

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

Proposed Residential Development, Regents Park Phase 6

Reference	RWO/FRADS/21134
Date	January 2024
Client Name	Project Genesis Ltd
Version	2

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CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Project Genesis Ltd

This report has been prepared for the sole use and reliance of the above-named parties. This report shall not be relied upon or transferred to any other parties without the express written authorisation of RWO Group. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	First Issue	29.01.2024
2	Revised Layout added	28.02.2024

1.0 EXECUTIVE SUMMARY

This assessment has looked at the implications of a proposed residential development in relation to drainage and flood risk.

The sites under consideration are located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency (EA) a copy of the flood map is provided in Appendix F.

NPPF Technical Guidance advises the following;

Flood Zone 1 is defined as a low risk area, which comprises land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

Flood Zone 2 is defined as a medium-risk area, which 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.

Flood Zone 3 is defined as a high-risk area, which 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 sea flooding (>0.5%) in any year.

Other sources of flooding have been assessed and the risk of flooding from these sources is considered to be low and/or manageable with mitigation.

Surface water from the proposed development will be discharged through a public sewer surface water drain, which ultimately discharges to a watercourse. Flows will be restricted to a Greenfield rate of discharge which has been calculated as being 10.66 l/s.

Foul water will discharge to public sewers, subject to relevant consents and approvals.

2.0 INTRODUCTION

RWO Associates (RWO) has been instructed by Project Genesis Ltd to prepare a Flood Risk Assessment and Drainage Strategy to support a planning application for a proposed residential development at Regents Park, Consett.

3.0 THE SITE

The proposed development is located in Consett approximately 1km to the west of Consett town centre. The site centred Ordnance Survey reference is NZ 09681 409681. A site location plan is provided in Appendix A and an aerial photograph is presented as Figure 1 below.



Figure 1 – Site location (Red marker indicates the approximate extents)

The site is located in a predominantly residential area with dwellings located to the east and north of the development site, to the west and south is openland. A topographical survey is included in Appendix B.

4.0 PROPOSED DEVELOPMENT

It is proposed to develop the site for residential purposes which will consist of 71 dwellings, along with associated roads, drainage and site infrastructure.

A proposed site layout plan is included in Appendix C.

5.0 EXISTING DRAINAGE

Public sewer records obtained from Northumbrian Water are provided in Appendix D which identifies the following public sewers in the vicinity of the site;

- A 300mm public surface sewer is recorded to the north of the site.
- A 150mm public foul sewer is recorded to the north of the site.
- A 150mm foul sewer dissects the site and is subject to a S104 agreement, the S104 approved plan is included in Appendix E.

There are no open watercourses within the site or on the boundary.

6.0 FLOOD RISK

The sites under consideration are located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency (EA) a copy of the flood map is provided in Appendix F.

NPPF Technical Guidance advises the following;

Flood Zone 1 is defined as a [low] - risk area, which comprises land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

Flood Zone 2 is defined as a [medium] - risk area, which 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.

Flood Zone 3 is defined as a [high] - risk area, which 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 sea flooding (>0.5%) in any year.

As such the proposed development is located in an area of low risk of flooding.

The proposed site usage falls within the 'more vulnerable' category as identified in the NPPF Table 2: Flood Risk Vulnerability Classification. As such the exception test, will not need considered for any development within Flood Zone 1, based on NPPF Table 3: Flood risk vulnerability and flood zone 'compatibility'.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Table 1 – 'NPPF Table 3: Flood Risk Vulnerability Classification'

<p>Essential infrastructure</p> <ul style="list-style-type: none"> • 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.
<p>Highly Vulnerable</p> <ul style="list-style-type: none"> • Police stations, ambulance stations and fire stations and command centres and telecommunication installations required to be operational during flooding. • Emergency disposal 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”).
<p>More vulnerable</p> <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. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan.</i>
<p>Less vulnerable</p> <ul style="list-style-type: none"> • 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 agricultural and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals workings and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewerage treatment works (if adequate measures to control pollution and manage sewerage during flooding events are in place).
<p>Water-compatible development</p> <ul style="list-style-type: none"> • 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 installations. • Ship building, repairing, dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water based recreation (excluding sleeping accommodation). • Lifeguard and coastal 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, <i>subject to specific warning and evacuation plan.</i>

Table 2 – ‘NPPF Table 2: Flood Risk Vulnerability Classification’

Surface Water (Pluvial) Flooding

The Environment Agency Surface Water (Pluvial) Flood Map provided below indicates the site is not at risk from surface water flooding.

The [location] site has a small area of surface water flooding, this is associated with a localised low-lying area on the site. With the inclusion of positive drainage across the site and new levels the localised ponding will be removed.

The risk of flooding from this source is therefore considered low.

