Moor Fields, Little Dunmow

Reserved Matters Application

Drainage Strategy Statement

134390-DSS-(00)

JULY 2023

RSK GENERAL NOTES

Project No.: 134390

Title: Moor Fields, Little Dunmow - Drainage Strategy Statement

Client: Dandara Eastern Ltd.

Date: 13th July 2023

Office: Hemel Hempstead

Status: Final (For Planning Purposes Only)

Author	G Turner	**Technical reviewer**	
	[redacted]		
Date:	14th July 2023	Date:	14th July 2023

Project manager

Date: 14th July 2023

CONTENTS

Contents

1 INTRODUCTION

Outline planning application ref no. UTT/21/3596/OP for the consented scheme referred to in this statement as, “Moor Fields, Little Dunmow” was supported by a Flood Risk Assessment (FRA) prepared by RSK Land and Development Engineering, report reference 890428-R1(1)-FRA (November 2021). This FRA fully investigated all issues respective to flood risk on this proposed development site. In addition, the potential for this site to cause flooding of adjacent land should it be developed was also investigated. The subject of flooding and flood risk are not intended to be revisited within this Drainage Strategy Statement (DSS) as the principles established within the consented FRA have been fully accepted and encompassed by the Drainage Strategy being promoted within this DSS.

The principles of surface water drainage design as established within the consented FRA are listed below for reference purposes.

1. No further overland flow control measures are proposed as all surface water runoff up to the 1 in 100-year (plus 40% climate change) storm event will be stored on site and discharged to the nearby watercourses in a controlled manner.
2. Assuming there may be residual potential for some localised surface water overland flow passing through the site, the proposed finished floor levels (FFLs) have been set at 150mm minimum above the site access roads which will act as exceedance flow routes.
3. It is acknowledged that the consent of the Lead Local Flood Authority will be required to discharge into the ordinary watercourse running through the site which has been identified as the outfall for the designed surface water drainage network.
4. A 10% allowance has been made for urban creep as recommended within the FRA.
5. The findings of the FRA in terms of Greenfield runoff have been excepted and utilized within the hydraulic simulations undertaken and included within this report. The Qbar 1 in 1yr peak flow has therefore been taken as 12.1l/s, which also accords with requirements stipulated under Planning Condition 7.

2 PLANNING CONDITIONS

Planning condition 7 states the following:

No works except demolition shall takes place until a detailed surface water drainage scheme for the site, based on sustainable drainage principles and an assessment of the hydrological and hydro geological context of the development, has been submitted to and approved in writing by the local planning authority. The scheme should include but not be limited to:

- *Verification of the suitability of infiltration of surface water for the development. We would expect to see further testing undertaken in winter to reflect the most conservation management. This should be based on detailed infiltration tests that have been undertaken in accordance with BRE 365 testing procedure and the infiltration testing methods found in chapter 25.3 of the CIRIA SuDS Manual C753. Designing for infiltration should also take into consideration ground water levels.*
- *Where infiltration is not viable, the scheme should be limited discharging rates to 2.12l/s for all storm events up to and including 1 in 100 year rate plus 40% allowance for climate change. All relevant permission to discharge from the site into any outfall should be demonstrated.*
- *Provide sufficient storage to ensure no off-site flooding as a result of the development during all storm events up to and including the 1 in 100 year plus 40% climate change event.*
- *Demonstrate that all storage features can half empty within 24 hours for the 1 in 30 plus 40% climate change critical storm event.*
- *Final modelling and calculation for all areas of the drainage system. The appropriate level of treatment for all runoff leaving the site, in line with the Simple Index Approach in Chapter 26 of the CIRIA SuDS Manual C753.*
- *Detailed engineering drawings of each component of the drainage scheme.*
- *A final drainage plan which details exceedance and conveyance routs, FFL and ground levels, and location and siting of any drainage features.*
- *A written report summarising the final strategy and highlighting any minor changes to the approved strategy.*

The purpose of this Drainage Strategy Statement (DSS) is to fully address the above stated requirements to demonstrate compliance with the principles as set out within the consented FRA, thereby allow discharging of planning condition 7.

3 CONSIDERATIONS

3.1 Infiltration

Further infiltration testing will be undertaken in the winter months along with groundwater monitoring to satisfy the requirements of planning condition 7.

For the purposes of developing a robust DSS a precautionary approach has been adopted and it has been assumed that no infiltration will be possible as all site investigation works undertaken to date indicate infiltration is likely to be unviable for this site.

Subject to the result of the additional testing works a review will be undertaken to establish if some part of the site may benefit from disposal of surface water runoff via infiltration techniques.

3.2 Discharge Rates

As a precautionary approach the surface water drainage design limits discharge to 1 in 1yr greenfield runoff equivalent. A hydrobrake will be utilized within a flow control chamber just upstream from the point of discharge into the nearby ordinary watercourse. The hydrobrake design will limit forward flows to 12.1 l/s maximum for all storm scenarios up to and including the 1 in 100yr climate change event.

An assumption of 40% for the CC allowance has been adopted in line with the requirements of planning condition 7 and the recommendations of the consented FRA report.

3.3 Attenuation Storage

Attenuation storage is to be provided sufficient to encapsulate the runoff from the 1 in 100yr + climate change event, this being contained entirely within the surface water drainage network and SuDS features.

The primary storage will be in the detention basin and linked to the enhanced swale located at the southern end of the development site. Additional storage will be provided within permeable paving and in geocellular units forming tanks below the permeable paving, these being installed at various locations around the site, where localized flooding issued have been identified by the hydraulic modelling work.

The requirements in term of the attenuation features half emptying within a 24hr period have been tested and proven, this in reality is only applicable to the detention basin and enhanced swale as the localized below ground geocellular structures are only of limited capacity and failure of any one of these would have negligible impact on the network as a whole.

In calculating the surface water runoff the following CV values have been adopted.

Winter simulations	0.86
Summer simulations	0.75

The LLFA guidance suggests that a CV value of 1 should be adopted, however this assumes that permeable paved areas and soft areas located between impermeable are excluded.

The above CV values have been applied to both permeable and impermeable area as defined on the catchment plan, contained under Appendix B.

3.4 Water Quality

The Simple Index Approach as defined within the SuDS Manual has been adopted to demonstrate an adequate level of water quality improvement has been built into the drainage strategy. All surface water runoff including runoff from roofs will pass through at least two stages of treatment. All parking bays that are accessible and within the public realm will receive three stages of treatment as these are to be of a permeable paved construction.

The results of the SIA assessments are provided under Appendix A

3.5 Detailed Engineering Drawings

Drawings showing the construction details to be adopted in the proposed drainage works are provided under Appendix B of this DSS. These drawings also include sections and typical sections of the proposed attenuation features. The drawings also include the proposed site level which have been used to set the cover levels for the design drainage network.

3.6 Exceedance / Conveyance Routes

The conveyance routes for exceedance flows are detailed on the drawing contained under appendix C to this DSS. The general principles are that the FFLs of the properties on the development will be elevated relative to the adjacent road network that services them and this road network will act as a conduit to direct exceedance flow away from property and towards the enhanced swale and detention basin located at the south end of the site, thereby following the natural topography of the site.

3.7 Drainage Plans

The surface water drainage strategy is presented on the drawings contained under appendix B to this DSS. The principles of the detailed drainage design follow those as

previously defined on the RSK illustrative drainage strategy drawing contained within the appendices to the FRA.

3.8 Written Report

This Drainage Design Statement has been developed to form the required written report which addresses the full requirements of planning condition 7. The hydraulic modelling results that demonstrate the drainage design's compliance with the constraints imposed are provided under Appendix D to this DSS.

4 SUDS PROVSIONS

4.1 Schedule of SuDS Features

SuDS Features	Consented Drainage Strategy	Revised Drainage Strategy	Comment
Permeable paving	Yes	Yes	Permeable paving utilized in parking bays, all surface water runoff from the adjacent parking access roads to be directed to the permeable parking bays where practicable.
Silt catchment provision	Yes	Yes	Catchpit chambers to be utilized in the drainage network to remove silts and heavy metals.
Geocellular units forming buried storage tanks	No	Yes	Attenuation storage provision to contain on site additional volumetric runoff
Enhanced Swale feature	Yes	Yes	Additional attenuation storage provision to be utilized to also create a habitat for encouraging biodiversity.
Detention basin	Yes	Yes	Additional attenuation storage provision to be utilized to create occasional wetland habitat.
Flow control device	Yes	Yes	To control flow at the outfall thereby ensuring the agreed discharge rate into the Mill Stream is never exceeded.

The above table demonstrates that the drainage strategy being submitted for reserved matters approval and presented within this document encompasses the same level of SuDS features as the drainage scheme approved at the outline planning stage.

5 SUMMARY

The hydraulic modelling result to be found at Appendix D confirm that the drainage strategy is fit for purpose and is able to contained the full attenuation volume associated with a 1in 100yr climate change event, allowing for urban creep at 10%.

There are significant opportunities to incorporate addition gecellular units forming small attenuation tanks below the permeable paved parking bays and private access roads located across the site. How these localized source control measures would interconnect with the drainage network will be the subject of a technical approval process required by the adopting water authority.

The modelling results as contained under Appendix D represent a simple solution that has limited flow control devices and makes maximum use of the enhance swale and detention basin located to at the southern end of the site.

Robustness

The drainage strategy as present can be considered a robust design as it makes no reductions respective to the extensive area of permeable paving. The full extents of this paving and the runoff from it have been taken into consideration and are assumed to be contributory during peak discharge even though the time duration for these areas to start contributing in to the pipe network would be significantly longer than time take for the runoff from the impermeable areas to reach the network.

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APPENDIX A

Water Quality Assessment – Simple Index Approach

SIMPLE INDEX APPROACH: TOOL

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevent design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index
- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

Runoff Area Land Use Description	Pollution Hazard	Pollution Hazard Indices: Total Suspended Solids	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable): → Low traffic roads (eg residential roads and general access roads, < 300 traffic movements/day)	Low	0.5	0.4	0.4
If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:				
Landuse Pollution Hazard Index	Low	0.5	0.4	0.4

DESIGN CONDITIONS: 1; 2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the row below the drop down lists

SuDS Component Description	Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (ie the upstream SuDS component) from the drop down list: → Swale	0.5	0.6	0.6
Select SuDS Component 2 (ie the second SuDS component in a series) from the drop down list: → Detention basin	0.5	0.6	0.6
Select SuDS Component 3 (ie the third SuDS component in a series) from the drop down list: → None			
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component description and agreed user defined indices in these rows:			
Aggregated Surface Water Pollution Mitigation Index	0.75	0.85	0.9

DESIGN CONDITIONS: 1; 2; 3

SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B

SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.85'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? Go to Step 2B

No ? Go to Step 2C

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

	Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Select type of groundwater protection from the drop down list: → None			
If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:			
Groundwater Protection Pollution Mitigation Index	0	0	0

DESIGN CONDITIONS: 1; 2; 3; 4

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Combined Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	0.75	0.85	0.9

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.85'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

	Sufficiency of Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
	Sufficient	Sufficient	Sufficient

DESIGN CONDITIONS: 1

References to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of development on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

SIMPLE INDEX APPROACH: TOOL

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index
- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

Runoff Area Land Use Description	Pollution Hazard	Pollution Hazard Indices: Total Suspended Solids	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable): → Residential roofing	Very low	0.2	0.2	0.05
If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:				
Landuse Pollution Hazard Index	Very low	0.2	0.2	0.05

DESIGN CONDITIONS: 1; 2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the row below the drop down lists

SuDS Component Description	Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (ie the upstream SuDS component) from the drop down list: → Swale	0.5	0.6	0.9
Select SuDS Component 2 (ie the second SuDS component in a series) from the drop down list: → Detention basin	0.5	0.6	0.9
Select SuDS Component 3 (ie the third SuDS component in a series) from the drop down list: → None			
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component description and agreed user defined indices in these rows:			
Aggregated Surface Water Pollution Mitigation Index	0.75	0.85	0.9

DESIGN CONDITIONS: 1; 2; 3

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Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.85'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? Go to Step 2B

No ? Go to Step 2C

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

	Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Select type of groundwater protection from the drop down list: → None			
If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:			
Groundwater Protection Pollution Mitigation Index	0	0	0

DESIGN CONDITIONS: 1; 2; 3; 4

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Combined Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	0.75	0.85	0.9

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.85'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

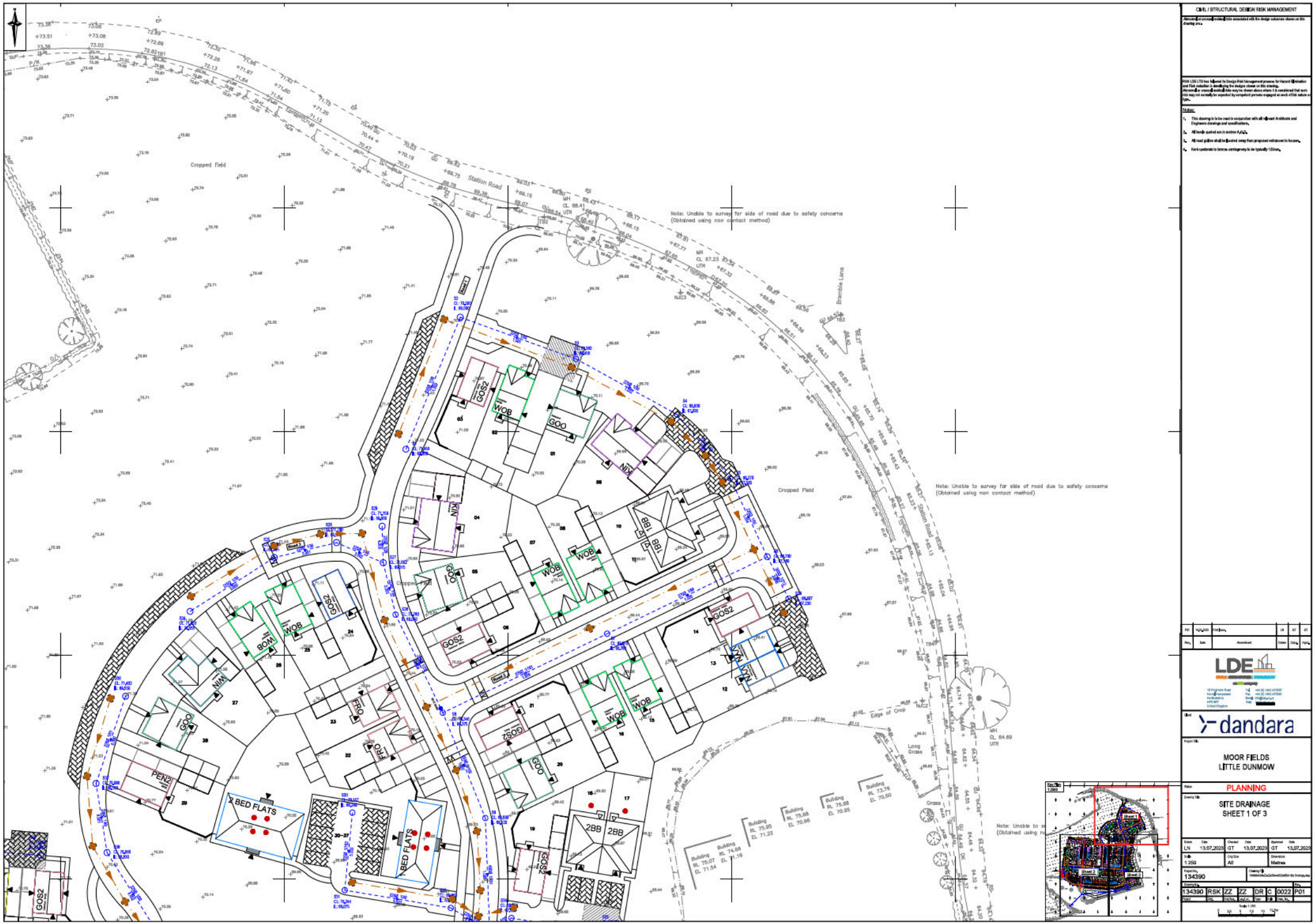
	Sufficiency of Pollution Mitigation Indices: Total Suspended Solids	Metals	Hydrocarbons
	Sufficient	Sufficient	Sufficient

DESIGN CONDITIONS: 1

References to (local) planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of development on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

APPENDIX B

Engineering drawings



CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres AOD.
3. All road gullies shall be located away from proposed entrances to houses.
4. Kerb upstands to tarmac contingency to be typically 125mm.

