

M5 Junction 10 Improvements Scheme

Environmental Statement

Appendix 8.1 Flood Risk Assessment - Part 2 of 2

TR010063 – APP 6.15

Regulation 5 (2) (e)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Volume 6
October 2024

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Infrastructure Planning Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M5 Junction 10 Improvements Scheme Development Consent Order 202[x]

6.15 Environmental Statement:

Appendix 8.1 Flood Risk Assessment - Part 2 of 2 (Tracked)

| | |
|-----------------------------------------------|-------------------------------------------------|
| Regulation Number: | Regulation 5(2)(e) |
| Planning Inspectorate Scheme Reference | TR010063 |
| Application Document Reference | TR010063/APP/6.15 |
| Author: | M5 Junction 10 Improvements Scheme Project Team |

| Version | Date | Status of Version |
|----------------|---------------|--------------------------|
| Rev 0 | December 2023 | DCO Application |
| Rev 1 | October 2024 | Deadline 5 |
| | | |
| | | |
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| | | |

Contents

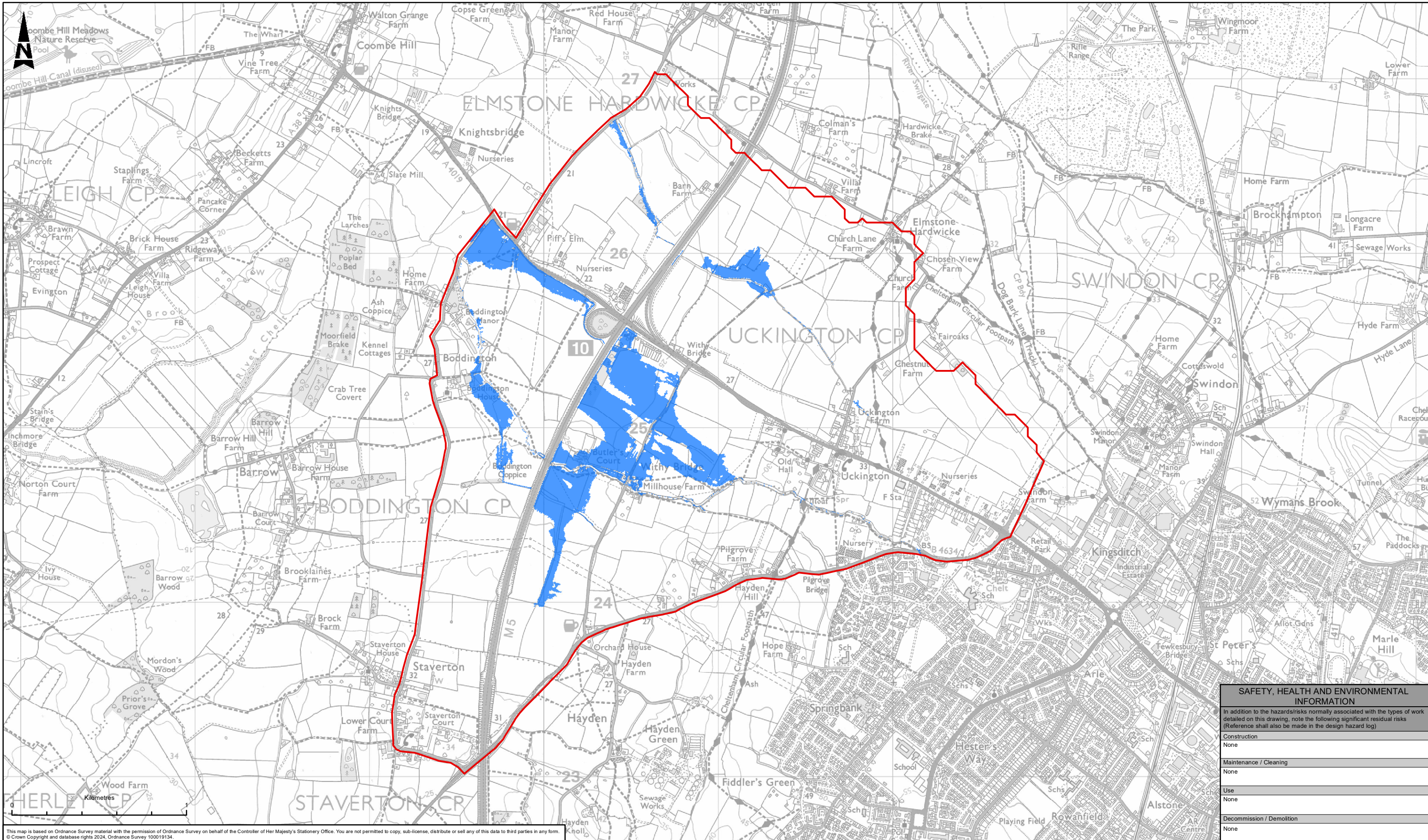
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|------------------------------------|----------|
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Appendices



Appendix 8.1 B. FRA Figures

| Figure reference | Document title | Sheet | Document number | Revision |
|-------------------|--------------------------------------------------------------------------------|---------------|------------------------------------------|----------|
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| 4- 65 | 1% AEP Baseline flood risk depth map - present day | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000034 | 0 |
| 4- 76 | 1% AEP Baseline flood risk depth map - future with 53% climate change | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000035 | 0 |
| 5-1 | Flood Compensation | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000032 | 0 |
| <u>5.4</u> | <u>Flood extent for 3.3% AEP (functional floodplain) in relation to Scheme</u> | <u>1 of 1</u> | <u>GCCM5J10-ATK-EWE-ZZ-GS-GI-4000022</u> | |
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| 5- 65 | 1% AEP level difference map – present day | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000036 | 0 |
| 5- 76 | 1% AEP Scheme flood risk depth map – future with 53% climate change | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000039 | 0 |
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| 5- 98 | 0.1% AEP Scheme flood risk depth map - present day | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000042 | 0 |
| 5- 109 | 0.1% AEP level difference map | 1 of 1 | GCCM5J10-ATK-EWE-ZZ-GS-GI-000044 | 0 |



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LEGEND

MODEL DOMAIN

1 IN 30 YEAR RETURN PERIOD

NOTE:

1. FLOOD ZONE 3B AS DERIVED FROM HYDRAULIC MODELLING USING 3.3% ANNUAL EXCEEDANCE PROBABILITY EVENT (1 IN 30-YEAR RETURN PERIOD).

| SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log) | |
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
|-------------|-----------|----------|-------|---------|----------|------------|------------|
| | PUBLISHED | P01 | KS | NJ | CC | TT | 17/07/24 |

