

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby

Reference:2022/2922

### **Surface Water Drainage Design**

1 in 100 year

### **Existing Runoff**

The existing site is currently a domestic dwelling referred to as Waipori Lodge and consists of a single large single storey dwelling, access drive, paved areas and vegetated areas. The total site area has been estimated at 3715m² which includes 1071m² of roofed and paved with the remaining 2644m² being vegetation.

The site is currently drained by a 225mm diameter combined sewer which runs north to south from the site and into Carr Hill Lane and then into the Yorkshire Water public sewer. There are numerous connections from roof gutters and foul connections points into the combined sewer. There are also several road gullies which also connect into the combined sewer. The existing sewer network is shown at Appendix A of this report.

The modified rational method was used to estimate the existing runoff from the site for various. Tabulated below are the estimated flows from the site based on an impermeable area of 0.107 hectares.

Return Period Flow in litres per second (I/s)

1 in 1 year 12.55

1 in 30 year 39.92

55.98

Table 1: Modified Rational flows from existing site 0.107 hectares

It is therefore estimated that during a 1 in 100 year plus climate change 40% storm that the site would generate a flow of 78.4l/s. The existing 225mm diameter combined sewer which is at a gradient of 1 in 8 has a free flow capacity of 166.1l/s. It is therefore considered that the existing combined sewer, even factoring in 2l/s for foul sewerage, is adequately sized to convey the 1 in 100 year plus climate change flow downstream.

The runoff and pipe capacity calculations are provide at Appendix A.

Lea Favill - Director

#### 7 Wavenev Close, Burton Upon Stather, Scunthorpe, DN15 9DT

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#### **Proposed Surface Water Drainage Strategy**

The proposal is to introduce 3 additional residential dwellings each with an impermeable area of less than 200m². The site is steep and as such extensive retaining structures will be required around each dwelling. As such, each dwelling will be at a different level and there is very little room for ponds, tanks and swales within each plot. Therefore, a practical minimum discharge rate of 1l/s has been adopted for each of the three plots to give a total of 3l/s additional flow from the site. It is considered that the existing combined 225mm diameter sewer is adequate to convey the additional flow.

The proposed drainage layout is provided at Appendix C.

An assessment of the required balance volume for a paved area has been made using the estimated post development impermeable area of 200m² (0.02 hectares) from each plot. Using WinDes Source Control software developed by Microdrainage the required soakaway sizing has been calculated for the 1 in 100 year plus climate change (40%) event.

Reference should be made to Appendix D where the calculation sheets are provided. The drainage strategy drawing provided at Appendix C shows the location of the crate tanks within each plot. It is estimated that a tank 9m² by 0.8m deep will be required in each plot.

#### **Proposed Foul Water Drainage Strategy**

The foul drainage from each of the three new plots will be connected to the existing combined sewer as per the drainage strategy provided at Appendix C.

#### **Adoption & Maintenance**

The piped drainage and tank systems within the site will be the responsibility of the individual owners. This will also include the pipes and manholes.

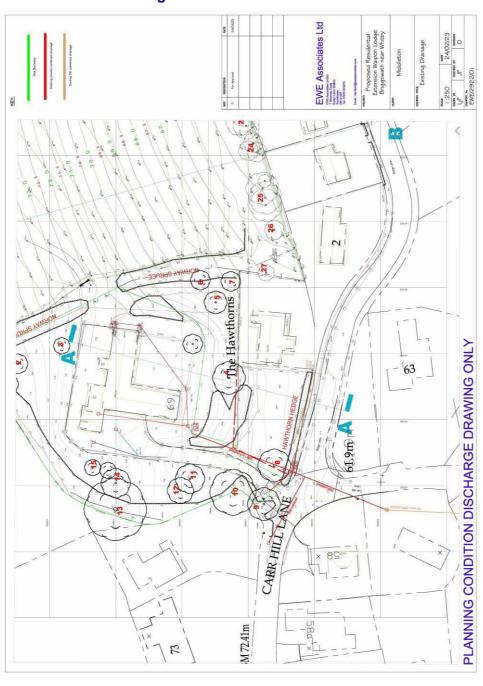
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## **APPENDIX A – Existing Site Plan**



Lea Favill - Director

## 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

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Site: Waipori Lodge Briggswath Whitby

