5.6 Developed Site Drainage

5.6.1 An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the site compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

5.6.2 In order to quantify any potential increase in surface water runoff, the existing brownfield runoff rate from the site must initially be determined. The rates of runoff have been determined using the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS[9].

5.6.3 The Building Regulations [10] permissible runoff rate is 0.014 l/s/m^2 (140 l/s/ha) with a recommended reduction of 30% betterment, as per correspondence received in a pre-application advice letter from BMBC received 7th March 2014.

5.6.4 The measures detailed in Section 5.7 and 5.8 will control the surface water runoff from the site to this level and therefore surface water flood risk from the developed site.

5.7 Sustainable Drainage Options (SuDS)

5.7.1 Sustainable water management measures should be used to control the surface water runoff from the proposed development site therefore, managing the flood risk to the site and surrounding areas from surface water runoff.

5.7.2 Current guidance promotes sustainable water management through the use of SuDS. SuDS options include:

- Green roofs
- Water butts
- Permeable paving
- Rainwater harvesting
- Filter strips
- Wetland Areas
- Infiltration basins
- Detention basins
- Oversized pipes
- Brown roofs
- Swales
- Cellular Storage

5.7.3 A hierarchy of techniques is identified[11]:

1. **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
2. **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
3. **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
4. **Regional Control** – management of runoff from several sites, typically in a detention pond or wetland.

[9] Office of the Deputy Prime Minister, National SuDS Working Group, July 2004, Interim Code of Practice for sustainable drainage systems.
[10] Building Regulations, Part H – Drainage and Waste Disposal, Section 3, 2000; amended 2010.
[11] CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality advice.

5.7.4 It is generally accepted that the implementation of SuDS as opposed to conventional drainage systems, provides several benefits by:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
- reducing potable water demand through rainwater harvesting;
- improving amenity through the provision of public open spaces and wildlife habitat; and
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

5.8 Feasibility of SuDS Options

5.8.1 Soils mapping produced by the National Soils Resources Institute (Cranfield University) shows that the south-west section of the site is underlain by loamy and clayey floodplain soils with naturally high groundwater. The north-eastern section of the site is underlain by slowly permeable, seasonally wet, acid, loamy and clayey soils.

5.8.2 Based on the above, the permeability of the soil appears to be reduced and the bedrock may encourage high groundwater. As such the use of infiltration SuDS may be limited.

5.8.3 If an infiltration system is proposed, it is recommended that a series of infiltration/soakaway tests are carried out on site to BRE Digest 365 Guidelines to confirm the assumptions made in the calculations.

5.9 Surface Water Management Strategy

5.9.1 A surface water management strategy for the proposed development has been developed as part of a FRA to manage and reduce the flood risk posed by the surface water runoff from the site.

5.9.2 A surface water management strategy for the proposed development will manage and reduce the flood risk posed by the surface water runoff from the site.

5.9.3 At this stage the use of SuDS features may be limited by the infiltration. Landscaped areas within the site appear to be limited, however, those areas surrounding site installations and vehicle manoeuvring areas in the northern section of the site will allow a proportion of the rainfall to infiltrate into the soil substrate.

5.9.4 It is recommended that interceptors should be fitted on the upstream side of attenuation storage devices in order to improve the quality of surface water discharging from the site.

5.9.5 Due to the nature of the site being the location of former mine works, it is proposed that the ground bears the conditions of a brownfield site as it was backfilled with poor quality earth and has shallow soil horizons. It is therefore proposed that the Building Regulations permissible runoff rate is more applicable to the site of 140 l/s/ha; subject to a 30% reduction for betterment.

5.9.6 From the detailed drainage design in Appendix 6, surface runoff will be attenuated in underground cellular storage units before discharging to the River Dearne via an existing

outfall. This outfall currently serves the neighbouring Alkane facility and a highway drain from Park Spring Road, and is located 180m south of the southern boundary.

5.9.7 All events up to and including the 1 in 100 year (+30%) rainfall event will be attenuated. During detailed design the system could be designed to attenuate to the 1 in 1, 1 in 30 and 1 in 100 year events, in accordance with the Interim Code of Practice for SuDS.

5.9.8 Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the buildings and through contouring of the hardstanding areas.

5.9.9 At this stage of the planning process it is proposed that a planning condition can be adopted to cover the detailed design of the surface water runoff from the site. It is proposed that the detailed drainage design of the final scheme would be secured by a planning condition attached to any planning permission granted and agreed with the Environment Agency and the LPA prior to works commencing.

