REPORT

Sandsfield Gravel Company Ltd

Milegate Eastern Extension Quarry and Landfill

Flood Management Plan

Submitted to:

Sansfield Gravel Company Ltd
Brandesburton
Driffield
East Yorkshire
YO25 8SA

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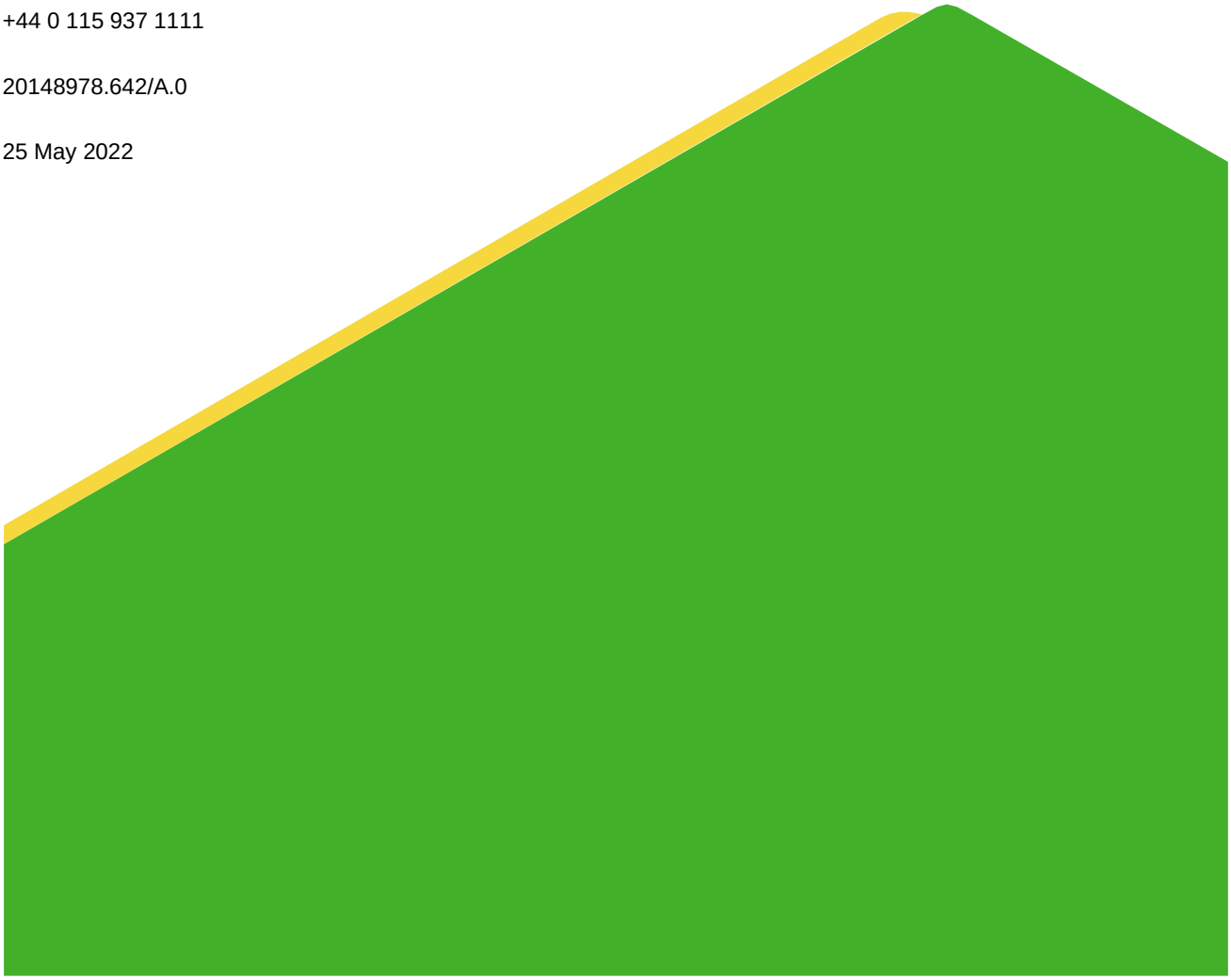

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1.0 INTRODUCTION

1.1 General

Sandsfield Gravel Company Ltd (Sandsfield) has requested Golder, member of WSP in UK (Golder), to update the Flood Management Plan (FMP) for its existing Milegate Extension Landfill at Catwick Lane, Brandesburton, Driffield, East Yorkshire YO25 8SA, for the proposed development of an Eastern Extension. This report presents an appraisal of the flood risk at the Site from various sources and proposed mitigation measures to manage the risk.

Sandsfield proposes to develop the existing operations, as follows:

- Allow continued and uninterrupted quarrying and landfilling operations to extend into the neighbouring field to the east (the 'Eastern Extension') which is currently in agricultural use. The Eastern Extension is proposed to be completed within the timeframe already permitted for the existing operations i.e. before February 2038;
- Gain planning approval for movement of the existing landfill flare from the southeast corner to the northwest corner of the existing site (January 2019) and upgrade of that flare (September 2021) (retrospective planning application); and
- Install a new landfill gas utilisation compound at the northwest corner of the existing site, in which there will be the phased installation of two new landfill gas-to-energy engines ('micro-generators') and associated equipment. The landfill gas flare will be moved into this compound. A new cable connection will be installed from the compound, extending northwest to a new step-down transformer, enabling the gas engines to generate electricity and supply a neighbouring business by private wire and the National Grid

1.2 Objectives

This FMP is prepared in support of both planning application and Environmental Permit variation application. The objective of this report is to update the FMP to reflect current operations, and the proposed development of the Site, for submission to East Riding of Yorkshire Council (ERYC) and the Environment Agency (EA). The Eastern Extension Quarry and Landfill will be engineered and managed in accordance with the principles already established at the existing Site.

2.0 SITE DETAILS

2.1 Site Location

The Site is located approximately 1 km southeast of the village of Brandesburton, East Yorkshire and is centred on National Grid Reference (NGR) N 513356, E 447229 (**Drawing FMP1 – Site Location Plan**). The Site is bound to the north by open fields and the Moor Main Drain, to the south and east by the Milldam Beck, and to the west by another landfill, Milegate Landfill (now closed).

Access to the Site is obtained from Catwick Lane via Sandsfield's Site reception and offices that serve the quarry and landfill operations, and the adjacent waste transfer station. The entrance has secure steel and mesh gates to prevent non-operational vehicle access, which also prevents unauthorised access to the quarry and landfill. The haul road leading from the reception to the quarry and landfill is constructed from hardcore.

2.2 Existing Site and Proposed Development

2.2.1 Existing Quarry and Landfill (Cells 1 to 8)

Excavation of sand and gravel at the Site commenced on 22 February 2000 and took place in a generally east to west direction. Additional sand and gravel was extracted from the Northern Extension area from 2018. The site covers an area of approximately 8.6 ha and consists of a void to an approximate depth of 10 m below ground level, equivalent to an elevation of -5.5 m above Newlyn Ordnance Datum (AOD) in the eastern part of the Site and -2.5 m AOD in the western part of the Site. The pre-existing and and surrounding Site topography falls from north to south towards the Milldam Beck.

Today, mineral extraction at the existing Site is substantially complete, apart from small areas around the base and sides in the northeast corner which will be removed as subsequent landfill cell preparation takes place.

Landfilling has taken place continuously since waste acceptance commenced in 2007. Filling began in Cell 1 and proceeded in a westerly direction through Cells 3, 5 and 7. Cell 8 was constructed to the north of Cell 7 in 2016, and landfilling has proceeded in an easterly direction through Cells 8 and 6. Cell 4 has been divided in Cells 4A and 4B. Cell 2 will also be divided into Cell 2A and 2B.

Today, Cells 1, 3, 5, 7 and 8 are filled, capped and restored; Cell 6 has been filled and awaits capping and restoration in 2022; Cell 4A was opened in October 2020 and Cell 4B was opened in January 2022; and Cells 2A and 2B await development.

The final expected restoration profile for the existing facility following filling and capping of the cells is shown on **Drawing FMP5**.

2.2.2 Proposed Eastern Extension

The quarry development proposal is for the continued and uninterrupted extraction of the sand and gravel reserve. The dimensions of the quarry excavation will be guided by the mineral reserve and as follows:

- A >10 m stand-off from the existing landfill Cell 1 to the west.
- A >12 m stand-off from the Moor Main Drain to the north and from the Milldam Beck to the east and south to protect the adjacent ground, stream, and provide room for edge protection bunds.
- Quarry sideslopes will be created at 1(v) in 1(h) in sand and gravel and 1(v) in 2(h) in clay materials.
- Mineral is expected to be absent in the northwest and northeast corners but will be extracted where present within the planning permission boundary.

The volume of sand and gravel is estimated at 400,000 m^3 or 640,000 tonnes (at 1.6 t/m^3).

The direction of working will be eastwards through the existing quarry sidewall in the area of Cells 2A and 2B, and then Sandsfield will ‘chase the mineral’ clockwise around the north end of the site and then southwards once a working face has been established across the full, west to east, width of the site. Extraction of mineral would commence upon receipt of both planning permission and Environmental Permit to ensure that both extraction of mineral and restoration by landfill can be achieved. Mineral would be extracted at a typical rate of 100,000 tonnes/annum currently proposed to start in 2023 and finish in 2030 (seven years).

Landfilling is proposed to start in Cell 9 in 2025 and finish in 2034 (nine years), followed by capping and restoration. The site will be worked progressively with the objective, as far as is operationally and economically practicable, of minimising the site area that is disturbed and unrestored at any one time.

It is proposed that the eastern edge of Cells 2A and 2B will comprise an intercell bund, to enable cell development to continue eastwards from about 2025 as a continued and uninterrupted operation. By that time, mineral extraction will be at a mid-stage of completion and landfill development will then progress systematically behind the mineral extraction operation with the development of Cells 9 to 14 in a generally clockwise and then north to south direction.

The total landfill void space for the existing Site is estimated as 1,247,280 m^3 (pre-settlement). Development of the Eastern Extension is estimated to provide an additional landfill void space of 0.82 Mm^3 (pre-settlement). Depending on the local geology found, if additional mineral reserves are exported, there will be a commensurate increase in waste void.

The Eastern Extension has an area of 8.4 ha of which Cells 9 to 14 form approximately 5.3 ha (**Drawing FMP4**).

2.3 Topography, Soils, Geology and Hydrogeology

The Site lies in an area of gently sloping land with original pre-quarrying ground elevations generally ranging from approximately 7 to 15 m AOD. Current ground levels on Site range from approximately 15 m AOD in the northern extent of the Site down to -5.5 m AOD at the base of the existing site void. Ground levels in the vicinity of the Site typically fall gently to the south and west towards the Milldam Beck which lies at an elevation of approximately 5 m AOD along the southern boundary.

The Site is shown on the British Geological Survey (BGS) website as underlain by Glaciofluvial deposits of Devensian Age, which are made up of sand and gravel with localised lenses of silt or clay. A layer of Glacial Till around 10 m thick lies beneath the sand and gravel at the Site. Underlying the superficial deposits is the Flamborough Chalk Formation. There are no records of faults or other major geological structures beneath the Site. The sand and gravel unit is comprised of three distinct layers: an upper sand unit (locally referred to as the Upper Sand) and a lower sand unit (locally referred to as the Lower Sand), separated by a thin discontinuous clay layer (locally referred to as Middle Clay).

The Site is not located within a designated groundwater source protection zone and does not immediately overlie a Principal Aquifer. The Agency has classified the superficial deposits as a Secondary A Aquifer which indicates these are permeable layers capable of supporting water supplies at a local rather than strategic scale. The deeper Chalk is classified as a Principal Aquifer.

Observations made by Sandsfield during extraction of sand and gravel and levels within groundwater monitoring boreholes suggest that groundwater present in the Lower Sand discharges into the existing voids. Measured groundwater levels from monitoring boreholes indicate that groundwater levels in the sand and gravel typically range between about +4 m AOD and -2 m AOD.

Groundwater elevations in monitoring boreholes installed in the Chalk are typically around 2 m AOD. Regional groundwater flow directions in the Chalk reported on the hydrogeological map for the area (1:100,000 scale IGS Hydrogeological Map Sheet 10 for East Yorkshire) are towards the east and southeast.

Historic groundwater monitoring at the existing site and at the adjacent restored Milegate Landfill has demonstrated that groundwater does not provide an important contribution to stream flow in the Milldam Beck. Groundwater within the Lower Sand layer lies below the bed level of the Milldam Beck, though groundwater perched on the Middle Clay layer may contribute to a minor amount of flow within the Beck during times of high groundwater recharge.

2.4 Local Hydrology and Drainage

The Site lies within the catchment of the Milldam Beck, which forms the southern boundary of the Milegate Extension Landfill and flows towards the west. The Beck also forms the eastern boundary of the proposed Eastern Extension, where it flows towards the south (**Drawing FMP2**). The bed of the Milldam Beck at the southeastern corner of the Milegate Extension Landfill lies at an elevation of approximately 5.0 m OD and falls to approximately 4.5 m OD at the southwestern corner of the Site.

Observations made of the Beck indicate it flows during the winter months and tends to run dry during the summer months. Flow in the summer months occurs only after significant rainfall events. These observations indicate that the Beck is supported by surface water run-off rather than by being supported by groundwater base flow. Flow in the Milldam Beck was measured on one occasion in 2001 as approximately 24 l/s.

The Milldam Beck is fed by the Moor Main Drain, which forms the northern boundary of the Eastern Extension and itself is likely to be supported by surface water run-off from East Field airfield located north of the Site. The Moor Main Drain discharges to the Milldam Beck in the northeast corner of the Site. The Milldam Beck discharges approximately 600 m southwest of the Site to the New Drain (also called the Catfoss Drain and Carr Dike in its upper reaches).

South beyond the Milldam Beck, a number of recreational fishing ponds exist, which are flooded sand and gravel workings.

3.0 FLOOD RISKS

3.1 Potential Sources of Flooding

Potential sources of flooding are summarized in Table FMP1.

Table FMP1: Potential Sources of Flooding to the Site

Type of Flooding	Further Consideration Required?	Comments
Fluvial	Yes	The Existing Site is shown on published Environmental Agency maps to lie partially within Flood Zone 2 and 3 (1) floodplain of the Milldam Beck. Based on Envirocheck - Landmark flood map (2), the Eastern Extension landfill is shown as not being impacted by fluvial flooding, however, partial potential impact from Flood Zone 2 and 3 * is shown on the quarry area outside the proposed landfill area.
Tidal	No	The Site is not located near any tidal influences.
Surface Water Run-off	Yes	Based on Envirocheck - Landmark surface water flood maps, the landfill area withing the Eastern Extension is shown as not being impacted by surface water flooding, however, partial potential impact from surface water flood impact is shown on the northeastern corner of mineral extraction area outside the proposed landfill area. Nevertheless, there is a need to ensure that any existing surface water flood risk and potential changes to the run-off regime during the development of the Site are appropriately managed.
Impounded Water Bodies	No	Several lakes and ponds are located to the southeast of the Site; however, there are no known raised water bodies within a 1 km radius of the Site which could pose a possible residual risk of flooding due to catastrophic failure.

Type of Flooding	Further Consideration Required?	Comments
Groundwater	Yes	The excavated void within the Site is at risk from groundwater flooding as its base elevation is below ground water levels; however, underlying soils of the area consist of sand and gravel which allows for good Site drainage above the water table.
Pluvial	Yes	Based on Envirocheck - Landmark pluvial flood maps, the landfill area withing the Eastern Extension is shown as not being impacted by pluvial flooding; however, partial potential impact is shown on the northeastern corner of mineral extraction area outside the proposed landfill area. Nevertheless, there is a need to ensure that any existing pluvial flood post-development of the Eastern Extension are appropriately managed as part of the proposed site restoration plan.
(1) Flood Zone 2 (Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 100 and 1 in 1,000 annual probability of flooding i.e. between 1% AEP to 0.1% AEP). Flood Zone 3 (Land having a 1 in 100 or greater annual probability of flooding i.e. 1% AEP or greater) (2) See Appendix FMP2 for Envirocheck- Landmark flood maps		

The flooding identified as requiring further consideration within **Table FMP1** is discussed within Sections 3.2 to 3.4.

3.2 Fluvial Flood Risk

3.2.1 Fluvial Flood Risk at the Existing Site (Cells 1 to 8)

The southern and eastern part of the existing Site lies within the indicative 0.1% Annual Exceedance Probability (AEP) flood plain of the Milldam Beck as indicated on user-generated flood map for the site from the EA Flood Map for Planning Agency website as shown in **Drawing FMP6** (aligns with Envirocheck EA/NRW Flood Data Map, Sheet 1 of **Appendix FMP2**).

The flood extent map in **Drawing FMP6** indicates possible flood inundation of Cells 1, 3, 2A, 2B and 4A, partially falling within Flood Zone 2 and 3. Permitting for the existing site, based on previous discussion with the Agency in November 2005, has accounted for fluvial flood risk from Milldam Beck, with mitigations designed to prevent ingress of specified events to the operational voids.

The final restoration elevation of the Site adjacent to the Beck will be similar to the pre-development ground level and no flood plain compensation is expected to be required on Site.

Further information on proposed flood risk mitigation during different development stages are discussed in Section 4 of this report.

