Residential Development at Church Lane, Whitburn

Flood Risk Assessment and Drainage Strategy

October 2014

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CONTROL SHEET

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Contents

1. INTRODUCTION

Fairhurst were appointed by Fitz Architects to undertake a Flood Risk Assessment and Drainage Strategy for the proposed housing development at Whitburn in South Tyneside. The proposed development can be seen in Appendix A.

The aim of this FRA and drainage strategy report is to evaluate the current proposals with regard to flood risk and drainage, and identify potential flood risk to and from the development site. Fairhurst have carried out the following:

i. Assessment of the development potential of the site with regards to flood risk in line with the National Planning Policy Framework (NPPF) and Flood Risk and Coastal Change Planning Practice Guidance (PPG).
ii. An assessment of the surface water runoff.
iii. An indicative drainage layout.

The proposals are for the construction of 6 No. residential properties with associated access roads and car parking on an existing brownfield site on the southern periphery of Whitburn, South Tyneside.

2. PLANNING POLICY

2.1 National planning policy

One of the key aims of the National Planning Policy Framework (NPPF) and Planning Policy Guidance (PPG) is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

A risk-based approach should be adopted at all levels of planning. Applying the source pathway-receptor model to planning for development in areas of flood risk requires:

- a strategic approach which avoids adding to the causes or "sources" of flood risk, by such means as avoiding inappropriate development in flood risk areas and minimising run-off from new development onto adjacent and other downstream property, and into the river systems;
- managing flood "pathways" to reduce the likelihood of flooding by ensuring that the design and location of the development maximises the use of SuDS, and takes account of its susceptibility to flooding, the performance and processes of river/coastal systems and appropriate flood defence infrastructure, and of the likely routes and storage of floodwater, and its influence on flood risk downstream; and
- reducing the adverse consequences of flooding on the "receptors" (i.e. people, property, infrastructure, habitats and statutory sites) by avoiding inappropriate development in areas at risk of flooding.

Flood risk assessment should be carried out to the appropriate degree at all levels of the planning process, to assess the risks of all forms of flooding to and from development taking climate change into account. A sequential risk-based approach should be applied to determining the suitability of land for development in flood risk areas.

In areas at risk of river or sea flooding, preference should be given to locating new development in Flood Zone 1. If there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

Flood risk has been categorised as High, Medium and Low based on the probability of inundation. Extracts from Tables 1, 2 and 3 of the Flood Risk and Coastal Change PPG are provided below, which highlights the likely response to planning applications within each Flood Zone.

Residential development is categorised as "more vulnerable" and therefore should only take place within Flood Zones 1 or 2.

Table 1 - Extract from the Flood Risk and Coastal Change Planning Practice Guidance

Zone 1 Low Probability **Definition** This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). **Appropriate uses** All uses of land are appropriate in this zone. **Flood risk assessment requirements** For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention. **Policy aims** In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.
Zone 2 Medium Probability **Definition** This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year. **Appropriate uses** Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed. **Flood risk assessment requirements** All development proposals in this zone should be accompanied by a flood risk assessment. **Policy aims** In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.
Zone 3a High Probability **Definition** This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. **Appropriate uses** The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood. **Flood risk assessment requirements** All development proposals in this zone should be accompanied by a flood risk assessment.

Zone 3a (cont.)

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

Definition
Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in Table 2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
- relocate existing development to land with a lower probability of flooding.

Where required an exception test must be passed in order for developments of that nature to be justified within the Flood Zone. For the Exception Test to be passed the following must be demonstrated:

a) it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared.

b) the development should be on developable, previously-developed land or, if it is not there are no reasonable alternative sites on developable previously-developed land; and

c) a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Table 2: Flood risk vulnerability classification from Flood Risk and Coastal Change Planning Practice Guidance

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops, financial, professional and other services,
- restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (**excluding sleeping accommodation).**
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a **specific warning and evacuation plan.**

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Extract from the Flood Risk and Coastal Change Planning Practice Guidance

Key: ✓ Development is appropriate.

× Development should not be permitted.

3. DEVELOPMENT SITE

3.1 Existing Site Conditions – General Background

The development site is located on the southern periphery of Whitburn in South Tyneside with an approximate National Grid Reference of NZ406616. The site is bounded by the existing residential properties on the northern and western boundaries, Cornthwaite Park to the south and Whitburn Cricket ground to the east. The site, with a total area of 0.21ha, is currently undeveloped brownfield land consisting of overgrown vegetation and areas of paving/ hard stand which are relict features from the sites' previous use as a single residential dwelling.

Levels within the site vary, but those for the main part of the site generally fall from north to south with the access road from Church Lane falling east to west. The highest levels are adjacent to the North West corner of the site and the lowest on the access road to Church Lane.

3.2 Existing Watercourses

There are no existing open watercourses within, or in close proximity to, the development site. The nearest is Cut Throat Dene, which is approximately 1.3km south of the site.

3.3 Proposed Development

The proposed development is outlined in Appendix A. The current proposals are for the construction of 6 no. 3 storey residential units, together with associated access roads, north of Cornthwaite Park.

3.4 Historic Features

Historic mapping for the area has been examined from 1862 to 1987 in order to identify changes in land use on the site and throughout the catchment which may be relevant to flood risk.

The site has previously been occupied by a residential dwelling. This is noted on the 1959 plans as Church Lane House and shown on all historic plans up to 1987. This former land use does not impact significantly on flood risk to the development site and when it is taken in to consideration with minimal changes to the catchment in the immediate vicinity, there are no changes which further impact on this risk.

4 SOURCES OF FLOOD RISK INFORMATION

4.1 Environment Agency

The Environment Agency Flood Map shows the development site to be within Flood Zone 1 (Low Probability of flooding), as shown in Figure 1. This is outside of the area which is at risk from extreme fluvial or tidal flooding and the site is therefore not at risk from inundation in a 1 in 1000 year event.

