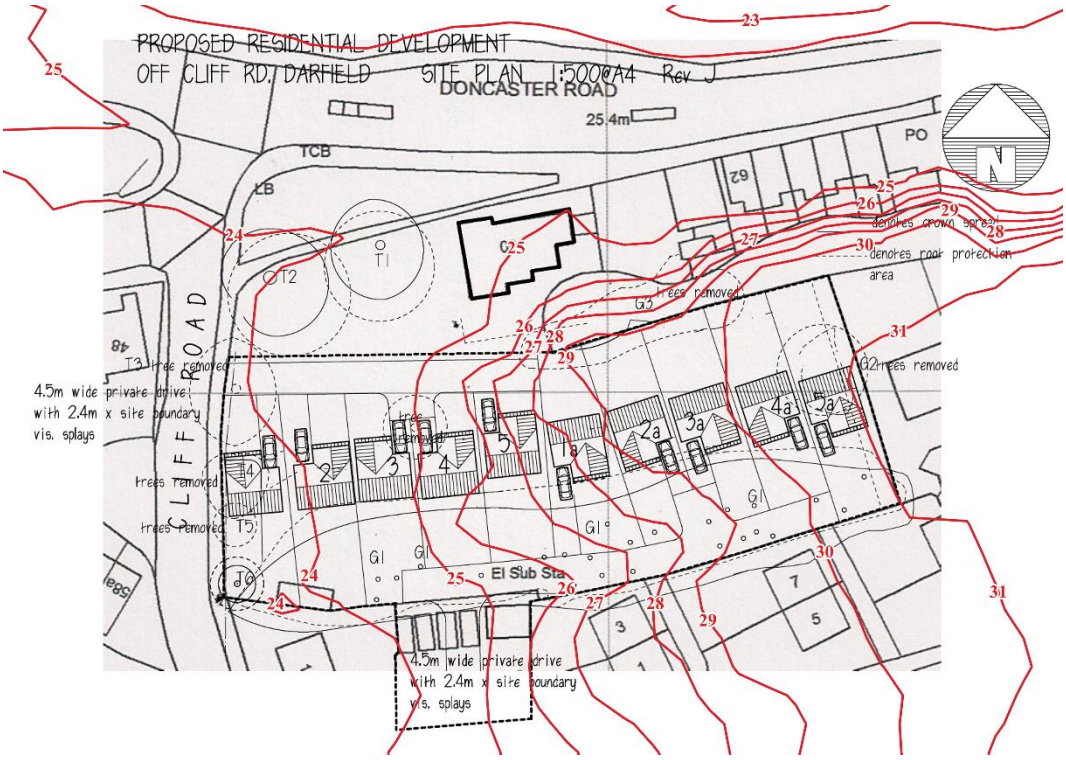
3.1. The site is within the Don and Rother Management Catchment.

3.2. Considering the development's 'more vulnerable' classification in flood zone 3a, the central allowance category should be used.

3.3. The central allowance for anticipated change to peak river flows into the '2080s' (2070-2115) is 28%, the higher allowance is 38%.

