Ref: 3995/2.3
Date- 25th January 2016
PLOVER ROAD, MINSTER – RESIDENTIAL SITE

ADDENDUM FLOOD RISK ASSESSMENT

INTRODUCTION

This report has been produced as an addendum to the Flood Risk Assessment revision B dated 2nd July 2015 to address comments made by the Mid Kent Planning team drainage engineer and the Lower Medway Internal Drainage Board. These comments are contained within Appendix A.

SURFACE WATER DRAINAGE

The comments from the IDB and Mid Kent planning team were that the proposed off site flow rate of 31l/s for the site was too high as this was based on the existing 1 in 100 year flow rate.

It is therefore proposed to discharge to the existing QBar rate of 10.7l/s, which is based on the residential site area of 3 hectares. See Microdrainage ICP SUDS rural run-off summary within Appendix B.

The surface water drainage strategy was therefore re-designed to suit this much reduced rate and it was found that the overall storage requirement was 950m³ during the peak 1 in 100 year storm event. (see Microdrainage summary calculations in Appendix C)

The Mid Kent Planning team also made comments regarding the off site 450mm surface water drain proposed. Since these comments further survey work were carried out to clear vegetation from the northern boundary and an existing ditch was discovered which conveys existing flows from the fields to the existing Scrapsgate Drain, with a pipe link under the footpath running parallel to this watercourse.

There is therefore a pre-existing right to discharge of surface water through the adjacent land.

A topographical survey was carried out to survey this ditch and the scheme was re-designed to suit the existing invert level. The proposed storage swale invert was raised to 6.800 from the previously submitted design which has reduced the capacity of this swale.

To compensate, storage is proposed to be spread through the site into 5 main permeable paved areas, each with flow restrictions.

gloucester house, 66a church walk, burgess hill, west sussex rh15 9as
tel: 01444 871444 fax: 01444 871401
email: mroberts@gtacivils.co.uk www.gtacivils.co.uk

The storage potential of each area is summarised in the table on drawing 3995/SK100 rev C in Appendix B, but also replicated below:

STORAGE STRUCTURE	
SWALE	264m³
Upper Pond	50m³
Permeable Paving Zone 1	155m³
Permeable Paving Zone 2	54m³
Permeable Paving Zone 3	62m³
Permeable Paving Zone 4	400m³
Permeable Paving Zone 5	300m³
TOTAL	**1021m³**

It can be seen from the table that the required storage of 950m³ for the whole site is reached. The detailed design will assign the exact flow restrictions for each area.

The Mid Kent planning team also raised concerns over the diversion of the existing ditch serving the existing housing estate to the east, particularly with regards to the 90 degree bend.

The scheme has been re-designed to take the ditch into the Upper pond, which will then be drained through the site via a new swale to the side of the road. It is still proposed to retain an existing ditch to the eastern boundary as it is felt that filling this ditch would present a land drainage problem as the adjacent site may also discharge to some extent into this. The supermarket site will also discharge to this ditch.

It is proposed that this ditch is contained within the rear gardens and a covenant written in the deeds of each sale that this ditch must be maintained under riparian law. Alternatively, subject to Mid Kent consent, a secondary fence line could be introduced so that there is a zone for this ditch which can be maintained by the management company. This could be finalised at detailed design stage.

CONCLUSION

With these revised proposals, it is proposed that the flood risk to adjacent properties will be much reduced as there will be a significant volume of storage provided and all storms will be restricted to the Qbar greenfield run off rate.

Martin Roberts IEng, ACIWEM, MCIHT
Managing Director
gta civils ltd - consulting engineers

APPENDIX A

Comments from Mid Kent Planning team and Lower Medway IDB

this. Where the site access needs to cross this realigned ditch, a clear span bridge should be provided in preference to a culvert. However, it must be ensured that there is no net-loss in open ditch length/volume.