Max Height Min Height DeltaH Stope (%) To (mins) ARF SAAR 70 UCWI PIMP SCHOOL OF TO (mins) PROPERTOR  CV Or Or Or Modified Rational Meth Longth (m) Max Height Min Height DeltaH Stope (%) To (mins) ARF	76 0.107 72.5 66.0 6.5 8.54 7.36 0.999 0.36 77.83 0.25 100.0 0.36 77.83 0.25 hod	m Ha mAOD mins.	Post Development Rainfall Duration (hours) 1.5 2.75 1.5 1.75 2.25 2.75 3.35 3.75 4.42 Post Development Rainfall Duration (hours)	Rainfall Duration (days) 0.005 0.005 0.010 0.021 0.031 0.042 0.063 0.073 0.063 0.073 0.083 0.073 0.083 0.074 0.104 0.104 0.105 0.125 0.135 0.146 0.159 0.167 0.177 Return Period	(mm) 5 6.65 8.7 10.17 11.36 12.37 13.26 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	Effective Depth (mm) 6.0 6.0 6.0 6.7 8.8 10.3 11.5 12.5 13.4 14.5 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15	years (mnhr) (mnhr) (mnhr) (mnhr) (41.7 20.6 11.7 4 11.5 6.8 8.0 11.6 11.6 11.6 11.6 11.6 11.6 11.6 11	FLOW (#s)  12.6 8.0 5.2 4.1 3.4 3.0 2.7 2.4 2.2 1.1 1.9 1.8 1.7 1.6 1.5 1.4 1.4	FLOV (Wsihe 117.3 74.8 48.9 38.1 32.0 27.8 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.7 14.1
Area (ha) Max Height DeltaH Slope (%) To (mins) ARF SAAR 17 UCW PRIME SOIL CV Cr Cr Cr Modified Rational Meth Length (m) Max Height DeltaH Min Height DeltaH Solote (m) Max Height DeltaH Solote (m) Max Height DeltaH Slope (%) To (mins) ARF	0.107 725 660 658,54 7.38 95 100,999 100,000 0.36 77.83 0.25 112.55 hod 76 0.107 7725 660 660 6.5	mAOD mAOD mins mm mm %	(nours) 0.12 0.25 0.5 0.5 0.75 1 1.25 1.5 1.75 2.2 2.25 2.76 3.35 3.75 4.425	(days) 0.005 0.010 0.005 0.010 0.021 0.031 0.052 0.052 0.053 0.073 0.083 0.083 0.094 0.115 0.115 0.125 0.135 0.135 0.146 0.167 0.177  Return Period  Rainfall Duration	(mm) 5 6.65 8.7 10.17 11.36 12.37 13.26 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	Depth (mm) 6.0 6.0 6.7 8.8 10.3 11.5 12.5 13.4 14.2 15.0 15.7 16.9 17.4 18.0 18.5 19.4 19.4	(mm/hr) 41.7 28.6 17.4 13.6 11.4 9.9 6.8 6.0 7.4 6.9 6.4 6.1 5.7 5.5 2 5.0 4.8 4.8 4.8 years	12.6 8.0 5.2 4.1 3.4 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.6 1.6 1.5	(Vs/hz 117.3
Max Height Min Height DeltaH Stope (%) To (mins) ARF SAAR 7 UUW PMP SAAR FOR CEPETOR  COP COP COP COP COP COP COP COP COP CO	72.5 66.0 6.5 8.54 7.38 0.999 100.0 85 100.0 0.38 77.83 0.25 12.55 hod 76 0.107 72.5 66.0 6.5	mAOD mAOD mins mm mm %	0.12 0.25 0.5 0.76 1 1.05 1.15 1.15 2.2 2.25 2.75 3.3 3.25 3.76 4 4.25	0.005 0.010 0.021 0.021 0.031 0.042 0.063 0.063 0.073 0.083 0.094 0.115 0.125 0.135 0.146 0.156 0.156 0.157 Return Period	5 6 65 8.7 10.17 11.36 12.37 13.26 14.06 14.79 15.47 16.69 17.24 17.77 18.28 18.76 19.22 19.67	8.0 8.7 8.8 10.3 11.5 12.5 13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.0 19.4 19.9 30 50	41.7 28.6 17.4 13.8 11.4 9.9 8.8 8.0 7.4 6.9 6.4 9.1 5.7 5.5 5.2 6.0 4.8 4.8	8.0 5.2 4.1 3.4 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	1173 74.8 48.9 38.1 32.0 27.8 24.9 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