5.9.10 From the detailed surface water drainage design in Appendix 6, the total attenuation required for the site to attenuate to the brownfield rate, allowing for a 30% betterment, has been calculated at 207.5m^3; delivered via four separate geocellular storage units within the site boundary.

5.9.11 The adoption of a surface water management strategy for the site represents an enhancement from the current conditions as the current surface water runoff from the site is uncontrolled, untreated, unmanaged and unmitigated.

5.10 Foul Drainage

5.10.1 The proposed development will create foul flows from the site.

5.10.2 There are no Yorkshire Water sewer assets located within the immediate vicinity of the site. As such, a foul sewer is planned to be requisitioned to connect with a known connection point located approximately 380m south-east of the southernmost boundary of the site. Yorkshire Water confirms there is sufficient capacity to connect foul flows from this site into the identified asset (Appendix 4).

5.10.3 According to British Water Flows and Loads guidance[12], peak foul water discharge from an industrial development (with a canteen) can be considered to be 100 litres per person per day. A figure of 50 litres of foul flow per person per day is considered for industrial units without a canteen. Using this method, approximate foul flows can be calculated for the proposed industrial development for both scenarios outlined above.

5.10.4 A figure of 25 full-time equivalent (FTE) members of staff is expected to be on site during the operation phase.

5.10.5 Peak foul flows from the proposed development is summarised below in Table 5.6. The foul flow rates below are indicative only and should be established at detailed design.

[12] British Water Code of Practice , Flows and Loads – 3, 2009

Table 5.6: Anticipated Foul Flows

Industrial Unit Type	Discharge Rate Per Person Per Day (litres)	No. of FTE Staff	Peak Foul Flows (l/s)
With Canteen	100	25	0.03
Without Canteen	50	25	0.015

5.10.6 Based on tables 5.6 above, a maximum flow of 0.03 l/s of foul flow can be anticipated to be discharged from the proposed development, assuming the maximum figure of 25 FTE staff in an industrial unit with a canteen.

5.11 Site Drainage Summary

5.11.1 It has been demonstrated that both surface water and foul flows from the site can be managed such that flood risk to and from the site following development is not increased.

6.0 Summary and Conclusions

6.1 Introduction

6.1.1. This report presents an FRA, in accordance with the NPPF, an application for a Timber Resource Recovery Centre to be located on land located off the Houghton Main Colliery Roundabout, Park Spring Road, Houghton Main, Barnsley. This has included an assessment of the surface water drainage requirements of the site.

6.1.2. This report details the flood risk at the site and how this could be managed and mitigated to allow the site to be developed in support of the enclosed planning application. The proposed scale of development may present risks of flooding on-site and/or off-site if flooding is not effectively managed.

6.2 Assessment of Flood Risk

6.2.1 The FRA has demonstrated the following:

- There is a main River (River Dearne) at its closest point, located 85m to the north of the north-western corner of the site. Furthermore, an ordinary watercourse is 100m to the north of the northern perimeter of the site at its closest point at a confluence with the River Dearne. .
- The detailed flood map provided by the Environment Agency show that the site is largely located within Flood Zone 1; outside the extent of the 1 in 1000 annual probability of flooding / <0.1% AEP. A small section in the western section of the site is shown to be located within Flood Zone 2; between the 1 in 100 to 1 in 1000 annual probability of fluvial flooding (1 - 0.1% AEP). However, it has been discussed within this FRA that the extent of the current Flood Zone mapping is erroneous and that the site should be considered to lie entirely within Flood Zone 1.
- In PPG ID: 7, the appropriate uses have been identified for the Flood Zones. The proposed development is classified as 'less vulnerable'. All development types are generally deemed acceptable in terms of flood risk in Flood Zone 1. Based on the above, the Sequential Test should be passed and the Exception Test should not be required.
- Two secondary flooding sources were identified within the site:
    - Overland flow flooding; and
    - Groundwater flooding.
- It is further recommended that any electrical equipment or such equipment sensitive to water ingress be installed with sufficient ground clearance to avoid the potential for groundwater and overland flooding to affect such infrastructure.

6.2.2 Table 6.1 summarises the probability and consequence of flooding for the site with and without mitigation measures.

