The Glassworks, Harton Quay, South Shields

NPPF Flood Risk Assessment and Outline Drainage Strategy

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Proposals contained or forming part of this report represent the outline design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works, to which this report refers, are undertaken more than twelve months following the issue of this report Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

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References

Updated National Planning Policy Framework (NPPF) 2019 – Section 14

National Planning Guidance (NPG) GOV.UK – Guidance - Flood Risk and Coastal Change Site Specific Flood Risk Assessment

Government Climate Change Guidance - Published 19 February 2016, Last updated 22 July 2020

South Tyneside Council - Strategic Flood Risk Assessment and Mapping 2011

South Tyneside Council – Preliminary Flood Risk Assessment and Mapping 2011

Appendices

Appendix A	Application Redline Plan/Site Location Plan
Appendix B	Topographical Survey Showing Site levels and Features
Appendix C	Environment Agency Product 4 Detailed Flood Data
Appendix D	Site Plans showing Proposed Levels
Appendix E	NWL Sewer Mapping and Pre Planning Sewerage Response
	LLFA Correspondence
	Drainage Calculation Sheets
	Curtins Outline Drainage Strategy Drawing

This report is prepared following the standard section format and order of the Planning Practice Guidance GOV.UK - Flood risk and coastal change site specific flood risk assessment: Checklist

1.0 Development Site and Location

1.1 Site Location

The site is located in South Shields close to the eastern banks of the River Tyne and Shields Harbour.

The approximate postcode of the application site is NE33 1EA and the approximate Ordnance Survey grid reference of the site is NZ2359669.

An Ordnance Survey map extract showing the application site location is outlined **RED** in the following Figure 1.1

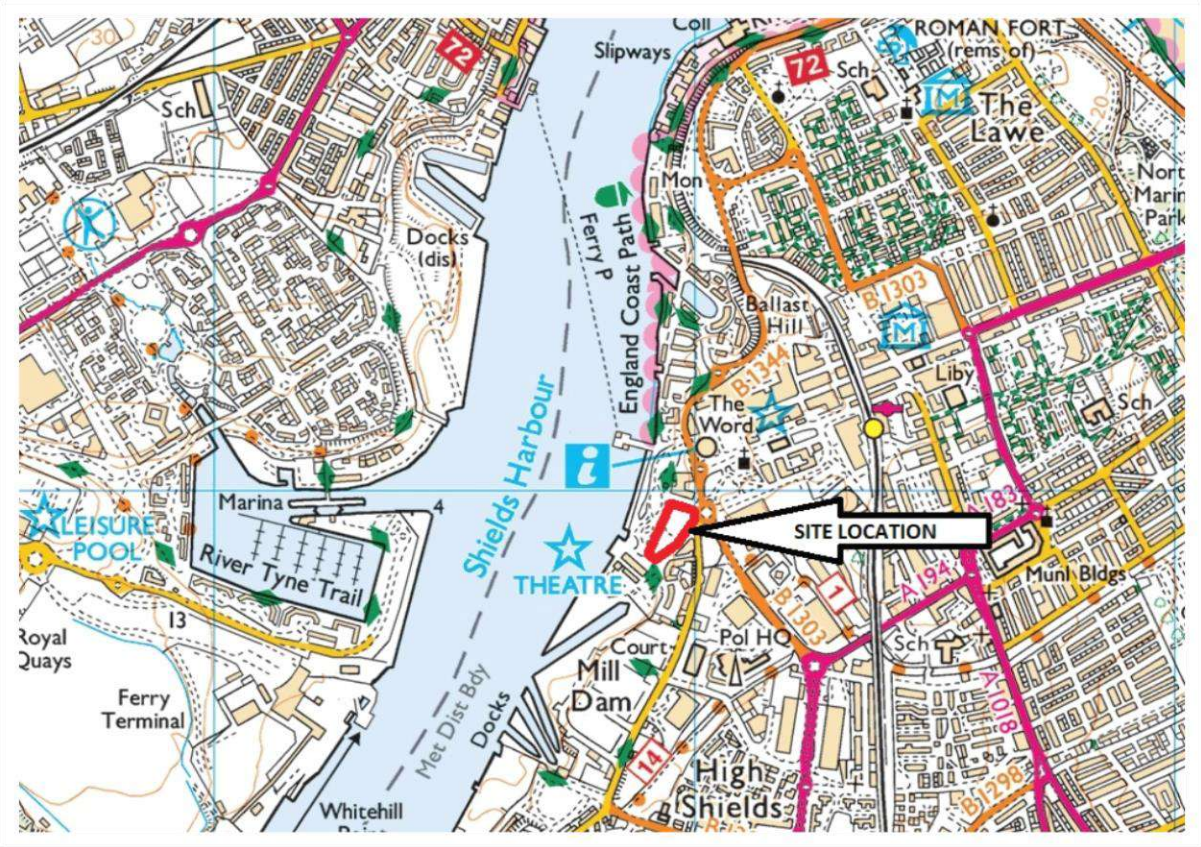


Figure 1.1 – Location Plan

1.2 Current Use

The site is previously developed industrial land currently cleared and now partially laid to grass. A historic structure and a substation are on the western boundary and a historic wall remains along the eastern boundary.

A GoogleEarth extract is shown in Figure 1.2 which identifies the application area outlined in **RED**.

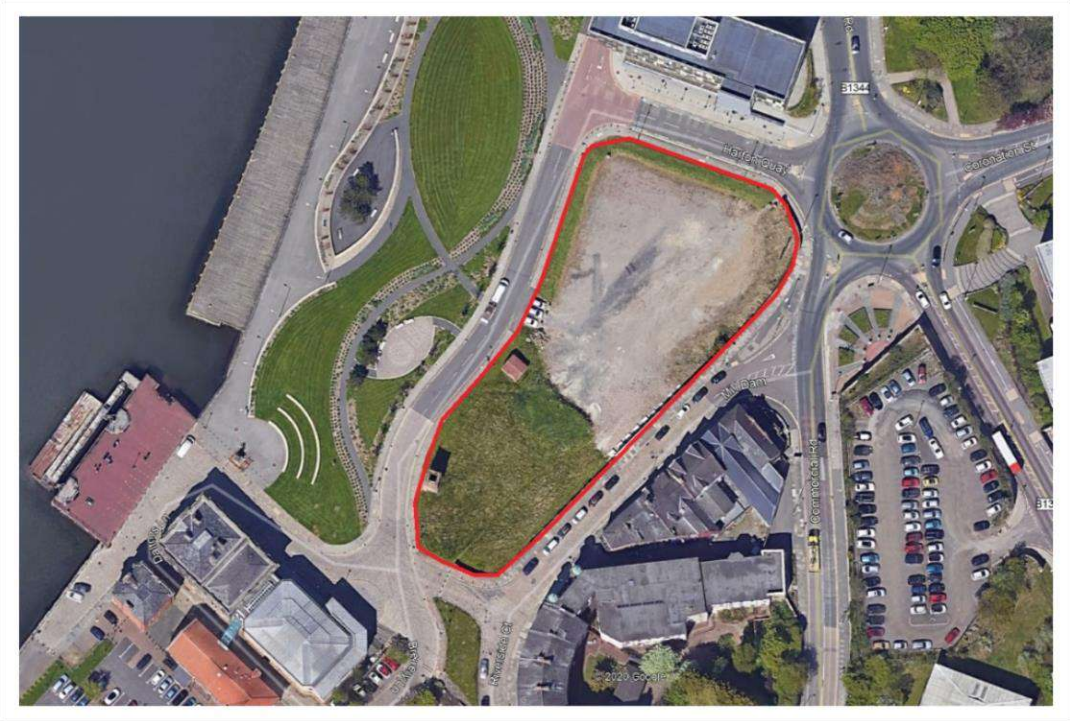


Figure 1.2 –Google Earth Extract

The site can be seen in its current state. A redline plan is provided in Appendix A

1.3 Flood Zone

Initial observation of the Environment Agency's Flood Map for Planning shows the site area fully within Flood Zone 1 Low Probability.

The southern tip pf the site is almost reached by the extents of Flood Zone 2 Medium Probability associated with the adjacent River Tyne. The Flood Zone 3 High Probability extents also reach close to the southern extents of the site.

National Planning Policy Guidance Table 1: Flood Zones advises that:-

- Flood Zone 1 Low Probability comprises land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
- Flood Zone 2 Medium Probability comprises land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding, and

This is reviewed further in Section 5 Site Specific Flood Risk.

2.0 Development Proposals

2.1 Proposals

This Flood Risk Assessment has been prepared on behalf of Muse Developments ('the Applicant") in support of a full planning application for a new five storeys office building including the ground floor which is accessible from either the river or town and top floor which includes a landscaped deck area. There will also be an under croft 22 space car park (including 2no. disabled bays and 1no. electric vehicle charging bay) and a space for a motorcycle, that responds to site levels and allows for cycle storage, shower facilities, changing facilities and plant on the same level.

The site totals approximately 0.5 hectares. A planning red line plan is contained in Appendix A

2.2 Vulnerability

With reference to the National Planning Policy Guidance GOV.UK Flood risk and Coastal Change Site Specific Flood Risk Assessment – Guidance Table 2, the development proposals can be regarded as **Less Vulnerable**, e.g. Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non- residential institutions not included in the 'more vulnerable' class; and assembly and leisure.

2.3 Estimated Lifecycle of Development

As the planning application is for full planning approval and that the masterplan shows commercial development, it is assumed that the overall lifecycle will be 60 years. This will be factored in consideration of the impact of climate change on any assessed flood risk and drainage design within the site throughout this flood risk assessment and outline drainage strategy.

2.4 Consultation with Flood Risk and Drainage Consultees

In order to inform this flood risk assessment and outline drainage strategy to meet the specific planning requirements for development adjacent the River Tyne tidal flood risk zones, Curtins, have carried out consultation with the Environment Agency by requesting detailed Product 4 data and mapping and contacting South Tyneside Council's FRM/LLFA and Northumbrian Water Limited to discuss surface water drainage matters.

3.0 Sequential Test

Initial observation of the Environment Agency's Flood Map for Planning and Surface Water flood maps and the South Tyneside Council Strategic and Preliminary Flood Risk Assessments all show the site to be at low risk just outside of the higher risk tidal flood zones associated with the adjacent River Tyne estuary.

A full review of flood risk is carried out in Section 5 to demonstrate this low risk to the developable area of the site. On this basis it is considered that there is no requirement for Sequential Testing

4.0 Climate Change

The impacts of climate change will be considered within each of the following report sections on site specific flood risk assessment.

This will take into consideration current national climate change guidance published by the Government in February 2016 and last updated July 2020.

The requirements for climate change impacts on tidal flood levels are considered in Section 5 and impacts on surface water drainage are considered in Section 6 Surface Water Management.

5.0 Site Specific Flood Risk

5.1 Environment Agency Flood Map for Planning

The Environment Agency's website provides on-line mapping to identify flood zoning for planning purposes. An extract of the Flood Map for Planning is shown in Figure 5.1 with the site outlined **RED**.

Figure 5.1 – Environment Agency Flood Map for Planning (Rivers and Sea)

The overall area of the site is outside of the high risk flood zones (shaded blue) to the west associated with the River Tyne which is designated as 'Main River' shown by the blue line. The River Tyne flood risk is predominantly tidal at this location rather than fluvial (river flood flows).

Therefore, for planning purposes the site can be considered as Low Risk Flood Zone 1 (land having a less than 1 in 1,000 annual probability of river or sea flooding) and as noted in Section 3 there is no requirement for Sequential Testing.

A small area of Flood Zone 2 Medium Risk (land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding) extends close to the southern tip of the site where site levels are much lower than the north. A full review of historic and predicted flood risk levels is carried out late in this section.

Figure 5.2 below provides an extract of a further rivers and sea flood risk map from the Environment Agency with the site outlined **RED** and shown clear of the High and Medium risk flood zones.

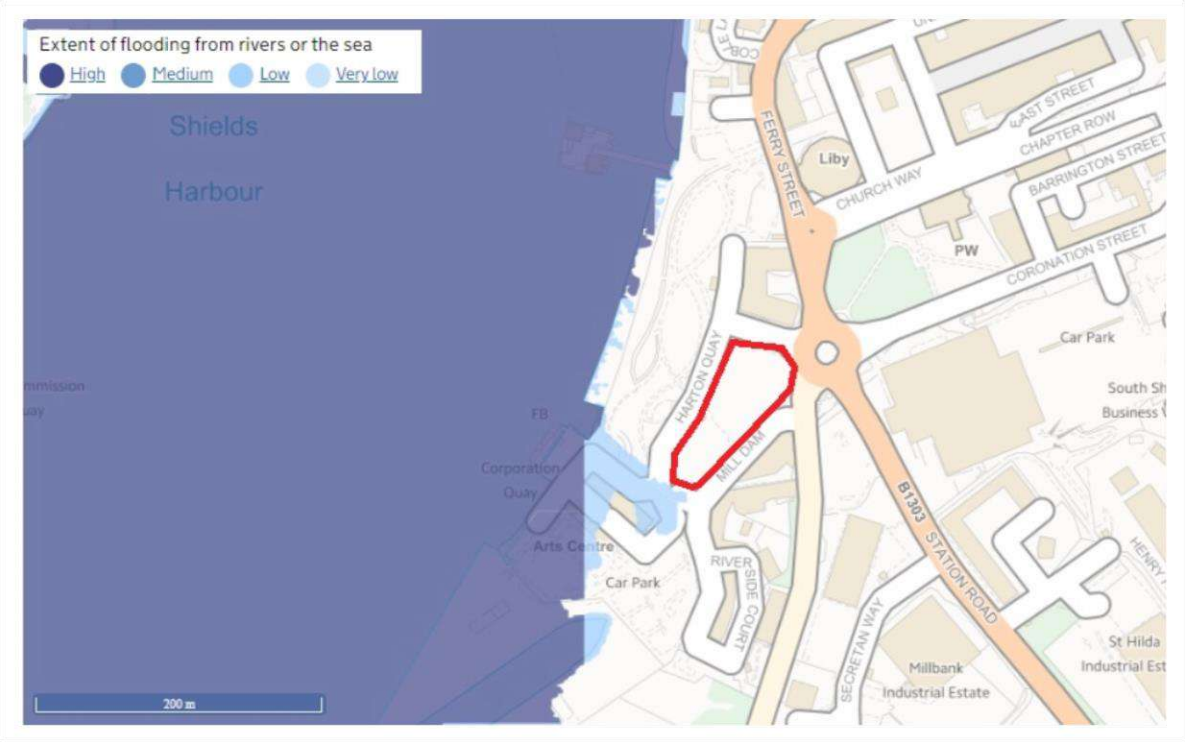


Figure 5.2 – Environment Agency Extent of Flooding from Rivers or the Sea Map

5.2 Environment Agency Surface Water Flood Risk Mapping

Extracts of the Environment Agency's 'Flood Risk from Surface Water' maps follow with the site area outlined **RED**.

Figures 5.3 shows the high risk 1 in 30 year chance of flooding i.e. generally more regular flash summer storms. The site and general area can all be seen to be clear of any risk.

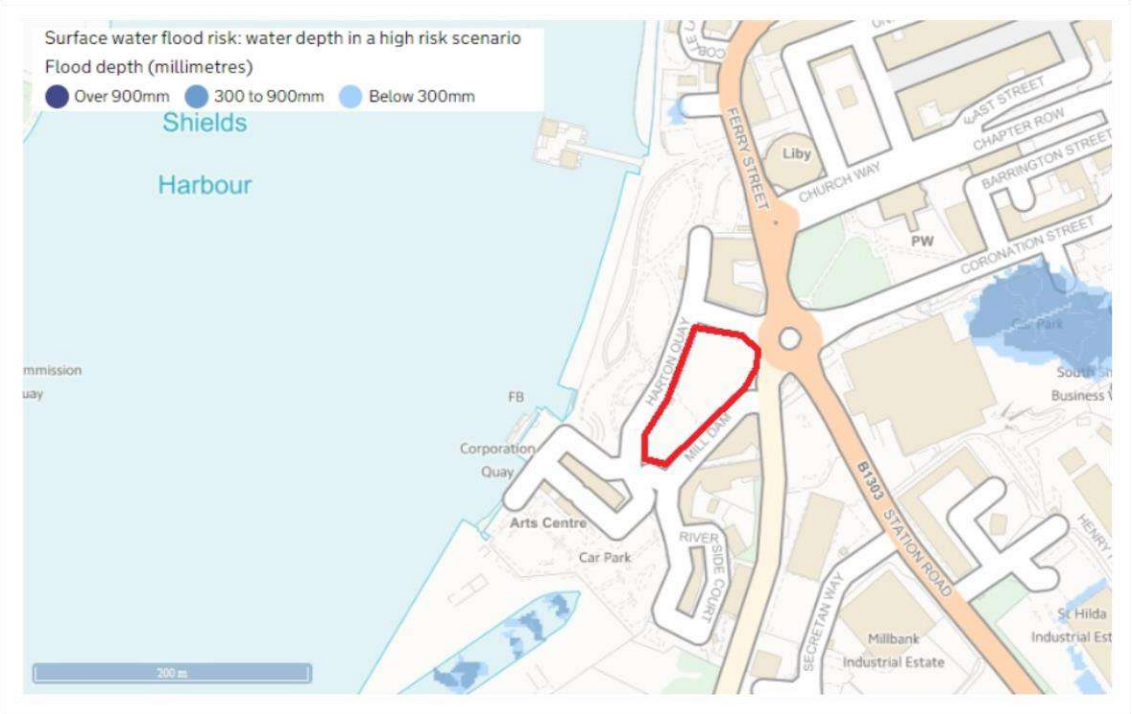


Figure 5.3 – Environment Agency Flood Risk from Surface Water – High Risk (1 in 30 Year)

Figures 5.4 shows the medium risk 1 in 100 year chance of flooding i.e. the typical design event for surface water flood risk. As with the high risk map, the site and general area can all be seen to be clear of risk.