Rev	Date	Amendment	Drawn	Chkd	Appd
P01	14/07/2023	First Issue	LN	GT	GT

LDE

dandara

MOOR FIELDS
LITTLE DUNMOW

Status: PLANNING

Drawing Title:
SITE DRAINAGE
SHEET 1 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	13.07.2023	GT	13.07.2023	GT	13.07.2023

Scale	Orig Size	Dimensions
1:250	A0	Metres

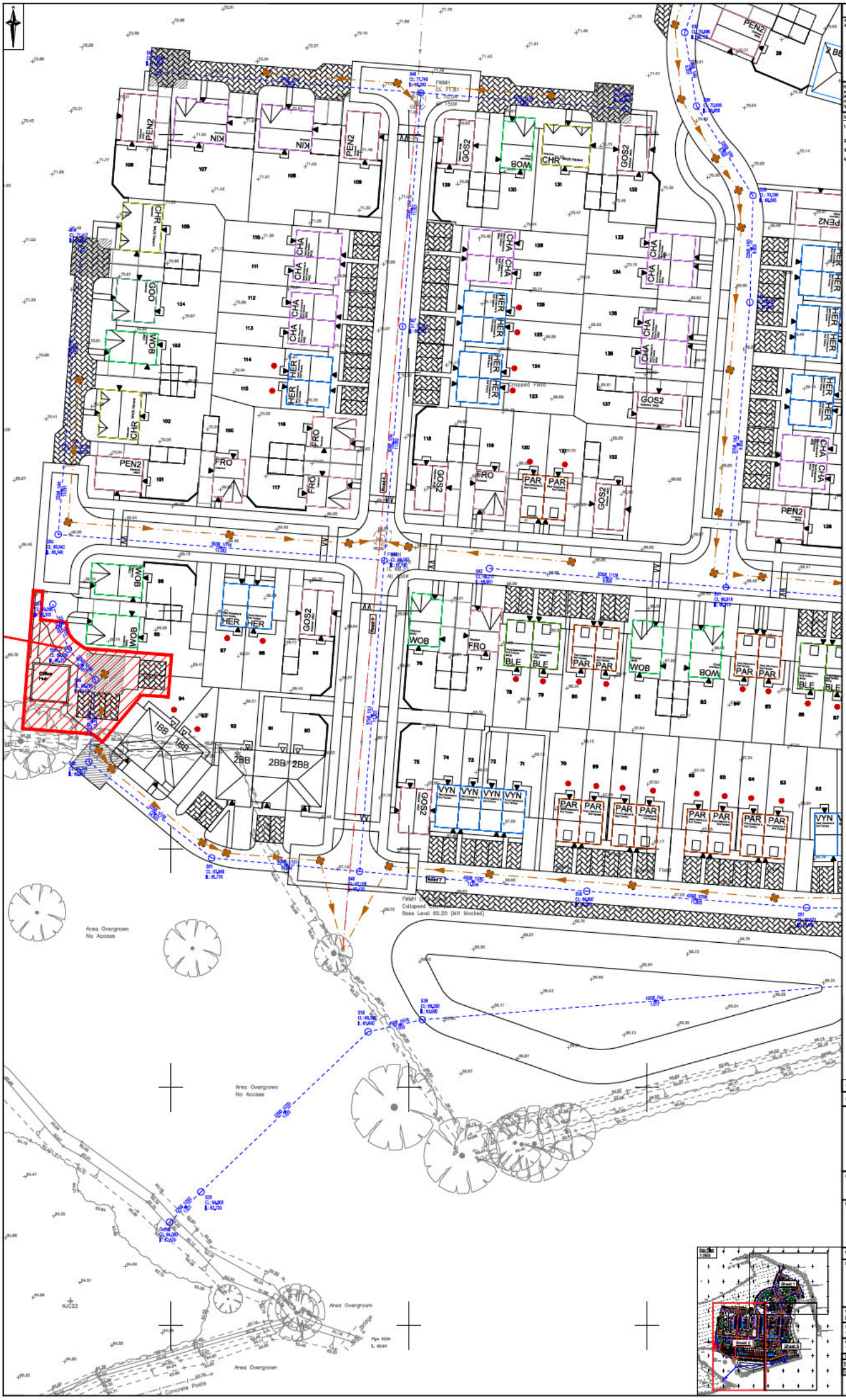
Project No.: 134390

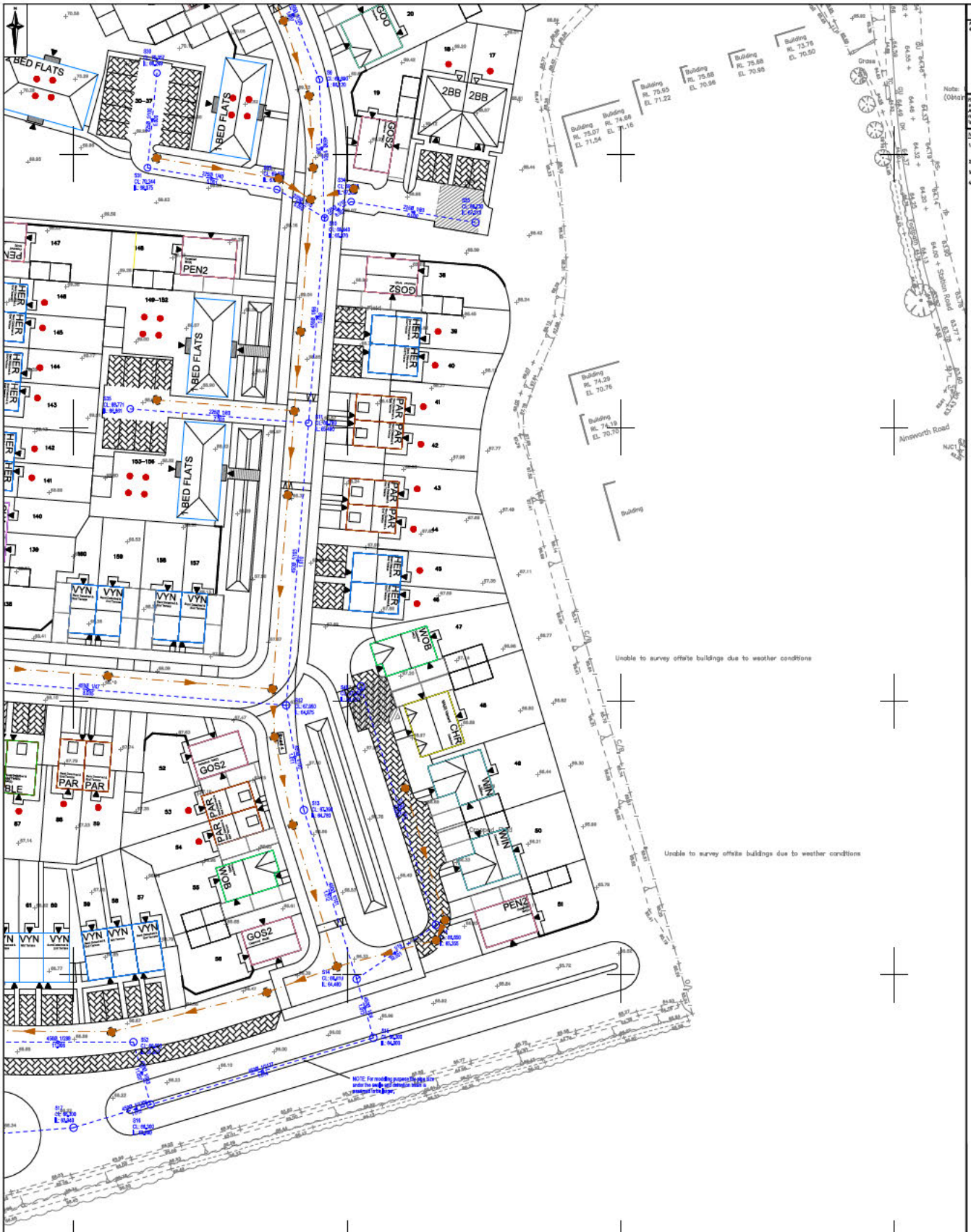
Drawing No.: 134390 RSK ZZ ZZ DR C 0022 P01

Key Plan 1:2500

Sheet 1
Sheet 2
Sheet 3

Scale 1:250


CDM / STRUCTURAL DESIGN RISK MANAGEMENT
Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:
Notes:
1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres AOD.
3. All rear gullies shall be located away from proposed entrances to houses.
4. Kerb upstands to tarmac carriageway to be typically 125mm.
Cropped Field
Area Overgrown
No Access
Area Overgrown
No Access
Area Overgrown
Concrete Posts
LDE
dandara
MOOR FIELDS
LITTLE DUNMOW
PLANNING
SITE DRAINAGE
SHEET 2 OF 3
134390
RSK ZZ ZZ DR C 0023 P01



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Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P01	14.07.2023	First Issue.	LN	GT	GT

LDE

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MOOR FIELDS
LITTLE DUNMOW

PLANNING

SITE DRAINAGE
SHEET 3 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	13.07.2023	GT	13.07.2023	GT	13.07.2023

Scale	Orig Size	Dimensions
1:250	A0	M

Project No.: 134390

Drawing No.: 134390 RSK ZZ ZZ DR C 0024 P01

Key Plan Scale 1:2500

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

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1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres AOD.
3. The Groundwork's contractor shall ensure that no dirt spoils remain after the installation of the final road wearing course.
4. All road gullies shall be located away from proposed entrances to houses.
5. For tree protection areas and trees to be removed refer to the Arboriculturist's drawings and/or report.
6. Kerb upstands to terrace contiguously to be typically 150mm.

Rev.	Date	Amendment	Drawn	Chkd	Appd
P03	15/12/23	Amended to latest architects layout.	LN	GT	GT
P02	01/12/23	Drainage.	LN	AF	GT

LDE

Client: dandara

Project title: MOOR FIELDS LITTLE DUNMOW

Status: PLANNING

Drawing title: SURFACE WATER & SUDS STRATEGY

Drawn	Date	Checked	Date	Approved	Date
LN	30.06.2023	AF	04.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
1:500	A0	Metres

Project no.: 134390

Drawing no.: 134390 | RSK | ZZ | ZZ | DR | C | 0005 | P01

Scale 1:500

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Identification and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres AOD.
3. For Drainage Layout see Drawing No 0005
4. The Groundworks contractor shall ensure that no dust spots remain after the installation of the final road wearing course.
5. All road gullies shall be located away from proposed entrances to houses.
6. For tree protection areas and trees to be removed refer to the Arboriculturalist's drawings and/or report.
7. Kerb upstands to tarmac carriageway to be typically 125mm.

Rev	Date	Amendment	Drawn	Chkd	Appd
P01	05/07/23	Amended to latest architects layout.	LN	AF	GT
P02	05/07/23	Updated.	LN	AF	GT

LDE

dandara

MOOR FIELDS
LITTLE DUNMOW

PLANNING

SITE LEVELS
SHEET 1 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	03.06.2023	AF	04.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
1:250	A0	Metres

Project No. 134390

Drawing No. 134390 | RSK | ZZ | ZZ | DR | C | 0006 | Rev. P02

Key Plan 1:2500

Sheet 1 Sheet 2 Sheet 3

Scale 1:250

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or site.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres A.O.D.
3. For Drainage Layout see Drawing No 0005
4. The Groundwork's contractor shall ensure that on the spots reveals after the installation of the final road wearing course.
5. All road gullies shall be trapped away from proposed entrances to houses.
6. For tree protection areas and trees to be removed refer to the Arboriculturalist's drawings and/or report.
7. Kerb upstands to tarmac contiguously to be typically 125mm.

Office Hub

Area Overgrown
No Access

Area Overgrown
No Access

Area Overgrown

Area Overgrown

Concrete Posts

Finish (Top Cover)
Collapsed Chamber
Base Level 66.20 (NH Blocked)

Rev.	Date	Amendment	Chkd.	Appd.
P02	15.07.2025	Amended to latest architects layout.	LN	GT
P01	05.07.2025	First Issue.	LN	GT

LDE

dandara

MOOR FIELDS
LITTLE DUNMOW

PLANNING

SITE LEVELS
SHEET 2 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	03.06.2025	AF	04.07.2025	GT	05.07.2025

Scale	Orig Size	Dimensions
1:250	A0	M

Project No.: 134390

Drawing No.: 134390 RSK ZZ ZZ DR C 0007 P02

Rev.: P02

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. All levels quoted are in metres A.O.D.
3. For Drainage Layout see Drawing No 0005
4. The Groundwork's contractor shall ensure that no fin spots remain after the installation of the final road wearing course.
5. All road gullies shall be located away from proposed entrances to houses.
6. For tree protection areas and trees to be removed refer to the Arboricultural's drawings and/or report.
7. Kerb upstands to tarmac carriageway to be typically 125mm.

Unable to survey offsite buildings due to weather conditions

Unable to survey offsite buildings due to weather conditions

Rev.	Date	Amendment	Chkd	Chkg	Appd.
P02	15.07.2025	Amended to client and team comments	LN	GT	GT
P01	05.07.2023	First Issue.	LN	AF	GT

LDE

dandara

MOOR FIELDS
LITTLE DUNMOW

Status: PLANNING

Drawing Title:
SITE LEVELS
SHEET 3 OF 3

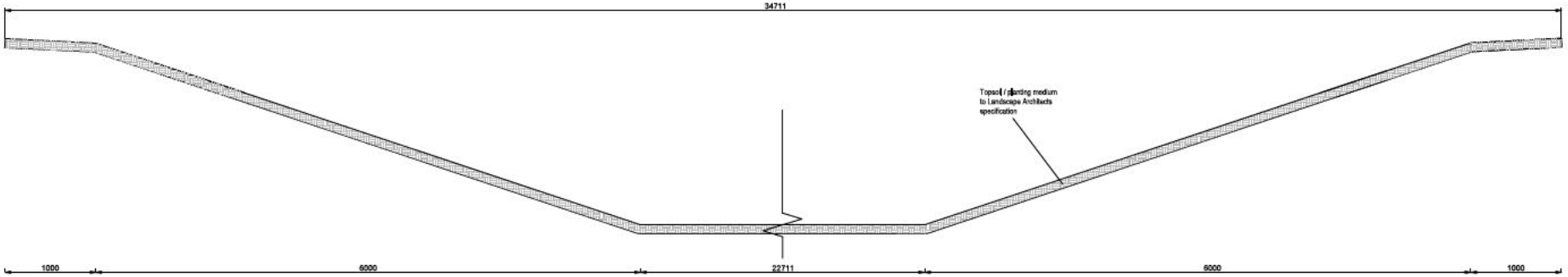
Drawn	Date	Checked	Date	Approved	Date
LN	03.06.2025	AF	04.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
1:250	A0	M

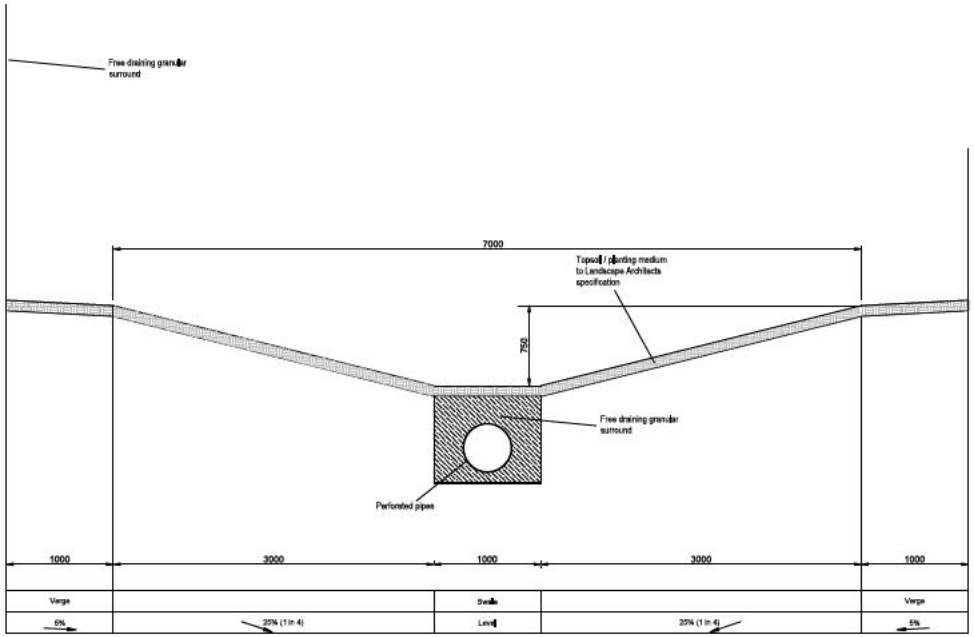
Project No.: 134390

Drawing No.: 134390 RSK ZZ ZZ DR C 0006 P02

Rev.



