



W471 – Land at Harleston, Norfolk
Flooding and drainage note
For Scott Properties
November 2018

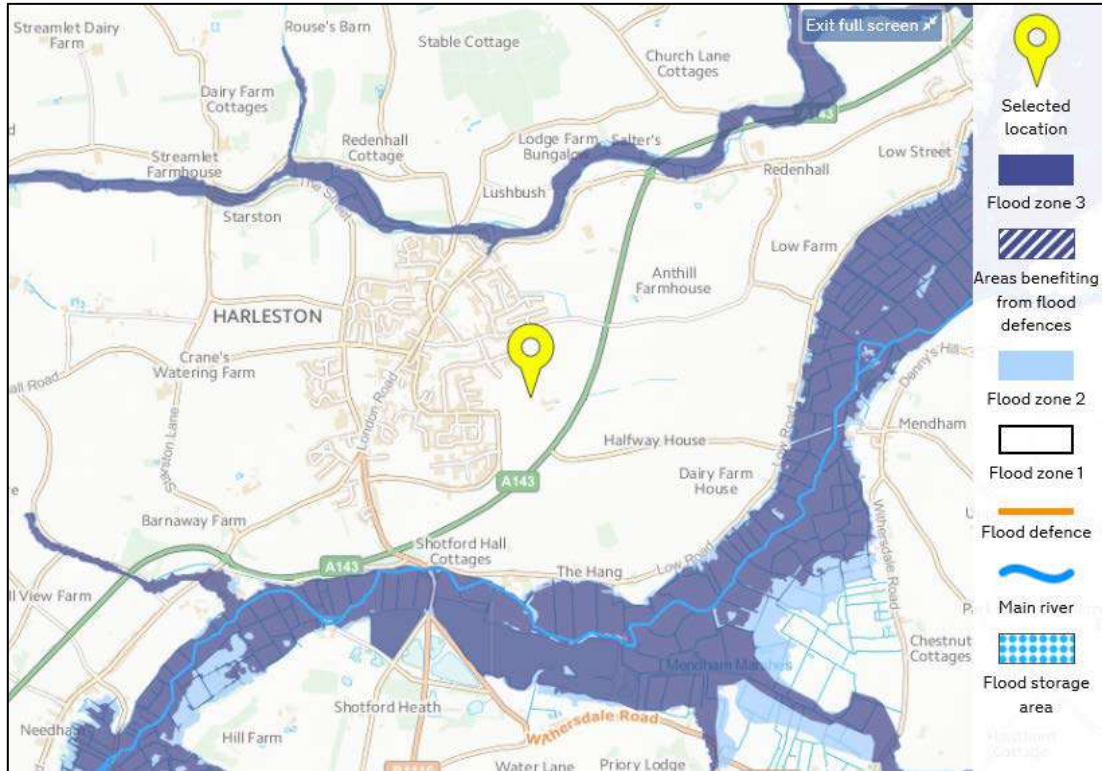
Introduction

This note presents the findings of a desktop investigation into flooding and drainage issues for a potential mixed use development site in the east of Harleston, Norfolk. The site is identified as GNL2136 in the Greater Norwich Local Plan Regulation 18 Consultation.

The site extends to approximately 27 ha of predominantly undeveloped greenfield land. The site lies to the west of the A143 and south of Green Lane, and is approximately centred on Ordnance Survey grid reference 625336,283181.

Flooding

The site lies in Flood Zone 1 (see map extract below) and is not therefore considered to likely to be affected by floodwater from a watercourse (or tidal source).



Flood map for planning extract (22/10/2018) © Crown copyright and database rights 2018 Ordnance Survey 100047325

The surface water flood map for the area (see extracts below) shows a band of shallow low risk, surface water flooding flowing northwards through the east of the site (eventually entering the ditch/watercourse to the north of Green Lane). The map also picks out the land drainage/boundary ditch network on and around the site. The limited extent and/or low probability of the flooding means that it is not considered to pose any notable or unmanageable constraint to the development of the site. The inclusion of a shallow landscaped channel and/or low bund in the east of the site would allow for the surface water flow route to be maintained without causing any negative on or off-site effects.