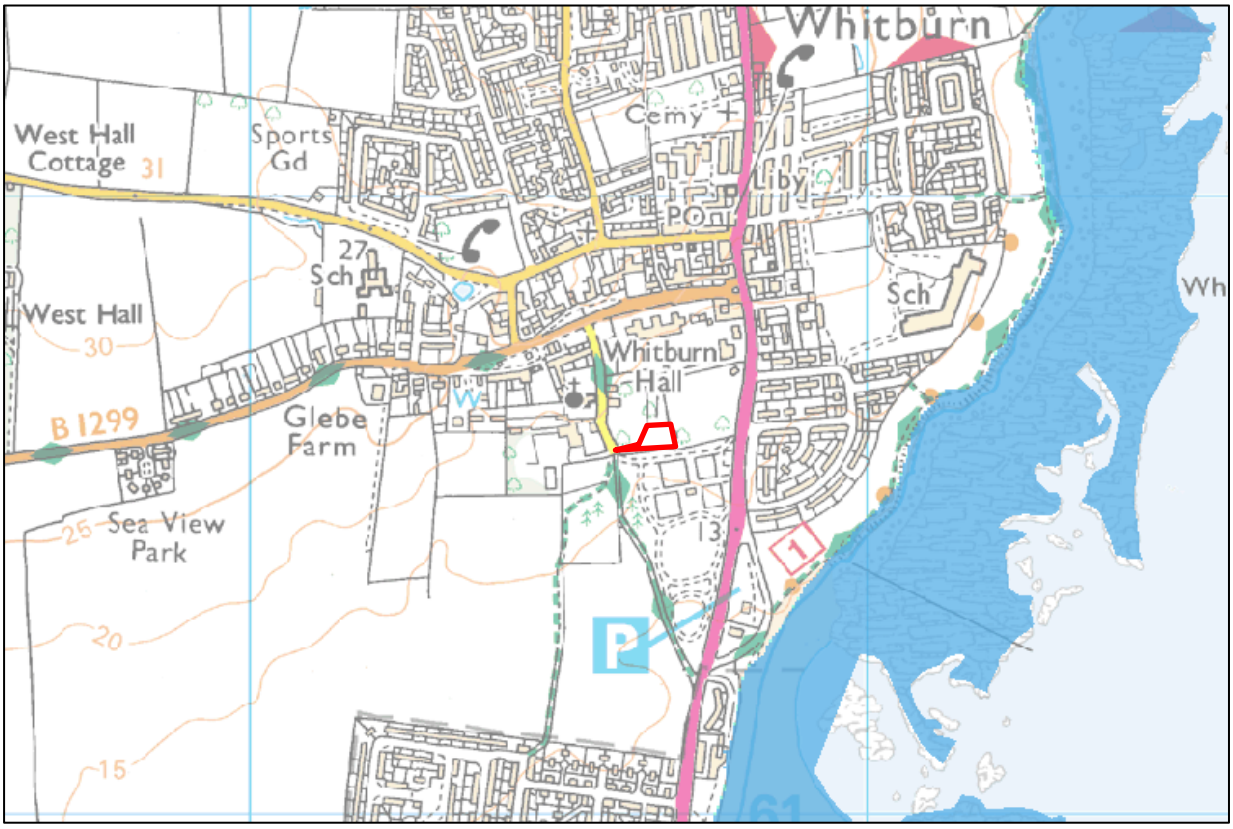


Figure 1: Extract from EA flood map, South Tyneside

= Flooding from river or sea without defences during a 1 in 100 year event.
= Additional flooding during an extreme event (1 in 1000 year event)
= Location of development

4.2 Strategic Flood Risk Assessment

The South Tyneside Council Level 1 and 2 Strategic Flood Risk Assessment (SFRA) was published in February 2011. The SFRA has been examined and found to include specific information relative to the development site. The site is noted in the Sequential Test Spreadsheets as being in Flood Zone 1 and is recorded as being primarily at low risk of surface water flooding.

Further to this, Figure 2 is an extract from the SFRA which shows that the site is not affected by surface water flooding.

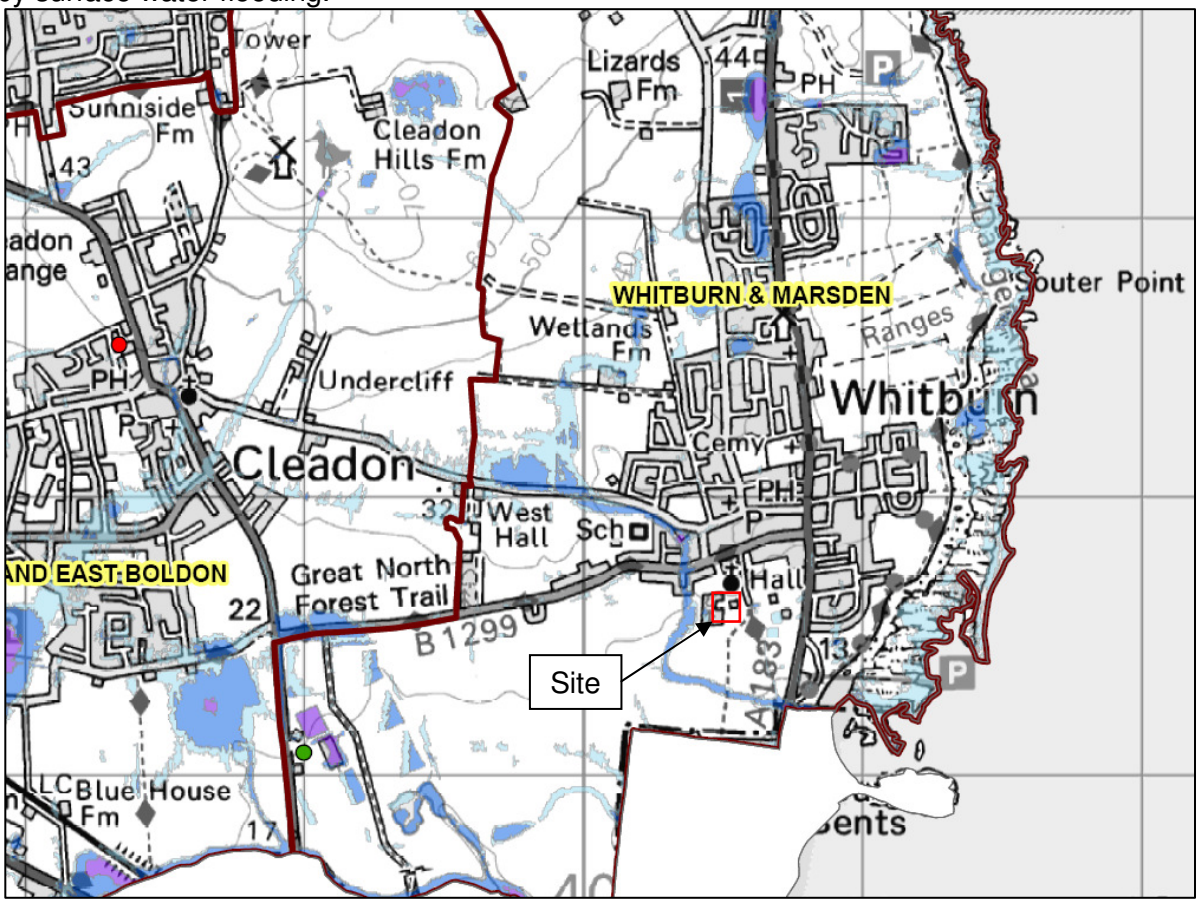


Figure 2: Extract from the South Tyneside SFRA – Areas Susceptible to Surface Water Flooding

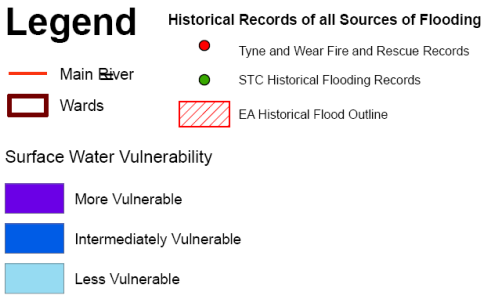


Figure 3, below, is an extract from the SFRA which shows the location of those areas where there are reported incidents of sewer flooding. This shows the site to be within an area considered to have a 'High Flood Risk Status'. There is no statistical equivalent provided within the body of the report to quantify 'High Flood Risk Status'. Sewer flooding is discussed in further detail in Section 4.4.

