HPK/2012/0633

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HIGH PEAK BOROUGH COUNCIL
GLOSSOP STB
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YORK STREET

GLOSSOP

DRAINAGE MANAGEMENT STRATEGY



For

Prospect (GB) Ltd
5 Meridian Business Village
Hansby Drive
Liverpool
L24 9LG

prospect. HOMES

October 2012

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YORK STREET
GLOSSOP

Drainage Management Strategy

October 2012

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Prepared by: _____
Richard Nicholas BEng (Hons) MBA
Associate

Checked by: _____
Martin Pocock BEng (Hons) CEng MICE C.WEM MCIWEM
Technical Director

Authorised by: _____
Robert Ankers
Director

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2.0	*October 2012*	*Final*	*RDN*

Old Marsh Farm Barns
Welsh Road, Sealand
Flintshire CH5 2LY
Telephone: 01244 288 178
Fax: 01244 288 516

www.betts-associates.co.uk

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EXECUTIVE SUMMARY

This report was commissioned by Prospect (GB) Ltd referred to hereafter as 'the client' to support a planning application for the demolition of the existing buildings and the construction of 19 residential dwellings complete with highway, external works, footpaths, car parking, landscaping, boundary walls, fencing, external services and drainage.

This report determines an appropriate management strategy for the surface and foul water flows generated by the proposed development. Design constraints have been identified and consultation undertaken with the various interested parties involved.

From review of the ground conditions identified in the Ground Investigation report (ref. RSKENSR SI Chapter 6.4.2) infiltration will not be a viable means of surface water discharge due to the underlying strata.

As infiltration is not viable two surface water systems are likely to be required; one to serve the highway run-off, restricted to QBar and discharging to the watercourse and one to serve the domestic run-off, restricted to 50% of the pre-development annual run-off and discharging to the combined public sewer.

This report is considered to satisfy elements of SUR1 of the Code for Sustainable Homes that relate to the management of Surface Water.

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Specialist Software

- Flood Estimation Handbook FEH CD-ROM (v.3.0) – *Determination of Catchment Descriptors and depths of rainfall*
- MicroDrainage WinDES (v.12.6.1) – *Calculation of Greenfield run-off rates IH124/ICP-SUDS, rates of rainall and stormwater storage estimates*

Abbreviations & Acronyms

AEP	Annual Exceedance Probability	LPA	Local Planning Authority
BGL	Below Ground Level	mAOD	Metres Above Ordnance Datum
BGS	British Geological Survey	NGR	National Grid Reference
CC	Climate Change	NPPF	National Planning Policy Framework
EA	Environment Agency	NSRI	National Soils Research Institute
FEH	Flood Estimation Handbook	OS	Ordnance Survey
FRA	Flood Risk Assessment	QSE	Quick Storage Estimate
FZ	Flood Zone	SFRA	Strategic Flood Risk Assessment
Ha	Hectare	SuDS	Sustainable Urban Drainage Systems
HPBC	High Peak Borough Council	TWL	Top Water Level
IDB	Internal Drainage Board	UKCIP	United Kingdom Climate Impacts Programme
LLFA	Lead Local Flood Authority	UU	United Utilities

1.0 SURFACE WATER MANAGEMENT

1.1 Pre-development Surface Water Run-off

1.1.1 For the purposes of determining the existing rate of surface water run-off the site is considered to be Brownfield and Greenfield. The total area of the site is 0.568ha, of which 3550sqm (63%) is considered to be impermeable.

1.1.2 The surface water run-off rates from both the pervious and hardstanding areas have been calculated using the Flood Estimation Handbook (FEH) rainfall catchment characteristics. A full summary of the pre-development surface water run-off calculations is included in Appendix G.

1.1.3 The pre-development 1 year return period Greenfield run-off rate is calculated to be 1.6l/s, based on an area of 2130sqm and the IH124/ICP-SUDS method.