The ongoing maintenance of any drainage system should also be fully considered at this stage. With the presently proposed layout, we have concerns that it will be particularly difficult to gain access to the ditches forming the boundaries to the south and east of the site. We also have concerns over the system's general ability to function as designed if the '450mm culverted ditch' across third party land cannot be secured. If permission from the neighbouring land owner can be obtained, a blockage of this culvert would lead to a significant flood risk to the development site. If the principle of the third-party land crossing is acceptable, we would encourage the developer to consider seeking permission to construct an open-channelled conveyance feature, with the maintenance responsibilities clearly outlined.

If the permission of the owner of the adjacent land cannot be obtained, the entire network will need to be reconfigured.

In light of the above, we would request that a **holding objection** is registered pending the submission of revised information to demonstrate that the drainage from this site can be managed without exacerbating the on/off-site flood risk.

Please let me know if I can be of any further assistance?

Kind regards,

Joe Williamson

Joseph Williamson | Flood Risk Project Officer | **Kent County Council**
Environment Planning and Enforcement, Invicta House, County Hall, Maidstone, Kent, ME14 1XX
t: 03000 413481 | **e:** joseph.williamson@kent.gov.uk | www.kent.gov.uk

-----Original Message-----
From: pstechnical@midkent.gov.uk [mailto:pstechnical@midkent.gov.uk]
Sent: 11 September 2015 17:00
To: SUDS - GT
Subject: Planning consultation 15/507059/OUT Land North Of Plover Road Minster-on-sea Kent ME12 3BT

Please see attached letter for your consideration

From: Planning Support Technical
Sent: 2 Oct 2015 15:27:14 +0100
To: Scanning Team
Subject: FW: Planning consultation 15/507059/OUT Land North Of Plover Road Minster-on-sea Kent ME12 3BT

Marilyn Kimber
Planning Support Officer (Technical Team)
Mid Kent Planning Support
Maidstone BC, Swale BC and Tunbridge Wells BC
t 01622 602459

MKPS – Working in Partnership with: *Maidstone, Swale andTunbridge Wells Councils*
***Please note**: All planning related correspondence for MBC, SBC and TWBC should be sent to:*
Mid Kent Planning Support, Maidstone House, King Street, Maidstone ME15 6JQ
Tel: 01622 602736 email: planningsupport@midkent.gov.uk
Access planning services online at: www.maidstone.gov.uk; www.swale.gov.uk; www.tunbridgewells.gov.uk or submit an application via www.planningportal.gov.uk

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From: Joseph.Williamson@kent.gov.uk [mailto:Joseph.Williamson@kent.gov.uk]
Sent: 02 October 2015 14:55
To: Planning Support Technical
Cc: pete.dowling@riverstouridb.org.uk
Subject: RE: Planning consultation 15/507059/OUT Land North Of Plover Road Minster-on-sea Kent ME12 3BT

Good afternoon.

Thank you for consulting us on the above application.

We would initially recommend that the Lower Medway Internal Drainage Board are consulted owing to the applicant's proposed realignment of, and subsequent discharge of surface water to, an on/off-site ditch system. Their prior written approval will be required for any such works, and the rate at which the runoff discharges to this system will need to be agreed with them prior to the finalisation of the drainage design. It is likely that the proposed 31l/s will be higher than the maximum flow rate that they will be willing to receive. For this ~3ha site, we would anticipate that a maximum rate of around 12-15l/s would be more appropriate, with lower intensity rainfall events generating correspondingly lower flows than this figure.

We also have concerns with the depicted realignment of the existing ditch and would encourage the applicant to reconsider the proposed 90 degree bend. It would facilitate the conveyance of water and the maintenance of the drainage network if this were redesigned to run in a straight line alongside the new highway. The depicted attenuation pond could be redesigned to be an online feature (with a flow control device limiting the rate of discharge downstream). This may require a small amount of reprofiling of the open green space, but we would not anticipate any significant difficulties in achieving

From: Planning Comments
Sent: 1 Oct 2015 12:19:51 +0100
To: Scanning Team
Subject: FW: 15/507059 - Outline application for residential development on land off Plover Road, Minster.
Attachments: LM Byelaws.pdf

From: Pete Dowling [mailto:Pete@medwayidb.co.uk]
Sent: 30 September 2015 17:27
To: Planning Support
Subject: 15/507059 - Outline application for residential development on land off Plover Road, Minster.