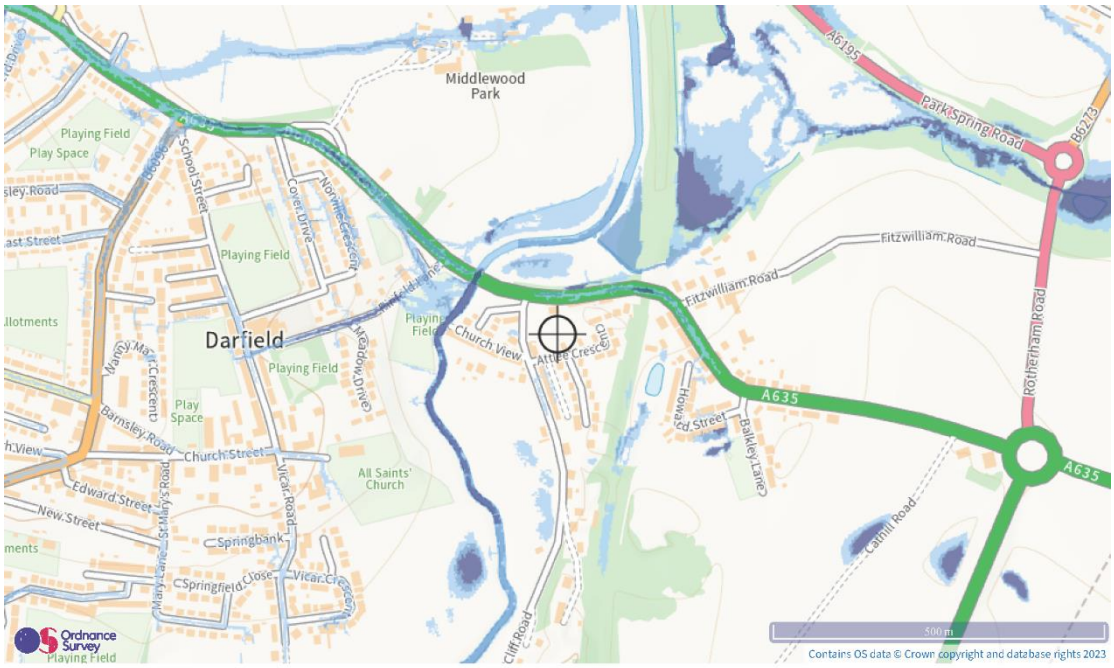
4. Site specific flood risk

4.1. The site slopes up from around 24mAOD at the western edge with Cliff Road, up to 31mAOD at the eastern edge of the site. Environment Agency 2022 LIDAR DTM contours have been overlaid on the preliminary development plan below.



4.2. Data, including flood modelling information, has been provided by the Environment Agency relating to the site.

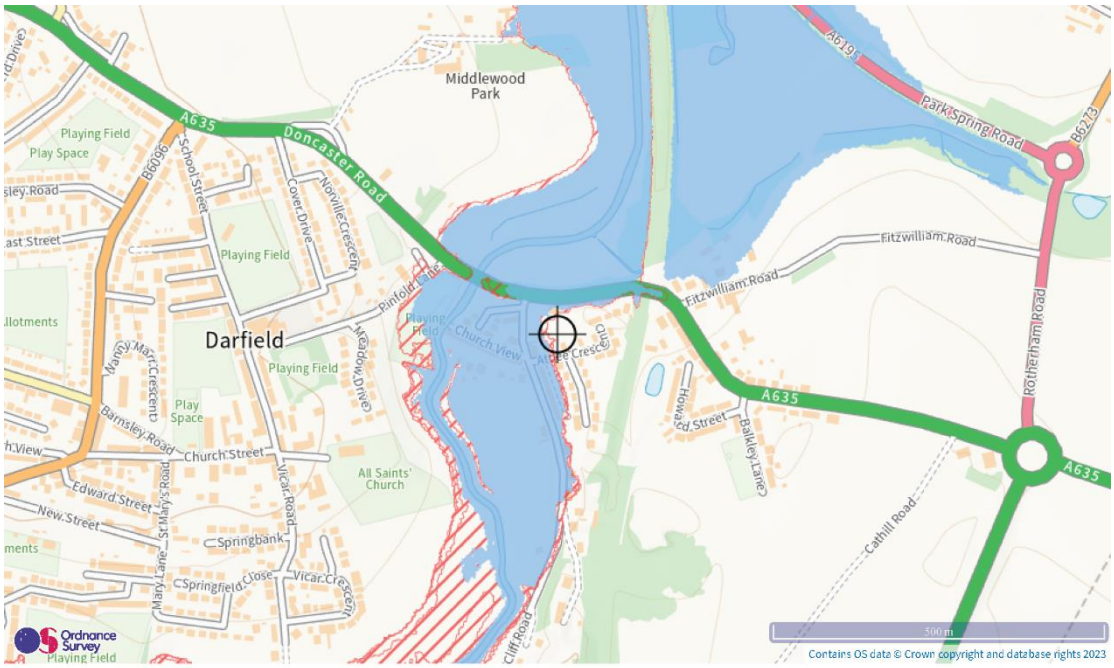
4.3. The site is not at risk due to surface water. This is likely due to the notable slope enabling sufficient runoff.