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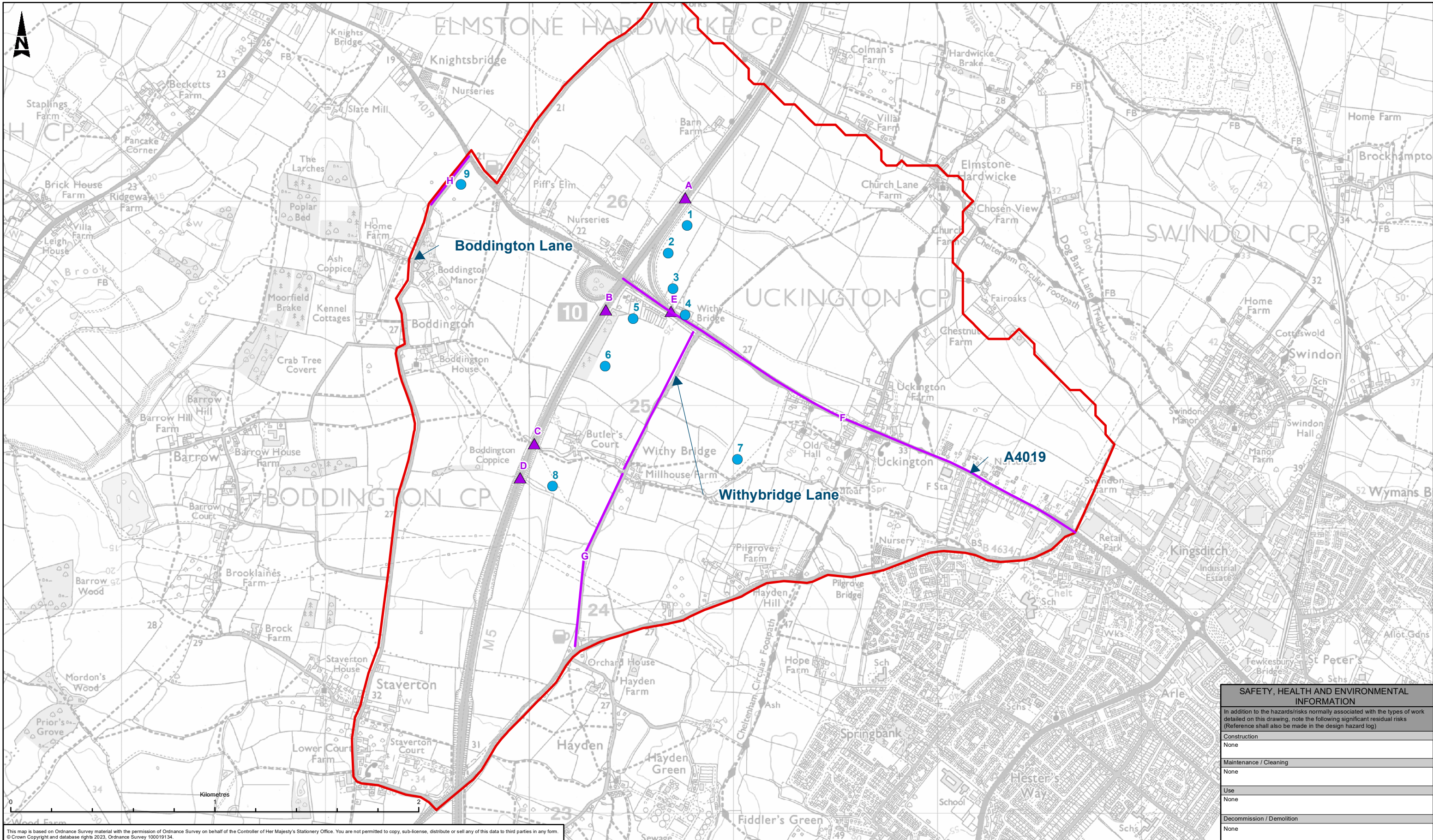
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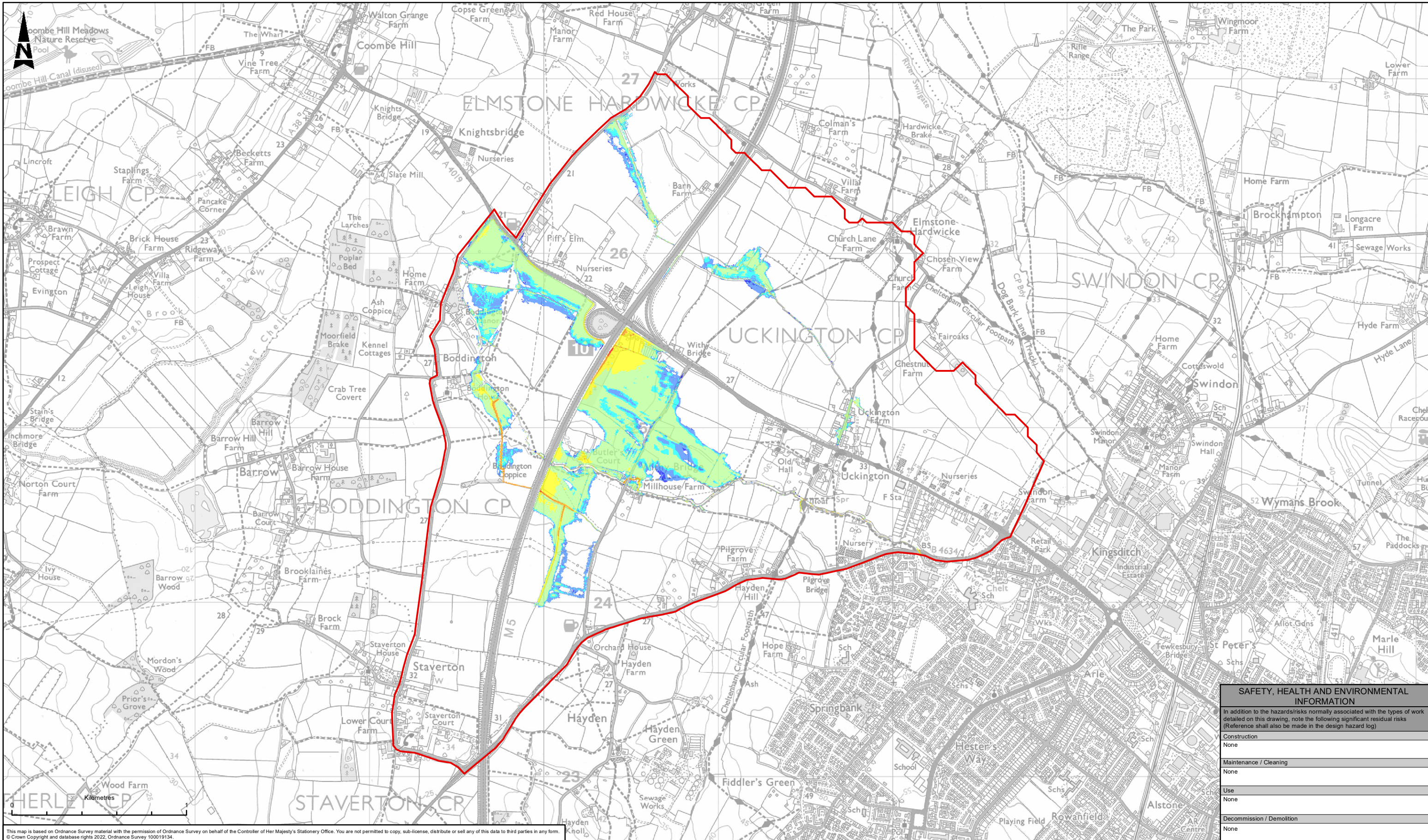
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| | |
|-----------------------|-------------------------------------------------------------------------------|
| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 4.4 FLOOD ZONE 3B |
| Drawing Number | Project Originator Volume GCCM5J10 - ATK - EWE - ZZ - GS - GI - 400003 |
| Original Size | A3 |
| Scale | 1:20,000 |
| Project Ref | 5214106 |
| Sheet | 1 of 1 |
| Rev | P01 |



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| | | | | | | | | |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------|--|
| LEGEND MODEL DOMAIN FLOW RESULTS FLOW RESULTS DEPTH RESULTS | Description Status: PUBLISHED Revision: P02 Drawn: JM Checked: NJ Reviewed: CC Authorised: LJ Issue Date: 17/07/23 | | Drawing Suitability PUBLISHED | | Status A1 | | Project Title M5 Junction 10 Improvements Scheme | |
| | Description Status: PUBLISHED Revision: P02 Drawn: JM Checked: NJ Reviewed: CC Authorised: LJ Issue Date: 17/07/23 | | Member of the SNC-Lavalin Group 5th Floor, Block 5 Shire Hall Bearland Gloucester GL1 2TH Tel: 08000 514 514 www.atkinsglobal.com | | Drawing Title FIGURE 4-5 LOCATION OF POINTS FOR RESULT REPORTING | | Drawing Number GCCM5J10-ATK-EWE-ZZ-GS-GI_000031 | |
| | Description Status: PUBLISHED Revision: P02 Drawn: JM Checked: NJ Reviewed: CC Authorised: LJ Issue Date: 17/07/23 | | Client | | Project Originator Volume GCCM5J10-ATK-EWE-ZZ-GS-GI_000031 | | Location Type Role Number Rev. Original Size: A3 Scale: 1:17,109 Project Ref: 5214106 Sheet: 1 of 1 Rev: P02 | |
| | Description Status: PUBLISHED Revision: P02 Drawn: JM Checked: NJ Reviewed: CC Authorised: LJ Issue Date: 17/07/23 | | Client | | Project Originator Volume GCCM5J10-ATK-EWE-ZZ-GS-GI_000031 | | Location Type Role Number Rev. Original Size: A3 Scale: 1:17,109 Project Ref: 5214106 Sheet: 1 of 1 Rev: P02 | |
| | Description Status: PUBLISHED Revision: P02 Drawn: JM Checked: NJ Reviewed: CC Authorised: LJ Issue Date: 17/07/23 | | Client | | Project Originator Volume GCCM5J10-ATK-EWE-ZZ-GS-GI_000031 | | Location Type Role Number Rev. Original Size: A3 Scale: 1:17,109 Project Ref: 5214106 Sheet: 1 of 1 Rev: P02 | |