TYPICAL SECTION THROUGH DETENTION BASIN



TYPICAL SECTION THROUGH
ENHANCED SWALE ACCESS ROAD

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings.
2. Drawings not to be scaled.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P02	13.07.2023	Second Issue.	LN	GT	GT
P01	05.07.2023	First Issue.	LN	AF	GT

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CIVILS | STRUCTURES | HYDROLOGY
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Email: info@lde.co.uk
Web: [redacted]

Client: dandara

Project Title:
MOOR FIELDS
LITTLE DUNMOW

Status: PLANNING

Drawing Title:
SuDS DETAILS
SHEET 1 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	30.06.2023	AF	04.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
1:25	A1	M

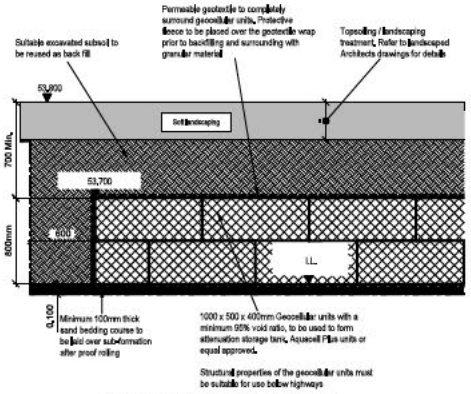
Project No.: 134390

Drawing File: 134390-RSK-ZZ-ZZ-DR-C-0014-P02.dwg

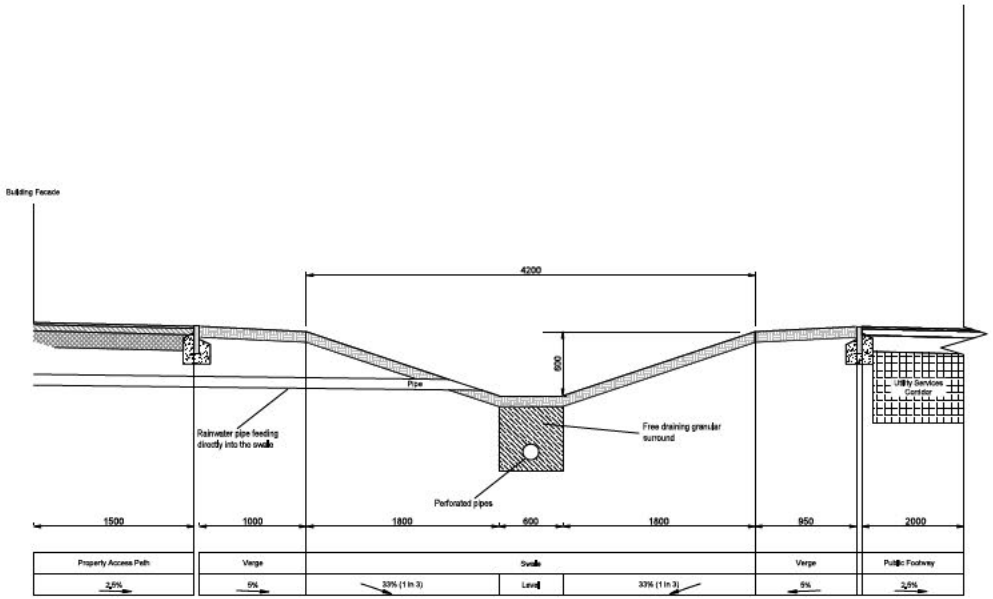
Drawing No.: 134390 | RSK | ZZ | ZZ | DR | C | 0014 | Rev. P02

Project | Orig. | Vol./Sys. | Lev./Loc. | Type | Role | Drawing No. | Rev.

Scale 1 : 25
0 250 500 750 1000 1250 1500 1750 2000mm



TYPICAL SECTION THROUGH ATTENUATION TANK
BELOW LANDSCAPED AREAS



TYPICAL SECTION THROUGH SWALE
IN STREETSCPE LOCATIONS

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings.
2. Drawings not to be scaled.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P02	13.07.2023	Second Issue.	LN	GT	GT
P01	05.07.2023	First Issue.	LN	AF	GT

LDE
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Fax: +44 (0) 1442 437580
Email: info@lde.co.uk
Web: [redacted]

Client: dandara

Project Title:
MOOR FIELDS
LITTLE DUNMOW

Status: PLANNING

Drawing Title:
SuDS DETAILS
SHEET 2 OF 3

Drawn	Date	Checked	Date	Approved	Date
LN	30.06.2023	AF	04.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
1:25	A1	M

Project No.: 134390

Drawing File: 134390-RSK-ZZ-ZZ-DR-C-0015-P02-SuDS Details.dwg

Drawing No.: 134390 | RSK | ZZ | ZZ | DR | C | 0015 | Rev. P02

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Drawing No.

Scale 1 : 25
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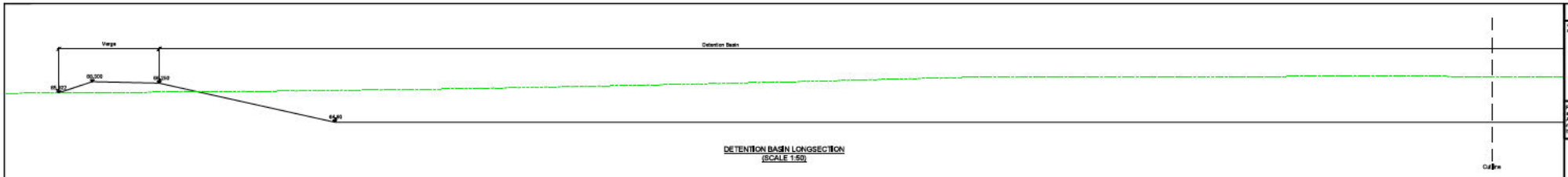
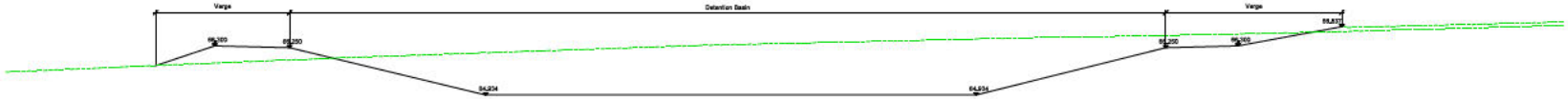
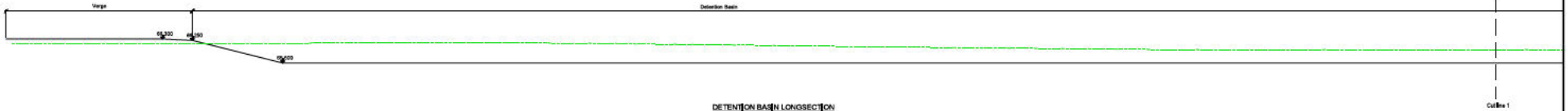


DETENTION BASIN LONGSECTION
(SCALE 1:50)

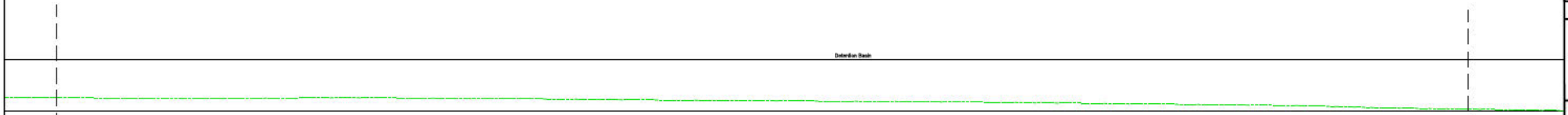
DETENTION BASIN LONGSECTION
(SCALE 1:50)



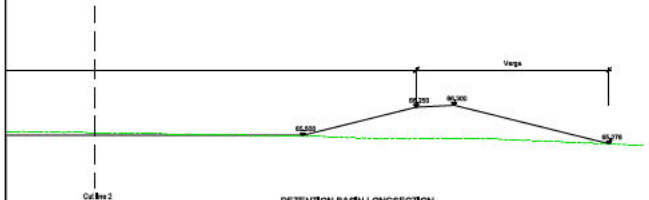
DETENTION BASIN CROSS-SECTION
(SCALE 1:50)



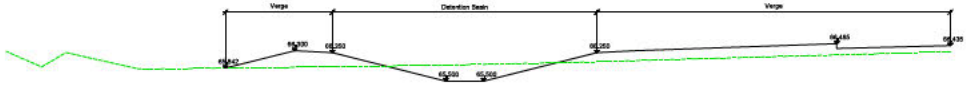
DETENTION BASIN LONGSECTION
(SCALE 1:50)



DETENTION BASIN LONGSECTION
(SCALE 1:50)



DETENTION BASIN LONGSECTION
(SCALE 1:50)



DETENTION BASIN CROSS-SECTION
(SCALE 1:50)

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Identification and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings.
2. Drawings not to be scaled.

Rev.	Date	Amendment	Drawn	Chkd	Appd
P01	15/08/2023	First Issue	LN	GT	GT

LDE

Client: dandara

Project title: MOOR FIELDS
LITTLE DUNMOW

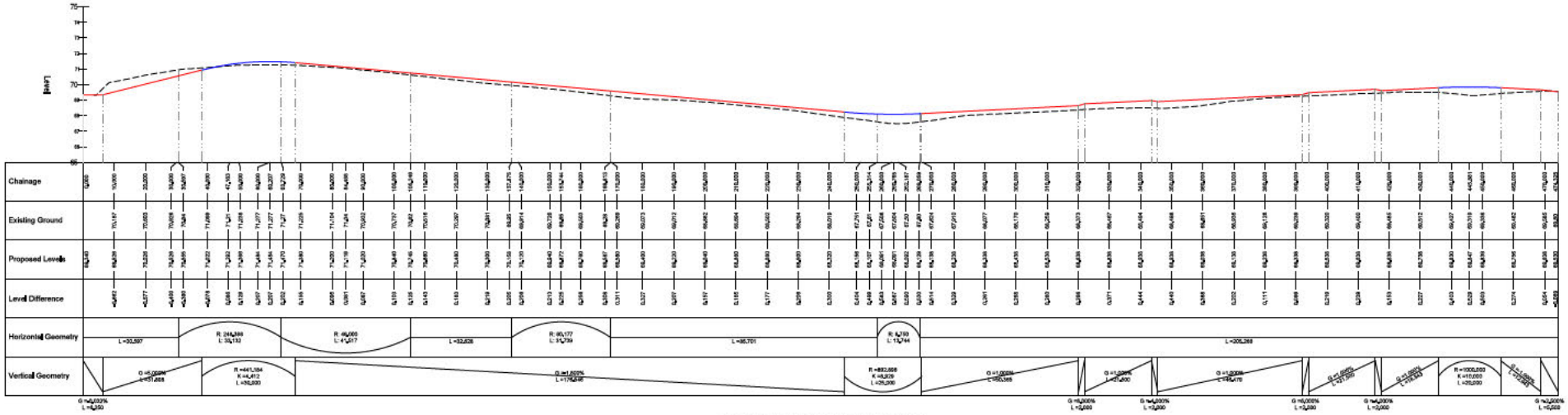
Status: PLANNING

Drawing title: SuDS DETAILS
SHEET 3 OF 3

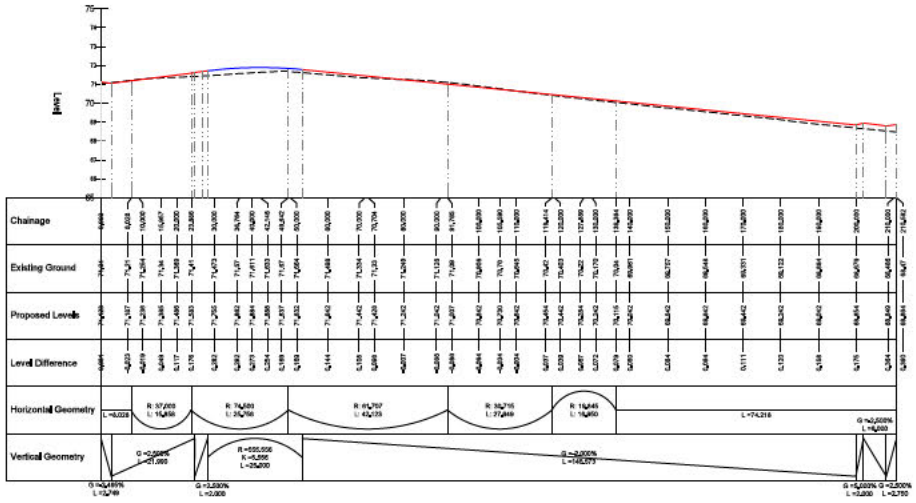
Drawn	Date	Checked	Date	Approved	Date
LN	13.07.2023	GT	13.07.2023	GT	13.07.2023
Scale		Orig Size		Dimensions	
1:50		A0		Metres	

Project No.: 134390

Drawing No.: 134390 | RSK | ZZ | ZZ | DR | C | 0016 | Rev. P02



ALIGNMENT - ROAD 1 - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 65.000



ALIGNMENT - ROAD 2 - LONGSECTION
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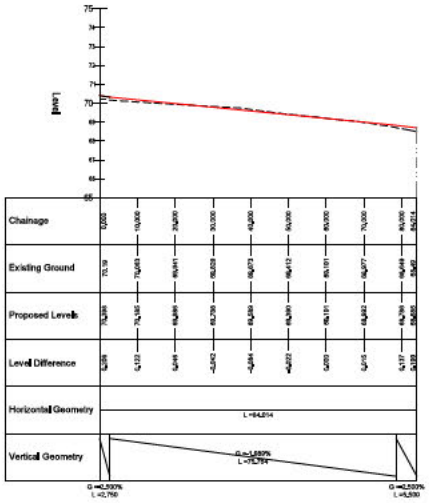
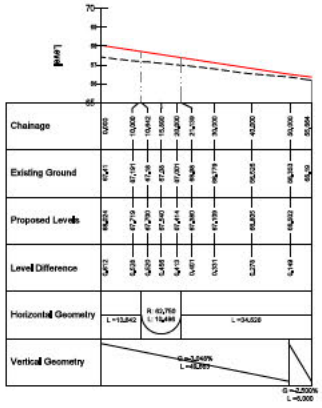


ALIGNMENT - ROAD 3 - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 65.000



ALIGNMENT - ROAD 4 - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 65.000

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. Do not scale this drawing.
2. This drawing present the longitudinal sections for the proposed road network that will service the Moor Fields development. This drawing is to be read in conjunction with all other relevant engineers, architects and specialist design drawings and details.
3. Road centrelines and levels are give on the following drawings:
   134390-RSK-ZZ-ZZ-DR-C-0006 - Site Levels (Sheet 1)
   134390-RSK-ZZ-ZZ-DR-C-0007 - Site Levels (Sheet 2)
4. All dimensions are in meters unless noted otherwise. All levels are in meters unless noted otherwise.
5. Any discrepancies noted on site are to be reported to the engineer immediately.

LDE
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Fax: +44 (0) 1462 437001
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Web:

Client
dandara

Project title
MOOR FIELD
LITTLE DUNMOW

Status
PLANNING

Drawing title
LONGITUDINAL SECTIONS
SHEET 1 OF 2

PLANNING APPLICATION DOCUMENT NOT FOR CONSTRUCTION

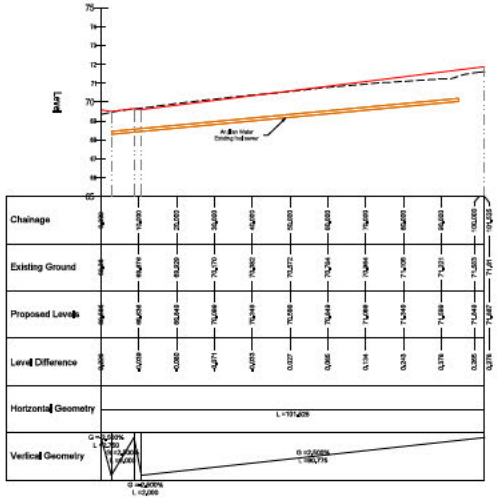
Drawn	Date	Checked	Date	Approved	Date
LN	05.07.2023	GT	05.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
AS SHOWN	A0	Metres

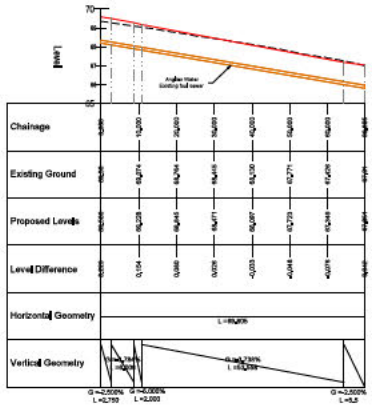
Project no.: 134390
Drawing ID: 134390-RSK-ZZ-ZZ-DR-C-0018-Longitudinal Sections

Drawing No.: 134390 | RSK | ZZ | ZZ | DR | C | 0018 | P01
Project | Orig. | Vol./Sys. | Level | Type | Role | Doc. No. | Rev.