1.1.4 The pre-development 1 year return period Brownfield run-off rate is calculated to be 14.5l/s, based on an area of 3550sqm and a peak annual rainfall intensity of 14.7mm/hr.

1.1.5 The pre-development total 1 year return period surface water run-off rate is calculated to be 16.1l/s.

1.1.6 The pre-development 100 year return period Greenfield run-off rate is calculated to be 3.8l/s, based on an area of 2130sqm and the IH124/ICP-SUDS method.

1.1.7 The pre-development 100 year return period Brownfield run-off rate is calculated to be 48.1l/s, based on an area of 3550sqm and a peak annual rainfall intensity of 48.8mm/hr.

1.1.8 The pre-development total 100 year return period surface water run-off rate is calculated to be 51.9l/s.

1.1.9 The total approximate pre-development volume of surface water run-off generated by the 1 in 1 year return period storm event is 57.2m^3; estimated using the FEH rainfall catchment characteristics.

1.1.10 The total approximate pre-development volume of surface water run-off generated by the 1 in 100 year return period storm event is 320.6m^3; estimated using the FEH rainfall catchment characteristics.

1.1.11 A pre-development impermeable areas plan is included in Appendix C.

1.1.12 The developer has undertaken an investigation of the existing drainage systems to determine the current method of surface water. It has been identified that the existing roof area and areas of hardstanding are positively drained to the existing public combined sewer system via the onsite combined drainage network. The drainage report and supporting plan is included in Appendix I.

1.2 Post-development Surface Water Run-off

1.2.1 The residential nature of the development proposals means that amount of proposed impermeable area will be reduced by comparison to the existing impermeable area.

1.2.2 The proposed impermeable area will be approximately 2453sqm, 43% of the total development area.

1.2.3 The surface water run-off rates from the hardstanding areas have been calculated using the Flood Estimation Handbook (FEH) rainfall catchment characteristics. A full summary of the post-development surface water run-off calculations is included in Appendix G.

1.2.4 The post-development 1 year return period Brownfield run-off rate is calculated to be 10.1l/s, based on an area of 2453sqm and a peak annual rainfall intensity of 14.7mm/hr.

1.2.5 The post-development 100 year return period Brownfield run-off rate is calculated to be 43.5l/s, based on an area of 2453sqm and a peak annual rainfall intensity of 48.8mm/hr.

1.2.6 The total approximate post-development volume of surface water run-off generated by the 1 in 1 year return period storm event is 31.6m^3; estimated using the FEH rainfall catchment characteristics.

1.2.7 The total approximate post-development volume of surface water run-off generated by the 1 in 100 year return period storm event with a 30% allowance for Climate Change is 230.2m^3; estimated using the FEH rainfall catchment characteristics.

1.2.8 The post-development proposals result in a reduction in the both rate and volume of surface water run-off for the annual and 100 year return period storm events, even with the addition of a 30% allowance for Climate Change for the 100 year return period storm event volume of run-off.

1.2.9 A post-development impermeable areas plan is included in Appendix E.

1.3 Sustainable Drainage Systems (SuDS)

1.3.1 In accordance with NPPF, Sustainable Drainage Systems (SuDS) should be specified wherever possible to manage surface water. This in turn reduces the burden downstream on both watercourses and sewerage systems.

1.3.2 SuDS have the ability to address three core objectives; water quantity, water quality and amenity value. With the appropriate system specified, all three core objectives can be satisfied. Where possible, peak surface water discharge rates to watercourses and sewers should be reduced.

1.3.3 Preference should always be given to SuDS over the traditional methods of buried sewers wherever possible and practical. Runoff from car parking areas and roads could be conveyed through swales, permeable pavements, bio-retention areas and petrol interceptors to provide a degree of treatment before flows are carried to public sewers.

1.3.4 Opportunities should be taken to provide soft landscaping where at all possible on site to assist in minimising surface water run-off. Added benefits include biodiversity and visual enhancements.

1.3.5 Due to the site constraints (particularly ground conditions; poor infiltration characteristics and contamination) the application of SuDS drainage techniques are not considered to be feasible on this Brownfield site.