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LEGEND

MODEL DOMAIN

1 IN 100 YEAR DEPTH RESULTS

- 0 - 10mm
- 10 - 50mm
- 50 - 100mm
- 100 - 500mm
- 500 - 1000mm
- 1000 - 2000mm
- > 2000mm

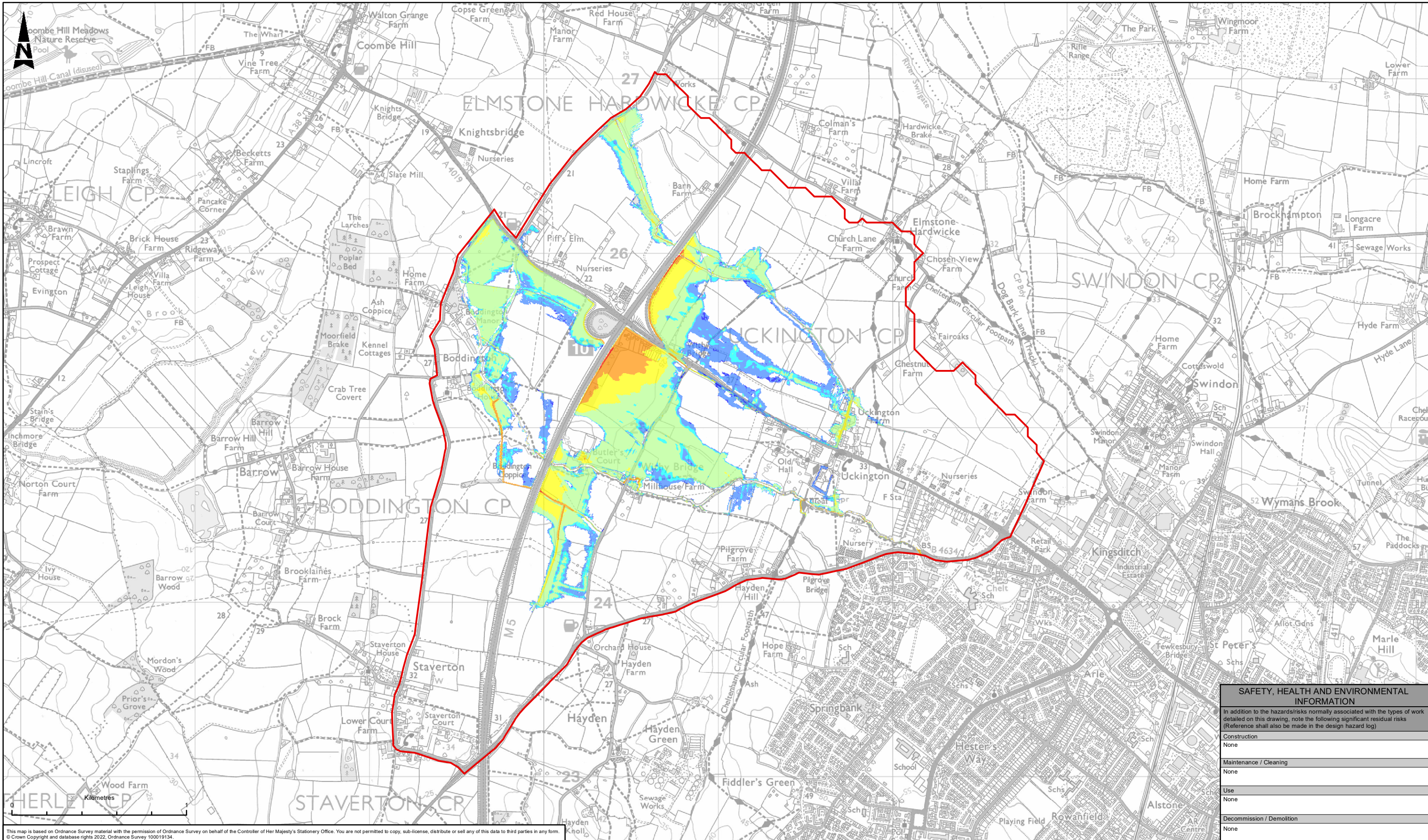
| SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log) | |
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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|-------------------|-----------------|---------------------------------------------------------------------|---------------|
| Project Title | | M5 Junction 10 Improvements Scheme | |
| Drawing Title | | FIGURE 4-6 1% AEP BASELINE FLOOD RISK DEPTH MAP - PRESENT DAY | |
| Drawing Number | | GCCM5J10 - ATK - EWE ZZ - GS - GI - 000034 | |
| Original Size: A3 | Scale: 1:20,000 | Project Ref: 5214106 | Sheet: 1 of 1 |
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LEGEND

 MODEL DOMAIN

1 IN 100 YEAR + 53% CC DEPTH RESULTS

- 0 - 10mm
- 10 - 50mm
- 50 - 100mm
- 100 - 500mm
- 500 - 1000mm
- 1000 - 2000mm
- > 2000mm

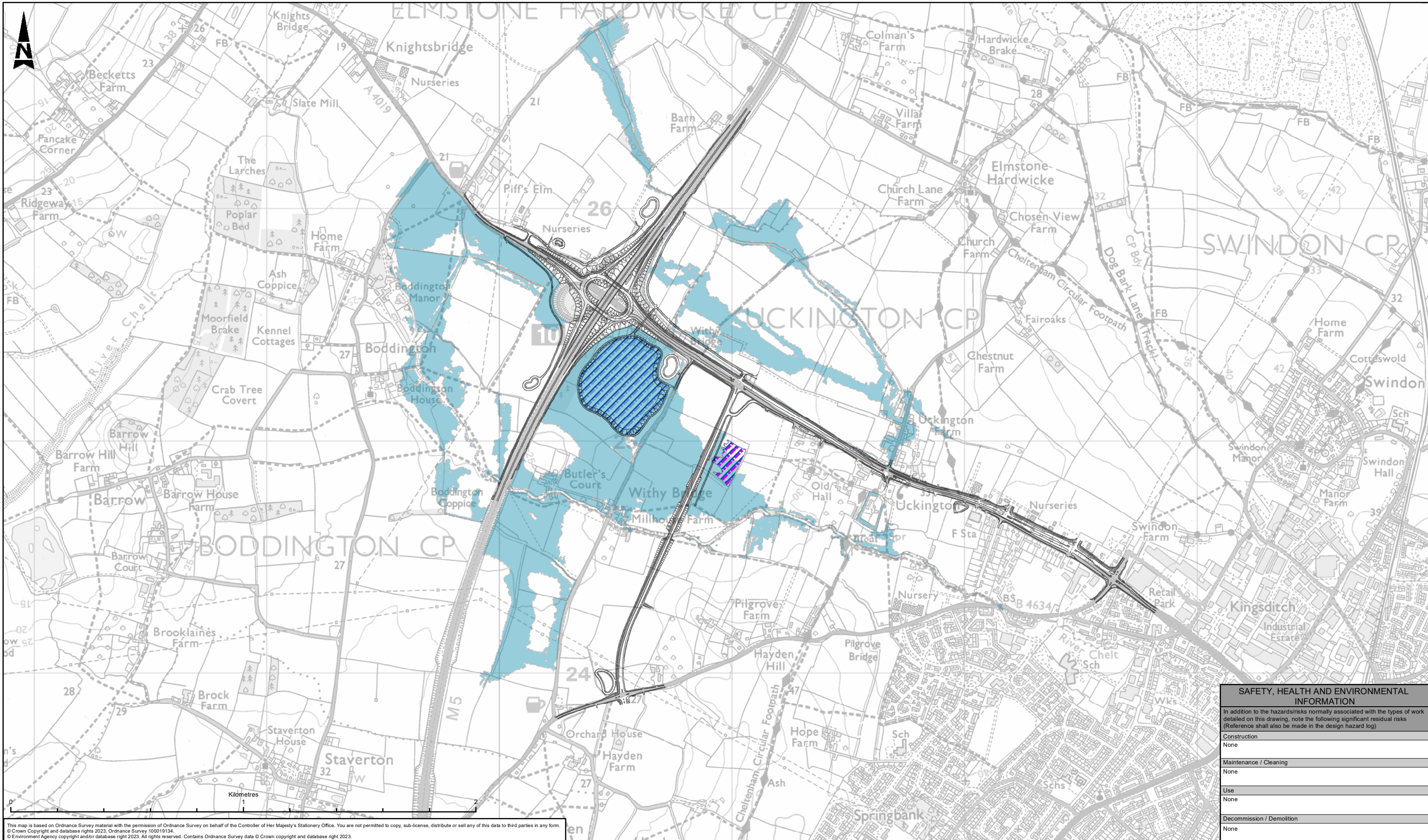
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| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log) | |
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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| Project Title | | M5 Junction 10 Improvements Scheme | |
| Drawing Title | | FIGURE 4-7 1% AEP BASELINE FLOOD RISK DEPTH MAP - FUTURE WITH 53% CLIMATE CHANGE | |
| Client | Project | Originator | Volume |
| | GCCM5J10 - ATK - EWE | ZZ - GS - GI - 000035 | |
| Original Size | Scale | Project Ref. | Sheet |
| A3 | 1:20,000 | 5214106 | 1 of 1 |
| Rev. | | | |
| P01 | | | |



