

# **Response to Objection to Outline planning permission for Extension of MIRA Technology Park**

## **Technical Note**

**Date:** 29/11/2022

**Client Name:** ERI MTP Limited

**Document Reference:** EED13833-118-TN-3-1-3

This document has been prepared and checked in accordance with  
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

---

**Issue**

**Prepared by**

Sean Whelan  
Senior Engineer



**Checked & Approved by**

Brendan McCarthy  
Technical Director



---

### **Introduction**

- 1.1. Waterman was commissioned by ERI MTP Limited to address objections raised to an outline planning application for the Extension of MIRA Technology Park to comprise employment use (Class B2); associated office and service uses (Class Eg); storage (Class B8); new spine road; car parking, landscaping and enabling works - all matters reserved. The Site is located to the south of Watling Street, Caldecote, CV10 0TS.
- 1.2. The full response is provided in Appendix A and the further information required to overcome the objection, as outlined by Warwickshire County Council, is summarised below:
  - 1) The LLFA requires further information regarding the capacity and flood risk associated with the on-site watercourse to demonstrate that proposals will not increase flood risk on site and elsewhere. Further evidence should include:
    - An evaluation of the on-site channel capacity including surveyed cross sections demonstrating that there is sufficient capacity to accommodate contributing flows from the site. This is particularly pertinent given the proposals to remove storage capacity on site by infilling the southern ditch and increase the contributing catchment area to the watercourse.
    - Discussion around the potential risk of bank overtopping and anticipated flow routes and flood outlines.
    - Information on the condition of the downstream culvert passing under the A444 demonstrating that flow will not be constricted and pose an increase to flood risk.

- 2) Given the proposed catchment changes, indicative site levels and further discussion should be provided on the anticipated increase in cross catchment flows and flow routes demonstrating that flood risk will not be increased on site or elsewhere as a result. This should also provide clarification as to whether land raising is proposed as part of the strategy.
- 3) Given the above requirements for further flood risk investigation in point 1, demonstrate that the proposed drainage features are outside the 8m watercourse easement and any anticipated flood outlines. This is to ensure their performance will not be compromised should the watercourse overtop, and that there will be adequate access for maintenance. This should include further details on the drainage layout plan 'Attenuation Summary' illustrating where the watercourse lies in relation to the drainage features and further detail on the outfall locations.
- 4) The proposed discharge rate of 6.2l/s/ha is higher than the usual average QBAR discharge rate for areas underlain with clay (Soil type 4). The LLFA requires further evidence demonstrating that calculations are correct and follow best practice methodology.
- 5) The LLFA notes the proposals for Permeable paving and multiple ponds to provide surface water attenuation and a treatment train, which is welcomed. However, the current drainage strategy still relies on substantial storage volumes from underground tanks. The LLFA therefore requires further evidence that opportunities to maximise above ground SuDS within the strategy have been explored and further justification is provided for the chosen methodologies.

### **Item 1 - Capacity and flood risk associated with the on-site watercourse**

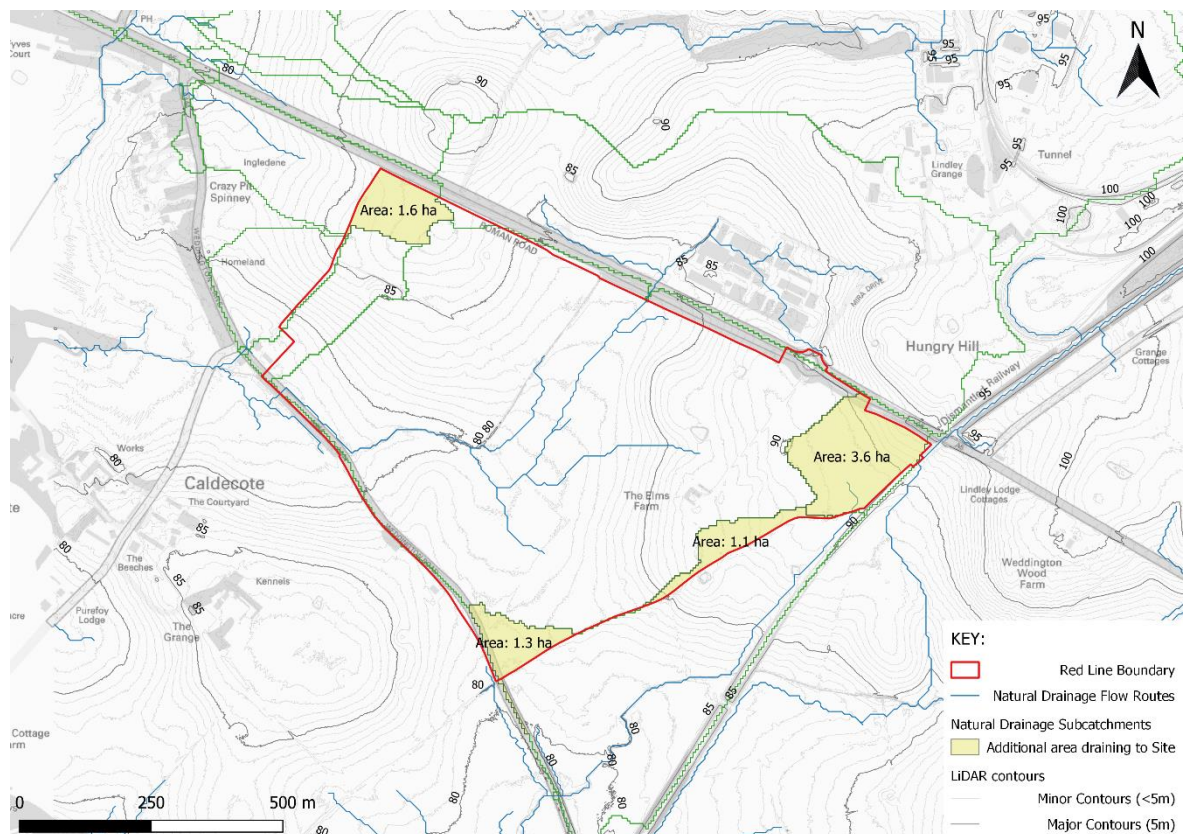
- 1.3. The channel capacity of the on-site watercourse has been assessed using topographic survey information (Appendix B) and Manning's Equation for open-channel flow (calculation details provided in Appendix C).
- 1.4. The estimated contribution from the upstream catchment for the 1:100 + 22% climate change event is 1.66 m<sup>3</sup>/s, as detailed within the submitted FRA (EED13833-118-R-2-4-3-FRA).
- 1.5. The proposed total runoff rate from the Site, based on restricting runoff from impermeable surfaces to greenfield runoff rates is 0.236 m<sup>3</sup>/s.
- 1.6. The minimum capacity of the channel is 2.38 m<sup>3</sup>/s at the upper end of the watercourse.
- 1.7. Therefore, there is sufficient capacity within the channel to convey the maximum design flow (1.90 m<sup>3</sup>/s), allowing for both the upstream contribution (1.66 m<sup>3</sup>/s) and the proposed discharge from the Site (0.24 m<sup>3</sup>/s).
- 1.8. The outflow structure at the downstream end of the watercourse consists of two 900mm diameter culverts. Survey information for the downstream end of the culverts is not available. However, the gradient has been estimated as 1:270 based on LiDAR ground levels at the upstream and downstream ends. The 1:270 gradient has been sense-checked based on the watercourse upstream of the culverts, which has a gradient of 1:272. Each 900mm culvert has a pipe full capacity of 1.55 m<sup>3</sup>/s<sup>1</sup> based on the assumed gradient. Therefore, the outflow structure has sufficient capacity (2 x 1.553 = 3.10 m<sup>3</sup>/s) to convey the maximum design flow (1.90 m<sup>3</sup>/s).
- 1.9. It is expected that the culvert will be cleared of any siltation and surveyed at the next design stage to facilitate a condition survey, confirm its downstream dimensions, and ensure it can function as designed.