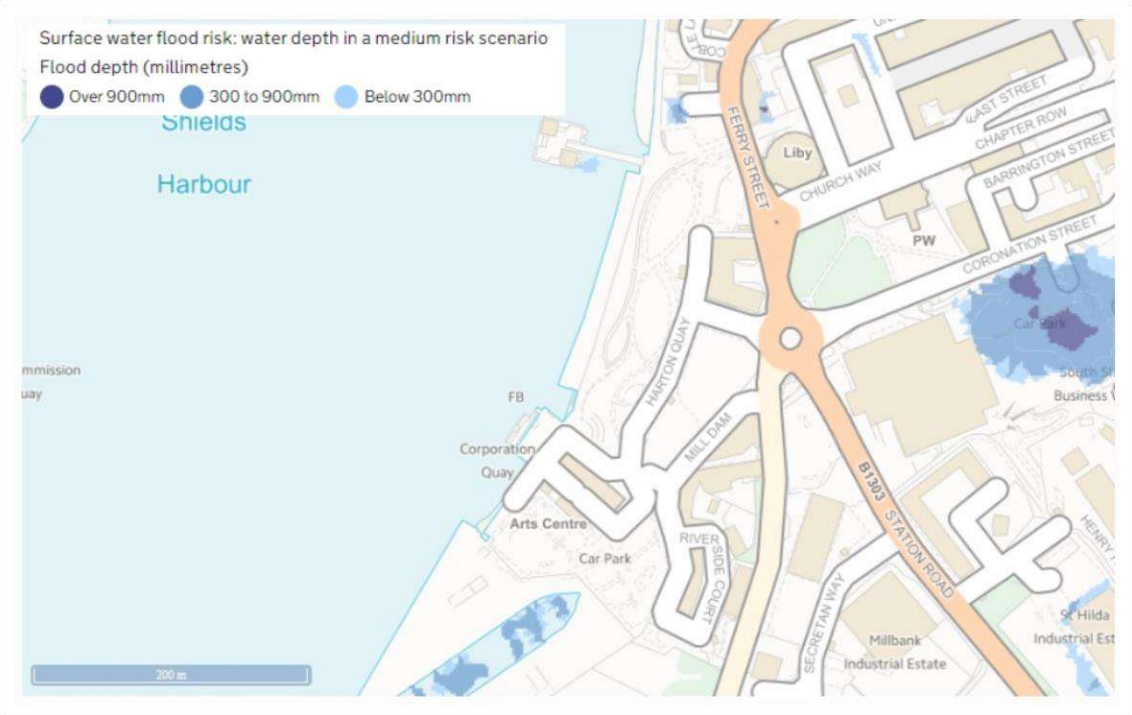


Figure 5.4 – Environment Agency Flood Risk from Surface Water – Medium Risk (1 in 100 Year)

Figures 5.5 shows the low risk 1 in 1000 year chance of flooding i.e. the most extreme surface water flood risk event. As with the high and medium risk maps, the site and general area can all be seen to be clear of risk.

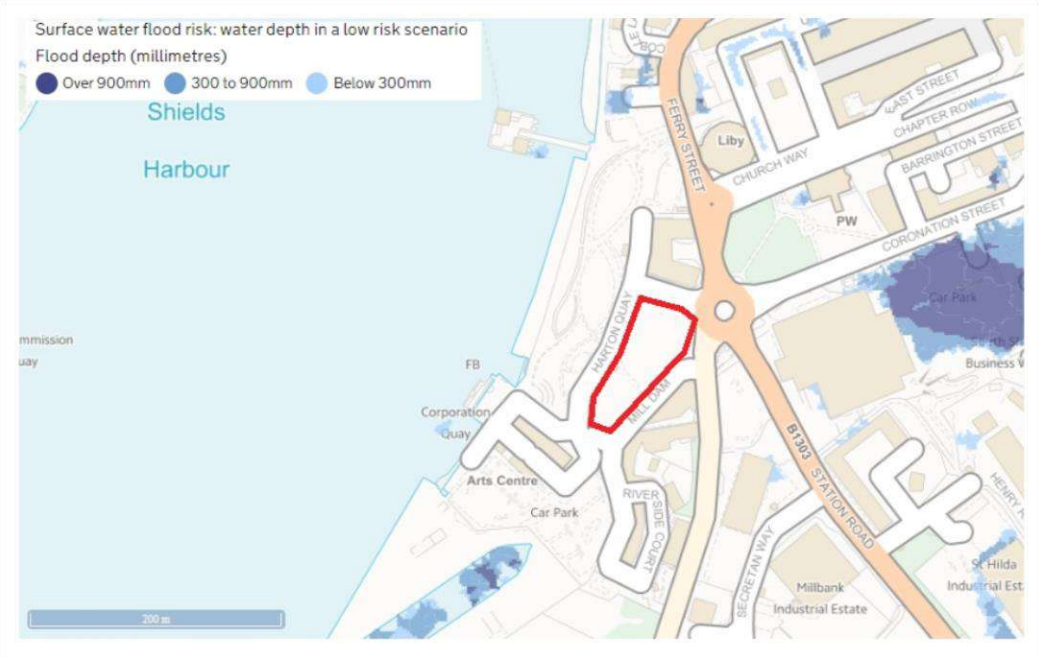


Figure 5.5 – Environment Agency Flood Risk from Surface Water Low Risk (1 in 1000 year)

Figure 5.6 shows the combined extents of risk from all of the low, medium and high risk events. It can be seen that the site is mapped at all round low risk.

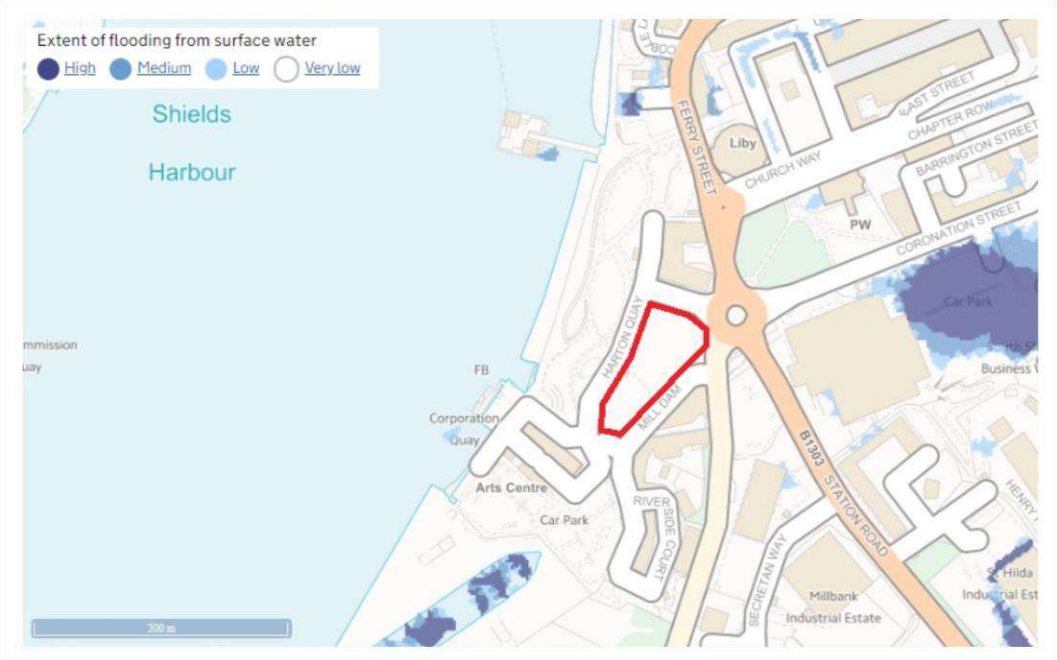


Figure 5.6 – Environment Agency Flood Risk from Surface Water – Combined Extents

Based on the above observations of the Environment Agency's surface water flood risk maps the risk to the site from surface water flooding is considered **LOW**.

The surface water modelling is assumed to include for climate change, and as such, the risk is still considered to remain **LOW** throughout the development's lifecycle.

5.3 South Tyneside Council Flood Risk Information

A review of the of information available in the South Tyneside Council's Preliminary and Strategic Flood Risk Assessments has been carried out with relevant map extracts taken and comments provided.

The following SFRA PPS Flood Zoning map extract in Figure 5.7 with the site outlined **RED** shows various information.

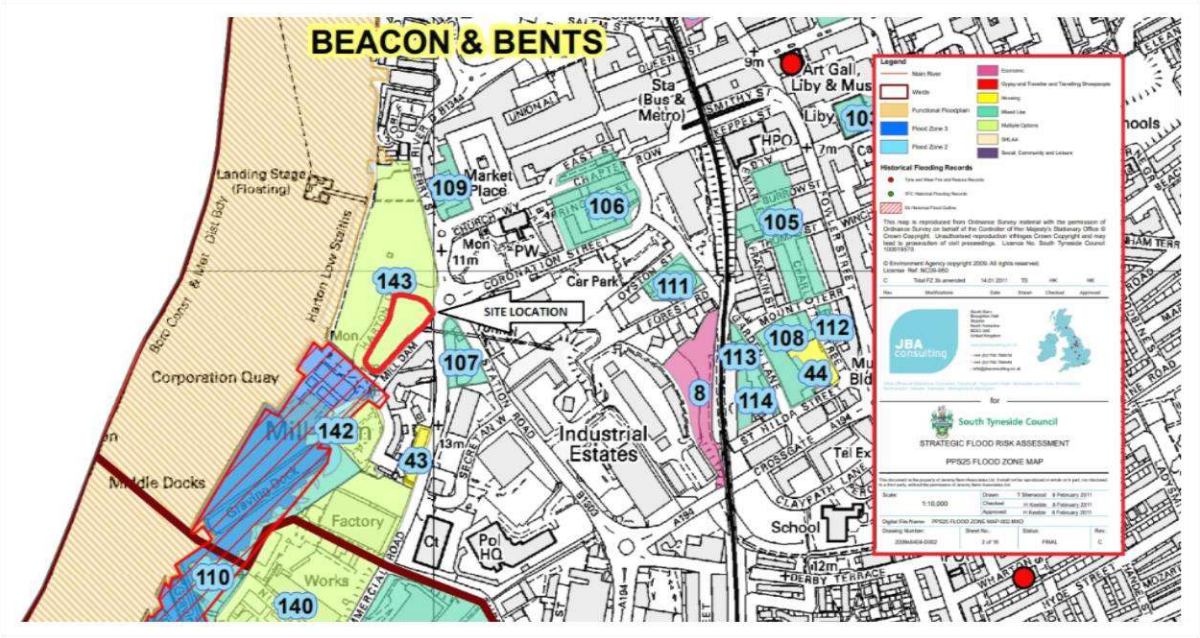


Figure 5.7 – South Tyneside SFRA PPS Flood Zone Map Extract

The site is part of local plan allocation area 143 which has comments noted as '*site is shown only marginally within FZ2. Almost whole of site within FZ1. Development within FZ1 may be acceptable subject to satisfactory FRA/DIA'*

The map extract also shows historic flood extents as red crossed hatching. This is considered further in the information provided by the Environment Agency Product 4 request in Section 5.4

The following SFRA climate change sensitivity map extract in Figure 5.8 with the site outlined **RED** shows that the site area is sensitive to climate change. The sensitivity decrease as existing ground levels climb from west to east.

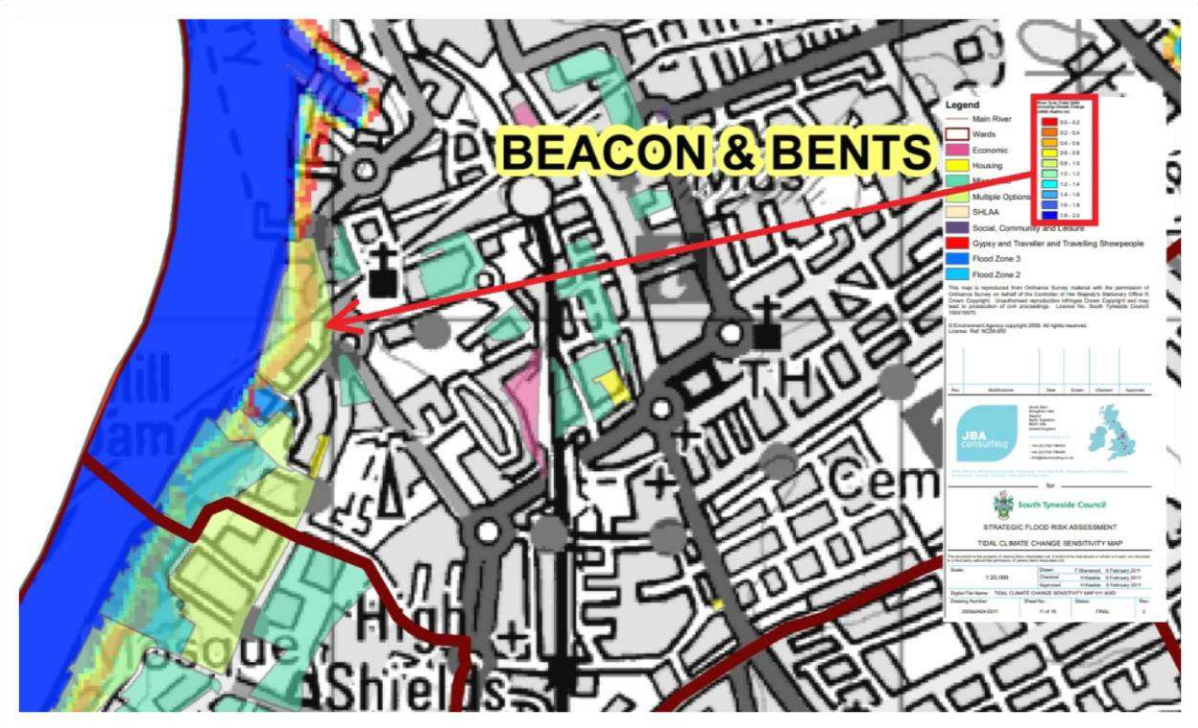


Figure 5.8 – South Tyneside SFRA Climate Change Sensitivity Map Extract

The following SFRA groundwater flood risk map extract in Figure 5.9 with the site outlined **RED** shows that the site area is located in a low risk (<25%) area.