Table 6.1: Probability and consequences of all sources of flooding

Flooding Source	Potential Source	Probability	Consequence & Impact Without Mitigation	Consequence & Impact With Mitigation	Comment
Fluvial flooding	River Dearne (Main River), Unnamed Tributary (Ordinary Watercourse)	Low	Low	Negligible	Will not affect the site area.
Tidal flooding	None	Negligible	Negligible	Negligible	None
Flooding from rising / high groundwater	Aquifer	Low	Low	Negligible	No occupation of buildings below ground level. Negligible impact with correct management (i.e. appropriated sized drainage system).
Overland flow flooding	Poor Permeability	Low	Low	Negligible	Negligible impact with correct management (i.e. appropriated sized drainage system).
Flooding from artificial drainage systems	Sewers	Negligible	Negligible	Negligible	Will not affect the site area.
Flooding due to infrastructure failure	Houghton Washland Reservoir	Low	Negligible	Negligible	Flood Zone will not affect site area

Key: *Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on consequence and impact with mitigation from each flooding source.*

6.3 Site Drainage

6.3.1 In addition, the FRA has considered the potential impact of the development on surface water and foul runoff rates.

Surface Water

6.3.2 The surface water management strategy for the proposed development will manage and reduce the flood risk posed by the surface water runoff from the site.

6.3.3 The site is approximately 3.00ha in area and is currently a brownfield site which is largely grassland with limited areas of a mixture of young and mature tree cover located towards the westernmost boundary of the site, with a number of hedgerows around the site perimeter.

6.3.4 The attenuation volume required to reduce the post-application surface water runoff to the permissible Brownfield runoff rate of 140 l/s/ha (minus 30%) has been calculated in the detailed drainage design in Appendix 6.

6.3.5 The total storage requirement for this site has been designed to provide 207.5m^3 of attenuation.

Foul Water

6.3.6 Assuming a peak foul water discharge of 100 litres per person per day, for 25 FTE staff at an industrial unit with a canteen, the peak foul flow from the site will be approximately 0.03 l/s. An industrial unit without a canteen with similar staff levels will have a peak foul flow of 0.015 l/s.

6.3.7 There are no Yorkshire Water sewers located within the immediate vicinity of the site. As such, the use of an appropriately specified package treatment plant, located within the site, should be investigated further at detailed design.

6.3.8 The location and treatment requirement for these works would need to be developed with the Environment Agency and LPA as part of the Environmental permitting process set out by the Environmental Permitting (England and Wales) Regulations 2010.

6.3.9 It has been demonstrated that both surface water and foul flows from the site can be managed such that flood risk to and from the site following the proposed development is not increased.

6.4 Conclusion

6.4.1 This FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF.

6.4.2 The development should not therefore be precluded on the grounds of flood risk.

Key

Site Location
(SE 41676 06429)

enzygo
environmental consultants
STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT:
Peel Environmental Ltd

SCALE: 1:20,000@A3

PROJECT REF: CRM.066.004.D.001

DRAWN: MG

CHECKED: SD

DATE: Jan 2015

PROJECT:
Houghton Main

TITLE:
Site Location Plan

FIGURE NO:
1

Little Park

Tunnel

Drain

Track

Dismantled Railway

Path

47m

Workings (disused)

Houghton Main Colliery Roundabout

River Dearne

LITTLE

Edderthorpe

Ash Tree Stables

CROOKE HOUSE LANE

North Carr Lane (Track)