<sup>1</sup> HR Wallingford, 1990. *Tables for the hydraulic design of pipes and sewers*. Fifth Edition. London: Thomas Telford Ltd

## Item 2 - Catchment contributions

- 1.10. All of the runoff from the Site currently drains to the River Anker which is the proposed discharge location of the drainage strategy. Therefore, there will be no increased discharge to the River Anker as a result of the development proposals based on the contributing catchment area.
- 1.11. The change in natural drainage sub-catchments has been assessed and is shown in Figure 1. There is an additional area of 7.6 ha being drained to the on-site watercourse, passing through the culvert at the downstream end of the Site, and eventually discharging to the River Anker.

Figure 1: Overview of the natural drainage flow routes



- 1.12. Although the proposed drainage strategy will increase the area draining to the on-site watercourse, this will all be attenuated to the Greenfield QBAR rate for the existing catchment area so there will be no increase in total runoff from the Site.
- 1.13. It is demonstrated by the previous assessment that the on-site watercourse has sufficient capacity to accommodate the proposed design flow.
- 1.14. As noted in paragraph 3.17 of the FRA (EED13833-118-R-2-4-3-FRA), the LLFA have previously raised concerns regarding historical flooding in the area of Weddington to the east of the Site. The eastern sub-catchments of the Site within the existing Weddington catchment area will be actively drained as part of the proposed drainage strategy. Therefore, flows will be transferred from the

Weddington, known to be at risk of flooding, to the on-site drainage network and watercourse, which has been confirmed to have sufficient capacity to accommodate the additional flows.

- 1.15. Land in the northern corner the Site that currently drains to the catchment to the west will also drain to the on-site drainage network and watercourse, both of which have sufficient capacity to accommodate the additional flows.

### **Item 3 - Drainage features outside 8m easement and flood extents**

- 1.16. There are two ponds on the previously submitted drainage strategy that do not provide the full 8m easement. These are currently being redesigned as part of the next stage of the design and the ponds will be removed and replaced with a swale. The 8m easement will be considered and included within the updated drainage strategy and supporting drawings

### **Item 4 - Review of the greenfield discharge rate**

- 1.17. Updated calculation of the greenfield runoff rate (4.32 l/s/ha) for the site, is provided in Appendix D. The revised greenfield runoff rate is 30% lower than the previous calculation (6.2 l/s/ha), which was based on an overestimated annual average rainfall (SAAR). The revised discharge rate for the site area is 264.52 l/s, based on a total site area of 61.0 ha.
- 1.18. The volume of attenuation for the site will be updated based on the revised greenfield run-off and optimised using hydrobrakes to restrict the flow throughout the proposed development. This will be issued as part of the Reserved Matter application.

### **Item 5 - Justification of the proposed SuDS features**

- 1.19. The drainage design is based on an outline parameter plan to support an outline planning application. The primary objective is to ensure that the Site is space proofed to provide sufficient surface water attenuation, storage, and water quality treatment. There will be an opportunity at the Reserved Matters stage to incorporate further SuDS features (such as rain garden, bioretention areas, etc.) as increasing levels of detail become available for specific plots and construction phases.
- 1.20. The currently proposed surface water drainage strategy includes a mix of ponds, tanks, and permeable paving. It provides storage and attenuation while ensuring surface water is treated at source through the extensive use of permeable paving.

## APPENDIX A

Your ref: PAP/2022/0423  
Our ref: WCC002597/FRM/GF/001  
Your letter received: 21/09/2022



**SENT BY EMAIL**

Mr Jeff Brown  
Head of Development Control  
North Warwickshire Borough Council  
The Council House  
South Street  
Atherstone CV9 1DE

Flood Risk Management  
Warwickshire County Council  
Shire Hall  
Warwick  
Warwickshire  
CV34 4RL  
Tel: 01926 412982  
[FRMPlanning@warwickshire.gov.uk](mailto:FRMPlanning@warwickshire.gov.uk)  
[www.warwickshire.gov.uk](http://www.warwickshire.gov.uk)

**FAO Jeff Brown**

10 October 2022

Dear Mr Brown

**PROPOSAL:** Outline planning permission for Extension of MIRA Technology Park to comprise employment use (Class B2); associated office and service uses (Class Eg); storage (Class B8); new spine road; car parking, landscaping and enabling works - All matters reserved

**LOCATION:** Land to the south of, Watling Street, Caldecote, CV10 0TS

Warwickshire County Council as the Lead Local Flood Authority (LLFA) has reviewed the application which was received on the 21 September 2022. Based on the information submitted the LLFA currently recommends refusal of planning permission and **objects** to the development based on the following reasons.

**Reason**

The information submitted with this application does not comply with the requirements set out in the National Planning Policy Framework<sup>i</sup> (NPPF) and supporting Flood Risk & Coastal Change guidance<sup>ii</sup>. Specifically:

- The Flood Risk Assessment may be considered insufficient in assessing the flood risk to or from the proposed development.
- The details relating to the surface water drainage are insufficient.

The submitted information does not therefore allow a suitable assessment of the proposed development, considering flood risk and surface water drainage matters.

**Overcoming our objection**

You can overcome our objection by submitting further information which is detailed below. This information should provide a suitable assessment of the flood risk both to and from the development and provide details of the proposed surface water drainage considering the scale and nature of the development to ensure the site will not increase risk elsewhere and where possible reduces flood risk overall. If this cannot be achieved we are likely to maintain our objection to the application.



*Working for  
Warwickshire*

At the 'outline' planning stage the Surface Water Drainage Strategy should be developed to inform the masterplan or indicative site layout. This should be based on SuDS principles and provide opportunity to attenuate surface water runoff, improve water quality and provide amenity and biodiversity. This should be supported by suitable high-level calculations demonstrating the performance of the attenuation and that adequate space is provided.

Given the above, the following comments are made and further information required is outlined. This forms the basis of our current objection:

1. The LLFA requires further information regarding the capacity and flood risk associated with the on site watercourse to demonstrate that proposals will not increase flood risk on site and elsewhere. Further evidence should include:
  - An evaluation of the on site channel capacity including surveyed cross sections demonstrating that there is sufficient capacity to accommodate contributing flows from the site. This is particularly pertinent given the proposals to remove storage capacity on site by infilling the southern ditch and increase the contributing catchment area to the watercourse.
  - Discussion around the potential risk of bank overtopping and anticipated flow routes and flood outlines.
  - Information on the condition of the downstream culvert passing under the A444 demonstrating that flow will not be constricted and pose an increase to flood risk.
2. Given the proposed catchment changes, indicative site levels and further discussion should be provided on the anticipated increase in cross catchment flows and flow routes demonstrating that flood risk will not be increased on site or elsewhere as a result. This should also provide clarification as to whether land raising is proposed as part of the strategy.
3. Given the above requirements for further flood risk investigation in point 1, demonstrate that the proposed drainage features are outside the 8m watercourse easement and any anticipated flood outlines. This is to ensure their performance will not be compromised should the watercourse overtop, and that there will be adequate access for maintenance. This should include further details on the drainage layout plan 'Attenuation Summary' illustrating where the watercourse lies in relation to the drainage features and further detail on the outfall locations.
4. The proposed discharge rate of 6.2l/s/ha is higher than the usual average QBAR discharge rate for areas underlain with clay (Soil type 4). The LLFA requires further evidence demonstrating that calculations are correct and follow best practice methodology.
5. The LLFA notes the proposals for Permeable paving and multiple ponds to provide surface water attenuation and a treatment train, which is welcomed. However the current drainage strategy still relies on substantial storage volumes from underground tanks. The LLFA therefore requires further evidence that opportunities to maximise above ground SuDS within the strategy have been explored and further justification is provided for the chosen methodologies.