Min Height DeltaH Slope (%) To (mins) ARF SAAR 10 UCW PRIMP SOIL PRETENTIAGE RUNOIF PR DEEPSTOR  CV Cr Longth (m) Area (ha) Max Height Min Height DeltaH Slope (W) To (mins) ARF	68.0 6.5 8.54 7.38 0.999 706.000 0.38 77.83 0.25 0.7783 1.3 12.55 hbd	mAOD mins mm mm %	0.26 0.5 0.76 1 1 1.26 1.5 1.75 2.2 2.25 2.5 2.76 3.35 3.35 3.5 4.425	0.010 0.021 0.031 0.042 0.052 0.063 0.073 0.083 0.094 0.115 0.115 0.125 0.135 0.146 0.167 0.177 Return Period	6 65 8.7 10.17 11.36 12.37 13.26 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	6.7 8.8 10.3 11.5 12.5 13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.9 30 50	26.6 17.4 13.8 11.4 9.9 8.8 8.0 7.4 6.9 6.4 6.1 5.7 5.5 5.2 5.0 4.8 4.8 4.8 4.8	8.0 5.2 4.1 3.4 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	74.8 48.9 38.1 32.0 27.8 24.9 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
DeltaH SiOpe (%) To (mins) ARF SAAR 7 SAAR 7 PIMP SOCIETY PRIP OCC CV CV CV CV Modified Rational Meth Langth (m) Ares that Max Height Min Height DeltaH Siope (%) To (mins) ARF	6.5 8.54 7.38 0.999 706.000 85 100.0 0.36 77.83 0.25 0.7783 1.3 12.55 hod	mins mm mm %	0.5 0.76 1.105 1.105 1.15 1.176 2.205 2.25 2.25 2.35 3.325 3.76 4.425	0.021 0.031 0.042 0.062 0.063 0.073 0.083 0.094 0.115 0.125 0.135 0.156 0.156 0.157 0.157 0.157	8.7 10.17 11.36 12.37 13.26 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	8.8 10.3 11.5 12.5 12.5 13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 19.0 19.4 19.9	17.4 13.8 11.4 9.9 8.8 8.0 7.4 6.9 6.4 9.1 5.7 5.5 5.2 5.0 4.8 years	5.2 4.1 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	48.9 38.1 32.0 27.8 24.9 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
Slope (%) To (mins) ARF SAAR TO (UCW) PRIME SOIL PROTECTION OF C Cr  Modified Rational Meth Longth (m) Area (ha) Max Height Min Height DataH Slope (%) To (mins) ARF	8.54 7.36 0.996 0.996 100.0 85 100.0 0.36 77.83 0.25 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	mm mm % Us	0.76 1.26 1.5 1.5 1.75 2.2 2.25 2.5 2.75 3.3 3.25 3.5 3.76 4 4.25	0.031 0.042 0.052 0.063 0.073 0.083 0.073 0.084 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177  Return Period  Rainfall Duration	10.17 11.36 12.37 13.26 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	10.3 11.5 12.5 13.4 14.2 15.0 15.7 16.9 17.4 18.0 18.5 19.0 19.4 19.9	138 1114 9.9 8.8 8.0 7.4 6.9 6.4 6.1 5.7 5.5 5.2 5.0 4.8 4.8 4.8 4.8	4.1 3.4 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5 1.4	38.1 32.0 27.8 24.9 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
To (mins) ARF ARF SAAR 7 SAAR 7 PIMP SOCIETY PRIP OCC CV CV CV CV Modified Rational Meth Longth (m) Ares that Modified Rational Meth Longth (m) Max Height Min Height Doltah H Stope (%) To (mins) ARF	7.38 0.999 706.000 85 100.0 0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	mm mm % Us	1 1.25 1.5 1.5 1.7 2 2.25 2.25 2.25 2.25 3.3 3.25 3.76 4 4.25	0.042 0.052 0.063 0.073 0.083 0.094 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177	11.36 12.37 13.26 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	11.5 12.5 13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	11.4 9.9 8.8 8.0 7.4 6.9 6.4 6.1 5.7 5.5 5.2 5.0 4.8 4.6	3.4 3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	32.0 27.8 24.9 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