Low Farm

Middle

42m

39m

4070$_{00}$

4065$_{00}$

4060$_{00}$

4410$_{00}$

4415$_{00}$

4420$_{00}$

Key

- Site Boundary
- Surface Water Features

enzygo environmental consultants

STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.002

DRAWN: MG

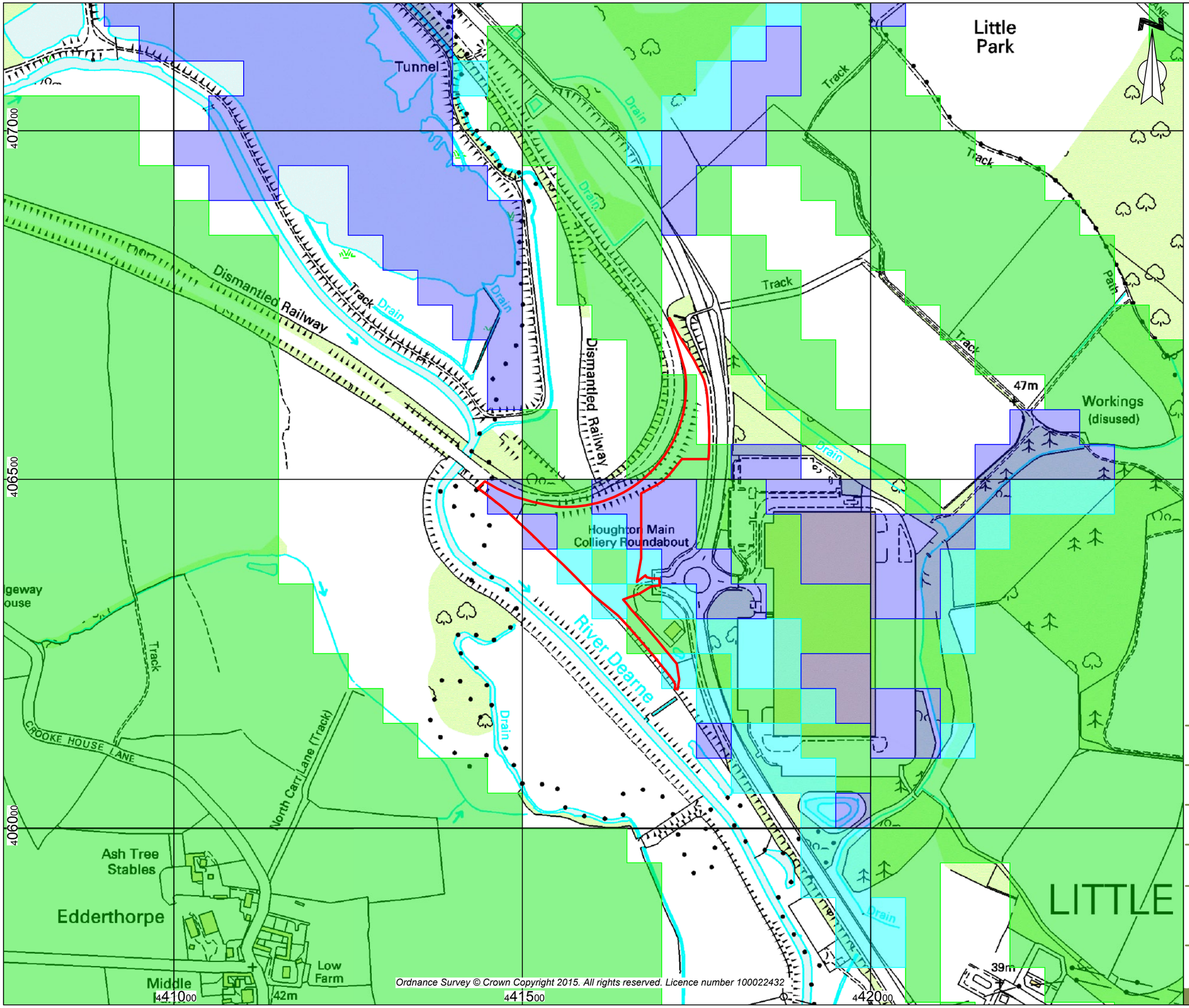
CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: Surface Water Features

FIGURE NO: 2



Key

- Site Boundary
- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

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STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.003