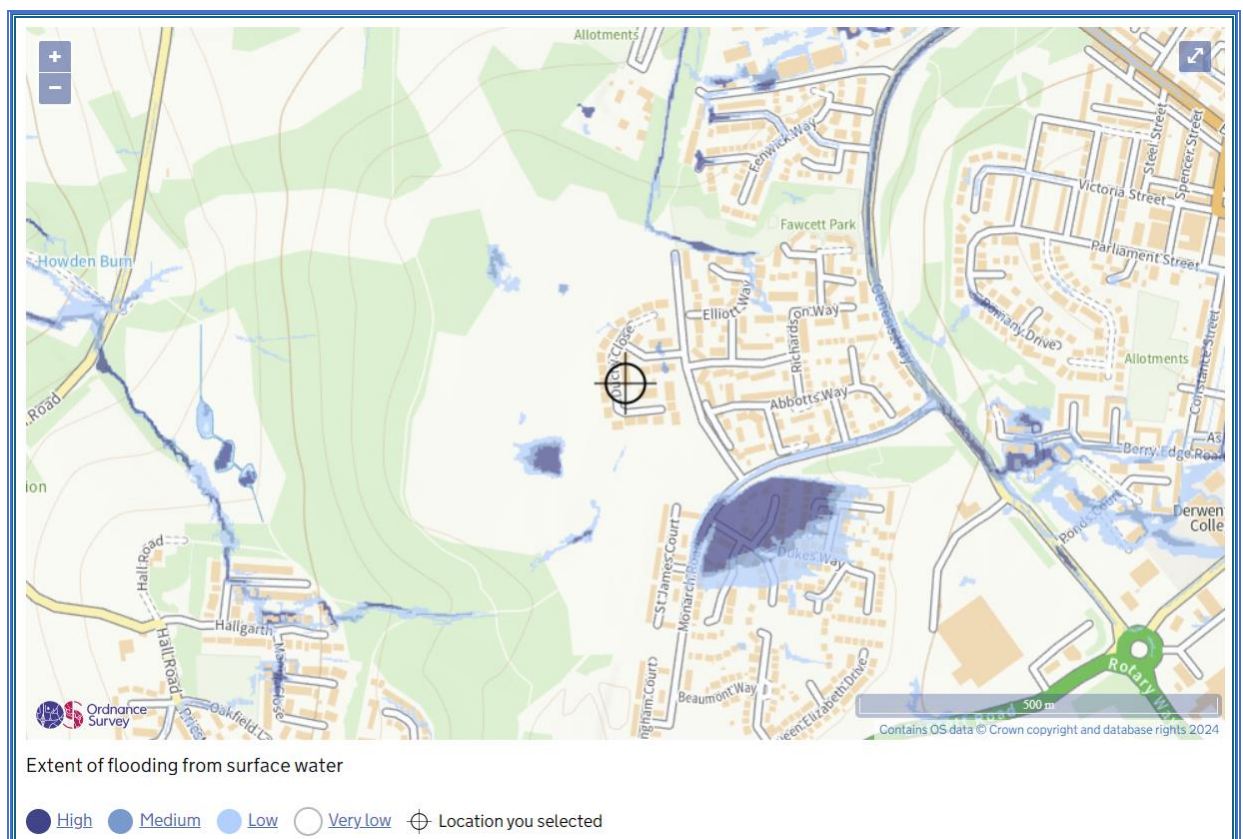


Figure 2 – Surface Water (Pluvial) Flood Map

Flooding from Sewers

The sewers near the site are public sewers owned by Northumbrian Water and will be subject to regular maintenance and inspection, therefore blockage of these sewers is unlikely.

The risk of flooding from sewers is low.

The measures to mitigate the risks of flooding from new drainage are as detailed in Section 7.0.

Flooding from Reservoirs, Canals and Other Artificial Sources

The site is not located in an area identified as being at potential risk in the event of a reservoir failure or canal breach.

7.0 SURFACE AND FOUL WATER DRAINAGE

The proposed site drainage will comprise of a separate foul and surface water drainage system.

The following summarises the requirements for the discharge of surface and foul water from the site.

Sustainable Urban Drainage Systems (SUDS)

The site is underlain by Calcitic fused slag material, which excludes the use of soil infiltration as a means of surface water disposal.

Infiltration drainage will not be required given the known ground conditions.

Whilst the disposal of surface water by infiltration methods is not feasible Sustainable Urban Drainage System (SUDS) may be used in conjunction with conventional drainage systems to improve water quality as well as manage surface water discharge.

The following audit has been carried out relating to suitability of SUD's systems:

Drainage Method	Description/Suitability	Proposal/Feasibility
1. Infiltration.	Ground conditions exclude this as a means of surface water disposal.	Not applicable.
2. Ponds and wetlands.	Suitable subject to land being made available & groundwater levels and suitable lining.	Applicable.
3. Infiltration Basins.	Ground conditions exclude this as a means of surface water disposal.	Not applicable.
4. Detention Basins.	Suitable subject to land being made available & groundwater levels and suitable lining.	Applicable.
5. Swale.	May be utilised convey water/improve water quality, subject to suitable lining.	Applicable.
6. French/Filter drain.	May be utilised convey water/improve water quality , subject to suitable lining.	Applicable.
7. Pervious/Permeable Pavement.	Tannked permeable paving, with suitable lining.	Applicable.
8. Geocellular Systems/Tank systems.	May be used as surface water attenuation.	Applicable.
9. Oversized pipes.	May be used as surface water attenuation.	Applicable.
10. Box culverts.	May be used as surface water attenuation.	Applicable.
11. Purpose designed tanks.	May be used as surface water attenuation.	Applicable.

Surface Water Drainage

The disposal of surface water shall be in accordance with the Requirement H3 of Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should first be given to discharge to soakaway/infiltration system, watercourse and public sewer in that priority order.

As noted in the SUDS sections, the discharge of surface water drainage via infiltration methods is not feasible.

There are no known watercourses on the site boundary or within the site, as such this has been excluded as a means of surface water disposal.

As such it is proposed to discharge surface water to the public surface water sewer to the north of the site, subject to relevant consents and approvals. It is understood that surface water sewer ultimately discharges to a watercourse.

For the purposes of this report, it is assumed the sites will discharge on a greenfield discharge rate which will be calculated utilising the IH124 methodology.

A calculation has been undertaken using the H R Wallingford tool which indicates a greenfield runoff rate [Qbar] for the sites as follows, a copy of the greenfield runoff calculation is provided in Appendix H. The Greenfield rate of discharge is 10.66 l/s.

As surface water discharge from the sites will be restricted, on-site surface water attenuation will be required. The following provides an initial calculation of the approximate volumes of attenuation using the 'Quick Storage Estimate' element of Windes Microdrainage:

Attenuation Volumes

Storage Design Parameters

- M5-60 = 17.300
- Ratio R = 0.306
- Restricted discharge rate = 10.66 litres/second.
- Proposed Impermeable area = 1.886 ha
- 1:100 Year Return Period [+45% cc] = 1389m³.

The proposed on-site drainage system shall be designed in accordance with the requirements of Sewers for Adoption and shall demonstrate that:

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall event.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall event (including an allowance of 45% for the effects of future climate change), as defined in NPPF Technical Guidance.