Surface water flood map extract (19/10/2018)© Crown copyright and database rights 2018 Ordnance Survey 100047325



Surface water flood map extract (02/11/2018)© Crown copyright and database rights 2018 Ordnance Survey 100047325

The most notable off-site area of flooding shown on the surface water flood map is the pooling to the east of the A143. The pooling is apparently the result of the combination of the alignment of the A143 embankment and a restriction in the Green Lane watercourses/drainage ditches where they have been piped beneath the A143 (the images below show the apparent outlets to the Green Lane watercourses/drainage ditches to the west of the A143).



Headwalls at the heads of the two Green Lane watercourses/drainage ditches to the west of the A 143 (north of Green Lane on the left, south of Green Lane on the east)

As the extent of the pooling upstream of the A143 is limited, and the result of overland rural flow, it is not considered to pose a notable threat to the structure of the A143, or threaten to overwhelm the 'structure' and flow towards the site. In other words the area of flooding is not analogous to a reservoir, and the A143 is not acting on the scale of a reservoir embankment or flood defence structure.

The appended Anglian Water sewer plan shows surface water sewers to the west and north of the site. There is also an unmapped short length of surface water sewer along the site's western boundary. The precise location of the sewer (or its adoption status) is not defined in this note. However, from plans submitted to South Norfolk planning department and the position of manholes observed during a site visit, the sewer is the outfall for the Persimmon Homes "Harvest Way" development. The outfall crosses into the site at a point adjacent to the north-western corner of the Harvest Way basin, runs north (following the western boundary ditch) for some 50 m before outfalling to the ditch through a brick headwall (see images overleaf). For clarity, there is also a length of wastewater sewer shown running from the Harvest Way development to Green Lane, along the western boundary.

None of the surface water sewers in the area are considered to pose a notable or unmanageable threat to the proposed development. In the event that any of them become overloaded (because of an intense rainfall event for example) then any floodwater arising from manholes would tend to be

directed away from the site and/or be intercepted by the existing ditch network. At the masterplanning stage, space for access and a maintenance strip for the boundary ditch and sewers will be provided along the western site boundary. This strip will also allow any flood flows from the surface water sewer to be routed northwards and/or into the ditch.



Image showing the Harvest way development outfall to the western boundary ditch, looking north towards Green Lane

The site geology (Boulder Clay over Crag) suggests that groundwater flooding (i.e. flooding arising from a significant rise in the level of a regional or local groundwater body) is not a realistic threat to the site.

Surface water management

The site is underlain by Boulder Clay over Crag. British Geological Society (BGS) borehole data (available online) suggests that the Crag is not shallow enough to allow the site to be drained using 'normal' depth infiltration methods. Subject to later stage intrusive investigations it is therefore proposed to discharge runoff from the development to the on-site ditch network. Flows would be limited to the mean annual greenfield runoff rate (Q_{BAR}) calculated for the post development impermeable catchment. On-site attenuation would be provided in order to manage the runoff generated by the development for up to and including the 1 in 100 annual probability storm, inclusive of the requisite climate change allowance (currently an allowance of 40 %).

The volume required to attenuate flows to the mean annual greenfield rate per 1 hectare of newly created impermeable cover is approximately 1,300 m³ which would readily fit within the site boundary.