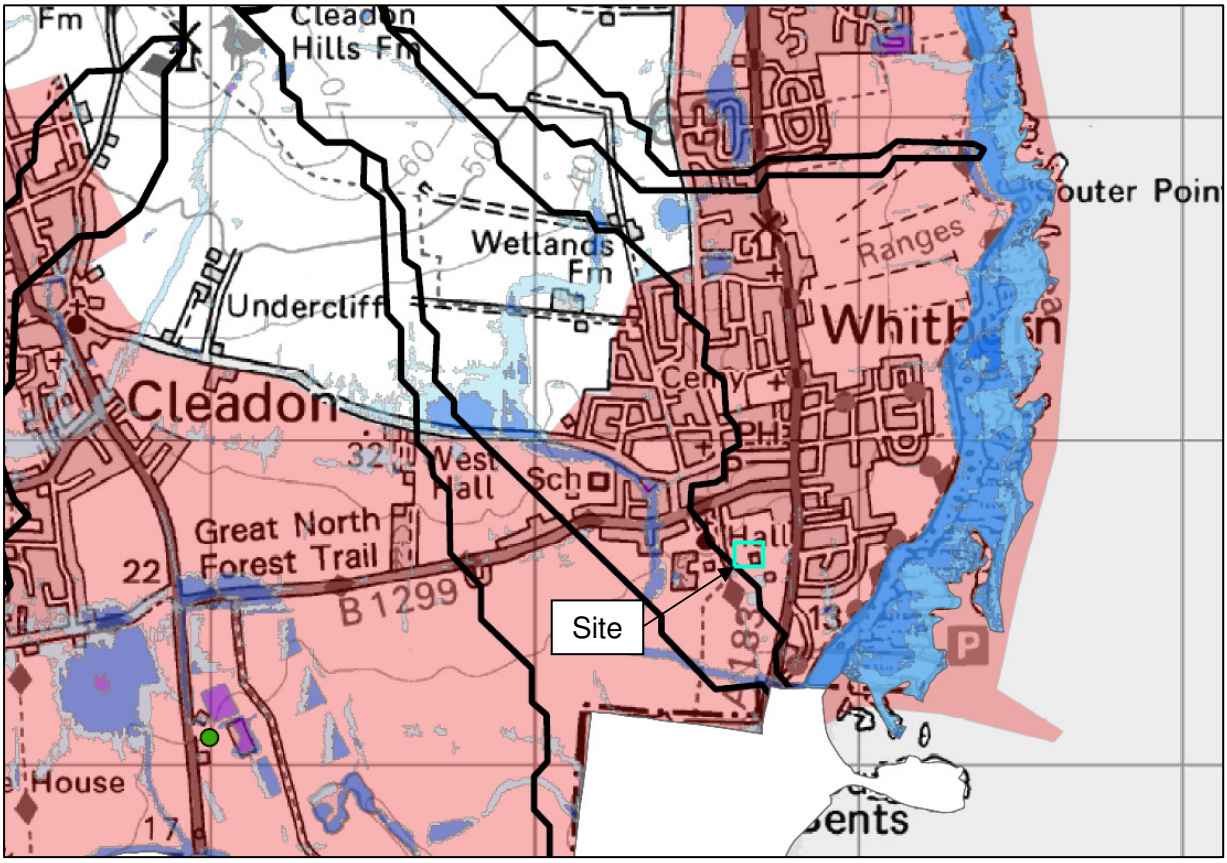


Figure 3: Extract from the South Tyneside SFRA – Areas at risk of sewer flooding.

4.3 Surface Water Management Plan

The South Tyneside Council Surface Water Management Plan (SWMP) was published in April 2014. The SWMP has been examined and was found to be consistent with the SFRA is identifying the site to be outside of those areas at risk of surface water flooding. Figure 4 is an extract from the SWMP and it shows that, even allowing for an increase in rainfall intensity (of 20%) due to climate change, that the site is not at risk of surface water flooding during the 1 in 100 year rainfall event.

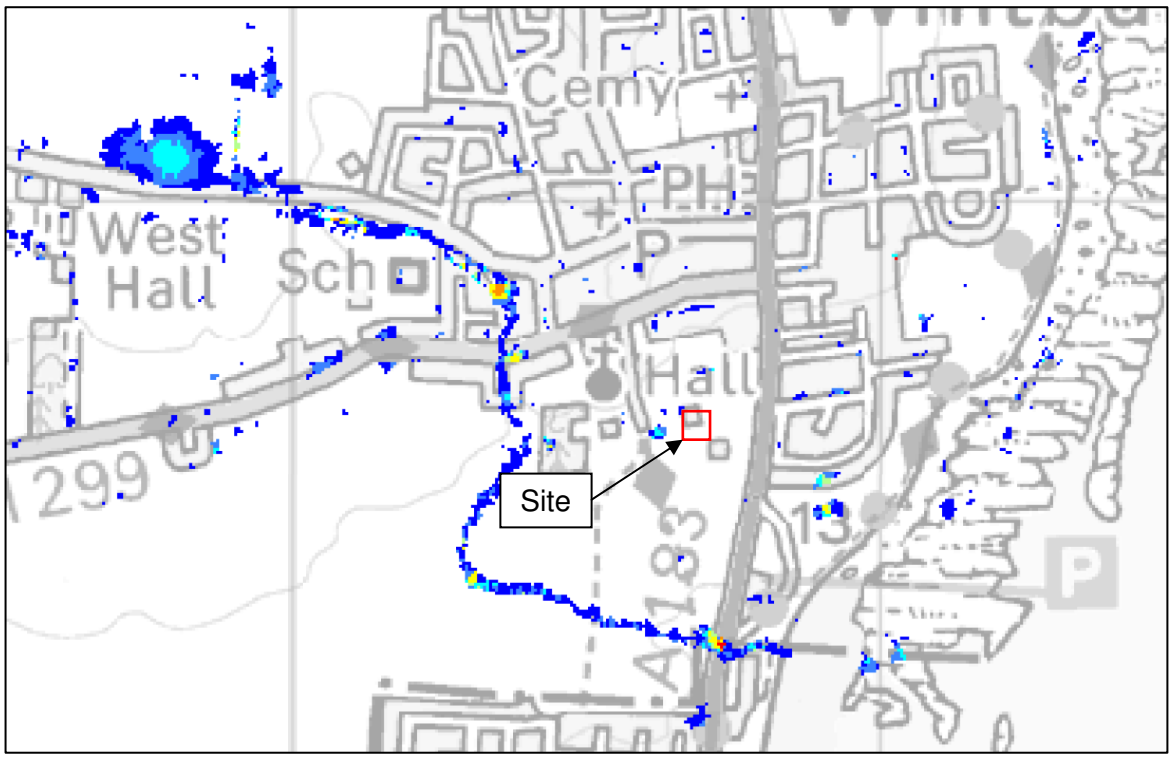


Figure 4: Extract from the South Tyneside SWMP – Areas at risk of sewer flooding.

4.4 Water Company

Northumbrian Water (NW), the sewerage operator in the region, is required by OFWAT to maintain a register of flooding incidents due to hydraulic capacity problems on the sewerage network. The DG5 register is a record of locations where customers have reported flooding from the sewerage network due to hydraulic capacity problems. Properties are placed on the register following investigations to determine the cause and risk of flooding. Properties are then placed on the appropriate register depending on the risk - not the number of occurrences of flooding.

NW have been contacted and confirm that there are no sewer flooding incidents in the vicinity of the site recorded on their DG5 register (refer to Appendix B).

4.5 Local Authority

The Local Authority for Whitburn is South Tyneside Council (STC). The Environmental Protection Officer at STC has been contacted to enquire about historic flooding at the development site. A copy of their response is included in Appendix B. They do not hold any record of flooding specific to the development site.

5. POTENTIAL SOURCES OF FLOOD RISK

5.1 Fluvial

Extreme fluvial flood events have the potential to cause rapid inundation of properties whilst posing a threat to the welfare of occupants and potentially preventing emergency access to properties and essential infrastructure.

There are no open watercourses within, or in the immediate vicinity of, the development site. It is not considered to be at risk of fluvial flooding.