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LEGEND

- SCHEME ALIGNMENT
- COMPENSATORY FLOODPLAIN
- FLOOD STORAGE AREA
- DESIGN EVENT (1% AEP + 53% CC)

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log)

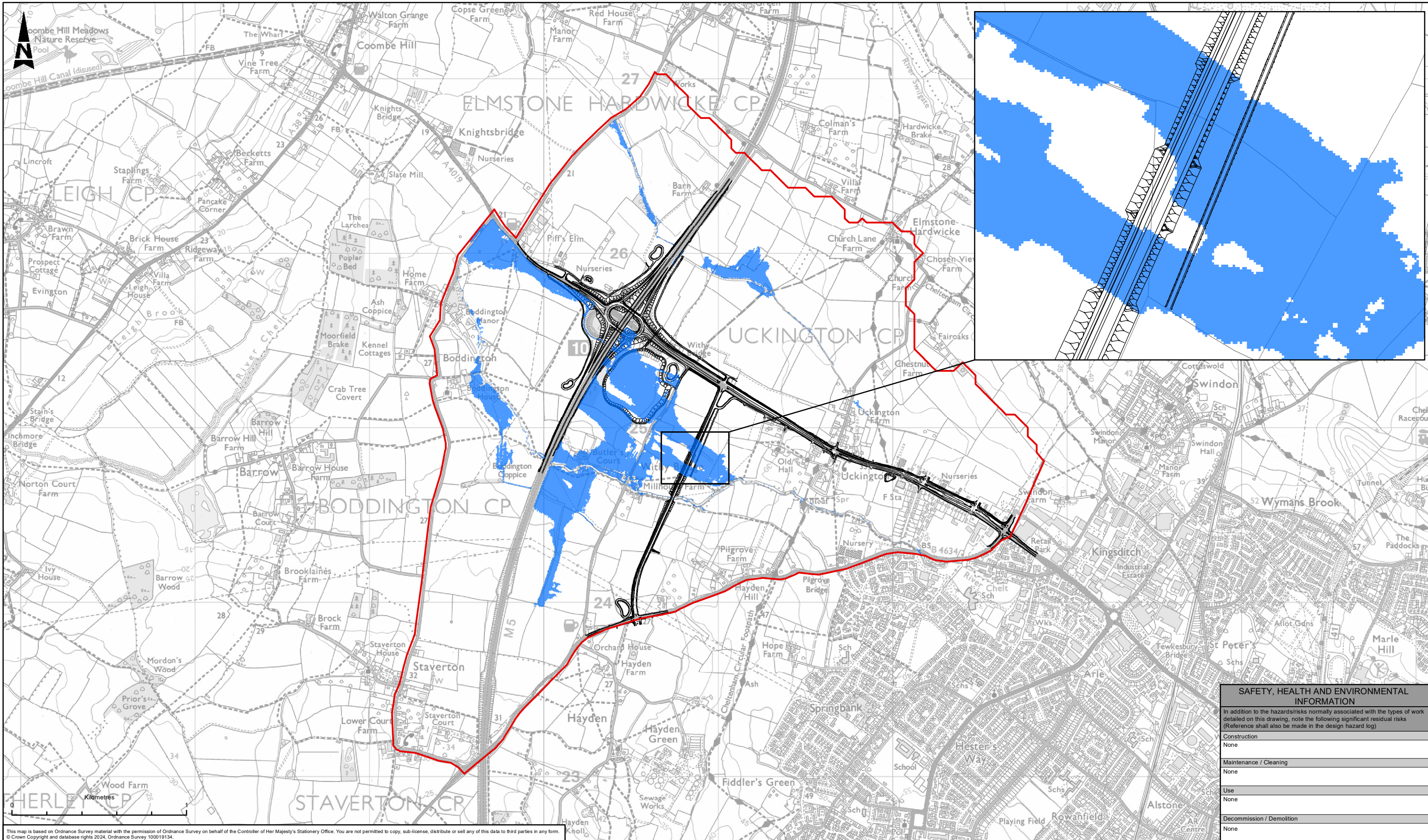
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| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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|-----------------------|-------------------------------------------------------------------|
| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 5-1 FLOOD COMPENSATION |
| Drawing Number | Project Originator Volume GCCM5J10-ATK-EWE-ZZ-GS-GI-000032 |
| Original Size | A3 |
| Scale | 1:15,000 |
| Project Ref | 5214106 |
| Sheet | 1 of 1 |
| Rev | P02 |



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LEGEND

- SCHEME ALIGNMENT
- MODEL DOMAIN
- 1 IN 30 YEAR RETURN PERIOD**
-

NOTES:

1. FLOOD ZONE 3B AS DERIVED FROM HYDRAULIC MODELLING USING 3.3% ANNUAL EXCEEDANCE PROBABILITY EVENT (1 IN 30-YEAR RETURN PERIOD).
2. SCHEME IS SHOWN SUPER IMPOSED FOR REFERENCE. FZ3B IS SHOWN HERE TO REFLECT THE BASELINE CONDITIONS.
3. INSET TO INDICATE RELATIVE POSITIONING OF THE LINK ROAD CULVERTS WITH FZ3B - INDIVIDUAL BARRELS ARE NOT SHOWN.
4. SCHEME CULVERTS WERE LOCATED AND NUMBERED TO CONVEY THE DESIGN FLOOD.
5. WITH-SCHEME MODELLING WAS USED TO DEMONSTRATE THE IMPACT OF THE LINK ROAD ON BASELINE FLOOD RISK.