Surface water storage estimate – greenfield discharge

Flow+ - Untitled

File Help

Simulation Settings

Storm Network

Design Settings

Nodes

Links

Hydrographs

Flow Controls

Storage

Other

Results

Approval Settings

Approval Results

Libraries

Manhole Type

Link Types

Preferences

Pre-development discharge

Site Makeup: Greenfield [OK]

Greenfield Method: IH124 [Cancel]

Positively Drained Area (ha): 1.000

SAAR (mm): 604 [Load]

Soil Index: 5

SPR: 0.33

Region: 5

Growth Factor 1 year: 0.87

Growth Factor 30 years: 2.55

Growth Factor 100 years: 3.56

Betterment (%): 0

[Calc]

QBar (l/s): 1.9

Q 1 year (l/s): 1.6

Q 30 year (l/s): 4.8

Q 100 year (l/s): 6.7

Flow+ - Untitled

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Other

Results

Approval Settings

Approval Results

Libraries

Manhole Type

Link Types

Preferences

Storage Estimate

Return Period (years): 100 [OK]

Climate Change (%): 40 [Cancel]

Impermeable Area (ha): 1.000

Peak Discharge (l/s): 1.900

Infiltration Coefficient (m/hr)
(leave blank if no infiltration)

[Calc]

Required Storage (m³)

[Calc]

from: 1195

to: 1308

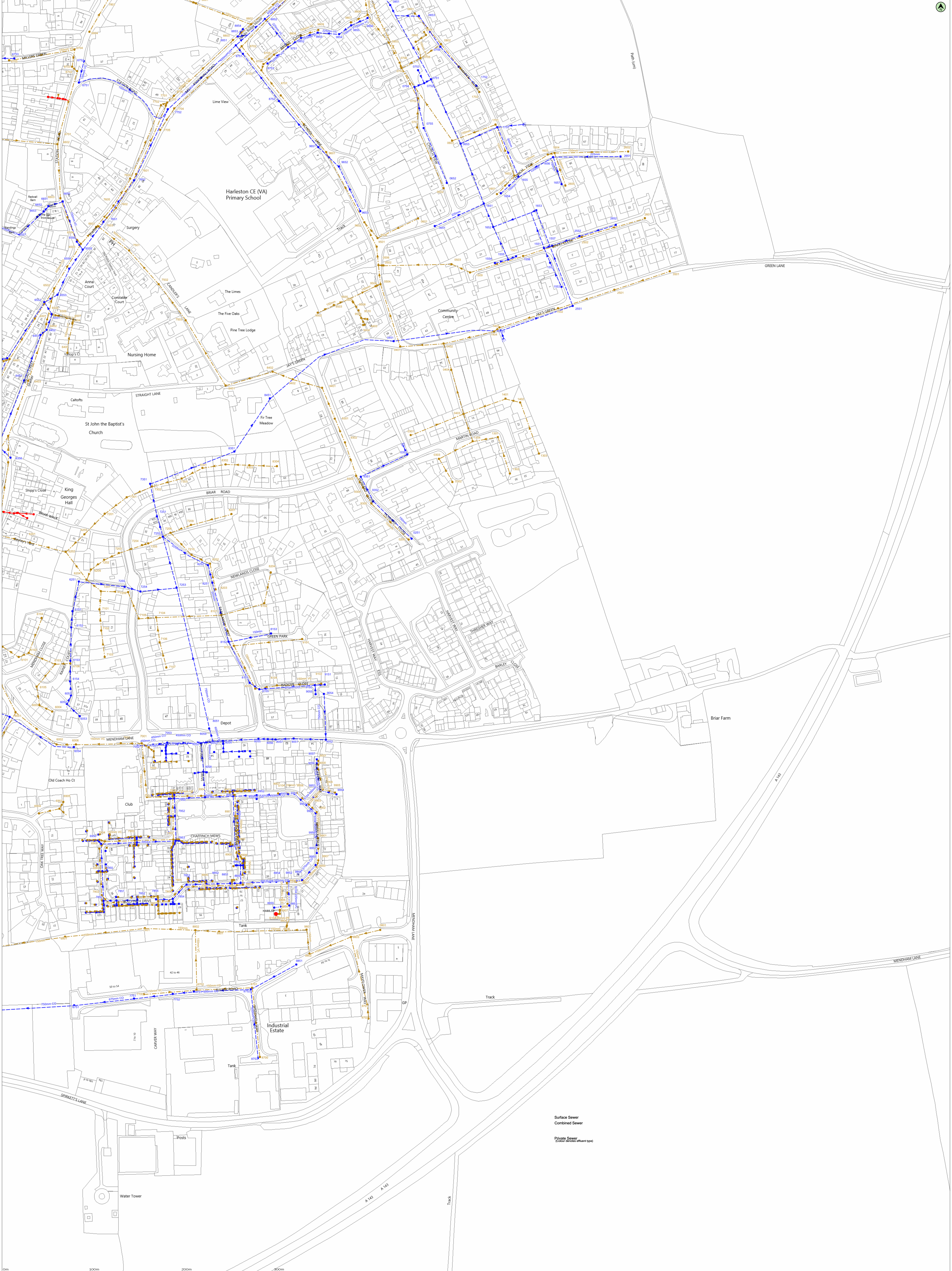
With infiltration (m³)