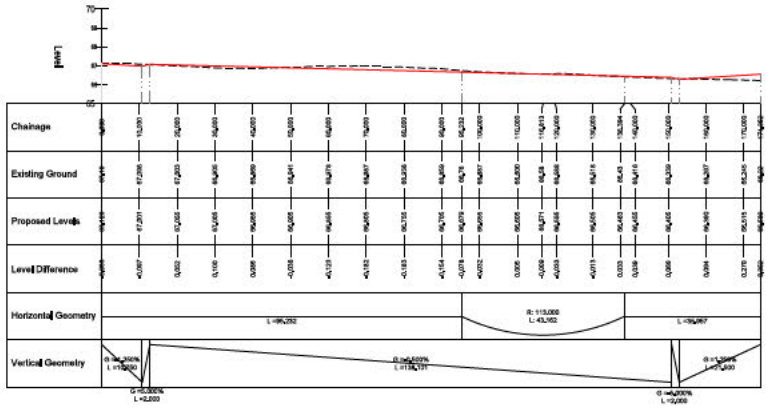
Scale 1:500
0 5 10 15 20 25m



ALIGNMENT - ROAD 5 - LONGSECTION
SCALE: H 1:500,V 1:100, DATUM: 65.000



ALIGNMENT - ROAD 6 - LONGSECTION
SCALE: H 1:500,V 1:100, DATUM: 65.000



ALIGNMENT - ROAD 7 - LONGSECTION
SCALE: H 1:500,V 1:100, DATUM: 65.000

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that work risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. Do not scale this drawing.
2. This drawing present the longitudinal sections for the proposed road network that will service the Moor Fields development. This drawing is to be read in conjunction with all other relevant engineers, architects and specialist design drawings and details.
3. Road contours and levels are give on the following drawings:
   134390-RSK-ZZ-ZZ-DR-C-0008 - Site Levels (Sheet 1)
   134390-RSK-ZZ-ZZ-DR-C-0007 - Site Levels (Sheet 2)
4. All dimensions are in meters unless noted otherwise. All levels are in meters unless noted otherwise.
5. Any discrepancies noted on site are to be reported to the engineer immediately.

Rev	Date	Amendment	Drawn	Chkd	Appd
P01	05/07/2023	First Issue	LN	GT	GT

LDE
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Client: dandara

Project title: MOOR FIELD
LITTLE DUNMOW

Status: PLANNING

Drawing title: LONGITUDINAL SECTIONS
SHEET 1 OF 2

PLANNING DRAWING NOT FOR CONSTRUCTION

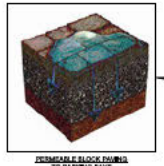
Drawn	Date	Checked	Date	Approved	Date
LN	05.07.2023	GT	05.07.2023	GT	05.07.2023

Scale	Orig Size	Dimensions
AS SHOWN	A0	M

Project no.: 134390
Drawing file: 134390-RSK-ZZ-ZZ-DR-C-0019 Longitudinal Sections.dwg

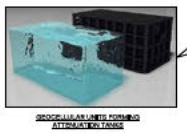
Drawing no.: 134390 | RSK | ZZ | ZZ | DR | C | 0019 | P01
Project | Orig. | Vol./Sys. | Zone/Loc. | Type | Role | Doc. No. | Rev.

Scale 1:500
0 5 10 15 20 25m

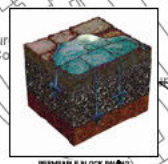


PERMEABLE BLOCK PAVING TO PARKING BAYS

+

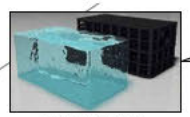


GEOCELLULAR UNITS FORMING ATTENUATION TANKS

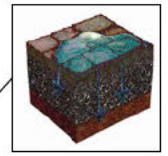


PERMEABLE BLOCK PAVING TO PARKING BAYS

+

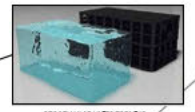


GEOCELLULAR UNITS FORMING ATTENUATION TANKS



PERMEABLE BLOCK PAVING TO PARKING BAYS

+



GEOCELLULAR UNITS FORMING ATTENUATION TANKS

BIORETENTION AREA

BIORETENTION AREA

DETENTION BASIN

(Office Hub location and design subject to future reserved matters application)

Office Hub

Issues

Track

Travellers Site

AINSWORTH DRIVE

HARRISONS ROAD

STATION ROAD

57.2m

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design solutions shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing presents the proposed SuDS features to be incorporated into the surface water drainage design for the development proposed on the former West Hatts College site.
2. This drawing forms part of the following document:
   "West Hatts College Drainage Design Statement".
3. Refer to RSK drawing no. 134390-RSK-ZZ-ZZ-DR-C-0005 for details of the below ground surface water drainage network that links together all the SuDS features shown.
4. Details in respect of how the SuDS features on this drawing have been integrated into the landscaping proposals for the site are given in the RSK Landscape Masterplan.

Rev.	Date	Amendment	Drawn	Chkd	Appd
P01	13/07/2023	First issue.	LN	GT	GT

LDE

dandara

Project title: MOOR FIELD LITTLE DUNMOW

Status: PLANNING

Drawing title: SuDS FEATURES PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	13.07.2023	GT	13.07.2023	GT	13.07.2023

Scale	Orig Size	Dimensions
1:500	A0	Metres

Project No.: 134390

Drawing No.: 134390-RSK-ZZ-ZZ-DR-C-0021-SuDS Features

Drawing No.: 134390 | RSK | ZZ | ZZ | DR | C | 0021 | P01

Scale 1:500

0 5 10 15 20 25m

APPENDIX C

Exceedance and Conveyance Routes

CDM / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risks may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Engineer's and Architect's drawings and specifications.
2. This drawing is to be printed in COLOUR.
3. All levels quoted are in metres AOD.
4. For Drainage Construction Details refer to RSK drawing 0004-0010
5. This drawing has been prepared for Catchment Area purposes only, and must not be used for House Setting Out.
6. All drainage design is subject to technical approval. No connections shall be made to any public sewers without written consent from the drainage authority.

Legend

- FFL 00.000 — Proposed Finished Floor Level (FFL)
- Overland Flow Route
- Site Boundary

Rev	Date	Amendment	Drawn	Chkd	Appd
P01	14/07/2023	First Issue	LN	GT	GT

LDE

Client: dandara

Project title: MOOR FIELDS LITTLE DUNMOW

Status: PLANNING

Drawing title: OVERLAND FLOOD FLOW PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	14.07.2023	GT	14.07.2023	GT	14.07.2023

Scale	Orig Size	Dimensions
1:500	A0	Metres

Project No: 134390

Drawing No: 134390 | RSK | ZZ | ZZ | DR | C | 0025 | P01

Scale 1:500

APPENDIX D

Hydraulic Modelling Results

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	240.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.400	Preferred Cover Depth (m)	0.300
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.034	5.00	71.450	1350	566327.157	221496.078	1.650
S2	0.000		70.500	1350	566338.860	221524.301	1.500
S3	0.053	5.00	70.360	1200	566364.581	221515.271	1.910
S4	0.000		69.830	1200	566387.236	221503.124	1.895
S5	0.039	5.00	69.270	1200	566399.626	221489.558	1.705
S6	0.000	5.00	68.700	1350	566407.897	221472.053	1.520
S7	0.132	5.00	69.510	1200	566372.120	221454.836	2.730
S8	0.066	5.00	70.340	1200	566335.410	221437.187	3.965
S9	0.078	5.00	69.890	1200	566344.907	221413.664	3.770
S10	0.021	5.00	69.440	1200	566345.886	221388.365	3.570
S11	0.118	5.00	68.780	1200	566343.022	221351.864	3.290
S12	0.078	5.00	67.950	1350	566338.862	221299.249	2.975
S13	0.084	5.00	67.390	1350	566342.085	221280.062	2.610
S14	0.029	5.00	66.410	1350	566351.736	221249.207	1.950
S15	0.000		66.300	1350	566354.796	221238.463	2.300
Swale 1	0.000		66.300	1500	566331.699	221231.543	2.320
S16	0.000		66.300	1350	566308.602	221224.624	2.340
S17	0.000	5.00	66.300	1350	566299.962	221222.027	2.360
Detention Basin	0.000		66.300	1500	566251.396	221218.120	2.380
S18	0.000	5.00	66.300	1350	566202.831	221214.213	2.400
S19	0.000	5.00	66.300	1350	566191.474	221211.671	2.450
S20	0.000	5.00	64.000	1350	566156.365	221178.059	1.280
Outfall	0.000		64.000	1350	566149.804	221171.740	1.330
S23	0.024	5.00	68.607	1350	566412.695	221462.603	1.377
S24	0.000	5.00	71.853	1350	566278.939	221459.839	1.298
S25	0.047	5.00	71.555	1350	566297.782	221471.876	1.590
S26	0.039	5.00	71.200	1350	566311.673	221475.190	1.630
S27	0.032	5.00	71.002	1350	566322.093	221470.690	1.687
S28	0.040	5.00	70.780	1200	566324.860	221459.080	1.730
S29	0.010	5.00	71.159	1350	566321.845	221478.854	1.559
S30	0.000	5.00	70.357	1200	566315.200	221414.863	2.108
S31	0.037	5.00	70.244	1200	566313.492	221397.534	2.169
S32	0.029	5.00	69.663	1200	566337.172	221393.585	2.188
S33	0.000	5.00	68.730	1350	566373.453	221387.535	1.417
S34	0.052	5.00	69.306	1200	566350.731	221391.324	2.281
S35	0.023	5.00	68.771	1200	566310.421	221354.440	1.910
S36	0.010	5.00	71.402	1350	566264.517	221440.866	1.852
S37	0.047	5.00	70.996	1350	566257.927	221421.377	1.846
S38	0.017	5.00	70.660	1350	566260.388	221405.956	1.830
S39	0.014	5.00	70.208	1350	566272.255	221387.152	1.823
S40	0.172	5.00	69.767	1350	566271.614	221364.754	1.827

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S41	0.185	5.00	68.819	1200	566266.566	221304.972	2.304
S42	0.179	5.00	69.217	1350	566216.928	221308.893	2.267
S43	0.000	5.00	67.950	1350	566352.124	221302.577	1.500
S44	0.074	5.00	66.650	1350	566366.215	221257.420	1.295
S45	0.059	5.00	72.684	1350	566147.363	221413.093	1.429
S46	0.047	5.00	71.740	1200	566202.585	221408.732	2.410
S47	0.164	5.00	70.510	1350	566198.710	221359.673	1.950
S48	0.080	5.00	69.537	1200	566194.835	221310.596	2.437
S49	0.028	5.00	67.106	1350	566189.694	221245.301	1.686
S50	0.059	5.00	66.897	1350	566237.370	221241.191	1.647
S51	0.083	5.00	66.671	1350	566283.519	221237.727	1.576
S52	0.074	5.00	66.503	1350	566310.903	221237.683	1.503
S53	0.064	5.00	70.997	1350	566245.517	221405.342	1.377
S54	0.000	5.00	71.417	1350	566131.247	221375.943	1.427
S55	0.069	5.00	70.162	1350	566127.877	221334.287	1.487
S56	0.130	5.00	69.642	1350	566126.400	221316.040	1.502
S57	0.000	5.00	69.380	1350	566125.284	221301.394	3.077
S58	0.022	5.00	69.080	1350	566128.547	221291.991	2.843
S59	0.020	5.00	68.760	1350	566135.072	221285.325	2.586
S60	0.000		68.240	1350	566134.749	221267.724	2.183
S61	0.054	5.00	67.660	1350	566159.604	221247.890	1.890