1.4 Methods of Surface Water Management

1.4.1 At present the site is predominantly impermeable; the total site area is 0.568ha and the existing impermeable area is 0.355ha (63%).

1.4.2 There are three methods that have been reviewed for the management and discharge of surface water detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority listed below.

- Discharge via infiltration
- Discharge to watercourse
- Discharge to public sewerage system

1.5 Discharge via Infiltration

1.5.1 Any impermeable areas that can drain to soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems.

1.5.2 The British Geology Survey (BGS) description of the bedrock geology and superficial deposits for the site area are as follows: -

1:50 000 scale bedrock geology description: *Millstone Grit Group [See Also Migr] - Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 316 to 327 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.*

Setting: *swamps, estuaries and deltas. These rocks were formed in marginal coastal plains with lakes and swamps periodically inundated by the sea; or estuaries and deltas, and shallow seas.*

1:50 000 scale superficial deposits description: *Till, Devensian - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions.*

Setting: *ice age conditions. These rocks were formed in cold periods with Ice Age glaciers scouring the landscape and depositing moraines of till with outwash sand and gravel deposits from seasonal and post glacial meltwaters.*

1.5.3 The National Soil Resources Institute (NSRI) indicates that the nature of the soil is likely to be; slowly permeable, seasonally wet, acid loamy and clayey soils, with drainage considered to be impeded.

1.5.4 From review of the ground conditions identified in the Ground Investigation report (ref. RSKENSR SI Chapter 6.4.2) infiltration will not be a viable means of surface water discharge due to the underlying strata.

1.6 Discharge to a Watercourse

1.6.1 There is a minor watercourse crossing the site adjacent to the southern boundary; it is culverted under the existing road and open channel beyond. The watercourse is a minor tributary of Shelf Brook located approximately 200m to the west.

1.6.2 Although the previous development discharged the surface water run-off generated to the combined public sewer network the topography of the development suggests that the site previously (prior to any development) discharged to the watercourse.

1.6.3 As infiltration is determined not to be viable from a sustainable drainage perspective it would be favourable to discharge the proposed surface water flows generated to the watercourse, minimising the volume of discharge to the combined public sewer network and in turn reducing the volume of water that requires treatment.

1.6.4 If discharge to the watercourse is proposed then it will be necessary to restrict the surface water discharge to QBar, calculated to be 4.9l/s.

1.6.5 This restricted flow generates a storage requirement during periods of intense rainfall. The resultant stormwater storage requirement for the 1 in 1 year return period storm event with a restricted discharge rate of 4.9l/s and a contributing impermeable area of 2470sqm is approximately between 8.8m^3 and 21m^3 (mean volume; 14.9m^3).

1.6.6 The resultant storage requirement for the 1 in 30 year return period storm event with a restricted discharge rate of 4.9l/s and a contributing impermeable area of 2470sqm is approximately between 46m^3 and 83m^3 (mean volume; 64.5m^3).

1.6.7 The resultant storage requirement for the 1 in 100 year return period storm event plus a 30% allowance for Climate Change with a restricted discharge rate of 4.9l/s and an impermeable area of 2470sqm is approximately between 113m^3 and 189m^3 (mean volume; 151m^3).

1.6.8 It may not be possible to discharge all of the surface water flows generated to the watercourse as the attenuation requirements may not allow a feasible solution; it may be that discharge to the watercourse is a part solution, possibly dealing with the flows generated by the public highway.

1.7 Discharge to a Public Sewer

1.7.1 As infiltration is not feasible and discharge to the watercourse is only anticipated to provide a partial solution in dealing with the surface water generated then it may be necessary to continue to discharge some of the surface water generated by the run-off from domestic areas.

1.7.2 If discharge of the domestic run-off is proposed to the combined public sewer network is proposed then it will be necessary to restrict the surface water discharge to 50% of the existing annual run-off rate (14.5l/s), calculated to be 7.3l/s; based on a peak annual rainfall intensity of 14.7mm/hr.