We ask to be re-consulted with the results of any additional information. We will provide you with bespoke comments within 21 days of receiving formal reconsultation.

### **Informative**

- a) Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. Sustainable Drainage Systems (SuDS) are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on-site as opposed to traditional drainage approaches which involve piping water off-site as quickly as possible.
- b) The LLFA does not consider oversized pipes or box culverts as sustainable drainage. Where such attenuation is considered necessary, this should be supplemented with suitable above ground

features such as green roofs, rain-gardens and tree pits to provide water quality, amenity and biodiversity benefits.

- c) Reference is made to the LLFA's *Flood Risk & Sustainable Drainage Local guidance for developers*<sup>iii</sup> which provides further advice and guidance as to how surface water drainage proposals should be designed.

### Advisory

Section 23 of the Land Drainage Act 1991 requires that before the erection or alteration of any obstruction to the flow in an ordinary watercourse, a written consent is obtained from the Lead Local Flood Authority (LLFA) for the area. The proposed alterations to ordinary watercourses including outfall structures and diversions will require consent. Our guidance and application form can be found at the following link: <https://www.warwickshire.gov.uk/watercourse>.

Yours sincerely

*Georgina Flower*

Georgina Flower  
Flood Risk Management Engineer

---

#### Documents Reviewed:

- Design and Access Statement\_MIRA technology Park, South Site\_Rev P09\_Aug 2022
- Application Boundary\_MIRA South Site\_ 21092 SGP xx 00 DR A 111001\_Rev D
- Parameters Plan\_MIRA South Site\_ 21092 SGP XX 00 DR A 111003\_H
- Masterplan option 10 B\_MIRA South Site\_ 21092 SGP XX 00 DR A 111010\_M
- Flood Risk Assessment and Outline Drainage Strategy\_ MIRA Technology Park South Site\_ EED13833-118-R-2-4-3-FRA\_Issue 4
- Preliminary Risk Assessment\_ MIRA, Land South of A5, Nuneaton\_ WIE13833-118-R-1.3.1-RJM\_Issue 1.3.1
- Planning Statement\_ MIRA Technology Park South Site\_ 27220\_Rev 1\_01 August 2022

---

<sup>i</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf)

<sup>ii</sup> <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

<sup>iii</sup> <https://api.warwickshire.gov.uk/documents/WCCC-1039-95>

## APPENDIX B



- Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL OSNI NETWORK. LOCAL SCALE FACTOR OF 0.99975 APPLIED.
  2. DRAINAGE INFORMATION HAS BEEN DETERMINED WITHOUT MAN ENTRY INTO CHAMBERS AND WHILST EVERY EFFORT HAS BEEN MADE TO CORRECTLY IDENTIFY THIS INFORMATION, IT SHOULD ALWAYS BE CHECKED IN AREAS THAT ARE CRITICAL TO THE FUTURE PROPOSAL.
  3. ALL SEWERS ARE PRESUMED TO BE STRAIGHT BETWEEN CHAMBERS, WITH ROUTES/CONNECTIVITY OBTAINED USING ACOUSTIC METHODS ONLY. THESE ARE TO BE CONSIDERED ASSUMED AND SHOULD BE INVESTIGATED FURTHER IN CRITICAL AREAS.

| Coordinate Table |             |            |            |        |
|------------------|-------------|------------|------------|--------|
| Station          | Description | Easting    | Northing   | Level  |
| M1               | Nail        | 436238.011 | 295237.042 | 86.763 |
| M2               | Nail        | 436284.982 | 295214.974 | 86.083 |
| M3               | Nail        | 436331.113 | 295192.885 | 85.566 |
| M4               | Nail        | 436373.785 | 295171.201 | 90.525 |
| M5               | Nail        | 436412.468 | 295152.111 | 90.333 |
| M6               | Nail        | 436457.193 | 295129.607 | 90.744 |
| M7               | Nail        | 436494.185 | 295107.202 | 91.603 |
| M8               | Nail        | 436533.395 | 295082.679 | 92.670 |
| M9               | Nail        | 436576.872 | 295048.434 | 93.505 |
| M10              | Nail        | 436624.719 | 295028.104 | 95.305 |
| M11              | Nail        | 436700.170 | 295000.882 | 97.441 |
| M12              | Nail        | 436710.660 | 295015.561 | 92.883 |
| M13              | Nail        | 436683.538 | 294989.033 | 92.569 |
| M14              | Nail        | 436651.596 | 294961.870 | 91.186 |
| M15              | Nail        | 436606.762 | 294924.180 | 90.905 |
| M16              | Nail        | 436551.228 | 294863.367 | 90.516 |
| M17              | Nail        | 436511.741 | 294822.917 | 90.255 |
| M18              | Nail        | 436462.782 | 294792.099 | 90.142 |
| M19              | Nail        | 435519.661 | 295009.979 | 78.685 |
| M20              | Nail        | 435562.895 | 294951.753 | 79.290 |
| M21              | Nail        | 435586.343 | 294912.928 | 79.704 |
| M22              | Nail        | 435608.867 | 294872.234 | 80.637 |
| M23              | Nail        | 435635.630 | 294838.364 | 81.336 |
| M24              | Nail        | 435683.052 | 294795.769 | 82.861 |
| M25              | Nail        | 435712.364 | 294768.073 | 82.695 |
| M26              | Nail        | 435753.309 | 294731.557 | 82.014 |
| M27              | Nail        | 435785.724 | 294694.789 | 81.926 |
| M28              | Nail        | 435811.330 | 294644.802 | 82.283 |
| M29              | Nail        | 435832.762 | 294592.169 | 81.270 |
| M30              | Nail        | 435848.401 | 294543.225 | 80.886 |
| M31              | Nail        | 435876.128 | 294484.658 | 80.724 |