3.2.2 Fluvial Flood Risk at the Proposed Eastern Extension (Cells 9 to 14)

This proposed Eastern Extension of the development is not at risk of fluvial flooding during the 0.1% AEP and higher probability events. The new landfill lies within Flood Zone 1 which is low probability of flooding i.e. less than 0.1% AEP as indicated on Envirocheck - Landmark flood map (See **Appendix FMP1**, Sheet 1). However, the proposed mineral extraction area between the landfill boundary and Moor Main Drain and Milldam Beck River is subject to potential flood inundation by Flood Zone 2 and 3 at the northeast corner of proposed extension area, were it to be developed fully to the indicated boundary. Section 4.0 of this report will discuss proposed mitigation measures for this part of the site.

3.3 Surface Water Flood Risk (proposed Eastern Extension)

3.3.1 General

Potential changes to the run-off regime during development of the Eastern Extension and upon completion requires appropriate management to ensure there is no increase in surface water flood risk due to the development. An assessment of surface water run-off regimes for pre-development, extension site operations and for post-development scenarios during a 1% AEP rainfall event plus 40% climate change allowance is provided in the following sections.

3.3.2 Pre-development

The Eastern Extension as it stands, prior to any proposed development, is a Greenfield site comprising agricultural land. A pre-development mean annual Greenfield run-off rate of 2 litres/second/hectare was estimated for the combined Site (8.4 ha) using the IH124 Methodology (calculations presented in **Appendix FMP1**) as implemented by HR Wallingford using their online greenfield assessment tool. Pre-development Site topography shows relatively higher levels in the centre of the site (between proposed Cell 11 and 14) which then fall gently towards the Moor Main Drain at the north and to the Milldam Beck east and south of the site boundary with surface water run-off discharging directly into these two streams.

3.3.3 Operational

The HR Wallingford greenfield assessment tool was used to assess the maximum increase in run-off for the 1% AEP storm event during operations as a result of the development of mineral extraction/landfill site extension. Flood Estimation Handbook (FEH) 2013 rainfall data was used to generate rainfall depths for the Site. A run-off coefficient of 90% has been applied in estimating runoff arising from the post restoration cells in the extension area within the calculations, which accounts for the impermeable capping layer.

The assessment has been undertaken for each operational phase of the development as each cell is progressed (**Drawing FMP4**). The combined Site catchment area of 8.4 ha was adopted for the surface water assessment of site during operations.

The run-off volumes estimated for each phase can be offset against the total available void space within the Site where drainage paths allow routing into the void. More than adequate temporary storage is available within the void to store flood water during a 1% AEP rainfall event during all operational phases (**Drawing FMP4**).

At commencement of landfilling at the final cell at the extension Site, the increase in post-development run-off will need to be temporarily stored on Site. This temporary storage within the void area will need to provide for a maximum volume of 5,490 m³ equivalent to 1% AEP attenuation requirement; this includes potential runoff from the entire 8.4 ha combined site and is thus conservative. Calculations for attenuation storage requirement during operations provided in **Appendix FMP1**.

3.3.4 Post-development

An increase in run-off from the post-development Site could lead to increased flows within the Milldam Beck and raise the risk of flooding in the downstream river catchment. The HR Wallingford calculation tool was used to estimate the maximum increase in post-development run-off for the 1% AEP, 24-hour storm event including an allowance for climate change. A storm event with 24-hour duration results in the largest storage volume requirements post-development. An additional 40% rainfall depth has been allowed for the post-development surface water estimates to accommodate future climate change (upper end Climate change scenario) as per Environmental Agency Guidelines. A conservative assumption regarding the percentage of drained area that is impermeable of 70% has been applied for the post-development Site, accounting for the low permeability capping.

At completion of Site restoration, the increase in post-development surface water run-off above the pre-development run-off rate will need to be temporarily stored on Site. This temporary storage will need to provide for a volume of 6,430 m³ across the combined site during a 1% AEP, 24-hour rainfall event, including 40% allowance for climate change.

Mitigation measures to store the increase in surface water run-off from the Eastern Extension are further discussed in Section 4.2.3.

3.4 Groundwater Flood Risk

Groundwater borehole records for the existing Site indicate that the base of the extension site void is located below normal groundwater level. Therefore, there is a risk of groundwater seepage into the open void area leading to flooding up to a level equivalent to the groundwater elevations on Site. However, the inflow rate of groundwater into the void will be reduced as a low permeability engineered clay liner is constructed for each cell and is to be managed through installation of a perimeter backdrain around the base of the active cells. The consequence of groundwater flooding to the void is considered to be minor and would only lead to possible delays to operations within the flooded areas. Potential basal instability caused by floor heave is considered as part of the engineering design.

4.0 FLOOD RISK MANAGEMENT AND MITIGATION

4.1 Fluvial Flood Risk Mitigation

4.1.1 Pre-development

The Eastern Extension area is currently used for agricultural purposes. No fluvial flood mitigation is in place at the Site due to the minor impacts of flooding to agricultural land.

At the adjacent, currently operating landfill site, discussions with the Environmental Agency prior to landfill development did not raise major regulatory concerns with flood risk as per Environmental Permit EPR/BX1942IX.

4.1.2 Extension Site Operations

Existing Site Cells 1 to 8

Mitigation measures which were installed to protect the existing site operational areas during development include flood bunds to a minimum level of 8.5 mAOD, designed to prevent ingress from the Mildam Beck. These bunds are to be removed prior to commencement of operations of the Eastern Extension.

Eastern Extension Site Cells 9 to 14

For the new site extension, the flood bund is to be constructed along the development edge adjacent to the designated flood extent of the Moor Main Drain and Milldam Beck stream to maintain the minimum freeboard along the development boundary (see **Drawing FMP4**). The minimum height above ground level for the bund surrounding the extension site shall be a 1.0 m, specified nominally and to be confirmed prior to construction.

4.1.3 Post-development

Following filling and capping of the landfill, the site will be restored to pre-settlement, post-restoration levels. The Site will be restored to grassed agricultural land and will not require any specific fluvial flood mitigation. Surface water will be captured and directed from the Site to the surface water attenuation ponds. This is further discussed in Section 4.2.3.

4.2 Surface Water Flood Risk Mitigation

4.2.1 Pre-development

The Eastern Extension has been used for agricultural purposes and no surface water management is in place with runoff discharging directly to the Milldam Beck overland.

During gravel extraction from the existing site, surface water run-off has been collected at the base of the active excavated void where it was pumped to the surface water settlement ponds prior to discharge to the Milldam Beck.

4.2.2 Extension Site Operations

Existing Site: Cells 1 to 8

The current surface water management allows for run-off to be temporarily stored and attenuated during landfill operations. There is an existing gravity drainage system within the landfill that allows surface water run-off to be captured in shallow open channels and directed towards the open void which acts as a temporary attenuation sump. From the voids, surface water is subsequently pumped out of the void to the existing surface water settlement ponds prior to discharged into the permitted discharge point, as per Environmental Permit EPR/BX1942IX.

Eastern Extension Site: Cell 9 to 14

Surface water management at the Eastern Extension to mitigate the increase in run-off during development will be in line with the approach taken and permitted at the existing site. During operations, surface water run-off will be allowed to temporarily pond within the quarry / undeveloped landfill areas and being effectively attenuated prior to discharge. It is proposed to allow for surface water run-off from areas adjoining the active cell to flow by gravity in shallow open channels, directed towards the open void. The accumulated surface water volume within the void will be pumped to a new proposed open ditch, draining from east to west along the northern perimeter of the development. The starting point of the proposed ditch will be adjacent to the northwest corner of Cell 9 and will flow by gravity and tie into the existing gravity ditch of the surface water management for the existing Site (Cell 1 to 8), as per the permitted work in the existing site described previously.

4.2.3 Post-development

A surface water collection channel is to extend clockwise around the Eastern Extension alongside the Moor Main Drain and Milldam Beck stream, constructed during operations as cells are progressively closed and restored. This channel will be retained following post-development as discussed in Section 4.1.2. The channel will collect all surface water runoff from the Eastern Extension and direct it to the proposed attenuation storage area which will cater for up to 1% AEP plus 40% climate change allowance. The channel in itself will provide limited attenuation storage due its relative steep slope which will not allow for it to act as part of the live attenuation. Therefore, the required storage volume of 6,430 m^3 (as discussed in Section 3.3.2.3) will be provided in the new proposed attenuation pond with a separate post-development discharge point to the Milldam Beck (see **Drawing FMP5**). This discharge and attenuation storage will be in addition to the permitted discharge (i.e. as per existing operations) and post-development attenuation pond, located to the west of the existing site. Attenuation storage calculations for the post-development scenario are provided in **Appendix FMP1**.

4.3 Groundwater Flood Risk Mitigation

Groundwater flood risk within the Eastern Extension is intended to be managed during landfill operations by use of dewatering techniques, in line with the approach adopted for the existing development. This is expected to take the form of in-void perimeter drains discharging to sumps and sump dewatering using Site pumps. Water will be pumped to the surface water settling ponds located within the southern area of the Site.

In the unlikely event of total dewatering pump failure, groundwater ingress into the void as pumped groundwater levels rebound, could be expected. However, there would be no adverse groundwater flood risk to the Site as (static) groundwater levels are located below surrounding ground elevations. Quarry and landfill operations within the flooded area of the void may be affected until dewatering operations can be continued.

5.0 CONCLUSION

Pre-development, the Eastern Extension comprises agricultural land where surface water run-off from the Site is discharged directly to the Milldam Beck.

In line with the permitted approach to water management and flood risk at the existing site to the west, during landfill development, flood risk from surface water and groundwater sources will be managed on Site in a phased manner. As mineral extraction works proceed and landfill cells are progressively constructed, surface water will be captured within the excavated void space where it will infiltrate to groundwater or be pumped to a settlement pond prior to discharge to the Milldam Beck via the same outlet used for existing operations, in accordance with existing EP requirements.

To protect against fluvial flood risk during the proposed development, a flood bund should be constructed to a minimum elevation of 8.5 m AOD along the southern boundary of the Site. This will provide a 3.5 m freeboard above the normal water level within the Milldam Beck.

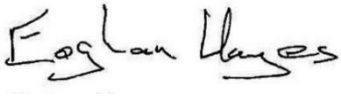
Groundwater flood risk is limited to the void space within the Site and can be adequately managed using an on-site dewatering system during operations.

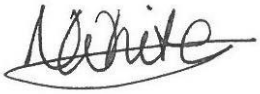
Prior to construction of the final cell in the development (Cell 14), surface water attenuation ponds should be provided to accommodate the 1% AEP rainfall event plus climate change allowance for the Site, which will then discharge to the Milldam Beck. A surface water channel should be retained around the eastern and northern perimeter of the Site to capture all run-off within the Site and divert this to the attenuation ponds.

The flood mitigation measures discussed within this FMP will adequately mitigate the impact of the proposed Eastern Extension development during both operational and post-development phases.

Signature Page

Golder WSP





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Project Manager

Date: 25 May 2022

SE/EH/NW/ab

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At WSP House, 70 Chancery Lane, London, WC2A 1AF
VAT No. 905054942

DRAWINGS

Drawing FMP1: Site Location Plan

Drawing FMP2: Site Locality and Drainage Plan

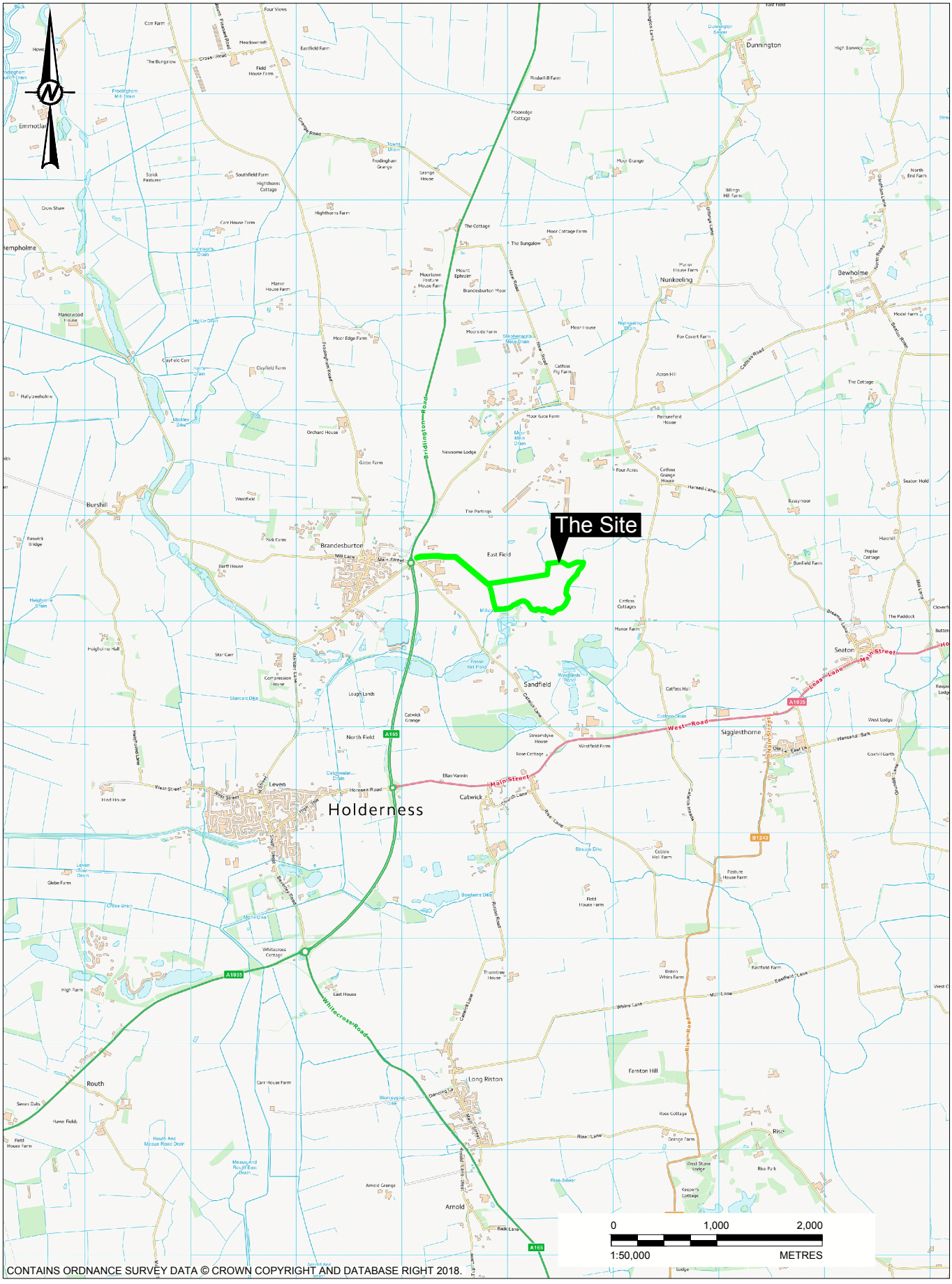
Drawing FMP3: Pre-development Plan

Drawing FMP4: During-development Surface Water Management Plan

Drawing FMP5: Post-development Plan

Drawing FMP6: Environment Agency Flood Map

Drawing ES5.3: Topographic Survey



CLIENT
SANDSFIELD GRAVEL COMPANY LTD

PROJECT
EASTERN EXTENSION FLOOD MANAGEMENT PLAN

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

TITLE
SITE LOCATION PLAN

PROJECT NO.	CONTROL	REV.	DRAWING
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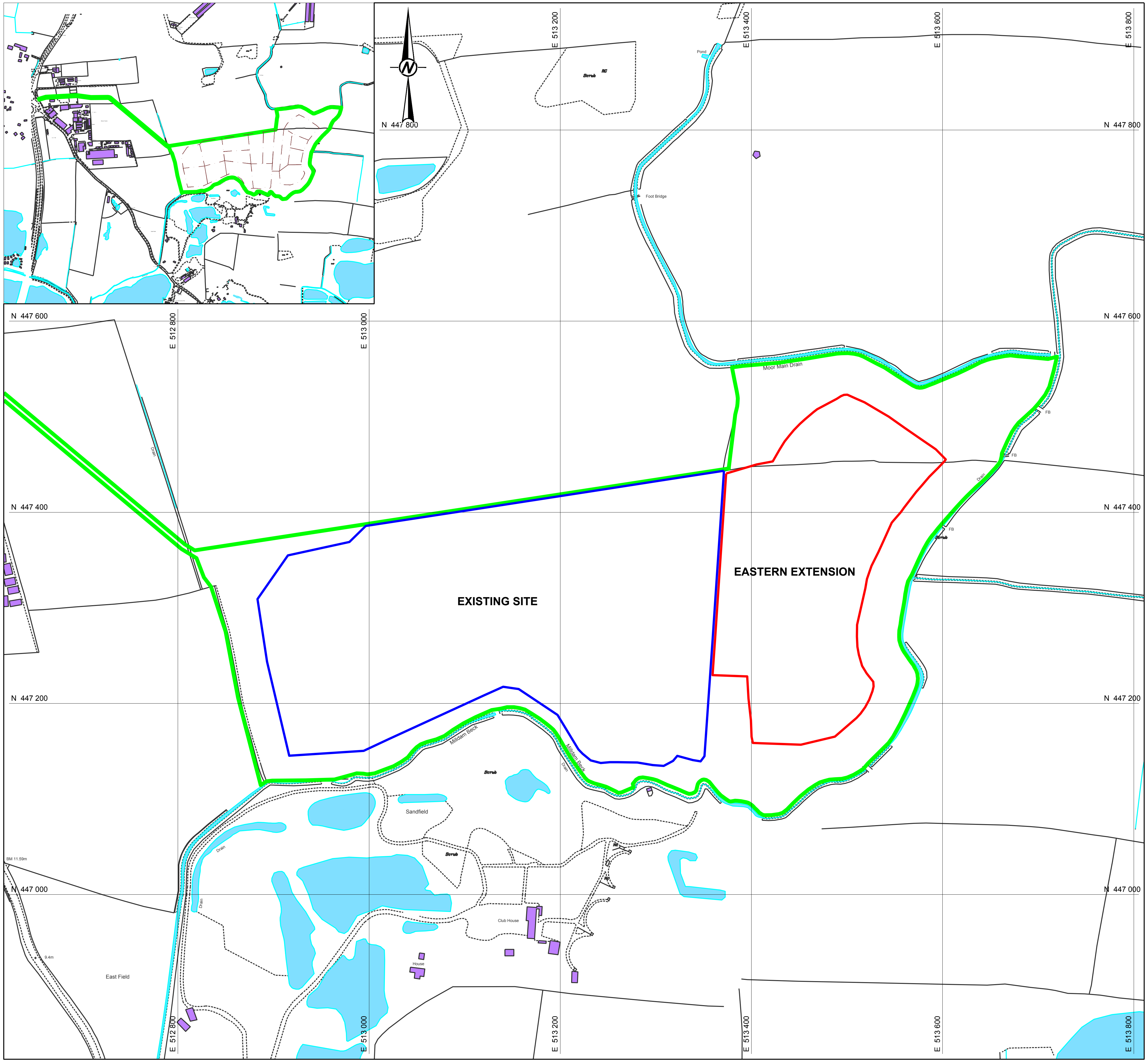