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	30.553	0.600	69.800	69.000	0.800	38.2	225	5.24	50.0
1.001	S2	S3	27.260	0.600	69.000	68.450	0.550	49.6	225	5.48	50.0
1.002	S3	S4	25.706	0.600	68.450	67.935	0.515	49.9	225	5.71	50.0
1.003	S4	S5	18.372	0.600	67.935	67.565	0.370	49.7	225	5.88	50.0
1.004	S5	S6	19.361	0.600	67.565	67.180	0.385	50.3	225	6.05	50.0
2.000	S23	S6	10.599	0.600	67.230	67.180	0.050	212.0	300	5.16	50.0
1.005	S6	S7	39.704	0.600	67.180	66.780	0.400	99.3	375	6.42	50.0
1.006	S7	S8	40.733	0.600	66.780	66.375	0.405	100.6	375	6.79	50.0
3.000	S24	S25	22.359	0.600	70.555	69.965	0.590	37.9	225	5.17	50.0
3.001	S25	S26	14.281	0.600	69.965	69.570	0.395	36.2	225	5.28	50.0
3.002	S26	S27	11.349	0.600	69.570	69.315	0.255	44.5	225	5.38	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	2.123	84.4	4.6	1.425	1.275	0.034	0.0
1.001	1.862	74.0	4.6	1.275	1.685	0.034	0.0
1.002	1.855	73.8	11.8	1.685	1.670	0.087	0.0
1.003	1.860	74.0	11.8	1.670	1.480	0.087	0.0
1.004	1.849	73.5	17.1	1.480	1.295	0.126	0.0
2.000	1.076	76.0	3.3	1.077	1.220	0.024	0.0
1.005	1.818	200.8	20.3	1.145	2.355	0.150	0.0
1.006	1.806	199.5	38.2	2.355	3.590	0.282	0.0
3.000	2.131	84.7	0.0	1.073	1.365	0.000	0.0
3.001	2.182	86.8	6.4	1.365	1.405	0.047	0.0
3.002	1.966	78.2	11.7	1.405	1.462	0.086	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.000	S29	S27	8.167	0.600	69.600	69.315	0.285	28.7	225	5.06	50.0
3.003	S27	S28	11.935	0.600	69.315	69.050	0.265	45.0	225	5.48	50.0
3.004	S28	S8	24.302	0.600	69.050	68.090	0.960	25.3	225	5.64	50.0
1.007	S8	S9	25.367	0.600	66.375	66.120	0.255	99.5	450	7.00	50.0
1.008	S9	S10	25.318	0.600	66.120	65.870	0.250	101.3	450	7.21	50.0
5.000	S30	S31	17.412	0.600	68.249	68.075	0.174	100.1	225	5.22	50.0
5.001	S31	S32	24.008	0.600	68.075	67.475	0.600	40.0	225	5.42	50.0
5.002	S32	S10	10.158	0.600	67.475	66.460	1.015	10.0	225	5.46	50.0
6.000	S33	S34	23.035	0.600	67.313	67.025	0.288	80.0	225	5.26	50.0
6.001	S34	S10	5.677	0.600	67.025	66.460	0.565	10.0	225	5.29	50.0
1.009	S10	S11	36.613	0.600	65.870	65.490	0.380	96.4	450	7.50	50.0
7.000	S35	S11	32.702	0.600	66.861	66.316	0.545	60.0	225	5.32	50.0
1.010	S11	S12	52.780	0.600	65.490	64.975	0.515	102.5	450	7.94	50.0
8.000	S36	S37	20.573	0.600	69.550	69.150	0.400	51.4	225	5.19	50.0
8.001	S37	S38	15.616	0.600	69.150	68.830	0.320	48.8	225	5.33	50.0
8.002	S38	S39	22.235	0.600	68.830	68.385	0.445	50.0	225	5.53	50.0
8.003	S39	S40	22.408	0.600	68.385	67.940	0.445	50.4	225	5.73	50.0
8.004	S40	S41	59.995	0.600	67.940	66.515	1.425	42.1	375	6.09	50.0
9.000	S42	S41	49.792	0.600	66.950	66.590	0.360	138.3	300	5.62	50.0
8.005	S41	S12	72.523	0.600	66.515	64.975	1.540	47.1	450	6.49	50.0
1.011	S12	S13	19.456	0.600	64.975	64.780	0.195	99.8	450	8.10	50.0
1.012	S13	S14	32.329	0.600	64.780	64.460	0.320	101.0	450	8.37	50.0
10.000	S43	S44	47.304	0.600	66.450	65.355	1.095	43.2	225	5.40	50.0
10.001	S44	S14	16.646	0.600	65.355	64.460	0.895	18.6	225	5.49	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
4.000	2.453	97.5	1.4	1.334	1.462	0.010	0.0
3.003	1.954	77.7	17.3	1.462	1.505	0.128	0.0
3.004	2.611	103.8	22.8	1.505	2.025	0.168	0.0
1.007	2.038	324.1	69.9	3.515	3.320	0.516	0.0
1.008	2.020	321.2	80.5	3.320	3.120	0.594	0.0
5.000	1.307	52.0	0.0	1.883	1.944	0.000	0.0
5.001	2.074	82.5	5.0	1.944	1.963	0.037	0.0
5.002	4.160	165.4	8.9	1.963	2.755	0.066	0.0
6.000	1.463	58.2	0.0	1.192	2.056	0.000	0.0
6.001	4.152	165.1	7.0	2.056	2.755	0.052	0.0
1.009	2.071	329.4	99.3	3.120	2.840	0.733	0.0
7.000	1.691	67.2	3.1	1.685	2.239	0.023	0.0
1.010	2.008	319.3	118.4	2.840	2.525	0.874	0.0
8.000	1.828	72.7	1.4	1.627	1.621	0.010	0.0
8.001	1.877	74.6	7.7	1.621	1.605	0.057	0.0
8.002	1.854	73.7	10.0	1.605	1.598	0.074	0.0
8.003	1.847	73.4	11.9	1.598	1.602	0.088	0.0
8.004	2.799	309.1	35.2	1.452	1.929	0.260	0.0
9.000	1.335	94.3	24.3	1.967	1.929	0.179	0.0
8.005	2.968	472.0	84.6	1.854	2.525	0.624	0.0
1.011	2.035	323.7	213.6	2.525	2.160	1.576	0.0
1.012	2.022	321.6	225.0	2.160	1.500	1.660	0.0
10.000	1.995	79.3	0.0	1.275	1.070	0.000	0.0
10.001	3.048	121.2	10.0	1.070	1.725	0.074	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.013	S14	S15	11.171	0.600	64.460	64.000	0.460	24.3	450	8.41	50.0
1.014	S15	Swale 1	42.547	0.600	64.000	63.980	0.020	2127.4	750	9.60	50.0
1.015	Swale 1	S16	24.111	0.600	63.980	63.960	0.020	1205.6	1200	9.98	50.0
11.000	S45	S46	55.394	0.600	71.255	69.330	1.925	28.8	225	5.38	50.0
12.000	S53	S46	43.066	0.600	69.620	69.330	0.290	148.5	225	5.67	50.0
11.001	S46	S47	49.212	0.600	69.330	68.560	0.770	63.9	225	6.17	50.0
11.002	S47	S48	49.230	0.600	68.560	67.100	1.460	33.7	300	6.47	50.0
13.000	S54	S55	41.792	0.600	69.990	68.675	1.315	31.8	225	5.30	50.0
13.001	S55	S56	18.307	0.600	68.675	68.215	0.460	39.8	225	5.45	50.0
13.002	S56	S48	68.650	0.600	68.140	67.540	0.600	114.4	300	6.22	50.0
11.003	S48	S49	65.497	0.600	67.100	65.570	1.530	42.8	375	6.87	50.0
14.000	S57	S58	9.953	0.600	66.303	66.237	0.066	150.8	225	5.16	50.0
14.001	S58	S59	9.328	0.600	66.237	66.174	0.063	148.1	225	5.30	50.0
14.002	S59	S60	17.604	0.600	66.174	66.057	0.117	150.5	225	5.58	50.0
14.003	S60	S61	31.799	0.600	66.057	65.845	0.212	150.0	225	6.07	50.0
14.004	S61	S49	30.201	0.600	65.770	65.570	0.200	151.0	300	6.47	50.0
11.004	S49	S50	47.853	0.600	65.420	65.250	0.170	281.5	450	7.53	50.0
11.005	S50	S51	46.279	0.600	65.250	65.095	0.155	298.6	450	8.19	50.0
11.006	S51	S52	27.384	0.600	65.095	65.000	0.095	288.3	450	8.57	50.0
11.007	S52	S16	11.857	0.600	65.000	64.980	0.020	592.9	450	8.81	50.0
1.016	S16	S17	10.414	0.600	63.960	63.940	0.020	520.7	1000	10.10	50.0
1.017	S17	Detention Basin	94.015	0.600	63.940	63.920	0.020	4700.8	1200	13.02	43.5
1.018	Detention Basin	S18	13.526	0.600	63.920	63.900	0.020	676.3	1200	13.18	43.2
1.019	S18	S19	11.638	0.600	63.900	63.850	0.050	232.8	225	13.41	42.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.013	4.138	658.2	238.9	1.500	1.850	1.763	0.0
1.014	0.597	263.8	238.9	1.550	1.570	1.763	0.0
1.015	1.068	1208.4	238.9	1.120	1.140	1.763	0.0
11.000	2.448	97.3	8.0	1.204	2.185	0.059	0.0
12.000	1.070	42.6	8.7	1.152	2.185	0.064	0.0
11.001	1.638	65.1	23.0	2.185	1.725	0.170	0.0
11.002	2.716	192.0	45.3	1.650	2.137	0.334	0.0
13.000	2.329	92.6	0.0	1.202	1.262	0.000	0.0
13.001	2.079	82.7	9.4	1.262	1.202	0.069	0.0
13.002	1.469	103.8	27.0	1.202	1.697	0.199	0.0
11.003	2.776	306.6	83.1	2.062	1.161	0.613	0.0
14.000	1.062	42.2	0.0	2.852	2.618	0.000	0.0
14.001	1.072	42.6	3.0	2.618	2.361	0.022	0.0
14.002	1.063	42.3	5.7	2.361	1.958	0.042	0.0
14.003	1.065	42.3	5.7	1.958	1.590	0.042	0.0
14.004	1.277	90.3	13.0	1.590	1.236	0.096	0.0
11.004	1.206	191.9	99.9	1.236	1.197	0.737	0.0
11.005	1.171	186.3	107.9	1.197	1.126	0.796	0.0
11.006	1.192	189.6	119.1	1.126	1.053	0.879	0.0
11.007	0.828	131.6	129.2	1.053	0.870	0.953	0.0
1.016	1.458	1145.2	368.1	1.340	1.360	2.716	0.0
1.017	0.535	605.5	320.0	1.160	1.180	2.716	0.0
1.018	1.431	1618.0	317.8	1.180	1.200	2.716	0.0
1.019	0.853	33.9	314.8	2.175	2.225	2.716	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.020	S19	S20	48.604	0.600	63.850	62.720	1.130	43.0	225	13.81	42.0
1.021	S20	Outfall	9.110	0.600	62.720	62.670	0.050	182.2	225	13.97	41.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.020	2.000	79.5	309.4	2.225	1.055	2.716	0.0
1.021	0.965	38.4	307.4	1.055	1.105	2.716	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	30.553	38.2	225	Circular	71.450	69.800	1.425	70.500	69.000	1.275
1.001	27.260	49.6	225	Circular	70.500	69.000	1.275	70.360	68.450	1.685
1.002	25.706	49.9	225	Circular	70.360	68.450	1.685	69.830	67.935	1.670
1.003	18.372	49.7	225	Circular	69.830	67.935	1.670	69.270	67.565	1.480
1.004	19.361	50.3	225	Circular	69.270	67.565	1.480	68.700	67.180	1.295
2.000	10.599	212.0	300	Circular	68.607	67.230	1.077	68.700	67.180	1.220
1.005	39.704	99.3	375	Circular	68.700	67.180	1.145	69.510	66.780	2.355
1.006	40.733	100.6	375	Circular	69.510	66.780	2.355	70.340	66.375	3.590
3.000	22.359	37.9	225	Circular	71.853	70.555	1.073	71.555	69.965	1.365
3.001	14.281	36.2	225	Circular	71.555	69.965	1.365	71.200	69.570	1.405
3.002	11.349	44.5	225	Circular	71.200	69.570	1.405	71.002	69.315	1.462
4.000	8.167	28.7	225	Circular	71.159	69.600	1.334	71.002	69.315	1.462
3.003	11.935	45.0	225	Circular	71.002	69.315	1.462	70.780	69.050	1.505
3.004	24.302	25.3	225	Circular	70.780	69.050	1.505	70.340	68.090	2.025
1.007	25.367	99.5	450	Circular	70.340	66.375	3.515	69.890	66.120	3.320
1.008	25.318	101.3	450	Circular	69.890	66.120	3.320	69.440	65.870	3.120
5.000	17.412	100.1	225	Circular	70.357	68.249	1.883	70.244	68.075	1.944
5.001	24.008	40.0	225	Circular	70.244	68.075	1.944	69.663	67.475	1.963

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S2	1350	Manhole	Adoptable
1.001	S2	1350	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
1.004	S5	1200	Manhole	Adoptable	S6	1350	Manhole	Adoptable
2.000	S23	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
1.005	S6	1350	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.006	S7	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable
3.000	S24	1350	Manhole	Adoptable	S25	1350	Manhole	Adoptable
3.001	S25	1350	Manhole	Adoptable	S26	1350	Manhole	Adoptable
3.002	S26	1350	Manhole	Adoptable	S27	1350	Manhole	Adoptable
4.000	S29	1350	Manhole	Adoptable	S27	1350	Manhole	Adoptable
3.003	S27	1350	Manhole	Adoptable	S28	1200	Manhole	Adoptable
3.004	S28	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable
1.007	S8	1200	Manhole	Adoptable	S9	1200	Manhole	Adoptable
1.008	S9	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
5.000	S30	1200	Manhole	Adoptable	S31	1200	Manhole	Adoptable
5.001	S31	1200	Manhole	Adoptable	S32	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
5.002	10.158	10.0	225	Circular	69.663	67.475	1.963	69.440	66.460	2.755
6.000	23.035	80.0	225	Circular	68.730	67.313	1.192	69.306	67.025	2.056
6.001	5.677	10.0	225	Circular	69.306	67.025	2.056	69.440	66.460	2.755
1.009	36.613	96.4	450	Circular	69.440	65.870	3.120	68.780	65.490	2.840
7.000	32.702	60.0	225	Circular	68.771	66.861	1.685	68.780	66.316	2.239
1.010	52.780	102.5	450	Circular	68.780	65.490	2.840	67.950	64.975	2.525
8.000	20.573	51.4	225	Circular	71.402	69.550	1.627	70.996	69.150	1.621
8.001	15.616	48.8	225	Circular	70.996	69.150	1.621	70.660	68.830	1.605
8.002	22.235	50.0	225	Circular	70.660	68.830	1.605	70.208	68.385	1.598
8.003	22.408	50.4	225	Circular	70.208	68.385	1.598	69.767	67.940	1.602
8.004	59.995	42.1	375	Circular	69.767	67.940	1.452	68.819	66.515	1.929
9.000	49.792	138.3	300	Circular	69.217	66.950	1.967	68.819	66.590	1.929
8.005	72.523	47.1	450	Circular	68.819	66.515	1.854	67.950	64.975	2.525
1.011	19.456	99.8	450	Circular	67.950	64.975	2.525	67.390	64.780	2.160
1.012	32.329	101.0	450	Circular	67.390	64.780	2.160	66.410	64.460	1.500
10.000	47.304	43.2	225	Circular	67.950	66.450	1.275	66.650	65.355	1.070
10.001	16.646	18.6	225	Circular	66.650	65.355	1.070	66.410	64.460	1.725
1.013	11.171	24.3	450	Circular	66.410	64.460	1.500	66.300	64.000	1.850
1.014	42.547	2127.4	750	Circular	66.300	64.000	1.550	66.300	63.980	1.570
1.015	24.111	1205.6	1200	Circular	66.300	63.980	1.120	66.300	63.960	1.140
11.000	55.394	28.8	225	Circular	72.684	71.255	1.204	71.740	69.330	2.185
12.000	43.066	148.5	225	Circular	70.997	69.620	1.152	71.740	69.330	2.185
11.001	49.212	63.9	225	Circular	71.740	69.330	2.185	70.510	68.560	1.725
11.002	49.230	33.7	300	Circular	70.510	68.560	1.650	69.537	67.100	2.137
13.000	41.792	31.8	225	Circular	71.417	69.990	1.202	70.162	68.675	1.262

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.002	S32	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
6.000	S33	1350	Manhole	Adoptable	S34	1200	Manhole	Adoptable
6.001	S34	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.009	S10	1200	Manhole	Adoptable	S11	1200	Manhole	Adoptable
7.000	S35	1200	Manhole	Adoptable	S11	1200	Manhole	Adoptable
1.010	S11	1200	Manhole	Adoptable	S12	1350	Manhole	Adoptable
8.000	S36	1350	Manhole	Adoptable	S37	1350	Manhole	Adoptable
8.001	S37	1350	Manhole	Adoptable	S38	1350	Manhole	Adoptable
8.002	S38	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable
8.003	S39	1350	Manhole	Adoptable	S40	1350	Manhole	Adoptable
8.004	S40	1350	Manhole	Adoptable	S41	1200	Manhole	Adoptable
9.000	S42	1350	Manhole	Adoptable	S41	1200	Manhole	Adoptable
8.005	S41	1200	Manhole	Adoptable	S12	1350	Manhole	Adoptable
1.011	S12	1350	Manhole	Adoptable	S13	1350	Manhole	Adoptable
1.012	S13	1350	Manhole	Adoptable	S14	1350	Manhole	Adoptable
10.000	S43	1350	Manhole	Adoptable	S44	1350	Manhole	Adoptable
10.001	S44	1350	Manhole	Adoptable	S14	1350	Manhole	Adoptable
1.013	S14	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
1.014	S15	1350	Manhole	Adoptable	Swale 1	1500	Manhole	Adoptable
1.015	Swale 1	1500	Manhole	Adoptable	S16	1350	Manhole	Adoptable
11.000	S45	1350	Manhole	Adoptable	S46	1200	Manhole	Adoptable
12.000	S53	1350	Manhole	Adoptable	S46	1200	Manhole	Adoptable
11.001	S46	1200	Manhole	Adoptable	S47	1350	Manhole	Adoptable
11.002	S47	1350	Manhole	Adoptable	S48	1200	Manhole	Adoptable
13.000	S54	1350	Manhole	Adoptable	S55	1350	Manhole	Adoptable

Pipeline Schedule

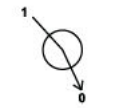
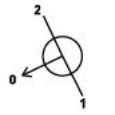
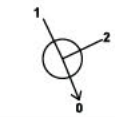
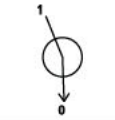
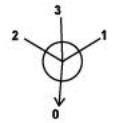
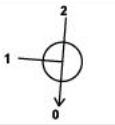
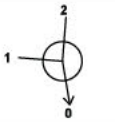
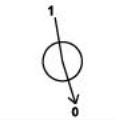
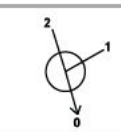
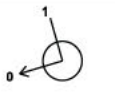
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
13.001	18.307	39.8	225	Circular	70.162	68.675	1.262	69.642	68.215	1.202
13.002	68.650	114.4	300	Circular	69.642	68.140	1.202	69.537	67.540	1.697
11.003	65.497	42.8	375	Circular	69.537	67.100	2.062	67.106	65.570	1.161
14.000	9.953	150.8	225	Circular	69.380	66.303	2.852	69.080	66.237	2.618
14.001	9.328	148.1	225	Circular	69.080	66.237	2.618	68.760	66.174	2.361
14.002	17.604	150.5	225	Circular	68.760	66.174	2.361	68.240	66.057	1.958
14.003	31.799	150.0	225	Circular	68.240	66.057	1.958	67.660	65.845	1.590
14.004	30.201	151.0	300	Circular	67.660	65.770	1.590	67.106	65.570	1.236
11.004	47.853	281.5	450	Circular	67.106	65.420	1.236	66.897	65.250	1.197
11.005	46.279	298.6	450	Circular	66.897	65.250	1.197	66.671	65.095	1.126
11.006	27.384	288.3	450	Circular	66.671	65.095	1.126	66.503	65.000	1.053
11.007	11.857	592.9	450	Circular	66.503	65.000	1.053	66.300	64.980	0.870
1.016	10.414	520.7	1000	Circular	66.300	63.960	1.340	66.300	63.940	1.360
1.017	94.015	4700.8	1200	Circular	66.300	63.940	1.160	66.300	63.920	1.180
1.018	13.526	676.3	1200	Circular	66.300	63.920	1.180	66.300	63.900	1.200
1.019	11.638	232.8	225	Circular	66.300	63.900	2.175	66.300	63.850	2.225
1.020	48.604	43.0	225	Circular	66.300	63.850	2.225	64.000	62.720	1.055
1.021	9.110	182.2	225	Circular	64.000	62.720	1.055	64.000	62.670	1.105