Extent of flooding from surface water

High Medium Low Very low Location you selected

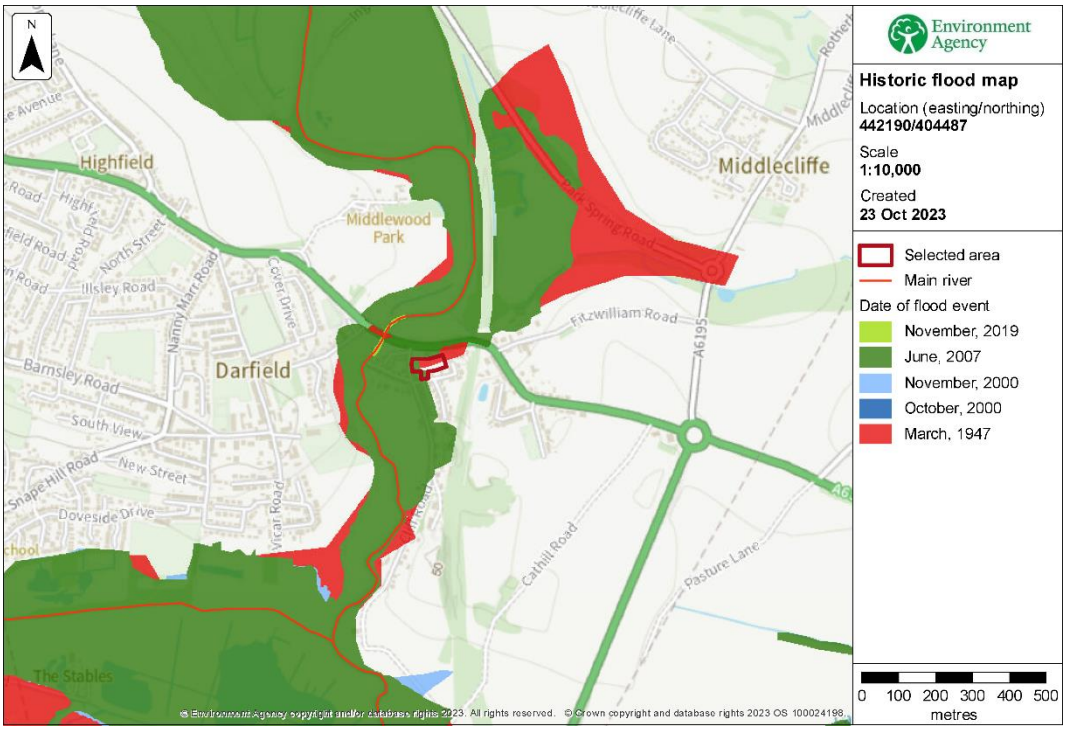
4.4. The west edge of the site is at risk of flooding due to reservoir breaches. The area of flooding is not significantly increased in combination with flooding from rivers.



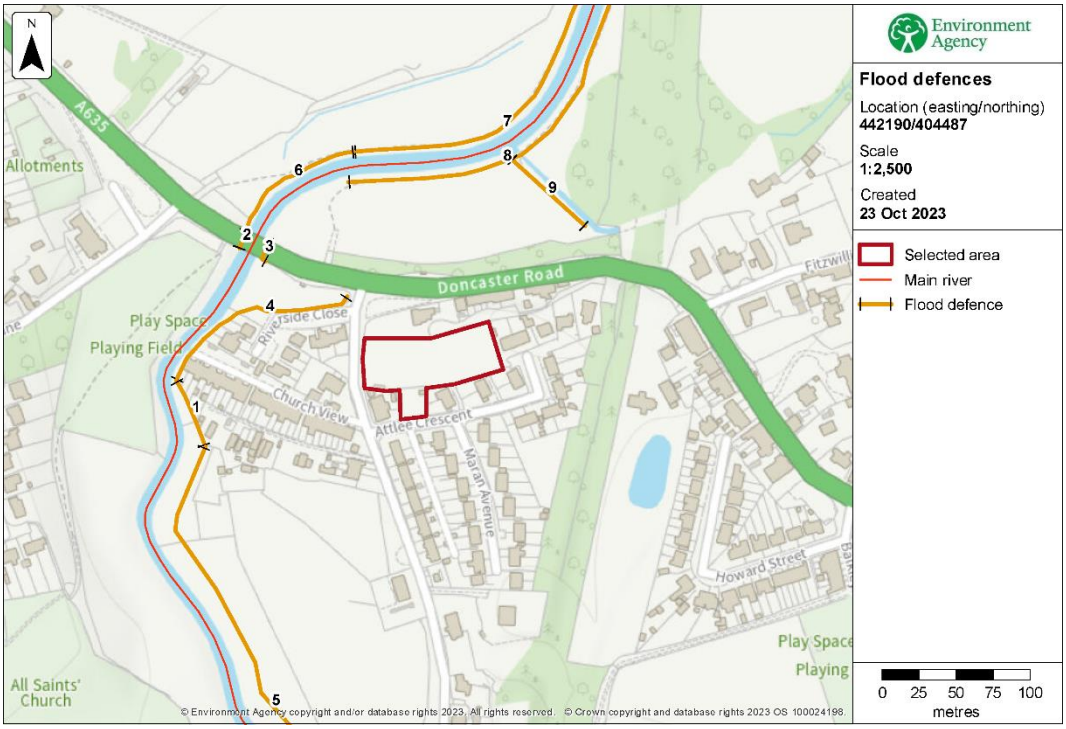
Maximum extent of flooding from reservoirs:

when river levels are normal when there is also flooding from rivers Location you selected