LEGEND

- ENVIRONMENTAL PERMIT BOUNDARY
- CELL BOUNDARY
- EXISTING LANDFILL
- LANDFILL EXTENSION
- SURFACE WATER FEATURE
- BUILDING

REFERENCE(S)

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CLIENT
SANDSFIELD GRAVEL COMPANY LTD

PROJECT
EASTERN EXTENSION FLOOD MANAGEMENT PLAN

TITLE
SITE LOCALITY AND DRAINAGE PLAN

CONSULTANT
WSP GOLDER

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PREPARED	ECS
REVIEWED	NW
APPROVED	NW

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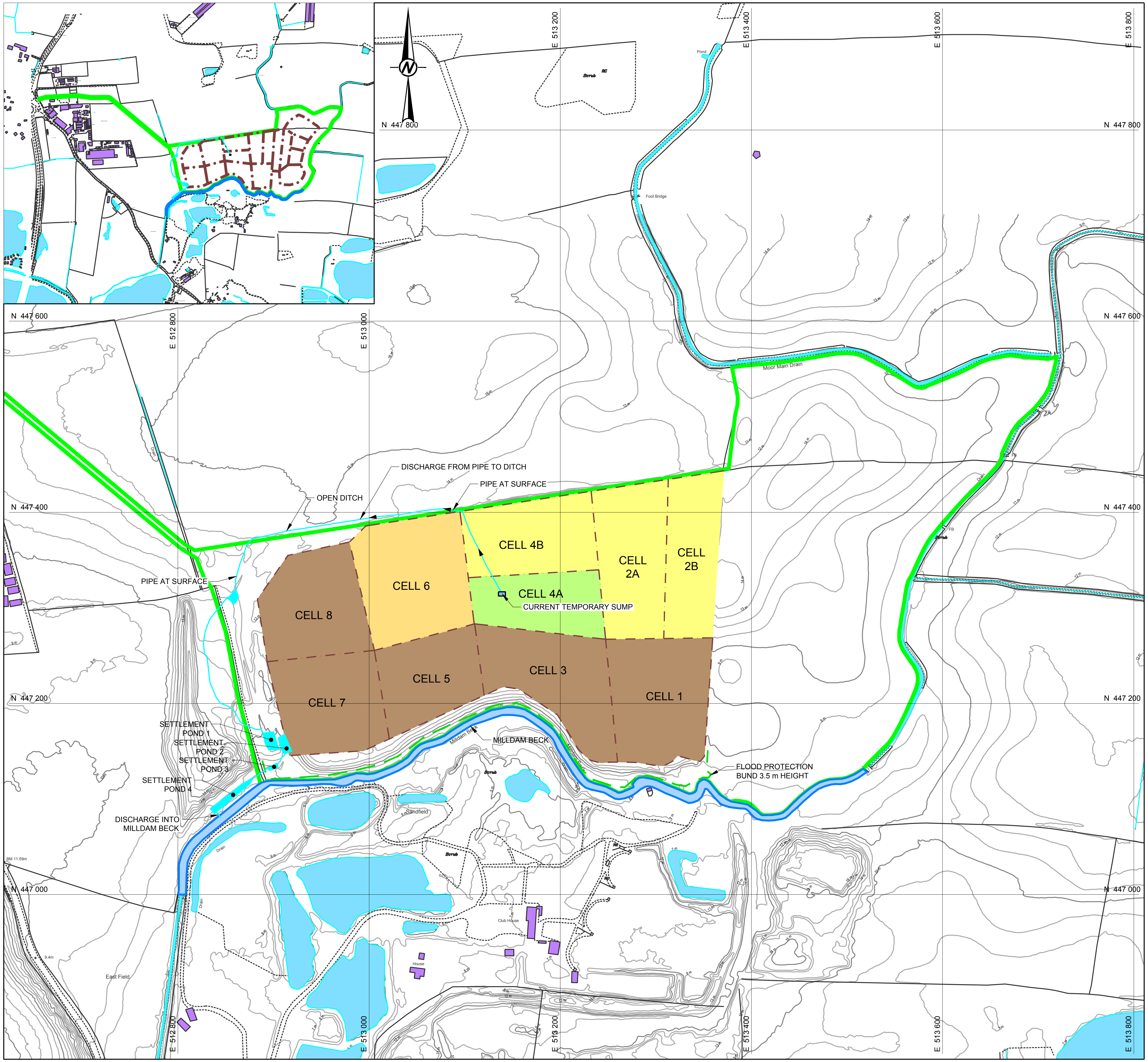

LEGEND

- AND ENVIRONMENTAL PERMIT BOUNDARY
- CELL BOUNDARY
- RESTORED LANDFILL
- CURRENT LANDFILL
- FILLED AND UNRESTORED LANDFILL
- FUTURE LANDFILL
- SURFACE WATER FEATURE
- BUILDING

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PROJECT
EASTERN EXTENSION FLOOD MANAGEMENT PLAN

TITLE
PRE-DEVELOPMENT PLAN

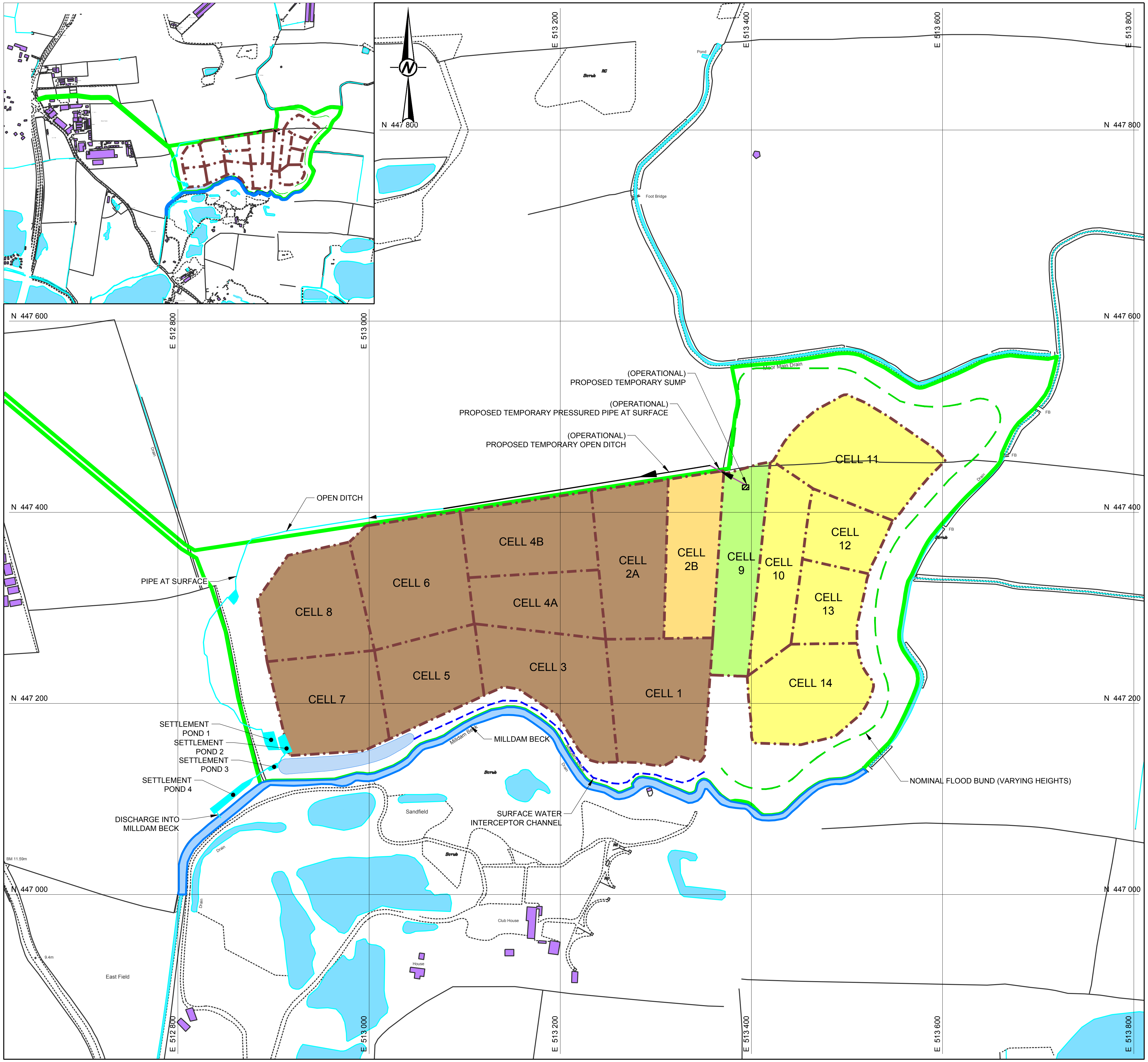
CONSULTANT
wsp GOLDER

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

PROJECT NO.	CONTROL	REV.	DRAWING
20148978	1008-FM-0003	A	FMP3

25 mm

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3



LEGEND

- AND ENVIRONMENTAL PERMIT BOUNDARY
- CELL BOUNDARY
- RESTORED LANDFILL
- CURRENT LANDFILL
- FILLED AND UNRESTORED LANDFILL
- FUTURE LANDFILL
- SURFACE WATER FEATURE
- BUILDING

REFERENCE(S)

SURROUNDING TOPOGRAPHY REPRODUCED FROM ORDNANCE SURVEY® DIGITAL MAP DATA © CROWN COPYRIGHT 2003. ALL RIGHTS RESERVED.

0 100 200
1:4,000 METRES

CLIENT
SANDSFIELD GRAVEL COMPANY LTD

PROJECT
EASTERN EXTENSION FLOOD MANAGEMENT PLAN

TITLE
OPERATIONAL EXTENSION SURFACE WATER MANAGEMENT PLAN

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

PROJECT NO.	CONTROL	REV.	DRAWING
20148978	1008-FM-0004	A	FMP4

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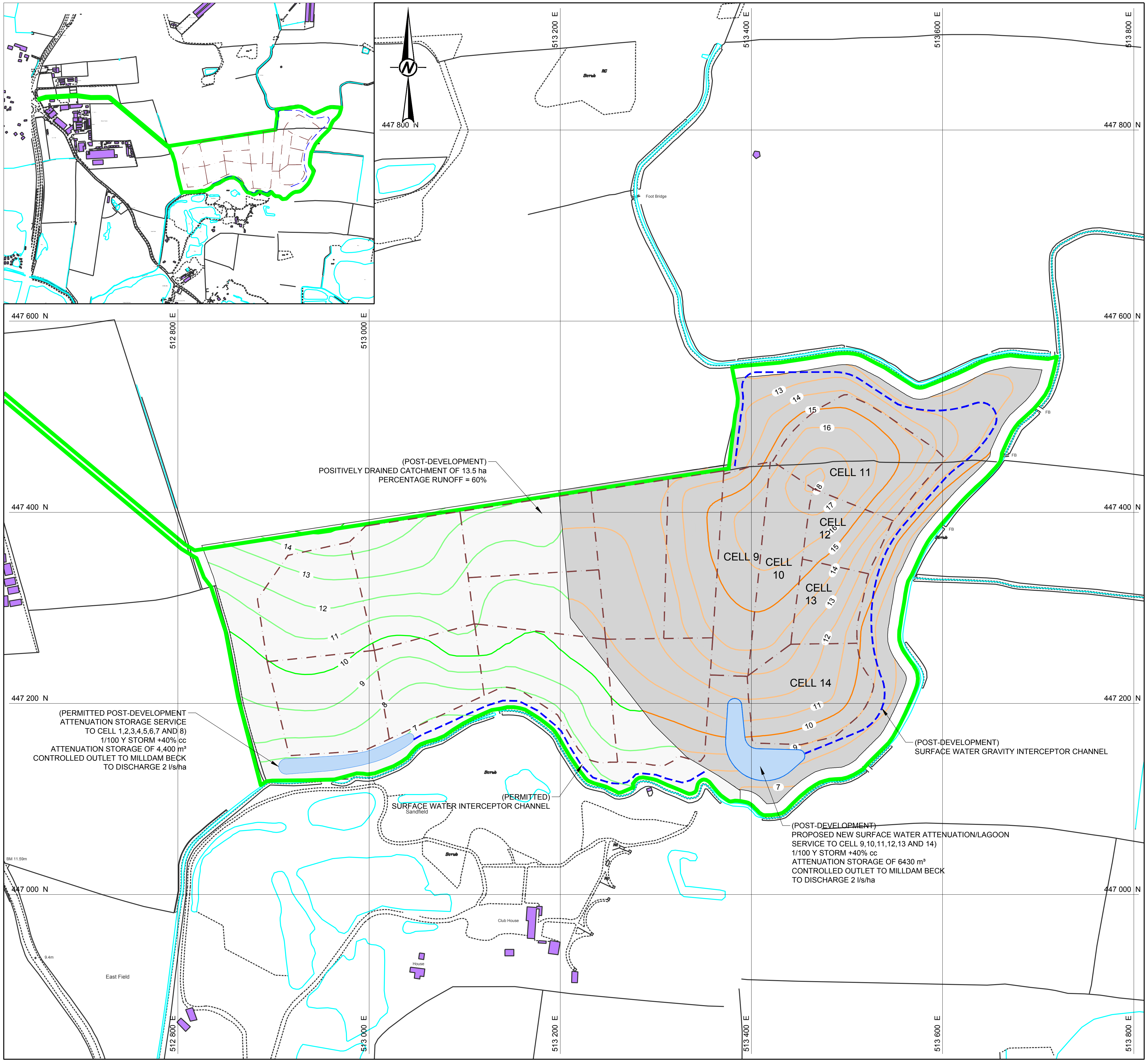


LEGEND

- AND ENVIRONMENTAL PERMIT BOUNDARY
- CELL BOUNDARY
- BUILDING
- EXISTING PERMITTED RESTORATION PROFILE (POST SETTLEMENT, POST RESTORATION)
- PROPOSED RESTORATION PROFILE (POST SETTLEMENT, POST RESTORATION)

NOTE(S)

1. ALL LEVELS RELATIVE TO NEWLYN ORDNANCE DATUM.

REFERENCE(S)

SURROUNDING TOPOGRAPHY REPRODUCED FROM ORDNANCE SURVEY® DIGITAL MAP DATA © CROWN COPYRIGHT 2003. ALL RIGHTS RESERVED.

EXISTING FINAL RESTORATION SCHEME PROVIDED BY DJM WASTE MANAGEMENT CONSULTANCY, DRAWING REF: 02/01/005, DATED 08.05.02. EXTENSION BY GOLDER ASSOCIATES.