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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| | |
|---------------------------|------|
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

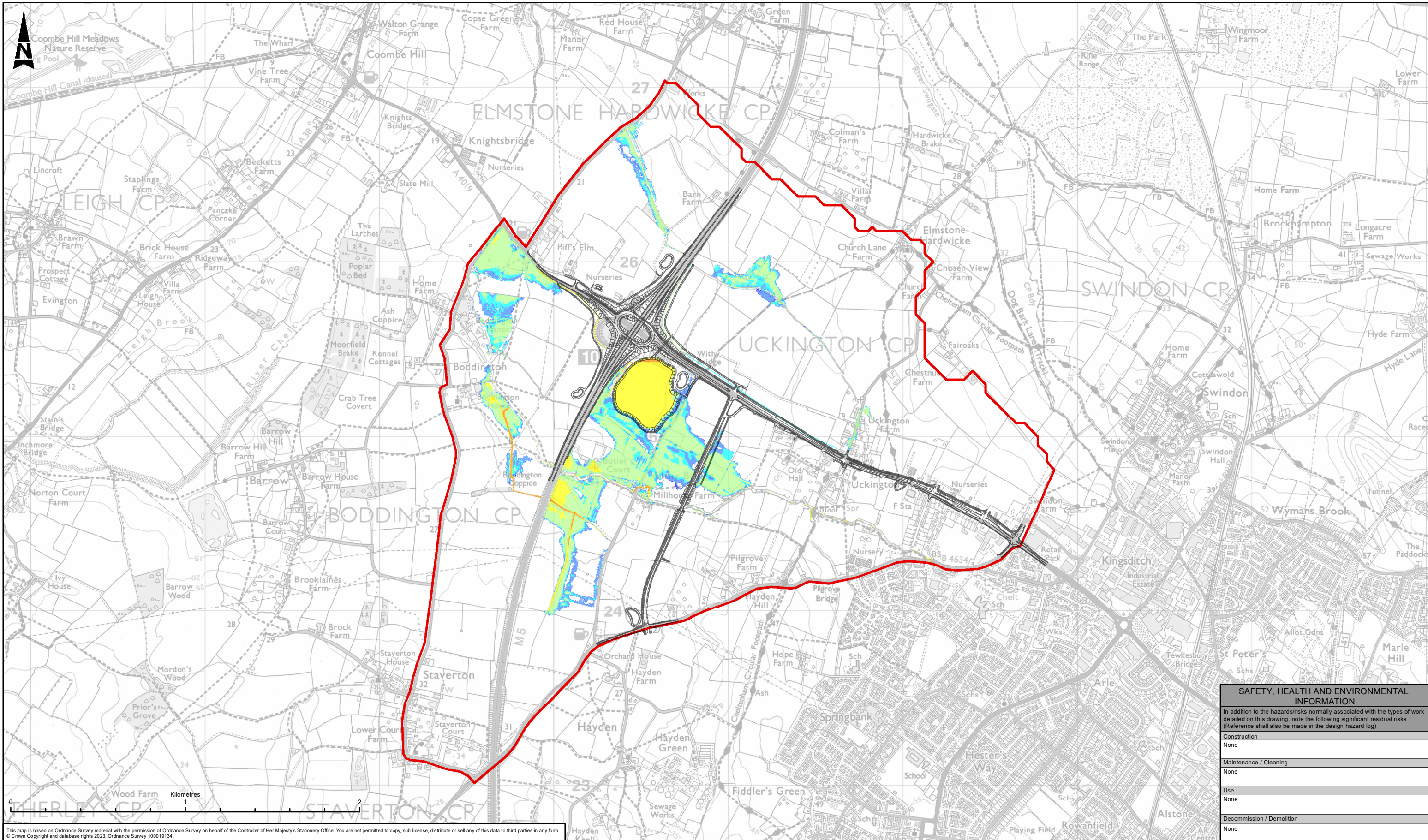
LEGEND

- SCHEME ALIGNMENT
- MODEL DOMAIN
- 1 IN 30 YEAR RETURN PERIOD**
-

NOTES:

1. FLOOD ZONE 3B AS DERIVED FROM HYDRAULIC MODELLING USING 3.3% ANNUAL EXCEEDANCE PROBABILITY EVENT (1 IN 30-YEAR RETURN PERIOD).
2. SCHEME IS SHOWN SUPER IMPOSED FOR REFERENCE. FZ3B IS SHOWN HERE TO REFLECT THE BASELINE CONDITIONS.
3. INSET TO INDICATE RELATIVE POSITIONING OF THE LINK ROAD CULVERTS WITH FZ3B - INDIVIDUAL BARRELS ARE NOT SHOWN.
4. SCHEME CULVERTS WERE LOCATED AND NUMBERED TO CONVEY THE DESIGN FLOOD.
5. WITH-SCHEME MODELLING WAS USED TO DEMONSTRATE THE IMPACT OF THE LINK ROAD ON BASELINE FLOOD RISK.

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|-------------|--|---------------------------------|--|-------------------------------------------------------------------------------------------------------|--|------------------------------------|--|
| Description | | Drawing Suitability | | Status | | Project Title | |
| | | PUBLISHED | | A1 | | M5 Junction 10 Improvements Scheme | |
| | | AtkinsRéalis | | 5th Floor, Block 5 Bearland Gloucester GL1 2TH Tel: 08000 514 514 www.atkinsrealis.com | | Drawing Title | |
| | | Copyright © AtkinsRéalis (2023) | | Gloucestershire COUNTY COUNCIL | | Drawing Number | |
| | | Client | | Project | | Originator | |
| | | | | GCCM5J10 - ATK - EWE | | Volume | |
| | | | | ZZ - GS - GI - 400002 | | | |
| | | | | Location | | Type | |
| | | | | Scale | | Project Ref | |
| | | | | 1:20,000 | | 5214106 | |
| | | | | Sheet | | Number | |
| | | | | 1 of 1 | | | |
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| | | | | P01 | | | |



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| LEGEND | |
|-----------------------------|------------------|
| | SCHEME ALIGNMENT |
| | MODEL DOMAIN |
| 1 IN 100 YEAR DEPTH RESULTS | |
| | 0 - 10mm |
| | 10 - 50mm |
| | 50 - 100mm |
| | 100 - 500mm |
| | 500 - 1000mm |
| | 1000 - 2000mm |
| | > 2000mm |

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log)