DRAWN: MG

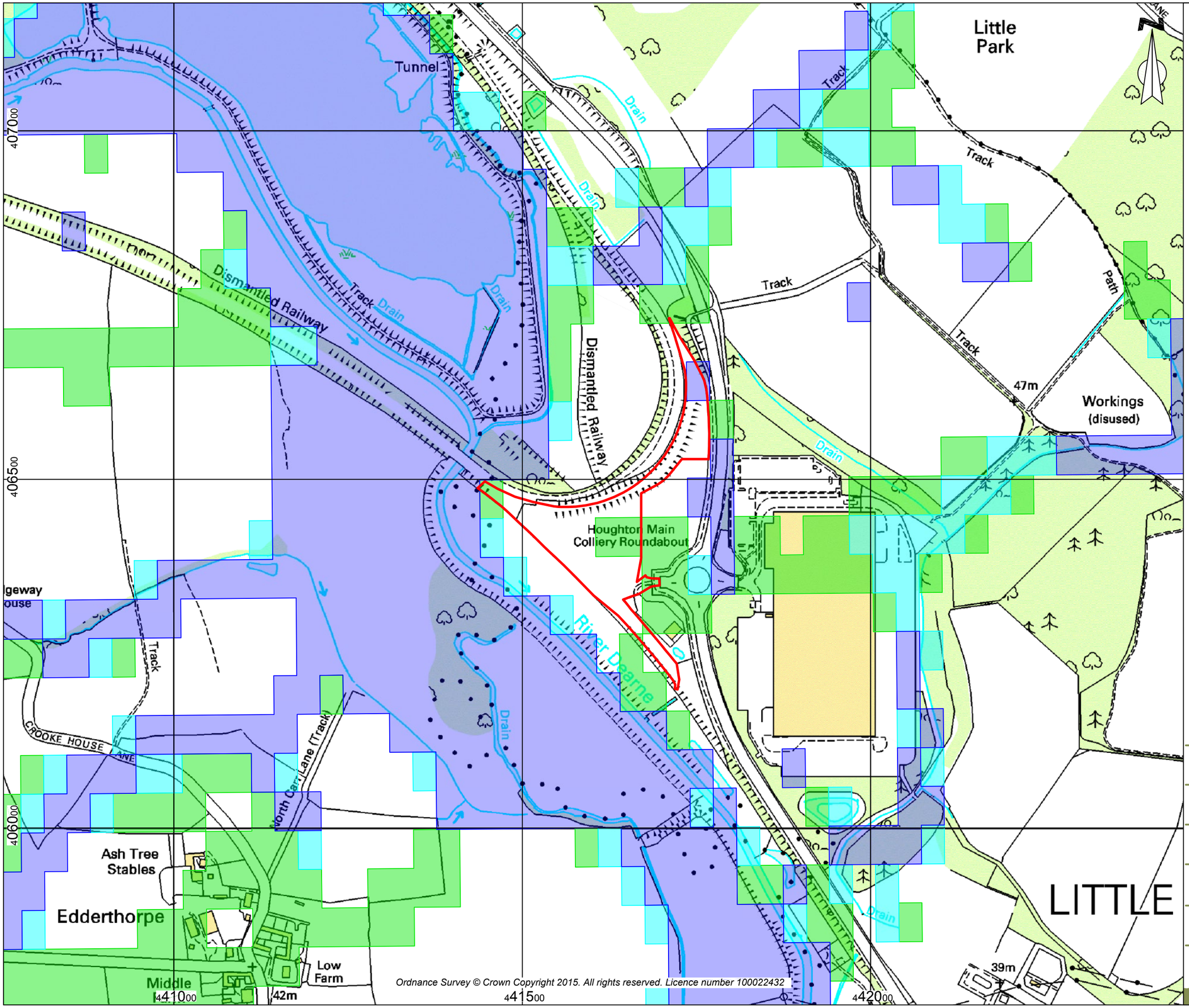
CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: BGS Groundwater Flooding Susceptibility

FIGURE NO: 3



Key

- Site Boundary
- 1 in 75 Year Flood Event
- 1 in 100 Year Flood Event
- 1 in 1000 Year Flood Event

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STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.004