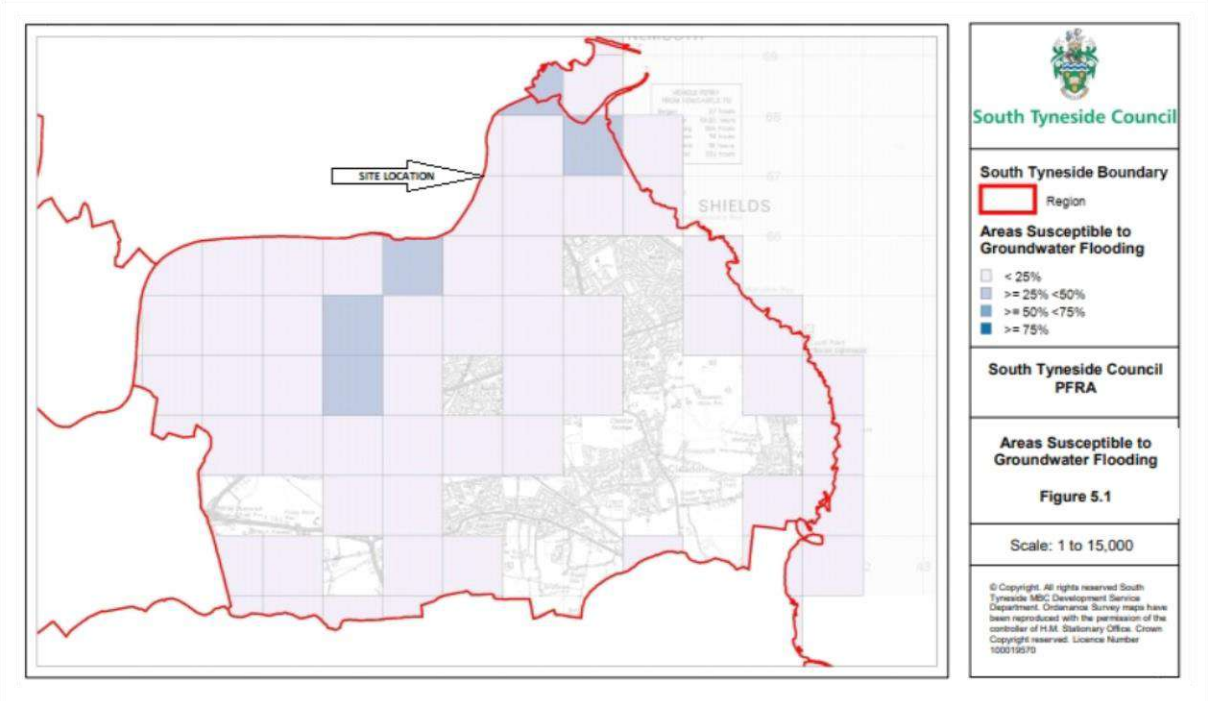
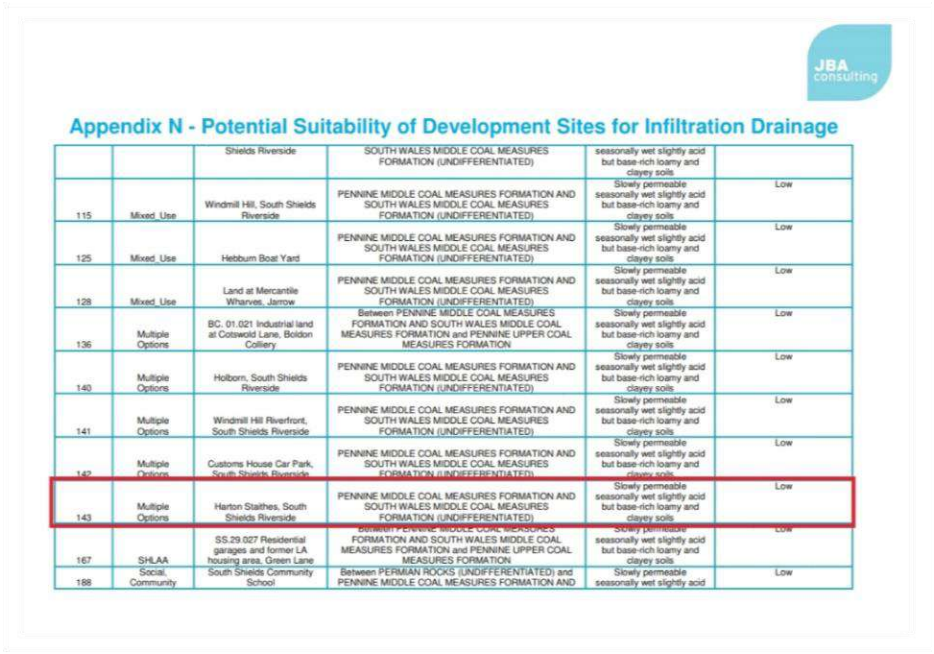


Figure 5.9 – South Tyneside SFRA Groundwater Flood Risk Map Extract

Figure 5.10 shows an extract of a table from the SFRA of '*Potential Suitability of Development Sites for Infiltration Drainage*'. Site 143 can be seen to be regarded as: '*slowly permeable seasonally wet slightly acid base rich loamy and clayey soils*'. On this basis the use of infiltration as a drainage receptor is considered highly unlikely to be viable. See Section 6 for further consideration.



Appendix N - Potential Suitability of Development Sites for Infiltration Drainage

		Shields Riverside	SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	seasonally wet slightly acid but base-rich loamy and clayey soils	
115	Mixed_Use	Windmill Hill, South Shields Riverside	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
125	Mixed_Use	Hebburn Boat Yard	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
128	Mixed_Use	Land at Mercantile Wharves, Jarrow	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
136	Multiple Options	BC, 01.021 Industrial land at Cotswold Lane, Boldon Colliery	Between PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION and PENNINE UPPER COAL MEASURES FORMATION	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
140	Multiple Options	Holborn, South Shields Riverside	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
141	Multiple Options	Windmill Hill Riverfront, South Shields Riverside	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
142	Multiple Options	Customs House Car Park, South Shields Riverside	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
143	Multiple Options	Harton Staithes, South Shields Riverside	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED)	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
167	SHLAA	SS.29.027 Residential garages and former LA housing area, Green Lane	Between PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION and PENNINE UPPER COAL MEASURES FORMATION	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Low
188	Social_Community	South Shields Community School	Between PERMIAN ROCKS (UNDIFFERENTIATED) and PENNINE MIDDLE COAL MEASURES FORMATION AND	Slowly permeable seasonally wet slightly acid	Low

Figure 5.10 – South Tyneside SFRA Infiltration Viability Table Extract

Figure 5.11 shows an extract from the SFRA mapping of critical drainage areas. The mapping shows the site shaded green which shows that Northumbrian Water Limited Flood Risk Status is Low or No DG5 records. The site is therefore assumed not to be in a critical drainage area.

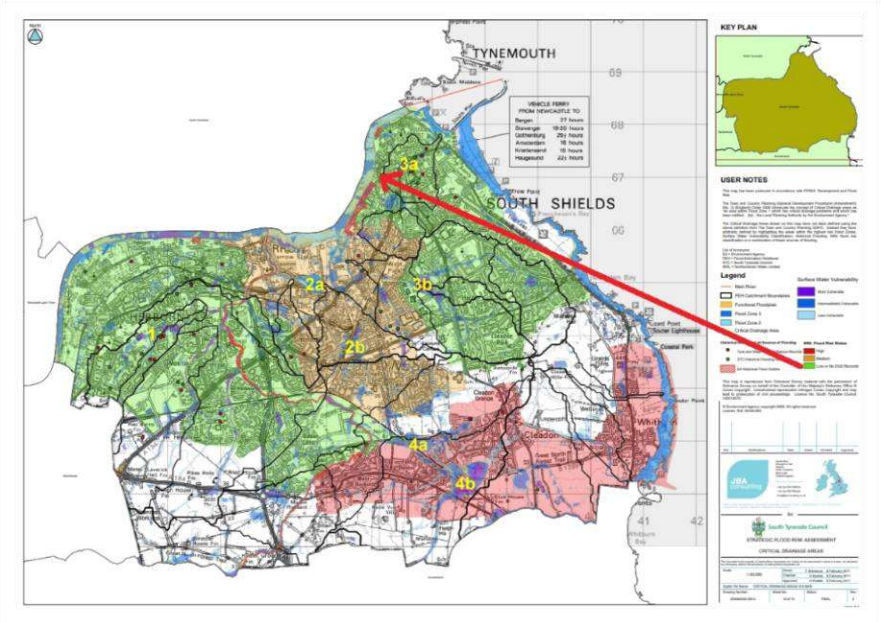


Figure 5.11 – South Tyneside SFRA Critical Drainage Areas Map Extract

5.4 Environment Agency Detailed Flood Data (Product 4)

Although the site is fully within the low risk Flood Zone 1 mapped on the Environment Agency's Flood Risk Map for Planning, the proximity to the higher risk tidal flood risk zones and mapped historic flooding dictates that a more detailed review using Product 4 detailed mapping and flood level data is carried out. This is represented below with the provided mapping and data contained in Appendix C

Flood Map for Planning

The map generally corelates with the online mapping other than a very small intrusion of Flood Zone 2 into the very southern lowest ground level part of the site area. This is reviewed later in relation to ground levels and predicted future tidal flood levels

Surface Water Flood Risk Map

The detailed map correlates with that of the Environment Agency online mapping and South Tyneside SFRA mapping showing the site at all round low risk from surface water flooding.

Historic Flood Events Map

Historic flood extents are shown for the 2008 and 2013 flood events where the river channel capacity was exceeded.

It can be seen that the Harton Quay carriageway at the southern tip of the site was affected by these flood events as was the land to the south. The site is mapped as not affected but future flood extents could increase with climate change.

Model Outline Plan

This plan shows the flood extents for varying modelled event levels. It can be seen that both the 1 in 200 + Climate Change and 1 in 1000 + Climate change extents reach the very southern tip of the site but do not encroach into it. This is reviewed further later.

Node Plan

This plan identifies the node points of the flood model. The site can be seen to be located between node points TY01061 and TY01062.

Node Table

Tabled flood levels are provided for events from 1 in 2 year probability up to 1 in 10000 year plus climate change. A review of predicted 200 and 1000 year plus climate change for both node points shows them very comparable. The following is extracted from the tabled data:-

1 in 200 yr	**=**	**3.92 mAOD**
1 in 200 yr + CC	**=**	**4.85 mAOD**
1 in 1000 yr	**=**	**4.2 mAOD**
1 in 1000 yr + CC	**=**	**5.13 mAOD**

It can be seen that the impacts of climate change on both the 1 in 200 and 1000 year events is significant (showing around 0.9 m increase). The Environment Agency have however advised that the levels are from a 2015 model, therefore the climate change allowances do not incorporate the latest values. The increases in sea level expected are dictated by Table 3 of the updated .GOV climate change guidance of which an extract is provided in Figure 5.12 below. Both Higher Central and Upper End increases for the Northumbria basin catchments are considered.

Table 3: sea level allowances by river basin district for each epoch in mm per year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Northumbria	Higher central	4.6 (161)	7.5 (225)	10.1 (303)	11.2 (336)	1.03
Northumbria	Upper end	5.8 (203)	10 (300)	14.3 (429)	16.5 (495)	1.43

Figure 5.12 – Tidal Climate Change Table 3 Extract

Below is an assessment of the likely increases over a 60 year lifecycle using the current climate change guidance from an estimated completion/occupation date of 2022 (e.g. 2022 to 2082).

Higher Central	2022 to 2035	=	13 years at 4.6 mm	=	59.8 mm
	2036 to 2065	=	30 years at 7.5 mm	=	225.0 mm
	2066 to 2082	=	16 years at 10.1 mm	=	161.6 mm
				Σ	**446.4 mm**
Upper End	2022 to 2035	=	13 years at 5.8 mm	=	75.4 mm
	2036 to 2065	=	30 years at 10.0 mm	=	300.0 mm
	2066 to 2082	=	16 years at 14.3 mm	=	228.8 mm
				Σ	**604.2 mm**

In summary, these predicted increases applied the previous flood level table gives the following predicted flood levels for the anticipated 60 year lifecycle of the development:-

1 in 200 yr (3.92 mAOD) + 60 years CC = **4.367 to 4.524 mAOD**

1 in 1000 yr (4.2 mAOD) + 60 years CC = **4.646 to 4.804 mAOD**

Observation of the topographical survey (see Appendix B) shows the lowest site level at the very southern tip to be 4.36 mAOD but a steep bank takes site levels immediately to 5.5 mAOD. On this basis comparing with the maximum tidal flood levels, the site is at very low risk of flooding.

5.5 Flooding from Other Sources

The Environment Agency produce mapping showing areas at risk should catastrophic failure of reservoirs occur. An extract is shown in Figure 5.13 with the site area marked **RED**.

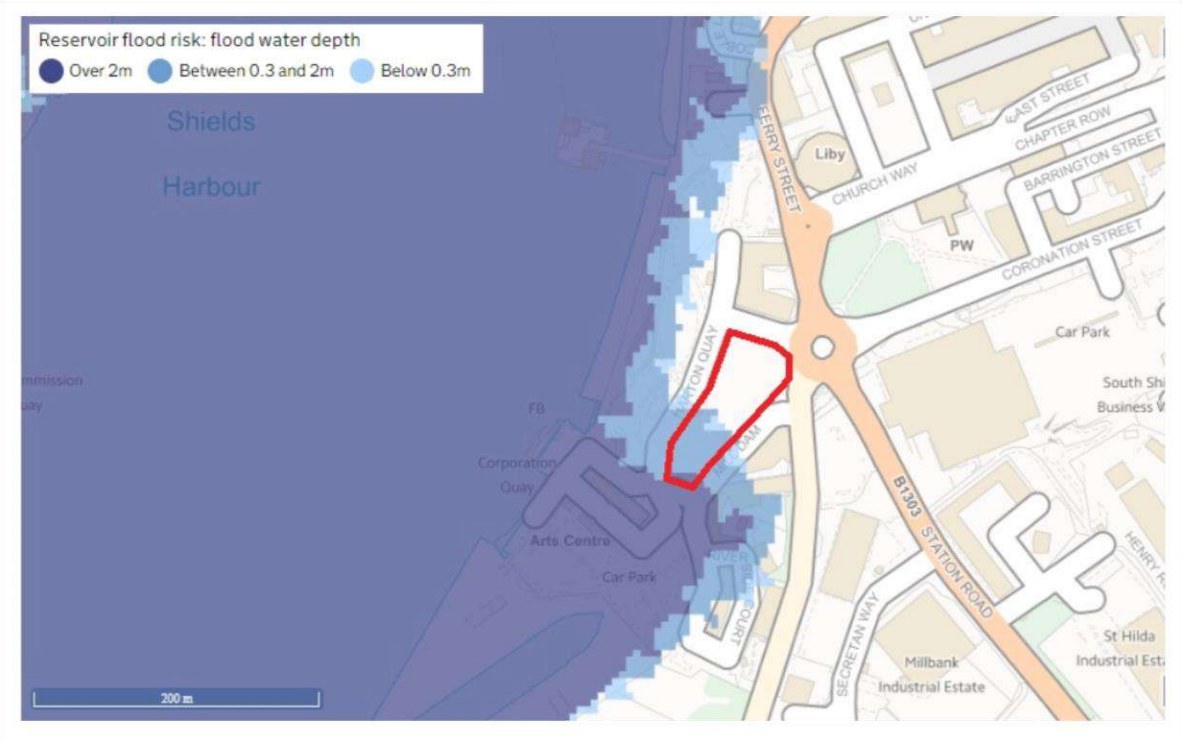


Figure 5.13 – Environment Agency Flood Risk from Reservoirs – Depth

The risk extents can be seen to roughly mimic that of the Flood Zone 2 & 3 extents but with a bit more encroachment into the southern tip of the site where levels are lower. The risk is identified to come from the Kielder Reservoir which is under the jurisdiction of Northumbrian Water Limited. Although risk is identified to the ;lower southern parts of the site area given the constant maintenance and close scrutiny reservoirs have from the 'Water Authorities' (NWL in this case), the risk associated with catastrophic failure and increase in risk as a result of climate change is considered **LOW**.

Flooding from existing sewers and drains can present a flood risk which will generally relate to surface water flooding during extreme rainfall rather than foul sewer flooding. Figure 5.11 showing an extract from the South Tyneside SFRA confirms the site is not in a critical drainage area. Northumbrian Water sewer mapping also provides a map of recorded sewer flood issues and the site is clear of any flagged area. On this basis the risk of flooding from existing drains and sewers is therefore considered **LOW**.

Flooding from new drainage can present a risk of flooding. New drainage will have to be designed to modern British Standard, Building Regulation, Sewers for Adoption and SuDS legislation standards in full liaison with Northumbrian Water Limited and South Tyneside Councils Flood Risk Management/Lead Local Flood Authority team. This is considered in more detail in Section 6 Surface

Water management. On this basis the risk of flooding from the new drainage is therefore considered **LOW**.

Flooding from groundwater can present a flood risk. Figure 5.9 showing an extract from the South Tyneside SFRA confirms the risk form groundwater flooding is considered **LOW**

5.6 Flood Risk Mitigation Design Requirements

The site levels provide good opportunity to set minimum floor levels above the predicted 1 in 200 year plus climate change tidal flood levels. A 600 mm freeboard above the maximum 4.524 mAOD giving 5.124 mAOD should not present any issue with current ground levels ranging from 5.5 to 10.5 mAOD.

Basement parking access points should be set away from the southern tip of the site where the risk is greatest and should be set a minimum of 300 mm above the highest flood level of 4.524 mAOD.

Proposed basement car parking finished floor level is 6.0 mAOD and the podium level where office space will commence is at 10.0 mAOD. On this basis it is considered that the overall site and proposed building within the site are all at low risk from all sources of flooding.

5.7 Flood Risk Summary

Following the review of available flood information, the following can therefore be summarised in terms of flood risk:-

Current Primary River Flood Risk	**LOW**
Surface Water Flood Risk	**LOW**
Reservoir Flood Risk	**LOW**
Existing Drainage Flood Risk	**LOW**
New Drainage Flood Risk	**LOW**
Groundwater Flood Risk	**LOW**
Risk from Climate Change	**LOW**
Residual (Lifecycle) Primary River Flood Risk	**LOW**

6.0 Drainage Strategy and Surface Water Management

6.1 Below Ground Drainage

Separate Foul and Surface water gravity drainage systems designed in accordance with BS EN 752 and Building Regulations are proposed for the development. Curtins are responsible for the below ground drainage associated with the proposed site wide impermeable hardstanding areas. Any below ground drainage associated with modifications to Public Highway are to be considered under a S278 agreement and is outside of the scope of this report.