5.2 Infrastructure Failure

The failure of conveyance infrastructure such as culverts or bridges could increase the risk of flooding at the site. There are no bridges in the vicinity of the site and Fairhurst are not aware of any culverts near to the site which could pose a risk to the development.

5.3 Overland Flow

Land to the north of the site is the garden of the adjacent property and consists primarily of lawns and a small wooded area with limited areas of paving. Whilst these gardens fall southwards towards the development site, there is a stone wall along the northern boundary separating the two sites. As the adjoining site is unlikely to produce significant runoff volumes and there is a wall which could divert any flows which do arise, the risk of flooding from this area is considered to be low.

The land to the south of the site (Cornthwaite Park) falls south and therefore away from the site and thus flooding from this area is also considered to be low.

The cricket club to the east of the site is, by its very nature, quite flat with no noticeable fall. Again, the risk of flooding from overland flow from this site is considered to be low.

Overall, overland flows are not considered to pose a flood risk to the development and no mitigation strategies are required.

5.4 Sewer Flooding

There are no adopted sewers within the site boundary, so flooding directly from surcharging sewers does not pose a risk to the proposed development. The nearest sewers are located in Cornthwaite Park, south and west of the site. A copy of the sewer plans are included in Appendix E.

As noted in section 5.3, Corthwaite Park has a slight fall southwards so any flows arising from surcharged adopted sewers will directed south and away from the site. Overall, the risk from adopted sewer flooding is low.

The only other sewers which may be present are private drains serving adjacent residential properties, which are to the north of the site. In this case, there is only one large detached

property on the plot to the north which is not anticipated to have an extensive drainage network. As such, a blockage or failure of the network is unlikely to generate significant volumes of water which pose a risk to the development. However, should the network overflow, the stone wall on the northern boundary will prevent the majority of this flow from shedding in to the development site.

6. SURFACE WATER DRAINAGE

The development is within Flood Zone 1, therefore in accordance with the NPPF, the Flood Risk Assessment focuses on the management of surface water to ensure flood risk is not increased elsewhere. The surface water strategy for the site will be developed in accordance with The Building Regulations Part H.

6.1 Existing Surface Water Runoff

The site covers a total area of approximately 0.21ha and whilst it is considered a brownfield site having previously been developed, the vast majority is covered by vegetation. Therefore, for the purposes of this section of the report, the site is considered to be greenfield.

The EA/DERFA R&D Technical Report W5-074 'Preliminary Rainfall Runoff Management for Developments' states that for developments which are less than 50 ha in size the Institute of Hydrology Report 124 (IH124) 'Flood Estimation for Small Catchments' should be used to calculate the peak greenfield runoff rates. This advice is replicated in The SUDS Manual (CIRIA C697).

The IH124 method uses the following equation to calculate greenfield runoff:

$$Q_{BAR,\ rural} = 0.00108 * AREA^{0.89} * SAAR^{1.17} * SOIL^{2.17}$$

Where:

$Q_{BAR,\ rural}$ = Mean Annual Flood (m^3/s)
AREA = Catchment Area (km^2)
SAAR = Standard Average Annual Rainfall (mm)
SOIL = Soil Index (from Wallingford Procedure Winter Rainfall Acceptance (WRAP) maps)

Technical Report W5-074 states that "Where developments are smaller than 50 ha the analysis for determining the peak Greenfield discharge rate should use 50 ha in the formula and linearly interpolate the flow rate value based on the ratio of the development to 50 ha."

The Greenfield runoff rate has been calculated on a 'per hectare' basis for a range of return periods. Table 4 summarises the results and the full calculations can be seen in Appendix C.

Event	Greenfield Runoff Rate (l/s/ha)
1 in 1 year	1.4
Q_{BAR}	1.6
1 in 30 year	2.8
1 in 100 year	3.3

Table 4 – Greenfield runoff rates

6.2 Proposed Surface Water Drainage

6.2.1 Principles

The Building Regulations Part H sets out a hierarchy for the choice of discharge point for a rainwater system. In order of priority, the possibilities are given as:

- an adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable,
- a watercourse; or where that is not reasonably practicable,
- a sewer.

6.2.2 Infiltration

A geoenvironmental desk study has been completed for the site in Feburary 2014. Within this the British Geological Survey (BGS) records have been consulted and it was found that no boreholes have been sunk within the site boundary. However, there is one borehole within 250m of the site which found that the underlaying soils were soft sandy clay overlying firm brown and grey sandy gravely clay to a depth of at least 4.00mBGL

This is further supported by the SFRA which includes a table showing 'Potential Suitability of Development Sites for Infiltration Drainage', in which the development site is included. In that table, it is recorded that the soil type is "*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and slightly acidic, loams and clays, impeded drainage*". In summary, the table concludes that potential suitability for infiltration drainage is low.

Overall, it is considered that the ground conditions at the proposed development are likely to preclude the use of infiltration systems to discharge surface water runoff. This will be reviewed at the detailed design stage after the results of a full ground investigation have been obtained.

6.2.3 Discharge to a watercourse

There are no watercourses in the immediate vicinity of the site which would be suitable for the discharge of surface water from the development. Therefore, it is intended to utilise a connection to the Northumbrian Water (NW) adopted sewers closest to the site.

6.2.3 Discharge to a sewer

The nearest sewers are located in Cornthwaite Park, approximately 50m south of the site boundary. NW have been contacted with regards to discharging surface water runoff from the development to this sewer and their response will be forwarded upon receipt.

Should the existing site not have connections to the adopted sewer network from the former residential dwelling which can be used to serve the proposed development, a new sewer will be laid to connect with NW manhole 6503 in Cornthwaite Park. This would require a Section

98 Sewer Requisition. This is a lengthy process involving feasibility studies, design and construction as well as the acquisition of appropriate easements over the land in which the sewer will be laid. Post construction, NW will be responsible for maintaining the sewers or lateral drains as public apparatus.

Subject to further investigation by NW, it may also be possible to utilise the surface water connection shown near to Church Lane (at manhole 6504) once the upstream extent and hydraulic capacity of this drain has been confirmed. This will remove the need to enter in to a Section 98 Agreement.

6.2.3 Design Principles

To minimise flood risk from the development, surface water discharge will be limited and attenuated to the equivalent existing greenfield runoff rates. These have been calculated in accordance with the EA/DERFA R&D Technical Report W5-074 'Preliminary Rainfall Runoff Management for Developments'; calculations can be seen in Appendix C.

It is anticipated that the development will create a total impermeable area 0.16ha. Table 5 summarises the allowable discharge rates based on these areas:

Event	Discharge Rate (l/s)
1 in 1 year	0.2
Q_{BAR}	0.3
1 in 30 year	0.4
1 in 100 year	0.5

Table 5 – Allowable discharge rates.

It should be noted that the discharge rates are less than 5l/s which is generally considered to be the lowest achievable discharge rate using conventional flow control methods. Therefore, discharge to the NW sewers from this site will be limited to 5l/s for all events up to and including the 1 in 100 year event.

The Environment Agency generally advises that a lifespan of 100 years should be used for residential developments. The Environment Agency Guidance to Support the National Planning Policy Framework states that for the time period 2085 to 2115, peak rainfall intensity should be increased by 30% to account for the possible impacts of climate change.

A preliminary drainage design for the site which includes the required storage volume to attenuate flows from the proposed development is shown on Fairhurst drawing number 106501/2001 and this is included in Appendix A. This design is based on restricting the discharge rates to 5l/s and increasing the peak rainfall by 30%. For the 1% AEP event plus a 30% increase in rainfall as an allowance for climate change, it is estimated that a total attenuation volume of up to 70m^3 will be required. To ensure that discharge rates are controlled, a flow control device will be installed upstream of the offsite drainage connection.