DRAWN: MG

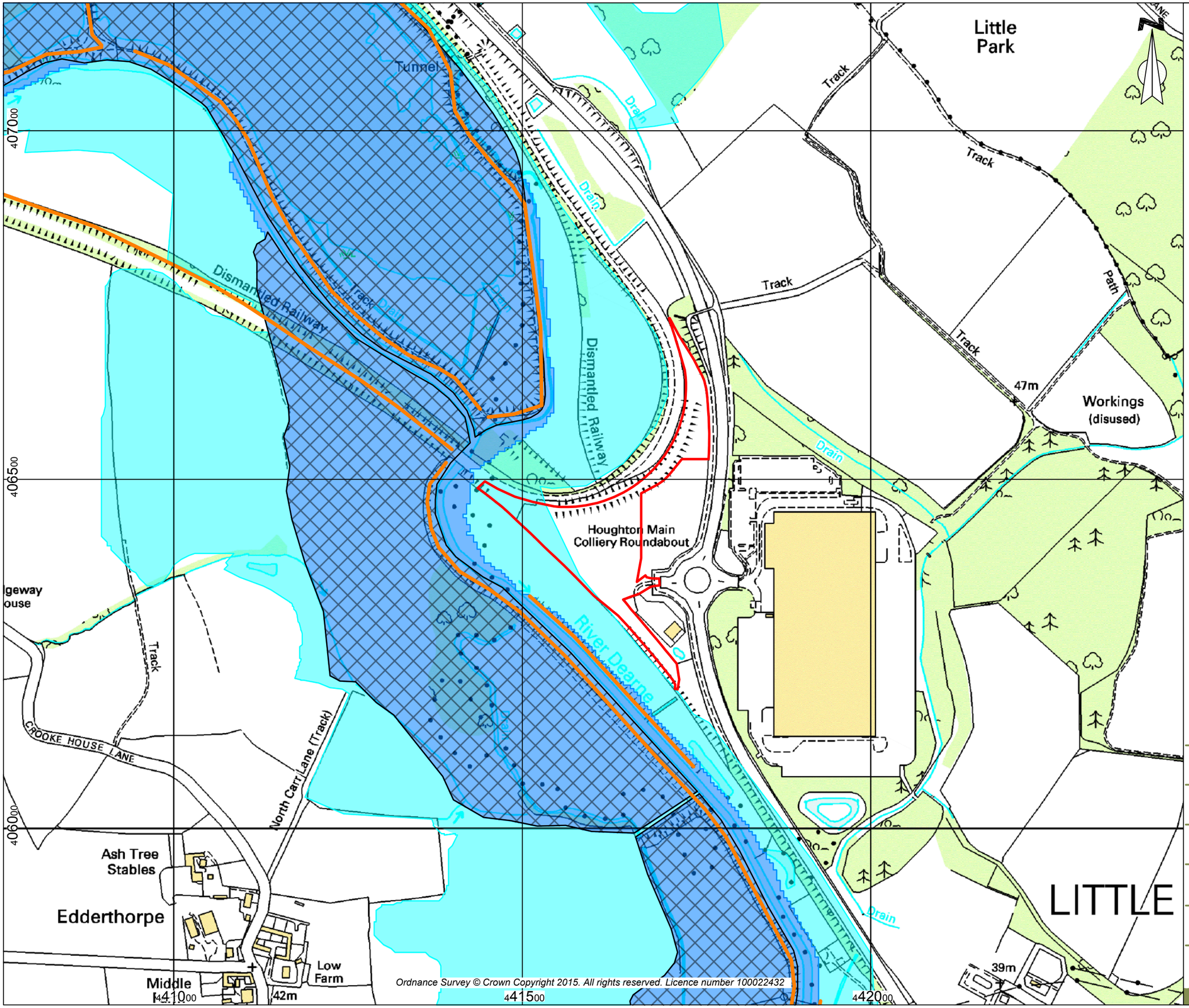
CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: RMS Overland Flow Flooding

FIGURE NO: 4



enzygo environmental consultants
STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.005

DRAWN: MG

CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: Environment Agency Flood Zones

FIGURE NO: 5

Little Park

Tunnel

Drain

Track

Dismantled Railway

Path

47m

Workings (disused)

Houghton Main Colliery Roundabout

River Dearne

39m

LITTLE

Ash Tree Stables

Edderthorpe

Middle

Low Farm

42m

CROOKE HOUSE LANE

North Carr Lane (Track)

4070$_{00}$

4065$_{00}$

4060$_{00}$

4410$_{00}$

4415$_{00}$

4420$_{00}$

Key

Site Boundary

Geological Indicators of Flooding

enzygo
environmental consultants
STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.006

