

JOB NUMBER: **MD0930**

PROJECT: **PROPOSED HOUSING DEVELOPMENT,
GLEN STREET, HEBBURN**

CLIENT: GLEESON DEVELOPMENTS LTD

REPORT NUMBER: MD0930/rep/001 Rev A

REPORT TITLE: **FLOOD RISK & DRAINAGE ASSESSMENT**

Prepared with reasonable care and attention:



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Marc J Haley
B.Eng (Hons) C.Eng M.I.C.E.

CONTENTS

- 1 INTRODUCTION
 - 1.1 Background
 - 1.2 Scope of Report
 - 1.3 Consultations & Data Sources

- 2 SITE DESCRIPTION
 - 2.1 Site Location
 - 2.2 Site Walkover Survey
 - 2.3 Site Flooding Potential
 - 2.4 Existing Surface water Runoff

- 3 PROPOSED DEVELOPMENT
 - 3.1 Proposed Development Description
 - 3.2 Proposed Development Surface Water Runoff & Proposals
 - 3.3 Proposed Development Surface Water Storage
 - 3.4 Proposed Development Foul Water Runoff & Proposals
 - 3.5 Possible Combined Sewer Diversion

- 4 CONCLUSIONS
 - 4.1 Conclusions

APPENDICES

- A Aerial Photograph
- B Proposed Site Layout
- C Topographical Survey

EXECUTIVE SUMMARY

M Design were commissioned by Gleeson Developments Ltd to undertake a Flood Risk Assessment (FRA) in support of the proposed development at Glen Street, Hebburn.

The development was found not to lie in an area affected by fluvial or coastal flooding.

The proposed development is the construction of approximately 31 residential dwellings with associated infrastructure including access road and parking areas. The majority of the existing site is impermeable hardstanding. There is a number of large industrial buildings and parking areas.

The proposed layout shows that there is permeable grassed areas to the front and rear of each dwelling. Therefore the development will reduce the impermeable area of the site. Northumbrian Water Limited (NWL) have been consulted regarding the drainage connection location and discharge rates in the form of a developers enquiry. The option of using sustainable urban drainage techniques within the drainage design will also be considered. These aspects are discussed within the body of this report.

The proposed drainage system to serve the development will be designed to ensure it does not increase the risk of flooding either on site or elsewhere in the catchment area. Development of this site will be shown to be appropriate in relation to flood risk.

1 INTRODUCTION

M Design were commissioned by Gleeson Developments Ltd to undertake a Flood Risk Assessment (FRA) in support of the proposed development at Glen Street, Hebburn.

The planning process requires an assessment to be made of any flood risks related to proposed developments. In particular this involves two key issues; whether the development itself would be at risk of being flooded or whether the development would increase the risk of flooding elsewhere. This assessment is contained within this report which has been prepared for submission with the planning application.

The study also assesses the potential requirements for any surface water storage within the on-site infrastructure design.

1.2 Scope of Report

The following tasks were undertaken in the preparation of this report:

- A site visit was carried out in order to identify any risks of flooding to the site, identify drainage patterns, receiving watercourses, and to identify any constraints to the drainage system that may restrict the proposed development;
- Liaison with the Environment Agency was undertaken to establish occurrences of flooding in the area;
- Calculations were undertaken to establish the current surface water runoff from the site
- An evaluation was made of how the proposed development would affect the existing surface water runoff.

1.3 Consultations and Data Sources

The following tasks were undertaken in the preparation of this report:

- Environment Agency Flood Maps;
- Landmark Information Group Maps;
- Institute of Hydrology (1994) Report 124 – Flood Estimation for Small Catchments;
- CIRIA Document 624 'Development and Flood Risk'
- Environment Agency;

2 Site Description

2.1 Site Location

The site is located to the north of Glen Street, Hebburn. The site area is approximately 0.86 hectares and the centre of the site is at NZ 306 644. The site elevation is approximately 37.20m A.O.D.



Fig 2.1 Proposed Development at Glen Street, Hebburn.

The site is surrounded by a mixture of housing developments and industrial units. A railway passes the site along the northern western boundary.

A site photograph is included within this report as Appendix A.

2.2 Site Walkover Survey

A site visit was conducted by M Design on 24th February 2014 in order to determine key site topographical features.