This could take the form of an orifice place, vortex flow control device or similar. The Micro Drainage output is included in Appendix D.

The proposed surface water drainage could utilise a series of interconnected oversize pipes to both convey water to the offsite connection and to provide attenuation volume during severe rainfall events. A piped system brings the benefits of permitting the adoption of most of the drainage network by NW. This will ensure that long term maintenance of the network can be secured. Alternatively, if it is not intended that the drainage design will be adopted, it would also be possible to utilise a geocellular tank to store excess runoff during storm events.

The hydraulic performance of the network will ensure that there will be no overland flooding within the development up to and including the 1 in 30 year rainfall event inclusive of an allowance for climate change. The drainage and site levels design will be such that any flood waters arising from events greater than 1 in 30 years (up to 1 in 100 years) will be contained within the site boundary without inundating any of the proposed residential dwellings.

To ensure that the development will not increase risk of flooding to adjacent properties, the external levels will be designed such that runoff will not be directed offsite. Where this is not possible, runoff will be prevented from shedding offsite through the use of linear drainage channels, gullies and cut-off drains which will be connected to the main surface water drainage network.

The SuDS Manual (CIRIA c697) details a wide range of drainage techniques some of which may be incorporated within the proposed drainage design. Some which may still be suitable for this site include:

- green roofs;
- rainwater harvesting;
- pervious pavements, drives and car parking spaces

The feasibility and suitability of each SuDS solution will be fully appraised at the detailed Design stage of the development. However, it is considered that the information provided demonstrates that feasible solution is available. This will ensure that flood risk will not increase on or off site as a result of the proposed development

7 FOUL WATER DRAINAGE

Foul flows have been calculated to be <0.3 l/s, using the advised design flow of 4000litres/dwelling/day in accordance with Sewers for Adoption 7th Edition.

Northumbrian Water (NW) have been consulted through a 'Pre-Development Enquiry' to determine whether the foul flows of 0.3l/s can be accommodated within the adopted combined network at NW manhole 6503 in Cornthwaite Park (refer to NW record in Appendix E). A copy of their correspondence will be forwarded upon receipt.

Should the existing site not have connections to the adopted sewer network from the former residential dwelling which can be used to serve the proposed development, a new sewer will be laid to connect with NW manhole 6503 in Cornthwaite Park. This would require a Section 98 Sewer Requisition. This is a lengthy process involving feasibility studies, design and construction as well as the acquisition of appropriate easements over the land in which the sewer will be laid. Post construction, NW will be responsible for maintaining the sewers or lateral drains as public apparatus.

8 DEVELOPMENT POTENTIAL

The proposed development is within Flood Zone 1 (Low Probability). No detailed sequential test is therefore required to identify sites of lower risk. This is in line with the information set out in the Flood Risk and Coastal Change Planning Practice Guidance.

The proposed residential development can be classified as “More Vulnerable” according to Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance. From Table 3 in the Practice Guidance, the proposed development is suitable for this site, therefore the Sequential Test is considered to be satisfied and no exception test is required.

9 CONCLUSIONS

The Flood Risk Assessment for the proposed housing development at Whitburn has been prepared in accordance with the NPPF and the Flood Risk and Coastal Change Planning Practice Guidance.

There are no recorded incidents of flooding, from either surface water or fluvial sources, which have affected the site, as confirmed by South Tyneside Council and Northumbrian Water.

The development site is not within the Environment Agency's indicative flood envelopes and is therefore classed as being within Flood Risk Zone 1. Based on the compatibility of developments within each Flood Zone, set out within the Planning Practice Guidance, the site is suitable for all types of developments.

Increased runoff from the introduction of impermeable surfaces will be attenuated on site to ensure no increase in flood risk to the surrounding area. The site is unlikely to be suitable for the use of infiltration drainage and there are no open watercourses in the vicinity of the site. It is proposed that surface water discharge will be attenuated on site to 5l/s, the lowest flow rate which can be reliably achieved, for events up to the 1 in 100 year rate to ensure no increase in flood risk.

Design work will be undertaken which provides a suitable surface water drainage solution for the proposed development. The design will be such that it can accommodate runoff from all events up to and including the 1 in 100 year event, inclusive of an allowance for climate change, without producing any flooding on site.

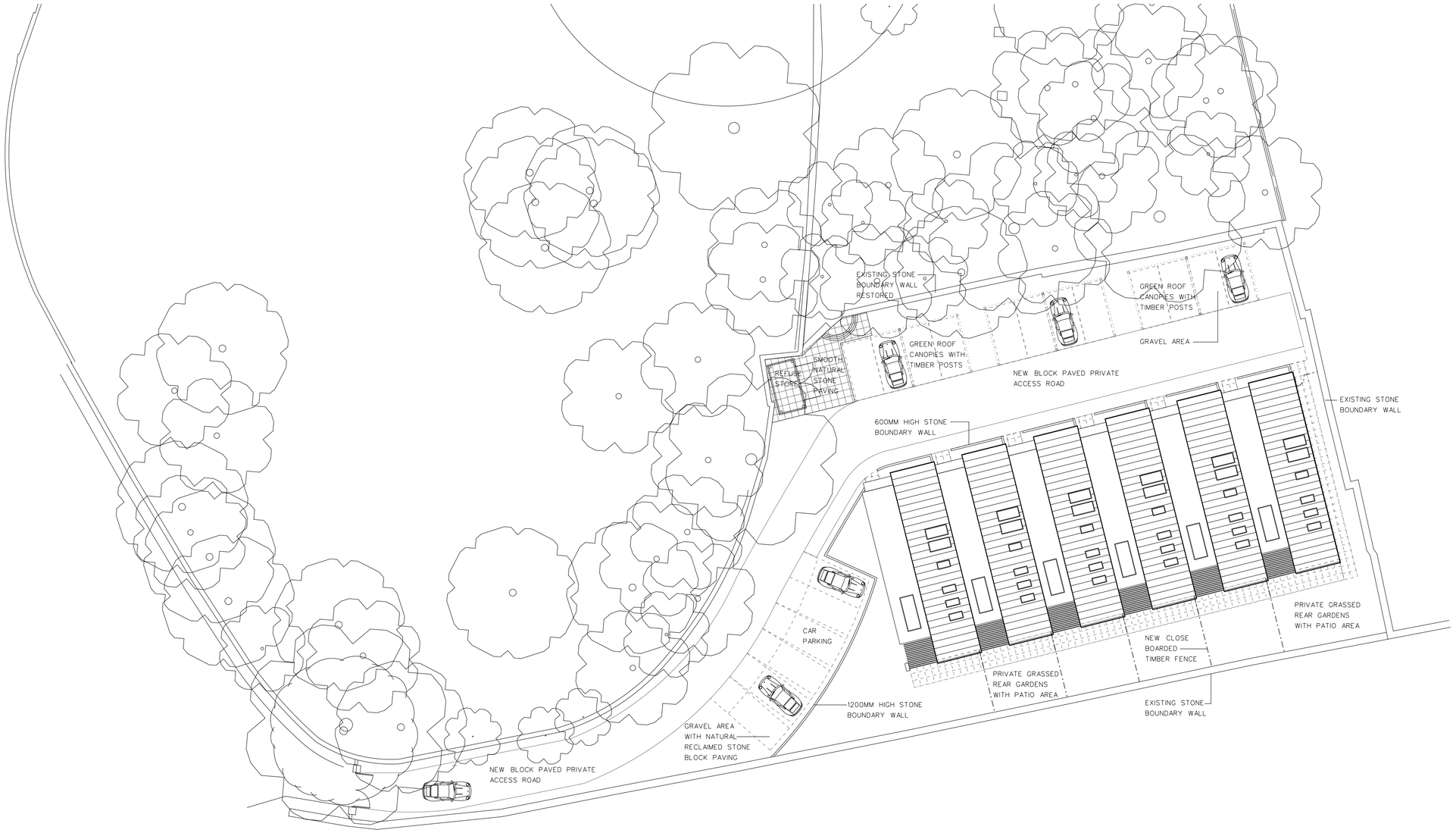
The possible effects of climate change have been considered by acknowledging the requirement to make an allowance for increased rainfall in the calculation of the surface water discharge rates over the lifespan of the development in line with NPPF.