from: []

to: []



Appended information
Anglian Water sewer plans



0m 100m 200m 300m

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Data updated 04/09/18

Foul Sewer	—	Outfall	⊕	Sewage Treatment Works	□
Surface Sewer	—	Inlet	⊕	Public Pumping Station	●
Combined Sewer	—	Manhole	⊕	Decommissioned Pumping Station	●
Rising Main	—				
Private Sewer	—				
Decommissioned Sewer	—				

David Pearson @ cannone.co.uk
Green Lane, Harleston

Scale: 1:250 Date: 04/10/18
Map Centre: 52510, 26161 Out Ref: 265248 - 2
Prepared by: dpl



This plan is provided by Anglian Water pursuant to obligations under the Water Industry Act 1989 sections 191 or 195. It must be used in conjunction with any records made available. The information on this plan is based on data currently recorded but cannot be guaranteed to be accurate or up-to-date. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by the holder. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record or record at all, the location of any water main, discharge pipe, sewer or disposal main or any form of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (© Crown copyright and database right 2018 Ordnance Survey 10002432). This map is to be used for the purposes of showing the location of Anglian Water plant only. Any other uses of the map data or further copies are not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0200	625032	283296	F	-	-	-
0201	625035	283279	F	32.24	31.21	1.03
0302	625080	283328	F	33.58	32.44	1.14
0303	625065	283353	F	32.85	31.26	1.59
0401	625023	283475	F	30.31	28.07	2.24
0402	625070	283478	F	29.96	28.28	1.68
0403	625092	283402	F	32.18	30.56	1.62
0404	625078	283449	F	31.29	29.66	1.63
0502	625005	283562	F	28.1	26.71	1.39
0503	625079	283564	F	28.93	27.32	1.61
0504	625002	283542	F	28.56	26.93	1.63
0506	625000	283563	F	-	-	-
0601	625042	283613	F	-	-	-
0602	625070	283646	F	-	-	-
0603	625079	283697	F	26.12	22.7	3.42
0701	625042	283712	F	25.61	23.8	1.81
0702	625042	283743	F	24.97	22.89	2.08
0704	625024	283776	F	23.72	22.11	1.61
0705	625045	283787	F	23.64	22.42	1.22
0706	625023	283782	F	-	-	-
0801	625011	282844	F	-	-	-
0801	625039	283835	F	24.12	23.02	1.1
0802	625067	283802	F	23.93	22.63	1.3
0803	625011	283803	F	23.07	21.57	1.5
0804	625051	283812	F	-	-	-
0805	625040	283804	F	-	-	-
1301	625129	283377	F	33	31.67	1.33
1302	625142	283337	F	33.77	32.67	1.1
1303	625173	283359	F	33.42	32.19	1.23
1304	625102	283372	F	32.55	31.17	1.38
1401	625137	283418	F	32.13	31.07	1.06
1402	625153	283414	F	32.47	31.19	1.28
1403	625131	283495	F	30.17	28.78	1.39
1404	625125	283491	F	30.23	28.76	1.47
1501	625156	283572	F	28.57	27.78	0.79