Foul Water Drainage

Foul water will discharge to the public sewerage network, subject to relevant consents and approvals.

8.0 CONCLUSIONS

This assessment has looked at the implications of a proposed residential development in relation to drainage and flood risk.

The sites under consideration are located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency [EA] a copy of the flood map is provided in Appendix F.

NPPF Technical Guidance advises the following:

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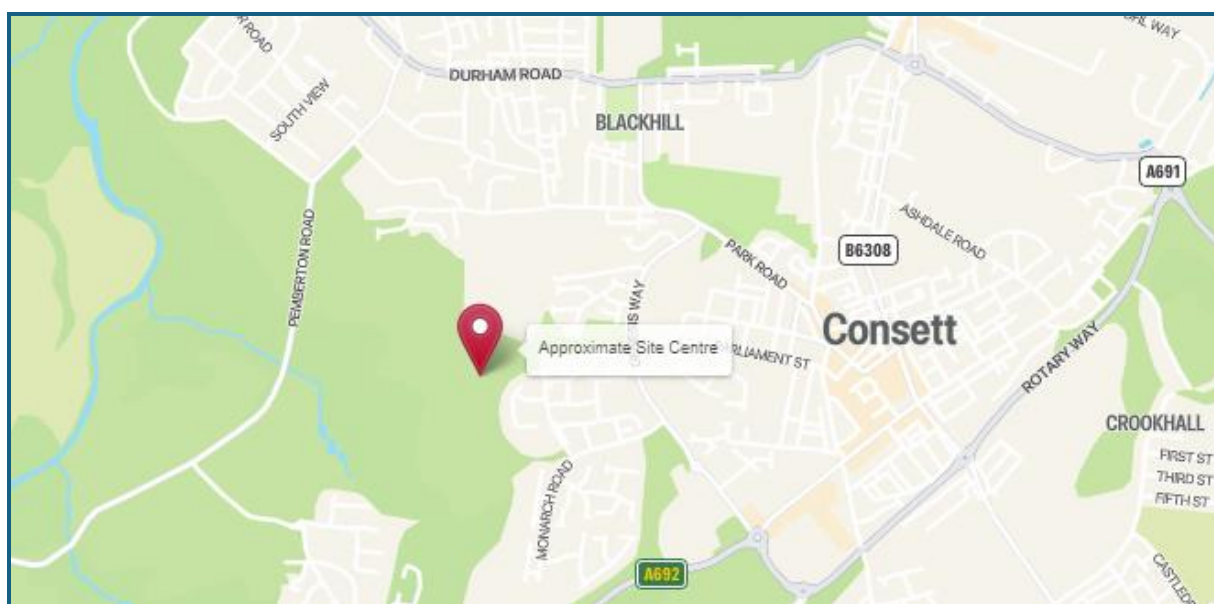
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Other sources of flooding have been assessed and the risk of flooding from these sources is considered to be low and/or manageable with mitigation.

Surface water from the proposed development will be discharged through a public sewer surface water drain, which ultimately discharges to a watercourse. Flows will be restricted to a Greenfield rate of discharge which has been calculated as being 10.66 l/s.

Foul water will discharge to public sewers, subject to relevant consents and approvals.

Appendix A Site Location Plan



Location Map	
Site	Regents Park Ph6
Client	Project Genesis Ltd
Job Number	21134
Scale	NTS

Appendix B Topographic Survey



LEGEND :-



Regents Park
Phase 6

JOB TITLE

PGL

CLIENT

Topographical Survey

DRAWING TITLE

1:1000@ A1

LC

SCALE

DRAWN

31/10/2023

CS

DATE

APPROVED

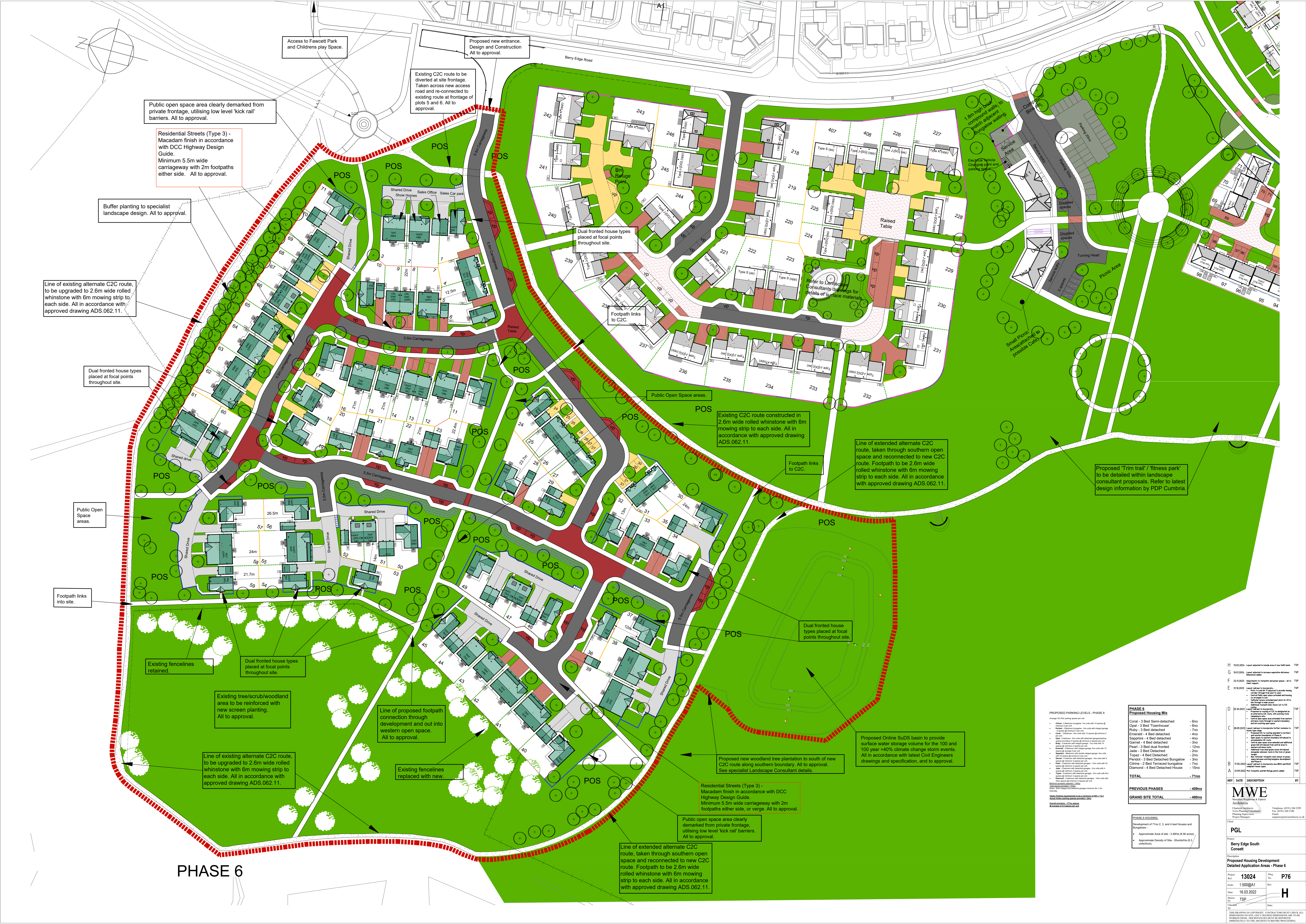
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DH8 7NU