0 100 200
1:4,000 METRES

CLIENT
SANDSFIELD GRAVEL COMPANY LTD

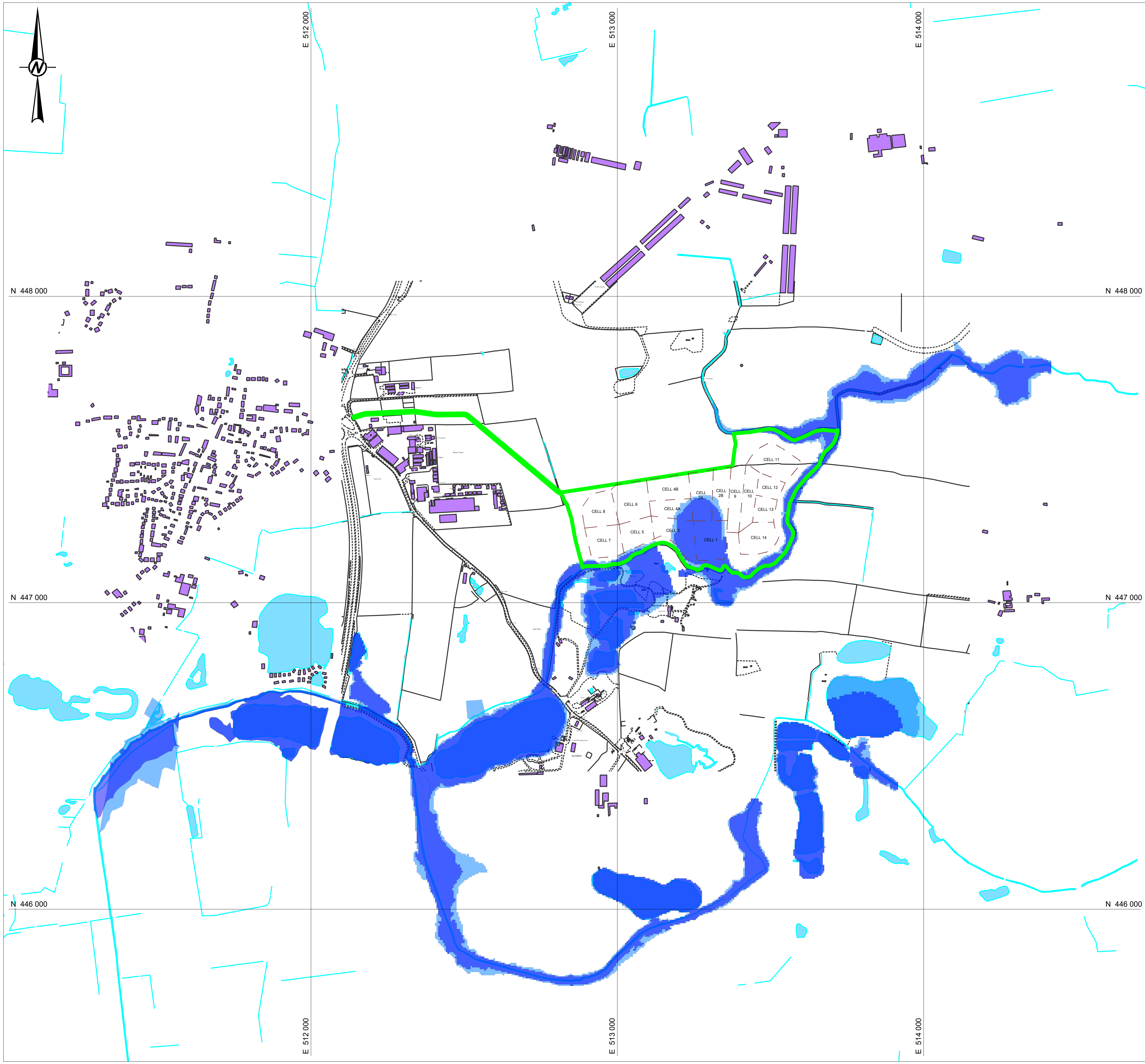
PROJECT
EASTERN EXTENSION FLOOD MANAGEMENT PLAN

TITLE
POST-DEVELOPMENT PLAN

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

PROJECT NO.	CONTROL	REV.	DRAWING
20148978	1008-FM-0005	A	FMP5



LEGEND

	FLOOD ZONE 2 (LAND HAVING BETWEEN A 1 IN 100 AND 1 IN 1,000 ANNUAL PROBABILITY OF RIVER FLOODING; OR LAND HAVING BETWEEN A 1 IN 200 AND 1 IN 1,000 ANNUAL PROBABILITY OF FLOODING)
	FLOOD ZONE 3 (LAND HAVING A 1 IN 100 OR GREATER ANNUAL PROBABILITY OF FLOODING)

0 250 500

1:12,500 METRES

CLIENT
SANDSFIELD GRAVEL COMPANY LTD

PROJECT
EASTERN EXTENSION PLANNING APPLICATION

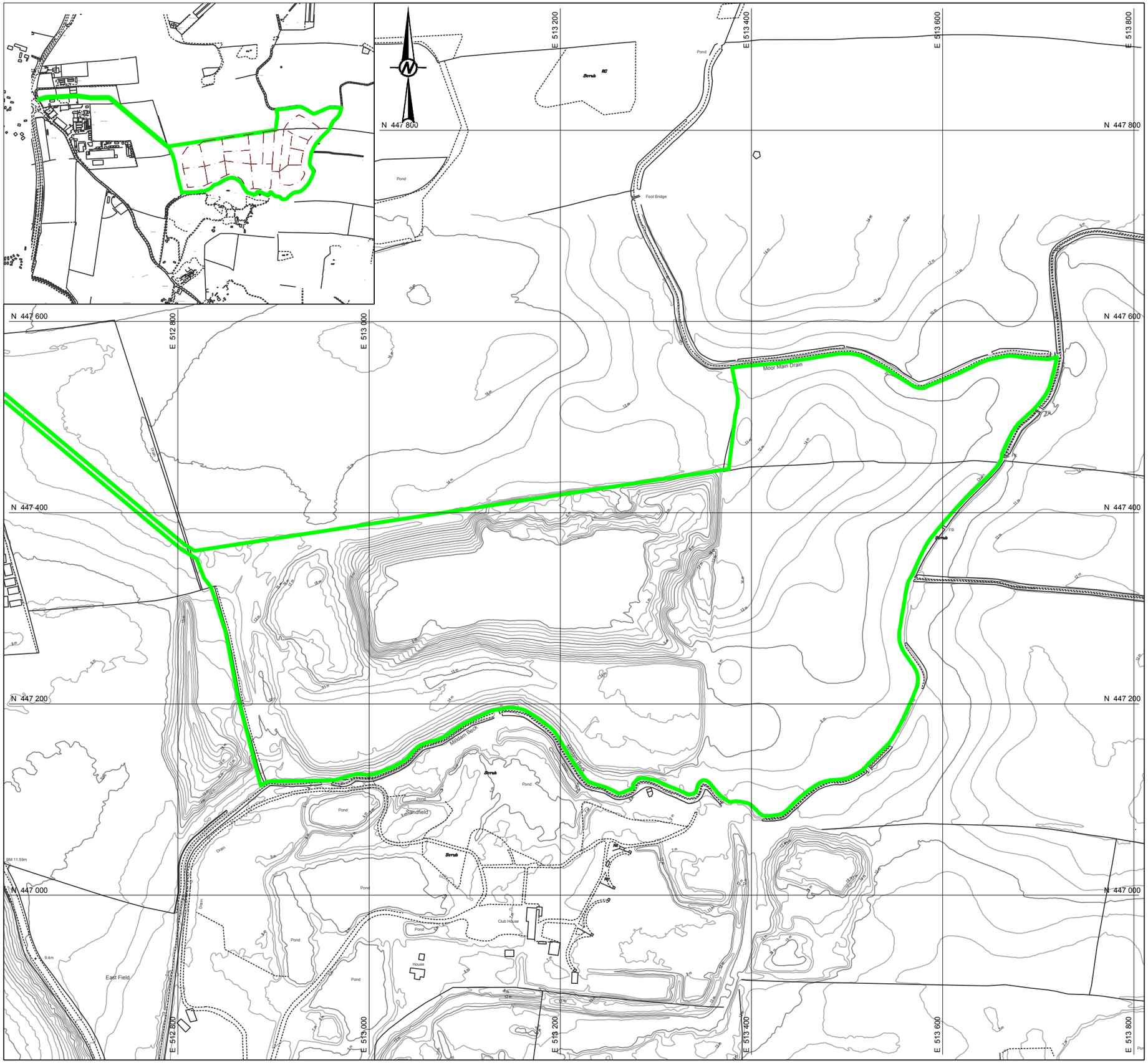
TITLE
ENVIRONMENT AGENCY FLOOD MAP

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

PROJECT NO.	CONTROL	REV.	FIGURE
20148978	1002-PA-0006	A	FMP6



LEGEND

ENVIRONMENTAL PERMIT BOUNDARY

REFERENCE(S)

SURROUNDING TOPOGRAPHY REPRODUCED FROM ORDNANCE SURVEY® DIGITAL MAP DATA © CROWN COPYRIGHT 2003. ALL RIGHTS RESERVED.

0 100 200
1:4,000 METRES

CLIENT
SANDSFIELD GRAVEL COMPANY LTD

PROJECT
EASTERN EXTENSION PLANNING APPLICATION

TITLE
TOPOGRAPHIC SURVEY

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-01-20
DESIGNED	SE
PREPARED	ECS
REVIEWED	NW
APPROVED	NW

PROJECT NO.	CONTROL	REV.	DRAWING
20148978	1002-PA-0007	A	ES5.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

25 mm

0

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APPENDIX FMP1

Surface Water Calculations

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Siddig Elshareef
Site name:	Sandsfield Milegate (Post-development)
Site location:	Brandesburton, Driffield

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.90994° N
Longitude:	0.27389° W
Reference:	1936736937
Date:	Dec 14 2021 04:05

Site characteristics

Total site area (ha):	8.4
Significant public open space (ha):	0
Area positively drained (ha):	8.4
Impermeable area (ha):	5.88
Percentage of drained area that is impermeable (%):	70
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	8.4
Net impermable area for storage volume design (ha):	6.24
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	91.63
FEH / FSR conversion factor:	1.19	1.19
SAAR (mm):	641	641
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 10 year:	1.45	1.45
Growth curve factor 30 year:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	36.58	36.58
Q_{BAR} for net site area (l/s):	36.58	36.58

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	31.5	31.5
1 in 30 years (l/s):	36.6	36.6
1 in 100 year (l/s):	36.6	36.6

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	6428	6428
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	6428	6428

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Siddig Elshareef
Site name:	Sandsfield Milegate (During-development)
Site location:	Brandesburton, Driffield

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.90994° N
Longitude:	0.27389° W
Reference:	3871977423
Date:	Dec 14 2021 04:21

Site characteristics

Total site area (ha):	8.4
Significant public open space (ha):	0
Area positively drained (ha):	8.4
Impermeable area (ha):	7.56
Percentage of drained area that is impermeable (%):	90
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	8.4
Net impermable area for storage volume design (ha):	7.68
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	91.63
FEH / FSR conversion factor:	1.19	1.19
SAAR (mm):	641	641
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 10 year:	1.45	1.45
Growth curve factor 30 year:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	36.58	36.58
Q_{BAR} for net site area (l/s):	36.58	36.58

Design criteria

Climate change allowance factor:	1.0
Urban creep allowance factor:	1.1
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	31.5	31.5
1 in 30 years (l/s):	36.6	36.6
1 in 100 year (l/s):	36.6	36.6

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	5490	5490
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	5490	5490

Storage Volume Calculations

Milegate Extension Landfill
Brandesburton, East Yorkshire

Predevelopment $QBAR_{rural}$ Greenfield Runoff Rate 2.0 l/s/ha

Calculated using IOH 124 Methodology with the following parameters:
SAAR = 648 mm; SOIL = 0.3; Growth Factor = 3.

Post Development: 100 year return period				
Area		86,229 m^2		
Runoff Coefficient		0.90		
Duration (mins)	Rainfall (mm)	Post Development Volume of Runoff (m^3)	Predevelopment Volume of Runoff (Greenfield) (m^3)	Storage Required to Retain Greenfield Rate (m^3)
15	31	2,439	16	2,423
30	38	2,918	31	2,887
60	45	3,489	63	3,426
120	54	4,174	125	4,048
240	64	4,991	251	4,740
360	71	5,542	376	5,166
720	85	6,628	753	5,876
1080	91	7,093	1,129	5,964
1440	96	7,442	1,505	5,937
			Maximum	**5,964**

Maximum surface water storage requirements are for a rainfall event with a 1080 minute (18 hour) duration

Post Development: 100 year return period plus 20% (Climate Change)				
Area		86,229 m^2		
Runoff Coefficient		0.90		
Duration (mins)	Rainfall (mm)	Existing & Proposed Volume of Runoff (m^3)	Volume of Runoff (Greenfield) (m^3)	Storage Required to Retain Greenfield Rate (m^3)
15	38	2,927	16	2,911
30	45	3,502	31	3,470
60	54	4,187	63	4,124
120	65	5,008	125	4,883
240	77	5,989	251	5,738
360	86	6,650	376	6,274
720	102	7,954	753	7,201
1080	110	8,512	1,129	7,383
1440	115	8,931	1,505	7,426
1800	119	9,271	1,881	7,389
			Maximum	**7,426**

Maximum surface water storage requirements are for a rainfall event with a 1440 minute (24 hour) duration

Flow Rate Q (m^3/s) = C i A
where C = coefficient of runoff; i = rainfall intensity; A = catchment area
then Runoff Volume = Q x Duration

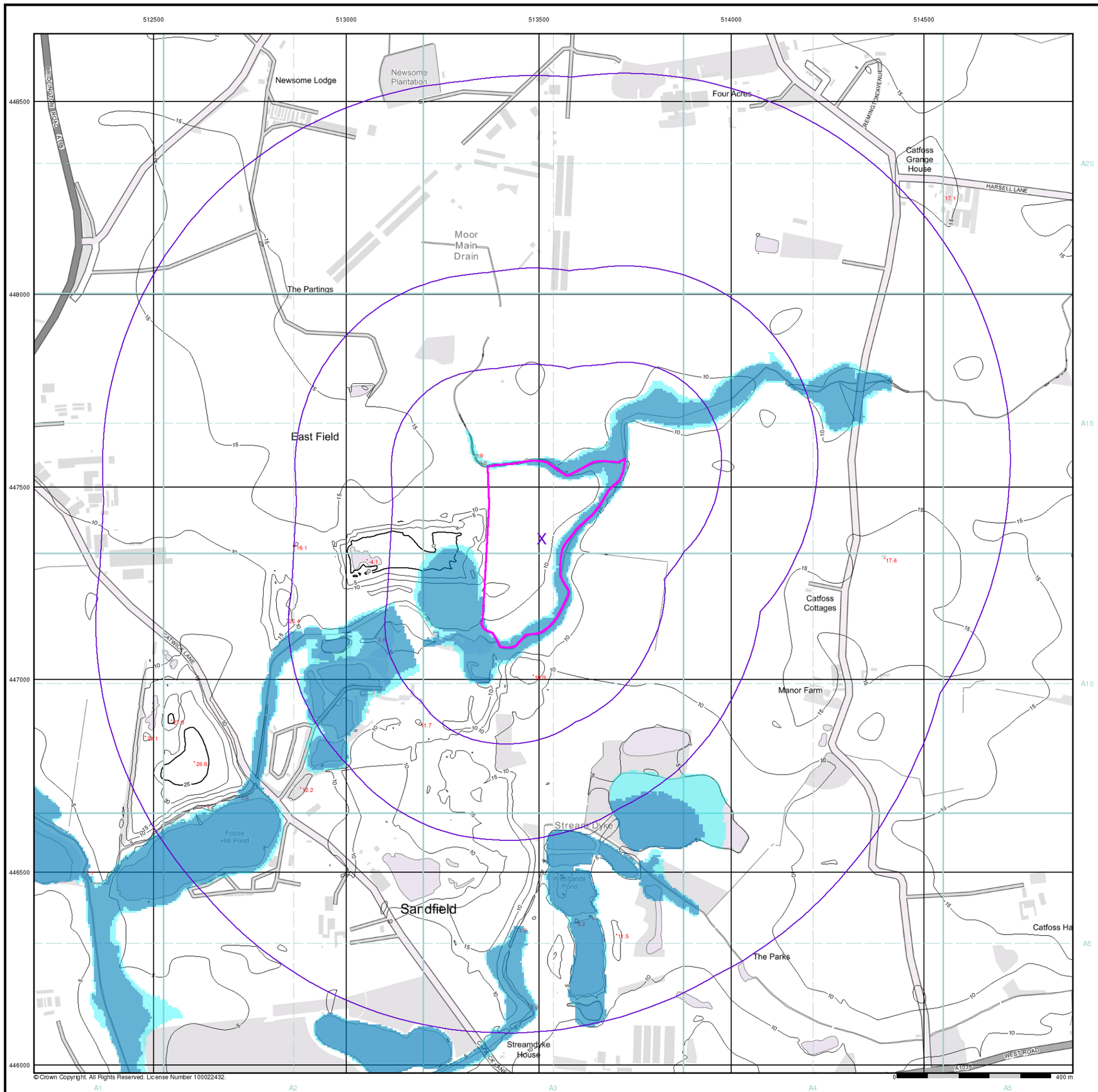
Upslope Catchment Runoff Volume

Upslope Greenfield Catchment Area	10 ha
Predevelopment Q100yr Greenfield Runoff Rate	4.2 l/s/ha
1% AEP plus Climate Change, 24 hour rainfall event storage requirements	4,400 m^3

Golder Associates

APPENDIX FMP2

Envirocheck Flood Maps



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Flood Data

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in metres)