1.7.3 The invert level of the combined public sewer is 160.704mAOD, determined from the topographic survey and measured depth. Based on this outfall invert level and the approximate proposed Finished Floor Level (FFL) of the dwelling furthest from the outfall (164.50mAOD at 100m distance away), it is possible to provide the necessary storage whilst still allowing for the gradient of the pipework and minimum cover requirements.

2.0 FOUL WATER MANAGEMENT

2.1 The pre-development foul water flows would not have been significant by comparison to the surface water flows discharging to the combined public sewer network.

2.2 It is proposed that the foul water flows generated by the proposed development continue to discharge to the combined public sewer.

2.3 Based on the proposals for the construction of 19 residential dwellings the approximate peak foul water flows generated by the development are approximately 0.874l/s. This is based on 4000 litres per dwelling per 24 hours; the guidance contained within Sewers for Adoption 6th Edition (SfA).

3.0 SUMMARY AND CONCLUSIONS

3.1 The proposed re-development of the land off York Street, Glossop comprises the demolition of some existing buildings and the construction of 19 residential dwellings complete with highway, external works, footpaths, car parking, landscaping, boundary walls, fencing, external services and drainage.

3.2 From review of the ground conditions identified in the Ground Investigation report (ref. RSKENSR SI Chapter 6.4.2) infiltration will not be a viable means of surface water discharge due to the underlying strata.

3.3 As infiltration is not feasible and discharge to the watercourse is only anticipated to provide a partial solution in dealing with the surface water generated then it may be necessary to continue to discharge some of the surface water generated by the run-off from domestic areas. The domestic surface water run-off is proposed to be discharged to the public sewer network at 7.3l/s; this is 50% of the existing annual peak run-off rate.

3.4 Two surface water systems are likely to be required; one to serve the highway restricted to QBar, discharging to the watercourse and one to serve the domestic run-off, restricted to 50% of the pre-development annual run-off and discharging to the combined public sewer. The approximate stormwater storage requirements shown below adopt a conservative approach and use a restricted discharge rate of QBar for all of the surface water run-off generated.

3.5 The restricted flow generates a storage requirement during periods of intense rainfall. The resultant stormwater storage requirement for the 1 in 1 year return period storm event with a restricted discharge rate of 4.9l/s and a contributing impermeable area of 2470sqm is approximately between 8.8m^3 and 21m^3 (mean volume; 14.9m^3).

3.6 The resultant storage requirement for the 1 in 30 year return period storm event with a restricted discharge rate of 4.9l/s and a contributing impermeable area of 2470sqm is approximately between 46m^3 and 83m^3 (mean volume; 64.5m^3).

3.7 The resultant storage requirement for the 1 in 100 year return period storm event plus a 30% allowance for Climate Change with a restricted discharge rate of 4.9l/s and an impermeable area of 2470sqm is approximately between 113m^3 and 189m^3 (mean volume; 151m^3).

3.8 It is proposed that the foul water flows generated by the proposed development continue to discharge to the combined public sewer.

3.9 This report determines an appropriate management strategy for the surface and foul water flows generated by the proposed development. Design constraints have been identified and consultation undertaken with the various interested parties involved.

3.10 This report is considered to satisfy elements of SUR1 of the Code for Sustainable Homes that relate to the management of Surface Water.

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CIRIA 522: Sustainable urban drainage systems – design manual for England and Wales (2000).
CIRIA 523: Sustainable urban drainage systems – best practice manual (2001).
CIRIA 609: Sustainable drainage systems. Hydraulic, structural and water quality advice (2004).
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CIRIA 635: Designing for exceedance in urban drainage: Good practice (2006).
CIRIA 644: Building Greener (2007).
CIRIA 697: The SUDS manual (2007).
Flood Risk to People – Phase 2 (FD2321/TR2), DEFRA and the Environment Agency (2006).
Flood estimation for small catchments: Institute of Hydrology Report No.124, NERC (1994).
Flood Estimation Handbook, Centre for Ecology and Hydrology (1999).
National Planning Policy Framework (NPPF), CLG (2012).
Planning Policy Statement 25: Development and Flood Risk (2006).
Sewers for Adoption 6th Edition, WRc (2006).
Technical Guidance to the National Planning Policy Framework, CLG (2012).