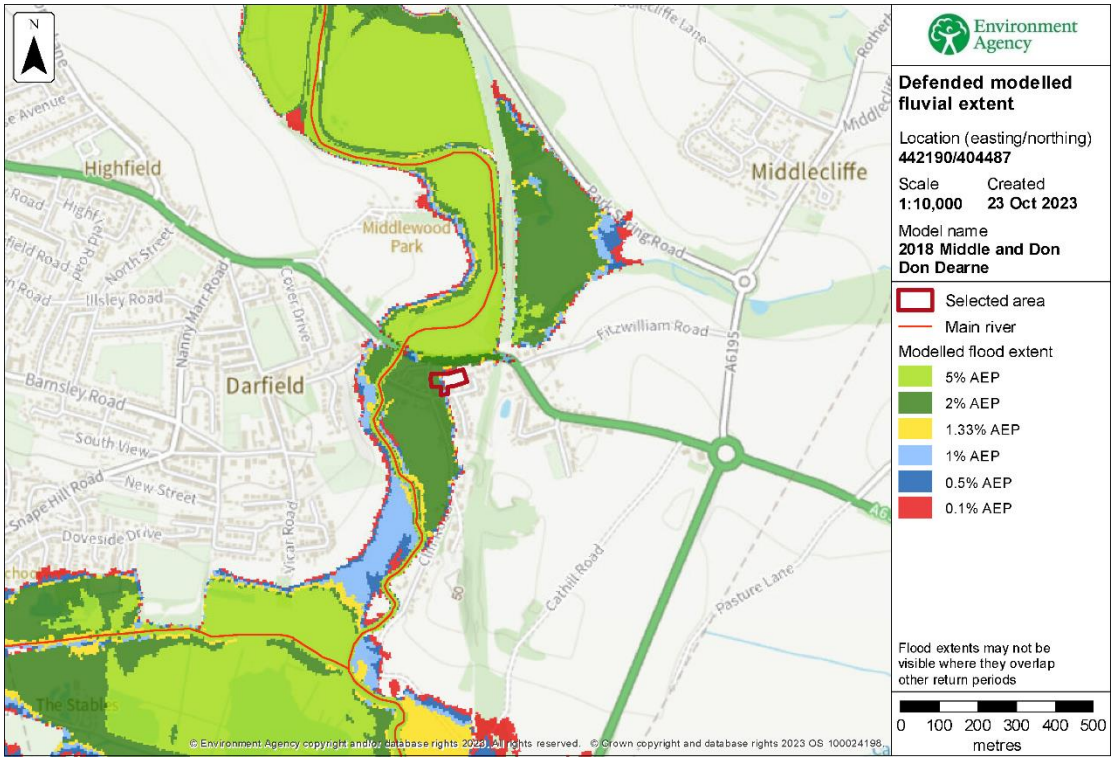
4.5. Parts of the site are recorded to have flooded in the past. The western edge flooded in the June 2007 floods and the northern edge in the



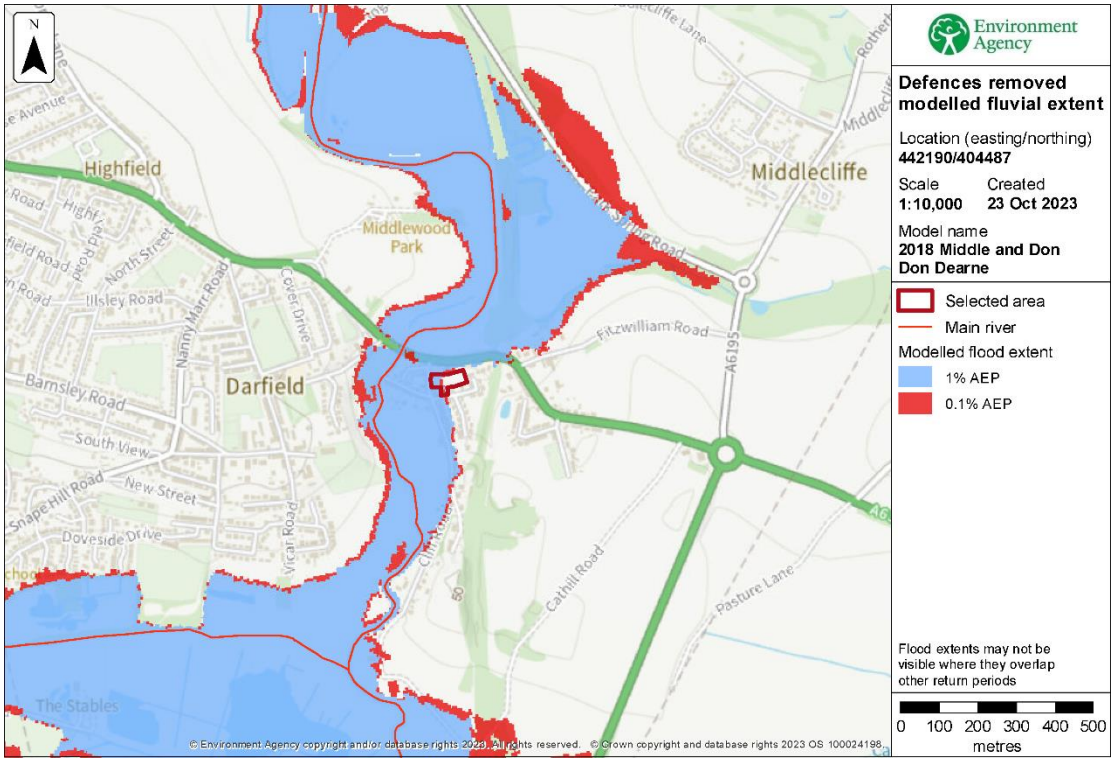
4.6. The site benefits from flood defences. The nearest defence, no. 4 is listed as a wall in poor condition. The crest level of the asset is not recorded.