1502	625194	283516	F	30.02	29.25	0.77
1509	625099	283555	F	28.86	27.32	1.54
1510	625128	283639	F	27.04	25.55	1.49
1602	625147	283659	F	26.81	24.47	2.34
1603	625183	283682	F	-	-	-
1604	625190	283684	F	27.5	25.53	1.97
1701	625126	283715	F	24.87	23.49	1.38
1702	625109	283750	F	24.41	23.13	1.28
2501	625255	283636	F	31.02	29.25	1.77
2502	625220	283693	F	29.46	28.33	1.13
2601	625288	283613	F	29.99	29.06	0.93
2602	625270	283686	F	28.48	26.57	1.91
2605	625202	283649	F	-	-	-
3501	625315	283556	F	31.51	30.02	1.49
5102	624993	283190	F	33.5	31.33	2.17
5307	624999	283278	F	26.26	24.51	1.75
5308	624999	283349	F	28	26.34	1.66
5402	624994	283459	F	25.83	24.17	1.66
6001	624607	283079	F	33.8	32.26	1.54
6002	624651	283044	F	35.65	33.44	2.21
6004	624647	283080	F	35.32	34.16	1.16
6005	624633	283086	F	35.36	34.15	1.21
6006	624672	283044	F	-	-	-
6101	624610	283139	F	33.64	31.45	2.19
6102	624621	283143	F	33.54	31.56	1.98
6103	624650	283131	F	34.05	32.24	1.81
6104	624635	283181	F	-	-	-
6105	624630	283107	F	34.48	33.71	0.77
6106	624666	283132	F	34.31	33.38	0.93
6201	624622	283262	F	-	-	-
6202	624661	283252	F	31.17	29.07	2.1
6203	624681	283272	F	30.6	29.36	1.24
6204	624684	283222	F	31.95	29.49	2.46
6402	624686	283233	F	31.54	29.73	1.81
6401	624600	283461	F	25.51	23.72	1.79
6402	624640	283499	F	24.73	23.33	1.4
6403	624621	283438	F	25.1	24.19	0.91
6404	624668	283499	F	-	-	-
6405	624663	283468	F	-	-	-
6501	624628	283505	F	24.76	22.85	1.91
6502	624640	283537	F	24.33	22.37	1.96
6503	624677	283586	F	23.76	21.74	2.02
6504	624671	283592	F	24.54	22.6	1.94
6505	624650	283508	F	-	-	-
6506	624654	283508	F	-	-	-
6507	624670	283504	F	-	-	-
6901	624694	283604	F	23.54	21.6	1.94
6902	624652	283693	F	25.67	24.02	1.65
6903	624655	283635	F	25.55	23.5	2.05
6701	624654	283705	F	25.73	24.2	1.53
6702	624673	283772	F	19.04	17	2.04
6703	624668	283777	F	19.7	17.88	2.82
6704	624671	283786	F	20.07	17.179	2.891
6705	624600	283784	F	20.06	18.308	1.752
6801	624660	282836	F	38.11	34.56	3.55
6804	624687	283815	F	27.72	26.23	1.49
6900	624698	282931	F	-	-	-
6901	624699	282906	F	-	-	-
6903	624654	282975	F	-	-	-
6904	624632	282970	F	-	-	-
6905	624659	282982	F	-	-	-
7000	624747	283015	F	-	-	-
7001	624743	283045	F	-	-	-
7002	624721	283045	F	-	-	-
7101	624698	283190	F	32.3	31.26	0.95
7102	624700	283167	F	33.08	32.05	1.03
7103	624703	283139	F	33.79	32.73	1.06
7104	624759	283181	F	32.45	31.42	1.03
7105	624740	283180	F	32.56	30.81	1.75
7106	624763	283155	F	33.04	31.82	1.22
7107	624770	283127	F	33.48	32.33	1.15
7201	624703	283294	F	30.19	29.46	0.73
7202	624703	283244	F	31.49	29.85	1.64
7203	624719	283251	F	31.05	30	1.05