Tel : +44(0)1207 201210
Fax : +44(0)1207 580564
www.ace-absolute.co.uk

REV	AMENDMENT	DRAWN	CHECKED

PROJECT No.	0001	DRG No.	B	REV
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Appendix C Proposed Site Layout



PHASE 6

Public open space area clearly demarked from private frontage, utilising low level 'kick rail' barriers. All to approval.

Residential Streets (Type 3) - Macadam finish in accordance with DCC Highway Design Guide. Minimum 5.5m wide carriageway with 2m footpaths either side. All to approval.

Buffer planting to specialist landscape design. All to approval.

Line of existing alternate C2C route, to be upgraded to 2.6m wide rolled whinstone with 6m mowing strip to each side. All in accordance with approved drawing ADS.062.11.

Dual fronted house types placed at focal points throughout site.

Public Open Space areas.

Footpath links into site.

Existing fences retained.

Dual fronted house types placed at focal points throughout site.

Line of existing alternate C2C route, to be upgraded to 2.6m wide rolled whinstone with 6m mowing strip to each side. All in accordance with approved drawing ADS.062.11.

Line of proposed footpath connection through development and out into western open space. All to approval.

Existing fences replaced with new.

Line of extended alternate C2C route, taken through southern open space and reconnected to new C2C route. Footpath to be 2.6m wide rolled whinstone with 6m mowing strip to each side. All in accordance with approved drawing ADS.062.11.

Existing C2C route to be diverted at site frontage. Taken across new access road and re-connected to existing route at frontage of plots 5 and 6. All to approval.

Proposed new entrance. Design and Construction All to approval.

Dual fronted house types placed at focal points throughout site.

Footpath links to C2C.

Existing C2C route constructed in 2.6m wide rolled whinstone with 6m mowing strip to each side. All in accordance with approved drawing ADS.062.11.

Footpath links to C2C.

Line of extended alternate C2C route, taken through southern open space and reconnected to new C2C route. Footpath to be 2.6m wide rolled whinstone with 6m mowing strip to each side. All in accordance with approved drawing ADS.062.11.

Proposed Online SuDS basin to provide surface water storage volume for the 100 and 100 year +40% climate change storm events. All in accordance with latest Civil Engineers drawings and specification, and to approval.

Proposed new woodland tree plantation to south of new C2C route along southern boundary. All to approval. See specialist Landscape Consultant details.

Residential Streets (Type 3) - Macadam finish in accordance with DCC Highway Design Guide. Minimum 5.5m wide carriageway with 2m footpaths either side, or verge. All to approval.

Public open space area clearly demarked from private frontage, utilising low level 'kick rail' barriers. All to approval.

1.8m high brick compound walls to match adjacent Bungalow walling.

Small Picnic Area attached to possible Café.

Proposed 'Trim trail' / 'fitness park' to be detailed within landscape consultant proposals. Refer to latest design information by PDP Cumbria.

PROPOSED PARKING LEVELS - PHASE 6

Plot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

PHASE 6 Proposed Housing Mix

Coral - 3 Bed Semi-detached	- 600
Opal - 3 Bed Townhouse	- 600
Ruby - 3 Bed Detached	- 700
Emerald - 4 Bed detached	- 400
Sapphire - 4 Bed detached	- 400
Garnet - 4 Bed detached	- 300
Pearl - 3 Bed dual fronted	- 1200
Jade - 3 Bed Detached	- 200
Poppy - 4 Bed Detached	- 200
Peridot - 3 Bed Detached Bungalow	- 300
Citrine - 2 Bed Terrace bungalow	- 700
Diamond - 4 Bed Detached House	- 1500
TOTAL	- 7100

PREVIOUS PHASES

PHASE 1 HOUSING	- 4900
GRAND SITE TOTAL	- 4800

H	10.02.2025	Level adjusted to include area of new fall back.	TSP
G	09.02.2025	Level adjusted to include separate driveway.	TSP
F	23.01.2025	Approved house types and plot areas - all to approval.	TSP
E	28.01.2025	Level adjusted to incorporate 100 and 100 year +40% climate change storm events.	TSP
D	05.01.2025	Level adjusted to incorporate 100 and 100 year +40% climate change storm events.	TSP
C	08.01.2025	Level adjusted to incorporate 100 and 100 year +40% climate change storm events.	TSP
B	17.01.2025	Level adjusted to incorporate 100 and 100 year +40% climate change storm events.	TSP
A	21.01.2025	Plot numbers and site layout plan issued.	TSP