Standard Contour 105 100 95

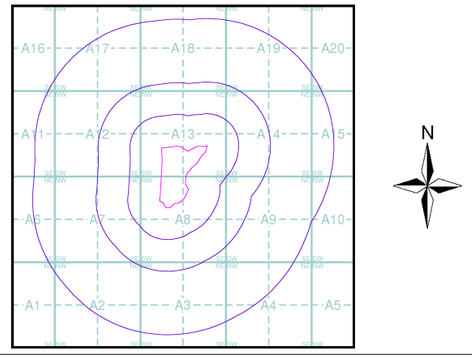
Master Contour

Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

EA/NRW Flood Data Map - Slice A



Order Details

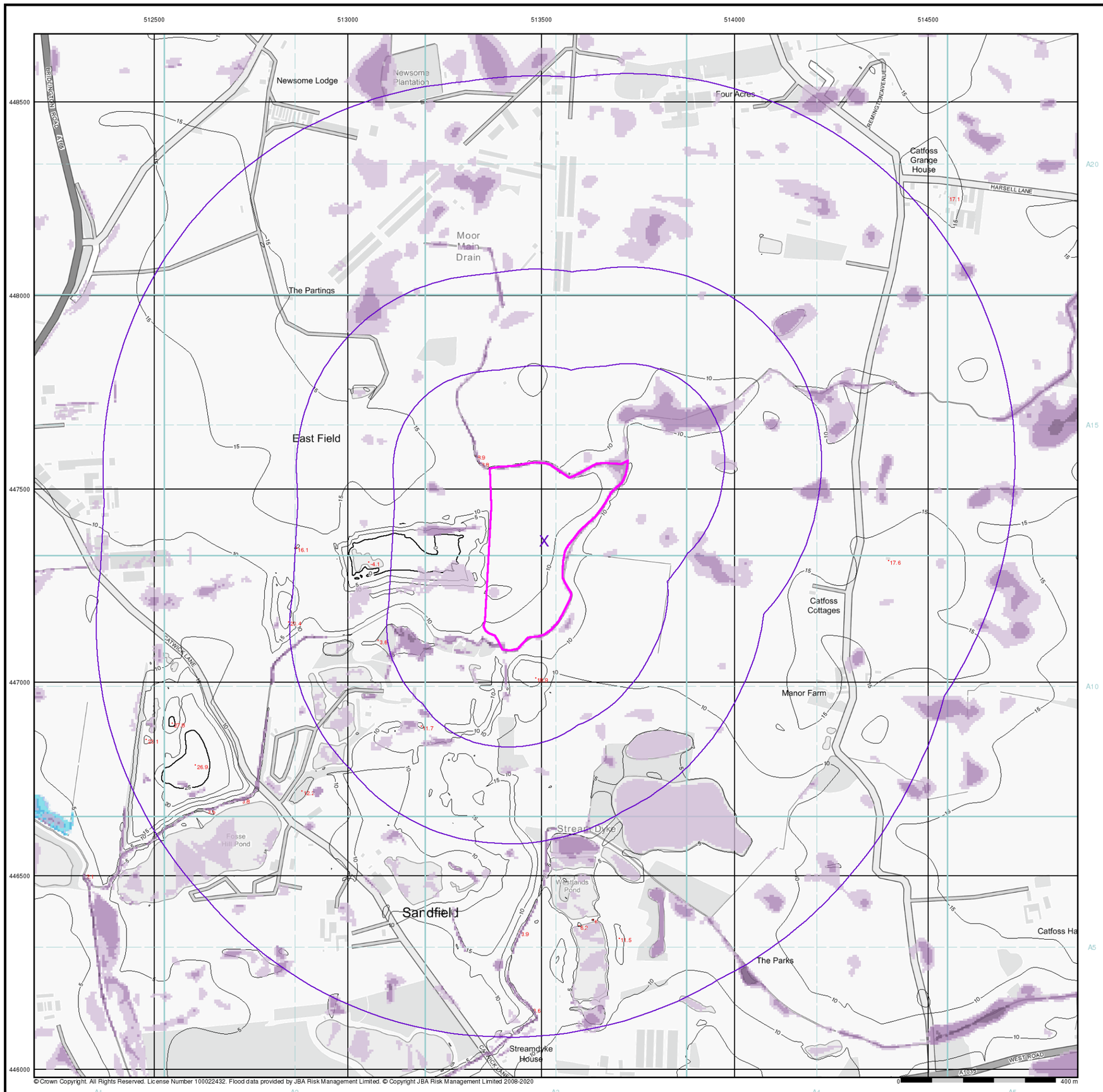
Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

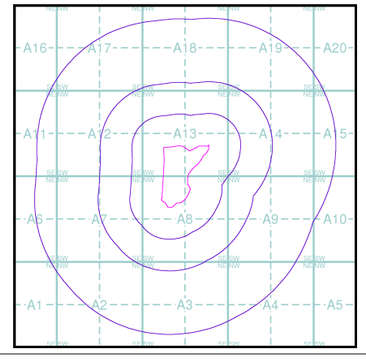
Contours (height in metres)

Standard Contour — 105 — 100 — 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height * 157.8

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

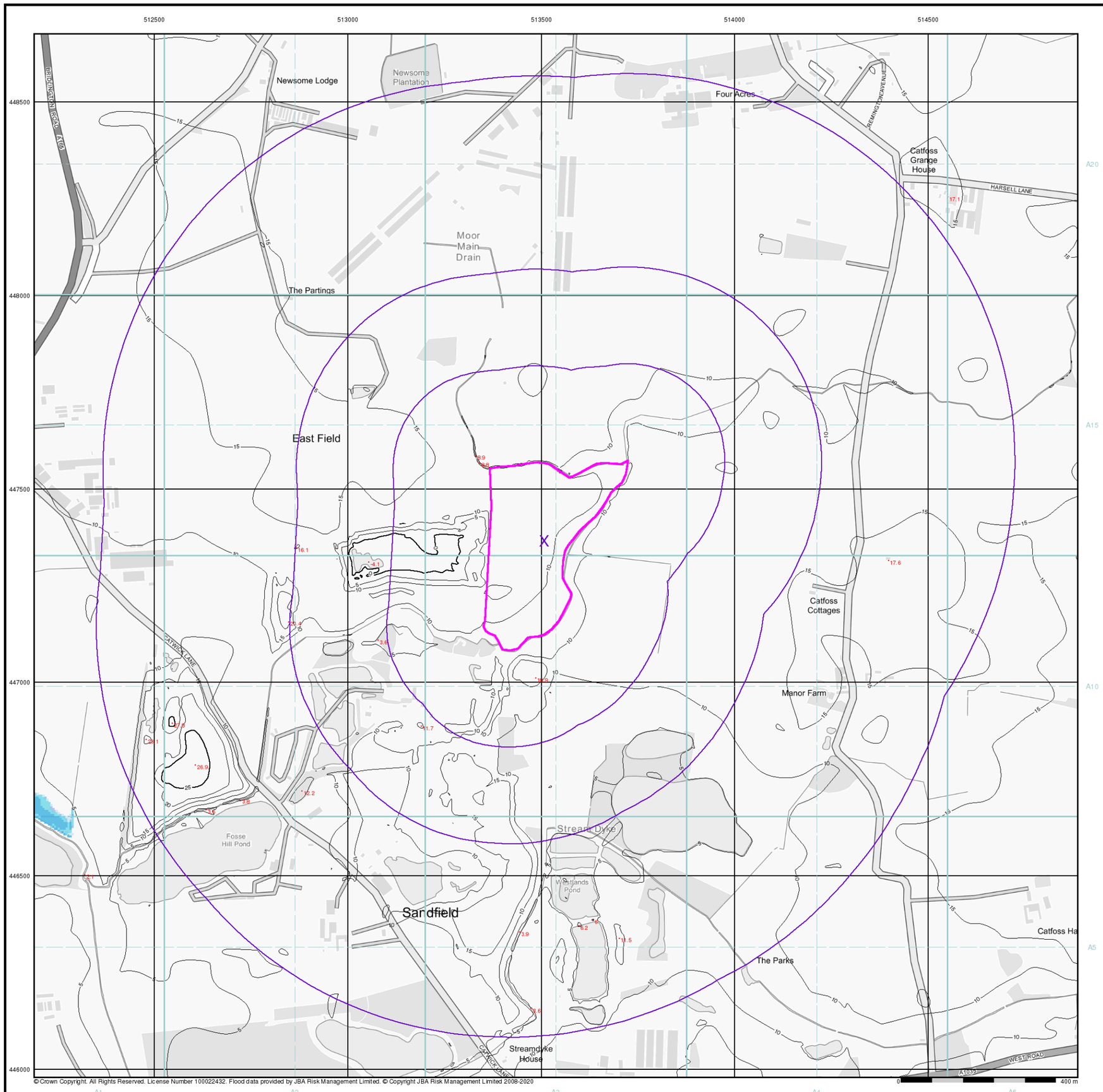
Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

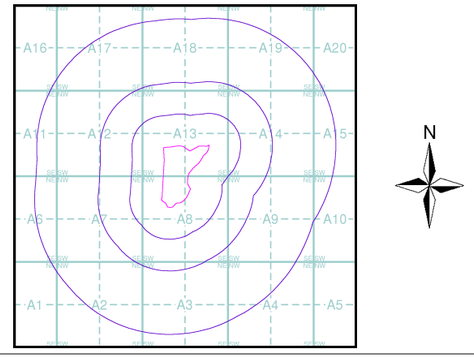
Modelled Flood Depth

Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- MLW Mean Low Water
- MHW Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

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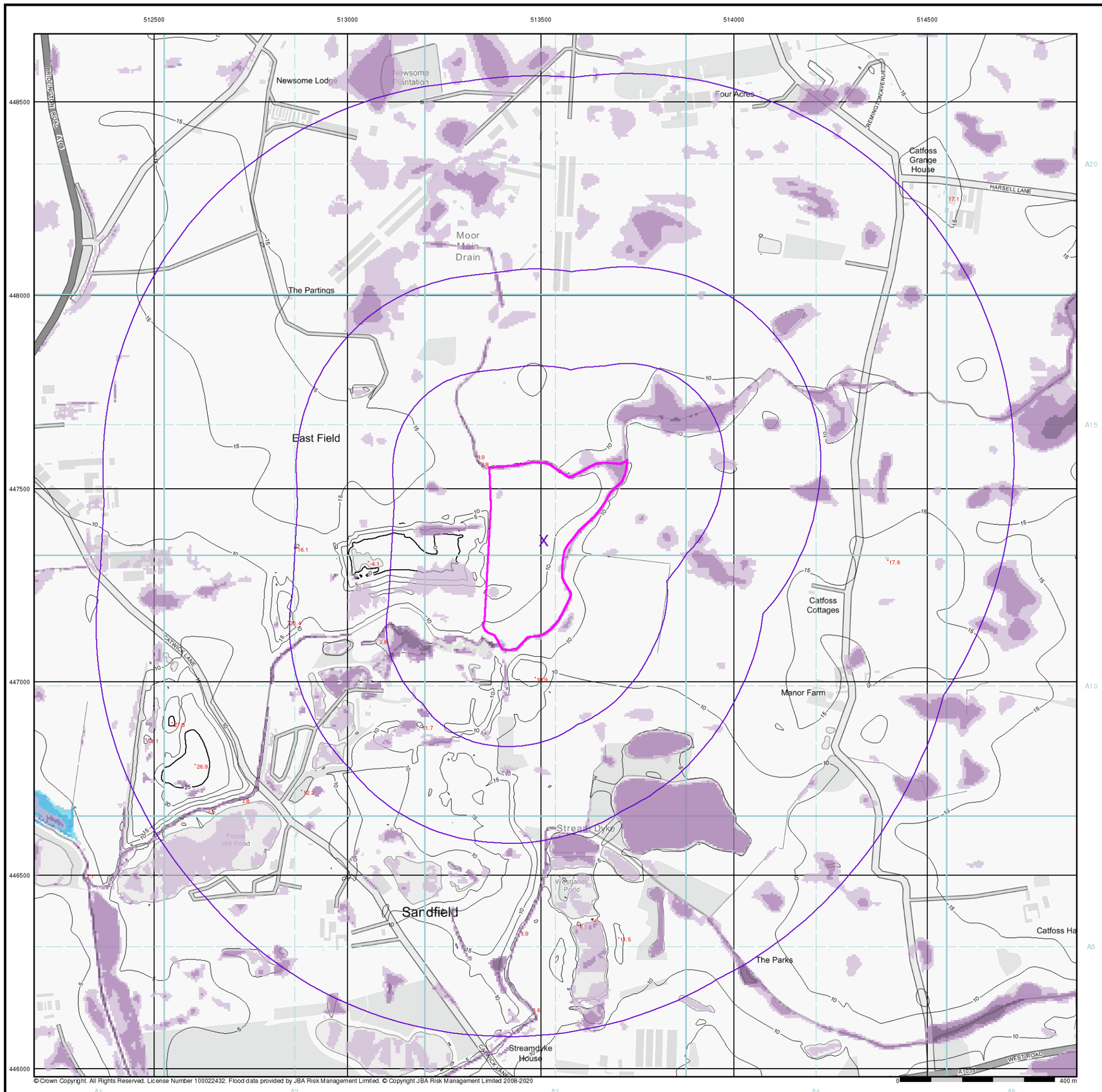
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP®

JBA 200 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

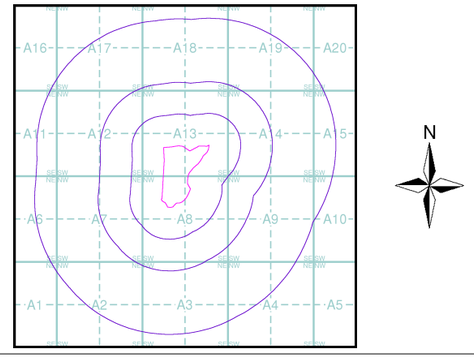
Contours (height in metres)

Standard Contour — Mean Low Water (MLW)

Master Contour — Mean High Water (MHW)

Spot Height *157.8

JBA 200 Year Return Flood Map (Undefended) - Slice A



Order Details

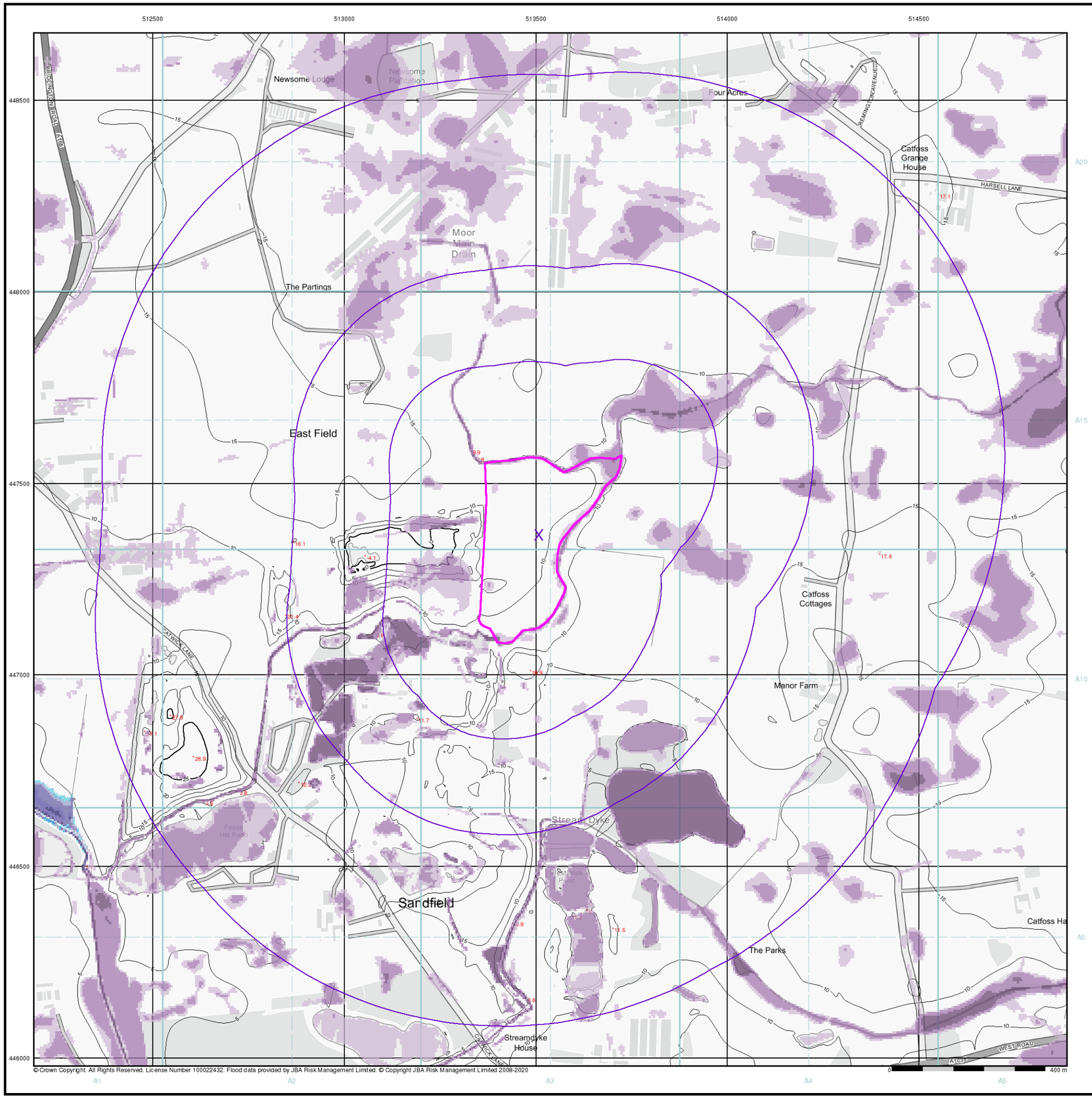
Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