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
13.001	S55	1350	Manhole	Adoptable	S56	1350	Manhole	Adoptable
13.002	S56	1350	Manhole	Adoptable	S48	1200	Manhole	Adoptable
11.003	S48	1200	Manhole	Adoptable	S49	1350	Manhole	Adoptable
14.000	S57	1350	Manhole	Adoptable	S58	1350	Manhole	Adoptable
14.001	S58	1350	Manhole	Adoptable	S59	1350	Manhole	Adoptable
14.002	S59	1350	Manhole	Adoptable	S60	1350	Manhole	Adoptable
14.003	S60	1350	Manhole	Adoptable	S61	1350	Manhole	Adoptable
14.004	S61	1350	Manhole	Adoptable	S49	1350	Manhole	Adoptable
11.004	S49	1350	Manhole	Adoptable	S50	1350	Manhole	Adoptable
11.005	S50	1350	Manhole	Adoptable	S51	1350	Manhole	Adoptable
11.006	S51	1350	Manhole	Adoptable	S52	1350	Manhole	Adoptable
11.007	S52	1350	Manhole	Adoptable	S16	1350	Manhole	Adoptable
1.016	S16	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
1.017	S17	1350	Manhole	Adoptable	Detention Basin	1500	Manhole	Adoptable
1.018	Detention Basin	1500	Manhole	Adoptable	S18	1350	Manhole	Adoptable
1.019	S18	1350	Manhole	Adoptable	S19	1350	Manhole	Adoptable
1.020	S19	1350	Manhole	Adoptable	S20	1350	Manhole	Adoptable
1.021	S20	1350	Manhole	Adoptable	Outfall	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	566327.157	221496.078	71.450	1.650	1350				
						0	1.000	69.800	225
S2	566338.860	221524.301	70.500	1.500	1350	1	1.000	69.000	225
									
						0	1.001	69.000	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S3	566364.581	221515.271	70.360	1.910	1200	 1	1.001	68.450	225
						0	1.002	68.450	225
S4	566387.236	221503.124	69.830	1.895	1200	 1	1.002	67.935	225
						0	1.003	67.935	225
S5	566399.626	221489.558	69.270	1.705	1200	 1	1.003	67.565	225
						0	1.004	67.565	225
S6	566407.897	221472.053	68.700	1.520	1350	 1	2.000	67.180	300
						2	1.004	67.180	225
						0	1.005	67.180	375
S7	566372.120	221454.836	69.510	2.730	1200	 1	1.005	66.780	375
						0	1.006	66.780	375
S8	566335.410	221437.187	70.340	3.965	1200	 1	3.004	68.090	225
						2	1.006	66.375	375
						0	1.007	66.375	450
S9	566344.907	221413.664	69.890	3.770	1200	 1	1.007	66.120	450
						0	1.008	66.120	450
S10	566345.886	221388.365	69.440	3.570	1200	 1	6.001	66.460	225
						2	5.002	66.460	225
						3	1.008	65.870	450
						0	1.009	65.870	450
S11	566343.022	221351.864	68.780	3.290	1200	 1	7.000	66.316	225
						2	1.009	65.490	450
						0	1.010	65.490	450
S12	566338.862	221299.249	67.950	2.975	1350	 1	8.005	64.975	450
						2	1.010	64.975	450
						0	1.011	64.975	450
S13	566342.085	221280.062	67.390	2.610	1350	 1	1.011	64.780	450
						0	1.012	64.780	450
S14	566351.736	221249.207	66.410	1.950	1350	 1	10.001	64.460	225
						2	1.012	64.460	450
						0	1.013	64.460	450
S15	566354.796	221238.463	66.300	2.300	1350	 1	1.013	64.000	450
						0	1.014	64.000	750

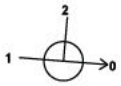
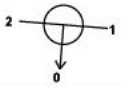
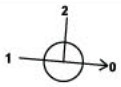
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Swale 1	566331.699	221231.543	66.300	2.320	1500	1	1.014	63.980	750
						0	1.015	63.980	1200
S16	566308.602	221224.624	66.300	2.340	1350	1	11.007	64.980	450
						2	1.015	63.960	1200
						0	1.016	63.960	1000
S17	566299.962	221222.027	66.300	2.360	1350	1	1.016	63.940	1000
						0	1.017	63.940	1200
Detention Basin	566251.396	221218.120	66.300	2.380	1500	1	1.017	63.920	1200
						0	1.018	63.920	1200
S18	566202.831	221214.213	66.300	2.400	1350	1	1.018	63.900	1200
						0	1.019	63.900	225
S19	566191.474	221211.671	66.300	2.450	1350	1	1.019	63.850	225
						0	1.020	63.850	225
S20	566156.365	221178.059	64.000	1.280	1350	1	1.020	62.720	225
						0	1.021	62.720	225
Outfall	566149.804	221171.740	64.000	1.330	1350	1	1.021	62.670	225
S23	566412.695	221462.603	68.607	1.377	1350	0	2.000	67.230	300
S24	566278.939	221459.839	71.853	1.298	1350	0	3.000	70.555	225
S25	566297.782	221471.876	71.555	1.590	1350	1	3.000	69.965	225
						0	3.001	69.965	225
S26	566311.673	221475.190	71.200	1.630	1350	1	3.001	69.570	225
						0	3.002	69.570	225
S27	566322.093	221470.690	71.002	1.687	1350	1	4.000	69.315	225
						2	3.002	69.315	225
						0	3.003	69.315	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S28	566324.860	221459.080	70.780	1.730	1200	1	3.003	69.050	225
						0	3.004	69.050	225
S29	566321.845	221478.854	71.159	1.559	1350	0	4.000	69.600	225
S30	566315.200	221414.863	70.357	2.108	1200	0	5.000	68.249	225
S31	566313.492	221397.534	70.244	2.169	1200	1	5.000	68.075	225
						0	5.001	68.075	225
S32	566337.172	221393.585	69.663	2.188	1200	1	5.001	67.475	225
						0	5.002	67.475	225
S33	566373.453	221387.535	68.730	1.417	1350	0	6.000	67.313	225
S34	566350.731	221391.324	69.306	2.281	1200	1	6.000	67.025	225
						0	6.001	67.025	225
S35	566310.421	221354.440	68.771	1.910	1200	0	7.000	66.861	225
S36	566264.517	221440.866	71.402	1.852	1350	0	8.000	69.550	225
S37	566257.927	221421.377	70.996	1.846	1350	1	8.000	69.150	225
						0	8.001	69.150	225
S38	566260.388	221405.956	70.660	1.830	1350	1	8.001	68.830	225
						0	8.002	68.830	225
S39	566272.255	221387.152	70.208	1.823	1350	1	8.002	68.385	225
						0	8.003	68.385	225
S40	566271.614	221364.754	69.767	1.827	1350	1	8.003	67.940	225
						0	8.004	67.940	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S41	566266.566	221304.972	68.819	2.304	1200		1	9.000	66.590	300
							2	8.004	66.515	375
							0	8.005	66.515	450
S42	566216.928	221308.893	69.217	2.267	1350		0	9.000	66.950	300
S43	566352.124	221302.577	67.950	1.500	1350		0	10.000	66.450	225
S44	566366.215	221257.420	66.650	1.295	1350		1	10.000	65.355	225
							0	10.001	65.355	225
S45	566147.363	221413.093	72.684	1.429	1350		0	11.000	71.255	225
S46	566202.585	221408.732	71.740	2.410	1200		1	12.000	69.330	225
							2	11.000	69.330	225
							0	11.001	69.330	225
S47	566198.710	221359.673	70.510	1.950	1350		1	11.001	68.560	225
							0	11.002	68.560	300
S48	566194.835	221310.596	69.537	2.437	1200		1	13.002	67.540	300
							2	11.002	67.100	300
							0	11.003	67.100	375
S49	566189.694	221245.301	67.106	1.686	1350		1	14.004	65.570	300
							2	11.003	65.570	375
							0	11.004	65.420	450
S50	566237.370	221241.191	66.897	1.647	1350		1	11.004	65.250	450
							0	11.005	65.250	450
S51	566283.519	221237.727	66.671	1.576	1350		1	11.005	65.095	450
							0	11.006	65.095	450
S52	566310.903	221237.683	66.503	1.503	1350		1	11.006	65.000	450
							0	11.007	65.000	450
S53	566245.517	221405.342	70.997	1.377	1350		0	12.000	69.620	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S54	566131.247	221375.943	71.417	1.427	1350		0	13.000	69.990	225
S55	566127.877	221334.287	70.162	1.487	1350		1	13.000	68.675	225
							0	13.001	68.675	225
S56	566126.400	221316.040	69.642	1.502	1350		1	13.001	68.215	225
							0	13.002	68.140	300
S57	566125.284	221301.394	69.380	3.077	1350		0	14.000	66.303	225
S58	566128.547	221291.991	69.080	2.843	1350		1	14.000	66.237	225
							0	14.001	66.237	225
S59	566135.072	221285.325	68.760	2.586	1350		1	14.001	66.174	225
							0	14.002	66.174	225
S60	566134.749	221267.724	68.240	2.183	1350		1	14.002	66.057	225
							0	14.003	66.057	225
S61	566159.604	221247.890	67.660	1.890	1350		1	14.003	65.845	225
							0	14.004	65.770	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Fast
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	40	0	0
100	40	0	0

Node S19 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	12.1		
Invert Level (m)	63.850	Diameter (m)	0.076		

Node S15 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	64.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	144.0	0.0	1.000	899.0	0.0	1.001	0.0	0.0

Node S18 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	63.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	811.0	0.0	1.000	2339.0	0.0	1.001	0.0	0.0

Node S23 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	67.230
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	6

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	0.0	0.800	60.0	0.0	0.801	0.0	0.0

Node S42 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	68.700	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1	Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.25	Length (m)	126.700		

Node S49 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	65.420
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	18

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	130.0	0.0	0.400	130.0	0.0	0.401	0.0	0.0

Node S50 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	65.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	15