Appendix A

Drawings

Fitz Architects drawing AL(90) 0200 – Proposed Site Plan

Fairhurst Drawing 106501/2001 – Indicative Surface Water Drainage Layout



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CLIENT

STELLA PROPERTY INVESTMENTS

PROJECT

6 NEW DWELLINGS AT CHURCH LANE, WHITBURN

STAGE

PLANNING

DRAWING

PROPOSED SITE PLAN

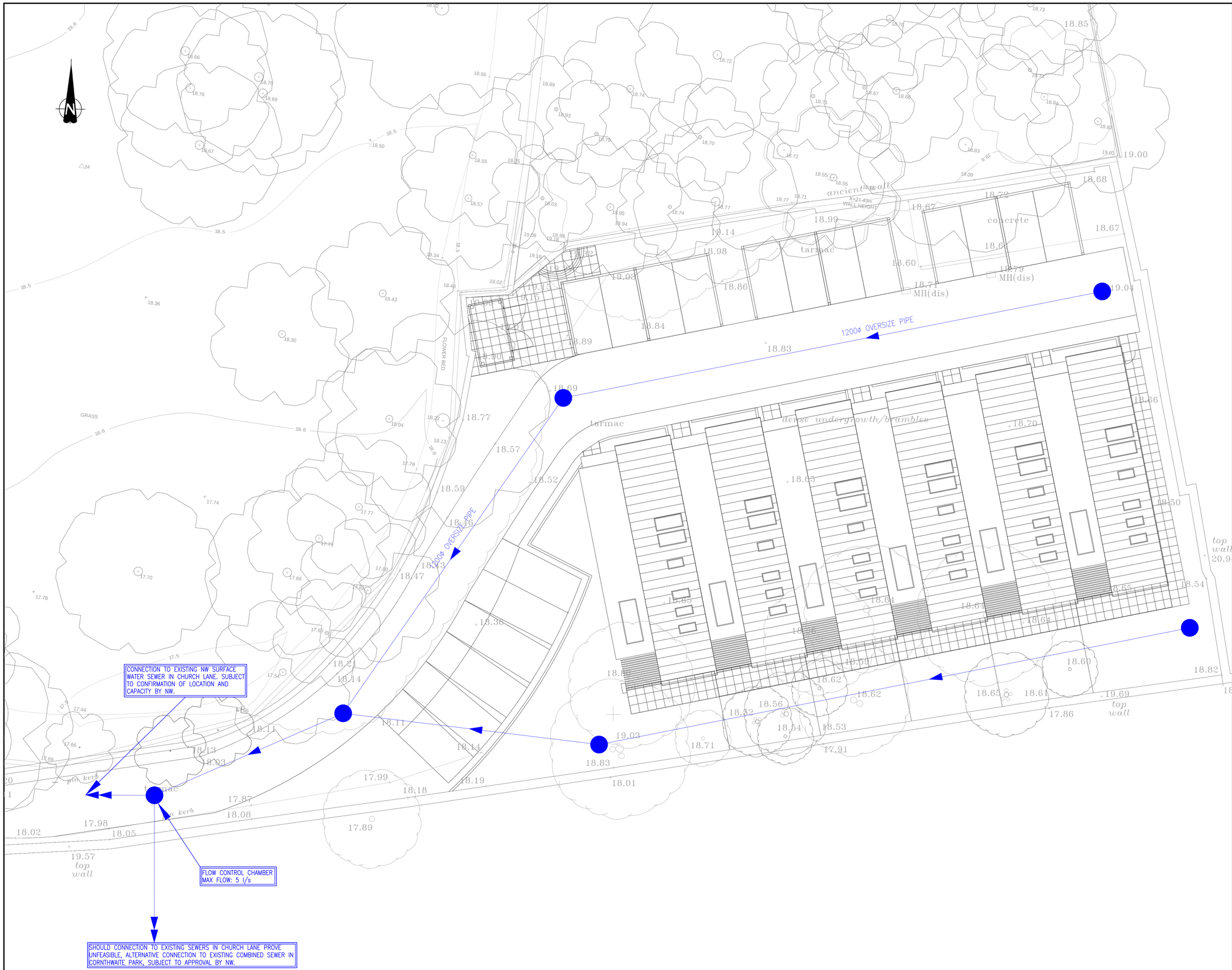
PROJECT NUMBER	SCALES
1266	1:200 @ A1
DRAWING NUMBER	**DATE**
AL (90) 0200	18 MAY 14
DRAWN BY	**CHECKED BY**
CM	CRF

REVISION

NORTH

REVISION	DATE AND DESCRIPTION

75MM



Do not scale from this drawing.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM.

CONSTRUCTION

DEMOLITION

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

KEY

PROPOSED SURFACE WATER SEWER WITH MANHOLE.

Rev.	Date	Description	Drwn.	Chkd.	Appd.

FAIRHURST
1 Arngrove Court
Barrack Road,
Newcastle-upon-Tyne
NE4 6DB
Tel: 0191 221 0505
Fax: 0844 381 4412

Client:
FITZARCHITECTS

Project Title:
CHURCH LANE
WHITBURN

Drawing Title:
INDICATIVE SURFACE WATER DRAINAGE LAYOUT.

Scale at A1:	Status:	
1:125	For Information	
Drawn:	Checked:	Approved:
DR	JM	JM
Date:	Date:	Date:
29/09/14	29/09/14	29/09/14
Drawing No.:		Revision:
106501/2001		–

Appendix B

Correspondence

South Tyneside Council

Date: 12th September 2014
Our ref: Church lane, Whitburn_FL
Your ref: N/A

Daniel Roberson
Fairhurst Engineering Solutions
1 Amgrove Court,
Barrack Road,
Newcastle Upon Tyne
NE4 6DB

Dear Daniel,

RE: Land adjacent to Church Lane, Whitburn

I am in receipt of a location plan ref AL (90) 1000 (Fitz architects 18th May 2014) and refer to your recent enquiry about flood incidents in the area indicated by the red line boundary. I would like to provide you with the following information.

I have checked our historic records for flooding and we have no specific reports for flooding on this site. I have also checked flooding reports within the adjacent area again we have no reports of flooding problems in the surrounding area.