**TOPOGRAPHICAL KEY**

**SURVEY STATION** 5

**BANKING** TOP BOTTOM

**HEDGE SPREADS**

**WOODLAND CANOPY**

**ARROW ON STEPS**

**RAMP INDICATOR**

**TREES**

**GATE**

**SEWER CHANNEL**

**ROAD VANDERED**

**FOOTPATH**

**CHANGE IN SURFACE**

**FENCE**

**WALL**

**OVERHEAD ELECTRIC**

**OVERHEAD TELECOM**

**FOUL SEWER**

**SURFACE SEWER**

**P-TRAP**

**BACK DROP (EXTERNAL)**

**BACK DROP (INTERNAL)**

**BUILDING**

**OPEN SIDED BUILDING**

**OVERHANG / CANOPY**

**GLASSHOUSE**

**CONTOUR**

**SPOT LEVEL**

**SONAR LEVEL**

**BORE HOLE**

**TRAIL HOLE**

**GENERAL ABBREVIATIONS**

**ACU**

**AV VALVE**

**AV**

**BASE LEVEL**

**BL**

**BOLLARD**

**BS**

**BUS STOP**

**CABLE RISER**

**CABLE T.Y. COVER**

**CATCH PIT**

**CONTROL BOX**

**CROSSING CONTROL BUTTON**

**CAMP ROOF COURSE**

**DRAINAGE CHANNEL**

**DCH**

**DIR**

**ELECTRICITY POLE**

**ER**

**FLOOR LEVEL**

**FL**

**FOUL WATER**

**FW**

**GAS RISER**

**GR**

**GULLY**

**GV**

**IMPERFECTION COVER**

**IC**

**INLET**

**IN**

**MANHOLE**

**MANHOLE POST**

**MP**

**OUTLET PIPE**

**OUTLET**

**OVERHEAD SURVEY BENCH MARK**

**OT**

**POST BOX**

**PO BOX**

**ROAD SIGN**

**RWS**

**RAIN WATER PIPE**

**RWP**

**RESTRAINED FLOW**

**RF**

**SOFT BED**

**SB**

**STOP VALVE**

**SV**

**STREET NAME PLATE**

**SNP**

**STOP VALVE**

**SV**

**SOIL PIPE**

**SPP**

**SOIL VENT PIPE**

**SVP**

**TACTILE PAVING**

**TAC**

**TRAFFIC LIGHT**

**TL**

**TELEPHONE CALL BOX**

**TCL**

**TOP OF WALL**

**TOW**

**TRAIL**

**TRAIL LIGHT COVER**

**TLT**

**UNABLE TO LOCATE**

**UNL**

**UNABLE TO BASE**

**UNL**

**UNABLE TO SURVEY**

**UNL**

**VENT PIPE**

**VP**

**WATER METER**

**WM**

**WATER TAP**

**WT**

**WTO**

**WATER TAP**

**WT**

**FENCE ABBREVIATIONS**

**BWW**

**CONCRETE PANEL FENCE**

**CP**

**CHAIN LINK FENCE**

**CLF**

**CHICKEN WIRE FENCE**

**CWF**

**IRON RAILINGS**

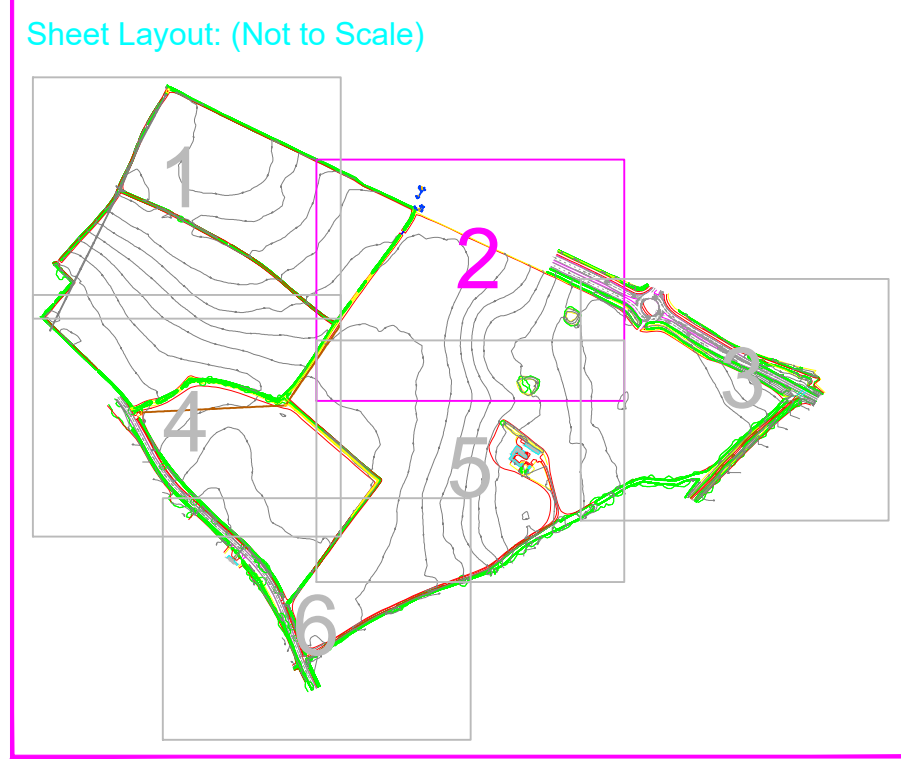
**IR**

**POST AND RAIL FENCE**

**PRF**

**WIRE MESH FENCE**

**WMF**



|          |  |             |  |  |                                        |  |          |  |          |    |          |    |      |                |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |
|----------|--|-------------|--|--|----------------------------------------|--|----------|--|----------|----|----------|----|------|----------------|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|----|--|--|--|--|
| 1        |  |             |  |  | Mini Information and Watercourse Added |  |          |  |          | M1 |          | TS | TS   | September 2021 |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |
| Revision |  | Description |  |  |                                        |  | Drawn by |  | Check by |    | Appr. by |    | Date |                |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |    |  |  |  |  |
| 0m       |  | 5           |  |  |                                        |  | 10       |  |          |    |          | 15 |      |                |  |  | 20 |  |  |  |  | 25 |  |  |  |  | 30 |  |  |  |  | 35 |  |  |  |  | 40 |  |  |  |  | 45 |  |  |  |  | 50 |  |  |  |  | 55 |  |  |  |  |

**Topographical Survey**

Client:

**MIRA**

**Southern Fields**  
**Horiba MIRA**  
**Walling Street**  
**Nuneaton**  
**CV10 0TU**

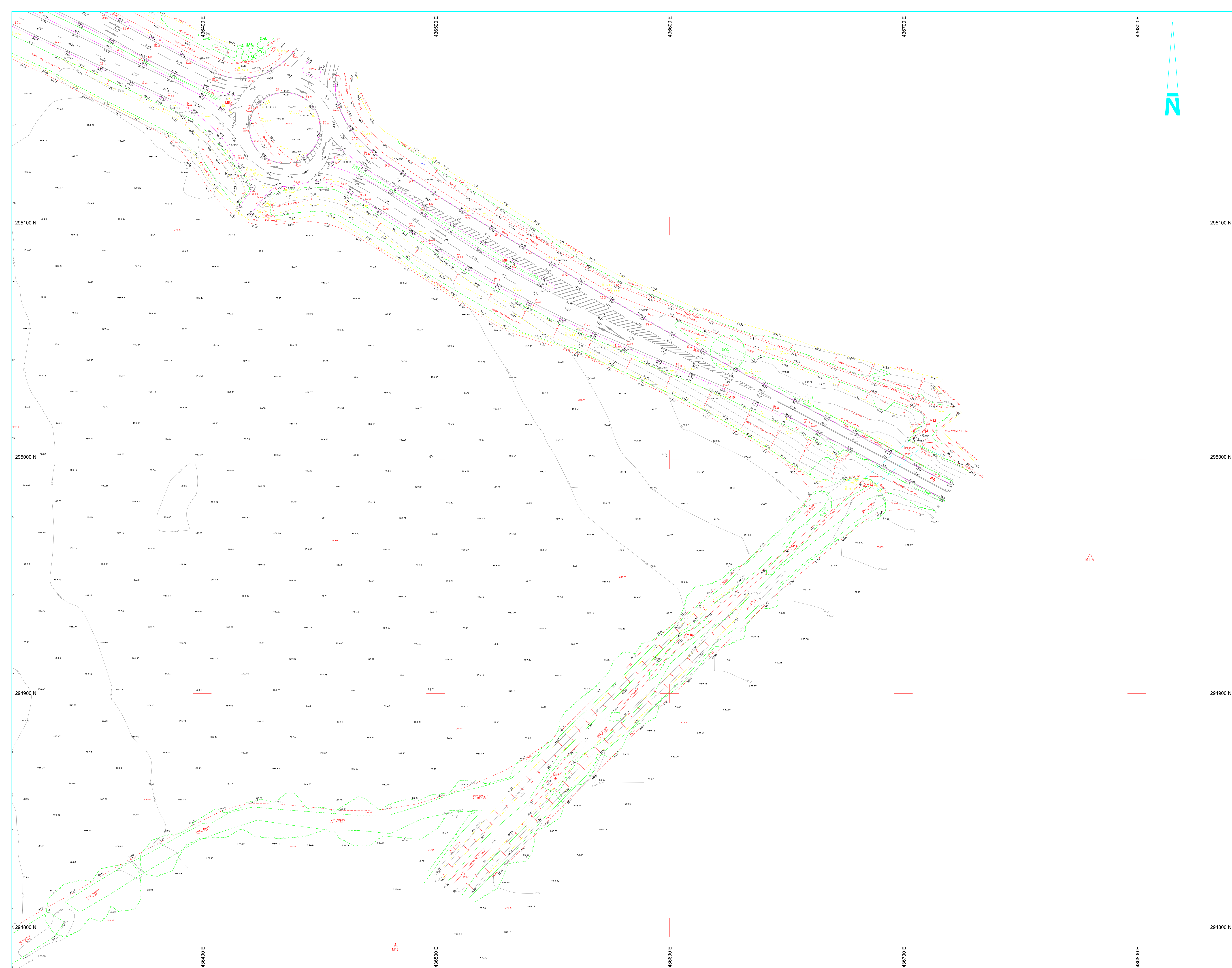
Scale: 1:500 Sheet Size: A0 Sheet Number: 2 Date: August 2021

Project Number: 30080 Rev: 1 Surveyed by: M.L.M.B.P. Checked by: TS Approved by: TS

**mksurveys**

www.mksurveys.com www.surveys4bm.co.uk

Head Office: Milton Keynes T: 01908 565561 E: m@mk-surveys.co.uk

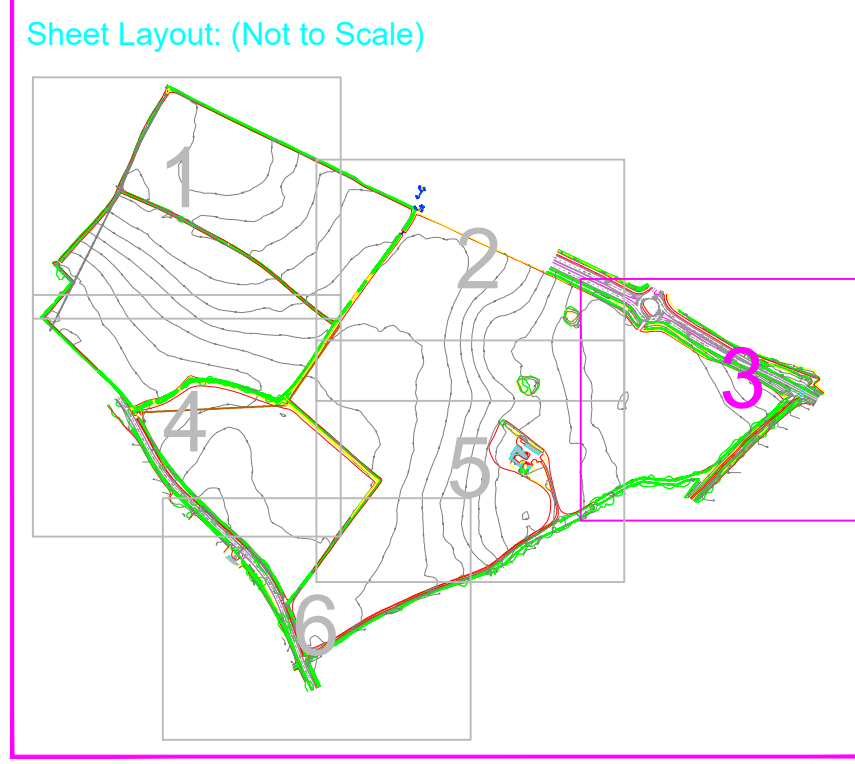


Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR OF 0.9997 APPLIED.
2. DRAINAGE INFORMATION HAS BEEN DETERMINED WITHOUT MAN ENTRY INTO CHAMBERS AND WHILST EVERY EFFORT HAS BEEN MADE TO CORRECTLY IDENTIFY THIS INFORMATION, IT SHOULD ALWAYS BE CHECKED IN AREAS THAT ARE CRITICAL TO THE FUTURE PROPOSAL.
3. ALL SEWERS ARE PRESUMED TO BE STRAIGHT BETWEEN CHAMBERS, WITH ROUTES CONNECTIVITY OBTAINED USING ACOUSTIC METHODS ONLY. THESE ARE TO BE CONSIDERED ASSUMED AND SHOULD BE INVESTIGATED FURTHER IN CRITICAL AREAS.

| Coordinate Table |             |            |            |        |
|------------------|-------------|------------|------------|--------|
| Station          | Description | Easting    | Northing   | Level  |
| M1               | Nail        | 436238.011 | 295237.042 | 86.753 |
| M2               | Nail        | 436284.982 | 295214.974 | 88.083 |
| M3               | Nail        | 436331.113 | 295192.885 | 89.566 |
| M4               | Nail        | 436373.785 | 295171.201 | 90.525 |
| M5               | Nail        | 436412.468 | 295152.111 | 90.333 |
| M6               | Nail        | 436457.193 | 295129.007 | 90.744 |
| M7               | Nail        | 436494.185 | 295107.202 | 91.603 |
| M8               | Nail        | 436533.395 | 295082.679 | 92.670 |
| M9               | Nail        | 436576.872 | 295048.434 | 93.505 |
| M10              | Nail        | 436624.719 | 295028.104 | 95.305 |
| M11              | Nail        | 436700.170 | 295000.882 | 97.441 |
| M12              | Nail        | 436710.660 | 295015.561 | 92.883 |
| M13              | Nail        | 436683.538 | 294989.033 | 92.569 |
| M14              | Nail        | 436651.596 | 294961.870 | 91.186 |
| M15              | Nail        | 436606.762 | 294924.180 | 90.905 |
| M16              | Nail        | 436551.228 | 294863.367 | 90.516 |
| M17              | Nail        | 436511.741 | 294822.917 | 90.255 |
| M18              | Nail        | 436462.782 | 294792.099 | 90.142 |
| M19              | Nail        | 435519.651 | 295009.979 | 78.685 |
| M20              | Nail        | 435562.895 | 294951.753 | 79.290 |
| M21              | Nail        | 435586.343 | 294912.928 | 79.704 |
| M22              | Nail        | 435608.367 | 294875.234 | 80.637 |
| M23              | Nail        | 435635.630 | 294838.364 | 81.336 |
| M24              | Nail        | 435683.052 | 294795.769 | 82.861 |
| M25              | Nail        | 435712.364 | 294758.070 | 82.885 |
| M26              | Nail        | 435753.309 | 294731.557 | 82.014 |
| M27              | Nail        | 435785.724 | 294694.789 | 81.506 |
| M28              | Nail        | 435811.330 | 294644.802 | 82.283 |
| M29              | Nail        | 435832.762 | 294592.169 | 81.270 |
| M30              | Nail        | 435848.401 | 294543.225 | 80.886 |
| M31              | Nail        | 435876.128 | 294484.658 | 80.724 |