Drawing references

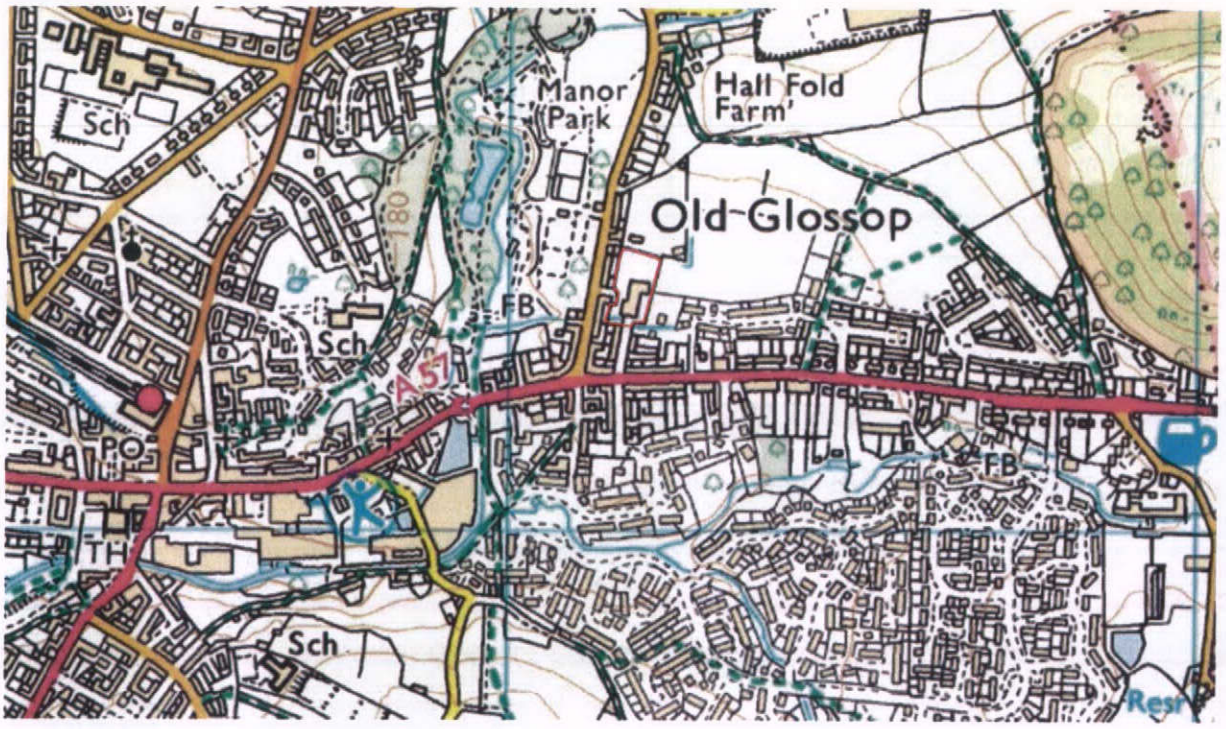
Proposed Site Layout – 1127/SK/01/D – (PWL Architects)
Topographical Survey – 6108/01 – (Powers & Tiltman Ltd)
Pre-development Impermeable Areas Plan – 100 – Rev P1 (Betts Associates Ltd)
Post-development Impermeable Areas Plan – 101 – Rev P1 (Betts Associates Ltd)