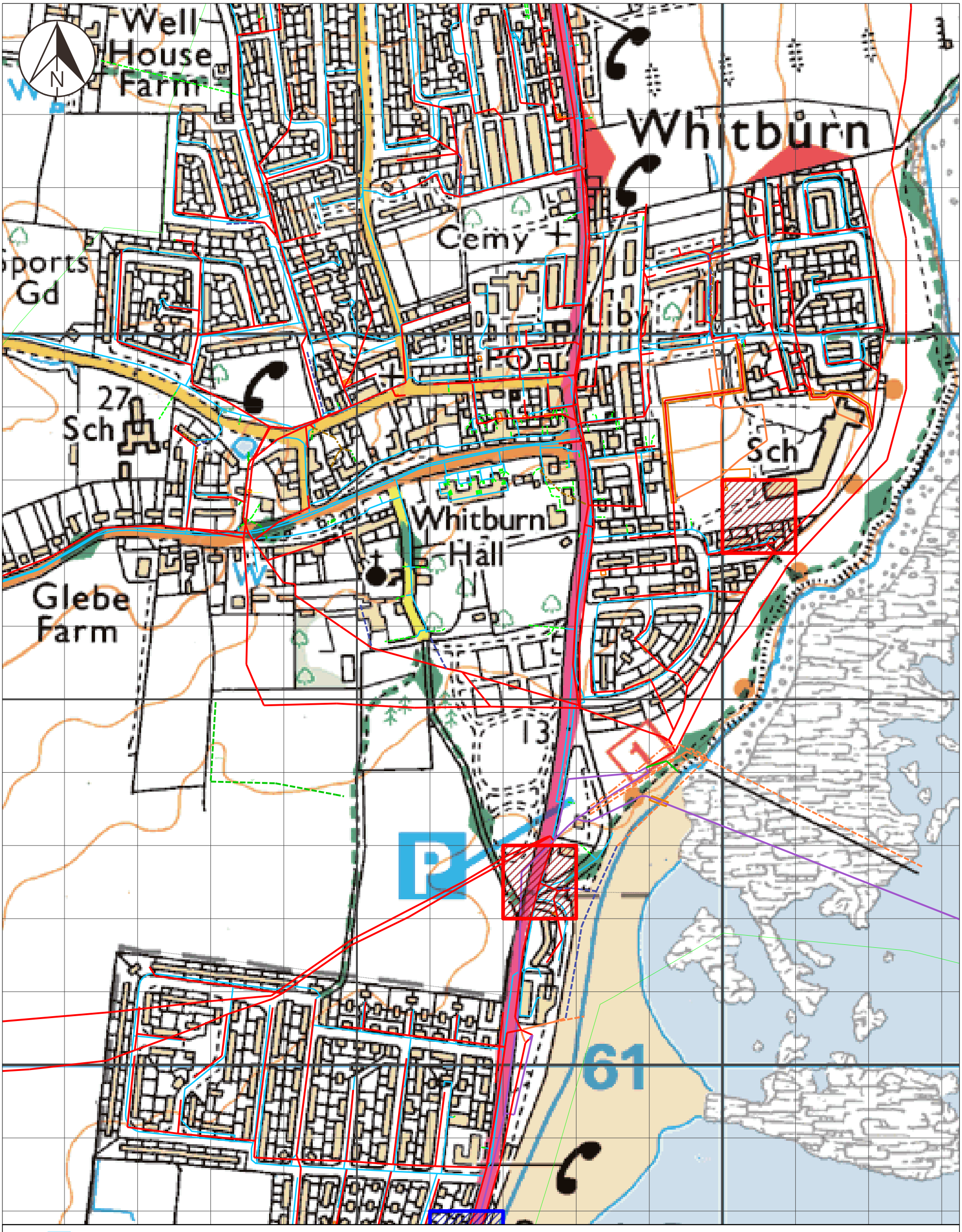
The Strategic Flood Risk Assessment (2009) identified that the location was likely to have base rich loamy and clay soils with impeded drainage. The Surface Water Management Plan (April 2014) also indicates an area adjacent to the site that is indicated to suffer surface water flooding for both a 1 in 30 and 1in 100 events. Both these documents are available on line on our council website should you wish to view them.

I trust information provided is satisfactory, however should you have any queries please do not hesitate to contact me by telephone on (0191) 424 7651 or by email at michelle.hogg@southtyneside.gov.uk

Yours sincerely

M Hogg

Michelle Hogg
Environmental Protection Officer



NORTHUMBRIAN WATER

User : CAPEL

Date : 10/09/2014 15:26:44

Title :

Map Sheet : NZ4061

Centre Point : 440670,561617

Paper / Scale : A3@1:5015

50 m

Appendix C

Existing Surface Water Discharge Calculations

Existing Greenfield Runoff Rates

The EA/DERFA R&D Technical Report W5-074 'Preliminary Rainfall Runoff Management for Developments' states that for developments which are less than 200 ha in size the Institute of Hydrology Report 124 (IH124) 'Flood Estimation for Small Catchments' should be used to calculate the peak greenfield runoff rates.

The areas being considered are all less than 50 ha; Technical Report W5-074 provides the following advice for this scenario.

> *"Where developments are smaller than 50 ha the analysis for determining the peak greenfield discharge rate should use 50 ha in the formula and linearly interpolate the flow rate value based on the ratio of the development to 50 ha."*

This advice is replicated in The SUDS Manual (CIRIA C697).

As described above, the IH124 method uses the following equation to calculate greenfield runoff:

$$Q_{BAR,\ rural} = 0.00108 * AREA^{0.89} * SAAR^{1.17} * SOIL^{2.17}$$

Where:
$Q_{BAR,\ rural}$ = Mean Annual Flood (m^3/s)
AREA = Catchment Area (km^2)
SAAR = Standard Average Annual Rainfall (mm)
SOIL = Soil Index (from Wallingford Procedure maps)

For the area of Whitburn, the SAAR is taken to be 650 mm and the SOIL value is 0.3. Regional Growth Factors have been obtained from Technical Report W5-074, which have been used to determine peak flows for a range of return periods.

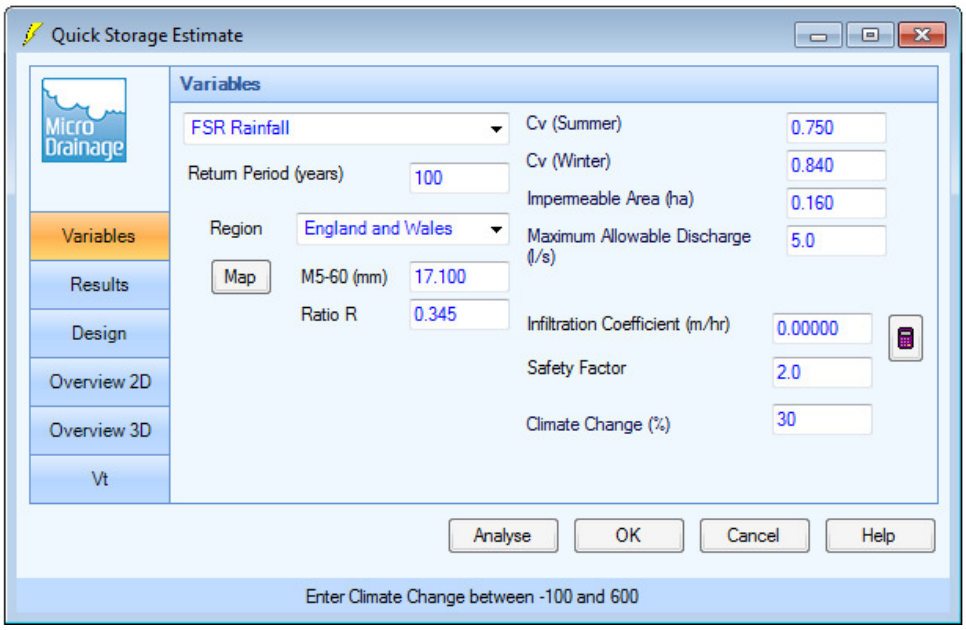
For 50 ha $Q_{BAR,\ rural} = 0.00108 * 0.50^{0.89} * 650^{1.17} * 0.3^{2.17}$
$= 0.084\ m^3/s$
$= 84\ l/s$