| TOPOGRAPHICAL KEY            |                              |
|------------------------------|------------------------------|
| <b>SURVEY STATION</b>        | <b>GENERAL ABBREVIATIONS</b> |
| <b>BANKING</b>               | ACU                          |
| <b>HEDGE SPREADS</b>         | AL                           |
| <b>WOODLAND CANOPY</b>       | AL                           |
| <b>ARROW ON STEPS</b>        | BL                           |
| <b>RAILS INDICATOR</b>       | BL                           |
| <b>DIRECTION INDICATOR</b>   | BL                           |
| <b>TREES</b>                 | BL                           |
| <b>GATE</b>                  | BL                           |
| <b>WATER CHANNEL</b>         | BL                           |
| <b>ROAD UNPAVED</b>          | BL                           |
| <b>FOOTPATH</b>              | BL                           |
| <b>CHANGE IN SURFACE</b>     | BL                           |
| <b>FENCE</b>                 | BL                           |
| <b>WALL</b>                  | BL                           |
| <b>OVERHEAD ELECTRIC</b>     | BL                           |
| <b>OVERHEAD TELECOM</b>      | BL                           |
| <b>FOUL SEWER</b>            | BL                           |
| <b>SURFACE SEWER</b>         | BL                           |
| <b>P-TRAP</b>                | BL                           |
| <b>BACK DROP (INTERNAL)</b>  | BL                           |
| <b>OPEN SIDED BUILDING</b>   | BL                           |
| <b>OVERHANG / CANOPY</b>     | BL                           |
| <b>GLASSHOUSE</b>            | BL                           |
| <b>SPOT LEVEL</b>            | BL                           |
| <b>SONAR LEVEL</b>           | BL                           |
| <b>BORE HOLE</b>             | BL                           |
| <b>TRAIL HOLE</b>            | BL                           |
| <b>BARBED WIRE FENCE</b>     | BL                           |
| <b>CONCRETE PANEL FENCE</b>  | BL                           |
| <b>CORRUGATED IRON FENCE</b> | BL                           |
| <b>CHAIN LINK FENCE</b>      | BL                           |
| <b>CHESTNUT PLANE</b>        | BL                           |
| <b>IRON RAILINGS</b>         | BL                           |
| <b>POST AND RAIL FENCE</b>   | BL                           |
| <b>WIRE MESH FENCE</b>       | BL                           |
| <b>WIRE MESH FENCE</b>       | BL                           |



| Revision | Description                           | By | TS | TS | September 2021 |
|----------|---------------------------------------|----|----|----|----------------|
| 1        | M18 Information and Watercourse Added | ML | TS | TS |                |

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client:

**MIRA**

Southern Fields  
Horiba MIRA  
Watling Street  
Nuneaton  
CV10 0TU

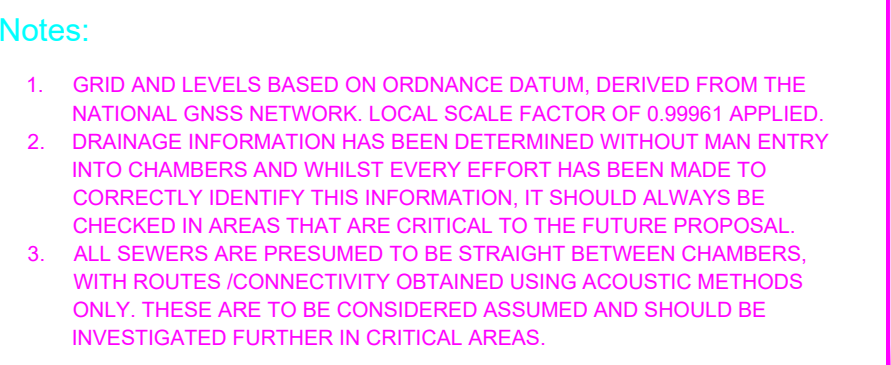
| Scale: | Sheet Size: | Sheet Number: | Date:       |
|--------|-------------|---------------|-------------|
| 1:500  | A0          | 3             | August 2021 |

| Project Number: | Rev: | Surveyed by: | Checked by: | Approved by: |
|-----------------|------|--------------|-------------|--------------|
| 30080           | 1    | ML/MB/BP     | TS          | TS           |