ARF SAAR 170 UCWI PIMIP SOIL PETCENTRE RUNOIF PR DEEPSTOR  CV Cr Longth (m) Area (ha) Max Height Min Height Delta H Stope (W) To (mins) ARF	0.999 706.000 85 1100.0 0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	mm mm % Us	1.25 1.5 1.75 2.25 2.5 2.5 3.3 3.25 3.5 4 4.25	0.052 0.063 0.073 0.083 0.094 0.104 0.115 0.125 0.146 0.156 0.156 0.177 Return Period	12.37 13.26 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	12.5 13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.9	9.9 8.8 8.0 7.4 6.9 6.4 6.1 5.7 5.5 5.2 6.0 4.8 4.8	3.0 2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.5	27.8 24.9 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5 13.0
SAAR ULUCWI PIMP SOOIL PROPERTY OF COMMENT O	706.000 85 100.0 0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	mm % Vs Ma Ha mAOD	1.5 1.76 2 2 2 26 2.5 2.76 3.3 3.26 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.063 0.073 0.083 0.094 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177 Return Period	13.26 14.06 14.06 14.79 15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67	13.4 14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	6.8 8.0 7.4 6.9 6.4 6.1 5.7 9.5 5.2 5.0 4.8 4.6	2.7 2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	24.9 22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5 13.0
UCWI PIMP SOIL Percentage Runoff PR DEEPSTOR  CV Cr Modified Rational Meth Longth (m) Area (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	85 100.0 0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	mm % Vs Ma Ha mAOD	1.75 2 2.25 2.5 2.5 2.75 3.3.25 3.5 3.75 4 4.25	0.073 0.083 0.094 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177	14 06 14,79 15,47 16.1 16.69 17,24 17,77 18,28 18,76 19,22 19,67	14.2 15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	8.0 7.4 6.9 6.4 6.1 5.7 5.5 5.2 5.0 4.6 4.6	2.4 2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	22.6 20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5
PRIME SOOIL Percentage Runoff PR DEEPSTOR  CV Cr Cr Cr Modified Rational Meth Length (m) Arca (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	100 0 0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	Ws m Ha mAOD	2 225 25 275 3 3 25 3.75 4 4.25 Post Development Rainfall Duration (hours)	0.083 0.094 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177 Return Period	14,79 15,47 16,1 16,69 17,24 17,77 18,28 18,76 19,22 19,67	15.0 15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	7.4 6.9 6.4 6.1 5.7 5.5 6.2 6.0 4.8 4.6	2.2 2.1 1.9 1.8 1.7 1.6 1.6 1.5	20.8 19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5 13.0
SOIL Percentage Runoff PR DEEPSTOR  CV Cr Individual Support Support  Tyear  Modified Rational Meth Length (m) Area (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	0.36 77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	2 25 2 5 2 75 3 3 25 3 5 3 75 4 4 25  Post Development Rainfail Duration (hours)	0.094 0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177 Return Period	15.47 16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67 flood Rainfall	15.7 16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	6.9 6.4 6.1 5.7 5.5 5.2 5.0 4.8 4.6	2.1 1.9 1.8 1.7 1.6 1.6 1.5	19.3 18.1 17.1 16.2 15.4 14.7 14.1 13.5 13.0