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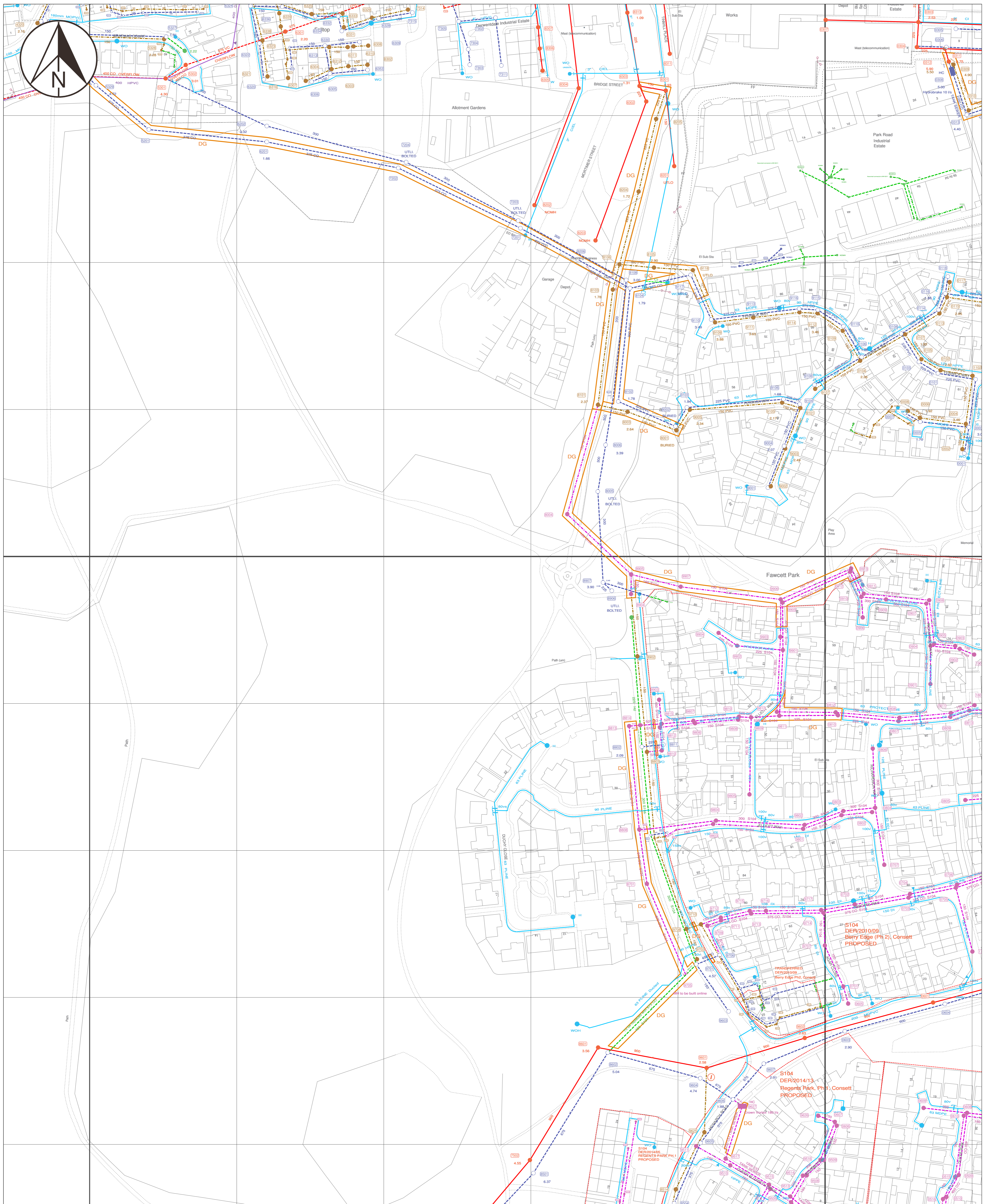
PGL
Berry Edge South
Consent

Proposed Housing Development
Detailed Application Areas - Phase 6

Page: 13024 of 13024
Date: 16.03.2022
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Sheet: P76 of H

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Appendix D Northumbrian Water Sewer Records

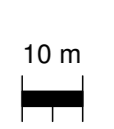


Waste Water -		Private/Non NWL		Proposed		Water Network -		Network Types		AB Asbestos	
Combined	—	Combined	—	Combined	—	Network Distribution	—	Treated	—	AB Asbestos	XXXX
Foul	—	Foul	—	Foul	—	Raw	—	Fire	—	Abandoned	XXXX
Surface	—	Surface	—	Surface	—	Supply	—	Private	—	Out of Comm	XXXX
Treated Eff	—	Treated Eff	—							Proposed	XXXX
Untreated Eff	—	Trade Eff	—								
Overflow	—	Watercourse	—								

User : BOWMS Date : 30/01/2024 15:54:08 Map Sheet : NZ0950NE
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The material contained on this plot has been reproduced from an Ordnance Survey map with permission of the controller of H.M.S.O. Crown Copyright Reserved. Licence No. AC0000851702. The information shown on this plan should be regarded as approximate and is intended for guidance only. No Liability of any kind whatsoever is accepted by Northumbrian Water, its servants or agents for any omission. The actual position of any water mains or sewers shown on the plan must be established by taking trial holes in all cases. In the case of water mains Northumbrian Water must be given two working days notice of their intention to excavate trial holes. With effect from 1 October 2011, private lateral drains and sewers automatically transferred to Northumbrian Water under a scheme made by the Secretary of State pursuant to section 105A Water Industry Act 1991. These former private drains and sewers together with existing private connections may not be shown but their presence should be anticipated. WARNING...Where indicated on the plan there could be abandoned asbestos cement materials or shards of pipe. If excavating in the vicinity of these abandoned asbestos cement materials, the appropriate Health & Safety precautions should be taken. Northumbrian Water accepts no liability in respect of claims, costs, losses or other liabilities which arise as the result of the presence of the pipes or any failure to take adequate precautions. Emergency Telephone Number: 0345 717 1100