Dear Sir/Madam,

Thank you for your letter dated 11 September regarding the above planning application.

The applicant should be advised that this site is within the Lower Medway IDB's district and therefore any works connected to any watercourse, or within 8 metres of an IDB maintained watercourse, will require the Board's prior formal written consent (a copy of the Board's byelaws is attached). The site drains to Scrapsgate Drain which is IDB maintained. The proposal therefore has the potential to affect IDB interests.

The applicant states that the existing runoff rates from the site, including an adjacent site for a foodstore (ref 15/505670), have been calculated to be 9.7l/s (Qbar) and 31l/s (Q100) and proposes to attenuate post-development runoff to a rate of 31l/s. Whilst it is very much agreed that the wider site should be considered, the overall rate of discharge should ideally be restricted to 9.7l/s, but at the very least should be replicate Greenfield conditions (if runoff was restricted to this higher rate, local flood risk during lower than 1 in 100 year events would be increased). I therefore **object** to the proposal as currently detailed.

It is requested that details of drainage be agreed in direct consultation with KCC's Drainage and Flood Risk Management Team.

Regards

Peter Dowling
On behalf of the Lower Medway IDB

APPENDIX B

Microdrainage Rural run-off calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	3.000	Urban	0.000
SAAR (mm)	587	Region Number	Region 7

Results l/s

QBAR Rural	10.7
QBAR Urban	10.7
Q100 years	34.2
Q1 year	9.1
Q30 years	24.3
Q100 years	34.2

APPENDIX C

Microdrainage Calculations
Whole site tank to determine required storage volume

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 962 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	10.340	0.340	0.0	5.7	5.7	323.2	O K
30 min Summer	10.455	0.455	0.0	6.6	6.6	432.5	O K
60 min Summer	10.577	0.577	0.0	7.4	7.4	548.1	O K
120 min Summer	10.696	0.696	0.0	8.1	8.1	661.5	O K
180 min Summer	10.758	0.758	0.0	8.5	8.5	720.0	O K
240 min Summer	10.795	0.795	0.0	8.7	8.7	754.8	O K
360 min Summer	10.840	0.840	0.0	8.9	8.9	798.1	O K
480 min Summer	10.862	0.862	0.0	9.0	9.0	819.3	O K
600 min Summer	10.871	0.871	0.0	9.1	9.1	827.9	O K
720 min Summer	10.873	0.873	0.0	9.1	9.1	829.6	O K
960 min Summer	10.873	0.873	0.0	9.1	9.1	829.1	O K
1440 min Summer	10.860	0.860	0.0	9.0	9.0	816.8	O K
2160 min Summer	10.825	0.825	0.0	8.8	8.8	784.2	O K
2880 min Summer	10.785	0.785	0.0	8.6	8.6	746.0	O K
4320 min Summer	10.706	0.706	0.0	8.2	8.2	670.6	O K
5760 min Summer	10.635	0.635	0.0	7.8	7.8	603.1	O K
7200 min Summer	10.573	0.573	0.0	7.4	7.4	544.5	O K
8640 min Summer	10.519	0.519	0.0	7.0	7.0	493.5	O K
10080 min Summer	10.472	0.472	0.0	6.7	6.7	448.1	O K
15 min Winter	10.382	0.382	0.0	6.0	6.0	362.5	O K
30 min Winter	10.511	0.511	0.0	7.0	7.0	485.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	122.433	0.0	297.6	34
30 min Summer	82.239	0.0	395.8	48
60 min Summer	52.662	0.0	550.7	78
120 min Summer	32.503	0.0	680.5	134
180 min Summer	24.118	0.0	757.0	192
240 min Summer	19.386	0.0	810.5	250
360 min Summer	14.268	0.0	892.2	368
480 min Summer	11.460	0.0	951.6	484
600 min Summer	9.659	0.0	997.5	600
720 min Summer	8.396	0.0	1033.4	672
960 min Summer	6.724	0.0	1080.6	782
1440 min Summer	4.907	0.0	1091.5	1038
2160 min Summer	3.573	0.0	1375.5	1452
2880 min Summer	2.849	0.0	1460.3	1860
4320 min Summer	2.067	0.0	1576.9	2684
5760 min Summer	1.644	0.0	1698.5	3472
7200 min Summer	1.377	0.0	1778.0	4256
8640 min Summer	1.193	0.0	1845.1	5024
10080 min Summer	1.056	0.0	1900.3	5760
15 min Winter	122.433	0.0	333.0	34
30 min Winter	82.239	0.0	438.1	48