Percentage Runoff PR  DEEPSTOR  CV  Cr  cr  moverage outlow  f year  Modified Rational Meth  Length (m)  Area (ha)  Max Height  Min Height  DoltaH  Stope (%)  To (mins)  ARF	77.83 0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	2.5 2.76 3.26 3.25 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.104 0.115 0.125 0.135 0.146 0.156 0.167 0.177 Return Period	16.1 16.69 17.24 17.77 18.28 18.76 19.22 19.67 flood Rainfall	16.3 16.9 17.4 18.0 18.5 19.0 19.4 19.9	6.4 6.1 5.7 5.5 5.2 5.0 4.8 4.6	1.9 1.8 1.7 1.6 1.6 1.5	18.1 17.1 16.2 15.4 14.7 14.1 13.5
CV Cr Allowable dufflow 1. year  Modified Rational Meth Longth (m) Area (ha) Max Height Min Height DataH Stope (%) To (mins) ARF	0.25 0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	2.75 3 3.25 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.115 0.125 0.135 0.146 0.156 0.167 0.177 Return Period	16.69 17.24 17.77 18.28 18.76 19.22 19.67 flood Rainfall	16.9 17.4 18.0 18.5 19.0 19.4 19.9	6.1 5.7 5.5 5.2 5.0 4.8 4.6	1.8 1.7 1.6 1.6 1.5	17.1 16.2 15.4 14.7 14.1 13.5 13.0
Cv Cr Cr Recomble surflow Tyear Modified Rational Meth Length (m) Area (ha) Max Height Min Height DoltaH Stope (%) To (mins) ARF	0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	3 3.25 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.125 0.135 0.146 0.156 0.167 0.177 Return Period	17.24 17.77 18.28 18.76 19.22 19.67 flood Rainfall	17.4 18.0 18.5 19.0 19.4 19.9	5.7 5.5 5.2 5.0 4.8 4.6 years	1.7 1.6 1.6 1.5	16.2 15.4 14.7 14.1 13.5 13.0
Cv Cr Cr Recomble surflow Tyear Modified Rational Meth Length (m) Area (ha) Max Height Min Height DoltaH Stope (%) To (mins) ARF	0.7783 1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	3 3.25 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.125 0.135 0.146 0.156 0.167 0.177 Return Period	17.77 18.28 18.76 19.22 19.67 flood Rainfall	17.4 18.0 18.5 19.0 19.4 19.9	5.7 5.5 5.2 5.0 4.8 4.6 years	1.7 1.6 1.6 1.5	16.2 15.4 14.7 14.1 13.5 13.0
Cr altowable suttlow 1 year  Modified Rational Meth Length (m) Area (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	3.25 3.5 3.75 4 4.25  Post Development Rainfall Duration (hours)	0.135 0.146 0.156 0.167 0.177 Return Period	17.77 18.28 18.76 19.22 19.67 flood Rainfall	18.0 18.5 19.0 19.4 19.9 30 50	5.5 5.2 5.0 4.8 4.6 years	1.6 1.6 1.5	15.4 14.7 14.1 13.5 13.0
Cr altowable suttlow 1 year  Modified Rational Meth Length (m) Area (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	3.5 3.75 4 4.25 Post Development Rainfall Duration (hours)	0.146 0.158 0.167 0.177 Return Period	18.28 18.76 19.22 19.67 flood Rainfall	18.5 19.0 19.4 19.9 30 50	5.2 5.0 4.8 4.6 years	1.6 1.5 1.4	14.7 14.1 13.5 13.0
Cr altowable suttlow 1 year  Modified Rational Meth Length (m) Area (ha) Max Height Min Height DeltaH Stope (%) To (mins) ARF	1.3 12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	3.75 4 4.25  Post Development Rainfall Duration (hours)	0.156 0.167 0.177 Return Period	18.76 19.22 19.67 flood Rainfall	19.0 19.4 19.9 30 50	5.0 4.8 4.6 years	1.5	14.1 13.5 13.0
Allowable dufflow  1 year  Modified Rational Meth Length (m) Area (ha) Max Height Min Height DoltaH Stope (%) To (mins) ARF	12.55 hod 76 0.107 72.5 66.0 6.5	m Ha mAOD	4 4.25  Post Development Rainfall Duration (hours)	0.167 0.177 Return Period	19.22 19.67 flood Rainfall	19.4 19.9 30 50	4.8 4.6 years years	1.4	13.5 13.0