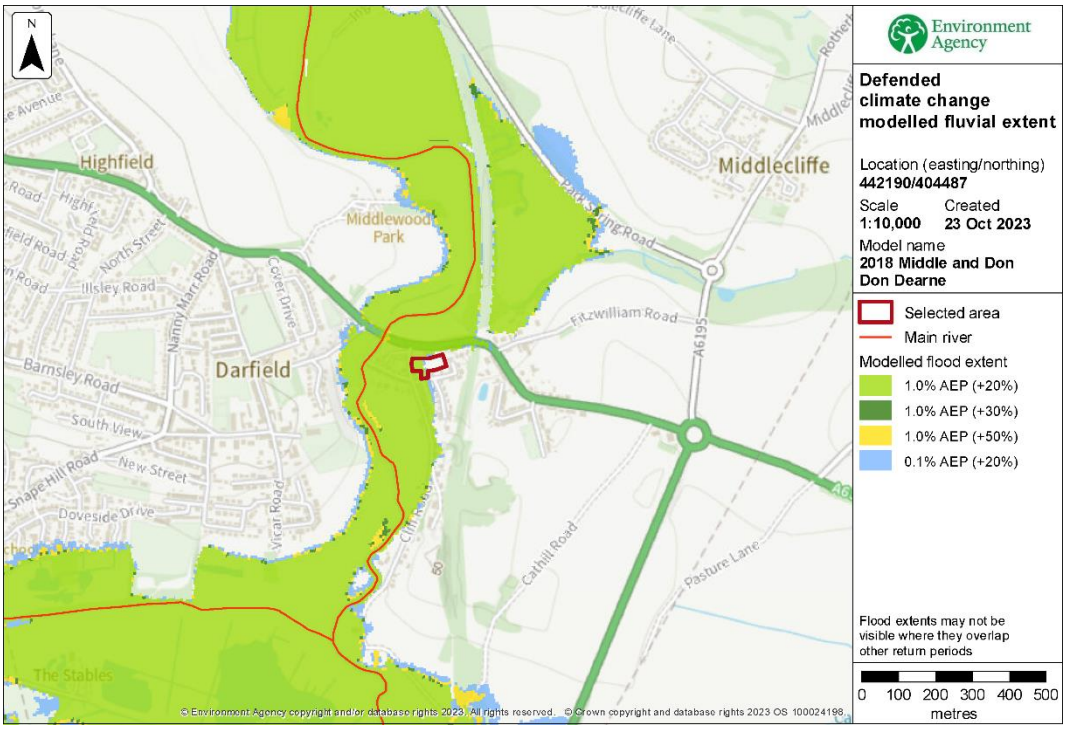
4.7. Data from the 2018 Middle and Lower Don model has been provided. The western edge of the site is within the 2% annual exceedance probability (AEP) area of the defended model.