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	10.648	0.648	0.0	7.8	7.8	615.4	O K
120 min Winter	10.783	0.783	0.0	8.6	8.6	744.1	O K
180 min Winter	10.854	0.854	0.0	9.0	9.0	811.4	O K
240 min Winter	10.897	0.897	0.0	9.2	9.2	852.2	O K
360 min Winter	10.952	0.952	0.0	9.5	9.5	904.5	O K
480 min Winter	10.981	0.981	0.0	9.6	9.6	932.1	O K
600 min Winter	10.995	0.995	0.0	9.7	9.7	945.7	O K
720 min Winter	11.001	1.001	0.0	9.7	9.7	950.6	O K
960 min Winter	10.995	0.995	0.0	9.7	9.7	945.3	O K
1440 min Winter	10.976	0.976	0.0	9.6	9.6	927.2	O K
2160 min Winter	10.926	0.926	0.0	9.4	9.4	879.4	O K
2880 min Winter	10.866	0.866	0.0	9.1	9.1	823.0	O K
4320 min Winter	10.750	0.750	0.0	8.4	8.4	712.8	O K
5760 min Winter	10.649	0.649	0.0	7.8	7.8	616.5	O K
7200 min Winter	10.564	0.564	0.0	7.3	7.3	535.3	O K
8640 min Winter	10.491	0.491	0.0	6.8	6.8	466.6	O K
10080 min Winter	10.428	0.428	0.0	6.4	6.4	406.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	52.662	0.0	617.4	76
120 min Winter	32.503	0.0	762.2	132
180 min Winter	24.118	0.0	847.2	190
240 min Winter	19.386	0.0	906.3	246
360 min Winter	14.268	0.0	995.7	360
480 min Winter	11.460	0.0	1059.2	474
600 min Winter	9.659	0.0	1105.8	586
720 min Winter	8.396	0.0	1139.1	694
960 min Winter	6.724	0.0	1171.1	886
1440 min Winter	4.907	0.0	1173.9	1106
2160 min Winter	3.573	0.0	1540.9	1568
2880 min Winter	2.849	0.0	1635.5	2016
4320 min Winter	2.067	0.0	1762.0	2868
5760 min Winter	1.644	0.0	1902.9	3696
7200 min Winter	1.377	0.0	1992.1	4536
8640 min Winter	1.193	0.0	2067.8	5288
10080 min Winter	1.056	0.0	2130.9	6064

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.440

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.288	8	12	0.288	16	20	0.288
4	8	0.288	12	16	0.288			

Model Details

Storage is Online Cover Level (m) 13.000

Cellular Storage Structure

Invert Level (m) 10.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1000.0	1000.0	2.100	0.0	1280.0
2.000	1000.0	1280.0			

Hydro-Brake® Outflow Control

Design Head (m) 1.200 Diameter (mm) 100
Design Flow (l/s) 10.7 Invert Level (m) 10.000
Hydro-Brake® Type Md3 (Obsolete)

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	10.7	3.000	16.9	7.000	25.8
0.200	5.6	1.400	11.5	3.500	18.2	7.500	26.7
0.300	5.4	1.600	12.3	4.000	19.5	8.000	27.6
0.400	6.2	1.800	13.1	4.500	20.7	8.500	28.4
0.500	6.9	2.000	13.8	5.000	21.8	9.000	29.2
0.600	7.5	2.200	14.4	5.500	22.8	9.500	30.0
0.800	8.7	2.400	15.1	6.000	23.9		
1.000	9.7	2.600	15.7	6.500	24.8		

APPENDIX D

Proposed site drainage scheme 3995/SK100C

GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations , record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.