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	130.0	0.0	0.400	130.0	0.0	0.401	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	69.836	0.036	4.8	0.0519	0.0000	OK
15 minute winter	S2	11	69.038	0.038	4.7	0.0546	0.0000	OK
15 minute winter	S3	10	68.513	0.063	12.1	0.0707	0.0000	OK
15 minute winter	S4	11	67.996	0.061	11.8	0.0688	0.0000	OK
15 minute winter	S5	11	67.642	0.077	17.1	0.0876	0.0000	OK
15 minute winter	S6	11	67.252	0.072	17.2	0.1026	0.0000	OK
15 minute winter	S7	11	66.883	0.103	33.9	0.1168	0.0000	OK
15 minute winter	S8	11	66.519	0.144	65.6	0.1633	0.0000	OK
15 minute winter	S9	11	66.278	0.158	76.4	0.1789	0.0000	OK
15 minute winter	S10	11	66.042	0.172	95.1	0.1946	0.0000	OK
15 minute winter	S11	11	65.672	0.182	113.9	0.2062	0.0000	OK
15 minute winter	S12	11	65.277	0.302	209.3	0.4319	0.0000	OK
15 minute winter	S13	12	65.072	0.292	214.1	0.4181	0.0000	OK
15 minute winter	S14	11	64.682	0.222	227.4	0.3174	0.0000	OK
30 minute winter	S15	27	64.308	0.308	183.9	80.5911	0.0000	OK
30 minute winter	Swale 1	25	64.300	0.320	83.7	0.5655	0.0000	OK
30 minute winter	S16	25	64.300	0.340	136.0	0.4862	0.0000	OK
30 minute winter	S17	25	64.295	0.355	137.1	0.5076	0.0000	OK
15 minute winter	Detention Basin	19	64.276	0.356	108.3	0.6289	0.0000	OK
720 minute winter	S18	600	64.217	0.317	31.3	333.7367	0.0000	SURCHARGED
720 minute winter	S19	600	64.214	0.364	6.9	0.5204	0.0000	SURCHARGED
720 minute winter	S20	600	62.788	0.068	6.9	0.0971	0.0000	OK
720 minute winter	Outfall	600	62.734	0.064	6.9	0.0000	0.0000	OK
60 minute winter	S23	41	67.254	0.024	1.8	1.4088	0.0000	OK
15 minute summer	S24	1	70.555	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	4.7	1.114	0.056	0.1299	
15 minute winter	S2	1.001	S3	4.7	0.708	0.063	0.1822	
15 minute winter	S3	1.002	S4	11.8	1.353	0.161	0.2257	
15 minute winter	S4	1.003	S5	11.9	1.155	0.161	0.1904	
15 minute winter	S5	1.004	S6	17.2	1.504	0.235	0.2222	
15 minute winter	S6	1.005	S7	16.4	0.848	0.082	0.7798	
15 minute winter	S7	1.006	S8	33.9	1.071	0.170	1.2973	
15 minute winter	S8	1.007	S9	66.0	1.412	0.204	1.1861	
15 minute winter	S9	1.008	S10	76.5	1.452	0.238	1.3340	
15 minute winter	S10	1.009	S11	95.1	1.642	0.289	2.1217	
15 minute winter	S11	1.010	S12	113.8	1.310	0.356	4.5715	
15 minute winter	S12	1.011	S13	204.1	1.847	0.631	2.1572	
15 minute winter	S13	1.012	S14	215.6	2.318	0.670	3.0149	
15 minute winter	S14	1.013	S15	229.3	3.645	0.348	0.8537	
30 minute winter	S15	1.014	Swale 1	83.7	0.636	0.317	7.2956	
30 minute winter	Swale 1	1.015	S16	85.6	0.444	0.071	6.0624	
30 minute winter	S16	1.016	S17	137.1	0.657	0.120	2.5137	
30 minute winter	S17	1.017	Detention Basin	140.6	0.792	0.232	25.7774	
15 minute winter	Detention Basin	1.018	S18	142.3	2.031	0.088	1.9047	
720 minute winter	S18	1.019	S19	6.9	0.289	0.203	0.4629	
720 minute winter	S19	Orifice	S20	6.9				
720 minute winter	S20	1.021	Outfall	6.9	0.712	0.179	0.0881	278.1
60 minute winter	S23	2.000	S6	1.0	0.270	0.013	0.0596	
15 minute summer	S24	3.000	S25	0.0	0.000	0.000	0.0545	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S25	10	70.007	0.042	6.6	0.0595	0.0000	OK
15 minute winter	S26	10	69.630	0.060	12.0	0.0864	0.0000	OK
15 minute winter	S27	10	69.392	0.077	17.8	0.1107	0.0000	OK
15 minute winter	S28	10	69.124	0.074	23.1	0.0839	0.0000	OK
15 minute winter	S29	10	69.619	0.019	1.4	0.0269	0.0000	OK
15 minute summer	S30	1	68.249	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S31	10	68.114	0.039	5.2	0.0438	0.0000	OK
15 minute winter	S32	10	67.512	0.037	9.2	0.0421	0.0000	OK
15 minute summer	S33	1	67.313	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S34	10	67.059	0.034	7.3	0.0384	0.0000	OK
15 minute winter	S35	11	66.894	0.033	3.2	0.0377	0.0000	OK
15 minute winter	S36	10	69.571	0.021	1.4	0.0306	0.0000	OK
15 minute winter	S37	10	69.200	0.050	8.0	0.0709	0.0000	OK
15 minute winter	S38	10	68.887	0.057	10.2	0.0814	0.0000	OK
15 minute winter	S39	11	68.446	0.061	12.1	0.0880	0.0000	OK
15 minute winter	S40	10	68.025	0.085	36.1	0.1213	0.0000	OK
15 minute winter	S41	11	66.642	0.127	85.6	0.1441	0.0000	OK
15 minute winter	S42	10	67.056	0.106	25.2	0.1514	0.0000	OK
15 minute summer	S43	1	66.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S44	10	65.399	0.044	10.4	0.0632	0.0000	OK
15 minute winter	S45	10	71.299	0.044	8.3	0.0628	0.0000	OK
15 minute winter	S46	11	69.423	0.093	23.5	0.1050	0.0000	OK
15 minute winter	S47	11	68.658	0.098	45.0	0.1403	0.0000	OK
15 minute winter	S48	11	67.235	0.135	82.7	0.1528	0.0000	OK
15 minute winter	S49	14	65.605	0.185	98.8	23.1166	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S25	3.001	S26	6.5	0.967	0.075	0.0970	
15 minute winter	S26	3.002	S27	11.9	1.156	0.152	0.1170	
15 minute winter	S27	3.003	S28	17.5	1.496	0.226	0.1400	
15 minute winter	S28	3.004	S8	22.9	2.064	0.221	0.2698	
15 minute winter	S29	4.000	S27	1.4	0.223	0.014	0.0557	
15 minute summer	S30	5.000	S31	0.0	0.000	0.000	0.0384	
15 minute winter	S31	5.001	S32	5.1	1.160	0.062	0.1059	
15 minute winter	S32	5.002	S10	9.1	2.189	0.055	0.0423	
15 minute summer	S33	6.000	S34	0.0	0.000	0.000	0.0419	
15 minute winter	S34	6.001	S10	7.2	2.013	0.044	0.0204	
15 minute winter	S35	7.000	S11	3.1	0.866	0.047	0.1184	
15 minute winter	S36	8.000	S37	1.4	0.341	0.019	0.0861	
15 minute winter	S37	8.001	S38	7.8	1.094	0.105	0.1119	
15 minute winter	S38	8.002	S39	10.1	1.222	0.137	0.1843	
15 minute winter	S39	8.003	S40	12.1	1.086	0.165	0.2510	
15 minute winter	S40	8.004	S41	35.4	1.399	0.114	1.5462	
15 minute winter	S41	8.005	S12	85.1	1.242	0.180	5.4345	
15 minute winter	S42	9.000	S41	24.5	1.124	0.259	1.0841	
15 minute summer	S43	10.000	S44	0.0	0.000	0.000	0.1255	
15 minute winter	S44	10.001	S14	10.3	0.734	0.085	0.3744	
15 minute winter	S45	11.000	S46	8.1	0.828	0.084	0.5753	
15 minute winter	S46	11.001	S47	23.0	1.437	0.353	0.7885	
15 minute winter	S47	11.002	S48	45.0	1.796	0.235	1.2495	
15 minute winter	S48	11.003	S49	82.3	2.354	0.269	2.2914	
15 minute winter	S49	11.004	S50	64.6	1.589	0.337	2.2407	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	S50	26	65.410	0.160	67.2	19.9286	0.0000	OK
30 minute winter	S51	27	65.263	0.168	50.3	0.2403	0.0000	OK
30 minute winter	S52	27	65.190	0.190	52.0	0.2715	0.0000	OK
15 minute winter	S53	10	69.689	0.069	9.0	0.0984	0.0000	OK
15 minute summer	S54	1	69.990	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S55	10	68.728	0.053	9.7	0.0758	0.0000	OK
15 minute winter	S56	11	68.246	0.106	27.8	0.1510	0.0000	OK
15 minute summer	S57	1	66.303	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S58	10	66.277	0.040	3.1	0.0579	0.0000	OK
15 minute winter	S59	10	66.232	0.058	5.8	0.0825	0.0000	OK
15 minute winter	S60	11	66.113	0.056	5.8	0.0805	0.0000	OK
15 minute winter	S61	11	65.848	0.078	12.8	0.1114	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	S50	11.005	S51	48.1	0.925	0.258	2.4057	
30 minute winter	S51	11.006	S52	50.3	0.857	0.265	1.6071	
30 minute winter	S52	11.007	S16	52.0	0.926	0.395	0.6668	
15 minute winter	S53	12.000	S46	8.8	0.697	0.206	0.5515	
15 minute summer	S54	13.000	S55	0.0	0.000	0.000	0.1438	
15 minute winter	S55	13.001	S56	9.5	1.365	0.115	0.1271	
15 minute winter	S56	13.002	S48	27.1	1.242	0.261	1.4974	
15 minute summer	S57	14.000	S58	0.0	0.000	0.000	0.0234	
15 minute winter	S58	14.001	S59	3.0	0.476	0.071	0.0599	
15 minute winter	S59	14.002	S60	5.8	0.750	0.136	0.1381	
15 minute winter	S60	14.003	S61	5.6	0.739	0.133	0.2423	
15 minute winter	S61	14.004	S49	12.8	0.901	0.142	0.4282	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	69.868	0.068	16.5	0.0973	0.0000	OK
15 minute winter	S2	10	69.071	0.071	16.3	0.1013	0.0000	OK
15 minute winter	S3	10	68.576	0.126	41.7	0.1430	0.0000	OK
15 minute winter	S4	11	68.060	0.125	41.1	0.1418	0.0000	OK
15 minute winter	S5	12	67.844	0.279	59.4	0.3151	0.0000	SURCHARGED
15 minute winter	S6	12	67.607	0.427	100.6	0.6117	0.0000	SURCHARGED
15 minute winter	S7	11	67.668	0.888	129.4	1.0047	0.0000	SURCHARGED
15 minute winter	S8	12	67.656	1.281	198.7	1.4492	0.0000	SURCHARGED
15 minute winter	S9	12	67.628	1.508	226.6	1.7052	0.0000	SURCHARGED
15 minute winter	S10	12	67.571	1.701	226.3	1.9242	0.0000	SURCHARGED
15 minute winter	S11	12	67.432	1.942	254.8	2.1960	0.0000	SURCHARGED
15 minute winter	S12	12	67.108	2.133	508.5	3.0530	0.0000	SURCHARGED
15 minute winter	S13	12	66.356	1.576	539.7	2.2548	0.0000	SURCHARGED
15 minute winter	S14	12	65.142	0.682	579.0	0.9760	0.0000	SURCHARGED
960 minute winter	S15	930	64.677	0.677	77.3	271.5627	0.0000	OK
960 minute winter	Swale 1	930	64.677	0.697	38.8	1.2321	0.0000	OK
960 minute winter	S16	930	64.677	0.717	66.8	1.0264	0.0000	OK
960 minute winter	S17	930	64.677	0.737	66.1	1.0549	0.0000	OK
960 minute winter	Detention Basin	945	64.677	0.757	64.1	1.3384	0.0000	OK
960 minute winter	S18	930	64.677	0.777	62.0	1092.8960	0.0000	SURCHARGED
960 minute winter	S19	930	64.670	0.820	10.7	1.1738	0.0000	SURCHARGED
960 minute winter	S20	930	62.806	0.086	10.7	0.1234	0.0000	OK
960 minute winter	Outfall	930	62.750	0.080	10.7	0.0000	0.0000	OK
15 minute winter	S23	14	67.579	0.349	111.5	20.3903	0.0000	SURCHARGED
15 minute summer	S24	1	70.555	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	16.3	1.574	0.194	0.3173	
15 minute winter	S2	1.001	S3	16.0	0.968	0.217	0.4584	
15 minute winter	S3	1.002	S4	41.1	2.106	0.558	0.5861	
15 minute winter	S4	1.003	S5	41.2	1.466	0.557	0.5498	
15 minute winter	S5	1.004	S6	58.6	2.098	0.797	0.7700	
15 minute winter	S6	1.005	S7	108.7	1.446	0.541	4.3792	
15 minute winter	S7	1.006	S8	137.7	1.498	0.690	4.4927	
15 minute winter	S8	1.007	S9	201.7	1.578	0.622	4.0192	
15 minute winter	S9	1.008	S10	217.5	1.611	0.677	4.0115	
15 minute winter	S10	1.009	S11	233.3	1.818	0.708	5.8011	
15 minute winter	S11	1.010	S12	256.0	1.617	0.802	8.3626	
15 minute winter	S12	1.011	S13	507.9	3.206	1.569	3.0827	
15 minute winter	S13	1.012	S14	539.1	3.403	1.676	5.1223	
15 minute winter	S14	1.013	S15	580.4	4.023	0.882	1.7700	
960 minute winter	S15	1.014	Swale 1	38.8	0.335	0.147	17.9775	
960 minute winter	Swale 1	1.015	S16	37.7	0.238	0.031	16.6621	
960 minute winter	S16	1.016	S17	66.1	0.347	0.058	6.3504	
960 minute winter	S17	1.017	Detention Basin	64.1	0.342	0.106	69.3587	
960 minute winter	Detention Basin	1.018	S18	62.0	0.897	0.038	10.2905	
960 minute winter	S18	1.019	S19	10.7	0.283	0.315	0.4629	
960 minute winter	S19	Orifice	S20	10.7				
960 minute winter	S20	1.021	Outfall	10.7	0.799	0.278	0.1216	562.0
15 minute winter	S23	2.000	S6	-102.4	-1.606	-1.346	0.7464	
15 minute summer	S24	3.000	S25	0.0	0.000	0.000	0.1318	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S25	10	70.043	0.078	22.8	0.1116	0.0000	OK
15 minute winter	S26	10	69.700	0.130	41.5	0.1857	0.0000	OK
15 minute winter	S27	10	69.488	0.173	61.3	0.2481	0.0000	OK
15 minute winter	S28	10	69.210	0.160	80.0	0.1812	0.0000	OK
15 minute winter	S29	10	69.634	0.034	4.8	0.0484	0.0000	OK
15 minute summer	S30	1	68.249	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S31	10	68.149	0.074	17.9	0.0836	0.0000	OK
15 minute winter	S32	12	67.573	0.098	31.7	0.1112	0.0000	OK
15 minute winter	S33	12	67.584	0.271	14.2	0.3876	0.0000	SURCHARGED
15 minute winter	S34	12	67.594	0.569	25.6	0.6438	0.0000	SURCHARGED
15 minute winter	S35	11	67.460	0.599	11.1	0.6779	0.0000	SURCHARGED
15 minute winter	S36	10	69.589	0.039	4.8	0.0557	0.0000	OK
15 minute winter	S37	10	69.249	0.099	27.5	0.1410	0.0000	OK
15 minute winter	S38	10	68.944	0.114	35.4	0.1628	0.0000	OK
15 minute winter	S39	10	68.510	0.125	41.9	0.1788	0.0000	OK
15 minute winter	S40	10	68.102	0.162	124.6	0.2323	0.0000	OK
15 minute winter	S41	12	67.605	1.090	299.2	1.2331	0.0000	SURCHARGED
15 minute winter	S42	12	67.836	0.886	86.7	1.2675	0.0000	SURCHARGED
15 minute summer	S43	1	66.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S44	10	65.438	0.083	35.8	0.1188	0.0000	OK
15 minute winter	S45	10	71.338	0.083	28.6	0.1183	0.0000	OK
15 minute winter	S46	12	69.705	0.375	81.5	0.4241	0.0000	SURCHARGED
15 minute winter	S47	11	68.753	0.193	146.5	0.2763	0.0000	OK
15 minute winter	S48	11	67.397	0.297	275.9	0.3355	0.0000	OK
15 minute winter	S49	12	66.040	0.620	335.0	50.3495	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S25	3.001	S26	22.6	1.262	0.260	0.2564	
15 minute winter	S26	3.002	S27	41.1	1.443	0.525	0.3208	
15 minute winter	S27	3.003	S28	60.6	1.923	0.780	0.3764	
15 minute winter	S28	3.004	S8	79.1	2.761	0.762	0.6982	
15 minute winter	S29	4.000	S27	4.8	0.276	0.049	0.1493	
15 minute summer	S30	5.000	S31	0.0	0.000	0.000	0.0951	
15 minute winter	S31	5.001	S32	17.7	1.679	0.215	0.3103	
15 minute winter	S32	5.002	S10	31.6	2.822	0.191	0.2866	
15 minute winter	S33	6.000	S34	-14.2	-0.489	-0.245	0.9161	
15 minute winter	S34	6.001	S10	29.4	18.156	0.178	0.2258	
15 minute winter	S35	7.000	S11	11.7	1.115	0.174	1.3006	
15 minute winter	S36	8.000	S37	4.8	0.467	0.065	0.2188	
15 minute winter	S37	8.001	S38	27.2	1.480	0.365	0.2875	
15 minute winter	S38	8.002	S39	35.1	1.641	0.476	0.4753	
15 minute winter	S39	8.003	S40	41.5	1.566	0.565	0.5973	
15 minute winter	S40	8.004	S41	123.2	1.868	0.399	4.6601	
15 minute winter	S41	8.005	S12	250.2	1.678	0.530	11.4908	
15 minute winter	S42	9.000	S41	86.4	1.441	0.916	3.5063	
15 minute summer	S43	10.000	S44	0.0	0.000	0.000	0.3037	
15 minute winter	S44	10.001	S14	35.5	1.133	0.293	0.4416	
15 minute winter	S45	11.000	S46	28.3	1.046	0.291	1.4675	
15 minute winter	S46	11.001	S47	70.4	1.976	1.081	1.8714	
15 minute winter	S47	11.002	S48	145.7	2.409	0.759	2.9101	
15 minute winter	S48	11.003	S49	277.0	3.084	0.904	6.3143	
15 minute winter	S49	11.004	S50	281.6	2.000	1.468	7.5820	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	S50	22	65.807	0.557	263.3	50.2585	0.0000	SURCHARGED
30 minute winter	S51	22	65.620	0.525	209.7	0.7508	0.0000	SURCHARGED
30 minute winter	S52	22	65.467	0.467	227.4	0.6676	0.0000	SURCHARGED
15 minute winter	S53	12	69.802	0.182	31.0	0.2610	0.0000	OK
15 minute summer	S54	1	69.990	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S55	10	68.774	0.099	33.4	0.1423	0.0000	OK
15 minute winter	S56	11	68.370	0.230	96.0	0.3298	0.0000	OK
15 minute winter	S57	10	66.318	0.015	0.4	0.0217	0.0000	OK
15 minute winter	S58	11	66.318	0.081	10.7	0.1155	0.0000	OK
15 minute winter	S59	10	66.288	0.114	19.9	0.1628	0.0000	OK
15 minute winter	S60	11	66.168	0.111	19.6	0.1589	0.0000	OK
15 minute winter	S61	13	66.050	0.280	44.5	0.4009	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	S50	11.005	S51	192.3	1.214	1.033	7.3326	
30 minute winter	S51	11.006	S52	211.0	1.332	1.113	4.3388	
30 minute winter	S52	11.007	S16	230.1	1.538	1.748	1.6982	
15 minute winter	S53	12.000	S46	30.5	0.893	0.716	1.5989	
15 minute summer	S54	13.000	S55	0.0	0.000	0.000	0.3413	
15 minute winter	S55	13.001	S56	33.1	1.600	0.400	0.4187	
15 minute winter	S56	13.002	S48	93.7	1.654	0.902	3.8872	
15 minute winter	S57	14.000	S58	-0.4	-0.071	-0.008	0.0692	
15 minute winter	S58	14.001	S59	10.3	0.629	0.242	0.1534	
15 minute winter	S59	14.002	S60	19.6	1.004	0.464	0.3482	
15 minute winter	S60	14.003	S61	19.6	1.033	0.464	0.8603	
15 minute winter	S61	14.004	S49	45.2	1.178	0.500	2.0970	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	69.878	0.078	21.4	0.1119	0.0000	OK
15 minute winter	S2	10	69.081	0.081	21.2	0.1162	0.0000	OK
15 minute winter	S3	12	68.785	0.335	54.1	0.3792	0.0000	SURCHARGED
15 minute winter	S4	13	68.631	0.696	54.1	0.7876	0.0000	SURCHARGED
15 minute winter	S5	14	68.564	0.999	69.0	1.1298	0.0000	SURCHARGED
15 minute winter	S6	14	68.512	1.332	195.5	1.9064	0.0000	FLOOD RISK
15 minute winter	S7	14	68.436	1.656	165.5	1.8725	0.0000	SURCHARGED
15 minute winter	S8	12	68.427	2.052	203.4	2.3205	0.0000	SURCHARGED
15 minute winter	S9	12	68.409	2.289	225.3	2.5891	0.0000	SURCHARGED
15 minute winter	S10	12	68.374	2.504	293.5	2.8321	0.0000	SURCHARGED
15 minute winter	S11	12	68.263	2.773	263.5	3.1357	0.0000	SURCHARGED
15 minute winter	S12	12	67.948	2.973	574.4	4.2549	0.0000	FLOOD RISK
15 minute winter	S13	12	66.988	2.208	617.4	3.1589	0.0000	SURCHARGED
15 minute winter	S14	12	65.410	0.950	669.9	1.3587	0.0000	SURCHARGED
960 minute winter	S15	945	64.838	0.838	142.3	386.6026	0.0000	SURCHARGED
960 minute winter	Swale 1	945	64.838	0.858	48.2	1.5153	0.0000	OK
960 minute winter	S16	945	64.838	0.878	84.1	1.2558	0.0000	OK
960 minute winter	S17	945	64.838	0.898	83.3	1.2844	0.0000	OK
960 minute winter	Detention Basin	945	64.838	0.918	80.8	1.6213	0.0000	OK
960 minute winter	S18	945	64.838	0.938	78.3	1433.2450	0.0000	SURCHARGED
960 minute winter	S19	945	64.829	0.979	11.7	1.4012	0.0000	SURCHARGED
960 minute winter	S20	945	62.811	0.091	11.7	0.1300	0.0000	OK
960 minute winter	Outfall	945	62.754	0.084	11.7	0.0000	0.0000	OK
15 minute winter	S23	14	68.538	1.308	202.4	47.4999	0.0000	FLOOD RISK
15 minute summer	S24	1	70.555	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	21.2	1.687	0.251	0.3841	
15 minute winter	S2	1.001	S3	20.8	1.015	0.282	0.7007	
15 minute winter	S3	1.002	S4	54.1	1.851	0.734	1.0224	
15 minute winter	S4	1.003	S5	45.9	1.463	0.620	0.7307	
15 minute winter	S5	1.004	S6	66.0	2.133	0.898	0.7700	
15 minute winter	S6	1.005	S7	151.2	1.774	0.753	4.3792	
15 minute winter	S7	1.006	S8	192.3	1.910	0.964	4.4927	
15 minute winter	S8	1.007	S9	217.3	1.758	0.670	4.0192	
15 minute winter	S9	1.008	S10	237.7	1.820	0.740	4.0115	
15 minute winter	S10	1.009	S11	242.7	1.847	0.737	5.8011	
15 minute winter	S11	1.010	S12	272.1	1.717	0.852	8.3626	
15 minute winter	S12	1.011	S13	575.2	3.630	1.777	3.0827	
15 minute winter	S13	1.012	S14	616.5	3.891	1.917	5.1223	
15 minute winter	S14	1.013	S15	668.4	4.219	1.016	1.7700	
960 minute winter	S15	1.014	Swale 1	48.2	0.331	0.183	18.7258	
960 minute winter	Swale 1	1.015	S16	46.9	0.245	0.039	21.0402	
960 minute winter	S16	1.016	S17	83.3	0.344	0.073	7.6469	
960 minute winter	S17	1.017	Detention Basin	80.8	0.371	0.134	85.9940	
960 minute winter	Detention Basin	1.018	S18	78.3	0.978	0.048	12.6458	
960 minute winter	S18	1.019	S19	11.7	0.294	0.345	0.4629	
960 minute winter	S19	Orifice	S20	11.7				
960 minute winter	S20	1.021	Outfall	11.7	0.818	0.305	0.1302	619.9
15 minute winter	S23	2.000	S6	-188.2	-2.673	-2.475	0.7464	
15 minute summer	S24	3.000	S25	0.0	0.000	0.000	0.1600	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S25	10	70.055	0.090	29.5	0.1292	0.0000	OK
15 minute winter	S26	11	69.752	0.182	53.8	0.2604	0.0000	OK
15 minute winter	S27	11	69.625	0.310	77.8	0.4433	0.0000	SURCHARGED
15 minute winter	S28	12	69.323	0.273	100.9	0.3092	0.0000	SURCHARGED
15 minute winter	S29	10	69.639	0.039	6.3	0.0552	0.0000	OK
15 minute winter	S30	12	68.491	0.242	0.0	0.2732	0.0000	SURCHARGED
15 minute winter	S31	12	68.485	0.410	23.3	0.4642	0.0000	SURCHARGED
15 minute winter	S32	12	68.401	0.926	41.6	1.0475	0.0000	SURCHARGED
15 minute winter	S33	12	68.417	1.104	31.2	1.5797	0.0000	SURCHARGED
15 minute winter	S34	12	68.402	1.377	63.7	1.5572	0.0000	SURCHARGED
15 minute winter	S35	12	68.303	1.442	14.5	1.6308	0.0000	SURCHARGED
15 minute winter	S36	10	69.594	0.044	6.3	0.0634	0.0000	OK
15 minute winter	S37	12	69.276	0.126	35.7	0.1796	0.0000	OK
15 minute winter	S38	12	69.258	0.428	46.0	0.6125	0.0000	SURCHARGED
15 minute winter	S39	12	69.158	0.773	54.3	1.1061	0.0000	SURCHARGED
15 minute winter	S40	12	68.999	1.059	162.3	1.5151	0.0000	SURCHARGED
15 minute winter	S41	12	68.721	2.206	341.1	2.4947	0.0000	FLOOD RISK
15 minute winter	S42	12	69.128	2.178	112.4	3.5741	0.0000	FLOOD RISK
15 minute summer	S43	1	66.450	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S44	12	65.498	0.143	46.5	0.2041	0.0000	OK
15 minute winter	S45	10	71.350	0.095	37.1	0.1364	0.0000	OK
15 minute winter	S46	12	70.551	1.221	98.8	1.3806	0.0000	SURCHARGED
15 minute winter	S47	12	69.294	0.734	179.5	1.0497	0.0000	SURCHARGED
15 minute winter	S48	13	68.209	1.109	334.1	1.2538	0.0000	SURCHARGED
30 minute winter	S49	21	66.927	1.507	342.9	51.6185	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S25	3.001	S26	29.3	1.275	0.337	0.3475	
15 minute winter	S26	3.002	S27	51.8	1.440	0.663	0.4210	
15 minute winter	S27	3.003	S28	77.1	1.978	0.992	0.4747	
15 minute winter	S28	3.004	S8	98.7	2.787	0.950	0.9665	
15 minute winter	S29	4.000	S27	6.3	0.279	0.064	0.1808	
15 minute winter	S30	5.000	S31	6.1	0.176	0.118	0.6925	
15 minute winter	S31	5.001	S32	34.2	1.695	0.415	0.9548	
15 minute winter	S32	5.002	S10	49.8	3.020	0.301	0.4040	
15 minute winter	S33	6.000	S34	-31.2	-0.786	-0.537	0.9161	
15 minute winter	S34	6.001	S10	-31.1	2.764	-0.188	0.2258	
15 minute winter	S35	7.000	S11	19.3	1.214	0.287	1.3006	
15 minute winter	S36	8.000	S37	6.2	0.491	0.086	0.2834	
15 minute winter	S37	8.001	S38	35.3	1.555	0.473	0.4882	
15 minute winter	S38	8.002	S39	45.5	1.709	0.618	0.8843	
15 minute winter	S39	8.003	S40	61.9	1.586	0.842	0.8912	
15 minute winter	S40	8.004	S41	144.7	1.929	0.468	6.6173	
15 minute winter	S41	8.005	S12	310.0	1.957	0.657	11.4908	
15 minute winter	S42	9.000	S41	93.2	1.434	0.988	3.5063	
15 minute summer	S43	10.000	S44	0.0	0.000	0.000	0.5023	
15 minute winter	S44	10.001	S14	42.7	1.250	0.353	0.5518	
15 minute winter	S45	11.000	S46	36.7	1.130	0.377	1.5443	
15 minute winter	S46	11.001	S47	82.0	2.061	1.259	1.9572	
15 minute winter	S47	11.002	S48	174.1	2.514	0.907	3.4667	
15 minute winter	S48	11.003	S49	307.6	3.054	1.003	7.2241	
30 minute winter	S49	11.004	S50	302.4	1.936	1.576	7.5820	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S50	13	66.504	1.254	387.8	51.2562	0.0000	SURCHARGED
15 minute winter	S51	13	66.049	0.954	321.0	1.3647	0.0000	SURCHARGED
15 minute winter	S52	13	65.662	0.662	349.0	0.9479	0.0000	SURCHARGED
15 minute winter	S53	12	70.710	1.090	40.2	1.5594	0.0000	FLOOD RISK
15 minute summer	S54	1	69.990	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S55	12	68.830	0.155	43.4	0.2219	0.0000	OK
15 minute winter	S56	12	68.739	0.599	125.5	0.8572	0.0000	SURCHARGED
15 minute winter	S57	14	67.043	0.740	19.3	1.0588	0.0000	SURCHARGED
15 minute winter	S58	14	67.027	0.790	38.3	1.1299	0.0000	SURCHARGED
30 minute winter	S59	21	67.033	0.859	36.5	1.2298	0.0000	SURCHARGED
30 minute winter	S60	21	67.000	0.943	38.1	1.3497	0.0000	SURCHARGED
30 minute winter	S61	21	66.967	1.197	47.1	1.7134	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S50	11.005	S51	291.1	1.837	1.563	7.3326	
15 minute winter	S51	11.006	S52	322.3	2.034	1.700	4.3388	
15 minute winter	S52	11.007	S16	347.4	2.195	2.640	1.8264	
15 minute winter	S53	12.000	S46	32.5	0.921	0.765	1.7128	
15 minute summer	S54	13.000	S55	0.0	0.000	0.000	0.4190	
15 minute winter	S55	13.001	S56	43.9	1.626	0.531	0.6311	
15 minute winter	S56	13.002	S48	109.8	1.633	1.057	4.8343	
15 minute winter	S57	14.000	S58	-19.3	-0.485	-0.457	0.3958	
15 minute winter	S58	14.001	S59	-30.4	-0.764	-0.712	0.3710	
30 minute winter	S59	14.002	S60	30.5	1.003	0.721	0.7001	
30 minute winter	S60	14.003	S61	40.6	1.132	0.958	1.2647	
30 minute winter	S61	14.004	S49	60.0	1.090	0.665	2.1267	