Web-based references

Bingmaps – http://www.bing.com/Maps/
British Geological Survey – http://www.bgs.ac.uk/opengeoscience/home.html
Chronology of British Hydrological Events – www.dundee.ac.uk/
CIRIA – http://www.ciria.org/
Cranfield University – http://www.landis.org.uk/soilscapes/
Environment Agency – www.environment-agency.gov.uk/
FloodProBE – http://www.floodprobe.eu/
Flood Forum – http://www.floodforum.org.uk/
Flood London – http://www.floodlondon.com/
Flood Resilience Group – http://www.floodresiliencegroup.org/frg/
Google Maps – http://maps.google.co.uk/
High Peak Borough Council – http://www.highpeak.gov.uk/
London Resilience – http://www.londonprepared.gov.uk/
Shire Group of IDB's – http://www.shiregroup-idbs.gov.uk/default.asp
Streetmap – http://www.streetmap.co.uk/
United Utilities – http://www.unitedutilities.com/default.aspx
US Army Corps of Engineers – http://www.hec.usace.army.mil/software/hec-ras/
Watertight International – http://www.watertightinternational.com/

LOCATION PLAN

York Street, Glossop



OS X (Eastings)	404182
OS Y (Northings)	394318
Nearest Post Code	SK13 8QW
Lat (WGS84)	N53:26:44 (53.445614)
Long (WGS84)	W1:56:19 (-1.938503)
LR	SK041943
mX	-215793
mY	7031505

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APPENDIX A: LOCATION PLAN

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APPENDIX B: TOPOGRAPHICAL SURVEY

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APPENDIX C: PRE-DEVELOPMENT IMPERMEABLE AREAS PLAN

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Cricket Ground

DO NOT SCALE

LEGEND

PRE-DEVELOPMENT IMPERMEABLE AREA
[3550sqm - 0.355Ha]

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

prospect. HOMES

PROJECT: YORK STREET GLOSSOP

TITLE: PRE-DEVELOPMENT IMPERMEABLE AREA

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 2012	NTS	RDN	RA

PROJECT No:	DRAWING No:	REV:
PRS09	100	P1

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APPENDIX D: PROPOSED PLANNING DRAWINGS

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N

Legend	
4B1280	3
4B1129	7
3B1059	1
3B929	3
2B671	5
Total	19

0 5 10 15 20 25m 1:500

Key

- Concrete paving
- 1800 high close boarded fence
- 450 high low level artstone wall with 1.8m high piers and timber infill
- 900 high post and rail
- Gates within fencing to provide 900mm clear opening and to be the same height as fence. Fence, gates and ironmongery to meet Secured by Design 2010 clause 10.
- External home composting container
- Water butt
- Rotary clothes lines to hold 4m+ of drying line for 2 bedroom dwellings, and 6m+ for 3 bed and above dwellings.
- Location for external bin storage.

D 25/10/12 amended to suit prospect comments
C 25/10/12 amended to suit prospect comments
B 25/10/12 amended to suit prospect comments
A 25/10/12 amended to suit prospect comments

prospect. HOMES

Project
York Street, Glossop

PWL ARCHITECTS

Title
Planning Site Layout

The First Floor 32 Market Street Altrincham Cheshire WA14 1PF
Tel 0161 941 4009 Fax 0161 926 9257 E Mail info@pwlarchitects.com