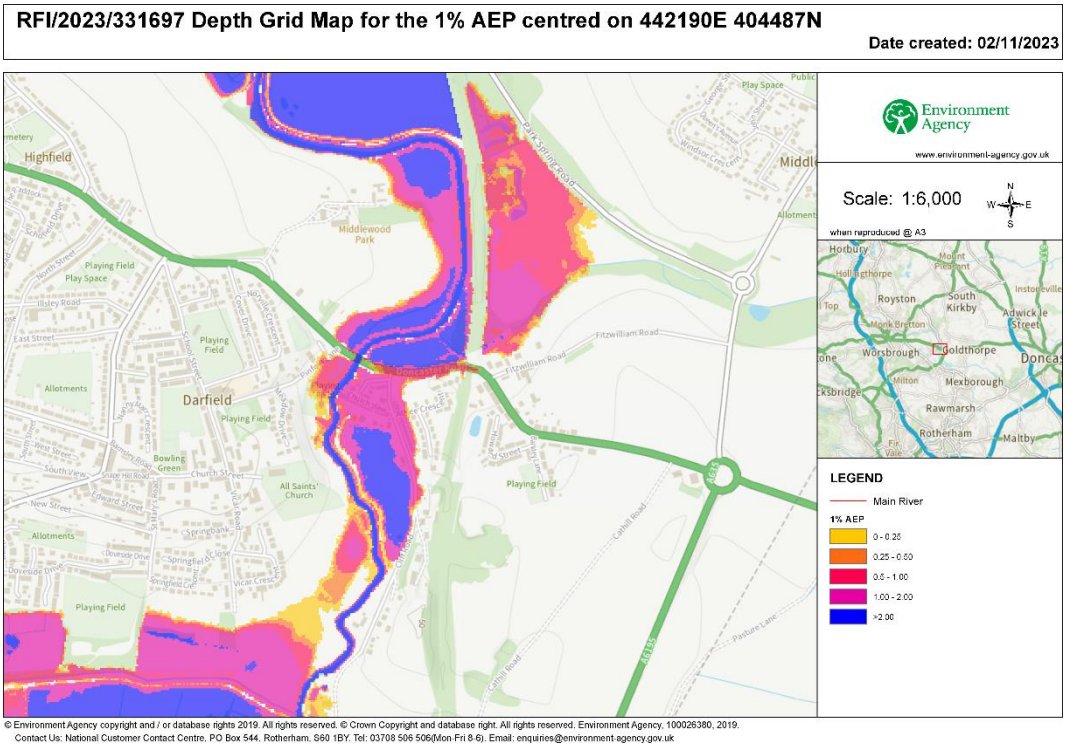
4.8. With defences removed, the AEP of the western edge is reduced to 1%.



4.9. With a 20% climate change allowance, the area of flood extent within increases slightly for the 1% AEP. It is apparent that the flood extent is not very sensitive to additional climate change allowances, as the higher 30% and 50% allowances do little to increase the flood extent shown on the map.

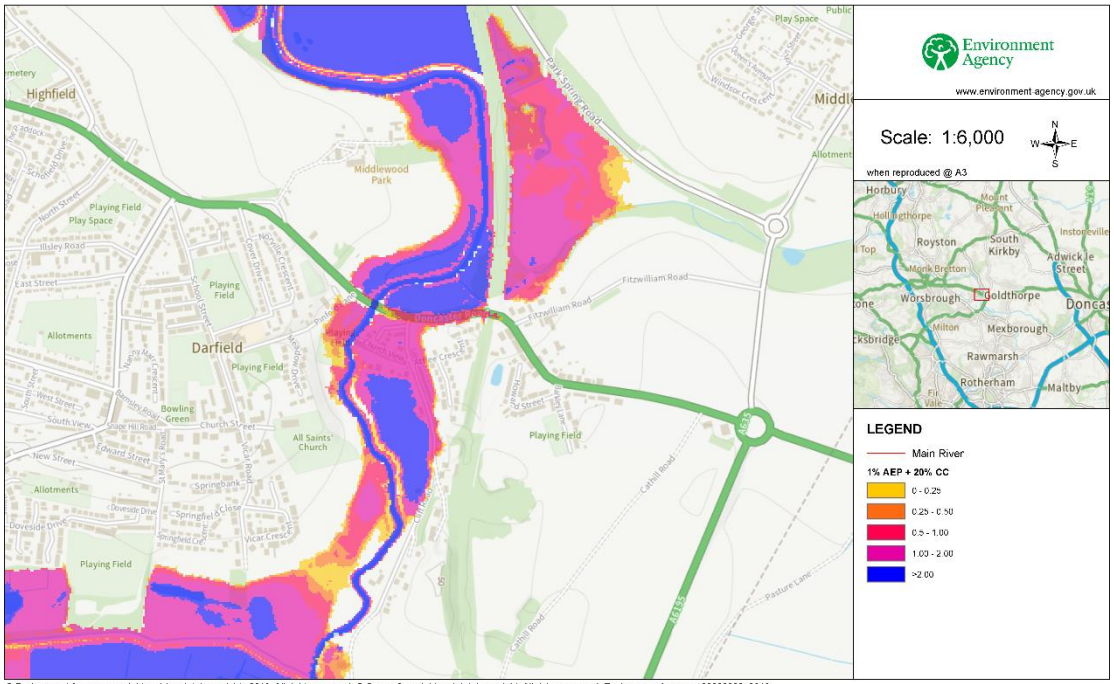


4.10. The modelled depth of flood at the west edge of the site is in the 1-2m range, both for 1% AEP and 1% AEP + 20% climate change allowance.