7204	624744	283260	F	31.07	30.07	1
7205	624750	283261	F	30.96	30.09	0.87
7206	624729	283209	F	32.33	30.27	2.06
7207	624699	283210	F	32.21	29.83	2.38
7208	624775	283273	F	30.83	30.55	0.28
7209	624797	283282	F	31.29	30.71	0.58
7210	624797	283249	F	-	-	-
7301	624727	283311	F	30.01	29.63	0.38
7302	624754	283323	F	30.11	29.76	0.35
7303	624787	283332	F	30.4	29.99	0.41
7501	624730	283578	F	24.32	22.65	1.67
7502	624762	283542	F	26.01	24.38	1.63
7503	624791	283503	F	27.58	25.38	2.2
7601	624737	283661	F	22.59	21.34	1.25
7602	624716	283625	F	23.12	21.43	1.69
7603	624697	283604	F	23.47	21.53	1.94
7604	624731	283656	F	22.62	20.69	1.93
7605	624713	283627	F	23.24	21.22	2.02
7700	624746	282774	F	-	-	-
7701	624771	283738	F	22.04	20.19	1.85
7702	624764	283736	F	22.21	20.2	2.01
7703	624769	283735	F	22.07	21.22	0.85
7704	624776	283732	F	21.72	20.06	1.66
7705	624763	283709	F	22.06	20.5	1.56
7706	624778	283746	F	-	-	-
7801	624747	282845	F	38.28	35.07	3.21
7802	624700	282881	F	-	-	-
7803	624707	282873	F	-	-	-
7803	624799	283847	F	-	-	-
7804	624718	282873	F	-	-	-
7805	624787	282890	F	-	-	-
7806	624773	282875	F	-	-	-
7807	624791	282875	F	-	-	-
7900	624777	282988	F	-	-	-
7901	624749	282987	F	-	-	-
7902	624778	282941	F	-	-	-
7903	624736	282940	F	-	-	-
7904	624704	282939	F	-	-	-
7905	624771	282965	F	-	-	-
8101	624829	283184	F	-	-	-
8102	624876	283197	F	-	-	-
8103	624843	283151	F	33.608	32.488	1.12
8104	624890	283108	F	35.393	33.055	2.338
8105	624866	283104	F	34.9	32.878	2.022
8201	624841	283293	F	31.95	30.97	0.98
8202	624817	283240	F	-	-	-
8203	624823	283212	F	-	-	-
8204	624883	283230	F	-	-	-
8301	624809	283343	F	31.14	30.26	0.88
8302	624834	283347	F	31.73	30.92	0.81
8303	624860	283346	F	-	-	-
8304	624890	283345	F	32.13	32.12	0.01
8401	624834	283432	F	30.07	27.97	2.1
8402	624885	283447	F	30.29	28.96	1.33
8700	624871	282706	F	41.067	38.68	2.387
8701	624863	282781	F	40.134	37.691	2.443
8701	624894	283746	F	23.13	21.03	2.1
8702	624803	282779	F	36.862	36.862	0
8702	624852	283799	F	20.94	19.37	1.57
8703	624873	283773	F	22.047	20.247	1.8
8704	624875	283790	F	21.94	20.34	1.6
8705	624886	283790	F	22.157	20.457	1.7
8801	624827	282841	F	38.47	35.54	2.93
8801	624902	283846	F	-	-	-
8802	624901	282843	F	-	-	-
8802	624862	283823	F	21.28	-	-
8803	624842	283806	F	20.95	19.78	1.17
8803	624853	282892	F	-	-	-
8804	624841	282892	F	-	-	-
8805	624913	282891	F	-	-	-
8806	624899	282843	F	-	-	-
8807	624893	282861	F	-	-	-
8808	624893	282865	F	-	-	-
8900	624846	282935	F	-	-	-
8901	624845	282967	F	-	-	-
8902	624844	282990	F	-	-	-
8903	624839	282989	F	-	-	-
8904	624808	282989	F	-	-	-
8905	624846	282920	F	-	-	-
8906	6248					