Appendix E S104 Sewer Adoption Plan for Adjacent Site

Do Not Scale

DESIGNERS RISK NOTES

- In accordance with the Construction (Design & Management) Regulations 2015, it is the policy of the practice to Design Out as many identifiable risks as possible for the construction, operation and maintenance of the project.
- All drawings are to be read in conjunction with the Pre-Construction Information which is defined in the Construction (Design & Management) Regulations 2015.
- A competent Contractor should be aware of 'Normal' risks involved with the construction process. However, additional precautions will need to be considered for the following items:
 - A) None identified.
- Safe methods and systems of work remain the responsibility of the Contractor and must be identified in the Construction Phase Plan. The Construction Phase Plan must be in place prior to the start of any modification or site works.
- Residual risks that have been identified and cannot be 'Designed Out' are as follows:
 - A) None identified.
- If any party using this drawing considers that there are 'Abnormal' risks that have not been identified above, then the Engineer should be notified.

General Notes

- Contractor must check all dimensions on site.
- Discrepancies must be reported to the designer before proceeding.
- Dimensions are in m, unless noted otherwise.
- All dimensions are in m, unless noted otherwise.
- All levels are related to Ordnance Datum.
- All levels are in meters, unless noted otherwise.
- Refer to service engineer's drawings to confirm exact location and details for service entries.
- All road gullies and downpipes connections are to be 150mm diameter.
- Road gullies to be pc concrete or plastic.
- All underground drainage to be verified clay, pc concrete or uPVC to W85 x 450/2000.
- All connections to MFLs to be constructed crown to crown unless stated otherwise.
- For construction details refer to drawing 2467510.
- All drainage to be constructed and tested in accordance with "specification for adoption 0th edition".
- Cover, invert levels and location of existing drains are to be checked by the contractor prior to commencement of any drainage works. Any discrepancies must be reported to the engineer. Any discrepancies must be reported to the engineer.
- Manhole covers to be 600mm dia. unless stated otherwise.
- Refer to architect's plans for exact locations of internal drainage points.
- All proprietary products should be used strictly in accordance with the manufacturer's details and requirements.
- All not shown and gullies are to be excavated for loading purposes.

Legend

- Denotes site boundary
- Denotes existing surface water manhole
- Denotes existing full water manhole
- Denotes existing combined sewer manhole
- Denotes proposed adoptable surface water drainage
- Denotes proposed adoptable full water drainage
- Denotes proposed surface water manhole
- Denotes proposed full water manhole
- Denotes proposed surface water inspection chamber (600 mm deep unless noted otherwise)
- Denotes proposed full water inspection chamber (600 mm deep unless noted otherwise)
- Denotes proposed road gully
- Denotes proposed down pipe
- Denotes proposed rodding eye
- Denotes proposed channel drain
- Denotes proposed 100mm soil & vent pipe
- Denotes 100mm seated floor gully
- Denotes 100mm back inlet gully
- Denotes S104 sewer assessment

C	NWL sewer assessment amended	KR	GH	13.10.23
B	Drawing amended to suit the latest layout	KR	GH	11.10.23
A	Drawing amended to suit the latest layout	PK	NMS	10.05.18

Rev	Amendment	By	Chk'd	Date

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Client: **Project Genesis Ltd**

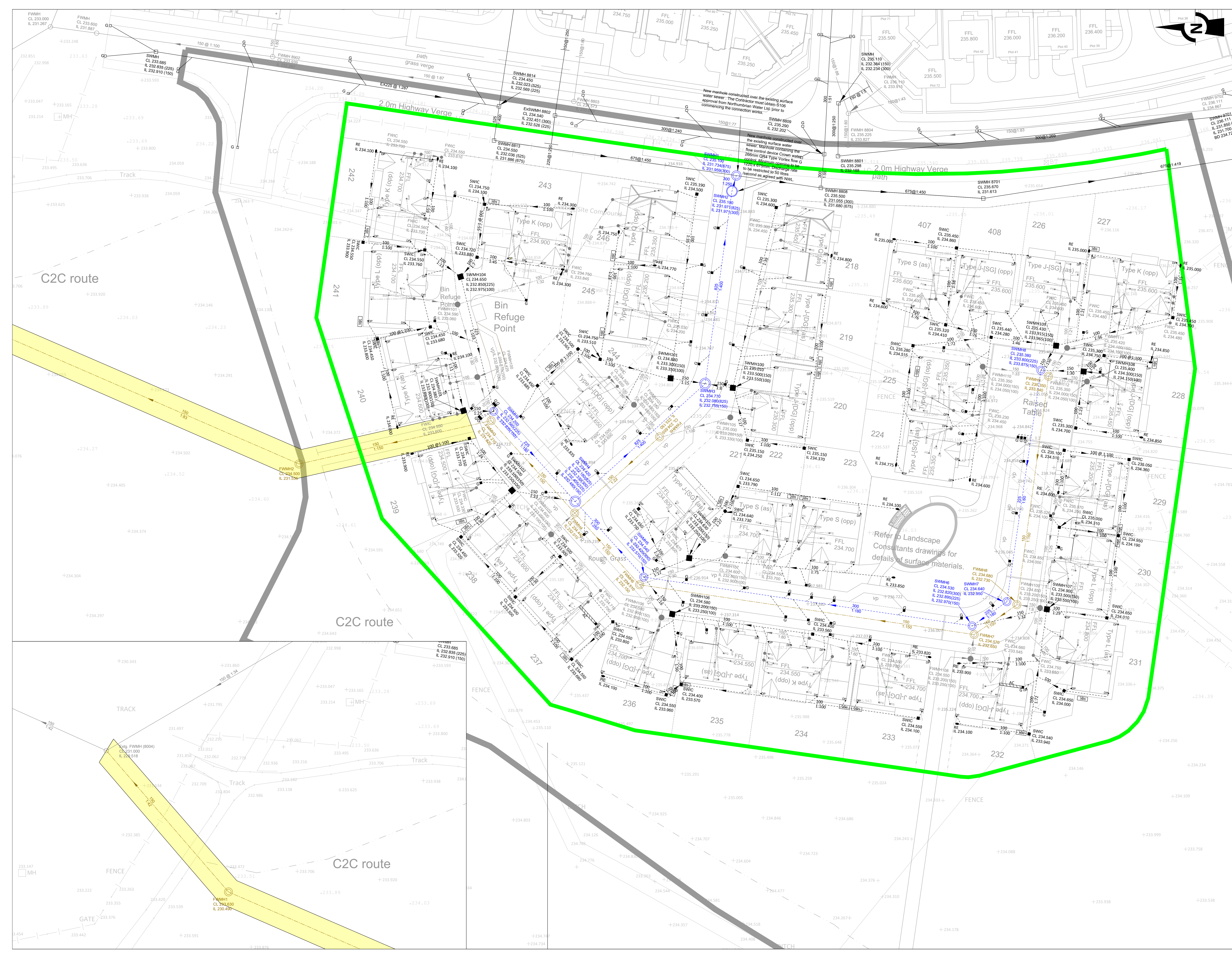
Project: **Berry Edge Bungalows Executive Oval**