6.2 Surface water

The surface water run-off from the development comprises roof water run-off and run-off associated with proposed external hard landscaping.

In accordance with National Planning Policy Framework (NPPF) and Building Regulations Part H the hierarchy of surface water disposal has been considered as follows:

1. Into ground (infiltration)
2. Surface water body
3. Surface water sewer, highway drain or other drainage system
4. Combined sewer

Infiltration has been considered as the preferred method of surface water disposal. As noted in section 5.3 above the South Tyneside SFRA indicates that the site is within an area where infiltration is considered to have low viability. Further to this the low lying nature of the site adjacent to the River Tyne would indicate that groundwater levels are likely to be high and it may not be possible to infiltrate 1m above the groundwater levels at all times of the year. The site is also understood to be underlain made ground up to approximately 5m deep. Given the above it is not considered that infiltration would be viable in this instance.

The site is approximately 70m from the River Tyne. Discharge of surface water directly to the river would involve crossing both adopted highway and third party land before constructing a new outfall to river. The site is not riparian, therefore direct discharge to surface water body is not considered viable in this instance. Northumbrian Water records indicate that the site is bound by public sewers within Mill dam and Harton Quay. The sewer records can be seen in Appendix E. A large 900mm x 1300mm brick egg surface water sewer is detailed within Mill Dam. This sewer is shown to discharge immediately downstream to the River Tyne. As detailed above the Tyne at this location is understood to be tidal and therefore it is considered that a restricted discharge rate to surface water sewer would have a negligible impact on local flood risk within the catchment.

Given the above surface water run-off will be collected and discharged unrestricted via a dedicated gravity network into the public surface sewer system in the circulatory highways prior to discharging to the River Tyne, subject to agreement with Northumbrian Water. South Tyneside Council and Northumbrian Water have been consulted as part of the pre-planning discussions and have confirmed their acceptance of these proposals (see Appendix E).

The surface water system will be designed to accommodate below ground the 1 in 100yr critical event with a 40% allowance for climate change. As the site is low lying with a proposed connection to a tidal section of the Tyne hydraulic modelling will be undertaken to ensure that the site is able to adequately drain under surcharged outfall conditions up to and including the 1 in 200 year maximum tidal event with a 60% allowance for climate change. The corresponding flood level for this condition is 4.524 as detailed in section 5.4 above.

The proposed drainage strategy can be seen in Appendix E

6.3 SuDS

Local Standard 7 of the North-East Lead Local Flood Authorities Sustainable Drainage Local Standards details that SuDS should still be incorporated where unrestricted discharge is proposed in order to improve the quality of water discharged to watercourse. In accordance with this guidance options for SuDS incorporation have been assessed and measures proposed to be incorporated are detailed below.

6.3.1 Bioretention systems

Bioretention systems, also referred to as rain gardens, are proposed to be used to slow flows and treat runoff from some hardstanding areas, whilst also providing amenity benefits. These will also provide some biodiversity benefit, though they will be situated in pedestrian areas. The detailed design is to be in accordance with C753 Chapter 18.

Runoff will be treated by the soil filter medium. This material specification is adapted from C753 Box. 18.1, and aims to provide a good growth medium, a 30% void ratio and a percolation rate between 100 and 300 mm/hr. A drainage layer of permeable sub-base beneath the filter medium containing perforated pipes will carry runoff to the main drainage network.

The bioretention systems are to be designed so that the 1in1 year and the first flush from more intense storms will filter through the soil. The ability of the filter medium to handle the runoff is dependent on its actual percolation rate, and the flat surface area of the medium. Since many of the systems are on a slope, it will not possible to have all the filter medium surfaces flat.

Overflow pipes will be provided for flows that exceed the percolation rate of the soil, up to the 1in100 year plus climate change design storm. The peak inflow for each bioretention system is given by the 15-minute summer 1in100 year plus climate change event.

6.3.2 Pervious pavements

Permeable block paving may be suitable in some areas where run-off is not proposed to be captured within rain gardens, notably the podium deck where levels are such that flow to rain gardens would be impractical. This measure could assist the bioretention system with managing runoff water quality.

6.4 Foul water

The foul water for the development will be collected and discharged via gravity to the proposed adoptable foul sewer within the carriageway immediately adjacent to the western elevation of the proposed buildings.

The hydraulic design of the below ground drainage system has been estimated to accommodate the anticipated flow from the proposed development. Further confirmation on foul flow rates from the above ground drainage would be required to confirm the required hydraulic capacity of the system.

7.0 Occupants and Users of the Development (Access & Egress)

7.1 Flood Warnings

Figure 7.1 below confirms that the site is just outside of an area where flood warnings are given by the Environment Agency (southern tip corresponding with current Flood Zone 2 extents).

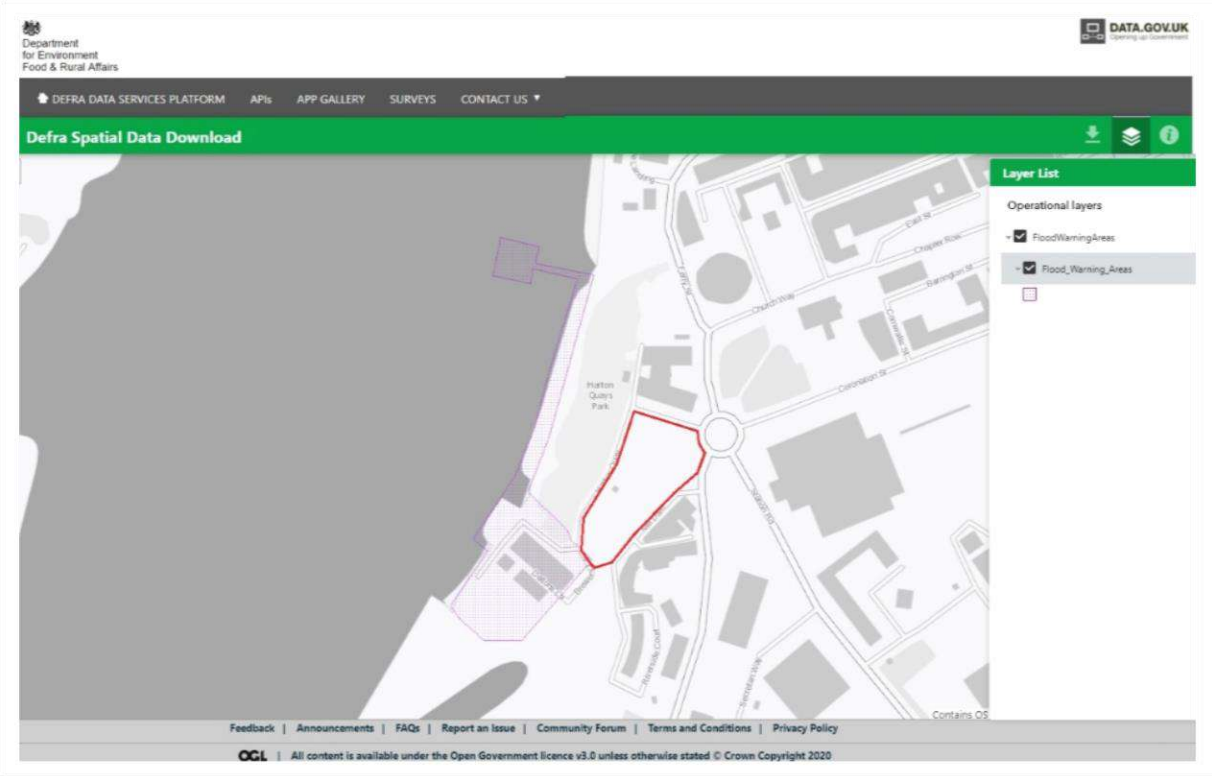


Figure 7.1 – Flood Warning Area Map Extract

It is an important consideration of a Flood Risk Assessment to consider access and egress arrangements for the occupants and users of the development should major flooding as outlined within this flood risk assessment occur within the development's lifecycle.

7.2 Access and Egress

The site levels afford good access and egress away from the flood risk areas to the south. On this basis there is no need for registration to the flood warning system or the preparation of a site flood Warning and Evacuation Management Plan.

8.0 Exception Test

As with Sequential Testing considered in Section 3, with the low all round flood risk to the site area, it is considered that no Exception Testing is required.

9.0 Residual Risk

A Flood Risk Assessment should consider the residual risk to a proposed development for its intended lifecycle. In this case, with the masterplan consisting of commercial development, a 60 year lifecycle is assumed.

The detailed assessment of predicted tidally impacted fluvial flood levels is provided in Section 5.0 which takes into account expected flood level increases as a result of climate change over the intended 60 year lifecycle of the project on the 200 year return events. Therefore, the residual risk for the lifecycle of the development is considered **LOW**.

10.0 Flood Risk Assessment Credentials

This Flood Risk Assessment has been carried for the proposed development by Curtins civil engineering team who have extensive combined experience of civil engineering and flood risk assessment preparation.

This Flood Risk Assessment has been carried out following the general requirements of the NPPF (2019) and South Tyneside Councils Preliminary and Strategic Flood Risk Assessment requirements.

11.0 Conclusion and Recommendations

11.1 Conclusion

This Flood Risk Assessment has been conducted to assess flood risk to support the planning application for redevelopment of land at Harton Quays, South Shields.

This Flood Risk Assessment has been conducted in general accordance with the requirements of the NPPF (2019) to provide a sufficient level of detail on flood risk and drainage strategy for the application.

The Environment Agency Flood Map for Planning shows the site to be a Flood Zone 1 Low Risk area. With the development proposals being commercial usage, NPPF table 3 shows the development type of less vulnerable as appropriate development.

As the southern tip of the site abuts higher risk flood Zone 2 and Flood Zone 3 areas a detailed assessment of flood levels and extents has been carried out. This includes predicted increases in tidal flood levels as a result of climate change over the developments likely lifecycle. The site is shown to remain at low risk.

Surface water flood risk has been assessed and the risk is identified as low.

Other secondary flood risks including groundwater and reservoir flooding have also been assessed and the site is considered to be at low risk from all sources.

Risk from the provision of new surface water drainage as detailed in Section 6 Surface Water Management and shown on the Outline Drainage Strategy drawing contained in Appendix E is considered low.

Risk from Climate Change and Residual Risk is considered low risk.

11.2 Recommendations for Detailed Design

Minimum ground floor levels of the proposed buildings are to be set at a minimum freeboard of 600 mm above the 1 in 200 year plus climate change flood level of 4.524 mAOD. This is met by a car park level of 6.0 mAOD and a podium level of 10.0 mAOD.

Similarly, the access to the basement parking should be set away from the southern tip of the site and given a minimum 300 mm freeboard above the 1 in 200 year plus climate change flood level of 4.524 mAOD therefore 4.824 mAOD,

A detailed drainage scheme should be developed following the principles set in outline drainage strategy described in Section 6 : Surface Water Management and as shown on the Curtins outline drainage strategy drawing 076755-CUR-ZZ-ZZ-DR-C-92001-P02 contained in Appendix E.

12.0 Appendices

Appendix A	**Application Redline Plan/Site Location Plan**
Appendix B	**Topographical Survey Showing Site levels and Features**
Appendix C	**Environment Agency Product 4 Detailed Flood Data**
Appendix D	**Site Plans showing Proposed Levels**
Appendix E	**NWL Sewer Mapping**
	Drainage Calculation Sheets
	Curtins Outline Drainage Strategy Drawing

Appendix A Application Redline Plan/Site Location Plan

South Tyneside Council

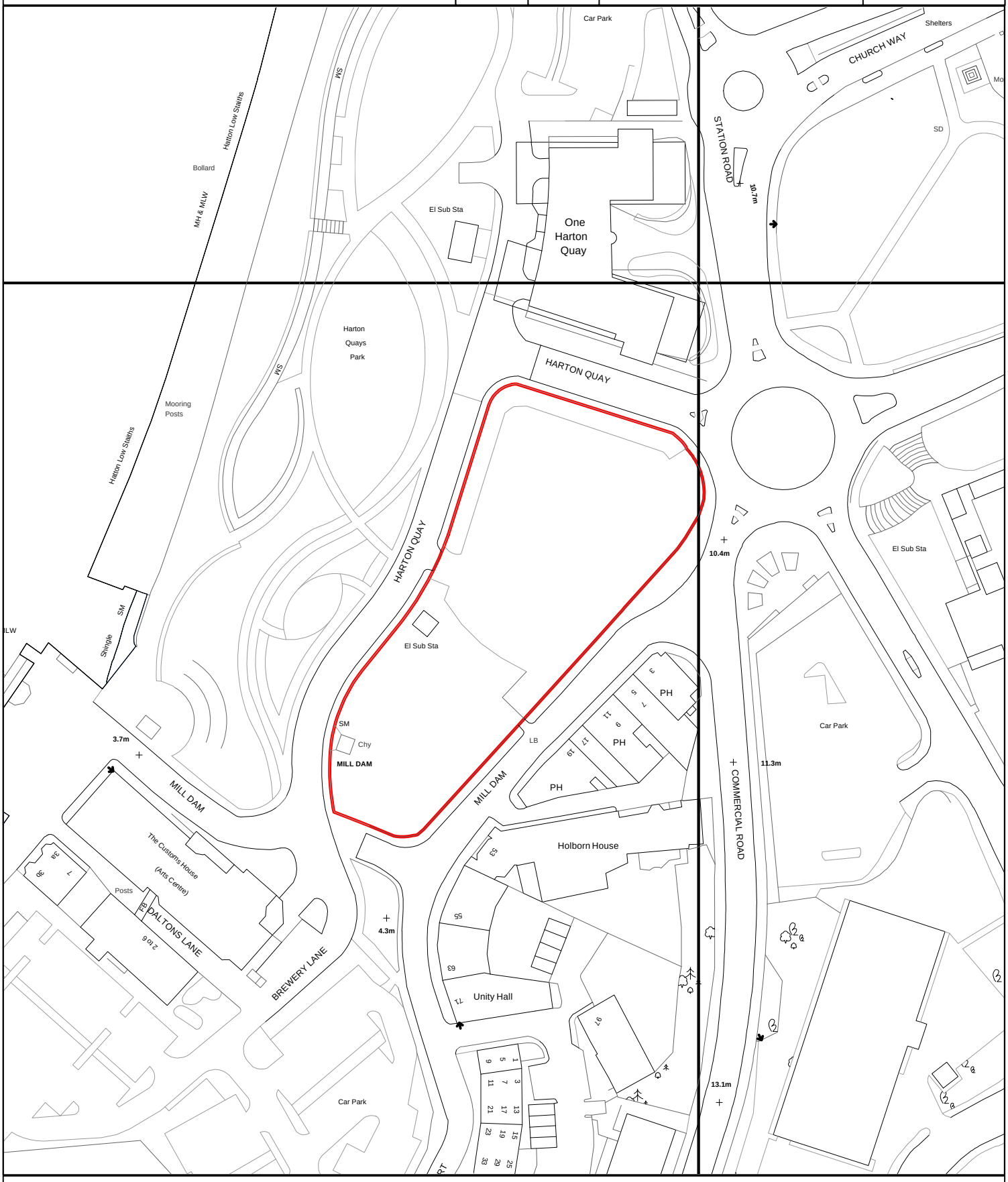
Economic Regeneration

Town Hall & Civic Offices, Westoe Road, South Shields, NE33 2RL
Telephone: (0191) 427 1717