Modified Rational Meth Length (m) Area (ha) Max Height Min Height DoltaH Slope (%) To (mins) ARF	76 0.107 72.5 66.0 6.5	m Ha mAOD	4.25  Post Development Rainfall Duration (hours)	0.177  Return Period  Rainfall Duration	19.67 flood Rainfall	19.9 30 50	4.6 years years		13.0
Modified Rational Meth Length (m) Area (ha) Max Height Min Height DoltaH Slope (%) To (mins) ARF	76 0.107 72.5 66.0 6.5	m Ha mAOD	Post Development Rainfall Duration (hours)	Return Period	flood Rainfall	30 50	years years	1:4	
Length (m) Area (ha) Max Height DoltaH Slope (%) To (mins) ARF	76 0.107 72.5 66.0 6.5	mAOD	Rainfall Duration (hours)	Rainfall Duration	Rainfall	50	years		
Area (ha) Max Height Min Height DeltaH Slope (%) Te (mins) ARF	0.107 72.5 66.0 6.5	mAOD	(hours)		Rainfall Denth				
Max Height Min Height DoltaH Stope (%) Te (mins) ARF	72.5 66.0 6.5	mAOD		(days)		Effective	Rainfall Intensity	FLOW (Vs)	FLOV
Min Height DeltaH Slope (%) Te (mins) ARF	66.0			(days)	(mm)	Depth (mm)	(mm/hr)	FLOW (us)	(I/s/ha
Min Height DeltaH Slope (%) Te (mins) ARF	6.5	mAOD	0.12	0.005	15.9	21.0	132.5	39.9	372.7
Slope (%) Te (mins) ARF			0.25	0.010	20.11	20.3	80.4	24.2	226.3
Slope (%) Te (mins) ARF		E3557474	0.5	0.021	25.01	25.3	50.0	15.1	140.7
Te (mins) ARF			0.75	0.031	28.37	28.7	37.8	11.4	106.4
ARF	7.36	mins	1	0.042	31	31.4	31.0	9.3	87.2
	0.999	iiiiis	1.25	0.052	33.21	33.6	26.6	8.0	74.7
	706,000	mm	1.5	0.063	35.12	35.5	23.4	7.1	65.9
ucwi	85	mm	1.75	0.073	36.81	37.2	21.0	6.3	59.2
	100.0	%	2	0.083	38.34	38.8	19.2	5.8	53.9
	0.36		2.25	0.094	39.75	40.2	17.7	5.3	49.7
	77.83		2.5	0.104	41.04	41.5	16.4	4.9	46.2
DEEPSTOR	0.25		2.75	0.115	42.25	42.7	15.4	4.6	43.2
		-	3	0.125	43.38	43.9	14.5	4.4	40.7
			3.25	0.135	44.45	45.0	13.7	4.1	38.5
Cv	0.7783	8	3.5	0.146	45.46	46.0	13.0	3.9	36.5
Cr	13.		3.75	0.156	46.42	47.0	12.4	3.7	34.8
attenue to to a continue	1.0				47.33				0.10
allowable outliow			4	0.167		47.9	11.8	3.6	33.3
30 year	39.92	Vs.	4.25	0.177	48.21	48.8	11,3	3.4	31.9
Modified Rational Meth	hod			Return Period		100	years		
S a codd (m)	76	1	Post Development Rainfall Duration	Deinfall Done	Rainfall	140 Effective	years Rainfall Intensity		FLOV
Length (m) Area (ha)	0.107	m Ha	(hours)	Rainfall Duration	(mm)			FLOW (Vs)	(I/s/ha
			(nours)	(days)	(mm) 22.3	Depth (mm)	(mm/hr)	50.0	
	72.5	mAOD		0.005		29.3	185.8	56.0	522.7
	66.0	mAOD	0.25	0.010	27.81	28.1	111.2	33.5	312.9
DeltaH	6.5	1	0.5	0.021	34.07	34.5	68.1	20.5	191.7
	8.54		0.75	0.031	38.31	38.8	51.1	15.4	143.7
Te (mins)	7.36	mins	1	0.042	41.61	42.1	41.6	12.5	117.
	0.999	111114	1.25	0.052	44.35	44.9	35.5	10.7	99.8
	706,000	mm	1.5	0.063	46.72	47.3	31.1	9,4	87.6
ucwi	85	mm	1.75	0.073	48.81	49.4	27.9	8.4	78.5
	100.0	44.	2	0.083	50.69	51.3	25.3	7.6	71.3
		"	2.25	0.083	52.41	53.0	23.3		65.5
	0.36							7.0	
	77.83	ı	2.5	0.104	54	54.6	21.6	6.5	60.8
DEEPSTOR	0.25	J	2.75	0.115	55.47	56.1	20.2	6.1	56.7
		200	3	0.125	56.85	57.5	19.0	5.7	53.3
			3.25	0.135	58.14	58.8	17.9	5.4	50.3
Cv	0.7783		3.5	0.146	59.37	60.1	17.0	5.1	47.7
Gr	13	1	3.75	0.156	60.53	61.2	16.1	4.9	45.4
allows able audition	1.0		4	0.167	61.64	62.4	15.4	4.6	43.3
WINDWARIE ORIGINA	55.98	l/s	4.25	0.167	62.7	63.4	15.4	4.6	43.3