Scale	Date
1:500@A3	10/12
Drawn	**Drwg No**
CJW	1127/PL/02/D

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APPENDIX E: POST-DEVELOPMENT IMPERMEABLE AREAS PLAN

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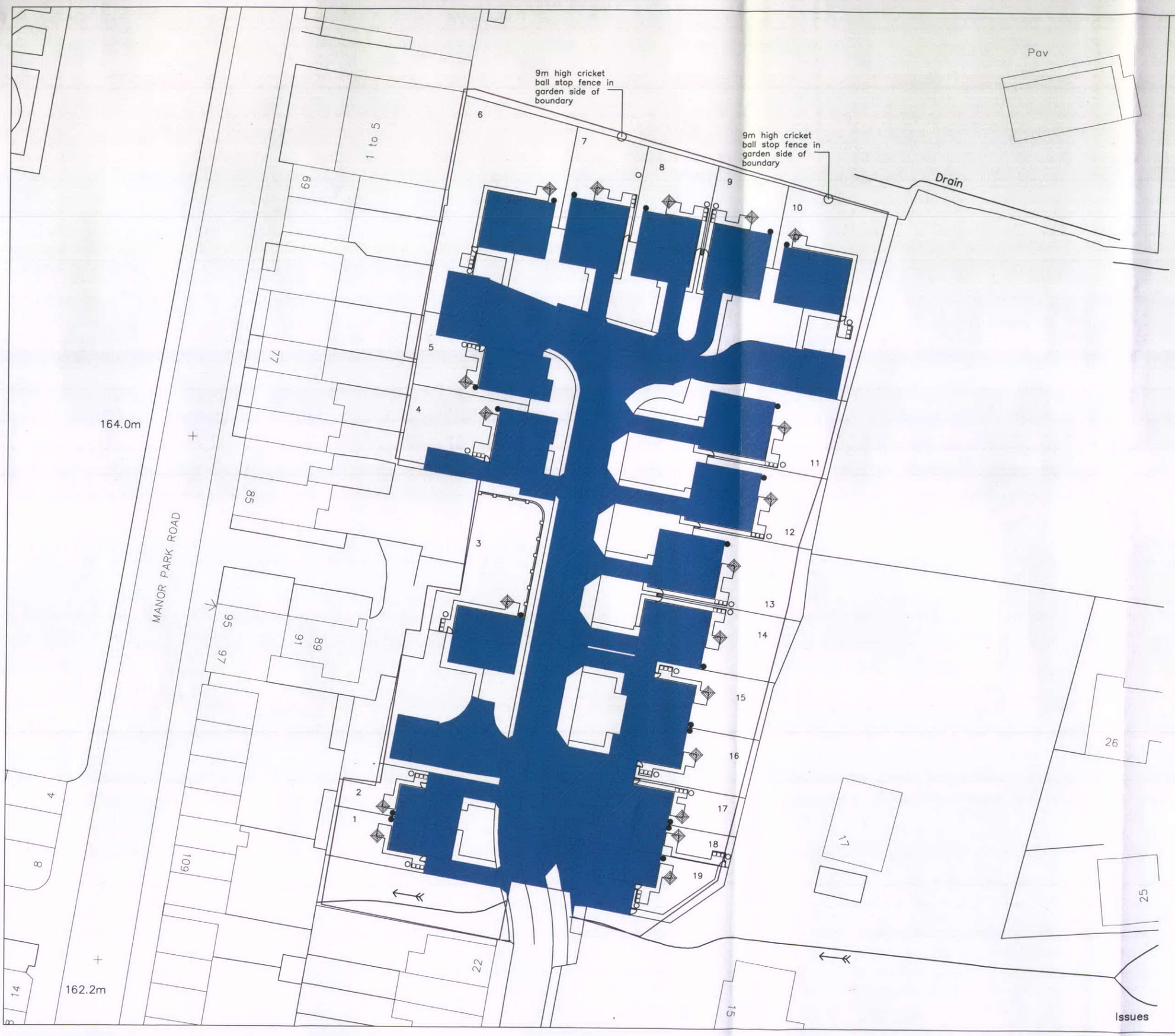

DO NOT SCALE

LEGEND

PROPOSED IMPERMEABLE AREA
[2453sqm - 0.245Ha]

REV	DATE	BY	DESCRIPTION	CHK
P2	26.10.12	RDN	UPDATED TO SUIT REVISED LAYOUT	RA

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

prospect. HOMES

PROJECT:
YORK STREET
GLOSSOP

TITLE:
POST-DEVELOPMENT
IMPERMEABLE AREAS PLAN

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
AUG 2012	NTS	RDN	RA

PROJECT No:	DRAWING No:	REV:
PRS09	101	P2

Issues