| | |
|---------------------------|------|
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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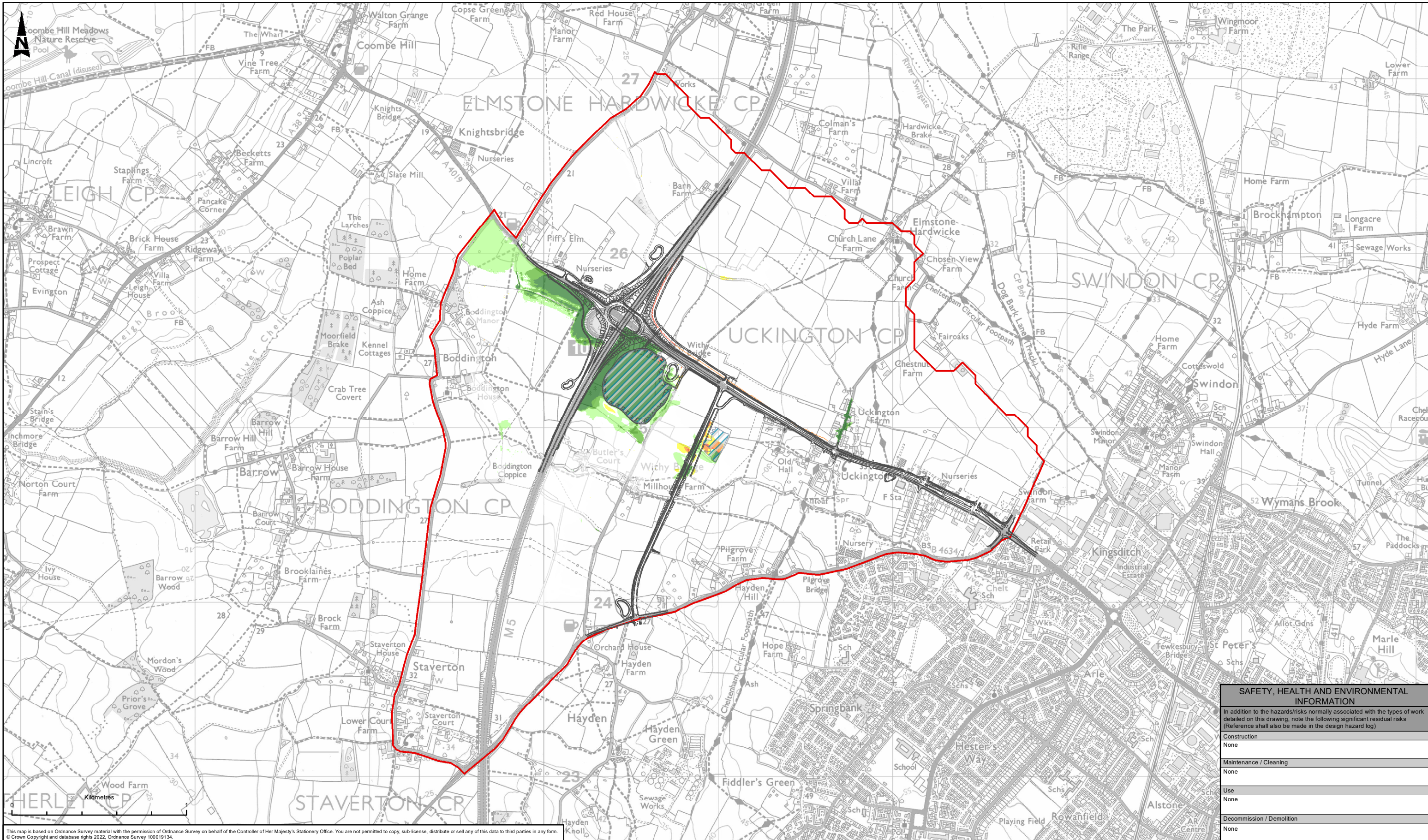
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| | |
|----------------|-------------------------------------------------------------------|
| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 5-5 1% AEP SCHEME FLOOD RISK DEPTH MAP - PRESENT DAY |
| Drawing Number | GCCM5J10 - ATK - EWE-ZZ - GS - GI - 000038 |
| Original Size | A3 |
| Scale | 1:20,000 |
| Project Ref | 5214106 |
| Sheet | 1 of 1 |
| Rev | P03 |



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In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log)

| | |
|---------------------------|------|
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

LEGEND

| | |
|--|--------------------|
| | SCHEME ALIGNMENT |
| | MODEL DOMAIN |
| | FLOOD STORAGE AREA |

FLOOD LEVEL DIFFERENCE

| | |
|--|----------------|
| | <-100 mm |
| | -50 to -100 mm |
| | -10 to -50 mm |
| | -10 to 10mm |
| | 10 to 50 mm |
| | 50 to 100mm |
| | >100 mm |

DIFFERENCE = WITH-SCHEME FLOOD LEVELS MINUS BASELINE FLOOD LEVELS. POSITIVE RESULTS INDICATE A DETRIMENT TO FLOOD LEVELS, WHILST NEGATIVE RESULTS INDICATE A BETTERMENT TO FLOOD LEVELS.

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
|-------------|--------|----------|-------|---------|----------|------------|------------|
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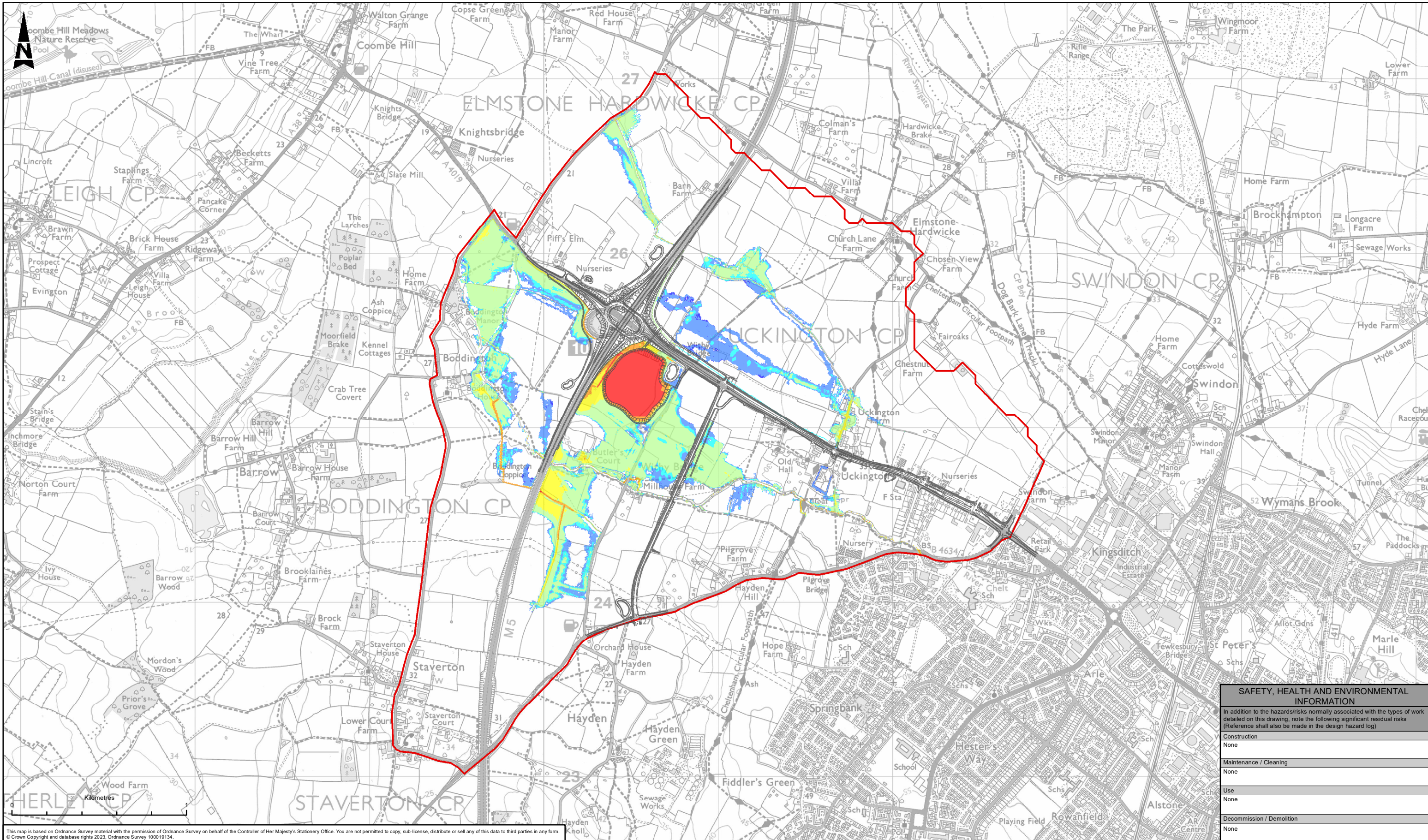
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| Project Title | M5 Junction 10 Improvements Scheme | | | | | | |
| Drawing Title | FIGURE 5-6 1% AEP LEVEL DIFFERENCE MAP - PRESENT DAY | | | | | | |
| Drawing Number | Project | Original | Volume | | | | |
| | GCCM5J10 - ATK - EWE | | | | | | |
| | ZZ - GS - GI - 000036 | | | | | | |
| Original Size | A3 | Scale | 1:20,000 | Project Ref | 5214106 | Sheet | 1 of 1 |
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LEGEND

| | |
|--|------------------|
| | MODEL DOMAIN |
| | SCHEME ALIGNMENT |

1 IN 100 YEAR + 53% CC DEPTH RESULTS

| | |
|--|---------------|
| | 0 - 10mm |
| | 10 - 50mm |
| | 50 - 100mm |
| | 100 - 500mm |
| | 500 - 1000mm |
| | 1000 - 2000mm |
| | > 2000mm |

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log)

| | |
|---------------------------|------|
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