The site is accessed via Glen Street to the south of the site. The majority of the existing site is impermeable hardstanding. There is a number of large industrial buildings and parking areas. The site generally slopes towards the northern boundary.

2.3 Site Flooding Potential

The development is shown by the Environment Agency flood maps to lie within an area which is at very low risk of flooding.



The Environment Agency's definition of this (taken from PPS25) is stated below:

Very 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.

FRA 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 FRA. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E for minimum requirements.

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 techniques.

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To establish if the proposed development is appropriate within Flood Zone 1 the vulnerability of the site is to be assessed. Although not referred to directly in the table below the proposed works would be classed as **"More Vulnerable"**.

Table D.2: Flood Risk Vulnerability Classification

Essential Infrastructure	<ul style="list-style-type: none"> • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> • 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.¹⁹
More Vulnerable	<ul style="list-style-type: none"> • 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.²⁰ • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> • 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 plants. • Sewage treatment plants (if adequate pollution control measures are in place).

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Table D.3: Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Flood Risk Vulnerability classification (see Table D2)	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	YES	YES	YES	YES	YES
Zone 2	YES	YES	Exception Test Required	YES	YES
Zone 3a	Exception Test Required	YES	NO	Exception Test Required	YES
Zone 3b ‘Functional Floodplain’	Exception Test Required	YES	NO	NO	NO

As shown previously the site is within **Flood Zone 1** and is classed as **More Vulnerable**. Table D.3 confirms that the development is appropriate and no exception test is required.

M Design have also considered risk of flooding for other sources. The plan below shows the risk to the proposed development from surface water flooding.



The plan shows that there is a small area within the site which is at risk from surface water flooding. This area is extremely small and is likely caused by water ponding at a low spot on the site in times of heavy rainfall or the existing drains on site flooding.

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The proposed development will have a new, fully designed drainage system constructed which will remove this risk of flooding. Therefore flood risk from surface water flooding is thought to be negligible.

The plan below shows that the site is not at risk of flooding from reservoir flooding.



In summary the flood risk to the site is thought to be negligible. Therefore the site is deemed to be acceptable in terms of flood risk.

3 Proposed Development

3.1 Proposed Development Description

The proposal for the site is the construction of approximately 31 residential dwellings with associated infrastructure including access roads and parking area. This site will be accessed via Glen Street to the east.

The site is shown by the Environment Agency flood maps to lie within flood zone 1; therefore not at risk from flooding and no special requirements are necessary in relation to the setting of the finished floor levels for the proposed dwellings.

3.2 Proposed Development Surface Water Runoff & Proposals

NWL have been consulted regarding the site in the form of a developers enquiry. Through this process they have analyzed the capacity of the sewers in the area and established possible connection points for the foul and surface water drainage. The response in relation to the surface water drainage is shown below:

- 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 Edition 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.

Should a sewer connection be the only option, then the proposed surface water flow of 45.31 l/sec can discharge into the existing 1700 x 1060mm brick egg combined sewer running through the middle of the site (or the diversion of), via manholes 6501 and 7504. Existing connections should be utilised where possible.

Following the Building Regulations hierarchy of preferable surface water disposal methods, other options will need be to ruled out before a connection to the existing sewer will be approved.

The options of surface water soakaways have been considered. A site investigation has been carried out on site and this has highlighted the ground conditions would not support soakaways.

Ground Conditions	Hard surfacing (tarmac or concrete) 0.05m to 0.2m thick (locally absent in southwest and north) overlying horizons of made ground in turn comprising sand and gravel, ash and cinders/ ashy clay and relict topsoil. Glacial till proven at depths of between 0.6m and 2.0m, typically firm and stiff although very locally soft or very soft clay to a maximum of 2.6m depth.
Soakaway Drains	The use of soakaway drains is not considered appropriate at this site.