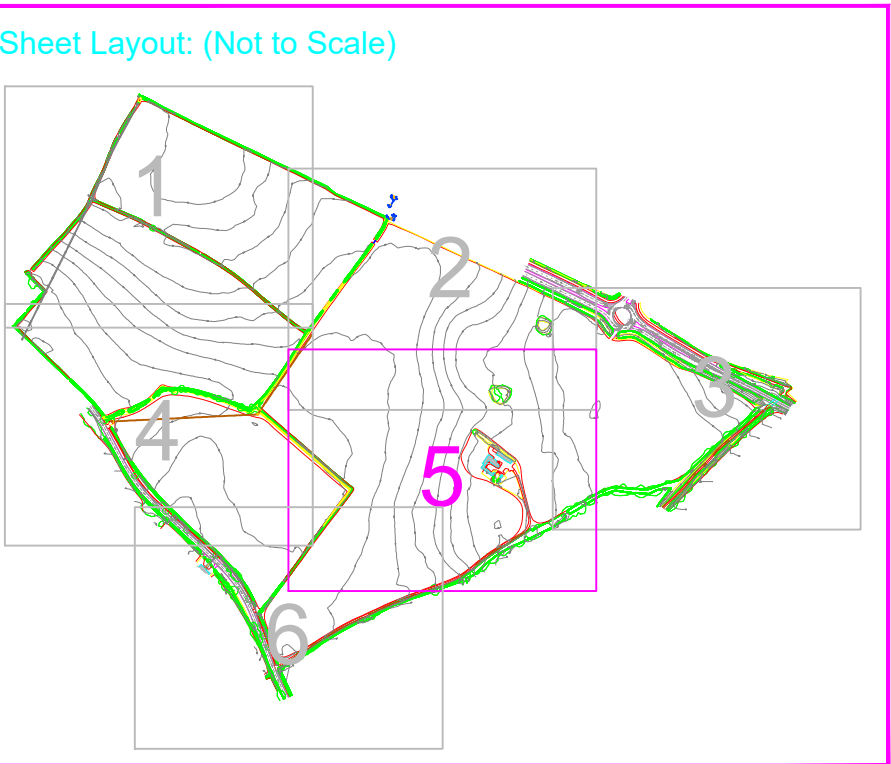
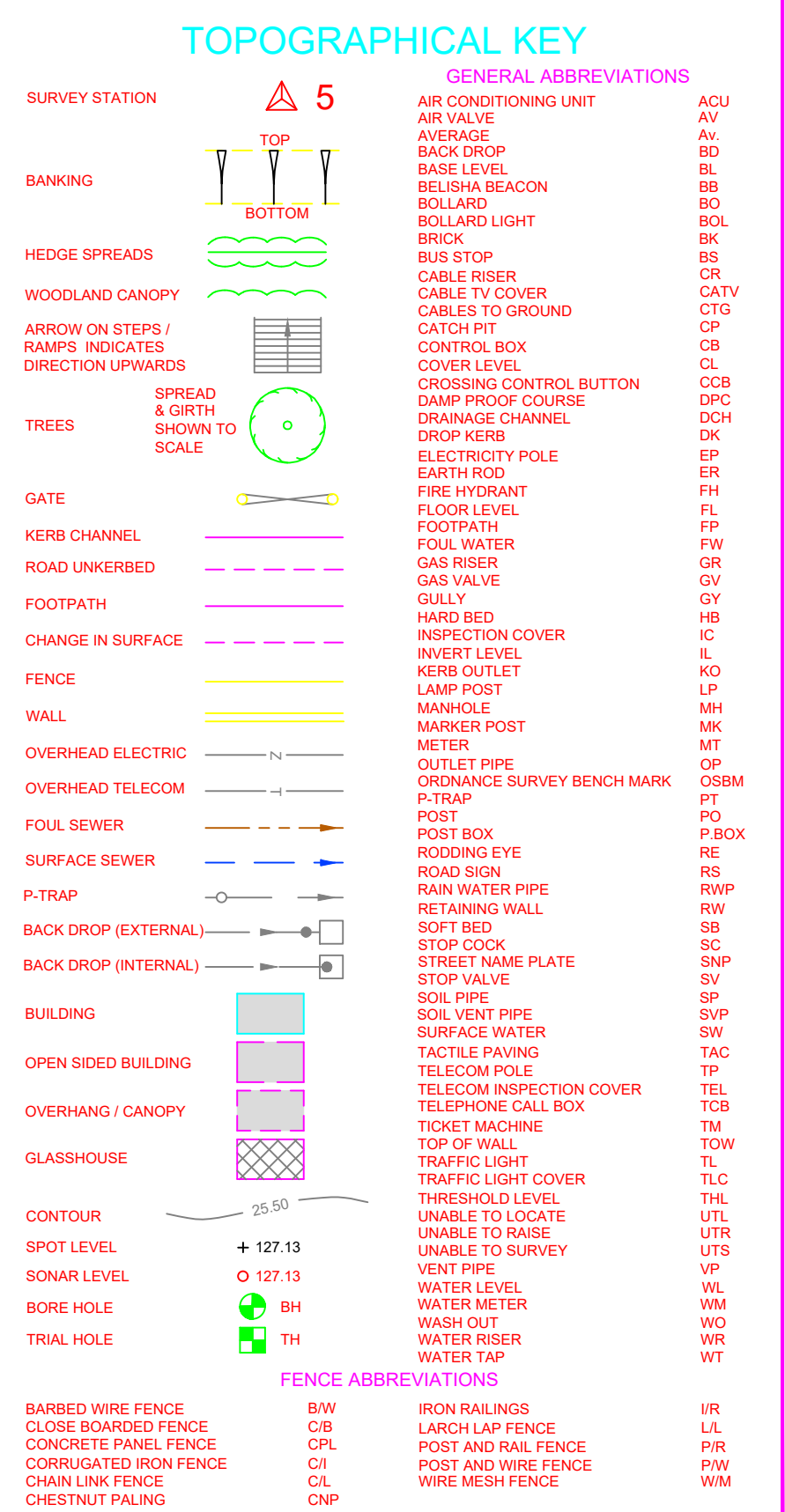
**mksurveys**

www.mksurveys.com  
www.surveys4bm.co.uk  
Head Office: Milton Keynes T: 01908 565561 E: mail@mksurveys.co.uk





| Coordinate Table |             |            |            |        |
|------------------|-------------|------------|------------|--------|
| Station          | Description | Easting    | Northing   | Level  |
| M1               | Nail        | 46328.011  | 295237.042 | 86.753 |
| M2               | Nail        | 46333.962  | 295214.480 | 86.983 |
| M3               | Nail        | 46333.113  | 295252.805 | 86.756 |
| M4               | Nail        | 46336.783  | 295177.201 | 90.525 |
| M5               | Nail        | 46342.455  | 295132.122 | 86.756 |
| M6               | Nail        | 46345.793  | 295129.607 | 90.744 |
| M7               | Nail        | 46346.875  | 295127.002 | 91.063 |
| M8               | Nail        | 46350.078  | 295092.079 | 90.570 |
| M9               | Nail        | 46354.872  | 295048.434 | 93.505 |
| M10              | Nail        | 46358.230  | 295028.338 | 90.744 |
| M11              | Nail        | 46370.170  | 295005.882 | 97.441 |
| M12              | Nail        | 46370.660  | 295000.861 | 92.893 |
| M13              | Nail        | 46368.530  | 294949.099 | 90.744 |
| M14              | Nail        | 46365.566  | 294961.870 | 91.186 |
| M15              | Nail        | 46366.952  | 294924.180 | 90.805 |
| M16              | Nail        | 46363.362  | 294963.333 | 90.744 |
| M17              | Nail        | 46361.742  | 294822.917 | 90.255 |
| M18              | Nail        | 46358.774  | 294722.109 | 90.142 |
| M19              | Nail        | 46355.150  | 295029.099 | 90.255 |
| M20              | Nail        | 46356.885  | 294951.753 | 79.290 |
| M21              | Nail        | 46356.344  | 294951.753 | 79.290 |
| M22              | Nail        | 46356.967  | 294873.238 | 80.637 |
| M23              | Nail        | 46357.630  | 294838.364 | 81.336 |
| M24              | Nail        | 46356.724  | 294795.758 | 80.637 |
| M25              | Nail        | 46356.324  | 294678.079 | 82.695 |
| M26              | Nail        | 46357.330  | 294731.557 | 82.014 |
| M27              | Nail        | 46356.674  | 294694.674 | 82.695 |
| M28              | Nail        | 463591.300 | 294644.002 | 82.283 |
| M29              | Nail        | 46358.762  | 294592.169 | 81.270 |
| M30              | Nail        | 46358.462  | 294543.225 | 80.724 |
| M31              | Nail        | 463876.128 | 294844.058 | 80.724 |



| MH Information and Watercourse Added |             | ML       | TS        | TS       | September 2021 |
|--------------------------------------|-------------|----------|-----------|----------|----------------|
| Division                             | Description | Surv. by | Check. by | Appr. by | Date           |
| 5                                    | 10          | 15       | 20        | 25       | 30             |
| 35                                   | 40          | 45       | 50        | 55       |                |

## Topographical Survey

Client:  MIRA

Southern Fields  
Horiba MIRA  
Watling Street  
Nuneaton  
CV10 0TU

|                                 |                          |                                 |                             |
|---------------------------------|--------------------------|---------------------------------|-----------------------------|
| Scale:<br><b>1:500</b>          | Sheet Size:<br><b>A0</b> | Sheet Number:<br><b>5</b>       | Date:<br><b>August 2021</b> |
| Project Number:<br><b>30080</b> | Rev:<br><b>1</b>         | Surveyed by:<br><b>ML/MB/BP</b> | Checked by:<br><b>TS</b>    |
|                                 |                          |                                 | Approved by:<br><b>TS</b>   |