APPENDIX E

LLFA Technical Assessment Proforma.

Essex County Council

SuDS Water quantity and Quality – LLFA Technical Assessment Proforma

Introduction

This proforma identifies the information required by Essex LLFA to enable technical assessment the Designers approach to water quantity and water quality as part of SuDS design approach in compliance with Essex SuDS Design Guide.

Completion of the proforma will also allow for technical assessment against Non-statutory technical standards (NSTS) for Sustainable Drainage. The proforma will accompany the site specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

Please complete this form in full for full applications and the coloured sections for outline appllications. This will help us identify what information has been included and will assist with a smoother and quicker application.

Instructions for use

Use the units defined for input of figures
Numbers in brackets refer to accompanying notes.
Where .....m^3 .....m^3/m^2 are noted – both values should be filled in.

Site details

1.1	Planning application reference (if known)	UTT/21/3596/OP	
1.2	Site name	Moor Fields, Little Dunmow	
1.3	Total application site area (1)	14.07	ha
1.4	Predevelopment use (4)	Greenfield	
1.5	Post development use	Residential	
	If other, please sepcify		
1.6	Urban creep applicable	Yes	if yes, factor applied: 10%
1.7	Proposed design life / planning application life	120	
1.8	Method(s) of discharge: (5)		

☐ *Reuse* ☐ *Infiltration* ☐ *Hybrid* ☑ *Waterbody* ☐ *Storm sewer* ☐ *Combined sewer*

1.9	Is discharge direct to estuary / sea	No
1.10	Have agreements in principle (where applicable) for discharge been provided	Yes

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SuDS Water quantity and Quality – LLFA Technical Assessment

Calculation inputs

2.1	Area within site which is drained by SuDS (2)	61600	m^2
2.2	Impermeable area drained pre development (3)	0	m^2
2.3	Impermeable area drained post development (3)	27560	m^2
2.4	Additional impermeable area (2.3 minus 2.2)	27560	m^2
2.5	Method for assessing greenfield runoff rate	Fixed under planning conditions	
2.6	Method for assessing brownfield runoff rate		
2.7	Coefficient of runoff (Cv) (6)	0.86 & 0.75	
2.8	Source of rainfall data (FEH Preferred)	FSR	
2.9	Climate change factor applied 40	%	

Attenuation (positive outlet)

2.10 Drainage outlet at risk of drowning (tidal locking, elevated water levels in watercourse/sewer)
Note: Vortex controls require conditions of free discharge to operate as per manufacturers specification.

2.11 Invert level at final outlet 62.27 mAOD

2.12 Design level used for surcharge water level at point of discharge (16) 64.85 mAOD

Infiltration (Discharge to Ground)

2.13 Have infiltration tests been undertaken No

2.14 If yes, which method has been used

2.15 Infiltration rate (where applicable) m/s

2.16 Depth to highest known ground water table mAOD

2.17 If there are multiple infiltration features please specify where they can be found in the FRA

2.18 Depth of infiltration feature mAOD

2.19 Factor of safety used for sizing infiltration storage

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SuDS Water quantity and Quality – LLFA Technical Assessment Proforma

Calculation outputs

Sections 3 and 4 refer to site where storage is provided by full attenuation or partial infiltration. Where all flows are infiltrated to ground go straight to Section 6.

3.0 Greenfield runoff rates (incl. Urban Creep)

3.1	1 in 1 year rainfall	l/s/ha, Fixed	l/s for the site
3.2	1 in 30 year rainfall	l/s/ha,	l/s for the site
3.3	1 in 100 year rainfall + CCA	l/s/ha,	l/s for the site

4.0 Brownfield runoff rates (incl. Urban Creep)

4.1	1 in 1 year rainfall	l/s/ha,	l/s for the site
4.2	1 in 30 year rainfall	l/s/ha,	l/s for the site
4.3	1 in 100 year rainfall + CCA	l/s/ha,	l/s for the site

5.0 Proposed maximum rate of runoff from site (incl. Urban Creep) (7)

5.1	1 in 1 year rainfall	l/s/ha,	l/s for the site
5.2	1 in 30 year rainfall	l/s/ha,	l/s for the site
5.3	1 in 100 year rainfall + CCA	l/s/ha,	l/s for the site

6.0 Attenuation storage to manage flow rates from site (incl. Climate Change Allowance (CCA) and Urban Creep)

6.1	Storage - 1 in 100 year + CCA (9)	m^3	m^3/m^2
6.2	50% storage drain down time 1 in 30 years		hours

7.0 Controlling volume of runoff from the site(10)

7.1	Pre development runoff volume(12) (development area)	m^3 for the site
7.2	Post development runoff volume (unmitigated) (12)	m^3 for the site
7.3	Volume to be controlled (5.2 - 5.1)	m^3 for the site

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7.4 Volume control provided by:

- Interception losses[13] m^3
- Rain harvesting [14] m^3
- Infiltration m^3
- Attenuation m^3
- Separate volume designated as long term storage[15] m^3

7.5 Total volume control (sum of inputs for 5.4) m^3 [17]

8.0 Site storage volumes (full infiltration only)

8.1	Storage - 1in 30 year + CCA [8]	m^3	m^3/m^2 (of developed impermeable area)
8.2	Storage - 1 in 100 year + CCA [11]	m^3	m^3/m^2

SuDS Water quantity and Quality – LLFA Technical Assessment Proforma

Design Inputs

Proposed site use: Residential

Pollution hazard category (see C753 Table 26.2): Low

High risk area defined as area storing fuels chemicals, refuelling area, washdown area, loading bay.

Design Outputs

List order of SuDS techniques proposed for treatment: Enhanced swales and detention basin.

Note that gully pots, pipes and tanks are not accepted by Essex LLFA as a form of treatment (for justification see C753 Section 4.1, Table 26.15 and Box B.2)

Are very high pollution risk areas drained separate from SuDS to foul system: No

Other

Please include any other information that is relevant to your application

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SuDS Water quantity and Quality – LLFA Technical Assessment Proforma

Notes

1. All area with the proposed application site boundary to be included.
2. The site area which is positively drained includes all green areas which drain to the SuDS system and area of surface SuDS features. It excludes large open green spaces which do not drain to the SuDS system.
3. Impermeable area should be measured pre and post development. Impermeable surfaces include, roofs, pavements, driveways and paths where runoff is conveyed to the drainage system.
4. Predevelopment use may impact on the allowable discharge rate. The LLFA will seek for reduction in flow rates to GF (Essex SuDS Design Guide).
5. Runoff may be discharge via one or more methods.
6. Sewers for Adoption 6th Edition recommends a Cv of 100% when designing drainage for impermeable area (assumes no loss of runoff from impermeable surfaces) and 0% for permeable areas. Where lower Cv's are used the applicant should justify the selection of Cv.
7. It is Essex County Council's preference that discharge rates for all events up to the 1 in 100 year event plus climate change are limited to the 1 in 1 greenfield rate. This is also considered to mitigate the increased runoff volumes that occur with the introduction of impermeable surfaces. If discharge rates are limited to a range of matched greenfield flows then it is necessary to provide additional mitigation of increased runoff volumes by the provision of Long-term Storage.
8. Storage for the 1 in 30 year must be fully contained within the SuDS components. Note that standing water within SuDS components such as ponds, basins and swales is not classified as flooding. Storage should be calculated for the critical duration rainfall event.
9. Runoff generated from rainfall events up to the 1 in 100 year will not be allowed to leave the site in an uncontrolled way. Temporary flooding of designated areas to shallow depths and velocities may be acceptable.
10. The following information should only be provided if increased runoff volumes are not mitigated by limiting all discharge rates back to the greenfield 1 in 1 year rate.
11. Climate change is specified as 40% increase to rainfall intensity, unless otherwise agreed with the LLFA / EA.
12. To be determined using the 100 year return period 6 hour duration winter rainfall event.
13. Where Source Control is provided Interception losses will occur. An allowance of 5mm rainfall depth can be subtracted from the net inflow to the storage calculation where interception losses are demonstrated. The Applicant should demonstrate use of subcatchments and source control techniques. Further information is available in the SuDS Design Guide.
14. Please refer to Rain harvesting BS for guidance on available storage.
15. Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 l/s/ha.
16. Careful consideration should be used for calculations where flow control / storage is likely to be influenced by surcharged sewer or peak levels within a watercourse. Outlets can be tidally locked where discharge is direct to estuary or sea. Calculations should demonstrate that risk of downed outlet has been taken into consideration. Vortex controls require conditions of free discharge to operate as per specification.
17. In controlling the volume of runoff the total volume from mitigation measures should be greater than or equal to the additional volume generated.