DRAWN: MG

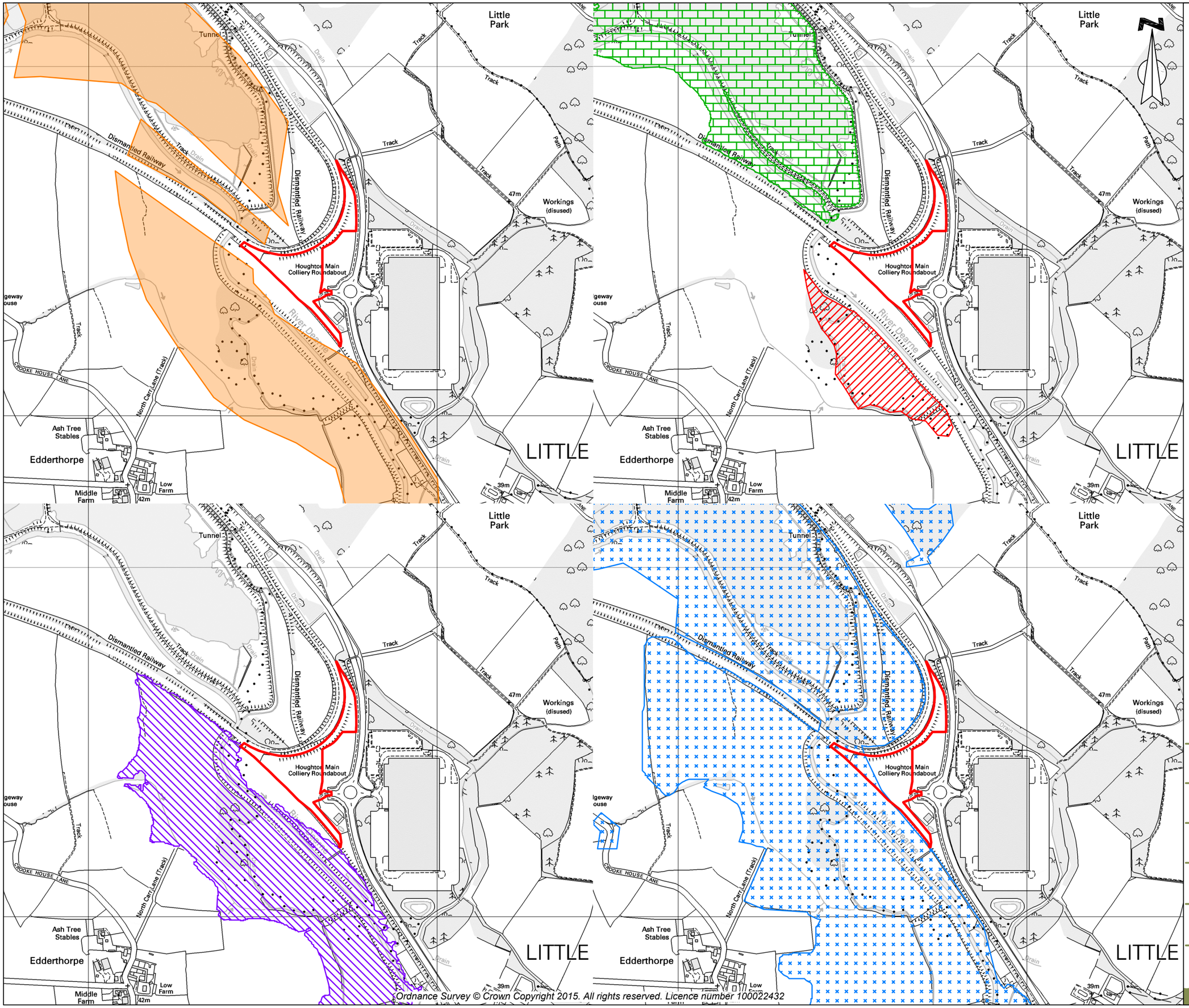
CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: Geological Indicators of Flooding (based on geological deposits)

FIGURE NO: 6



enzygo environmental consultants
STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