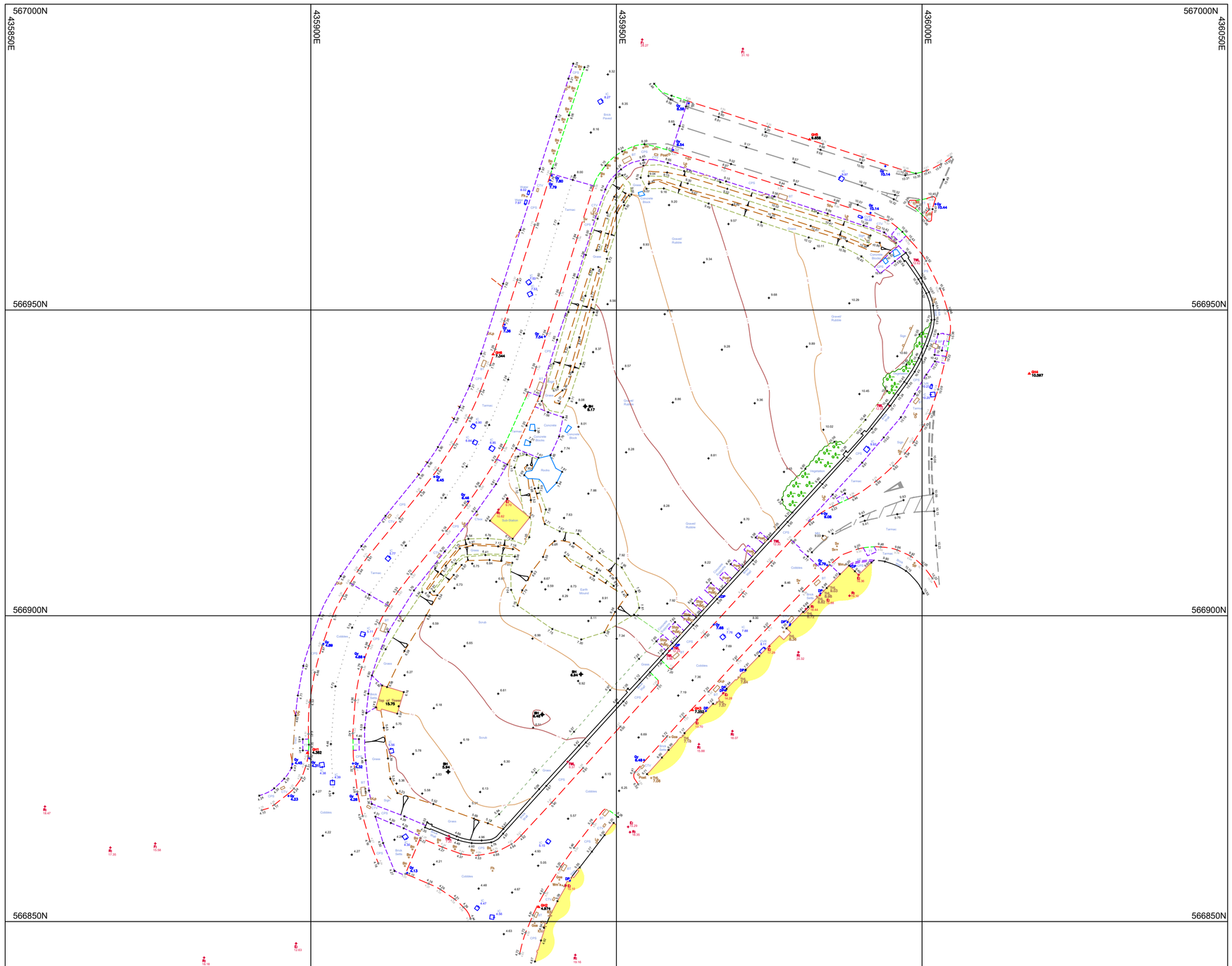
Projects	Drawing Title
Harton Staithes Site Mill Dam Harton Staithes	Site Plan

Project Code	Dwg. No.	Drawn By	Date
		Checked By	Date
		Scale 1: 1250	Size A4

Rev	Date	OS Ref	Chkd



Appendix B Topographical Survey Showing Site levels and Features



N

OS Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.
The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Legend:

Buildings
Wall
Kerb line
Line marking
Drop kerb
Centre line
Overhead Cable
Concrete edge
Tarmac edge
Grass verge
Canopy/Overhang
Verge
Station and Name
Station Level
Tree / Bush / Sapling
Area of Undergrowth
Woodland
R: Ridge Level
E: Eaves Level
F: Flat Roof Level
TWL: Top of Wall Level
Gate

Fence types:
IW Interwoven
IR Iron Railings
WM Wire Mesh
PR Post & Rail
PW Post & Wire
CL Chain Link
WP Wooden Panels
CP Concrete Panels
Steel Palisade

IC Inspection chamber
PInv Pipe invert
Gy Gully
Bg Back gully
Dp Down pipe
Pipe Pipe above ground
MH Manhole
WL Water level
Fl Flood light
Lp Lamp post
Tp Telegraph post
Ep Electricity post
Tl Traffic light
Bus Bus stop
Sv Stop valve
St Stop tap
Er Earth rod
Wm Water meter
Gas Gas valve
Av Air valve
IOU Underdrilled Inspection
Ws Wash out
Re Rodding eye
BB Belisha beacon
CTV Cable tv
Mkr Marker post
Gmkr Gas marker post
So Soffit

Bo Bollard
IB Illuminated bollard
Bin Rubbish bin
Vp Vent pipe
Gri Ground light
Lbox Letter box
Ldr Ladder
Stly Stile
IFL Internal floor level
THL Threshold level
Sp Sign post
TH Trialhole
BH Borehole
ELC Electric
BT British Telecom
Ctrol Control box
TT Tactile
BP Brick paved
CPS Concrete paving slabs
CVR Cover
IC Inspection chamber
Rwall Retaining wall
UTL Unable to tift
TCL Tree canopy level
G: Girth
MG Multi girth
Stmp Tree Stump
CL: Cover level
IL: Invert level

Rev.	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

24 Riverside Studios
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Newcastle Business Park
Newcastle
NE4 7YL
t. (0191) 273 6391
newcastle@greenhatch-group.co.uk
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Derb (Head Office): Rowan House, Duffield Road, Little Eaton, Derby, DE21 5DR, t. (0133) 283 0044
St Albans: Unit B, The Courtyard, Alban Park, St Albans, Hertfordshire, AL4 0LA, t. (0172) 785 4481
London: 27 Cornwall Terrace Mews, Regents Park, London, NW1 5LL, t. (0207) 224 1806

CLIENT
Muse Developments

PROJECT
Harton Quay South Shields

TITLE
Topographical Survey

SCALE	DATE
A2@ 1: 500	31.01.20
DRAWN	QUALITY REF
JT	GH6769

Level datum	See Notes
Grid orientation	See Notes
Job number	35957

Drawing No. 35957_T
Rev. 0

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	435899.4525	566877.5707	4.3820
GH2	435937.2777	566852.3908	4.9742
GH3	435962.4354	566884.5884	7.2516
GH4	436017.5469	566939.5936	10.5969
GH5	435981.6119	566977.8774	9.6581
GH6	435929.8373	566942.7518	7.3436

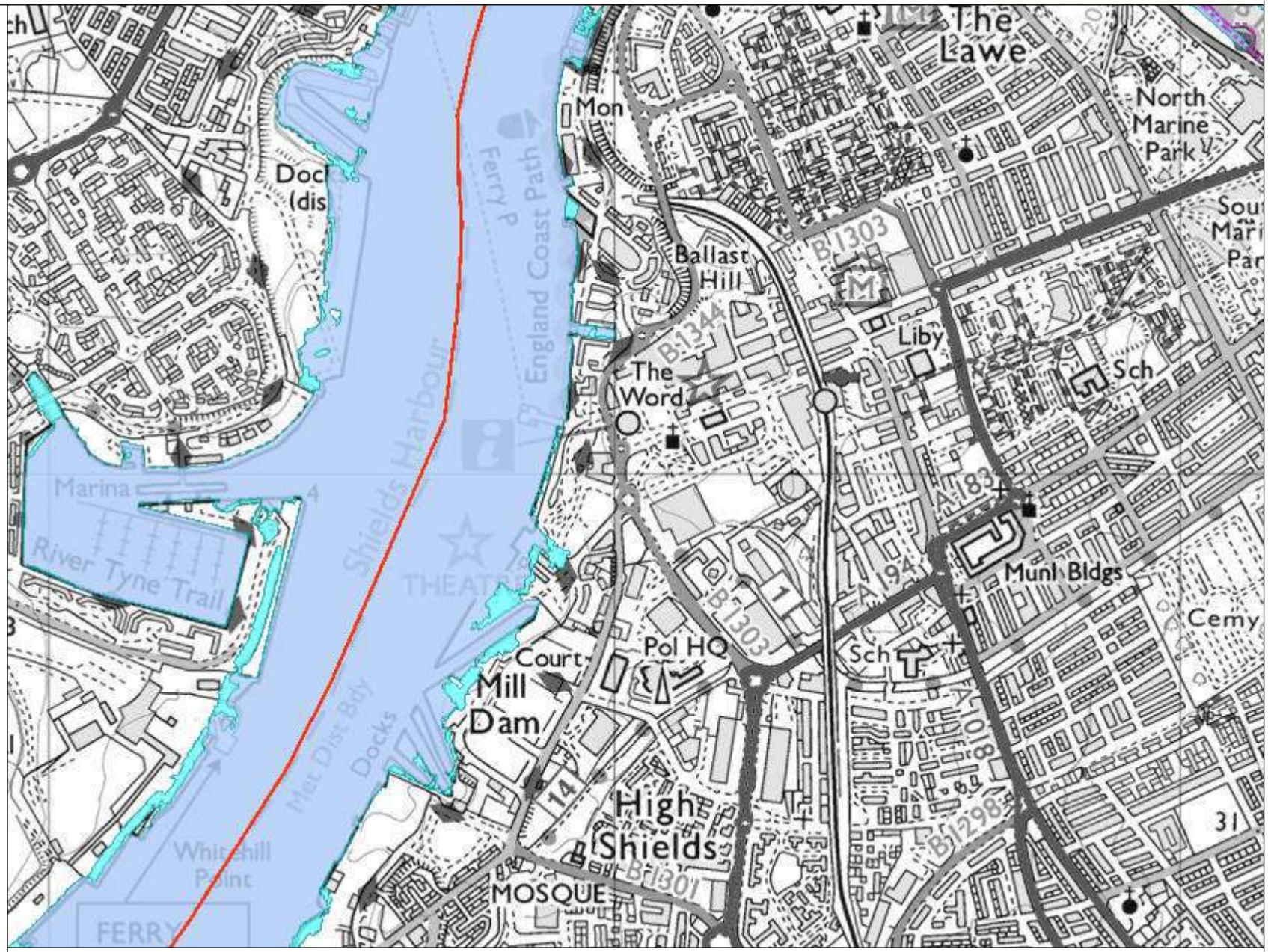
Appendix C Environment Agency Product 4 Detailed Flood Data

Flood Map for Planning

Environment Agency

Legend

- Statutory Main Rivers
- Defences
- Flood Storage Areas
- Areas benefiting from flood defence
- Flood Zone 3
- Flood Zone 2



1: 10,000

0 250

Metres

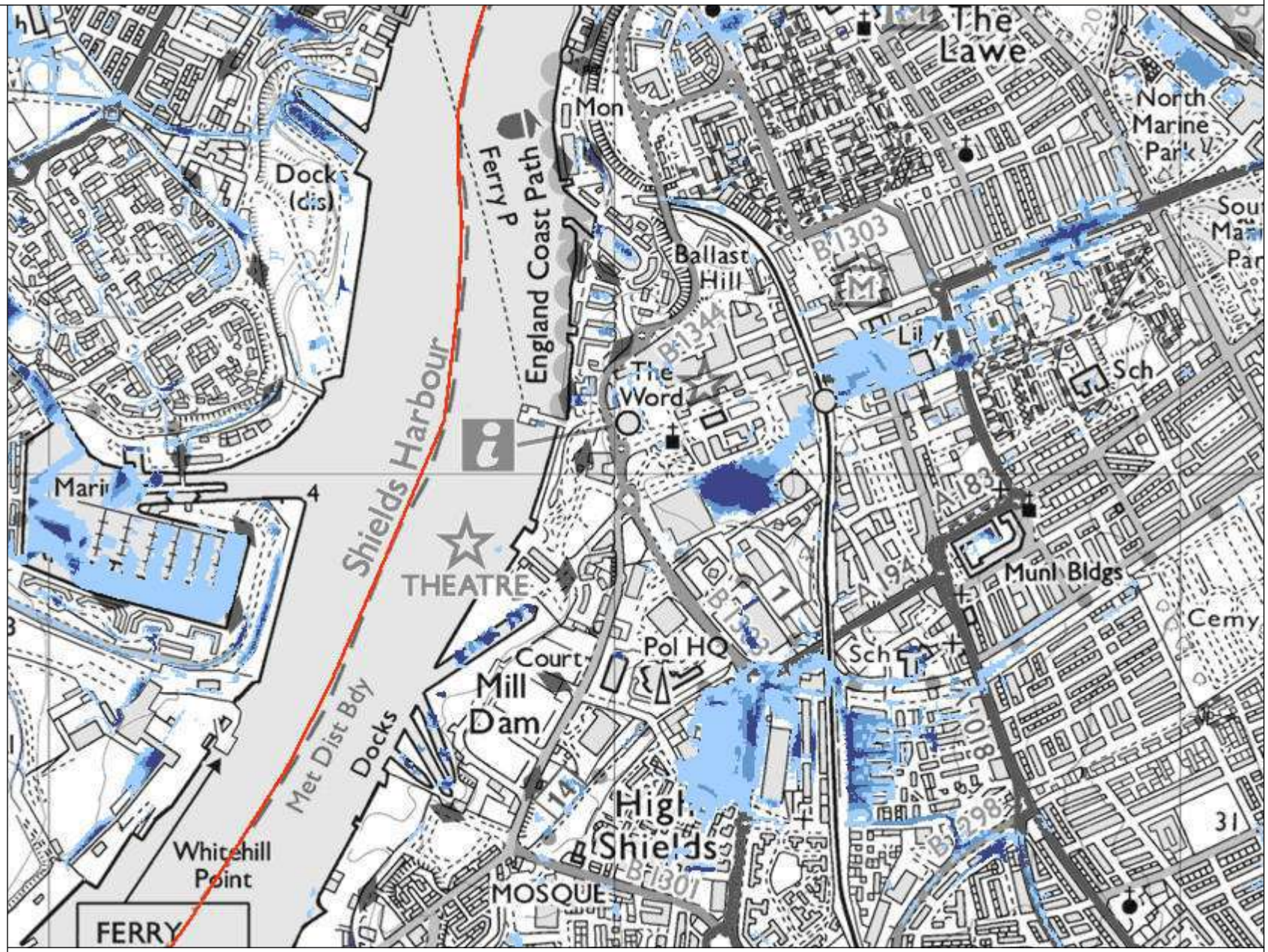
N W E S

Surface Water Flood Risk

Environment Agency

Legend

- Statutory Main Rivers
- High (>= 3.3%)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)



1: 10,000

0 250

Metres

N W E S

Environment Agency

Legend

Extent of the flood on:

31-12-1978 from Main River South Shields
EAFE12183
Channel Capacity Exceeded

15-12-2013 from Main River North and South Shields
EAFE121852
Channel Capacity Exceeded

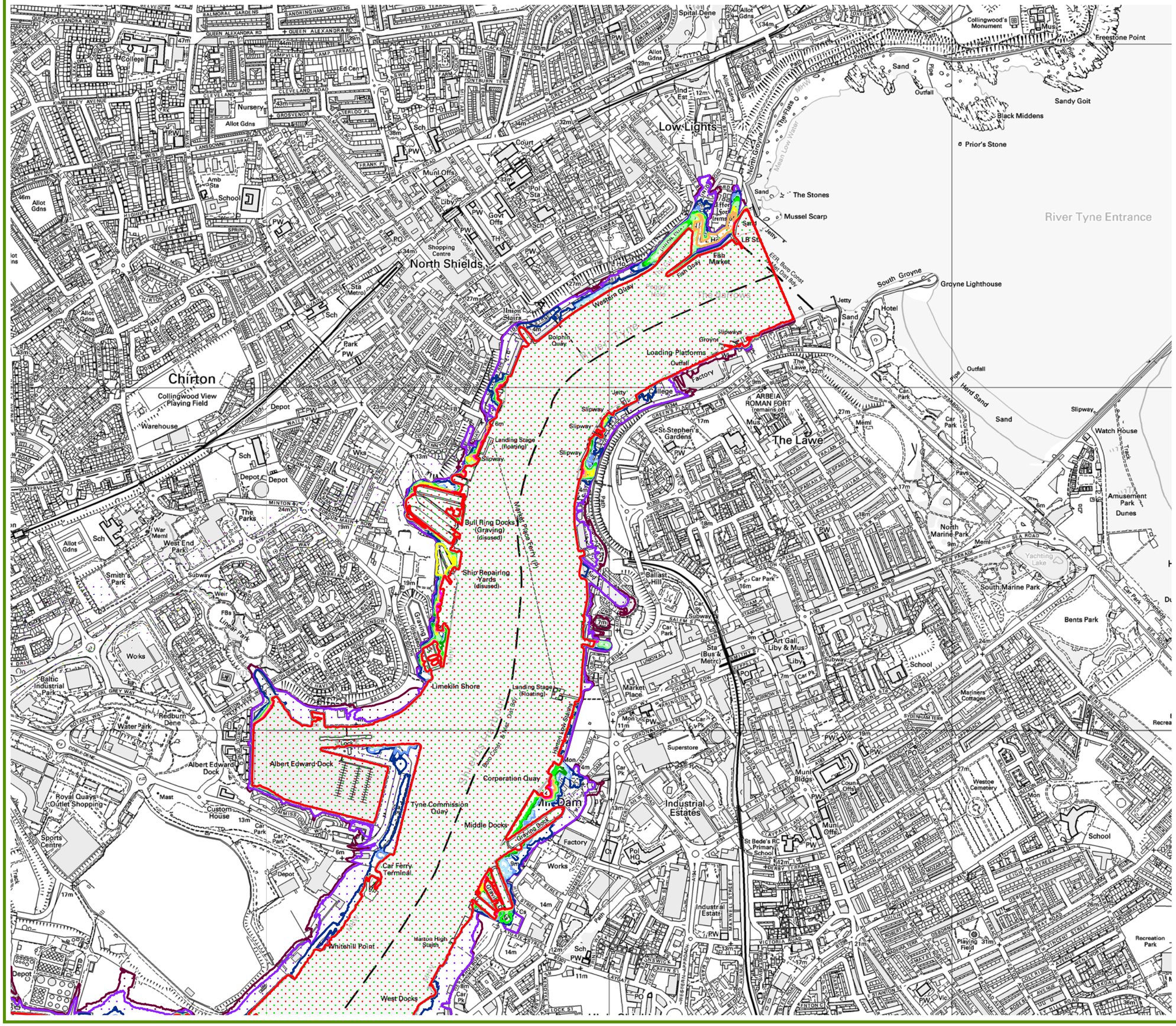
Historic Flood Events
South Shields

Date: 2020-Oct Scale: 1:10,000 Status: Final

MapEdit data quality flag: Adequate

Data Source: MapEdit 01-10-2020

Approved by: James Carradice 01-10-2020



Environment Agency

Legend

Extent of a flood with a:

- 1 in 5
- 1 in 10
- 1 in 20
- 1 in 30
- 1 in 50
- 1 in 75
- 1 in 100
- 1 in 150
- 1 in 200
- 1 in 1,000
- 1 in 200 + Climate Change
- 1 in 1,000 + Climate Change

chance of happening in any given year

Modelled Flood Outlines South Shields

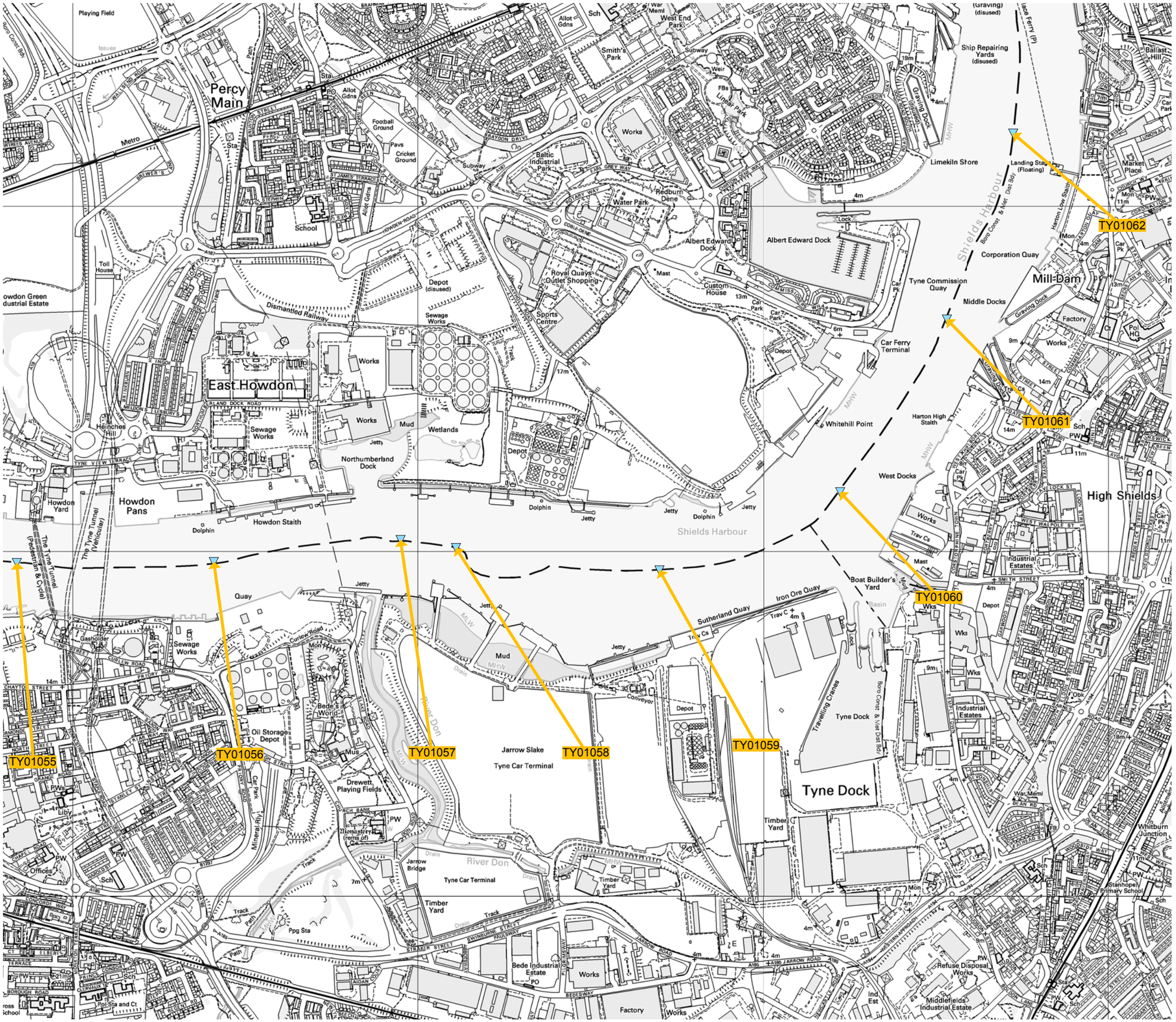
Date: Oct 2020 Scale: 1:10,000 Status: Final

MapEdit data quality flag: Adequate

Data Source: MapEdit 01-10-2020

Approved by: James Carradice 01-10-2020

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6).
Email: enquiries@environment-agency.gov.uk



Environment Agency

Legend

Node Points with Modelled Flood Levels

Node Point Plan
South Shields

Date: Oct 2020 Scale: 1:10,000 Status: Final

MapEdit data quality flag: Adequate

Data Source: MapEdit 01-10-2020

Approved by: James Carradice 01-10-2020

Node Point Attributes Table

Modelled Flood Group = EA1211286

Node Point Name	Return Period (1:x years)	Level Value (mAOD)
TY01055	2	3.33
	5	3.44
	10	3.52
	20	3.61
	30	3.66
	50	3.74
	75	3.8
	100	3.84
	150	3.89
	200	3.95
	201	4.87
	1000	4.22
	1001	5.17
TY01056	2	3.33
	5	3.43
	10	3.52
	20	3.61
	30	3.65
	50	3.73
	75	3.79
	100	3.83
	150	3.89
	200	3.94
	201	4.87
	1000	4.22
	1001	5.16
TY01057	2	3.32
	5	3.43
	10	3.51
	20	3.6
	30	3.65
	50	3.73
	75	3.79
	100	3.83
	150	3.88
	200	3.94
	201	4.86
	1000	4.21
	1001	5.15
TY01058	2	3.32
	5	3.42
	10	3.51
	20	3.6
	30	3.65
	50	3.73
	75	3.79
	100	3.83
	150	3.88
	200	3.94
	201	4.86
	1000	4.21
	1001	5.15
TY01059	2	3.31
	5	3.42
	10	3.5
	20	3.59
	30	3.64
	50	3.72
	75	3.78
	100	3.82
	150	3.88
	200	3.93
	201	4.86
	1000	4.21
	1001	5.15
TY01060	2	3.31
	5	3.41
	10	3.5
	20	3.59
	30	3.64
	50	3.72
	75	3.78
	100	3.82
	150	3.87
	200	3.93
	201	4.86
	1000	4.2
	1001	5.14
TY01061	2	3.3
	5	3.41
	10	3.49
	20	3.58
	30	3.63
	50	3.71
	75	3.77
	100	3.81
	150	3.87
	200	3.92
	201	4.85
	1000	4.2
	1001	5.13
TY01062	2	3.29
	5	3.4
	10	3.49
	20	3.58
	30	3.63
	50	3.7
	75	3.76
	100	3.81
	150	3.86
	200	3.92
	201	4.85
	1000	4.19
	1001	5.13

*201 and 1001 denotes 200+Climate Change and 1,000+Climate Change

Appendix D Site Plans showing Proposed Levels

Key

- Planning application boundary
- Proposed building
- Proposed building: undercroft car park (Level -01)
- Proposed tree in soft landscape
- Proposed grass
- Proposed shrub planting
- Proposed raingarden planting
- Proposed hedge planting
- Proposed seating
- Proposed steps
- Proposed concrete terraces (seating steps)
- Paving to podium
- Small unit paving (setts)
- Tarmac paths
- Tactile corduroy paving to steps
- Handrails to steps and podium
- Levels
  Existing levels retained denoted with (e)

Notes

1. All dimensions in mm, unless otherwise stated.
2. Scaling from drawing if printed incorrectly may lead to errors.
3. All information outside red line boundary shown for contextual purpose only.
4. All hatch patterns are indicative only unless stated otherwise.
5. Levels information on this drawing illustrates the design intent. The contractor is to check and verify all levels and dimensions against site survey information.

HARTON QUAY

HARTON QUAYS PARK

GLASSWORKS

PODIUM
(LEVEL 00)

CENTRAL
LAWN

CHIMNEY

Basement access ramp

DROP-OFF/LAYBY

Proposed opening through Mill Dam Wall

Proposed opening through Mill Dam Wall

Proposed opening through Mill Dam Wall

Proposed opening through Mill Dam Wall

Proposed opening through Mill Dam Wall

HARTON QUAY

COMMERCIAL ROAD

MILL DAM

STEAMBOAT

DALTON LANE

CUSTOMS HOUSE

Indicative Structure

Scale

0m 5m 10m 20m

N

Date	Description of revision
18.11.20	Stage 3

Drawn	Checked	Approved	Revision
AF	AF	AP	P01

Paper size
A1

Drawing status
FOR STAGE APPROVAL

Drawing number
RFM-XX-00-DR-L-0001

Scale
1:250

Project
GLASSWORKS, HARTON QUAYS, SOUTH SHIELDS
RF20-834

Client
MUSE

Revision
X01

Document title
LANDSCAPE GENERAL ARRANGEMENT

re-form landscape architecture

Tower Works, Globe Road,
Leeds LS11 5QG

T: +44 (0)113 2454695
E: info@re-formlandscape.com
W: re-formlandscape.com

Appendix E **NWL Sewer Mapping**

LLFA Correspondence

Drainage Calculation Sheets

Curtins Outline Drainage Strategy Drawing

Northumbrian Water
Developer Services
Leat House
Pattinson Road
Washington
NE38 8LB

Ext: 36603
Direct Line: 0191 419 6603
Email: developmentenquiries@nwl.co.uk
Our Ref: 111250936280
Your Ref:

Tuesday, 24 November 2020

[Contact Address]

Mr N Turner
Curtins
Ground Floor
Rose Wharf
78-80 East Street
Leeds
LS9 8EE

Dear Nick

Re: Pre-Planning Enquiry – Land off Harton Quay, South Shields

Further to the Point of Connection Application for the above site, received 9th November 2020, we are now able to provide the following response.

We have based our response on the information in your application and accompanying correspondence. Therefore, should any of the information now be different, then you must ensure that you inform us of any changes as further Network Modelling may be required and our response may also change, leading to this response being invalid.

Northumbrian Water assesses the impact of the proposed development on our assets and assesses the capacity within our network's to accommodate and treat the anticipated flows arising from the development. We do not therefore offer comment on aspects of planning applications that are outside of our area of control.

Enclosed in this response is a scaled plan showing the **approximate** position of the water and sewerage networks within the vicinity of this site.

We have changed the way contractors and developers can access our assets.

Historically only our own staff and framework contractors could access our sewerage network. As of 1st January 2018, we are allowing third party contractors to access our sewer network on a site by site basis, subject to certain conditions.

Further information (including how to apply) is available from our web site - https://www.nwl.co.uk/services/developers/developer-sewerage-services/

Also enclosed is our extract showing locations within the approximate vicinity of this site that have, from our records, experienced flooding. This has been provided to demonstrate the known flood risks within the vicinity which have been considered as part of our assessment on this enquiry.

We have also carried out a review of your application and can confirm the following:

Sewerage and Sewage Treatment

Northumbrian Water would ask that you please separate the foul and surface water flows in accordance with Part H of the Building Regulations prior to the final connection to the public sewer.

All new connections to the public sewerage system must first be approved through the Section 106 of the Water Industry Act 1991 process prior to construction.

Should you decide to proceed with this development, a fully completed Sewer Connection application form will be required. These are available to download from the following link:

https://www.nwl.co.uk/services/developers/developer-sewerage-services/new-sewer-connections-s106/

- Foul Water Discharge

The proposed foul flows of 20 l/s seems exceptionally high for a development of this type and we would anticipate the likely discharge to be more in the region of 2l/s unless it is anticipated that process flows will be discharged from this site in addition to domestic foul flows.

With the above in mind unrestricted foul domestic flows can discharge without restriction into the 225mm foul public sewer via manhole 9903.

- Surface Water Discharge

No surface water flow from the proposed development will be allowed to connect into the existing public sewerage system unless it is proven that the alternative options which are listed within Part H of the Building Regulations 2010 are not available:

Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority –

(a) an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,

(b) a watercourse; or, where that is not reasonably practicable,

(c) a sewer.

If the more sustainable options prove to be unfeasible and subject to obtaining agreement from the Lead local flood authority then the proposed unrestricted surface water flow of 116 l/sec would be permitted to discharge into the 2000mm diameter surface public sewer via manhole 9801.

As this surface water sewer ultimately discharges to a watercourse, we suggest that you contact either the Environment Agency or Lead Local Flood Authority, as appropriate, to discuss this in further detail.

Written approval for all individual connections (direct or indirect) to the public sewerage system should be obtained through the Section 106 process, following completion of the detailed drainage design and before the commencement of any drainage works on site.

- Sewage Treatment Capacity

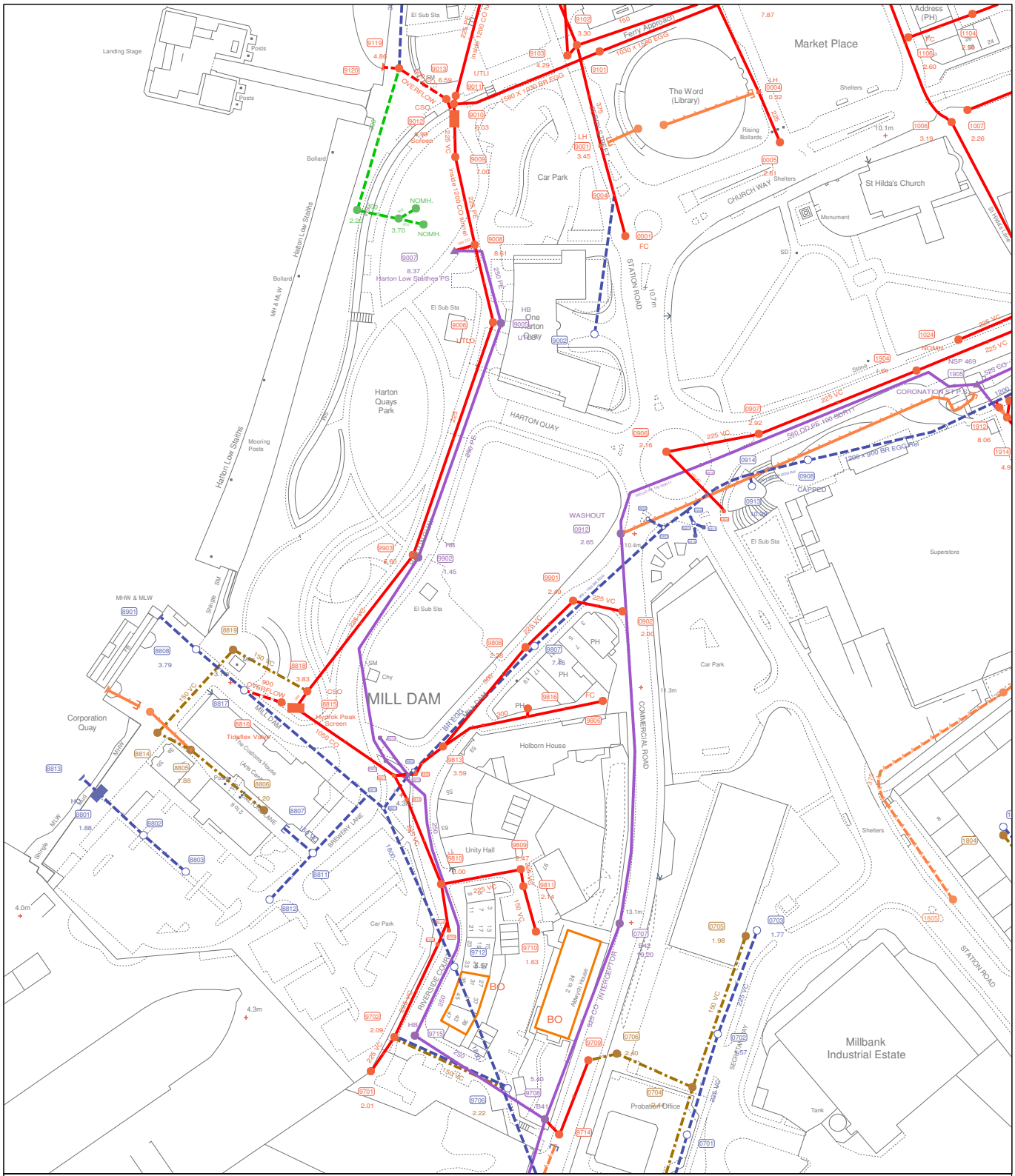
The Sewage Treatment Works to which this development finally discharges to is able to accept the additional flows.