## 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby

Roughness	1,5	mm	U/S level	68.78			
THE RESIDENCE TO SERVICE THE PROPERTY OF THE PERSON OF THE		mm	D/S level	64.53	2020		
Diam(mm) Length	AND		Gradient	0.131787	m	7.588	
PROPOR'N DEPTH	WETTED PERIMETER	AREA OF	HYDRAULIC MEAN DEPTH	VELOCITY (m/s)	DISCHARGE (I/s)	DEPTH (mm)	SURFACE
							_(mm)
FULL	0.7068583	0.03976078	0.0562500	4.18	166.16	225	
0.01	0.0450753	6.7297E-05	0.0014930	0.28	0.02	2	45
0.02	0.0638537	0.00018977	0.0029719	0.51	0.10	5	63
0.03	0.0783374	0.00034757	0.0044368	0.70	0.24	7	77
0.04	0.0906111	0.00053347	0.0058875	0.86	0.46	9	88
0.05	0.101481	0.00074325	0.0073240	1.02	0.76	11	98
0.1	0.1447877	0.00206931	0.0142920	1.65	3.40	23	135
0.15	0.1789647	0.00373991	0.0208975	2.14	8.02	34	161
0.2	0.2086414	0.00566108	0.0271331	2.56	14.52	45	180
0.25	0.2356194	0.00777328	0.0329908	2.93	22.76	56	195
0.3	0.2608379	0.01003227	0.0384617	3.25	32.56	68	206
0.35	0.2848733	0.01240214	0.0435356	3.53	43.73	79	215
0.4	0.3081236	0.01485185	0.0482009	3.77	56.04	90	220
0.45	0.3308915	0.01735337	0.0524443	3.99	69.24	101	224
0.5	0.3534292	0.01988039	0.0562500	4.18	83.08	113	225
0.55	0.3759668	0.02240742	0.0595994	4.34	97.27	124	224
0.6	0.3987347	0.02490894	0.0624699	4.48	111.52	135	220
0.65	0.421985	0.02735865	0.0648332	4.59	125.52	146	215
0.7	0.4460205	0.02972851	0.0666528	4.67	138.89	158	206
0.75	0.4712389	0.03198751	0.0678796	4.73	151.24	169	195
0.8	0.4982169	0.0340997	0.0684435	4.75	162.08	180	180
0.85	0.5278936	0.03602087	0.0682351	4.74	170.88	191	161
0.9	0.5620706	0.03769147	0.0670583	4.69	176.77	203	135
0.95	0.6053773	0.03901753	0.0644516	4.57	178.31	214	98
1	0.7068583	0.03976078	0.0562500	4.18	166.16	225	0

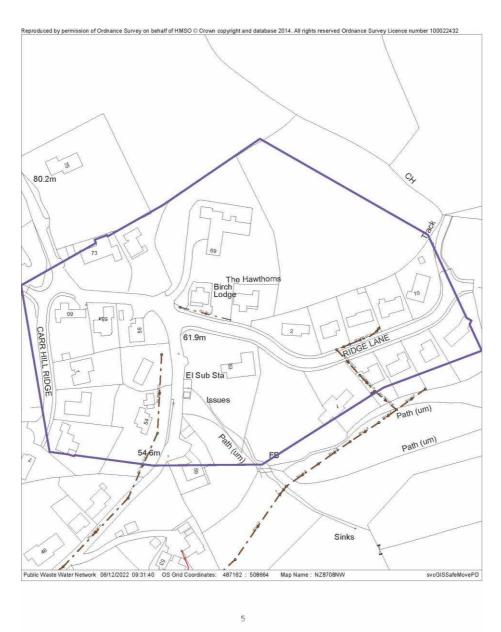
### 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby

Reference:2022/2922

**APPENDIX B - Sewer Plan** 



SafeMove

Lea Favill - Director

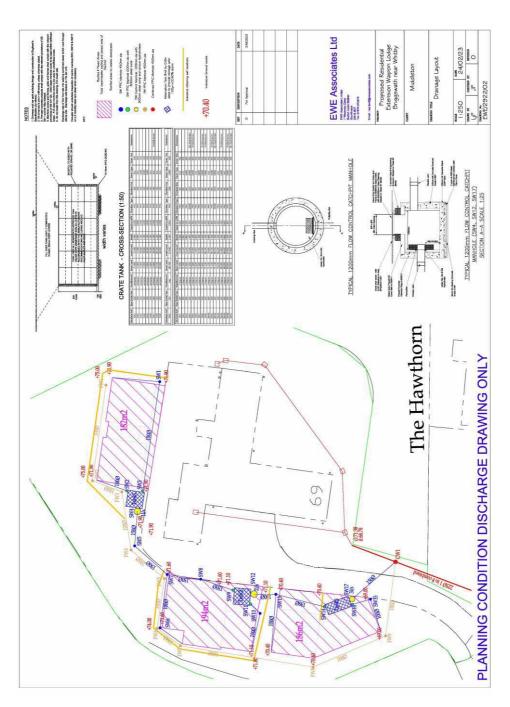
### 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby

Reference:2022/2922

## **APPENDIX C – Drainage Strategy Drawing**



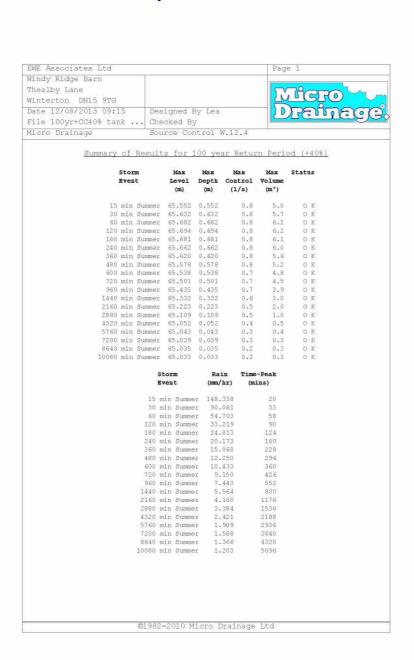
#### 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby