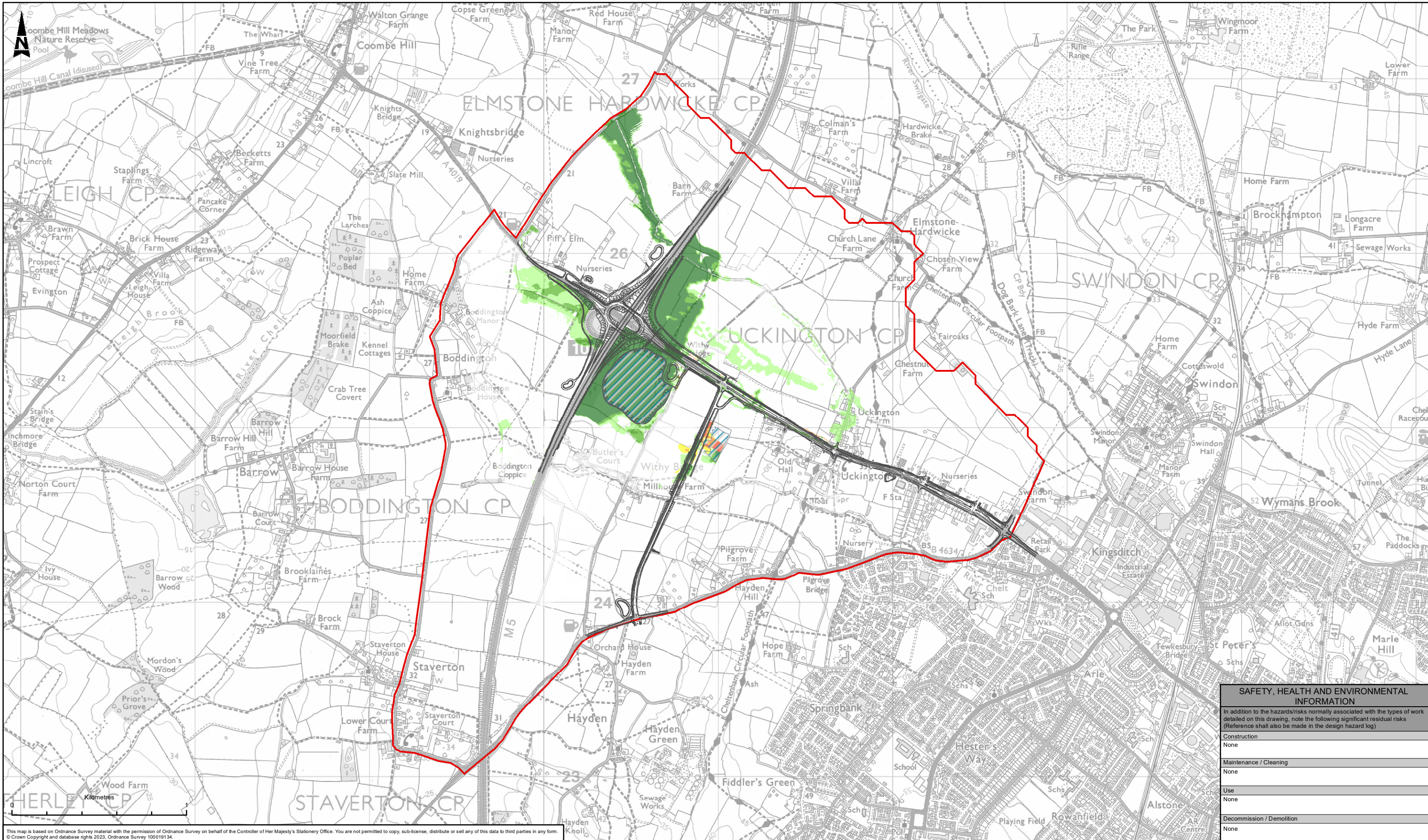
| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
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| PUBLISHED | A1 | P03 | JM | NJ | CC | TT | 03/07/23 |

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PROJECT INFORMATION

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| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 5-7 1% AEP SCHEME FLOOD RISK DEPTH MAP - FUTURE WITH 53% CLIMATE CHANGE |
| Drawing Number | Project: GCCM5J10 - ATK - EWE ZZ - GS - GI - 000039 |
| Original Size | A3 |
| Scale | 1:20,000 |
| Project Ref | 5214106 |
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| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log) | |
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| LEGEND | |
|--------|--------------------|
| | SCHEME ALIGNMENT |
| | MODEL DOMAIN |
| | FLOOD STORAGE AREA |

| FLOOD LEVEL DIFFERENCE | |
|------------------------|----------------|
| | <-100 mm |
| | -50 to -100 mm |
| | -10 to -50 mm |
| | -10 to 10mm |
| | 10 to 50 mm |
| | 50 to 100mm |
| | >100 mm |

DIFFERENCE = WITH-SCHEME FLOOD LEVELS MINUS BASELINE FLOOD LEVELS. POSITIVE RESULTS INDICATE A DETRIMENT TO FLOOD LEVELS, WHILST NEGATIVE RESULTS INDICATE A BETTERMENT TO FLOOD LEVELS.

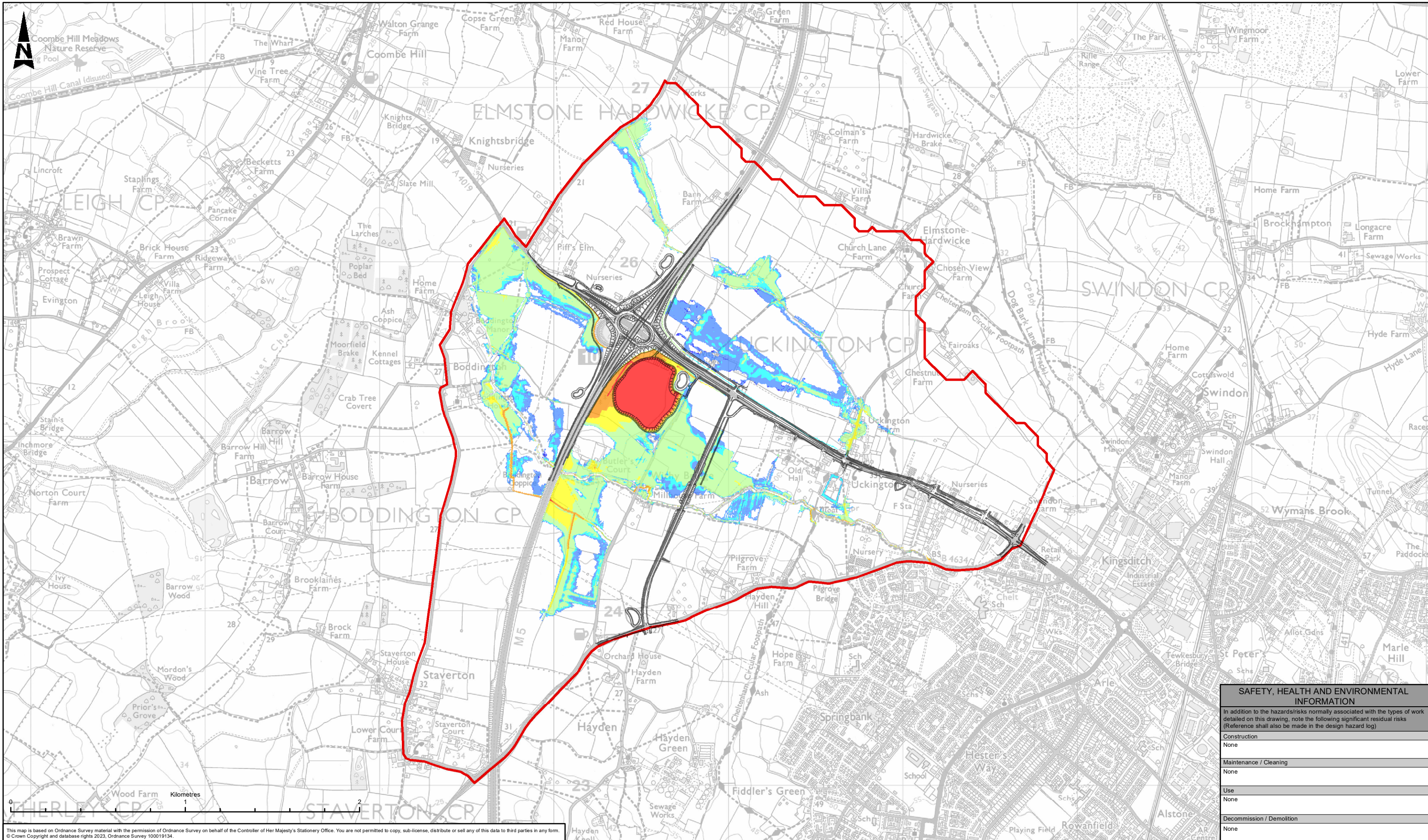
| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
|-------------|--------|----------|-------|---------|----------|------------|------------|
| PUBLISHED | A1 | P03 | SD | NJ | CC | TT | 17/07/23 |