Please note that this response is valid for 1 year only and you should resubmit your proposals should this period lapse prior to your development beginning.

Should you require any further assistance or information, then please do not hesitate to contact me at developmentenquiries@nwl.co.uk or alternatively on 0191 419 6603, please quote our reference number above in any future correspondence.

Yours sincerely,

Laura Clegg
Team Leader
Developer Services



NWL Responsibility | Private/Non NWL | Proposed

Combined | Foul | Surface | Treated Eff | Untreated Eff | Overflow

Combined | Foul | Surface | Treated Eff | Trade Eff | Watercourse

Combined | Foul | Surface

Annotations: Direction of flow; Backdrop; Abandoned; Rising Main

Symbols: Chambers; Inlet/Outlet; Treatment Works; Pumping Station; Capped End; Balancing Pond; Termination Node; Rodding Eye; Unknown End; Attribute Change; Air Valve; Property Connection; Lamp Hole; Hatchbox; Dual Usage Chamber

NORTHUMBRIAN WATER *living water*

User : DAWSJ1

Date : 29/09/2020

Title : 0000

Centre Point : 435961,566917

Map Sheet : NZ3566NE

20 m

NORTHUMBRIAN WATER living water

User : BOWMS

Title :

Centre Point : 435951,566922

Date : 09/11/2020 15:57:09

Map Sheet : NZ3566

Paper / Scale : A3@1:5015

50 m

Nick Turner

From: Lea Nicholson <Lea.Nicholson@southtyneside.gov.uk>
Sent: 16 October 2020 12:08
To: Nick Turner
Subject: RE: Harton Quay, South Shields

Hi Nick,

Yes, happy to agree with this in principle

Regards

Lea

Lea Nicholson
Environmental Protection
Development Services
Regeneration and Environment
South Tyneside Council
Tel : 01914247923

From: Nick Turner [mailto:Nick.Turner@curtins.com]
Sent: 16 October 2020 11:20
To: Lea Nicholson
Subject: FW: Harton Quay, South Shields

Hi Lea,

Thanks for your time this morning.

As discussed, our intention would be to discharge freely to surface water sewer, subject to confirmation from NWL.

Are you able to just drop me a note to confirm that you are happy with this in principle?

Kind Regards,
Nick

Nick Turner Project Engineer
Curtins
T. 0113 274 8509 | nick.turner@curtins.com

From: Nick Turner
Sent: 15 October 2020 12:17
To: Lea Nicholson <Lea.Nicholson@southtyneside.gov.uk>
Subject: RE: Harton Quay, South Shields

Hi Lea,

Just following up on the below.

Have you had a chance to review our proposals for discharge to the NWL surface water sewer?

Kind Regards,
Nick

Nick Turner Project Engineer
Curtins
T. 0113 274 8509 | nick.turner@curtins.com

From: Nick Turner
Sent: 30 September 2020 11:24
To: Lea Nicholson <Lea.Nicholson@southtyneside.gov.uk>
Subject: RE: Harton Quay, South Shields

Hi,

Thank you for the information.

We have now reviewed your guidance and the NWL sewer records (see attached). Our intention with the site surface water drainage would be to discharge to the surface water sewer within Mill Dam. Given the proximity to the river and the low lying site levels, it is anticipated that high ground water levels will be encountered on-site. We do not therefore anticipate soakaways to be a viable solution.

As this sewer discharges immediately downstream to a tidal stretch of the Tyne estuary would free discharge of surface water be acceptable to yourselves as the LLFA?

The project is in the early stages of design however it is our intention to explore options for providing source control elements within the scheme to improve water quality wherever possible.

Please feel free to give me a call on 07902192987 if you have any queries.

Kind Regards,
Nick

Nick Turner Project Engineer
Curtins
T. 0113 274 8509 | nick.turner@curtins.com

From: Lea Nicholson <Lea.Nicholson@southtyneside.gov.uk>
Sent: 25 September 2020 15:22

To: Nick Turner <Nick.Turner@curtins.com>
Subject: Harton Quay, South Shields

Hi Nick,

I am responding to your email of the 16th September regarding the new office development at Harton Quay in South Shields.

Could I direct you to our recently adopted local standards in the first instance, see link.

north-east-llfa-local-sustainable-drainage-standards

Happy to discuss further, contact details below

Lea Nicholson
Environmental Protection
Development Services
Regeneration and Environment
South Tyneside Council
Tel : 01914247923

Co-operative Council of the Year 2019.

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South Tyneside Council, Town Hall & Civic Offices, Westoe Road, South Shields, Tyne & Wear, NE33 2RL, Tel: 0191 427 7000, Website: www.southtyneside.gov.uk

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW1.00	0.082	5.00	10.000	1350	435949.741	566956.614	1.519
SW1.01			10.000	1350	435952.775	566966.129	1.586
SW1.02			10.000	1350	435994.073	566959.575	1.865
SW1.03			9.850	1350	435997.030	566944.644	1.816
SW1.04	0.089	5.00	9.900	1350	435980.780	566926.217	2.030
SW1.05			9.900	1350	435969.328	566923.268	2.184
SW1.06	0.087	5.00	8.460	1350	435950.701	566902.910	2.124
SW1.07			7.313	1350	435938.054	566897.742	2.551
SW1.08			4.158	1350	435912.581	566870.522	1.881
SW1.09			4.150	1350	435898.990	566854.429	2.227
SW2.00	0.012	5.00	7.840	1350	435930.329	566908.443	2.840
SW3.00	0.010	5.00	5.087	1350	435913.380	566878.963	1.825

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW1.00	SW1.01	9.987	0.600	8.481	8.414	0.067	150.0	225	5.16	50.0
1.001	SW1.01	SW1.02	41.815	0.600	8.414	8.135	0.279	150.0	225	5.81	50.0
1.002	SW1.02	SW1.03	15.221	0.600	8.135	8.034	0.101	150.0	225	6.05	50.0
1.003	SW1.03	SW1.04	24.569	0.600	8.034	7.870	0.164	150.0	225	6.43	50.0
1.004	SW1.04	SW1.05	11.826	0.600	7.870	7.791	0.079	150.0	225	6.62	50.0
1.005	SW1.05	SW1.06	27.594	0.600	7.716	6.336	1.380	20.0	300	6.75	50.0
1.006	SW1.06	SW1.07	13.662	0.600	6.336	4.970	1.366	10.0	300	6.79	50.0
1.007	SW1.07	SW1.08	37.280	0.600	4.762	2.277	2.485	15.0	300	6.95	50.0
1.008	SW1.08	SW1.09	21.064	0.600	2.277	1.923	0.354	59.5	300	7.12	50.0
2.000	SW2.00	SW1.07	13.198	0.600	5.000	4.912	0.088	150.0	150	5.27	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.065	42.3	11.1	1.294	1.361	0.082	0.0	79	0.901
1.001	1.065	42.3	11.1	1.361	1.640	0.082	0.0	79	0.901
1.002	1.065	42.3	11.1	1.640	1.591	0.082	0.0	79	0.901
1.003	1.065	42.3	11.1	1.591	1.805	0.082	0.0	79	0.901
1.004	1.065	42.3	23.2	1.805	1.884	0.171	0.0	119	1.090
1.005	3.531	249.6	23.2	1.884	1.824	0.171	0.0	61	2.236
1.006	4.999	353.4	35.0	1.824	2.043	0.258	0.0	63	3.220
1.007	4.079	288.3	36.6	2.251	1.581	0.270	0.0	72	2.829
1.008	2.042	144.3	37.9	1.581	1.927	0.280	0.0	105	1.730
2.000	0.818	14.5	1.6	2.690	2.251	0.012	0.0	34	0.539

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	SW3.00	SW1.08	8.479	0.600	3.262	2.427	0.835	10.2	150	5.04	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	3.180	56.2	1.4	1.675	1.581	0.010	0.0	16	1.334

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.987	150.0	225	1 STANDARD	10.000	8.481	1.294	10.000	8.414	1.361
1.001	41.815	150.0	225	1 STANDARD	10.000	8.414	1.361	10.000	8.135	1.640
1.002	15.221	150.0	225	1 STANDARD	10.000	8.135	1.640	9.850	8.034	1.591
1.003	24.569	150.0	225	1 STANDARD	9.850	8.034	1.591	9.900	7.870	1.805
1.004	11.826	150.0	225	1 STANDARD	9.900	7.870	1.805	9.900	7.791	1.884
1.005	27.594	20.0	300	1 STANDARD	9.900	7.716	1.884	8.460	6.336	1.824
1.006	13.662	10.0	300	1 STANDARD	8.460	6.336	1.824	7.313	4.970	2.043
1.007	37.280	15.0	300	1 STANDARD	7.313	4.762	2.251	4.158	2.277	1.581
1.008	21.064	59.5	300	1 STANDARD	4.158	2.277	1.581	4.150	1.923	1.927
2.000	13.198	150.0	150	1 STANDARD	7.840	5.000	2.690	7.313	4.912	2.251
3.000	8.479	10.2	150	1 STANDARD	5.087	3.262	1.675	4.158	2.427	1.581

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW1.00	1350	Manhole	1 STANDARD	SW1.01	1350	Manhole	1 STANDARD
1.001	SW1.01	1350	Manhole	1 STANDARD	SW1.02	1350	Manhole	1 STANDARD
1.002	SW1.02	1350	Manhole	1 STANDARD	SW1.03	1350	Manhole	1 STANDARD
1.003	SW1.03	1350	Manhole	1 STANDARD	SW1.04	1350	Manhole	1 STANDARD
1.004	SW1.04	1350	Manhole	1 STANDARD	SW1.05	1350	Manhole	1 STANDARD
1.005	SW1.05	1350	Manhole	1 STANDARD	SW1.06	1350	Manhole	1 STANDARD
1.006	SW1.06	1350	Manhole	1 STANDARD	SW1.07	1350	Manhole	1 STANDARD
1.007	SW1.07	1350	Manhole	1 STANDARD	SW1.08	1350	Manhole	1 STANDARD
1.008	SW1.08	1350	Manhole	1 STANDARD	SW1.09	1350	Manhole	1 STANDARD
2.000	SW2.00	1350	Manhole	1 STANDARD	SW1.07	1350	Manhole	1 STANDARD
3.000	SW3.00	1350	Manhole	1 STANDARD	SW1.08	1350	Manhole	1 STANDARD

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	84.280	23.848
1 year 15 minute winter	59.144	23.848
1 year 30 minute summer	57.102	16.158
1 year 30 minute winter	40.072	16.158
1 year 60 minute summer	40.398	10.676
1 year 60 minute winter	26.839	10.676
1 year 120 minute summer	26.432	6.985
1 year 120 minute winter	17.561	6.985
1 year 180 minute summer	21.115	5.434
1 year 180 minute winter	13.725	5.434
1 year 240 minute summer	17.197	4.545
1 year 240 minute winter	11.425	4.545
1 year 360 minute summer	13.694	3.524
1 year 360 minute winter	8.901	3.524
1 year 480 minute summer	11.066	2.925
1 year 480 minute winter	7.352	2.925
1 year 600 minute summer	9.254	2.531
1 year 600 minute winter	6.323	2.531
1 year 720 minute summer	8.394	2.250
1 year 720 minute winter	5.641	2.250
1 year 960 minute summer	7.097	1.869
1 year 960 minute winter	4.701	1.869
1 year 1440 minute summer	5.374	1.440
1 year 1440 minute winter	3.611	1.440
1 year 2160 minute summer	4.012	1.109
1 year 2160 minute winter	2.764	1.109
1 year 2880 minute summer	3.437	0.921
1 year 2880 minute winter	2.310	0.921
1 year 4320 minute summer	2.717	0.710
1 year 4320 minute winter	1.789	0.710
1 year 5760 minute summer	2.311	0.591
1 year 5760 minute winter	1.496	0.591
1 year 7200 minute summer	2.002	0.511
1 year 7200 minute winter	1.292	0.511
1 year 8640 minute summer	1.776	0.453
1 year 8640 minute winter	1.146	0.453
1 year 10080 minute summer	1.605	0.409
1 year 10080 minute winter	1.036	0.409
30 year 15 minute summer	205.071	58.028
30 year 15 minute winter	143.910	58.028
30 year 30 minute summer	140.191	39.669
30 year 30 minute winter	98.380	39.669
30 year 60 minute summer	98.615	26.061
30 year 60 minute winter	65.517	26.061
30 year 120 minute summer	63.038	16.659
30 year 120 minute winter	41.881	16.659

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 180 minute summer	49.285	12.683
30 year 180 minute winter	32.037	12.683
30 year 240 minute summer	39.344	10.398
30 year 240 minute winter	26.139	10.398
30 year 360 minute summer	30.343	7.808
30 year 360 minute winter	19.724	7.808
30 year 480 minute summer	24.111	6.372
30 year 480 minute winter	16.019	6.372
30 year 600 minute summer	19.882	5.438
30 year 600 minute winter	13.585	5.438
30 year 720 minute summer	17.819	4.776
30 year 720 minute winter	11.975	4.776
30 year 960 minute summer	14.763	3.887
30 year 960 minute winter	9.779	3.887
30 year 1440 minute summer	10.836	2.904
30 year 1440 minute winter	7.282	2.904
30 year 2160 minute summer	7.836	2.166
30 year 2160 minute winter	5.399	2.166
30 year 2880 minute summer	6.555	1.757
30 year 2880 minute winter	4.405	1.757
30 year 4320 minute summer	4.995	1.306
30 year 4320 minute winter	3.290	1.306
30 year 5760 minute summer	4.130	1.057
30 year 5760 minute winter	2.673	1.057
30 year 7200 minute summer	3.521	0.898
30 year 7200 minute winter	2.272	0.898
30 year 8640 minute summer	3.082	0.786
30 year 8640 minute winter	1.989	0.786
30 year 10080 minute summer	2.754	0.702
30 year 10080 minute winter	1.777	0.702
100 year +40% CC 15 minute summer	368.854	104.373
100 year +40% CC 15 minute winter	258.845	104.373
100 year +40% CC 30 minute summer	255.101	72.185
100 year +40% CC 30 minute winter	179.018	72.185
100 year +40% CC 60 minute summer	180.954	47.821
100 year +40% CC 60 minute winter	120.222	47.821
100 year +40% CC 120 minute summer	116.088	30.679
100 year +40% CC 120 minute winter	77.126	30.679
100 year +40% CC 180 minute summer	90.626	23.321
100 year +40% CC 180 minute winter	58.909	23.321
100 year +40% CC 240 minute summer	72.104	19.055
100 year +40% CC 240 minute winter	47.904	19.055
100 year +40% CC 360 minute summer	55.175	14.198
100 year +40% CC 360 minute winter	35.865	14.198
100 year +40% CC 480 minute summer	43.619	11.527
100 year +40% CC 480 minute winter	28.979	11.527
100 year +40% CC 600 minute summer	35.816	9.797
100 year +40% CC 600 minute winter	24.472	9.797
100 year +40% CC 720 minute summer	31.983	8.572
100 year +40% CC 720 minute winter	21.495	8.572
100 year +40% CC 960 minute summer	26.337	6.935
100 year +40% CC 960 minute winter	17.446	6.935

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 1440 minute summer	19.151	5.133
100 year +40% CC 1440 minute winter	12.870	5.133
100 year +40% CC 2160 minute summer	13.707	3.788
100 year +40% CC 2160 minute winter	9.444	3.788
100 year +40% CC 2880 minute summer	11.375	3.049
100 year +40% CC 2880 minute winter	7.645	3.049
100 year +40% CC 4320 minute summer	8.565	2.239
100 year +40% CC 4320 minute winter	5.641	2.239
100 year +40% CC 5760 minute summer	7.017	1.796
100 year +40% CC 5760 minute winter	4.542	1.796
100 year +40% CC 7200 minute summer	5.944	1.516
100 year +40% CC 7200 minute winter	3.836	1.516
100 year +40% CC 8640 minute summer	5.175	1.320
100 year +40% CC 8640 minute winter	3.340	1.320
100 year +40% CC 10080 minute summer	4.604	1.174
100 year +40% CC 10080 minute winter	2.971	1.174