CLIENT: Peel Environmental Ltd

SCALE: 1:5,000@A3

PROJECT REF: CRM.066.004.D.007

DRAWN: MG

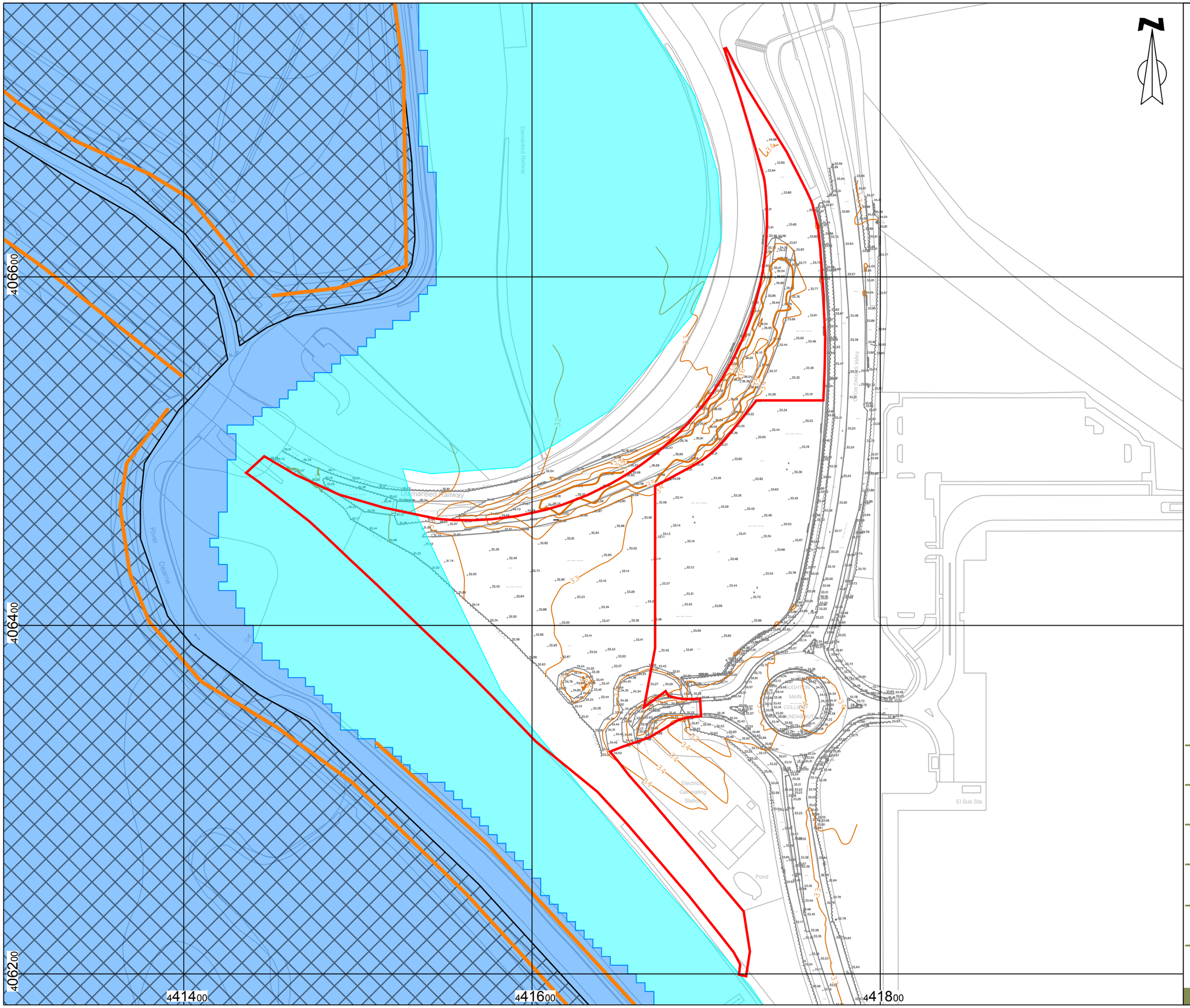
CHECKED: SD

DATE: Jan 2015

PROJECT: Houghton Main

TITLE: Historic Flood Events

FIGURE NO: 7


406600
406400
406200
414400
416400
418400
Dismantled Railway
River Deame
Dike
Electricity Generating Station
Pond
El Sub Sta
PARK SPRING CLOSE
HOUGHTON MAIN
COLLIERY
ROUNDABOUT
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3.9
3.92
3.94
3.96
3.98
4
4.02
4.04
4.06
4.08
4.1
4.12
4.14

Key

Site Boundary

Existing Development - Total Site area is 3.00ha

Permeable Area
99% of the site is permeable measuring 2.97ha

Impermeable Area
1% of the site is impermeable measuring 0.03ha

Dismantled Railway

River Dearne

Dyr

PARK SPRING ROAD

HOUGHTON MAIN COLLIERY ROUNDABOUT

Electricity Generating Station

El Sub Sta

Pond

EXISTING DEVELOPMENT

Key

Site Boundary

Proposed Development - Total Site area is 3.00ha

Permeable Area
49% of the site is permeable measuring 1.46ha

Impermeable Area
51% of the site is impermeable measuring 1.54ha

Dismantled Railway

River Dearne

Dyr

PARK SPRING ROAD

HOUGHTON MAIN COLLIERY ROUNDABOUT

Electricity Generating Station

El Sub Sta

Pond

PROPOSED DEVELOPMENT

enzygo
environmental consultants

STEP Business Centre, Wortley Rd, Sheffield, S36 2UH

SCALE	PROJECT NO.	PROJECT
1:2,500@A3	CRM.066.004.D.009	Houghton Main
DATE	DRAWING NO.	DRAWING TITLE
Jan 2015	9	Permeable and Impermeable Areas
DRAWN	CHECKED	CLIENT
MG	SD	Peel Environmental Ltd

APPENDICES

Appendix 1 – Proposed Site Layout