**mk surveys**

[www.mksurveys.co.uk](http://www.mksurveys.co.uk) [www.surveys4bim.co.uk](http://www.surveys4bim.co.uk)

Head Office: Milton Keynes t: 01908 565561 e: [mail@mksurveys.co.uk](mailto:mail@mksurveys.co.uk)



## APPENDIX C

# CALCULATIONS

Company: WIE Office: London  
 Sheet No: 1 of 1 Project No: EED13833  
 By: Ryan Davies Date: 14/11/2022  
 Checked: Sean Whelan Date: 22/11/2022

Project Title MIRA  
 Calculations Title Channel Capacity Assessment

| LOCATION | CALCULATIONS                                                                                                                                                                                                                                                                                                                                              |      |                     |                                    |                                    |           |           | OPTIONS               |  |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------|------------------------------------|------------------------------------|-----------|-----------|-----------------------|--|
|          | Channel capacity has been assessed using Mannings equation for open channel flow and channel dimensions extracted from existing topographic survey and LiDAR information. Typical values have been assumed for channel roughness. Hydraulic radius and slope have been calculated along the watercourse to identify maximum, minimum, and average values. |      |                     |                                    |                                    |           |           |                       |  |
|          | <b>Channel capacity Assessment</b>                                                                                                                                                                                                                                                                                                                        |      |                     |                                    |                                    |           |           |                       |  |
|          | Mannings Equation $v = \frac{1}{n} \cdot R_h^{2/3} \cdot S^{1/2}$                                                                                                                                                                                                                                                                                         |      |                     |                                    |                                    |           |           |                       |  |
|          | v = average velocity through section (m/s)<br>n = Manning's roughness = 0.04 assumed to be a clean winding channel<br>R <sub>h</sub> = hydraulic radius (m <sup>2</sup> /m) = A/p = Area/Wetted perimeter of cross-section<br>S = slope (m/m)                                                                                                             |      |                     |                                    |                                    |           |           |                       |  |
|          | $q = v \cdot A$                                                                                                                                                                                                                                                                                                                                           |      |                     |                                    |                                    |           |           |                       |  |
|          | q = flow (m <sup>3</sup> /s)<br>A = cross-sectional area (m <sup>2</sup> )                                                                                                                                                                                                                                                                                |      |                     |                                    |                                    |           |           |                       |  |
|          | x-sec                                                                                                                                                                                                                                                                                                                                                     | n    | A (m <sup>2</sup> ) | p (m)                              | R <sub>h</sub> (m <sup>2</sup> /m) | IL (mAOD) | dist. (m) | chain (m)             |  |
|          | 1                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 3.28                | 5.64                               | 0.58                               | 82.20     | 0.00      | 0.00                  |  |
|          | 2                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 2.76                | 4.80                               | 0.58                               | 82.11     | 32.50     | 32.50                 |  |
|          | 3                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 1.84                | 4.01                               | 0.46                               | 82.16     | 32.56     | 65.06                 |  |
|          | 4                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 2.29                | 4.15                               | 0.55                               | 81.76     | 75.96     | 141.02                |  |
|          | 5                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 2.62                | 4.62                               | 0.57                               | 81.31     | 78.85     | 219.87                |  |
|          | 6                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 3                   | 4.84                               | 0.62                               | 80.44     | 85.63     | 305.50                |  |
|          | 7                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 3.69                | 5.73                               | 0.64                               | 79.16     | 95.33     | 400.83                |  |
|          | 8                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 4.3                 | 6.38                               | 0.67                               | 78.63     | 73.77     | 474.60                |  |
|          | 9                                                                                                                                                                                                                                                                                                                                                         | 0.04 | 4.6                 | 7.28                               | 0.63                               | 78.34     | 79.62     | 554.22                |  |
|          | 10                                                                                                                                                                                                                                                                                                                                                        | 0.04 | 4.75                | 6.82                               | 0.70                               | 77.78     | 77.04     | 631.26                |  |
|          | 11                                                                                                                                                                                                                                                                                                                                                        | 0.04 | 4.23                | 7.44                               | 0.57                               | 77.57     | 57.07     | 688.33                |  |
|          | reach                                                                                                                                                                                                                                                                                                                                                     | n    | A (m <sup>2</sup> ) | R <sub>h</sub> (m <sup>2</sup> /m) | fall (m)                           | S (1:X)   | v (m/s)   | q (m <sup>3</sup> /s) |  |
|          | 1-2                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 3.02                | 0.58                               | 0.09                               | 361       | 0.91      | 2.76                  |  |
|          | 3-4                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 2.07                | 0.51                               | 0.40                               | 190       | 1.15      | 2.38                  |  |
|          | 4-5                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 2.46                | 0.56                               | 0.45                               | 175       | 1.28      | 3.15                  |  |
|          | 5-6                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 2.81                | 0.59                               | 0.87                               | 98        | 1.78      | 5.00                  |  |
|          | 6-7                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 3.35                | 0.63                               | 1.28                               | 74        | 2.13      | 7.14                  |  |
|          | 7-8                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 4.00                | 0.66                               | 0.53                               | 139       | 1.60      | 6.41                  |  |
|          | 8-9                                                                                                                                                                                                                                                                                                                                                       | 0.04 | 4.45                | 0.65                               | 0.29                               | 275       | 1.14      | 5.05                  |  |
|          | 9-10                                                                                                                                                                                                                                                                                                                                                      | 0.04 | 4.68                | 0.66                               | 0.56                               | 138       | 1.62      | 7.59                  |  |
|          | 10-11                                                                                                                                                                                                                                                                                                                                                     | 0.04 | 4.49                | 0.63                               | 0.21                               | 272       | 1.12      | 5.02                  |  |

## APPENDIX D

[Print](#)[Close Report](#)

# Greenfield runoff rate estimation for sites

[www.uksuds.com](http://www.uksuds.com) | Greenfield runoff tool

Calculated by: Sean Whelan

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

Latitude: 52.55206° N

Longitude: 1.47097° W

Reference: 3464598155

Date: Nov 22 2022 12:36

Runoff estimation approach: IH124

## Site characteristics

Total site area (ha): 1

## Methodology

 $Q_{BAR}$  estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics: Default Edited

SOIL type: 4 4

HOST class: N/A N/A

SPR/SPRHOST: 0.47 0.47

Hydrological characteristics: Default Edited

SAAR (mm): 644 636

Hydrological region: 4 4

Growth curve factor 1 year: 0.83 0.83

Growth curve factor 30 years: 2 2

Growth curve factor 100 years: 2.57 2.57

Growth curve factor 200 years: 3.04 3.04

## Notes

### (1) Is $Q_{BAR} < 2.0$ l/s/ha?

When  $Q_{BAR}$  is  $< 2.0$  l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates $< 5.0$ l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

### (3) Is $SPR/SPRHOST \leq 0.3$ ?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

| Greenfield runoff rates | Default | Edited |
|-------------------------|---------|--------|
| Q <sub>BAR</sub> (l/s): | 4.38    | 4.32   |
| 1 in 1 year (l/s):      | 3.63    | 3.58   |
| 1 in 30 years (l/s):    | 8.76    | 8.63   |
| 1 in 100 year (l/s):    | 11.25   | 11.09  |
| 1 in 200 years (l/s):   | 13.31   | 13.12  |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at [www.uksuds.com](http://www.uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at [www.uksuds.com/terms-and-conditions.htm](http://www.uksuds.com/terms-and-conditions.htm). The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.