Results for 1 year Critical Storm Duration. Lowest mass balance: 74.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1.00	10	8.554	0.073	8.9	0.1845	0.0000	OK
15 minute winter	SW1.01	11	8.484	0.070	8.8	0.0996	0.0000	OK
15 minute winter	SW1.02	11	8.207	0.072	8.7	0.1028	0.0000	OK
15 minute winter	SW1.03	12	8.102	0.068	8.6	0.0975	0.0000	OK
15 minute winter	SW1.04	11	7.977	0.107	17.4	0.2463	0.0000	OK
15 minute winter	SW1.05	11	7.769	0.053	17.2	0.0762	0.0000	OK
15 minute winter	SW1.06	11	6.393	0.057	25.9	0.1289	0.0000	OK
15 minute winter	SW1.07	11	4.824	0.062	27.1	0.0882	0.0000	OK
15 minute winter	SW1.08	13	3.802	1.525	27.4	2.1829	0.0000	SURCHARGED
15 minute summer	SW1.09	1	3.753	1.830	26.5	0.0000	0.0000	OK
15 minute winter	SW2.00	11	5.030	0.030	1.3	0.0457	0.0000	OK
30 minute winter	SW3.00	19	3.824	0.562	8.5	0.8665	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1.00	1.000	SW1.01	8.8	0.810	0.207	0.1080	
15 minute winter	SW1.01	1.001	SW1.02	8.7	0.824	0.206	0.4460	
15 minute winter	SW1.02	1.002	SW1.03	8.6	0.829	0.204	0.1587	
15 minute winter	SW1.03	1.003	SW1.04	8.6	0.613	0.203	0.3501	
15 minute winter	SW1.04	1.004	SW1.05	17.2	0.973	0.405	0.2087	
15 minute winter	SW1.05	1.005	SW1.06	17.1	1.943	0.068	0.2453	
15 minute winter	SW1.06	1.006	SW1.07	25.8	2.858	0.073	0.1236	
15 minute winter	SW1.07	1.007	SW1.08	27.0	1.190	0.094	1.5064	
15 minute winter	SW1.08	1.008	SW1.09	21.6	0.307	0.150	1.4833	5.6
15 minute winter	SW2.00	2.000	SW1.07	1.2	0.499	0.086	0.0328	
30 minute winter	SW3.00	3.000	SW1.08	-7.6	0.803	-0.136	0.1493	

Results for 30 year Critical Storm Duration. Lowest mass balance: 74.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1.00	10	8.605	0.124	21.7	0.3104	0.0000	OK
15 minute winter	SW1.01	10	8.529	0.115	21.4	0.1639	0.0000	OK
15 minute winter	SW1.02	11	8.255	0.120	21.2	0.1717	0.0000	OK
15 minute winter	SW1.03	11	8.145	0.111	21.3	0.1587	0.0000	OK
15 minute winter	SW1.04	11	8.079	0.209	43.1	0.4827	0.0000	OK
15 minute winter	SW1.05	11	7.801	0.085	42.5	0.1209	0.0000	OK
15 minute winter	SW1.06	11	6.429	0.093	64.0	0.2097	0.0000	OK
15 minute winter	SW1.07	11	4.860	0.098	67.1	0.1398	0.0000	OK
15 minute summer	SW1.08	10	3.881	1.604	66.9	2.2949	0.0000	FLOOD RISK
15 minute summer	SW1.09	1	3.753	1.830	65.7	0.0000	0.0000	OK
15 minute winter	SW2.00	10	5.049	0.049	3.2	0.0738	0.0000	OK
15 minute summer	SW3.00	10	3.929	0.667	13.8	1.0281	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1.00	1.000	SW1.01	21.4	1.004	0.506	0.2129	
15 minute winter	SW1.01	1.001	SW1.02	21.2	1.023	0.501	0.8718	
15 minute winter	SW1.02	1.002	SW1.03	21.3	1.037	0.502	0.3119	
15 minute winter	SW1.03	1.003	SW1.04	21.0	0.719	0.496	0.7122	
15 minute winter	SW1.04	1.004	SW1.05	42.5	1.184	1.005	0.4211	
15 minute winter	SW1.05	1.005	SW1.06	42.4	2.460	0.170	0.4812	
15 minute winter	SW1.06	1.006	SW1.07	64.0	3.634	0.181	0.2406	
15 minute winter	SW1.07	1.007	SW1.08	67.0	1.392	0.232	1.6831	
15 minute summer	SW1.08	1.008	SW1.09	65.7	0.934	0.456	1.4833	22.8
15 minute winter	SW2.00	2.000	SW1.07	3.1	0.643	0.214	0.0637	
15 minute summer	SW3.00	3.000	SW1.08	-11.4	1.103	-0.203	0.1493	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 74.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1.00	12	8.708	0.227	38.9	0.5697	0.0000	SURCHARGED
15 minute winter	SW1.01	12	8.655	0.241	38.5	0.3456	0.0000	SURCHARGED
15 minute winter	SW1.02	11	8.475	0.340	38.4	0.4865	0.0000	SURCHARGED
15 minute winter	SW1.03	11	8.405	0.371	33.7	0.5306	0.0000	SURCHARGED
15 minute winter	SW1.04	11	8.300	0.430	70.1	0.9931	0.0000	SURCHARGED
15 minute winter	SW1.05	11	7.826	0.110	70.0	0.1575	0.0000	OK
15 minute winter	SW1.06	11	6.463	0.127	108.7	0.2857	0.0000	OK
15 minute winter	SW1.07	11	4.928	0.166	114.2	0.2370	0.0000	OK
15 minute winter	SW1.08	11	4.065	1.788	117.6	2.5593	0.0000	FLOOD RISK
15 minute summer	SW1.09	1	3.753	1.830	111.1	0.0000	0.0000	OK
15 minute winter	SW2.00	10	5.068	0.068	5.7	0.1024	0.0000	OK
15 minute winter	SW3.00	11	4.070	0.808	14.1	1.2446	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1.00	1.000	SW1.01	38.5	1.133	0.908	0.3971	
15 minute winter	SW1.01	1.001	SW1.02	38.4	1.121	0.907	1.6630	
15 minute winter	SW1.02	1.002	SW1.03	33.7	1.065	0.796	0.6054	
15 minute winter	SW1.03	1.003	SW1.04	34.9	0.878	0.824	0.9771	
15 minute winter	SW1.04	1.004	SW1.05	70.0	1.760	1.653	0.4629	
15 minute winter	SW1.05	1.005	SW1.06	69.9	2.738	0.280	0.7140	
15 minute winter	SW1.06	1.006	SW1.07	108.7	4.132	0.308	0.3597	
15 minute winter	SW1.07	1.007	SW1.08	113.8	1.829	0.395	2.0561	
15 minute winter	SW1.08	1.008	SW1.09	116.1	1.649	0.805	1.4833	53.6
15 minute winter	SW2.00	2.000	SW1.07	5.6	0.749	0.385	0.0983	
15 minute winter	SW3.00	3.000	SW1.08	-10.4	1.090	-0.184	0.1493	

DESIGN CONSIDERATIONS

EXISTING DRAINAGE

- EXISTING SITE UNDEVELOPED AND IS UNDERSTOOD NOT TO BE POSITIVELY DRAINED TO THE EXISTING DRAINAGE NETWORK. CCTV SURVEY IS REQUIRED TO CONFIRM ON-SITE DRAINAGE.
- SITE SURROUNDED BY SURFACE AND COMBINED WATER NWL SEWERS. EXACT POSITION, DEPTH AND CONDITION TO BE CONFIRMED.
- NWL SEWER RISING MAIN SHOWN TO CROSS SITE NEAR EXISTING TOWER. EXACT LOCATION TBC
- LARGE 900 X 1300 BRICK EGG SURFACE WATER SEWER SHOWN TO SOUTH OF SITE. SEWER DISCHARGES IMMEDIAETLY DOWNSTREAM TO A TIDAL SECTION OF THE TYNE ESTUARY.

SURFACE WATER - UNRESTRICTED DISCHARGE

- AS NWL SW SEWER DISCHARGES IMMEDIATELY DOWNSTREAM TO A TIDAL SECTION OF THE TYNE UNRESTRICTED DISCHARGE IS PROPOSED TO THIS SYSTEM AS SW FLOW RESTRICTION WOULD MAKE NEGLIGIBLE DIFFERENCE TO CATCHMENT WIDE FLOODING ISSUES.
- SUDS/SOURCE CONTROL FEATURES ARE STILL TO BE INCORPORATED WITHIN THE DRAINAGE DESIGN TO IMPROVE THE QUALITY OF SURFACE WATER RUN-OFF TO THE RIVER.
- CONNECTION TO PUBLIC SEWER IS SUBJECT TO S106 AGREEMENT WITH NORTHUMBRIAN WATER.

SUDS

OPTIONS FOR SUDS/SOURCE CONTROL ARE TO BE CONSIDERED AS FOLLOWS:

- BLUE/GREEN ROOF TO PROPOSED BUILDING
- LANDSCAPE PROPOSALS TO INCORPORATE RAIN GARDENS/BIO-RETENTION SYSTEMS. RAIN GARDENS ARE TO BE DESIGNED TO ACCOMODATE RUN-OFF FROM PROPOSED HARD LANDSCAPING
- PODIUM DRAINAGE IS TO BE CONSIDERED ABOVE UNDERCROFT CAR PARK.
- PERMEABLE PAVING TO HARDLANDSCAPED AREAS WHERE POSSIBLE.

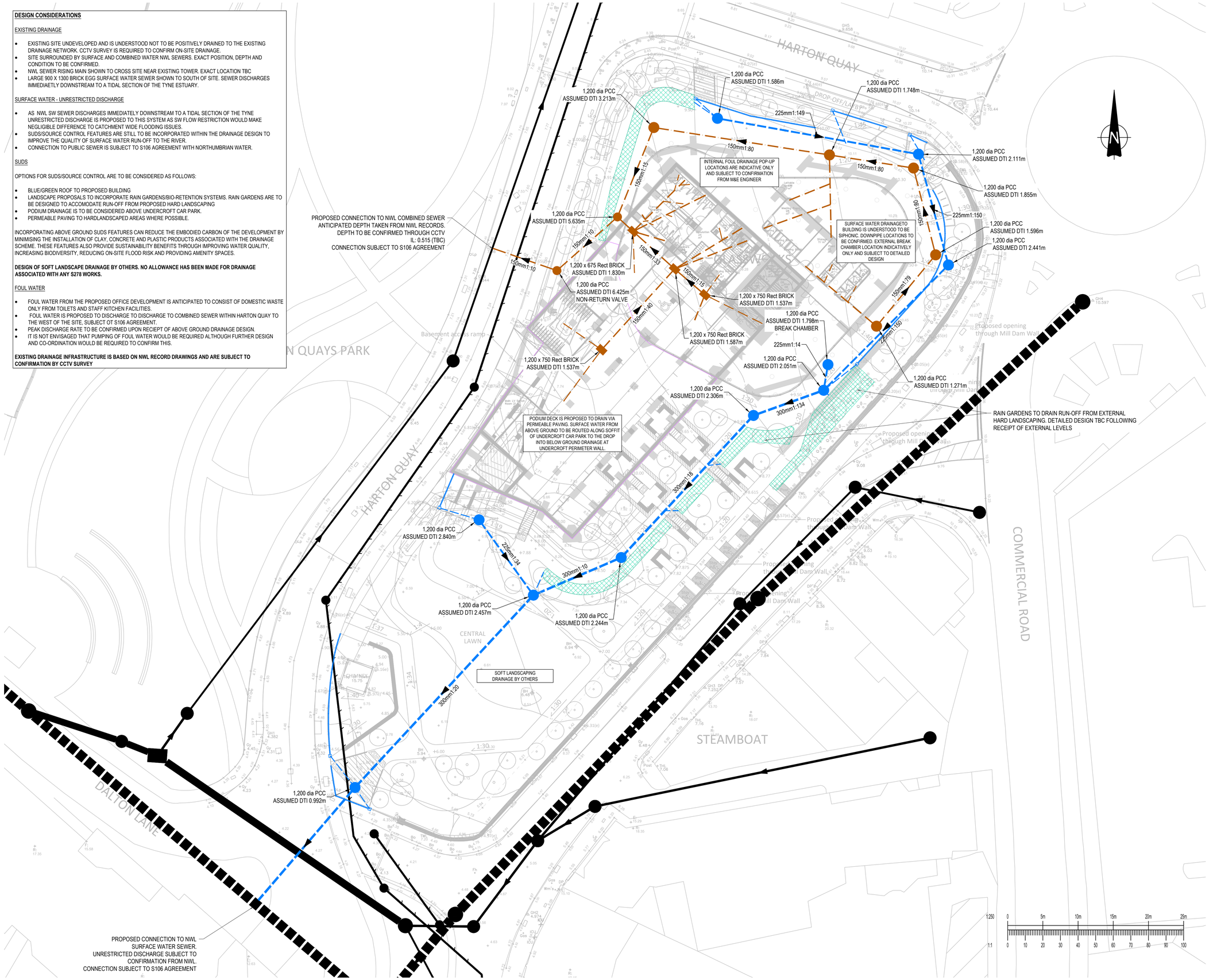
INCORPORATING ABOVE GROUND SUDS FEATURES CAN REDUCE THE EMBODIED CARBON OF THE DEVELOPMENT BY MINIMISING THE INSTALLATION OF CLAY, CONCRETE AND PLASTIC PRODUCTS ASSOCIATED WITH THE DRAINAGE SCHEME. THESE FEATURES ALSO PROVIDE SUSTAINABILITY BENEFITS THROUGH IMPROVING WATER QUALITY, INCREASING BIODIVERSITY, REDUCING ON-SITE FLOOD RISK AND PROVIDING AMENITY SPACES.

DESIGN OF SOFT LANDSCAPE DRAINAGE BY OTHERS. NO ALLOWANCE HAS BEEN MADE FOR DRAINAGE ASSOCIATED WITH ANY S278 WORKS.

FOUL WATER

- FOUL WATER FROM THE PROPOSED OFFICE DEVELOPMENT IS ANTICIPATED TO CONSIST OF DOMESTIC WASTE ONLY FROM TOILETS AND STAFF KITCHEN FACILITIES.
- FOUL WATER IS PROPOSED TO DISCHARGE TO DISCHARGE TO COMBINED SEWER WITHIN HARTON QUAY TO THE WEST OF THE SITE, SUBJECT OT S106 AGREEMENT.
- PEAK DISCHARGE RATE TO BE CONFIRMED UPON RECIEPT OF ABOVE GROUND DRAINAGE DESIGN.
- IT IS NOT ENVISAGED THAT PUMPING OF FOUL WATER WOULD BE REQUIRED ALTHOUGH FURTHER DESIGN AND CO-ORDINATION WOULD BE REQUIRED TO CONFIRM THIS.

EXISTING DRAINAGE INFRASTRUCTURE IS BASED ON NWL RECORD DRAWINGS AND ARE SUBJECT TO CONFIRMATION BY CCTV SURVEY



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. AN ALLOWANCE IS TO BE MADE FOR DRAINAGE TO REAR OF BASEMTN RETAINING WALL SUBJECT TO FURTHER SITE INVESTIGATION AND DETAILED DESIGN. REFER TO STRUCTURAL ENGINEER DRAWINGS FOR FURTHER INFORMATION.
5. FOR GENERAL NOTES REFER TO DRAWING.

KEY:

- PROPOSED SURFACE WATER DRAINAGE WITH DIRECTION OF FLOW
- PROPOSED FOUL WATER DRAINAGE WITH DIRECTION OF FLOW
- EXISTING SEVERN TRENT SURFACE WATER SEWER
- EXISTING SEVERN TRENT COMBINED WATER RISING MAIN
- EXISTING SEVERN TRENT COMBINED WATER SEWER
- PROPOSED LINEAR DRAIN
- RAIN GARDEN/BIORETENTION SYSTEM
- PODIUM EXTENTS - PERMEABLE PAVING

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION UNUSUAL SIGNIFICANT HAZARDS

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION
1. DEEP MANHOLE EXCAVATIONS IN EXCESS OF 6m DEEP
2.
3.

MAINTENANCE / CLEANING
1.
2.
3.

DECOMMISSIONING / DEMOLITION
1.
2.
3.

Rev:	Description:	Date:	By:	Chkd:
P03	UPDATED LANDSCAPE PLAN; RAIN GARDENS AMENDED; LINEAR DRAINS ADDED; PERMEABLE PAVING ADDED	03/12/20	AJR	NT
P02	PELIMINARY STAGE 3	13/11/20	NT	OT
P01	PRELIMINARY ISSUE	04/11/20	NT	OT

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Status: SUITABLE FOR INFORMATION — S2

Project: HARTON QUAYS

Drg Title: DRAINAGE STRATEGY

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	04/11/20	NT	NT	OT

Scale: 1:250

Project No: 076755 | Originator: CUR | Volume: ZZ | Level: ZZ | Type: DR | Role: C | Category / Number: 92001 | Rev: P03

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