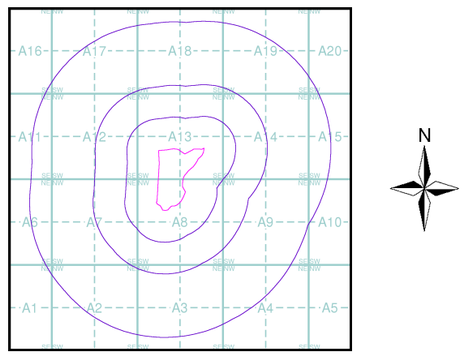
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 1000 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
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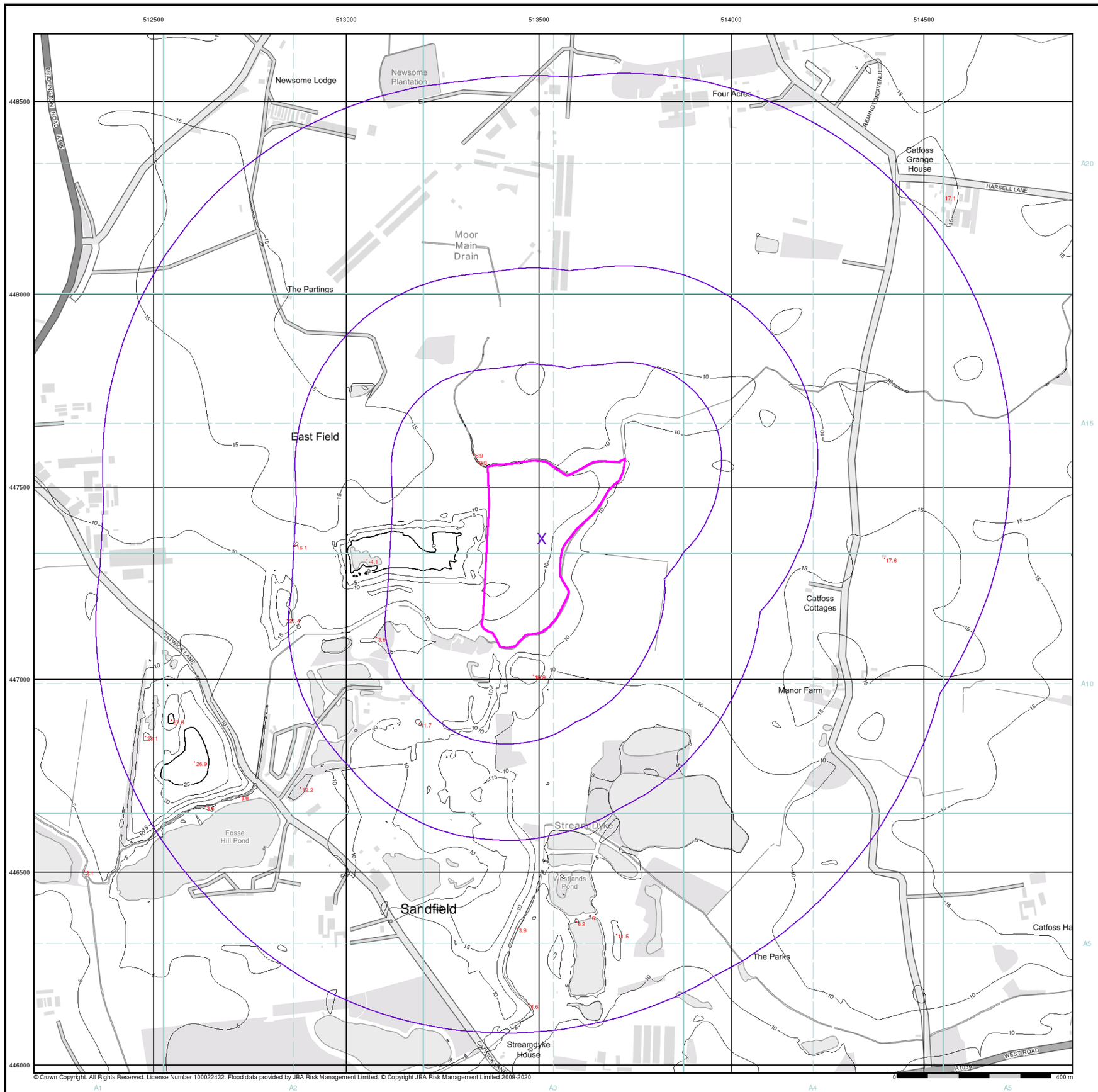
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

JBA Canal Failure Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

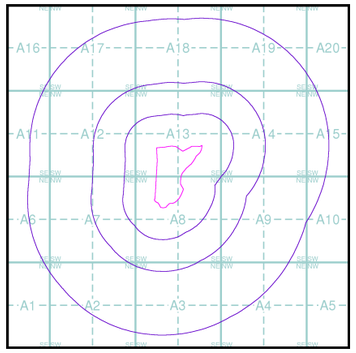
Flood Data

- Canal Failure
- Coverage

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- MLW Mean Low Water
- MHW Mean High Water

JBA Canal Failure Flood Map - Slice A



Order Details

Order Number:	257580139_1_1
Customer Ref:	20148978
National Grid Reference:	513510, 447370
Slice:	A
Site Area (Ha):	10.66
Search Buffer (m):	1000

Site Details

Humberside Shooting Grounds, Catwick Lane, Brandesburton, Driffield, YO25 8RY

Landmark INFORMATION GROUP

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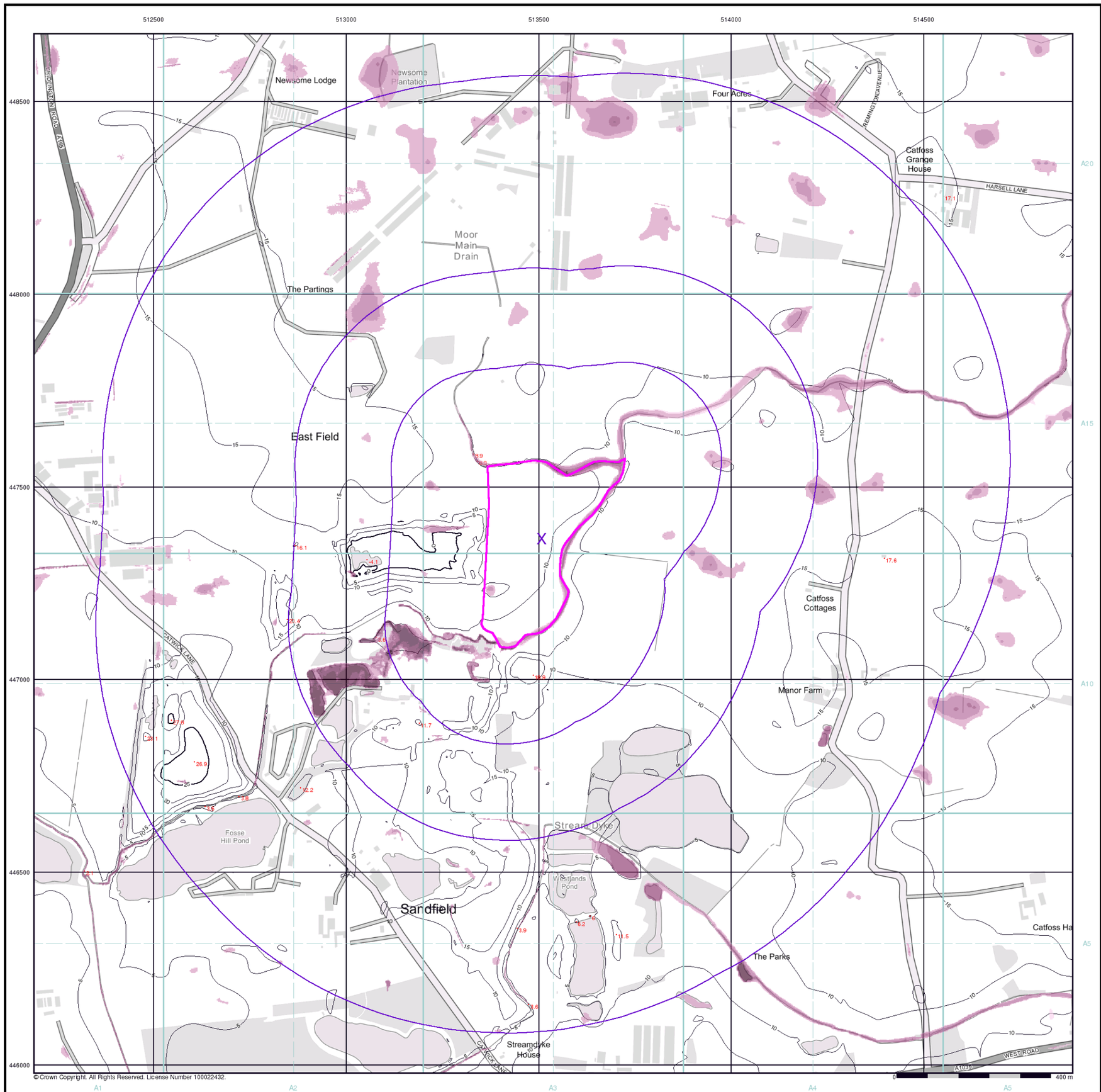
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height (e.g. 167.8)

MLW Mean Low Water

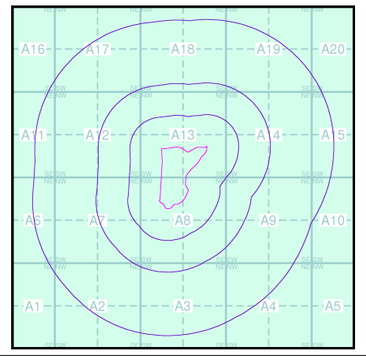
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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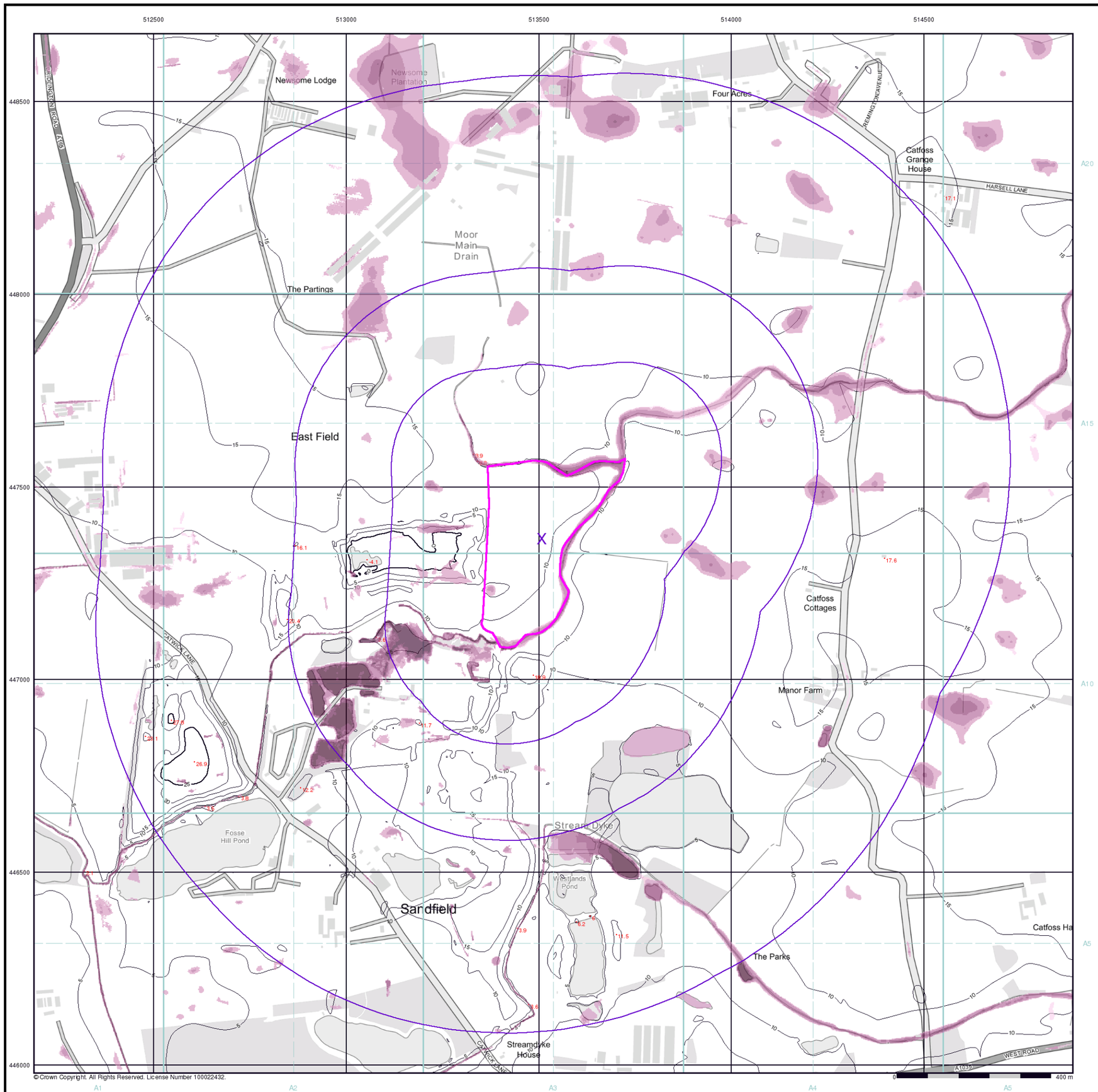

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Depth Map

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

Suitability

See the suitability map below

- National to county
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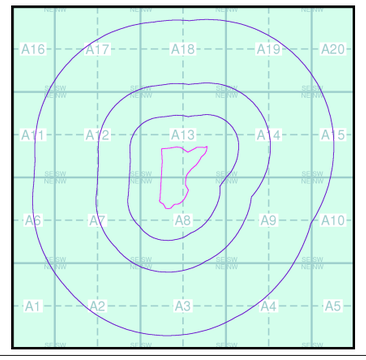
EA/NRW Suitability Map - Slice A



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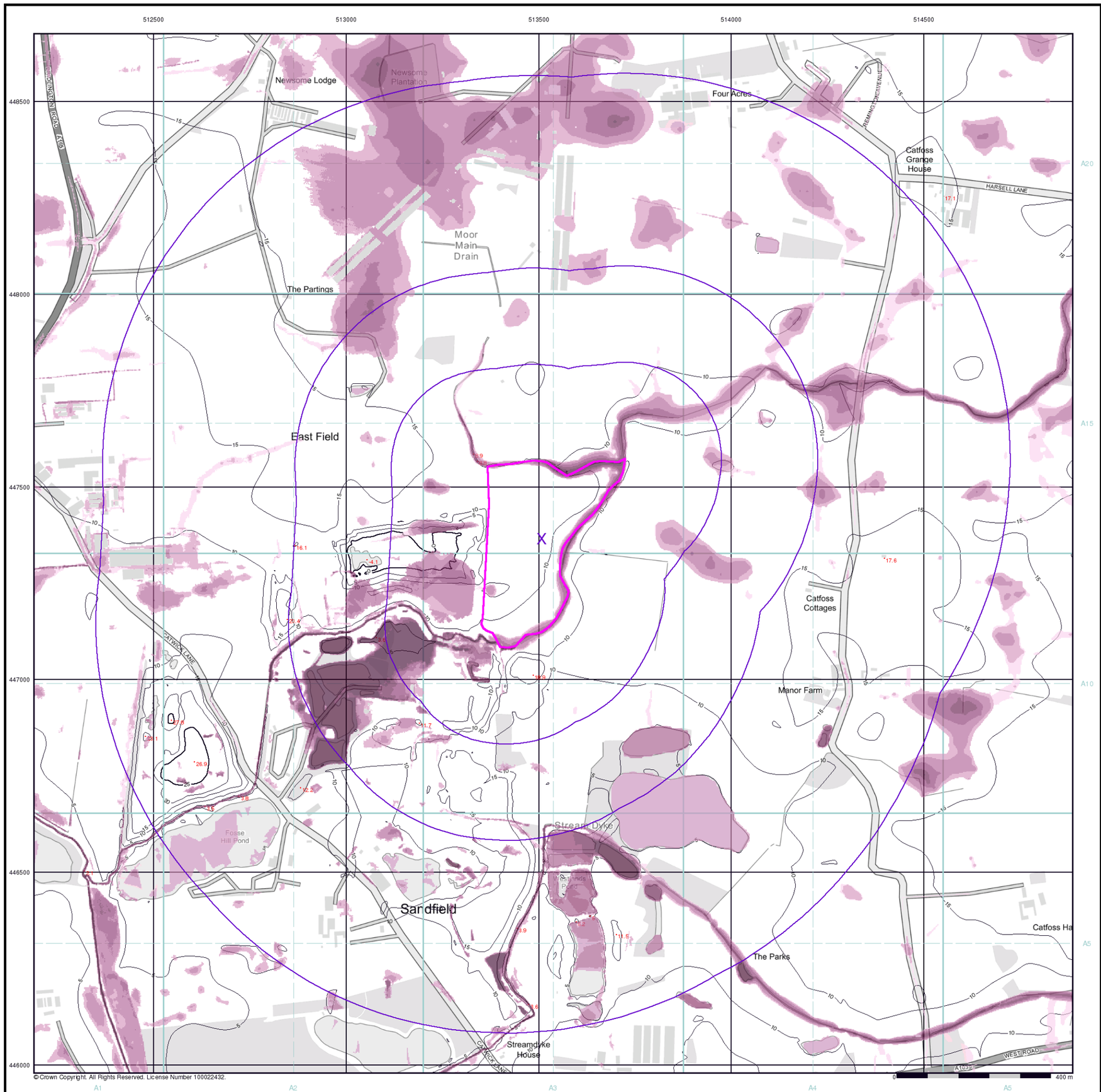

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EA/NRW Surface Water 1000 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

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Suitability

See the suitability map below

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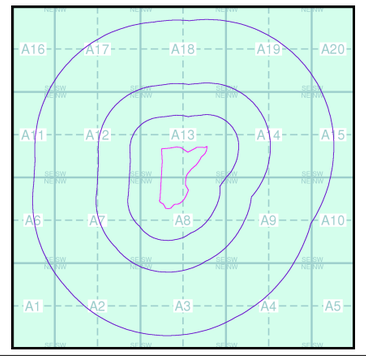
EA/NRW Suitability Map - Slice A