2. Tender or billing drawings shall not be used for construction or the ordering of materials.

3. Do not scale. All dimensions and levels to be site confirmed.

4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements

6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.

EXISTING DITCH DRAINING SITE

EXISTING STREAM

Existing 150Φ outfall to watercourse

Ex ditch bed 6.680

Control chamber Max outflow 10.7 l/s (Existing QBar rate from residential site) IL 6.800

EXISTING DITCH

EXISTING DITCH

PROPOSED REPLACEMENT DITCH - 4M WIDE TOP OF BANK TO TOP OF BANK

Top of banks 7.500m AOD

FLOW RESTRICTION

PERMEABLE PAVING ZONE 4 - AREA = 518M/SQ. DEPTH TO FORMATION 1.1M. WITH CELLULAR TANK UNDER, 0.68M DEEP. TOTAL STORAGE 400m/cubed

PERMEABLE PAVING ZONE 3 - AREA = 186M/SQ. DEPTH TO FORMATION 1.2M. SUB-BASE STORAGE 62m/cubed

PERMEABLE PAVING ZONE 2 - AREA = 230M/SQ. DEPTH TO FORMATION 0.7M. SUB-BASE STORAGE 54m/cubed

TANK

Proposed Tank 342 cu.m capacity (UNDER SEPERATE APPLICATION)

Control chamber Max outflow 6 l/s

FLOW RESTRICTION

NEW SWALE

FLOW RESTRICTION

PROPOSED SWALE 264cu.m capacity

NEW SWALE

EXISTING DITCH TO BE DIVERTED UNDER SUPERMARKET SCHEME

NEW SWALE

Section A-A

FLOW RESTRICTION

PERMEABLE PAVING ZONE 1 - AREA = 463M/SQ DEPTH TO FORMATION 1.2M SUB-BASE STORAGE 155m/cubed

FLOW RESTRICTION

FLOW RESTRICTION

EXISTING DITCH DIVERTED INTO NEW POND

PROPOSED POND 1 - 50cu.m capacity peak storage

PERMEABLE PAVING ZONE 5 - AREA = 390M/SQ. DEPTH TO FORMATION 1.1M WITH CELLULAR TANK UNDER, 0.68M DEEP. TOTAL STORAGE 300m/cubed

PARISH ROAD

Key

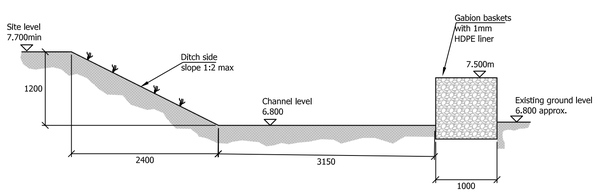
Permeable paving

NOTES

Surface water storage design shown for 1 in 100 year event + 30% climate change

STORAGE SUMMARY

SWALE	264m³
Upper Pond	50m³
Permeable Paving Zone 1	155m³
Permeable Paving Zone 2	54m³
Permeable Paving Zone 3	62m³
Permeable Paving Zone 4	400m³
Permeable Paving Zone 5	300m³
TOTAL	1021m³



TYPICAL SECTION A-A
THROUGH DITCH/ SWALE
1:50

Rev	Amendments	Date	Dsn	Chk
C	Updated to latest site layout and KCC/IDB comments	23.01.16	MR	NS

Status: PRELIMINARY

Client: DALEMARCH SHEPPY LTD

Architect: BDB

Project: PROPOSED MIX DEVELOPMENT LAND OFF PLOVER ROAD, SHEPPY

Title: SURFACE WATER DRAINAGE STRATEGY

Date: APRIL 2012	Scale @ A1: 1:500
Base Layout Ref.	CAD File ref.
Clients Ref.	Project Ref.: 3995

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CONSULTING ENGINEERS
gloucester house, 66a church walk,
burgess Hill, west sussex, rh15 9as
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Drawing Number: 3995/SK100

Rev.: C