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| | | | |
|-------------------|-----------------|-------------------------------------------------------------------------------|---------------------------|
| Project Title | | M5 Junction 10 Improvements Scheme | |
| Drawing Title | | FIGURE 5-8 1% AEP LEVEL DIFFERENCE MAP - FUTURE WITH 53% CLIMATE CHANGE | |
| Drawing Number | | GCCM5J10 - ATK - EWE ZZ - GS - GI - 000037 | |
| Original Size: A3 | Scale: 1:20,000 | Project Ref: 5214106 | Sheet: 1 of 1 Rev: P03 |



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| LEGEND | |
|--------|---------------|
| | MODEL DOMAIN |
| | 0 - 10mm |
| | 10 - 50mm |
| | 50 - 100mm |
| | 100 - 500mm |
| | 500 - 1000mm |
| | 1000 - 2000mm |
| | > 2000mm |

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log)

| | |
|---------------------------|------|
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
|-------------|--------|----------|-------|---------|----------|------------|------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

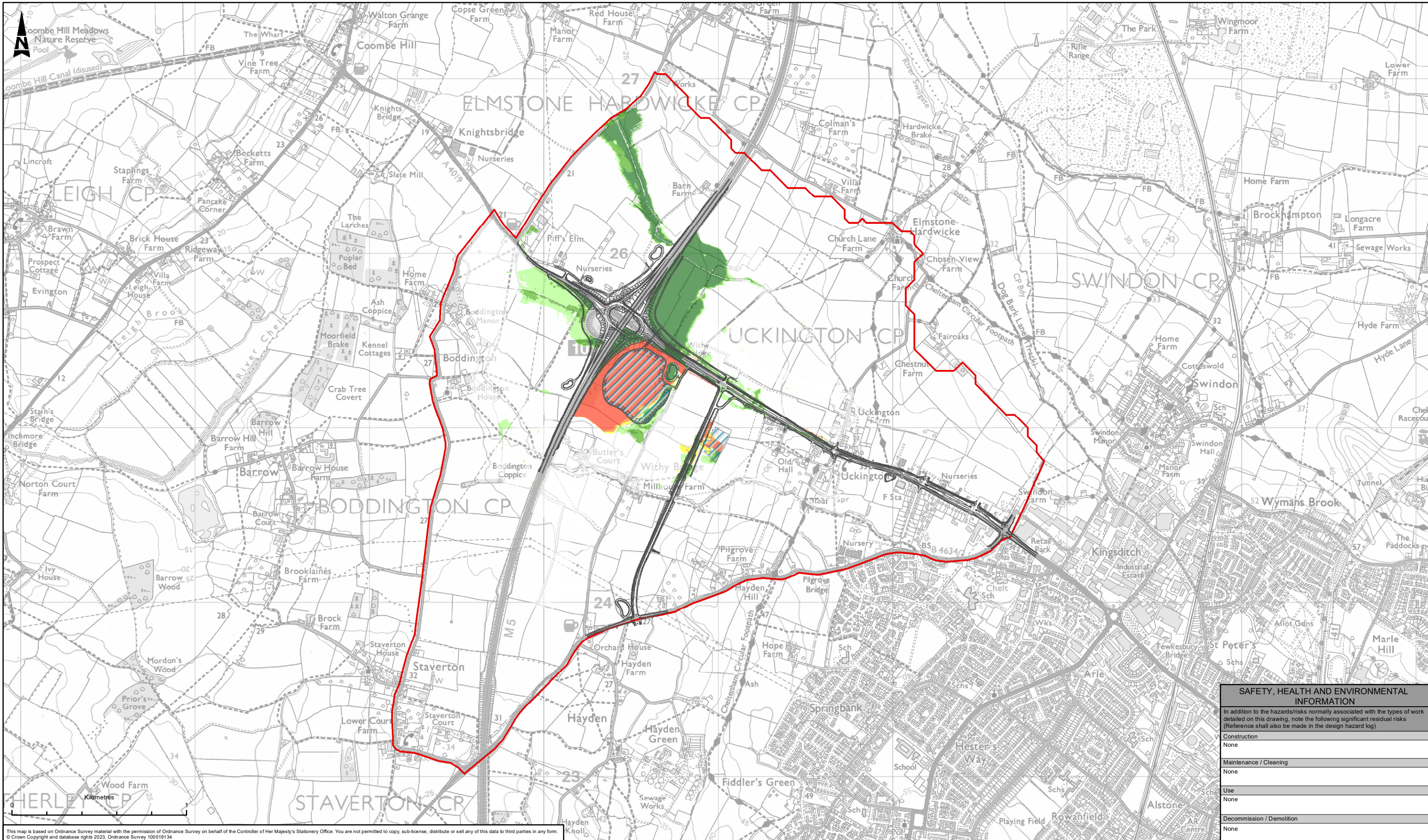
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| | |
|----------------|---------------------------------------------------------------------|
| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 5-9 0.1% AEP SCHEME FLOOD RISK DEPTH MAP - PRESENT DAY |
| Drawing Number | GCCM5J10 - ATK - EWE-ZZ - GS - GI - 000042 |
| Original Size | A3 |
| Scale | 1:20,000 |
| Project Ref | 5214106 |
| Sheet | 1 of 1 |
| Rev | P03 |



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| SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made in the design hazard log) | |
| Construction | None |
| Maintenance / Cleaning | None |
| Use | None |
| Decommission / Demolition | None |

| LEGEND | |
|--------|--------------------------------|
| | SCHEME ALIGNMENT |
| | MODEL DOMAIN |
| | FLOOD STORAGE AREA |
| | FLOOD LEVEL DIFFERENCE <100 mm |
| | -50 to -100 mm |
| | -10 to -50 mm |
| | -10 to 10mm |
| | 10 to 50 mm |
| | 50 to 100mm |
| | >100 mm |

| FLOOD LEVEL DIFFERENCE | |
|------------------------|----------------|
| | <100 mm |
| | -50 to -100 mm |
| | -10 to -50 mm |
| | -10 to 10mm |
| | 10 to 50 mm |
| | 50 to 100mm |
| | >100 mm |

DIFFERENCE = WITH-SCHEME FLOOD LEVELS MINUS BASELINE FLOOD LEVELS. POSITIVE RESULTS INDICATE A DETRIMENT TO FLOOD LEVELS, WHILST NEGATIVE RESULTS INDICATE A BETTERMENT TO FLOOD LEVELS.

| Description | Status | Revision | Drawn | Checked | Reviewed | Authorised | Issue Date |
|-------------|-----------|----------|-------|---------|----------|------------|------------|
| DESCRIPTION | PUBLISHED | P01 | SD | NJ | CC | TT | 18/07/23 |

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| | |
|-------------------|------------------------------------------------------------------------------------|
| Project Title | M5 Junction 10 Improvements Scheme |
| Drawing Title | FIGURE 5-10 0.1% AEP LEVEL DIFFERENCE MAP |
| Drawing Number | Project: GCCM5J10 - ATK - EWE Original: ZZ - GS - GI - 000044 Volume: 1 of 1 |
| Original Size: A3 | Scale: 1:20,000 Project Ref: 5214106 Sheet: 1 of 1 Rev: P01 |

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