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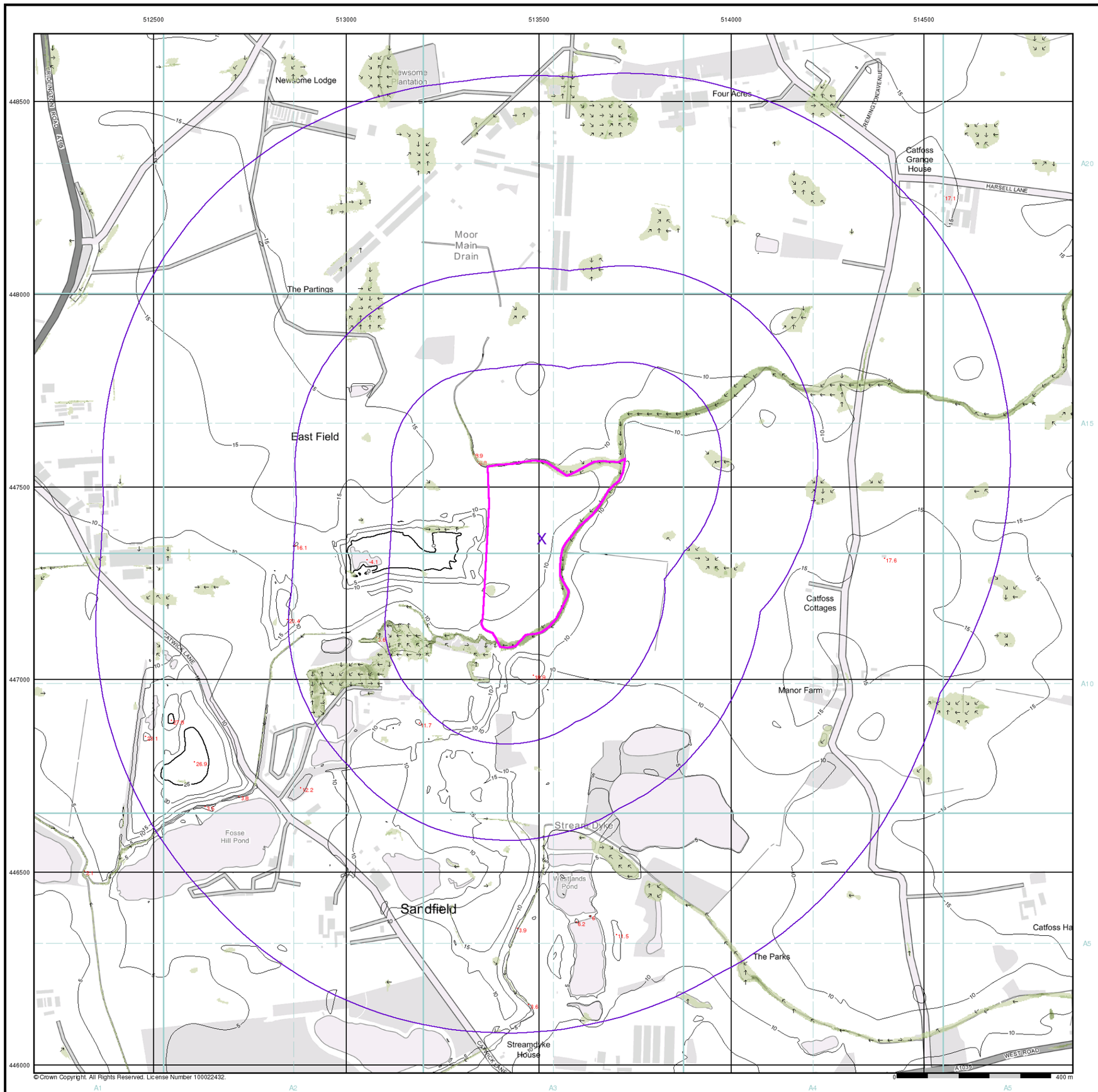

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

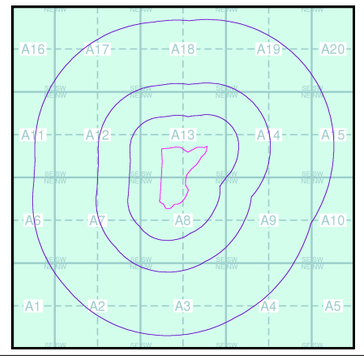
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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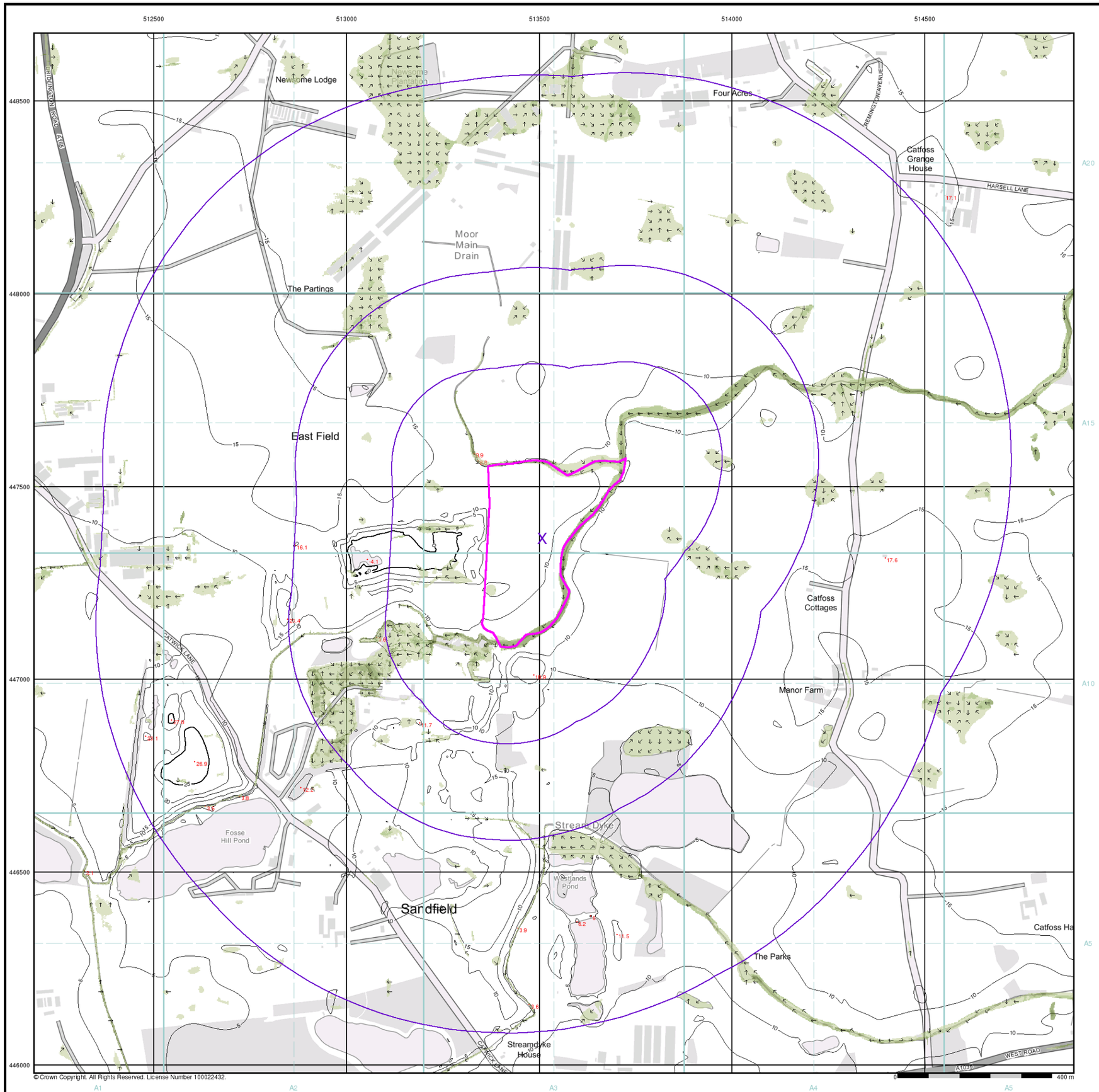

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

Suitability

See the suitability map below

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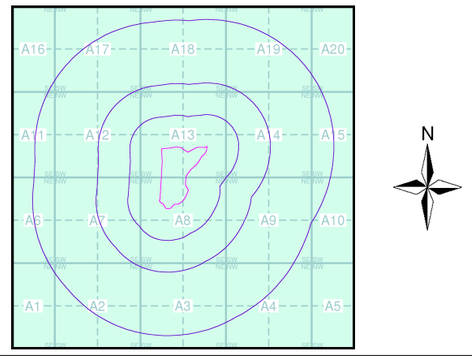
EA/NRW Suitability Map - Slice A



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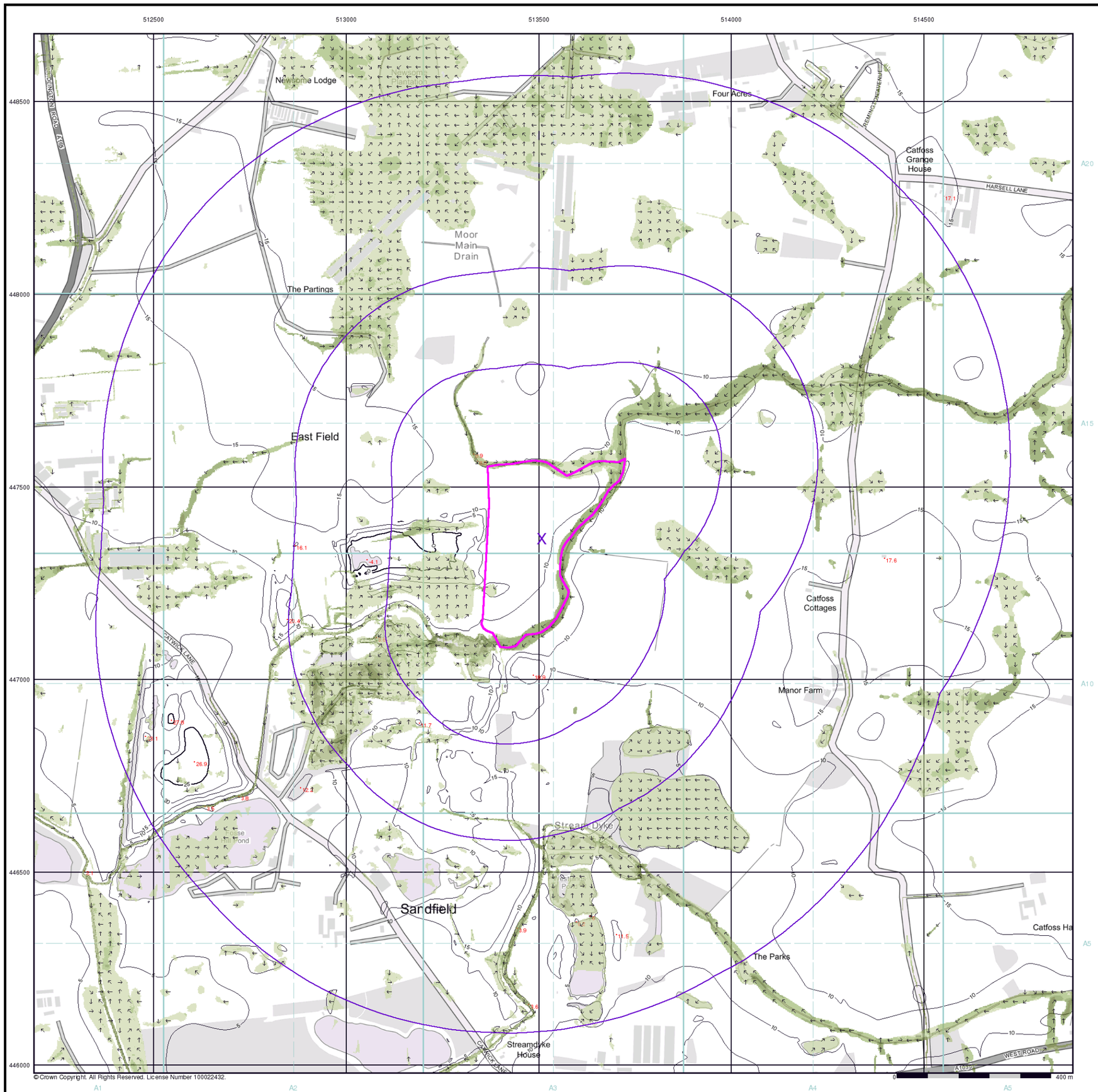

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 1000 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

Suitability

See the suitability map below

- National to county
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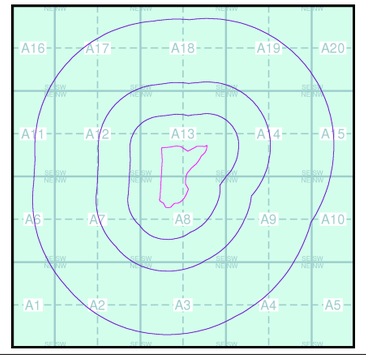
EA/NRW Suitability Map - Slice A



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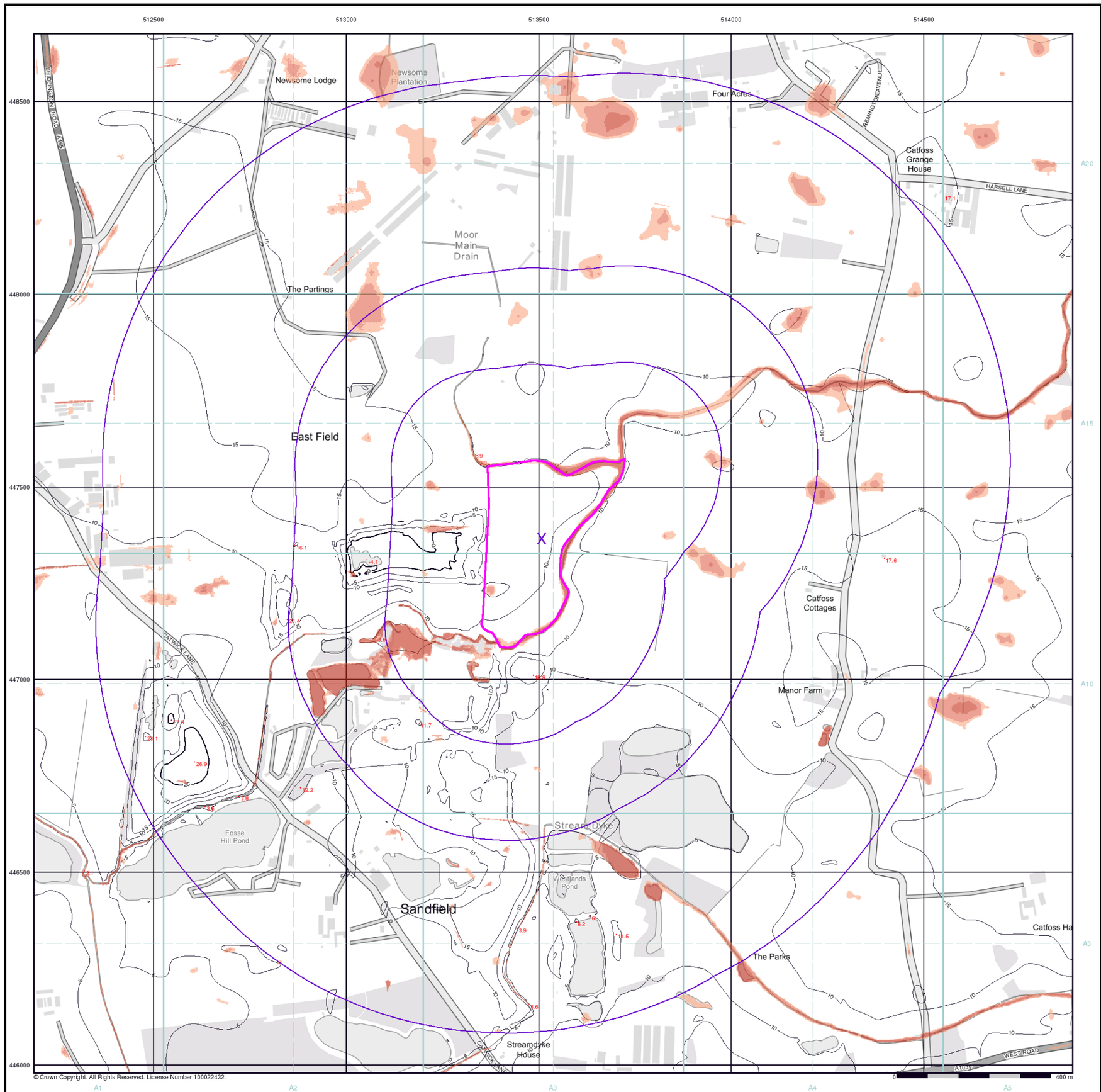