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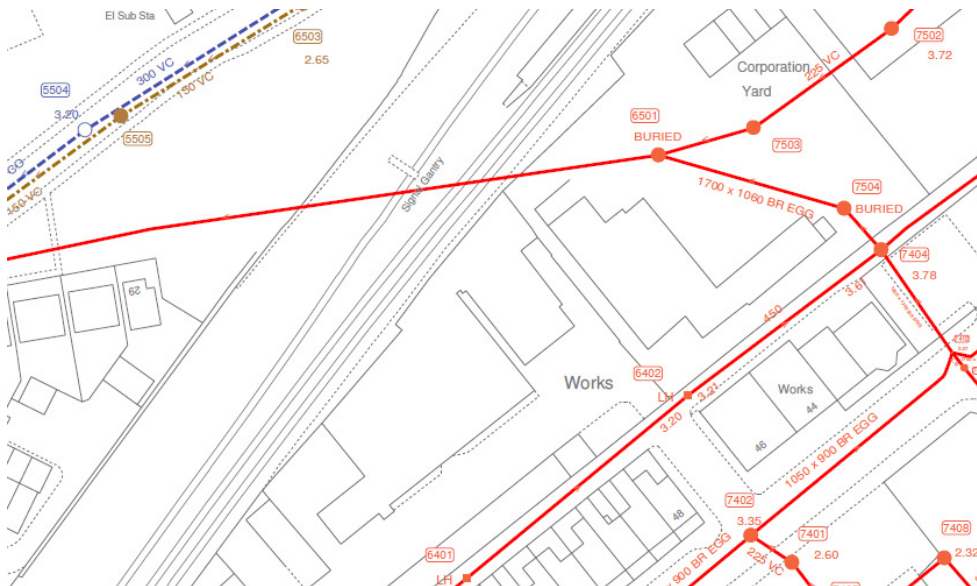
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The next option would be to discharge the surface water flows into a local watercourse. However the plan below shows that there are no watercourses near the site.



Therefore as all other methods of surface water disposal have been shown to be unfeasible a connection to a NWL system will be acceptable.

The NWL response has stated that the surface water flows can connect to the combined sewer that crosses the site. The flows from the existing development are thought to have connected unrestricted into this sewer.



M DESIGN civil, structural & environmental engineering

Unit 4 Bewick House, Horsley Business Centre, Horsley Village, Northumberland, NE15 0NY

t 01661 854444 f 01661 854455 e info@mdesign.uk.com w www.mdesign.uk.com

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A proposed discharge rate of 45.31 l/s has been agreed. This restriction is to be placed on the system prior to it connecting into the combined sewer. The flows will be limited by the use of a flow control device such as a HydroBrake.

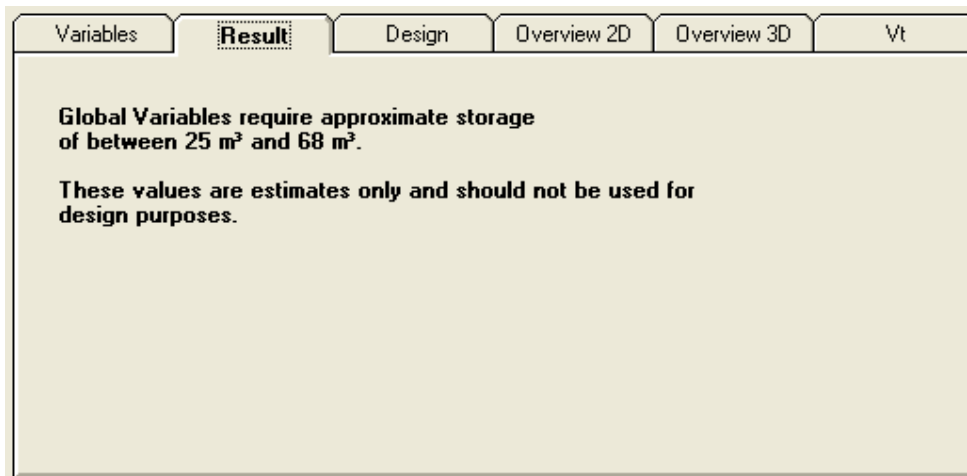
A storage system will be constructed within the site to contain the additional flows. The sewerage undertaker will adopt the system provided the design and installation is completed in accordance with Sewers for Adoption.

The on-site storage has to be designed to be capable of providing storage for a 1 in 30 year storm event without any on-site flooding occurring. A 1 in 100 year storm event should also be analysed to show the route of any flooding in extreme storm events.

Our client also plans construct the driveways to the properties from permeable aggregate construction. This will help reduce the overall impermeable area of the site and the amount of storage required.