Reference:2022/2922

### APPENDIX D - WINDES 100yr+CC40% Calculations



## 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

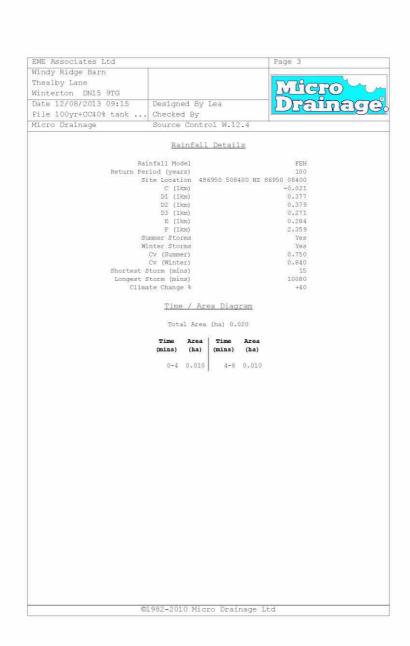
Technical Note: 001

Date: 28<sup>th</sup> February 2023 Site: Waipori Lodge Briggswath Whitby

EWE Associates Ltd				Pa	age 2
Windy Ridge Barn				80	55 (MACO) (1976)
Thealby Lane					V-10 - 4
Winterton DN15 9TG					V LCLEO
N. P. (1997) 1997 1997 1997 1997 1997 1997 1997		-			
	esigned	100	9 a	1	Parrage
File 100yr+CC40% tank C				l	
Micro Drainage S	ource C	ontro.	W.12.4		
Summary of Resu	lts for	100	year Ret	urn Per	siod (+40%)
Storm	мах ма			Max	Status
Event	(m)	(m)	Control (1/s)	(m <sup>3</sup> )	
15 min Winter 30 min Winter 60 min Winter 120 min Winter 120 min Winter 240 min Winter 240 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 1440 min Winter 1440 min Winter 1440 min Winter 2480 min Winter 2480 min Winter 4320 min Winter 4320 min Winter 4320 min Winter					
15 min Winter	65.623	0.623	0.8	5.6	O K
50 min Winter	65 792	0.717	0.9	7.0	Flood Pisk
120 mip Winter	65,793	0.793	0.9	7.1	Flood Risk
180 min Winter	65.772	0.772	0.9	7.0	Flood Risk
240 min Winter	65.740	0.740	0.9	6.7	Flood Risk
360 min Winter	65.669	0.669	0.8	6.0	O K
480 min Winter	65.603	0.603	0.8	5.4	0 к
600 min Winter	65.542	0.542	0.7	4.9	0 К
720 min Winter	65,489	0.489	0.7	4.4	O K
1440 min Winter	65.399	0.399	0.6	2.6	OK
2160 min Winter	65.069	0.069	0.5	0.6	ő k
2880 min Winter	65.052	0.052	0.4	0.5	ок
4320 min Winter	65.041	0.041	0.3	0.4	O K
5760 min Winter	65.036	0.036	0.2	0.3	0 К
1200 min wincer	00.032	0.002	0.2	0.3	ок
8640 min Winter 10080 min Winter			0.2	0.4 0.3 0.3 0.3	o K
10000 Mili Wincer					O K
	Storm		Rain Ti mm/hr)	me-Peak (mins)	
15	min Win	ter 1	18.338	20	
	min Win			33	
	min Win			60	
	min Win			96 134	
	min Win			172	
3.60	min Win	ter :	15.068	244	
480	min Win	ter	12.250	314	
600	min Win	ter :	10.433	382	
720	min Win	ter	9.150	448	
960	min win	ter	1.443	580	
	min Win			840	
	min Win			1124 1472	
	min Win			2196	
5760	min Win	ter	1.909	2904	
7200	min Win	ter	1.588	3632	
8640	min Win min Win min Win	ter	1.366	4376	
10080	min Win	ter	1.203	5112	

Technical Note: 001 Date: 28<sup>th</sup> February 2023

Site: Waipori Lodge Briggswath Whitby



### 7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT

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Site: Waipori Lodge Briggswath Whitby