RFI/2023/331697 Depth Grid Map for the 1% AEP + 20% Climate Change centred on 442190E 404487N

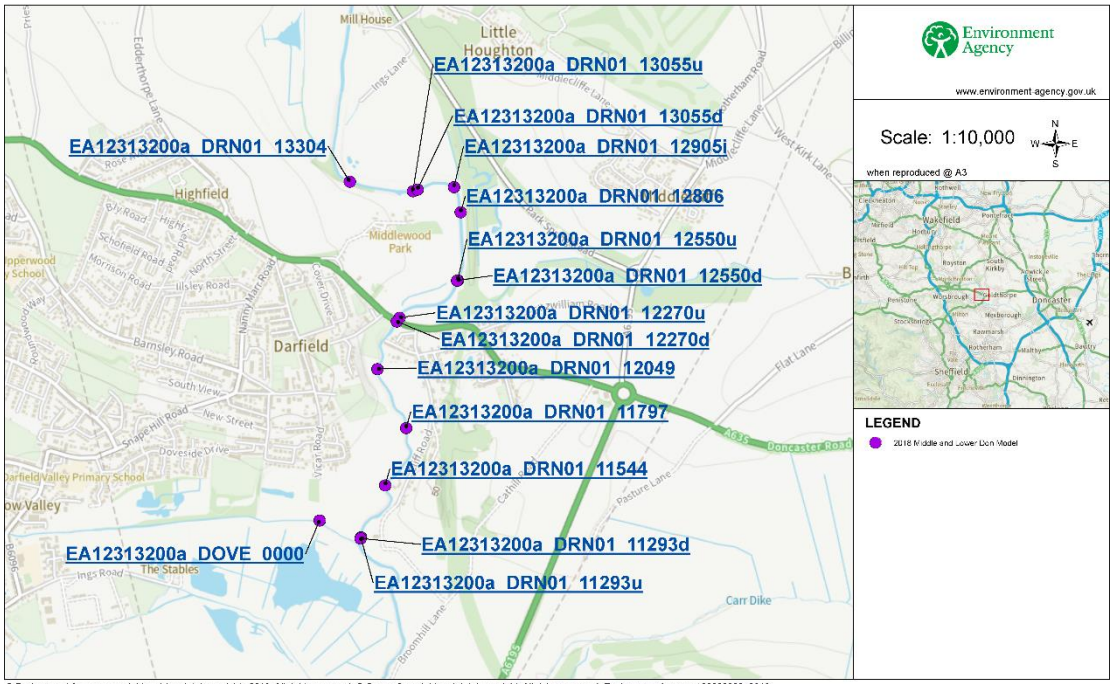
Date created: 02/11/2023



4.11. The nearest relevant node points for the site are EA12313200a_DRN01_12550d and EA12313200a_DRN01_12049. The relevant data tables are reproduced on the next page.

RFI/2023/331697 Node Point Map centred on 442190E 404487N

Date created: 02/11/2023



2018 Middle and Lower Don Defended Model Results: Don Dearne (Level - mAOD)									
Node	Annual Exceedance Probability (AEP) Max Stage								
	50% AEP (1 in 2)	10% AEP (1 in 10)	5% AEP (1 in 20)	3.33% AEP (1 in 30)	2% AEP (1 in 50)	1.33% AEP (1 in 75)	1% AEP (1 in 100)	0.5% AEP (1 in 200)	0.1% AEP (1 in 1000)
EA12313200a_DRN01_12049	22.34	22.88	23.27	23.50	24.06	24.29	24.75	25.02	25.46
EA12313200a_DRN01_12270d	22.70	23.21	23.67	23.90	24.49	24.69	25.00	25.15	25.55

2018 Middle and Lower Don Defended Climate Change Model Results: Don Dearne (Level - mAOD)				
Node	Annual Exceedance Probability (AEP) Max Stage			
	1% AEP (1 in 100) +20% CC	1% AEP (1 in 100) +30% CC	1% AEP (1 in 100) +50% CC	0.1% AEP (1 in 1000) +20% CC
EA12313200a_DRN01_12049	24.93	25.04	25.23	25.80
EA12313200a_DRN01_12270d	25.12	25.17	25.29	25.94

2018 Middle and Lower Don Undefended Model Results: Don Dearne (Level - mAOD)		
Node	Annual Exceedance Probability (AEP) Max Stage	
	1% AEP (1 in 100)	0.1% AEP (1 in 1000)
EA12313200a_DRN01_12049	24.68	25.47
EA12313200a_DRN01_12270d	24.79	25.59

4.12. The central allowance for climate change in this catchment area is 28%, similar to the modelled 1 in 100 + 30% model. This model predicts a flood level of 25.17mAOD.