3.3 Proposed Development Surface Water Storage

To accommodate the additional flows storage will be required on site. This could be in the form of oversized pipes below the road network. Taking into consideration the proposed impermeable area and the surface water restriction rate of 45.31 l/s it has been calculated between 25 – 68 m³ of storage will be required. This is based on a 1 in 30 year storm event allowing for an additional 20% increase in rainfall depths, as required by NPPF guidelines.



The screenshot shows a software interface with a navigation bar at the top containing tabs for 'Variables', 'Result', 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The 'Result' tab is selected and highlighted with a dashed border. The main content area displays the following text:

Global Variables require approximate storage of between 25 m³ and 68 m³.

These values are estimates only and should not be used for design purposes.

Taking the mid range volume of 47m³, this volume could be accommodated within 75m of 0.9m dia. pipes. These pipes could be constructed below the proposed access road.

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The exact layout, size and depth of the drainage is to be confirmed following the detailed design stage. The 1 in 100 year storm event is also to be modelled to check for any flooding that may occur and to ensure it does not pose risk to any dwellings.

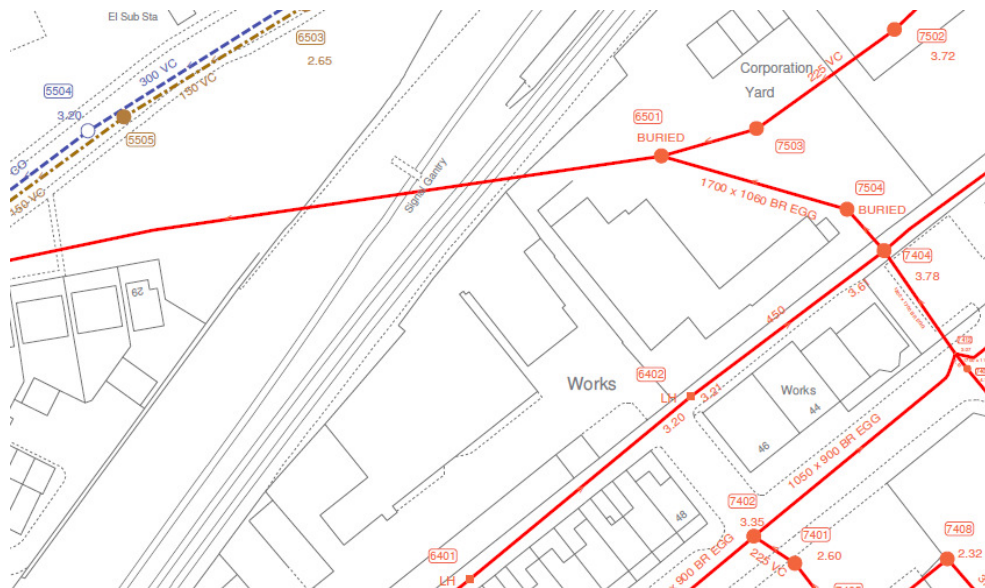
The detailed design will also take into consideration the storage within the proposed manholes and other pipes in the system so there is the potential that the length of pipe required may decrease.

3.4 Proposed Development Foul Water Runoff & Proposals

NWL have also agreed that the foul water flows can discharge into the combined drainage system that crosses the site.

- Foul Water Discharge

The estimated foul flow of 1.426 l/sec can discharge into the existing combined sewer within the rear lane of Glen Street, the existing combined sewer/s (or diversion of) within the site, or a combination of both. The developer should undertake a full drainage survey on site to identify all existing connections into the combined system, with a view to utilising them for the foul water disposal from this proposed development.



The exact layout of the foul water drainage will be confirmed following the detailed design stage.