Drawing Title: **Section 104 Plan**

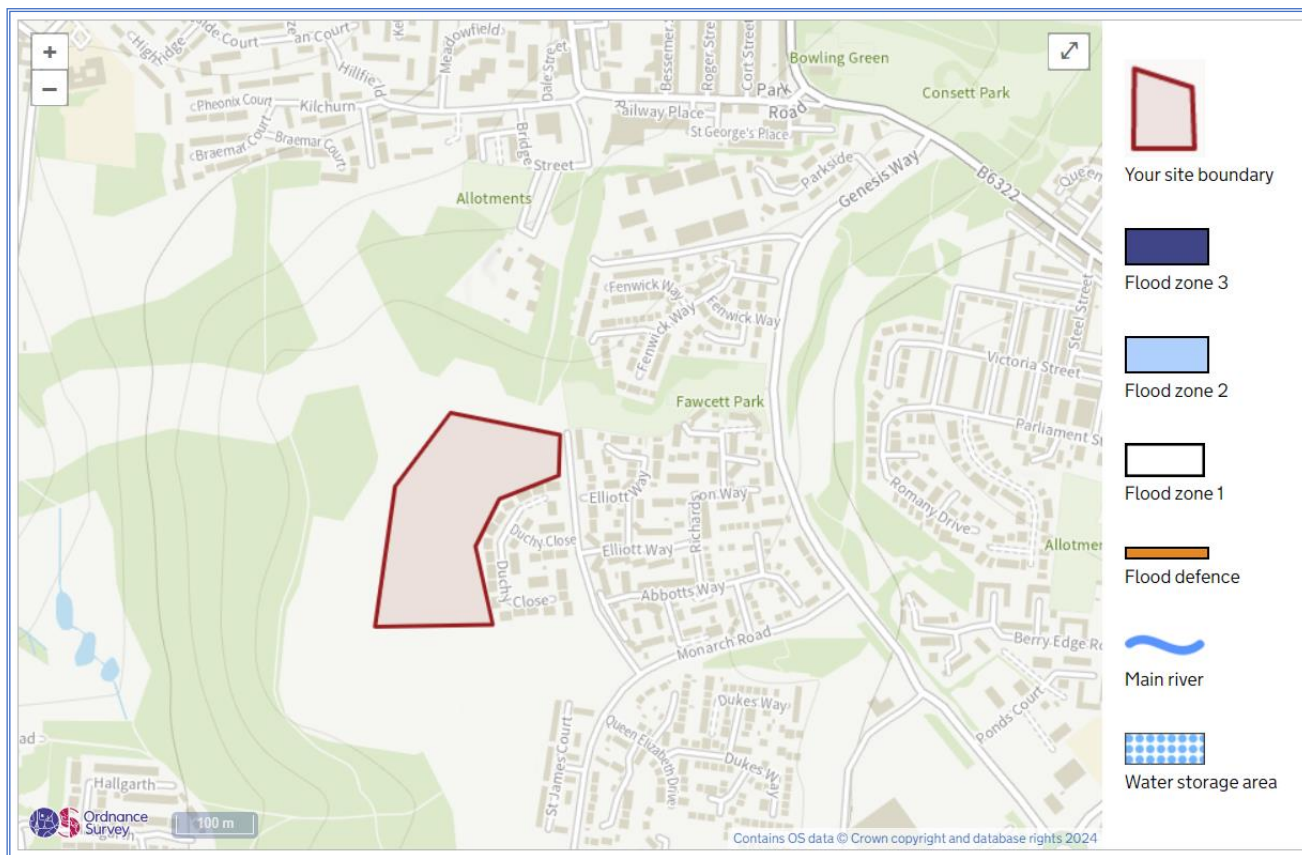
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The Shadbolt Group is a trading name of Shadbolt Consulting Ltd. Use of drawings is deemed an acceptance of our T&Cs available on our website.