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

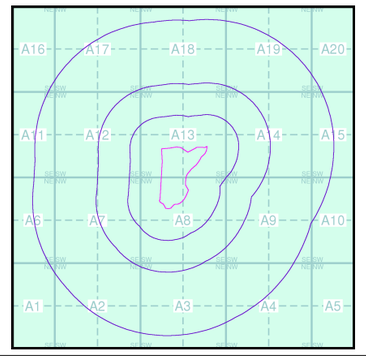
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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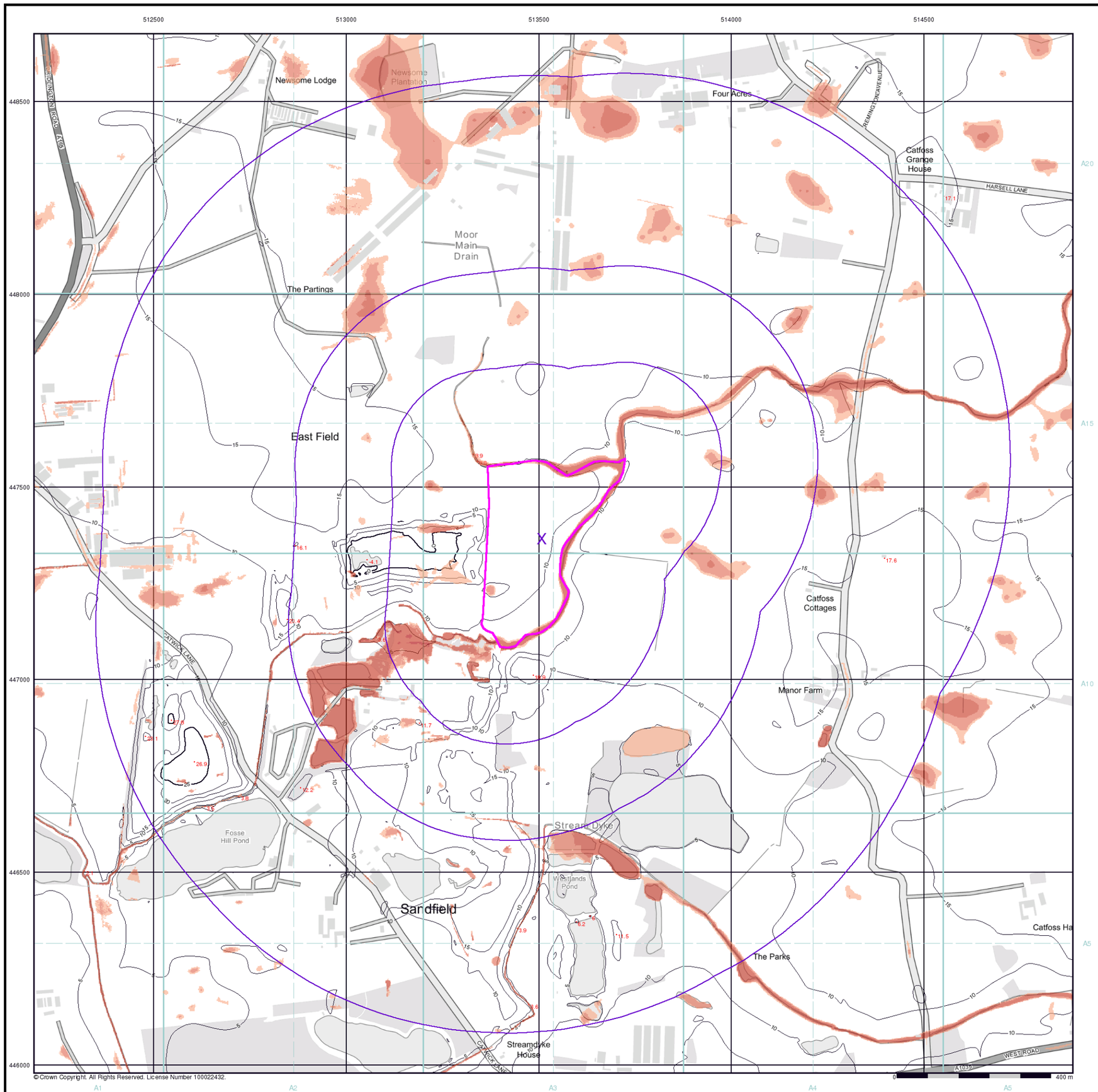

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

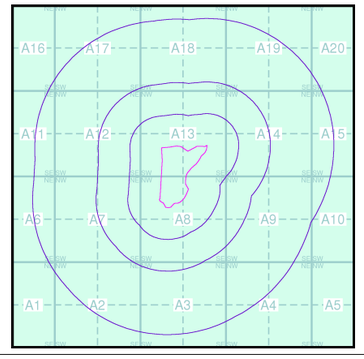
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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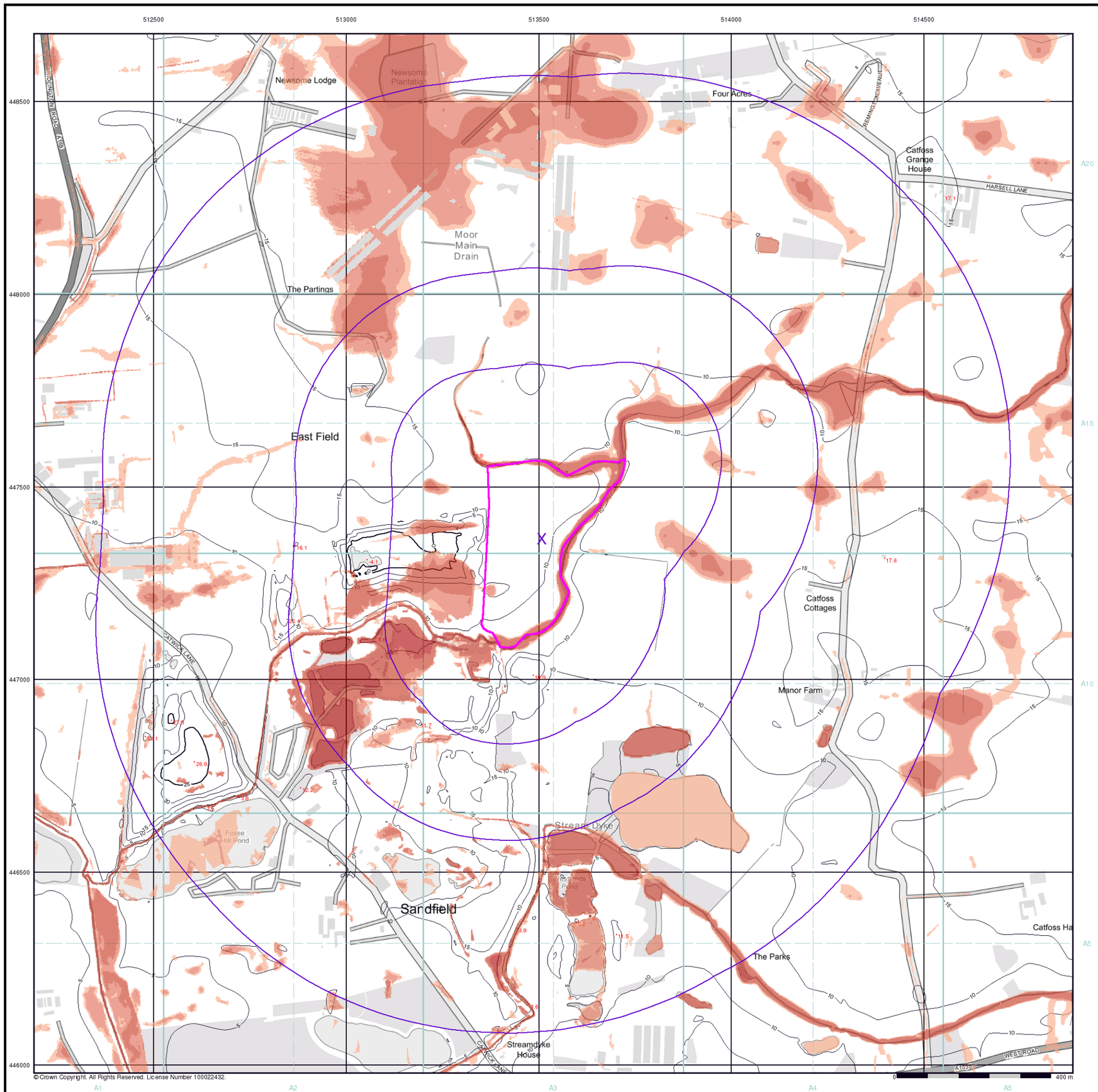

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Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
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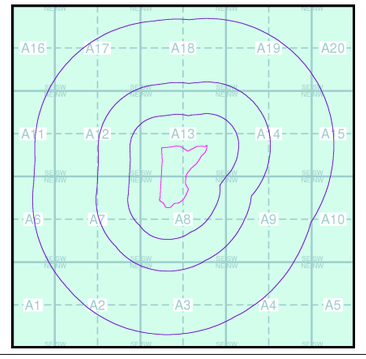
EA/NRW Suitability Map - Slice A



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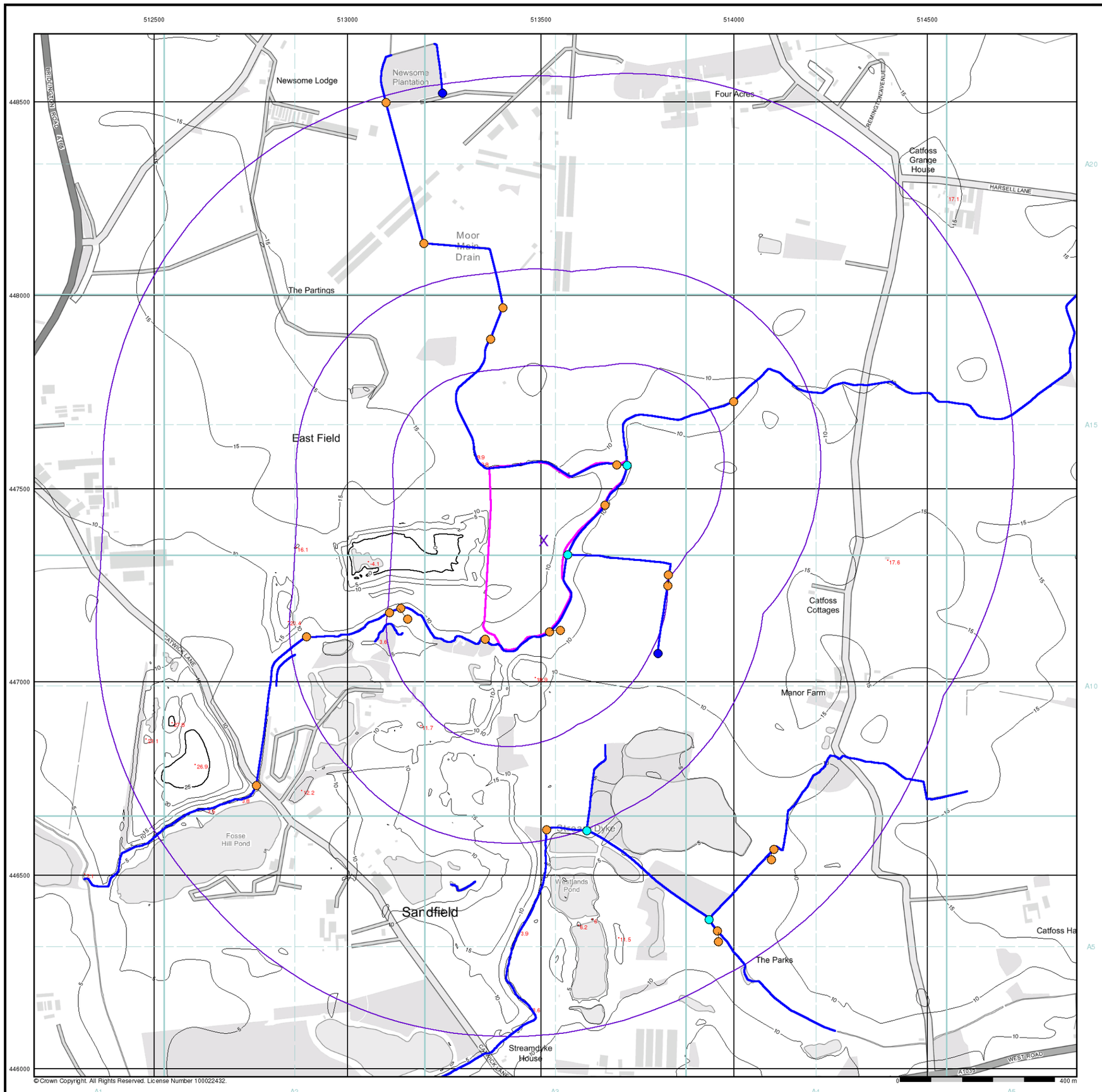

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LANDMARK INFORMATION GROUP®

OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

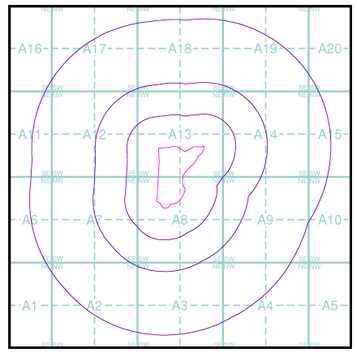
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea
- Junction
- Outlet
- Pseudo
- Source
- Other

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height 167.3
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



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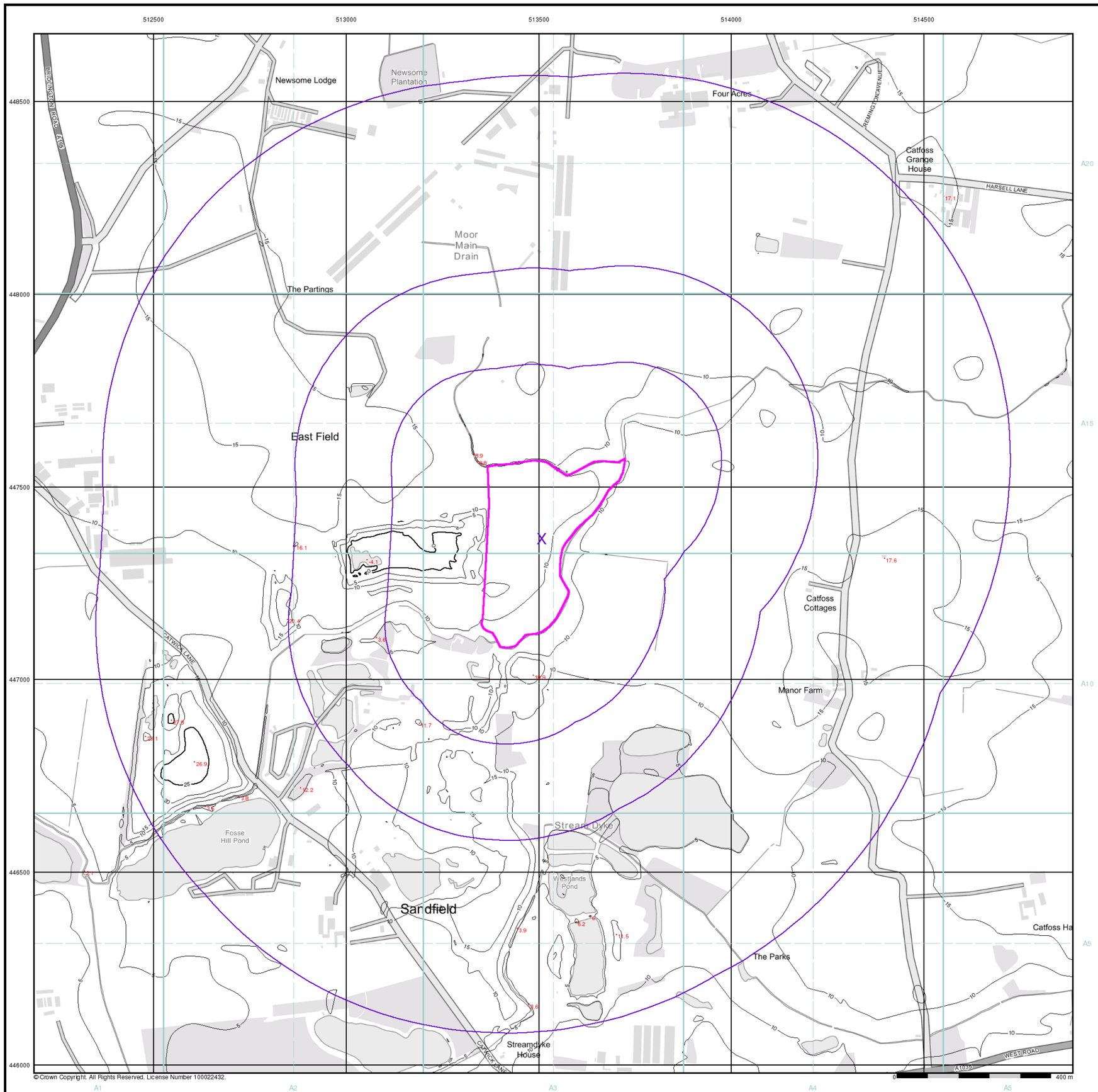

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EA/NRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Historic Flood Events Data

- Channel Capacity Exceeded (no raised defences)
- Channel Capacity Exceeded /Surface Water
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Historical Flood Liabilities
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Surface Water
- Unknown

Contours (height in metres)

Standard Contour 105 100 95

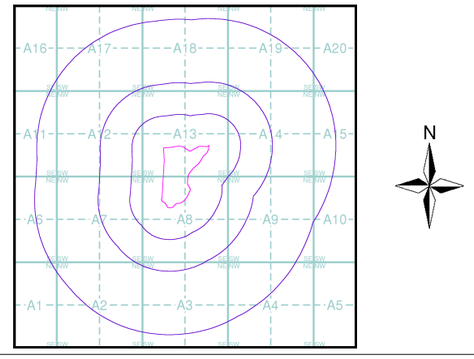
Master Contour

Spot Height *167.8

MLW Mean Low Water

MHW Mean High Water

EA/NRW Historic Flood Map - Slice A



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