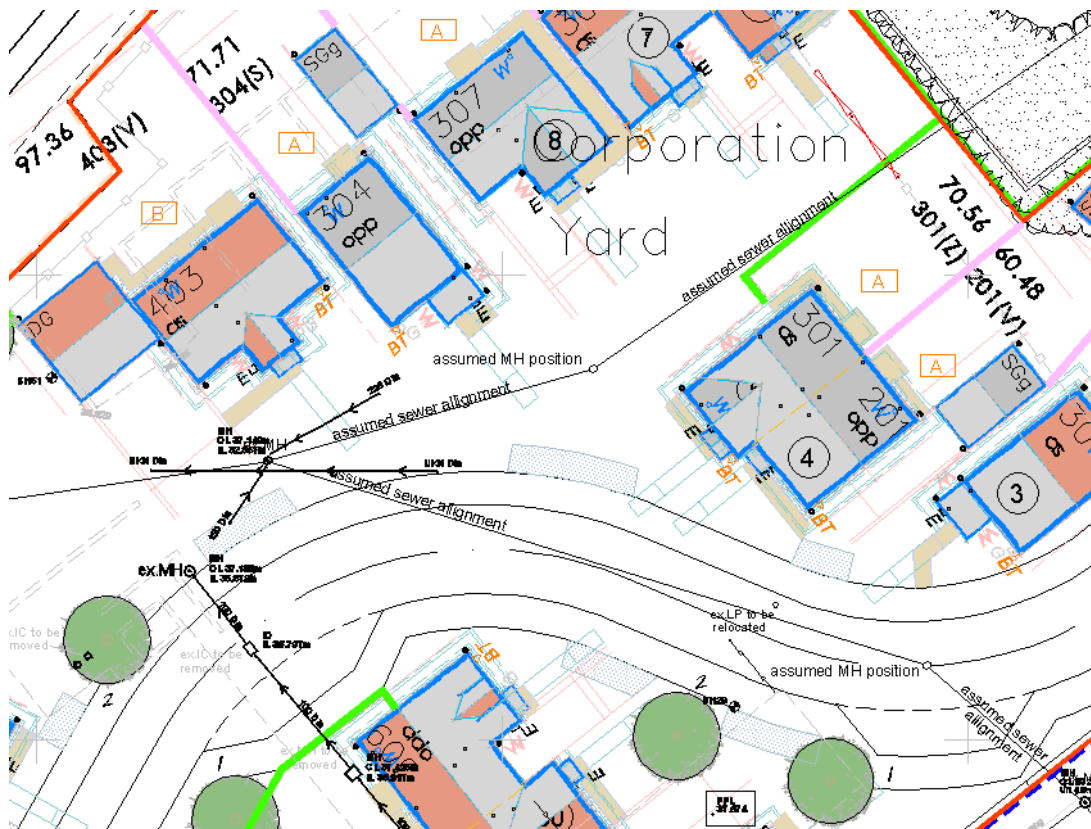
3.5 Possible Combined Sewer Diversion

There is an existing combined sewer that crosses the site. This would have been the connection point for the drainage from the previous site. NWL have highlighted this and question whether a sewer diversion is required.

- Protection of Existing Sewerage Assets

We wish to draw your attention to the existing sewers which pass through the site. These sewers should be diverted, protected or accommodated within your site layout with an appropriate easement. To discuss this in further detail, please contact Roger Perkins on 0191 419 6621.

The site layout has been designed to avoid these sewers and ensure that a diversion is not required.



4 Conclusions

4.1 Conclusions

This report has shown that the development will be constructed in a manner that does not increase the risk of flooding elsewhere. The surface water flows from the site will be restricted to the agreed rate of 45.31 l/s by the use of a flow control such as a hydrobrake. The additional flows will be stored in a system of oversized pipes within the road layout of the development.

The surface water will ultimately discharge into an adopted NWL sewer, to the north of the site, via an off site connection. The sewerage undertaker will adopt the system provided the design and installation is completed in accordance with Sewers for Adoption.

The on-site storage has to be designed to be capable of providing storage for a 1 in 30 year storm event without any on-site flooding occurring. A 1 in 100 year storm event should also be analysed to show the route of any flooding in extreme storm events.

The option of using sustainable urban drainage techniques such as soakaways have been considered, however due to the existing ground conditions they are not a suitable option. Our client will however construct the driveways to the properties from permeable aggregate construction. This will help reduce the overall impermeable area of the site.

The site has also been shown to be entirely within a 'very low' flood risk zone. Therefore the site is not at risk of flooding. The proposed development is appropriate in relation to flood risk and there is no requirement to raise any of the finished floor levels above the existing site levels.

Consideration of other sources of flooding have been investigated and found to be negligible. The development is therefore deemed as acceptable in relation to flood risk.

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Appendix A



Aerial Photograph of Site

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Appendix B



Proposed Site Layout

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Appendix C

For topographical survey see additional PDF