4.13. Plots 1, 2 and 3 would be at risk in the 1 in 100 + 30% case if finished floor levels are kept similar to the existing ground levels. The other plots would be outside the flood area if the FFLs follow the natural land topography.

4.14. To avoid flood water entering the ground floor of properties the finished floor levels should be 300mm above the expected flood level. This would put the FFLs at a minimum of 25.47mAOD.

4.15. For especially plot 1, an increase in FFL to this level would be quite significant and may introduce further problems such as poor disabled accessibility and incongruence in the street scene due to level differences. If the full floor level increase cannot be achieved, the floor levels should be raised as much as reasonably practicable, and extra flood resistance and resilience measures should be implemented. At a minimum, an FFL of 24.5mAOD would be above the expected 1 in 50 flood level.

4.16. Additional resilience measures can be included in the design of the buildings and site:

- Flood resistant building materials with low permeability up to level of 25.77mAOD (flood level +600mm.)
- Doors and windows to be flood resistant to 25.77mAOD.
- Backflow valves should be implemented on the drainage to prevent surcharging.

- Electrical circuits can be chased in from the ceiling or dado rail with sockets at least 600mm above the floor.
- Through floor or wall services should be properly sealed to prevent water ingress.
- Ensure that any voids that may be in the flood area are accessible for drying and cleaning.
- Plasterboard or other wall coverings can be placed in a horizontal orientation, so that the lower 1200mm of finishes can be easily removed and replaced in the event of damage.
- Floor surfaces that are resilient to water, such as tiles in kitchens and bathrooms can be used to ease cleanup.

4.17. The risk due to surface water flooding is negligible. Good design of the site and drainage system should ensure surface water is dealt with without increasing flood risk either on or off site.

5. Surface water management

5.1. The site does appear to be greenfield and therefore any runoff should be limited to no more than the greenfield estimated runoff. The planning practice guidance drainage hierarchy should be followed: 1) infiltration, 2) discharge to surface water body, 3) discharge to surface water sewer, 4) discharge to combined sewer. A percolation test will be required to determine if the soils at the site are suitable for disposal of surface water via infiltration. Infiltration design should also consider the gradient of the site. If the site is not suitable for soakaways, attenuation systems can be used to limit the runoff rate into the sewer network.

5.2. If the above recommendation is implemented, the scheme will not adversely affect surface water drainage either on the site or elsewhere in the locality.

6. Occupants and users

6.1. The development comprises private dwellings, that will be occupied by the residents.

6.2. As the land is currently vacant, there will be an increase in the number of occupants on the plot.

6.3. Bedrooms will typically be located on the upper storeys of the dwellings, which will be above any estimated flood level.

7. Residual Risk

7.1. The undefended model results in a reduced AEP of flooding for the west edge of the site, which could be due to flood water leaving the river channel further upstream reducing the inundation near the site. This makes it difficult to predict whether failure of defences would negatively affect the site in question, it may be sensitive to the exact location of the breach. In any case most of the site is well above any predicted flood level.

7.2. The proposed development is accessed from Cliff Road, which is likely to begin to flood before the properties. The occupants should be signed up to received Environment Agency flood warnings. Additionally, they should be made familiar with Environment Agency guidance on what to do before, during, and after a flood. This will allow for action to be taken by the residents before the access becomes impassable in an extreme storm event.

7.3. The upper storeys of the residential buildings will provide a place of refuge above any estimated flood level. Additionally, areas of the private drives will be high ground that is unlikely to flood.

7.4. The residual risk due to breach of reservoirs is low. Large reservoirs are regulated by the Reservoirs Act 1975 which puts duties onto owners regarding the upkeep and safety works of reservoirs. The Environment Agency is the enforcement authority.

8. Conclusion

8.1. The western edge of the site sits within flood zone 3, and the north edge is in flood zone 2, but the remainder of the site is outside of the flood plain. The site is not susceptible to surface water flooding.

8.2. The floor levels of the buildings closer to Cliff Road should be increased to 25.47mAOD ideally to be 300mm above the estimated 1 in 100 year + 30% climate change flood level. If this is not possible due to other constraints, an FFL of 24.5mAOD is above the 1 in 50 year estimated level, and resilience measures should be put in place.

8.3. The drainage system including attenuation volume should reduce the risk of surface water flooding both on site and elsewhere in the locality.

8.4. A place of safety is provided by the first floor of the dwellings and the high ground at the east end of the site.

8.5. The proposal is in a residential area that shares similar levels of flood risk and has been deemed acceptable.

8.6. The proposal can be built in accordance with the requirements of planning practice guidance in relation to flood risk.

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08.11.2023