Appendix F Gov.UK Flood Map



Flood map obtained from Gov.UK website [31.01.2024]

Appendix G Surface Water Runoff Calculation

Calculated by: Ronnie Lamb

Site name: Regents Park

Site location: Consett

Site Details

Latitude: 54.85339° N

Longitude: 1.85014° W

Reference: 133055784

Date: Aug 10 2023 14:20

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	759	759
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Q_{BAR} (l/s):	10.66	10.66
1 in 1 year (l/s):	9.17	9.17
1 in 30 years (l/s):	18.66	18.66
1 in 100 year (l/s):	22.18	22.18
1 in 200 years (l/s):	25.27	25.27

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix H Groundsure Flood Insight Report

73 Howard Street
 North Shields
 Tyne & Wear, NE30 1AF



Date 10/08/2023 14:55
 File BASIN.1.SRCX

Designed by Ronnie
 Checked by

Innovyze

Source Control 2020.1.3

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.304	0.304	10.6	408.7	O K
30 min Summer	0.406	0.406	10.7	559.9	O K
60 min Summer	0.515	0.515	10.7	731.0	O K
120 min Summer	0.626	0.626	10.7	914.6	O K
180 min Summer	0.687	0.687	10.7	1020.2	O K
240 min Summer	0.726	0.726	10.7	1089.1	O K
360 min Summer	0.773	0.773	10.7	1173.5	O K
480 min Summer	0.803	0.803	10.7	1228.5	O K
600 min Summer	0.822	0.822	10.7	1264.2	O K
720 min Summer	0.834	0.834	10.7	1287.0	O K
960 min Summer	0.844	0.844	10.7	1305.6	O K
1440 min Summer	0.836	0.836	10.7	1291.1	O K
2160 min Summer	0.809	0.809	10.7	1240.2	O K
2880 min Summer	0.776	0.776	10.7	1179.2	O K
4320 min Summer	0.704	0.704	10.7	1050.6	O K
5760 min Summer	0.632	0.632	10.7	925.4	O K
7200 min Summer	0.565	0.565	10.7	812.5	O K
8640 min Summer	0.501	0.501	10.7	709.4	O K
10080 min Summer	0.443	0.443	10.7	618.0	O K
15 min Winter	0.338	0.338	10.7	458.6	O K
30 min Winter	0.450	0.450	10.7	628.8	O K
60 min Winter	0.570	0.570	10.7	821.6	O K
120 min Winter	0.693	0.693	10.7	1030.6	O K
180 min Winter	0.761	0.761	10.7	1152.7	O K
240 min Winter	0.806	0.806	10.7	1234.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	111.106	0.0	384.6	26
30 min Summer	76.481	0.0	532.8	41
60 min Summer	50.460	0.0	741.5	70
120 min Summer	32.224	0.0	948.1	130
180 min Summer	24.426	0.0	1077.4	188
240 min Summer	19.918	0.0	1170.0	248
360 min Summer	14.813	0.0	1300.6	366
480 min Summer	12.010	0.0	1398.6	486
600 min Summer	10.196	0.0	1473.0	604
720 min Summer	8.914	0.0	1528.2	724
960 min Summer	7.203	0.0	1579.2	962
1440 min Summer	5.321	0.0	1514.5	1250
2160 min Summer	3.921	0.0	2108.7	1608
2880 min Summer	3.152	0.0	2257.1	1992
4320 min Summer	2.312	0.0	2467.8	2772
5760 min Summer	1.852	0.0	2673.2	3576
7200 min Summer	1.562	0.0	2816.3	4328
8640 min Summer	1.359	0.0	2937.5	5096
10080 min Summer	1.208	0.0	3039.2	5760
15 min Winter	111.106	0.0	432.4	26
30 min Winter	76.481	0.0	596.2	40
60 min Winter	50.460	0.0	831.2	70
120 min Winter	32.224	0.0	1061.7	128
180 min Winter	24.426	0.0	1204.9	186
240 min Winter	19.918	0.0	1306.4	244

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Source Control 2020.1.3

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
360 min Winter	0.861	0.861	10.7	1336.8	O K
480 min Winter	0.896	0.896	10.7	1403.7	O K
600 min Winter	0.918	0.918	10.7	1447.5	O K
720 min Winter	0.933	0.933	10.7	1476.4	O K
960 min Winter	0.948	0.948	10.7	1505.3	O K
1440 min Winter	0.945	0.945	10.7	1499.7	O K
2160 min Winter	0.912	0.912	10.7	1435.1	O K
2880 min Winter	0.872	0.872	10.7	1358.3	O K
4320 min Winter	0.762	0.762	10.7	1153.6	O K
5760 min Winter	0.646	0.646	10.7	949.7	O K
7200 min Winter	0.540	0.540	10.7	771.8	O K
8640 min Winter	0.444	0.444	10.7	618.1	O K
10080 min Winter	0.361	0.361	10.7	492.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
360 min Winter	14.813	0.0	1445.4	360
480 min Winter	12.010	0.0	1541.7	476
600 min Winter	10.196	0.0	1599.5	592
720 min Winter	8.914	0.0	1615.8	706
960 min Winter	7.203	0.0	1585.1	932
1440 min Winter	5.321	0.0	1507.7	1362
2160 min Winter	3.921	0.0	2359.4	1716
2880 min Winter	3.152	0.0	2522.1	2188
4320 min Winter	2.312	0.0	2745.0	3068
5760 min Winter	1.852	0.0	2994.4	3864
7200 min Winter	1.562	0.0	3155.2	4616
8640 min Winter	1.359	0.0	3291.6	5352
10080 min Winter	1.208	0.0	3407.3	5960

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.300	Shortest Storm (mins)	15
Ratio R	0.306	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 2.009

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.670		0.670		0.670

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Model Details

Storage is Online Cover Level (m) 1.300

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1236.0	1.300	2283.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0146-1070-1300-1070
Design Head (m)	1.300
Design Flow (l/s)	10.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	146
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	10.7	Kick-Flo®	0.830	8.7
Flush-Flo™	0.383	10.7	Mean Flow over Head Range	-	9.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.1	2.000	13.1	4.000	18.2	7.000	23.9
0.200	10.0	1.000	9.5	2.200	13.7	4.500	19.3	7.500	24.7
0.300	10.6	1.200	10.3	2.400	14.3	5.000	20.3	8.000	25.4
0.400	10.7	1.400	11.1	2.600	14.9	5.500	21.2	8.500	26.2
0.500	10.6	1.600	11.8	3.000	15.9	6.000	22.2	9.000	26.9
0.600	10.3	1.800	12.5	3.500	17.1	6.500	23.0	9.500	27.6

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