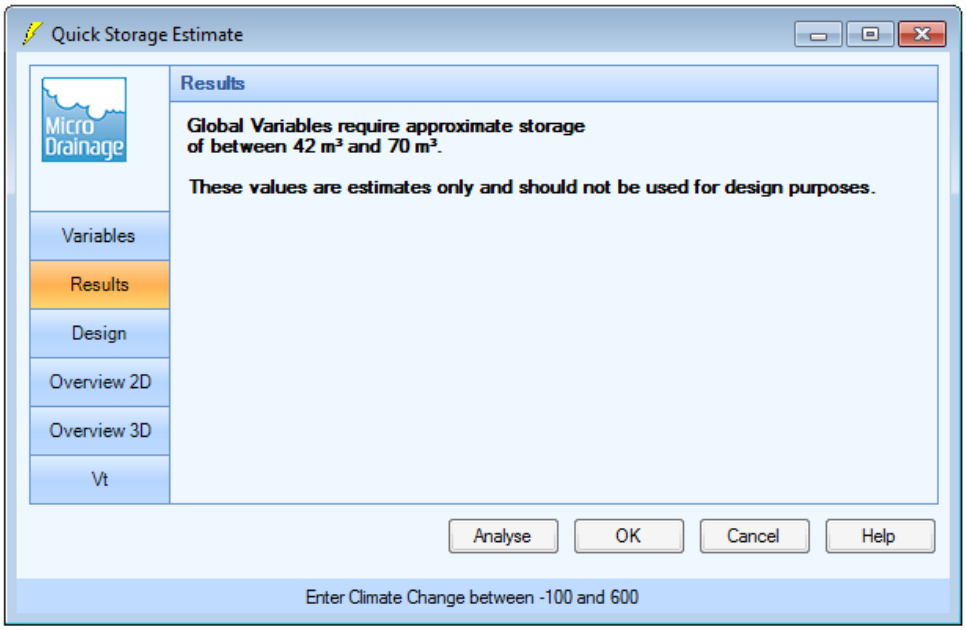
For 1 ha $Q_{BAR,\ rural} = 84/50 = 1.6\ l/s/ha$

Event	Growth Factor	Greenfield Runoff Rate (l/s/ha)
1 in 1 year	0.85	1.4
Mean Annual Flood	1.00	1.6
1 in 30 year	1.75	2.8
1 in 100 year	2.08	3.3

Appendix D

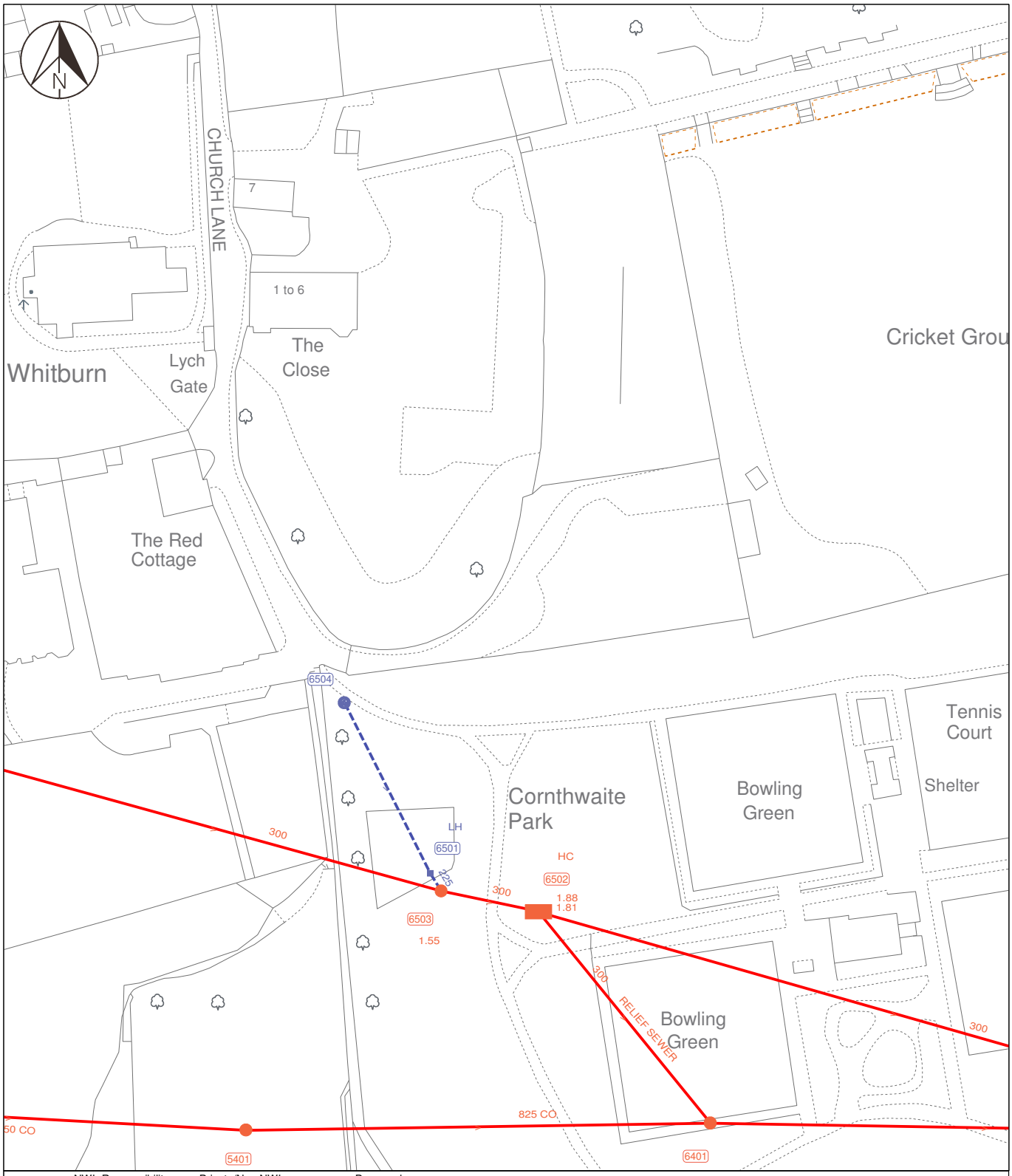
MicroDrainage Quick Storage Estimates


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years) 100
Region England and Wales
Map
M5-60 (mm) 17.100
Ratio R 0.345
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.160
Maximum Allowable Discharge (l/s) 5.0
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 30
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600


Quick Storage Estimate
Micro Drainage
Results
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Global Variables require approximate storage of between 42 m³ and 70 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600

Appendix E

Northumbrian Water sewer records



NWL Responsibility

Combined	
Foul	
Surface	
Treated Eff	
Untreated Eff	
Overflow	

Private/Non NWL

Combined	
Foul	
Surface	
Trade Eff	
Watercourse	

Proposed

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

NORTHUMBRIAN WATER

User : THRAG

Date : 19/09/2014 17:12:49

Title : 0000

Map Sheet : NZ4061NE

Centre Point : 440637,561610

Paper / Scale : A4@1:1250

10 m

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